
Graylog Documentation

Release 4.0.0

Graylog, Inc.

Oct 26, 2021

GRAYLOG

1	Architectural considerations	3
1.1	Minimum setup	3
1.2	Bigger production setup	4
1.3	Graylog Architecture Deep Dive	5
2	Getting Started	7
2.1	Planning Your Log Collection	7
2.1.1	Strategies	7
2.1.2	Use Cases	8
2.1.3	Event Log Sources	8
2.1.4	Collection method	9
2.1.5	Users	10
2.1.6	Retention	11
2.2	Download & Install Graylog	11
2.2.1	Operating System Packages	11
2.2.2	Configuration Management	12
2.2.3	Containers	12
2.2.4	Virtual Appliances	12
2.3	Initial Configuration	13
2.3.1	server.conf	13
2.3.2	elasticsearch.yml	15
2.4	Connect to the Web Console	16
2.5	Explore Graylog	18
2.5.1	Streams	18
2.5.2	Searches	19
2.5.3	Dashboards	19
2.5.4	Alerts	19
2.5.5	System	19
2.6	Collect Messages	21
2.6.1	Content packs	22
2.6.2	Create an Input	22
2.6.3	Verify Messages Are Being Collected	22
3	Installing Graylog	27
3.1	Virtual Machine Appliances	27
3.1.1	Pre-Considerations	27
3.1.2	Download	27
3.1.3	Run the image	27
3.1.4	Logging in	30
3.1.5	Configuration	31

3.1.6	VMWare ESXi	31
3.1.7	Update OVA to latest Version	31
3.1.8	Production readiness	31
3.2	Operating System Packages	31
3.2.1	Prerequisites	32
3.2.2	Step by Step Guides	32
3.2.3	DEB / APT	32
3.2.4	RPM / YUM / DNF	33
3.2.5	Step-by-step guides	35
3.2.6	Feedback	45
3.3	Chef, Puppet, Ansible	46
3.4	Docker	46
3.4.1	Requirements	46
3.4.2	Quick start	46
3.4.3	Configuration	53
3.4.4	Persisting data	55
3.4.5	Plugins	56
3.4.6	Kubernetes automatic master selection	57
3.4.7	Nomad automatic master selection	58
3.4.8	Troubleshooting	58
3.4.9	Testing a beta version	58
3.5	Amazon Web Services	58
3.5.1	AMIs	58
3.5.2	Usage	59
3.5.3	Networking	59
3.5.4	HTTPS	59
3.5.5	Basic configuration	59
3.5.6	Production readiness	59
3.6	Manual Setup	59
3.6.1	Graylog server on Linux	59
3.7	System requirements	64
4	Upgrading Graylog	65
4.1	Upgrading to Graylog 2.0.x	65
4.1.1	Elasticsearch 2.x	65
4.1.2	MongoDB	67
4.1.3	Log4j 2 migration	67
4.1.4	Dead Letters feature removed	67
4.1.5	Removed configuration settings	67
4.1.6	Changed configuration defaults	68
4.1.7	Changed prefixes for configuration override	69
4.1.8	REST API Changes	69
4.1.9	Web Interface Config Changes	70
4.2	Upgrading to Graylog 2.1.x	70
4.2.1	HTTPS Setup	70
4.2.2	Web Interface Listener	70
4.2.3	Internal Metrics to MongoDB	71
4.2.4	Configuration file changes	71
4.2.5	Graylog REST API	71
4.2.6	For Plugin Authors	72
4.2.7	Changed Elasticsearch Cluster Status Behavior	72
4.2.8	Changes in message field values trimming	73
4.3	Upgrading to Graylog 2.2.x	73
4.3.1	Email Alarm Callback	73

4.3.2	Alert Notifications (previously known as Alarm Callbacks)	73
4.3.3	Default stream/Index Sets	73
4.3.4	RotationStrategy & RetentionStrategy Interfaces	74
4.3.5	Changes in Exposed Configuration	74
4.3.6	Changes in Split & Count Converter	74
4.3.7	Graylog REST API	74
4.4	Upgrading to Graylog 2.3.x	75
4.4.1	Graylog switches to Elasticsearch HTTP client	75
4.4.2	Graylog REST API	76
4.5	Upgrading to Graylog 2.4.x	76
4.5.1	More plugins shipped by default	77
4.6	Upgrading to Graylog 2.5.x	77
4.6.1	Protecting against CSRF, HTTP header required	77
4.6.2	Elasticsearch 6 changes	77
4.7	Upgrading to Graylog 3.0.x	77
4.7.1	Elasticsearch Version Requirements	77
4.7.2	Simplified HTTP interface configuration	78
4.7.3	Plugins merged into the Graylog server	79
4.7.4	New “bin_dir” and “data_dir” configuration parameters	80
4.7.5	Removed support for Drools-based filters	80
4.7.6	Changed metrics name for stream rules	83
4.7.7	Email alarm callback default settings	83
4.7.8	Collector Sidecar is deprecated	83
4.7.9	Legacy Content Packs	83
4.7.10	Elasticsearch 6 changes	84
4.8	Upgrading to Graylog 3.1.x	84
4.8.1	Views & Extended Search	84
4.8.2	Alerts	85
4.9	Upgrading to Graylog 3.2.x	87
4.9.1	Migrating Dashboards	87
4.9.2	Changed Default TLS Protocols	87
4.9.3	Indexing Requests use HTTP Expect: 100-Continue Header	88
4.9.4	Accounted Message Size Field	88
4.9.5	Known Bugs and Limitations	88
4.10	Upgrading to Graylog 3.3.x	89
4.10.1	[BREAKING] Fixing certificate validation for LDAP servers used for authentication	89
4.10.2	Deprecating legacy Aggregation API endpoints	90
4.10.3	API Access Token Encryption	90
4.10.4	Dashboards API	90
4.10.5	Saved Searches API	91
4.10.6	CSV Export API	91
4.10.7	Enterprise Audit Log	91
4.10.8	Notes for plugin authors	91
4.11	Upgrading to Graylog 4.0.x	91
4.11.1	Breaking Changes	92
4.11.2	API Endpoint Deprecations	94
4.11.3	API Endpoint Removals	95
4.12	Upgrading Graylog Originally Installed from Image	95
4.13	Upgrading Graylog Originally Installed from Package	96
4.14	Upgrading Elasticsearch	96
4.14.1	Elasticsearch Reindexing Notes	96
4.14.2	Elasticsearch 6 Upgrade Notes	101
4.14.3	Elasticsearch 7 Upgrade Notes	102
4.14.4	Elasticsearch Rolling Upgrade Notes	103

5	Configuring Graylog	105
5.1	server.conf	105
5.1.1	Properties	106
5.2	Web interface	119
5.2.1	Overview	119
5.2.2	Configuration Options	119
5.2.3	How does the web interface connect to the Graylog server?	120
5.2.4	Browser Compatibility	120
5.2.5	Making the web interface work with load balancers/proxies	120
5.3	Load balancer integration	124
5.3.1	Load balancer state	124
5.3.2	Graceful shutdown	125
5.3.3	Web Interface	125
5.4	Using HTTPS	125
5.4.1	Things to consider	126
5.4.2	Certificate/Key file format	126
5.4.3	Creating a self-signed private key/certificate	126
5.4.4	Converting a PKCS #12 (PFX) file to private key and certificate pair	127
5.4.5	Converting an existing Java Keystore to private key/certificate pair	127
5.4.6	Sample files	129
5.4.7	Adding a self-signed certificate to the JVM trust store	130
5.5	Multi-node Setup	131
5.5.1	Prerequisites	132
5.5.2	MongoDB replica set	132
5.5.3	Elasticsearch cluster	132
5.5.4	Graylog Multi-node	133
5.5.5	Scaling	133
5.5.6	Troubleshooting	134
5.6	Elasticsearch	134
5.6.1	Elasticsearch versions	134
5.6.2	Configuration	135
5.6.3	Avoiding split-brain and shard shuffling	138
5.6.4	Custom index mappings	140
5.6.5	Cluster Status explained	147
5.7	Index model	148
5.7.1	Overview	148
5.7.2	Index Set Configuration	152
5.7.3	Maintenance	153
5.8	Backup	155
5.8.1	Disaster recovery	155
5.9	Default file locations	155
5.9.1	DEB package	156
5.9.2	RPM package	156
5.10	Graylog REST API	157
5.10.1	Using the API browser	158
5.10.2	Interacting with the Graylog REST API	160
6	Securing Graylog	165
6.1	Default ports	165
6.2	Configuring TLS ciphers	165
6.3	Security related topics	166
6.3.1	Generating Graylog certificates and keys with Microsoft AD CS	166
6.3.2	Secured Graylog and Beats input	171
6.3.3	Logging user activity	173

6.3.4	Using ModSecurity	174
6.3.5	The URL Whitelist	176
7	Sending in log data	179
7.1	What are Graylog message inputs?	179
7.2	Log sources	179
7.2.1	Ingest syslog	180
7.2.2	Ingest journald	182
7.2.3	Ingest Windows eventlog	184
7.2.4	Ingest CEF	186
7.2.5	Ingest Raw/Plaintext	186
7.2.6	Ingest GELF	186
7.2.7	Ingest from files	187
7.2.8	Ingest JSON path from HTTP API	188
7.2.9	Ingest Application Data	189
7.3	Individual Inputs	190
7.3.1	Beats	190
7.3.2	AWS Kinesis/CloudWatch Input	190
7.3.3	IPFIX Input	196
7.3.4	Okta Log Events Input	199
7.3.5	Palo Alto Networks Input	201
7.4	Using Apache Kafka as transport queue	205
7.5	Using RabbitMQ (AMQP) as transport queue	205
7.6	Input Throttling	205
7.6.1	Graylog Inputs that support throttling	205
7.6.2	Enabling throttling	206
7.6.3	Throttling criteria	206
8	Graylog Sidecar	207
8.1	Installation	208
8.1.1	Install the Sidecar	208
8.1.2	Install collectors	209
8.2	Sidecar Configuration	210
8.2.1	sidecar.yml Reference	211
8.2.2	First start	211
8.2.3	Mode of Operation	212
8.2.4	Sidecar Status	212
8.3	Step-by-step guide	212
8.4	Creating a new Log Collector	216
8.5	Using Configuration Variables	218
8.5.1	Runtime Variables	220
8.6	Secure Sidecar Communication	220
8.6.1	Certificate based client authentication	221
8.7	Run Sidecar as non-root user	221
8.8	Upgrading from the Collector Sidecar	222
8.8.1	1. Install New Sidecar	222
8.8.2	2. Migrate configuration	222
8.8.3	3. Adopt configuration to Graylog 3.0	222
8.8.4	4. Switch over to the new Sidecar	223
8.8.5	Sidecar Configuration Migrator	223
8.9	Sidecar Glossary	225
8.9.1	Configuration	225
8.9.2	Inputs	225
8.10	Debug	225

8.11	Uninstall	226
8.12	Known Problems	226
9	Searching	227
9.1	Search query language	228
9.1.1	Syntax	228
9.1.2	Escaping	230
9.2	Time frame selector	230
9.2.1	Relative time frame selector	231
9.2.2	Absolute time frame selector	231
9.2.3	Keyword time frame selector	231
9.3	Saved Searches	232
9.4	Widgets	233
9.4.1	Creating a widget	234
9.4.2	Aggregation	236
9.4.3	Message Table	238
9.4.4	Repositioning and Resizing	241
9.5	Decorators	241
9.5.1	List active decorators	244
9.5.2	Syslog severity mapper	246
9.5.3	Format string	246
9.5.4	Pipeline Decorator	246
9.5.5	Further functionality	247
9.6	Parameters	247
9.6.1	Declaring a parameter	248
9.6.2	Default values	250
9.7	Export results as CSV	250
9.7.1	Exporting Message Tables on a Dashboard	252
9.7.2	Decorator Support	253
9.7.3	Exporting the full message	253
9.7.4	Troubleshooting	253
9.8	Search result highlighting	253
9.8.1	Enabling/Disabling search result highlighting	254
9.9	Search configuration	254
9.9.1	Query time range limit	255
9.9.2	Relative time ranges	256
10	Streams	257
10.1	What are streams?	257
10.1.1	What's the difference to saved searches?	258
10.2	How do I create a stream?	258
10.3	Index Sets	258
10.3.1	Storage requirements	260
10.4	Outputs	260
10.5	Use cases	260
10.6	How are streams processed internally?	260
10.7	Stream Processing Runtime Limits	261
10.7.1	How to configure the timeout values if the defaults do not match	262
10.7.2	What could cause it?	262
10.7.3	Summary: How do I solve it?	262
10.8	Programmatic access via the REST API	263
10.8.1	Checking for currently active alert/triggered conditions	263
10.8.2	List of already triggered stream alerts	264
10.9	FAQs	264

10.9.1	Using regular expressions for stream matching	264
10.9.2	Can I add messages to a stream after they were processed and stored?	265
10.9.3	Can I write own outputs, alert conditions or notifications?	265
11	Alerts	267
11.1	Alerts & Events	267
11.1.1	Alerting by Example	267
11.2	Defining an Event	274
11.2.1	Priority	274
11.3	Filter	274
11.3.1	Filter with dynamic lists (Enterprise feature)	275
11.4	Aggregation	275
11.5	Fields	276
11.6	Notifications	276
11.6.1	Data available to notifications	276
11.6.2	Email alert notification	278
11.6.3	HTTP alert notification	280
11.6.4	PagerDuty alert notification	281
11.6.5	Slack alert notification	282
11.6.6	Script alert notification [Enterprise]	284
11.6.7	Legacy Script alert callback	286
11.7	Event Summary	287
12	Dashboards	289
12.1	Why dashboards matter	289
12.2	How to use dashboards	290
12.2.1	Creating an empty dashboard	290
12.2.2	Adding and configuring widgets	291
12.3	Widget specific search criteria	291
12.4	Examples	292
12.5	Result	293
12.6	Export a search as a dashboard	293
12.7	Widget cache times	293
12.8	Dashboard permissions	294
12.8.1	That's it!	294
13	Extractors	295
13.1	The problem explained	295
13.2	Graylog extractors explained	295
13.3	Import extractors	297
13.4	Using regular expressions to extract data	299
13.5	Using Grok patterns to extract data	299
13.6	Using the JSON extractor	301
13.7	Automatically extract all key=value pairs	301
13.8	Normalization	303
13.8.1	The standard date converter	303
13.8.2	The flexible date converter	306
14	Processing Pipelines	307
14.1	Pipelines	307
14.1.1	Overview	307
14.1.2	Pipeline structure	307
14.2	Rules	308
14.2.1	Overview	308
14.2.2	Rule Structure	309

14.2.3	Data Types	310
14.2.4	Conditions	310
14.2.5	Actions	310
14.3	Stream connections	311
14.3.1	Overview	311
14.3.2	The All messages stream	311
14.3.3	The importance of message processor ordering	311
14.4	Functions	312
14.4.1	Overview	312
14.4.2	Function Index	313
14.5	Usage	335
14.5.1	Overview	335
14.5.2	Configuration	335
14.5.3	Manage rules	336
14.5.4	Managing pipelines	337
14.5.5	Connect pipelines to streams	338
14.5.6	Simulate your changes	339
15	Lookup Tables	341
15.1	Components	341
15.1.1	Data Adapters	341
15.1.2	Caches	341
15.1.3	Lookup Tables	342
15.1.4	Lookup Results	342
15.2	Setup	343
15.2.1	Create Data Adapter	343
15.2.2	Create Cache	344
15.2.3	Create Lookup Table	345
15.3	Usage	346
15.3.1	Extractors	346
15.3.2	Converters	346
15.3.3	Decorators	347
15.3.4	Pipeline Rules	348
15.4	Built-in Data Adapters	348
15.4.1	CSV File Adapter	348
15.4.2	DNS Lookup Adapter	348
15.4.3	DSV File from HTTP Adapter	349
15.4.4	HTTP JSONPath Adapter	349
15.4.5	Geo IP - MaxMind Databases	349
15.5	Enterprise Data Adapters	349
15.6	MongoDB	349
15.6.1	Alter from HTTP Rest API	349
15.6.2	Alter from Pipeline Function	350
15.6.3	Alter from GUI	350
16	Geolocation	351
16.1	Setup	351
16.1.1	Download the database	351
16.1.2	Configure Lookup Table	352
16.1.3	Use the Lookup Table	352
16.2	Visualize geolocations in a map	352
16.2.1	Display a map in the search results page	352
16.2.2	Add map to a dashboard	353
16.3	FAQs	355

16.3.1	Will Graylog extract IPs from all fields?	355
16.3.2	What geo-information is extracted from IPs?	356
16.3.3	Where is the extracted geo-information stored?	356
16.3.4	Which geo-points format does Graylog use to store coordinates?	356
16.3.5	I have a field in my messages with coordinates information already, can I use it in Graylog?	356
16.3.6	Not all fields containing IP addresses are resolved. Why does this happen?	356
17	Indexer failures	357
17.1	Common indexer failure reasons	357
17.1.1	MapperParsingException	358
18	Permission Management	359
18.1	Authentication	360
18.2	Users	361
18.3	Roles	362
18.3.1	Providing Dashboard Creation Access	364
18.4	Teams	366
18.4.1	AD/LDAP Synchronization with Teams	367
18.5	Sharing	367
18.5.1	Sharing Streams and Dashboards with Teams	368
18.5.2	Sharing within Teams	368
18.5.3	Sharing Dashboards within Teams	371
19	Plugins	375
19.1	About Plugins	375
19.2	Plugin Types	375
19.2.1	API concepts	375
19.2.2	Event Notifications	377
19.2.3	Decorators	380
19.3	Writing Plugins	381
19.3.1	Sample Plugin	382
19.3.2	Creating a plugin skeleton	382
19.3.3	The anatomy of a plugin	383
19.3.4	Required conventions for web plugins	385
19.3.5	Best practices for web plugin development	385
19.3.6	Building plugins	386
19.4	Installing and loading plugins	386
20	Content Packs	387
20.1	What are content packs?	387
20.1.1	Parameter	387
20.2	How do I create a Content Pack?	387
20.3	Upload a content pack	389
20.4	Installing a content pack	389
20.5	Uninstalling a content pack	389
21	Graylog Marketplace	391
21.1	GitHub integration	391
21.2	General best practices	392
21.2.1	README content	392
21.2.2	License	392
21.3	4 Types of Add-Ons	392
21.4	Contributing plug-ins	392
21.5	Contributing content packs	393
21.6	Contributing GELF libraries	393

21.7	Contributing other content	393
22	Frequently asked questions	395
22.1	General	395
22.1.1	Do I need to buy a license to use Graylog?	395
22.1.2	How long do you support older versions of the Graylog product?	395
22.2	Architecture	395
22.2.1	What is MongoDB used for?	395
22.2.2	Can you guide me on how to replicate MongoDB for High Availability?	395
22.2.3	I have datacenters across the world and do not want logs forwarding from everywhere to a central location due to bandwidth, etc. How do I handle this?	396
22.2.4	Which load balancers do you recommend we use with Graylog?	396
22.2.5	Isn't Java slow? Does it need a lot of memory?	396
22.2.6	Does Graylog encrypt log data?	396
22.2.7	Where are the log files Graylog produces?	396
22.3	Installation / Setup	396
22.3.1	Should I download the OVA appliances or the separate packages?	396
22.3.2	How do I find out if a specific log source is supported?	397
22.3.3	Can I install the Graylog Server on Windows?	397
22.3.4	Can I run Graylog on Azure?	397
22.4	Functionality	397
22.4.1	Can Graylog automatically clean old data?	397
22.4.2	Does Graylog support LDAP / Active Directory and its groups?	397
22.4.3	Do we have a user audit log for compliance?	397
22.4.4	Does Graylog have reporting functionality?	398
22.4.5	Can I filter inbound messages before they are processed by the Graylog server?	398
22.4.6	Dedicated Partition for the Journal	398
22.4.7	Raise the Java Heap	398
22.4.8	How can I start an input on a port below 1024?	398
22.5	Graylog & Integrations	398
22.5.1	What is the best way to integrate my applications to Graylog?	398
22.5.2	I have a log source that creates dynamic syslog messages based on events and subtypes and grok patterns are difficult to use - what is the best way to handle this?	399
22.5.3	I want to archive my log data. Can I write to another database, for example HDFS / Hadoop, from Graylog?	399
22.5.4	I don't want to use Elasticsearch as my backend storage system – can I use another database, like MySQL, Oracle, etc?	399
22.5.5	How can I create a restricted user to check internal Graylog metrics in my monitoring system?	399
22.6	Troubleshooting	400
22.6.1	I'm sending in messages, and I can see they are being accepted by Graylog, but I can't see them in the search. What is going wrong?	400
22.6.2	I have configured an SMTP server or an output with TLS connection and receive handshake errors. What should I do?	400
22.6.3	Suddenly parts of Graylog did not work as expected	400
22.6.4	I cannot go past page 66 in search results	400
22.6.5	My field names contain dots and stream alerts do not match anymore	401
22.6.6	What does "Uncommitted messages deleted from journal" mean?	401
22.6.7	What does "Journal utilization is too high" mean?	401
22.6.8	How do I fix the "Deflector exists as an index and is not an alias" error message?	401
22.6.9	How do I enable debug logging for a specific plugin or area of Graylog?	402
22.6.10	Have another troubleshooting question?	402
22.7	Support	403
22.7.1	I think I've found a bug, how do I report it?	403
22.7.2	I'm having issues installing or configuring Graylog, where can I go for support?	403

23	The thinking behind the Graylog architecture and why it matters to you	405
23.1	A short history of Graylog	405
23.2	The log management market today	405
23.2.1	Architectural considerations	405
23.2.2	Blackboxes	407
23.3	The future	407
24	Changelog	409
24.1	Graylog 4.0.13	409
24.1.1	Core	409
24.2	Graylog 4.0.12	409
24.3	Graylog 4.0.11	409
24.3.1	Core	409
24.4	Graylog 4.0.10	410
24.4.1	Core	410
24.5	Graylog 4.0.9	410
24.5.1	Core	410
24.6	Graylog 4.0.8	410
24.6.1	Core	411
24.6.2	Integrations Plugin	411
24.7	Graylog 4.0.7	411
24.7.1	Core	411
24.8	Graylog 4.0.6	411
24.8.1	Core	411
24.9	Graylog 4.0.5	412
24.9.1	Core	412
24.10	Graylog 4.0.4	412
24.10.1	Core	412
24.10.2	Integrations Plugin	412
24.11	Graylog 4.0.3	412
24.11.1	Core	412
24.11.2	Integrations Plugin	413
24.12	Graylog 4.0.2	413
24.12.1	Core	413
24.12.2	Legacy Collector Plugin	414
24.12.3	Threatintel Plugin	414
24.13	Graylog 4.0.1	414
24.13.1	Core	414
24.13.2	Integrations Plugin	414
24.13.3	Threatintel Plugin	415
24.14	Graylog 4.0.0	415
24.14.1	Core	415
24.14.2	Integrations Plugin	417
24.15	Graylog 3.3.14	417
24.15.1	Core	417
24.16	Graylog 3.3.13	418
24.17	Graylog 3.3.12	418
24.17.1	Core	418
24.18	Graylog 3.3.11	418
24.18.1	Core	418
24.19	Graylog 3.3.10	418
24.19.1	Core	419
24.20	Graylog 3.3.9	419
24.20.1	Core	419

24.21	Graylog 3.3.8	419
24.22	Graylog 3.3.7	419
24.22.1	Core	419
24.23	Graylog 3.3.6	420
24.23.1	Core	420
24.23.2	Legacy AWS Plugin	420
24.23.3	Integrations Plugin	420
24.24	Graylog 3.3.5	421
24.25	Graylog 3.3.4	421
24.26	Graylog 3.3.3	421
24.26.1	Core	421
24.27	Graylog 3.3.2	422
24.27.1	Core	422
24.27.2	Integrations Plugin	422
24.28	Graylog 3.3.1	422
24.28.1	Core	422
24.29	Graylog 3.3.0	423
24.29.1	Core	423
24.30	Graylog 3.2.6	425
24.30.1	Core	425
24.31	Graylog 3.2.5	425
24.31.1	Core	425
24.31.2	AWS Plugin (legacy)	426
24.32	Graylog 3.2.4	426
24.32.1	Core	426
24.33	Graylog 3.2.3	426
24.33.1	Core	426
24.34	Graylog 3.2.2	427
24.34.1	Core	427
24.34.2	Integrations Plugin	428
24.35	Graylog 3.2.1	428
24.35.1	Core	428
24.36	Graylog 3.2.0	428
24.36.1	Core	429
24.36.2	Integrations Plugin	431
24.37	Graylog 3.1.4	431
24.37.1	Core	431
24.37.2	Integrations Plugin	432
24.38	Graylog 3.1.3	432
24.38.1	Core	432
24.38.2	Integrations Plugin	433
24.39	Graylog 3.1.2	433
24.39.1	Core	433
24.40	Graylog 3.1.1	433
24.40.1	Core	434
24.40.2	Integrations Plugin	434
24.41	Graylog 3.1.0	434
24.41.1	Views & Extended Search	434
24.41.2	Core	434
24.42	Graylog 3.0.2	437
24.43	Graylog 3.0.1	437
24.44	Graylog 3.0.0	437
24.45	Graylog 2.5.2	438
24.46	Graylog 2.5.1	438

24.47 Graylog 2.5.0	438
24.48 Graylog 2.4.7	439
24.49 Graylog 2.4.6	439
24.50 Graylog 2.4.5	440
24.51 Graylog 2.4.4	440
24.52 Graylog 2.4.3	441
24.53 Graylog 2.4.2	441
24.54 Graylog 2.4.1	441
24.55 Graylog 2.4.0	442
24.56 Graylog 2.4.0-rc.2	442
24.57 Graylog 2.4.0-rc.1	442
24.58 Graylog 2.4.0-beta.4	443
24.59 Graylog 2.4.0-beta.3	443
24.60 Graylog 2.4.0-beta.2	444
24.61 Graylog 2.4.0-beta.1	444
24.62 Graylog 2.3.2	447
24.63 Graylog 2.3.1	447
24.64 Graylog 2.3.0	448
24.65 Graylog 2.2.3	452
24.66 Graylog 2.2.2	453
24.67 Graylog 2.2.1	453
24.68 Graylog 2.2.0	454
24.69 Graylog 2.1.3	457
24.70 Graylog 2.1.2	458
24.71 Graylog 2.1.1	459
24.72 Graylog 2.1.0	460
24.73 Graylog 2.0.3	467
24.74 Graylog 2.0.2	467
24.75 Graylog 2.0.1	468
24.76 Graylog 2.0.0	469
24.77 Graylog 1.3.4	473
24.78 Graylog 1.3.3	473
24.79 Graylog 1.3.2	474
24.80 Graylog 1.3.1	474
24.81 Graylog 1.3.0	474
24.82 Graylog 1.2.2	475
24.83 Graylog 1.2.1	476
24.84 Graylog 1.2.0	476
24.85 Graylog 1.2.0-rc.4	476
24.86 Graylog 1.2.0-rc.2	477
24.87 Graylog 1.1.6	478
24.88 Graylog 1.1.5	478
24.89 Graylog 1.1.4	479
24.90 Graylog 1.1.3	479
24.91 Graylog 1.1.2	479
24.92 Graylog 1.1.1	480
24.93 Graylog 1.1.0	481
24.94 Graylog 1.1.0-rc.3	481
24.95 Graylog 1.1.0-rc.1	482
24.96 Graylog 1.1.0-beta.3	482
24.97 Graylog 1.1.0-beta.2	483
24.98 Graylog 1.0.2	484
24.99 Graylog 1.0.1	484
24.100 Graylog 1.0.0	485

24.101	Graylog 1.0.0-rc.4	486
24.102	Graylog 1.0.0-rc.3	486
24.103	Graylog 1.0.0-rc.2	486
24.104	Graylog 1.0.0-rc.1	487
24.105	Graylog 1.0.0-beta.2	488
24.106	Graylog 1.0.0-beta.2	489
24.107	Graylog2 0.92.4	490
24.108	Graylog 1.0.0-beta.1	490
24.109	Graylog2 0.92.3	490
24.110	Graylog2 0.92.1	491
24.111	Graylog2 0.92.0	491
24.112	Graylog2 0.92.0-rc.1	492
24.113	Graylog2 0.91.3	492
24.114	Graylog2 0.91.3	492
24.115	Graylog2 0.92.0-beta.1	493
24.116	Graylog2 0.91.1	493
24.117	Graylog2 0.90.1	494
24.118	Graylog2 0.91.0-rc.1	494
24.119	Graylog2 0.90.0	494
24.120	Graylog2 0.20.3	495
24.121	Graylog2 0.20.2	495
25	Introduction	497
26	Setup	499
26.1	Requirements	499
26.2	Installation	499
26.2.1	DEB / APT	499
26.2.2	RPM / YUM / DNF	500
26.2.3	Edit the Configuration File	500
26.2.4	Starting Graylog	500
26.3	Cluster Setup	501
26.4	Update Graylog Enterprise	501
26.4.1	Update Enterprise	501
26.4.2	Graylog OSS to Graylog Enterprise	501
27	Cloud Forwarder	505
27.1	Introduction	505
27.2	Security	505
27.3	Input Profile	506
27.4	Configuration	506
27.4.1	File	506
27.4.2	Wizard	506
27.5	Operating System Package Configuration	510
27.5.1	Install via DEB	510
27.5.2	RPM Install Instructions	510
27.5.3	Docker Installation	511
27.6	Monitoring Forwarder Activity and Health	511
27.6.1	Forwarder Overview	512
27.6.2	REST API	512
27.7	Resiliency Models	514
27.7.1	Message Recovery	514
27.7.2	Load Balancing Options	514
27.8	Distinguishing Forwarders	514

28 Archiving	515
28.1 Setup	515
28.1.1 Installation	515
28.1.2 Configuration	515
28.2 Usage	521
28.2.1 Creating Archives	521
28.2.2 Restoring Archives	523
28.2.3 Searching in Restored Indices	526
29 Audit Log	527
29.1 Setup	527
29.1.1 Installation	527
29.1.2 Configuration	527
29.2 Usage	531
29.2.1 View Audit Log Entries	532
29.2.2 Expand Event Details	532
29.2.3 Search & Filter	533
29.2.4 Export Entries	534
30 Reporting	537
30.1 Setup	537
30.1.1 Installation	537
30.1.2 Configuration	538
30.2 Usage	539
30.2.1 Creating Reports	539
30.2.2 Configure Reports	541
30.2.3 History	543
30.2.4 Generating Report On Demand	543
31 License	545
31.1 License Installation	545
31.2 License Verification	546
31.2.1 Details on License Verification	546
31.2.2 Details on licensed traffic	547
32 Changelog	549
32.1 Graylog Enterprise 4.0.13	549
32.1.1 Enterprise	549
32.2 Graylog Enterprise 4.0.12	549
32.3 Graylog Enterprise 4.0.11	549
32.3.1 Enterprise	549
32.4 Graylog Enterprise 4.0.10	549
32.4.1 Enterprise	550
32.5 Graylog Enterprise 4.0.9	550
32.6 Graylog Enterprise 4.0.8	550
32.6.1 Enterprise	550
32.7 Graylog Enterprise 4.0.7	550
32.7.1 Enterprise	550
32.8 Graylog Enterprise 4.0.6	551
32.8.1 Enterprise	551
32.8.2 Enterprise Integrations Plugin	551
32.9 Graylog Enterprise 4.0.5	551
32.9.1 Enterprise	551
32.10 Graylog Enterprise 4.0.4	551
32.10.1 Enterprise	551

32.11	Graylog Enterprise 4.0.3	551
32.11.1	Enterprise	552
32.11.2	Enterprise Integrations Plugin	552
32.12	Graylog Enterprise 4.0.2	552
32.12.1	Enterprise	552
32.12.2	Enterprise Integrations Plugin	552
32.13	Graylog Enterprise 4.0.1	552
32.13.1	Enterprise	552
32.13.2	Enterprise Integrations Plugin	553
32.14	Graylog Enterprise 4.0.0	553
32.14.1	Enterprise	553
32.14.2	Enterprise Integrations Plugin	553
32.15	Graylog Enterprise 3.3.14	553
32.15.1	Enterprise	554
32.16	Graylog Enterprise 3.3.13	554
32.16.1	Enterprise	554
32.17	Graylog Enterprise 3.3.12	554
32.18	Graylog Enterprise 3.3.11	554
32.19	Graylog Enterprise 3.3.10	554
32.19.1	Enterprise	555
32.20	Graylog Enterprise 3.3.9	555
32.20.1	Enterprise	555
32.20.2	Enterprise Integrations Plugin	555
32.21	Graylog Enterprise 3.3.8	555
32.21.1	Enterprise Integrations Plugin	555
32.22	Graylog Enterprise 3.3.7	556
32.22.1	Enterprise Integrations Plugin	556
32.23	Graylog Enterprise 3.3.6	556
32.23.1	Enterprise	556
32.23.2	Enterprise Integrations Plugin	556
32.24	Graylog Enterprise 3.3.5	556
32.25	Graylog Enterprise 3.3.4	557
32.26	Graylog Enterprise 3.3.3	557
32.27	Graylog Enterprise 3.3.2	557
32.28	Graylog Enterprise 3.3.1	557
32.29	Graylog Enterprise 3.3.0	557
32.30	Graylog Enterprise 3.2.6	558
32.31	Graylog Enterprise 3.2.5	558
32.32	Graylog Enterprise 3.2.4	558
32.33	Graylog Enterprise 3.2.3	558
32.34	Graylog Enterprise 3.2.2	559
32.35	Graylog Enterprise 3.2.1	559
32.36	Graylog Enterprise 3.2.0	559
32.37	Graylog Enterprise 3.1.4	559
32.38	Graylog Enterprise 3.1.3	560
32.39	Graylog Enterprise 3.1.2	560
32.40	Graylog Enterprise 3.1.1	560
32.41	Graylog Enterprise 3.1.0	560
32.42	Graylog Enterprise 3.0.2	560
32.43	Graylog Enterprise 3.0.1	561
32.44	Graylog Enterprise 3.0.0	561
32.45	Graylog Enterprise 2.5.2	561
32.45.1	Plugin: License	561
32.46	Graylog Enterprise 2.5.1	561

32.47	Graylog Enterprise 2.5.0	562
32.48	Graylog Enterprise 2.4.7	562
32.48.1	Plugin: License	562
32.49	Graylog Enterprise 2.4.6	562
32.50	Graylog Enterprise 2.4.5	562
32.51	Graylog Enterprise 2.4.4	562
32.52	Graylog Enterprise 2.4.3	562
32.53	Graylog Enterprise 2.4.2	563
32.54	Graylog Enterprise 2.4.1	563
32.55	Graylog Enterprise 2.4.0	563
32.56	Graylog Enterprise 2.4.0-rc.2	563
32.57	Graylog Enterprise 2.4.0-rc.1	563
32.58	Graylog Enterprise 2.4.0-beta.4	563
32.58.1	Plugin: License	563
32.59	Graylog Enterprise 2.4.0-beta.3	564
32.60	Graylog Enterprise 2.4.0-beta.2	564
32.61	Graylog Enterprise 2.4.0-beta.1	564
32.61.1	Plugin: Archive	564
32.62	Graylog Enterprise 2.3.2	564
32.62.1	Plugin: Archive	564
32.63	Graylog Enterprise 2.3.1	564
32.63.1	Plugin: Archive	564
32.64	Graylog Enterprise 2.3.0	565
32.64.1	Plugin: Archive	565
32.65	Graylog Enterprise 2.2.3	565
32.65.1	Plugin: Archive	565
32.66	Graylog Enterprise 2.2.2	565
32.66.1	Plugin: Audit Log	565
32.67	Graylog Enterprise 2.2.1	565
32.67.1	Plugin: Archive	565
32.68	Graylog Enterprise 2.2.0	566
32.68.1	Plugin: Archive	566
32.69	Graylog Enterprise 1.2.1	566
32.69.1	Plugin: Archive	566
32.69.2	Plugin: Audit Log	566
32.70	Graylog Enterprise 1.2.0	566
32.70.1	Plugin: Archive	566
32.70.2	Plugin: Audit Log	566
32.71	Graylog Enterprise 1.1	566
32.72	Graylog Enterprise 1.0.1	567
32.72.1	Plugin: Archive	567
32.73	Graylog Enterprise 1.0.0	567
32.73.1	Plugin: Archive	567
33	Graylog Integrations	569
33.1	Integrations Setup	569
33.1.1	Installation	569
33.1.2	Server Restart	571
33.1.3	Installation Success	571
33.2	Open Source	571
33.3	Enterprise	571
33.3.1	Forwarder	572
33.3.2	Enterprise Output Framework	577
33.3.3	Microsoft Office 365 Input	584

34 GELF	587
34.1 Structured events from anywhere. Compressed and chunked.	587
34.2 GELF via UDP	587
34.2.1 Chunking	587
34.2.2 Compression	588
34.3 GELF via TCP	588
34.4 GELF Payload Specification	588
34.5 Example payload	589
34.5.1 Sending GELF messages via UDP using netcat	590
34.5.2 Sending GELF messages via TCP using netcat	590
34.5.3 Sending GELF messages via HTTP using curl	590

NOTE: There are multiple options for reading this documentation. See [link](#) to the lower left.

ARCHITECTURAL CONSIDERATIONS

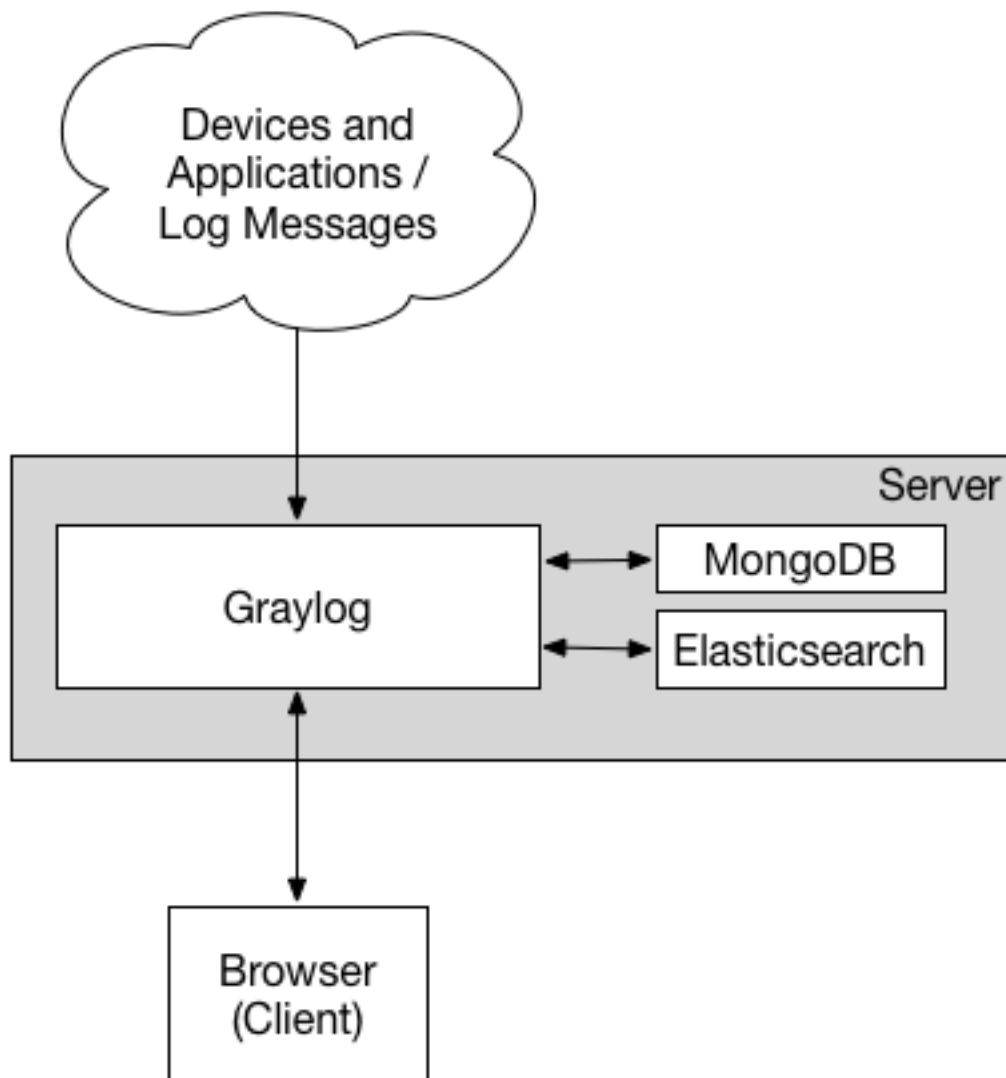
There are a few rules of thumb when scaling resources for Graylog:

- Graylog nodes should have a focus on CPU power. These also serve the user interface to the browser.
- Elasticsearch nodes should have as much RAM as possible and the fastest disks you can get. Everything depends on I/O speed here.
- MongoDB is storing meta information and configuration data and doesn't need many resources.

Also keep in mind that ingested messages are **only** stored in Elasticsearch. If you have data loss in the Elasticsearch cluster, the messages are gone - except if you have created backups of the indices.

1.1 Minimum setup

This is a minimum Graylog setup that can be used for smaller, non-critical, or test setups. None of the components are redundant, and they are easy and quick to setup.

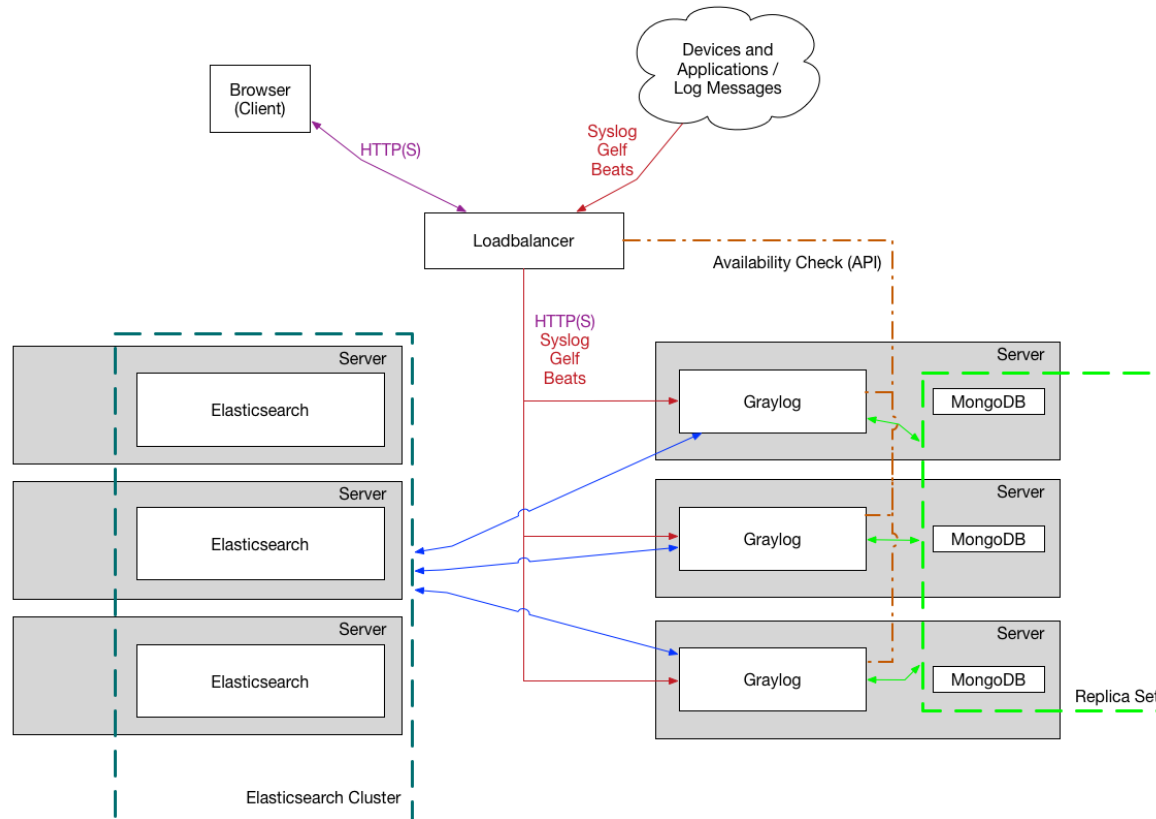


Our *Virtual Machine Appliances* are using this design by default, deploying nginx as *frontend proxy*.

1.2 Bigger production setup

This is a setup for bigger production environments. It has several Graylog nodes behind a load balancer distributing the processing load.

The load balancer can ping the Graylog nodes via HTTP on the Graylog REST API to check if they are alive and take dead nodes out of the cluster.



How to plan and configure such a setup is covered in our [Multi-node Setup guide](#).

Some guides on the [Graylog Marketplace](#) also offer some ideas how you can use [RabbitMQ \(AMQP\)](#) or [Apache Kafka](#) to add some queuing to your setup.

1.3 Graylog Architecture Deep Dive

If you are really interested in the Graylog architecture at a more detailed level - whether you want to understand more for planning your architecture design, performance tuning, or just because you love stuff like that, our cheeky engineering team has put together this [deep architecture guide](#). It's not for the faint at heart, but we hope you love it.

GETTING STARTED

This guide is designed for first time users and is intended to give enough key information to get Graylog installed and configured initially. Each section links to additional details on the topic.

Graylog is a very flexible solution. It can be deployed in many different ways. For those who would like to do an initial lab evaluation of Graylog, we recommend starting with the virtual machine appliances.

Virtual Appliances are the fastest way to get started. However, since the Virtual Appliances are generally not suitable for use in production, **they should be used strictly for proof of concept, evaluations or lab environments**. Users should plan to pick one of the other, more flexible installation methods for a production deployment.

If you need assistance planning and building your logging environment [we offer professional support](#) that can work with you.

2.1 Planning Your Log Collection

We know you are eager to get Graylog installed and working, but we ask that you take a few moments to review this section and plan your deployment appropriately. Proper planning will make the difference between a useful solution that meets a variety of stakeholder needs and a complicated mess that drains resources and provides little value. There are many factors you must consider when designing a log management solution.

2.1.1 Strategies

Even in a small organization, modern environments produce a lot of log data. Not long ago, 500 MB per day was considered a normal volume of logs for a small shop. Today, 5GB per day is not unusual for a small environment. A large environment can produce a thousand times more than that.

Assuming an average event size of 500k, 5GB per day equates to 125 log events every second, some 10.8 million events per day. With that much information being generated, you will need a strategy to manage it effectively. There are two major approaches.

Minimalist

“Doing the needful”

The Minimalist Strategy proceeds from a “Default No” position when deciding which events to collect. What that means is you don’t collect any log unless it is required for an identified business use case. This strategy has some advantages, it keeps licensing and storage costs down, by reducing the volume of collected events. It also minimizes the “noise” produced by extraneous events, allowing analysts to focus on events that have maximum value. Finally, it improves system and query efficiency, improving performance overall.

Maximalist

“Collect it all, let Graylog sort it out.”

The Maximalist strategy is to collect all events that are produced by any source. The thinking goes, all log data is potentially valuable, especially for forensics. Collecting it all and keeping it forever guarantees you will have it if you need it. However, this strategy is often not practical, due to budgetary or other constraints. The cost of this strategy can be prohibitive, since many more technical and human resources must be devoted to collection, processing and storage of event data. There is a performance penalty associated with keeping extremely large data sets online that must be considered as well.

2.1.2 Use Cases

“What do you want to do with event data?”

Use cases should inform most decisions during the planning phase. Some of these decisions include determining the event sources from which you must collect, how you will collect from these sources, how much of each event type to store, how events should be enriched and how long to retain the data.

Use case, broadly defined, means the technical steps necessary to achieve a technical and/or business outcome. An easier way to think about it is that a use case is a description of what you want to do with an event log once you’ve collected it. Use cases are often categorized to group like activities. Some common use case categories are Security, Operations, and DevOps. An example of a Security use case might be monitoring user logins to critical resources. An operations use case might monitor network or hardware performance, while DevOps use cases would focus on real-time application layer monitoring or troubleshooting.

2.1.3 Event Log Sources

“What logs do you need to collect?”

In an environment where seemingly everything generates event logs, it can be difficult to know what to collect. In most cases, selection of event sources should be driven by the use cases you have identified. For example, if the use case is monitoring of user logins to critical resources, the event sources selected should be only those of the critical resources in question. Perhaps the LDAP directory server, Local servers, firewalls, network devices, and key applications.

Some other potential event sources by category.

Security

- Firewalls
- Endpoint Security (EDR, AV, etc.)
- Web Proxies/Gateways
- LDAP/Active Directory

- IDS
- DNS
- DHCP
- Servers
- Workstations
- Netflow

Ops

- Applications
- Network Devices
- Servers
- Packet Capture/Network Recorder
- DNS
- DHCP
- Email

DevOps

- Application Logs
- Load Balancer Logs
- Automation System Logs
- Business Logic

2.1.4 Collection method

“How will you collect it?”

After a list of event sources has been determined, the next step is to decide the method of collection for each source. Although many hardware and software products support common methods such as sending log data via syslog, many do not. It is critical to understand what method each event source uses and what resources that may require. For example, if a log shipper will be required to read logs from a local file on all servers, a log shipper must be selected and tested prior to deployment. In other cases, proprietary API's or software tools must be employed and integrated.

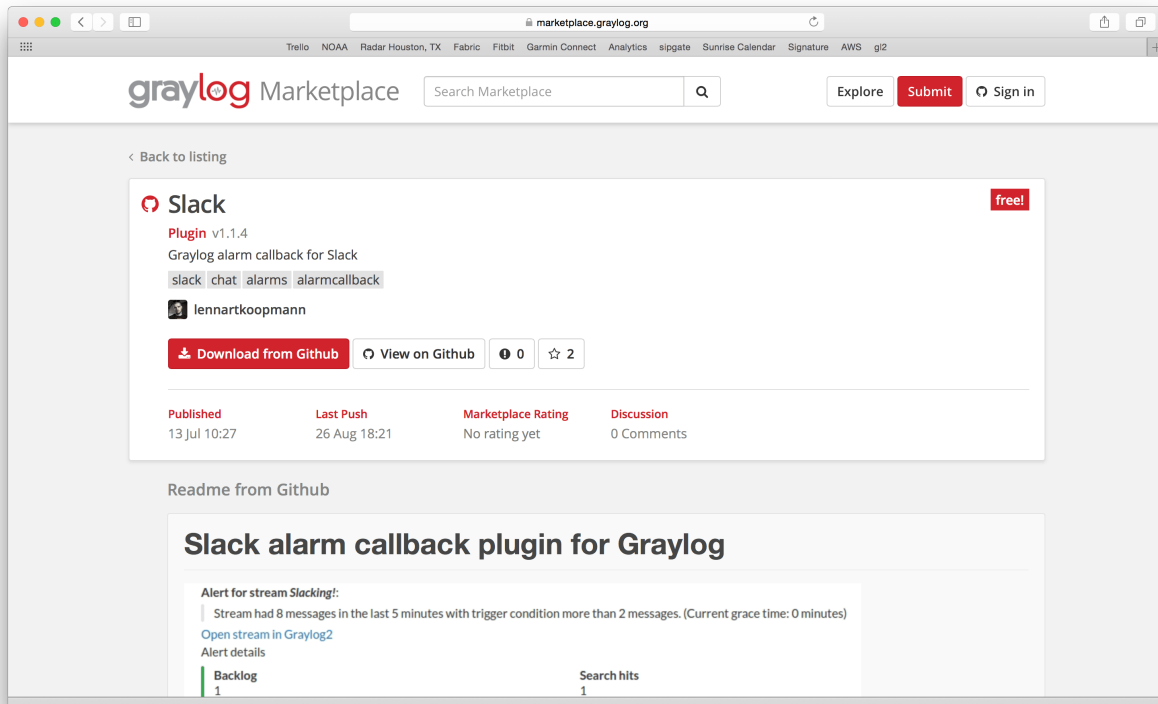
In some cases, changes to the event sources themselves (security devices, network hardware or applications) may be required. Additional planning is often required to deploy and maintain these collection methods over time.

Graylog supports many input types out of the box. More inputs are available in the Graylog Marketplace. At the time of writing, Graylog supports the following:

- Syslog (TCP, UDP, AMQP, Kafka)
- GELF (TCP, UDP, AMQP, Kafka, HTTP)
- AWS (AWS Logs, FlowLogs, CloudTrail)
- Beats/Logstash
- CEF (TCP, UDP, AMQP, Kafka)
- JSON Path from HTTP API
- Netflow (UDP)

- Plain/Raw Text (TCP, UDP, AMQP, Kafka)

The [Graylog Marketplace](#) is the central directory of add-ons for Graylog. It contains plugins, content packs, GELF libraries and more content built by Graylog developers and community members.



2.1.5 Users

“Who will use the solution?”

The most important user-related factor to consider is the number of users. If the number is large, or if many users will be querying the data simultaneously, you may want to take that into consideration when designing an architecture.

The users' level of skill should be considered. Less technical users may require more pre-built content, such as dashboards. They may also require more training.

Consideration should also be paid as to what event sources each user group should have access. As in all questions of access control, the principle of least privilege should apply.

Some typical user groups include:

- Security Analysts
- Engineers
- Management
- Help Desk

2.1.6 Retention

“How long will you keep the data?”

A key question when planning your log management system is log retention. There are two ways event log data may be retained, online or archived. Online data is stored in Elasticsearch and is searchable through the Graylog GUI. Archived data is stored in a compressed format, either on the Graylog server or on a network file share. It is still searchable, via GREP for example, but must be reconstituted in Graylog in order to be searchable through the GUI again.

Some regulatory frameworks require retention of event log data for a prescribed period. In the absence of a clear requirement, the question becomes one of balancing the cost of retention (storage) versus the utility of having historical data. There is no single answer, as each situation is different.

Most Graylog customers retain 30-90 days online (searchable in Elasticsearch) and 6-13 months of archives.

Calculating Storage Requirements

Like most data stores, Elasticsearch reacts badly when it consumes all available storage. In order to prevent this from happening, proper planning and monitoring must be performed.

Many variables affect storage requirements, such as how much of each message is kept, whether the original message is retained once parsing is complete, and how much enrichment is done prior to storage.

A simple rule of thumb for planning storage is to take your average daily ingestion rate, multiply it by the number of days you need to retain the data online, and then multiply that number by 1.3 to account for metadata overhead. (GB/day x Ret. Days x 1.3 = storage req.).

Elasticsearch makes extensive use of slack storage space in the course of its operations. Users are strongly encouraged to exceed the minimum storage required for their calculated ingestion rate. When at maximum retention, Elasticsearch storage should not exceed 75% of total space.

2.2 Download & Install Graylog

Graylog can be deployed in many different ways, You should download whatever works best for you. For those who would like to do an initial lab evaluation of Graylog, we recommend starting with the virtual machine appliances.

Virtual Appliances are definitely the fastest way to get started. However, since the virtual appliances are generally not suitable for use in production, **they should be used strictly for proof of concept, evaluations or lab environments.**

The virtual appliances are also completely unsecured. No hardening has been done and all default services are enabled.

For production deployments users should select and deploy one of the other, more flexible, installation methods.

2.2.1 Operating System Packages

Graylog may be installed on the following operating systems.

- Ubuntu
- Debian
- RHEL/CentOS
- SLES

Most customers use package tools like DEB or RPM to install the Graylog software. Details are included in the section, *Operating System Packages*.

2.2.2 Configuration Management

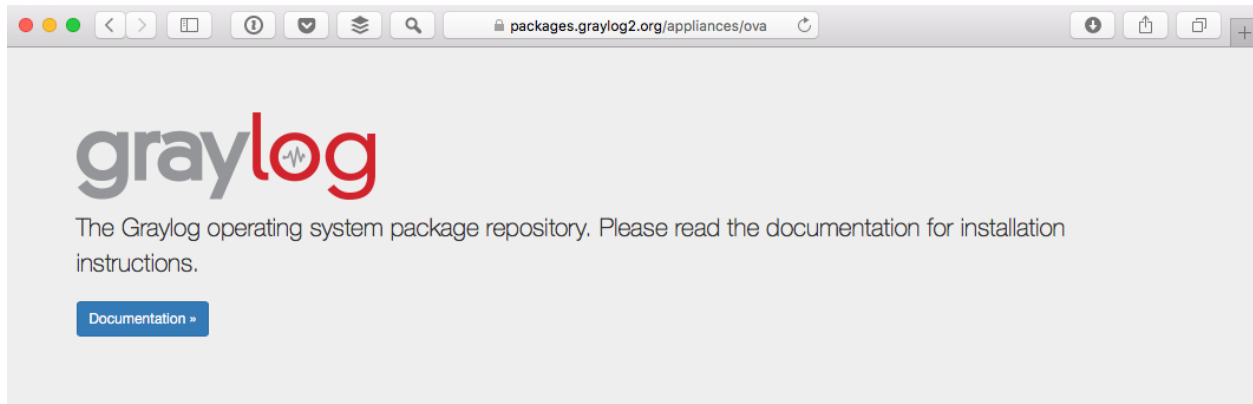
Customers who prefer to deploy graylog via configuration management tools may do so. Graylog currently supports *Chef*, *Puppet*, *Ansible*.

2.2.3 Containers

Graylog supports Docker for deployment of Graylog, MongoDB and Elasticsearch. Installation and configuration instructions may be found on the [Docker](#) installation page.

2.2.4 Virtual Appliances

Virtual Appliances may be downloaded from [virtual appliance download page](#) If you are unsure what the latest stable version number is, take a look at our [release page](#).



Name	Size	Modified
↑ Parent Directory		
graylog-1.3.3-2.ova	889.901.056	2016-03-15T14:25:32.000Z
graylog-1.3.4-1.ova	961.707.008	2016-03-16T15:32:09.000Z
graylog-2.0.0-1.ova	1.049.360.896	2016-04-26T14:48:07.000Z
graylog-2.0.0-2.ova	1.051.596.800	2016-04-29T16:20:11.000Z
graylog-2.0.1-1.ova	1.035.497.984	2016-05-11T14:40:03.000Z
graylog-2.0.1-2.ova	1.144.096.256	2016-05-12T13:35:13.000Z
graylog-2.0.2-1.ova	1.042.337.792	2016-06-13T12:36:13.000Z
graylog-2.0.3-1.ova	1.118.824.960	2016-06-20T16:13:28.000Z
graylog-2.1.0-1.ova	1.056.052.736	2016-09-01T15:36:13.000Z
graylog-2.1.1-1.ova	1.090.864.640	2016-10-25T07:40:04.000Z
graylog-2.1.2-1.ova	1.129.371.648	2016-11-04T16:35:10.000Z
graylog-beta-2.0.0-alpha.5-1.ova	1.075.486.208	2016-03-15T15:17:22.000Z
graylog-beta-2.0.0-beta.1-1.ova	1.081.942.016	2016-03-22T14:49:53.000Z
graylog-beta-2.0.0-beta.2-1.ova	1.028.090.368	2016-04-01T15:16:40.000Z
graylog-beta-2.0.0-beta.3-1.ova	1.026.099.712	2016-04-13T15:12:36.000Z

Supported Virtual Appliances

- OVA
- AWS-AMI

Deployment guide for *Virtual Machine Appliances*.

Deployment guide for *Amazon Web Services*.

Virtual Appliance Caveats

Virtual appliances are not suitable for production deployment out of the box. They do not have sufficient storage, nor do they offer capabilities like index replication that meet high availability requirements.

The virtual appliances are not hardened or otherwise secured. Use at your own risk and apply all security measures required by your organization.

2.3 Initial Configuration

Once the application is installed, there are a few items that must be configured before Graylog may be started for the first time. Both the Graylog `server.conf` and Elasticsearch `elasticsearch.yml` files are configuration files that contain key details needed for initial configuration.

This guide will provide you with the essential settings to get Graylog up and running. There are many other important settings in these files and we encourage you to review them once you are up and running. For more details, please see *server.conf*.

Note: If you are using the virtual appliance, please skip this section and go directly to *Connect to the Web Console*.

2.3.1 server.conf

The file `server.conf` is the Graylog configuration file. The default location for `server.conf` is: `/etc/graylog/server/server.conf`.

Note: All default file locations are listed *here*.

- **Entries are generally a single line:**

- `propertyName=propertyValue`
 - `propertyName:propertyValue`

- **White space that appears between the property name and property value is ignored, so the following are equivalent:**

- `name=Stephen`
 - `name = Stephen`

- White space at the beginning of the line is also ignored.
- Lines that start with the comment characters `!` or `#` are ignored. Blank lines are also ignored.
- The property value is generally terminated by the end of the line.

- White space following the property value is not ignored, and is treated as part of the property value.
- The characters newline, carriage return, and tab can be inserted with characters `\n`, `\r`, and `\t`, respectively.

General Properties

- **`is_master = true`**
 - If you are running more than one instances of Graylog server you must designate (only) one `graylog-server` node as the master. This node will perform periodical and maintenance actions that slave nodes won't.
- **`password_secret = <secret>`**
 - You **MUST** set a secret that is used for password encryption and salting. The server will refuse to start if this value is not set. Use at least 64 characters. If you run multiple `graylog-server` nodes, make sure you use the same `password_secret` for all of them!

Note: Generate a secret with for example `pwgen -N 1 -s 96`.

- **`root_username = admin`**
 - The default root user is named **admin**.
- **`root_password_sha2 = <SHA2>`**
 - A SHA2 hash of the password you will use for your initial login. Insert a SHA2 hash generated with `echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d" " -f1` and you will be able to log in to the web interface with username **admin** and password **yourpassword**.

Caution: You **MUST** specify a hash password for the root user (which you only need to initially set up the system and in case you lose connectivity to your authentication backend). This password cannot be changed using the API or via the web interface. If you need to change it, modify it in this file.

Web Properties

- **`http_bind_address = 127.0.0.1:9000`**
 - The network interface used by the Graylog HTTP interface.
 - This address and port is used by default in the `http_publish_uri`
- **`http_publish_uri = http://127.0.0.1:9000/`**
 - Web interface listen URI.
 - The HTTP URI of this Graylog node which is used by all clients using the Graylog web interface.

Elasticsearch Properties

- **elasticsearch_hosts** = `http://node1:9200,http://user:password@node2:19200`
 - List of Elasticsearch hosts Graylog should connect to.
 - Need to be specified as a comma-separated list of valid URIs for the http ports of your elasticsearch nodes.
 - If one or more of your elasticsearch hosts require authentication, include the credentials in each node URI that requires authentication.
 - Default: `http://127.0.0.1:9200` You may retain the default setting only if Elasticsearch is installed on the same host as the Graylog server.

MongoDB

- **mongodb_uri** = `mongodb://...`
 - MongoDB connection string. Enter your MongoDB connection and authentication information here.
 - See <https://docs.mongodb.com/manual/reference/connection-string/> for details.
 - **Examples:**
 - * Simple: `mongodb_uri = mongodb://localhost/graylog`
 - * Authenticate against the MongoDB server: `mongodb_uri = mongodb://grayloguser:secret@localhost:27017/graylog`
 - * Use a replica set instead of a single host: `mongodb_uri = mongodb://grayloguser:secret@localhost:27017,localhost:27018,localhost:27019/graylog?replicaSet=rs01`

Outgoing HTTP

- **http_proxy_uri** =
 - HTTP proxy for outgoing HTTP connections
- **http_non_proxy_hosts** =
 - A list of hosts that should be reached directly, bypassing the configured proxy server.
 - This is a list of patterns separated by “,”. The patterns may start or end with a “*” for wildcards.
 - Any host matching one of these patterns will be reached through a direct connection instead of through a proxy.

2.3.2 elasticsearch.yml

`Elasticsearch.yml` is the Elasticsearch configuration file. The default location for `elasticsearch.yml` is: `/etc/elasticsearch/elasticsearch.yml`.

Several values must be properly configured for elasticsearch to work properly.

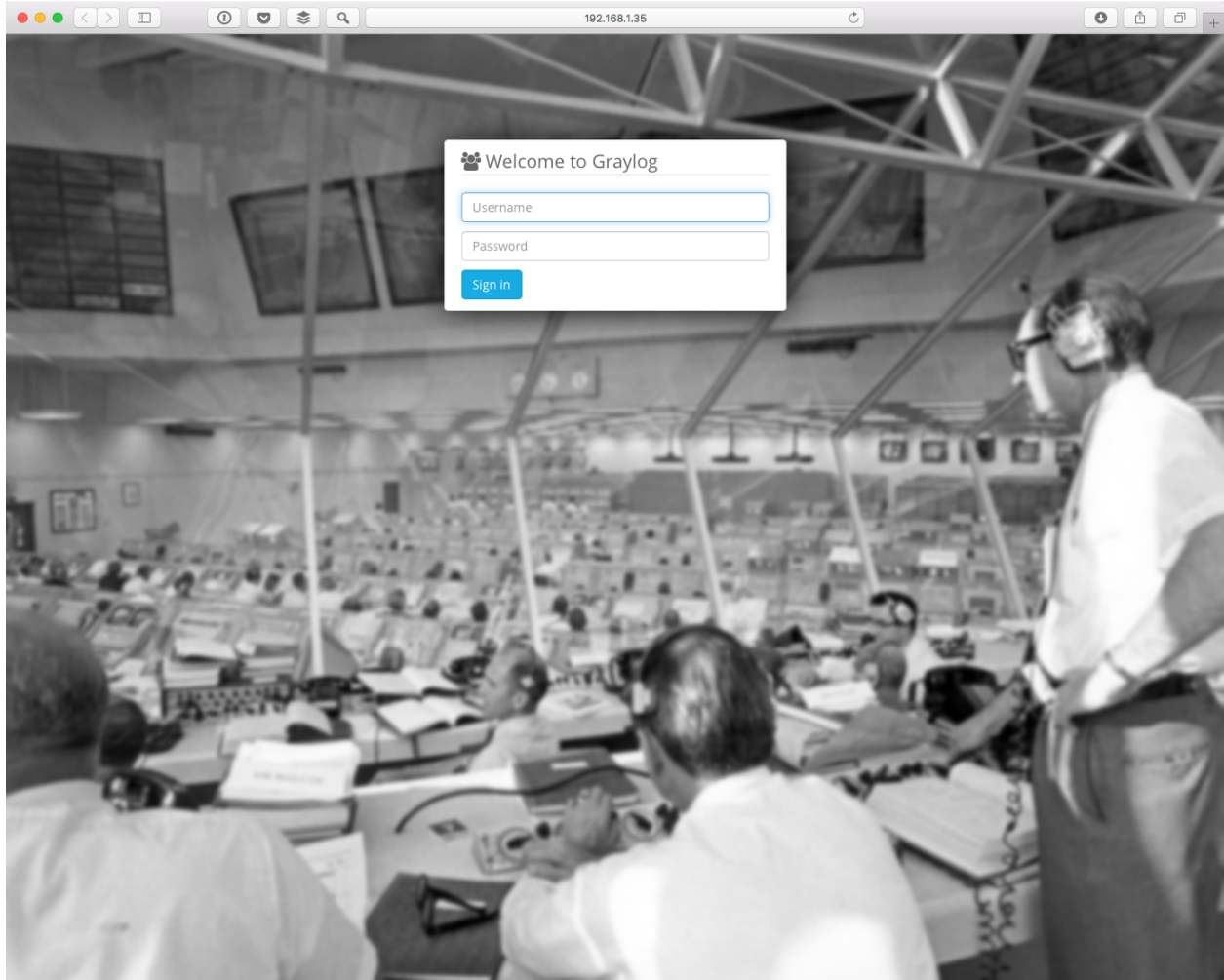
- **cluster.name:** `graylog`
 - This value may be set to anything the customer wishes, though we recommend using “graylog”.
 - This value must be the same for every Elasticsearch node in a cluster.

- **network.host:** `172.30.4.105`
 - By default, Elasticsearch binds to loopback addresses only (e.g. `127.0.0.1`). This is sufficient to run a single development node on a server.
 - To communicate and to form a cluster with nodes on other servers, your node will need to bind to a non-loopback address.
- **http.port:** `9200`
 - Port Elasticsearch will listen on. We recommend using the default value.
- **discovery.zen.ping.unicast.hosts:** `["es01.acme.org", "es02.acme.org"]`
 - Elasticsearch uses a custom discovery implementation called “Zen Discovery” for node-to-node clustering and master election. To form a cluster with nodes on other servers, you have to provide a seed list of other nodes in the cluster that are likely to be live and contactable.
 - May be specified as IP address or FQDN.

2.4 Connect to the Web Console

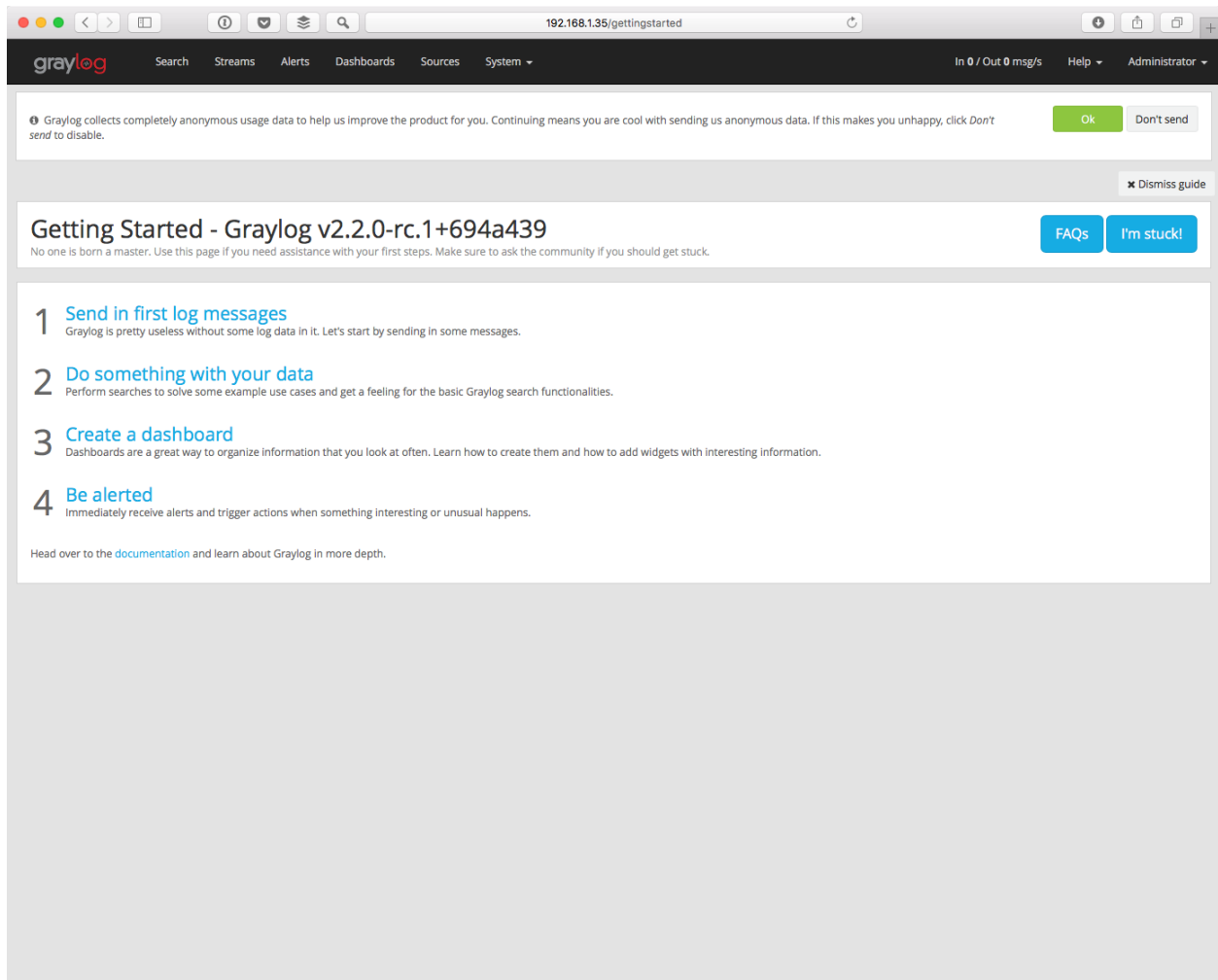
Open a browser and navigate to the URL `http://xxx.xxx.xxx.xxx:9000`, substituting the IP of your graylog server. You should see a Graylog login page similar to the screenshot below.

If using the VM appliance, log in using `admin` for both the username and password. If using either container or OS versions of Graylog, log in as `admin` and use the password from which you derived the password secret when installing Graylog.



Logging in will get you to a “Getting Started” screen. But, if you are reading this, then you’ve already found the “Getting Started Guide”, so just keep going.

Also, feel free to dismiss the guide or keep it for later.



2.5 Explore Graylog

Once messages are being received, you may want to poke around and explore a bit. There are several pages available, though not all pages may be visible to all users, depending on individual permissions. The following is a brief description of each page's purpose and function.

2.5.1 Streams

Streams are a core feature of Graylog and may be thought of as a form of tagging for incoming messages. Streams are a mechanism used to route messages into categories in real-time. Stream rules instruct Graylog which message to route into which streams.

Streams have many uses. First, they are used to route data for storage into an index. They are also used to control access to data, route messages for parsing, enrichment, or other modification. Then streams will determine which messages will be archived.

Streams may be used in conjunction with Alerts to notify users or otherwise respond when a message meets a set of conditions.

Messages may belong to one or to multiple streams. For additional detail, please see [Streams](#).

2.5.2 Searches

The Graylog Search page is the interface used to search logs directly. Graylog uses a simplified syntax, very similar to Lucene. Relative or absolute time ranges are configurable from drop down menus. Searches may be saved or visualized as dashboard widgets that may be added directly to dashboards from within the search screen.

Users may configure their own views and may choose to see either summary or complete data from event messages.

For additional detail, please see [Searching](#).

2.5.3 Dashboards

Graylog Dashboards are visualizations or summaries of information contained in log events. Each dashboard is populated by one or more widgets. Widgets visualize or summarize event log data with data derived from field values such as counts, averages, or totals. Trend indicators, charts, graphs, and maps are easily created to visualize the data.

Dashboard widgets and dashboard layouts are configurable. Dashboard access is controlled via Graylog's role based access control. Dashboards may be imported and exported via content packs.

For additional detail, please see [Dashboards](#).

2.5.4 Alerts

Alerts are composed of two related elements, alert conditions and alert notifications. Alert conditions are tied to streams and may be based on the content of a field, the aggregated value of a field, or message count thresholds. An alert notification triggers when a condition is met, typically sending an email or HTTP call back to an analyst or another system.

Additional output types may also be created via plugins. Alerts may be imported and exported via content packs.

For additional detail, please see [Alerts](#).

2.5.5 System

Overview

The Overview page displays information relating to the administration of the Graylog instance. It contains information on system notifications, system job status, ingestion rates, Elasticsearch cluster health, indexer failures, Time configuration and the system event messages.

Configuration

The Configuration page allows users to set options or variables related to searches, message processors and plugins.

Nodes

The Nodes page contains summary status information for each Graylog node. Detailed health information and metrics are available from buttons displayed on this page.

Inputs

Usually the first thing configured after initial system setup, Inputs are used to tell Graylog on which port to listen or how to go and retrieve event logs. The Inputs page allows users to create and configure new inputs, to manage extractors, to start and stop inputs, get metrics for each input and to add static fields to incoming messages.

Outputs

Outputs are used to define methods of forwarding data to remote systems, including port, protocol and any other required information. Out of the box, Graylog supports STDOUT and GELF outputs, but users may write their own and more are available in the [Graylog Marketplace](#).

Authentication

The Authentication page is used to configure Graylog's authentication providers and manage the active users of this Graylog cluster. Graylog supports LDAP or Active Directory for both authentication and authorization.

Content Packs

Content packs accelerate the set-up process for a specific data source. A content pack can include inputs/extractors, streams, dashboards, alerts and pipeline processors.

Any program element created within Graylog may be exported as Content Packs for use on other systems. These may be kept private by the author, for use in quick deployment of new nodes internally, or may be shared with the community via the Graylog Marketplace. For example, users may create custom Inputs, Streams, Dashboards, and Alerts to support a security use case. These elements may be exported in a content pack and then imported on a newly installed Graylog instance to save configuration time and effort.

Users may download content packs created and shared by other users via the [Graylog Marketplace](#). User created content packs are not supported by Graylog, but instead by their authors.

List of Elements Supported in Content Packs

- Inputs
- Grok Patterns
- Outputs
- Streams
- Dashboards
- Lookup Tables
- Lookup Caches
- Lookup Data Adapters

Indices

An Index is the basic unit of storage for data in Elasticsearch. Index sets provide configuration for retention, sharding, and replication of the stored data.

Values, like retention and rotation strategy, are set on a per index basis, so different data may be subjected to different handling rules.

For more details, please see [Index model](#).

Sidecars

Graylog created the Sidecar agent to manage fleets of log shippers like Beats or NXLog. These log shippers are used to collect OS logs from Linux and Windows servers. Log shippers are often the simplest way to read logs written locally to a flat file and send them to a centralized log management solution. Graylog supports management of any log shipper as a backend.

For more details, please see [Graylog Sidecar](#).

Pipelines

Graylog's Processing Pipelines are a powerful feature that enables user to run a rule, or a series of rules, against a specific type of event. Tied to streams, pipelines allow for routing, blacklisting, modifying and enriching messages as they flow through Graylog. Basically, if you want to parse, change, convert, add to, delete from or drop a message, Pipelines are the place to do it.

For more details, please see [Processing Pipelines](#).

2.6 Collect Messages

Once Graylog and associated components are running, the next step is to begin collecting logs.

The first step is to create an input. Inputs define the method by which Graylog collects logs. Out of the box, Graylog supports multiple methods to collect logs, including:

- Syslog (TCP, UDP, AMQP, Kafka)
- GELF (TCP, UDP, AMQP, Kafka, HTTP)
- AWS - AWS Logs, FlowLogs, CloudTrail
- Beats/Logstash
- CEF (TCP, UDP, AMQP, Kafka)
- JSON Path from HTTP API
- Netflow (UDP)
- Plain/Raw Text (TCP, UDP, AMQP, Kafka)

2.6.1 Content packs

Additional inputs may be installed via content packs. Content packs are bundles of Graylog input, extractor, stream, dashboard, and output configurations that can provide full support for a data source. Some content packs are shipped with Graylog by default and some are available from the website. Content packs that were downloaded from [the Graylog Marketplace](#) can be imported using the Graylog web interface.

You can load and even create your own content packs from the `System / Content Packs` page of the Graylog web interface.

2.6.2 Create an Input

To create an Input, open the `System / Inputs` page in the top menu, click the arrow in the drop down field, select your input type and click the green button labeled *Launch new input*.

Usually, the default settings are correct, but you may change any that you wish. Some input types may require authentication or other information specific to that source.

Note: If Graylog is not running as root, you will not have the option of using ports lower than 1024 for inputs. Sending devices may need to be reconfigured. Since best practice dictates that applications should not be run as root, customers who cannot change the event source are encouraged to use a load balancer, or other external means, to perform port translation.

Save the input. It will start automatically.

If your event source is already configured to send events to the port you selected, in the case of *push* event sources like Syslog or CEF, you should start to receive messages within a few seconds.

Check out [Sending in log data](#) if you'd like to learn more about the supported options for ingesting messages into Graylog.

2.6.3 Verify Messages Are Being Collected

Once you have an input defined, you will want to verify that you are receiving messages on that input. Check the *Throughput / Metrics* section to the right of your input. You should see the *NetworkIO* values start to climb, showing the amount of data consumed on this input.

Inputs
Graylog nodes accept data via inputs. Launch or terminate as many inputs as you want here.

Select input Launch new input Find more inputs

Global inputs 0 configured
There are no global inputs.

Local inputs 2 configured

appliance-gelf-udp GELF UDP RUNNING
On node 2e9c218c / graylog-beta

Show received messages Manage extractors Stop input More actions

```
allow_override_date: true
bind_address: 0.0.0.0
override_source: <empty>
port: 12201
recv_buffer_size: 1048576
```

Throughput / Metrics
1 minute average rate: 0 msg/s
Network IO: 0B 0B (total: 0B 0B)
Empty messages discarded: 0

Static fields
from_gelf: true ✕

appliance-syslog-udp Syslog UDP RUNNING
On node 2e9c218c / graylog-beta

Show received messages Manage extractors Stop input More actions

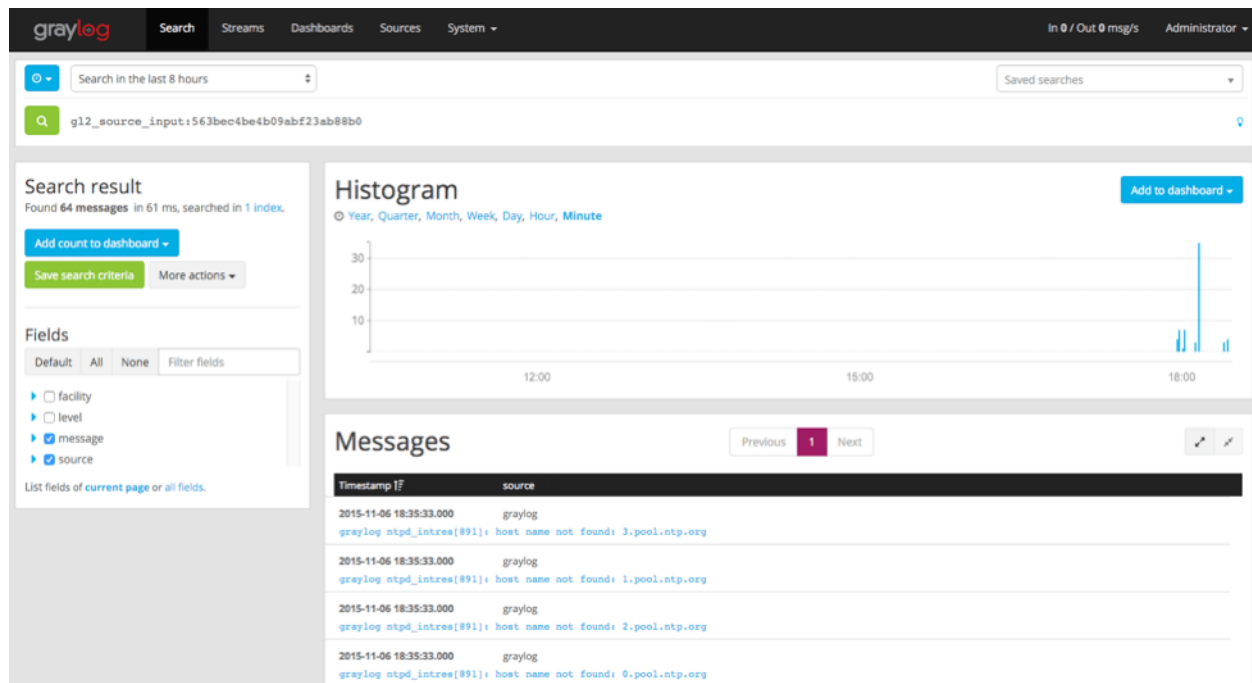
```
allow_override_date: true
bind_address: 0.0.0.0
expand_structured_data: false
force_rdns: false
override_source: <empty>
port: 514
recv_buffer_size: 262144
store_full_message: false
```

Throughput / Metrics
1 minute average rate: 0 msg/s
Network IO: 0B 0B (total: 0B 0B)
Empty messages discarded: 0

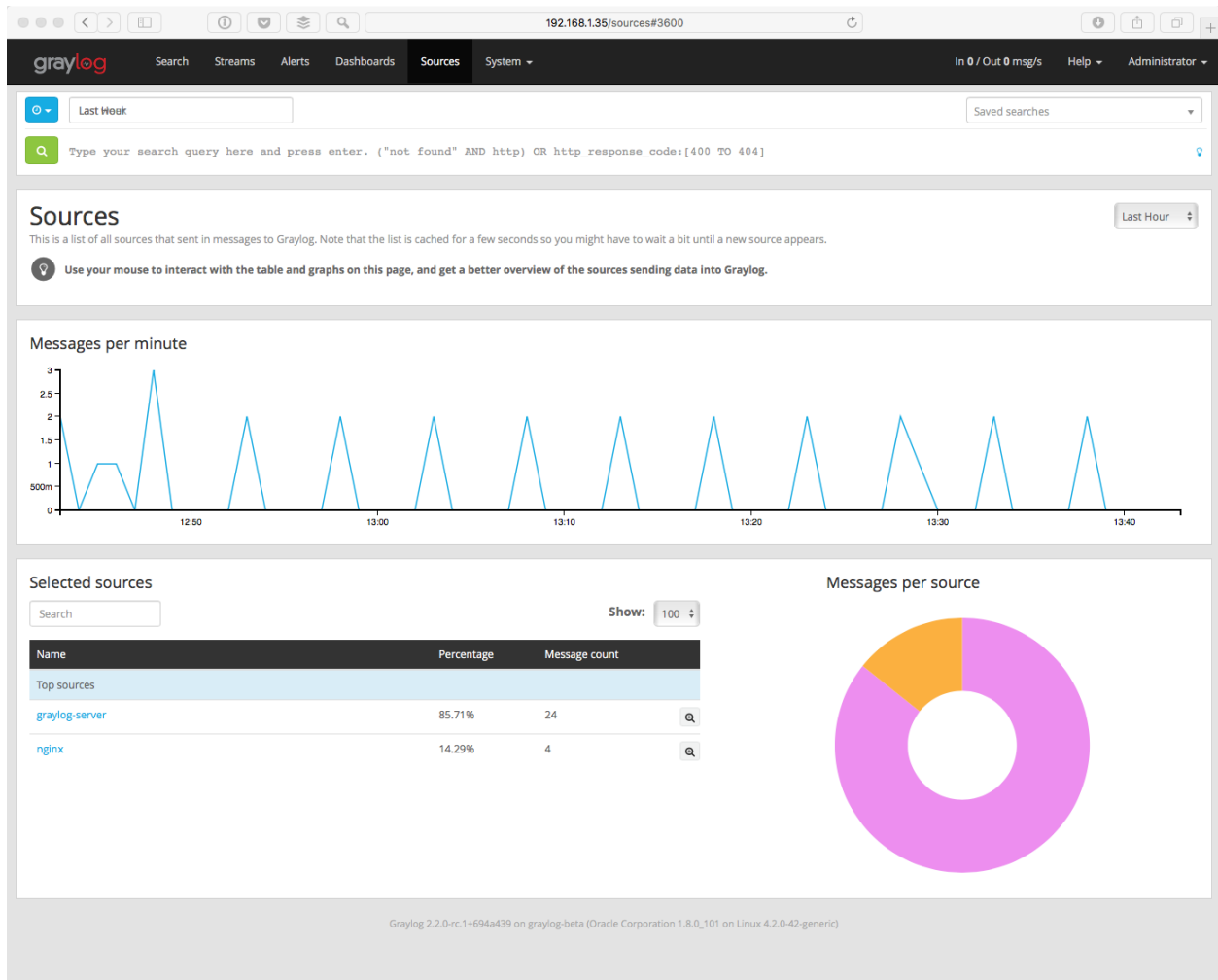
Static fields
from_syslog: true ✕

Graylog 2.2.0-rc.1+694a439 on graylog-beta (Oracle Corporation 1.8.0_101 on Linux 4.2.0-42-generic)

Click on the *Show received messages* button next to the input you just created. You should now see the messages received on this input.



If you click on *Sources* in the top menu, you will see a nice overview of all devices, servers, or applications sending data into Graylog and how many messages have been received from each source. Initially, you may not see much on this page. However, once you start sending data from more systems, their hostnames or IP addresses will also be listed on this page.



Skip the following section if you are all good.

If You Don't Have Messages

1. Check to see that you made the proper entries in the input configuration described above.
2. Check the configuration at the event source and make sure that it matches the ports and other options defined in the input. For example, if you changed the port for a Syslog UDP input to 5014, be sure the sending device has that same port defined.

3. Check to see if traffic is coming to the defined port. You can use the `tcpdump` command to do this:

```
$ sudo tcpdump -i lo host 127.0.0.1 and udp port 5014
```

4. Check to see if the server is listening on the host:

```
$ sudo netstat -peanut | grep ":5014"
```

If you still have issues, connect to our [community support](#) or get in touch with us via the [professional support offering](#).

INSTALLING GRAYLOG

Modern server architectures and configurations are managed in many different ways. Some people still put new software somewhere in `opt` manually for each server while others have already jumped on the configuration management train and fully automated reproducible setups.

Graylog can be installed in many different ways so you can pick whatever works best for you. We recommend to start with the *virtual machine appliances* for the fastest way to get started and then pick one of the other, more flexible installation methods to build an easier to scale setup.

This chapter is explaining the many ways to install Graylog and aims to help choosing the one that fits your needs.

3.1 Virtual Machine Appliances

3.1.1 Pre-Considerations

Please run this appliance always in a separated network that is isolated from the internet. Read also the notes about production *readiness*!

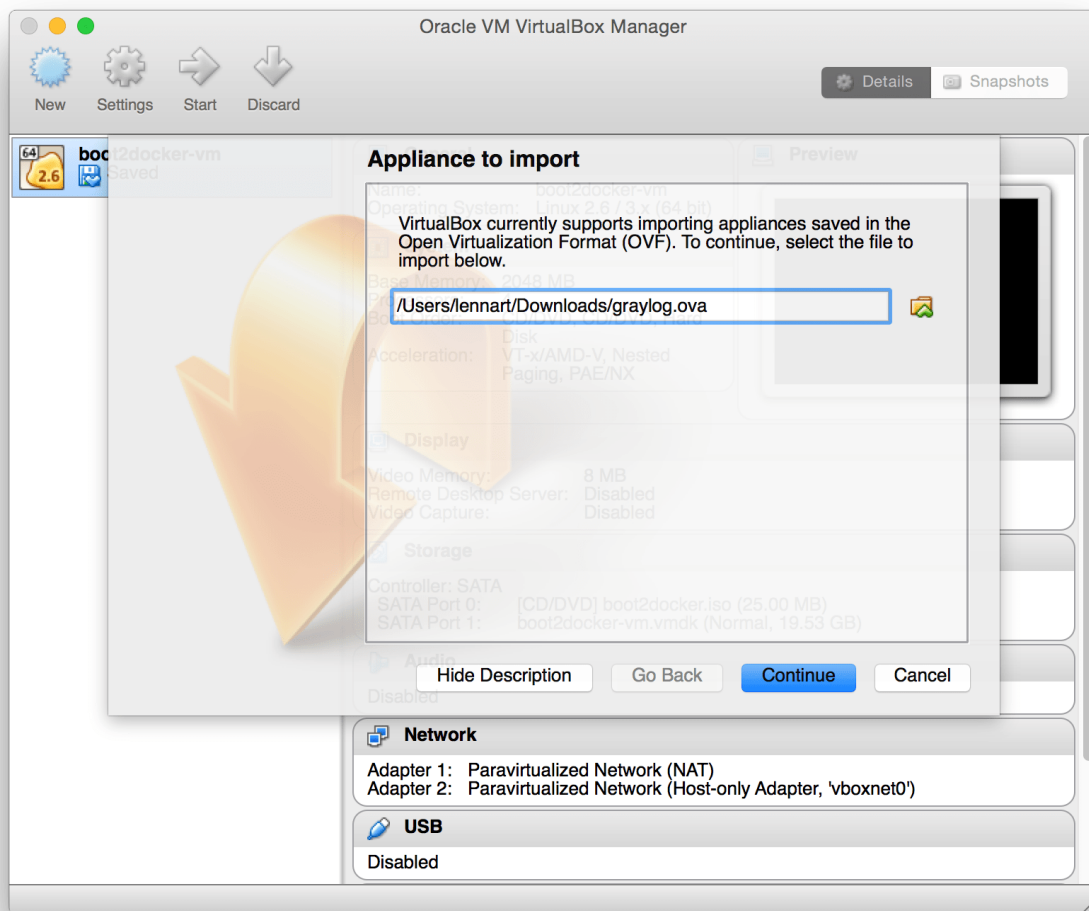
3.1.2 Download

Download the *OVA image*. If you are unsure what the latest version number is, take a look at our *release page*.

3.1.3 Run the image

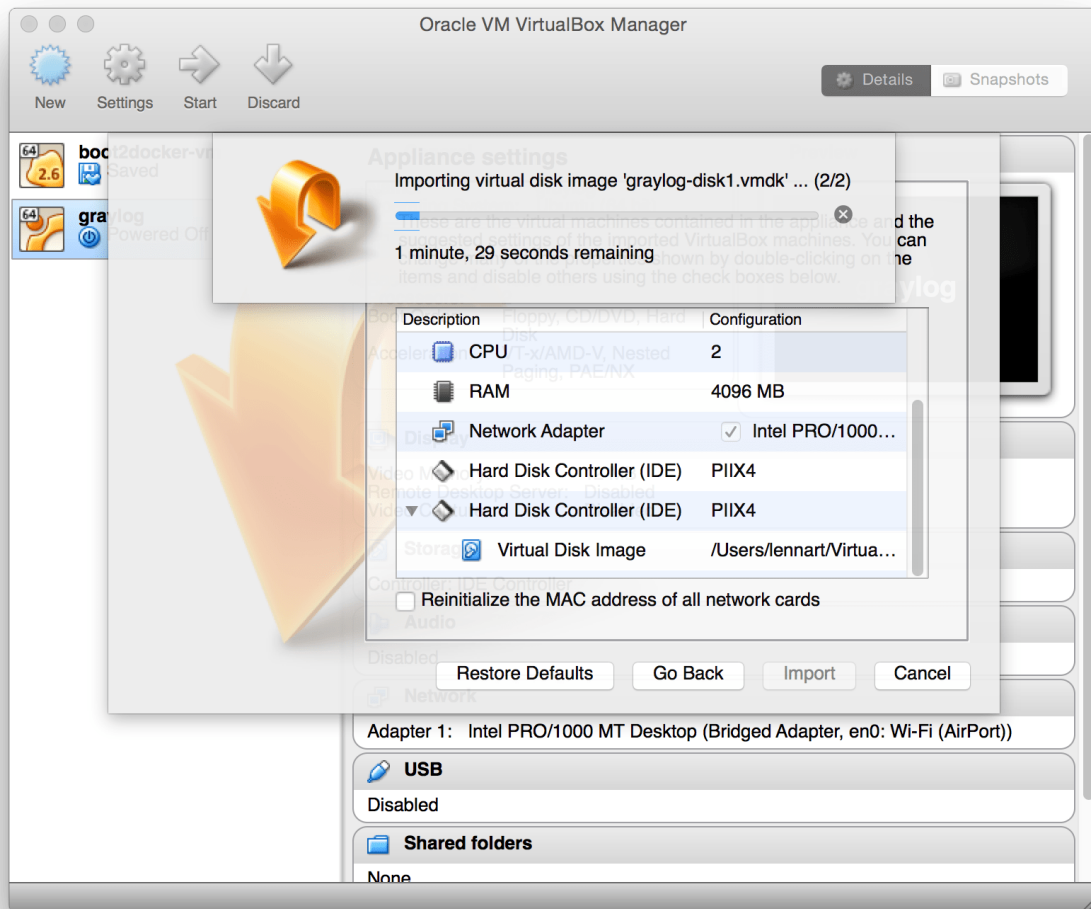
You can run the OVA in many systems like *VMware* or *Virtualbox*. In this example we will guide you through running the OVA in the free Virtualbox on OSX.

In Virtualbox select *File -> Import appliance*:

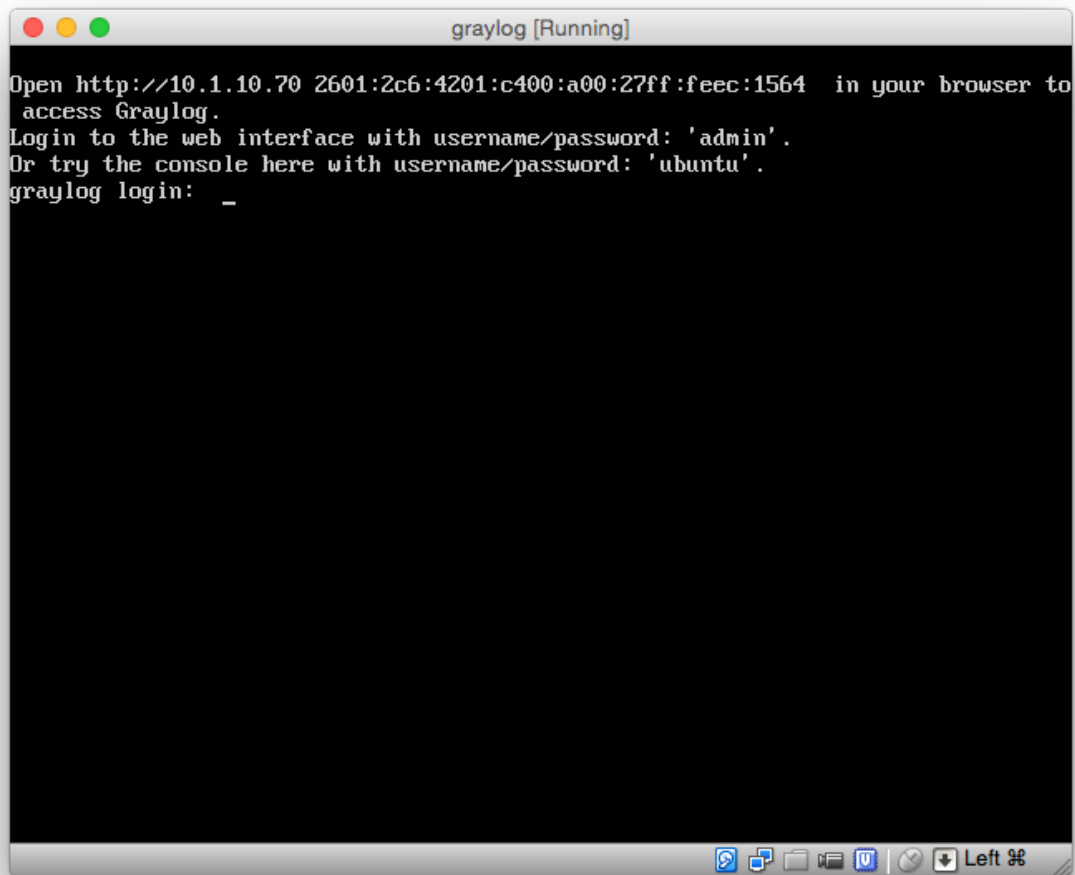


Hit *Continue* and keep the suggested settings on the next page as they are. Make sure that you have enough RAM and CPUs on your local machine. You can lower the resources the virtual machine will get assigned but we recommend to not lower it to ensure a good Graylog experience. In fact you might have to raise it if you plan to scale out later and send more messages into Graylog.

Press *Import* to finish loading the OVA into Virtualbox:



You can now start the VM and should see a login shell like this when the boot completed:



Note: If you don't have a working DHCP server for your virtual machine, you will get the error message:

“Your appliance came up without a configured IP address. Graylog is probably not running correctly!”

In this case, you have to login and edit configuration files under `/etc/netplan/` in order to setup a fixed IP address. Then create the file `/var/lib/graylog-server/firstboot` and reboot.

3.1.4 Logging in

You can log into the shell of the operating system of the appliance with the user *ubuntu* and the password *ubuntu*. You should of course change those credentials.

The web interface is reachable on port 80 at the IP address of your virtual machine. The login prompt of the shell is showing you this IP address, too. (See screenshot above).

The standard user for the web interface is *admin*, the password is shown in the console of the virtual server on the first boot.

3.1.5 Configuration

Please check the *Graylog configuration file* documentation, if you need to further customize your appliance.

3.1.6 VMWare ESXi

Warning: The appliances are build technically with VirtualBox. However most ESXi versions are able to import and run the appliance but be prepared for unexpected troubles especially during import.

If you are using the appliance on a VMWare host, you might want to install the hypervisor tools:

```
sudo apt-get install -y open-vm-tools
```

3.1.7 Update OVA to latest Version

2.x It is not possible to upgrade previous OVAs to Graylog 3.0.0.

3.x Starting with Graylog 3.0.0, OVAs use the Operating System packages, so you can upgrade your appliance by following *this update guide*.

3.1.8 Production readiness

The Graylog appliance is not created to provide a production ready solution. It is build to offer a fast and easy way to try the software itself and not wasting time to install Graylog and it components to any kind of server.

3.2 Operating System Packages

Until configuration management systems made their way into broader markets and many datacenters, one of the most common ways to install software on Linux servers was to use operating system packages. Debian has `DEB`, Red Hat has `RPM` and many other distributions are based on those or come with their own package formats. Online repositories of software packages and corresponding package managers make installing and configuring new software a matter of a single command and a few minutes of time.

Graylog offers official `DEB` and `RPM` package repositories. The packages have been tested on the following operating systems:

- Ubuntu 16.04, 18.04, 20.04
- Debian 8, 9, 10
- RHEL/CentOS 6, 7, 8

The repositories can be set up by installing a single package. Once that's done, the Graylog packages can be installed via `apt-get` or `yum`. The packages can also be downloaded with a web browser at <https://packages.graylog2.org/> if needed.

3.2.1 Prerequisites

Warning: We caution you not to install or upgrade Elasticsearch to 7.11 and later! It is not supported. If you do so, it will break your instance!

Make sure to install and configure the following software before installing and starting any Graylog services:

- Java (≥ 8)
- Elasticsearch (6.x or 7.x)
- MongoDB (4.0 or 4.2)

3.2.2 Step by Step Guides

- [Ubuntu](#)
- [Debian](#)
- [RHEL/CentOS](#)
- [SLES](#)

3.2.3 DEB / APT

Download and install `graylog-4.0-repository_latest.deb` via `dpkg(1)` and also make sure that the `apt-transport-https` package is installed:

```
$ sudo apt-get install apt-transport-https
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update
$ sudo apt-get install graylog-server
```

Hint: If you want the *Integrations Plugins* or the *Enterprise Plugins* installed, you need to install them now. The following install all official provided packages by Graylog at the same time: `sudo apt-get install graylog-server graylog-enterprise-plugins graylog-integrations-plugins graylog-enterprise-integrations-plugins`

After the installation completed successfully, Graylog can be started with the following commands. Make sure to use the correct command for your operating system.

OS	Init System	Command
Debian 7	SysV	<code>sudo service graylog-server start</code>
Debian 8 & 9, Ubuntu 16.04, 18.04, 20.04	systemd	<code>sudo systemctl start graylog-server</code>

The packages are configured to **not** start any Graylog services during boot. You can use the following commands to start Graylog when the operating system is booting.

OS	Init System	Command
Debian 7	SysV	<code>sudo update-rc.d graylog-server defaults 95 10</code>
Debian 8 & 9, Ubuntu 16.04, 18.04, 20.04	systemd	<code>sudo systemctl enable graylog-server</code>

Update to latest version

If you've been using the repository package to install Graylog before, it has to be updated first. The new package will replace the repository URL, without which you will only be able to get bugfix releases of your previously installed version of Graylog.

The update basically works like a fresh installation:

```
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update
$ sudo apt-get install graylog-server
```

Caution: If you have the *Integrations Plugins* or the *Enterprise Plugins* installed, you need to update them together with the Graylog server package. The following command updates all official provided packages by Graylog at the same time: `sudo apt-get install graylog-server graylog-enterprise-plugins graylog-integrations-plugins graylog-enterprise-integrations-plugins`

Manual Repository Installation

If you don't like to install the repository DEB to get the repository configuration onto your system, you can do so manually (although we don't recommend to do that).

First, add the [Graylog GPG keyring](#) which is being used to sign the packages to your system.

Hint: We assume that you have placed the GPG key into `/etc/apt/trusted.gpg.d/`.

Now create a file `/etc/apt/sources.list.d/graylog.list` with the following content:

```
deb https://packages.graylog2.org/repo/debian/ stable 4.0
```

3.2.4 RPM / YUM / DNF

Download and install `graylog-4.0-repository_latest.rpm` via `rpm` (8) :

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
↳latest.rpm
$ sudo yum install graylog-server
```

Hint: If you want the *Integrations Plugins* or the *Enterprise Plugins* installed, you need to install them now. The following install all official provided packages by Graylog at the same time: `sudo yum`

```
install graylog-server graylog-enterprise-plugins graylog-integrations-plugins
graylog-enterprise-integrations-plugins
```

After the installation completed successfully, Graylog can be started with the following commands. Make sure to use the correct command for your operating system.

OS	Init System	Command
CentOS 6	SysV	<code>sudo service graylog-server start</code>
CentOS 7, 8	systemd	<code>sudo systemctl start graylog-server</code>

The packages are configured to **not** start any Graylog services during boot. You can use the following commands to start Graylog when the operating system is booting.

OS	Init System	Command
CentOS 6	SysV	<code>sudo update-rc.d graylog-server defaults 95 10</code>
CentOS 7, 8	systemd	<code>sudo systemctl enable graylog-server</code>

Update to latest version

If you've been using the repository package to install Graylog before, it has to be updated first. The new package will replace the repository URL, without which you will only be able to get bugfix releases of your previously installed version of Graylog.

The update basically works like a fresh installation:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
→latest.rpm
$ sudo yum clean all
$ sudo yum install graylog-server
```

Running `yum clean all` is required because YUM might use a stale cache and thus might be unable to find the latest version of the `graylog-server` package.

Caution: If you have the *Integrations Plugins* or the *Enterprise Plugins* installed, you need to update them together with the Graylog server package. The following command updates all official provided packages by Graylog at the same time: `sudo yum install graylog-server graylog-enterprise-plugins graylog-integrations-plugins graylog-enterprise-integrations-plugins`

Manual Repository Installation

If you don't like to install the repository RPM to get the repository configuration onto your system, you can do so manually (although we don't recommend to do that).

First, add the [Graylog GPG key](#) which is being used to sign the packages to your system.

Hint: We assume that you have placed the GPG key into `/etc/pki/rpm-gpg/RPM-GPG-KEY-graylog`.

Now create a file named `/etc/yum.repos.d/graylog.repo` with the following content:

```
[graylog]
name=graylog
baseurl=https://packages.graylog2.org/repo/el/stable/4.0/$basearch/
gpgcheck=1
repo_gpgcheck=0
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-graylog
```

3.2.5 Step-by-step guides

Ubuntu installation

This guide describes the fastest way to install Graylog on Ubuntu 18.04 and 20.04 LTS. All links and packages are present at the time of writing but might need to be updated later on.

Warning: This guide **does not cover** security settings! The server administrator must make sure the graylog server is not publicly exposed, and is following security best practices.

Prerequisites

Taking a minimal server setup as base will need this additional packages:

```
$ sudo apt-get update && sudo apt-get upgrade
$ sudo apt-get install apt-transport-https openjdk-8-jre-headless uuid-runtime pwgen
```

If you get an error stating *Unable to locate package*, you likely need to enable the universe repository which can be done typing the below command, and subsequent commands as follows:

```
$ sudo add-apt-repository universe
$ sudo apt-get update && sudo apt-get upgrade
$ sudo apt-get install apt-transport-https openjdk-8-jre-headless uuid-runtime pwgen
```

MongoDB

The official MongoDB repository provides the most up-to-date version and is the recommended way of installing MongoDB¹:

```
$ sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv_
↪9DA31620334BD75D9DCB49F368818C72E52529D4
$ echo "deb [ arch=amd64 ] https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0_
↪multiverse" | sudo tee /etc/apt/sources.list.d/mongodb-org-4.0.list
$ sudo apt-get update
$ sudo apt-get install -y mongodb-org
```

The last step is to enable MongoDB during the operating system's startup and verify it is running.

¹ For e.g. corporate proxies and other non-free environments you can use a keyserver approach via wget. `wget -qO- 'http://keyserver.ubuntu.com/pks/lookup?op=get&search=0x9DA31620334BD75D9DCB49F368818C72E52529D4' | sudo apt-key add -`

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable mongod.service
$ sudo systemctl restart mongod.service
$ sudo systemctl --type=service --state=active | grep mongod
```

Elasticsearch

Graylog can be used with Elasticsearch 7.x, please follow the below instructions to install the open source version of Elasticsearch.

```
$ wget -q https://artifacts.elastic.co/GPG-KEY-elasticsearch -O myKey
$ sudo apt-key add myKey
$ echo "deb https://artifacts.elastic.co/packages/oss-7.x/apt stable main" | sudo tee _
↪-a /etc/apt/sources.list.d/elastic-7.x.list
$ sudo apt-get update && sudo apt-get install elasticsearch-oss
```

The above instructions are a derivative from the [Elasticsearch install page](#)

Modify the [Elasticsearch configuration file](#) (/etc/elasticsearch/elasticsearch.yml) and set the cluster name to graylog and uncomment `action.auto_create_index: false` to enable the action:

```
$ sudo tee -a /etc/elasticsearch/elasticsearch.yml > /dev/null <<EOT
cluster.name: graylog
action.auto_create_index: false
EOT
```

After you have modified the configuration, you can start Elasticsearch and verify it is running.

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable elasticsearch.service
$ sudo systemctl restart elasticsearch.service
$ sudo systemctl --type=service --state=active | grep elasticsearch
```

Graylog

Now install the Graylog repository configuration and Graylog itself with the following commands:

```
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update && sudo apt-get install graylog-server graylog-enterprise-
↪plugins graylog-integrations-plugins graylog-enterprise-integrations-plugins
```

Hint: If you do not want the *Integrations Plugins* or the *Enterprise Plugins* installed, then simply run `sudo apt-get install graylog-server`

Edit the Configuration File

Read the instructions *within* the configurations file and edit as needed, located at `/etc/graylog/server/server.conf`. Additionally add `password_secret` and `root_password_sha2` as these are *mandatory* and **Graylog will not start without them**.

To create your `root_password_sha2` run the following command:

```
$ echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d  
↪ " " -f1
```

To be able to connect to Graylog you should set `http_bind_address` to the public host name or a public IP address of the machine you can connect to. More information about these settings can be found in [Configuring the web interface](#).

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use [NGINX or Apache as a reverse proxy](#).

The last step is to enable Graylog during the operating system's startup and verify it is running.

```
$ sudo systemctl daemon-reload  
$ sudo systemctl enable graylog-server.service  
$ sudo systemctl start graylog-server.service  
$ sudo systemctl --type=service --state=active | grep graylog
```

The next step is to [ingest messages](#) into your Graylog and extract the messages with [extractors](#) or use [the Pipelines](#) to work with the messages.

Multiple Server Setup

If you plan to have multiple server taking care of different roles in your cluster *like we have in this big production setup* you need to modify only a few settings. This is covered in our [Multi-node Setup guide](#). The *default file location guide* will give you the file you need to modify in your setup.

Debian installation

This guide describes the fastest way to install Graylog on Debian Linux 10 (Buster). All links and packages are present at the time of writing but might need to be updated later on.

Warning: This guide **does not cover** security settings! The server administrator must make sure the graylog server is not publicly exposed, and is following security best practices.

Prerequisites

If you're starting from a minimal server setup, you will need to install these additional packages:

```
$ sudo apt update && sudo apt upgrade
$ sudo apt install apt-transport-https openjdk-11-jre-headless uuid-runtime pwgen
↪ dirmngr gnupg wget
```

MongoDB

The official MongoDB repository provides the most up-to-date version and is the recommended way of installing MongoDB:

```
$ wget -qO - https://www.mongodb.org/static/pgp/server-4.2.asc | sudo apt-key add -
$ echo "deb http://repo.mongodb.org/apt/debian buster/mongodb-org/4.2 main" | sudo
↪ tee /etc/apt/sources.list.d/mongodb-org-4.2.list
$ sudo apt-get update
$ sudo apt-get install -y mongodb-org
```

The next step is to enable MongoDB during the operating system's startup:

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable mongod.service
$ sudo systemctl restart mongod.service
$ sudo systemctl --type=service --state=active | grep mongod
```

Elasticsearch

Graylog can be used with Elasticsearch 7.x, please follow the below instructions to install the open source version of Elasticsearch.

```
$ wget -qO - https://artifacts.elastic.co/GPG-KEY-elasticsearch | sudo apt-key add -
$ echo "deb https://artifacts.elastic.co/packages/oss-7.x/apt stable main" | sudo tee
↪ -a /etc/apt/sources.list.d/elasticsearch-7.x.list
$ sudo apt update && sudo apt install elasticsearch-oss
```

The above instructions are a derivative from the [Elasticsearch install page](#)

Modify the [Elasticsearch configuration file](#) (`/etc/elasticsearch/elasticsearch.yml`) and set the cluster name to `graylog` and uncomment `action.auto_create_index: false` to enable the action:

```
$ sudo tee -a /etc/elasticsearch/elasticsearch.yml > /dev/null <<EOT
cluster.name: graylog
action.auto_create_index: false
EOT
```

After you have modified the configuration, you can start Elasticsearch and verify it is running.

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable elasticsearch.service
$ sudo systemctl restart elasticsearch.service
$ sudo systemctl restart elasticsearch.service
```

Graylog

Now install the Graylog repository configuration and Graylog itself with the following commands:

```
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update && sudo apt-get install graylog-server graylog-enterprise-
  ↳ plugins graylog-integrations-plugins graylog-enterprise-integrations-plugins
```

Hint: If you do not want the *Integrations Plugins* or the *Enterprise Plugins* installed, then simply run `sudo apt-get install graylog-server`

Edit the Configuration File

Read the instructions *within* the configurations file and edit as needed, located at `/etc/graylog/server/server.conf`. Additionally add `password_secret` and `root_password_sha2` as these are *mandatory* and **Graylog will not start without them**.

To create your `root_password_sha2` run the following command:

```
echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d"
  ↳ " -f1
```

To be able to connect to Graylog you should set `http_bind_address` to the public host name or a public IP address of the machine you can connect to. More information about these settings can be found in *Configuring the web interface*.

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use *NGINX or Apache as a reverse proxy*.

The last step is to enable Graylog during the operating system's startup and verify it is running.

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable graylog-server.service
$ sudo systemctl start graylog-server.service
$ sudo systemctl --type=service --state=active | grep graylog
```

The next step is to *ingest messages* into your Graylog and extract the messages with *extractors* or use *the Pipelines* to work with the messages.

Multiple Server Setup

If you plan to have multiple server taking care of different roles in your cluster *like we have in this big production setup* you need to modify only a few settings. This is covered in our *Multi-node Setup guide*. The *default file location guide* will give you the file you need to modify in your setup.

CentOS installation

This guide describes the fastest way to install Graylog on CentOS 8. All links and packages are present at the time of writing but might need to be updated later on.

Warning: This guide **does not cover** security settings! The server administrator must make sure the graylog server is not publicly exposed, and is following security best practices.

Prerequisites

Taking a minimal server setup as base will need this additional packages:

```
$ sudo yum install java-1.8.0-openjdk-headless.x86_64
```

If you want to use pwgen later on you need to Setup [EPEL](#) on your system with `sudo yum install epel-release` and install the package with `sudo yum install pwgen`.

MongoDB

Installing MongoDB on CentOS should follow [the tutorial for RHEL and CentOS](#) from the MongoDB documentation. First add the repository file `/etc/yum.repos.d/mongodb-org.repo` with the following contents:

```
[mongodb-org-4.2]
name=MongoDB Repository
baseurl=https://repo.mongodb.org/yum/redhat/$releasever/mongodb-org/4.2/x86_64/
gpgcheck=1
enabled=1
gpgkey=https://www.mongodb.org/static/pgp/server-4.2.asc
```

After that, install the latest release of MongoDB with `sudo yum install mongodb-org`.

Additionally, run these last steps to start MongoDB during the operating system's boot and start it right away:

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable mongod.service
$ sudo systemctl start mongod.service
$ sudo systemctl --type=service --state=active | grep mongod
```

Elasticsearch

Graylog can be used with Elasticsearch 7.x, please follow the below instructions to install the open source version of Elasticsearch.

First install the Elastic GPG key with `rpm --import https://artifacts.elastic.co/GPG-KEY-elasticsearch` then add the repository file `/etc/yum.repos.d/elasticsearch.repo` with the following contents:

```
[elasticsearch-7.x]
name=Elasticsearch repository for 7.x packages
baseurl=https://artifacts.elastic.co/packages/oss-7.x/yum
gpgcheck=1
```

(continues on next page)

(continued from previous page)

```
pgpkey=https://artifacts.elastic.co/GPG-KEY-elasticsearch
enabled=1
autorefresh=1
type=rpm-md
```

followed by the installation of the latest release with `sudo yum install elasticsearch-oss`.

Modify the [Elasticsearch configuration file](#) (`/etc/elasticsearch/elasticsearch.yml`) and set the cluster name to `graylog` and uncomment `action.auto_create_index: false` to enable the action:

```
$ sudo tee -a /etc/elasticsearch/elasticsearch.yml > /dev/null <<EOT
cluster.name: graylog
action.auto_create_index: false
EOT
```

After you have modified the configuration, you can start Elasticsearch:

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable elasticsearch.service
$ sudo systemctl restart elasticsearch.service
$ sudo systemctl --type=service --state=active | grep elasticsearch
```

Graylog

Now install the Graylog repository configuration and Graylog itself with the following commands:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
↪latest.rpm
$ sudo yum install graylog-server graylog-enterprise-plugins graylog-integrations-
↪plugins graylog-enterprise-integrations-plugins
```

Hint: If you do not want the *Integrations Plugins* or the *Enterprise Plugins* installed, then simply run `sudo yum install graylog-server`

Edit the Configuration File

Read the instructions *within* the configurations file and edit as needed, located at `/etc/graylog/server/server.conf`. Additionally add `password_secret` and `root_password_sha2` as these are *mandatory* and **Graylog will not start without them**.

To create your `root_password_sha2` run the following command:

```
echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d"
↪" -f1
```

To be able to connect to Graylog you should set `http_bind_address` to the public host name or a public IP address of the machine you can connect to. More information about these settings can be found in [Configuring the web interface](#).

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use *NGINX or Apache as a reverse proxy*.

The last step is to enable Graylog during the operating system's startup:

```
$ sudo systemctl daemon-reload
$ sudo systemctl enable graylog-server.service
$ sudo systemctl start graylog-server.service
$ sudo systemctl --type=service --state=active | grep graylog
```

The next step is to *ingest messages* into your Graylog and extract the messages with *extractors* or use *the Pipelines* to work with the messages.

SELinux information

Hint: We assume that you have `policycoreutils-python` installed to manage SELinux.

If you're using SELinux on your system, you need to take care of the following settings:

- Allow the web server to access the network: `sudo setsebool -P httpd_can_network_connect 1`
- **If the policy above does not comply with your security policy, you can also allow access to each port individually:**
 - Graylog REST API and web interface: `sudo semanage port -a -t http_port_t -p tcp 9000`
 - Elasticsearch (only if the HTTP API is being used): `sudo semanage port -a -t http_port_t -p tcp 9200`
- Allow using MongoDB's default port (27017/tcp): `sudo semanage port -a -t mongod_port_t -p tcp 27017`

If you run a single server environment with *NGINX or Apache proxy*, enabling the Graylog REST API is enough. All other rules are only required in a multi-node setup. Having SELinux disabled during installation and enabling it later, requires you to manually check the policies for MongoDB, Elasticsearch and Graylog.

Hint: Depending on your actual setup and configuration, you might need to add more SELinux rules to get to a running setup.

Further reading

- <https://www.nginx.com/blog/nginx-se-linux-changes-upgrading-rhel-6-6/>
- <https://wiki.centos.org/HowTos/SELinux>
- <https://wiki.centos.org/TipsAndTricks/SelinuxBooleans>
- <http://www.serverlab.ca/tutorials/linux/administration-linux/troubleshooting-selinux-centos-red-hat/>
- https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/SELinux_Users_and_Administrators_Guide/

- <https://www.digitalocean.com/community/tutorials/an-introduction-to-selinux-on-centos-7-part-1-basic-concepts>

Multiple Server Setup

If you plan to have multiple server taking care of different roles in your cluster *like we have in this big production setup* you need to modify only a few settings. This is covered in our [Multi-node Setup guide](#). The *default file location guide* will give you the file you need to modify in your setup.

SLES installation

This guide describes the fastest way to install Graylog on SLES 12 SP3. All links and packages are present at the time of writing but might need to be updated later on.

Warning: This guide **does not cover** security settings! The server administrator must make sure the graylog server is not publicly exposed, and is following standard security best practices.

Prerequisites

The following patterns are required for a minimal setup (see [SLES 12 SP3 Deployment Guide](#)):

- Base System
- Minimal System (Appliances)
- YaST configuration packages

Warning: This Guide assumes that the firewall is disabled and communication is possible to the outside world.

Assuming a minimal setup, you have to install the Java runtime environment:

```
$ sudo zypper install java-1_8_0-openjdk
```

MongoDB

Installing MongoDB on SLES should follow [the tutorial for SLES](#) from the MongoDB documentation. Add the GPG key and the repository before installing MongoDB:

```
$ sudo rpm --import https://www.mongodb.org/static/pgp/server-4.0.asc
$ sudo zypper addrepo --gpgcheck "https://repo.mongodb.org/zypper/suse/12/mongodb-org/4.0/x86_64/" mongodb
$ sudo zypper -n install mongodb-org
```

In order to automatically start MongoDB on system boot, you have to activate the MongoDB service by running the following commands:

```
$ sudo chkconfig mongod on
$ sudo systemctl daemon-reload
$ sudo systemctl restart mongod.service
```

Elasticsearch

Graylog can be used with Elasticsearch 7.x, please follow the installation instructions from [the Elasticsearch installation guide](#).

First install the Elastic GPG key with `rpm --import https://artifacts.elastic.co/GPG-KEY-elasticsearch` then add the repository file `/etc/zypp/repos.d/elasticsearch.repo` with the following contents:

```
[elasticsearch-7.x]
name=Elasticsearch repository for 7.x packages
baseurl=https://artifacts.elastic.co/packages/oss-7.x/yum
gpgcheck=1
gpgkey=https://artifacts.elastic.co/GPG-KEY-elasticsearch
enabled=1
autorefresh=1
type=rpm-md
```

followed by the installation of the latest release with `sudo zypper install elasticsearch-oss`.

Make sure to modify the [Elasticsearch configuration file](#) (`/etc/elasticsearch/elasticsearch.yml`) and set the cluster name to `graylog` and uncomment `action.auto_create_index: false` to enable the action:

```
$ sudo tee -a /etc/elasticsearch/elasticsearch.yml > /dev/null <<EOT
cluster.name: graylog
action.auto_create_index: false
EOT
```

In order to automatically start Elasticsearch on system boot, you have to activate the Elasticsearch service by running the following commands:

```
$ sudo chkconfig elasticsearch on
$ sudo systemctl daemon-reload
$ sudo systemctl restart elasticsearch.service
```

Graylog

First install the Graylog GPG Key with `rpm --import https://packages.graylog2.org/repo/debian/keyring.gpg` then add the repository file `/etc/zypp/repos.d/graylog.repo` with the following content:

```
[graylog]
name=graylog
baseurl=https://packages.graylog2.org/repo/el/stable/4.0/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-graylog
```

After that, install the latest release with `sudo zypper install graylog-server graylog-enterprise-plugins graylog-integrations-plugins graylog-enterprise-integrations-pl`

Hint: If you do not want the *Integrations Plugins* or the *Enterprise Plugins* installed, then simply run `sudo zypper install graylog-server`

Make sure to follow the instructions in your `/etc/graylog/server/server.conf` and add `password_secret` and `root_password_sha2`. These settings are mandatory and without them, Graylog will not start!

You can use the following command to create your `password_secret`:

```
cat /dev/urandom | base64 | cut -c1-96 | head -1
```

You need to use the following command to create your `root_password_sha2`:

```
echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d"↵" -f1
```

To be able to connect to Graylog you should set `http_bind_address` to the public host name or a public IP address of the machine you can connect to. More information about these settings can be found in [Configuring the web interface](#).

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use [NGINX or Apache as a reverse proxy](#).

The last step is to enable Graylog during the operating system's startup:

```
$ sudo chkconfig graylog-server on
$ sudo systemctl daemon-reload
$ sudo systemctl start graylog-server.service
```

The next step is to [ingest messages](#) into your new Graylog Cluster and extract the messages with [extractors](#) or use [the Pipelines](#) to work with the messages.

Cluster Setup

If you plan to have multiple servers assuming different roles in your cluster [like we have in this big production setup](#) you need to modify only a few settings. This is covered in our [Multi-node Setup guide](#). The [default file location guide](#) lists the locations of the files you need to modify.

3.2.6 Feedback

Please file a [bug report](#) in the [GitHub repository](#) for the operating system packages if you run into any packaging related issues.

If you found this documentation confusing or have more questions, please open an [issue](#) in the [Github repository](#) for the documentation.

3.3 Chef, Puppet, Ansible

The DevOps movement turbocharged market adoption of the newest generation of configuration management and orchestration tools like [Chef](#), [Puppet](#) or [Ansible](#). Graylog offers official scripts for all three of them:

- <https://supermarket.chef.io/cookbooks/graylog2>
- <https://forge.puppet.com/graylog/graylog>
- <https://galaxy.ansible.com/Graylog2/graylog-ansible-role>

3.4 Docker

3.4.1 Requirements

You will need a fairly recent version of [Docker](#).

We will use the following Docker images in this chapter:

- Graylog: [graylog/graylog](#)
- MongoDB: [mongo](#)
- Elasticsearch: [docker.elastic.co/elasticsearch/elasticsearch](#)

3.4.2 Quick start

If you want to checkout Graylog on your local desktop without any further customization, you can run the following three commands to create the necessary environment:

```
$ docker run --name mongo -d mongo:4.2
$ docker run --name elasticsearch \
  -e "http.host=0.0.0.0" \
  -e "discovery.type=single-node" \
  -e "ES_JAVA_OPTS=-Xms512m -Xmx512m" \
  -d docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
$ docker run --name graylog --link mongo --link elasticsearch \
  -p 9000:9000 -p 12201:12201 -p 1514:1514 \
  -e GRAYLOG_HTTP_EXTERNAL_URI="http://127.0.0.1:9000/" \
  -d graylog/graylog:4.0
```

Warning: All configuration examples are created to run on the local computer. Should those be used on external servers, adjust `GRAYLOG_HTTP_EXTERNAL_URI` and add `GRAYLOG_HTTP_PUBLISH_URI` and `GRAYLOG_HTTP_EXTERNAL_URI` according to the *[server.conf documentation](#)*.

How to get log data in

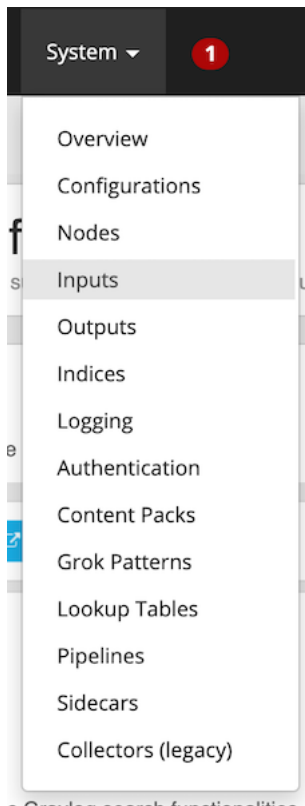
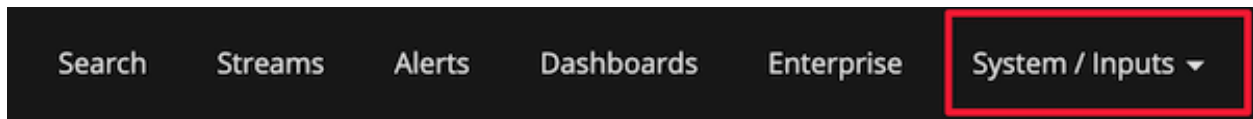
You can create different kinds of inputs under *System / Inputs*, however you can only use ports that have been properly mapped to your Docker container, otherwise data will not show up in the Graylog UI.

For example, to start a Graylog Docker container listening on port 5555, stop your container and recreate it, while appending `-p 5555:5555` to your `docker run` command:

```
$ docker run --link mongo --link elasticsearch \
  -p 9000:9000 -p 12201:12201 -p 1514:1514 -p 5555:5555 \
  -e GRAYLOG_HTTP_EXTERNAL_URI="http://127.0.0.1:9000/" \
  -d graylog/graylog:4.0
```

Similarly, the same can be done for UDP by appending `-p 5555:5555/udp`.

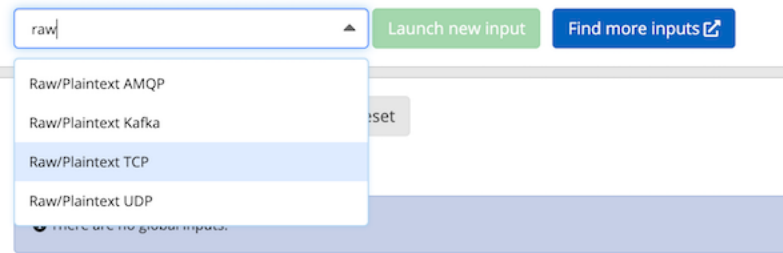
After ensuring that your Graylog Docker container is listening on `:5555`, create a Raw/Plaintext Input by navigating to <http://localhost:9000/system/inputs> :



Once on the Inputs page, search for `Raw/Plaintext TCP` and click `Launch new input`

Inputs

Graylog nodes accept data via inputs. Launch or terminate as many inputs as you want here.



The screenshot shows the 'Inputs' page in Graylog. At the top, there's a search bar containing the text 'raw'. To the right of the search bar are two buttons: 'Launch new input' (green) and 'Find more inputs' (blue with an external link icon). Below the search bar, a dropdown menu is open, displaying a list of input types: 'Raw/Plaintext AMQP', 'Raw/Plaintext Kafka', 'Raw/Plaintext TCP' (which is highlighted), and 'Raw/Plaintext UDP'. Below the list, there's a small text that says 'There are no graylog inputs.'.

Inputs

Graylog nodes accept data via inputs. Launch or terminate as many inputs as you want here.



This screenshot shows the 'Inputs' page after a selection. The search bar now contains 'Raw/Plaintext TCP' and has a small 'X' icon to clear it. The 'Launch new input' button is now green, while the 'Find more inputs' button remains blue with an external link icon.

After launching the input, you'll see a dialog box pop up with several options. You can leave most these options as their defaults, but note that you'll need to provide a name for the input, as well as select the node, or "Global" for the location for the input.

Launch new *Raw/Plaintext TCP* input

☒ Global

Should this input start on all nodes

Title

Raw/Plaintext Input

Select a name of your new input that describes it.

Bind address

0.0.0.0

Address to listen on. For example 0.0.0.0 or 127.0.0.1.

Port

5555

Port to listen on.

Receive Buffer Size (optional)

1048576

The size in bytes of the `recvBufferSize` for network connections to this input.

No. of worker threads (optional)

2

Number of worker threads processing network connections for this input.

TLS cert file (optional)

Path to the TLS certificate file

TLS private key file (optional)

Path to the TLS private key file

☐ Enable TLS

Accept TLS connections

TLS key password (optional)

The password for the encrypted key file.

TLS client authentication (optional)

disabled

Whether clients need to authenticate themselves in a TLS connection

TLS Client Auth Trusted Certs (optional)

TLS Client Auth Trusted Certs (File or Directory)

☐ TCP keepalive

Enable TCP keepalive packets

☐ Null frame delimiter?

Use null byte as frame delimiter? Otherwise newline delimiter is used.

Maximum message size (optional)

2097152

The maximum length of a message.

Override source (optional)

The source is a hostname derived from the received packet by default. Set this if you want to override it with a custom string.

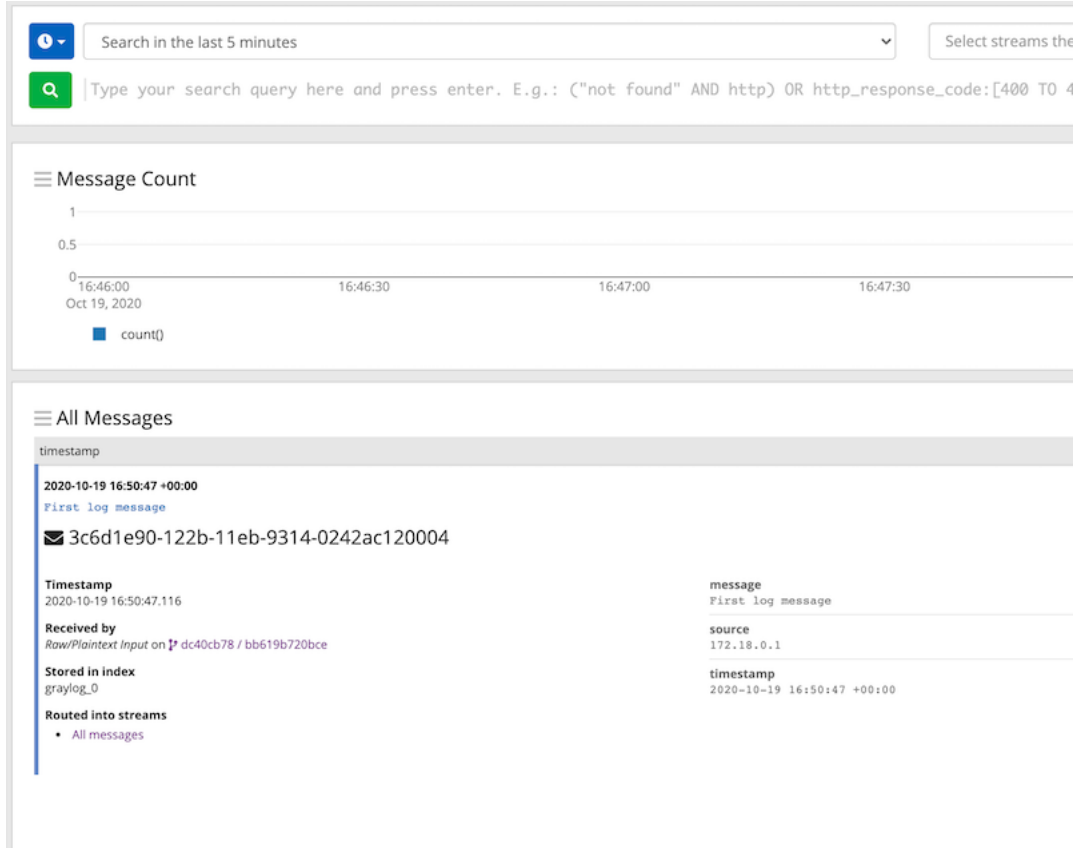
Cancel

Save

After that you can send a plaintext message to the Graylog Raw/Plaintext TCP input running on port 5555 using the following command:

```
$ echo 'First log message' | nc localhost 5555
```

Which you can then view in the Graylog UI:



Settings

Graylog comes with a default configuration that works out of the box but you have to set a password for the admin user and the web interface needs to know how to connect from your browser to the Graylog REST API.

Both settings can be configured via environment variables (also see [Configuration](#)):

```
-e GRAYLOG_ROOT_PASSWORD_  
→SHA2=8c6976e5b5410415bde908bd4dee15dfb167a9c873fc4bb8a81f6f2ab448a918  
-e GRAYLOG_HTTP_EXTERNAL_URI="http://127.0.0.1:9000/"
```

In this case you can login to Graylog with the username and password admin.

Generate your own admin password with the following command and put the SHA-256 hash into the GRAYLOG_ROOT_PASSWORD_SHA2 environment variable:

```
echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d"  
→" -f1
```

All these settings and command line parameters can be put in a `docker-compose.yml` file, so that they don't have to be executed one after the other.

Warning: The following example does not persist any data and configurations. You should read the section *Persisting data* to add persistence to your docker-compose file.

Example Version 2:

```
version: '2'
services:
  # MongoDB: https://hub.docker.com/_/mongo/
  mongodb:
    image: mongo:4.2
  # Elasticsearch: https://www.elastic.co/guide/en/elasticsearch/reference/7.10/
  ↪docker.html
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
    environment:
      - http.host=0.0.0.0
      - transport.host=localhost
      - network.host=0.0.0.0
      - "ES_JAVA_OPTS=-Xms512m -Xmx512m"
    ulimits:
      memlock:
        soft: -1
        hard: -1
      mem_limit: 1g
  # Graylog: https://hub.docker.com/r/graylog/graylog/
  graylog:
    image: graylog/graylog:4.0
    environment:
      # CHANGE ME (must be at least 16 characters)!
      - GRAYLOG_PASSWORD_SECRET=somepasswordpepper
      # Password: admin
      - GRAYLOG_ROOT_PASSWORD_
  ↪SHA2=8c6976e5b5410415bde908bd4dee15dfb167a9c873fc4bb8a81f6f2ab448a918
      - GRAYLOG_HTTP_EXTERNAL_URI=http://127.0.0.1:9000/
    entrypoint: /usr/bin/tini -- wait-for-it elasticsearch:9200 -- /docker-
  ↪entrypoint.sh
    links:
      - mongodb:mongo
      - elasticsearch
    restart: always
    depends_on:
      - mongodb
      - elasticsearch
    ports:
      # Graylog web interface and REST API
      - 9000:9000
      # Syslog TCP
      - 1514:1514
      # Syslog UDP
      - 1514:1514/udp
      # GELF TCP
      - 12201:12201
      # GELF UDP
      - 12201:12201/udp
```

Example Version 3:

```
version: '3'
services:
  # MongoDB: https://hub.docker.com/_/mongo/
  mongo:
    image: mongo:4.2
    networks:
      - graylog
  # Elasticsearch: https://www.elastic.co/guide/en/elasticsearch/reference/7.10/
  ↪docker.html
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
    environment:
      - http.host=0.0.0.0
      - transport.host=localhost
      - network.host=0.0.0.0
      - "ES_JAVA_OPTS=-Xms512m -Xmx512m"
    ulimits:
      memlock:
        soft: -1
        hard: -1
    deploy:
      resources:
        limits:
          memory: 1g
    networks:
      - graylog
  # Graylog: https://hub.docker.com/r/graylog/graylog/
  graylog:
    image: graylog/graylog:4.0
    environment:
      # CHANGE ME (must be at least 16 characters)!
      - GRAYLOG_PASSWORD_SECRET=somepasswordpepper
      # Password: admin
      - GRAYLOG_ROOT_PASSWORD_
  ↪SHA2=8c6976e5b5410415bde908bd4dee15dfb167a9c873fc4bb8a81f6f2ab448a918
      - GRAYLOG_HTTP_EXTERNAL_URI=http://127.0.0.1:9000/
      entrypoint: /usr/bin/tini -- wait-for-it elasticsearch:9200 -- /docker-
  ↪entrypoint.sh
    networks:
      - graylog
    restart: always
    depends_on:
      - mongo
      - elasticsearch
    ports:
      # Graylog web interface and REST API
      - 9000:9000
      # Syslog TCP
      - 1514:1514
      # Syslog UDP
      - 1514:1514/udp
      # GELF TCP
      - 12201:12201
      # GELF UDP
      - 12201:12201/udp
  networks:
    graylog:
      driver: bridge
```

After starting all three Docker containers by running `docker-compose up`, you can open the URL `http://127.0.0.1:9000` in a web browser and log in with username `admin` and password `admin` (make sure to change the password later). Change `GRAYLOG_HTTP_EXTERNAL_URI=` to your server IP if you run Docker remotely.

3.4.3 Configuration

Every configuration option can be set via [environment variables](#). Simply prefix the parameter name with `GRAYLOG_` and put it all in one case.

For example, setting up the SMTP configuration for sending Graylog alert notifications via email, the `docker-compose.yml` would look like this:

```
version: '2'
services:
  mongo:
    image: "mongo:4.2"
    # Other settings [...]
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
    # Other settings [...]
  graylog:
    image: graylog/graylog:4.0
    # Other settings [...]
    environment:
      GRAYLOG_TRANSPORT_EMAIL_ENABLED: "true"
      GRAYLOG_TRANSPORT_EMAIL_HOSTNAME: smtp
      GRAYLOG_TRANSPORT_EMAIL_PORT: 25
      GRAYLOG_TRANSPORT_EMAIL_USE_AUTH: "false"
      GRAYLOG_TRANSPORT_EMAIL_USE_TLS: "false"
      GRAYLOG_TRANSPORT_EMAIL_USE_SSL: "false"
```

Another option would be to store the configuration file outside of the container and edit it directly.

Custom configuration files

Instead of using a long list of environment variables to configure Graylog (see [Configuration](#)), you can also overwrite the bundled Graylog configuration files.

The bundled configuration files are stored in `/usr/share/graylog/data/config/` inside the Docker container.

Create the new configuration directory next to the `docker-compose.yml` file and copy the default files from GitHub:

```
$ mkdir -p ./graylog/config
$ cd ./graylog/config
$ wget https://raw.githubusercontent.com/Graylog2/graylog-docker/4.0/config/graylog.
  ↳ conf
$ wget https://raw.githubusercontent.com/Graylog2/graylog-docker/4.0/config/log4j2.xml
```

The newly created directory `./graylog/config/` with the custom configuration files now has to be mounted into the Graylog Docker container.

This can be done by adding an entry to the [volumes](#) section of the `docker-compose.yml` file:

```
version: '2'
services:
  mongodb:
    image: mongo:4.2
    # Other settings [...]
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.0
    # Other settings [...]
  graylog:
    image: graylog/graylog:4.0
    # Other settings [...]
  volumes:
    # Mount local configuration directory into Docker container
    - ./graylog/config:/usr/share/graylog/data/config
```

Warning: Graylog is running as USER graylog with the ID 1100 in Docker. That ID need to be able to read the configuration files you place into the container.

Reading individual configuration settings from files

The Graylog Docker image supports reading individual configuration settings from a file. This can be used to secure configuration settings with [Docker secrets](#) or similar mechanisms.

This has the advantage, that configuration settings containing sensitive information don't have to be added to a custom configuration file or into an environment variable in plaintext.

The Graylog Docker image checks for the existence of environment variables with the naming scheme `GRAYLOG_<CONFIG_NAME>__FILE` on startup and expects the environment variable to contain the absolute path to a readable file.

For example, if the environment variable `GRAYLOG_ROOT_PASSWORD_SHA2__FILE` contained the value `/run/secrets/root_password_hash`, the Graylog Docker image would use the contents of `/run/secrets/root_password_hash` as value for the `root_password_sha2` configuration setting.

Docker secrets

Note: Docker secrets are only available in Docker Swarm services starting with Docker 1.13. Please refer to [Manage sensitive data with Docker secrets](#) for more details.

Example for using Docker secrets in a Docker Swarm service:

```
# Create SHA-256 hash of our password
$ echo -n 'password' | sha256sum | awk '{ print $1 }'
5e884898da28047151d0e56f8dc6292773603d0d6aabbdd62a11ef721d1542d8

# Create a Docker secret named "root_password_hash"
$ printf '5e884898da28047151d0e56f8dc6292773603d0d6aabbdd62a11ef721d1542d8' | \
  docker secret create root_password_hash -
nlujwooo5uu6z0m91bmve79uo

$ docker secret ls
```

(continues on next page)

(continued from previous page)

```

ID                                NAME                                DRIVER                                CREATED                                ↵
↪   UPDATED
nlujwooo5uu6z0m91bmve79uo      root_password_hash                                34 seconds ago                                ↵
↪   34 seconds ago

# Create Docker Swarm service named "graylog" with access
# to the secret named "root_password_hash"
$ docker service create --name graylog \
  --secret root_password_hash \
  -e GRAYLOG_ROOT_PASSWORD_SHA2__FILE=/run/secrets/root_password_hash \
  -p 9000:9000 graylog/graylog:4.0
mclk5gm39ingk51s869dc0htz
overall progress: 1 out of 1 tasks
1/1: running  [=====>]
verify: Service converged

$ docker service ls
ID                                NAME                                MODE                                REPLICAS                                IMAGE↵
↪                                PORTS
mclk5gm39ing                    graylog                            replicated                            1/1                                ↵
↪graylog:4.0                    *:9000->9000/tcp

```

3.4.4 Persisting data

In order to make the recorded data persistent, you can use external volumes to store all data. In case of a container restart, this will simply re-use the existing data from the former instances.

Using Docker volumes for the data of MongoDB, Elasticsearch, and Graylog, the `docker-compose.yml` file looks as follows:

```

version: '2'
services:
  # MongoDB: https://hub.docker.com/_/mongo/
  mongodb:
    image: mongo:4.2
    volumes:
      - mongo_data:/data/db
  # Elasticsearch: https://www.elastic.co/guide/en/elasticsearch/reference/7.10/
  ↪docker.html
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
    volumes:
      - es_data:/usr/share/elasticsearch/data
    environment:
      - http.host=0.0.0.0
      - transport.host=localhost
      - network.host=0.0.0.0
      - "ES_JAVA_OPTS=-Xms512m -Xmx512m"
    ulimits:
      memlock:
        soft: -1
        hard: -1
      mem_limit: 1g
  # Graylog: https://hub.docker.com/r/graylog/graylog/
  graylog:

```

(continues on next page)

(continued from previous page)

```

image: graylog/graylog:4.0
volumes:
  - graylog_data:/usr/share/graylog/data
environment:
  # CHANGE ME (must be at least 16 characters)!
  - GRAYLOG_PASSWORD_SECRET=somepasswordpepper
  # Password: admin
  - GRAYLOG_ROOT_PASSWORD_
→SHA2=8c6976e5b5410415bde908bd4dee15dfb167a9c873fc4bb8a81f6f2ab448a918
  - GRAYLOG_HTTP_EXTERNAL_URI=http://127.0.0.1:9000/
  entrypoint: /usr/bin/tini -- wait-for-it elasticsearch:9200 -- /docker-
→entrypoint.sh
links:
  - mongodb:mongo
  - elasticsearch
restart: always
depends_on:
  - mongodb
  - elasticsearch
ports:
  # Graylog web interface and REST API
  - 9000:9000
  # Syslog TCP
  - 1514:1514
  # Syslog UDP
  - 1514:1514/udp
  # GELF TCP
  - 12201:12201
  # GELF UDP
  - 12201:12201/udp
# Volumes for persisting data, see https://docs.docker.com/engine/admin/volumes/
→volumes/
volumes:
  mongo_data:
    driver: local
  es_data:
    driver: local
  graylog_data:
    driver: local

```

Start all services with exposed data directories:

```
$ docker-compose up
```

3.4.5 Plugins

If you want to add plugins, you can put them into a local directory and mount that directory as a volume. This way, you don't have to create a new docker image every time you want to add a new plugin (or remove an old one).

Simply create a plugin folder, download the plugin(s) you want to install into it and mount the directory as a volume into the docker container:

```

$ mkdir plugin
$ wget https://downloads.graylog.org/releases/graylog-integrations/graylog-
→integrations-plugins-4.0.3.tgz

```

(continues on next page)

(continued from previous page)

```
$ tar -xvzf graylog-integrations-plugins-4.0.3.tgz graylog-integrations-plugins-4.0.3/
→plugin/graylog-plugin-integrations-4.0.3.jar --directory plugin
$ docker run --name graylog --link mongo --link elasticsearch \
  -p 9000:9000 -p 12201:12201 -p 1514:1514 \
  -e GRAYLOG_HTTP_EXTERNAL_URI="http://127.0.0.1:9000/" \
  -v ./plugin:/usr/share/graylog/plugin \
  -d graylog/graylog:4.0
```

The `docker-compose.yml` would look like this:

```
version: '3'
services:
  mongo:
    image: mongo:4.2
    # Other settings [...]
  elasticsearch:
    image: docker.elastic.co/elasticsearch/elasticsearch-oss:7.10.2
    # Other settings [...]
  graylog:
    image: graylog/graylog:4.0
    # Other settings [...]
  volumes:
    - <PATH_TO_LOCAL_PLUGIN_DIR>:/usr/share/graylog/plugin
```

Restart the container and docker will recreate the graylog container with the new volume included:

```
$ docker-compose restart graylog
```

3.4.6 Kubernetes automatic master selection

Running Graylog in Kubernetes opens the challenge to set the `is_master=true` setting only for one node in the cluster. The problem can be solved by calculating the name of the pod if Graylog is running in a stateful set with the following environment variable:

```
env:
- name: POD_NAME
  valueFrom:
    fieldRef:
      fieldPath: metadata.name
```

For a stateful set, the name of the first pod in a cluster always ends with `-0`. See the [Documentation about stateful set](#). The master selection mechanism in `docker-entrypoint.sh` file does the following:

- Examine if Graylog is running inside Kubernetes
- Verify that the pod name ends in `-0`
- Set `is_master=true` for this container

3.4.7 Nomad automatic master selection

When running Graylog in a Nomad cluster, you must ensure that only one node in the cluster has the setting `is_master=true` in the `server.conf` file.

Whether the container is running on Nomad may be identified with an environmental check on `NOMAD_ALLOC_INDEX`. Should that variable be set to 0, the container will set Graylog to `is_master=true`. If the variable is set to anything other than 0, it will set Graylog to `is_master=false`.

3.4.8 Troubleshooting

- In case you see warnings regarding open file limit, try to set `ulimit` from the outside of the container:

```
$ docker run --ulimit nfile=64000:64000 ...
```

- The `devicemapper` storage driver can produce problems with Graylogs disk journal on some systems. In this case please [pick another driver](#) like `aufs` or `overlay`.

3.4.9 Testing a beta version

Caution: We only recommend running pre-release versions if you are an experienced Graylog user and know what you are doing.

You can also run a pre-release (alpha, beta, or release candidate) version of Graylog using Docker.

The pre-releases are tagged in the [graylog/graylog](#) Docker image.

See the [available tags for the Graylog image on Docker Hub](#) and pick an alpha/beta/rc tag like this:

```
$ docker run --link mongo --link elasticsearch -p 9000:9000 -p 12201:12201 -p 1514:1514 \
-e GRAYLOG_HTTP_BIND_ADDRESS="127.0.0.1:9000" \
-d graylog/graylog:4.0.0-rc.1-2
```

3.5 Amazon Web Services

3.5.1 AMIs

Select your [AMI](#) and [AWS Region](#).

3.5.2 Usage

- Click on *Launch instance* for your AWS region to start Graylog into.
- Choose an instance type **with at least 4GB memory**.
- Finish the wizard and spin up the VM.
- Open port 80 and 22 in the applied security group to access the web interface.
- Login to the instance via SSH as user *ubuntu* to see web login credentials.
- additionally open more ports for ingesting log data, like 514 for syslog or 12201 for the GELF protocol.

Open `http://<private ip>` in your browser to access the Graylog web interface. Default username is *admin* with the password shown on the first SSH login.

3.5.3 Networking

Your browser needs access to port 80 for reaching the web interface. Make sure that a security group is opening that port. On the appliance a NGINX instance is used as proxy to simplify network access. Take a look in the configuration `/etc/nginx/sites-available/default` for further fine tuning.

3.5.4 HTTPS

In order to enable HTTPS for the web interface port 443 needs also be open. The configuration can be done with NGINX as well. See [Using HTTPS](#) for a full reference.

3.5.5 Basic configuration

The Graylog appliance is based on Ubuntu system packages so all configuration changes can be done analog to the rest of this documentation. See [Configuring Graylog](#)

3.5.6 Production readiness

The Graylog appliance is not created to provide a production ready solution. It is build to offer a fast and easy way to try the software itself and not wasting time to install Graylog and it components to any kind of server.

3.6 Manual Setup

3.6.1 Graylog server on Linux

Prerequisites

Graylog depends on MongoDB and Elasticsearch to operate, please refer to [the system requirements](#) for details.

Downloading and extracting the server

Download the tar archive from the [download pages](#) and extract it on your system:

```
~$ tar xvfz graylog-VERSION.tgz
~$ cd graylog-VERSION
```

Configuration

Now copy the example configuration file:

```
~# cp graylog.conf.example /etc/graylog/server/server.conf
```

You can leave most variables as they are for a first start. All of them should be well documented.

Configure at least the following variables in `/etc/graylog/server/server.conf`:

- **is_master = true**
 - Set only one `graylog-server` node as the master. This node will perform periodical and maintenance actions that slave nodes won't. Every slave node will accept messages just as the master nodes. Nodes will fall back to slave mode if there already is a master in the cluster.
- **password_secret**
 - You must set a secret that is used for password encryption and salting here. The server will refuse to start if it's not set. Generate a secret with for example `pwgen -N 1 -s 96`. If you run multiple `graylog-server` nodes, make sure you use the same `password_secret` for all of them!
- **root_password_sha2**
 - A SHA2 hash of a password you will use for your initial login. Set this to a SHA2 hash generated with `echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d" " -f1` and you will be able to log in to the web interface with username **admin** and password **yourpassword**.
- **elasticsearch_hosts**
 - List of Elasticsearch hosts Graylog should connect to.
- **mongodb_uri**
 - Enter your MongoDB connection and authentication information here.

Starting the server

You need to have Java installed. Running the OpenJDK is totally fine and should be available on all platforms. For example on Debian it is:

```
~$ apt-get install openjdk-8-jre
```

Start the server:

```
~$ cd bin/
~$ ./graylogctl start
```

The server will try to write a `node_id` to the `graylog-server-node-id` file. It won't start if it can't write there because of for example missing permissions.

See the startup parameters description below to learn more about available startup parameters. Note that you might have to be *root* to bind to the popular port 514 for syslog inputs.

You should see a line like this in the debug output of Graylog successfully connected to your Elasticsearch cluster:

```
2013-10-01 12:13:22,382 DEBUG: org.elasticsearch.transport.netty - [graylog-server]
→connected to node [[Unuscione, Angelo][thN_gIBkQDm2ab7k-2Zaaw][inet[/10.37.160.
→227:9300]]]
```

You can find the logs of Graylog in the directory `logs/`.

Important: All systems running Graylog must have synchronised system time. We strongly recommend to use [NTP](#) or similar mechanisms on all machines of your Graylog infrastructure.

Supplying external logging configuration

Graylog is using [Apache Log4j 2](#) for its internal logging and ships with a [default log configuration file](#) which is embedded within the shipped JAR.

In case you need to modify Graylog's logging configuration, you can supply a Java system property specifying the path to the configuration file in your start script (e. g. `graylogctl`).

Append this before the `-jar` parameter:

```
-Dlog4j.configurationFile=file:///path/to/log4j2.xml
```

Substitute the actual path to the file for the `/path/to/log4j2.xml` in the example.

In case you do not have a log rotation system already in place, you can also configure Graylog to rotate logs based on their size to prevent the log files to grow without bounds using the [RollingFileAppender](#).

One such example `log4j2.xml` configuration is shown below:

```
<?xml version="1.0" encoding="UTF-8"?>
<Configuration packages="org.graylog2.log4j" shutdownHook="disable">
  <Appenders>
    <RollingFile name="rolling-file" fileName="/var/log/graylog-server/server.log"
→filePattern="/var/log/graylog-server/server.log.%i.gz">
      <PatternLayout pattern="%d{yyyy-MM-dd'T'HH:mm:ss.SSSXXX} %-5p [%c{1}] %m%n"/
→>
    <Policies>
      <SizeBasedTriggeringPolicy size="50MB"/>
    </Policies>
    <DefaultRolloverStrategy max="10" fileIndex="min"/>
  </RollingFile>

  <!-- Internal Graylog log appender. Please do not disable. This makes internal
→log messages available via REST calls. -->
  <Memory name="graylog-internal-logs" bufferSize="500"/>
</Appenders>
<Loggers>
  <!-- Application Loggers -->
  <Logger name="org.graylog2" level="info"/>
  <Logger name="com.github.joschi.jadconfig" level="warn"/>
  <!-- This emits a harmless warning for ActiveDirectory every time which we can
→'t work around :( -->
  <Logger name="org.apache.directory.api.ldap.model.message.BindRequestImpl"
→level="error"/>
  <!-- Prevent DEBUG message about Lucene Expressions not found. -->
```

(continues on next page)

(continued from previous page)

```

<Logger name="org.elasticsearch.script" level="warn"/>
<!-- Disable messages from the version check -->
<Logger name="org.graylog2.periodical.VersionCheckThread" level="off"/>
<!-- Silence chatty natty -->
<Logger name="com.joestelmach.natty.Parser" level="warn"/>
<!-- Silence Kafka log chatter -->
<Logger name="kafka.log.Log" level="warn"/>
<Logger name="kafka.log.OffsetIndex" level="warn"/>
<!-- Silence useless session validation messages -->
<Logger name="org.apache.shiro.session.mgt.AbstractValidatingSessionManager"
↪level="warn"/>
  <Root level="warn">
    <AppenderRef ref="rolling-file"/>
    <AppenderRef ref="graylog-internal-logs"/>
  </Root>
</Loggers>
</Configuration>

```

Command line (CLI) parameters

There are a number of CLI parameters you can pass to the call in your `graylogctl` script:

- `-h, --help`: Show help message
- `-f CONFIGFILE, --configfile CONFIGFILE`: Use configuration file `CONFIGFILE` for Graylog; default: `/etc/graylog/server/server.conf`
- `-d, --debug`: Run in debug mode
- `-l, --local`: Run in local mode. Automatically invoked if in debug mode. Will not send system statistics, even if enabled and allowed. Only interesting for development and testing purposes.
- `-p PIDFILE, --pidfile PIDFILE`: Set the file containing the PID of graylog to `PIDFILE`; default: `/tmp/graylog.pid`
- `-np, --no-pid-file`: Do not write PID file (overrides `-p/--pidfile`)
- `--version`: Show version of Graylog and exit

Problems with IPv6 vs. IPv4?

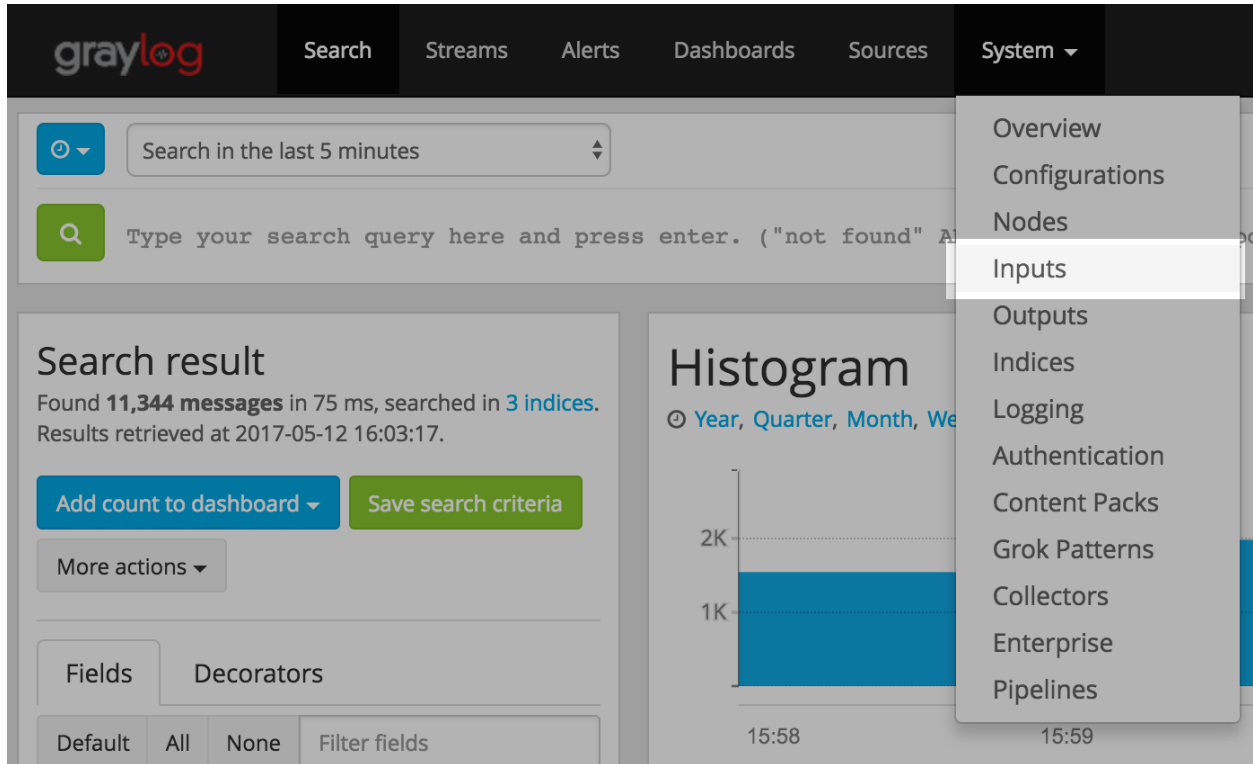
If your Graylog node refuses to listen on IPv4 addresses and always chooses for example a `http_bind_address` like `:::9000` you can tell the JVM to prefer the IPv4 stack.

Add the `java.net.preferIPv4Stack` flag in your `graylogctl` script or from wherever you are calling the `graylog.jar`:

```
~$ sudo -u graylog java -Djava.net.preferIPv4Stack=true -jar graylog.jar
```

Create a message input and send a first message

Log in to the web interface on port 9000 (e.g. `http://127.0.0.1:9000`) and navigate to *System -> Inputs*.



Launch a new *Raw/Plaintext UDP* input, listening on `127.0.0.1` on port `9099`. There's no need to configure anything else for now.

The list of running inputs on that node should show you your new input right away.

Let's send a message in:

```
echo "Hello Graylog, let's be friends." | nc -w 1 -u 127.0.0.1 9099
```

This has sent a short string to the raw UDP input you just opened. Now search for *friends* using the search bar on the top and you should already see the message you just sent in. Click on it in the table and see it in detail:

The screenshot shows the Graylog Messages interface. At the top, there's a 'Messages' header with navigation buttons 'Previous', '1' (selected), and 'Next'. Below the header, a table lists messages with columns 'Timestamp' and 'source'. The first message is from '127.0.0.1' at '2017-02-07 13:40:53.511' with the message 'Hello Graylog, let's be friends.'. To the right of the message, there's a 'Permalink' button, a 'Copy ID' button, and two dropdown menus: 'Show surrounding messages' and 'Test against stream'. Below the message, there's a section 'Received by' showing 'Raw UDP on p cd03ee44 / joschi-mbp15.lan'. To the right, there's a 'message' field with the text 'Hello Graylog, let's be friends.'. Below that, there's a 'source' field with '127.0.0.1' and a 'timestamp' field with '2017-02-07T13:40:53.511Z'. At the bottom, there's a 'Stored in index' section showing 'graylog2_4727' and a 'Routed into streams' section with a link 'All messages'.

You have just sent your first message to Graylog! Why not spawn a syslog input and point some of your servers to it? You could also create some user accounts for your colleagues.

3.7 System requirements

Warning: We caution you not to install or upgrade Elasticsearch to 7.11 and later! It is not supported. If you do so, it will break your instance!

The Graylog server application has the following prerequisites:

- Some modern Linux distribution (Debian Linux, Ubuntu Linux, or CentOS recommended)
- Elasticsearch 6.8, and version 7 up to 7.10
- MongoDB 3.6, 4.0 or 4.2
- Oracle Java SE 8 (OpenJDK 8 also works; latest stable update is recommended)

Hint: Graylog 3.x does include first compatibility with Java 11 and we welcome people that test this.

UPGRADING GRAYLOG

When upgrading from a previous version of Graylog you follow the previous used installation method (ex. from image or package) using the new version numbers.

The following Upgrade notes should be read carefully before you start the upgrade process. Breaking changes and dependency upgrades are documented in those upgrade notes.

You should always follow minor versions when updating across multiple versions to make sure necessary migrations are run correctly. The upgrade notes are always written coming from the stable release before.

4.1 Upgrading to Graylog 2.0.x

4.1.1 Elasticsearch 2.x

The embedded Elasticsearch node being used by Graylog has been upgraded to Elasticsearch 2.x which includes some breaking changes. Graylog 2.x does not work with Elasticsearch 1.x anymore and cannot communicate with existing Elasticsearch 1.x clusters.

Please see [Breaking changes in Elasticsearch 2.x](#) for details.

The blog article [Key points to be aware of when upgrading from Elasticsearch 1.x to 2.x](#) also contains interesting information about the upgrade path from Elasticsearch 1.x to 2.x.

Multicast Discovery

Multicast discovery has been removed from Elasticsearch 2.x (although it is still provided as an Elasticsearch plugin for now).

To reflect this change, the `elasticsearch_discovery_zen_ping_unicast_hosts` now has to contain the address of at least one Elasticsearch node in the cluster which Graylog can connect to.

Default network host

The network interface which Elasticsearch binds to (`elasticsearch_network_host`) has been changed to localhost (i. e. `127.0.0.1` or `:::1`); see [Network changes/Bind to localhost](#).

If Elasticsearch is not running on the same machine, `elasticsearch_network_host` must be set to a host name or an IP address which can be accessed by the other Elasticsearch nodes in the cluster.

Index range types

Note: This step needs to be performed before the update to Elasticsearch 2.x!

Some Graylog versions stored meta information about indices in elasticsearch, alongside the messages themselves. Since Elasticsearch 2.0 having multiple types with conflicting mappings is no longer possible, which means that the `index_range` type must be removed before upgrading to Elasticsearch 2.x.

Find out if your setup is affected by running (replace `$elasticsearch` with the address of one of your Elasticsearch nodes) `curl -XGET $elasticsearch:9200/_all/_mapping/index_range; echo`

If the output is `{}` you are not affected and can skip this step.

Otherwise, you need to delete the `index_range` type, Graylog does not use it anymore.

As Graylog sets older indices to read-only, first we need to remove the write block on those indices. Since we'll be working with Elasticsearch's JSON output, we recommend installing the `jq` utility which should be available on all popular package managers or directly at [GitHub](#).

```
for i in `curl -s -XGET $elasticsearch:9200/_all/_mapping/index_range | jq -r "keys[]"`  
do  
    echo -n "Updating index $i: "  
    echo -n "curl -XPUT $elasticsearch:9200/$i/_settings -d '{\"index.blocks.read_\"  
only\":false, \"index.blocks.write\":false}' : "  
    curl -XPUT $elasticsearch:9200/$i/_settings -d '{"index.blocks.read_only":false,  
"index.blocks.write":false}'  
    echo  
done
```

The output for each of the curl commands should be `{"acknowledged":true}`. Next we have to delete the `index_range` mapping. We can perform this via the next command.

Note: We strongly recommend to perform this on a single index before running this bulk command. This operation can be expensive to perform if you have a lot of affected indices.

```
for i in `curl -s -XGET $elasticsearch:9200/_all/_mapping/index_range | jq -r "keys[]"`  
do  
    echo -n "Updating index $i: "  
    curl -XDELETE $elasticsearch:9200/$i/index_range  
    echo  
done
```

It is not strictly necessary to set the indices back to read only, but if you prefer to do that, note the index names and commands during the first step and change the `false` into `true`.

Graylog Index Template

Graylog applies a custom [index template](#) to ensure that the indexed messages adhere to a specific schema.

Unfortunately the index template being used by Graylog 1.x is incompatible with Elasticsearch 2.x and has to be removed prior to upgrading.

In order to [delete the index template](#) the following curl command has to be issued against one of the Elasticsearch nodes:

```
curl -X DELETE http://localhost:9200/_template/graylog-internal
```

Graylog will automatically create the new index template on the next startup.

Dots in field names

One of the most important breaking changes in Elasticsearch 2.x is that [field names may not contain dots](#) anymore.

Using the [Elasticsearch Migration Plugin](#) might help to highlight some potential pitfalls if an existing Elasticsearch 1.x cluster should be upgraded to Elasticsearch 2.x.

4.1.2 MongoDB

Graylog 2.x requires MongoDB 2.4 or newer. We recommend using MongoDB 3.x and the [WiredTiger storage engine](#).

When upgrading from MongoDB 2.0 or 2.2 to a supported version, make sure to read the [Release Notes](#) for the particular version.

4.1.3 Log4j 2 migration

Graylog switched its logging backend from [Log4j 1.2](#) to [Log4j 2](#).

Please refer to the [Log4j Migration Guide](#) for information on how to update your existing logging configuration.

4.1.4 Dead Letters feature removed

The Dead Letters feature, which stored messages that couldn't be indexed into Elasticsearch for various reasons, has been removed.

This feature has been disabled by default. If you have enabled the feature the configuration file, please check the `dead_letters_enabled` collection in MongoDB and remove it afterwards.

4.1.5 Removed configuration settings

Index Retention and Rotation Settings

In 2.0.0 the index rotation and retention settings have been moved from the Graylog server config file to the database and are now configurable via the web interface.

The old settings from the `graylog.conf` or `/etc/graylog/server/server.conf` will be migrated to the database.

Warning: When you upgrade from a 1.x version and you modified any rotation/retention settings, please make sure you **KEEP** your old settings in the config file so the migration process will add your old settings to the database! Otherwise the retention process will use the default settings and might remove a lot of indices.

Overview

Some settings, which have been deprecated in previous versions, have finally been removed from the Graylog configuration file.

Table 1: Removed configuration settings

Setting name	Replacement
mongodb_host	mongodb_uri
mongodb_port	mongodb_uri
mongodb_database	mongodb_uri
mongodb_useauth	mongodb_uri
mongodb_user	mongodb_uri
mongodb_password	mongodb_uri
elasticsearch_node_name	elasticsearch_node_name_prefix
collector_expiration_threshold	(moved to collector plugin)
collector_inactive_threshold	(moved to collector plugin)
rotation_strategy	UI in web interface (System/Indices)
retention_strategy	UI in web interface (System/Indices)
elasticsearch_max_docs_per_index	UI in web interface (System/Indices)
elasticsearch_max_size_per_index	UI in web interface (System/Indices)
elasticsearch_max_time_per_index	UI in web interface (System/Indices)
elasticsearch_max_number_of_indices	UI in web interface (System/Indices)
dead_letters_enabled	None

4.1.6 Changed configuration defaults

For better consistency, the defaults of some configuration settings have been changed after the project has been re-named from *Graylog2* to *Graylog*.

Table 2: Configuration defaults

Setting name	Old default	New default
elasticsearch_cluster_name	graylog2	graylog
elasticsearch_node_name	graylog2-server	graylog-server
elasticsearch_index_prefix	graylog2	graylog
elasticsearch_discovery_zen_ping_unicast_enabled	empty hosts	127.0.0.1:9300
elasticsearch_discovery_zen_ping_multicast_enabled	true	false
mongodb_uri	mongodb://127.0.0.1/graylog2	mongodb://localhost/graylog

4.1.7 Changed prefixes for configuration override

In the past it was possible to override configuration settings in Graylog using environment variables or Java system properties with a specific prefix.

For better consistency, these prefixes have been changed after the project has been renamed from *Graylog2* to *Graylog*.

Table 3: Configuration override prefixes

Override	Old prefix	New prefix	Example
Environment variables	GRAYLOG2_	GRAYLOG_	GRAYLOG_IS_MASTER
System properties	graylog2.	graylog.	graylog.is_master

4.1.8 REST API Changes

The output ID key for the list of outputs in the `/streams/*` endpoints has been changed from `_id` to `id`.

```
{
  "id": "564f47c41ec8fe7d920ef561",
  "creator_user_id": "admin",
  "outputs": [
    {
      "id": "56d6f2cce45e0e52d1e4b9cb", // ==> Changed from `_id` to `id`
      "title": "GELF Output",
      "type": "org.graylog2.outputs.GelfOutput",
      "creator_user_id": "admin",
      "created_at": "2016-03-02T14:03:56.686Z",
      "configuration": {
        "hostname": "127.0.0.1",
        "protocol": "TCP",
        "connect_timeout": 1000,
        "reconnect_delay": 500,
        "port": 12202,
        "tcp_no_delay": false,
        "tcp_keep_alive": false,
        "tls_trust_cert_chain": "",
        "tls_verification_enabled": false
      },
      "content_pack": null
    }
  ],
  "matching_type": "AND",
  "description": "All incoming messages",
  "created_at": "2015-11-20T16:18:12.416Z",
  "disabled": false,
  "rules": [],
  "alert_conditions": [],
  "title": "ALL",
  "content_pack": null
}
```

4.1.9 Web Interface Config Changes

The web interface has been integrated into the Graylog server and was rewritten in React. Therefore configuring it has changed fundamentally since the last version(s). Please consult [Web interface](#) for details.

Please take note that the `application.context` configuration parameter present in Graylog 1.x (and earlier) is not existing anymore. The web interface can currently only be served without a path prefix.

4.2 Upgrading to Graylog 2.1.x

4.2.1 HTTPS Setup

Previous versions of Graylog were automatically generating a private key/certificate pair for HTTPS if either the private key or the certificate (or both) for `rest_tls_key_file`, `rest_tls_cert_file`, `web_tls_key_file`, or `web_tls_cert_file` couldn't be read. While this feature is very comfortable for inexperienced users, it has lots of serious drawbacks like very weak key sizes (only 1024 bits), being untrusted by all TLS libraries used by web browsers and other client software (because they are self-signed and not included in the system's CA/trust store), and problems with inter-node communications with other Graylog nodes.

Due to those shortcomings, the feature has been removed completely. Users need to use proper certificates or generate their own self-signed certificates and configure them with the appropriate settings, see [Using HTTPS](#) for reference.

4.2.2 Web Interface Listener

Graylog 2.0.x has been using separate listeners for the REST API and the web interface by default. The Graylog REST API on `http://127.0.0.1:12900`, the Graylog web interface on `http://127.0.0.1:9000`. Beginning with Graylog 2.1.0 it is possible to run both the REST API and the web interface on the same host/port-combination and this is now the default. This means that the REST API is now running on `http://127.0.0.1:9000/api/` by default and the web interface is now running on `http://127.0.0.1:9000/`. Furthermore, all requests going to `http://127.0.0.1:9000/api/` requesting a content-type of `text/html` or `application/xhtml+xml` are redirected to the web interface, therefore making it even easier to set up Graylog and use it behind proxies, expose it externally etc.

Please take note that you can still run the REST API and the web interface on two separate listeners. If you are running a Graylog 2.0.x configuration specifying `web_listen_uri` explicitly and you want to keep that, you do not have to change anything.

Please also take note, that when you have configured `rest_listen_uri` and `web_listen_uri` to run on the same host/port-combination, the following configuration directives will have no effect:

- `web_enable_tls`, `web_tls_cert_file`, `web_tls_key_file`, `web_tls_key_password` (These will depend on the TLS configuration of the REST listener).
- `web_enable_cors`, `web_enable_gzip`, `web_thread_pool_size`, `web_max_initial_line_length`, `web_max_header_size` (Those will depend on the corresponding settings of the REST listener).

4.2.3 Internal Metrics to MongoDB

Previous versions of Graylog included a (long deprecated) metrics reporter for writing internal `metrics` into MongoDB in a fixed interval of 1 second.

This feature has been removed completely and can be optionally pulled in by using the [Graylog Metrics Reporter Plugins](#).

4.2.4 Configuration file changes

Network settings

The network settings in the Graylog configuration file (`rest_listen_uri`, `rest_transport_uri`, and `web_listen_uri`) are now using the default ports for the HTTP (80) and HTTPS (443) if no custom port was given. Previously those settings were using the custom ports 12900 (Graylog REST API) and 9000 (Graylog web interface) if no explicit port was given.

Examples:

Configuration setting	Old effective URI	New effective URI
<code>rest_listen_uri = http://127.0.0.1:12900/</code>	<code>http://127.0.0.1:12900/</code>	<code>http://127.0.0.1:12900/</code>
<code>rest_listen_uri = http://127.0.0.1/</code>	<code>http://127.0.0.1:12900/</code>	<code>http://127.0.0.1:80/</code>
<code>rest_listen_uri = https://127.0.0.1/</code>	<code>https://127.0.0.1:12900/</code>	<code>https://127.0.0.1:443/</code>

Collector Sidecar

The network changes are reflected in the Sidecar configuration as well and should be adopted. However it's still possible to use the old API port by setting it explicitly. In case a mass deployment is too hard to change, just run the following to switch back to the old REST API port (OVA based installation):

```
sudo graylog-ctl set-listen-address --service rest --address http://0.0.0.0:12900
sudo graylog-ctl reconfigure
```

4.2.5 Graylog REST API

Removed resources

Original resource	Replacement
<code>/system/buffers</code>	<code>/system/metrics/org.graylog2.buffers.input.size</code>
	<code>/system/metrics/org.graylog2.buffers.input.usage</code>
	<code>/system/metrics/org.graylog2.buffers.process.size</code>
	<code>/system/metrics/org.graylog2.buffers.process.usage</code>
	<code>/system/metrics/org.graylog2.buffers.output.size</code>
	<code>/system/metrics/org.graylog2.buffers.output.usage</code>
<code>/system/buffers/classes</code>	None

Removed index rotation/retention settings from “/system/configuration”

The index rotation and retention settings have been moved to MongoDB in Graylog 2.0.0 but the representation of the old configuration options was still present in the `/system/configuration` resource.

In order to stay in sync with the actual configuration file, the following values have been removed:

- `rotation_strategy`
- `retention_strategy`
- `elasticsearch_max_docs_per_index`
- `elasticsearch_max_size_per_index`
- `elasticsearch_max_time_per_index`
- `elasticsearch_max_number_of_indices`

The retention and rotation configuration settings can be retrieved using the following resources:

- `/system/indices/rotation/config`
- `/system/indices/retention/config`

4.2.6 For Plugin Authors

Between Graylog 2.0.x and 2.1.0 we also made changes to the Plugin API. These include:

- Removing `org.graylog2.plugin.streams.Stream#getAlertCondition`, as it was faulty and not easily replaceable with a working version without breaking our separation of models and persistence services.

If you are maintaining a plugin that was originally written for Graylog 1.x or 2.0.x, you need to make sure that your plugin is still compiling and working under Graylog 2.1.x or adapt it if necessary.

UI Plugins

The new app prefix feature requires some changes in UI plugins to make them work with that.

- `import webpackEntry from 'webpack-entry';` needs to be added at the very top of the `src/web/index.jsx` file
- The `Routes.pluginRoute()` function needs to be used instead of a literal string to build URLs for links and buttons

Please check the [updated plugins documentation](#) for details.

4.2.7 Changed Elasticsearch Cluster Status Behavior

In previous versions Graylog stopped indexing into the current write index if the *Elasticsearch cluster status* turned RED. Since Graylog 2.1.0 only checks the status of the current write index when it tries to index messages.

If the current write index is GREEN or YELLOW, Graylog will continue to index messages even though the overall cluster status is RED. This avoids Graylog downtimes when doing Elasticsearch maintenance or when older indices have problems.

4.2.8 Changes in message field values trimming

Previous versions of Graylog were trimming message field values inconsistently, depending on the codec used. We have changed that behaviour in Graylog 2.1.0, so all message field values are trimmed by default. This means that leading or trailing whitespace of every field is removed during ingestion.

Important: This change will break your existing stream rules, extractors, and Drool rules if you are expecting leading or trailing white spaces in them. Please adapt them so they do not require those white spaces.

4.3 Upgrading to Graylog 2.2.x

4.3.1 Email Alarm Callback

Previous versions of Graylog created an implicit email alarm callback if no explicit callback existed for a stream.

Due to the extensive rework done in alerting, this behavior has been modified to be explicit, and more consistent with other entities within Graylog: from now on **there will not be a default alarm callback**.

To simplify the transition for people relying on this behavior, we have added a migration step that will create an email alarm callback for each stream that has alert conditions, has alert receivers, but has no associated alarm callbacks.

With to the introduction of email templates in 0.21, the `transport_email_subject_prefix` config setting became unused. It is now being removed completely. In early versions it was used to add a prefix to the generated subject of alerting emails. Since 0.21 it is possible to define a complete template used for the generation of alert email subjects.

4.3.2 Alert Notifications (previously known as Alarm Callbacks)

Graylog 2.2.0 introduces some changes in alerting. Alerts have now states, helping you to know in an easier way if something requires your attention.

These changes also affect the way we send notifications: Starting in Graylog 2.2.0, alert notifications are only executed **once**, just when a new alert is triggered. As long as the alert is unresolved or in grace period, **Graylog will not send further notifications**. This will help you reducing the noise and annoyance of getting notified way too often when a problem persists for a while.

If you are using Graylog for alerting, please take a moment to ensure this change will not break any of your processes when an alert occurs.

4.3.3 Default stream/Index Sets

With the introduction of index sets, and the ability to change a stream's write target, the default stream needs additional information, which is calculated when starting a new Graylog 2.2 master node.

It requires recalculation of the index ranges of the default stream's index set, which when updating from pre-2.2 versions is stored in the `graylog_index`. This is potentially expensive, because it has to calculate three aggregations across every open index to detect which streams are stored in which index.

Please be advised that this necessary migration can put additional load on your cluster.

Warning: Make sure that all rotation and retention strategy plugins you had installed in 2.1 are updated to a version that is compatible with 2.2 before you start the Graylog 2.2 version for the first time. (e.g. Graylog Enterprise) This is needed so the required data migrations will run without problems.

Warning: The option to remove a message from the default stream is currently not available when using the pipeline function `route_to_stream`. This will be fixed in a subsequent bug fix release. Please see [the corresponding Github issue](#).

4.3.4 RotationStrategy & RetentionStrategy Interfaces

The Java interfaces for `RetentionStrategy` and `RotationStrategy` changed in 2.2. The `#rotate()` and `#retain()` methods are now getting an `IndexSet` as first parameter.

This only affects you if you are using custom rotation or retention strategies.

4.3.5 Changes in Exposed Configuration

The exposed configuration settings on the `/system/configuration` resource of the Graylog REST API doesn't contain the following (deprecated) Elasticsearch-related settings anymore:

- `elasticsearch_shards`
- `elasticsearch_replicas`
- `index_optimization_max_num_segments`
- `disable_index_optimization`

4.3.6 Changes in Split & Count Converter

The behavior of the split & count converter has been changed to that it resembles typical `split()` functions.

Previously, the split & count converter returned 0, if the split pattern didn't occur in the string. Now it will return 1.

Examples:

String	Split Pattern	Old Result New Result	
<empty>	-	0	0
foo	-	0	1
foo-bar	-	2	2

4.3.7 Graylog REST API

Streams API

Due to the introduction of index sets, the payload for creating, updating and cloning of streams now requires the `index_set_id` field. The value for this needs to be the ID of an existing index set.

Affected endpoints:

- `POST /streams`
- `PUT /streams/{streamId}`
- `POST /streams/{streamId}/clone`

4.4 Upgrading to Graylog 2.3.x

4.4.1 Graylog switches to Elasticsearch HTTP client

In all prior versions, Graylog used the Elasticsearch node client to connect to an Elasticsearch cluster, which was acting as a client-only Elasticsearch node. For compatibility reasons of the used binary transfer protocol, the range of Elasticsearch versions Graylog could connect to was limited. For more information and differences between the different ways to connect to Elasticsearch, you can check the [Elasticsearch documentation](#).

Starting with version 2.3.0, we are switching over to using a lightweight HTTP client, which is almost version-agnostic. The biggest change is that it does not connect to the Elasticsearch native protocol port (defaulting to 9300/tcp), but the Elasticsearch HTTP port (defaulting to 9200/tcp).

Due to the differences in connecting to the Elasticsearch cluster, configuring Graylog has changed. These configuration settings have been removed:

```
elasticsearch_cluster_discovery_timeout
elasticsearch_cluster_name
elasticsearch_config_file
elasticsearch_discovery_initial_state_timeout
elasticsearch_discovery_zen_ping_unicast_hosts
elasticsearch_http_enabled
elasticsearch_network_bind_host
elasticsearch_network_host
elasticsearch_network_publish_host
elasticsearch_node_data
elasticsearch_node_master
elasticsearch_node_name_prefix
elasticsearch_path_data
elasticsearch_path_home
elasticsearch_transport_tcp_port
```

The following configuration options are now being used to configure connectivity to Elasticsearch:

Config Setting	Type	Comments	Default
elasticsearch_connect_timeout	Duration	Timeout when connection to individual Elasticsearch hosts	10s (10 Seconds)
elasticsearch_hosts	List<URI>	Comma-separated list of URIs of Elasticsearch hosts	http://127.0.0.1:9200
elasticsearch_idle_timeout	Duration	Timeout after which idle connections are terminated	-1s (Never)
elasticsearch_max_total_connections	int	Maximum number of total Elasticsearch connections	20
elasticsearch_max_total_connections_per_route/host	int	Maximum number of Elasticsearch connections per route/host	2
elasticsearch_max_retries	int	Maximum number of retries for requests to Elasticsearch	2
elasticsearch_socket_timeout	Duration	Timeout when sending/receiving from Elasticsearch connection	60s (60 Seconds)
elasticsearch_discovery_enabled	boolean	Enable automatic Elasticsearch node discovery	false
elasticsearch_discovery_filter	String	Filter by node attributes for the discovered nodes	empty (use all nodes)
elasticsearch_discovery_frequency	Duration	Frequency of the Elasticsearch node discovery	30s (30 Seconds)

In most cases, the only configuration setting that needs to be set explicitly is `elasticsearch_hosts`. All other configuration settings should be tweaked only in case of errors.

Warning: The automatic node discovery does not work if Elasticsearch requires authentication, e. g. when using Shield (X-Pack).

Caution: Graylog does not react to externally triggered index changes (creating/closing/reopening/deleting an index) anymore. All of these actions need to be performed through the Graylog REST API in order to retain index consistency.

Special note for upgrading from an existing Graylog setup with a new Elasticsearch cluster

If you are upgrading the Elasticsearch cluster of an existing Graylog setup without migrating the indices, your Graylog setup contains stale index ranges causing nonexistent index errors upon search/alerting. To remediate this, you need to manually trigger an index range recalculation for all index sets once. This is possible using the web interface using the System->Indices functionality or by using the REST API using the `/system/indices/ranges/<index set id>/rebuild` endpoint.

4.4.2 Graylog REST API

Rotation and Retention strategies

The deprecated HTTP resources at `/system/indices/rotation/config` and `/system/indices/retention/config`, which didn't work since Graylog 2.2.0, have been removed.

These settings are part of the index set configuration and can be configured under `/system/indices/index_sets`.

Stream List Response structure does not include *in_grace* field anymore

The response to `GET /streams`, `GET /streams/<id>` & `PUT /streams/<id>` does not contain the `in_grace` field for configured alert conditions anymore.

The value of this flag can be retrieved using the `GET /alerts/conditions` endpoint, or per stream using the `GET /streams/<streamId>/alerts/conditions` endpoint.

4.5 Upgrading to Graylog 2.4.x

You can upgrade from Graylog 2.3.x to Graylog 2.4.x without the need to change the configuration of your Graylog server.

4.5.1 More plugins shipped by default

The following Graylog plugins are now shipped as part of the Graylog server release.

- AWS Plugin - <https://github.com/Graylog2/graylog-plugin-aws>
- Threat Intelligence Plugin - <https://github.com/Graylog2/graylog-plugin-threatintel>
- NetFlow Plugin - <https://github.com/Graylog2/graylog-plugin-netflow>
- CEF Plugin - <https://github.com/Graylog2/graylog-plugin-cef>

Warning: Make sure you remove all previous versions of these plugins from your `plugin/` folder before starting the new Graylog version!

4.6 Upgrading to Graylog 2.5.x

4.6.1 Protecting against CSRF, HTTP header required

Using the Graylog server API requires all clients sending non-GET requests to include a custom HTTP header (`X-Requested-By`). The value of the header is not important, but its presence is, as all requests without it will be ignored and will return a 400 error.

This is important for people using scripts that modify Graylog in any way through the REST API. We already adapted Graylog web interface and our plugins, so if you don't use any scripts or 3rd party products to access Graylog, you don't have to do anything else.

If you are using the Graylog Sidecar, you either have to use Graylog version 2.5.1 or update the Sidecar to [version 0.1.7](#). That version is using the correct CSRF headers for HTTP requests against the Graylog server API.

4.6.2 Elasticsearch 6 changes

There is a breaking change in Elasticsearch 6 that may affect some queries on your searches and dashboards:

Before Elasticsearch 6, queries for keyword fields were split by whitespaces and combined with OR operators resulting, for example, in `type:(ssh login)` and `type:(ssh OR login)` being equivalent. This is no longer the case in Elasticsearch 6 and now those queries are different: the former looking for the `ssh login` value, the second for either `ssh` or `login` values.

Please ensure to look for those queries in your Graylog setup before upgrading to Elasticsearch 6 and add the OR operators where needed.

4.7 Upgrading to Graylog 3.0.x

4.7.1 Elasticsearch Version Requirements

Graylog 3.0 drops support for Elasticsearch versions before 5.6.x. That means you have to upgrade Elasticsearch to at least version 5.6.13 before upgrading Graylog to version 3.0. Make sure to read the Elasticsearch upgrade guides before doing that.

4.7.2 Simplified HTTP interface configuration

Graylog used to have a lot of different settings regarding the various HTTP interfaces it provides, namely the Graylog REST API and the Graylog web interface.

This mostly originates from the fact that Graylog used to consist of two components before Graylog 2.0.0, a server component and a separate web interface.

The changes in this release finally merge the HTTP listeners for the Graylog REST API and web interface into a single HTTP listener, which should make the initial configuration of Graylog simpler and reduce errors caused by conflicting settings.

The path of the Graylog REST API is now hard-coded to `/api`, so if you're still using the legacy URI on port 12900/tcp or have been using a custom path (via the `rest_listen_uri` or `rest_transport_uri` settings), you'll have to update the URI used to access the Graylog REST API.

This might also affect your **Graylog Collector Sidecars**. Make sure to check each `collector_sidecar.yml` and update the `server_url` accordingly.

If you are using a reverse proxy in front of Graylog (like nginx) and configured it to set the `X-Graylog-Server-URL` HTTP header, you have to remove the `api/` suffix because that is now the default. (as mentioned above)

Example:

```
# This nginx setting in Graylog <3.0 ...
header_upstream X-Graylog-Server-URL http://{host}/api

# ... needs to be changed to the following with Graylog 3.0
header_upstream X-Graylog-Server-URL http://{host}/
```

For a more detailed description of the new HTTP settings, please consult the annotated [Graylog configuration file](#).

Overview of removed Graylog REST API settings:

Removed Setting	New Setting	Default
<code>rest_listen_uri</code>	<code>http_bind_address</code>	127.0.0.1:9000
<code>rest_transport_uri</code>	<code>http_publish_uri</code>	<code>http://</code> <code>\$http_bind_address/</code>
<code>web_endpoint_uri</code>	<code>http_external_uri</code>	<code>\$http_publish_uri</code>
<code>rest_enable_cors</code>	<code>http_enable_cors</code>	true
<code>rest_enable_gzip</code>	<code>http_enable_gzip</code>	true
<code>rest_max_header_size</code>	<code>http_max_header_size</code>	8192
<code>rest_max_initial_line_length</code>	<code>http_max_initial_line_length</code>	4096
<code>rest_thread_pool_size</code>	<code>http_thread_pool_size</code>	16
<code>rest_enable_tls</code>	<code>http_enable_tls</code>	false
<code>rest_tls_cert_file</code>	<code>http_tls_cert_file</code>	Empty
<code>rest_tls_key_file</code>	<code>http_tls_key_file</code>	Empty
<code>rest_tls_key_password</code>	<code>http_tls_key_password</code>	Empty

Overview of removed Graylog web interface settings:

Removed Setting	New Setting	Default
web_enable	None	
web_listen_uri	http_bind_address	127.0.0.1:9000
web_enable_cors	http_enable_cors	true
web_enable_gzip	http_enable_gzip	true
web_max_header_size	http_max_header_size	8192
web_max_initial_line_length	http_max_initial_line_length	4096
web_thread_pool_size	http_thread_pool_size	16
web_enable_tls	http_enable_tls	false
web_tls_cert_file	http_tls_cert_file	Empty
web_tls_key_file	http_tls_key_file	Empty
web_tls_key_password	http_tls_key_password	Empty

4.7.3 Plugins merged into the Graylog server

Starting with Graylog 3.0.0, the following official plugins were merged into the Graylog server:

- [Beats Input](#)
- [CEF Input](#)
- [Collector Plugin](#)
- [Enterprise Integration Page](#)
- [Map Widget](#)
- [NetFlow Input](#)
- [Pipeline Processor](#)

That means these plugins are not available as separate plugins anymore. If you manually update your Graylog installation (without using operating system packages), make sure to remove all old plugin files from the [plugin_dir](#) folder.

The old issues in these repositories are still available for reference but new issues should only be created in the [Graylog server issue tracker](#).

The following HTTP API paths changed due to the plugin merge:

Old Path	New Path
/plugins/org.graylog.plugins.map/mapdata	/search/mapdata
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/pipeline	/system/pipelines/pipeline
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/pipeline/parse	/system/pipelines/pipeline/parse
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/rule	/system/pipelines/rule
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/rule/functions	/system/pipelines/rule/functions
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/rule/multiple	/system/pipelines/rule/multiple
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/rule/parse	/system/pipelines/rule/parse
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/connections	/system/pipelines/connections
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/connections/to_stream	/system/pipelines/connections/to_stream
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/connections/to_pipeline	/system/pipelines/connections/to_pipeline
/plugins/org.graylog.plugins.pipelineprocessor/system/pipelines/simulate	/system/pipelines/simulate

4.7.4 New “bin_dir” and “data_dir” configuration parameters

We introduced two new configuration parameters related to file system paths.

- `bin_dir` config option points to the directory that contains scripts like `graylogctl`.
- `data_dir` option configures the base directory for Graylog server state.

Please check the updated default `graylog.conf` configuration file for required changes to your existing file.

4.7.5 Removed support for Drools-based filters

For a long time, Graylog allowed to use [Drools](#) to filter messages. Unfortunately, using Drools to perform complex filter logic came with a performance penalty and wasn't as flexible as we would have liked it to be.

Starting with Graylog 3.0.0, the support for Drools-based message filters has been removed from Graylog. The `rules_file` configuration setting has been removed accordingly.

We recommend migrating the Drools-based logic to [Processing Pipelines](#).

Drools-based blacklist

Graylog provided undocumented blacklist-functionality based on Drools. This blacklist could only be modified via the Graylog REST API on the `/filters/blacklist` resource.

If you've been using this functionality, you'll have to migrate these blacklist rules to the [Processing Pipelines](#).

To check if you're using the Drools-based blacklist in Graylog prior to version 3.0.0, you can run the following command:

```
# curl -u admin:password -H 'Accept: application/json' 'http://graylog.example.com/
↳api/filters/blacklist?pretty=true'
```

String-based blacklist rule

Old blacklist rule:

```
{
  "id" : "54e300001234123412340001",
  "type" : "string",
  "name" : "String Blacklist",
  "description" : "Drop messages based on case-insensitive string comparison",
  "fieldName" : "custom_field",
  "pattern" : "EXAMPLE pattern",
  "creator_user_id" : "admin",
  "created_at" : "2018-04-04T12:00:00.000Z"
}
```

New pipeline rule:

```
rule "string-blacklist"
when
  has_field("custom_field") &&
  lowercase(to_string($message.custom_field)) == "example pattern"
then
  drop_message();
end
```

See also:

- `has_field()`
- `lowercase()`
- `drop_message()`

Regex-based blacklist rule

Old blacklist rule:

```
{
  "id" : "54e300001234123412340002",
  "type" : "regex",
  "name" : "Regex Blacklist",
  "description" : "Drop messages based on regular expression",
  "fieldName" : "custom_field",
```

(continues on next page)

(continued from previous page)

```
"pattern" : "^EXAMPLE.*",
"creator_user_id" : "admin",
"created_at" : "2018-04-04T12:00:00.000Z"
}
```

New pipeline rule:

```
rule "regex-blacklist"
when
  has_field("custom_field") &&
  regex("^EXAMPLE.*", to_string($message.custom_field)).matches == true
then
  drop_message();
end
```

See also:

- [has_field\(\)](#)
- [regex\(\)](#)
- [drop_message\(\)](#)

IP Range-based blacklist rule

Old blacklist rule:

```
{
  "id" : "54e300001234123412340003",
  "type" : "iprange",
  "name" : "IP Blacklist",
  "description" : "Drop messages based on IP address",
  "fieldName" : "custom_field",
  "pattern" : "192.168.0.0/16",
  "creator_user_id" : "admin",
  "created_at" : "2018-04-04T12:00:00.000Z"
}
```

New pipeline rule:

```
rule "ip-blacklist"
when
  has_field("custom_field") &&
  cidr_match("192.168.0.0/16", to_ip($message.custom_field))
then
  drop_message();
end
```

See also:

- [has_field\(\)](#)
- [to_ip\(\)](#)
- [cidr_match\(\)](#)
- [drop_message\(\)](#)

4.7.6 Changed metrics name for stream rules

The name of the metrics for stream rules have been changed to include the stream ID which helps identifying the actual stream they are related to.

Old metric name:

```
org.graylog2.plugin.streams.StreamRule.${stream-rule-id}.executionTime
```

New metric name:

```
org.graylog2.plugin.streams.Stream.${stream-id}.StreamRule.${stream-rule-id}.  
↔executionTime
```

4.7.7 Email alarm callback default settings

The defaults of the configuration settings for the email alarm callback with regard to encrypted connections have been changed.

Setting	Old default	New default
transport_email_use_tls	false	true
transport_email_use_ssl	true	false

Furthermore, it's not possible anymore to enable both settings (SMTP with STARTTLS and SMTP over SSL) at the same time because this led to errors at runtime when Graylog tried to upgrade the connection to TLS with STARTTLS in an already existing SMTPS connection.

Most SMTP services prefer SMTP with STARTTLS to provide an encrypted connection.

4.7.8 Collector Sidecar is deprecated

Graylog 3.0 comes with a new Sidecar implementation. We still support the old **Collector Sidecars**, which can be found in the `System / Collectors (legacy)` menu entry. For more information check the [Sidecar documentation](#) and the [Upgrade guide](#).

4.7.9 Legacy Content Packs

The implementation of content packs were fundamentally reworked. Parameters were added and checks implemented to give the user better usability. This rework did come with the cost that old content packs might not work any longer and stop the new content packs from loading. If the content packs page does not finish loading we recommend to remove the old content packs from your MongoDB. For that, please connect to your MongoDB shell and remove all content packs with the following command:

```
> db.content_packs.deleteMany({})
```

This command will only remove the content packs, it will not remove the installed configurations.

4.7.10 Elasticsearch 6 changes

There is a breaking change in Elasticsearch 6 that may affect some queries on your searches and dashboards:

Before Elasticsearch 6, queries for keyword fields were split by whitespaces and combined with OR operators resulting, for example, in `type: (ssh login)` and `type: (ssh OR login)` being equivalent. This is no longer the case in Elasticsearch 6 and now those queries are different: the former looking for the `ssh login` value, the second for either `ssh` or `login` values.

Please ensure to look for those queries in your Graylog setup before upgrading to Elasticsearch 6 and add the OR operators where needed.

4.8 Upgrading to Graylog 3.1.x

Overview

- *Upgrading to Graylog 3.1.x*
 - *Views & Extended Search*
 - * *HTTP API Changes*
 - * *Configuration File Changes*
 - *Alerts*
 - * *Alarm Callback Plugins*
 - * *Alert Condition Plugins*
 - * *Deprecated HTTP API Endpoints*
 - * *Configuration File Changes*

4.8.1 Views & Extended Search

The Views and Extended Search feature has been open-sourced in this version. (except the support for parameters) It was only accessible in Graylog Enterprise in Graylog 3.0.

HTTP API Changes

The following Views related HTTP API paths changed due to the migration to open source:

Old Path	New Path
<code>/api/plugins/org.graylog.plugins.enterprise/views</code>	<code>/api/views</code>
<code>/api/plugins/org.graylog.plugins.enterprise/search</code>	<code>/api/views/search</code>

Configuration File Changes

The following views related configuration file settings changed due to the migration to open source:

Removed Setting	New Setting
enterprise_search_maximum_search_age	views_maximum_search_age

4.8.2 Alerts

The old Alerts system has been replaced by an Alerts & Events system in Graylog 3.1.

Existing alerts will be automatically migrated to the new system when the Graylog 3.1 server starts for the first time. The migration will log the number of migrated legacy alert conditions and alarm callbacks:

```
2019-08-05T10:36:06.404Z INFO [V20190722150700_LegacyAlertConditionMigration]_
↔Migrated <2> legacy alert conditions and <2> legacy alarm callbacks
```

Alarm Callback Plugins

The new Alerts & Events system is supporting the execution of legacy Alarm Callback plugins for now. We recommend to switch event definitions over to event notifications, though. At some point in the future support for legacy Alarm Callback plugins will be removed. More information for plugin developers can be found on the [Event Notifications](#) page.

Note: Please note, that the data sent via a legacy Alarm Callback might be slightly different than via the old Alerts system. If you've built automation on top of alerts, you might want to check that everything still works after the migration.

Alert Condition Plugins

The new Alerts & Events system is *not* supporting the execution of legacy Alert Condition plugins. Old alerts using the internal alert conditions are automatically migrated to new event definitions. (message count, field value and field content value conditions) Custom alert condition plugins cannot be migrated and need to be rewritten as event definitions in the new system.

Deprecated HTTP API Endpoints

The following HTTP API endpoints are deprecated and will be removed in a future release:

Deprecated API Endpoints
/api/streams/{streamid}/alerts/{alertId}/history
/api/streams/{streamid}/alerts/{alertId}/history
/api/alerts/callbacks
/api/alerts/callbacks/types
/api/alerts/callbacks/{alarmCallbackId}/test
/api/alerts/conditions
/api/alerts/conditions/types
/api/streams/alerts
/api/streams/alerts/paginated
/api/streams/alerts/{alertId}
/api/streams/{streamid}/alarmcallbacks
/api/streams/{streamid}/alarmcallbacks/available
/api/streams/{streamid}/alarmcallbacks/alarmCallbackId
/api/streams/{streamid}/alerts/conditions
/api/streams/{streamid}/alerts/conditions/test
/api/streams/{streamid}/alerts/conditions/{conditionId}
/api/streams/{streamid}/alerts/conditions/{conditionId}/test
/api/streams/{streamid}/alerts
/api/streams/{streamid}/alerts/check
/api/streams/{streamid}/alerts/paginated
/api/streams/{streamid}/alerts/receivers
/api/streams/{streamid}/alerts/sendDummyAlert

The deprecated API endpoints don't have a one to one mapping to new ones, but the following Endpoints can be used to manage Event Definitions and Event Notifications as well as search for events:

New Events API Endpoints
/api/events/definitions
/api/events/entity_types
/api/events/notifications
/api/events/search

Configuration File Changes

The following alerting related configuration file settings changed in this release:

Setting	Status	Description
alert_check_interval	re-moved	Was part of the old and now removed alerts system.
processing_status_persist_interval	added	Related to the new alerts system.
processing_status_update_threshold	added	Related to the new alerts system.
processing_status_journal_write_rate_threshold	added	Related to the new alerts system.
default_events_index_prefix	added	Related to the new alerts system.
default_system_events_index_prefix	added	Related to the new alerts system.

See [server configuration page](#) for details on the new settings.

4.9 Upgrading to Graylog 3.2.x

Overview

- *Upgrading to Graylog 3.2.x*
 - *Migrating Dashboards*
 - *Changed Default TLS Protocols*
 - *Indexing Requests use HTTP Expect: 100-Continue Header*
 - *Accounted Message Size Field*
 - *Known Bugs and Limitations*
 - * *Configuration File Changes*

Warning: Graylog 3.2.0 comes with a number of migrations that change parts of your existing data fundamentally. Please make sure to have a recent backup of your MongoDB that you can rollback to, before attempting to upgrade from an earlier version.

4.9.1 Migrating Dashboards

Graylog 3.2 contains a massive overhaul of its dashboarding functionality, which comes with a different data structure for them. Therefore, when running Graylog 3.2 for the first time, existing dashboards are being migrated. We try to keep them the same way as before, with a few exceptions:

- Quickvalues widgets configured to show both a pie chart and a data table are split up into two different widgets
- Stacked Charts containing multiple series with different queries are split up by query. If a stacked chart contains 5 series, 3 with query “foo”, 2 with query “bar”, it is split up into two widgets, one containing all 3 “foo”-series, the other containing the 2 “bar”-series.
- Widgets created using 3rd party plugins are migrated with their config, but unless the plugin author creates a corresponding plugin for 3.2, a placeholder is shown.

4.9.2 Changed Default TLS Protocols

Graylog 3.2 will ship with a secure default of supported TLS protocols. This means that TLS 1.0 and TLS 1.1 won't be supported anymore. The new default setting affects all TLS enabled services such as message inputs or the graylog web interface. If needed, you can re-enable old TLS protocols with the newly introduced `enabled_tls_protocols` setting.

4.9.3 Indexing Requests use HTTP Expect: 100-Continue Header

Messages indexing requests to Elasticsearch are now executed with a HTTP Expect-Continue header. For the unlikely case that this is creating problems, it can be disabled using the newly introduced `elasticsearch_use_expect_continue` setting.

4.9.4 Accounted Message Size Field

Every message now includes the `gl2_accounted_message_size` field. To make sure this field will be created with the correct data type in all active write indices, the mapping of these indices needs to be updated. New indices created by index rotation will automatically have the correct mapping because the index template got updated automatically.

Note: The index mapping for the field `gl2_accounted_message_size` needs only be done if you want to use that instead. The next regular index rotation will create this for all new indices.

Warning: The following steps need to be executed **before** starting the server with the 3.2.0 version!

All of the following commands need to be executed against one of the Elasticsearch servers in the cluster.

First, a list of all active write indices is needed:

```
curl -s localhost:9200/_cat/aliases/*_deflector?h=index
```

For each of the index names returned by the previous command, the following command needs to be executed (<active-write-index-name> in the URL needs to be replaced with the actual index name):

```
curl -s -X PUT --data '{"properties":{"gl2_accounted_message_size":{"type": "long"}}}'  
↪ -H Content-Type:application/json localhost:9200/<active-write-index-name>/_  
↪mapping/message
```

The two steps could also be combined:

```
for index in `curl -s localhost:9200/_cat/aliases/*_deflector?h=index`; do curl -s -X_  
↪PUT --data '{"properties":{"gl2_accounted_message_size":{"type": "long"}}}' -H_  
↪Content-Type:application/json localhost:9200/$index/_mapping/message ; done
```

The Graylog servers can now be restarted with the 3.2.0 version.

4.9.5 Known Bugs and Limitations

- Some functionality of the search has been removed, namely:
- Retrieving the full query that is sent to Elasticsearch.
- Retrieving the list of terms a message field value was indexed with.
- The list of indices the current search used to generate results.
- The count of all received messages displayed next to the search. We will add the count again, once the calculation works as expected. As a workaround a message count widget can be added to the search.
- The message list widget currently does not allow sorting by field.

- The “Show surrounding messages” action is not part of 3.2.0, but will be reimplemented in a next version.

Configuration File Changes

The following configuration file settings changed in this release:

Setting	Status	Description
enabled_tls_protocols	added	Set system wide enabled TLS protocols

See *server configuration page* for details on the new settings.

4.10 Upgrading to Graylog 3.3.x

Overview

- *Upgrading to Graylog 3.3.x*
 - *[BREAKING] Fixing certificate validation for LDAP servers used for authentication*
 - *Deprecating legacy Aggregation API endpoints*
 - *API Access Token Encryption*
 - *Dashboards API*
 - *Saved Searches API*
 - *CSV Export API*
 - *Enterprise Audit Log*
 - *Notes for plugin authors*

4.10.1 [BREAKING] Fixing certificate validation for LDAP servers used for authentication

Prior to v3.3.3, the certificates of LDAP servers which are connected to using a secure connection (SSL or TLS) were not validated, even if the “Allow self-signed certificates” option was unchecked. Starting with v3.3.3, certificates are validated against the local default keystore. This might introduce a breaking change, depending on your local LDAP settings and the validity of the certificates used (if any). Please ensure that all certificates used are valid, their common name matches the host part of your configured LDAP server and your local keystore contains all CA/intermediate certs required for validation.

A [CVE](#) is tracked for this issue.

4.10.2 Deprecating legacy Aggregation API endpoints

This release is marking several endpoints of the legacy (pre 3.2) aggregation API as being deprecated. They will be removed in 4.0. These include:

- */search/universal/(absolute|relative|keyword)/*
 - *terms-histogram*
 - *histogram*
 - *fieldhistogram*
 - *stats*
 - *termsstats*
 - *terms*
- */sources*

These endpoints are not being used by the frontend anymore. In general, we try to replace very specific endpoints with more general, flexible ones. Deprecating and removing these endpoints frees development time for new things, which would otherwise need to be invested in maintaining legacy code. All of the functionality offered by these endpoints can be implemented by the *Views* API in a better way, please consult your local Swagger instance for details.

4.10.3 API Access Token Encryption

For improved security, all API access tokens will now be stored encrypted in the database. Existing API tokens will automatically be encrypted by a database migration on Graylog server startup.

Warning: The token encryption is using the `password_secret` value from `graylog.conf` (or `/etc/graylog/server/server.conf`) as encryption key. All Graylog nodes in the cluster need to have the same value configured for that option to make sure encryption/decryption works correctly. (if the values differ across your nodes, use the one from the master node for all other nodes)

4.10.4 Dashboards API

Since 3.2.0, the legacy dashboards API was still accessible and functional under */dashboards*, you could create, manipulate and delete legacy dashboards, but this had no effect in the frontend. Starting with 3.3.0, the legacy dashboards API will be moved to */legacy/dashboards*. The current dashboards will be accessible through */dashboards* again. The pre-3.2.0 route for the current dashboards (*/views/dashboards*) will redirect there as well. Please note that the format has changed. You can see the new format for dashboards in the API browser.

We are planning to remove the legacy dashboards API and the */views/dashboards* redirect in the next major upgrade of Graylog.

4.10.5 Saved Searches API

Since 3.2.0, the legacy saved searches API was still accessible and functional under `/search/saved`, you could create, manipulate and delete legacy saved searches, but this had no effect in the frontend. Starting with 3.3.0, the legacy saved searches API will be moved to `/legacy/search/saved`. The current saved searches will be accessible through `/search/saved` again. The pre-3.2.0 route for the current saved searches (`/views/savedSearches`) will redirect there as well. Please note that the format has changed. You can see the new format for saved searches in the API browser.

We are planning to remove the legacy saved searches API and the `/views/savedSearches` redirect in the next major upgrade of Graylog.

4.10.6 CSV Export API

For 3.3.0 a new endpoint for creating CSV exports has been added under `/views/search/messages`.

We are planning to remove the older export endpoints in the next major upgrade of Graylog: - `/search/universal/absolute/export` - `/search/universal/keyword/export` - `/search/universal/relative/export`

4.10.7 Enterprise Audit Log

The audit log messages now include detailed information for every search, dashboard and CSV export requests. This will increase the storage usage for the audit log collection in MongoDB.

4.10.8 Notes for plugin authors

Prior to 3.2.0, it was possible to consume a special `OkHttpClient` instance which bypassed the configured proxy. It was consumed by injecting it using the `@Named("systemHttpClient")` annotation. Since the `http_non_proxy_hosts` configuration directive exists, which allows configuring hosts which bypass the proxy, it is not required anymore and not used internally either. Therefore it is removed. We advise any plugin author aware of the usage of this functionality in the plugin to remove the `@Named` annotation so the generic client is used instead.

4.11 Upgrading to Graylog 4.0.x

Overview

- *Upgrading to Graylog 4.0.x*
 - *Breaking Changes*
 - * *Changes to the Elasticsearch Support*
 - * *LDAP and Active Directory configuration changes*
 - * *LDAP and Active Directory group mapping removed*
 - * *Fixing certificate validation for LDAP servers used for authentication*
 - * *Change of API endpoint for user retrieval and modification*
 - * *Disabled Cross-Origin Requests by Default*
 - * *Removal of pluggable authentication realm Java APIs*

- * *SSO Authentication Plugin*
- *API Endpoint Deprecations*
 - * *Deprecation of cluster stats endpoints*
 - * *Deprecation of API endpoint for unpaginated listing of grok patterns*
 - * *Deprecation of API endpoint for unpaginated listing of streams*
 - * *Deprecation of API endpoint for unpaginated listing of users*
- *API Endpoint Removals*
 - * *Removal of legacy Dashboard API*
 - * *Removal of legacy Saved Searches API*
 - * *Removal of legacy redirects for Dashboards & Saved Search API*
 - * *Removal of legacy LDAP API endpoints*

Warning: Please make sure to create a MongoDB database backup before starting the upgrade to Graylog 4.0!

Warning: If you are upgrading MongoDB from 3.X to 4.2, you must first [upgrade MongoDB to 4.0](#)

4.11.1 Breaking Changes

Changes to the Elasticsearch Support

Starting with Graylog v4.0, bigger changes to the Elasticsearch versions supported are happening:

- Support for Elasticsearch versions prior to v6.8.0 is dropped.
- Support for Elasticsearch v7.6 up to 7.10 is now included.

This means that you can upgrade to Graylog v4.0 without an Elasticsearch update only if you have been on at least Elasticsearch v6.8.0 before. Additionally, due to the fact that Elasticsearch supports only indices created by the last two major versions (i.e. ES6.8.0+ reads indices created by ES5 & ES6, while ES7 reads indices created by ES6 & ES7), you can change to Graylog v4.0 with an Elasticsearch update without reindexing only if you have been on at least Elasticsearch v6.0.0 before. If you have been on any older Elasticsearch version you need to reindex every index you want to keep once for every two major versions of Elasticsearch up to at least ES6.

When upgrading Elasticsearch from one major version to another, please read the upgrade guides provided by elastic:

- [To 6.8.0](#)
- [To 7.9.0](#)

And our [Elasticsearch Upgrade Notes](#).

Please do notice that Graylog does not support rolling upgrades between major versions, while Elasticsearch does. If you are upgrading from one major version of Elasticsearch to another, you need to restart Graylog in order to reinitialize the storage module. A procedure which allows a rolling upgrade of Elasticsearch between two major versions of a multi-node Graylog cluster is outlined [here](#).

LDAP and Active Directory configuration changes

The LDAP and Active Directory authentication and authorization support has been rewritten in Graylog 4.0. Existing LDAP settings will automatically be migrated to the new backend.

Because the new backends require more configuration settings than the old one, migrated backends are **disabled by default**! Please make sure to review the migrated backends under “System / Authentication” and enable one backend to make it possible to login with LDAP or Active Directory users again.

LDAP and Active Directory group mapping removed

The old LDAP and Active Directory group mapping has been replaced by teams support in Graylog Enterprise.

Existing custom roles will be migrated to the new entity sharing system on the first server startup.

See [Permission Management page](#) for more details.

Fixing certificate validation for LDAP servers used for authentication

Prior to v3.3.3, the certificates of LDAP servers which are connected to using a secure connection (SSL or TLS) were not validated, even if the “Allow self-signed certificates” option was unchecked. Starting with v3.3.3, certificates are validated against the local default keystore. This might introduce a breaking change, depending on your local LDAP settings and the validity of the certificates used (if any). Please ensure that all certificates used are valid, their common name matches the host part of your configured LDAP server and your local keystore contains all CA/intermediate certs required for validation.

A [CVE](#) is tracked for this issue.

Change of API endpoint for user retrieval and modification

In 4.0 we changed the following user API endpoints to expect a user ID parameter instead of the username:

Endpoint	Description
PUT /users/{userId}	Update user account
PUT /users/{userId}/password	Update user password
GET /users/{userId}/tokens	Get user tokens
POST /users/{userId}/tokens/{name}	Generate new user API token
DELETE /users/{userId}/tokens/{idOrToken}	Delete user API token

Disabled Cross-Origin Requests by Default

For improved security, Cross-Origin requests towards the API server are now disallowed by default. In the rare case, that your setup is serving the frontend assets from a different origin than the server, you can re-enable this with `http_enable_cors = true` in `graylog.conf`.

Removal of pluggable authentication realm Java APIs

The Java API to implement custom authentication realms has been removed and got replaced with the `AuthServiceBackend` Java API.

SSO Authentication Plugin

Due to the aforementioned removal of the pluggable authentication realm Java APIs, the [SSO Authentication Plugin](#) doesn't work with Graylog 4.0 anymore.

The core feature of the old SSO plugin (trusted HTTP header authentication) got integrated in the server.

The old SSO plugin **must be removed** from the plugin folder before starting a Graylog 4.0 server.

4.11.2 API Endpoint Deprecations

The following API endpoints are deprecated beginning with 4.0.

Deprecation of cluster stats endpoints

Starting with v4.0, the cluster stats endpoints are deprecated and will be removed in a future version. Those include:

- `/system/cluster/stats`
- `/system/cluster/stats/elasticsearch`
- `/system/cluster/stats/mongo`

Deprecation of API endpoint for unpaginated listing of grok patterns

In 3.0 we introduced a new API endpoint to retrieve grok patterns from the backend: `/system/grok/paginated` which allows to pass pagination parameters. We therefore mark `/system/grok` as deprecated. Users who use this endpoint for scripting purpose should change their scripts to the format of the new endpoint, so they only need to change the URL when `/system/grok/paginated` will become `/system/grok`.

Deprecation of API endpoint for unpaginated listing of streams

In 4.0 we introduce a new API endpoint to retrieve streams from the backend: `/streams/paginated` which allows to pass pagination parameters. We therefore mark `/streams` as deprecated. Users who use this endpoint for scripting purpose should change their scripts to the format of the new endpoint, so they only need to change the URL when `/streams/paginated` will become `/streams`.

Deprecation of API endpoint for unpaginated listing of users

In 4.0 we introduce a new API endpoint to retrieve users from the backend: `/users/paginated` which allows to pass pagination parameters. We therefore mark `/users` as deprecated. Users who use this endpoint for scripting purpose should change their scripts to the format of the new endpoint, so they only need to change the URL when `/users/paginated` will become `/users`.

4.11.3 API Endpoint Removals

The following API endpoints have been removed in 4.0.

Removal of legacy Dashboard API

Starting with 3.3, the previous Dashboard API was replaced by the views API. Therefore it was moved to a `/legacy` prefix and marked for deprecation. Now it is removed altogether.

Removal of legacy Saved Searches API

Starting with 3.3, the previous Saved Searches API was replaced by the views API. Therefore it was moved to a `/legacy` prefix and marked for deprecation. Now it is removed altogether.

Removal of legacy redirects for Dashboards & Saved Search API

For 3.3, the pre-views Dashboards & Saved Searches APIs were moved to a `/legacy` prefix. The new APIs were moved to `/dashboards` & `/search/saved` and legacy redirects were created for the previous routes (`/views/dashboards` & `/views/savedSearches`).

With 4.0, the legacy redirects (which were marked as being deprecated in 3.3) are removed.

Removal of legacy LDAP API endpoints

The following API endpoints for LDAP configuration management have been removed. They have been replaced with the new `/system/authentication/services/backends` API endpoints.

- GET `/system/ldap/settings`
- PUT `/system/ldap/settings`
- DELETE `/system/ldap/settings`
- GET `/system/ldap/settings/groups`
- PUT `/system/ldap/settings/groups`
- GET `/system/ldap/groups`
- POST `/system/ldap/test`

4.12 Upgrading Graylog Originally Installed from Image

2.x It is not possible to upgrade previous OVAs to Graylog 3.0.0.

3.x Starting with Graylog 3.0.0, OVAs use the Operating System packages, so you can upgrade your appliance by following [this update guide](#).

4.13 Upgrading Graylog Originally Installed from Package

If the current installation was installed using a package manager (ex. yum, apt), update the repository package to the target version, and use the system tools to upgrade the package. For .rpm based systems [this update guide](#) and for .deb based systems [this update guide](#) should help.

4.14 Upgrading Elasticsearch

Warning: We caution you not to install or upgrade Elasticsearch to 7.11 and later! It is not supported. If you do so, it will break your instance!

Since Graylog 2.3 Elasticsearch 5.x is supported. This Graylog version supports Elasticsearch 2.x and 5.x. It is recommended to update Elasticsearch 2.x to the latest stable 5.x version, after you have Graylog 2.3 or later running. This Elasticsearch upgrade does not need to be made during the Graylog update.

When upgrading from Elasticsearch 2.x to Elasticsearch 5.x, make sure to read [the upgrade guide](#) provided by Elastic. The Graylog [Elasticsearch configuration documentation](#) contains information about the compatible Elasticsearch version. After the upgrade you must *rotate the indices once manually*.

Graylog 2.5 is the first Graylog version that supports Elasticsearch 6. The upgrade might need more attention and include the need to reindex your data if you are upgrading from versions before 5.x. Make sure to check [our Elasticsearch 6 upgrade notes](#) for this and other requirements.

When upgrading from Elasticsearch 5.x to Elasticsearch 6.x, make sure to read the [upgrade guide](#) provided by Elastic.

Graylog 4.0 is the first release that supports Elasticsearch 7, the upgrade is recommended as soon as possible but might need more attention and include the need to reindex your data. Make sure to check [our Elasticsearch 7 upgrade notes](#) for this and other requirements.

When upgrading from Elasticsearch 6.x to Elasticsearch 7.x, make sure to read the [upgrade guide](#) provided by Elastic. The Graylog [Elasticsearch configuration documentation](#) contains information about the compatible Elasticsearch version. After the upgrade you must *rotate the indices once manually*.

Note: A note about rolling upgrades for Elasticsearch: Elasticsearch supports rolling upgrades to avoid downtimes during upgrades. Graylog supports rolling upgrades with no restart of any Graylog node for Elasticsearch as long as they are performed *between minor versions*. For more information please see [Rolling Upgrade Notes](#).

4.14.1 Elasticsearch Reindexing Notes

Overview

- [Elasticsearch Reindexing Notes](#)
 - [Reindexing procedure](#)
 - [Detailed list of commands](#)
 - * [Prerequisites](#)
 - * [Re-Index commands for every index](#)

* *Cleanup*

This page contains a list of commands which can be used to assist you in reindexing indices on new versions of Elasticsearch.

Reindexing procedure

These steps describe how to reindex an index on Elasticsearch. The detailed reference commands which can be used (after adjusting them to your specific details) are linked after each step.

1. Check that the index is not the active write index (*Cmd*)
2. Create a re-index target index: <index-name>_reindex (e.g. graylog_0_reindex) (with correct settings for shards and replicas) (*Cmd*)
3. Check that mapping and settings of the new index are correct (*Cmd*)
4. Start re-index task in ES (using requests_per_second URL param and size param in the payload to avoid overloading the ES cluster) (*Cmd*)
5. Check progress of re-index task and wait until it is done (*Cmd*)
6. Check that the document counts in the old and the new index match (*Cmd*)
7. Delete old index (*Cmd*)
8. Recreate the old index: <index-name> (e.g. graylog_0) (with correct settings for shards and replicas) (*Cmd*)
9. Check that mapping and settings of the new index are correct (*Cmd*)
10. Start re-index task in ES to re-index documents back into the old index (using requests_per_second URL param and size param in the payload to avoid overloading the ES cluster) (*Cmd*)
11. Check that the document counts in the old and the new index match (*Cmd*)
12. Recreate Graylog index ranges for the old index (*Cmd*)
13. Delete temporary re-index target index (e.g. graylog_0_reindex) (*Cmd*)

Detailed list of commands

Note: This is not a copy&paste tutorial and you need to read and adjust the commands to your local needs. We use the tools [httpie](#) and [jq](#) in the following commands.

Prerequisites

Check ES versions of all nodes

The ES version needs to be the same on all ES nodes in the cluster before we can start the re-index process!:

```
http ":9200/_cat/nodes?v&h=name,ip,version"
```

Check that all shards are initialized (“green”)

All shards need to be initialized before we can start the re-index process.:

```
http ":9200/_cat/indices?h=health,status,index" | grep -v '^green'
```

Update Graylog index templates in Elasticsearch

The index templates that Graylog writes to Elasticsearch need to be updated before we can start the re-index process.:

```
http post :9000/api/system/indexer/indices/templates/update x-requested-by:httpie
```

Collect indices that need a re-index to work with ES 6

All indices which have not been created with ES 5 need to be re-index to work with ES 6. (or deleted if they are not needed anymore...):

```
http :9200/_settings | jq '[ path(.[] | select(.settings.index.version.created <
↪ "5000000")) [] ]'
```

Re-Index commands for every index

The following commands need to be executed for every index that needs to be re-indexed. Replace the `graylog_0` index name in the examples below with the index name you are currently working on.

Check if index is an active write index

We should never re-index the active write target because that index is actively written to. If the active write index is still a 2.x ES index, a manual index rotation needs to be triggered.:

```
http :9200/*_deflector/_alias | jq 'keys'
```

Create new index

The new index needs to be created before it can be used as a re-index target. The request needs to include the correct settings for the number of shards and replicas. These settings can be different for each index set! (actual settings can be found in the Graylog “System / Indices” page for each index set):

```
http put :9200/graylog_0_reindex settings='{ "number_of_shards":4, "number_of_replicas
↪ ":0}'
```

Check mapping and index settings

Use these commands to check if the settings and index mapping for the new index are correct.:

```
http :9200/graylog_0_reindex/_mapping
http :9200/graylog_0_reindex/_settings
```

Start re-index process

This command starts the actual re-index process. It will return a task ID that can be used to check the progress of the re-index task in Elasticsearch.

The size value in the payload is the batch size that will be used for the re-index process. It defaults to 1000 and can be adjusted to tune the re-indexing process.:

```
http post :9200/_reindex wait_for_completion==false source='{ "index": "graylog_0",
↪ "size": 1000 }' dest='{ "index": "graylog_0_reindex" }'
```

The re-index API supports the `requests_per_second` URL parameter to throttle the re-index process. This can be useful to make sure that the re-index process doesn't take too much resources. See this document for an explanation on how the parameter works: https://www.elastic.co/guide/en/elasticsearch/reference/6.0/docs-reindex.html#_url_parameters_3:

```
http post :9200/_reindex wait_for_completion==false requests_per_second==500 source='{
↪ { "index": "graylog_0", "size": 1000 }' dest='{ "index": "graylog_0_reindex" }'
```

Wait for the re-index to complete and check re-index progress

The re-index progress can be checked with the following command using the task ID that has been returned by the re-index request.:

```
http :9200/_tasks/<task-id>
```

Compare documents in the old and new index

Before we continue, we should check that all documents have been re-indexed into the new index by comparing the document counts.:

```
http :9200/graylog_0/_count
http :9200/graylog_0_reindex/_count
```

Delete old index

Now delete the old index so we can recreate it for re-indexing.:

```
http delete :9200/graylog_0
```

Recreate old index

Recreate the old index again so we can use it as a re-index target. The request needs to include the correct settings for the number of shards and replicas. These settings can be different for each index set! (actual settings can be found in the Graylog “System / Indices” page for each index set):

```
http put :9200/graylog_0 settings='{ "number_of_shards":4,"number_of_replicas":0}'
```

Check mapping and index settings

Use these commands to check if the settings and index mapping for the recreated index are correct.:

```
http :9200/graylog_0/_mapping
http :9200/graylog_0/_settings
```

Start re-index process for old index

This command starts the re-index process to move back the documents into the old index. It will return a task ID that can be used to check the progress of the re-index task in Elasticsearch.

The size value in the payload is the batch size that will be used for the re-index process. It defaults to 1000 and can be adjusted to tune the re-indexing process.:

```
http post :9200/_reindex wait_for_completion==false source='{ "index": "graylog_0_
↳reindex", "size": 1000}' dest='{ "index": "graylog_0"}
```

The re-index API supports the `requests_per_second` URL parameter to throttle the re-index process. This can be useful to make sure that the re-index process doesn't take too much resources. See this document for an explanation on how the parameter works: https://www.elastic.co/guide/en/elasticsearch/reference/6.0/docs-reindex.html#_url_parameters_3:

```
http post :9200/_reindex wait_for_completion==false requests_per_second==500 source='{
↳{"index": "graylog_0_reindex", "size": 1000}' dest='{ "index": "graylog_0"}
```

Compare documents in the old and new index

Before we continue, we should check that all documents have been re-indexed into the re-created old index by comparing the document counts with the temporary index.:

```
http :9200/graylog_0/_count
http :9200/graylog_0_reindex/_count
```

Create index range for the recreated index

Graylog needs to know about the recreated index by creating an index range for it:

```
http post :9000/api/system/indices/ranges/graylog_0/rebuild x-requested-by:httpie
```

Delete temporary re-index target index

The temporary re-index target index can now be deleted because we don't use it anymore.:

```
http delete :9200/graylog_0_reindex
```

Cleanup

The re-index process leaves some tasks in Elasticsearch that need to be cleaned up manually.

Find completed re-index tasks for deletion

Execute the following command to get all the tasks we should remove.:

```
http :9200/_tasks/_search | jq '[.hits.hits[] | select(._source.task.action ==
↪ "indices:data/write/reindex" and ._source.completed == true) | {"task_id": ._id,
↪ "description": ._source.task.description}]'
```

Remove completed re-index tasks

Execute the following command for every completed task ID. Re-Index Commands:

```
http delete :9200/_tasks/task/<task-id>
```

4.14.2 Elasticsearch 6 Upgrade Notes

Upgrades from Elasticsearch 2.x direct to the latest Elasticsearch 6.x are not supported. Only the upgrade from Elasticsearch 5.x is supported and covered by this document.

At first check if the data in Elasticsearch need to be re-indexed:

```
$ http :9200/_settings | \
jq '[ path(.[] |select(._settings.index.version.created < "5000000"))[] ]'
```

The above example uses the tools [httpie](#) and [jq](#) to query the Elasticsearch API and check if any indices are created with Elasticsearch prior to Version 5. If that returns any index names, you need to re-index your data to make them work with Elasticsearch 6.

Upgrading to Elasticsearch 6 is always a [full-cluster-restart](#) and all breaking changes need to be checked carefully. Once started there is no going back or downgrade possible.

The [Elasticsearch breaking changes notes](#) contain a complete list of changes in Elasticsearch that should be checked against your configuration. The most notable is the cluster name is no longer allowed in *path.data* (see [breaking changes in Elasticsearch 6](#)) and the release of [Elasticsearch OSS Packages](#).

Upgrade without re-index

When no re-index is needed the easiest way is to follow the [elastic upgrade guide for Elasticsearch](#) this gives all needed commands.

Upgrade with re-index

First a brief overview what steps need to be performed followed by the list of commands. Once you started the process of reindex your data you need to finish all steps to get a working Graylog and Elasticsearch cluster again.

1. Upgrade to Graylog latest 2.4 release (2.4.6 at time of writing)
2. **Upgrade ES to the latest 5.6.x on all cluster nodes. (5.6.14 as of this writing)**
 - See: <https://www.elastic.co/guide/en/elasticsearch/reference/5.6/setup-upgrade.html>
3. **Wait until all shards are initialized after updating ES (Cmd)**
 - If the active write index is still a 2.x ES index, a manual index rotation needs to be triggered
4. Upgrade to Graylog 2.5 (2.5.1 at time of writing)
5. Update the index template for every index set to the latest ES 6 one by using the Graylog HTTP API. (otherwise a user has to rotate the active write index just to install the latest index template)
6. **Check which indices have been created with ES 2.x and need re-indexing (Cmd)**
 - For each index to re-index perform the *Reindexing Procedure*.
7. Delete old re-index tasks from ES (Cmd)
8. Upgrade to the latest ES 6.x version. (6.8.1 as of this writing)

4.14.3 Elasticsearch 7 Upgrade Notes

When you are upgrading your Elasticsearch version to v7.x, you need to consider if all of your existing indices will still be readable, as Elasticsearch only supports indices created by the last two major versions and drops support for older formats. If all of your currently existing indices have been created on your current major version and you are upgrading from at least Elasticsearch v6.0.0, then you are fine. If you do know that you have older indices or you are unsure, it is best to check before doing the upgrade.

Let us say you want to upgrade to Elasticsearch 7. The oldest index version it supports is from ES6.0.0. The internal version representation for this is *6000000* (*major version * 1000000*).

Now let us check if we have any indices created by a version older than that:

```
$ http localhost:9200/_settings | \
jq '[ path(.[] |select(.settings.index.version.created < "6000000")) [] ] '
```

The above example uses the tools [httpie](#) and [jq](#) to query the Elasticsearch API at *localhost*, port *9200*. Please adjust the command to your Elasticsearch server's URL and the required version.

If this command returns any index names, those are indices which will not be readable after the upgrade and need a reindex before they work with the next major version.

Upgrade without re-index

When no re-index is needed the easiest way is to follow the [elastic upgrade guide for Elasticsearch](#) this gives all needed commands. Please use the guide corresponding to your version.

Upgrade with re-index

If you have identified any incompatible indices in the previous step, those need to be reindexed. First a brief overview what steps need to be performed followed by the list of commands. Once you started the process of reindex your data you need to finish all steps to get a working Graylog and Elasticsearch cluster again.

1. Upgrade to the latest patch release of your current Graylog.
2. If you have not been on Elasticsearch 6 before, please follow the [Elasticsearch 6 Upgrade Notes](#).
3. Upgrade to Graylog 4.x. All of your pre-existing custom index mapping templates should still exist.
4. (Optional) Reindex indices on ES7 that were created on ES6, so the upgrade to ES8 will be painless. Use the [Reindexing Procedure](#) steps.

4.14.4 Elasticsearch Rolling Upgrade Notes

This page contains a few notes and a recommended procedure to perform a rolling upgrade for a Elasticsearch cluster utilized by Graylog.

Elasticsearch supports rolling upgrades to avoid downtimes during upgrades. Detailed information about the procedures and limitations are provided [here](#).

Graylog supports rolling upgrades without restarting any Graylog node for Elasticsearch upgrades *between minor versions*. While Elasticsearch supports upgrading from e.g. 6.8 to 7.0, Graylog requires a restart when the major version of the Elasticsearch cluster is changed.

To avoid message loss in case of a rolling Elasticsearch upgrade which requires the restart of Graylog nodes, please follow this procedure:

1. Temporarily disable ES [automatic node discovery](#) if it is used.
2. Mentally split up the Elasticsearch cluster in two groups by designating each Elasticsearch node to group A or B.
3. Mentally split up the Graylog cluster in two groups by designating each Graylog node to group A or B.
4. Temporarily configure each Graylog node from group A to use only Elasticsearch nodes from group A and vice versa for group B.
5. [Pause message processing](#) on each Graylog node from group B *or* shut down Graylog nodes from group B.
6. Upgrade all Elasticsearch nodes from group B.
7. Restart all Graylog nodes from group B.
8. [Pause message processing](#) on each Graylog node from group A *or* shut down Graylog nodes from group A.
9. Upgrade all Elasticsearch nodes from group A.
10. Restart all Graylog nodes from group A.
11. Revert all changes performed in steps 1 and 4.

Before performing this procedure, please make sure that:

1. You have at least 2 nodes in each of your Graylog and Elasticsearch clusters.

2. Temporarily splitting up your clusters still allows you to handle the incoming message load.

If performed correctly, this procedure allow you to perform a rolling Elasticsearch upgrade between two major versions without any message loss and a minimal amount of time where a subset of your Graylog nodes is down because of a restart.

Pausing Message Processing on Graylog Nodes

Instead of shutting down individual Graylog nodes, message processing can be paused instead. This has the benefit that all Graylog nodes will continue to accept messages, those nodes on which message processing is disabled will keep in their journal instead of indexing them on Elasticsearch and continue indexing after a restart.

In order to do this, you can pause message processing by going to the web interface of any node, navigate to `System -> Nodes`, click on the `More Actions` dropdown next to the node you want to pause message processing and click `Pause message processing`.

CONFIGURING GRAYLOG

5.1 server.conf

The file `server.conf` is the Graylog configuration file.

Note: Check *Default file locations* to locate it in your installation.

It has to use ISO 8859-1/Latin-1 character encoding. Characters that cannot be directly represented in this encoding can be written using Unicode escapes as defined in [Java SE Specifications](#), using the `u` prefix. For example, `u002c`.

- **Entries are generally expected to be a single line of the form, one of the following:**
 - `propertyName=propertyValue`
 - `propertyName:propertyValue`
- **White space that appears between the property name and property value is ignored, so the following are equivalent:**

- `name=Stephen`
 - `name = Stephen`

- White space at the beginning of the line is also ignored.
- Lines that start with the comment characters `!` or `#` are ignored. Blank lines are also ignored.
- The property value is generally terminated by the end of the line. White space following the property value is not ignored, and is treated as part of the property value.
- A property value can span several lines if each line is terminated by a backslash (`\`) character. For example:

```
targetCities=\
    Detroit,\
    Chicago,\
    Los Angeles
```

This is equivalent to `targetCities=Detroit,Chicago,Los Angeles` (white space at the beginning of lines is ignored).

- The characters newline, carriage return, and tab can be inserted with characters `\n`, `\r`, and `\t`, respectively.
- The backslash character must be escaped as a double backslash. For example:

```
path=c:\\docs\\doc1
```

5.1.1 Properties

General

- **is_master = true**
 - If you are running more than one instances of Graylog server you have to select only one `graylog-server` node as the master. This node will perform periodical and maintenance actions that slave nodes won't.
 - Every slave node will accept messages just as the master nodes. Nodes will fall back to slave mode if there already is a master in the cluster.
- **node_id_file = /etc/graylog/server/<node-id>**
 - The auto-generated node ID will be stored in this file and read after restarts. It is a good idea to use an absolute file path here if you are starting Graylog server from init scripts or similar.
- **password_secret = <secret>**
 - You MUST set a secret that is used for password encryption and salting. The server will refuse to start if it's not set. Use at least 64 characters. If you run multiple `graylog-server` nodes, make sure you use the same `password_secret` for all of them!

Note: Generate a secret with for example `pwgen -N 1 -s 96`

- **root_username = admin**
 - The default root user is named **admin**.
- **root_password_sha2 = <SHA2>**
 - A SHA2 hash of a password you will use for your initial login. Set this to a SHA2 hash generated with `echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d" " -f1` and you will be able to log in to the web interface with username **admin** and password **yourpassword**.

Caution: You MUST specify a hash password for the root user (which you only need to initially set up the system and in case you lose connectivity to your authentication backend). This password cannot be changed using the API or via the web interface. If you need to change it, modify it in this file.

- **root_email = ""**
 - The email address of the root user. Default is empty.
- **root_timezone = UTC**
 - The time zone setting of the root user. See this [list of valid time zones](#). Default is UTC.
- **bin_dir = bin**
 - This directory contains binaries that are used by the Graylog server. (relative or absolute)
- **data_dir = data**
 - This directory is used to store Graylog server state. (relative or absolute)
- **plugin_dir = plugin**
 - Set plugin directory here (relative or absolute)

Web & REST API

- **http_bind_address = 127.0.0.1:9000**
 - The network interface used by the Graylog HTTP interface.
 - This network interface must be accessible by all Graylog nodes in the cluster and by all clients using the Graylog web interface.
 - If the port is omitted, Graylog will use port 9000 by default.
- **http_publish_uri = http://\$http_bind_address/**
 - The HTTP URI of this Graylog node which is used to communicate with the other Graylog nodes in the cluster and by all clients using the Graylog web interface.
 - The URI will be published in the cluster discovery APIs, so that other Graylog nodes will be able to find and connect to this Graylog node.
 - This configuration setting has to be used if this Graylog node is available on another network interface than \$http_bind_address, for example if the machine has multiple network interfaces or is behind a NAT gateway.
 - This configuration setting *must not* be configured to a wildcard address!
 - If http_bind_address contains a wildcard IPv4 address (0.0.0.0), http_publish_uri will be filled with the first non-loopback IPv4 address of this machine instead.
- **http_external_uri = \$http_publish_uri**
 - The public URI of Graylog which will be used by the Graylog web interface to communicate with the Graylog REST API.
 - The external Graylog URI usually has to be specified, if Graylog is running behind a reverse proxy or load-balancer and it will be used to generate URLs addressing entities in the Graylog REST API (see \$http_bind_address).
 - When using Graylog Collector, this URI will be used to receive heartbeat messages and must be accessible for all collectors.
 - This setting can be overridden on a per-request basis with the “X-Graylog-Server-URL” HTTP request header.
- **http_enable_cors = true**
 - Enable CORS headers for HTTP interface.
 - This is necessary for JS-clients accessing the server directly.
 - If these are disabled, modern browsers will not be able to retrieve resources from the server.
- **http_enable_gzip = true**
 - This compresses API responses and therefore helps to reduce overall round trip times.
- **http_max_header_size = 8192**
 - The maximum size of the HTTP request headers in bytes.
- **http_thread_pool_size = 16**
 - The size of the thread pool used exclusively for serving the HTTP interface.
- **http_enable_tls = false**
 - This secures the communication with the HTTP interface with TLS to prevent request forgery and eavesdropping.

- **http_tls_cert_file = /path/to/graylog.crt**
 - The X.509 certificate chain file in PEM format to use for securing the HTTP interface.
- **http_tls_key_file = /path/to/graylog.key**
 - The PKCS#8 private key file in PEM format to use for securing the HTTP interface.
- **http_tls_key_password = secret**
 - The password to unlock the private key used for securing the HTTP interface. (if key is encrypted)
- **trusted_proxies = 127.0.0.1/32, 0:0:0:0:0:0:1/128**
 - Comma separated list of trusted proxies that are allowed to set the client address with X-Forwarded-For header. May be subnets, or hosts.

Elasticsearch

- **elasticsearch_hosts = http://node1:9200,http://user:password@node2:19200**
 - List of Elasticsearch hosts Graylog should connect to.
 - Need to be specified as a comma-separated list of valid URIs for the http ports of your elasticsearch nodes.
 - If one or more of your elasticsearch hosts require authentication, include the credentials in each node URI that requires authentication.
 - Default: `http://127.0.0.1:9200`
- **elasticsearch_connect_timeout = 10s**
 - Maximum amount of time to wait for successful connection to Elasticsearch HTTP port.
 - Default: 10 seconds
- **elasticsearch_socket_timeout = 60s**
 - Maximum amount of time to wait for reading back a response from an Elasticsearch server.
 - Default: 60 seconds
- **elasticsearch_idle_timeout = -1s**
 - Maximum idle time for an Elasticsearch connection. If this is exceeded, this connection will be tore down.
 - Default: infinity
- **elasticsearch_max_total_connections = 200**
 - Maximum number of total connections to Elasticsearch.
 - Default: 200
- **elasticsearch_max_total_connections_per_route = 20**
 - Maximum number of total connections per Elasticsearch route (normally this means per elasticsearch server).
 - Default: 20
- **elasticsearch_max_retries = 2**
 - Maximum number of times Graylog will retry failed requests to Elasticsearch.
 - Default: 2

- **elasticsearch_discovery_enabled = false**

- Enable automatic Elasticsearch node discovery through Nodes Info, see [Elasticsearch Reference » Cluster APIs » Nodes Info](#).
- Default: false

Warning: Automatic node discovery does not work if Elasticsearch requires authentication, e. g. with Shield.

Warning: This setting must be false on AWS Elasticsearch Clusters (the hosted ones) and should be used carefully. In case of trouble with connections to ES this should be the first option to be disabled. See [Automatic node discovery](#) for more details.

- **elasticsearch_discovery_filter = rack:42**

- Filter for including/excluding Elasticsearch nodes in discovery according to their custom attributes, see [Elastic Search Reference » Cluster APIs » Node Specification](#).
- Default: empty

- **elasticsearch_discovery_frequency = 30s**

- Frequency of the Elasticsearch node discovery.
- Default: 30 seconds

- **elasticsearch_discovery_default_scheme = http**

- Set the default scheme when connecting to Elasticsearch discovered nodes. (available options: http, https)
- Default: http

- **elasticsearch_compression_enabled = false**

- Enable payload compression for Elasticsearch requests.
- Default: false

- **elasticsearch_use_expect_continue = true**

- Enable use of “Expect: 100-continue” Header for Elasticsearch index requests. If this is disabled, Graylog cannot properly handle HTTP 413 Request Entity Too Large errors.
- Default: true

Rotation

Attention: The following settings identified with ! in this section have been moved to the database in Graylog 2.0. When you upgrade, make sure to set these to your previous 1.x settings so they will be migrated to the database!

- **rotation_strategy = count !**

- Graylog will use multiple indices to store documents in. You can configured the strategy it uses to determine when to rotate the currently active write index.

- It supports multiple rotation strategies:
 - count of messages per index, use `elasticsearch_max_docs_per_index`
 - size per index, use `elasticsearch_max_size_per_index`
- valid values are count, size and time, default is count.
- **`elasticsearch_max_docs_per_index = 20000000 !`**
 - (Approximate) maximum number of documents in an Elasticsearch index before a new index is being created, also see `no_retention` and `elasticsearch_max_number_of_indices`.
 - Configure this if you used `rotation_strategy = count` above.
- **`elasticsearch_max_size_per_index = 1073741824 !`**
 - (Approximate) maximum size in bytes per Elasticsearch index on disk before a new index is being created, also see `no_retention` and `elasticsearch_max_number_of_indices`. Default is 1GB.
 - Configure this if you used `rotation_strategy = size` above.
- **`elasticsearch_max_time_per_index = 1d !`**
 - (Approximate) maximum time before a new Elasticsearch index is being created, also see `no_retention` and `elasticsearch_max_number_of_indices`. Default is 1 day.
 - Configure this if you used `rotation_strategy = time` above.
 - Please note that this rotation period does not look at the time specified in the received messages, but is using the real clock value to decide when to rotate the index!
 - **Specify the time using a duration and a suffix indicating which unit you want:**
 - * `1w` = 1 week
 - * `1d` = 1 day
 - * `12h` = 12 hours
 - Permitted suffixes are: `d` for day, `h` for hour, `m` for minute, `s` for second.
- **`elasticsearch_max_number_of_indices = 20 !`**
 - How many indices do you want to keep?
- **`retention_strategy = delete !`**
 - Decide what happens with the oldest indices when the maximum number of indices is reached.
 - **The following strategies are available:**
 - * `delete` - Deletes the index completely (Default)
 - * `close` - Closes the index and hides it from the system. Can be re-opened later.

-
- **`elasticsearch_disable_version_check = true`**
 - Disable checking the version of Elasticsearch for being compatible with this Graylog release.

Warning: Using Graylog with unsupported and untested versions of Elasticsearch may lead to data loss!

- **`no_retention = false`**

- Disable message retention on this node, i. e. disable Elasticsearch index rotation.

Attention: The following settings identified with **!!** have been moved to the database in Graylog 2.2.0. When you upgrade, make sure to set these to your previous settings so they will be migrated to the database. These settings are read **once** at the very first startup to be the initial settings in the database.

- **elasticsearch_shards = 4 !!**

- The number of shards for your indices. A good setting here highly depends on the number of nodes in your Elasticsearch cluster. If you have one node, set it to 1.

- **elasticsearch_replicas = 0 !!**

- The number of replicas for your indices. A good setting here highly depends on the number of nodes in your Elasticsearch cluster. If you have one node, set it to 0.

Note: `elasticsearch_shards` and `elasticsearch_replicas` only applies to newly created indices.

- **elasticsearch_index_prefix = graylog !!**

- Prefix for all Elasticsearch indices and index aliases managed by Graylog.

- **elasticsearch_template_name = graylog-internal !!**

- Name of the Elasticsearch index template used by Graylog to apply the mandatory index mapping.
- Default: `graylog-internal`

- **elasticsearch_analyzer = standard !!**

- Analyzer (tokenizer) to use for message and full_message field. The “standard” filter usually is a good idea.
- All supported analyzers are: standard, simple, whitespace, stop, keyword, pattern, language, snowball, custom
- Elasticsearch documentation: <https://www.elastic.co/guide/en/elasticsearch/reference/5.6/analysis.html>
- Note that this setting only takes effect on newly created indices.

- **disable_index_optimization = false !!**

- Disable the optimization of Elasticsearch indices after index cycling. This may take some load from Elasticsearch on heavily used systems with large indices, but it will decrease search performance. The default is to optimize cycled indices.

- **index_optimization_max_num_segments = 1 !!**

- Optimize the index down to `<= index_optimization_max_num_segments`. A higher number may take some load from Elasticsearch on heavily used systems with large indices, but it will decrease search performance. The default is 1.

- **allow_leading_wildcard_searches = false**

- Do you want to allow searches with leading wildcards? This can be extremely resource hungry and should only be enabled with care.

- See also: *Searching*
- **allow_highlighting = false**
 - Do you want to allow searches to be highlighted? Depending on the size of your messages this can be memory hungry and should only be enabled after making sure your Elasticsearch cluster has enough memory.
- **elasticsearch_request_timeout = 1m**
 - Global request timeout for Elasticsearch requests (e. g. during search, index creation, or index time-range calculations) based on a best-effort to restrict the runtime of Elasticsearch operations.
 - Default: 1m
- **elasticsearch_index_optimization_timeout = 1h**
 - Global timeout for index optimization (force merge) requests.
 - Default: 1h
- **elasticsearch_index_optimization_jobs = 20**
 - Maximum number of concurrently running index optimization (force merge) jobs.
 - If you are using lots of different index sets, you might want to increase that number.
 - Default: 20
- **index_ranges_cleanup_interval = 1h**
 - Time interval for index range information cleanups. This setting defines how often stale index range information is being purged from the database.
 - Default: 1h
- **output_batch_size = 500**
 - Batch size for the Elasticsearch output. This is the maximum (!) number of messages the Elasticsearch output module will get at once and write to Elasticsearch in a batch call. If the configured batch size has not been reached within `output_flush_interval` seconds, everything that is available will be flushed at once. Remember that every output buffer processor manages its own batch and performs its own batch write calls. (`outputbuffer_processors` variable)
- **output_flush_interval = 1**
 - Flush interval (in seconds) for the Elasticsearch output. This is the maximum amount of time between two batches of messages written to Elasticsearch. It is only effective at all if your minimum number of messages for this time period is less than `output_batch_size * outputbuffer_processors`.
- **output_fault_count_threshold = 5**
- **output_fault_penalty_seconds = 30**
 - As stream outputs are loaded only on demand, an output which is failing to initialize will be tried over and over again. To prevent this, the following configuration options define after how many faults an output will not be tried again for an also configurable amount of seconds.
- **processbuffer_processors = 5**
- **outputbuffer_processors = 3**
 - The number of parallel running processors.
 - Raise this number if your buffers are filling up.

- `outputbuffer_processor_keep_alive_time = 5000`
- `outputbuffer_processor_threads_core_pool_size = 3`
- `outputbuffer_processor_threads_max_pool_size = 30`
- **`udp_recvbuffer_sizes = 1048576`**
 - UDP receive buffer size for all message inputs (e. g. SyslogUDPInput).
- **`processor_wait_strategy = blocking`**
 - Wait strategy describing how buffer processors wait on a cursor sequence. (default: sleeping)
 - **Possible types:**
 - * `yielding` - Compromise between performance and CPU usage.
 - * `sleeping` - Compromise between performance and CPU usage. Latency spikes can occur after quiet periods.
 - * `blocking` - High throughput, low latency, higher CPU usage.
 - * `busy_spinning` - Avoids syscalls which could introduce latency jitter. Best when threads can be bound to specific CPU cores.
- **`ring_size = 65536`**
 - Size of internal ring buffers. Raise this if raising `outputbuffer_processors` does not help anymore.
 - For optimum performance your `LogMessage` objects in the ring buffer should fit in your CPU L3 cache.
 - Must be a power of 2. (512, 1024, 2048, ...)
- `inputbuffer_ring_size = 65536`
- `inputbuffer_processors = 2`
- `inputbuffer_wait_strategy = blocking`
- **`message_journal_enabled = true`**
 - Enable the disk based message journal.
- **`message_journal_dir = data/journal`**
 - The directory which will be used to store the message journal. The directory must be exclusively used by Graylog and must not contain any other files than the ones created by Graylog itself.

Attention: If you create a separate partition for the journal files and use a file system creating directories like 'lost+found' in the root directory, you need to create a sub directory for your journal. Otherwise Graylog will log an error message that the journal is corrupt and Graylog will not start.

- `message_journal_max_age = 12h`
- **`message_journal_max_size = 5gb`**
 - Journal hold messages before they could be written to Elasticsearch.
 - For a maximum of 12 hours or 5 GB whichever happens first.
 - During normal operation the journal will be smaller.
- **`message_journal_flush_age = 1m`**

- This setting allows specifying a time interval at which we will force an fsync of data written to the log. For example if this was set to 1000 we would fsync after 1000 ms had passed.
- **message_journal_flush_interval = 1000000**
 - This setting allows specifying an interval at which we will force an fsync of data written to the log. For example if this was set to 1 we would fsync after every message; if it were 5 we would fsync after every five messages.
- **message_journal_segment_age = 1h**
 - This configuration controls the period of time after which Graylog will force the log to roll even if the segment file isn't full to ensure that retention can delete or compact old data.
- **message_journal_segment_size = 100mb**

Attention: When the journal is full and it keeps receiving messages, it will start dropping messages as a FIFO queue: The first dropped message will be the first inserted and so on (and not some random).

- **async_eventbus_processors = 2**
 - Number of threads used exclusively for dispatching internal events. Default is 2.
- **lb_recognition_period_seconds = 3**
 - How many seconds to wait between marking node as DEAD for possible load balancers and starting the actual shutdown process. Set to 0 if you have no status checking load balancers in front.
- **lb_throttle_threshold_percentage = 95**
 - Journal usage percentage that triggers requesting throttling for this server node from load balancers. The feature is disabled if not set.
- **stream_processing_timeout = 2000**
- **stream_processing_max_faults = 3**
 - Every message is matched against the configured streams and it can happen that a stream contains rules which take an unusual amount of time to run, for example if its using regular expressions that perform excessive backtracking.
 - This will impact the processing of the entire server. To keep such misbehaving stream rules from impacting other streams, Graylog limits the execution time for each stream.
 - The default values are noted below, the timeout is in milliseconds.
 - If the stream matching for one stream took longer than the timeout value, and this happened more than “max_faults” times that stream is disabled and a notification is shown in the web interface.

Note: Since 0.21 the Graylog server supports pluggable output modules. This means a single message can be written to multiple outputs. The next setting defines the timeout for a single output module, including the default output module where all messages end up.

- **output_module_timeout = 10000**
 - Time in milliseconds to wait for all message outputs to finish writing a single message.
- **stale_master_timeout = 2000**
 - Time in milliseconds after which a detected stale master node is being rechecked on startup.
- **shutdown_timeout = 30000**

- Time in milliseconds which Graylog is waiting for all threads to stop on shutdown.

MongoDB

- **mongodb_uri = mongodb://...**
 - MongoDB connection string. Enter your MongoDB connection and authentication information here.
 - See <https://docs.mongodb.com/manual/reference/connection-string/> for details.
 - Take notice that +-signs in the username or password need to be replaced by %2B.
 - **Examples:**
 - * Simple: `mongodb://localhost/graylog`
 - * Authenticate against the MongoDB server: `mongodb_uri = mongodb://grayloguser:secret@localhost:27017/graylog`
 - * Use a replica set instead of a single host: `mongodb://grayloguser:secret@localhost:27017,localhost:27018,localhost:27019/graylog?replicaSet=rs01`
 - * **DNS Seedlist** is set as `mongodb+srv://server.example.org/graylog`.
- **mongodb_max_connections = 1000**
 - Increase this value according to the maximum connections your MongoDB server can handle from a single client if you encounter MongoDB connection problems.
- **mongodb_threads_allowed_to_block_multiplier = 5**
 - Number of threads allowed to be blocked by MongoDB connections multiplier. Default: 5
 - If `mongodb_max_connections` is 100, and `mongodb_threads_allowed_to_block_multiplier` is 5, then 500 threads can block. More than that and an exception will be thrown.
 - <http://api.mongodb.com/java/current/com/mongodb/MongoOptions.html#threadsAllowedToBlockForConnectionMultiplier>

Email

- `transport_email_enabled = false`
- `transport_email_hostname = mail.example.com`
- `transport_email_port = 587`
- `transport_email_use_auth = true`
- **`transport_email_use_tls = true`**
 - Enable SMTP with STARTTLS for encrypted connections.
- **`transport_email_use_ssl = false`**
 - Enable SMTP over SSL (SMTPS) for encrypted connections.

Attention: Make sure to enable only *one* of these two settings because most (or all) SMTP services only support one of the encryption mechanisms on the same port. Most SMTP services support SMTP with STARTTLS while SMTPS is deprecated on most SMTP services. Setting both to `false` is needed when you want to send via unencrypted connection.

- `transport_email_auth_username = you@example.com`
- `transport_email_auth_password = secret`
- `transport_email_subject_prefix = [graylog]`
- `transport_email_from_email = graylog@example.com`
- **`transport_email_web_interface_url = https://graylog.example.com`**
 - Specify this to include links to the stream in your stream alert mails.
 - This should define the fully qualified base url to your web interface exactly the same way as it is accessed by your users.

HTTP

- **`http_connect_timeout = 5s`**
 - The default connect timeout for outgoing HTTP connections.
 - Values must be a positive duration (and between 1 and 2147483647 when converted to milliseconds).
 - Default: 5s
- **`http_read_timeout = 10s`**
 - The default read timeout for outgoing HTTP connections.
 - Values must be a positive duration (and between 1 and 2147483647 when converted to milliseconds).
 - Default: 10s
- **`http_write_timeout = 10s`**
 - The default write timeout for outgoing HTTP connections.
 - Values must be a positive duration (and between 1 and 2147483647 when converted to milliseconds).
 - Default: 10s
- **`http_proxy_uri =`**
 - HTTP proxy for outgoing HTTP connections

<p>Attention: If you configure a proxy, make sure to also configure the “<code>http_non_proxy_hosts</code>” option so internal HTTP connections with other nodes does not go through the proxy.</p>
--

- **`http_non_proxy_hosts =`**
 - A list of hosts that should be reached directly, bypassing the configured proxy server.
 - This is a list of patterns separated by “;”. The patterns may start or end with a “*” for wildcards.
 - Any host matching one of these patterns will be reached through a direct connection instead of through a proxy.

Processing Status

Note: The settings for processing status usually don't need to be tweaked.

- **`processing_status_persist_interval = 1s`**
 - The server is writing processing status information to the database on a regular basis. This setting controls how often the data is written to the database.
 - Values must be a positive duration and cannot be less than one second.
 - Default: 1s (one second)
- **`processing_status_update_threshold = 1m`**
 - Configures the threshold for detecting outdated processing status records. Any records that haven't been updated in the configured threshold will be ignored.
 - Values must be a positive duration and cannot be less than one second.
 - Default: 1m (one minute)
- **`processing_status_journal_write_rate_threshold= 1`**
 - Configures the journal write rate threshold for selecting processing status records. Any records that have a lower one minute rate than the configured value might be ignored. (dependent on number of messages in the journal)
 - Values must be a positive duration.
 - Default: 1

Script alert notification

- **`integrations_web_interface_uri = https://graylog.example.com`**
 - Specify this to include a search page link (that displays relevant alert messages) in the script arguments or standard in JSON.
 - This should define the fully qualified base url to your web interface exactly the same way as it is accessed by your users.
 - Default: none
- **`integrations_scripts_dir = /usr/share/graylog-server/scripts`**
 - An absolute or relative path where scripts are permitted to be executed from.
 - If specified, this overrides the default location (see the [File Locations](#) document).

Others

- **gc_warning_threshold = 1s**
 - The threshold of the garbage collection runs. If GC runs take longer than this threshold, a system notification will be generated to warn the administrator about possible problems with the system. Default is 1 second.
- **ldap_connection_timeout = 2000**
 - Connection timeout for a configured LDAP server (e. g. ActiveDirectory) in milliseconds.
- **disable_sigar = false**
 - Disable the use of SIGAR for collecting system stats.
- **dashboard_widget_default_cache_time = 10s**
 - The default cache time for dashboard widgets. (Default: 10 seconds, minimum: 1 second)
- **proxied_requests_thread_pool_size = 32**
 - For some cluster-related REST requests, the node must query all other nodes in the cluster. This is the maximum number of threads available for this. Increase it, if `/cluster/*` requests take long to complete.
 - Should be `http_thread_pool_size * average_cluster_size` if you have a high number of concurrent users.
- **default_events_index_prefix = gl-events**
 - The default index prefix for graylog events.
- **default_system_events_index_prefix = gl-system-events**
 - The default index prefix for graylog system events.
- **enabled_tls_protocols = TLSv1.2,TLSv1.3**
 - Configure system wide enabled TLS protocols. Only configure this if you need to support legacy systems. We will maintain a secure default. (Currently TLS 1.2 and TLS 1.3). (Note: The web interface cannot support TLS 1.3 with JDK 8)
- **content_packs_loader_enabled = false**
 - Automatically load content packs in “content_packs_dir” on the first start of Graylog.
- **content_packs_dir = data/contentpacks**
 - The directory which contains content packs which should be loaded on the first start of Graylog.
- **content_packs_auto_install**
 - A comma-separated list of content packs (files in “content_packs_dir”) which should be applied on the first start of Graylog.
 - Default: none

5.2 Web interface

When your Graylog instance/cluster is up and running, the next thing you usually want to do is check out our web interface, which offers you great capabilities for searching and analyzing your indexed data and configuring your Graylog environment. Per default you can access it using your browser on `http://<graylog-server>:9000/`.

5.2.1 Overview

The Graylog web interface was rewritten in JavaScript for 2.0 to be a client-side single-page browser application. This means its code is running solely in your browser, fetching all data via HTTP(S) from the REST API of your Graylog server.

Note: The HTTP address must be accessible by everyone using the web interface. This means that Graylog *must* listen on a public network interface *or* be exposed to one using a proxy, NAT or a load balancer!

5.2.2 Configuration Options

If our default settings do not work for you, there is a number of options in the Graylog server configuration file which you can change to influence its behavior:

Setting	Default	Explanation
<code>http_bind_address</code>	<code>127.0.0.1:9000</code>	The network interface used by the Graylog HTTP interface.
<code>http_publish_uri</code>	If not set, <code>http://\$http_bind_address</code> will be used.	The HTTP URI of this Graylog node which is used to communicate with the other Graylog nodes in the cluster and by all clients using the Graylog web interface.
<code>http_external_uri</code>	If <code>uri</code> not set, <code>\$http_publish_uri</code> will be used.	The public URI of Graylog which will be used by the Graylog web interface to communicate with the Graylog REST API. Graylog web interface.
<code>http_enable_cors</code>	<code>true</code>	This is necessary for JS-clients accessing the server directly. If disabled, modern browsers will not be able to retrieve resources from the server.
<code>http_enable_gzip</code>	<code>true</code>	Serve web interface assets using compression to reduce overall roundtrip times.
<code>http_max_header_size</code>	<code>8192</code>	The maximum size of the HTTP request headers in bytes.
<code>http_thread_pool_size</code>	<code>16</code>	The size of the thread pool used exclusively for serving the HTTP interface.
<code>http_enable_ssl</code>	<code>false</code>	This secures the communication with the HTTP interface with TLS to prevent request forgery and eavesdropping.
<code>http_tls_certificate</code>	(no default)	The X.509 certificate chain file in PEM format to use for securing the HTTP interface.
<code>http_tls_key</code>	(no default)	The PKCS#8 private key file in PEM format to use for securing the HTTP interface.
<code>http_tls_key_password</code>	(no default)	The password to unlock the private key used for securing the HTTP interface. (only needed if the key is encrypted)

5.2.3 How does the web interface connect to the Graylog server?

The web interface is fetching all information it is showing from the REST API of the Graylog server. Therefore it needs to connect to it using HTTP(S). There are several ways how you can define which way the web interface connects to the Graylog server. The URI used by the web interface is determined in this exact order:

- If the HTTP(S) client going to the web interface port sends a `X-Graylog-Server-URL` header, which contains a valid URL, then this is overriding everything else.
- If `http_external_uri` is defined in the Graylog configuration file, this is used if the aforementioned header is not set.
- If `http_publish_uri` is defined in the Graylog configuration file, this is used if the aforementioned `http_external_uri` is not set.
- If none of the above are defined, `http://$http_bind_address` is used.

The web interface assets (e.g. the `index.html`, CSS and JavaScript files) are accessible at the URI root (`/` by default) and the REST API endpoints are accessible at the `/api` path.

Example:

Setting `http_bind_address` to `10.0.0.1:9000` configures the Graylog server with the following URLs.

- Web interface: `http://10.0.0.1:9000/`
- REST API: `http://10.0.0.1:9000/api/`

5.2.4 Browser Compatibility

Writing the web interface as a single-page application is a challenging task. We want to provide the best possible experience to everyone, which often means using modern web technology only available in recent browsers, while keeping a reasonable compatibility with old and less-capable browsers. These browsers are officially supported in Graylog 3.0:

Browser	OS	Minimum Version
Chrome	Windows, OS X, Linux	50
Firefox	Windows, OS X, Linux	45 / 38 ESR
Internet Explorer	Windows	11
Microsoft Edge	Windows	25
Safari	OS X	9

Please take into account that you need to enable JavaScript in order to use Graylog web interface.

5.2.5 Making the web interface work with load balancers/proxies

If you want to run a load balancer/reverse proxy in front of Graylog, you need to make sure that:

- The HTTP port of the load balancer/reverse proxy is accessible for clients
- The HTTP address for the Graylog server is properly set (as explained in [How does the web interface connect to the Graylog server?](#)), so it is resolvable and accessible for the load balancer/reverse proxy.
- If you use SSL, your certificates must be valid and trusted by your clients.

Note: To help you with your specific environment, we show some example configuration use cases.

For the configuration use cases below we assume the following:

- Your Graylog server configuration contains `http_bind_address = 127.0.0.1:9000`
- The hostname for the setup is `graylog.example.org`
- The IP address for that hostname is `192.168.0.10`

Using a Layer 3 load balancer (forwarding TCP Ports)

1. Configure your load balancer to forward connections going to `192.168.0.10:80` to `127.0.0.1:9000`.
2. Start the Graylog server as usual.
3. Access the web interface on `http://graylog.example.org`.
4. Read up on [Using HTTPS](#).

NGINX

Proxy web interface and API traffic using HTTP:

```
server
{
    listen 80 default_server;
    listen [::]:80 default_server ipv6only=on;
    server_name graylog.example.org;

    location / {
        proxy_set_header Host $http_host;
        proxy_set_header X-Forwarded-Host $host;
        proxy_set_header X-Forwarded-Server $host;
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
        proxy_set_header X-Graylog-Server-URL http://$server_name/;
        proxy_pass http://127.0.0.1:9000;
    }
}
```

NGINX can be used for SSL Termination, you would only need to modify the `server listen` directive and add all Information about your certificate.

If you are running multiple Graylog Server you might want to use HTTPS/SSL to connect to the Graylog Servers (on how to Setup read [Using HTTPS](#)) and use HTTPS/SSL on NGINX. The configuration for TLS certificates, keys and ciphers is omitted from the sample config for brevity's sake.

Proxy web interface and API traffic using HTTPS (TLS):

```
server
{
    listen 443 ssl http2;
    server_name graylog.example.org;
    # <- your SSL Settings here!

    location /
    {
        proxy_set_header Host $http_host;
        proxy_set_header X-Forwarded-Host $host;
        proxy_set_header X-Forwarded-Server $host;
```

(continues on next page)

(continued from previous page)

```
proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
proxy_set_header X-Graylog-Server-URL https://$server_name/;
proxy_pass      http://127.0.0.1:9000;
}
}
```

If you want to serve several different applications under one domain name, you can also serve the Graylog web interface using a path prefix.

Proxy web interface and API traffic under a path prefix using HTTP:

```
server
{
    listen 80 default_server;
    listen [::]:80 default_server ipv6only=on;
    server_name applications.example.org;

    location /graylog/
    {
        proxy_set_header Host $http_host;
        proxy_set_header X-Forwarded-Host $host;
        proxy_set_header X-Forwarded-Server $host;
        proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
        proxy_set_header X-Graylog-Server-URL http://$server_name/graylog/;
        rewrite      ^/graylog/(.*)$ /$1 break;
        proxy_pass    http://127.0.0.1:9000;
    }
}
```

This makes your Graylog setup available under the following URLs:

- Web interface: <http://applications.example.org/graylog/>
- REST API: <http://applications.example.org/graylog/api/>

Apache httpd 2.x

Proxy web interface and API traffic using HTTP:

```
<VirtualHost *:80>
    ServerName graylog.example.org
    ProxyRequests Off
    <Proxy *>
        Order deny,allow
        Allow from all
    </Proxy>

    <Location />
        RequestHeader set X-Graylog-Server-URL "http://graylog.example.org/"
        ProxyPass http://127.0.0.1:9000/
        ProxyPassReverse http://127.0.0.1:9000/
    </Location>
</VirtualHost>
```

Proxy web interface and API traffic using HTTPS (TLS):

```
<VirtualHost *:443>
    ServerName graylog.example.org
    ProxyRequests Off
    SSLEngine on
    # <- your SSL Settings here!

    <Proxy *>
        Order deny,allow
        Allow from all
    </Proxy>

    <Location />
        RequestHeader set X-Graylog-Server-URL "https://graylog.example.org/"
        ProxyPass http://127.0.0.1:9000/
        ProxyPassReverse http://127.0.0.1:9000/
    </Location>

</VirtualHost>
```

HAProxy 1.6

Proxy web interface and API traffic using HTTP:

```
frontend http
    bind 0.0.0.0:80

    option forwardfor
    http-request add-header X-Forwarded-Host %[req.hdr(host)]
    http-request add-header X-Forwarded-Server %[req.hdr(host)]
    http-request add-header X-Forwarded-Port %[dst_port]
    acl is_graylog hdr_dom(host) -i -m str graylog.example.org
    use_backend      graylog if is_graylog

backend graylog
    description      The Graylog Web backend.
    http-request set-header X-Graylog-Server-URL http://graylog.example.org/
    use-server graylog_1
    server graylog_1 127.0.0.1:9000 maxconn 20 check
```

Multiple Backends (roundrobin) with Health-Check (using HTTP):

```
frontend graylog_http
    bind *:80
    option forwardfor
    http-request add-header X-Forwarded-Host %[req.hdr(host)]
    http-request add-header X-Forwarded-Server %[req.hdr(host)]
    http-request add-header X-Forwarded-Port %[dst_port]
    acl is_graylog hdr_dom(host) -i -m str graylog.example.org
    use_backend      graylog

backend graylog
    description      The Graylog Web backend.
    balance roundrobin
    option httpchk HEAD /api/system/lbstatus
    http-request set-header X-Graylog-Server-URL http://graylog.example.org/
    server graylog1 192.168.0.10:9000 maxconn 20 check
```

(continues on next page)

(continued from previous page)

```
server graylog2 192.168.0.11:9000 maxconn 20 check
server graylog3 192.168.0.12:9000 maxconn 20 check
```

5.3 Load balancer integration

When running multiple Graylog servers a common deployment scenario is to route the message traffic through an IP load balancer. By doing this we can achieve both a highly available setup, as well as increasing message processing throughput, by simply adding more servers that operate in parallel.

5.3.1 Load balancer state

However, load balancers usually need some way of determining whether a backend service is reachable and healthy or not. For this purpose Graylog exposes a load balancer state that is reachable via its REST API.

There are two ways the load balancer state can change:

- due to a lifecycle change (e.g. the server is starting to accept messages, or shutting down)
- due to manual intervention via the REST API

Note: In the following examples we assume that the Graylog REST API is available on the URI path `/api/` (e. g. `http://graylog.example.com/api/`).

To query the current load balancer status of a Graylog instance, all you need to do is to issue a HTTP call to its REST API:

```
GET /api/system/lbstatus
```

The status knows three different states, `ALIVE`, `THROTTLED` and `DEAD`, which is also the `text/plain` response of the resource. Additionally, the same information is reflected in the HTTP status codes: If the state is `ALIVE` the return code will be `200 OK`, for `THROTTLED` it will be `429 (too many request)` and for `DEAD` it will be `503 Service unavailable`. This is done to make it easier to configure a wide range of load balancer types and vendors to be able to react to the status.

The resource is accessible without authentication to make it easier for load balancers to access it.

To programmatically change the load balancer status, an additional endpoint is exposed:

```
PUT /api/system/lbstatus/override/alive
PUT /api/system/lbstatus/override/dead
PUT /api/system/lbstatus/override/throttled
```

Only authenticated and authorized users are able to change the status, in the currently released Graylog version this means only admin users can change it.

5.3.2 Graceful shutdown

Often, when running a service behind a load balancer, the goal is to be able to perform zero-downtime upgrades, by taking one of the servers offline, upgrading it, and then bringing it back online. During that time the remaining servers can take the load seamlessly.

By using the load balancer status API described above one can already perform such a task. However, it would still be guesswork when the Graylog server is done processing all the messages it already accepted.

For this purpose Graylog supports a graceful shutdown command, also accessible via the web interface and API. It will set the load balancer status to `DEAD`, stop all inputs, turn on messages processing (should it have been disabled manually previously), and flush all messages in memory to Elasticsearch. After all buffers and caches are processed, it will shut itself down safely.

The screenshot shows the Graylog web interface's 'Nodes' page. At the top, there's a navigation bar with links like Search, Streams, Dashboards, Sources, and System / Nodes. Below the navigation bar, the 'Nodes' section is titled, and a message states: 'This page provides a real-time overview of the nodes in your Graylog cluster.' A warning icon and text indicate that message processing can be paused, but buffers will not accept new messages until resumed. The main content area shows 'There is 1 active node' with a star icon and the node ID 'a50e3d14 / graylog'. It shows 'In 0 / Out 0 msg/s.' and a message journal status. A status bar indicates the node is 'Running', 'Enabled', and 'ALIVE'. A dropdown menu is open, showing options: 'Pause message processing', 'Override LB status', 'Graceful shutdown', 'Local message inputs', and 'Get thread dump'. At the bottom, a footer line reads: 'Graylog 2.0.3 (f07c170) on graylog (Oracle Corporation 1.8.0_77 on Linux 4.2.0-35-generic)'.

5.3.3 Web Interface

It is possible to use the Graylog web interface behind a load balancer for high availability purposes.

Note: Take care of the configuration you need *with a proxy setup*, as it will *not* work out of the box.

5.4 Using HTTPS

We highly recommend securing your Graylog installation using SSL/TLS to make sure that no sensitive data is sent over the wire in plain text. To make this work, you need to enable the `http_enable_tls` setting in your Graylog server configuration.

You also need to make sure that you have proper certificates in place, which are valid and trusted by the clients.

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use *NGINX or Apache as a reverse proxy*.

5.4.1 Things to consider

You have multiple options to ensure that your connection is secure and safe. The first would be to create a self-signed certificate, add that to the previously copied java keystore and use this keystore with your Graylog java options. Since you will need to do this for every certificate and every trust store, this quickly becomes unmanageable in a clustered architecture. Each node needs to trust all certificates from all other nodes.

The second option would be to create your own certificate authority. You only add the certificate authority once to the key store and all certificates that are created with this authority will be trusted.

The same can be done if you have already your own certificate authority, you only need the certificates and keys in the format that can be used with Graylog. Add the certificate authority key to the keystore and all certificates that are signed by this certificate authority will be trusted. Same when you pay for certificates or use a free Certificate authority like let's encrypt to get the server certificates.

Just add the certificate authority to the keystore and all certificates are trusted.

5.4.2 Certificate/Key file format

When you are configuring TLS, you need to make sure that your certificate/key files are in the right format, which is X.509 for certificates and PKCS#8 for the private keys. Both must to be stored in PEM format.

5.4.3 Creating a self-signed private key/certificate

Create a file named `openssl-graylog.cnf` with the following content (customized to your needs):

```
[req]
distinguished_name = req_distinguished_name
x509_extensions = v3_req
prompt = no

# Details about the issuer of the certificate
[req_distinguished_name]
C = US
ST = Some-State
L = Some-City
O = My Company
OU = My Division
CN = graylog.example.com

[v3_req]
keyUsage = keyEncipherment, dataEncipherment
extendedKeyUsage = serverAuth
subjectAltName = @alt_names

# IP addresses and DNS names the certificate should include
# Use IP.### for IP addresses and DNS.### for DNS names,
# with "###" being a consecutive number.
[alt_names]
IP.1 = 203.0.113.42
DNS.1 = graylog.example.com
```

Create PKCS#5 private key and X.509 certificate:

```
$ openssl version
OpenSSL 0.9.8zh 14 Jan 2016
$ openssl req -x509 -days 365 -nodes -newkey rsa:2048 -config openssl-graylog.cnf -
↳keyout pkcs5-plain.pem -out cert.pem
Generating a 2048 bit RSA private key
.....+++
.+++
writing new private key to 'pkcs5-plain.pem'
-----
```

Convert PKCS#5 private key into a *unencrypted* PKCS#8 private key:

```
$ openssl pkcs8 -in pkcs5-plain.pem -topk8 -nocrypt -out pkcs8-plain.pem
```

Convert PKCS#5 private key into an *encrypted* PKCS#8 private key (using the passphrase `secret`):

```
$ openssl pkcs8 -in pkcs5-plain.pem -topk8 -out pkcs8-encrypted.pem -passout
↳pass:secret
```

5.4.4 Converting a PKCS #12 (PFX) file to private key and certificate pair

PKCS #12 key stores (PFX files) are commonly used on Microsoft Windows. This needs to be done only if you have to convert PKCS #12 Keys to be used with Graylog.

In this example, the PKCS #12 (PFX) file is named `keystore.pfx`:

```
$ openssl pkcs12 -in keystore.pfx -nokeys -out graylog-certificate.pem
$ openssl pkcs12 -in keystore.pfx -nocerts -out graylog-pkcs5.pem
$ openssl pkcs8 -in graylog-pkcs5.pem -topk8 -out graylog-key.pem
```

The resulting `graylog-certificate.pem` and `graylog-key.pem` can be used in the Graylog configuration file.

5.4.5 Converting an existing Java Keystore to private key/certificate pair

This section describes how to export a private key and certificate from an existing Java KeyStore in JKS format. This is needed if you want to export the certificates from the Java KeyStore.

The starting point is an existing Java KeyStore in JKS format which contains a private key and certificate which should be used in Graylog:

```
$ keytool -list -v -keystore keystore.jks -alias graylog.example.com
Enter keystore password:
Alias name: graylog.example.com
Creation date: May 10, 2016
Entry type: PrivateKeyEntry
Certificate chain length: 1
Certificate[1]:
Owner: CN=graylog.example.com, OU=Unknown, O="Graylog, Inc.", L=Hamburg, ST=Hamburg,
↳C=DE
Issuer: CN=graylog.example.com, OU=Unknown, O="Graylog, Inc.", L=Hamburg, ST=Hamburg,
↳C=DE
Serial number: 2b33832d
Valid from: Tue May 10 10:02:34 CEST 2016 until: Mon Aug 08 10:02:34 CEST 2016
Certificate fingerprints:
```

(continues on next page)

(continued from previous page)

```

MD5: 8A:3D:9F:ED:69:93:1B:6C:E3:29:66:EA:82:8D:42:BE
SHA1: 5B:27:92:25:46:36:BC:F0:82:8F:9A:30:D8:50:D0:ED:32:4D:C6:A0
SHA256:
11:11:77:F5:F6:6A:20:A8:E6:4A:5D:B5:20:21:4E:B8:FE:B6:38:1D:45:6B:ED:D0:7B:CE:B8:C8:BC:DD:B4:FB
Signature algorithm name: SHA256withRSA
Version: 3

Extensions:

#1: ObjectId: 2.5.29.14 Criticality=false
SubjectKeyIdentifier [
KeyIdentifier [
0000: AC 79 64 9F A1 60 14 B9 51 F4 F5 0B B3 B5 02 A5 .yd..`..Q.....
0010: B8 07 DC 7B ....
]
]

```

The Java KeyStore in JKS format has to be converted to a PKCS#12 keystore, so that OpenSSL can work with it:

```

$ keytool -importkeystore -srckeystore keystore.jks -destkeystore keystore.p12 -
deststoretype PKCS12
Enter destination keystore password:
Re-enter new password:
Enter source keystore password:
Entry for alias graylog.example.com successfully imported.
Import command completed: 1 entries successfully imported, 0 entries failed or
cancelled

```

After the keystore has been successfully converted into PKCS#12 format, OpenSSL can export the X.509 certificate with PEM encoding:

```

$ openssl pkcs12 -in keystore.p12 -nokeys -out graylog-certificate.pem
Enter Import Password:
MAC verified OK

```

The private key can only be exported in PKCS#5 format with PEM encoding:

```

$ openssl pkcs12 -in keystore.p12 -nocerts -out graylog-pkcs5.pem
Enter Import Password:
MAC verified OK
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:

```

Graylog currently only supports PKCS#8 private keys with PEM encoding, so OpenSSL has to convert it into the correct format:

```

$ openssl pkcs8 -in graylog-pkcs5.pem -topk8 -out graylog-key.pem
Enter pass phrase for graylog-pkcs5.pem:
Enter Encryption Password:
Verifying - Enter Encryption Password:

```

The working directory should now contain the PKCS#8 private key (graylog-key.pem) and the X.509 certificate (graylog-certificate.pem) to be used with Graylog:

```

$ head graylog-key.pem graylog-certificate.pem
==> graylog-key.pem <==

```

(continues on next page)


```
-----BEGIN ENCRYPTED PRIVATE KEY-----
MIIE6TabBgkqhkiG9w0BBQMwDgQIwMhLa5bw9vgCaggABIIEyN42AeYJJNBEiqhI
mWqJDot4Jokw2vB4abcIJ5Do4+7tjtMrecVRCDsvBZzjkXjnbumbHEoxexe5f0/z
wgq6f/UDyTM3uKYQTG9lfcqTyMDUlo3Wc8OqSqsNehOAQZA7hMCehqgNJHO0ZfnY
EFvrXHurJWi4eA9vLRup86dbm4Wp3o8pmjOLduXieHfcgVtm5jfd7XfL5cRFS8kS
bSFH4v8xDxLNaJmKkKL9gPCACMRBo09nGk/Z9q9N8zkj+xG9lxlNRMX51SRzg20E0
nyyKTb39tJF35zjroB2HfiFWyrPQluF6yGoroGvu0L3eWosjBLjdRs0eBgjjCM5P
idPySVqMH6/4CPKJqvB97vP4QhpYcr9jlYjsbn6Zg4OIELpM00VLvp0yU9tqtURR
Tc9YA1NMLZ2RrV5ZCevh3vc2L1WHM7rl87x4WHgprDFnjKxf02DrFhgCsGwkEQnub3
vj86ql3RHhqoXT4W0zugvcv2/NBLMv0HNQBafEK3XlYBmtQpEJhwSxesza1i7CpU

==> graylog-certificate.pem <==
Bag Attributes
    friendlyName: graylog.example.com
    localKeyID: 54 69 6D 65 20 31 34 36 32 38 36 37 38 32 33 30 39 32
subject=/C=DE/ST=Hamburg/L=Hamburg/O=Graylog, Inc./OU=Unknown/CN=graylog.example.com
issuer=/C=DE/ST=Hamburg/L=Hamburg/O=Graylog, Inc./OU=Unknown/CN=graylog.example.com
-----BEGIN CERTIFICATE-----
MIIDkTCCAnmgAwIBAgIEKzODLTANBgkqhkiG9w0BAQsFAADB5MQswCQYDVQQGEwJE
RTEQMA4GA1UECBMSGFgtYnVyZzEQMA4GA1UEBxMHSGFgtYnVyZzEWMBQGA1UEChMN
R3JheWxvZyZyagSW53jLjEjEQMA4GA1UECxMHVW5rbm93bjEcMBoGA1UEAxMTZ3JheWxv
Zy5leGFtcGxlLmNvbTAeFw0xNjA1MTAwODAyMzRaFw0xNjA1MDgwODAyMzRaMHkx
```

```
# Enable HTTPS support for the HTTP interface.
# This secures the communication with the HTTP interface with TLS to prevent request_
↳forgery and eavesdropping.
http_enable_tls = true

# The X.509 certificate chain file in PEM format to use for securing the HTTP_
↳interface.
http_tls_cert_file = /path/to/graylog-certificate.pem

# The PKCS#8 private key file in PEM format to use for securing the HTTP interface.
http_tls_key_file = /path/to/graylog-key.pem

# The password to unlock the private key used for securing the HTTP interface. (if_
↳key is encrypted)
http_tls_key_password = secret
```

```
-----BEGIN RSA PRIVATE KEY-----
MIIBOwIBAAJBANxtmQ1Kccdp7HBNT8zgTai48Vv617bj4SnhkcMN99sCQ2Naj/sp
[...]
NiCYNLiCawBbpZnYw/ztPVACK4EwOpUy+u19cMB0JA==
-----END RSA PRIVATE KEY-----
```

PKCS#8 plain private key:

```
-----BEGIN PRIVATE KEY-----
MIIBVAIBADANBgkqhkiG9w0BAQEFAASCAT4wggE6AgEAAkEA6GZN0rQFKRIVaPoz
[...]
LaLGdd9G63kLg85eldSy55uIAXsvqQIgfsYaliVtSbAgYx1Yfs3hJ+CTpNKzTNv/
Fx80EltYV6k=
-----END PRIVATE KEY-----
```

PKCS#5 encrypted private key:

```
-----BEGIN RSA PRIVATE KEY-----
Proc-Type: 4, ENCRYPTED
DEK-Info: DES-EDE3-CBC, E83B4019057F55E9

iIPs59nQn4RSd7ppch9/vNE7PfRSHLoQFmaAjaF0DxjV9oucZnUjJq2gphAB2E2H
[...]
y5IT1MZPgN3LNkVSSLPWko08uFZQdfu0JTKcn7NPYRc=
-----END RSA PRIVATE KEY-----
```

PKCS#8 encrypted private key:

```
-----BEGIN ENCRYPTED PRIVATE KEY-----
MIIBpjBABgkqhkiG9w0BBQ0wMzAbBgkqhkiG9w0BBQwwDgQIU9Y9p2EfWucCAggA
[...]
IjsZNp6zmlqf/RXnETsJjGd0TXRWaEdu+XOOyVyPskX2177X9DUJoD31
-----END ENCRYPTED PRIVATE KEY-----
```

5.4.7 Adding a self-signed certificate to the JVM trust store

Graylog nodes inside a cluster need to communicate with each other using the Graylog REST API. When using HTTPS for the Graylog REST API, the X.509 certificate must be *trusted* by the JVM trust store (similar to the trusted CA bundle in an operating system), otherwise communication will fail.

Important: If you are using different X.509 certificates for each Graylog node, you have to add *all of them* into the JVM trust store of each Graylog node.

The default trust store of an installed Java runtime environment can be found at `$JAVA_HOME/jre/lib/security/cacerts`. In order not to “pollute” the official trust store, we make a copy of it which we will use with Graylog instead:

```
$ cp -a "${JAVA_HOME}/jre/lib/security/cacerts" /path/to/cacerts.jks
```

After the original key store file has been copied, we can add the self-signed certificate (`cert.pem`, see [Creating a self-signed private key/certificate](#)) to the key store (the default password is `changeit`):

```
$ keytool -importcert -keystore /path/to/cacerts.jks -storepass changeit -alias_
→graylog-self-signed -file cert.pem
Owner: CN=graylog.example.com, O="Graylog, Inc.", L=Hamburg, ST=Hamburg, C=DE
Issuer: CN=graylog.example.com, O="Graylog, Inc.", L=Hamburg, ST=Hamburg, C=DE
Serial number: 8c80134cee556734
Valid from: Tue Jun 14 16:38:17 CEST 2016 until: Wed Jun 14 16:38:17 CEST 2017
Certificate fingerprints:
    MD5:  69:D1:B3:01:46:0D:E9:45:FB:C6:6C:69:EA:38:ED:3E
```

(continues on next page)

(continued from previous page)

```

    SHA1: F0:64:D0:1B:3B:6B:C8:01:D5:4D:33:36:87:F0:FB:10:E1:36:21:9E
    SHA256: ↵
    ↪F7:F2:73:3D:86:DC:10:22:1D:14:B8:5D:66:B4:EB:48:FD:3D:74:89:EC:C4:DF:D0:D2:EC:F8:5D:78:49:E7:2F
    Signature algorithm name: SHA1withRSA
    Version: 3

Extensions:

[Other details about the certificate...]

Trust this certificate? [no]: yes
Certificate was added to keystore

```

To verify that the self-signed certificate has indeed been added, it can be listed with the following command:

```

$ keytool -keystore /path/to/cacerts.jks -storepass changeit -list | grep graylog-
↪self-signed -A1
graylog-self-signed, Jun 14, 2016, trustedCertEntry,
Certificate fingerprint (SHA1): ↵
↪F0:64:D0:1B:3B:6B:C8:01:D5:4D:33:36:87:F0:FB:10:E1:36:21:9E

```

The printed certificate fingerprint (SHA1) should match the one printed when importing the self-signed certificate.

In order for the JVM to pick up the new trust store, it has to be started with the JVM parameter `-Djavax.net.ssl.trustStore=/path/to/cacerts.jks`. If you've been using another password to encrypt the JVM trust store than the default `changeit`, you additionally have to set the JVM parameter `-Djavax.net.ssl.trustStorePassword=secret`.

Most start and init scripts for Graylog provide a `JAVA_OPTS` variable which can be used to pass the `javax.net.ssl.trustStore` and (optionally) `javax.net.ssl.trustStorePassword` system properties.

Note: The default location to change the JVM parameter depends on your installation type and is documented *with all other default locations*.

Warning: Without adding the previously created Java keystore to the JVM parameters, Graylog won't be able to verify any self-signed certificates or custom CA certificates.

5.5 Multi-node Setup

This guide doesn't provide a step-by-step tutorial for building a multi-node Graylog cluster but does simply give some advice for questions that might arise during the setup.

It's important for such a project that you understand each step in the setup process and do some planning upfront. Without a proper roadmap of all the things you want to achieve with a Graylog cluster, you will be lost on the way.

Graylog should be the last component you install in this setup. Its dependencies, namely MongoDB and Elasticsearch, have to be up and running first.

Important: This guide doesn't include instructions for running a multi-node Graylog cluster in an untrusted network. We assume that the connection between the hosts is trusted and doesn't have to be secured individually.

5.5.1 Prerequisites

Every server which is part of this setup should have the software requirements installed to run the targeted software. All software requirements can be found in the installation manual.

We highly recommend that the system time on all systems is kept in sync via NTP or a similar mechanism. Needless to say that DNS resolution must be working, too. Because everything is a freaking DNS problem.

In order to simplify the installation process, the servers should have a working Internet connection.

5.5.2 MongoDB replica set

We recommend to [deploy a MongoDB replica set](#).

MongoDB doesn't have to run on dedicated servers for the workload generated by Graylog, but you should follow the recommendations given in the MongoDB documentation about architecture. Most important is that you have an odd number of MongoDB servers in the replica set.

In most setups, each Graylog server will also host an instance of MongoDB which is part of the same replica set and shares the data with all other nodes in the cluster.

Note: To avoid unauthorized access to your MongoDB database, the [MongoDB replica set should be setup with authentication](#).

The correct order of working steps should be as follows:

1. Create the replica set (`rs01`)
2. Create the database (`graylog`)
3. Create a user account for accessing the database, which has the roles `readWrite` and `dbAdmin`.

If your MongoDB needs to be reachable over network you should set the IP with `bind_ip` in the configuration.

5.5.3 Elasticsearch cluster

The [Elasticsearch setup documentation](#) should help you to install Elasticsearch with a robust base configuration.

It is important to name the Elasticsearch cluster not simply named *elasticsearch* to avoid accidental conflicts with Elasticsearch nodes using the default configuration. Just choose anything else (we recommend *graylog*), because this is the default name and any Elasticsearch instance that is started in the same network will try to connect to this cluster.

The Elasticsearch servers need one IP that can be reached over network set in `network.host` and some participants of the cluster in `discovery.zen.ping.unicast.hosts`. That is enough to have a minimal cluster setup.

When you secure your Elasticsearch with [User Authentication](#) you need to add credentials to the [Graylog configuration](#) to be able to use the secured Elasticsearch cluster with Graylog.

5.5.4 Graylog Multi-node

After the installation of Graylog, you should take care that only one Graylog node is configured to be master with the configuration setting `is_master = true`.

The HTTP settings configured in `http_bind_address` (or `http_publish_uri`) must be accessible for all Graylog nodes of the cluster.

Graylog to MongoDB connection

The `mongodb_uri` configuration setting must include all MongoDB nodes forming the replica set, the name of the replica set, as well as the previously configured user account with access to the replica set. The configuration setting is a normal [MongoDB connection string](#).

Finally, the MongoDB connection string in the Graylog configuration file should look like this:

```
mongodb_uri = mongodb://USERNAME:PASSWORD@mongodb-node01:27017,mongodb-node02:27017,
↪mongodb-node03:27017/graylog?replicaSet=rs01
```

Graylog to Elasticsearch connection

Graylog will connect to the Elasticsearch [REST API](#).

To avoid issues with the connection to the Elasticsearch cluster you should add some of the network addresses of the Elasticsearch nodes to `elasticsearch_hosts`.

Graylog web interface

It's possible to use a *loadbalancer* in front of all Graylog servers, please refer to *[Making the web interface work with load balancers/proxies](#)* for more details.

Depending on your setup, it's possible to either use a hardware loadbalancer for TLS/HTTPS termination, a *reverse proxy*, or to simply enable it *in the Graylog node*.

5.5.5 Scaling

Each component in this multi-node setup can be scaled on the individual needs.

Depending on the amount of messages ingested and how long messages should be available for direct search, the Elasticsearch cluster will need most of the resources on your setup.

Keep an eye on the Metrics of each part of the cluster. One option is to use [telegraf](#) to fetch important metrics and store them in your favorite metric system (e. g. Graphite, Prometheus or Influx).

Elasticsearch Metrics and some administration can be done with [Elastic HQ](#) or [Cerebro](#). Those will help you to understand the Elasticsearch cluster health and behavior.

Graylog Metrics can be monitored [with the Graylog Metrics Reporter plugins](#) which are able to send the internal Graylog metrics to your favorite metrics collector (e. g. Graphite or Prometheus).

Up until today, we have almost never faced the issue that the MongoDB replica set needed special attention. But of course you should still monitor it and store its metrics - just to be sure.

5.5.6 Troubleshooting

- After every configuration change or service restart, watch the logfile of the applications you have worked on. Sometimes other log files can also give you hints about what went wrong. For example if you're configuring Graylog and try to find out why the connection to the MongoDB isn't working, the MongoDB logs can help to identify the problem.
- If *HTTPS has been enabled for the Graylog REST API*, it need to be setup for the Graylog web interface, too.

5.6 Elasticsearch

We strongly recommend to use a dedicated Elasticsearch cluster for your Graylog setup.

If you are using a shared Elasticsearch setup, a problem with indices unrelated to Graylog might turn the cluster status to YELLOW or RED and impact the availability and performance of your Graylog setup.

5.6.1 Elasticsearch versions

Starting with version 2.3, Graylog uses the HTTP protocol to connect to your Elasticsearch cluster, so it does not have a hard requirement for the Elasticsearch version anymore. We can safely assume that any version starting from 2.x is working.

Warning: We caution you not to install or upgrade Elasticsearch to 7.11 and later! It is not supported. If you do so, it will break your instance!

Graylog version	Elasticsearch version
1.2.0-1.2.1	1.7.1
1.3.0-1.3.3	1.7.3
1.3.4	1.7.5
2.0.0	2.3.1
2.0.1-2.0.3	2.3.2
2.1.0-2.1.3	2.3.5
2.2.0-2.2.3	2.4.4
2.3.x-2.4.x	2.4.x, 5.6.x
2.5.x	2.4.x, 5.6.x, 6.8.x
3.0-3.3	5.6.x, 6.8.x
4.0.x	6.8.x, 7.7.x-7.10.x

Note: Graylog works fine with the [Amazon Elasticsearch Service](#) using Elasticsearch 6 or 7.

Note: Graylog works fine with the [Elastic Cloud](#) using Elasticsearch 6 or 7.

5.6.2 Configuration

Caution: As Graylog has switched from an embedded Elasticsearch node client to a lightweight HTTP client in version 2.3, please check the [upgrade notes](#) how to migrate your configuration if you are switching from an earlier version.

Graylog

The most important setting to make a successful connection is a list of comma-separated URIs to one or more Elasticsearch nodes. Graylog needs to know the address of at least one other Elasticsearch node given in the `elasticsearch_hosts` setting. The specified value should at least contain the scheme (`http://` for unencrypted, `https://` for encrypted connections), the hostname or IP and the port of the HTTP listener (which is 9200 unless otherwise configured) of this node. Optionally, you can also specify an authentication section containing a user name and a password, if either your Elasticsearch node uses [Shield/X-Pack](#) or [Search Guard](#), or you have an intermediate HTTP proxy requiring authentication in between the Graylog server and the Elasticsearch node. Additionally you can specify an optional path prefix at the end of the URI.

A sample specification of `elasticsearch_hosts` could look like this:

```
elasticsearch_hosts = http://es-node-1.example.org:9200/foo,https://  
→someuser:somepassword@es-node-2.example.org:19200
```

Caution: Graylog assumes that all nodes in the cluster are running the same versions of Elasticsearch. While it might work when patch-levels differ, we highly encourage to keep versions consistent.

Warning: Graylog does not react to externally triggered index changes (creating/closing/reopening/deleting an index) anymore. All of these actions need to be performed through the Graylog REST API in order to retain index consistency.

Available Elasticsearch configuration tunables

The following configuration options are now being used to configure connectivity to Elasticsearch:

Config Setting	Type	Comments	Default
<code>elasticsearch_connection_timeout</code>	Duration	Timeout when connection to individual Elasticsearch hosts	10s (10 Seconds)
<code>elasticsearch_hosts</code>	List of URIs	Comma-separated list of URIs of Elasticsearch hosts	<code>http://127.0.0.1:9200</code>
<code>elasticsearch_idle_timeout</code>	Duration	Timeout after which idle connections are terminated	-1s (Never)
<code>elasticsearch_max_total_connections</code>	Integer	Maximum number of total Elasticsearch connections	20
<code>elasticsearch_max_total_connections_per_route/host</code>	Integer	Maximum number of Elasticsearch connections per route/host	2
<code>elasticsearch_socket_timeout</code>	Duration	Timeout when sending/receiving from Elasticsearch connection	60s (60 Seconds)
<code>elasticsearch_discovery_enabled</code>	Boolean	Enable automatic Elasticsearch node discovery	false
<code>elasticsearch_discovery_username</code>	String	The default username used for authentication for all newly discovered nodes.	empty (no authentication used for discovered nodes)
<code>elasticsearch_discovery_password</code>	String	The default password used for authentication for all newly discovered nodes.	empty (no authentication used for discovered nodes)
<code>elasticsearch_discovery_scheme</code>	String	The default scheme used for all newly discovered nodes.	http
<code>elasticsearch_discovery_filter_by_node_attributes</code>	String	Filter by node attributes for the discovered nodes	empty (use all nodes)
<code>elasticsearch_discovery_frequency</code>	Duration	Frequency of the Elasticsearch node discovery	30s (30 Seconds)
<code>elasticsearch_compression_enabled</code>	Boolean	Enable GZIP compression of Elasticsearch request payloads	false
<code>elasticsearch_version</code>	String	Major version of the Elasticsearch version used. If not specified, the version will be auto-sensed from the configured nodes. Will disable auto-sensing if specified.	<not set> (auto-sense) Values: 6 / 7
<code>elasticsearch_mute_deprecation_warnings</code>	Boolean	Enable muting of deprecation warnings for deprecated configuration settings in Elasticsearch. These warnings are attached as “Warnings” in HTTP-Response headers and might clutter up the logs. Works only with ES7	false

Automatic version sensing

Starting with Graylog 4.0, we do support multiple major versions of Elasticsearch, which are partially incompatible with each other (ES6 & ES7). Therefore, we need to know which Elasticsearch version is running in the cluster. This is why we do a single request to the first reachable Elasticsearch node and parse the version of the response it sent back. There are some things which can go wrong at this point, or you might want to run an unsupported version. If you are absolutely sure what you are doing, you can set the `elasticsearch_version` configuration variable. It will disable auto-sensing, force Graylog to pretend that this Elasticsearch major version is running in the cluster, and load the corresponding support module.

Note: Elasticsearch 8.0 (which is not released at the time of this writing) is not supported by Graylog 4.0. There is a good chance that it works with our ES7 support, so you can try to set `elasticsearch_version = 7` to make it run.

Automatic node discovery

Caution: Automatic node discovery does not work when using the [Amazon Elasticsearch Service](#) because Amazon blocks certain Elasticsearch API endpoints.

Graylog uses automatic node discovery to gather a list of all available Elasticsearch nodes in the cluster at runtime and distribute requests among them to potentially increase performance and availability. To enable this feature, you need to set the `elasticsearch_discovery_enabled` to `true`. Optionally, you can define the a filter allowing to selectively include/exclude discovered nodes (details how to specify node filters are found in the [Elasticsearch cluster documentation](#)) using the `elasticsearch_discovery_filter` setting, or tuning the frequency of the node discovery using the `elasticsearch_discovery_frequency` configuration option. If your Elasticsearch cluster uses authentication, you need to specify the `elasticsearch_discovery_default_user` and `elasticsearch_discovery_default_password` settings. The username/password specified in these settings will be used for *all* nodes discovered in the cluster. If your cluster uses HTTPS, you also need to set the `elasticsearch_discovery_default_scheme` setting. It specified the scheme used for discovered nodes and must be consistent across all nodes in the cluster.

Configuration of Elasticsearch nodes

Control access to Elasticsearch ports

If you are not using [Shield/X-Pack](#) or [Search Guard](#) to authenticate access to your Elasticsearch nodes, make sure to restrict access to the Elasticsearch ports (default: 9200/tcp and 9300/tcp). Otherwise the data is readable by anyone who has access to the machine over network.

Open file limits

Because Elasticsearch has to keep a lot of files open simultaneously it requires a higher open file limit that the usual operating system defaults allow. **Set it to at least 64000 open file descriptors.**

Graylog will show a notification in the web interface when there is a node in the Elasticsearch cluster which has a too low open file limit.

Read about how to raise the open file limit in the corresponding [5.x](#) / [6.x](#) documentation pages.

Heap size

It is strongly recommended to raise the standard size of heap memory allocated to Elasticsearch. Just set the `ES_HEAP_SIZE` environment variable to for example 24g to allocate 24GB. We recommend to use around 50% of the available system memory for Elasticsearch (when running on a dedicated host) to leave enough space for the system caches that Elasticsearch uses a lot. But please take care that you **don't cross 32 GB!**

Merge throttling

As of ES 6.2 Merge Throttling settings have been deprecated. (https://www.elastic.co/guide/en/elasticsearch/reference/6.2/breaking_60_settings_changes.html)

Elasticsearch is throttling the merging of Lucene segments to allow extremely fast searches. This throttling however has default values that are very conservative and can lead to slow ingestion rates when used with Graylog. You would see the message journal growing without a real indication of CPU or memory stress on the Elasticsearch nodes. It usually goes along with Elasticsearch INFO log messages like this:

```
now throttling indexing
```

When running on fast IO like SSDs or a SAN we recommend to increase the value of the `indices.store.throttle.max_bytes_per_sec` in your `elasticsearch.yml` to 150MB:

```
indices.store.throttle.max_bytes_per_sec: 150mb
```

Play around with this setting until you reach the best performance.

Tuning Elasticsearch

Graylog is already setting specific configuration for every index it is managing. This is enough tuning for a lot of use cases and setups.

More detailed information about the configuration of Elasticsearch can be found in the [official documentation](#).

5.6.3 Avoiding split-brain and shard shuffling

Split-brain events

Elasticsearch sacrifices consistency in order to ensure availability, and partition tolerance. The reasoning behind that is that short periods of misbehaviour are less problematic than short periods of unavailability. In other words, when Elasticsearch nodes in a cluster are unable to replicate changes to data, they will keep serving applications such as Graylog. When the nodes are able to replicate their data, they will attempt to converge the replicas and to achieve *eventual consistency*.

Elasticsearch tackles the previous by electing master nodes, which are in charge of database operations such as creating new indices, moving shards around the cluster nodes, and so forth. Master nodes coordinate their actions actively with others, ensuring that the data can be converged by non-masters. The cluster nodes that are not master nodes are not allowed to make changes that would break the cluster.

The previous mechanism can in some circumstances fail, causing a **split-brain event**. When an Elasticsearch cluster is split into two sides, both thinking they are the master, data consistency is lost as the masters work independently on the data. As a result the nodes will respond differently to same queries. This is considered a catastrophic event, because the data from two masters can not be rejoined automatically, and it takes quite a bit of manual work to remedy the situation.

Avoiding split-brain events

Elasticsearch nodes take a simple majority vote over who is master. If the majority agrees that they are the master, then most likely the disconnected minority has also come to conclusion that they can not be the master, and everything is just fine. This mechanism requires at least 3 nodes to work reliably however, because one or two nodes can not form a majority.

The minimum amount of master nodes required to elect a master must be configured manually in `elasticsearch.yml`:

```
# At least NODES/2+1 on clusters with NODES > 2, where NODES is the number of master_
↪nodes in the cluster
discovery.zen.minimum_master_nodes: 2
```

The configuration values should typically for example:

Master nodes	mini- mum_master_nodes	Comments
1	1	
2	1	With 2 the other node going down would stop the cluster from working!
3	2	
4	3	
5	3	
6	4	

Some of the master nodes may be *dedicated master nodes*, meaning they are configured just to handle lightweight operational (cluster management) responsibilities. They will not handle or store any of the cluster's data. The function of such nodes is similar to so called *witness servers* on other database products, and setting them up on dedicated witness sites will greatly reduce the chance of Elasticsearch cluster instability.

A dedicated master node has the following configuration in `elasticsearch.yml`:

```
node.data: false
node.master: true
```

Shard shuffling

When cluster status changes, for example because of node restarts or availability issues, Elasticsearch will start automatically rebalancing the data in the cluster. The cluster works on making sure that the amount of shards and replicas will conform to the cluster configuration. This is a problem if the status changes are just temporary. Moving shards and replicas around in the cluster takes considerable amount of resources, and should be done only when necessary.

Avoiding unnecessary shuffling

Elasticsearch has couple configuration options, which are designed to allow short times of unavailability before starting the recovery process with shard shuffling. There are 3 settings that may be configured in `elasticsearch.yml`:

```
# Recover only after the given number of nodes have joined the cluster. Can be seen_
↪as "minimum number of nodes to attempt recovery at all".
gateway.recover_after_nodes: 8
# Time to wait for additional nodes after recover_after_nodes is met.
```

(continues on next page)

(continued from previous page)

```
gateway.recover_after_time: 5m
# Inform Elasticsearch how many nodes form a full cluster. If this number is met,
↳ start up immediately.
gateway.expected_nodes: 10
```

The configuration options should be set up so that only *minimal* node unavailability is tolerated. For example server restarts are common, and should be done in managed manner. The logic is that if you lose large part of your cluster, you probably should start re-shuffling the shards and replicas without tolerating the situation.

5.6.4 Custom index mappings

Sometimes it's useful to not rely on Elasticsearch's [dynamic mapping](#) but to define a stricter schema for messages.

Note: If the index mapping is conflicting with the actual message to be sent to Elasticsearch, indexing that message will fail.

Graylog itself is using a default mapping which includes settings for the `timestamp`, `message`, `full_message`, and `source` fields of indexed messages:

```
$ curl -X GET 'http://localhost:9200/_template/graylog-internal?pretty'
{
  "graylog-internal" : {
    "order" : -1,
    "index_patterns" : [
      "graylog_*"
    ],
    "settings" : {
      "index" : {
        "analysis" : {
          "analyzer" : {
            "analyzer_keyword" : {
              "filter" : "lowercase",
              "tokenizer" : "keyword"
            }
          }
        }
      }
    },
    "mappings" : {
      "message" : {
        "_source" : {
          "enabled" : true
        },
        "dynamic_templates" : [
          {
            "internal_fields" : {
              "mapping" : {
                "type" : "keyword"
              },
              "match_mapping_type" : "string",
              "match" : "gl2_*"
            }
          }
        ]
      }
    }
  },
}
```

(continues on next page)

(continued from previous page)

```

    {
      "store_generic" : {
        "mapping" : {
          "type" : "keyword"
        },
        "match_mapping_type" : "string"
      }
    }
  ],
  "properties" : {
    "gl2_processing_timestamp" : {
      "format" : "yyyy-MM-dd HH:mm:ss.SSS",
      "type" : "date"
    },
    "gl2_accounted_message_size" : {
      "type" : "long"
    },
    "gl2_receive_timestamp" : {
      "format" : "yyyy-MM-dd HH:mm:ss.SSS",
      "type" : "date"
    },
    "full_message" : {
      "fielddata" : false,
      "analyzer" : "standard",
      "type" : "text"
    },
    "streams" : {
      "type" : "keyword"
    },
    "source" : {
      "fielddata" : true,
      "analyzer" : "analyzer_keyword",
      "type" : "text"
    },
    "message" : {
      "fielddata" : false,
      "analyzer" : "standard",
      "type" : "text"
    },
    "timestamp" : {
      "format" : "yyyy-MM-dd HH:mm:ss.SSS",
      "type" : "date"
    }
  }
}
},
"aliases" : { }
}

```

In order to extend the default mapping of Elasticsearch and Graylog, you can create one or more custom index mappings and add them as index templates to Elasticsearch.

Let's say we have a schema for our data like the following:

Field Name	Field Type	Example
http_method	keyword	GET
http_response_code	long	200
ingest_time	date	2016-06-13T15:00:51.927Z
took_ms	long	56

This would translate to the following additional index mapping in Elasticsearch:

```
"mappings" : {
  "message" : {
    "properties" : {
      "http_method" : {
        "type" : "keyword"
      },
      "http_response_code" : {
        "type" : "long"
      },
      "ingest_time" : {
        "type" : "date",
        "format": "strict_date_time"
      },
      "took_ms" : {
        "type" : "long"
      }
    }
  }
}
```

The format of the `ingest_time` field is described in the Elasticsearch documentation about the [format mapping parameter](#). Also make sure to check the Elasticsearch documentation about [Field datatypes](#).

In order to apply the additional index mapping when Graylog creates a new index in Elasticsearch, it has to be added to an [index template](#). The Graylog default template (`graylog-internal`) has the lowest priority and will be merged with the custom index template by Elasticsearch.

Warning: If the default index mapping and the custom index mapping cannot be merged (e. g. because of conflicting field datatypes), Elasticsearch will throw an exception and won't create the index. So be extremely cautious and conservative about the custom index mappings!

Creating a new index template

Save the following index template for the custom index mapping into a file named `graylog-custom-mapping.json`:

```
{
  "template": "graylog_*",
  "mappings" : {
    "message" : {
      "properties" : {
        "http_method" : {
          "type" : "keyword"
        },
        "http_response_code" : {
```

(continues on next page)

(continued from previous page)

```

        "type" : "long"
      },
      "ingest_time" : {
        "type" : "date",
        "format": "strict_date_time"
      },
      "took_ms" : {
        "type" : "long"
      }
    }
  }
}

```

Note: The above template is only compatible with Elasticsearch 6.X. If using Graylog 4.0 with Elasticsearch 7.x, use the template below, saving it as `graylog-custom-mapping-7x.json`.

```

{
  "template": "graylog_*",
  "mappings": {
    "properties": {
      "http_method": {
        "type": "keyword"
      },
      "http_response_code": {
        "type": "long"
      },
      "ingest_time": {
        "type": "date",
        "format": "strict_date_time"
      },
      "took_ms": {
        "type": "long"
      }
    }
  }
}

```

Finally, load the index mapping into Elasticsearch with the following command:

```

$ curl -X PUT -d @'graylog-custom-mapping.json' -H 'Content-Type: application/json'
→ 'http://localhost:9200/_template/graylog-custom-mapping?pretty'
{
  "acknowledged" : true
}

```

Every Elasticsearch index created from that time on, will have an index mapping consisting of the original `graylog-internal` index template and the new `graylog-custom-mapping` template:

```

$ curl -X GET 'http://localhost:9200/graylog_deflector/_mapping?pretty'
{
  "graylog_3" : {
    "mappings" : {
      "message" : {

```

(continues on next page)

(continued from previous page)

```

    "dynamic_templates" : [
      {
        "internal_fields" : {
          "match" : "gl2_*",
          "match_mapping_type" : "string",
          "mapping" : {
            "type" : "keyword"
          }
        }
      },
      {
        "store_generic" : {
          "match_mapping_type" : "string",
          "mapping" : {
            "type" : "keyword"
          }
        }
      }
    ],

    "properties" : {
      "full_message" : {
        "type" : "text",
        "analyzer" : "standard"
      },
      "http_method" : {
        "type" : "keyword"
      },
      "http_response_code" : {
        "type" : "long"
      },
      "ingest_time" : {
        "type" : "date",
        "format" : "strict_date_time"
      },
      "message" : {
        "type" : "text",
        "analyzer" : "standard"
      },
      "source" : {
        "type" : "text",
        "analyzer" : "analyzer_keyword",
        "fielddata" : true
      },
      "streams" : {
        "type" : "keyword"
      },
      "timestamp" : {
        "type" : "date",
        "format" : "yyyy-MM-dd HH:mm:ss.SSS"
      },
      "took_ms" : {
        "type" : "long"
      }
    }
  }
}

```

(continues on next page)

(continued from previous page)

```
}
}
```

Note: When using different index sets every index set can have its own mapping.

Deleting custom index templates

If you want to remove an existing index template from Elasticsearch, simply issue a DELETE request to Elasticsearch:

```
$ curl -X DELETE 'http://localhost:9200/_template/graylog-custom-mapping?pretty'
{
  "acknowledged" : true
}
```

After you've removed the index template, new indices will only have the original index mapping:

```
$ curl -X GET 'http://localhost:9200/graylog_deflector/_mapping?pretty'
{
  "graylog_3" : {
    "mappings" : {
      "message" : {
        "dynamic_templates" : [
          {
            "internal_fields" : {
              "match" : "gl2_*",
              "match_mapping_type" : "string",
              "mapping" : {
                "type" : "keyword"
              }
            }
          },
          {
            "store_generic" : {
              "match_mapping_type" : "string",
              "mapping" : {
                "type" : "keyword"
              }
            }
          }
        ],
        "properties" : {
          "full_message" : {
            "type" : "text",
            "analyzer" : "standard"
          },
          "message" : {
            "type" : "text",
            "analyzer" : "standard"
          },
          "source" : {
            "type" : "text",
            "analyzer" : "analyzer_keyword",
```

(continues on next page)

(continued from previous page)

```

        "fielddata" : true
      },
      "streams" : {
        "type" : "keyword"
      },
      "timestamp" : {
        "type" : "date",
        "format" : "yyyy-MM-dd HH:mm:ss.SSS"
      }
    }
  }
}
}
}
}

```

Additional information on Elasticsearch Index Templates can be found in the official [Elasticsearch Template Documentation](#)

Note: Settings and index mappings in templates are only applied to new indices. After adding, modifying, or deleting an index template, you have to manually rotate the write-active indices of your index sets for the changes to take effect.

Rotate indices manually

Select the desired index set on the **System / Indices** page in the Graylog web interface by clicking on the name of the index set, then select “Rotate active write index” from the “Maintenance” dropdown menu.

graylog Search Streams Alerts Dashboards Sources System / Indices Help Admin

Indices & Index Sets

A Graylog stream write messages to an index set, which is a configuration for retention, sharding, and replication of the stored data. By configuring index sets, you could, for example, have different retention times for certain streams.

You can learn more about the index model in the [documentation](#)

Total: 89 indices, 1,791,378,512 documents, 1.1TB

Index set	Indices	Documents	Size	Default	Actions
Default index set	52	889,072,005	574.9GB	default	Edit More Actions

The Graylog default index set. Graylog will use this index set by default.

Index prefix:	graylog	Index rotation strategy:	Message Count	Index retention strategy:	Delete
Shards:	4	Max docs per index:	20000000	Max number of indices:	45
Replicas:	1				

Graylog 2.4.3+2c41897 on graylog-server-02.torch.sh (Oracle Corporation 1.8.0_65 on Linux 3.13.0-100-generic)

Index Set: Default index set

This is an overview of all indices (message stores) in this index set Graylog is currently taking in account for searches and analysis.

You can learn more about the index model in the [documentation](#)

[Index sets overview](#) [Edit Index Set](#) [Maintenance](#)

[Recalculate index ranges](#)
[Rotate active write index](#)

Index prefix:	graylog	Index rotation strategy:	Message Count	Index retention strategy:	Delete
Shards:	4	Max docs per index:	20000000	Max number of indices:	45
Replicas:	1				

52 indices with a total of 889,086,147 messages under management, current write-active index is *graylog_147*.

Elasticsearch cluster is green. Shards: 656 active, 0 initializing, 0 relocating, 0 unassigned, [What does this mean?](#)

graylog_147 active write index Contains messages up to a few seconds ago (6.7GB / 9,072,775 messages) [Hide Details / Actions](#)
Range re-calculated 2 days ago in 0ms. 198 segments, 0 open search contexts, 0 deleted messages

Primary shard operations		Total shard operations	
Index:	0 ops	Index:	0 ops
Flush:	364 ops (took a few seconds)	Flush:	728 ops (took a minute)
Merge:	0 ops	Merge:	0 ops
Query:	20,384 ops (took 2 minutes)	Query:	40,732 ops (took 4 minutes)

5.6.5 Cluster Status explained

Elasticsearch provides a classification for the [cluster health](#).

The cluster status applies to different levels:

- **Shard level** - see status descriptions below
- **Index level** - inherits the status of the worst shard status
- **Cluster level** - inherits the status of the worst index status

That means that the Elasticsearch cluster status can turn red if a single index or shard has problems even though the rest of the indices/shards are okay.

Note: Graylog checks the status of the current write index while indexing messages. If that one is GREEN or YELLOW, Graylog will continue to write messages into Elasticsearch regardless of the overall cluster status.

Explanation of the different status levels:

RED

The RED status indicates that some or all of the primary shards are not available.

In this state, no searches can be performed until all primary shards have been restored.

YELLOW

The YELLOW status means that all of the primary shards are available but some or all shard replicas are not.

When the index configuration include replication with a count that is equal or higher than the number of nodes, your cluster cannot become green. In most cases, this can be solved by adding another Elasticsearch node to the cluster or by reducing the replication factor of the indices.

GREEN

The cluster is fully operational. All primary and replica shards are available.

5.7 Index model

5.7.1 Overview

Graylog is transparently managing one or more sets of Elasticsearch indices to optimize search and analysis operations for speed and low resource consumption.

To enable managing indices with different [mappings](#), [analyzers](#), and [replication settings](#) Graylog is using so-called index sets which are an abstraction of all these settings.

Indices & Index Sets

A Graylog stream write messages to an index set, which is a configuration for retention, sharding, and replication of the stored data. By configuring index sets, you could, for example, have different retention times for certain streams.

You can learn more about the index model in the [documentation](#)

Create index set

Index Set Name	Indices	Documents	Size	Default
Access Logs	1	0	520.0B	
Default index set	4	355,896	106.7MB	default

Access Logs (4 weeks)

Index prefix: accesslogs
Shards: 4
Replicas: 1

Index rotation strategy: Index Time
Rotation period: P1D (1d, a day)

Index retention strategy: Delete
Max number of indices: 28

Default index set (4 indices, 355,896 documents, 106.7MB) **default**

The Graylog default index set. Graylog will use this index set by default.

Index prefix: graylog2
Shards: 4
Replicas: 0

Index rotation strategy: Index Time
Rotation period: PT1H (1h, an hour)

Index retention strategy: Delete
Max number of indices: 4

Navigation: << < 1 > >>

Each index set contains the necessary settings for Graylog to create, manage, and fill Elasticsearch indices and handle index rotation and data retention for specific requirements.

graylog
Search
Streams
Alerts
Dashboards
Sources
System
In 141 / Out 141 msg/s
Help
Administrator

Index Set: Default index set

This is an overview of all indices (message stores) in this index set Graylog is currently taking in account for searches and analysis.

You can learn more about the index model in the [documentation](#)

Index prefix: graylog2
Shards: 4
Replicas: 0

Index rotation strategy: PT1H (1h, an hour)
Rotation period:

Index Time
Index retention strategy: Delete
Max number of indices: 4

4 indices with a total of 365,091 messages under management, current write-active index is `graylog2_96`.

Elasticsearch cluster is yellow. Shards: 20 active, 0 initializing, 0 relocating, 4 unassigned, [What does this mean?](#)

graylog2_96 active write index Contains messages up to a few seconds ago (24.3MB / 81,989 messages) [Hide Details / Actions](#)
Range re-calculated 10 minutes ago in 0ms. 28 segments, 0 open search contexts, 0 deleted messages

Primary shard operations		Total shard operations	
Index:	82,057 ops (took a few seconds)	Index:	82,057 ops (took a few seconds)
Flush:	0 ops	Flush:	0 ops
Merge:	172 ops (took a few seconds)	Merge:	172 ops (took a few seconds)
Query:	12 ops (took a few seconds)	Query:	12 ops (took a few seconds)
Fetch:	5 ops (took a few seconds)	Fetch:	5 ops (took a few seconds)
Get:	0 ops	Get:	0 ops
Refresh:	1,662 ops (took a few seconds)	Refresh:	1,662 ops (took a few seconds)

Shard routing

S0
S1
S2
S3

Bold shards are primaries, others are replicas. Replicas are elected to primaries automatically when primaries leave the cluster. Size and document counts only reflect primary shards and no possible replica duplication.

Active write index cannot be closed Active write index cannot be deleted

graylog2_95 Contains messages from 7 days ago up to 10 minutes ago (33.9MB / 113,807 messages) [Show Details / Actions](#)

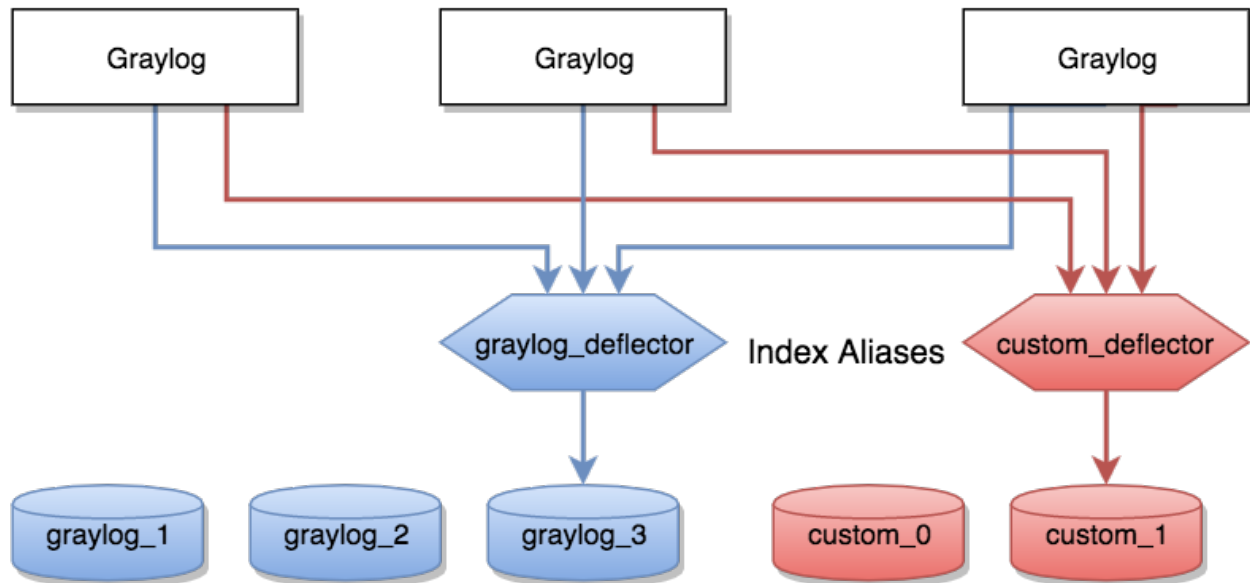
graylog2_94 Contains messages from 7 days ago up to 7 days ago (20.3MB / 67,446 messages) [Show Details / Actions](#)

graylog2_93 Contains messages from 8 days ago up to 7 days ago (30.4MB / 101,849 messages) [Show Details / Actions](#)

Graylog is maintaining an **index alias** per index set which is always pointing to the current write-active index from that index set. There is always exactly one index to which new messages are written until the configured rotation criterion (number of documents, index size, or index age) has been met.

A background task continuously checks if the rotation criterion of an index set has been met and a new index is created and prepared when that happens. Once the index is ready, the index alias is atomically switched to it. That means that all Graylog nodes can write messages into the alias without even knowing what the currently write-active index of the index set is.

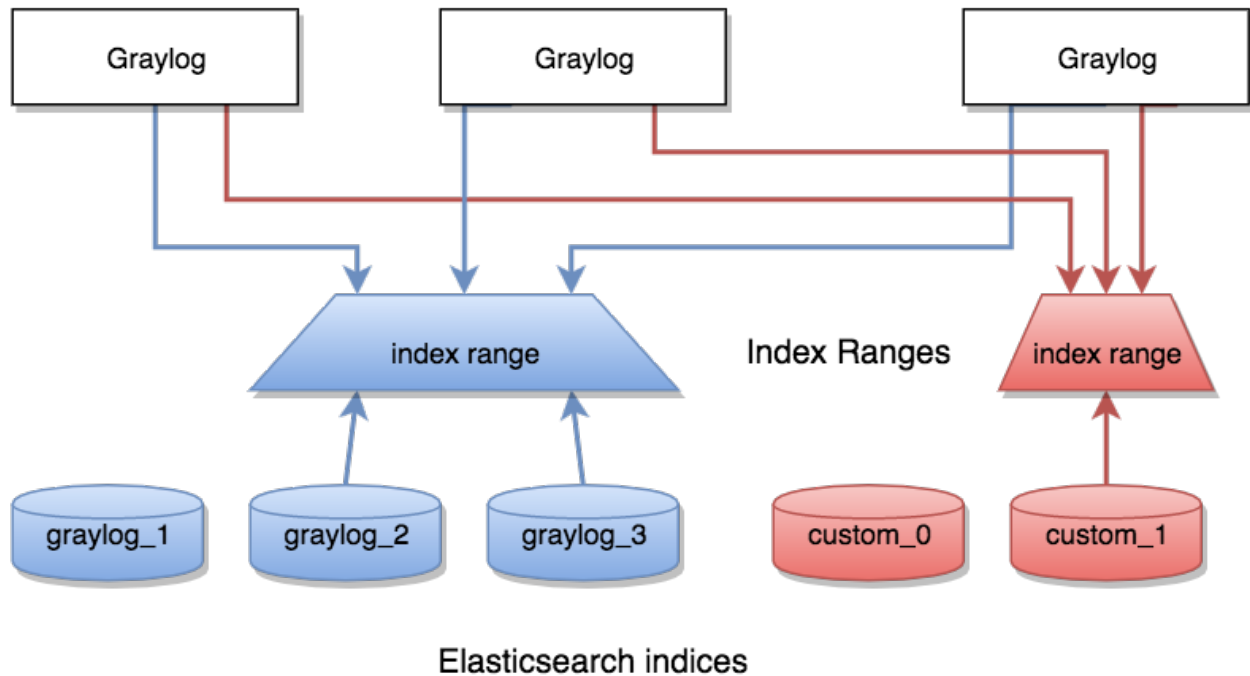
Write Path



Elasticsearch indices

Almost every read operation is performed with a given time range. Because Graylog is writing messages sequentially into Elasticsearch it can keep information about the time range each index covers. It selects a lists of indices to query when having a time range provided. If no time range was provided, it will search in all indices it knows.

Read Path



Eviction of indices and messages

There are configuration settings for the maximum number of indices Graylog is managing in a given index set.

Depending on the configured retention strategy, the oldest indices of an index set will automatically be closed, deleted, or exported when the configured maximum number of indices has been reached.

The deletion is performed by the Graylog master node in a background thread which is continuously comparing the number of indices with the configured maximum:

```
INFO : org.graylog2.indexer.rotation.strategies.AbstractRotationStrategy - Deflector_
↳index <graylog_95> should be rotated, Pointing deflector to new index now!
INFO : org.graylog2.indexer.MongoIndexSet - Cycling from <graylog_95> to <graylog_96>.
INFO : org.graylog2.indexer.MongoIndexSet - Creating target index <graylog_96>.
INFO : org.graylog2.indexer.indices.Indices - Created Graylog index template "graylog-
↳internal" in Elasticsearch.
INFO : org.graylog2.indexer.MongoIndexSet - Waiting for allocation of index <graylog_
↳96>.
INFO : org.graylog2.indexer.MongoIndexSet - Index <graylog_96> has been successfully_
↳allocated.
INFO : org.graylog2.indexer.MongoIndexSet - Pointing index alias <graylog_deflector>_
↳to new index <graylog_96>.
INFO : org.graylog2.system.jobs.SystemJobManager - Submitted SystemJob <f1018ae0-dcaa-
↳11e6-97c3-6c4008b8fc28> [org.graylog2.indexer.indices.jobs.
↳SetIndexReadOnlyAndCalculateRangeJob]
INFO : org.graylog2.indexer.MongoIndexSet - Successfully pointed index alias <graylog_
↳deflector> to index <graylog_96>.
```

5.7.2 Index Set Configuration

Index sets have a variety of different settings related to how Graylog will store messages into the Elasticsearch cluster.

Create Index Set
Create a new index set that will let you configure the retention, sharding, and replication of messages coming from one or more streams.

You can learn more about the index model in the [documentation](#)

Title
Custom Index Set
Descriptive name of the index set.

Description

Add a description of this index set.

Index prefix

A unique prefix used in Elasticsearch indices belonging to this index set. The prefix must start with a letter or number, and can only contain letters, numbers, '_', '-' and '+'.

Analyzer
standard
Elasticsearch analyzer for this index set.

Index shards
4
Number of Elasticsearch shards used per index in this index set.

Index replicas
0
Number of Elasticsearch replicas used per index in this index set.

Max. number of segments
1
Maximum number of segments per Elasticsearch index after optimization (force merge).

☐ Disable index optimization after rotation
Disable Elasticsearch index optimization (force merge) after rotation.

- **Title:** A descriptive name of the index set.
- **Description:** A description of the index set for human consumption.
- **Index prefix:** A unique prefix used for Elasticsearch indices managed by the index set. The prefix must start with a letter or number, and can only contain letters, numbers, `_`, `-` and `+`. The index alias will be named accordingly, e. g. `graylog_deflector` if the index prefix was `graylog`.
- **Analyzer:** (default: `standard`) The Elasticsearch [analyzer](#) for the index set.
- **Index shards:** (default: 4) The number of Elasticsearch shards used per index.
- **Index replicas:** (default: 0) The number of Elasticsearch replicas used per index.
- **Max. number of segments:** (default: 1) The maximum number of segments per Elasticsearch index after [index optimization \(force merge\)](#), see [Segment Merging](#) for details.
- **Disable index optimization after rotation:** Disable Elasticsearch [index optimization \(force merge\)](#) after index rotation. Only activate this if you have serious problems with the performance of your Elasticsearch cluster during the optimization process.

Index rotation

- **Message count:** Rotates the index after a specific number of messages have been written.
- **Index size:** Rotates the index after an approximate size on disk (before optimization) has been reached.
- **Index time:** Rotates the index after a specific time (e. g. 1 hour or 1 week).

Index Rotation Configuration

Graylog uses multiple indices to store documents in. You can configure the strategy it uses to determine when to rotate the currently active write index.

Select rotation strategy

Index Message Count



Max documents per index

20000000

Maximum number of documents in an index before it gets rotated

Index retention

- **Delete:** [Delete indices](#) in Elasticsearch to minimize resource consumption.
- **Close:** [Close indices](#) in Elasticsearch to reduce resource consumption.
- **Do nothing**
- **Archive:** Commercial feature, see [Archiving](#).

Index Retention Configuration

Graylog uses a retention strategy to clean up old indices.

Select retention strategy

Delete Index



Max number of indices

20

Maximum number of indices to keep before **deleting** the oldest ones

5.7.3 Maintenance

Keeping the index ranges in sync

Graylog will take care of calculating index ranges automatically as soon as a new index has been created.

In case the stored metadata about index time ranges has run out of sync, Graylog will notify you in the web interface. This can happen if an index was deleted manually or messages from already “closed” indices were removed.

The system will offer you to just re-generate all time range information. This may take a few seconds but is an easy task for Graylog.

You can easily re-build the information yourself after manually deleting indices or doing other changes that might cause synchronization problems:

```
$ curl -XPOST http://127.0.0.1:9000/api/system/indices/ranges/rebuild
```

This will trigger a system job:

```
INFO : org.graylog2.indexer.ranges.RebuildIndexRangesJob - Recalculating index ranges.
INFO : org.graylog2.system.jobs.SystemJobManager - Submitted SystemJob <9b64a9d0-dcac-
↪11e6-97c3-6c4008b8fc28> [org.graylog2.indexer.ranges.RebuildIndexRangesJob]
INFO : org.graylog2.indexer.ranges.RebuildIndexRangesJob - Recalculating index ranges,
↪for index set Default index set (graylog2_*): 5 indices affected.
INFO : org.graylog2.indexer.ranges.MongoIndexRangeService - Calculated range of
↪[graylog_96] in [7ms].
INFO : org.graylog2.indexer.ranges.RebuildIndexRangesJob - Created ranges for index
↪graylog_96: MongoIndexRange{id=null, indexName=graylog_96, begin=2017-01-
↪17T11:49:02.529Z, end=2017-01-17T12:00:01.492Z, calculatedAt=2017-01-17T12:00:58.
↪097Z, calculationDuration=7, streamIds=[00000000000000000000000000000001]}
[...]
```

```
INFO : org.graylog2.indexer.ranges.RebuildIndexRangesJob - Done calculating index
↪ranges for 5 indices. Took 44ms.
INFO : org.graylog2.system.jobs.SystemJobManager - SystemJob <9b64a9d0-dcac-11e6-97c3-
↪6c4008b8fc28> [org.graylog2.indexer.ranges.RebuildIndexRangesJob] finished in 46ms.
```

Manually rotating the active write index

Sometimes you might want to rotate the active write index manually and not wait until the configured rotation criterion for in the latest index has been met, for example if you've changed the index mapping or the number of shards per index.

You can do this either via an HTTP request against the REST API of the Graylog master node or via the web interface:

```
$ curl -XPOST http://127.0.0.1:9000/api/system/deflector/cycle
```

Triggering this job produces log output similar to the following lines:

```
INFO : org.graylog2.rest.resources.system.DeflectorResource - Cycling deflector for
↪index set <58501f0b4a133077ecd134d9>. Reason: REST request.
INFO : org.graylog2.indexer.MongoIndexSet - Cycling from <graylog_97> to <graylog_98>.
INFO : org.graylog2.indexer.MongoIndexSet - Creating target index <graylog_98>.
INFO : org.graylog2.indexer.indices.Indices - Created Graylog index template "graylog-
↪internal" in Elasticsearch.
INFO : org.graylog2.indexer.MongoIndexSet - Waiting for allocation of index <graylog_
↪98>.
INFO : org.graylog2.indexer.MongoIndexSet - Index <graylog_98> has been successfully
↪allocated.
INFO : org.graylog2.indexer.MongoIndexSet - Pointing index alias <graylog_deflector>
↪to new index <graylog_98>.
INFO : org.graylog2.system.jobs.SystemJobManager - Submitted SystemJob <024aac80-dcad-
↪11e6-97c3-6c4008b8fc28> [org.graylog2.indexer.indices.jobs.
↪SetIndexReadOnlyAndCalculateRangeJob]
```

(continues on next page)

(continued from previous page)

```
INFO : org.graylog2.indexer.MongoIndexSet - Successfully pointed index alias <graylog_
↳deflector> to index <graylog_98>.
INFO : org.graylog2.indexer.retention.strategies.
↳AbstractIndexCountBasedRetentionStrategy - Number of indices (5) higher than limit_
↳(4). Running retention for 1 index.
INFO : org.graylog2.indexer.retention.strategies.
↳AbstractIndexCountBasedRetentionStrategy - Running retention strategy [org.graylog2.
↳indexer.retention.strategies.DeletionRetentionStrategy] for index <graylog_94>
INFO : org.graylog2.indexer.retention.strategies.DeletionRetentionStrategy - Finished_
↳index retention strategy [delete] for index <graylog_94> in 23ms.
```

5.8 Backup

When it comes to backup in a Graylog setup it is not easy to answer. You need to consider what type of backup will suit your needs.

Your Graylog Server setup and settings are easy to backup with a [MongoDB dump](#) and a filesystem backup of all configuration files.

The data within your Elasticsearch Cluster can take the advantage of the [Snapshot and Restore](#) function that are offered by Elasticsearch.

5.8.1 Disaster recovery

To be able to restore Graylog after a total System crash you need the Graylog `server.conf` file - to be exact you need the key you used for `password_secret` in the configuration. The second important part is the MongoDB. This database contains all configuration. Possible options how-to [backup MongoDB](#) can be found at the [MongoDB documentation](#).

If you need to restore log data, you can do this using the archiving feature of Graylog enterprise or any other elastic-search backup and restore option. It is not enough to copy the data directories of your Elasticsearch nodes, you might not be able to restore from that.

Elasticsearch and MongoDB are databases, for both you should implement the ability to make a data dump and restore that - if you need want to be able to restore the current state.

5.9 Default file locations

Each installation flavor of Graylog will place the configuration files into a specific location on the local files system. The goal of this section is to provide a short overview about the most common and most important default file locations.

5.9.1 DEB package

This paragraph covers Graylog installations on Ubuntu Linux, Debian Linux, and Debian derivatives installed with the *DEB package*.

Graylog

	File system path
Configuration	/etc/graylog/server/server.conf
Logging configuration	/etc/graylog/server/log4j2.xml
Plugins	/usr/share/graylog-server/plugin
Binaries	/usr/share/graylog-server/bin
Scripts	/usr/share/graylog-server/scripts
JVM settings	/etc/default/graylog-server
Message journal files	/var/lib/graylog-server/journal
Log Files	/var/log/graylog-server/

Elasticsearch

Note: These are only the most common file locations. Please refer to the [Elasticsearch documentation](#) for a comprehensive list of default file locations.

	File system path
Configuration	/etc/elasticsearch
JVM settings	/etc/default/elasticsearch
Data files	/var/lib/elasticsearch/data
Log files	/var/log/elasticsearch/

MongoDB

	File system path
Configuration	/etc/mongod.conf
Data files	/var/lib/mongodb/
Log files	/var/log/mongodb/

5.9.2 RPM package

This paragraph covers Graylog installations on Fedora Linux, Red Hat Enterprise Linux, CentOS Linux, and other Red Hat Linux derivatives installed with the *RPM package*.

Graylog

	File system path
Configuration	/etc/graylog/server/server.conf
Logging configuration	/etc/graylog/server/log4j2.xml
Plugins	/usr/share/graylog-server/plugin
Binaries	/usr/share/graylog-server/bin
Scripts	/usr/share/graylog-server/scripts
JVM settings	/etc/sysconfig/graylog-server
Message journal files	/var/lib/graylog-server/journal
Log Files	/var/log/graylog-server/

Elasticsearch

Note: These are only the most common file locations. Please refer to the [Elasticsearch documentation](#) for a comprehensive list of default file locations.

	File system path
Configuration	/etc/elasticsearch
JVM settings	/etc/sysconfig/elasticsearch
Data files	/var/lib/elasticsearch/
Log files	/var/log/elasticsearch/

MongoDB

	File system path
Configuration	/etc/mongod.conf
Data files	/var/lib/mongodb/
Log files	/var/log/mongodb/

5.10 Graylog REST API

The functionality Graylog REST API is very comprehensive; even the Graylog web interface is exclusively using Graylog REST API to interact with the Graylog cluster.

To connect to the Graylog REST API with a web browser, just add `api/api-browser` to your current `http_publish_uri` setting or use the **API browser** button on the nodes overview page (*System / Nodes* in the web interface).

For example if your Graylog REST API is listening on `http://192.168.178.26:9000/api/`, the API browser will be available at `http://192.168.178.26:9000/api/api-browser/`.

The screenshot shows the Graylog web interface at the URL `gm-01-u.fritz.box/system/nodes`. The page title is "Nodes" and it provides a real-time overview of the nodes in the cluster. A note indicates that message processing can be paused at any time. The page lists three active nodes:

- Node 1:** `71ab6aaa / gm-01-c.fritz.box`. In 1 / Out 1 msg/s. The journal contains 1 unprocessed messages in 1 segment. 0 messages appended, 0 messages read in the last second. Current lifecycle state: Running, Message processing: Enabled, Load balancer indication: ALIVE. The JVM is using 803.8MB of 972.8MB heap space.
- Node 2:** `ed0ad32d / gm-01-d.fritz.box`. In 0 / Out 0 msg/s. The journal contains 0 unprocessed messages in 1 segment. 0 messages appended, 0 messages read in the last second. Current lifecycle state: Running, Message processing: Enabled, Load balancer indication: ALIVE. The JVM is using 650.7MB of 972.8MB heap space.
- Node 3:** `58c57924 / gm-01-u.fritz.box`. In 0 / Out 0 msg/s. The journal contains 0 unprocessed messages in 1 segment. 0 messages appended, 0 messages read in the last second. Current lifecycle state: Running, Message processing: Enabled, Load balancer indication: ALIVE. The JVM is using 824.9MB of 972.8MB heap space.

Each node entry includes buttons for "Details", "Metrics", "API browser", and "More actions". A red arrow points to the "API browser" button for the first node.

Note: The customized version of Swagger UI used by Graylog does currently only work in Google Chrome and Firefox.

5.10.1 Using the API browser

After providing the credentials (username and password), you can browse all available HTTP resources of the Graylog REST API.

Graylog REST API browser

192.168.178.26:9000/api/api-browser#/Cluster/get_get_0

GM provide username and password

AlarmCallbackHistories : Manage stream alarm callback histories Show/Hide | List Operations | Expand Operations | Raw

AlarmCallbacks : Manage stream alarm callbacks Show/Hide | List Operations | Expand Operations | Raw

AlertConditions : Manage stream alert conditions Show/Hide | List Operations | Expand Operations | Raw

Alerts : Manage stream alerts for all streams Show/Hide | List Operations | Expand Operations | Raw

Cluster : System information of all nodes in the cluster Show/Hide | List Operations | Expand Operations | Raw

GET /cluster Get system overview of all Graylog nodes

Response Class

Model | Model Schema

Map

Response Content Type application/json

Try it out! Hide Response

Request URL

http://192.168.178.26:9000/api/c/cluster

Response Body

```
{
  "71ab6aaa-cb39-46be-9dac-4ba99fed3d66": {
    "facility": "graylog-server",
    "codename": "Smuttynose",
    "node_id": "71ab6aaa-cb39-46be-9dac-4ba99fed3d66",
    "cluster_id": "3adaf799-1551-4239-84e5-6ed939b56f62",
    "version": "2.1.1+01d50e5",
    "started_at": "2016-09-23T10:39:00.179Z",
    "hostname": "gm-01-c.fritz.box",
    "lifecycle": "running",
    "lb_status": "alive",
    "timezone": "Europe/Berlin",
    "operating_system": "Linux 3.10.0-327.28.3.el7.x86_64",
    "is_processing": true
  },
  "ed0ad32d-8776-4d25-be2f-a8956ecebdcf": {
    "facility": "graylog-server",
    "codename": "Smuttynose",
    "node_id": "ed0ad32d-8776-4d25-be2f-a8956ecebdcf",
    "cluster_id": "3adaf799-1551-4239-84e5-6ed939b56f62",
  }
}
```

Response Code

200

Response Headers

```
{"X-Graylog-Node-Id":"58c57924-808a-4fa7-be09-63ca551628cd","Date":"Fri, 14 Oct 2016 13:16:59 GMT","Content-Encoding":"..."}
```

GET /cluster/{nodeId}/jvm Get JVM information of the given node

GET /cluster/{nodeId}/threaddump Get a thread dump of the given node

Cluster/Deflector : Cluster-wide deflector handling Show/Hide | List Operations | Expand Operations | Raw

5.10.2 Interacting with the Graylog REST API

While having a graphical UI for the Graylog REST API is perfect for interactive usage and exploratory learning, the real power unfolds when using the Graylog REST API for automation or integrating Graylog into another system, such as monitoring or ticket systems.

Naturally, the same operations the API browser offers can be used on the command line or in scripts. A very common HTTP client being used for this kind of interaction is `curl`.

Note: In the following examples, the username `GM` and password `superpower` will be used to demonstrate how to work with the Graylog REST API running at `http://192.168.178.26:9000/api`.

Warning: Since Graylog 2.5.0, all non-GET API requests **must include and set a value** for the `X-Requested-By` HTTP header. This is needed to prevent CSRF attacks.

The following command displays Graylog cluster information as JSON, exactly the same information the web interface is displaying on the *System / Nodes* page:

```
curl -u GM:superpower -H 'Accept: application/json' -X GET 'http://192.168.178.
↪26:9000/api/cluster?pretty=true'
```

The Graylog REST API will respond with the following information:

```
{
  "71ab6aaa-cb39-46be-9dac-4ba99fed3d66" : {
    "facility" : "graylog-server",
    "codename" : "Smuttynose",
    "node_id" : "71ab6aaa-cb39-46be-9dac-4ba99fed3d66",
    "cluster_id" : "3adaf799-1551-4239-84e5-6ed939b56f62",
    "version" : "2.1.1+01d50e5",
    "started_at" : "2016-09-23T10:39:00.179Z",
    "hostname" : "gm-01-c.fritz.box",
    "lifecycle" : "running",
    "lb_status" : "alive",
    "timezone" : "Europe/Berlin",
    "operating_system" : "Linux 3.10.0-327.28.3.el7.x86_64",
    "is_processing" : true
  },
  "ed0ad32d-8776-4d25-be2f-a8956ecebdcf" : {
    "facility" : "graylog-server",
    "codename" : "Smuttynose",
    "node_id" : "ed0ad32d-8776-4d25-be2f-a8956ecebdcf",
    "cluster_id" : "3adaf799-1551-4239-84e5-6ed939b56f62",
    "version" : "2.1.1+01d50e5",
    "started_at" : "2016-09-23T10:40:07.325Z",
    "hostname" : "gm-01-d.fritz.box",
    "lifecycle" : "running",
    "lb_status" : "alive",
    "timezone" : "Europe/Berlin",
    "operating_system" : "Linux 3.16.0-4-amd64",
    "is_processing" : true
  },
  "58c57924-808a-4fa7-be09-63ca551628cd" : {
    "facility" : "graylog-server",
```

(continues on next page)

(continued from previous page)

```

"codename" : "Smuttynose",
"node_id" : "58c57924-808a-4fa7-be09-63ca551628cd",
"cluster_id" : "3adaf799-1551-4239-84e5-6ed939b56f62",
"version" : "2.1.1+01d50e5",
"started_at" : "2016-09-30T13:31:39.051Z",
"hostname" : "gm-01-u.fritz.box",
"lifecycle" : "running",
"lb_status" : "alive",
"timezone" : "Europe/Berlin",
"operating_system" : "Linux 4.4.0-36-generic",
"is_processing" : true
}

```

Creating and using Access Token

For security reasons, using the username and password directly on the command line or in some third party application is undesirable.

To prevent having to use the clear text credentials, Graylog allows to create access tokens which can be used for authentication instead.

Note: Users require the permissions `users:tokenlist`, `users:tokencreate`, and `users:tokenremove` to manage their access tokens. Please check the documentation on [Permission Management](#) for more information. Also note that users, even administrators, may only manage their *own* tokens.

The following example will create an access token named `agents` for the user `graylog-sidecar`:

- Navigate to the users configuration menu `System / Authentication`.

The screenshot shows the Graylog web interface. At the top, there's a navigation bar with tabs for Search, Streams, Alerts, Dashboards, Sources, Enterprise, and System. The System tab is active, and a dropdown menu is open, showing 'Authentication' as the selected option. Below the navigation bar, there's a search bar and a histogram chart. The histogram chart shows a distribution of messages over time, with a peak around 09:05. Below the histogram, there's a 'Messages' table with columns for 'Timestamp' and 'source'. The table shows two messages: one from 'linux_monitor' at 2019-06-18 09:09:43.405 and another at 2019-06-18 09:09:42.584. On the left side, there's a 'Search result' section showing 'Found 1,003 messages in 9 ms, searched in 3 indices. Results retrieved at 2019-06-18 09:09:45.' Below this, there's a 'Fields' section with a list of fields to filter by, including 'action', 'beats_type', 'client_name', 'data_length', 'direction', 'dns_query', 'dst_addr', and 'dst_addr.raw_name'.

- Select the user you want to create a token for and click on `Edit tokens`.

Authentication Management
Configure Graylog's authentication providers and manage the active users of this Graylog cluster.

Read more authentication in the [documentation](#).

User accounts
Create as many users as you want next to the default administrator user here. You can also make changes to already existing users.

Filter Users

Name	Username	Email Address	Client Address	Role	Actions
Administrator	admin		10.0.0.80	Admin	System user Edit tokens
Report System User (build-in)	graylog-report	report@graylog.local		Reader Report System (Internal)	Edit More actions
Sidecar System User (build-in)	graylog-sidecar	sidecar@graylog.local		Sidecar System (Internal) Reader	Edit More actions

Edit tokens
Delete

- Give the token a name and create it.

Authentication Management
Configure Graylog's authentication providers and manage the active users of this Graylog cluster.

Read more authentication in the [documentation](#).

Edit tokens of user *graylog_sidecar*
You can create new tokens or delete old ones.

Token Name

Filter

No items to display

☒ Hide Tokens

- You should see now the token in the list.

Either by unchecking the hide option or by copying the token to the clipboard you can access the token. The received access token can now be used as username in a request to the Graylog REST API using Basic Auth together with the literal password token.

When an access token is no longer needed, it can be delete on the Graylog UI via the `Delete` button.

Creating and using Session Token

While access tokens can be used for permanent access, session tokens will expire after a certain time. The expiration time can be adjusted in the user's profile.

Getting a new session token can be obtained via POST request to the Graylog REST API. Username and password are required to get a valid session ID. The following example will create an session token for the user GM:

```
curl -i -X POST -H 'Content-Type: application/json' -H 'Accept: application/json' -H
'X-Requested-By: cli' 'http://192.168.178.26:9000/api/system/sessions' -d '{
  "username": "GM", "password": "superpower", "host": ""}'
```

The response will include the session token in the field `session_id` and the time of expiration:

```
{
  "valid_until" : "2016-10-24T16:08:57.854+0000",
  "session_id" : "cf1df45c-53ea-446c-8ed7-e1df64861de7"
}
```

The received token can now be used as username in a request to the Graylog REST API using Basic Auth together with the literal password session.

Now a `curl` command to get a list of access tokens would look as follows:

```
curl -u cf1df45c-53ea-446c-8ed7-e1df64861de7:session -H 'Accept: application/json' -X
GET 'http://192.168.178.26:9000/api/cluster?pretty=true'
```


SECURING GRAYLOG

To secure your Graylog setup, you should not use one of our pre-configured images, create your own unique installation where you understand each component and secure the environment by design. Expose only the services that are needed and secure them whenever possible with TLS/SSL and some kind of authentication. Do not use the pre-created appliances for critical production environments.

On the Graylog appliances MongoDB and Elasticsearch is listening on the external interface. This makes the creation of a cluster easier and demonstrates the way Graylog works. Never run this in an insecure network.

When using Amazon Web Services and our pre-configured AMI, never open all ports in the security group. Do not expose the server to the internet. Access Graylog only from within your VPC. Enable encryption for the communication.

6.1 Default ports

All parts of one Graylog installation will communicate over network sockets. Depending on your setup and number of nodes this might be exposed or can be bound to localhost. The [SELinux](#) configuration is already covered in our step-by-step guide for CentOS Linux.

Table 1: Default network communication ports

Component	Port
Graylog (web interface / API)	9000 (tcp)
Graylog to Elasticsearch	9200 (tcp)
Elasticsearch node communication	9300 (tcp)
MongoDB	27017 (tcp)

Each setup is unique in the requirements and ports might be changed by configuration, but you should limit who is able to connect to which service. In the [architecture description](#) you can see what components need to be exposed and communicate with each other.

6.2 Configuring TLS ciphers

When running Graylog in untrusted environments such as the Internet, we strongly recommend to use SSL/TLS for all connections. All TLS enabled services are configured to support TLS 1.2 or greater by default. In case you need to support legacy software, you can change the default TLS protocols with the `enabled_tls_protocols` setting.

When using [nginx](#) or [Apache httpd](#) for SSL termination the [Mozilla SSL Configuration Generator](#) will help to create a reasonably secure configuration for them.

6.3 Security related topics

6.3.1 Generating Graylog certificates and keys with Microsoft AD CS

In order to really make your Graylog installation “your own” Graylog, you will need to add TLS certificates issued and trusted by your own organization. Many organizations rely upon Microsoft’s ADCS (Active Directory Certificate Services) for the issuance of their internal certificates. Here, we will explain the basic requirements and workflow of setting up all keys and certificates for a Graylog stack.

In these examples we will assume a Graylog cluster, consisting of:

- One Graylog front-end server.
- Three Graylog data receiver hosts (clustered).
- Three ElasticSearch instances (clustered).
- SearchGuard, used to apply TLS/SSL for free on ElasticSearch.
- Three MongoDB instances (clustered as *replica set*)

Required certificates

In order to provide your full cluster with all required certificates, we’ll need to make all of the following keypairs and certificates. For each certificate you’ll need to gather the relevant hostnames, DNS aliases and IP addresses, because we want the certificates to work for all of these.

Table 2: Required certificates and key files

Goal	Subject	Subject alt. names	Filetype
Mon-goDB 1	CN=hostname1.mydomain.local	dns:hostname1.mydomain.local dns:graylogmongoalias.mydomain.local dns:ip:192.168.100.101	PEM PKCS#12 (cert+key in one)
Mon-goDB 2	CN=hostname2.mydomain.local	dns:hostname2.mydomain.local dns:graylogmongoalias.mydomain.local dns:ip:192.168.100.102	PEM PKCS#12 (cert+key in one)
Mon-goDB 3	CN=hostname3.mydomain.local	dns:hostname3.mydomain.local dns:graylogmongoalias.mydomain.local dns:ip:192.168.100.103	PEM PKCS#12 (cert+key in one)
Graylog frontend	CN=hostname4.mydomain.local	dns:hostname4.mydomain.local dns:graylogguialias.mydomain.local dns:ip:192.168.100.104	PEM (certificate) PKCS#8 (key file)
Graylog receiver 1	CN=hostname5.mydomain.local	dns:hostname5.mydomain.local dns:graylogreceiveralias.mydomain.local dns:graylogreceiveralias ip:192.168.100.105	PEM (certificate) PKCS#8 (key file)
Graylog receiver 2	CN=hostname6.mydomain.local	dns:hostname6.mydomain.local dns:graylogreceiveralias.mydomain.local dns:graylogreceiveralias ip:192.168.100.106	PEM (certificate) PKCS#8 (key file)
Graylog receiver 3	CN=hostname7.mydomain.local	dns:hostname7.mydomain.local dns:graylogreceiveralias.mydomain.local dns:graylogreceiveralias ip:192.168.100.107	PEM (certificate) PKCS#8 (key file)
Search-Guard Admin	CN=searchguardadmin,O=yourorganization		PEM (certificate) PKCS#8 (key file)
Elastic-Search 1	CN=hostname8.mydomain.local	dns:hostname8.mydomain.local dns:graylogelasticalias.mydomain.local dns:ip:192.168.100.108	PEM (certificate) PKCS#8 (key file)
Elastic-Search 2	CN=hostname9.mydomain.local	dns:hostname9.mydomain.local dns:graylogelasticalias.mydomain.local dns:ip:192.168.100.109	PEM (certificate) PKCS#8 (key file)
Elastic-Search 3	CN=hostname9.mydomain.local	dns:hostname9.mydomain.local dns:graylogelasticalias.mydomain.local dns:ip:192.168.100.109	PEM (certificate) PKCS#8 (key file)

Graylog stack certificate template

The certificates for the Graylog stack and all of its components need some pretty specific settings. In order to achieve these, you will need to define a new certificate template in AD CS.

Be careful:

- Defining a new certificate template will require elevated privileges in your Active Directory domain.
- PKI and certificates are a matter of trust! Do not break your organization's *Certificate Policy* or its *Certificate practice Statement*. Stick to your standard procedures and do not simply start messing with the PKI!

Defining the new template is done through the AD CS management tool “*Certification Authority*”.

1. Duplicate the default AD CS WebServer template, rename it to your liking.
2. General tab:
 1. Set the name to something recognizable, for example “Graylog Stack Template”.

2. The software will automatically generate the internal name, which removes all spaces: “GraylogStack-Template”.
3. Cryptography tab:
 1. **Provider** is the *Key Storage Provider*
 2. **Requests can use any provider available on the subject’s computer** is true
 3. **Algorithm** is *RSA 2048*
 4. **Request hash** is *SHA256*
 5. **Use alternate signature hash** must be set to false.
4. Extensions tab:
 1. **Application policies** is set to both *server auth* as well as *client auth*.
5. Request handling tab:

Note: If you are going to be generating all the keypairs on your issuing CA or on another management station, then you will need to add the following as well, which will allow you to export the keypair for migration to the Graylog stack servers.

1. **Allow the private key to be exported** is set to *Yes*.

Generating the keypair and certificates - preparation

The following instructions assume that you generate all the keypairs on a Windows administrative workstation, or on the issuing CA itself (meaning, you’ll need that extra “*Allow the private key to be exported*” flag). You can of course generate all keys on the Graylog stack servers and then simply submit the CSR (certificate signing request) to the CA.

The .INF input file for the *certreq* command would look similar to the following. Note that we are referring to the template by the internal name, which does not have whitespace!:

```
[Version]
signature="$Windows NT$"
[NewRequest]
Subject="CN=hostname5.mydomain.local"
HashAlgorithm=SHA256
KeyAlgorithm=RSA
KeyLength=2048
Exportable=True
MachineKeySet=True
[RequestAttributes]
CertificateTemplate="GraylogStackTemplate"
[Extensions]
2.5.29.17="{text}"
_continue_="dns=hostname5&"
_continue_="dns=hostname5.mydomain.local&"
_continue_="dns=graylogreceiveralias.mydomain.local&"
_continue_="dns=graylogreceiveralias&"
_continue_="ipaddress=192.168.100.105&"
```

If you’re one of the edge-cases where you will be using an older *Internet Explorer* to talk to the IP address of the host, as opposed to the hostname or its alias, you will need to add:


```
_continue_="dns=192.168.100.105&"
```

For some reason IExplore ignores the *ipaddress* field of the SAN (subject alternative name).

The above is only one of the needed .INF files; you will need one for each keypair being generated! So adjust all relevant fields and save each .INF file separately.

Generating the keypair and certificates - execution

As said, we're assuming that you're generating the keypairs on your Windows administration station. If you're generating the keypairs on the Graylog Linux hosts, then you will need to use different instructions.

For each of the .INF files that we built, we will run commands like the following (assuming that the files are all in D:\secretsgraylog):

```
certreq -new D:\secrets\graylog\hostname5-graylogreceiver.inf D:\secrets\graylog\
->hostname5-graylogreceiver.req
certreq -submit D:\secrets\graylog\hostname5-graylogreceiver.req
```

This gives you a request ID, for example "531". Ask one of your PKI administrators to approve the request, for example:

```
certutil -resubmit 531
```

Afterwards you can continue:

```
certreq -retrieve 531 D:\secrets\graylog\hostname5-graylogreceiver.cer
certreq -accept D:\secrets\graylog\hostname5-graylogreceiver.cer
```

What all of this does is:

1. Generate a keypair by your specifications.
2. Generate a CSR for the keypair.
3. Submit the CSR to the issuing CA.
4. Approve the CSR on the issuing CA.
5. Export the signed certificate from the issuing CA.
6. Import the signed certificate into your current server's certificate store.

SearchGuard admin

SearchGuard is used to add TLS/SSL encryption onto Elasticsearch for free. The product requires that the admin-user authenticates using a keypair and certificate. The generation process is similar to the one above, except that you won't be adding SANs, because the user does not have DNS names or IP addresses. The subject name will understandably also be different (e.g. *CN=searchguardadmin,OU=yourteam,O=yourorganization*), but be warned that it must match exactly with the account name in the SearchGuard configuration.

Generating the keypair and certificates - conversion

We showed earlier (in the table above) that each part of the Graylog stack has specific requirements for the format and files that are used to submit the keypair and the certificate. We will need to convert everything we have right now, in order to make them usable.

Warning: Key materials are very sensitive information! You should not leave them lying around! Once you have finished the setup of all keys and certificates on the Graylog stack, you must delete all the files we've put into D:secretsgraylog. Never leave key materials lying around!

Also, please use strong passwords on all PFX and PKCS files! Store these passwords safely, in a password vaulting application.

CA Chain

Each application requires that you provide the CA chain of your PKI, for inclusion in its trust store. The following assumes that you have one root CA and one issuing CA and that you've put their respective certificates in D:secretsgraylog:

```
openssl x509 -in rootca.crt -outform pem -out D:\secrets\graylog\rootca.pem
openssl x509 -in ca.crt -outform pem -out D:\secrets\graylog\ca.pem
type D:\secrets\graylog\rootca.pem > D:\secrets\graylog\cachain.pem
type D:\secrets\graylog\rootca.pem >> D:\secrets\graylog\cachain.pem
```

The resulting cachain.pem file can be used in all Graylog stack applications for inclusion in the trust store. You will probably need to run the file through **dos2unix** first though, to fix line endings.

MongoDB

For each of the keypairs we made we will need to repeat the following in Powershell (adjust all names accordingly):

```
Get-ChildItem -Path cert:\LocalMachine\My | Select-String hostname3
```

This will return metadata of the certificate for MongoDB on hostname3. You will need the thumbprint string, which will look similar to “5F98EBBF735CDDAE00E33E0FD69050EF9220254”. Moving on:

```
$mypass = ConvertTo-SecureString -String "yoursafepassword" -Force -AsPlainText
Get-ChildItem -Path cert:\LocalMachine\My\5F98EBBF735CDDAE00E33E0FD69050EF9220254 |
↪ Export-PfxCertificate -FilePath D:\secrets\graylog\hostname3-mongodb.pfx -Password
↪ $mypass
openssl x509 -in D:\secrets\graylog\hostname3-mongodb.cer -outform pem -out D:\
↪ secrets\graylog\hostname3-mongodb.crt
openssl pkcs12 -in D:\secrets\graylog\hostname3-mongodb.pfx -nocerts -out D:\secrets\
↪ graylog\hostname3-mongodb.key
type D:\secrets\graylog\hostname3-mongodb.crt > D:\secrets\graylog\hostname3-mongodb.
↪ pem
D:\secrets\graylog\hostname3-mongodb.key >> D:\secrets\graylog\hostname3-mongodb.pem
```

Finally, edit the PEM file D:secretsgrayloghostname3-mongodb.pem to remove all extraneous metadata and whitespaces. There should be nothing separating the `=== END CERTIFICATE ===` and the `=== BEGIN PRIVATE KEY ===` headers.

You may upload the PEM file to the relevant MongoDB server, where you will need to do one final conversion: use **dos2unix** to convert the line endings from Windows-type to Linux-type.

Graylog and ElasticSearch

For each of the keypairs we made we will need to repeat the following in Powershell (adjust all names accordingly):

```
Get-ChildItem -Path cert:\LocalMachine\My | Select-String hostname5
```

This will return metadata of the certificate for MongoDB on hostname5. You will need the thumbprint string, which will look similar to “5F98EBBFE735CDDAE00E33E0FD69050EF9220254”. Moving on:

```
$mypass = ConvertTo-SecureString -String "yoursafepassword" -Force -AsPlainText
Get-ChildItem -Path cert:\LocalMachine\My\5F98EBBFE735CDDAE00E33E0FD69050EF9220254 |
↪ Export-PfxCertificate -FilePath D:\secrets\graylog\hostname5-receiver.pfx -Password
↪ $mypass
openssl x509 -in D:\secrets\graylog\hostname5-receiver.cer -outform pem -out D:\
↪ secrets\graylog\hostname5-receiver.crt
openssl pkcs12 -in D:\secrets\graylog\hostname5-receiver.pfx -nocerts -out D:\secrets\
↪ graylog\hostname5-receiver.key
openssl pkcs8 -in D:\secrets\graylog\hostname5-receiver.key -topk8 -out D:\secrets\
↪ graylog\hostname5-receiver.pem
```

Finally, edit the CRT and PEM files to remove all extraneous metadata and whitespaces. There should be nothing before or after the **=== BEGIN** and **END ===** tags.

You may upload the PEM and CRT files to the relevant Elasticsearch or Graylog server, where you will need to do one final conversion: use **dos2unix** to convert the line endings from Windows-type to Linux-type.

6.3.2 Secured Graylog and Beats input

The goal of this guide is to have a secured Graylog interface, API and secure communication for Beats that are authenticated by certificate. This way only trusted sources are able to deliver messages into Graylog.

This is a structured document that contains only information already given at various location in this documentation. It should give the missing connection between the different parts of the documentation.

SSL/TLS prework

Create a CA with our [shadowCA](#) or use your already given CA. That is needed to create all certificates. The examples will take the given names from our shadowCA and reference to that only, please adjust this to your local needs. If in doubt check the shadowCA scripts what kind of certificate is created and used.

The CA certificate needs to be imported on all machines that are part of the setup using the [documented steps](#). Depending on your Browser you might need to import the `.der` to your Browser to trust the CA. In addition the CA `.der` file is imported to a JVM Keystore that is used by Graylog.

Adding of `.der` to JVM Keystore

Graylog needs to know the CA that is used to verify the certificates. The prime advantage is that it only needs the CA certificate and not all known self-signed certificates in the setup.:

```
# test the .der file
keytool -v -printcert -file shadowCA.der

# copy cacert into Graylog Folder (ubuntu / debian and CENTOS openJDK )
[ -f /usr/lib/jvm/jre/lib/security/cacerts ] && cp /usr/lib/jvm/jre/lib/security/
↪ cacerts /etc/graylog/server/cacerts.jks
[ -f /usr/lib/jvm/java-8-openjdk-amd64/jre/lib/security/cacerts ] && cp /usr/lib/jvm/
↪ java-8-openjdk-amd64/jre/lib/security/cacerts /etc/graylog/server/cacerts.jks
```

(continues on next page)

(continued from previous page)

```
# import CA .der into keystore
# will only work if the default password & user is not changed.
keytool -importcert -alias shadowCA -keystore /etc/graylog/server/cacerts.jks -
→storepass changeit -file shadowCA.der
```

Custom JVM Keystore for Graylog

Modify the *JVM Setting* to include `-Djavax.net.ssl.trustStore=/etc/graylog/server/cacerts.jks` in the `GRAYLOG_JAVA_OPTS`.

Create certificates

Create certificates for each server, all hostnames and IPs that might be used later to connect from and to this server should be included in the certificates. See [README of shadowCA](#) for the possible options. The most common error is that the certificate name does not match the hostname that is used for the connection.

The shadowCA uses the same settings that can be found *in the SSL* documentation, but easy up the process.

Deploy and configure

Graylog

HTTPS

Place the `.key` and `.cert` file on your Graylog server in the configuration dir (`/etc/graylog/server/`) and add them to the `Graylog server.conf`. In addition change `http_enable_tls` to **true**. You might need to cover other settings in a multinode cluster or special setups - just read the comments of the settings inside of the `server.conf`.

When using the Sidecar, use the **https** URI in the *sidecar.yml*

After restart of Graylog the web interface and the API is served via https only. No automatic redirect from http to https is made.

TLS Beats Input

To enable TLS on the input, a certificate (and private key file) is needed. It can be the same or a different certificate as the one of your REST/web interface, as long as it matches all hostnames of your input. Just reference the files *TLS cert file* and *TLS private key file* in the Beats Input configuration and restart the input.

The ingesting client will verify the presented certificate against his know CA certificates, if that is successful communication will be established using TLS.

Add client authentication to Beats input

Create one directory (`/etc/graylog/server/trusted_clients`) that will hold all client certificates you allow to connect to the beats input. This directory must be available on all Graylog server that have the input enabled. Write that path in the beats input configuration *TLS Client Auth Trusted Certs* and select **required** for the option *TLS client authentication*.

After this setting is saved only clients that provide a certificate that is trusted by the CA and is placed inside the configured directory (`/etc/graylog/server/trusted_clients`) can deliver messages to Graylog.

Beats Shipper

When using Beats configure a `logstash output`. The SSL configuration can be found as the second point in the [description by elastic](#). This is:

```
output.logstash:
  hosts: ["graylog.example.org:5044"]
  ssl.certificate_authorities: ["/etc/ca.pem"]
  ssl.certificate: "/etc/client.crt"
  ssl.key: "/etc/client.key"
```

Place your previously created certificates on the server where you installed beats and adjust the configuration to your needs.

The certificate (`.crt`) file of the beats needs to be placed at the Graylog server in the configured directory for trusted clients only if you have enabled that feature at the beats input in Graylog and want client authentication.

6.3.3 Logging user activity

Graylog has been built using a client-server architecture model in which the user interface retrieves all data via a collection of REST APIs. Thus logging relevant user activity, in other words an access log, is simply a matter of enabling a built-in feature. It logs all requests to the Graylog REST API and produces an access log augmented by additional information, like the user name, the remote address, and the user agent.

Configuring the Access Log

The Access Log is configured by adding an appender and logger to the `Log4j2 configuration` file (`log4j2.xml`). The following example demonstrates required additions on top of the normal logging configuration:

```
<?xml version="1.0" encoding="UTF-8"?>
<Configuration packages="org.graylog2.log4j" shutdownHook="disable">
  <Appenders>
    <!-- Simple appender that writes access log to specified file -->
    <File name="RestAccessLog" fileName="/var/log/graylog/server/restaccess.log"
    ↪append="true">
      <PatternLayout pattern="%d %-5p: %c - %m%n"/>
    </File>
  </Appenders>
  <Loggers>
    <!-- RestAccessLogFilter -->
    <Logger name="org.graylog2.rest.accesslog" level="debug" additivity="false">
      <AppenderRef ref="RestAccessLog" level="debug"/>
      <AppenderRef ref="STDOUT" level="info"/>
    </Logger>
  </Loggers>
</Configuration>
```

(continues on next page)

(continued from previous page)

```

    </Logger>
  </Loggers>
</Configuration>

```

The resulting log entries will look similar to the following messages:

```

2016-06-08 18:21:55,651 DEBUG: org.graylog2.rest.accesslog - 192.168.122.1 admin [-]
↳ "GET streams" Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:46.0) Gecko/20100101
↳ Firefox/46.0 200 -1
2016-06-08 18:21:55,694 DEBUG: org.graylog2.rest.accesslog - 192.168.122.1 admin [-]
↳ "GET system/fields" Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:46.0) Gecko/20100101
↳ Firefox/46.0 200 -1
2016-06-08 18:21:55,698 DEBUG: org.graylog2.rest.accesslog - 192.168.122.1 admin [-]
↳ "GET system/fields" Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:46.0) Gecko/20100101
↳ Firefox/46.0 200 -1
2016-06-08 18:21:55,780 DEBUG: org.graylog2.rest.accesslog - 192.168.122.1 admin [-]
↳ "GET system/inputs" Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:46.0) Gecko/20100101
↳ Firefox/46.0 200 -1
2016-06-08 18:21:56,021 DEBUG: org.graylog2.rest.accesslog - 192.168.122.1 admin [-]
↳ "GET search/universal/relative?query=%2A&range=300&limit=150&sort=timestamp%3Adesc"
↳ Mozilla/5.0 (X11; Fedora; Linux x86_64; rv:46.0) Gecko/20100101 Firefox/46.0 200 -1

```

X-Forwarded-For HTTP header support

If there is a proxy server, load balancer, or a network device which hides the client's IP address from Graylog, it can read the information from a supplied X-Forwarded-For HTTP request header. Most HTTP-capable devices support setting such a (semi-) standard HTTP request header.

Since overriding the client address from an externally supplied HTTP request header opens the door for spoofing, the list of trusted proxy servers which are allowed to provide the X-Forwarded-For HTTP request header, can be configured using the `trusted_proxies` setting in the Graylog configuration file (`graylog.conf`):

```

# Comma separated list of trusted proxies that are allowed to set the client address
↳ with X-Forwarded-For
# header. May be subnets, or hosts.
trusted_proxies = 127.0.0.1/32, 0:0:0:0:0:0:0:1/128

```

6.3.4 Using ModSecurity

ModSecurity is a popular open source web application firewall that can be used in conjunction with the Apache and Nginx web servers. When Graylog is configured behind a web server that uses ModSecurity, certain configuration changes must be made. The following examples are for version 2.x rules.

Some distributions (for example RHEL 7.x) ship with older rule sets that do not allow the MIME type `application/json` to be used in requests. This can be fixed by modifying the variable `tx.allowed_request_content_type`:

```

# Allow application/json
SecRule REQUEST_URI "@beginsWith /" \
  "id:'000001', \
  phase:1, \
  t:none, \
  setvar:'tx.allowed_request_content_type=application/x-www-form-urlencoded|multipart/
↳ form-data|text/xml|application/xml|application/x-amf|application/json|application/
↳ octet-stream', \

```

(continues on next page)

(continued from previous page)

```
nolog, \
pass"
```

Load balancers accessing `/system/lbstatus` rarely provide the ordinary HTTP headers `Host`, `Accept`, or `User-Agent`. The default rules disallow requests that are missing the mentioned headers. They should be explicitly allowed:

```
# Host header
SecRule REQUEST_URI "@beginsWith /system/lbstatus" \
  "id:'000002', \
  phase:2, \
  t:none, \
  ctl:ruleRemoveById=960008, \
  nolog, \
  pass"
# Accept header
SecRule REQUEST_URI "@beginsWith /system/lbstatus" \
  "id:'000003', \
  phase:2, \
  t:none, \
  ctl:ruleRemoveById=960015, \
  nolog, \
  pass"
# User agent header
SecRule REQUEST_URI "@beginsWith /system/lbstatus" \
  "id:'000004', \
  phase:2, \
  t:none, \
  ctl:ruleRemoveById=960009, \
  nolog, \
  Pass"
```

The HTTP verb `DELETE` is usually forbidden by default. It should be explicitly allowed for requests to `/api/`:

```
# Enable DELETE for /api/
SecRule REQUEST_URI "@beginsWith /api/" \
  "id:'000005', \
  phase:1, \
  t:none, \
  setvar:'tx.allowed_methods=GET HEAD POST OPTIONS DELETE', \
  nolog, \
  pass"
```

ModSecurity ships by default with strict rules against SQL injection. The query strings used in Graylog searches trigger those rules, breaking all search functionality. It should be noted that Graylog ships with no SQL based products. The offending rules can usually be safely removed, for example:

```
# Disable SQL injection rules
SecRuleRemoveById 981173
SecRuleRemoveById 960024
SecRuleRemoveById 981318
SecRuleRemoveById 981257
```

6.3.5 The URL Whitelist

There are certain components in Graylog which will perform outgoing HTTP requests. Among those, are event notifications and HTTP-based data adapters.

Allowing Graylog to interact with resources using arbitrary URLs may pose a security risk. HTTP requests are executed from Graylog servers and might therefore be able to reach more sensitive systems than an external user would have access to, including AWS EC2 metadata, which can contain keys and other secrets, Elasticsearch and others.

It is therefore advisable to restrict access by explicitly whitelisting URLs which are considered safe. HTTP requests will be validated against the Whitelist and are prohibited if there is no Whitelist entry matching the URL.

Configuring the Whitelist

The Whitelist configuration is located at `System/Configurations`. The Whitelist is enabled by default.

The screenshot shows the Graylog Configuration page with the 'URL Whitelist Configuration' section. A modal window titled 'Update Whitelist Configuration' is open, displaying a table of whitelisted URLs. The table has columns for #, Title, URL, Type, and Actions. Two entries are listed: 'DSV data adapter' with URL 'http://localhost:8090/csv/data.csv' and 'HTTP JSONPath data adapter' with URL '^http://localhost:8090/json/*'. The modal also includes a 'Disable Whitelist' checkbox and a warning message. A red arrow points from the 'Update' button in the modal to the 'Update' button in the main configuration section.

#	Title	URL	Type	Actions
1	DSV data adapter	http://localhost:8090/csv/data.csv	Exact ...	[icon]
2	HTTP JSONPath data adapter	^http://localhost:8090/json/*	Regex	[icon]

Disabling the Whitelist

If the security implications mentioned above are of no concern, the Whitelist can be completely disabled. When disabled, HTTP requests will not be restricted.

“Exact match” Whitelist entries

Whitelist entries of type `Exact match` contain a string which will be matched against a URL by direct comparison. If the URL is equal to this string, it is considered to be whitelisted.

“Regex” Whitelist entries

Whitelist entries of type `Regex` contain a regular expression. If a URL matches the regular expression, the URL is considered to be whitelisted. Graylog uses the [Java Pattern class](#) to evaluate regular expressions.

SENDING IN LOG DATA

A Graylog setup is pretty worthless without any data in it. This page explains the basic principles of getting your data into the system and also explains common fallacies.

7.1 What are Graylog message inputs?

Message inputs are the Graylog parts responsible for accepting log messages. Some default messages types are available by default in Graylog. But it might be needed to install additional plugins to enable Graylog to receive particular messages.

After choosing the input type in the Graylog web interface at `System / Inputs`, the input is launched without a restart of Graylog. Most environments will use the defaults for the inputs, but most inputs have a granular configuration available. Some can use TLS or authentication via certificates, and others can make use of a queuing system.

Most environments will have one input of each type and ingest all messages of that type to the one input. But it might be needed to have multiple inputs of the same kind to allow some extractors to work only on specific messages. But the processing pipeline would allow us to work on ingested messages from different sources on the same input in different ways. But as every environment is different, Graylog is flexible and will enable you to adjust everything to your need and not let you change your setting to fit Graylog.

The section about the different log sources describes how you ingest those types of logs; besides, some logs have individual inputs. Some of them are listed below in the individual inputs section. In addition to that, [the Graylog Marketplace](#) contains some inputs created by the community.

7.2 Log sources

We can't cover all possible options and device configurations in this section. The following describes the fundamentals of those inputs and the current best practice to ingest those kinds of messages into Graylog. Some can be done native others need some collector. The section will include one or two example collectors, but the free and open world has multiple more to offer, we can't cover all solutions.

7.2.1 Ingest syslog

Graylog is able to accept and parse [RFC 5424](#) and [RFC 3164](#) compliant syslog messages and supports TCP transport with both the octet counting or termination character methods. UDP is also supported and the recommended way to send log messages in most architectures.

Many devices, especially routers and firewalls, do not send RFC compliant syslog messages. This might result in wrong or completely failed parsing. In that case, you might have to go with a combination of *raw/plain* message inputs that do not attempt to do any parsing and *Extractors*.

Rule of thumb is that messages forwarded by *rsyslog* or *syslog-ng* are usually parsed flawlessly.

Sending syslog from Linux hosts

rsyslog

Sending syslog data from Linux hosts with *rsyslog* is done by defining an output Action that uses the [RFC 5424](#) format.

The output action can be placed at the end of the `/etc/rsyslog.conf` or as an included file such as `/etc/rsyslog.d/graylog.conf`.

These examples will send all syslog selectors to the example host `yourgraylog.example.com` (change this to the hostname or IP that resolves in the installed environment) on port 514 using the predefined format of `RSYSLOG_SyslogProtocol23Format`.

UDP (single @):

```
*. * @yourgraylog.example.org:514;RSYSLOG_SyslogProtocol23Format
```

TCP (double @@):

```
*. * @@yourgraylog.example.org:514;RSYSLOG_SyslogProtocol23Format
```

This can be improved by [configuring rsyslog to use TLS](#).

An opinionated example configuration using a local queue, TCP with TLS, recycling connections, and using the *rsyslog* advanced format:

```
*. * action(
  Action.resumeInterval="10"
  RebindInterval="10000"           # cycling TCP connections allows for load
  ↪balancing
  Queue.Size="100000"
  Queue.DiscardMark="97500"
  Queue.HighWaterMark="80000"
  Queue.Type="LinkedList"
  Queue.FileName="rsyslogqueue"
  Queue.CheckpointInterval="100"
  Queue.MaxDiskSpace="2g"
  Action.ResumeRetryCount="-1"
  Queue.SaveOnShutdown="on"
  Queue.TimeoutEnqueue="10"
  Queue.DiscardSeverity="0"
  type="omfwd"
  target="yourgraylog.example.org"
  protocol="tcp"
```

(continues on next page)

(continued from previous page)

```

port="514"
template="RSYSLOG_SyslogProtocol23Format"
StreamDriver="gtls"
StreamDriverMode="1"           # run driver in TLS-only mode
StreamDriverAuthMode="x509/name" # host TLS cert CN will be used for_
↪ authentication
StreamDriverPermittedPeers="yourgraylog.example.org" # only allowed hosts
)

```

For extremely old (pre-5.10 from 2010) versions of rsyslog that do not have the `RSYSLOG_SyslogProtocol23Format` built-in, a template must be defined:

```

$template GRAYLOG_SyslogProtocol23Format, "<%PRI%>%PROTOCOL-VERSION% %TIMESTAMP:::date-
↪ rfc3339% %HOSTNAME% %APP-NAME% %PROCID% %MSGID% %STRUCTURED-DATA% %msg%\n"

# Then referenced in the output action
*. * @graylog.example.org:514;GRAYLOG_SyslogProtocol23Format

```

syslog-ng

Use the `syslog` function in `syslog-ng` to send [RFC 5424](#) formatted messages via TCP to a Graylog host:

```

# Define TCP syslog destination.
destination d_net {
    syslog("graylog.example.org" port(514));
};
# Send from the default source s_src to the d_net destination configured above.
log {
    source(s_src);
    destination(d_net);
};

```

Sending syslog from MacOS X hosts

Sending log messages from MacOS X syslog daemons is easy. Just define a `graylog-server` instance as UDP log target by adding this line in your `/etc/syslog.conf`:

```

*. * @graylog.example.org:514

```

Now restart `syslogd`:

```

$ sudo launchctl unload /System/Library/LaunchDaemons/com.apple.syslogd.plist
$ sudo launchctl load /System/Library/LaunchDaemons/com.apple.syslogd.plist

```

Important: If `syslogd` was running as another user, you might end up with multiple `syslogd` instances and strange behavior of the whole system. Please check that only one `syslogd` process is running:

```

$ ps aux | grep syslog
lennart      58775   0.0   0.0   2432768    592 s004  S+   6:10PM   0:00.00 grep_
↪ syslog
root         58759   0.0   0.0   2478772   1020  ??   Ss   6:09PM   0:00.01 /usr/
↪ sbin/syslogd

```

That's it! Your MacOS X syslog messages should now appear in your Graylog system.

7.2.2 Ingest journald

Many Linux environments have journald configured to write the traditional log files to disk via Syslog. That enables us to use the Syslog to ingest the messages to Graylog.

The better solution would be to write directly from journald to Graylog. As this is not supported by journald at the time of writing, we need to use the collector `journalbeat` that allows to read the journal from systemd and use the beats framework to transport the messages.

In Graylog, create a `beats input` and configure the journalbeat with the logstash output pointing to the beats input in Graylog. The following configuration can be seen as example journalbeat configuration:

```
fields_under_root: true
fields.collector_node_id: ${sidecar.nodeName}
fields.gl2_source_collector: ${sidecar.nodeId}

journalbeat.inputs:
  # Paths that should be crawled and fetched. Possible values files and directories.
  # When setting a directory, all journals under it are merged.
  # When empty starts to read from local journal.
- paths: []

  # The number of seconds to wait before trying to read again from journals.
  #backoff: 1s
  # The maximum number of seconds to wait before attempting to read again from
  ↪journals.
  #max_backoff: 20s

  # Position to start reading from journal. Valid values: head, tail, cursor
  seek: cursor
  # Fallback position if no cursor data is available.
  #cursor_seek_fallback: head

  # Exact matching for field values of events.
  # Matching for nginx entries: "systemd.unit=nginx"
  #include_matches: []

output.logstash:
  # Boolean flag to enable or disable the output module.
  enabled: true

  # Graylog host and the beats input
  hosts: ["graylog:5044"]

  # Number of workers per Graylog host.
  #worker: 1

  # Set gzip compression level.
  #compression_level: 3

  # Configure escaping HTML symbols in strings.
  #escape_html: false

  # Optional maximum time to live for a connection to Graylog, after which the
  # connection will be re-established. A value of `0s` (the default) will
  # disable this feature.
  #
  # Not yet supported for async connections (i.e. with the "pipelining" option set)
```

(continues on next page)

(continued from previous page)

```

#ttl: 30s

# Optionally load-balance events between Graylog hosts. Default is false.
#loadbalance: false

# If enabled only a subset of events in a batch of events is transferred per
# transaction. The number of events to be sent increases up to `bulk_max_size`
# if no error is encountered.
slow_start: true

# The number of seconds to wait before trying to reconnect to Graylog
# after a network error. After waiting backoff.init seconds, the Beat
# tries to reconnect. If the attempt fails, the backoff timer is increased
# exponentially up to backoff.max. After a successful connection, the backoff
# timer is reset. The default is 1s.
#backoff.init: 1s

# The maximum number of seconds to wait before attempting to connect to
# Graylog after a network error. The default is 60s.
#backoff.max: 60s

# SOCKS5 proxy server URL
#proxy_url: socks5://user:password@socks5-server:2233

# Resolve names locally when using a proxy server. Defaults to false.
#proxy_use_local_resolver: false

# Enable SSL support. SSL is automatically enabled if any SSL setting is set.
#ssl.enabled: true

# Configure SSL verification mode. If `none` is configured, all server hosts
# and certificates will be accepted. In this mode, SSL based connections are
# susceptible to man-in-the-middle attacks. Use only for testing. Default is
# `full`.
#ssl.verification_mode: full

# List of supported/valid TLS versions. By default all TLS versions from 1.1
# up to 1.3 are enabled.
#ssl.supported_protocols: [TLSv1.1, TLSv1.2, TLSv1.3]

# Optional SSL configuration options. SSL is off by default.
# List of root certificates for HTTPS server verifications
#ssl.certificate_authorities: ["/etc/pki/root/ca.pem"]

# Certificate for SSL client authentication
#ssl.certificate: "/etc/pki/client/cert.pem"

# Client certificate key
#ssl.key: "/etc/pki/client/cert.key"

# Optional passphrase for decrypting the Certificate Key.
#ssl.key_passphrase: ''

# Configure cipher suites to be used for SSL connections
#ssl.cipher_suites: []

# Configure curve types for ECDHE-based cipher suites

```

(continues on next page)

(continued from previous page)

```
#ssl.curve_types: []

# Configure what types of renegotiation are supported. Valid options are
# never, once, and freely. Default is never.
#ssl.renegotiation: never

# Configure a pin that can be used to do extra validation of the verified_
↪certificate chain,
# this allow you to ensure that a specific certificate is used to validate the_
↪chain of trust.
#
# The pin is a base64 encoded string of the SHA-256 fingerprint.
#ssl.ca_sha256: ""

# The number of times to retry publishing an event after a publishing failure.
# After the specified number of retries, the events are typically dropped.
# Some Beats, such as Filebeat and Winlogbeat, ignore the max_retries setting
# and retry until all events are published. Set max_retries to a value less
# than 0 to retry until all events are published. The default is 3.
#max_retries: 3

# The maximum number of events to bulk in a single Graylog request. The
# default is 2048.
bulk_max_size: 2048

# The number of seconds to wait for responses from the Graylog server before
# timing out. The default is 30s.
#timeout: 30s
```

7.2.3 Ingest Windows eventlog

Some agents allow to send Windows event log via Syslog, others have a proprietary protocol implemented. Graylog can work with those that use Syslog as transport or that speak GELF. One collector that should be named is the [NXLog community edition](#) that can read the windows event log and forward that to Graylog via GELF.

But the most recommended way is to make use of a [winlogbeat](#). That is currently the best-known way to ingest windows event logs into Graylog.

The collector can be configured manually, with any software configuration utility present in the environment, or the [Graylog Sidecar](#) can be used to configure and control the collectors. Even manual installation and configuration might fit the setting.

To be able to ingest the messages to Graylog, one input is needed. That input needs to match the collector. For NXLog, it is much likely the GELF input, and for winlogbeat, it needs to be the [beats input](#).

One example winlogbeat configuration that reduce the noise. But still give enough insides:

```
fields_under_root: true
fields.collector_node_id: ${sidecar.nodeName}
fields.gl2_source_collector: ${sidecar.nodeId}

output.logstash:
  hosts: ["graylog:5044"]

winlogbeat.event_logs:
  - name: Application
```

(continues on next page)

(continued from previous page)

```
level: critical, error, warning
ignore_older: 48h
- name: Security
  processors:
    - drop_event.when.not.or:
      - equals.event_id: 129
      - equals.event_id: 141
      - equals.event_id: 1102
      - equals.event_id: 4648
      - equals.event_id: 4657
      - equals.event_id: 4688
      - equals.event_id: 4697
      - equals.event_id: 4698
      - equals.event_id: 4720
      - equals.event_id: 4738
      - equals.event_id: 4767
      - equals.event_id: 4728
      - equals.event_id: 4732
      - equals.event_id: 4634
      - equals.event_id: 4735
      - equals.event_id: 4740
      - equals.event_id: 4756
  level: critical, error, warning, information
  ignore_older: 48h
- name: System
  processors:
    - drop_event.when.not.or:
      - equals.event_id: 129
      - equals.event_id: 1022
      - equals.event_id: 1033
      - equals.event_id: 1034
      - equals.event_id: 4624
      - equals.event_id: 4625
      - equals.event_id: 4633
      - equals.event_id: 4719
      - equals.event_id: 4738
      - equals.event_id: 7000
      - equals.event_id: 7022
      - equals.event_id: 7024
      - equals.event_id: 7031
      - equals.event_id: 7034-7036
      - equals.event_id: 7040
      - equals.event_id: 7045
  level: critical, error, warning
  ignore_older: 48h
```

7.2.4 Ingest CEF

Most network and security systems support either Syslog or CEF (which stands for Common Event Format) over Syslog as means for sending data. The advantage of CEF over Syslog is that it ensures the data is normalized, making it more immediately useful.

The description of CEF is: CEF is an extensible, text-based format designed to support multiple device types by offering the most relevant information. CEF defines a syntax for log records comprising a standard header and a variable extension, formatted as key-value pairs.

Graylog gives the option to have CEF messages over UDP, TCP, or Kafka and AMQP as a queuing system. If the sender does not include the timezone information, it is possible to configure the timezone the messages will arrive. That will not overwrite the timezone included in the timestamp; it will be the assumed time zone for messages that do not include the timezone information.

7.2.5 Ingest Raw/Plaintext

The built-in `RAW/Plaintext` input is a netcat like application in Graylog. It will receive any data that is ingested into the running input.

The advantage is that this data is parsable with the extractors or the processing pipeline. But as no structure is known, Graylog will not automatically extract the time or any other information from the log.

This way of working is useful for debugging. You can check what kind of log a specific appliance or application sent. Sometimes, `RAW/Plaintext` is the best option to ingest logs from applications or scripts into Graylog.

7.2.6 Ingest GELF

The Graylog Extended Log Format (GELF) is a log format that avoids the shortcomings of classic plain Syslog and is perfect for logging from your application layer. It comes with optional compression, chunking, and, most importantly, a clearly defined structure. The Input of GELF messages can be UDP, TCP, or HTTP. Additionally, a queue is possible.

Some applications like [Docker can send GELF messages native](#). Also, [fluentd speaks GELF](#).

There are [dozens of GELF libraries](#) for many frameworks and programming languages to get you started. Read more about [GELF in the specification](#).

GELF via HTTP

You can send in all GELF types via HTTP, including uncompressed GELF that is just a plain JSON string.

After launching a GELF HTTP input you can use the following endpoints to send messages:

```
http://graylog.example.org:[port]/gelf (POST)
```

Try sending an example message using curl:

```
curl -XPOST http://graylog.example.org:12202/gelf -p0 -d '{"short_message":"Hello_
↪there", "host":"example.org", "facility":"test", "_foo":"bar"}'
```

Both keep-alive and compression are supported via the common HTTP headers. The server will return a 202 Accepted when the message was accepted for processing.

7.2.7 Ingest from files

Log files come in many different flavors and formats, much more than any single program could handle.

That is why Graylog does not collect files directly but uses a wide range of collectors and agents specially made for this. The collectors can be configured and controlled by the already available configuration management software in the environment, our *Graylog Sidecar* that needs to be installed and configured, or manually.

Of course, you can still use any program supporting the GELF or Syslog protocol (among others) to send your logs to Graylog.

The most recommended way to pick a log file from Windows or Linux systems is *filebeat*. This collector is built to collect log files and ship them to a central location. The output module in filebeat is called logstash needed to send messages to a Graylog beats input.

A basic filebeat configuration for filebeat on Linux can look like the following:

```
fields_under_root: true
fields.collector_node_id: ${sidecar.nodeName}
fields.gl2_source_collector: ${sidecar.nodeId}

filebeat.inputs:
- input_type: log
  paths:
    - /var/log/*.log
  type: log
output.logstash:
  hosts: ["graylog:5044"]
path:
  data: /var/lib/graylog-sidecar/collectors/filebeat/data
  logs: /var/lib/graylog-sidecar/collectors/filebeat/log
```

For Windows, the basic filebeat configuration can be like:

```
fields_under_root: true
fields.collector_node_id: ${sidecar.nodeName}
fields.gl2_source_collector: ${sidecar.nodeId}

output.logstash:
  hosts: ["graylog:5044"]
path:
  data: C:\Program Files\Graylog\sidecar\cache\filebeat\data
  logs: C:\Program Files\Graylog\sidecar\logs
tags:
- windows
filebeat.inputs:
  type: log
  enabled: true
  paths:
    - C:\logs\log.log
```

7.2.8 Ingest JSON path from HTTP API

The JSON path from HTTP API input is reading any JSON response of a REST resource and stores a field value of it as a Graylog message.

Navigate :

System/Inputs -> Inputs -> Select *Launch JSON path from HTTP API*, click *Launch Input*, set significant field values and *save* Input

```
source = github , jsonpath = $.download_count, interval time unit = Minutes
```

Example

Let's try to read the download count of a release package stored on GitHub for analysis in Graylog. The call looks like this:

```
$ curl -XGET https://api.github.com/repos/YourAccount/YourRepo/releases/assets/12345
{
  "url": "https://api.github.com/repos/YourAccount/YourRepo/releases/assets/12345",
  "id": 12345,
  "name": "somerelease.tgz",
  "label": "somerelease.tgz",
  "content_type": "application/octet-stream",
  "state": "uploaded",
  "size": 38179285,
  "download_count": 9937,
  "created_at": "2013-09-30T20:05:01Z",
  "updated_at": "2013-09-30T20:05:46Z"
}
```

The attribute we want to extract is `download_count` so we set the JSON path to `$.download_count`.

This will result in a message in Graylog looking like this:



You can use Graylog to analyze your download counts now.

JSONPath

JSONPath can do much more than just selecting a simple known field value. You can for example do this to select the first `download_count` from a list of releases where the field `state` has the value `uploaded`:

```
$.releases[?(@.state == 'uploaded')][0].download_count
```

... or only the first download count at all:

```
$.releases[0].download_count
```

You can [learn more about JSONPath here](#).

7.2.9 Ingest Application Data

We could not cover all languages or examples for many applications in the documentation. But to give a brief overview, we created this page.

Ruby on Rails

This is easy: You just need to combine a few components.

Log all requests and logger calls into Graylog

The recommended way to send structured information (i.e. HTTP return code, action, controller, ... in additional fields) about every request and explicit `Rails.logger` calls is easily accomplished using the [GELF gem](#) and [lograge](#). Lograge builds one combined log entry for every request (instead of several lines like the standard Rails logger) and has a Graylog output since version 0.2.0.

Start by adding Lograge and the GELF gem to your Gemfile:

```
gem "gelf"
gem "lograge"
```

Now configure both in your Rails application. Usually `config/environments/production.rb` is a good place for that:

```
config.lograge.enabled = true
config.lograge.formatter = Lograge::Formatters::Graylog2.new
config.logger = GELF::Logger.new("graylog.example.org", 12201, "WAN", { :host =>
  ↪ "hostname-of-this-app", :facility => "heroku" })
```

This configuration will also send all explicit `Rails.logger` calls (e.g. `Rails.logger.error "Something went wrong"`) to Graylog.

Log only explicit logger calls into Graylog

If you don't want to log information about every request, but only explicit `Rails.logger` calls, it is enough to only configure the Rails logger.

Add the GELF gem to your Gemfile:

```
gem "gelf"
```

... and configure it in your Rails application. Usually `config/environments/production.rb` is a good place for that:

```
config.logger = GELF::Logger.new("graylog.example.org", 12201, "WAN", { :host =>  
  ↪ "hostname-of-this-app", :facility => "heroku" })
```

Heroku

You need to apply a workaround if you want custom logging on Heroku. The reason for this is that Heroku injects its own logger (`rails_log_stdout`), that overwrites your custom one. The workaround is to add a file that makes Heroku think that the logger is already in your application:

```
$ touch vendor/plugins/rails_log_stdout/heroku_fix
```

7.3 Individual Inputs

These listed inputs are not all native available in Graylog. Most are dedicated to an individual product or framework. The default inputs like Syslog, CEF, GELF, or the RAW/Plaintext are not listed individually.

7.3.1 Beats

Beats are open source data shippers. They are single-purpose tools. Some beats are created and maintained by the company Elastic. Those listed in [this beats overview](#). The community creates an additional [wide range of beats](#). Most of the beats should work out of the box with the Graylog beats input. But it might be needed to adjust the settings.

For most beats, the logstash output is to send the messages to Graylog. For a beat, it makes no difference what receives the signals as long as it follows the protocol. The relatively new options to make use of a queue system are not (yet) implemented in Graylog so that the TCP input is the only option.

This *input can make use of TLS* and certificates for authentication.

7.3.2 AWS Kinesis/CloudWatch Input

Note: This input is available since Graylog version 3.1.1. Installation of an additional `graylog-integrations-plugins` package is required. See the [Integrations Setup](#) page for more info.

Attention: An understanding of how AWS [CloudWatch](#) and [Kinesis](#) is required.

Attention: Versions of Graylog and `graylog-integrations-plugins` must be the same.

This input allows Graylog to read log messages from CloudWatch via Kinesis. When reading logs from CloudWatch, Kinesis is required in order to stream messages to Graylog.

The following message types are supported:

CloudWatch Logs Raw text strings within in Cloudwatch.

CloudWatch Flow Logs Flow Logs within a Cloud Watch log group.

Kinesis Raw Logs Raw text strings written to Kinesis.

Manual Setup Flow

For this setup to function as expected, the Least Privilege Policy shown below must be allowed for the authorized user. (See [Permission Policies](#) below)

- 1) **AWS Kinesis Authorize** Type in input name, AWS Access Key, AWS Secret Key and select AWS Region in order to authorize Graylog and click the **Authorize & Choose Stream** button to continue. (See image below.)
- 2) **AWS Kinesis Setup** Select the Kinesis stream to pull logs from and click the **Verify Stream & Format** button to continue.
- 3) **AWS CloudWatch Health Check** Graylog will read a message from the Kinesis stream and check it's format. We'll automatically parse the message if it's a Flow Log.
- 4) **AWS Kinesis Review** Final step to review and finalize the details for the input.

The screenshot shows the 'AWS Kinesis Authorize' step of a four-part setup process. The interface includes a progress bar at the top with four tabs: 'AWS Kinesis Authorize' (active), 'AWS Kinesis Setup', 'AWS CloudWatch Health Check', and 'AWS Kinesis Review'. The main content area is titled 'Create Input & Authorize AWS' and contains a description: 'This integration allows Graylog to read messages directly from a Kinesis stream. CloudWatch messages can optionally be forwarded to Kinesis via CloudWatch subscriptions and then read by Graylog.' Below this are four input fields: 'Name' (containing 'Kinesis Input Name'), 'AWS Access Key' (containing 'AK*****'), 'AWS Secret Key' (containing '*****'), and 'AWS Region' (a dropdown menu set to 'Choose AWS Region'). A note below the region field states: 'The AWS Region where Kinesis is running.' At the bottom left is a purple button labeled 'Authorize & Choose Stream'. On the right side, there is a light blue box titled 'AWS Policy Permissions' with the text: 'Please verify that you have granted your AWS IAM user sufficient permissions. You can use the following policies for reference.' It contains two links: 'Show Recommended Policy' (with a right arrow) and 'Show Least Privilege Policy' (with a right arrow).

[AWS Kinesis Authorize](#) **AWS Kinesis Setup** [AWS CloudWatch Health Check](#) [AWS Kinesis Review](#)

Select Kinesis Stream

Below is a list of all Kinesis streams found within the specified AWS account.

Please select the stream you would like to read messages from, or follow the directions set up [CloudWatch Log Subscription](#), which can forward messages into a new Kinesis stream.

Select Stream

Select Kinesis Stream

[Advanced Options >](#)

[Verify Stream & Format](#)

Don't see the stream you need?

At least one Kinesis stream must exist in the specified region in order to continue with the setup. The log stream must contain at least a few log messages.

Graylog also supports the ability to create a Kinesis stream for you and subscribe it to a CloudWatch log group of your choice. Please be aware that this option will create additional resources in your AWS environment that will incur billing charges.

[Setup Kinesis Automatically](#)

Automatic Setup Flow

When adding the AWS Kinesis/CloudWatch input to Graylog, you will be guided throughout the setup process. For this setup to function as expected, the Recommended Policy shown below must be allowed for the authorized user. (See [Permission Policies](#) below)

- 1) **AWS Kinesis Authorize** Type in input name, AWS Access Key, AWS Secret Key and select AWS Region in order to authorize Graylog and click the **Authorize & Choose Stream** button to continue. (See image above)
- 2) **AWS Kinesis Setup** In the blue dialog box (seen in the image above), click the **Setup Kinesis Automatically** button. Type in a name for the Kinesis stream name, and select a Cloudwatch log Group from the dropdown list and click the **Begin Automated Setup** button.

You will be prompted with *Kinesis Auto Setup Agreement* and will need to acknowledge that you are aware of the resources that will be created and click the **I Agree! Create these AWS resources now.** button. (See images below).

Once agreed and acknowledge, the auto-setup will detail and reference the resources that were created and you can click the **Continue Setup** button. (see *Executing Auto-Setup* image below)

- 3) **AWS CloudWatch Health Check** Graylog will read a message from the Kinesis stream and check its format. Graylog will attempt to automatically parse the message if it is of a known type.
- 4) **AWS Kinesis Review** Final step to review and finalize the details for the input.

[AWS Kinesis Authorize](#) **AWS Kinesis Setup** [AWS CloudWatch Health Check](#) [AWS Kinesis Review](#)

Set Up Kinesis Automatically

Complete the fields below and Graylog will perform the automated Kinesis setup, which performs the following operations within your AWS account. See [Using CloudWatch Logs Subscription Filters](#) in the AWS documentation for more information.

1. Create a new Kinesis stream with the specified name.
2. Create the IAM role/policy needed to subscribe the Kinesis stream to the CloudWatch Log Group.
3. Subscribe the new Kinesis stream to the Log Group.

Kinesis Stream Name

Stream Name

1-128 alphanumeric characters and special characters underscore (_), period (.), and hyphen (-).

CloudWatch Group Name

Choose CloudWatch Group

[Back to stream Selection](#) [Begin Automated Setup](#)

Kinesis Auto Setup Agreement

This auto setup will create the following AWS resources. Click below to acknowledge that you understand that these resources will be created and that you are solely responsible for any associated AWS fees incurred from them. Note that all resources must be manually deleted by you if they are not needed.

1. Create a Kinesis stream with **1** shard.
2. Create an IAM Role and Policy to allow the specified CloudWatch group **CloudWatch_Log_Group** to publish log messages to the Kinesis stream **Kinesis_Stream**
3. Create a CloudWatch Subscription, which publishes log messages to the Kinesis stream.

Cancel

I Agree! Create these AWS resources now.

Executing Auto-Setup

✓ Create Kinesis Stream

Success. The new stream [Kinesis_Stream/arn:aws:kinesis:_____:stream/Kinesis_Stream] was created with [1] shard.

✓ Create Subscription Policy

Success! The role [graylog-cloudwatch-role-2019-08-30-12-17-08/arn:aws:iam:_____:role/graylog-cloudwatch-role-2019-08-30-12-17-08] has been created.

✓ Create Subscription

Success. The subscription filter [filter-name] was added for the CloudWatch log group [CloudWatch_Log_Group].

It may take up to ten minutes for the first messages to arrive in the Kinesis stream. The Kinesis Health Check in the following step will not complete successfully until messages are present in the stream. Please see the official [CloudWatch Subscriptions](#) documentation for more information.

Continue Setup

Permission Policies

Manual Setup Flow Permissions

AWS Policy Permissions

Please verify that you have granted your AWS IAM user sufficient permissions. You can use the following policies for reference.

Show Recommended Policy

To be able to use all available functionality for Kinesis setup.



Hide Least Privilege Policy

Doesn't include Kinesis auto-subscription controls.



```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "GraylogKinesisAutoSetup",
      "Effect": "Allow",
      "Action": [
        "iam:PassRole",
        "logs:DescribeSubscriptionFilters",
        "logs:PutLogEvents",
        "kinesis:CreateStream",
        "kinesis:DescribeStreamConsumer",
        "kinesis:PutRecord",
        "kinesis:RegisterStreamConsumer"
      ],
      "Resource": "*"
    }
  ]
}
```

Automatic Setup Flow Permissions

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "GraylogKinesisSetup",
      "Effect": "Allow",
      "Action": [
        "cloudwatch:PutMetricData",
        "dynamodb:CreateTable",
        "dynamodb:DescribeTable",
        "dynamodb:GetItem",
        "dynamodb:PutItem",
        "dynamodb:Scan",
        "dynamodb:UpdateItem",
        "ec2:DescribeInstances",
        "ec2:DescribeNetworkInterfaceAttribute",
        "ec2:DescribeNetworkInterfaces",
        "elasticloadbalancing:DescribeLoadBalancerAttributes",
        "elasticloadbalancing:DescribeLoadBalancers",
        "iam:CreateRole",
        "iam:GetRole",
        "iam:PassRole",
        "iam:PutRolePolicy",
        "kinesis:CreateStream",
        "kinesis:DescribeStream",
        "kinesis:GetRecords",
        "kinesis:GetShardIterator",
        "kinesis:ListShards",
        "kinesis:ListStreams",
        "logs:DescribeLogGroups",
        "logs:PutSubscriptionFilter"
      ],
      "Resource": "*"
    }
  ]
}
```

7.3.3 IPFIX Input

Note: This input is available since Graylog version 3.2. Installation of an additional `graylog-integrations-plugins` package is required. See the [Integrations Setup](#) page for more info.

This input allows Graylog to read ipfix logs. By default the input supports all the standard [IANA fields](#).

IPFIX Field Definitions

Any additional field that are being collected that are vendor/hardware specific need to be defined in a json file. This file needs to provide the [private enterprise number](#), as well as the additional field definitions that are being collected. The example below is how the json file needs to be structured.

Example of JSON file

The filepath of the json file with the additional field being collected need to be provided in the IPFIX field definitions option when creating the input.

```
{
  "enterprise_number": PRIVATE ENTERPRISE NUMBER,
  "information_elements": [
    {
      "element_id": ELEMENT ID NUMBER,
      "name": "NAME OF DEFINITION",
      "data_type": "ABSTRACT DATA TYPE"
    },
    ...
    ...
    ...
    {
      "element_id": ELEMENT ID NUMBER,
      "name": "NAME OF DEFINITIONt",
      "data_type": "ABSTRACT DATA TYPE"
    }
  ]
}
```

IPFIX Data Types

Value 	Description 	Reference 
0	octetArray	[RFC5102] [RFC7011]
1	unsigned8	[RFC5102] [RFC7011]
2	unsigned16	[RFC5102] [RFC7011]
3	unsigned32	[RFC5102] [RFC7011]
4	unsigned64	[RFC5102] [RFC7011]
5	signed8	[RFC5102] [RFC7011]
6	signed16	[RFC5102] [RFC7011]
7	signed32	[RFC5102] [RFC7011]
8	signed64	[RFC5102] [RFC7011]
9	float32	[RFC5102] [RFC7011]
10	float64	[RFC5102] [RFC7011]
11	boolean	[RFC5102] [RFC7011]
12	macAddress	[RFC5102] [RFC7011]
13	string	[RFC5102] [RFC7011]
14	dateTimeSeconds	[RFC5102] [RFC7011]
15	dateTimeMilliseconds	[RFC5102] [RFC7011]
16	dateTimeMicroseconds	[RFC5102] [RFC7011]
17	dateTimeNanoseconds	[RFC5102] [RFC7011]
18	ipv4Address	[RFC5102] [RFC7011]
19	ipv6Address	[RFC5102] [RFC7011]
20	basicList	[RFC6313] [RFC7011]
21	subTemplateList	[RFC6313] [RFC7011]
22	subTemplateMultiList	[RFC6313] [RFC7011]
23-255	Unassigned	

Launch new *IPFIX UDP* input ✕

☐ Global
Should this input start on all nodes

Node

Select Node

On which node should this input start

Title

Select a name of your new input that describes it.

Bind address

0.0.0.0

Address to listen on. For example 0.0.0.0 or 127.0.0.1.

Port

4739

Port to listen on.

Receive Buffer Size (optional)

262144

The size in bytes of the `recvBufferSize` for network connections to this input.

No. of worker threads (optional)

12

Number of worker threads processing network connections for this input.

Override source (optional)

The source is a hostname derived from the received packet by default. Set this if you want to override it with a custom string.

IPFIX field definitions (optional)

Add IPFIX field definitions

JSON file containing IPFIX field definitions.

Cancel

Save

7.3.4 Okta Log Events Input

Attention: This is a Graylog Enterprise feature and is only available since Graylog version 3.3. A valid Graylog Enterprise license is required.

Okta System Log records events related to your organization and provides an audit trail of your platform activity. This input will pull the following [Okta Log Event object](#) into your graylog so you can do further data analysis on the activity occurring in your organization.

For this input plugin to function as expected, the following items must be supplied in the input configuration:

- 1) **Domain name** Your Okta Domain (also known as your Okta URL). You can copy your domain from the Okta Developer Console. For information in finding your domain see: <https://developer.okta.com/docs/guides/find-your-domain/overview/>
- 2) **API key** The token which will be used to authenticate Graylog's requests to Okta. You can create an API token on the Okta Developer Console. For information on creating an okta api token see: <https://developer.okta.com/docs/guides/create-an-api-token/overview/>
- 3) **Pull log events since** The lower time bound of the Okta log events and determines how much historical data Graylog will pull from Okta when the Input starts. If not provided, 1 polling interval of historical data will be pulled. Must be a timestamp in ISO-8601 format."
- 4) **Polling interval** Determines how often Graylog will poll for new data stored in Okta. Cannot be smaller than 5 seconds.
- 5) **Keyword filter (optional)** The keyword filter is optional and is used to filter the log events results. If it is provided, then it cannot have more than 10 keywords (space-separated) and keywords cannot be more than 40 characters long.

Note: Since the Okta System Log records are related to your organization, it is recommended that this input only be run on one designated node. If global is selected, then the input will default to only run on the master node.

Launch new *Okta Log Events* input ✕

☐ Global

Should this input start on all nodes

Node

Select Node

On which node should this input start

Title

Select a name of your new input that describes it.

Domain name

https://company.okta.com/

Domain where the okta syslogs are located

API key

API token key

Pull Log Events Since

2020-04-26T00:00:00.000Z

Determines how much historical data Graylog will pull from Okta when the Input starts. If not provided, 1 polling interval of historical data will be pulled. Must be a timestamp in ISO-8601 format.

Polling interval

30

Determines how often Graylog will check for new data in Okta. The smallest allowable interval is 5 seconds.

Polling interval time unit

Seconds

☐ Allow throttling this input.

If enabled, no new messages will be read from this input until Graylog catches up with its message load. This is typically useful for inputs reading from files or message queue systems like AMQP or Kafka. If you regularly poll an external system, e.g. via HTTP, you normally want to leave this disabled.

☐ Store full message?

Store the full original Okta message as full_message?

Keyword filter (optional)

Filters the syslog results by keywords

Cancel

Save

7.3.5 Palo Alto Networks Input

Note: This input is available since Graylog version 2.5.0. Installation of an additional `graylog-integrations-plugins` package is required. See the [Integrations Setup](#) page for more info.

This input allows Graylog to receive SYSTEM, THREAT and TRAFFIC logs directly from a Palo Alto device and the Palo Alto Panorama system. Logs are sent with a typical Syslog header followed by a comma-separated list of fields. The fields order might change between versions of PAN OS.

Example SYSTEM message:

```
<14>1 2018-09-19T11:50:35-05:00 Panorama-1 - - - 1,2018/09/19 11:50:35,000710000506,
→SYSTEM,general,0,2018/09/19 11:50:35,,general,,0,0,general,informational,"Deviating
→device: Prod--2, Serial: 007255000045717, Object: N/A, Metric: mp-cpu, Value: 34",
→1163103,0x0,0,0,0,0,,Panorama-1
```

To get started, add a new Palo Alto Networks Input (TCP) in the `System > Inputs` area in Graylog. Specify the Graylog Node, Bind address, Port, and adjust the field mappings as needed.

Graylog has two different inputs, one is for PAN OS 8 and before, the second is for PAN OS 9. At the time of writing both releases, 9.0 and 9.1 are supported by this input.

PAN-OS 8 Input

This input ships with a field configuration that is compatible with PAN OS 8.1. Other versions can easily be supported by customizing the SYSTEM, THREAT and TRAFFIC mappings on the Add/Edit input page in Graylog.

The configuration for each message type is a CSV block that must include the `position`, `field`, and `type` headers.

For example:


```
position,field,type
1,receive_time,STRING
2,serial_number,STRING
3,type,STRING
4,content_threat_type,STRING
5,future_use1,STRING
...
```

Accepted values for each column:

Field	Accepted Values
<code>position</code>	A positive integer value.
<code>field</code>	A contiguous string value to use for the field name. Must not include the reserved field names: <code>_id</code> , <code>message</code> , <code>full_message</code> , <code>source</code> , <code>timestamp</code> , <code>level</code> , <code>streams</code>
<code>type</code>	One of the following supported types: <code>BOOLEAN</code> , <code>LONG</code> , <code>STRING</code>

The validity of each CSV configuration is checked when the Palo Alto input is started. If the CSV is malformed (or contains invalid properties), the input will fail to start. An error describing the specific issue will be logged in the `graylog-server` log file and also displayed at the top of the `http://<grayloghost>/system/overview` page for the affected node.

For example:

 **An input has failed to start** (triggered 10 days ago) 
Input 5bf4631c216c1e3ee4732b9 has failed to start on node e065896b-8a9a-4f45-83f2-e740525ed035 for this reason: »The header row is invalid. It must include the [position] field.«. This means that you are unable to receive any messages from this input. This is mostly an indication for a misconfiguration or an error. You can click [here](#) to solve this.

The mappings for each type look like this on the add/edit input page:

System Message Mappings (optional)

```
position,field,type
1,receive_time,STRING
2,serial_number,STRING
3,type,STRING
4,content_threat_type,STRING
5,future_use1,STRING
6,generated_time,STRING
7,virtual_system,STRING
8,event_id,STRING
9,object,STRING
```

CSV string representing the fields/positions/data types to parse. (See documentation)

Threat Message Mappings (optional)

```
position,field,type
1,receive_time,STRING
2,serial_number,STRING
3,type,STRING
4,threat_content_type,STRING
5,future_use1,STRING
6,generated_time,STRING
7,src_ip,STRING
8,dest_ip,STRING
9,nat_src_ip,STRING
```

CSV string representing the fields/positions/data types to parse. (See documentation)

Traffic Message Mappings (optional)

```
position,field,type
1,receive_time,STRING
2,serial_number,STRING
3,type,STRING
4,threat_content_type,STRING
5,future_use1,STRING
6,generated_time,STRING
7,src_ip,STRING
8,dest_ip,STRING
9,nat_src_ip,STRING
```

CSV representing the fields/positions/data types to parse. (See documentation)

Cancel

Save

The mappings built into the plugin by default are based on the following PAN OS 8.1 specifications. If you are running PAN OS 8.1, then there is no need to edit the mappings. However, if you are running a different version of PAN OS, please reference the official Palo Alto Networks log fields documentation that that version and customize the mappings on the Add/Edit Input page accordingly.

Version 8.1

- [8.1 - Traffic Log Fields](#)
- [8.1 - Threat Log Fields](#)
- [8.1 - System Log Fields](#)

Version 8.0

- [8.0 - Traffic Log Fields](#)
- [8.0 - Threat Log Fields](#)
- [8.0 - System Log Fields](#)

Version 7.1

- [7.1 - Traffic Log Fields](#)
- [7.1 - Threat Log Fields](#)
- [7.1 - System Log Fields](#)

PAN-OS 9 Input

This input auto detect if the data that is ingested is from Version 9.0 or 9.1. Since the release of Graylog 3.3.6 the later is supported automatically and will work out of the box.

The previous possible adjustments are not longer needed.

We have included a links to a few recent versions here for reference.

Version 9.1

- [9.1 - Traffic Log Fields](#)
- [9.1 - Threat Log Fields](#)
- [9.1 - HIP Match Log Fields](#)
- [9.1 - GlobalProtect Log Fields](#)
- [9.1 - Config Log Fields](#)
- [9.1 - System Log Fields](#)
- [9.1 - Correlated Events Log Fields](#)
-

Version 9.0

- [9.0 - Traffic Log Fields](#)
- [9.0 - Threat Log Fields](#)
- [9.0 - HIP Match Log Fields](#)
- [9.0 - Config Log Fields](#)
- [9.0 - System Log Fields](#)

- [9.0 - Correlated Events Log Fields](#)

Also see [Documentation for older PAN OS versions](#).

7.4 Using Apache Kafka as transport queue

Graylog supports [Apache Kafka](#) as a transport for various inputs such as GELF, syslog, and Raw/Plaintext inputs. The Kafka topic can be filtered by a regular expression and depending on the input, various additional settings can be configured.

Learn how to use rsyslog and Apache Kafka in the [Sending syslog via Kafka into Graylog guide](#).

7.5 Using RabbitMQ (AMQP) as transport queue

Graylog supports [AMQP](#) as a transport for various inputs such as GELF, syslog, and Raw/Plaintext inputs. It can connect to any AMQP broker supporting [AMQP 0-9-1](#) such as [RabbitMQ](#).

Learn how to use rsyslog and RabbitMQ in the [Sending syslog via AMQP into Graylog guide](#).

7.6 Input Throttling

Throttling allows certain Graylog Inputs to slow their message intake rates (by temporarily pausing intake processing) if contention occurs in the Graylog Journal.

7.6.1 Graylog Inputs that support throttling

- AWS Flow Logs
- AWS Cloudtrail
- AWS Logs
- CEF AMQP Input
- CEF Kafka Input
- GELF AMQP
- GELF Kafka
- JSON path from HTTP API
- Raw/Plaintext AMQP
- Raw/Plaintext Kafka
- Syslog AMQP
- Syslog Kafka

7.6.2 Enabling throttling

To enable throttling for one of these inputs, edit it in *System > Inputs* and check the *Allow throttling this input* checkbox.

7.6.3 Throttling criteria

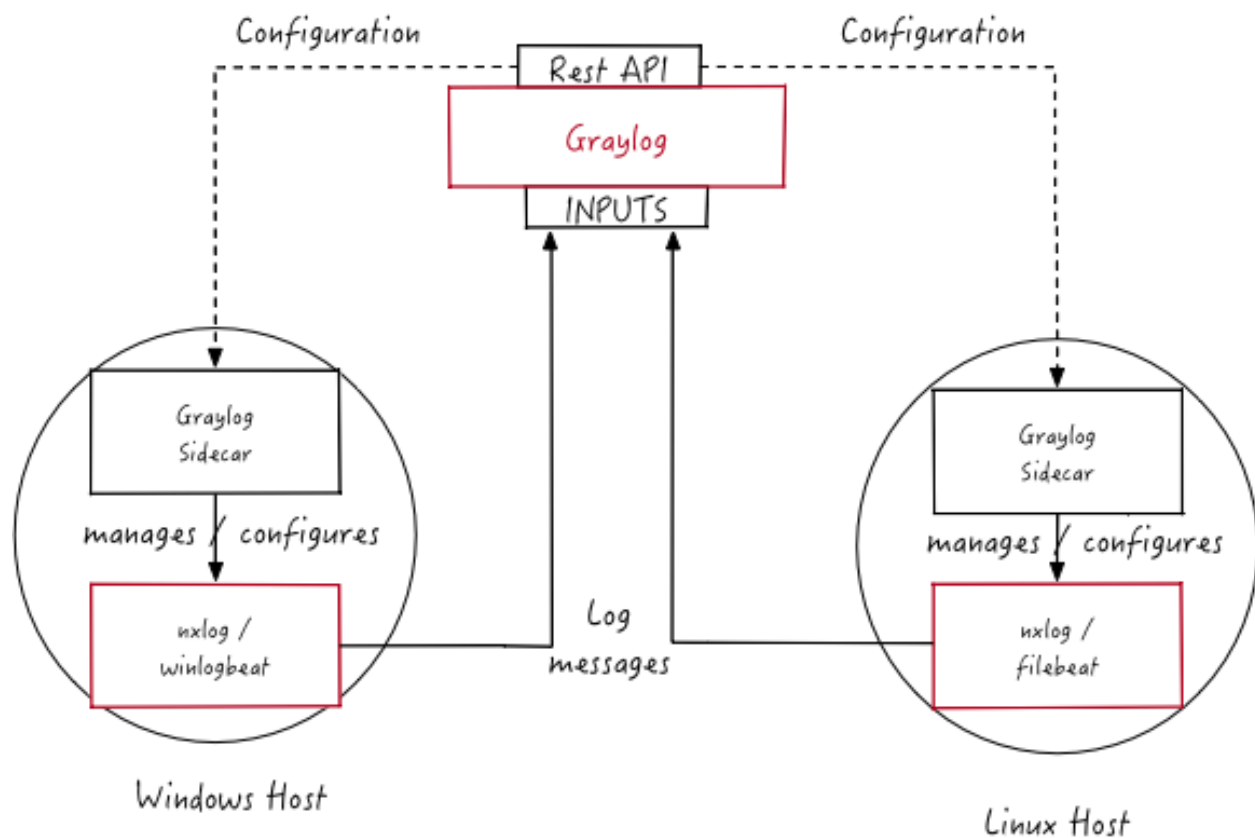
When enabled, the following criteria will be used to determine if throttling will occur:

1. If there are zero uncommitted entries in the Graylog Journal, throttling will not occur. No further checks will be performed.
2. Throttling will occur if the Journal has more than 100k uncommitted entries.
3. Throttling will occur if the Journal is growing in size rapidly (approximately 20k entries per second or greater).
4. Throttling will occur if the process ring buffer is full.
5. Nothing is currently being written to the Journal; throttling will not occur. No further checks will be performed.
6. Throttling will occur if the Journal is more than 90% full.
7. Throttling will occur if the Journal write rate is more than twice as high as the read rate.

GRAYLOG SIDECAR

Note: Graylog 3.0 comes with a new Sidecar implementation. We still support the old **Collector Sidecars**, which can be found in the `System / Collectors (legacy)` menu entry. In case you need to configure legacy **Collector Sidecar** please refer to the [Graylog Collector Sidecar documentation](#). We encourage users to migrate to the new **Sidecar**, which is covered by this document.

Graylog Sidecar is a lightweight configuration management system for different log collectors, also called *Backends*. The Graylog node(s) act as a centralized hub containing the configurations of log collectors. On supported message-producing devices/hosts, Sidecar can run as a service (Windows host) or daemon (Linux host).



The log collector configurations are centrally managed through the Graylog web interface. Periodically, the Sidecar daemon will fetch all relevant configurations for the target, using the [REST API](#). On its first run, or when a configuration

change has been detected, Sidecar will *generate* (render) relevant backend configuration files. Then it will start, or restart, those reconfigured log collectors.

8.1 Installation

You can get .deb and .rpm packages for Graylog Sidecar in our package repository. For Windows, you can download the installer from [here](#).

Please follow the version matrix to pick the right package:

Sidecar version	Graylog server version
1.1.x	3.2.5 or higher
1.0.x	3.0 or higher
0.1.x	2.2.x,2.3.x,2.4.x,2.5.x,3.0.x
0.0.9	2.1.x

All following commands should be executed on the **remote machine** where you want to collect log data from.

8.1.1 Install the Sidecar

Ubuntu

Install the Graylog Sidecar repository configuration and Graylog Sidecar itself with the following commands:

```
$ wget https://packages.graylog2.org/repo/packages/graylog-sidecar-repository_1-2_all.  
→deb  
$ sudo dpkg -i graylog-sidecar-repository_1-2_all.deb  
$ sudo apt-get update && sudo apt-get install graylog-sidecar
```

Edit the configuration (see [Configuration](#)) and activate the Sidecar as a system service:

```
$ vi /etc/graylog/sidecar/sidecar.yml  
  
$ sudo graylog-sidecar -service install  
  
[Ubuntu 14.04 with Upstart]  
$ sudo start graylog-sidecar  
  
[Ubuntu 16.04 and later with Systemd]  
$ sudo systemctl start graylog-sidecar
```

CentOS

Install the Graylog Sidecar repository configuration and Graylog Sidecar itself with the following commands:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-sidecar-  
→repository-1-2.noarch.rpm  
$ sudo yum install graylog-sidecar
```

Edit the configuration (see [Configuration](#)) and activate the Sidecar as a system service:


```
$ vi /etc/graylog/sidecar/sidecar.yml

$ sudo graylog-sidecar -service install
$ sudo systemctl start graylog-sidecar
```

Windows

Use the Windows installer, it can be run interactively:

```
$ graylog_sidecar_installer_1.0.0-1.exe
```

Or in silent mode with:

```
$ graylog_sidecar_installer_1.0.0-1.exe /S -SERVERURL=http://10.0.2.2:9000/api -
  ↳APITOKEN=yourapitoken
```

Optionally edit the configuration (see [Configuration](#)) and register the system service:

```
notepad.exe C:\Program Files\Graylog\sidecar\sidecar.yml

& "C:\Program Files\graylog\sidecar\graylog-sidecar.exe" -service install
& "C:\Program Files\graylog\sidecar\graylog-sidecar.exe" -service start
```

8.1.2 Install collectors

Next up, you can decide which collectors you want to use with your Sidecar and install them as well. We only cover the installation of the most common ones here, but you are free to use other collectors as well. Graylog contains default collector configurations for Filebeat, Winlogbeat and NXLog. But since you're able to define your own collector backends, there is nothing stopping you from running e.g. sysmon, auditd or packetbeat.

Beats on Linux

Install Filebeat or another Beats package by following the instructions on the official [Filebeat](#) download page.

Beats on Windows

The Windows Sidecar package already includes Filebeat and Winlogbeat. For other Beats packages follow the instructions on the official [Beats](#) download page.

NXLog on Ubuntu

Install the NXLog package from the official [NXLog](#) download page. Because the Sidecar takes control of stopping and starting NXlog it is necessary to stop all running instances of NXlog and unconfigure the default system service:

```
$ sudo /etc/init.d/nxlog stop
$ sudo update-rc.d -f nxlog remove
$ sudo gpasswd -a nxlog adm
$ sudo chown -R nxlog.nxlog /var/spool/nxlog
```

NXLog on CentOS

The same on a RedHat based system:

```
$ sudo service nxlog stop
$ sudo chkconfig --del nxlog
$ sudo gpasswd -a nxlog root
$ sudo chown -R nxlog.nxlog /var/spool/nxlog
```

NXlog on Windows

Install the NXLog package from the official download [page](#) and deactivate the system service. We just need the binaries installed on the system:

```
$ C:\Program Files (x86)\nxlog\nxlog -u
```

8.2 Sidecar Configuration

On the command line you can provide a path to the configuration file with the `-c` switch. The default configuration path on Linux systems is `/etc/graylog/sidecar/sidecar.yml` and `C:\Program Files\Graylog\sidecar\sidecar.yml` on Windows.

Most configuration parameters come with built-in defaults. The only parameters that need adjustment are `server_url` and `server_api_token`. You can get your API token by following the link on the [Sidecars Overview](#) page.

8.2.1 sidecar.yml Reference

Parameter	Description
server_url	URL to the Graylog API, e.g. <code>http://192.168.1.1:9000/api/</code>
server_api_token	The API token to use to authenticate against the Graylog server API. e.g. <code>1jq26cssvc6rj4qac4bt9oeeh0p4vt5u5kal9jocl1lg9mdi4og3n</code> The token is mandatory and needs to be configured.
node_id	The node ID of the sidecar. This can be a path to a file or an ID string. Example file path: <code>file:/etc/graylog/sidecar/node-id</code> Example ID string: <code>6033137e-d56b-47fc-9762-cd699c11a5a9</code> ATTENTION: Every sidecar instance needs a unique ID! Default: <code>file:/etc/graylog/sidecar/node-id</code>
node_name	Name of the Sidecar instance, will also show up in the web interface. The hostname will be used if not set.
update_interval	The interval in seconds the sidecar will fetch new configurations from the Graylog server Default: 10
tls_skip_verify	This configures if the sidecar should skip the verification of TLS connections. Default: <code>false</code>
send_status	This controls the transmission of detailed sidecar information like collector status, metrics and log file lists. It can be disabled to reduce load on the Graylog server if needed. Default: <code>true</code>
list_log_files	Send a directory listing to Graylog and display it on the host status page, e.g. <code>/var/log</code> . This can also be a list of directories. Default: <code>[]</code>
cache_path	The directory where the sidecar stores internal data. Default: <code>/var/cache/graylog-sidecar</code>
collector_configuration_directory	The directory where the sidecar generates configurations for collectors. Default: <code>/var/lib/graylog-sidecar/generated</code>
log_path	The directory where the sidecar stores its logs. Default: <code>/var/log/graylog-sidecar</code>
log_rotate_max_file_size	The maximum size of the log file before it gets rotated. Default: 10MiB
log_rotate_max_files	The maximum number of old log files to retain.
collector_binaries_access_list	A list of binaries which are allowed to be executed by the Sidecar. An empty list disables the white list feature. Default: <code>/usr/bin/filebeat, /usr/bin/packetbeat, /usr/bin/auditbeat, /usr/bin/heartbeat, /usr/share/filebeat/bin/filebeat, /usr/share/packetbeat/bin/packetbeat, /usr/share/metricbeat/bin/metricbeat, /usr/share/heartbeat/bin/heartbeat, /usr/share/auditbeat/bin/auditbeat, /usr/share/journalbeat/bin/journalbeat, /usr/bin/nxlog, /opt/nxlog/bin/nxlog</code>

8.2.2 First start

Once you installed the Sidecar package and started the service for the first time, you can verify that it shows up in the [Sidecars Overview](#) page. A new sidecar instance will not have any configurations assigned yet. Take the [Step-by-step guide](#) to create your first configuration.

8.2.3 Mode of Operation

When the Sidecar is assigned a configuration via the Graylog web interface, it will write a configuration file into the `collector_configuration_directory` directory for each collector backend. E.g. if you assigned a Filebeat collector you will find a `filebeat.yml` file in that directory. All changes have to be made in the Graylog web interface. Every time the Sidecar detects an update to its configuration it will rewrite the corresponding collector configuration file. Manually editing these files is not recommended.

Every time a collector configuration file is changed the collector process is restarted. The Sidecar takes care of the collector processes and reports the status back to the web interface

8.2.4 Sidecar Status

Each Sidecar instance is able to send status information back to Graylog. By enabling the option `send_status` metrics like load or the IP address of the host Sidecar is running on are sent. Also metrics that are relevant for a stable operation e.g. disk volumes over 75% utilization are included. Additionally with the `list_log_files` option a directory listing is displayed in the Graylog web interface. In that way an administrator can see which files are available for collecting. The list is periodically updated and files with write access are highlighted for easy identification. After enabling `send_status` or `send_status + list_log_files` go to the collector overview and click on one of them, a status page with the configured information will be displayed.

8.3 Step-by-step guide

We have prepared an example on how to configure the Sidecar using the Graylog web interface. The assumption is that we want to collect Apache logfiles and ship them with a Filebeat collector to a Beats input that is listening on Port 5044 on your Graylog Server.

- The first step is to create a Beats input where collectors can send data to. Click on `System / Inputs` and start a global Beats input on the listening address 0.0.0.0 and port 5044.

The screenshot shows the Graylog web interface with the 'Inputs' page selected. A modal dialog titled 'Launch new Beats input' is open. The dialog contains the following fields and options:

- ☒ Global: Should this input start on all nodes
- Node: Select Node (dropdown menu)
- Title: (text input field)
- Bind address: 0.0.0.0 (text input field)
- Port: 5044 (text input field)
- Receive Buffer Size (optional): 1048576 (text input field)
- No. of worker threads (optional): 8 (text input field)
- TLS cert file (optional): (text input field)

The background shows the 'Inputs' page with a search bar, filters, and a list of inputs. The 'Global inputs' section shows '0 configured' and 'There are no global inputs.' The 'Local inputs' section shows '4 configured' and 'No local inputs match the filter.'

- Navigate to the Sidecars overview. In your Graylog web interface click on **System / Sidecars**.

Sidecars Overview

The Graylog sidecars can reliably forward contents of log files or Windows EventLog from your servers.

Do you need an API token for a sidecar? [Create or reuse a token for the graylog-sidecar user.](#)

Find sidecars Show: 50

Name	Status	Operating System	Last Seen	Node Id	Sidecar Version
graylog-sidecar	Running	Linux	a few seconds ago	dc12c5cd-df6d-4a9a-849b-8c5821b15d48	1.0.0

« < 1 > »

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Navigate to the Sidecar Configuration page.

Collectors Configuration

The Collector Sidecar runs next to your favourite log collector and configures it for you. Here you can manage the Sidecar configurations.

Read more about the collector sidecar in the [Graylog documentation](#).

Configurations 0 total

These are the Configurations to use in your Collectors. Remember to apply new configurations to Collectors in the Administration page.

Find configurations Show: 10

There are no configurations to display, try creating one or changing your query.

« < > »

Log Collectors 4 total

Manage Log Collectors that you can configure and supervise through Graylog Sidecar and Graylog Web Interface.

Find collectors Show: 10

Name	Operating System	Actions
filebeat	Linux	<input type="button" value="edit"/> More actions
rxlog	Linux	<input type="button" value="edit"/> More actions
rxlog	Windows	<input type="button" value="edit"/> More actions
winlogbeat	Windows	<input type="button" value="edit"/> More actions

« < 1 > »

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Next we create a new configuration: We give the configuration a name and select `filebeat` on `Linux` as collector. (This collector definition is shipped with Graylog, and comes with a default configuration template). Most of the configuration defaults should work for you. However you need to change the `hosts`: setting and point it to your Beats input. You also might want to change the `paths`: to the location of your Apache logs. When done click `Create` to save your configuration.

New Collector Configuration
Some words about collector configurations.

[Read more about the Graylog Sidecar in the documentation.](#)

Name
filebeat-conf
Required. Name for this configuration.

Configuration color
■ [Change color](#)
Choose a color to use for this configuration.

Collector
filebeat on Linux
Choose the log collector this configuration is meant for.

Configuration

```

1 # Needed for Graylog
2 fields_under_root: true
3 fields_collector_node_id: $(sidecar.nodeName)
4 fields_gli2_source_collector: $(sidecar.nodeId)
5
6 filebeat.inputs:
7 - input_type: log
8   path:
9     - /var/log/*.log
10  type: log
11 output.logstash:
12   hosts: ["192.168.1.1:5044"]
13 path:
14   data: /var/lib/graylog-sidecar/collectors/filebeat/data
15   logs: /var/lib/graylog-sidecar/collectors/filebeat/log

```

Required. Collector configuration, see quick reference for more information.

[Migrate](#) [Preview](#)

[Create](#) [Cancel](#)

Collector Configuration Reference

Runtime Variables [Variables](#) [Reference](#)

These variables will be filled with the runtime information from each Sidecar

Name	Description
<code>\$(sidecar.operatingSystem)</code>	Name of the operating system the sidecar is running on, e.g. "Linux", "Windows"
<code>\$(sidecar.nodeName)</code>	The name of the sidecar, defaults to hostname if not set.
<code>\$(sidecar.nodeId)</code>	UUID of the sidecar.
<code>\$(sidecar.sidecarVersion)</code>	Version string of the running sidecar.

Graylog 3.0.0-rc2-SNAPSHOT+dc2755 on 1480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Next we need to assign our newly created configuration (and therefore the Filebeat collector) to our sidecar. Go to the **Collector Administration** page.

Collectors Administration
The Graylog collectors can reliably forward contents of log files or Windows EventLog from your servers.

[Read more about collectors and how to set them up in the Graylog documentation.](#)

Find sidecars [Find](#) [Reset](#) Show: 50

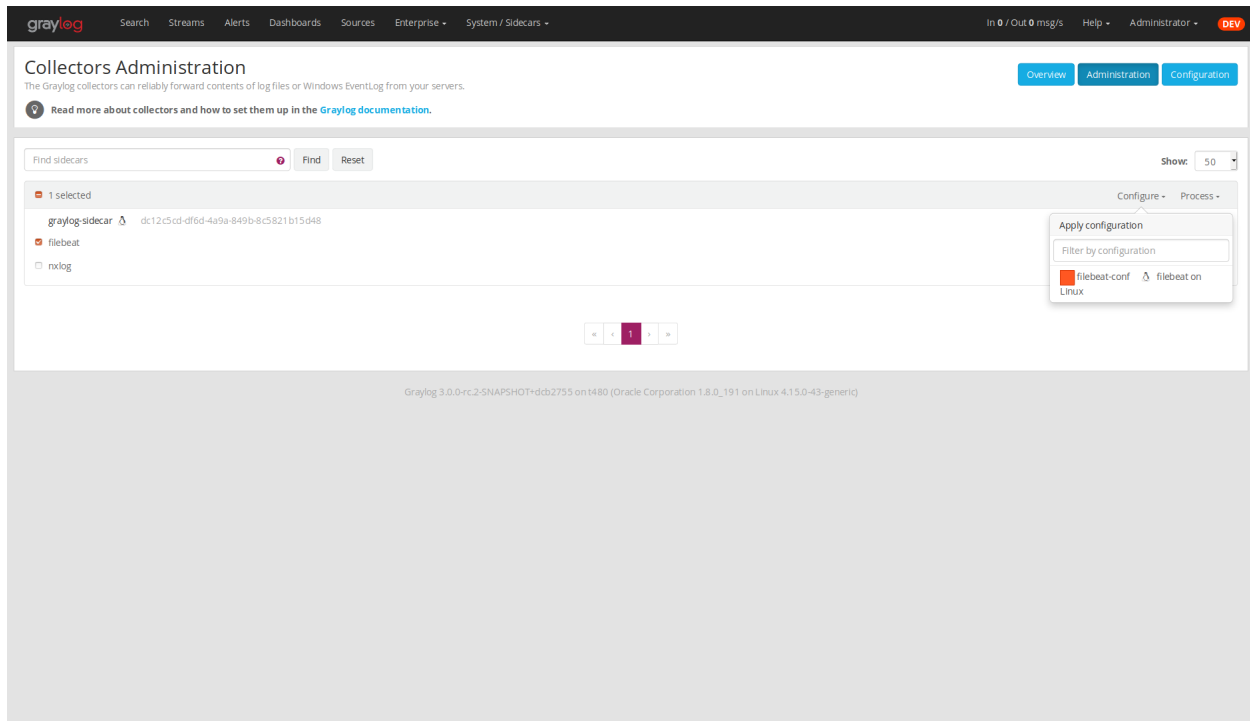
☐ Select all

Collector	Configuration	Collector Status	OS
graylog-sidecar	dc12Ccd-df6d-4a9a-849b-8c5821b15d48		
filebeat			
nxlog			

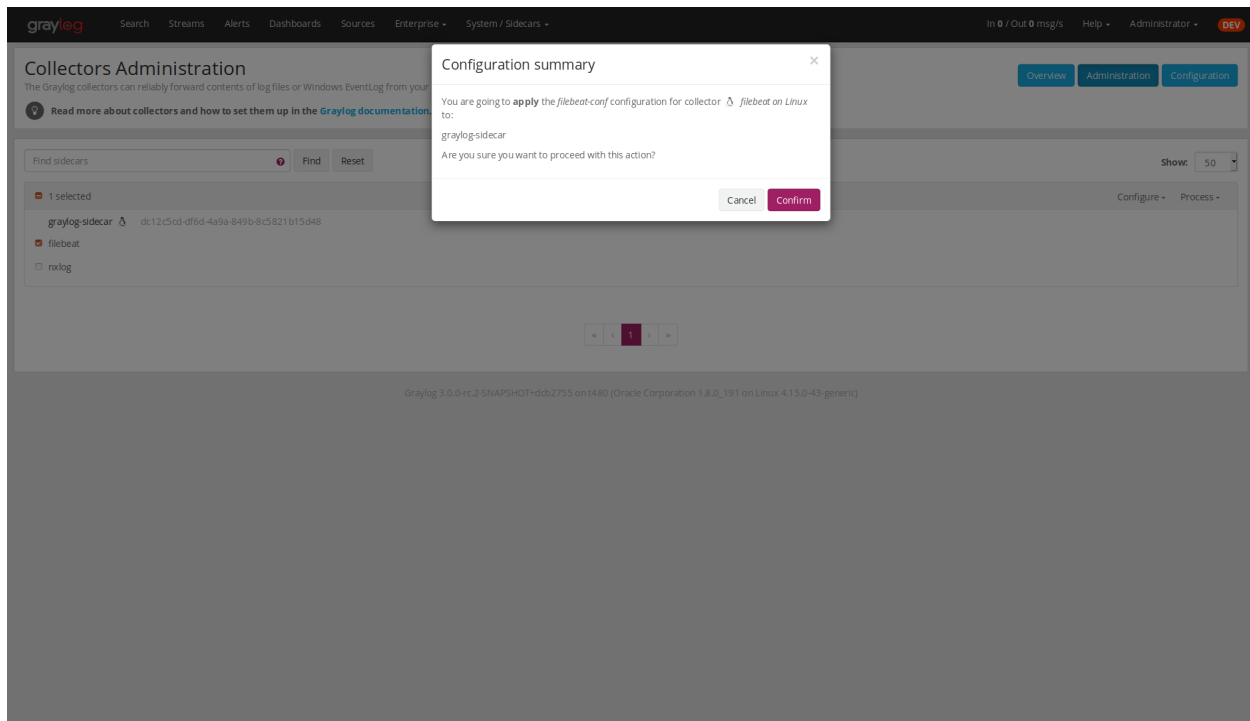
Graylog 3.0.0-rc2-SNAPSHOT+dc2755 on 1480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- You will see a list of sidecars and underneath them a list of collectors that could be assigned to them. Please note that collectors are assigned to sidecars by means of applying a collector configuration to the sidecar. Therefore, we first select the `filebeat` collector and then click on the `Configure` menu, where we can select the

`filebeat-conf` configuration we created earlier.



- Confirming the assignment, will directly push this configuration to your sidecar which will go and start the Filebeat collector with this configuration.



- If everything went fine, you should see the status running on the administration page.

graylog Search Streams Alerts Dashboards Sources Enterprise System / Sidecars In 0 / Out 0 msg/s Help Administrator DEV

Collectors Administration

The Graylog collectors can reliably forward contents of log files or Windows EventLog from your servers.

Read more about collectors and how to set them up in the [Graylog documentation](#).

Find sidecars Find Reset Show: 50

1 selected Configure Process

graylog-sidecar dc12c5cd-df6d-4a9a-849b-8c5821b15d48

filebeat Running filebeat-conf

nxlog

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Congratulations your collector setup is working now! You can go back to the Sidecars overview and click on the **Show messages** button to search for logs that have been collected via your sidecar.

graylog Search Streams Alerts Dashboards Sources Enterprise System / Sidecars In 0 / Out 0 msg/s Help Administrator DEV

Sidecars Overview

The Graylog sidecars can reliably forward contents of log files or Windows EventLog from your servers.

Do you need an API token for a sidecar? [Create or reuse a token for the graylog-sidecar user](#).

Find sidecars Find Reset Include inactive sidecars Show: 50

Name	Status	Operating System	Last Seen	Node Id	Sidecar Version
graylog-sidecar	Running	Linux	a few seconds ago	dc12c5cd-df6d-4a9a-849b-8c5821b15d48	1.0.0

Manage sidecar Show messages

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

8.4 Creating a new Log Collector

Graylog comes with a few predefined log collectors which can be easily extended and changed to your needs. Let's assume you want your sidecar to run *rsyslogd(8)* for you.

- Navigate to the Sidecars overview. In your Graylog web interface click on **System / Sidecars**.

Sidecars Overview

The Graylog sidecars can reliably forward contents of log files or Windows EventLog from your servers.

Do you need an API token for a sidecar? [Create or reuse a token for the graylog-sidecar user.](#)

Find sidecars Show: 50

Name	Status	Operating System	Last Seen	Node Id	Sidecar Version
graylog-sidecar	Running	Linux	a few seconds ago	dc12c5cd-df6d-4a9a-849b-8c5821b15d48	1.0.0

Manage sidecar
Show messages

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Navigate to the Sidecar Configuration page.

Collectors Configuration

The Collector Sidecar runs next to your favourite log collector and configures it for you. Here you can manage the Sidecar configurations.

Read more about the collector sidecar in the [Graylog documentation](#).

Configurations 0 total

These are the Configurations to use in your Collectors. Remember to apply new configurations to Collectors in the Administration page.

Find configurations Show: 10

There are no configurations to display, try creating one or changing your query.

Log Collectors 4 total

Manage Log Collectors that you can configure and supervise through Graylog Sidecar and Graylog Web interface.

Find collectors Show: 10

Name	Operating System	Actions
filebeat	Linux	Edit More actions
nxlog	Linux	Edit More actions
nxlog	Windows	Edit More actions
winlogbeat	Windows	Edit More actions

Graylog 3.0.0-rc.2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- After we click on Create Log Collector, we are presented with the following page, where we have to fill out some fields for our new collector. We give the collector a unique name and select Linux and Foreground Execution. Given that you installed rsyslogd(8) under /usr/sbin/rsyslogd we configure the executable path accordingly. If you are using Foreground Execution make sure that the collector you are running does not daemonize itself. Otherwise the sidecar has no way of controlling the collector once it has forked off into the background. For rsyslogd we therefore provide -n as *Execute Parameter*. If your collector

supports configuration validation, it is advised to use it. This acts as a pre-check, so that sidecar won't restart a collector with a broken configuration. For rsyslogd the option to do a configuration check is `-N 1`. Optionally you can provide a *Default Template* which will be proposed once you create a configuration for this collector.

New Log Collector
Some words about log collectors.

[Read more about the Graylog Sidecar in the documentation.](#)

Name
rsyslogd
Name for this collector

Process management
Foreground execution
Choose the service type this collector is meant for.

Operating System
Linux
Choose the operating system this collector is meant for.

Executable Path
/usr/sbin/rsyslogd
Path to the collector executable

Execute Parameters (Optional)
-n
Parameters the collector is started with. %s will be replaced by the path to the configuration file.

Parameters for Configuration Validation (Optional)
-N 1
Parameters that validate the configuration file. %s will be replaced by the path to the configuration file.

Default Template (Optional)

1	*.* @graylog.example.org:1514:RSYSLOG_SyslogProtocol2Format
2	

The default Collector configuration.

[Create](#) [Cancel](#)

Graylog 3.0.0-rc2-SNAPSHOT+dc2755 on 1480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

- Next up you can use your newly created collector by creating a configuration for it and assign it to a Sidecar. Please follow the [Step-by-step guide](#) accordingly.
- **Note:** Your Sidecar might refuse to start your collector, because it needs to be added to the `collector_binaries_accesslist` first. Please edit your [Configuration](#) and restart your Sidecar.

8.5 Using Configuration Variables

Configuration variables can contain arbitrary strings like the IP address of your Graylog server or the port of an input. The variables can then be used in multiple collector configurations, which avoids duplication and simplifies management.

To create a configuration variable go any `Collector Configuration` page:

New Collector Configuration
Some words about collector configurations.

[Read more about the Graylog Sidecar in the documentation.](#)

Name
filebeat-conf
Required. Name for this configuration.

Configuration color
[Red Square] [Change color](#)
Choose a color to use for this configuration.

Collector
filebeat on Linux
Choose the log collector this configuration is meant for.

Configuration

```

1 # Needed for Graylog
2 fields_under_root: true
3 fields_collector_node_id: $${sidecar.nodeName}
4 fields_gli_source_collector: $${sidecar.nodeId}
5
6 filebeat.inputs:
7 - input_type: log
8   paths:
9     - /var/log/*.log
10  type: log
11 output.logstash:
12   hosts: ["192.168.1.1:5044"]
13 path:
14   data: /var/lib/graylog-sidecar/collectors/filebeat/data
15   logs: /var/lib/graylog-sidecar/collectors/filebeat/log

```

Required. Collector configuration, see quick reference for more information.

[Migrate](#) [Preview](#)

[Create](#) [Cancel](#)

Collector Configuration Reference

Runtime Variables **Variables** Reference

These variables will be filled with the runtime information from each Sidecar

Name	Description
<code>\$\${sidecar.operatingSystem}</code>	Name of the operating system the sidecar is running on, e.g. "Linux", "Windows"
<code>\$\${sidecar.nodeName}</code>	The name of the sidecar, defaults to hostname if not set.
<code>\$\${sidecar.nodeId}</code>	UUID of the sidecar.
<code>\$\${sidecar.sidecarVersion}</code>	Version string of the running sidecar.

Graylog 3.0.0-rc2-SNAPSHOT+dc2755 on t480 (Oracle Corporation 1.8.0_191 on Linux 4.15.0-43-generic)

On the right you'll find a box **Collector Configuration Reference** which contains *Runtime Variables* and *Variables*. Click on **Variables** and then **Create Variable** to receive the following modal:

Collector Configuration
Some words about collector configurations.

[Read more about the Graylog Sidecar in the documentation.](#)

Name
filebeat-conf
Required. Name for this configuration.

Configuration color
[Red Square] [Change color](#)
Choose a color to use for this configuration.

Collector
filebeat on Linux
Note: Log Collector cannot change while the Configuration is in use. Clone the Configuration to create a new one.

Configuration

```

1 # Needed for Graylog
2 fields_under_root: true
3 fields_collector_node_id: $${sidecar.nodeName}
4 fields_gli_source_collector: $${sidecar.nodeId}
5
6 filebeat.inputs:
7 - input_type: log
8   paths:
9     - /var/log/*.log
10  type: log
11 output.logstash:
12   hosts: ["192.168.1.1:5044"]
13 path:
14   data: /var/lib/graylog-sidecar/collectors/filebeat/data
15   logs: /var/lib/graylog-sidecar/collectors/filebeat/log

```

Required. Collector configuration, see quick reference for more information.

[Migrate](#) [Preview](#)

[Update](#) [Back](#)

Create Variable \$\${user.BeatsInput}

Name
BeatsInput
Type a name for this variable

Description (Optional)
IP and Port of our Beats Input
Type a description for this variable

Content
192.168.1.1:5044
Write your variable content

[Cancel](#) [Save](#)

In this example we replace the hard coded IP and Port from our Beats input with a new variable named `$${user.BeatsInput}`:

Collector Configuration
Some words about collector configurations.

[Read more about the Graylog Sidecar in the documentation.](#)

Name
filebeat-conf
Required. Name for this configuration.

Configuration color
Change color
Choose a color to use for this configuration.

Collector
filebeat on Linux
Note: Log Collector cannot change while the Configuration is in use. Clone the Configuration to test it using another Collector.

Configuration

```

1 # Needed for Graylog
2 fields_under_root: true
3 fields_collector_node_id: ${sidecar.nodeId}
4 fields_gl2_source_collector: ${sidecar.nodeId}
5
6 filebeat.inputs:
7   - input_type: log
8     paths:
9       - /var/log/*.log
10    type: log
11    output.logstash:
12      hosts: ["$(user.BeatsInput)"]
13    path:
14      data: /var/lib/graylog-sidecar/collectors/filebeat/data
15      logs: /var/lib/graylog-sidecar/collectors/filebeat/log

```

Required. Collector configuration, see quick reference for more information.

[Migrate](#) [Preview](#)

[Update](#) [Back](#)

Collector Configuration Reference

[Runtime Variables](#) [Variables](#) [Reference](#)

Use variables to share text snippets across multiple configurations.
If your configuration format needs to use literals like `$(foo)`, which shall not act as a variable, you will have to write it as ``${foo}``.

[Create Variable](#)

Name	Description	Actions
\$(user.BeatsInput)	IP and Port of our Beats Input	Delete Edit

We can now use this variable in all our configurations. If we ever need to change the IP/port of our input, we just change the variable.

8.5.1 Runtime Variables

Runtime variables contain runtime informations from each Sidecar that is requesting this configuration. An important example is the `${sidecar.nodeId}` variable. The collector configuration should contain an instruction to fill that variable in an extra field `gl2_source_collector`. This allows Graylog to relate messages to the Sidecar that produced them. (This is what makes the `Show messages` button on the Sidecars overview page work)

8.6 Secure Sidecar Communication

The Communication between Sidecar and Graylog will be secured if your API *uses SSL*.

To secure the communication between the Collector and Graylog you just need to mark `Enable TLS` in your Beats Input. Without giving additional Information, Graylog will now create a self-signed certificate for this Input. Now in the Sidecar Beats Output Configuration you just mark `Enable TLS Support` and `Insecure TLS connection`. After this is saved, the communication between Beats and Graylog will use TLS.

8.6.1 Certificate based client authentication

If you want Graylog to only accept data from authenticated Collectors please follow the steps at [Secured Graylog and Beats input](#)

8.7 Run Sidecar as non-root user

The default is that the Sidecar is started with the root user to allow access to all log files. But this is not mandatory. If you like to start it with a daemon user, proceed like the following:

- Create a daemon user e.g. sidecar

The Sidecar itself is accessing the following files and directories:

- `sidecar.yml` - `/etc/graylog/sidecar/sidecar.yml`
- `collector_configuration_directory` - `/var/lib/graylog-sidecar/generated/`
- `node_id` - `/etc/graylog/sidecar/node-id`
- `cache_path` - `/var/cache/graylog-sidecar/`
- `log_path` - `/var/log/graylog-sidecar/`

So to make these directories readable for the sidecar user, use:

- `chown -R sidecar /etc/graylog/sidecar`
- `chown -R sidecar /var/cache/graylog-sidecar`
- `chown -R sidecar /var/lib/graylog-sidecar`
- `chown -R sidecar /var/log/graylog-sidecar`

You can change all paths to different places in the file system. If you prefer to store all Sidecar data in the home directory of the sidecar user, just change the paths accordingly.

Now systemd needs to know that the Sidecar should be started with a non-root user. Open `/etc/systemd/system/collector-sidecar.service` with an editor and navigate to the `[Service]` section, add:

```
User=sidecar
Group=sidecar
```

To make use of these settings reload systemd:

```
$ sudo systemctl daemon-reload
$ sudo systemctl restart graylog-sidecar
```

Check the log files in `/var/log/graylog-sidecar` for any errors. Understand that not only the Sidecar but also all backends, like `filebeat`, will be started as `sidecar` user after these changes. So all log files that the backend should observe also need to be readable by the `sidecar` user. Depending on the Linux distribution there is usually an administrator group which has access to most log files. By adding the `sidecar` user to that group you can grant access fairly easy. For example on Debian/Ubuntu systems this group is called `adm` (see [System Groups in Debian Wiki](#) or [Security/Privileges - Monitor system logs in Ubuntu wiki](#)).

8.8 Upgrading from the Collector Sidecar

This guide describes how you can perform an upgrade from the deprecated **Collector Sidecars** (0.1.x) to the new **Sidecars** (1.x).

One major difference between the old and the new Sidecars, is that we replaced the UI based collector configuration approach with one where you can manage the plain text configuration of the collectors directly. This might seem like an inconvenience at first, but gives you the flexibility to configure any collector backend you want.

Additionally, the new Sidecars don't assign configurations based on tags anymore. Instead you have to assign configurations explicitly (see *Step-by-Step guide*).

8.8.1 1. Install New Sidecar

The new Sidecar has different paths and executable names, so it can coexist with the old one. Install the new Sidecar by following the *Installation instructions* and have your Sidecar running as described in *First Start*.

Note: In case you were using filebeat on Linux, please make sure to also install the official collector package, since the filebeat binary is not part of the Sidecar package anymore.

8.8.2 2. Migrate configuration

Next, we need to migrate the configuration that was previously rendered on each host by the **Collector Sidecar**, to a new **Collector Configuration**.

We recommend to use the *Sidecar Configuration Migrator*. However, retrieving the old configuration can also be done manually by fetching it from your host at the `/etc/graylog/collector-sidecar/generated/` directory.

8.8.3 3. Adopt configuration to Graylog 3.0

There are a few things that might need attention after an upgrade:

- Use *Runtime variables* for static fields

The imported configuration contains instructions that add static fields which allows Graylog to relate messages to a Sidecar. You should replace the hardcoded values of `gl2_source_collector` and `collector_node_id` with runtime variables.

In case of a Beats collector this would be:

```
fields.gl2_source_collector: ${sidecar.nodeId}
fields.collector_node_id: ${sidecar.nodeName}
```

- Migrate to the new Beats input

Graylog 3.0 comes with a new Beats input. The former one was renamed to `Beats (deprecated)`. The new input handles fields a little different. Therefore you should define `fields_under_root: true` for the new input to get the Graylog fields work.

8.8.4 4. Switch over to the new Sidecar

Once you're done creating a new configuration, you can assign it to your Sidecar (see *Step-by-Step guide*). If everything works as expected, make sure to uninstall the old **Collector Sidecar** to avoid collecting your logs twice.

8.8.5 Sidecar Configuration Migrator

The task of the Sidecar configuration migrator is to extract the configuration from existing **Collector Sidecars** and convert it into new **Sidecar** configurations.

This feature needs a **Collector Sidecar** with version 0.1.8 or greater. Please upgrade the instance you want to import configurations from, if necessary.

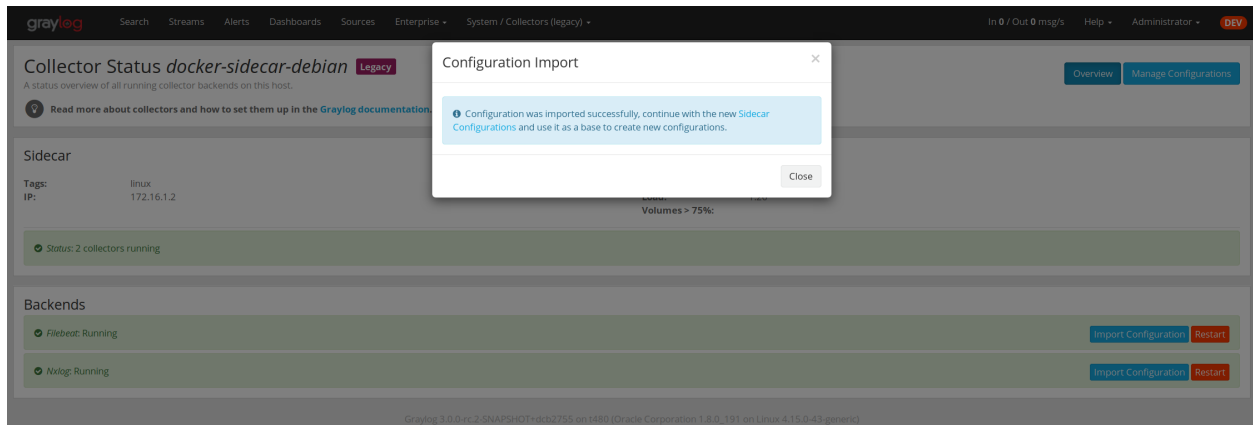
- Navigate to the Collectors (legacy) overview. In your Graylog web interface click on `System / Collectors (legacy)`.

The screenshot shows the 'Collectors in Cluster' page in the Graylog web interface. The page has a dark header with the Graylog logo and navigation links. Below the header, there's a notification banner about a new version of Graylog Collector. The main content area shows a table of collectors. The table has columns for Name, Status, Operating System, Last Seen, Collector Id, and Collector Version. One collector, 'docker-sidecar-debian', is listed with a status of 'Running' and a version of '0.1.8'. There are buttons for 'Filter', 'Reset', 'Include inactive collectors', and 'Show messages'.

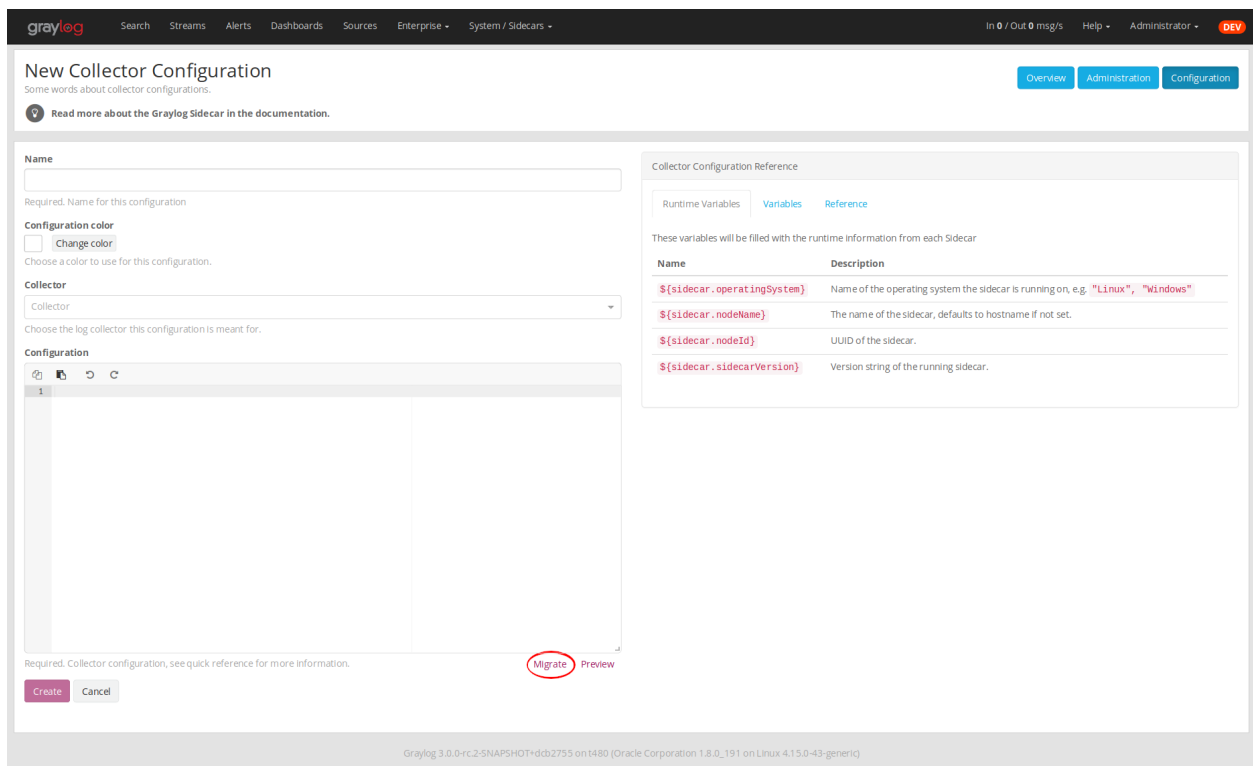
- Click on the name of the Collector you want to import configurations from

The screenshot shows the 'Collector Status' page for 'docker-sidecar-debian'. The page displays various metrics for the collector, including its tags, IP, CPU idle percentage, load, and volumes. It also shows a list of backends (Filebeat and Nlog) with their status and buttons to import configuration or restart. The page has a dark header with the Graylog logo and navigation links. Below the header, there's a notification banner about a new version of Graylog Collector. The main content area shows the collector's status and backends.

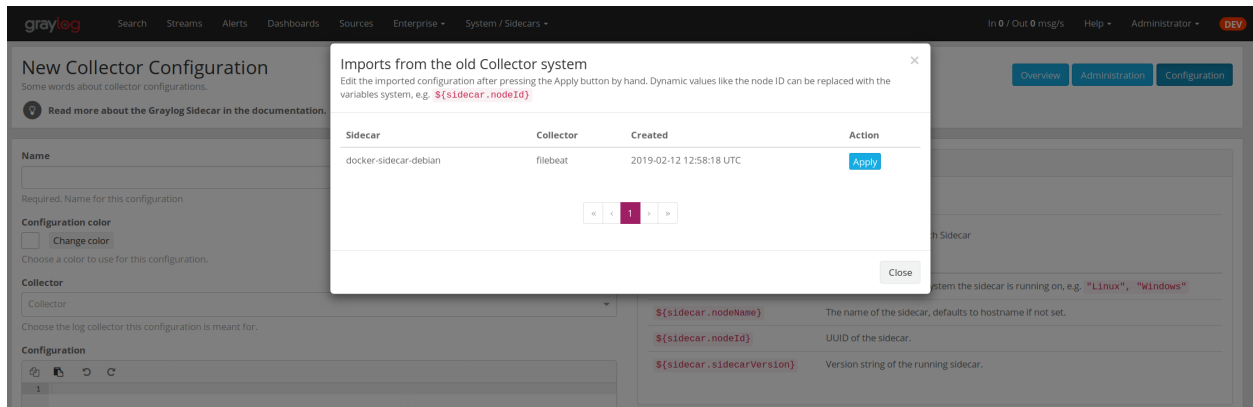
- Click the `Import Configuration` button on a backend to import a configuration. If the import was successful, follow the link to create a new Sidecar configuration:



- After clicking on Create Configuration use the Migrate button underneath the configuration editor:



- A window opens up and lets you pick already imported configurations. Clicking Apply will paste the configuration into the editor. Afterwards you can edit and save the configuration as usual.



8.9 Sidecar Glossary

To understand the different parts of the Graylog Sidecar they are explained in the following section.

8.9.1 Configuration

A configuration is the representation of a log collector configuration file in the Graylog web interface. A configuration can be assigned to Sidecars, which also assigns the corresponding collector. You can have multiple configurations for a single log collector. However, you can not assign the same collector twice to a Sidecar.

8.9.2 Inputs

Inputs are the way how collectors ingest data. An input can be a log file that the collector should continuously read or a connection to the Windows event system that emits log events. An input is connected to an output, otherwise there would be no way of sending the data to the next hop. So first create an output and then associate one or many inputs with it.

8.10 Debug

The Sidecar is writing log files to the directory configured in `log_path`. One file for each backend, there you can check for general issues like file permissions or log transmission problems. The Sidecar itself is writing to `sidecar.log`. Problems like failed connection to the Graylog API can be found there.

You can also start the Sidecar in foreground and monitor the output of the process:

```
$ graylog-sidecar -debug
```

8.11 Uninstall

On Linux just uninstall the package, to perform an uninstall on Windows run:

```
& "C:\Program Files\Graylog\graylog-sidecar.exe" -service stop  
& "C:\Program Files\Graylog\graylog-sidecar.exe" -service uninstall
```

8.12 Known Problems

Currently we know of two problems with NXLog:

- Since version 2.9.17 timestamps are transmitted [without millisecond precision](#)
- On Windows machines NXlog is not able to store its collector state so features like file tailing don't work correctly in combination with Sidecar. Use Sidecar version 0.1.0-alpha.1 or newer.

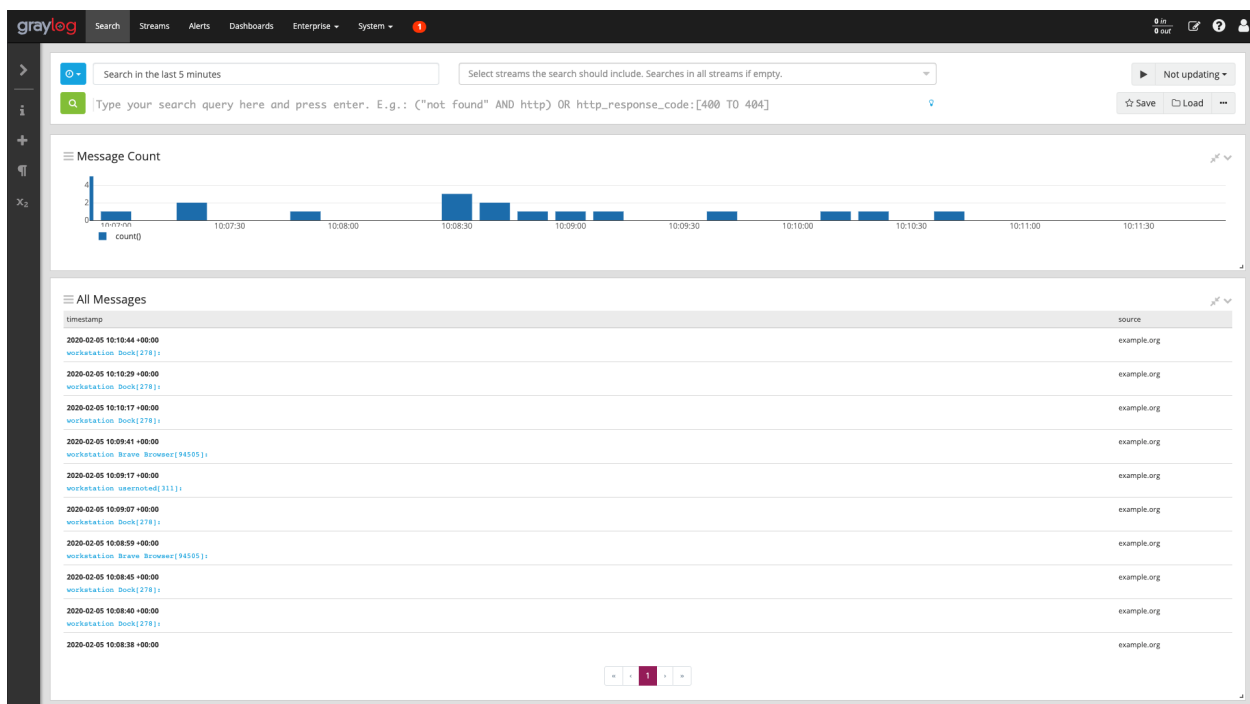
Known issue if you use a loadbalancer or firewall in front of Graylog's API:

- The Sidecar is using a persistent connection for API requests. Therefore it logs `408 Request Time-out` if the loadbalancer session or http timeout is lower than the configured `update_interval`.

SEARCHING

The search page is the heart of Graylog. You can execute a query and visualize the search result with a variety of widgets. Any search can be saved or exported as a dashboard. Saved searches allow to easily reuse specific search configurations. Dashboards enable widget specific search queries and can be shared, so other people can use them in their processes. For a better work flow Parameters can be added in the search query. Parameters are part of the Graylog Enterprise plugin.

With 3.2 we have rewritten the search interface and unified the layout for the main search, saved searches and dashboards.



9.1 Search query language

9.1.1 Syntax

The search syntax is very close to the Lucene syntax. By default all message fields are included in the search if you don't specify a message field to search in.

Messages that include the term *ssh*:

```
ssh
```

Messages that include the term *ssh* or *login*:

```
ssh login
```

Messages that include the exact phrase *ssh login*:

```
"ssh login"
```

Messages where the field *type* includes *ssh*:

```
type:ssh
```

Messages where the field *type* includes *ssh* or *login*:

```
type:(ssh OR login)
```

Note: Elasticsearch 2.x and 5.x split queries on whitespace, so the query `type:(ssh login)` was equivalent to `type:(ssh OR login)`. This is no longer the case in [Elasticsearch 6.0](#) and you must now include an `OR` operator between each term.

Messages where the field *type* includes the exact phrase *ssh login*:

```
type:"ssh login"
```

Messages that have the field *type*:

```
_exists_:type
```

Messages that do not have the field *type*:

```
NOT _exists_:type
```

Note: Elasticsearch 2.x allows to use `_missing_:type` instead of `NOT _exists_:type`. This query syntax has been removed in [Elasticsearch 5.0](#).

Messages that match regular expression `ethernet[0-9]+`:

```
/ethernet[0-9]+/
```

Note: Please refer to the Elasticsearch documentation about the [Regular expression syntax](#) for details about the supported regular expression dialect.

By default all terms or phrases are OR connected so all messages that have at least one hit are returned. You can use **Boolean operators and groups** for control over this:

```
"ssh login" AND source:example.org
("ssh login" AND (source:example.org OR source:another.example.org)) OR _exists_
↔:always_find_me
```

You can also use the NOT operator:

```
"ssh login" AND NOT source:example.org
NOT example.org
```

Note that AND, OR, and NOT are case sensitive and must be typed in all upper-case.

Wildcards: Use ? to replace a single character or * to replace zero or more characters:

```
source:*.org
source:exam?le.org
source:exam?le.*
```

Note that leading wildcards are disabled to avoid excessive memory consumption! You can enable them in your Graylog configuration file:

```
allow_leading_wildcard_searches = true
```

Also note that message, full_message, and source are the only fields that are being analyzed by default. While wildcard searches (using * and ?) work on all indexed fields, analyzed fields will behave a little bit different. See [wildcard and regexp queries](#) for details.

Fuzziness: You can search for similar terms:

```
ssh logni~
source:exmaple.org~
```

This example is using the [Damerau–Levenshtein distance](#) with a default distance of 2 and will match “ssh login” and “example.org” (intentionally misspelled in the query).

You can change the distance like this:

```
source:exmaple.org~1
```

You can also use the fuzzyness operator to do a **proximity** search where the terms in a phrase can have different/fuzzy distances from each other and don’t have to be in the defined order:

```
"foo bar"~5
```

Numeric fields support **range queries**. Ranges in square brackets are inclusive, curly brackets are exclusive and can even be combined:

```
http_response_code:[500 TO 504]
http_response_code:{400 TO 404}
bytes:{0 TO 64}
http_response_code:[0 TO 64}
```

You can also do searches with one side unbounded:

```
http_response_code:>400
http_response_code:<400
```

(continues on next page)

(continued from previous page)

```
http_response_code:>=400
http_response_code:<=400
```

It is also possible to combine unbounded range operators:

```
http_response_code: (>=400 AND <500)
```

It is possible to make a **range query** on the date field. It is important that the selected period of time at the timepicker fits the range you want to search in. If you search in the last 5 minutes, but the searched time is a week in the past the query will not return anything. The dates need to be UTC and the format needs to be like Graylog displays them.:

```
timestamp:["2019-07-23 09:53:08.175" TO "2019-07-23 09:53:08.575"]
```

Graylog has a custom index mapping for the field timestamp to save the date in the format like *YYYY-MM-DD HH:MM:SS.sss*. If one additional field where Elasticsearch has determined that this is a date and used the default date format, which is *YYYY-MM-DDTHH:MM:SS.sss*. Means that a search in that period would be like:

```
otherDate:["2019-07-23T09:53:08.175" TO "2019-07-23T09:53:08.575"]
```

At least with Elasticsearch 6.x, you can include timezone information in that time range. A query would look like:

```
otherDate:["2020-07-29T12:00:00.000-05:00" TO "2020-07-30T15:13:00.000-05:00"]
```

This date query can also be dynamic, that you always look back at a specified time:

```
otherDate:[now-5d TO now-4d]
```

9.1.2 Escaping

The following characters must be escaped with a backslash:

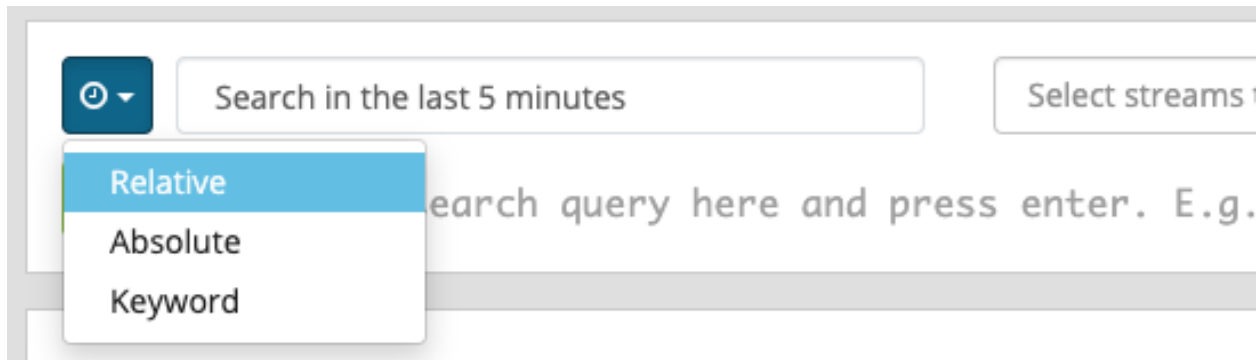
```
& | : \ / + - ! ( ) { } [ ] ^ " ~ * ?
```

Example:

```
resource:\posts\45326
```

9.2 Time frame selector

The time frame selector defines in what time range to search in. It offers three different ways of selecting a time range and is vital for search speed: If you know you are only interested in messages of the last hour, only search in that time frame. This will make Graylog search in *relevant indices* only and greatly reduce system load and required resources.



9.2.1 Relative time frame selector

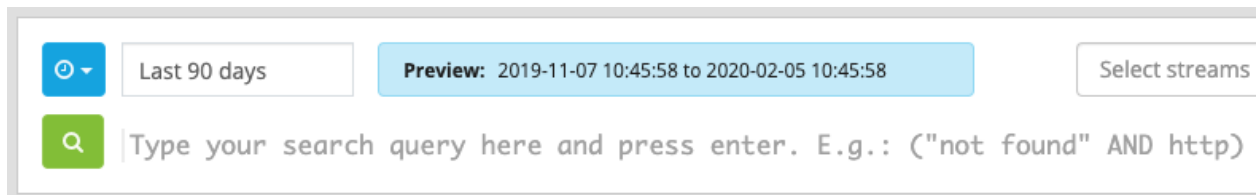
The relative time frame selector lets you look for messages from the selected option to the time you hit the search button. The selector offers a wide set of relative time frames that fit most of your search needs.

9.2.2 Absolute time frame selector

When you know exactly the boundaries of your search, you want to use the absolute time frame selector. Simply introduce the dates and times for the search manually or click in the input field to open up a calendar where you can choose the day with your mouse.

9.2.3 Keyword time frame selector

Graylog offers a keyword time frame selector that allows you to specify the time frame for the search in natural language like *last hour* or *last 90 days*. The web interface shows a preview of the two actual timestamps that will be used for the search.



Here are a few examples for possible values.

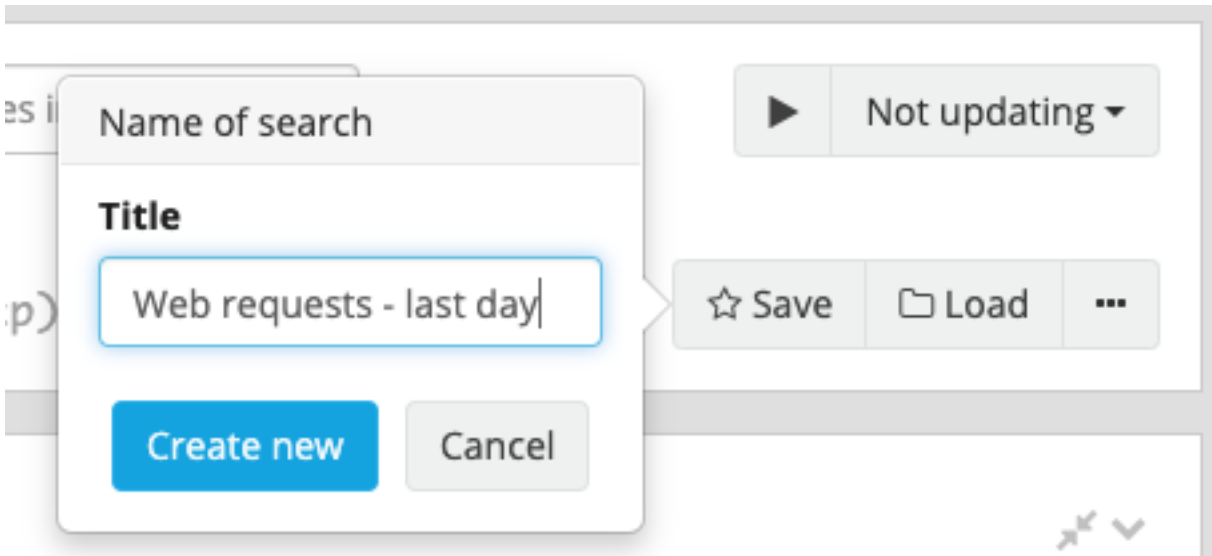
- “last month” searches between one month ago and now
- “4 hours ago” searches between four hours ago and now
- “1st of april to 2 days ago” searches between 1st of April and 2 days ago
- “yesterday midnight +0200 to today midnight +0200” searches between yesterday midnight and today midnight in timezone +0200 - will be 22:00 in UTC

The time frame is parsed using the [natty natural language parser](#). Please consult its documentation for details.

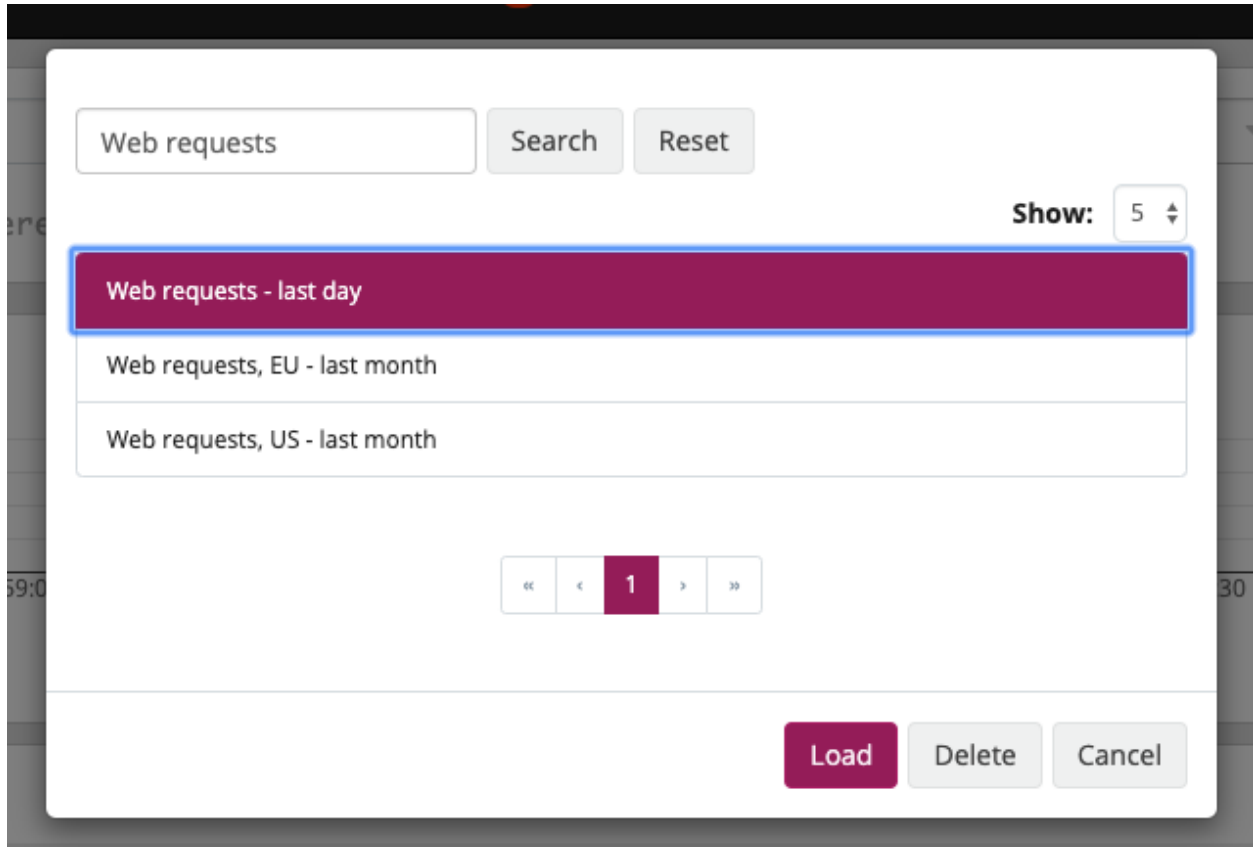
9.3 Saved Searches

Sometimes you may want a specific search configuration to be used later. Graylog provides a saved search functionality to accomplish exactly that.

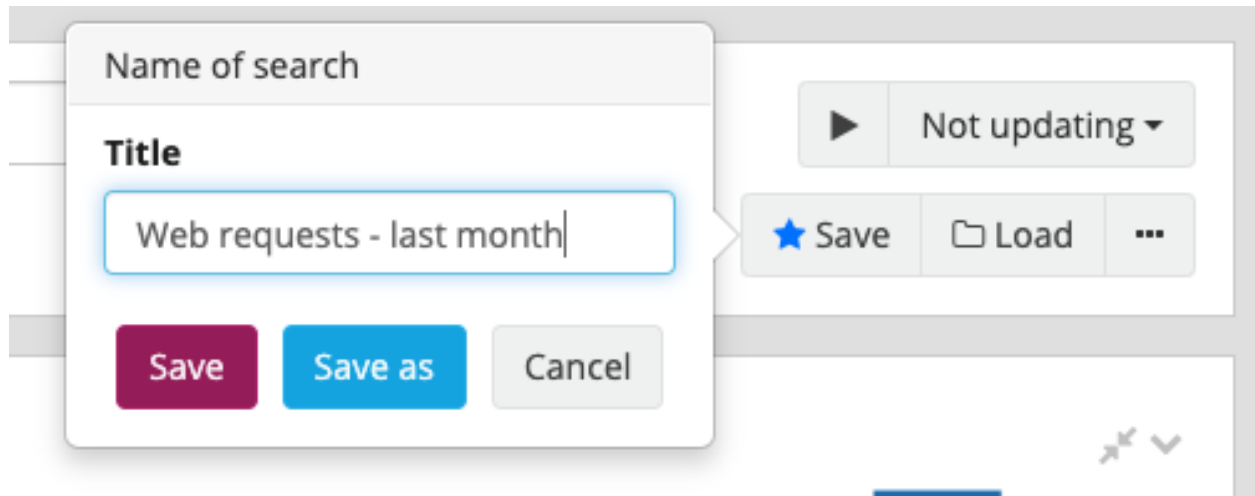
Once you submitted your search, click on the *Save* button on the right side of the search bar.



Give a name to the current search and click on save. When you want to use the saved search later on, you only need to click on the *Load* button and select it from the list. You can also use the overview to delete a saved search.



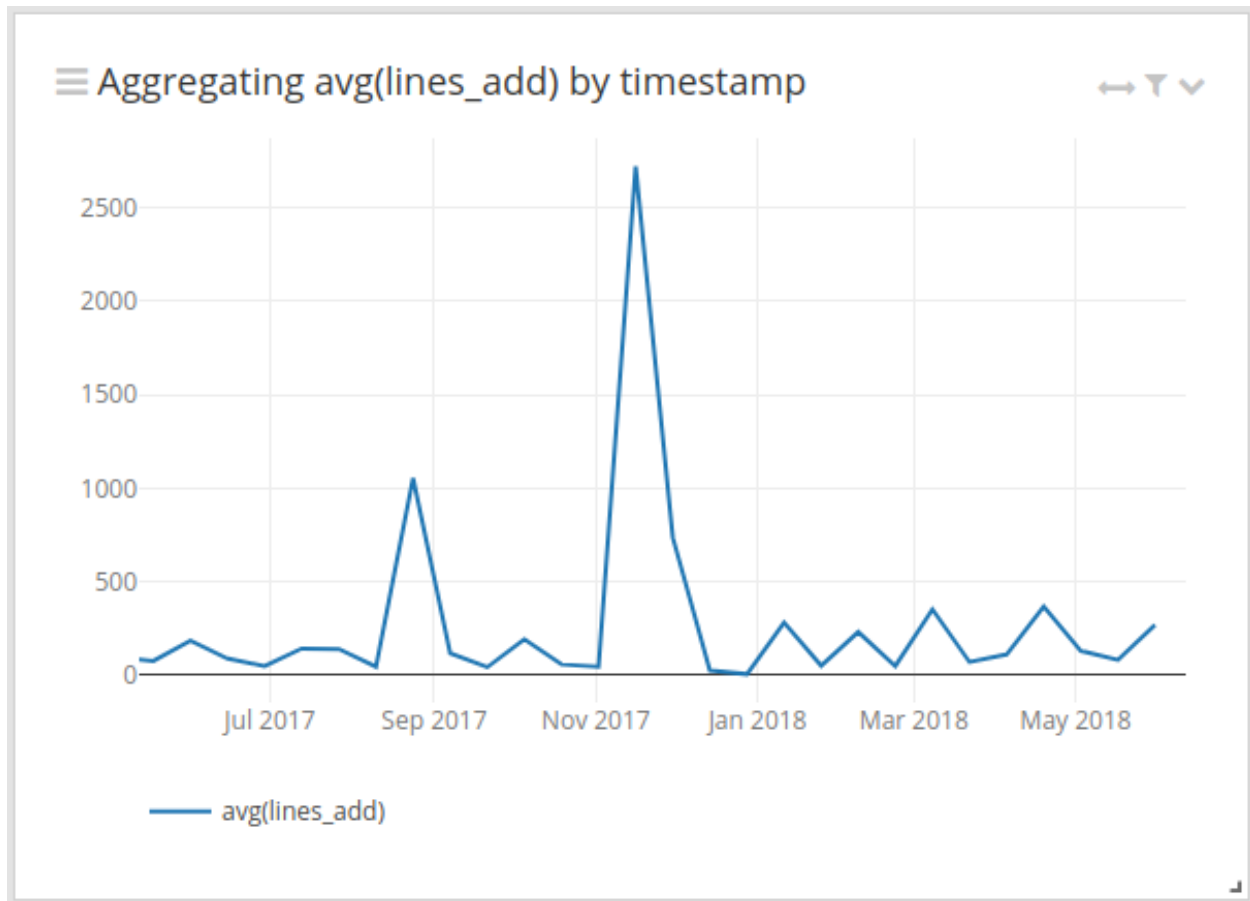
Of course, you can always update your saved search. To do so, select it from the overview, change the search, e.g. by adding new fields for a message table, adding new widgets or defining a different search query and click on the *Save* button. The open dialog allows changing the name and also contains a *Save as* button to create a new saved search without changing the original one.



9.4 Widgets

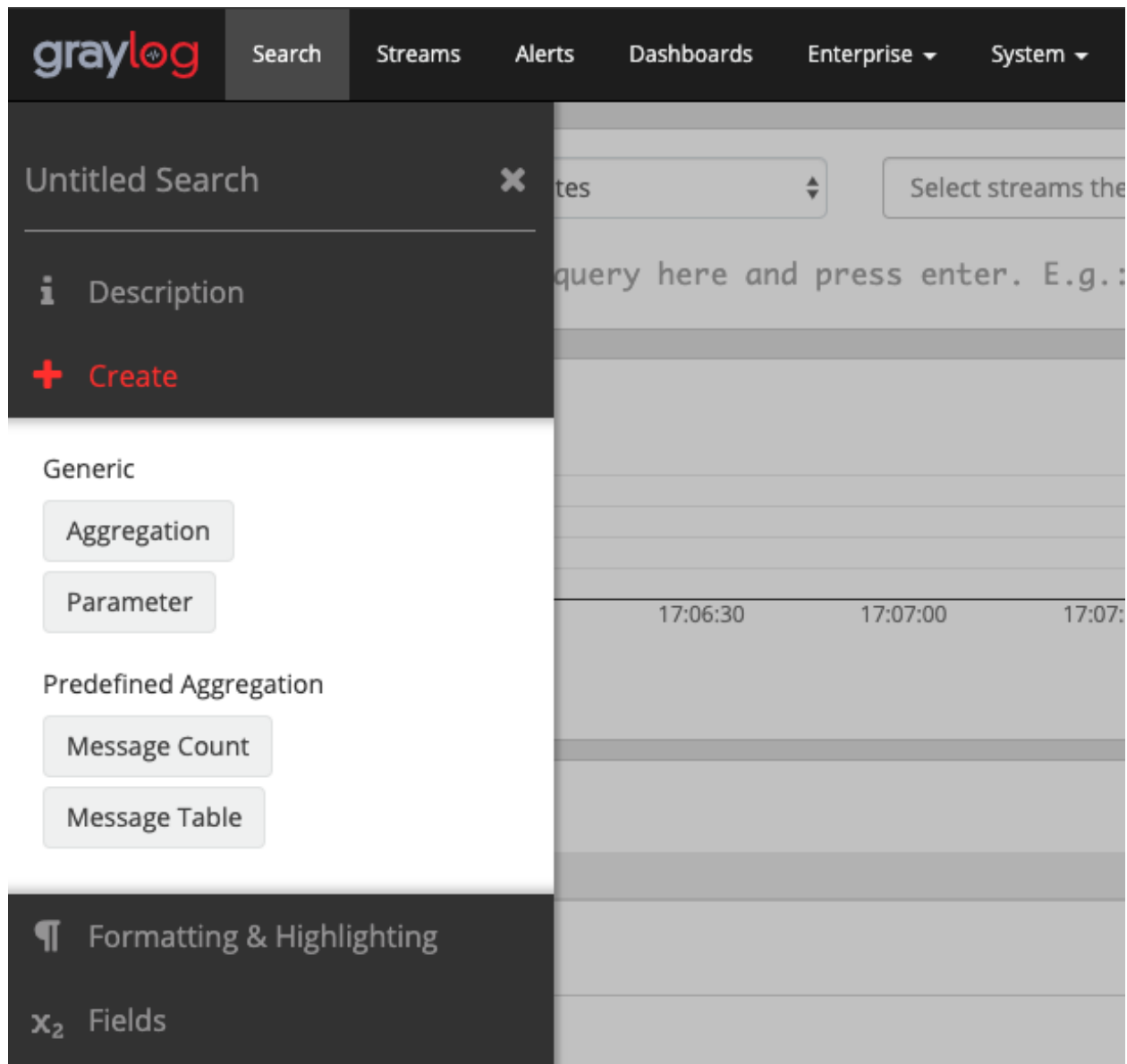
Graylog supports a wide variety of widgets which allow you to quickly visualize data from your logs. A widget is either a *Message Table* or an *Aggregation*. This section intends to give you some information to better understand each widget type, and how they can help you to see relevant details from the many logs you receive.

A widget can be freely placed inside a query. A widget can be edited or duplicated by clicking on the chevron on the right side in the head of the widget.



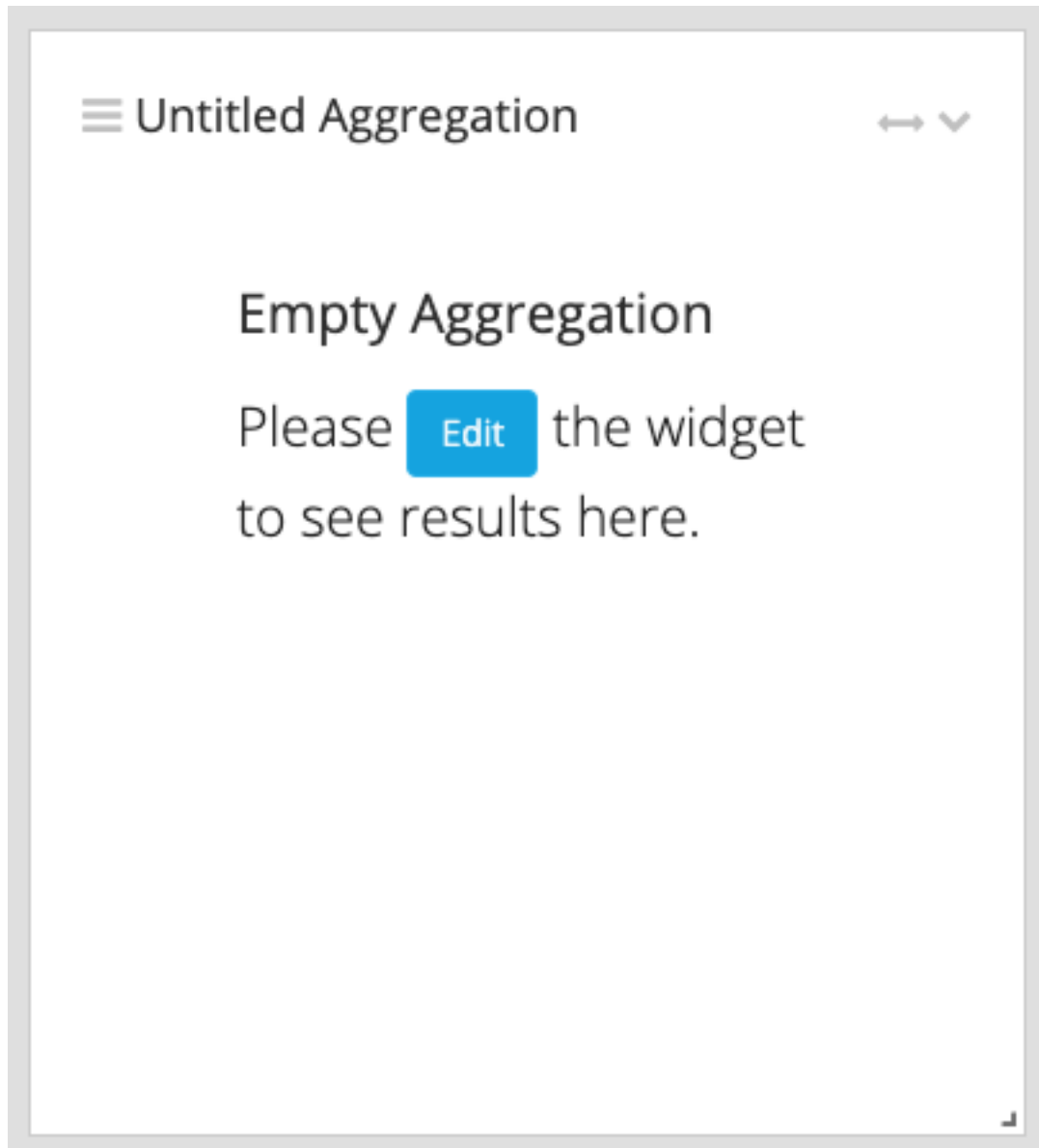
9.4.1 Creating a widget

To add a widget for your search or dashboard, open the sidebar and the “Create” section. You can also open the section directly by clicking on the plus sign.



You can create an empty “*Aggregation*”, or a predefined widget by selecting the “*Message Table*” or “Message Count”.

Empty aggregation widget:

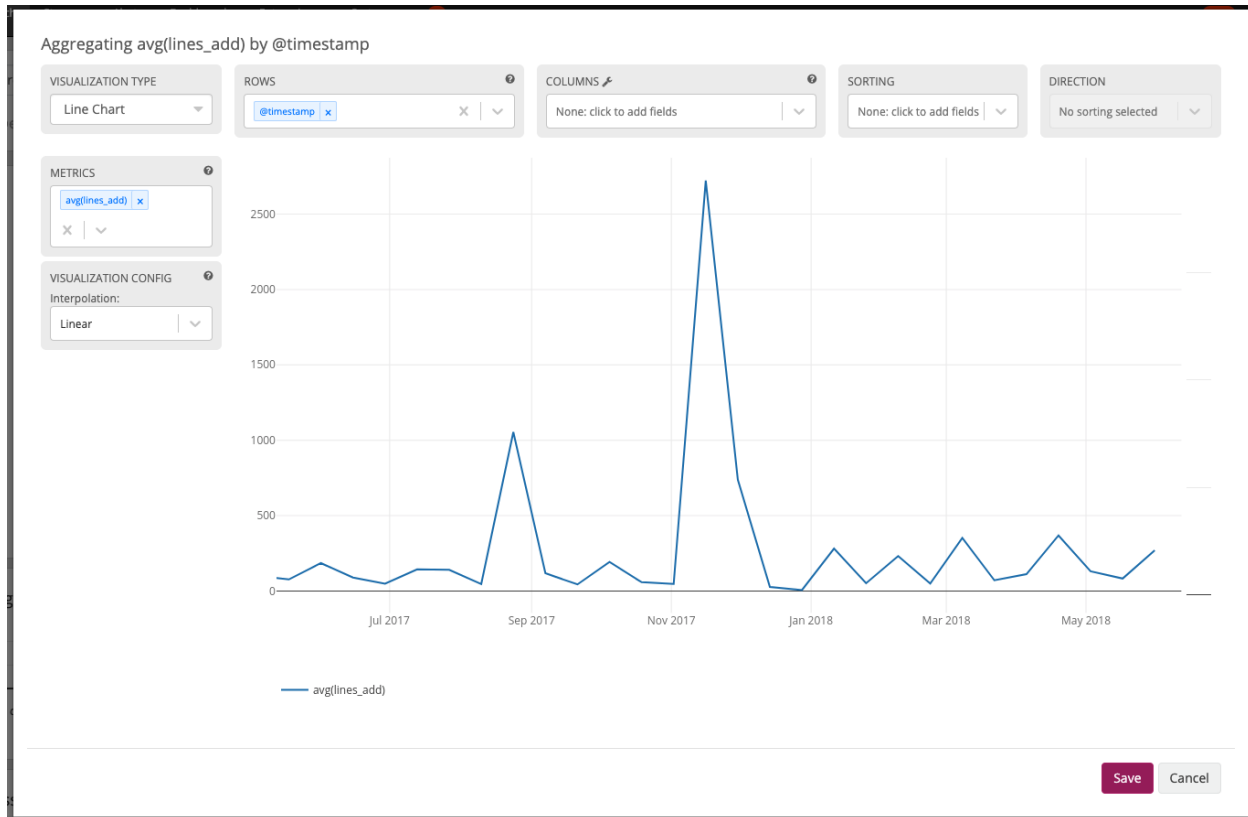


9.4.2 Aggregation

The goal of an aggregation is to reduce the number of data points in a meaningful way to get an answer from them. Data points can be numeric field types in a message (e.g. a `took_ms` field which contains how long a page needed to be rendered). Or string values which can be used for grouping the aggregation (e.g. an `action` field which contains the name of the controller action).

Configuring an aggregation

As describe in the previous section a click on + *Create -> Aggreataion* will create an empty widget on the very top of the search page. A click on the *chevron icon -> Edit* on the right side of the head will open the widget edit modal.



METRICS **METRICS** are a collection of functions to aggregate data points. The result of the aggregation depends on the grouping of **ROWS** and/or **COLUMNS**. The data points of a field will be aggregated to the grouping. *Example* The `avg()` function will find the average of the numeric data points `took_ms` around the configured grouping.

ROWS/COLUMNS Allows selecting fields whose values will be used to group results into new rows/columns. If the field is a `timestamp` for a row it will divide the data points into intervals. Otherwise the aggregation will take by default up to 15 elements of the selected field and apply the selected **METRICS** function to the data points. *Example* The `timestamp` field is aggregated with `avg()` on `took_ms`. The column action will give the average loading time for a page per action for every 5 minutes.

VISUALIZATION To display the result of an aggregation it is often easier to compare lots of result values graphically. Area Chart, Bar Chart, Heatmap, Data Table, Line Chart, Pie Chart, Scatter Plot, Single Number or World Map can be used as **VISUALIZATION**. The World Map needs geographical points in the form of latitude, longitude.

SORTING/DIRECTION The order of the result values can be configured here. **SORTING** defines by which field the sorting should happen and **DIRECTION** configures if it will be ascending or descending.

INTERPOLATION Visualizations like the Area Chart and Line Chart support different interpolation types. The available interpolation types are Linear, Step-after and Spline.

EVENT ANNOTATIONS All vializations which can display a timeline (Area Chart, Bar

chart, Line Chart, Scatter Plot) support event annotations. Each event will be displayed as an entry on the time axis.

9.4.3 Message Table

The Message Table displays the messages and their fields. The Message Table can be configured to show the message fields and the actual message. The actual message is rendered in a blue font, below the fields. Clicking on a message row opens the detailed view of a message with all its fields.

≡ Untitled Message Table

Previous 1 Next

timestamp	source	lines_add	lines_removed
2019-06-12 08:38:59 +00:00	localhost	21	0
Merging jdot & streamex dependencies required by views into core. (#6007)			
2019-06-07 11:46:48 +00:00	localhost	36	-1
Add support for neses maps in list for Content Packs			
2019-06-07 08:52:43 +00:00	localhost	2	-1
Fixing 'displayKey'/'valueKey' props in 'Select' component. (#6000)			
2019-06-07 08:52:43 +00:00	localhost	2	-1
Fixing 'displayKey'/'valueKey' props in 'Select' component. (#6000)			
2019-06-07 08:52:43 +00:00	localhost	2	-1
Fixing 'displayKey'/'valueKey' props in 'Select' component. (#6000)			
2019-06-07 08:52:43 +00:00	localhost	2	-1
Fixing 'displayKey'/'valueKey' props in 'Select' component. (#6000)			
2019-06-07 08:35:04 +00:00	localhost	66	-60
Avoid collisions when merging 'InputsStore' state into components state. (#5999)			
2019-06-07 08:35:04 +00:00	localhost	66	-60

Value and Field Actions

In the Sidebar and on Data Tables and Detail Message Rows are values and fields visible. By clicking on a value or a field a context menu will be shown where different actions can be executed.

Field actions

Based on the type of the field and where the menu is opened different Field actions are shown when a field name (and not its value) is clicked.

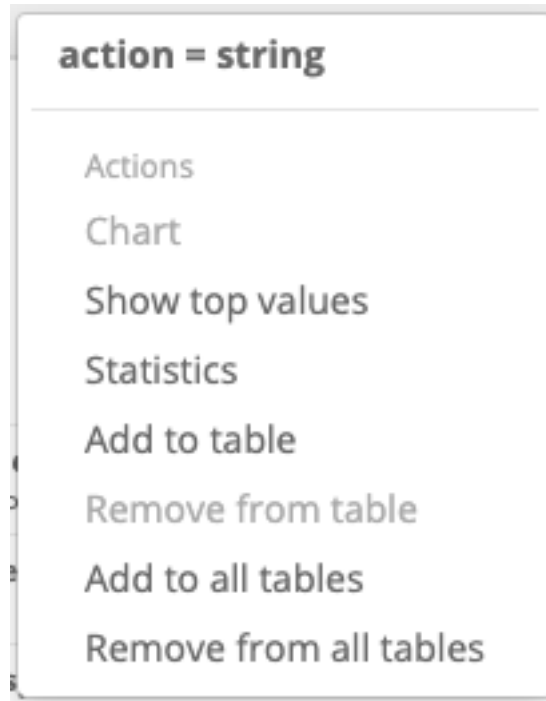


Chart This will generate a new Widget containing a line chart where the fields average value is displayed over time. This chart can be taken as an starting point for a more defined aggregation. This is only possible on fields from a numerical type.

Show top values This action will generate a new Widget containing a data table where the fields value are listed in the rows and the count of occurrence will be displayed next to it. This was formerly known as the “Quick Values” action.

Statistics Here the field values will be given to various statistics function depending on the type of the field. The result will be displayed in a Data Table Widget.

Add to table Add the field to the displayed fields of the message table where the Field Actions menu is shown.

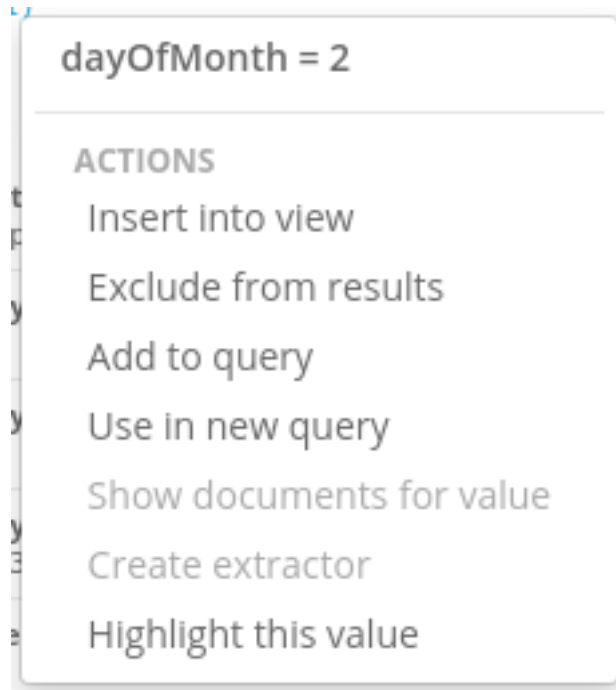
Add to all tables Add the field to the displayed fields of all tables.

Remove from table Remove the field from the list displayed fields from this table.

Remove from all tables Remove the field from the list displayed fields from all tables.

Value actions

The value actions produce different results depending on the type of the value and where the menu is opened. The following actions can be executed.



Insert into view This action will open up a modal where a view can be selected. A select-able list of Parameters will be shown from the selected view and after choosing a parameter a new browser tab will be opened containing the view with the value used in the parameter. This action is only available in enterprise Graylog.

Exclude from results Will add *NOT field:value* to the query to exclude all results where the field contains the value of the value action.

Add to query Will add *field:value* to the query to filter the results additionally for where the field has the value of the value action.

Use in new query Will open a new view tab with *field:value* as query string.

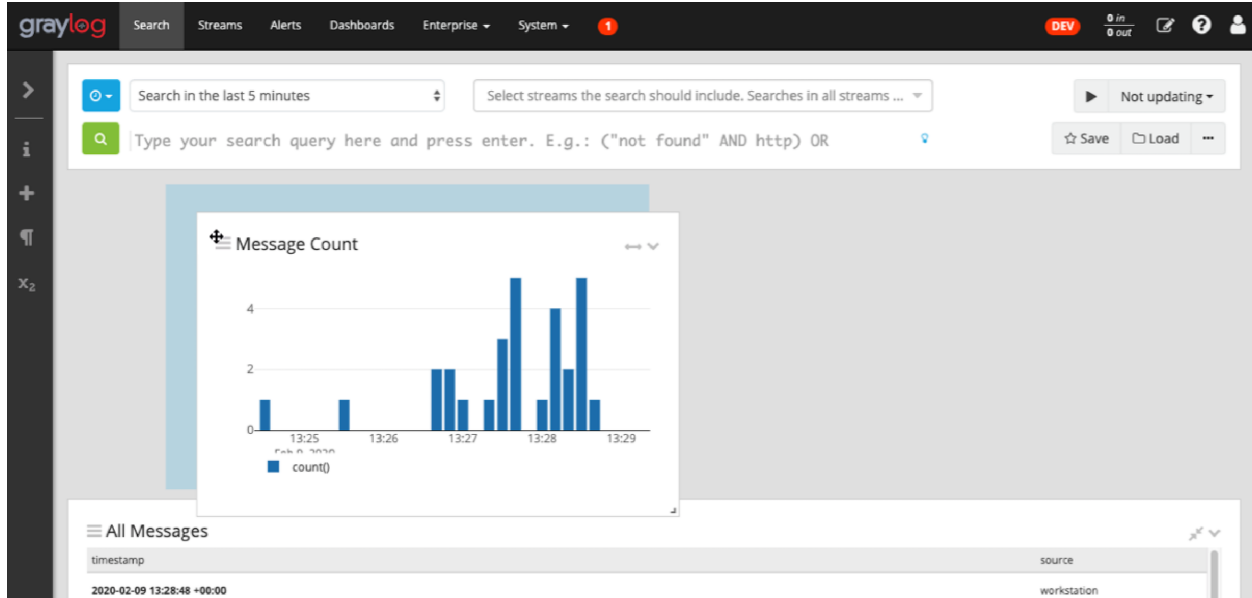
Show documents for value Available in Data Tables it will show the documents which where aggregated to display this value.

Create extractor For values of type string in Message Tables a short cut to create an extractor is given with this action.

Highlight this value This action will highlight this value for this field in all Message Tables and Data Tables.

9.4.4 Repositioning and Resizing

Widgets can be freely placed inside the search result grid. You can drag and drop them with the three lines left to the widget name or you resize them by using the gray arrow in their bottom-right corner. To expand a widget to the full grid width, click on the arrow in its top-right corner.



9.5 Decorators

Decorators allow you to alter message fields during search time automatically, while *preserving the unmodified message on disk*. Decorators are specially useful to make some data in your fields more readable, combine data in some field, or add new fields with more information about the message. As decorators are configured per stream (including the *default stream*), you are also able to present a single message in different streams differently.

As changes made by decorators are not persisted, you cannot search for decorated values or use field analyzers on them. You can still use those features in the original non-decorated fields.

Decorators are applied on a stream-level, and are shared among all users capable of accessing a stream, so all users can share the same results and benefit from the advantages decorators add.

Graylog includes some message decorators out of the box, but you can add new ones from pipelines or by writing your own as plugins.

Decorators can be configured in the system menu under “System/Configurations”. Select a stream in the section “Decorators Configuration” to see an overview of all related decorators.

Decorators Configuration

Select the stream for which you want to see the set of default decorators.

All system events ▼

Syslog Severity Mapper

```
source_field: level
target_field: level
```

Format String

```
format_string: Request to ${controller}#${action} finished in ${took_ms}ms
with code ${http_response_code}
require_all_fields: true
target_field: results
```

Hyperlink String

```
link_field: link
```

[Update](#)

To add new default decorators to a stream, click on the *Update* button. This will open a modal which provides two selects, one to specify the stream and one to define the type of the decorator. After creating a decorator you need to *Save* the changes to finish the configuration.

Update Default Decorators Configuration

Select the stream for which you want to change the set of default decorators.

Default Search

Select the type to create a new decorator for this stream:

Format String

Format String

`${source} - ${message}`

The format string used to create the concatenated field.

Target field

message

The message field that will be created with the formatted string.

☐ Require all fields

Check this if all fields in the format string need to be present in order to apply this decorator.

Create Cancel

Use drag and drop to change the execution order of the decorators.

No decorators configured.

Cancel Save

When you apply multiple decorators to the same search results, you can change the order in which they are applied at any time by using drag and drop in the decorator list inside the modal.

9.5.1 List active decorators

The message table widget provides an overview of all active decorators. When opening the stream search page, by selecting a stream on the “Streams” page, the widget will be preconfigured and display the related search results. Editing the message table widget will open a modal with an overview of all active decorators. You can also add decorators here, but they will not be saved or associated with the stream. If you want to save a decorator only for a specific message table, you can do this inside a *Dashboards* or *Saved Searches*.

All Messages

FIELDS

timestamp x

source x

x

▼

☒ Show message in new row

DECORATORS

Select decorator ▼

What are message decorators?

⬮ Syslog Severity Mapper

Actions ▼

source_field: level

target_field: level

⬮ Format String

Actions ▼

```
format_string: Request to
${controller}#${action} finished in
${took_ms}ms with code ${http_response_code}
require_all_fields: true
target_field: results
```

⬮ Hyperlink String

Actions ▼

link_field: link

9.5.2 Syslog severity mapper

The syslog severity mapper decorator lets you convert the numeric syslog level of syslog messages, to a human readable string. For example, applying the decorator to the `level` field in your logs would convert the syslog level 4 to `Warning (4)`.

To apply a syslog severity mapper decorator, you need to provide the following data:

- **Source field:** Field containing the numeric syslog level
- **Target field:** Field to store the human readable string. It can be the same one as the source field, if you wish to replace the numeric value on your search results

9.5.3 Format string

The format string decorator provides a simple way of combining several fields into one. It can also be used to modify the content of a field in, without altering the stored result in Elasticsearch.

To apply a format string decorator you need to provide the following data:

- **Format string:** Pattern used to format the resulting string. You can provide fields in the message by enclosing them in `{ }`. E.g. `{source}` will add the contents of the `source` message field into the resulting string
- **Target field:** Field to store the resulting value
- **Require all fields** (optional): Check this box to only format the string when all other fields are present

For example, using the format string `Request to {controller}#{action} finished in {took_ms}ms with code {http_response_code}`, could produce the text `Request to PostsController#show finished in 57ms with code 200`, and make it visible in one of the message fields in your search results.

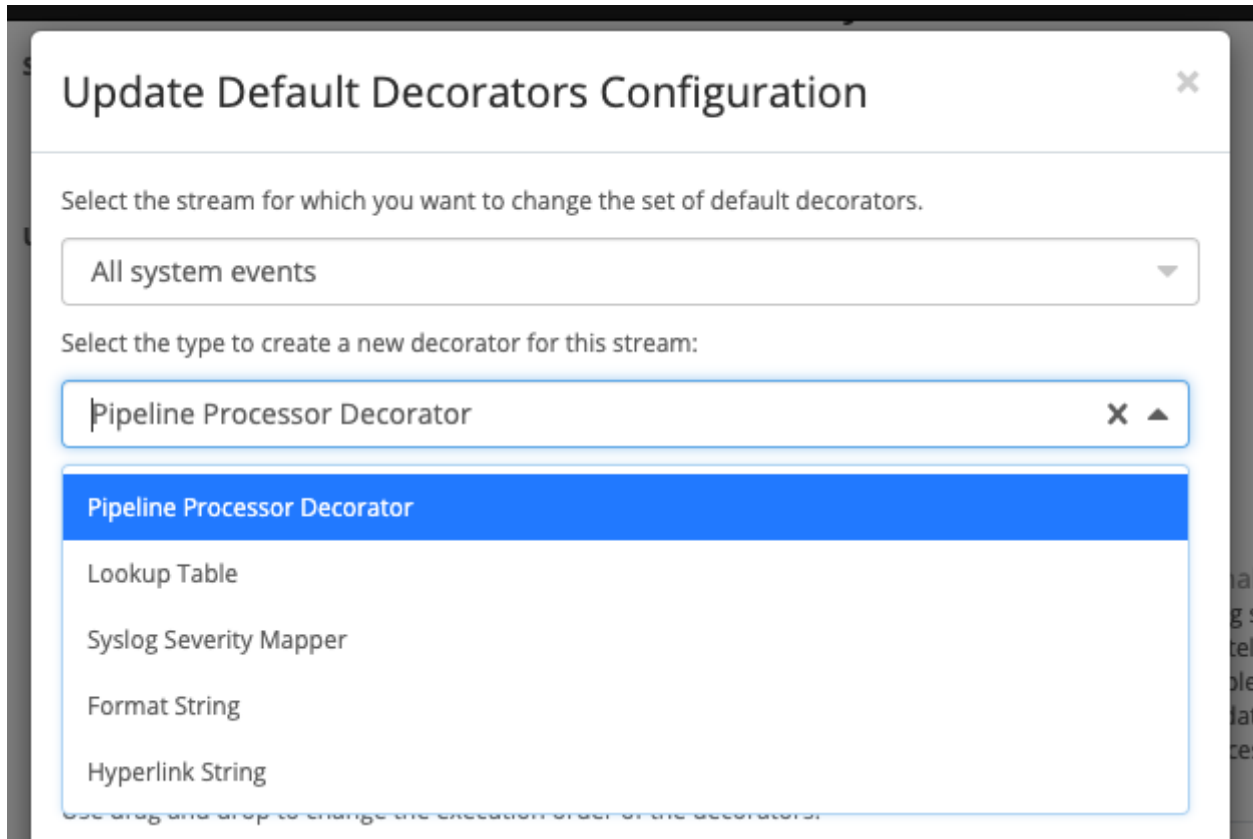
9.5.4 Pipeline Decorator

The pipeline decorator provides a way to decorate messages by processing them with an existing *processing pipeline*. In contrast to using a processing pipeline, changes done to the message by the pipeline are not persisted. Instead, the pipeline is used at search time to modify the *presentation* of the message.

The prerequisite of using the pipeline decorator is that an existing pipeline is required.

Note: Please take note, that the pipeline you use for decoration should not be connected to a stream. This would mean that it is run twice (during indexing *and* search time) for each message, effectively rendering the second run useless.

When you are done creating a pipeline, you can now add a decorator using it on any number of streams. In order to create one, you proceed just like for any other decorator type, by navigating to “System/Configurations” and clicking on the *Update* in the section “Decorators Configuration” and selecting the type (“Pipeline Processor Decorator” in this case) and clicking the *Apply* button next to one.



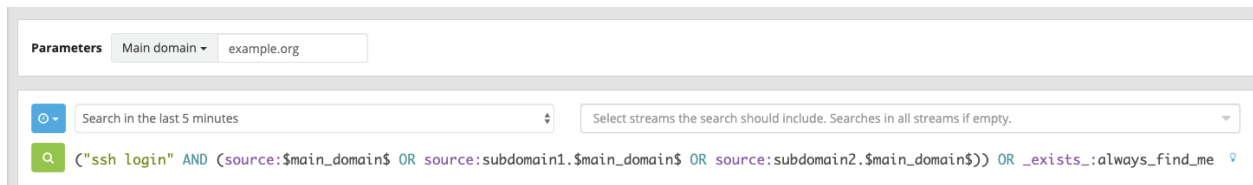
After selecting a pipeline and clicking *Save*, you are already set creating a new pipeline decorator.

9.5.5 Further functionality

If the existing decorators are not sufficient for your needs, you can either search the [Graylog marketplace](#), or *write your own decorator*.

9.6 Parameters

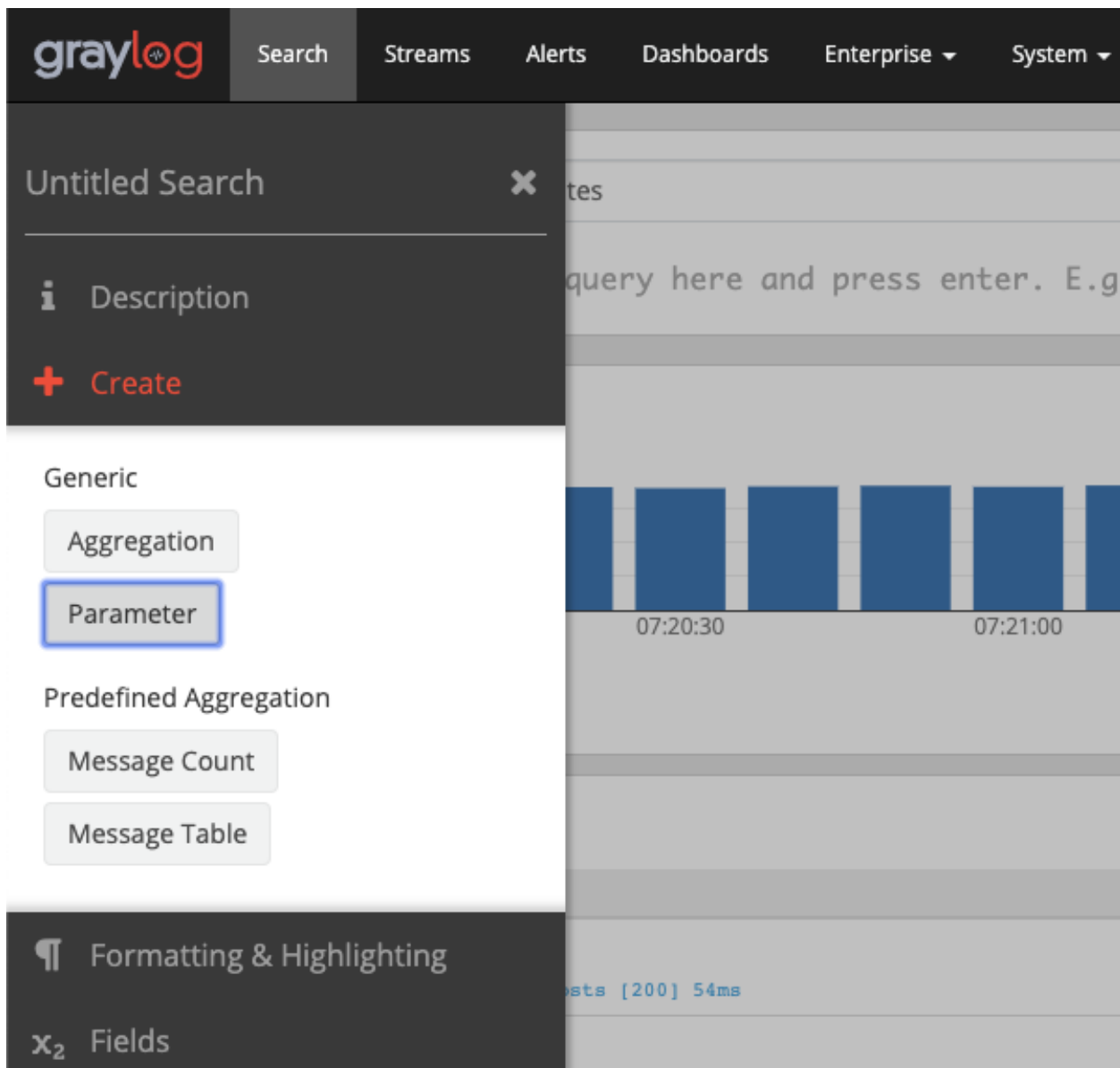
Complex searches queries sometimes require defining a value multiple times. Especially changing this value can be demanding. Parameters are very helpful in this scenario. They allow the usage of a placeholder which can be used as many times as needed.



Important: Parameters are an Enterprise Integrations plugin feature and thus requires an *Enterprise license*.

9.6.1 Declaring a parameter

Parameters can be added wherever you want to perform a search, no matter if saved searches, dashboards or the main search page. To create a parameter just open the sidebar section *Create* and select the option *Parameter*.



This will open a modal with the following options.

Declare parameters

Name

main_domain

Title

Main domain


Description

Parameter for the main domain

Default

example.org

How to use

After declaring it, you can use this parameter in all queries by using the `$main_domain$`  syntax in your query, whenever you want the value of the parameter to be inserted.

Cancel

Submit

- Name: The name of the placeholder you will use inside your query. It will represent the value.
- Title: The title will be displayed beside the parameter declaration input.
- Description: While the title should describe the parameters purpose, the description allows defining a more complex explanation.
- Default: The value which will be used by default for the parameter. More on this in the next section.

After clicking on *Submit* you will be able to implement the parameter inside your query with the syntax `$parameter-Name$`.

9.6.2 Default values

When using parameters you always need to define a value for every parameter. Otherwise, the query is not appropriate and the search can not be executed. With default parameter values, the search will always be executable, unless you remove a value manually.

When opening a dashboard or saved search you will see the following dialog first, if a configured parameter has no default value.

View: *Dashboard without default parameter value*

This view uses parameters which need to be entered before it can be executed. Please enter the parameter values into the form.

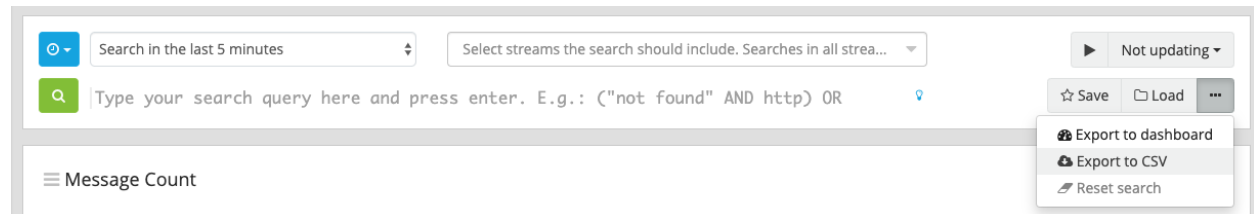
Main domain

Parameter for the main domain

[Continue](#)

9.7 Export results as CSV

It is possible to export the results of your search as a CSV document. To do so, click on the three dots on the right side of the search bar and select the *Export to CSV* option.



This will open a modal where you can choose the fields the CSV document should contain. The initial fields are based on the message table configured for the search page. It is also possible to define a limit. However, please note that because messages are loaded in chunks of fixed size, and because the final chunk will rarely end exactly at that fixed size, it is likely that the total number of messages exported will slightly exceed the number defined by the user.

Clicking on *Start Download* will create the file based on the specified options and start the download.

Export all search results to CSV

The following settings are based on the message table: All Messages

Define the fields for your CSV file. You can change the field order with drag and drop.

The export supports fields created by decorators which are part of the message table, but they currently do not appear in the field list. If you want to export a decorated field, just enter its name.

When you've finished the configuration, click on "Start Download".

Fields to export

timestamp x

source x


message x

x | v

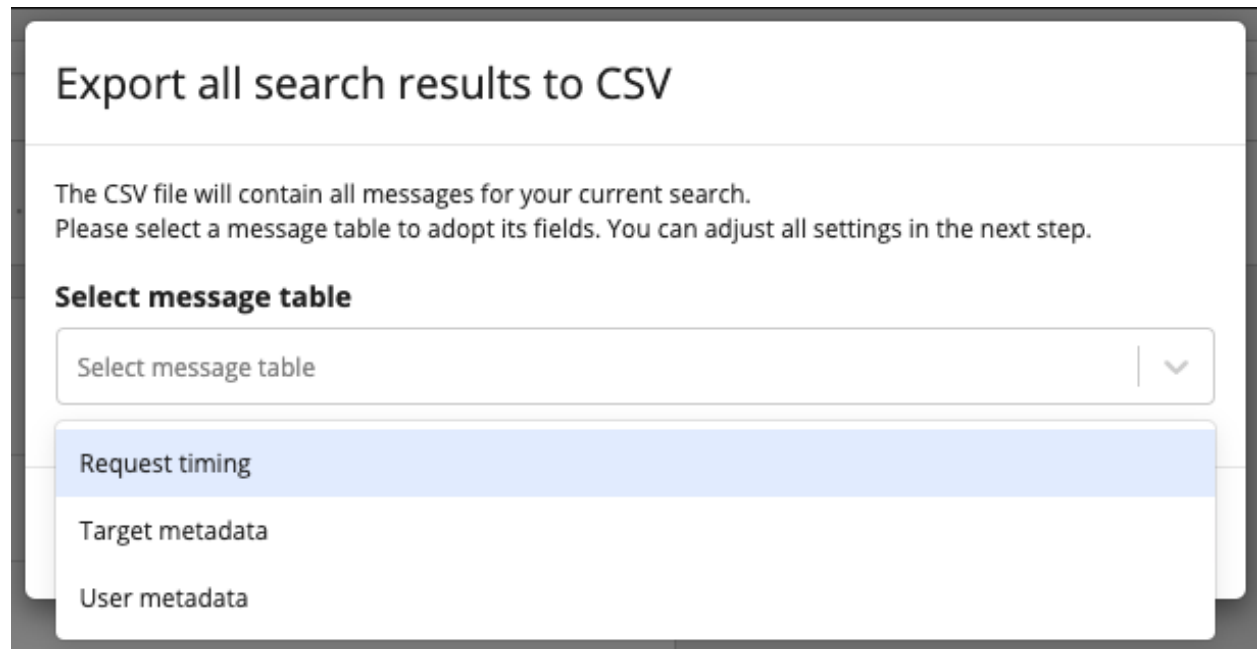
Messages limit

Messages are loaded in chunks. If a limit is defined, all chunks up to the one where the limit is reached will be retrieved. Which means the total number of delivered messages can be higher than the defined limit.

Close

 Start Download

When the search page or saved search contains multiple message tables, you can decide which message table you want to adopt the settings from. In this case you will see the following select when opening the CSV export modal:



Additionally, you can select *Export to CSV* in a message table's action menu, if you want to adopt its settings directly.



9.7.1 Exporting Message Tables on a Dashboard

The export on a dashboard is slightly different compared to the search page or saved searches. Because dashboards do not have a single result set, you always need to select a message table when clicking on *Export to CSV* in a dashboard's search bar action menu. You can find more information on this topic in the section [Widget specific search criteria](#).

Even though a message table on dashboard has its own search criteria and the dashboard's search bar only functions as a filter, you will always export the result set currently displayed by the message table. If you want to export only the search results the message table's search criteria is referring to, make sure the dashboard's filter is left blank.

9.7.2 Decorator Support

While the CSV export supports fields created by decorators, they are currently not being listed in the fields select options list and must be created manually. When you want to export a decorated field, enter its name in the field select and click on the option *Create field_name*. To ensure a decorated field is available in the context of the current search, open a message table's edit modal, by clicking on *Edit* in its context menu and find the decorators in the left sidebar.

9.7.3 Exporting the full message

If you want to export the full original message, keep in mind that it must be present in the stored message. Some Graylog inputs and file shippers can be configured to store the original message in the `full_message` field. Often, the message field may be used to export the entire, unparsed message.

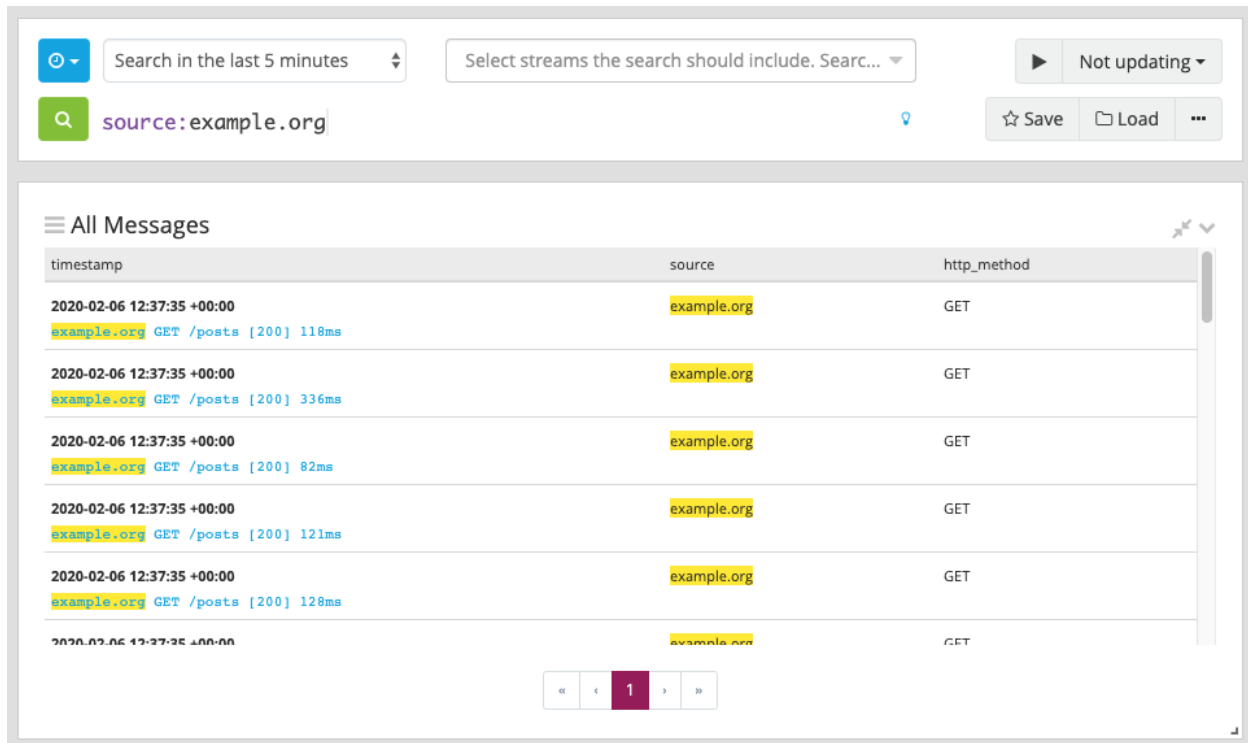
9.7.4 Troubleshooting

Depending on the number of messages the export may take a while. If the download never starts or the document does not contain the expected result, have a look at the `server.log`.

Warning: Exporting results to a CSV will **not** preserve sorting because Graylog is using the virtual `_doc` field to “sort” documents for performance reasons. If you need to have the exported data ordered you will need to either make a [scroll query to Elasticsearch](#) and process it after, or to download the file and post process it via other means.

9.8 Search result highlighting

Graylog supports search result highlighting since v0.20.2:



The screenshot displays the Graylog search interface. At the top, there is a search bar with the query `source:example.org` and a dropdown menu set to "Search in the last 5 minutes". To the right of the search bar, there is a button labeled "Select streams the search should include. Search..." and a "Not updating" status indicator. Below the search bar, there are buttons for "Save", "Load", and a menu icon.

The main section of the interface is titled "All Messages" and contains a table of search results. The table has three columns: "timestamp", "source", and "http_method". The "source" column is highlighted in yellow for all rows, indicating that the search query `source:example.org` was matched. The "timestamp" column shows the date and time of each message, and the "http_method" column shows the HTTP method used (GET).

timestamp	source	http_method
2020-02-06 12:37:35 +00:00	example.org	GET
2020-02-06 12:37:35 +00:00	example.org	GET
2020-02-06 12:37:35 +00:00	example.org	GET
2020-02-06 12:37:35 +00:00	example.org	GET
2020-02-06 12:37:35 +00:00	example.org	GET
2020-02-06 12:37:35 +00:00	example.org	GET

At the bottom of the table, there is a pagination control showing "1" of 1 results.

9.8.1 Enabling/Disabling search result highlighting

Using search result highlighting will result in slightly higher resource consumption of searches. You can enable and disable it using a configuration parameter in the `graylog.conf` of your Graylog nodes:

```
allow_highlighting = true
```

9.9 Search configuration

Graylog allows customizing the options allowed to search queries, like limiting the time range users can select or configuring the list of displayed relative time ranges.

Configurations
You can configure system settings for different sub systems on this page.

Search Configuration

Query time range limit disabled
The maximum time users can query data in the past. This prevents users from accidentally creating queries which span a lot of data and would need a long time and many resources to complete (if at all).

Relative time range options		Surrounding time range options	
PT5M	Search in the last 5 minutes	PT1S	1 second
PT15M	Search in the last 15 minutes	PT5S	5 seconds
PT30M	Search in the last 30 minutes	PT10S	10 seconds
PT1H	Search in the last 1 hour	PT30S	30 seconds
PT2H	Search in the last 2 hours	PT1M	1 minute
PT8H	Search in the last 8 hours	PT5M	5 minutes
P1D	Search in the last 1 day		
P2D	Search in the last 2 days		
P5D	Search in the last 5 days		
P7D	Search in the last 7 days		
P14D	Search in the last 14 days		
P30D	Search in the last 30 days		
PT0S	Search in all messages		

Surrounding search filter fields

- file
- source
- gl2_source_input
- source_file

[Update](#)

All search configuration settings can be customized using the web interface on the *System -> Configurations* page in the *Search configuration* section.

9.9.1 Query time range limit

Sometimes the amount of data stored in Graylog is quite big and spans a wide time range (e. g. multiple years). In order to prevent daily users from accidentally running search queries which could use up lots of resources, it is possible to limit the time range that users are allowed to search in.

Using this feature, the time range of a search query exceeding the configured query time range limit will automatically be adapted to the given limit.

The query time range limit is a *duration* formatted according to ISO 8601 following the basic format `P<date>T<time>` with the following rules:

Designator	Description
P	Duration designator (for period) placed at the start of the duration representation
Y	Year designator that follows the value for the number of years
M	Month designator that follows the value for the number of months
W	Week designator that follows the value for the number of weeks
D	Day designator that follows the value for the number of days
T	Time designator that precedes the time components of the representation
H	Hour designator that follows the value for the number of hours
M	Minute designator that follows the value for the number of minutes
S	Second designator that follows the value for the number of seconds

Examples:

ISO 8601 duration	Description
P30D	30 days
PT1H	1 hour
P1DT12H	1 day and 12 hours

More details about the format of ISO 8601 durations can be found [here](#).

9.9.2 Relative time ranges











The list of time ranges displayed in the *Relative time frame selector* can be configured, too. It consists of a list of *ISO 8601* durations which the users can select on the search page.

Update Search Configuration ×

☐ Enable query limit

Relative Timerange Options

Configure the available options for the **relative** time range selector as **ISO8601 duration**

PT5M	5	Search in the last 5 minutes	
PT15M	15	Search in the last 15 minutes	
PT30M	30	Search in the last 30 minutes	
PT1H	1h	Search in the last 1 hour	
PT2H	2h	Search in the last 2 hours	
PT8H	8h	Search in the last 8 hours	
P1D	1d	Search in the last 1 day	
P2D	2d	Search in the last 2 days	
P5D	5d	Search in the last 5 days	
P7D	7d	Search in the last 7 days	

10.1 What are streams?

The Graylog streams are a mechanism to route messages into categories in realtime while they are processed. You define rules that instruct Graylog which message to route into which streams. Imagine sending these three messages to Graylog:

```
message: INSERT failed (out of disk space)
level: 3 (error)
source: database-host-1

message: Added user 'foo'.
level: 6 (informational)
source: database-host-2

message: smtp ERR: remote closed the connection
level: 3 (error)
source: application-x
```

One of the many things that you could do with streams is creating a stream called *Database errors* that is catching every error message from one of your database hosts.

Create a new stream with these rules, selecting the option to match all rules:

- Field `level` must be greater than 4
- Field `source` must match regular expression `^database-host-\d+`

This will route every new message with a `level` higher than *WARN* and a `source` that matches the database host regular expression into the stream.

A message will be routed into every stream that has all (or any) of its rules matching. This means that a message can be part of many streams and not just one.

The stream is now appearing in the streams list and a click on its title will show you all database errors.

Streams can be used to be alerted in case certain condition happens. We cover more topics related to alerts in [Alerts](#).

10.1.1 What's the difference to saved searches?

The biggest difference is that streams are processed in realtime. This allows realtime alerting and forwarding to other systems. Imagine forwarding your database errors to another system or writing them to a file by regularly reading them from the message storage. Realtime streams do this much better.

Another difference is that searches for complex stream rule sets are always comparably cheap to perform because a message is *tagged* with stream IDs when processed. A search for Graylog internally always looks like this, no matter how many stream rules you have configured:

```
streams: [STREAM_ID]
```

Building a query with all rules would cause significantly higher load on the message storage.

10.2 How do I create a stream?

1. Navigate to the streams section from the top navigation bar.
2. Click “Create stream”.
3. Save the stream after entering a name and a description. For example *All error messages* and *Catching all error messages from all sources*. The stream is now saved but **not yet activated**.
4. Click on “Edit rules” for the stream you just created. That will open a page where you can manage and test stream rules.
5. Choose how you want to evaluate the stream rules to decide which messages go into the stream:
 - *A message must match all of the following rules* (logical AND): Messages will only be routed into the stream if all rules in the stream are fulfilled. This is the default behavior
 - *A message must match at least one of the following rules* (logical OR): Messages will be routed into the stream if one or more rules in the stream are fulfilled
6. Add stream rules, by indicating the field that you want to check, and the condition that should satisfy. Try the rules against some messages by loading them from an input or manually giving a message ID. Once you are satisfied with the results, click on “I’m done”.
7. The stream is still paused, click on the “Start stream” button to activate the stream.

10.3 Index Sets

For starters, you should read [Index model](#) for a comprehensive description of the index set functionality in Graylog.

Every stream is assigned to an index set which controls how messages routed into that stream are being stored into Elasticsearch. The stream overview in the web interface shows the assigned index set for each stream.

Streams

You can route incoming messages into streams by applying rules against them. If a message matches all rules of a stream it is routed into it. A message can be routed into multiple streams. You can for example create a stream that contains all SSH logins and configure to be alerted whenever there are more logins than usual. Read more about streams in the [documentation](#).

Take a look at the [Graylog stream dashboards](#) for wall-mounted displays or other integrations.

Filter streams

Access Logs index set *Access Logs*

Websvr Access Logs
0 messages/second. No configured rules. [Show stream rules](#)

All messages index set *Default index set* **Default**

Stream containing all messages
141 messages/second. The default stream contains all messages.

Index sets can be assigned to a stream when creating the stream and changed later when editing the stream settings.

Important: Graylog will not automatically copy messages into new Elasticsearch indices if another index set is being assigned to a stream.

Creating Stream

Title

Description

Index Set

Messages that match this stream will be written to the configured index set.

☒ **Remove matches from 'All messages' stream**
Remove messages that match this stream from the 'All messages' stream which is assigned to every message by default.

Graylog routes every message into the **All messages** stream by default, unless the message is removed from this stream with a pipeline rule (see [Processing Pipelines](#)) or it's routed into a stream marked with **Remove matches from 'All messages' stream**.

The latter is useful if messages should be stored with different settings than the ones in the **Default index set**, for example web server access logs should only be stored for 4 weeks while all other messages should be stored for 1 year.

10.3.1 Storage requirements

Graylog writes messages once for each index set into Elasticsearch. This means that if all streams are using the **Default index set**, each message will be written exactly once into Elasticsearch, no matter into how many streams the message has been sent. This can be thought of a kind of de-duplication.

If some streams use other index sets and the **Remove matches from ‘All messages’ stream** setting is not enabled, messages will be written into Elasticsearch at least twice, once for the **Default index set** and once for the assigned index set. This means that the same message will be stored in two or more indices in Elasticsearch with different index settings.

Unless you explicitly want to store messages multiple times in different Elasticsearch indices, either assign the **Default index set** to the respective streams or enable the **Remove matches from ‘All messages’ stream** setting for the respective streams.

10.4 Outputs

The stream output system allows you to forward every message that is routed into a stream to other destinations.

Outputs are managed globally (like message inputs) and not for single streams. You can create new outputs and activate them for as many streams as you like. This way you can configure a forwarding destination once and select multiple streams to use it.

Graylog ships with default outputs and can be extended with *Plugins*.

10.5 Use cases

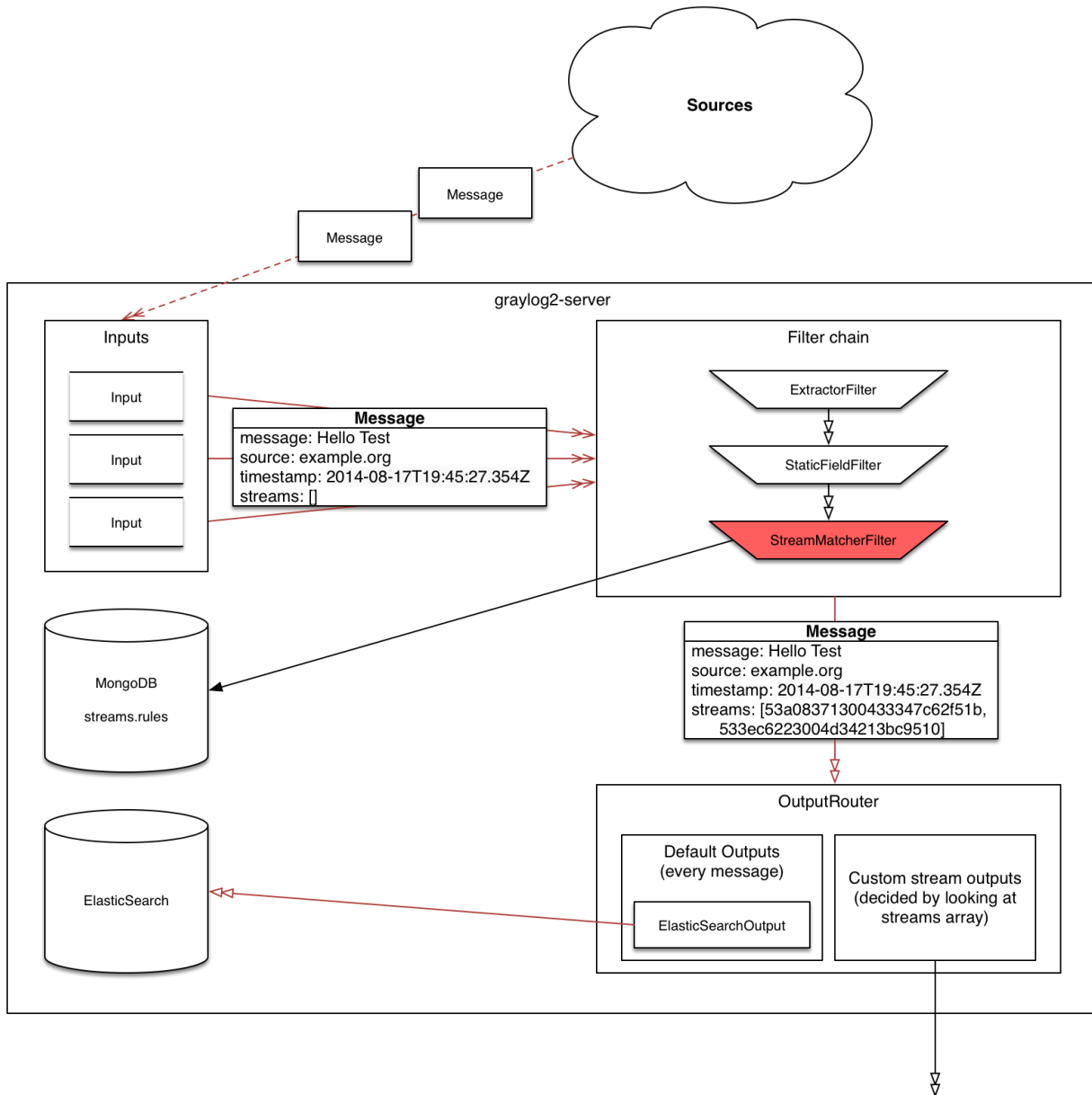
These are a few example use cases for streams:

- Forward a subset of messages to other data analysis or BI systems to reduce their license costs.
- Monitor exception or error rates in your whole environment and broken down per subsystem.
- Get a list of all failed SSH logins and use *aggregate* on the *username* field to analyze which user names were affected.
- Catch all HTTP POST requests to `/login` that were answered with a HTTP 302 and route them into a stream called *Successful user logins*. Now get a chart of when users logged in and use *quick values* to get a list of users that performed the most logins in the search time frame.

10.6 How are streams processed internally?

Every message that comes in is matched against the rules of a stream. For messages satisfying *all* or *at least one* of the stream rules (as configured in the stream), the internal ID of that stream is stored in the `streams` array of the processed message.

All analysis methods and searches that are bound to streams can now easily narrow their operation by searching with a `streams:[STREAM_ID]` limit. This is done automatically by Graylog and does not have to be provided by the user.



10.7 Stream Processing Runtime Limits

An important step during the processing of a message is the stream classification. Every message is matched against the user-configured stream rules. The message is added to the stream if all or any rules of a stream matches, depending on what the user chose. Applying stream rules is done during the indexing of a message only, so the amount of time spent for the classification of a message is crucial for the overall performance and message throughput the system can handle.

There are certain scenarios when a stream rule takes very long to match. When this happens for a number of messages, message processing can stall, messages waiting for processing accumulate in memory and the whole system could become non-responsive. Messages are lost and manual intervention would be necessary. This is the worst case scenario.

To prevent this, the runtime of stream rule matching is limited. When it is taking longer than the configured runtime limit, the process of matching this exact message against the rules of this specific stream is aborted. Message processing in general and for this specific message continues though. As the runtime limit needs to be configured pretty high (usually a magnitude higher as a regular stream rule match takes), any excess of it is considered a fault and is recorded for this stream. If the number of recorded faults for a single stream is higher than a configured threshold, the stream rule set of this stream is considered faulty and the stream is disabled. This is done to protect the overall stability and performance of message processing. Obviously, this is a tradeoff and based on the assumption, that the total loss of one or more messages is worse than a loss of stream classification for these.

There are scenarios where this might not be applicable or even detrimental. If there is a high fluctuation of the message load including situations where the message load is much higher than the system can handle, overall stream matching can take longer than the configured timeout. If this happens repeatedly, all streams get disabled. This is a clear indicator that your system is overutilized and not able to handle the peak message load.

10.7.1 How to configure the timeout values if the defaults do not match

There are two configuration variables in the configuration file of the server, which influence the behavior of this functionality.

- `stream_processing_timeout` defines the maximum amount of time the rules of a stream are able to spend. When this is exceeded, stream rule matching for this stream is aborted and a fault is recorded. This setting is defined in milliseconds, the default is 2000 (2 seconds).
- `stream_processing_max_faults` is the maximum number of times a single stream can exceed this runtime limit. When it happens more often, the stream is disabled until it is manually reenabled. The default for this setting is 3.

10.7.2 What could cause it?

If a single stream has been disabled and all others are doing well, the chances are high that one or more stream rules are performing bad under certain circumstances. In most cases, this is related to stream rules which are utilizing regular expressions. For most other stream rules types the general runtime is constant, while it varies very much for regular expressions, influenced by the regular expression itself and the input matched against it. In some special cases, the difference between a match and a non-match of a regular expression can be in the order of 100 or even 1000. This is caused by a phenomenon called *catastrophic backtracking*. There are good write-ups about it on the web which will help you understanding it.

10.7.3 Summary: How do I solve it?

1. Check the rules of the stream that is disabled for rules that could take very long (especially regular expressions).
2. Modify or delete those stream rules.
3. Re-enable the stream.

10.8 Programmatic access via the REST API

Many organisations already run monitoring infrastructure that are able to alert operations staff when incidents are detected. These systems are often capable of either polling for information on a regular schedule or being pushed new alerts - this article describes how to use the Graylog Stream Alert API to poll for currently active alerts in order to further process them in third party products.

10.8.1 Checking for currently active alert/triggered conditions

Graylog stream alerts can currently be configured to send emails when one or more of the associated alert conditions evaluate to true. While sending email solves many immediate problems when it comes to alerting, it can be helpful to gain programmatic access to the currently active alerts.

Each stream which has alerts configured also has a list of active alerts, which can potentially be empty if there were no alerts so far. Using the stream's ID, one can check the current state of the alert conditions associated with the stream using the authenticated API call:

```
GET /streams/<streamid>/alerts/check
```

It returns a description of the configured conditions as well as a count of how many triggered the alert. This data can be used to for example send SNMP traps in other parts of the monitoring system.

Sample JSON return value:

```
{
  "total_triggered": 0,
  "results": [
    {
      "condition": {
        "id": "984d04d5-1791-4500-a17e-cd9621cc2ea7",
        "in_grace": false,
        "created_at": "2014-06-11T12:42:50.312Z",
        "parameters": {
          "field": "one_minute_rate",
          "grace": 1,
          "time": 1,
          "backlog": 0,
          "threshold_type": "lower",
          "type": "mean",
          "threshold": 1
        },
        "creator_user_id": "admin",
        "type": "field_value"
      },
      "triggered": false
    }
  ],
  "calculated_at": "2014-06-12T13:44:20.704Z"
}
```

Note that the result is cached for 30 seconds.

10.8.2 List of already triggered stream alerts

Checking the current state of a stream's alerts can be useful to trigger alarms in other monitoring systems, but if one wants to send more detailed messages to operations, it can be very helpful to get more information about the current state of the stream, for example the list of all triggered alerts since a certain timestamp.

This information is available per stream using the call:

```
GET /streams/<streamid>/alerts?since=1402460923
```

The since parameter is a unix timestamp value. Its return value could be:

```
{
  "total": 1,
  "alerts": [
    {
      "id": "539878473004e72240a5c829",
      "condition_id": "984d04d5-1791-4500-a17e-cd9621cc2ea7",
      "condition_parameters": {
        "field": "one_minute_rate",
        "grace": 1,
        "time": 1,
        "backlog": 0,
        "threshold_type": "lower",
        "type": "mean",
        "threshold": 1
      },
      "description": "Field one_minute_rate had a mean of 0.0 in the last 1 minutes_
↪with trigger condition lower than 1.0. (Current grace time: 1 minutes)",
      "triggered_at": "2014-06-11T15:39:51.780Z",
      "stream_id": "53984d8630042acb39c79f84"
    }
  ]
}
```

Using this information more detailed messages can be produced, since the response contains more detailed information about the nature of the alert, as well as the number of alerts triggered since the timestamp provided.

Note that currently a maximum of 300 alerts will be returned.

10.9 FAQs

10.9.1 Using regular expressions for stream matching

Stream rules support matching field values using regular expressions. Graylog uses the [Java Pattern class](#) to execute regular expressions.

For the individual elements of regular expression syntax, please refer to Oracle's documentation, however the syntax largely follows the familiar regular expression languages in widespread use today and will be familiar to most.

However, one key question that is often raised is matching a string in case insensitive manner. Java regular expressions are case sensitive by default. Certain flags, such as the one to ignore case sensitivity can either be set in the code, or as an inline flag in the regular expression.

To for example route every message that matches the browser name in the following user agent string:


```
Mozilla/5.0 (Macintosh; Intel Mac OS X 10_9_1) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/32.0.1700.107 Safari/537.36
```

the regular expression `.*applewebkit.*` will not match because it is case sensitive. In order to match the expression using any combination of upper- and lowercase characters use the `(?i)` flag as such:

```
(?i).*applewebkit.*
```

Most of the other flags supported by Java are rarely used in the context of matching stream rules or extractors, but if you need them their use is documented on the same Javadoc page by Oracle.

10.9.2 Can I add messages to a stream after they were processed and stored?

No. Currently there is no way to re-process or re-match messages into streams.

Only new messages are routed into the current set of streams.

10.9.3 Can I write own outputs, alert conditions or notifications?

Yes. Please refer to the [Plugins](#) documentation page.

ALERTS

Alerts are created using Event Definitions that consist of Conditions. When a given condition is met it will be stored as an Event and can be used to trigger a notification. If your system has an enterprise license, then Events may be combined to create Correlations.

Graylog ships with default *alert conditions* and *alert notifications*, and both can be extended with *Plugins*.

11.1 Alerts & Events

As of Graylog 3.1.0, the Alerts page has changed to reflect a new method of generating Alerts. An Alert is triggered when a defined Event is detected. An Event is a condition that matches a log to a time period or aggregation. The Event may be used to group similar fields, change field content, or create new field content for use with Alerting and Correlation (an enterprise feature.)

11.1.1 Alerting by Example

The goal of this document is to provide explanation for the configuration of an Event Definition with an real life example.

Scenario

Graylog is getting log messages for a service, where user needs to authenticate to log in to the service (e.g ssh, web app). In this scenario we want to receive an email from Graylog if a brute force attack is run on the authentication of the service. So if one user failed to login to a system 10 times in one minute than we want to get an email from Graylog.

Event Details

After clicking on `Create Event Definition` we see the Event Definition create wizard. We are on the first page called `Event Details`. Here we enter title and description of our Event Definition. Also we define a priority. The priority is a tool for the user to add a classification to a event. It will be later displayed in the events overview as a thermometer:

 Login Failed konrad | egwene Event Login Failed 2020-02-21 13:38:07

Since we get a message about a brute force attack which should be treated urgently we set the priority on `high` and go on to the next step.

New Event Definition "Bruteforce attack on our web app"

Event Definitions allow you to create Alerts from different Conditions and alert on them.

Graylog's new Alerting system let you define more flexible and powerful rules. Learn more in the [documentation](#)

Alerts & Events | Event Definitions | Notifications

Event Details | Condition | Fields | Notifications | Summary

Event Details

Title

Bruteforce attack on our web app

Title for this Event Definition, Events and Alerts created from it.

Description (Optional)

A user had 10 failed logins in under 1 minute.

Longer description for this Event Definition.

Priority

High

Choose the priority for Events created from this Definition.

Previous | Next

Condition

As Condition Type we choose Filter & Aggregation. Below the selection will now the Filter section be available.

Filter

First of all we choose the Stream in which our log files are routed. If no stream for the web application was created, we highly recommend *to do that*. That way the query result will be limited to the logs of the web application and no other logs can influence the filter process.

Now we need to filter the incoming messages so we can later count the messages which are matching the filter. The log message which is indicating a failed authentication look like this:

```
Login failed for user admin from ip 240.210.133.39
```

So we add "Login failed for user" to our query field. On the right side should now a preview table appear which shows the messages matching the query. The preview uses Search within the last as time range. If you provoke a log entry now, you should see at least this message after updating the query.

Now we set Search within the last to 10 seconds and Execute search every to 10 seconds. Now the Event engine will execute the query every 10 seconds for a time range of 10 seconds.

Warning: If Search within the last is greater than Execute search every (which would be called a hopping window) the event engine generate multiple events for the same log line. For example if you set Search within the last to one minute and Execute search every to 10 seconds the engine will find the same log entry 6 times. Since the log entry is visible for one minute and we search every 10 seconds. If the Search within the last is the same as the Execute search every period, you create a so called Tumbling window which is recommended for most situations.

Aggregation

Since we want to aggregate on our events to count that we have more than 10 messages in 10 seconds, we choose Aggregation of results reaches a threshold for Create Events for Definition if... and go on with aggregation.

To be able to count the failed login attempts per user, we need an *extractor* on our incoming messages which is extracting our user name and store it in a field called `user`. Now we can expect that every message with login failed has a field `user`. And we use that field in the selection `Group by Field(s)`.

In the last step of that page we add one aggregation rule. *If count () is >= 10.*

To summarize what we have done here:

1. We add a stream to minimize the messages we have to filter on.
2. Insert a query to filter the logs down to our failed logins.
3. Grouped our logs so the aggregation will be only applied per user.
4. Add a rule which states that we only raise an alert if the count more than or equals 10.

Event Details

Filter & Aggregation

Fields

Notifications

Summary

Event Condition

Configure how Graylog should create Events of this kind. You can later use those Events as input on other Conditions, making it possible to build powerful Conditions based on others.

Condition Type

Filter & Aggregation

Choose the type of Condition for this Event.

Available Conditions

Filter & Aggregation
Create Events from log messages by filtering them and (optionally) aggregating their results to match a given condition. These Events can be used as input for a Correlation Rule.

Event Correlation
Correlate previously defined Events to identify meaningful incidents. This will create new Events that you can later use.

Filter

Add information to filter the log messages that are relevant for this Event Definition.

Search Query

Login failed for user

Search query that Messages should match. You can use the same syntax as in the Search page, including declaring Query Parameters from Lookup Tables by using the `{lookupParameter}` syntax.

Streams (Optional)

Failed Login

Select streams the search should include. Searches in all streams if empty.

Search within the last

1 minutes

Execute search every

10 seconds

Create Events for Definition if...

☐ Filter has results
☒ Aggregation of results reaches a threshold

Aggregation

Summarize log messages matching the Filter defined above by using a function. You can optionally group the Filter results by identical field values.

Group by Field(s) (Optional)

user

Select Fields that Graylog should use to group Filter results when they have identical values. **Example:** Assuming you created a Filter with all failed log-in attempts in your network, Graylog could alert you when there are more than 5 failed log-in attempts overall. Now, add `username` as Group by Field and Graylog will alert you for each `username` with more than 5 failed log-in attempts.

Create Events for Definition

Messages must meet **all** of the following rules:

If `count()` **is** `>=` **Threshold** `10`

Select Field (Optional)

Condition summary

Condition is valid

Preview: `count() >= 10`

Previous Next

By hitting next we come to the Fields page of the wizard.

Fields

Here we can add a custom field to our event. These fields can be used for several things.

First of all it will be a field which is part of the event. So it will be displayed as a field on the search page. That also means you can again run aggregations on that field. Fields can also be accessed within a notification and can be used for the enterprise feature *correlation*.

Since we are using an aggregation event definition, the only accessible fields are the ones we configured in the Group by Field(s). When aggregating multiple messages to one event we lose all fields we do not make a group by on. We want to add the `user` key to our notification, which we put in our Group by Field(s).

Event Details
Filter & Aggregation
Fields
Notifications
Summary

Custom Field "user"

Name

Name for this Field.

Use Field as Event Key ⓘ

☒

Indicates if this Field should be a Key and its order.

Field Data Type

String

Set Value From

Select a source for the value of this Field.

Template

Type a literal text to set to this Field or use [JME syntax](#) to add a dynamic Value.

☒ **Require all template values to be set**

Check this option to validate that all variables used in the Template have values.

Done

Cancel

Previous

Next

Available Fields in Template

Graylog lets you enrich generated Events with dynamic values. You can access Fields from the Event context with `{source.<fieldName>}`.

Available Fields in the Template depend on the condition that created the Event:

Filter: All Fields in the original log message
Aggregation: Fields set in Group By with their original names
Correlation: All Fields in the last matched and non-negated Event

At first we add a *Name* for our key. This is also the reference for future use, like the field name of the event message, later to aggregate on. Then we set *Use Field as Event Key* to true. This means the notifications will be grouped by this key. This is important in the next step for the group key is considered in the grace period. The number is reflecting the order in the grouping. If we would add another key (like the IP address from which the user connects), then we would first group by user and then group by IP, entering 2 for the IP address here.

For *Set Value From* we choose the template. This will extract the field from the resulting aggregation or filtered log message. Here we enter `{source.user}`. The resulting aggregation will be the *source* containing a field *user* since we entered it in the Group by Field(s).

If we only want events which do set the key - this is more important for filtered log messages - then we could set the flag *Require all template values to be set*. But since we have aggregation, this field is not needed and we go to the next page.

Notifications

We want to receive an email when the event got raised. Configuring a notification, will elevate the event to an alert. How to setup an email notification is explained [here](#). We will therefore select our already defined email notification and set our *Grace Period* to 5 Minutes. If we are target of a brute force attack then we do not want to get an email every 10 seconds reminding us that we are being attacked. This *Grace Period* will only be respected per Event Key we selected in our custom fields. So we will get an email for every new user name the attackers are using.

Event Details
Filter & Aggregation
Fields
Notifications
Summary

Notifications (optional)

Is this Event important enough that requires your attention? Make it an Alert by adding Notifications to it.

[Manage Notifications](#)

Notification	Type	Actions
notifyme@example.org	Email Notification	Remove from Event

[Add Notification](#)

Notification Settings

Grace Period

☒

Graylog sends Notifications for Alerts every time they occur. Set a Grace Period to control how long Graylog should wait before sending Notifications again. Note that Events with keys will have a Grace Period for each different key value.

Message Backlog

☐

Number of messages to be included in Notifications.

[Previous](#)
[Next](#)

Since we use an aggregation event here, the message backlog might not be really helpful so I leave it off. The backlog will show all messages within the time range of Search within the last and use the Query we entered. If you have a good enough query this can still be helpful. The number input will limit the amount of messages in the backlog.

Summary

We go on to the summary to have a last look at our Event Definition.

Event Details
Filter & Aggregation
Fields
Notifications
Summary

Event Summary

Details

Title
Bruteforce attack on our web app

Description
A user had 10 failed logins in under 10 seconds

Priority
High

Filter & Aggregation

Type
Aggregation

Search Query
Login failed for user

Streams
[Failed Login](#)

Search within
10 seconds

Execute search every
10 seconds

Group by Field(s)
user

Create Events if
count() >= 10

Fields

No Fields configured for Events based on this Definition.

Notifications

Settings
Grace Period is set to 5 seconds
Notifications will not include any messages.

notifyme@example.org
Email Notification
[More details](#)

[Cancel](#)
[Done](#)

After checking that all our configuration is correct we click on done to save the Event Definition.

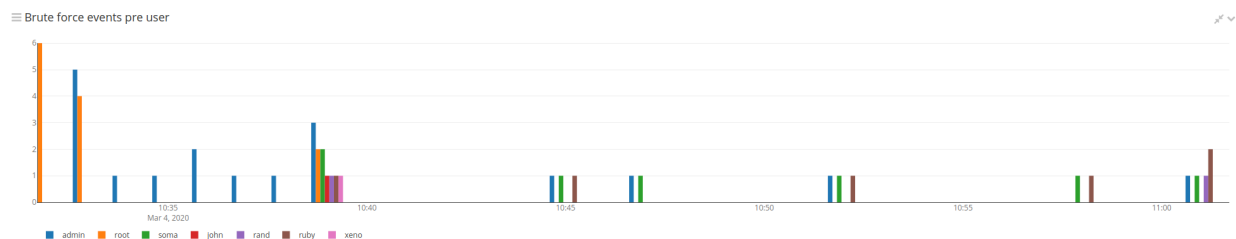
Working with the alerts

When a attacker now tries to login 10 times in under 10 seconds you should receive an email with content looking like this:

```
--- [Event Definition] -----
Title:    Bruteforce attack on our web app
Description: A user had 10 failed logins in under 10 seconds
Type:     aggregation-v1
--- [Event] -----
Timestamp:    2020-03-04T10:39:50.217Z
Message:      Bruteforce attack on our web app: soma - count()=11.0
Source:       egwene
Key:          soma
Priority:      3
Alert:        true
Timestamp Processing: 2020-03-04T10:39:50.217Z
Timerange Start: 2020-03-04T10:39:40.218Z
Timerange End:   2020-03-04T10:39:50.217Z
Fields:
  user: soma
```

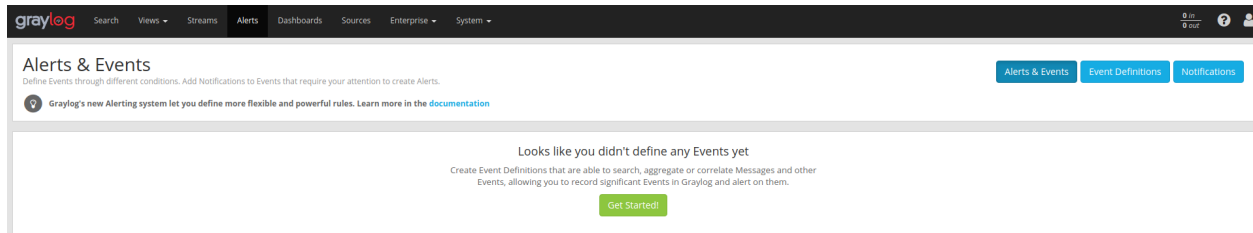
Here you can see that our user was set as `key`. Now we will go to the search page and create a widget based on that.

First of all we select the `All events` stream to narrow down our messages to the events. Then we add the `event_definition_id` to our query to only display the events of our new created event definition. Then we create a new aggregation widget and select the `timestamp` field as our Rows, we put `key` in our columns field and at last we set `count()` as our Metrics.



Now we can see the amount of alerts raised per user overtime. This is also helpful to be put into an report later on.

If no Events have been defined, the Alerts & Events page will display the “Get Started!” button as shown below.



11.2 Defining an Event

When you click on the “Get Started!” button you will be presented with a set of dialogues that allow you to set Title, Description, and Priority. You may click back on the selection bar to step backward in the definition process at any time.

11.2.1 Priority

The Priority of an Event is a classification for user purpose. The priority of an event will be displayed as a thermometer icon in the over view and will be written into the notification.

11.3 Filter

By combining a Filter and an Aggregation you can specifically describe the criteria of an Event. Define a Filter by using Search Query in the same syntax as the Search page. Select a Stream in which the message can be found. Define the window of time that the Filter will search backward to match messages. The search will be executed at the given interval. If the Filter matches an Event can be created. However, it may be useful to augment the filtered data with an aggregation

Filter

Add information to filter the log messages that are relevant for this Event Definition.

Search Query

Search query that Messages should match. You can use the same syntax as in the Search page.

Streams (Optional)

Select streams the search should include. Searches in all streams if empty.

Search within the last

minutes ▼

Execute search every

minutes ▼

Create Events for Definition if...

- ☐ Filter has results
- ☒ Aggregation of results reaches a threshold

If the defined Filter matches messages currently within the Graylog Server, they will be displayed in the Filter Preview panel on the right.

11.3.1 Filter with dynamic lists (Enterprise feature)

Dynamic lists allow you to define a Filter where some of the search arguments are parameterized. Everytime an event definition is being checked, these parameters are replaced with the result of a configured Look up table. For example, you maintain a list of former employees in Active Directory or an HR system and want an alert if anyone on the list tries to log in. You can define a filter like `Login from username:$former_employee$`, where the parameter `$former_employee$` is backed by a look up table, that returns a current list of your former employees.

11.4 Aggregation

An Aggregation can run a mathematical operation on either a numeric field value or the raw count of messages generated that match the Filter. Also, Aggregation can now group matches by a selected field before making the comparison. For instance, if the field `username` is defined, then it is possible to alert on five successive failed logins by a particular username. This use case is shown below.

Create Events for Definition

If	Is	Threshold
<input type="text" value="count()"/>	<input type="text" value="username"/>	<input type="text" value="5"/>

11.5 Fields

Creating Custom Fields allows the Event to populate data from the original log into the Graylog Events index. This prevents the operator from having to run subsequent searches to get vital information. This can also be used to limit the amount of data sent to a Notification target. The Event will be recorded to the “All Events” stream and will contain the Custom Field, as well as the result of the Aggregation that triggered the Event.

Messages

Previous 1 Next

Timestamp ⓘ	source
2019-08-20 06:41:27.376	freki
Firewall Event Count by Interface: Outside - count(src_interface)=12.0	
2019-08-20 06:41:27.376	freki
Firewall Event Count by Interface: outside - count(src_interface)=12.0	
2019-08-20 06:41:27.376	freki
Firewall Event Count by Interface: UDMZ2 - count(src_interface)=2.0	
2019-08-20 06:41:27.376	freki
Firewall Event Count by Interface: Outside - count(src_interface)=12.0	
2019-08-20 06:41:27.376	freki
Firewall Event Count by Interface: outside - count(src_interface)=12.0	

11.6 Notifications

After defining the Events that are needed to trigger an Alert it is possible to attach a Notification. By attaching a Notification to an Event or group of Events we can determine how and when information will flow out from Graylog. Notifications can be created by selecting the Notifications button under the Alerts tab, or by defining them in the Event workflow.

In this section we explain what the default alert notifications included in Graylog do, and how to configure them. Alert notifications are meant to be extensible through *Plugins*, you can find more types in the [Graylog Marketplace](#) or even create your own.

11.6.1 Data available to notifications

Graylog makes the following data available when it runs a notification.

Different notification types will expose the data differently, the details are listed with the description of the specific notifications below.

Event Definition Metadata Information about the event definition that created the alert.

- `event_definition_id` (String) - The database ID of the event definition
- `event_definition_type` (String) - The internal name of the event definition type (aggregation-v1 or correlation-v1)
- `event_definition_title` (String) - The title set in the UI
- `event_definition_description` (String) - The description set in the UI

- `job_definition_id` (String) - The internal job definition ID associated with a scheduled event definition
- `job_trigger_id` (String) - The internal ID associated with the current execution of the job

Event Data

- **event** The event as it is stored in Graylog
 - `id` (String) - The message ID of the stored event.
 - `event_definition_id` (String) - Same as `event_definition_id` in the metadata section.
 - `event_definition_type` (String) - Same as `event_definition_type` in the metadata section.
 - `origin_context` (String) - URN of the message or event creating this event (either event or message). Can be empty.
 - `timestamp` (DateTime) - The timestamp this event is describing, can be set to the underlying event or message (see `origin_context`).
 - `timestamp_processing` (DateTime) - The timestamp this event has been created by Graylog.
 - `timerange_start` (DateTime) - The start of the window of data Graylog used to create this event. Can be empty.
 - `timerange_end` (DateTime) - The end of the window of data Graylog used to create this event. Can be empty.
 - `streams` (Strings) - The list of stream IDs the event is stored in.
 - `source_streams` (Strings) - The list of stream IDs the event pulled data from.
 - `alert` (bool) - Whether this event is considered to be an alert. Always `true` for event definitions that have notifications.
 - `message` (String) - A human-friendly message describing this event.
 - `source` (String) - The host name of the Graylog server that created this event.
 - `key_tuple` (Strings) - The list of values making up the event's key.
 - `key` (String) - The event's key as a single string.
 - `priority` (long) - The event's priority value.
 - `fields` (Map<String, String>) - The custom fields attached to the event.

Backlog

- **backlog** (List of Message summaries) - The list of messages or events which lead to this alert being generated
 - `id` (String) - The message ID.
 - `index` (String) - The name of the index the message is stored in. Use together with `id` to uniquely identify a message in Graylog.
 - `source` (String) - The `source` field of the message.
 - `message` (String) - The `message` field of the message.
 - `timestamp` (DateTime) - The `timestamp` field of the message.
 - `stream_ids` (Strings) - The stream IDs of the message.

- `fields` (`Map<String, Object>`) - The remaining fields of the message, can be iterated over.

11.6.2 Email alert notification

The email alert notification can be used to send an email to the configured alert receivers when the conditions are triggered.

Make sure to check the *email-related configuration settings* in the Graylog configuration file.

Three configuration options are available for the alert notification to customize the email that will be sent. The *email body* and *email subject* are **JMTE** templates. JMTE is a minimal template engine that supports variables, loops and conditions. See the **JMTE documentation** for a language reference.

All of the data described above is available in the JMTE templates.

The default body template shows some advanced examples of accessing the information listed above:

```
--- [Event Definition] -----
Title:      ${event_definition_title}
Description: ${event_definition_description}
Type:       ${event_definition_type}
--- [Event] -----
Timestamp:      ${event.timestamp}
Message:        ${event.message}
Source:         ${event.source}
Key:            ${event.key}
Priority:        ${event.priority}
Alert:          ${event.alert}
Timestamp Processing: ${event.timestamp}
Timerange Start:  ${event.timerange_start}
Timerange End:    ${event.timerange_end}
Fields:
${foreach event.fields field}  ${field.key}: ${field.value}
${end}
${if backlog}
--- [Backlog] -----
Last messages accounting for this alert:
${foreach backlog message}
${message}
${end}
${end}
```

Title

Title to identify this Notification.

Description (Optional)

Longer description for this Notification.

Notification Type

Choose the type of Notification to create.

Sender

The email address that should be used as the notification sender.

Subject

The subject that should be used for the email notification.

User recipient(s) (Optional)

X ▼

Select Graylog users that will receive this Notification.

Email recipient(s) (Optional)

X ▼

Add email addresses that will receive this Notification.

Body Template

```

1 --- [Event Definition] -----
2 Title:      ${event_definition_title}
3 Description: ${event_definition_description}
4 Type:       ${event_definition_type}
5 --- [Event] -----
6 Timestamp:   ${event.timestamp}
7 Message:     ${event.message}
8 Source:      ${event.source}
9 Key:         ${event.key}
10 Priority:    ${event.priority}
11 Alert:       ${event.alert}
12 Timestamp Processing: ${event.timestamp}
13 Timerange Start:  ${event.timerange_start}
14 Timerange End:    ${event.timerange_end}
15 Fields:
16 ${foreach event.fields field} ${field.key}: ${field.value}
17 ${end}
18 ${if backlog}
19 --- [Backlog] -----
20 Last messages accounting for this alert:
21 ${foreach backlog message}
22 ${message}
23 ${end}
24 ${end}
25

```

The template that will be used to generate the email body.

11.6.3 HTTP alert notification

The HTTP alert notification lets you configure an endpoint that will be called when the alert is triggered.

Graylog will send a POST request to the notification URL including information about the alert. The body of the request is the JSON encoded data described above.

Here is an example of the payload included in a notification:

```
{
  "event_definition_id": "this-is-a-test-notification",
  "event_definition_type": "test-dummy-v1",
  "event_definition_title": "Event Definition Test Title",
  "event_definition_description": "Event Definition Test Description",
  "job_definition_id": "<unknown>",
  "job_trigger_id": "<unknown>",
  "event": {
    "id": "NotificationTestId",
    "event_definition_type": "notification-test-v1",
    "event_definition_id": "EventDefinitionTestId",
    "origin_context": "urn:graylog:message:es:testIndex_42:b5e53442-12bb-4374-90ed-
↪0deadbeefbaz",
    "timestamp": "2020-05-20T11:35:11.117Z",
    "timestamp_processing": "2020-05-20T11:35:11.117Z",
    "timerange_start": null,
    "timerange_end": null,
    "streams": [
      "00000000000000000000000000000002"
    ],
    "source_streams": [],
    "message": "Notification test message triggered from user <admin>",
    "source": "00000000000000000000000000000001",
    "key_tuple": [
      "testkey"
    ],
    "key": "testkey",
    "priority": 2,
    "alert": true,
    "fields": {
      "field1": "value1",
      "field2": "value2"
    }
  },
  "backlog": []
}
```


Title

Operations webhook

Title to identify this Notification.

Description (Optional)

Triggers a webhook in the operations team

Longer description for this Notification.

Notification Type

HTTP Notification

Choose the type of Notification to create.

URL

https://webhook.site/ba7a7cbb-4957-48f4-8130-b1975a489c31

The URL to POST to when an Event occurs.

Test Notification (Optional)

Execute Test Notification

Execute this Notification with a test Alert.

Create

Cancel

11.6.4 PagerDuty alert notification

The PagerDuty alert notification allows you create new incidents in PagerDuty in response to Events in your Graylog server.

Note: PagerDuty alert notifications are intended as a replacement for the PagerDuty integration previously available from [Graylog Labs](#). If you are using the Graylog Labs PagerDuty integration, you should migrate to the officially supported PagerDuty alert notifications at your earliest convenience.

Important: In order to use PagerDuty alert notifications, you will need an integration routing key. If you do not already have one, you will need to create a new integration in PagerDuty: [PagerDuty Documentation](#)

These are the supported configuration options:

Routing Key Your PagerDuty integration routing key.

Use Custom Incident Key If enabled, an incident key will be generated using the provided `Incident Key Prefix`. This will prevent PagerDuty from creating multiple incidents for a single Event. If not checked, no incident key will be generated and each event notification will create a new incident in PagerDuty.

Incident Key Prefix If `Custom Incident Key` is enabled, this will be used as the prefix for the incident key.

Client Name The name of the Graylog system that triggered the PagerDuty incident.

Client URL The URL for your Graylog web interface. If provided, this will be used to construct links which will be embedded in your PagerDuty incident.

Title

Title to identify this Notification.

Description (Optional)

Longer description for this Notification.

Notification Type

Choose the type of Notification to create.

Routing Key

The Pager Duty integration Routing Key.

☒ Use Custom Incident Key

Generate a custom incident key based on the Stream and the Alert Condition.

Incident Key Prefix

Incident key prefix that identifies the incident.

Client Name

The name of the Graylog system that is triggering the PagerDuty event.

Client URL

The URL of the Graylog system that is triggering the PagerDuty event.

11.6.5 Slack alert notification

The Slack alert notification allows you to send notifications to your slack workspace in response to events in your Graylog server.

Note: Slack alert notifications are intended as a replacement for the Slack integration previously available from [Graylog Labs](#). If you are using the Graylog Labs Slack plugin, you should migrate to the officially supported Slack alert notifications at your earliest convenience.

Title

slack notification

Title to identify this Notification.

Description (Optional)

testing slack notification


Longer description for this Notification.

Notification Type

Slack Notification

Choose the type of Notification to create.

Configuration color

 [Change color](#)

Choose a color to use for this configuration.

Webhook URL

http://hooks.slack.com/services/xxxx/xxx/xxxx

Slack "Incoming Webhook" URL

Channel

#general

Name of Slack #channel or @user for a direct message

Custom Message (optional)

--- [Event Definition] -----
 Title: \${event_definition_title}
 Type: \${event_definition_type}

Custom message to be appended below the alert title. See [docs](#) for more details.

Message Backlog Limit (optional)

☒ 5

Limit the number of backlog messages sent as part of the Slack notification. If set to 0, no limit will be enforced.

User Name (optional)

Graylog

User name of the sender in Slack

☐ **Notify Channel (optional)**

Notify all users in channel by adding @channel to the message

☐ **Link Names (optional)**

Find and link channel names and user names

Icon URL (optional)

Image to use as the icon for this message

Icon Emoji (optional)

:turtle

Emoji to use as the icon for this message (overrides Icon URL)

Test Notification (Optional)

These are the supported configuration options:

Webhook URL The unique [URL](#) used to send messages to your Slack instance.

Channel A [channel](#) to send message to.

Configuration Color Highlight the custom message with this [color](#).

Custom Message The message that will be sent to Slack. The data described above can be used in this template.

Message Backlog Limit (optional) Limit the number of backlog messages sent as part of the Slack notification. If set to 0, no limit will be enforced.

User Name (optional) User name of the sender in Slack.

Icon URL Image to use as the icon for this message.

Icon Emoji Emoji to use as the icon for this message (overrides Icon URL).

11.6.6 Script alert notification [Enterprise]

The Script Alert Notification lets you configure a script that will be executed when the alert is triggered.

Important: Script Alert Notification is an Enterprise Integrations plugin feature and thus requires an *Enterprise license*.

Title

Title to identify this Notification.

Description (Optional)

Longer description for this Notification.

Notification Type

Choose the type of Notification to create.

Script Path

The path to the script within your Graylog scripts directory.

Script Arguments

The script arguments. Arguments should be space separated. See documentation.

☒ Send Alert Data Through STDIN

Send a JSON object containing alert data to the script through STDIN. See documentation for parsing information.

Script Timeout (milliseconds)

The script timeout in milliseconds.

Test Notification (Optional)

Execute Test Notification

Execute this Notification with a test Alert.

Create

Cancel

These are the supported configuration options.

Script Path The path to where the script is located. Must be within the *permitted script path* (which is customizable).

Script Timeout The maximum time (in milliseconds) the script will be allowed to execute before being forcefully terminated.

Script Arguments Space-delimited string of parameters. Any of the data described above can be used.

Send Alert Data Through STDIN Sends the JSON encoded data described above through standard in. You can use a JSON parser in your script.

Script Alert Notification success is determined by its exit value; success equals zero. Any non-zero exit value will cause it to fail. Returning any error text through STDERR will also cause the alarm callback to fail.

Here is a sample Python script that shows all of the supported Script Alert Notification functionality (argument parsing, STDIN JSON parsing, STDOUT, exit values, and returning an exit value).:

```
#!/usr/bin/env python3
import json
import sys

# Function that prints text to standard error
def print_stderr(*args, **kwargs):
    print(*args, file=sys.stderr, **kwargs)

# Main function
if __name__ == "__main__":

    # Print out all input arguments.
    sys.stdout.write("All Arguments Passed In: " + ' '.join(sys.argv[1:]) + "\n")

    # Turn stdin.readlines() array into a string
    std_in_string = ''.join(sys.stdin.readlines())

    # Load JSON
    event_data = json.loads(std_in_string)

    # Extract some values from the JSON.
    sys.stdout.write("Values from JSON: \n")
    sys.stdout.write("Event Definition ID: " + event_data["event_definition_id"] + "\n")
    sys.stdout.write("Event Definition Title: " + event_data["event_definition_title"] + "\n")
    sys.stdout.write("Event Timestamp: " + event_data["event"]["timestamp"] + "\n")

    # Extract Message Backlog field from JSON.
    sys.stdout.write("\nBacklog:\n")
    for message in event_data["backlog"]:
        for field in message.keys():
            sys.stdout.write("Field: " + field + "\t")
            sys.stdout.write("Value: " + str(message[field]) + "\n")

    # Write to stderr if desired
    # print_stderr("Test return through standard error")

    # Return an exit value. Zero is success, non-zero indicates failure.
    exit(0)
```

11.6.7 Legacy Script alert callback

The Legacy Script Alert Callback lets you configure a script that will be executed when the alert is triggered.

Warning: Legacy alarm callbacks are being deprecated. If you are currently using the Legacy Script Alert Callback, you should migrate to Script Alert Notification as soon as possible.

Important: Legacy Script Alert Callback is an Enterprise Integrations plugin feature and thus requires an *Enterprise license*.

Title

Title to identify this Notification.

Description (Optional)

Longer description for this Notification.

Notification Type

Choose the type of Notification to create.

Choose Legacy Notification

Select a Legacy Notification to use on this Event Definition.

Legacy alarm callbacks are deprecated. Please switch to the new notification types as soon as possible!

Script Path

The path to the script file within the script folder [/Users/rhcurtis/dev/graylog-master/dev/graylog-project-repos/graylog2-server/scripts]. See requirements in documentation.

Script Arguments (optional)

The script arguments. Arguments can be space or new-line separated. See documentation.

☒ Send Alert Data Through STDIN

Send a JSON object containing alert data to the script through STDIN. See documentation for parsing information.

Script Timeout

The script timeout in milliseconds.

These are the supported configuration options.

Script Path The path to where the script is located. Must be within the *permitted script path* (which is customizable).

Script Timeout The maximum time (in milliseconds) the script will be allowed to execute before being forcefully terminated.

Script Arguments String of parameters in which the delimiters are either a space-delimited or a new-line. The following argument variables may be used:

Stream The stream this alert belongs to.

- `stream_id` ID of the stream
- `stream_name` title of the stream
- `stream_description` stream description
- `stream_url` a string that contains the URL to the view the relevant messages for the alert. Make sure to set the [HTTP URL](#) configuration parameter, as there is no default.

Alert The check result object for this stream.

- `alert_description` text that describes the check result
- `alert_triggered_at` date when this condition was triggered

Condition The available conditions to request are

- `condition_id` ID of the condition
- `condition_description` description of the condition
- `condition_title` title of the condition
- `condition_type` type of condition
- `condition_grace` grace period for the condition
- `condition_repeat_notification` repeat notification of the script

Send Alert Data Through STDIN Sends JSON alert data through standard in. You can use a JSON parser in your script. :

Legacy Script Alert Callback success is determined by its exit value; success equals zero. Any non-zero exit value will cause it to fail. Returning any error text through STDERR will also cause the alarm callback to fail.

11.7 Event Summary

When all of the components have been defined the Event Summary will be displayed to the user. At this time, the user may select a previous point in the Workflow to change a parameter. The user may also cancel out of the workflow, select done. The Event may be viewed under Alerts>Event Definitions.

DASHBOARDS

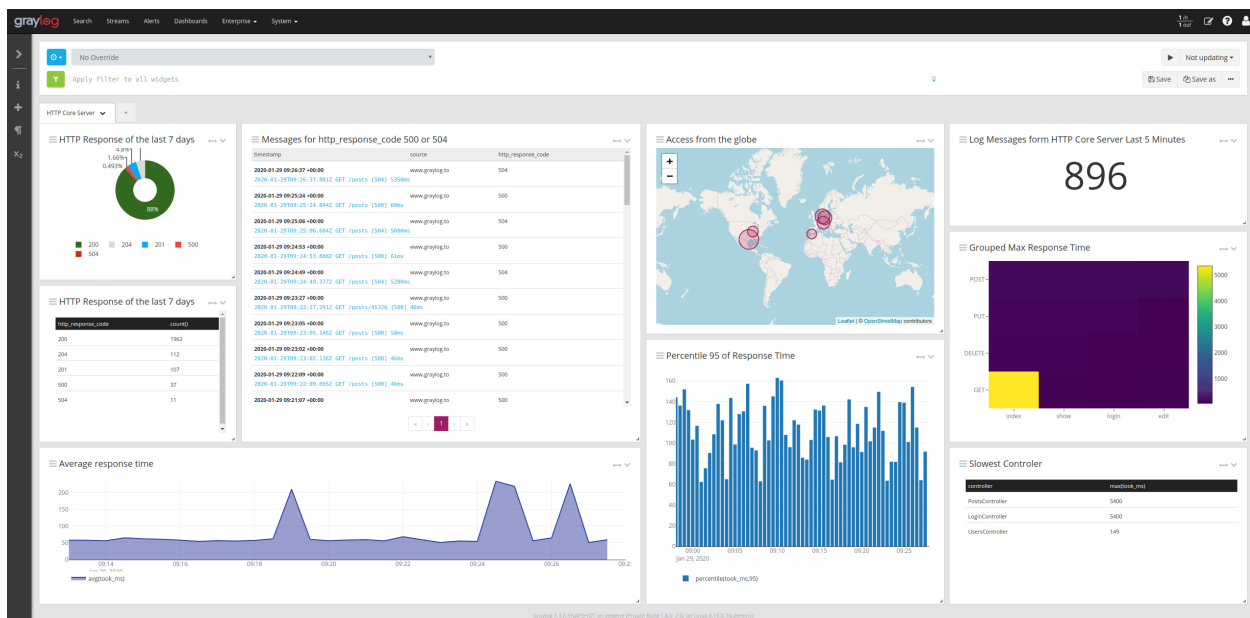
12.1 Why dashboards matter

Using dashboards allows you to build pre-defined searches on your data to always have everything important just one click away.

Sometimes it takes domain knowledge to be able to figure out the search queries to get the correct results for your specific applications. People with the required domain knowledge can define the search queries once to share them with co-workers, managers, or even sales and marketing departments.

In comparison with saved searches, dashboards include a range of additional features. The main difference is the possibility to define *Widget specific search criteria* like the query or the time range. Dashboards also support creating multiple tabs for different use cases, displaying the result in a full screen mode and as described sharing with other people.

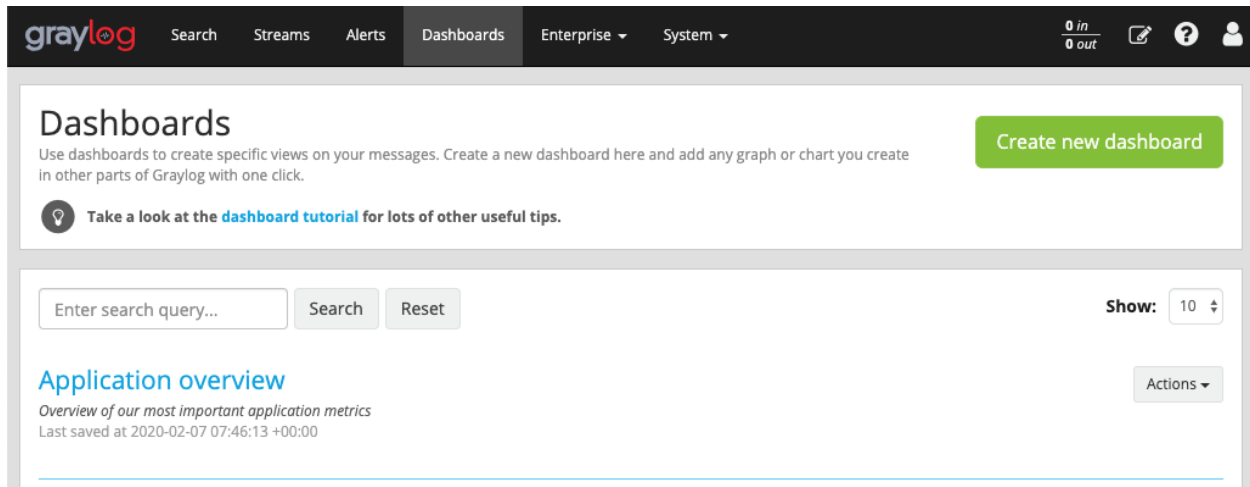
This guide will take you through the process of creating dashboards and storing information on them. At the end you will have a dashboard with automatically updating information that you can share with anybody or just a subset of people based on permissions.



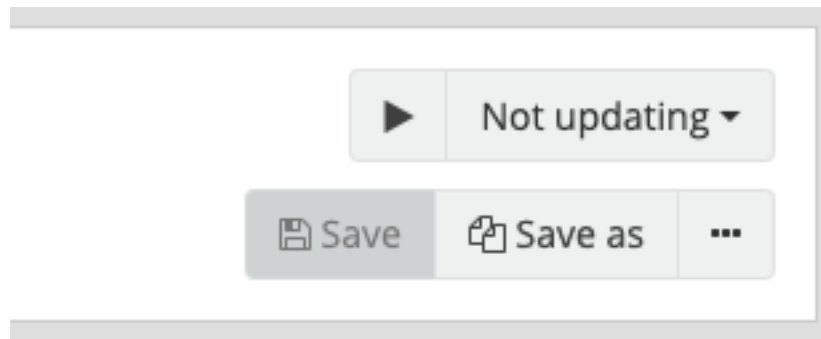
12.2 How to use dashboards

12.2.1 Creating an empty dashboard

Navigate to the *Dashboards* section using the link in the top menu bar of your Graylog web interface. The page is listing all dashboards that you are allowed to view. (More on permissions later.) Hit the *Create new dashboard* button to create a new empty dashboard.



You should now see your new dashboard. Hit the *Save as* button on the right side of the search bar to save the dashboard.



This will open a modal where you can define a title, summary and description.

Save new dashboard ✕

Title

 The title of the dashboard.

Summary

 A helpful summary of the dashboard.

Description

 A longer, helpful description of the dashboard and its functionality.

Cancel Save

The only required information is the *title* of the new dashboard. Use a specific but not too long title so people can easily see what to expect on the dashboard. The description can be a bit longer and could contain more detailed information about the displayed data or how it is collected.

Next, we will be adding widgets to the dashboard we have just created.

12.2.2 Adding and configuring widgets

You should have your empty dashboard in front of you. Let's add some widgets! You can add search result information to dashboards with a couple of clicks. Adding widgets to a dashboard works the same way like for the main search page. Have a look at the [Widgets](#) page for a more detailed description of different widget types and how to create them.

12.3 Widget specific search criteria

As described in the introduction the main difference between dashboards and saved searches is the possibility to define widget specific search criteria. This includes the time range, search query and stream selection.

These options can be defined using the search bar inside the widget edit modal.

⌕ Search in the last 5 minutes ⌵ Select streams the search should include. Searches in all streams if empty. ⌵

🔍 Type your search query here and press enter. E.g.: ("not found" AND http) OR 📍

Aggregating Message Count

VISUALIZATION TYPE
 Single Number ⌵

ROWS
 None: click to add fields ⌵

COLUMNS
 None: click to add fields ⌵

SORTING
 None: click to add fields ⌵

DIRECTION
 No sorting selected ⌵

While the main search bar still exists, it only allows to overwrite the widget specific search. While the widget specific search persists, search options configured with the main search bar will not be saved with the dashboard.

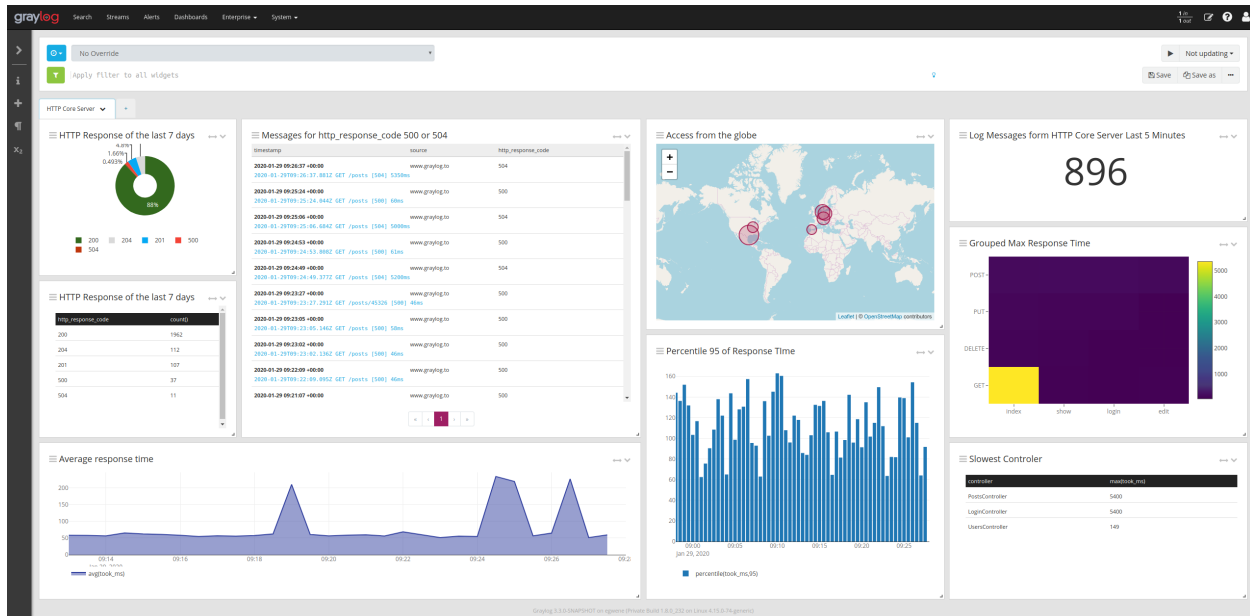
12.4 Examples

It is strongly recommended to read the getting started guide on basic searches and analysis first. This will make the following examples more obvious for you. For all examples you need to create an empty *Aggregation* and open the edit modal.

- **Top log sources today**
 - Example search: `*`, timeframe: Last 24 hours
 - Select visualization `Data Table`
 - Add row pivot `source`
 - Add metric `count (source)`
 - Select sorting `count (source)`
 - Save the widget
- **Number of exceptions in a given app today**
 - Example search: `source:myapp AND Exception`, timeframe: Last 24 hours
 - Select visualization `Single Number`
 - Add metric `count ()`
 - Save the widget
- **Response time chart of a given app**
 - Example search: `source:myapp2`, any timeframe you want
 - Select visualization `Single Number`
 - Add metric `avg (response_time)`
 - Save the widget

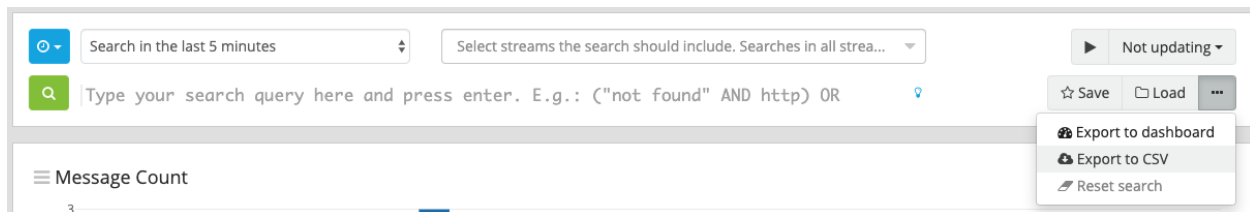
12.5 Result

You should now see widgets on your dashboard.



12.6 Export a search as a dashboard

The last sections described how to create a dashboard from scratch, but you can also transform an existing search to a dashboard. All you need to do is to click on the three dots on the right side of the search bar and select the option *Export as dashboard*. The newly created dashboard is just a draft and you will need to click on the *Save as* button to create the dashboard permanently.

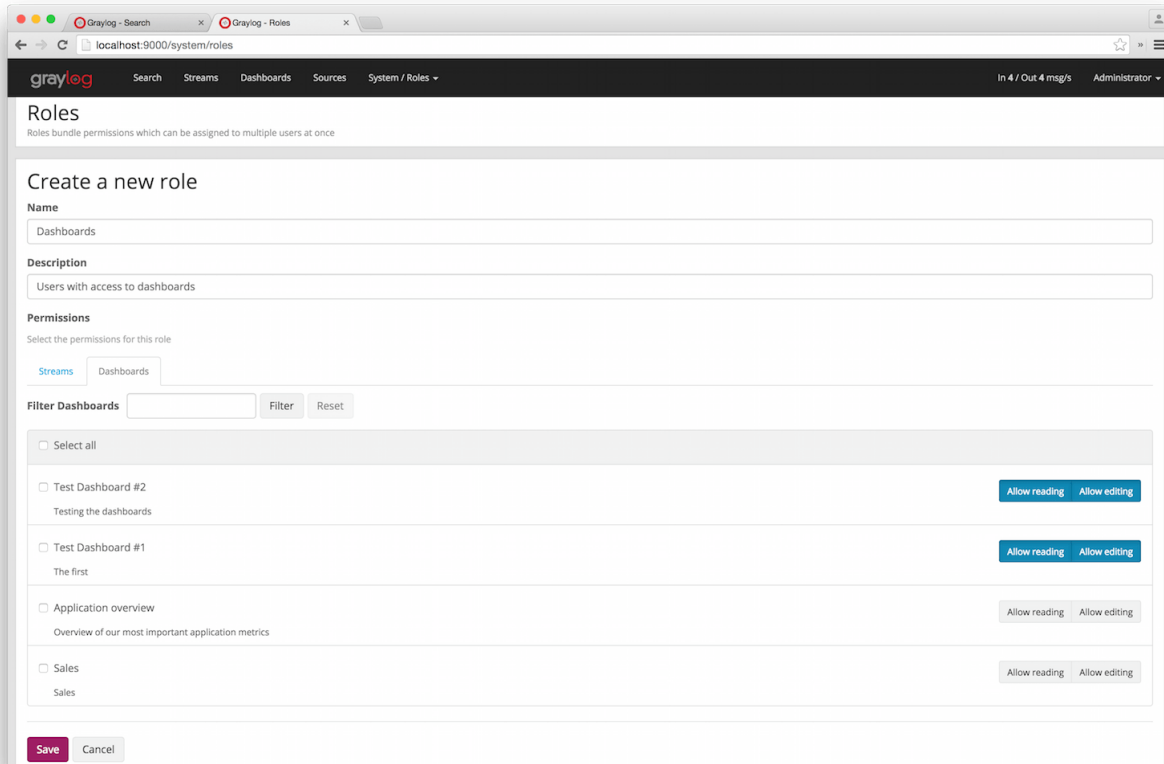


12.7 Widget cache times

Widget values are cached in `graylog-server` by default. **This means that the cost of value computation does not grow with every new device or even browser tab displaying a dashboard.** Some widgets might need to show real-time information (set cache time to 1 second) and some widgets might be updated way less often (like *Top SSH users this month*, cache time 10 minutes) to save expensive computation resources.

12.8 Dashboard permissions

Graylog users in the *Admin* role are always allowed to view and edit all dashboards. Users in the *Reader* role are by default not allowed to view or edit **any** dashboard.



Navigate to *System -> Roles* and create a new role that grant the permissions you wish. You can then assign that new role to any users you wish to give dashboard permissions in the *System -> Users* page.

You can read more about user permissions and roles.

12.8.1 That's it!

Congratulations, you have just gone through the basic principles of Graylog dashboards. Now think about which dashboards to create. We suggest:

- Create dashboards for yourself and your team members
- Create dashboards to share with your manager
- Create dashboards to share with the CIO of your company

Think about which information you need access to frequently. What information could your manager or CIO be interested in? Maybe they want to see how the number of exceptions went down or how your team utilized existing hardware better. The sales team could be interested to see signup rates in realtime and the marketing team will love you for providing insights into low level KPIs that is just a click away.

EXTRACTORS

13.1 The problem explained

Syslog (RFC3164, RFC5424) is the de facto standard logging protocol since the 1980s and was originally developed as part of the sendmail project. It comes with some annoying shortcomings that we tried to improve in *GELF* for application logging.

Because syslog has a clear specification in its RFCs it should be possible to parse it relatively easy. Unfortunately there are a lot of devices (especially routers and firewalls) out there that send logs looking like syslog but actually breaking several rules stated in the RFCs. We tried to write a parser that reads all of them as good as possible and failed. Such a loosely defined text message usually breaks the compatibility in the first date field already. Some devices leave out hostnames completely, some use localized time zone names (e. g. “MESZ” instead of “CEST”), and some just omit the current year in the timestamp field.

Then there are devices out there that at least do not claim to send syslog when they don’t but have another completely separate log format that needs to be parsed specifically.

We decided not to write custom message inputs and parsers for all those thousands of devices, formats, firmwares and configuration parameters out there but came up with the concept of *Extractors* introduced in the v0.20.0 series of Graylog.

13.2 Graylog extractors explained

The extractors allow you to instruct Graylog nodes about how to extract data from any text in the received message (no matter from which format or if an already extracted field) to message fields. You may already know why structuring data into fields is important if you are using Graylog: There are a lot of analysis possibilities with full text searches but the real power of log analytics unveils when you can run queries like `http_response_code:>=500 AND user_id:9001` to get all internal server errors that were triggered by a specific user.

Wouldn’t it be nice to be able to search for all blocked packages of a given source IP or to get a quickterms analysis of recently failed SSH login usernames? Hard to do when all you have is just a single long text message.


Attention: Graylog extractors only work on text fields but won’t be executed for numeric fields or anything other than a string.

Creating extractors is possible via either Graylog REST API calls or from the web interface using a wizard. Select a message input on the *System -> Inputs* page and hit *Manage extractors* in the actions menu. The wizard allows you to load a message to test your extractor configuration against. You can extract data using for example regular expressions, Grok patterns, substrings, or even by splitting the message into tokens by separator characters. The wizard looks like this and should be pretty intuitive:

graylog Search Streams Alerts Dashboards Sources System / Inputs ▾

New extractor for input *Syslog*

Extractors are applied on every message that is received by an input. Use them to extract and transform any text data into fields that allow you easy filtering and analysis later on.

 Find more information about extractors in the [documentation](#).

Example message

```
mgmt-mongo sshd[16144]: Invalid user oracle from 203.0.113.42
```

Wrong example? You can [load another message](#).

Extractor configuration

Extractor type Regular expression

Source field message

Regular expression [Try](#)

The regular expression used for extraction. First matcher group is used. Learn more in the [documentation](#).

Extractor preview
oracle

Condition

- ☒ Always try to extract
- ☐ Only attempt extraction if field contains string
- ☐ Only attempt extraction if field matches regular expression

Extracting only from messages that match a certain condition helps you avoiding wrong or unnecessary extractions and can also save CPU resources.

Store as field

Choose a field name to store the extracted value. It can only contain **alphanumeric characters and underscores**. Example: *http_response_code*.

Extraction strategy ☒ Copy ☐ Cut

Do you want to copy or cut from source? You cannot use the cutting feature on standard fields like *message* and *source*.

Extractor title

A descriptive name for this extractor.

Add converter [Add](#)

Add converters to transform the extracted value.

[Create extractor](#)

You can also choose to apply so called *converters* on the extracted value to for example convert a string consisting of numbers to an integer or double value (important for range searches later), anonymize IP addresses, lower-/uppercase a string, build a hash value, and much more.



13.3 Import extractors

The recommended way of importing extractors in Graylog is using *Content Packs*. The [Graylog Marketplace](#) provides access to many content packs that you can easily download and import into your Graylog setup.

You can still import extractors from JSON if you want to. Just copy the JSON extractor export into the import dialog of a message input of the fitting type (every extractor set entry in the directory tells you what type of input to spawn, e. g. syslog, GELF, or Raw/plaintext) and you are good to go. The next messages coming in should already include the extracted fields with possibly converted values.

A message sent by Heroku and received by Graylog with the imported *Heroku* extractor set on a plaintext TCP input looks like this: (look at the extracted fields in the message detail view)

✉ a700ec50-dfbf-11e3-b51a-12313c013090

Received by  Heroku test 2 on  3c1749a2 / 54.247.1

Timestamp: 2014-05-20 03:39:57.284

Index: graylog2_1

Actions ▾

bytes

31094

client_ip

164.177.

connect_time_ms

0

drain_id

d.158ca493-4116-451a-9e6e-8158d609eb53

dyno

web.1

facility

local3

heroku_component

router

heroku_source_type

heroku

http_method

get

http_status

200

level

Info [6]

message

at=info method=GET path=/ host=www.graylog2.org request id=f3ffb87e-

(continued from previous page)

```

IPV4  (?<![0-9]) (?:(?:25[0-5]|2[0-4][0-9]|0[0-1]?[0-9]{1,2})[.](?:25[0-5]|2[0-4][0-9]|0[0-1]?[0-9]{1,2})[.](?:25[0-5]|2[0-4][0-9]|0[0-1]?[0-9]{1,2})) (?![0-9])
IP  (?:%{IPV6}|%{IPV4})
DATA  .*?

```

Then, in the extractor configuration, we can use these patterns to extract the relevant fields from the line:

```

len=%{NUMBER:length} src=%{IP:srcip} sport=%{NUMBER:srcport} dst=%{IP:dstip} dport=%
↳{NUMBER:dstport}

```

This will add the relevant extracted fields to our log message, allowing Graylog to search on those individual fields, which can lead to more effective search queries by allowing to specifically look for packets that came from a specific source IP instead of also matching destination IPs if one would only search for the IP across all fields.

If the Grok pattern creates many fields, which can happen if you make use of heavily nested patterns, you can tell Graylog to skip certain fields (and the output of their subpatterns) by naming a field with the special keyword `UNWANTED`.

Let's say you want to parse a line like:

```
type:44 bytes:34 errors:122
```

but you are only interested in the second number `bytes`. You could use a pattern like:

```
type:%{BASE10NUM:type} bytes:%{BASE10NUM:bytes} errors:%{BASE10NUM:errors}
```

However, this would create three fields named `type`, `bytes`, and `errors`. Even not naming the first and last patterns would still create a field names `BASE10NUM`. In order to ignore fields, but still require matching them use `UNWANTED`:

```
type:%{BASE10NUM:UNWANTED} bytes:%{BASE10NUM:bytes} errors:%{BASE10NUM:UNWANTED}
```

This now creates only a single field called `bytes` while making sure the entire pattern must match.

If you already know the data type of the extracted fields, you can make use of the type conversion feature built into the Graylog Grok library. Going back to the earlier example:

```
len=50824 src=172.17.22.108 sport=829 dst=192.168.70.66 dport=513
```

We know that the content of the field `len` is an integer and would like to make sure it is stored with that data type, so we can later create field graphs with it or access the field's statistical values, like average etc.

Grok directly supports converting field values by adding `;datatype` at the end of the pattern, like:

```

len=%{NUMBER:length;int} src=%{IP:srcip} sport=%{NUMBER:srcport} dst=%{IP:dstip}
↳dport=%{NUMBER:dstport}

```

The currently supported data types, and their corresponding ranges and values, are:

Type	Range	Example
byte	-128 ... 127	<code>%{NUMBER:fieldname;byte}</code>
short	-32768 ... 32767	<code>%{NUMBER:fieldname;short}</code>
int	$-2^{31} \dots 2^{31} - 1$	<code>%{NUMBER:fieldname;int}</code>
long	$-2^{63} \dots 2^{63} - 1$	<code>%{NUMBER:fieldname;long}</code>
float	32-bit IEEE 754	<code>%{NUMBER:fieldname;float}</code>
double	64-bit IEEE 754	<code>%{NUMBER:fieldname;double}</code>
boolean	<i>true, false</i>	<code>%{DATA:fieldname;boolean}</code>
string	Any UTF-8 string	<code>%{DATA:fieldname;string}</code>
date	See SimpleDateFormat	<code>%{DATA:timestamp;date;dd/MMM/yyyy:HH:mm:ss Z}</code>
datetime	Alias for <i>date</i>	

There are many resources on the web with useful patterns, and one very helpful tool is the [Grok Debugger](#), which allows you to test your patterns while you develop them.

Graylog uses [Java Grok](#) to parse and run Grok patterns.

13.6 Using the JSON extractor

Since version 1.2, Graylog also supports extracting data from messages sent in JSON format.

Using the JSON extractor is easy: once a Graylog input receives messages in JSON format, you can create an extractor by going to *System -> Inputs* and clicking on the *Manage extractors* button for that input. Next, you need to load a message to extract data from, and select the field containing the JSON document. The following page lets you add some extra information to tell Graylog how it should extract the information. Let's illustrate how a message would be extracted with an example message:

```
{
  "level": "ERROR",
  "details": {
    "message": "This is an example error message",
    "controller": "IndexController",
    "tags": ["one", "two", "three"]
  }
}
```

Using the default settings, that message would be extracted into these fields:

details_tags one, two, three

level ERROR

details_controller IndexController

details_message This is an example error message

In the create extractor page, you can also customize how to separate list of elements, keys, and key/values. It is also possible to flatten JSON structures or expand them into multiple fields, as shown in the example above.

13.7 Automatically extract all key=value pairs

Sometimes you will receive messages like this:

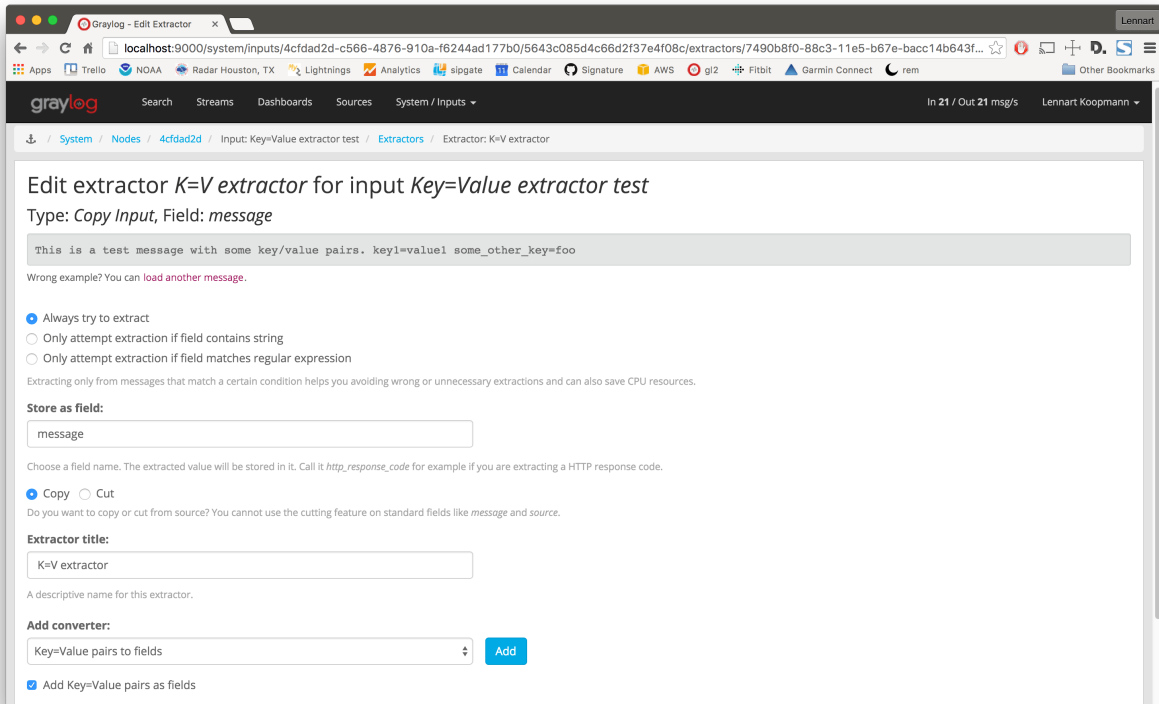
```
This is a test message with some key/value pairs. key1=value1 some_other_key=foo
```

You might want to extract all `key=value` pairs into Graylog message fields without having to specify all possible key names or even their order. This is how you can easily do this:

Create a new extractor of type “Copy Input” and select to read from the field `message`. (Or any other string field that contains `key=value` pairs.) Configure the extractor to store the (copied) field value to the same field. In this case

message. The trick is to add the “Key=Value pairs to fields” converter as last step. Because we use the “Copy Input” extractor, the converter will run over the complete field you selected and convert all `key=value` pairs it can find.

This is a screenshot of the complete extractor configuration:



... and this is the resulting message:

Messages

Previous 1 Next

Timestamp	source
2015-11-11 16:27:59.310	sundaysister.local
This is a test message with some key/value pairs. key1=value1 some_other_key=foo	
768535f0-88c3-11e5-b67e-bacc14b643f0	
<div> <div> Received by Key=Value extractor test on 4cfdad2d / 10.1.10.79 </div> <div> Stored in index graylog2_2 </div> <div> Routed into streams • Forward to Splunk </div> </div> <div> <div>facility gelf-rb</div> <div>file (lrb)</div> <div>key1 value1</div> <div>level 6</div> <div>line 5</div> <div>message This is a test message with some key/value pairs. key1=value1 some_other_key=foo</div> <div>some_other_key foo</div> <div>source sundaysister.local</div> <div>version 1.0</div> </div>	

Permalink Copy ID Test against stream

13.8 Normalization

Many log formats are similar to each other, but not quite the same. In particular they often only differ in the names attached to pieces of information.

For example, consider different hardware firewall vendors, whose models log the destination IP in different fields of the message, some use `dstip`, some `dst` and yet others use `destination-address`:

```
2004-10-13 10:37:17 PDT Packet Length=50824, Source address=172.17.22.108, Source_
↳port=829, Destination address=192.168.70.66, Destination port=513
2004-10-13 10:37:17 PDT len=50824 src=172.17.22.108 sport=829 dst=192.168.70.66_
↳dport=513
2004-10-13 10:37:17 PDT length="50824" srcip="172.17.22.108" srcport="829" dstip="192.
↳168.70.66" dstport="513"
```

You can use one or more non-capturing groups to specify the alternatives of the field names, but still be able to extract the a parentheses group in the regular expression. Remember that Graylog will extract data from the first matched group of the regular expression. An example of a regular expression matching the destination IP field of all those log messages from above is:

```
(?:dst|dstip|[dD]estination\saddress)="?(\\d{1,3}\\.(\\d{1,3}\\.(\\d{1,3}\\.(\\d{1,3}))"?
```

This will only extract the IP address without caring about which of the three naming schemes was used in the original log message. This way you don't have to set up three different extractors.

13.8.1 The standard date converter

Date parser converters for extractors allow you to convert extracted data into timestamps - Usually used to set the timestamp of a message based on some date it contains. Let's assume we have this message from a network device:

```
<131>: foo-bar-dc3-org-de01: Mar 12 00:45:38: %LINK-3-UPDOWN: Interface_
↳GigabitEthernet0/31, changed state to down
```

Extracting most of the data is not a problem and can be done easily. Using the date in the message (*Mar 12 00:45:38*) as Graylog message timestamp however needs to be done with a date parser converter.

Use a copy input extractor rule to select the timestamp and apply the *Date* converter with a format string:

```
MMM dd HH:mm:ss
```

(format string table at the end of this page)

Store as field:

Choose a field name. The extracted value will be stored in it. Call it *http_response_code* for example if you are extracting a HTTP response code.

☒ Copy ☐ Cut

Do you want to copy or cut from source?

Extractor title:


A descriptive name of this extractor.


Add converter:

☒ Convert to date type

Format string: ⓘ

Please note that you cannot use the cutting feature on standard fields like *message* and *source*.

✉ 4765e370-aa42-11e3-a7dd-4c8d79f2b596 

Received by  Cisco System Messages on [fb66b27e](#) / 10.226.163.44

Timestamp: 2014-03-12 00:45:38.000

Index: *graylog2_356*

Actions ▾

facility

local0

level

Error [3]

local_facility

link

local_level

3

message

Interface GigabitEthernet0/31, changed state to down

source

foo-bar-dc3-org-de01

type

updown

Standard date converter format string table

Symbol	Meaning	Presentation	Examples
G	era	text	AD
C	century of era (≥ 0)	number	20
Y	year of era (≥ 0)	year	1996
x	weekyear	year	1996
w	week of weekyear	number	27
e	day of week	number	2
E	day of week	text	Tuesday; Tue
y	year	year	1996
D	day of year	number	189
M	month of year	month	July; Jul; 07
d	day of month	number	10
a	halfday of day	text	PM
K	hour of halfday (0~11)	number	0
h	clockhour of halfday (1~12)	number	12
H	hour of day (0~23)	number	0
k	clockhour of day (1~24)	number	24
m	minute of hour	number	30
s	second of minute	number	55
S	fraction of second	millis	978
z	time zone	text	Pacific Standard Time; PST
Z	time zone offset/id	zone	-0800; -08:00; America/Los_Angeles
'	escape for text	delimiter	
“	single quote	literal	'

13.8.2 The flexible date converter

Now imagine you had one of those devices that send messages that are not so easy to parse because they do not follow a strict timestamp format. Some network devices for example like to send days of the month without adding a padding 0 for the first 9 days. You'll have dates like `Mar 9` and `Mar 10` and end up having problems defining a parser string for that. Or maybe you have something else that is really exotic like just *last wednesday* as timestamp. The flexible date converter is accepting any text data and tries to build a date from that as good as it can.

Examples:

- **Mar 12**, converted at 12:27:00 UTC in the year 2014: 2014-03-12T12:27:00.000
- **2014-3-12 12:27**: 2014-03-12T12:27:00.000
- **Mar 12 2pm**: 2014-03-12T14:00:00.000

Note that the flexible date converter is using UTC as time zone by default unless you have time zone information in the parsed text or have configured another time zone when adding the flexible date converter to an extractor (see this [comprehensive list of time zones](#) available for the flexible date converter).

PROCESSING PIPELINES

Graylog's new processing pipelines plugin allows greater flexibility in routing, blacklisting, modifying, and enriching messages as they flow through Graylog.

Pipelines and rules are not configuration for pre-built code, as extractors and stream rules are, but are instead represented as code, much like Drools rules. This gives them great flexibility and extensibility, and enables live changes to Graylog's message processing behavior.

The language used for pipeline rules is very simple and can be extended by functions, which are fully pluggable.

The following pages introduce the concepts of pipelines, rules, stream connections, and the built-in functions.

14.1 Pipelines

14.1.1 Overview

Pipelines are the central concept tying together the processing steps applied to your messages.

Pipelines contain rules and can be connected to one or more streams, enabling fine-grained control of the processing applied to messages.

Processing rules are simply conditions followed by a list of actions, and do not have control flow by themselves. Therefore, pipelines have one additional concept: stages.

Think of stages as groups of conditions and actions which need to run in order. All stages with the same priority run at the same time across all connected pipelines. Stages provide the necessary control flow to decide whether or not to run the remaining stages in a pipeline.

14.1.2 Pipeline structure

Internally pipelines are represented as code. Let's have a look at a simple example and understand what each part does:

```
pipeline "My new pipeline"
stage 1 match all
  rule "has firewall fields";
  rule "from firewall subnet";
stage 2 match either
  rule "geocode IPs";
  rule "anonymize source IPs";
end
```

This code snippet declares a new pipeline named `My new pipeline`, which has two stages.

Stages are run in the order of their given *priority*, and aren't otherwise named. Stage priorities can be any integer, positive or negative, you prefer. In our example the first stage has a priority of 1 and the second stage a priority of 2, however -99 and 42 could be used instead. Ordering based upon stage priority gives you the ability to run certain rules before or after others, which might exist in other connected pipelines, without modifying those other connected pipelines. This is particularly handy when dealing with changing data formats.

For example, if there was a second pipeline declared with a stage assigned priority 0, that stage's rules would run before either of the ones from the example (priorities 1 and 2, respectively). Note that the order in which stages are declared is irrelevant, since they are sorted according to their priority.

Stages then list the *rule references* they want to be executed, as well as whether *any* or *all* of the rules' conditions need to be satisfied to continue running the pipeline.

In our example, imagine rule *"has firewall fields"* checks for the presence of message fields `src_ip` and `dst_ip`, but does not have any actions to run. For a message without both fields the rule's condition would evaluate to `false` and the pipeline would abort after stage 1, as the stage requires *all* rules be satisfied (`match all`). With the pipeline aborted, stage 2 would not run.

`match either` acts as an OR operator, only requiring a single rule's condition evaluate to `true` in order to continue pipeline processing. Note that actions are still ran for all matching rules in the stage, even if it is the final stage in the pipeline.

Rules are referenced by their names, and can therefore be shared among many different pipelines. The intention is to enable creation of reusable building blocks, making it easier to process the data specific to your organization or use case.

Read more about [Rules](#) in the next section.

14.2 Rules

14.2.1 Overview

Rules are the cornerstone of processing pipelines. They contain the logic about how to change, enrich, route, and drop messages.

To avoid the complexities of a complete programming language, Graylog supports a small rule language to express processing logic. The rule language is intentionally limited to allow for easier understanding, faster learning, and better runtime optimization.

The real work of rules is done in *functions*, which are completely pluggable. Graylog already ships with a great number of built-in functions, providing data conversion, string manipulation, data retrieval using [lookup tables](#), JSON parsing, and much more.

We expect that special purpose functions will be written and shared by the community, enabling faster innovation and problem solving than previously possible.

14.2.2 Rule Structure

Building upon the previous example in the *Pipelines* section, let's look at examples of some of the rules we've referenced:

```
rule "has firewall fields"
when
  has_field("src_ip") && has_field("dst_ip")
then
end
```

```
rule "from firewall subnet"
when
  cidr_match("10.10.10.0/24", to_ip($message.gl2_remote_ip))
then
end
```

Firstly, apart from naming the rule structure follows a simple *when, then* pattern. In the *when* clause we specify a boolean expression which is evaluated in the context of the current message in the pipeline. These are the conditions used by the pipeline processor to determine whether to run a rule, and collectively (when evaluating the containing stage's *match all* or *match any* requirement) whether to continue in a pipeline.

Note that the *has firewall fields* rule uses the built-in function `has_field` to check whether the message has the `src_ip` and `dst_ip` fields, as we want to use them in a later stage of the pipeline. This rule has no actions to run in its *then* clause, since we only want to use it to determine whether subsequent stages should run.

The second rule, *from firewall subnet*, uses the built-in function `cidr_match`, which takes a [CIDR pattern](#) and an IP address. In this case we reference a field from the currently-processed message using the message reference syntax `$message`.

Graylog always sets the `gl2_remote_ip` field on messages, so we don't need to check whether that field exists. If we wanted to use a field that might not exist on all messages we'd first use the `has_field` function to ensure its presence.

Note the call to `to_ip` around the `gl2_remote_ip` field reference. This is necessary since the field is stored as a *string* internally, and `cidr_match` requires an IP address object for its `ip` parameter.

Requiring an explicit conversion to an IP address object demonstrates an important feature of Graylog's rule language: enforcement of type safety to ensure that you end up with the data in the correct format. All too often everything is treated as a string, which wastes enormous amounts of cycles on data conversion and prevents proper analysis of the data.

We again have no actions to run, since we're just using the rule to manage the pipeline's flow, so the *then* block is empty.

You might be wondering why we didn't just combine the *has firewall fields* and *from firewall subnet* rules, since they seem to be serving the same purpose. While we could absolutely do so, recall that rules are intended to be reusable building blocks. Imagine you have another pipeline for a different firewall subnet. Rather than duplicating the logic to check for `src_ip` and `dst_ip`, and updating each rule if anything ever changes (e.g. additional fields), you can simply add the *has firewall fields* rule to your new stage. With this approach you only need to update a single rule, with the change immediately taking effect for all pipelines referencing it. Nice!

14.2.3 Data Types

As we have seen in the previous section, we need to make sure to use the proper data types when calling functions.

Graylog's rule language parser rejects invalid use of types, making it safe to write rules.

The six built-in types in Graylog are `string` (a UTF-8 string), `double` (corresponds to Java's `Double`), `long` (Java's `Long`), `boolean` (Boolean), `void` (indicating a function has no return value to prevent it being used in a condition), and `ip` (a subset of `InetAddress`), but plugins are free to add additional types as they see fit. The rule processor takes care of ensuring that values and functions agree on the types being used.

By convention, functions that convert types start with the prefix `to_`. Please refer to the [Functions](#) index for a list.

Note: Before using the value of a message field, always convert it to the intended type with one of the `to_` [Functions](#).

14.2.4 Conditions

In Graylog's rules the **when** clause is a boolean expression, which is evaluated against the processed message.

Expressions support the common boolean operators AND (or `&&`), OR (`||`), NOT (`!`), and comparison operators (`<`, `<=`, `>`, `>=`, `==`, `!=`).

Any function that returns a value can be called in the **when** clause, but it must eventually evaluate to a boolean. For example: we were able to use `to_ip` in the *from firewall subnet* since it was being passed to `cidr_match`, which returns a boolean, but could not use `route_to_stream` since it doesn't return a value.

The condition must not be empty, but can simply consist of the boolean literal `true`. This is useful when you always want to execute a rule's actions.

If a condition calls a function which is not present (perhaps due to a typo or missing plugin) the call evaluates to `false`.

Note: Comparing two fields can be done when you use the same data type, e.g. `to_string($message.src_ip) == to_string($message.dst_ip)` will compare the two strings and will become `true` on match. Comparing different data types evaluates to `false`.

14.2.5 Actions

A rule's **then** clause contains a list of actions which are evaluated in the order they appear.

There are two different types of actions:

- Function calls
- Variable assignments

Function calls look exactly like they do in conditions. All functions, including those which do not return a value, may be used in the **then** clause.

Variable assignments have the following form:

```
let name = value;
```

Variables are useful to avoid recomputing expensive parsing of data, holding on to temporary values, or making rules more readable.

Variables need to be defined before they can be used. Their fields (if any) can be accessed using the `name.field` notation in any place where a value of the field's type is required.

The list of actions can be empty, in which case the rule is essentially a pluggable condition to help manage a pipeline's processing flow.

14.3 Stream connections

14.3.1 Overview

Pipelines by themselves do not process any messages. For a pipeline to actually do any work it must first be connected to one or more streams, which enables fine-grained control of the messages processed by that pipeline.

Note that the built-in function `route_to_stream` causes a message to be routed to a particular stream. After the routing occurs, the pipeline engine will look up and start evaluating any pipelines connected to that stream.

Although pipelines can trigger other pipelines via message routing, incoming messages must be processed by an initial set of pipelines connected to one or more streams.

14.3.2 The All messages stream

All messages received by Graylog are initially routed into the **All messages** stream. You can use this stream as the entry point to pipeline processing, allowing incoming messages to be routed to more streams and being processed subsequently.

However, if you prefer to use the original stream matching functionality (i.e. stream rules), you can configure the *Pipeline Processor* to run after the *Message Filter Chain* (in the *Message Processors Configuration* section of the *System -> Configurations* page) and connect pipelines to existing streams. This gives you fine-grained control over the extraction, conversion, and enrichment process.

14.3.3 The importance of message processor ordering

It's important to note that the order of message processors may have a significant impact on how your messages get processed.

For example: *Message Filter Chain* is responsible for setting static fields and running extractors defined on inputs, as well as evaluation of stream rules. If you create a pipeline that expects the presence of a static field, but the *Pipeline Processor* runs before *Message Filter Chain*, that field will not be available for use in your pipeline.

When designing your streams and pipelines be aware of the message processor order, especially if you have dependencies on earlier message processing.

14.4 Functions

14.4.1 Overview

Functions are the means of interacting with the messages Graylog processes.

Functions are written in Java and are pluggable, allowing Graylog's pipeline processing capabilities to be easily extended.

Conceptually a function receives parameters, the current message context, and (potentially) returns a value. The data types of its return value and parameters determine where it can be used in a rule. Graylog ensures the rules are sound from a data type perspective.

A function's parameters can either be passed as named pairs or position, as long as optional parameters are declared as coming last. The functions' documentation below indicates which parameters are optional by wrapping them in square brackets.

Let's look at a small example to illustrate these properties:

```
rule "function howto"
when
  has_field("transaction_date")
then
  // the following date format assumes there's no time zone in the string
  let new_date = parse_date(to_string($message.transaction_date), "yyyy-MM-dd_
↪HH:mm:ss");
  set_field("transaction_year", new_date.year);
end
```

In this example, we check if the current message contains the field `transaction_date` and then, after converting it to a string, try to parse it according to the format string `yyyy-MM-dd HH:mm:ss`, so for example the string `2016-03-05 14:45:02` would match. The `parse_date` function returns a `DateTime` object from the Java Joda-Time library, allowing easier access to the date's components.

We then add the transaction's year as a new field, `transaction_year` to the message.

You'll note that we didn't specify a time zone for our date, but Graylog still had to pick one. Graylog never relies on the local time of your server, as that makes it nearly impossible to figure out why date handling came up with its result.

The reason Graylog knows which timezone to use is because `parse_date` actually takes four parameters, rather than the two we've given it in this example. The other two parameters are a `String` called `timezone` (default value: "UTC") and a `String` called `locale` (default value: the default locale of the system running Graylog) which both are optional.

Let's assume we have another message field called `transaction_timezone`, which is sent by the application and contains the time zone ID the transaction was done in (hopefully no application in the world sends its data like this, though):

```
rule "function howto"
when
  has_field("transaction_date") && has_field("transaction_timezone")
then
  // the following date format assumes there's no time zone in the string
  let new_date = parse_date(
    to_string($message.transaction_date),
    "yyyy-MM-dd HH:mm:ss",
    to_string($message.transaction_timezone)
  );
```

(continues on next page)

(continued from previous page)

```

    set_field("transaction_year", new_date.year);
end

```

Now we're passing the `parse_date` function its `timezone` parameter the string value of the message's `transaction_timezone` field.

In this case we only have a single optional parameter, which makes it easy to simply omit it from the end of the function call. However, if there are multiple optional parameters, or if there are so many parameters that it gets difficult to keep track of which positions correspond to which parameters, you can also use the named parameter variant of function calls. In this mode the order of the parameters does not matter, but all required ones still need to be there.

In our case the alternative version of calling `parse_date` would look like this:

```

rule "function howto"
when
    has_field("transaction_date") && has_field("transaction_timezone")
then
    // the following date format assumes there's no time zone in the string
    let new_date = parse_date(
        value: to_string($message.transaction_date),
        pattern: "yyyy-MM-dd HH:mm:ss",
        timezone: to_string($message.transaction_timezone)
    );
    set_field("transaction_year", new_date.year);
end

```

All parameters in Graylog's processing functions, listed below, are named.

14.4.2 Function Index

The following list describes the built-in functions that ship with Graylog. Additional third party functions are available via plugins in the marketplace.

Table 1: Built-in Functions

Name	Description
<i>debug</i>	Print the passed value as string in the Graylog log.
<i>to_bool</i>	Converts the single parameter to a boolean value using its string value.
<i>to_double</i>	Converts the first parameter to a double floating point value.
<i>to_long</i>	Converts the first parameter to a long integer value.
<i>to_string</i>	Converts the first parameter to its string representation.
<i>to_url</i>	Converts a value to a valid URL using its string representation.
<i>to_map</i>	Converts a value to a map.
<i>is_null</i>	Checks whether a value is <code>null</code> .
<i>is_not_null</i>	Checks whether a value is not <code>null</code> .
<i>is_boolean</i>	Checks whether a value is a boolean value (<code>true</code> or <code>false</code>).
<i>is_number</i>	Checks whether a value is a numeric value (of type <code>long</code> or <code>double</code>).
<i>is_double</i>	Checks whether a value is a floating point value (of type <code>double</code>).
<i>is_long</i>	Checks whether a value is an integer value (of type <code>long</code>).
<i>is_string</i>	Checks whether a value is a string.
<i>is_collection</i>	Checks whether a value is an iterable collection.
<i>is_list</i>	Checks whether a value is an iterable list.
<i>is_map</i>	Checks whether a value is a map.

continues on next page

Table 1 – continued from previous page

Name	Description
<i>is_date</i>	Checks whether a value is a date (of type <code>DateTime</code>).
<i>is_period</i>	Checks whether a value is a time period (of type <code>Period</code>).
<i>is_ip</i>	Checks whether a value is an IP address (IPv4 or IPv6).
<i>is_json</i>	Checks whether a value is a parsed JSON tree.
<i>is_url</i>	Checks whether a value is a parsed URL.
<i>abbreviate</i>	Abbreviates a String using ellipses.
<i>capitalize</i>	Capitalizes a String changing the first letter to title case.
<i>uncapitalize</i>	Uncapitalizes a String changing the first letter to lower case.
<i>uppercase</i>	Converts a String to upper case.
<i>lowercase</i>	Converts a String to lower case.
<i>swapcase</i>	Swaps the case of a String.
<i>contains</i>	Checks if a string contains another string.
<i>replace</i>	Replaces the first “max” or all occurrences of a string within another string
<i>starts_with</i>	Checks if a string starts with a given prefix.
<i>ends_with</i>	Checks if a string ends with a given suffix.
<i>substring</i>	Returns a substring of <code>value</code> with the given start and end offsets.
<i>concat</i>	Concatenates two strings.
<i>split</i>	Split a string around matches of this pattern (Java syntax).
<i>regex</i>	Match a regular expression against a string, with matcher groups.
<i>regex_replace</i>	Match a regular expression against a string and replace with string.
<i>grok</i>	Applies a Grok pattern to a string.
<i>key_value</i>	Extracts key/value pairs from a string.
<i>crc32</i>	Returns the hex encoded CRC32 digest of the given string.
<i>crc32c</i>	Returns the hex encoded CRC32C (RFC 3720, Section 12.1) digest of the given string.
<i>md5</i>	Returns the hex encoded MD5 digest of the given string.
<i>murmur3_32</i>	Returns the hex encoded MurmurHash3 (32-bit) digest of the given string.
<i>murmur3_128</i>	Returns the hex encoded MurmurHash3 (128-bit) digest of the given string.
<i>sha1</i>	Returns the hex encoded SHA1 digest of the given string.
<i>sha256</i>	Returns the hex encoded SHA256 digest of the given string.
<i>sha512</i>	Returns the hex encoded SHA512 digest of the given string.
<i>parse_json</i>	Parse a string into a JSON tree.
<i>select_jsonpath</i>	Selects one or more named JSON Path expressions from a JSON tree.
<i>to_ip</i>	Converts the given string to an IP object.
<i>cidr_match</i>	Checks whether the given IP matches a CIDR pattern.
<i>from_input</i>	Checks whether the current message was received by the given input.
<i>route_to_stream</i>	Assigns the current message to the specified stream.
<i>remove_from_stream</i>	Removes the current message from the specified stream.
<i>create_message</i>	Currently incomplete Creates a new message which will be evaluated by the entire processing pipeline.
<i>clone_message</i>	Clones a message.
<i>drop_message</i>	This currently processed message will be removed from the processing pipeline after the rule finishes.
<i>has_field</i>	Checks whether the currently processed message contains the named field.
<i>remove_field</i>	Removes the named field from the currently processed message.
<i>set_field</i>	Sets the name field to the given value in the currently processed message.
<i>set_fields</i>	Sets multiple fields to the given values in the currently processed message.
<i>rename_field</i>	Rename a message field.
<i>syslog_facility</i>	Converts a syslog facility number to its string representation.

continues on next page

Table 1 – continued from previous page

Name	Description
<i>syslog_level</i>	Converts a syslog level number to its string representation.
<i>expand_syslog_priority</i>	Converts a syslog priority number to its level and facility.
<i>expand_syslog_priority_as_string</i>	Converts a syslog priority number to its level and facility string representations.
<i>now</i>	Returns the current date and time.
<i>parse_date</i>	Parses a date and time from the given string, according to a strict pattern.
<i>flex_parse_date</i>	Attempts to parse a date and time using the Natty date parser.
<i>parse_unix_milliseconds</i>	Attempts to parse a UNIX millisecond timestamp (milliseconds since 1970-01-01T00:00:00.000Z).
<i>format_date</i>	Formats a date and time according to a given formatter pattern.
<i>to_date</i>	Converts a type to a date.
<i>years</i>	Create a period with a specified number of years.
<i>months</i>	Create a period with a specified number of months.
<i>weeks</i>	Create a period with a specified number of weeks.
<i>days</i>	Create a period with a specified number of days.
<i>hours</i>	Create a period with a specified number of hours.
<i>minutes</i>	Create a period with a specified number of minutes.
<i>seconds</i>	Create a period with a specified number of seconds.
<i>millis</i>	Create a period with a specified number of millis.
<i>period</i>	Parses an ISO 8601 period from the specified string.
<i>lookup</i>	Looks up a multi value in the named lookup table.
<i>lookup_value</i>	Looks up a single value in the named lookup table.
<i>lookup_add_string_list</i>	Lookup table manipulation.
<i>lookup_clear_key</i>	Lookup table manipulation.
<i>lookup_remove_string_list</i>	Lookup table manipulation.
<i>lookup_table_set_string_list</i>	Lookup table manipulation.
<i>lookup_set_value</i>	Lookup table manipulation.
<i>lookup_string_list</i>	Lookup table manipulation.

debug

debug (value: any)

Print any passed value as string in the Graylog log.

Note: The debug message will only appear in the log of the Graylog node that was processing the message you are trying to debug.

Example:

```
// Print: "INFO : org.graylog.plugins.pipelineprocessor.ast.functions.Function -
↳PIPELINE DEBUG: Dropped message from <source>"
let debug_message = concat("Dropped message from ", to_string($message.source));
debug(debug_message);
```

to_bool

```
to_bool(value: any)
```

Converts the single parameter to a boolean value using its string value.

to_double

```
to_double(value: any, [default: double])
```

Converts the first parameter to a double floating point value.

to_long

```
to_long(value: any, [default: long])
```

Converts the first parameter to a long integer value.

to_string

```
to_string(value: any, [default: string])
```

Converts the first parameter to its string representation.

to_url

```
to_url(url: any, [default: string])
```

Converts the given url to a valid URL.

to_map

```
to_map(value: any)
```

Converts the given map-like value to a valid map.

The `to_map()` function currently only supports converting a parsed JSON tree into a map so that it can be used together with [set_fields](#).

Example:

```
let json = parse_json(to_string($message.json_payload));
let map = to_map(json);
set_fields(map);
```

See also:

- [set_fields](#)
- [parse_json](#)

is_null

`is_null(value: any)`

Checks if the given value is null.

Example:

```
// Check if the `src_addr` field is null (empty).  
// If null, boolean true is returned. If not null, boolean false is returned.  
is_null(src_addr)
```

is_not_null

`is_not_null(value: any)`

Checks if the given value is not null.

Example:

```
// Check if the `src_addr` field is not null.  
// If not null, boolean true is returned. If null, boolean false is returned.  
is_not_null(src_addr)
```

is_boolean

`is_boolean(value: any)`

Checks whether the given value is a boolean value (true or false).

is_number

`is_number(value: any)`

Checks whether the given value is a numeric value (of type long or double).

See also:

- [*is_double*](#)
- [*to_double*](#)
- [*is_long*](#)
- [*to_long*](#)

is_double

`is_double(value: any)`

Checks whether the given value is a floating point value (of type double).

See also:

- [*to_double*](#)

is_long

`is_long(value: any)`

Checks whether the given value is an integer value (of type `long`).

See also:

- *to_long*

is_string

`is_string(value: any)`

Checks whether the given value is a string.

See also:

- *to_string*

is_collection

`is_collection(value: any)`

Checks whether the given value is an iterable collection.

is_list

`is_list(value: any)`

Checks whether the given value is an iterable list.

is_map

`is_map(value: any)`

Checks whether the given value is a map.

See also:

- *to_map*

is_date

`is_date(value: any)`

Checks whether the given value is a date (of type `DateTime`).

See also:

- *now*
- *parse_date*
- *flex_parse_date*
- *parse_unix_milliseconds*

is_period

`is_period(value: any)`

Checks whether the given value is a time period (of type `Period`).

See also:

- *years*
- *months*
- *weeks*
- *days*
- *hours*
- *minutes*
- *seconds*
- *millis*
- *period*

is_ip

`is_ip(value: any)`

Checks whether the given value is an IP address (IPv4 or IPv6).

See also:

- *to_ip*

is_json

`is_json(value: any)`

Checks whether the given value is a parsed JSON tree.

See also:

- *parse_json*

is_url

`is_url(value: any)`

Checks whether the given value is a parsed URL.

See also:

- *to_url*

abbreviate

```
abbreviate(value: string, width: long)
```

Abbreviates a String using ellipses, the width defines the maximum length of the resulting string.

capitalize

```
capitalize(value: string)
```

Capitalizes a String changing the first letter to title case.

uncapitalize

```
uncapitalize(value: string)
```

Uncapitalizes a String changing the first letter to lower case.

uppercase

```
uppercase(value: string, [locale: string])
```

Converts a String to upper case. The locale (IETF BCP 47 language tag) defaults to “en”.

lowercase

```
lowercase(value: string, [locale: string])
```

Converts a String to lower case. The locale (IETF BCP 47 language tag) defaults to “en”.

swapcase

```
swapcase(value: string)
```

Swaps the case of a String changing upper and title case to lower case, and lower case to upper case.

contains

```
contains(value: string, search: string, [ignore_case: boolean])
```

Checks if value contains search, optionally ignoring the case of the search pattern.

Example:

```
// Check if the `example.org` is in the `hostname` field. Ignore case.
contains(to_string($message.hostname), "example.org", true)
```


replace

```
replace(value: string, search: string, [replacement: string], [max: long])
```

Replaces the first max or all occurrences of a string within another string. max is -1 per default which means to replace **all** occurrences, 1 only the first one, 2 the first two and so on.

Example:

```
// Correct misspelled message "foo rooft oota"
let new_field = replace(to_string($message.message), "oo", "u");    // "fu ruft uta"
let new_field = replace(to_string($message.message), "oo", "u", 1); // "fu rooft oota"
```

starts_with

```
starts_with(value: string, prefix: string, [ignore_case: boolean])
```

Checks if value starts with prefix, optionally ignoring the case of the string.

Example:

```
// Returns true
starts_with("Foobar Baz Quux", "foo", true);
// Returns false
starts_with("Foobar Baz Quux", "Quux");
```

ends_with

```
ends_with(value: string, suffix: string, [ignore_case: boolean])
```

Checks if value ends with suffix, optionally ignoring the case of the string.

Example:

```
// Returns true
starts_with("Foobar Baz Quux", "quux", true);
// Returns false
starts_with("Foobar Baz Quux", "Baz");
```

substring

```
substring(value: string, start: long, [end: long])
```

Returns a substring of value starting at the start offset (zero based indices), optionally ending at the end offset. Both offsets can be negative, indicating positions relative to the end of value.

concat

```
concat(first: string, second: string)
```

Returns a new string combining the text of `first` and `second`.

Note: The `concat()` function only concatenates two strings. If you want to build a string from more than two sub-strings, you'll have to use `concat()` multiple times, see the example below.

Example:

```
// Build a message like:
// 'TCP connect from 88.99.35.172 to 192.168.1.10 Port 443'
let build_message_0 = concat(to_string($message.protocol), " connect from ");
let build_message_1 = concat(build_message_0, to_string($message.src_ip));
let build_message_2 = concat(build_message_1, " to ");
let build_message_3 = concat(build_message_2, to_string($message.dst_ip));
let build_message_4 = concat(build_message_3, " Port ");
let build_message_5 = concat(build_message_4, to_string($message.dst_port));
set_field("message", build_message_5);
```

split

```
split(pattern: string, value: string, [limit: int])
```

Split a value around matches of `pattern`. Use `limit` to indicate the number of times the pattern should be applied.

Note: Patterns have to be valid [Java String literals](#), please ensure you escape any backslashes in your regular expressions!

regex

```
regex(pattern: string, value: string, [group_names: array[string]])
```

Match the regular expression in `pattern` against `value`. Returns a match object, with the boolean property `matches` to indicate whether the regular expression matched and, if requested, the matching groups as `groups`. The groups can optionally be named using the `group_names` array. If not named, the groups names are strings starting with `"0"`.

Note: Patterns have to be valid [Java String literals](#), please ensure you escape any backslashes in your regular expressions!

regex_replace

```
regex_replace(pattern: string, value: string, replacement: string,
[replace_all: boolean])
```

Match the regular expression in `pattern` against `value` and replace it, if matched, with `replacement`. You can use numbered capturing groups and reuse them in the replacement string. If `replace_all` is set to `true`, then all matches will be replaced, otherwise only the first match will be replaced.

Examples:

```
// message = 'logged in user: mike'
let username = regex_replace(".*user: (.*)", to_string($message.message), "$1");

// message = 'logged in user: mike'
let string = regex_replace("logged (in|out) user: (.*)", to_string($message.message),
↪ "User $2 is now logged $1");
```

Note: Patterns have to be valid [Java String literals](#), please ensure you escape any backslashes in your regular expressions!

grok

```
grok(pattern: string, value: string, [only_named_captures: boolean])
```

Applies the grok pattern `grok` to `value`. Returns a match object, containing a Map of field names and values. You can set `only_named_captures` to `true` to only return matches using named captures.

Tip: The result of executing the `grok` function can be passed as argument for [set_fields](#) to set the extracted fields into a message.

See also:

- [set_fields](#)

key_value

```
key_value(
  value: string,
  [delimiters: string],
  [kv_delimiters: string],
  [ignore_empty_values: boolean],
  [allow_dup_keys: boolean],
  [handle_dup_keys: string],
  [trim_key_chars: string],
  [trim_value_chars: string]
)
```

Extracts key-value pairs from the given `value` and returns them as a Map of field names and values. You can optionally specify:

delimiters Characters used to separate pairs. We will use each character in the string, so you do not need to separate them. Default value: `<whitespace>`.

kv_delimiters Characters used to separate keys from values. Again, there is no need to separate each character. Default value: `=`.

ignore_empty_values Ignores keys containing empty values. Default value: `true`.

allow_dup_keys Indicates if duplicated keys are allowed. Default value: `true`.

handle_dup_keys How to handle duplicated keys (if `allow_dup_keys` is set). It can take the values `take_first`, which will only use the first value for the key; or `take_last`, which will only use the last value for the key. Setting this option to any other value will change the handling to concatenate, which will combine all values given to the key, separating them with the value set in this option. For example, setting `handle_dup_keys: ", "`, would combine all values given to a key `a`, separating them with a comma, such as `1,2,foo`. Default value: `take_first`.

trim_key_chars Characters to trim (remove from the beginning and end) from keys. Default value: no trim.

trim_value_chars Characters to trim (remove from the beginning and end) from values. Default value: no trim.

Tip: The result of executing the `key_value` function can be passed as argument for [set_fields](#) to set the extracted fields into a message.

See also:

- [set_fields](#)

crc32

```
crc32(value: string)
```

Creates the hex encoded CRC32 digest of the `value`.

crc32c

```
crc32c(value: string)
```

Creates the hex encoded CRC32C (RFC 3720, Section 12.1) digest of the `value`.

md5

```
md5(value: string)
```

Creates the hex encoded MD5 digest of the `value`.

murmur3_32

```
murmur3_32(value: string)
```

Creates the hex encoded MurmurHash3 (32-bit) digest of the `value`.

murmur3_128

```
murmur3_128(value: string)
```

Creates the hex encoded MurmurHash3 (128-bit) digest of the `value`.

sha1

```
sha1(value: string)
```

Creates the hex encoded SHA1 digest of the `value`.

sha256

```
sha256(value: string)
```

Creates the hex encoded SHA256 digest of the `value`.

sha512

```
sha512(value: string)
```

Creates the hex encoded SHA512 digest of the `value`.

parse_json

```
parse_json(value: string)
```

Parses the `value` string as JSON, returning the resulting JSON tree.

See also:

- *to_map*

select_jsonpath

```
select_jsonpath(json: JsonNode, paths: Map<string, string>)
```

Evaluates the given `paths` against the `json` tree and returns the map of the resulting values.

See also:

- *is_json*
- *parse_json*

to_ip

```
to_ip(ip: string)
```

Converts the given `ip` string to an `IpAddress` object.

See also:

- [*cidr_match*](#)

cidr_match

```
cidr_match(cidr: string, ip: IpAddress)
```

Checks whether the given `ip` address object matches the `cidr` pattern.

See also:

- [*to_ip*](#)

from_input

```
from_input(id: string | name: string)
```

Checks whether the currently processed message was received on the given input. The input can be looked up by either specifying its `name` (the comparison ignores the case) or the `id`.

route_to_stream

```
route_to_stream(id: string | name: string, [message: Message],  
[remove_from_default: boolean])
```

Routes the message to the given stream. The stream can be looked up by either specifying its `name` or the `id`.

If `message` is omitted, this function uses the currently processed message.

This causes the message to be evaluated on the pipelines connected to that stream, unless the stream has already been processed for this message.

If `remove_from_default` is `true`, the message is also removed from the default stream “All messages”.

Example:

```
// Route the current processed message to a stream with ID `512bad1a535b43bd6f3f5e86`  
→ (preferred method)  
route_to_stream(id: "512bad1a535b43bd6f3f5e86");  
  
// Route the current processed message to a stream named `Custom Stream`  
route_to_stream(name: "Custom Stream");
```

remove_from_stream

```
remove_from_stream(id: string | name: string, [message: Message])
```

Removes the message from the given stream. The stream can be looked up by either specifying its name or the id.

If `message` is omitted, this function uses the currently processed message.

If the message ends up being on no stream anymore, it is implicitly routed back to the default stream “All messages”. This ensures that you the message is not accidentally lost due to complex stream routing rules. If you want to discard the message entirely, use the `drop_message` function.

create_message

```
create_message([message: string], [source: string], [timestamp: DateTime])
```

Creates a new message with from the given parameters. If any of them is omitted, its value is taken from the corresponding fields of the currently processed message. If `timestamp` is omitted, the timestamp of the created message will be the timestamp at that moment.

clone_message

```
clone_message([message: Message])
```

Clones a message. If `message` is omitted, this function uses the currently processed message.

drop_message

```
drop_message(message: Message)
```

The processing pipeline will remove the given message after the rule is finished executing.

If `message` is omitted, this function uses the currently processed message.

This can be used to implement flexible blacklisting based on various conditions.

Example:

```
rule "drop messages over 16383 characters"
when
  has_field("message") AND
  regex(pattern: "^.{16383,}$", value: to_string($message.message)).matches == true
then
  drop_message();
  // added debug message to be notified about the dropped message
  debug( concat("dropped oversized message from ", to_string($message.source)));
end
```

has_field

```
has_field(field: string, [message: Message])
```

Checks whether the given `message` contains a field with the name `field`.

If `message` is omitted, this function uses the currently processed message.

remove_field

```
remove_field(field: string, [message: Message])
```

Removes the given field with the name `field` from the given message, unless the field is reserved.

If `message` is omitted, this function uses the currently processed message.

set_field

```
set_field(field: string, value: any, [prefix: string], [suffix: string],  
[message: Message])
```

Sets the given field named `field` to the new `value`. The field name must be valid, and specifically cannot include a `.` character. It is trimmed of leading and trailing whitespace. String values are trimmed of whitespace as well.

The optional `prefix` and `suffix` parameters specify which prefix or suffix should be added to the inserted field name.

If `message` is omitted, this function uses the currently processed message.

See also:

- [*set_fields*](#)

set_fields

```
set_fields(fields: Map<string, any>, [prefix: string], [suffix: string],  
[message: Message])
```

Sets all of the given name-value pairs in `field` in the given message. This is a convenience function acting like [*set_field*](#). It can be helpful for using the result of a function like [*select_jsonpath*](#) or [*regex*](#) in the currently processed message especially when the key names are the result of a regular expression.

The optional `prefix` and `suffix` parameters specify which prefix or suffix should be added to the inserted field names.

If `message` is omitted, this function uses the currently processed message.

See also:

- [*set_field*](#)
- [*to_map*](#)
- [*grok*](#)
- [*key_value*](#)

rename_field

```
rename_field(old_field: string, new_field: string, [message: Message])
```

Modifies the field name `old_field` to `new_field` in the given message, keeping the field value unchanged.

syslog_facility

```
syslog_facility(value: any)
```

Converts the `syslog facility number` in `value` to its string representation.

syslog_level

```
syslog_level(value: any)
```

Converts the `syslog severity number` in `value` to its string representation.

expand_syslog_priority

```
expand_syslog_priority(value: any)
```

Converts the `syslog priority number` in `value` to its numeric severity and facility values.

expand_syslog_priority_as_string

```
expand_syslog_priority_as_string(value: any)
```

Converts the `syslog priority number` in `value` to its severity and facility string representations.

now

```
now([timezone: string])
```

Returns the current date and time. Uses the default time zone UTC.

See also:

- [*is_date*](#)

parse_date

```
parse_date(value: string, pattern: string, [locale: string], [timezone: string])
```

Parses the `value` into a date and time object, using the `pattern`. If no `timezone` is detected in the `pattern`, the optional `timezone` parameter is used as the assumed `timezone`. If omitted the `timezone` defaults to UTC.

The format used for the `pattern` parameter is identical to the pattern of the [Joda-Time DateTimeFormat](#).

Symbol	Meaning	Presentation	Examples
G	era	text	AD
C	century of era (≥ 0)	number	20
Y	year of era (≥ 0)	year	1996
x	weekyear	year	1996
w	week of weekyear	number	27
e	day of week	number	2
E	day of week	text	Tuesday; Tue
y	year	year	1996
D	day of year	number	189
M	month of year	month	July; Jul; 07
d	day of month	number	10
a	halfday of day	text	PM
K	hour of halfday (0~11)	number	0
h	clockhour of halfday (1~12)	number	12
H	hour of day (0~23)	number	0
k	clockhour of day (1~24)	number	24
m	minute of hour	number	30
s	second of minute	number	55
S	fraction of second	millis	978
z	time zone	text	Pacific Standard Time; PST
Z	time zone offset/id	zone	-0800; -08:00; America/Los_Angeles
'	escape for text	delimiter	
' '	single quote	literal	'

The format used for the `locale` parameter is a valid language tag according to [IETF BCP 47](#) which can be parsed by the `Locale#forLanguageTag(String)` method.

Also see [IANA Language Subtag Registry](#).

If no locale was specified, the locale of the system running Graylog (the default locale) is being used.

Examples:

Language Tag	Description
en	English
en-US	English as used in the United States
de-CH	German for Switzerland

See also:

- [is_date](#)

flex_parse_date

```
flex_parse_date(value: string, [default: DateTime], [timezone: string])
```

Uses the [Natty date parser](#) to parse a date and time value. If no timezone is detected in the pattern, the optional timezone parameter is used as the assumed timezone. If omitted the timezone defaults to UTC.

In case the parser fails to detect a valid date and time the `default` date and time is being returned, otherwise the expression fails to evaluate and will be aborted.

See also:

- *is_date*

parse_unix_milliseconds

`parse_unix_milliseconds(value: long)`

Attempts to parse a UNIX millisecond timestamp (milliseconds since 1970-01-01T00:00:00.000Z) into a proper `DateTime` object.

Example:

```
// 1519902000000 == 2018-03-01T12:00:00.000Z
let timestamp = parse_unix_milliseconds(1519902000000);
set_field("timestamp", timestamp);
```

See also:

- *is_date*

format_date

`format_date(value: DateTime, format: string, [timezone: string])`

Returns the given date and time value formatted according to the format string. If no timezone is given, it defaults to UTC. The timezone must be specified as *TZ database name* <https://en.wikipedia.org/wiki/List_of_tz_database_time_zones>

to_date

`to_date(value: any, [timezone: string])`

Converts value to a date. If no timezone is given, it defaults to UTC.

See also:

- *is_date*

years

`years(value: long)`

Create a time period with value number of years.

See also:

- *is_period*
- *period*

months

`months(value: long)`

Create a time period with `value` number of months.

See also:

- *is_period*
- *period*

weeks

`weeks(value: long)`

Create a time period with `value` number of weeks.

See also:

- *is_period*
- *period*

days

`days(value: long)`

Create a time period with `value` number of days.

See also:

- *is_period*
- *period*

hours

`hours(value: long)`

Create a time period with `value` number of hours.

See also:

- *is_period*
- *period*

minutes

`minutes(value: long)`

Create a time period with `value` number of minutes.

See also:

- *is_period*
- *period*

seconds

`seconds(value: long)`

Create a time period with `value` number of seconds.

See also:

- *is_period*
- *period*

millis

`millis(value: long)`

Create a time period with `value` number of milliseconds.

See also:

- *is_period*
- *period*

period

`period(value: string)`

Parses an ISO 8601 time period from `value`.

See also:

- *is_period*
- *years*
- *months*
- *days*
- *hours*
- *minutes*
- *seconds*
- *millis*

lookup

`lookup(lookup_table: string, key: any, [default: any])`

Looks up a multi value in the named lookup table.

Example:

```
rule "dst_ip geoip lookup"
when
  has_field("dst_ip")
then
  let geo = lookup("geoip-lookup", to_string($message.dst_ip));
  set_field("dst_ip_geolocation", geo["coordinates"]);
```

(continues on next page)

(continued from previous page)

```
set_field("dst_ip_geo_country_code", geo["country"].iso_code);
set_field("dst_ip_geo_country_name", geo["country"].names.en);
set_field("dst_ip_geo_city_name", geo["city"].names.en);
end
```

lookup_add_string_list

```
lookup_add_string_list(lookup_table, key, value, [keep_duplicates])
```

Add a string list in the named lookup table. Returns the updated list on success, null on failure.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_clear_key

```
lookup_clear_key(lookup_table, key)
```

Clear (remove) a key in the named lookup table.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_remove_string_list

```
lookup_remove_string_list(lookup_table, key, value)
```

Remove the entries of the given string list from the named lookup table. Returns the updated list on success, null on failure.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_table_set_string_list

```
lookup_set_string_list(lookup_table, key, value)
```

Set a string list in the named lookup table. Returns the new value on success, null on failure.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_set_value

```
lookup_set_value(lookup_table, key, value)
```

Set a single value in the named lookup table. Returns the new value on success, null on failure.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_string_list

```
lookup_string_list(lookup_table, key, [default])
```

Looks up a string list value in the named lookup table.

Warning: This function does only work with the *MongoDB Lookup Table* at the time of writing.

lookup_value

```
lookup_value(lookup_table: string, key: any, [default: any])
```

Looks up a single value in the named lookup table.

Example:

```
// Lookup a value in lookup table "ip_lookup" where the key is the string_
↳representation of the src_addr field.
lookup_value("ip_lookup", to_string($message.src_addr));
```

14.5 Usage

14.5.1 Overview

Once you understand the concepts explained in *Pipelines*, *Rules*, and *Stream connections*, you're ready to start creating your own processing pipelines. This page gives you the information you need to get started with the user interface.

14.5.2 Configuration

Configure the message processor

Before start using the processing pipelines you need to ensure the *Pipeline Processor* message processor is enabled and correctly configured. You can do so by going to the *System -> Configurations* page, and checking the configuration in the *Message Processors Configuration* section.

Configurations
You can configure system settings for different sub systems on this page.

Search Configuration
Query time range limit: disabled
The maximum time users can query data in the past. This prevents users from accidentally creating queries which span a lot of data and would need a long time and many resources to complete (if at all).

Relative time range options

PT5M	Search in the last 5 minutes
PT15M	Search in the last 15 minutes
PT30M	Search in the last 30 minutes
PT1H	Search in the last 1 hour
PT2H	Search in the last 2 hours
PT8H	Search in the last 8 hours
P1D	Search in the last 1 day
P2D	Search in the last 2 days
P5D	Search in the last 5 days
P7D	Search in the last 7 days
P14D	Search in the last 14 days
P30D	Search in the last 30 days
PTOS	Search in all messages

Surrounding time range options

PT1S	1 second
PT5S	5 seconds
PT10S	10 seconds
PT30S	30 seconds
PT1M	1 minute
PT5M	5 minutes

Surrounding search filter fields

file
source
gl2_source_input
source_file

Message Processors Configuration
The following message processors are executed in order. Disabled processors will be skipped.

#	Processor	Status
1	GeoIP Resolver	active
2	Pipeline Processor	active
3	Message Filter Chain	active

Plugins
Configuration for installed plugins.

Geo-Location Processor
If enabled, the Geo-Location Processor plugin scans all messages for fields containing **exclusively** an IP address, and puts their geo-location information into a field named `fieldname_geo_location` where "fieldname" is the name of the field containing an IP address.

Enabled: no
Database type: City database
Database path: /tmp/GeoLite2-City.mmdb

Collectors System
Inactive threshold: PT1M
Expiration threshold: P14D

On the Configurations page, you need to **enable the Pipeline Processor** message processor and, if you want your pipelines to have access to static fields set on inputs and/or fields set by extractors, **set the Pipeline Processor after the Message Filter Chain**.

14.5.3 Manage rules

You can create, edit, and delete your pipeline rules in the *Manage rules* page, under *System -> Pipelines*.

Pipeline Rules Experimental
Rules are a way of applying changes to messages in Graylog. A rule consists of a condition and a list of actions. Graylog evaluates the condition against a message and executes the actions if the condition is satisfied.

[Read more about Graylog pipeline rules in the documentation.](#)

[Manage connections](#) [Manage pipelines](#)

Filter Rules: [Filter](#) [Reset](#) [Create Rule](#)

Title	Description	Created	Last modified	Throughput	Errors	Actions
pipeline_field	Add pipeline field	an hour ago	an hour ago	1 msg/s	0 errors/s (0 total)	Delete Edit

Clicking on *Create Rule* or *Edit* in one of the rules will open a page where you can write your own rule. The page lists available functions and their details to make the task a bit more manageable.

Pipeline rule *pipeline_field* Experimental

Rules are a way of applying changes to messages in Graylog. A rule consists of a condition and a list of actions. Graylog evaluates the condition against a message and executes the actions if the condition is satisfied.

[Read more about Graylog pipeline rules in the documentation.](#)

[Manage connections](#) [Manage pipelines](#)

Title

You can set the rule title in the rule source. See the quick reference for more information.

Description

Add pipeline field

Rule description (optional).

Used in pipelines

[Pipeline test.](#)

Pipelines that use this rule in one or more of their stages.

Rule source

```

1 rule "pipeline_field"
2   when
3     true
4   then
5     set_field("pipeline", "true");
6   end

```

Rule source, see quick reference for more information.

[Save](#) [Cancel](#)

Rules quick reference

Read the [full documentation](#) to gain a better understanding of how Graylog pipeline rules work.

[Functions](#) [Example](#)

This is a list of all available functions in pipeline rules. Click on a row to see more information about the function parameters.

Function	Description
to_bool(value, [default]) : Boolean	Converts a value to a boolean value using its string representation
to_double(value, [default]) : Double	Converts a value to a double value using its string representation
to_long(value, [default]) : Long	Converts a value to a long value using its string representation
to_string(value, [default]) : String	Converts a value to its string representation
has_field(field, [message]) : Boolean	Checks whether a message contains a value for a field
set_field(field, value, [prefix], [suffix], [message]) : Void	Sets a new field in a message
set_fields(fields, [prefix], [suffix], [message]) : Void	Sets new fields in a message
rename_field(old_field, new_field, [message]) : Void	Rename a message field
remove_field(field, [message]) : Void	Removes a field from a message
drop_message([message]) : Void	Discards a message from further processing

14.5.4 Managing pipelines

Once there are some rules in Graylog, you can create pipelines that use them to modify and enrich your messages.

To manage your pipelines, access *Manage pipelines* page under *System -> Pipelines*. This page is where you can create, edit, and delete pipelines.

Pipelines overview

Pipelines let you transform and process messages coming from streams. Pipelines consist of stages where rules are evaluated and applied. Messages can go through one or more stages.

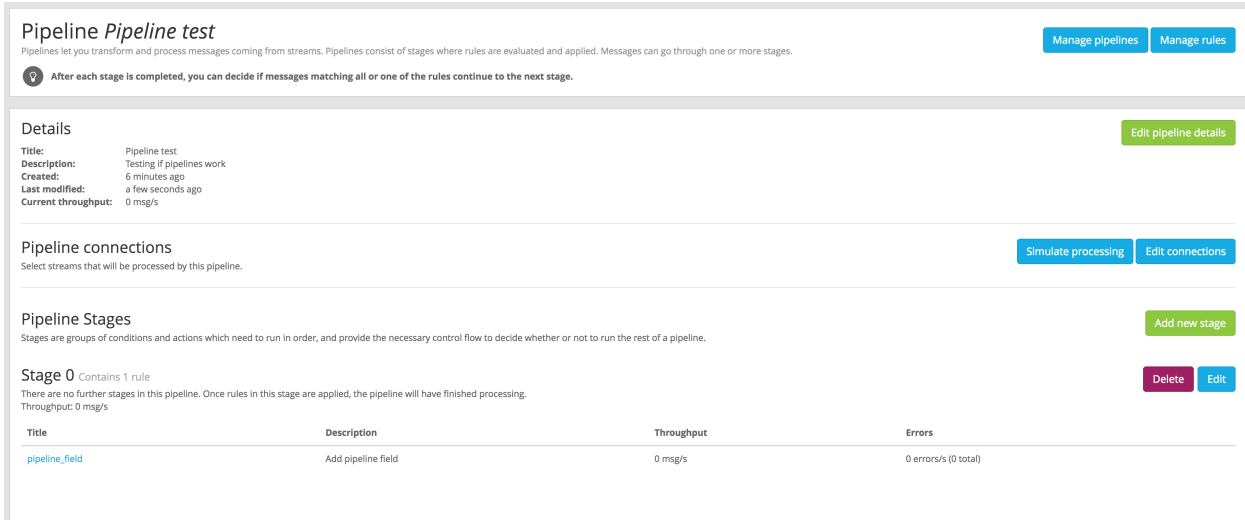
[Read more about Graylog pipelines in the documentation.](#)

[Simulate processing](#) [Manage rules](#)

Filter pipelines [Filter](#) [Reset](#) [Add new pipeline](#)

Pipeline	Connected to Streams	Processing Timeline	Actions
Pipeline test Testing if pipelines work Throughput: 0 msg/s	Not connected	<div>Stage 0</div>	Delete Edit

In order to create or edit pipelines, and as explained in *Pipelines*, you need to add your rules to a stage, which has a certain priority. The Web interface will let you add rules to the default stage (priority 0), and to create new stages with potentially different priorities.



Pipeline *Pipeline test*

Pipelines let you transform and process messages coming from streams. Pipelines consist of stages where rules are evaluated and applied. Messages can go through one or more stages.

After each stage is completed, you can decide if messages matching all or one of the rules continue to the next stage.

[Manage pipelines](#) [Manage rules](#)

Details [Edit pipeline details](#)

Title: Pipeline test
Description: Testing if pipelines work
Created: 6 minutes ago
Last modified: a few seconds ago
Current throughput: 0 msg/s

Pipeline connections [Simulate processing](#) [Edit connections](#)

Select streams that will be processed by this pipeline.

Pipeline Stages [Add new stage](#)

Stages are groups of conditions and actions which need to run in order, and provide the necessary control flow to decide whether or not to run the rest of a pipeline.

Stage 0 Contains 1 rule
There are no further stages in this pipeline. Once rules in this stage are applied, the pipeline will have finished processing.
Throughput: 0 msg/s

Title	Description	Throughput	Errors
pipeline_field	Add pipeline field	0 msg/s	0 errors/s (0 total)

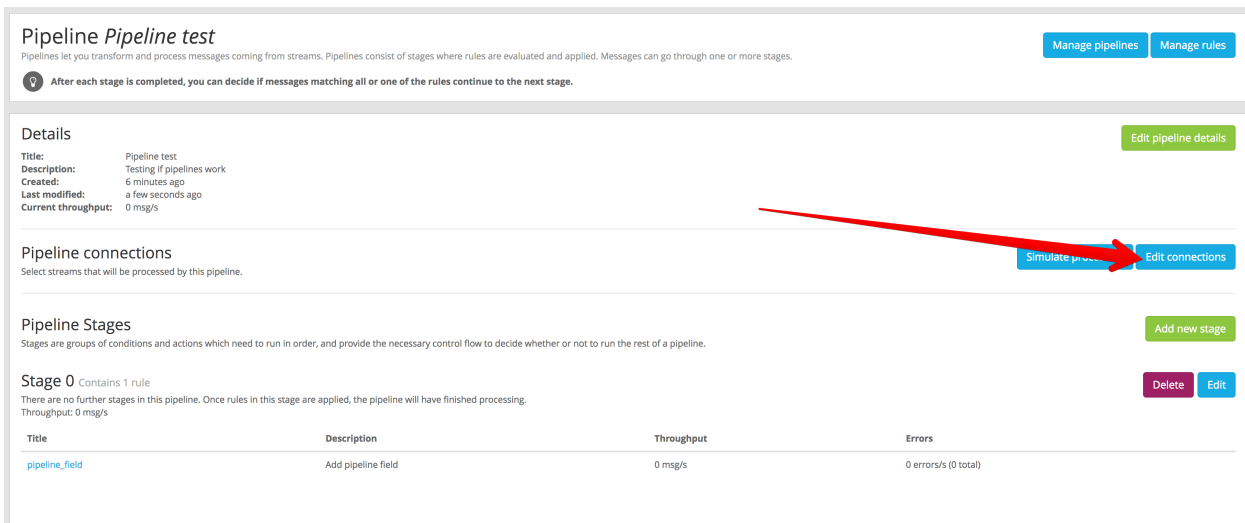
A pipeline can have more than one stage, and when you create or edit a stage you need to select how to proceed to the next stage in the pipeline:

All rules on this stage match the message This option will only consider further stages in the pipeline when all conditions in rules evaluated in this stage are `true`. This is equivalent to `match all` in the *Pipelines* section.

At least one of the rules on this stage matches the message Selecting this option will continue to further stages in the pipeline when one or more of the conditions in rules evaluated in this stage are `true`. This is equivalent to `match either` in the *Pipelines* section.

14.5.5 Connect pipelines to streams

You can decide which streams are connected to a pipeline from the pipeline details page. Under *System* -> *Pipelines*, click on the title of the pipeline you want to connect to a stream, and then click on the *Edit connections* button.



Pipeline *Pipeline test*

Pipelines let you transform and process messages coming from streams. Pipelines consist of stages where rules are evaluated and applied. Messages can go through one or more stages.

After each stage is completed, you can decide if messages matching all or one of the rules continue to the next stage.

[Manage pipelines](#) [Manage rules](#)

Details [Edit pipeline details](#)

Title: Pipeline test
Description: Testing if pipelines work
Created: 6 minutes ago
Last modified: a few seconds ago
Current throughput: 0 msg/s

Pipeline connections [Simulate processing](#) [Edit connections](#)

Select streams that will be processed by this pipeline.

Pipeline Stages [Add new stage](#)

Stages are groups of conditions and actions which need to run in order, and provide the necessary control flow to decide whether or not to run the rest of a pipeline.

Stage 0 Contains 1 rule
There are no further stages in this pipeline. Once rules in this stage are applied, the pipeline will have finished processing.
Throughput: 0 msg/s

Title	Description	Throughput	Errors
pipeline_field	Add pipeline field	0 msg/s	0 errors/s (0 total)

You can assign many pipelines to the same stream, in which case all connected pipelines will process messages routed into that stream based upon the overall order of stage priorities.

Remember, as mentioned in the [Stream connections](#) documentation, the *All messages* stream is where all messages are initially routed, and is therefore a good place to apply pipelines applicable to all of your messages. Such pipelines might be responsible for stream routing, blacklisting, field manipulation, etc.

14.5.6 Simulate your changes

After performing some changes in a processing pipeline, you most likely want to see how they are applied to incoming messages. This is what the pipeline simulator is for.


Click the *Simulate processing* button under *System -> Pipelines* or in the pipeline details page to access the pipeline simulator.

In order to test the message processing you need to provide a raw message that will be routed into the stream you want to simulate. The raw message should use the same format Graylog will receive. For example: you can type a *GELF* message, in the same format your GELF library would send, in the *Raw message* field. Don't forget to select the correct codec for the message you provide.

After specifying the message and codec, click *Load message* to start the simulation and display the results.

Original message

This is the original message loaded from Graylog.

 034ab981-6fa3-11e6-b037-da2ac9141870 not stored

Timestamp	documentation
2016-08-31 19:47:40.696	yes
Stored in Index	message
Message is not stored	Testing processing pipelines
	source
	127.0.0.1
	timestamp
	2016-08-31T17:47:40.696Z

Simulation results

These are the results of processing the loaded message. Processing took 248 µs.

Changes in original message

034ab981-6fa3-11e6-b037-da2ac9141870

Added fields

pipeline
true

More results ▾

Changes summary

Results preview

Simulation trace

The simulation provides the following results:

Changes summary Provides a summary of modified fields in the original message, as well as a list of added and dropped messages.

Results preview Shows all fields in the processed message.

Simulation trace Displays a trace of the processing, indicating which rules were evaluated and which were executed. It also includes a timeline, in microseconds, to allow you to see which rules and pipelines are taking up the most time during message processing.

LOOKUP TABLES

Graylog 2.3 introduced the lookup tables feature. It allows you to lookup/map/translate message field values into new values and write them into new message fields or overwrite existing fields. A simple example is to use a static CSV file to map IP addresses to host names.

15.1 Components

The lookup table systems consists of four components.

- Data adapters
- Caches
- Lookup tables
- Lookup results

15.1.1 Data Adapters

Data adapters are used to do the actual lookup for a value. They might read from a CSV file, connect to a database or execute HTTP requests to receive the lookup result.

Data adapter implementations are pluggable and new ones can be added through plugins.

15.1.2 Caches

The caches are responsible for caching the lookup results to improve the lookup performance and/or to avoid overloading databases and APIs. They are separate entities to make it possible to reuse a cache implementation for different data adapters. That way, the data adapters do not have to care about caching and do not have to implement it on their own.

Cache implementations are pluggable and new ones can be added through plugins.

Important: The CSV file adapter reads the entire contents of the file into HEAP memory. Ensure that you size the HEAP accordingly.

Note: The CSV file adapter refreshes its contents within each check interval if the file was changed. If the cache was purged but the check interval has not elapsed, lookups might return expired values.

15.1.3 Lookup Tables

The lookup table component ties together a data adapter instance and a cache instance. It is needed to actually enable the usage of the lookup table in extractors, converters, pipeline functions and decorators.

15.1.4 Lookup Results

The lookup result is returned by a lookup table through the data adapter and can contain two types of data. A **single value** and a **multi value**.

The **single value** can be a string, number or boolean and will be used in extractors, converters, decorators and pipeline rules. In our CSV example to lookup host names for IP addresses, this would be the host name string.

A **multi value** is a map/dictionary-like data structure and can contain several different values. This is useful if the data adapter can provide multiple values for a key. A good example for this would be the geo-ip data adapter which does not only provide the latitude and longitude for an IP address, but also information about the city and country of the location. Currently, the multi value can only be used in a pipeline rule when using the `lookup()` pipeline function.

Example 1: Output for a CSV data adapter including a single value and a multi value.

Test lookup

You can manually trigger the data adapter using this form. The data will be not cached.

Key

Key to look up a value for.

Look up

Lookup result

```
{
  "single_value": "localhost",
  "multi_value": {
    "value": "localhost"
  },
  "ttl": 9223372036854776000,
  "empty": false
}
```

Example 2: Output for the geo-ip data adapter including a single value and a multi value.

Test lookup

You can manually trigger the data adapter using this form. The data will be not cached.

Key

Key to look up a value for.

Lookup result

```
{
  "single_value": "37.3845,-122.0881",
  "multi_value": {
    "city": {
      "confidence": null,
      "geoname_id": 5375480,
      "names": {
        "de": "Mountain View",
        "ru": "Маунтин-Вью",
        "ja": "マウンテンビュー",
        "en": "Mountain View",
        "fr": "Mountain View",
        "zh-CN": "芒廷维尤"
      }
    }
  },
  "continent": {
```

15.2 Setup

The lookup tables can be configured on the “System/Lookup Tables” page.

You need to create at least one data adapter and one cache before you can create your first lookup table. The following example setup creates a lookup table with a CSV file data adapter and an in-memory cache.

15.2.1 Create Data Adapter

Navigate to “System/Lookup Tables” and click the “Data Adapters” button in the top right corner. Then you first have to select a data adapter type.

Every data adapter form includes data adapter specific documentation that helps you to configure it correctly.

graylog

SearchStreamsAlertsDashboardsSourcesSystem / Lookup Tables

In 39 / Out 39 msg/sHelpAdministrator

Data adapters for Lookup Tables

Data adapters provide the actual values for lookup tables

Lookup TablesCaches

Data Adapter Type

CSV File

The type of data adapter to configure.

Configure Adapter

Title

Host names

A short title for this data adapter.

Description

IP address to host name mappings

Data adapter description.

Name

host-names

The name that is being used to refer to this data adapter. Must be unique.

File path

/var/tmp/host-names.csv

The path to the CSV file.

Check interval

60

The interval to check if the CSV file needs a reload. (in seconds)

Separator

,

The delimiter to use for separating entries.

Quote character

"

The character to use for quoted elements.

Key column

ipaddr

The column name that should be used for the key lookup.

Value column

hostname

The column name that should be used as the value for a key.

Create Adapter

The CSV data adapter can read key value pairs from a CSV file.
Please make sure your CSV file is formatted according to your configuration settings.

CSV file requirements:

The first line in the CSV file needs to be a list of field/column names
The file uses **utf-8** encoding
The file is readable by **every** Graylog server node

Example 1

Configuration

Separator: ,
Quote character: "
Key column: ipaddr
Value column: hostname

CSV File

"ipaddr","hostname"
"127.0.0.1","localhost"
"10.0.0.1","server1"
"10.0.0.2","server2"

Example 2

Configuration

Separator: ;
Quote character: '"
Key column: ipaddr
Value column: hostname

CSV File

'ipaddr';'lladdr';'hostname'
'127.0.0.1';'e4:b2:11:d1:38:14';'localhost'
'10.0.0.1';'e4:b2:12:d1:48:28';'server1'
'10.0.0.2';'e4:b2:11:d1:58:34';'server2'

15.2.2 Create Cache

Navigate to “System/Lookup Tables” and click the “Caches” button in the top right corner. Then you first have to select a cache type.

Every cache form includes cache specific documentation that helps you to configure it correctly.

graylog

SearchStreamsAlertsDashboardsSourcesSystem / Lookup Tables

In 42 / Out 42 msg/sHelpAdministrator

Caches for Lookup Tables

Caches provide the actual values for lookup tables

Lookup TablesData Adapters

Cache Type

Node-local, in-memory cache

The type of cache to configure.

Configure Cache

Title

Node Memory Cache

A short title for this cache.

Description

Node local In-memory cache

Cache description.

Name

in-memory

The name that is being used to refer to this cache. Must be unique.

Maximum entries

1000

The limit of the number of entries the cache keeps in memory.

Expire after access

☒ 60 seconds

If enabled, entries are removed from the cache after the specified time from when they were last used.

Expire after write

☐ 0 seconds

If enabled, entries are removed from the cache after the specified time from when they were first used.

Create Cache

The in-memory cache maintains recently used values from data adapters.
Please make sure your Graylog servers have enough heap to accomodate the cached entries and monitor the cache efficiency.

Implementation details

The cache is local to each Graylog server, they do not share the entries.
For example, if you have two servers, they will maintain a completely independent cache from each other.

Cache size

Every cache has a maximum number of entries, unbounded caches are not supported.

Time-based expiration

Expire after access

The cache will remove entries after a fixed time since they have been used the last time.
This results in the cache behaving as a space limited least recently used cache.

Expire after write

The cache will remove entries after a fixed time since they have been entered into the cache.
This results in entries that are never older than the given time, which can be important for regularly changing data, such as configuration state of external systems.

15.2.3 Create Lookup Table

Now you can create a lookup table with the newly created data adapter and cache by navigating to “System/Lookup Tables” and clicking “Create lookup table”.

Make sure to select the data adapter and cache instances in the creation form.

Lookup Tables
Lookup tables can be used in extractors, converters and processing pipelines to translate message fields or to enrich messages.

[Caches](#) [Data Adapters](#)

Title
A short title for this lookup table.

Description
Description of the lookup table.

Name
The name that is being used to refer to this lookup table. Must be unique.

☐ **Enable single default value**
Enable if the lookup table should provide a default for the single value.

☐ **Enable multi default value**
Enable if the lookup table should provide a default for the multi value.

Data Adapter
Select an existing data adapter

Cache
Select an existing cache

[Create Lookup Table](#)

Default Values

Every lookup table can optionally be configured with default values which will be used if a lookup operation does not return any result.

Lookup Tables
Lookup tables can be used in extractors, converters and processing pipelines to translate message fields or to enrich messages.

[Caches](#) [Data Adapters](#)

Title
A short title for this lookup table.

Description
Description of the lookup table.

Name
The name that is being used to refer to this lookup table. Must be unique.

☒ **Enable single default value**
Enable if the lookup table should provide a default for the single value.

Default single value
The single value that is being used as lookup result if the data adapter or cache does not find a value.

☒ **Enable multi default value**
Enable if the lookup table should provide a default for the multi value.

Default multi value
The multi value that is being used as lookup result if the data adapter or cache does not find a value.

Data Adapter
Select an existing data adapter

Cache
Select an existing cache

[Create Lookup Table](#)

15.3 Usage

Lookup tables can be used with the following Graylog components.

- Extractors
- Converters
- Decorators
- Pipeline rules

15.3.1 Extractors

A lookup table extractor can be used to lookup the value of a message field in a lookup table and write the result into a new field or overwrite an existing field.

graylog Search Streams Alerts Dashboards Sources System / Inputs In 200 / Out 200 msg/s Help Administrator

New extractor for input *RAW TCP*

Extractors are applied on every message that is received by an input. Use them to extract and transform any text data into fields that allow you easy filtering and analysis later on.

[Find more information about extractors in the documentation.](#)

Example message

```
10.0.0.18
```

Wrong example? You can [load another message](#).

Extractor configuration

Extractor type Lookup Table

Source field source

Lookup Table Host names [Try](#)

Lookup tables can be created [here](#).

Condition

- ☒ Always try to extract
- ☐ Only attempt extraction if field contains string
- ☐ Only attempt extraction if field matches regular expression

Extracting only from messages that match a certain condition helps you avoiding wrong or unnecessary extractions and can also save CPU resources.

Store as field hostname

Choose a field name to store the extracted value. It can only contain alphanumeric characters and underscores. Example: `http_response_code`.

Extraction strategy ☒ Copy ☐ Cut

Do you want to copy or cut from source? You cannot use the cutting feature on standard fields like message and source.

Extractor title Lookup host name from IP address

A descriptive name for this extractor.

Add converter Select a converter [Add](#)

Add converters to transform the extracted value.

[Create extractor](#)

15.3.2 Converters

When you use an extractor to get values out of a text message, you can use a lookup table converter to do a lookup on the extracted value.

15.3.4 Pipeline Rules

There are two lookup functions that can be used in a pipeline rule, `lookup()` and `lookup_value()`. The first returns the **multi value** data of the lookup result, the second returns the **single value**.

Create pipeline rule

Rules are a way of applying changes to messages in Graylog. A rule consists of a condition and a list of actions. Graylog evaluates the condition against a message and executes the actions if the condition is satisfied.

[Read more about Graylog pipeline rules in the documentation.](#)

[Manage pipelines](#) [Manage rules](#) [Simulator](#)

Title

You can set the rule title in the rule source. See the quick reference for more information.

Description

Host name lookup

Rule description (optional):

Rule source

```
1 rule "host-name-lookup"
2   when true
3   then
4     let hostname = lookup_value("host-names", $message.source);
5     set_field("hostname", hostname);
6   let geo = lookup("geo-ip", $message.source);
7     set_field("country_code", geo.country.iso_code);
8   end
9 end
```

Rule source, see quick reference for more information.

[Save](#) [Cancel](#)

Rules quick reference

Read the [full documentation](#) to gain a better understanding of how Graylog pipeline rules work.

[Functions](#) [Example](#)

This is a list of all available functions in pipeline rules. Click on a row to see more information about the function parameters.

Function	Description
<code>to_bool(value, [default]) : Boolean</code>	Converts a value to a boolean value using its string representation
<code>to_double(value, [default]) : Double</code>	Converts a value to a double value using its string representation
<code>to_long(value, [default]) : Long</code>	Converts a value to a long value using its string representation
<code>to_string(value, [default]) : String</code>	Converts a value to its string representation
<code>has_field(field, [message]) : Boolean</code>	Checks whether a message contains a value for a field
<code>set_field(field, value, [prefix], [suffix], [message]) : Void</code>	Sets a new field in a message
<code>set_fields(fields, [prefix], [suffix], [message]) : Void</code>	Sets new fields in a message
<code>rename_field(old_field, new_field, [message]) : Void</code>	Rename a message field
<code>remove_field(field, [message]) : Void</code>	Removes a field from a message
<code>drop_message([message]) : Void</code>	Discards a message from further processing

15.4 Built-in Data Adapters

The following Data Adapters are shipped with Graylog by default. Detailed on-screen documentation for each is available on the Add/Edit Data Adapter page in Graylog.

15.4.1 CSV File Adapter

Performs key/value lookups from a CSV file.

15.4.2 DNS Lookup Adapter

Provides the ability to perform the following types of DNS resolutions:

- Resolve hostname to IPv4 address (A records)
- Resolve hostname to IPv6 address (AAAA records)
- Resolve hostname to IPv4 and IPv6 address (A and AAAA records)
- Reverse lookup (PTR record)
- Text lookup (TXT records)

15.4.3 DSV File from HTTP Adapter

Performs key/value from a DSV file. This adapter supports more advanced customization than the CSV File adapter (such a custom delimiter and customizable key/value columns).

15.4.4 HTTP JSONPath Adapter

Executes HTTP GET requests to lookup a key and parses the result based on configured JSONPath expressions.

15.4.5 Geo IP - MaxMind Databases

Provides the ability to extract geolocation information of IP addresses from MaxMind ASN, Country and City databases.

15.5 Enterprise Data Adapters

Graylog Enterprise brings another Lookup Table Data Adapter.

15.6 MongoDB

This data adapter stores its keys and values in the Graylog configuration database. The entries of the database can be altered via pipeline functions and HTTP Rest API calls. That way you can alter the result of the lookup table call based on incoming logs or from an external source.

15.6.1 Alter from HTTP Rest API

For a detail look on how to interact with the MongoDB Data Adapter please have a look at the [API browser](#) at `api/api-browser/#!/Plugins/MongoDBDataAdapter`. There you can see that you can add, update, list and delete key value pairs of the data adapter.

Here an example on how to add a key to an mongodb adapter with an api token:

```
curl -u d2tirtpunshmgdsbq5k3j0g4ku230ggruhsqpa0iu7mj1lia55i:token \
  -H 'X-Requested-By: cli' -H 'Accept: application/json' \
  -X POST 'http://127.0.0.1:9000/api/plugins/org.graylog.plugins.lookup/lookup/
↪adapters/mongodb/mongodb-data-name' \
  -H 'Content-Type: application/json' \
  --data-binary '${\n"key": "myIP",\n"values": ["12.34.42.99"],\n"data_adapter_id":
↪"5e578606cdda4779dd9f2611"\n}'
```

15.6.2 Alter from Pipeline Function

A reference of the pipeline functions handling the lookup table values can be found in the *pipeline rules functions* section of the documentation.

15.6.3 Alter from GUI

The values of the mongodb adapter can also be altered directly via the GUI.

The screenshot displays the Graylog GUI for configuring a MongoDB adapter. On the left, the 'Data Adapter (MongoDB)' configuration form includes fields for Title, Description, Name, and Custom Error TTL, along with an 'Update Adapter' button. On the right, the 'Create/update entries' section allows adding new entries with a Key and a list of Values. Below this, the 'Configured keys and values' table lists existing entries with their keys and values, and provides 'Edit' and 'Delete' actions for each.

Data Adapter (MongoDB)

Title IP lookup table
A short title for this data adapter.

Description mongodb
Data adapter description.

Name mongodb-data-adapter
The name that is being used to refer to this data adapter. Must be unique.

Custom Error TTL 1 minutes
Define a custom TTL for caching erroneous results. Otherwise the default of 5 seconds is used

Update Adapter

Create/update entries

Key neutralips
The lookup key name

Values 10.0.0.1
10.0.1.1
A list of values, one value per line.

Add new entry **Clear form**

Configured keys and values

Enter search query... **Search** **Reset** **Show:** 10

Key	Values	Action
badIPs	1. "172.16.0.23" 2. "192.168.4.1"	Edit Delete
goodIPs	1. "127.0.0.1" 2. "..."	Edit Delete

« 1 »

Attention: To add multiple values for one key, you need to separate the values by new lines.

GEOLOCATION

Graylog lets you extract and visualize geolocation information from IP addresses in your logs. Here we will explain how to configure the geolocation resolution, and how to create a map with the extracted geo-information.

16.1 Setup

Graylog ships with geolocation capabilities by default but **some configuration is still required on your side**. This section explains how to configure the functionality in detail.

On Graylog 3.0, the preferred way of configuring geolocation is by using *Lookup Tables*, as it provides more flexibility and is compatible with more database types. If you would rather use the old Message Processor, please check the [2.5 documentation](#).

Note: Before you get started, we recommend taking a look at some Lookup Table concepts in [the documentation](#).

16.1.1 Download the database

In the first place, you need to download a geolocation database. The Lookup Table Geo IP Data Adapter supports both **MaxMind City and Country databases** in the **MaxMind DB format**, as the [GeoIP2 Databases](#) or [GeoLite2 Databases](#) that MaxMind provides.

The next step is to store the geolocation database on all servers running Graylog. Make sure you grant the right permissions to the file so the user running Graylog can read the database.

Note: As-of December 30, 2019, you will need to create an account to obtain a license key to download the database(s).

More information is available on [MaxMind's blog post](#).

16.1.2 Configure Lookup Table

The next step is to configure a Graylog Lookup Table that is able to use the geolocation database. Follow the [Lookup Tables setup documentation](#) to see what you need to do. In most common cases you need to:

1. Create a Geo IP Data Adapter and point it to the location where you store the database. You can additionally test the Data Adapter to ensure it all works as expected.
2. Create a Cache (if needed) to make your lookups faster.
3. Create a Lookup Table that uses the Data Adapter and Cache you created in previous steps.

16.1.3 Use the Lookup Table

Now you are almost ready to extract geolocation information from IP addresses. All you need to do is to use the Lookup Table you created in the previous step in a Extractor, Converter, Decorator or Pipeline Rule. Take a look at the [Lookup Tables usage documentation](#) for more information.

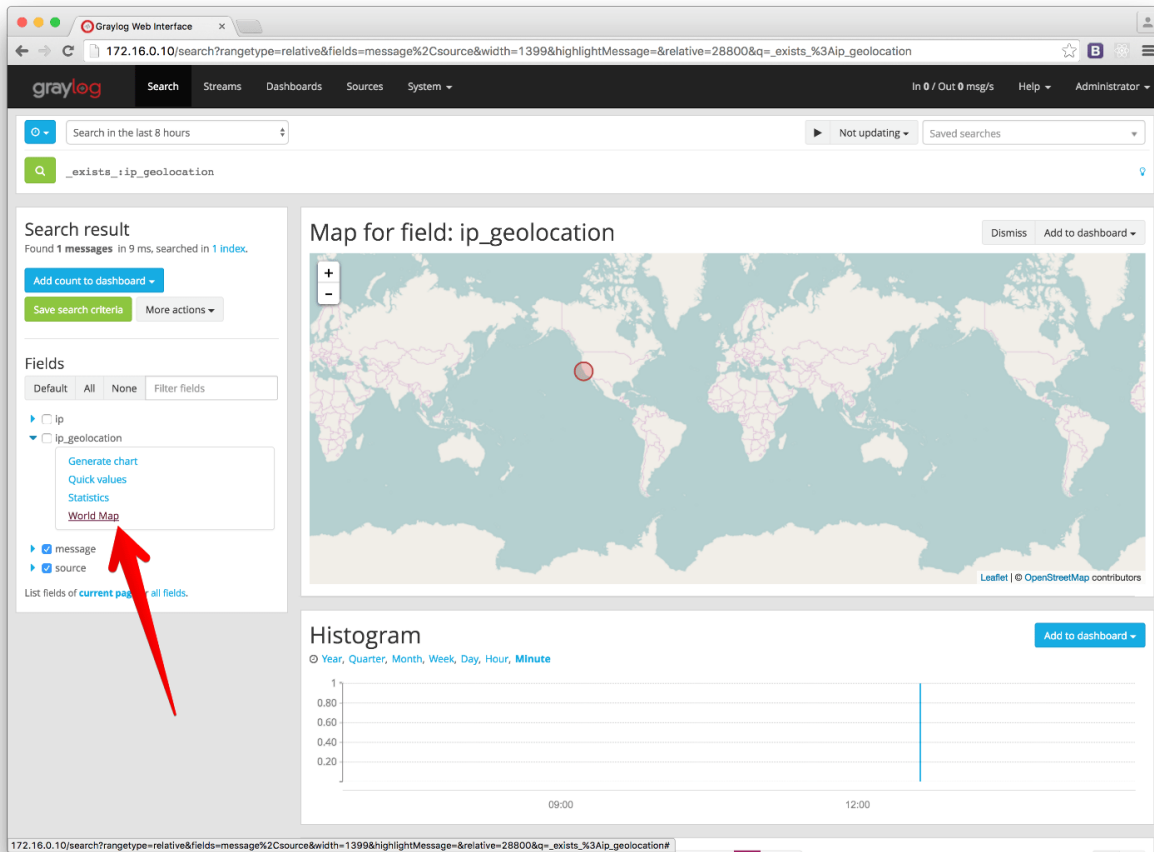
Note: Make sure to read [The importance of message processor ordering](#), specially if you will use the Lookup Table with a Pipeline, in order to better understand how Graylog will process messages.

16.2 Visualize geolocations in a map

Graylog can display maps from geolocation stored in any field, as long as the geo-points are using the `latitude`, `longitude` format. The default return value of the Geo IP Data Adapter returns the coordinates in the right format, so you most likely don't need to do anything special if you are using a Lookup Table for extracting geolocation information.

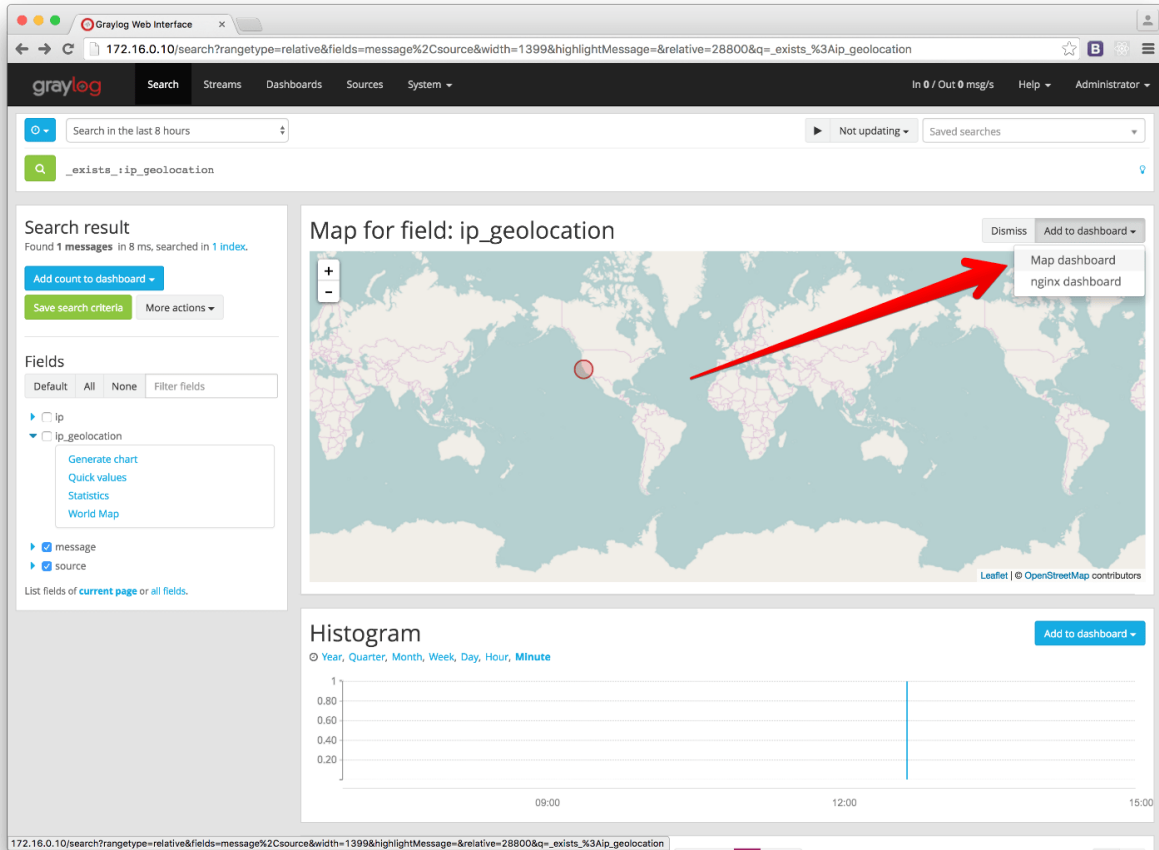
16.2.1 Display a map in the search results page

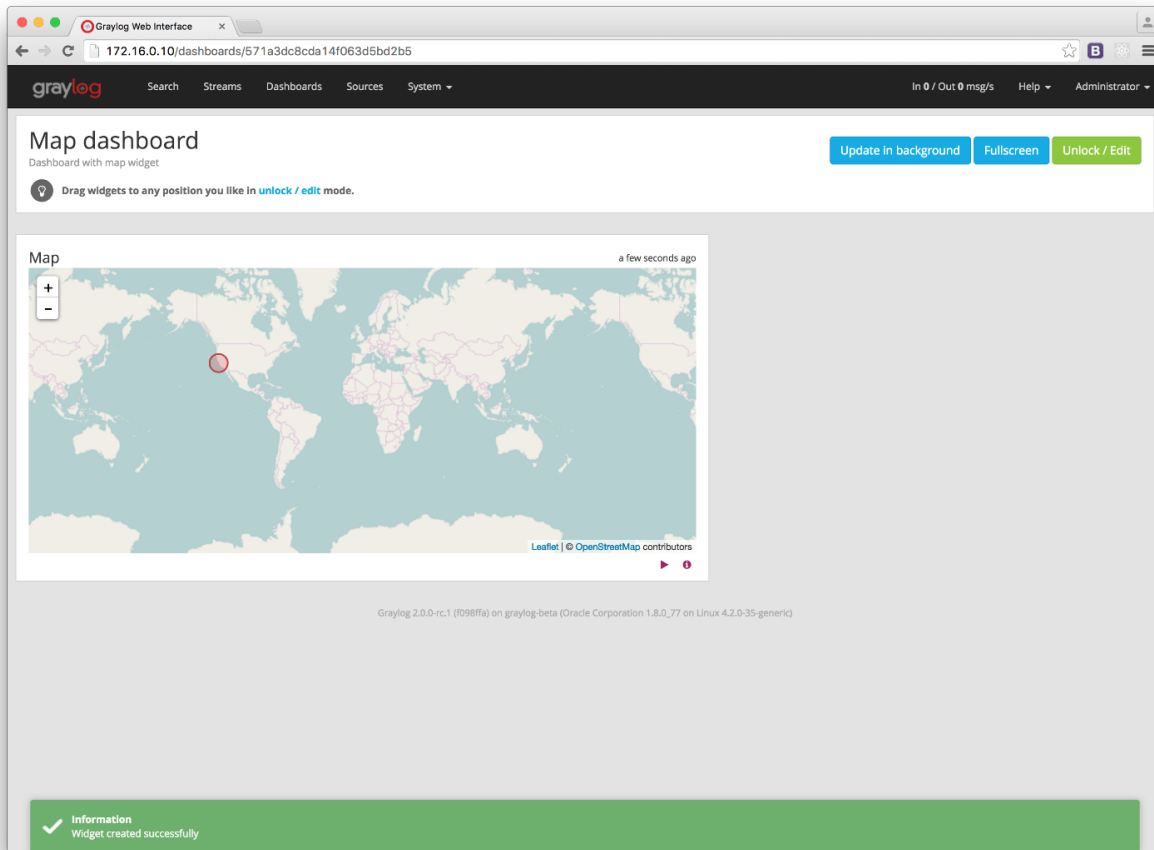
On any search result page, you can expand the field you want to use to draw a map in the search sidebar, and click on the *World Map* link. That will show a map with all different points stored in that field.



16.2.2 Add map to a dashboard

You can add the map visualization into any dashboards as you do with other widgets. Once you displayed a map in the search result page, click on *Add to dashboard*, and select the dashboard where you want to add the map.





16.3 FAQs

16.3.1 Will Graylog extract IPs from all fields?

No, you can configure which fields you want to extract data from in the Pipeline Rule or Extractor using the Lookup Table configured in the [setup section](#).

16.3.2 What geo-information is extracted from IPs?

Depending on the database you use, the extracted information will be different. By using a Pipeline Rule alongside a Lookup Table, you can extract any information returned by the MaxMind Database for the IP in your logs.

16.3.3 Where is the extracted geo-information stored?

Extracted geo-information is stored in message fields, which you can name as you wish.

16.3.4 Which geo-points format does Graylog use to store coordinates?

Graylog returns the geolocation information in the `latitude, longitude` format. The Map visualization also requires that format to be able to draw the coordinates on a map.

16.3.5 I have a field in my messages with coordinates information already, can I use it in Graylog?

Yes, you can display a map for coordinates as long as they are in the `latitude, longitude` format.

16.3.6 Not all fields containing IP addresses are resolved. Why does this happen?

Most likely it is a misconfiguration issue. It is easier to extract information if **IP addresses are in their own field**. You should also make sure your **Message Processors are in the right order** in the *Message Processors Configuration*, as explained in *The importance of message processor ordering*.

INDEXER FAILURES

Every Graylog node is constantly keeping track about every indexing operation it performs. This is important for making sure that you are not silently losing any messages. The web interface can show you a number of write operations that failed and also a list of failed operations. Like any other information in the web interface this is also available via the REST APIs so you can hook it into your own monitoring systems.

The screenshot shows the Graylog web interface. At the top is a navigation bar with links: Search, Streams, Alerts, Dashboards, Sources, System / Overview, In 144 / Out 144 msg/s, Help, and Administrator. Below the navigation bar is a section titled 'elasticsearch cluster' with a message: 'The possible Elasticsearch cluster states and more related information is available in the [Graylog documentation](#).' Below this is a green box with a checkmark and the text: 'Elasticsearch cluster is green. Shards: 25 active, 0 initializing, 0 relocating, 0 unassigned, [What does this mean?](#)'. Below this is a section titled 'Indexer failures' with a message: 'Every message that was not successfully indexed will be logged as an indexer failure. You can learn more about this feature in the [Graylog documentation](#).' Below this is a green box with a checkmark and the text: 'No failed indexing attempts in the last 24 hours.' To the right of this box is a blue button labeled 'Show errors'. Below this is a section titled 'Time configuration' with the text: 'Dealing with timezones can be confusing. Here you can see the timezone applied to different components of your system. You can check timezone settings of specific graylog-server nodes on their respective detail page.' Below this is a table with the following data:

User admin:	2017-02-07 13:32:09 +00:00
Your web browser:	2017-02-07 14:32:09 +01:00
Graylog server:	2017-02-07 14:32:09 +01:00

Information about the indexing failure is stored in a capped MongoDB collection that is limited in size. A lot (many tens of thousands) of failure messages should fit in there but it should not be considered a complete collection of all errors ever thrown.

17.1 Common indexer failure reasons

There are some common failures that can occur under certain circumstances. Those are explained here:

17.1.1 MapperParsingException

An error message would look like this:

```
MapperParsingException[failed to parse [failure]]; nested: NumberFormatException[For_
↪input string: "some string value"];
```

You tried to write a `string` into a numeric field of the index. The indexer tried to convert it to a number, but failed because the `string` did contain characters that could not be converted.

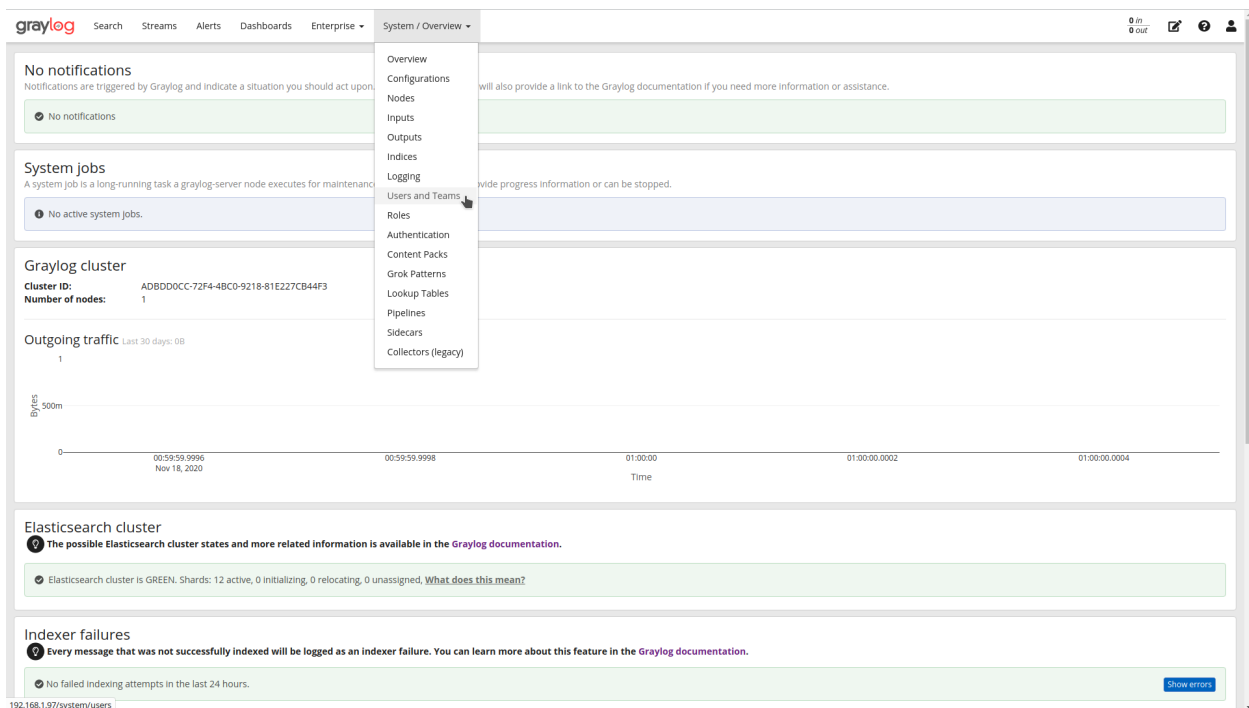
This can be triggered by for example sending GELF messages with different field types or extractors trying to write strings without converting them to numeric values first. **The recommended solution is to actively decide on field types.** If you sent in a field like `http_response_code` with a numeric value then you should never change that type in the future.

The same can happen with all other field types like for example booleans.

Note that index cycling is something to keep in mind here. The first type written to a field per index wins. If the Graylog index cycles then the field types are starting from scratch for that index. If the first message written to that index has the `http_response_code` set as `string` then it will be a `string` until the index cycles the next time. Take a look at [Index model](#) for more information.

PERMISSION MANAGEMENT

Graylog 4.0 introduced a completely new way of assigning permissions to users. The new version splits up the various sections of the permission and authentication system:



There are five different parts to it:

- Authentication
- Users
- Roles
- Teams
- Sharing

Teams and Sharing provides organizations with large user groups and multiple teams accessing Graylog to manage their own content on a day-to-day basis more efficiently. By giving individual teams and users control over their own content needs, these features reduce the time administrators spend responding to access and dashboard requests.

First, Graylog syncs with your organization's authoritative identity source, such as Active Directory or LDAP, so that users are automatically provisioned into Graylog with the appropriate rights and permissions. Then, Graylog auto-

populates access using the current roles and AD or LDAP groups, reflecting the organizational permissions structure. However, organizations can still manually manage access and permissions if necessary.

Second, Graylog Enterprise users can create Teams that can be easily found through a natural language search. For example, you can create teams such as “Security Team,” making it easier to find users with similar data needs. Graylog Enterprise leverages your authoritative identity source to populate Teams. The Teams functionality allows you to separate users into smaller groups within the organization, containing dashboards and reports to those assigned Teams and reducing informational noise generated from an excess of reports.

For smaller teams, the lack of Group Mapping has little impact. Group Mapping and Teams primarily prevent an overabundance of reports showing up in Users’ streams and dashboards. For smaller organizations using Open Source, removing this functionality has little impact. For Enterprise customers, Group Mapping and Teams enables them to reduce the proliferation of reports across all users, confining information to those who need it, reducing noise, and enhancing security.

18.1 Authentication

Graylog had pluggable authentication providers for a long time, but we have updated them for 4.0. In 4.0 only one external authentication provider can be active. We have removed the UI around changing the order these providers run, as there was practically no usage of this feature and it made reasoning about what happened in the background very difficult for the user.

Both LDAP and Active Directory continue to be available out of the box for Graylog Open Source and we have no plans on changing this. We believe that user access control is an essential feature of a logging solution. We have also added the “trusted HTTP header” authentication method to Graylog. This feature, in conjunction with a proxy server, is sometimes used to enable authentication providers that Graylog does not have support for, such as keycard systems, Kerberos, and others.

Both LDAP and Active Directory now support the synchronization of teams. Because teams are only available in Graylog Enterprise, the Open Source product no longer has Group Mapping.

In Enterprise Graylog will synchronize chosen LDAP/AD groups to teams when an authentication service is activated. Graylog will then keep the team members up to date as they log into the system.

Create Active Directory Authentication Service
Configure Graylog's authentication services of this Graylog cluster.

[Read more authentication in the documentation.](#)

[Authentication Services](#) [Authenticators](#)

[View Active Service](#) [Edit Active Service](#) [Create Service](#)

Server Configuration **User Synchronization** **Group Synchronization (Opt.)**

Introduction
This step enables importing Active Directory groups as Graylog teams. The group synchronization can be activated by clicking on the checkbox with the label *Enable Group Synchronization*. Afterwards fill out the form and test your settings in the second section *Load matching groups*. The last section *Select groups to import* allows you to specify which groups you want to import.

Enable Group Synchronization ☐ Synchronize Groups
Select this option if you want to import groups as teams

Group Search Base DN
Group Search Base
The base tree to limit the Active Directory group search query to, e.g. `ou=people,dc=example,dc=com`.

Group Search Pattern
(objectClass=group)
The search pattern used to find groups in Active Directory for mapping to Graylog teams, e.g. `(objectClass=group)`.

Team Name Attribute
cn
Which Active Directory attribute to use for the full name of the team in Graylog, e.g. `cn`.

Default Team Roles (Opt.)
Search for roles
The default Graylog roles synchronized teams will obtain. All users of a team will inherit these roles.

Load matching groups
Matching Groups [Load matching groups](#)

Select groups to import
Selection type ☒ All groups ☐ Include selected ☐ Exclude selected
With include / exclude you can select which groups you want / do not want to synchronize.

192.168.1.97/system/authentication/authenticator

Teams created in this way cannot be manually managed in Graylog, they have to be managed in the original identity provider. This means you cannot add or remove members from the team, but you can (and should) configure the roles the team brings with it.

18.2 Users

The User section shows a list of existing users including additional information that is useful to get a quick overview.

Users Overview
Overview of Graylog's registered users.

[Users Overview](#) [Teams Overview](#)

[Learn more in the documentation](#) [Create User](#)

System Administrator
The system administrator can only be edited in the graylog configuration file.

Full name	Username	E-Mail Address	Client Address	Enabled	Role	Actions
Administrator	admin		127.0.0.1	✓	Admin	System user Edit tokens

Users
Found 3 registered users on the system.

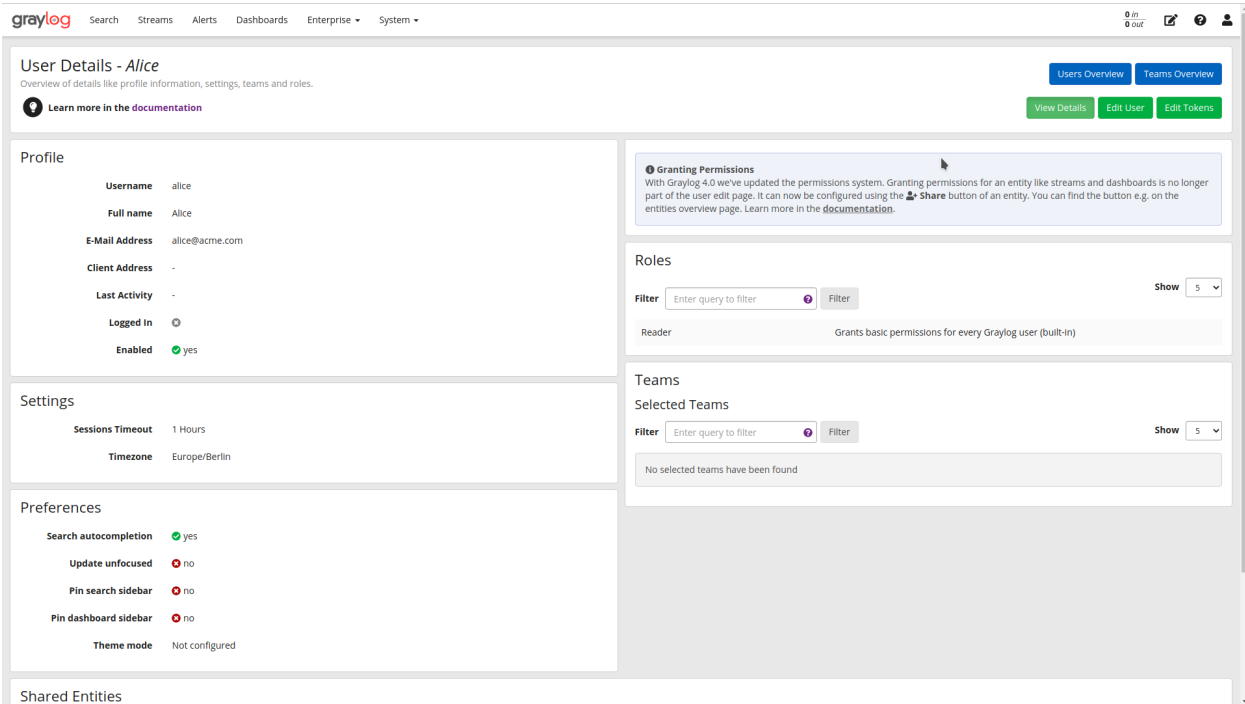
Enter search query... [Search](#) [Reset](#) Show 10

Full name	Username	E-Mail Address	Client Address	Enabled	Role	Actions
Alice	alice	alice@acme.com		✓	Reader	Edit More actions
Report System User (built-in)	graylog-report	report@graylog.local		✓	Report System (Internal) Reader Views Manager	Edit More actions
Sidecar System User (built-in)	graylog-sidecar	sidecar@graylog.local		✓	Reader Sidecar System (Internal)	Edit More actions

Graylog 4.0.0-9376305 on graylog (Private Build 1.8.0_275 on Linux 4.15.0-124-generic)

192.168.1.97/system/users

There is a new user view screen, that was not present in earlier versions. It shows basic profile information, the assigned roles, team membership for this user, and the “entities” that the user has been granted access to. Entities are things like Streams, Saved Searches, Dashboards, Alert Definitions, and Notifications.



The corresponding “Edit User” screen contains the same information but allows changes to profile information according to the permissions the user has (e.g. they cannot add themselves to arbitrary groups etc).

18.3 Roles

In 4.0, Roles have a more central position. While Graylog still has some of the same Roles, such as Administrator and Reader, it also includes some new ones. Since roles no longer contain information about which access is granted, it makes no sense to map LDAP/AD groups to them, and without Teams, there is no way to automatically group users.

Starting in 4.0, roles in general only describe capabilities. For example, you can now assign Roles like “Dashboard Creator”, “Event Definition Creator”, and “Event Notification Creator”. These Roles are now actions that users can take within Graylog. This permission system is based on grants, like in a database, where it records access to entities based on user access levels. This shift enhances an organization’s security posture by enabling organizations to limit access more precisely within the Graylog platform, reducing excess access risk.

Additionally, since Graylog 4.0 now supports “sharing” functionality, granting access to streams and dashboards is no longer part of the “edit Roles” capability. Standard out-of-the-box roles are:

- Admin
- Alerts Manager
- Archive Manager
- Archive Viewer
- Dashboard Creator
- Event Definition Creator

- Event Notification Creator
- Reader
- Report Creator
- Report Manager
- Teams Inspector
- User Inspector

With Graylog 4.0, Roles no longer define what entities a user can see, but the types of actions they can take. With this update, organizations no longer have the need to create custom roles.

For organizations upgrading to Graylog 4.0, the server will look at each user’s capabilities and access levels then migrate that to the new sharing system.

Roles Overview
Overview of Graylog's roles. Roles allow granting capabilities to users, like creating dashboards or event definitions.

Granting Permissions
With Graylog 4.0 we've updated the permissions system and changed the purpose of roles. The built-in roles still allow granting capabilities to users, like creating dashboards or viewing the archive catalog. But they no longer grant permissions for a specific dashboard or stream. It is also not possible to create an own role. Granting permissions for a specific entity can now be done by using its **Share** button. You can find the button e.g. on the entities overview page. If you want to grant permissions for an entity to multiple users at once, you can use teams. Learn more in the [documentation](#).

Roles
Found 14 roles on the system.

Name	Description	Users	Actions
Admin	Grants all permissions for Graylog administrators (built-in)	0	Edit
Alerts Manager	Allows reading and writing all event definitions and event notifications (built-in)	0	Edit
Archive Manager	Grants full control over the archive configuration and management (built-in)	0	Edit
Archive Viewer	Grants read access to the archive catalog (built-in)	0	Edit
Dashboard Creator	Allows creation of Dashboards (built-in)	0	Edit
Event Definition Creator	Allows creation of Event Definitions (built-in)	0	Edit
Event Notification Creator	Allows creation of Event Notifications (built-in)	0	Edit
Reader	Grants basic permissions for every Graylog user (built-in)	2 graylog-report, graylog-sidecar	Edit
Report Manager	Grants full control over report configurations and read access to dashboards and users (built-in)	0	Edit
Report System (Internal)	Internal technical role. Grants Report System User necessary access to generate reports (built-in)	1 graylog-report	Edit

Graylog 4.0.0-9376305 on graylog (Private Build 1.8.0.275 on Linux 4.15.0-124-generic)

192.168.1.97/system/roles

The information which specific entity a user or team has access to is managed through “sharing” on the entity itself, not through a role.

As an example, in earlier versions of Graylog, to give access to a stream containing windows logs and the corresponding dashboard visualizing them, an administrator had to create a role: “Windows Logs”, having “Stream Windows Logs” as “Allow Reading”, and “Dashboard Windows Logs” as “Allow Reading”. This role was then assigned to a user, either manually or via a group mapping.

In 4.0, there is no special role necessary for this access. Instead, the Administrator grants access to the stream, and either the Administrator or another owner of the dashboard shares access to the entities with a specific user or team. For most of the process, the user sharing the access does not have to have administrator-level access.

Roles now only govern what actions someone can take, but do not themselves state on which entities these actions can take place. The latter is done through the sharing dialog. (see the later section for details)

In 4.0 the UI does not allow defining new roles, even though this is still possible through the API. As there is much less need to create custom roles, we believe this is acceptable initially, but we plan on making custom roles possible in future releases.

18.3.1 Providing Dashboard Creation Access

Before users can create their own Dashboards, you need to provide them the appropriate level of access.

Under the “System” dropdown menu located in the top menu, click on the “Users and Teams” option. Choose the User record that you want to update.

Edit User - Alice
You can change the user details and password here and assign roles and teams.

[Learn more in the documentation](#)

[Users Overview](#) [Teams Overview](#)
[View Details](#) [Edit User](#) [Edit Tokens](#)

Profile

Username alice

Full Name
Give a descriptive name for this account, e.g. the full name.

E-Mail Address
Give the contact email address.

[Update Profile](#)

Settings

Sessions Timeout ☐ Sessions do not time out.
When checked sessions never time out due to inactivity.

Session automatically end after this amount of time, unless they are actively used.

Time Zone

Choose your local time zone or leave it as it is to use the system's default.

[Update Settings](#)

Password

New Password

Passwords must be at least 6 characters long. We recommend using a strong password.

Repeat Password

[Update Password](#)

Granting Permissions
With Graylog 4.0 we've updated the permissions system. Granting permissions for an entity like streams and dashboards is no longer part of the user edit page. It can now be configured using the [Share](#) button of an entity. You can find the button e.g. on the entities overview page. Learn more in the [documentation](#).

Roles

Assign Roles
 [Assign Role](#)

Selected Roles

Filter **Show**

Reader Grants basic permissions for every Graylog user (built-in)

Teams

Assign Teams
 [Assign Team](#) [Quick Create Team](#)

Selected Teams

Filter **Show**

No selected teams have been found

In the “Assign Roles” menu, you can change the individual user’s permissions to better align with their job function. In this case, the user, Alice, needs to be able to create Dashboards. Click on “Dashboard Creator,” then click “Assign Role.” Graylog automatically updates the user’s account, granting the necessary access immediately.

Edit User - Alice
You can change the user details and password here and assign roles and teams.

[Learn more in the documentation](#)

[Users Overview](#) [Teams Overview](#)
[View Details](#) [Edit User](#) [Edit Tokens](#)

Profile

Username

Full Name
Give a descriptive name for this account, e.g. the full name.

E-Mail Address
Give the contact email address.

[Update Profile](#)

Settings

Sessions Timeout ☐ Sessions do not time out
When checked sessions never time out due to inactivity.

Session automatically end after this amount of time, unless they are actively used.

Time Zone

Choose your local time zone or leave it as it is to use the system's default.

[Update Settings](#)

Password

New Password

Passwords must be at least 6 characters long. We recommend using a strong password.

Repeat Password

Roles
Assign Roles

[Assign Role](#)

Admin
Alerts Manager
Archive Manager
Archive Viewer
Dashboard Creator
Event Definition Creator
Event Notification Creator
Report Manager

[Show](#)

[X](#)

[Quick Create Team](#)

Selected Teams

Filter

[Show](#)

No selected teams have been found

Granting Permissions
With Graylog 4.0 we've updated the permissions system. Granting permissions for an entity like streams and dashboards is no longer part of the user edit page. It can now be configured using the [Share](#) button of an entity. You can find the button e.g. on the entities overview page. Learn more in the [documentation](#).

After providing “Dashboard Creator” access to users, they will be able to see the “Create a Dashboard” button on the upper right-hand side of their Dashboards view.

Dashboards
Use dashboards to create specific views on your messages. Create a new dashboard here and add any graph or chart you create in other parts of Graylog with one click.

[Take a look at the dashboard tutorial for lots of other useful tips.](#)

[Create new dashboard](#)

[Show](#)

There are no views present/matching the filter!

Graylog 4.0.0+9376305 on graylog (Private Build 1.8.0_275 on Linux 4.15.0-124-generic)

192.168.1.97/dashboards/new

18.4 Teams

Teams join users and roles together. Users can be in any number of teams, from zero to multiple teams. Each team can be assigned any number of roles, from zero to multiple many roles, which are added to the team's members when checking for permissions.

Currently, team management requires an Administrator account. Now that Roles have transitioned to defining capabilities, Administrators can use Teams as a way to provide Roles to multiple users at once, rather than providing the capabilities individually. For large organizations, this reduces the amount of time spent managing individual user access.

Creating a team requires minimal information about it and allows assigning roles and members directly:

Team Create
Create new team and assign users.

[Users Overview](#) [Teams Overview](#) [Create Team](#)

Profile

Name
The name of the team

Description
A description about the team

Users

Assign Users [Assign User](#)

Selected Users No selected users

Roles

Assign Roles [Assign Role](#)

Selected Roles No selected roles

[Create Team](#) [Cancel](#)

Graylog 4.0.0-9376305 on graylog (Private Build 1.8.0_275 on Linux 4.15.0-124-generic)

192.168.1.97/systems/teams/new

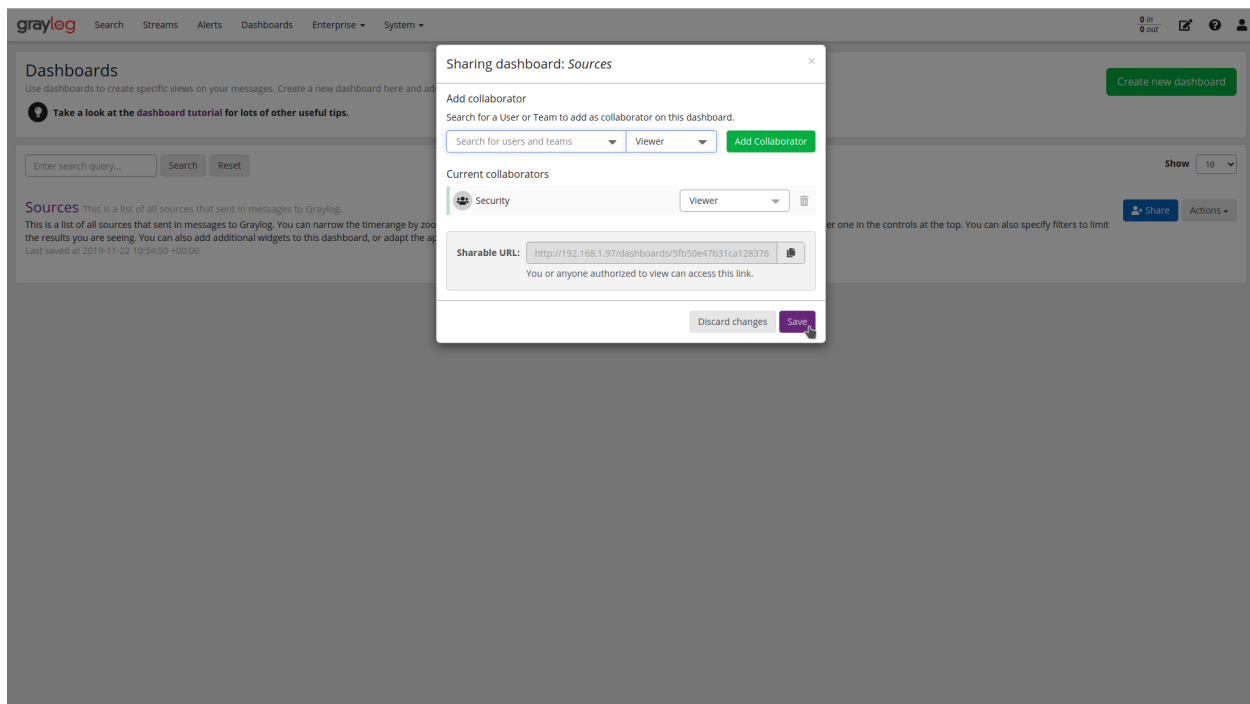
For example, if an organization has 10 Teams with 5 people on each Team, the Administrator can change Roles in bulk rather than having to manage all 55 users individually. Additionally, Administrators spend less time focusing on Role and Permissions within Graylog as they can apply unique sets of Roles to each Team without worrying that one User will have too much or too little access to engage in their job function.

18.4.1 AD/LDAP Synchronization with Teams

Enterprise organizations can leverage AD/LDAP synchronization, using their authoritative identity source to populate Teams. When a new user is added to the identity source of record, that user is automatically provisioned to the appropriate Graylog Team with all the Permissions everyone else in the Team has.

18.5 Sharing

As mentioned above, configuring who has access to something has moved away from the role configuration to the entities themselves. This functionality is available both in the Open Source and Enterprise level versions of Graylog. Any entity shared will be seen by all Users who have similar access levels to those entities. For example, the IT support team may choose to create dashboards which get shared across the organization. For small organizations, this increases noise but can be easily managed. Each entity that is implemented in the new system, which for 4.0 are Searches, Dashboards, Streams, Event Definitions, and Notifications, has a “Share” button associated with them.



That dialog looks the same for every entity and allows managing the level of access granted to the selected user or team. (Team assignment is only possible in Graylog Enterprise). Just as with Teams, sharing offers three different levels of access:

- Viewer
- Manager
- Owner

Viewer rights mean you can use the entity, but not make any changes to them. Manager rights mean you can edit any aspect about them, including deleting them. Owner rights mean Manager rights, but on top of them, come with the ability to share the entity with additional users. This difference is to prevent privilege escalation: just because I have access to change a dashboard does not mean I should be able to share it with someone else.

For any given user, their profile page lists which entities they have access to, both directly as well as through team membership.

18.5.1 Sharing Streams and Dashboards with Teams

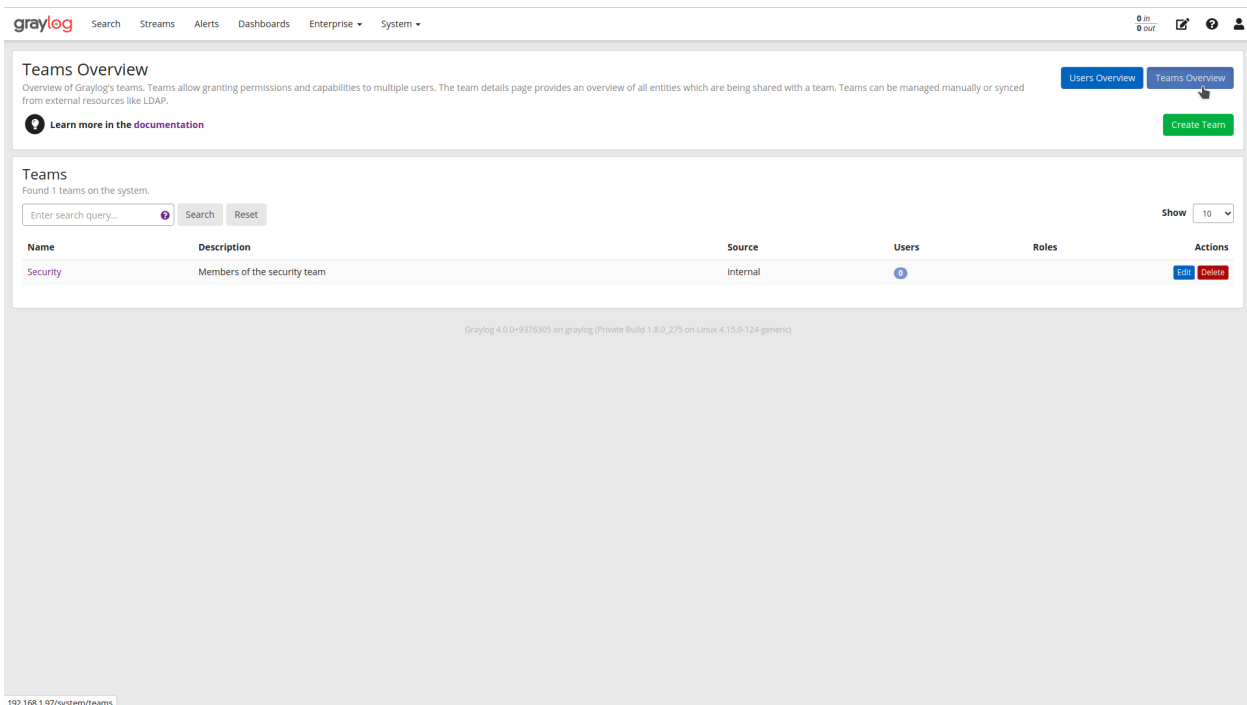
By changing Roles and User attributes, Graylog 4.0 also changes how users gain access to different entities. Instead of placing entity access at the user Profile level, Graylog 4.0 offers a “Sharing” feature similar to those in other applications.

Users who are “Owners” can share entities like Dashboards and Streams with other users.

For Enterprise level use, Sharing stays contained within individual Teams. Thus, individual Teams can create as many reports and Dashboards as they need without decreasing visibility for other teams. For example, if the IT Support Team shares 5 Dashboards, those will only show up for the IT Support Team, not the Security Team.

18.5.2 Sharing within Teams

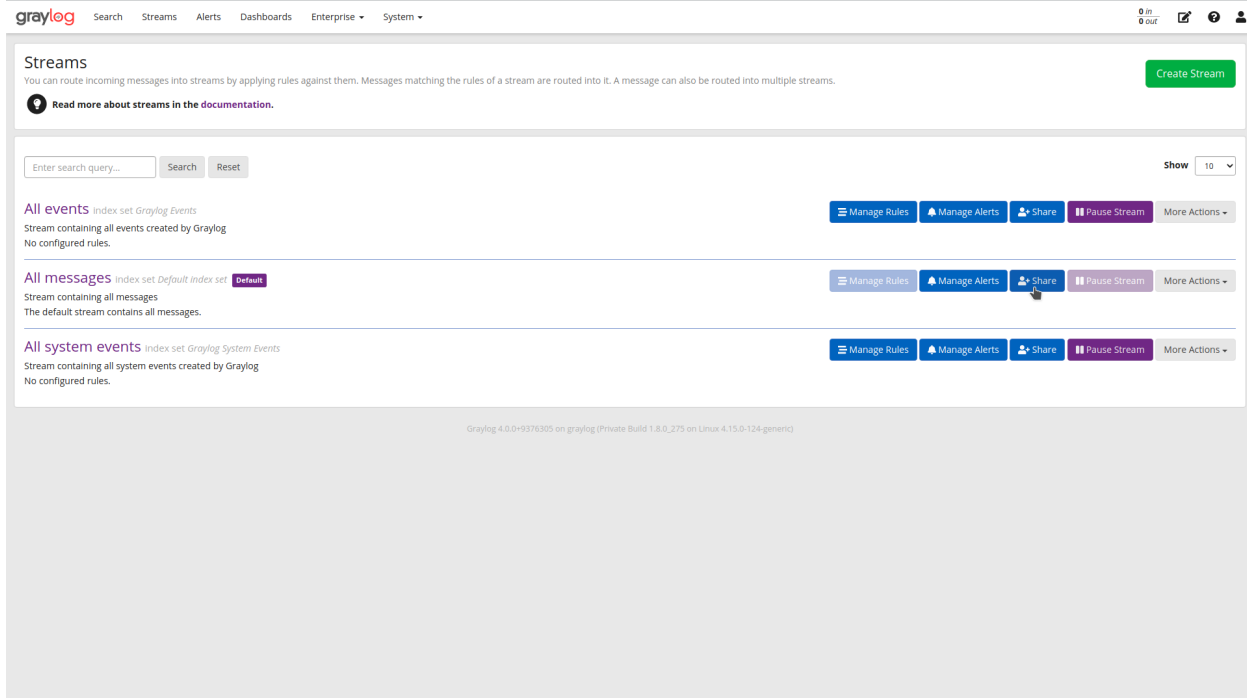
Before being assigned to a Team, users will see no streams and have no dashboards available. To create a permissions level for a Team, you select the Teams Overview button in the upper righthand corner of the screen. Teams Overview will show you the different Teams you have created in your Graylog environment, including the natural language name and Team description.



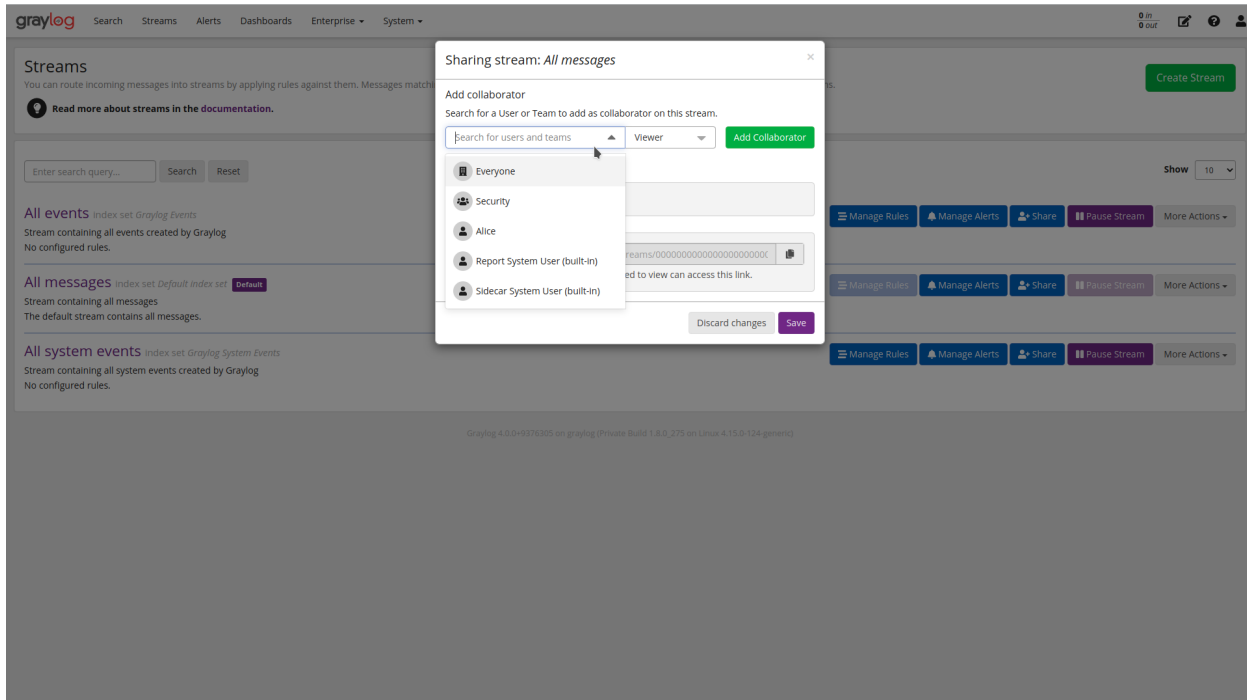
To add users or teams to a stream, go into the Streams menu. Choose the Stream you want to share. Click “Share” to open the sharing dialog.

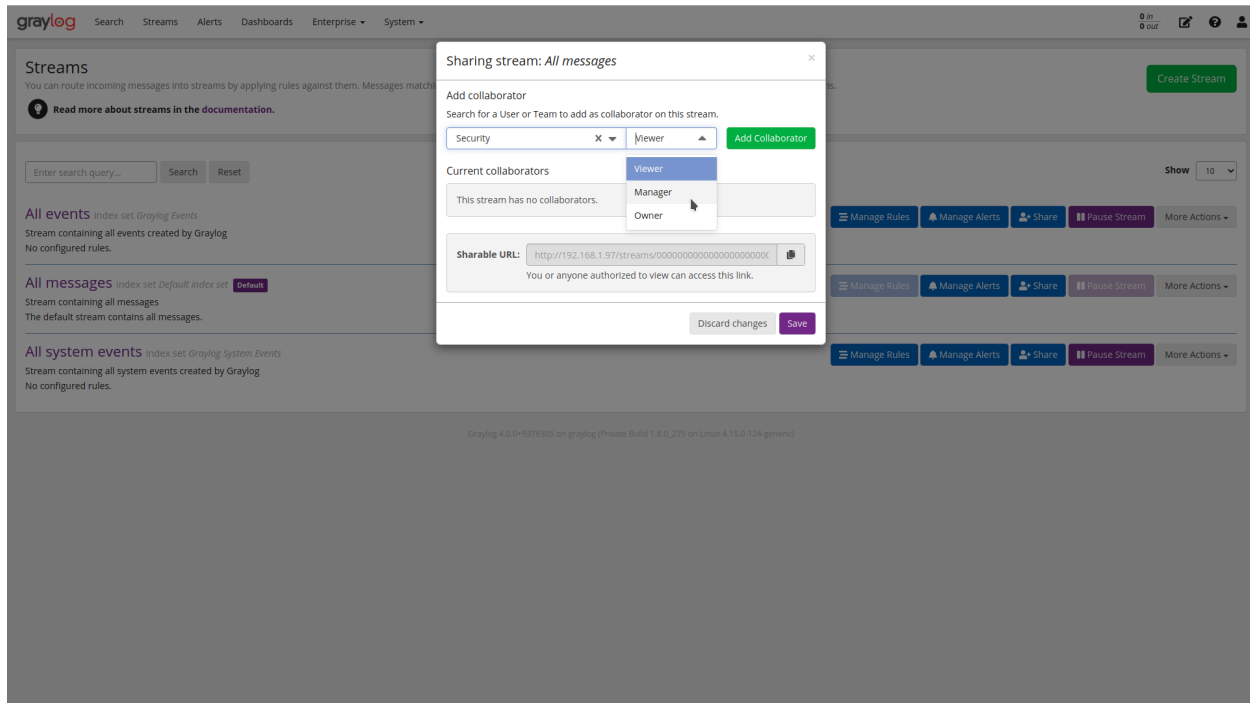
Once in the sharing dialog, you can choose to give an individual user or a Team access to the stream. Once you provide access to a Team, all users who are members of that Graylog Team will be given access to the Stream.

When you provide Stream access to a Team, you can also change the permissions for the entire Team.

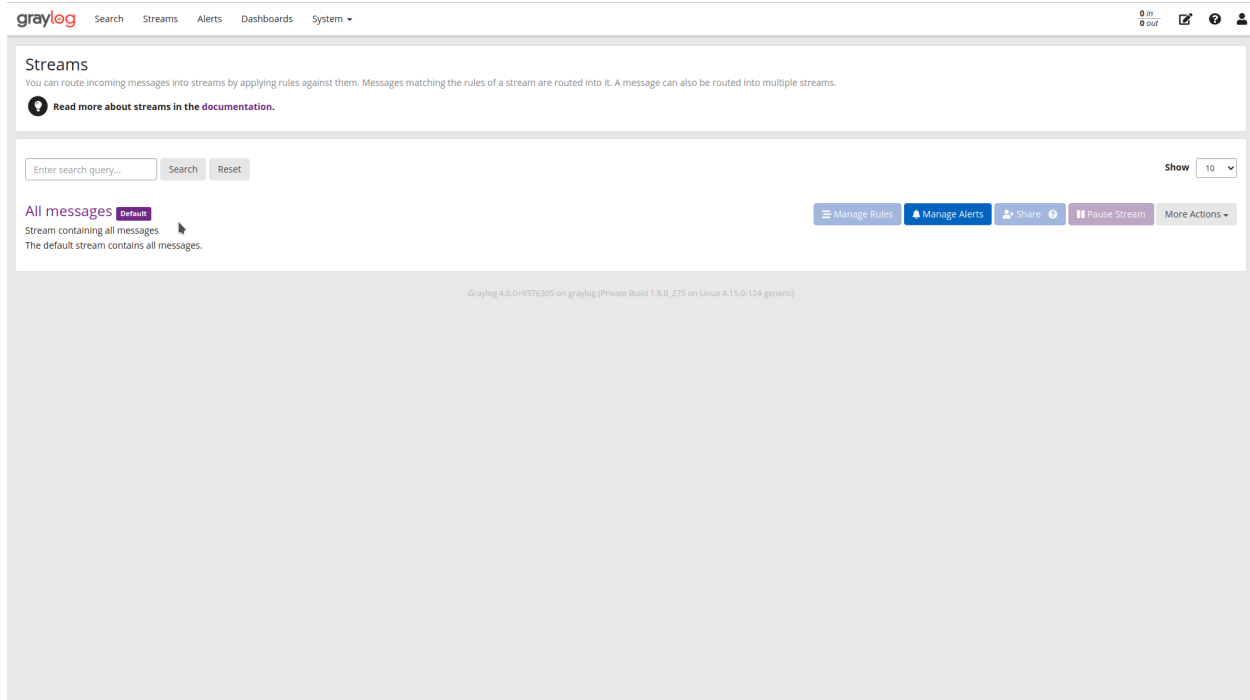


You can choose to add users individually or by their Team. Choosing Security Team provides everyone the same level of access to the Stream all at once rather than adding each user individually:





Once you save changes, users on the Team automatically gain access to the Stream.

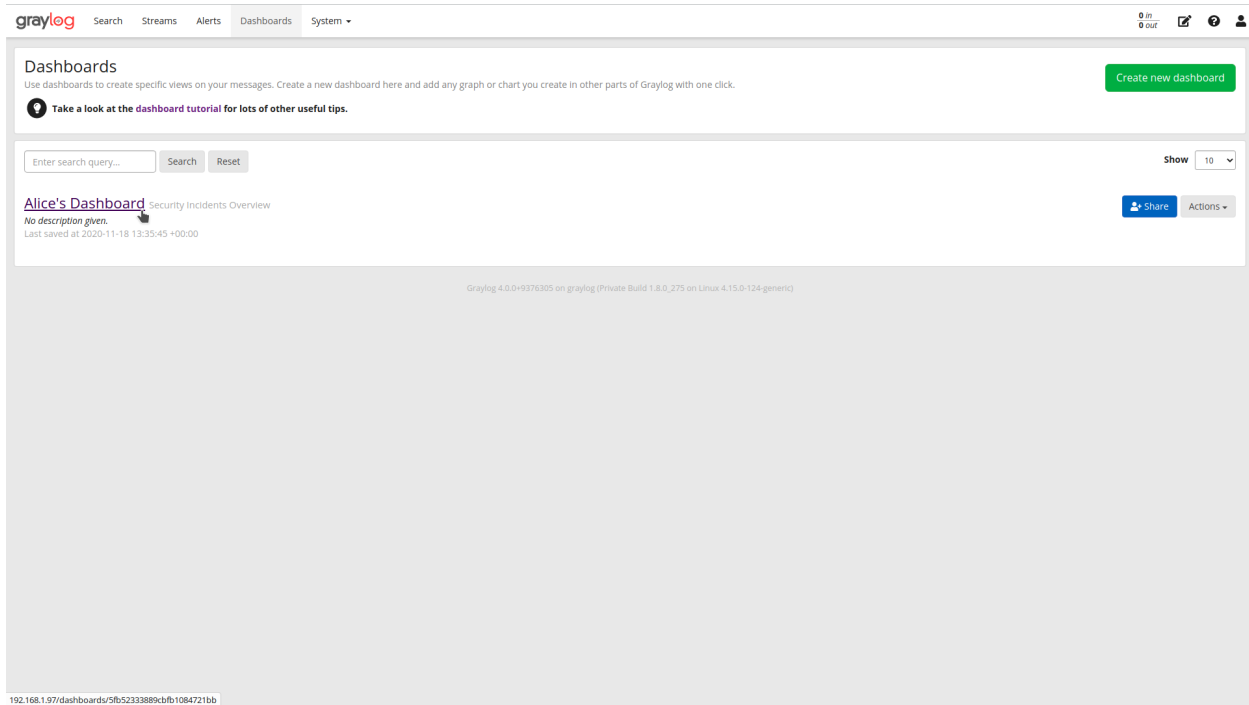


18.5.3 Sharing Dashboards within Teams

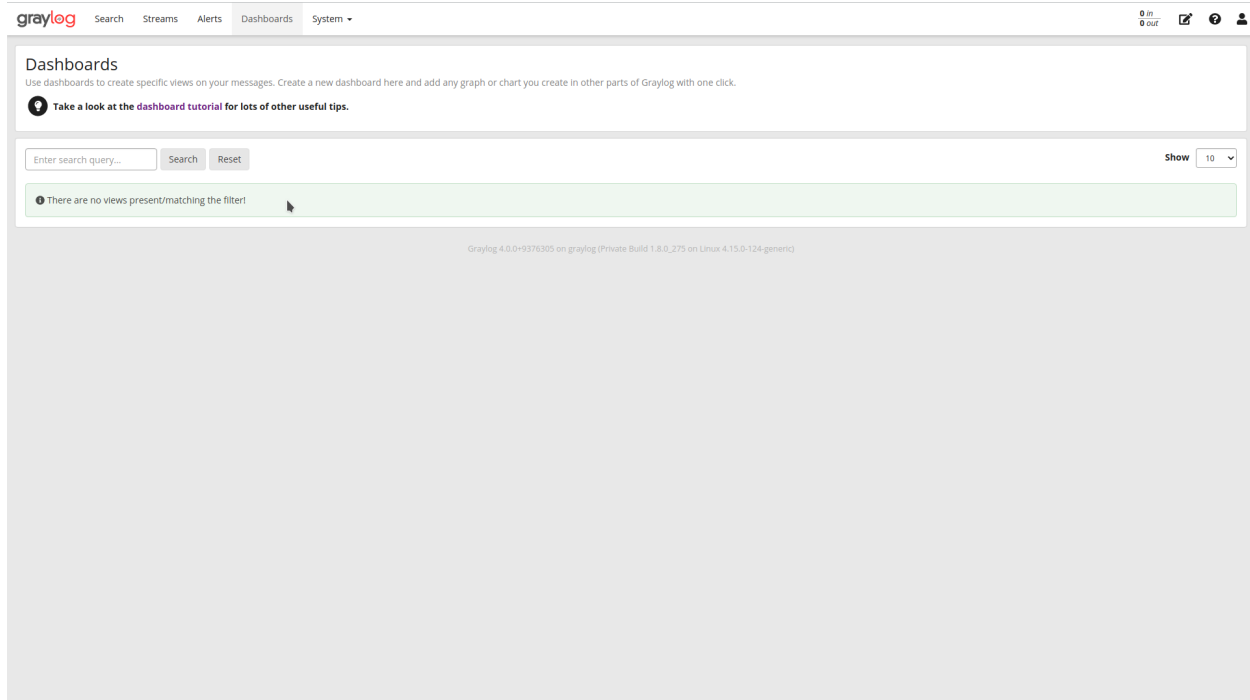
Graylog restricts Dashboards to Owners by default, meaning that all newly created Dashboards are “private dashboards.” This default setting ensures that Owners specify who can see their Dashboards and prevents data leakages. Owners can choose to share Dashboards with individuals or their Teams so that they can collaborate.

Example: Bob and Alice

Alice creates a Dashboard in her account.

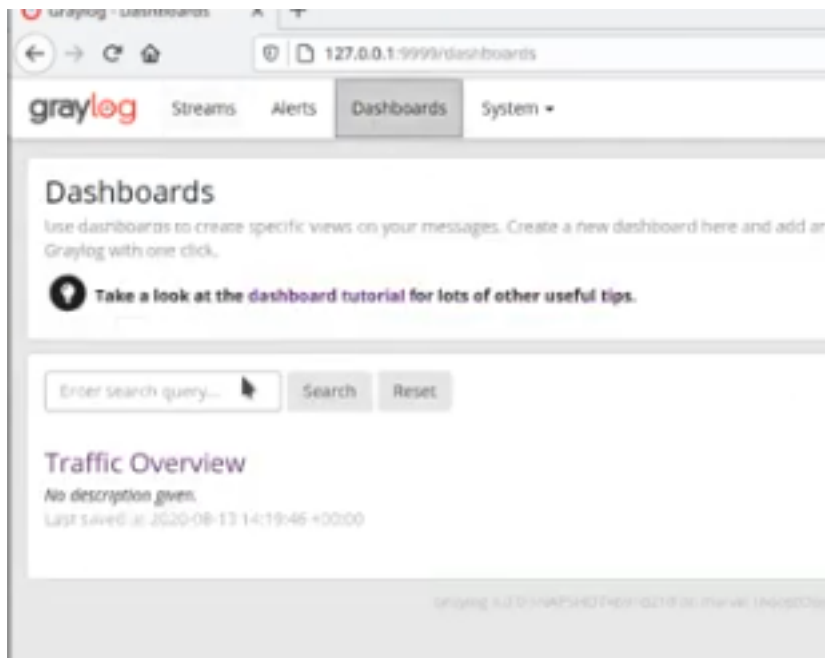


Bob, another member of her Team, cannot see the Dashboard in his account because the default Dashboard setting is private.

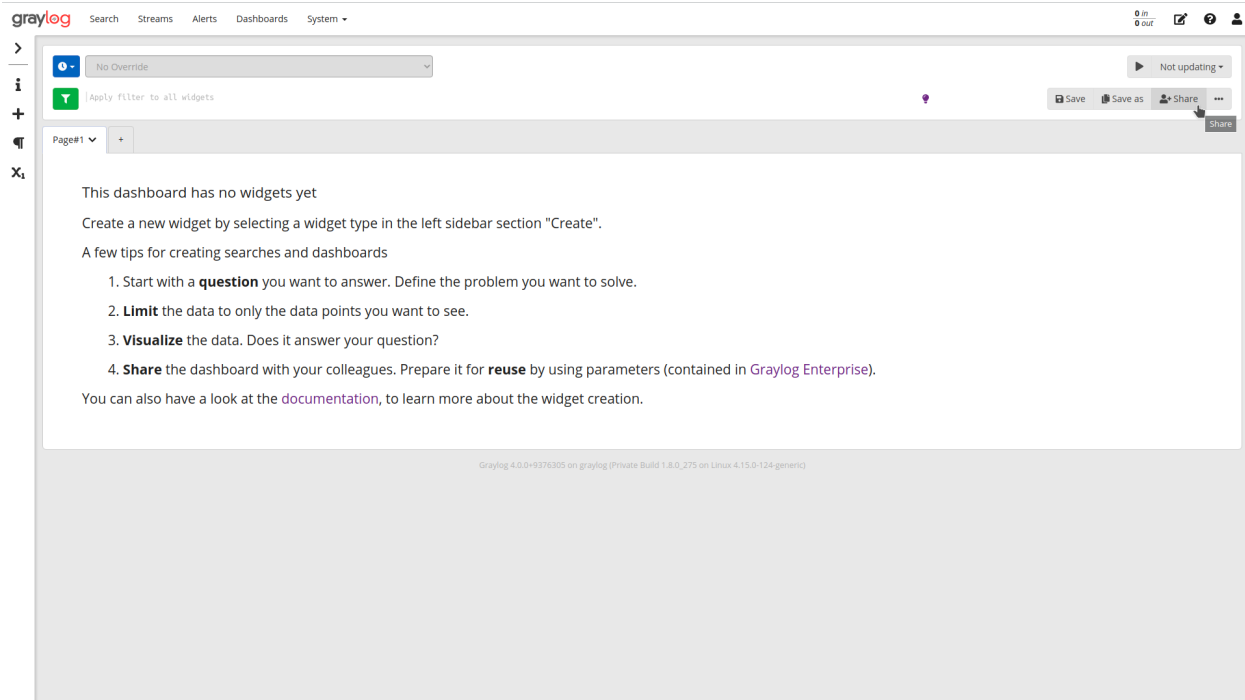


However, Bob can request that Alice share the Dashboard with him so that they can collaborate. When he requests this access, Alice can choose to share only with Bob or with the whole Team.

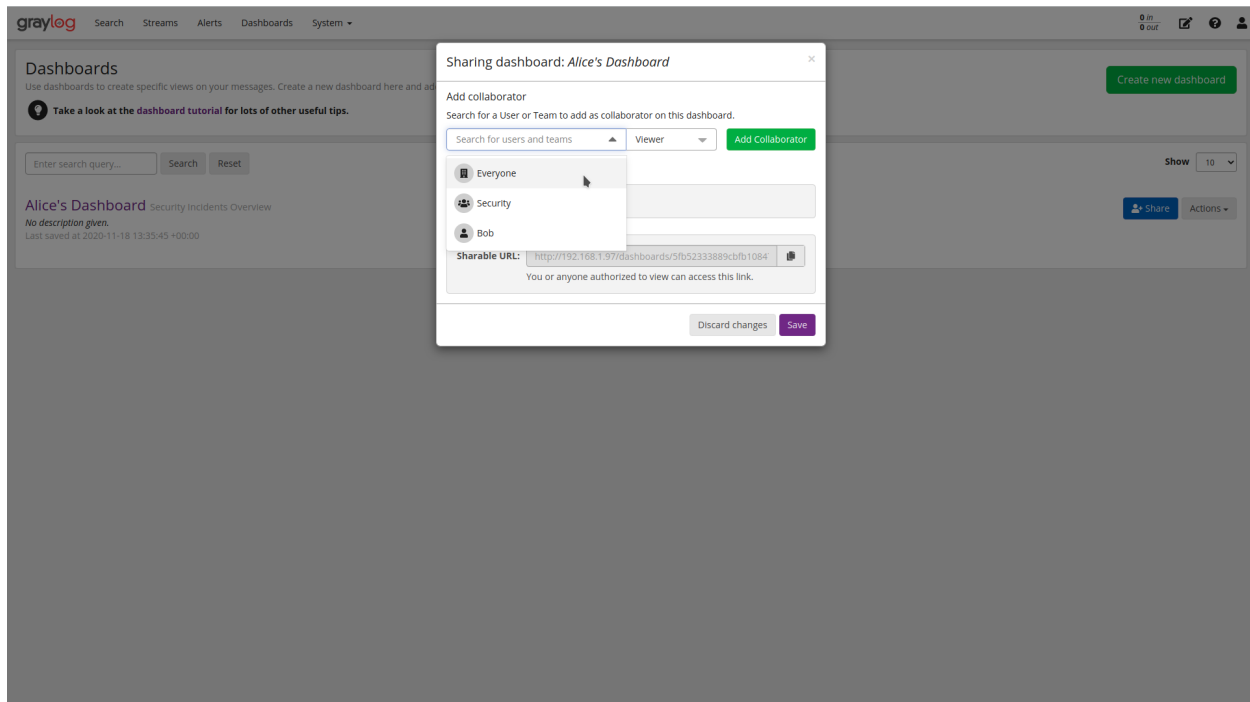
Alice then goes to her Dashboard view, chooses the Dashboard she wants to share:



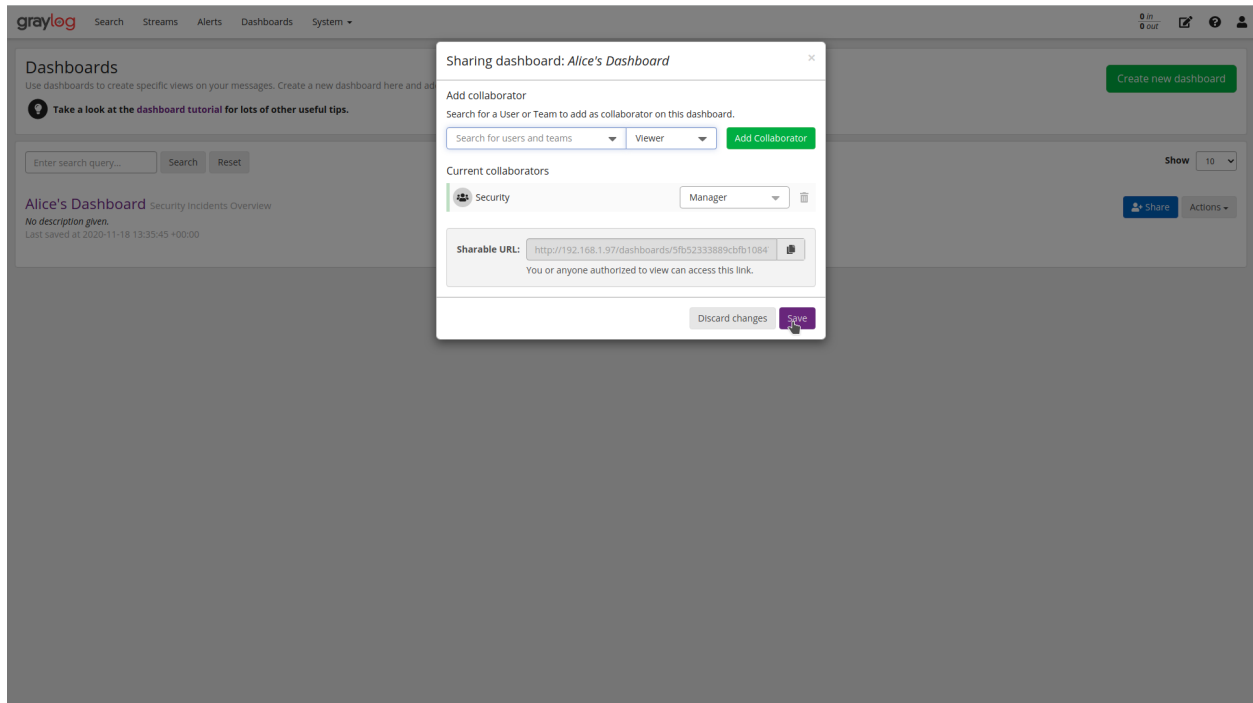
Once she chooses the Dashboard, she clicks on the “Share” button in the upper right-hand corner:



Alice can choose to share with a single user or her whole Team. She can also set access permissions as Viewer, Manager, or Owner.



Once she makes the access decision, she clicks on “Add Collaborator,” which saves the decisions, granting the selected level of access to all collaborators chosen.



19.1 About Plugins

Graylog offers various extension points to customize and extend its functionality through writing Java code.

The first step for writing a plugin is creating a skeleton that is the same for each type of plugin. The next chapter is explaining how to do this and will then go over to chapters explaining plugin types in detail.

19.2 Plugin Types

Graylog comes with a stable plugin API for the following plugin types:

- **Inputs:** Accept/write any messages into Graylog
- **Outputs:** Forward ingested messages to other systems as they are processed
- **Services:** Run at startup and able to implement any functionality
- *Event Notifications:* Called when an event alert has been triggered
- **Processors:** Transform/drop incoming messages (can create multiple new messages)
- **Filters:** (Deprecated) Transform/drop incoming messages during processing
- **REST API Resources:** An HTTP resource exposed as part of the Graylog REST API
- **Periodical:** Called at periodical intervals during server runtime
- *Decorators:* Used during search time to modify the presentation of messages
- **Authentication Realms:** Allowing to implement different authentication mechanisms (like single sign-on or 2FA)

19.2.1 API concepts

Graylog uses certain patterns in its code bases to make it easier to write extensions. It is important to know about these to be successful in writing custom for it.

You can browse the Graylog [Javadoc documentation](#) for details on each class and method mentioned here.

Factory Class

Many newer Graylog extension points split the common aspects of custom code into three different classes:

- instance creation - an, usually inner, interface commonly called `Factory`
- configuration - the factory returns a `ConfigurationRequest` instance (or a wrapped instance of it), commonly called `Config`
- descriptor - the factory returns a display descriptor instance, commonly called `Descriptor`

Say Graylog exposes an extension point interface called `ExtensionPoint`, which contains inner interfaces called `Factory`, `Config` and `Descriptor`. An implementation of `ExtensionPoint` then looks as following:

```
public AwesomeExtension implements ExtensionPoint {

    public interface Factory extends ExtensionPoint.Factory {
        @Override
        AwesomeExtension create(Decorator decorator);

        @Override
        AwesomeExtension.Config getConfig();

        @Override
        AwesomeExtension.Descriptor getDescriptor();
    }

    public static class Config implements ExtensionPoint.Config {
        @Override
        public ConfigurationRequest getRequestedConfiguration() {
            return new ConfigurationRequest();
        }
    }

    public static class Descriptor extends ExtensionPoint.Descriptor {
        public Descriptor() {
            super("awesome", "http://docs.graylog.org/", "Awesome_
↪Extension");
        }
    }
}
```

This pattern is used to prevent instantiation of extensions just to get their descriptor or configuration information, because some extensions might be expensive to set up or require some external service and configuration to work.

The factory itself is built using Guice's `assisted injection` for auto-wired factories. This allows plugin authors (and Graylog's internals as well) to cleanly describe their extension as well as taking advantage of dependency injection.

To register such an extension, Graylog typically offers a convenience method via its Guice modules (`GraylogModule` or `PluginModule`). For example alert conditions follow the same pattern and are registered as such:

```
public class SampleModule extends PluginModule {
    // other methods omitted for clarity
    @Override
    protected void configure() {
        addAlertCondition(SampleAlertCondition.class.getCanonicalName(),
            SampleAlertCondition.class,
            SampleAlertCondition.Factory.class);
    }
}
```

(continues on next page)

(continued from previous page)

```
}
}
```

19.2.2 Event Notifications

Event Notifications are responsible for sending information about events to external systems, such as sending an email, push notifications, opening tickets, writing to chat systems, etc.

They receive the event they were triggered for as well as a context object with additional metadata. Each notification consists of two classes. A configuration class, keeping parameters for the notification, and a second class with the actual notification code.

Class Overview

The interfaces to implement are `org.graylog.events.notifications.EventNotificationConfig` and `org.graylog.events.notifications.EventNotification`. Both classes are used to register a new notification type via the `PluginModule` class:

```
addNotificationType(TYPE_NAME,
                    EventNotificationConfig.class,
                    EventNotification.class,
                    EventNotification.Factory.class);
```

Example Event Notification

You can use the built-in notifications as full examples one for a [configuration class](#), and one for a [notification class](#).

To create an event notification plugin start by implementing the `EventNotificationConfig` interface:

```
public abstract class HTTPEventNotificationConfig implements EventNotificationConfig
```

Every notification has a unique type name. Usually a string appended by a version number, e.g.:

```
public static final String TYPE_NAME = "http-notification-v1"
```

Continue with the parameters which are needed for the notification. For example for a HTTP notification an URL is needed:

```
private static final String FIELD_URL = "url";

@JsonProperty(FIELD_URL)
public abstract String url();
```

A Builder for the configuration class is needed:

```
public static Builder builder() {
    return Builder.create();
}

@AutoValue.Builder
public static abstract class Builder implements EventNotificationConfig.Builder
    <Builder> {
```

(continues on next page)

(continued from previous page)

```

@JsonCreator
public static Builder create() {
    return new AutoValue_HTTPEventNotificationConfig.Builder()
        .type(TYPE_NAME);
}

@JsonProperty(FIELD_URL)
public abstract Builder url(String url);

public abstract HTTPEventNotificationConfig build();
}

```

Additionally interface methods are to implement:

public JobTriggerData toJobTriggerData(EventDto dto)

This is called when the scheduler executes the notification and is gathering data for the job.

public ValidationResult validate()

On the API level, inputs should be validated, put the checks here.

public EventNotificationConfigEntity toContentPackEntity(EntityDescriptorIds entityDescriptorIds)

If content-pack support is desired this method is called to transfer a notification to a content pack entity.

Take a look at the examples for more details on this.

After creating the configuration class the actual notification code can be written. This is done by implementing the EventNotification interface in a new class:

```
public class HTTPEventNotification implements EventNotification
```

There is just a single method to override. The notification logic goes into `execute(EventNotificationContext ctx)`.

The context object is keeping data about the event that lead to the notification, see [this class](#) for more informations.

For getting a backlog of messages which were the source of the event itself a service is provided:

```
ImmutableList<MessageSummary> backlog = notificationCallbackService.
    .getBacklogForEvent(ctx)
```

User Interface

Event Notifications need to provide some UI components that let the user enter Notification details in a form, and also display a summary of the Notification in the Event Definition summary.

First of all, Event Notifications need to register a plugin for `eventNotificationTypes`. As an example, we will show the definition of the HTTP Notification type:

```
eventNotificationTypes: [
  {
    type: 'http-notification-v1',
    displayName: 'HTTP Notification',
    formComponent: HttpNotificationForm,
    summaryComponent: HttpNotificationSummary,
    defaultConfig: {
      url: '',

```

(continues on next page)

(continued from previous page)

```

    },
  }
]

```

Here is a description of each field the Notification needs to provide:

- `type` Unique type identifying the Notification. You should use the same type as used in the server class
- `displayName` Human readable short name that describes the Notification. It will be used in select inputs
- `formComponent` React component providing the form elements the user should fill in order to create the Event Notification
- `defaultConfig` Object including the default configuration that is used once the Notification type is selected. We recommend defining the default configuration in your `formComponent` and then simply add a reference to it here
- `summaryComponent` React component displaying a summary of the Event Notification

In order to help you write the required React components, we now describe what props they will receive and what is expected from the given components.

Form component

This component should present inputs that need to be filled out in order to configure the Event Notification. The component will receive the following props:

```

config: PropTypes.object
onChange: PropTypes.func
validation: PropTypes.object

```

- `config` Contains the current configuration the user gave for the Notification. This will be set by default to the object given as `defaultConfig` in the plugin definition
- `onChange` Function to call when an input changes. The function expects to receive the complete configuration object as first argument. Please remember you should not directly modify the `config` prop, but instead clone the object first and apply modifications there
- `validation` Contains an object with validation information. The object has the following structure:

```

validation: {
  errors: {
    url: [
      "HTTP Notification URL cannot be empty."
    ],
  },
  failed: true
}

```

With that, once the user is done configuring the Event Notification, Graylog will submit the defined configuration into the server and create the Event Notification.

Summary component

This component should render a summary of all options configured in the Event Notification. It will be displayed in the summary step of the Event Definition form. The component receives the following props:

```
type: PropTypes.string,  
notification: PropTypes.object,  
definitionNotification: PropTypes.object,
```

- `type` Contains the `displayName` property defined in the Notification plugin
- `notification` Contains the Notification object, including its configuration
- `definitionNotification` Contains the `notification_id` used by the Event Definition. This is only required in case the Notification plugin is not installed or was deleted

In order to follow the same style as other Notifications in the summary component, we highly recommend using the `CommonNotificationSummary` component to render all common properties all Notifications have: title, type, description, and the children you pass. The component receives the same props as this one, plus the children you want to render with the custom plugin configuration. As an example, this is how the `HttpNotificationSummary` renders its summary:

```
<CommonNotificationSummary {...this.props}>  
  <React.Fragment>  
    <tr>  
      <td>URL</td>  
      <td><code>{notification.config.url}</code></td>  
    </tr>  
  </React.Fragment>  
</CommonNotificationSummary>
```

19.2.3 Decorators

Decorators can be used to transform a message field at display time. Multiple decorators can be applied at the same time, but you cannot make any assumptions about their order, as that is user defined. Stacked decorators receive the value of the previous decorator results.

They are typically used to map between the stored value and a human readable form of that value, for example like the *Syslog severity mapper* (compare its [code](#)) maps between numeric values and their textual representation.

Other uses include looking up user names based on a user's ID in a remote database, triggering a `whois` request on a domain name etc.

Class Overview

You need to implement the `org.graylog2.plugin.decorators.SearchResponseDecorator` interface. This class must declare a *Factory Class*.

Beyond the factory, configuration and descriptor classes, the only thing that a decorator needs to implement is the `apply` function:

```
SearchResponse apply(SearchResponse searchResponse);
```

The `org.graylog2.rest.resources.search.responses.SearchResponse` class represents the result that is being returned to the web interface (or other callers of the REST API).

You are free to modify any field, create new fields or remove fields. However, the web interface makes certain assumptions regarding fields that start with `gl2_` and requires at least the `timestamp`, `source` and `message` fields to be present.

Thrown exceptions are being logged as errors and lead to returning the original search response, without any modifications.

Example

Please refer to the sample [plugin implementation](#) for the full code.

Bindings

Compare with the code in the [sample plugin](#).

```
public class SampleModule extends PluginModule {

    @Override
    public Set<? extends PluginConfigBean> getConfigBeans() {
        return Collections.emptySet();
    }

    @Override
    protected void configure() {
        installSearchResponseDecorator(searchResponseDecoratorBinder(),
            PipelineProcessorMessageDecorator.class,
            PipelineProcessorMessageDecorator.Factory.class);
    }
}
```

User Interface

Decorators have no custom user interface elements.

19.3 Writing Plugins

What you need in your development environment before starting is:

- [git](#)
- [maven](#)
- [rpm](#)

If you plan to write a web plugin, you'll also need:

- [node](#)
- [yarn](#)

There are lots of different ways to get those on your local machine, unfortunately we cannot list all of them, so please refer to your operating system-specific documentation,

Graylog uses a couple of conventions and techniques in its code, so be sure to read about the [API concepts](#) for an overview.

19.3.1 Sample Plugin

In the following sections we will create a plugin skeleton based on a maven archetype. The skeleton is similar to the [sample plugin on Github](#). This documentation will link to specific parts for your reference. It is fully functional, even though it does not implement any useful functionality. Its purpose is to provide a reference for helping to implement your own plugins.

19.3.2 Creating a plugin skeleton

The easiest way to get started is to use our [Graylog meta project](#), which will create a complete plugin project infrastructure with all required classes, build definitions, and configurations. Using the meta project allows you to have the [Graylog server project](#) and your own plugins (or 3rd party plugins) in the same project, which means that you can run and debug everything in your favorite IDE or navigate seamlessly in the code base.

Note: We are working on a replacement tool for the `graylog-project` meta project, but for the time being it still works.

Maven is a widely used build tool for Java, that comes pre-installed on many operating systems or can be installed using most package managers. Make sure that you have at least version 3 before you go on.

First you should install the latest version of the [graylog-project-cli](#) on your workstation. Use this to bootstrap the meta project in your working directory with the following command:

```
$ graylog-project bootstrap github://Graylog2/graylog-project.git
```

This will create a checkout of the meta project in your current directory. You'll see both `graylog-project` and `graylog-project-repos`. Those two directories contain the meta data and all repositories that are required. The directory `graylog-project-repos` will also be the home of your new plugin.

Now you can bootstrap the plugin you want to write, by running the following command, inside the `graylog-project-repos` directory:

```
$ mvn archetype:generate -DarchetypeGroupId=org.graylog -DarchetypeArtifactId=graylog-  
↪plugin-archetype
```

It will ask you a few questions about the plugin you are planning to build. Let's say you work for a company called ACMECorp and want to build an alarm callback plugin that creates a JIRA ticket for each alarm that is triggered:

```
groupId: com.acmecorp  
artifactId: graylog-plugin-jira-alarmcallback  
version: 1.0.0  
package: com.acmecorp  
githubRepo: exampleGithubRepo  
pluginClassName: JiraAlarmCallback
```

Note that you do not have to tell the archetype wizard what kind of plugin you want to build because it is creating the generic plugin skeleton for you, and nothing that is related to the actual implementation. More on this in the example plugin chapters later. It is important that your `artifactId` has the prefix `graylog-plugin-`. The `githubRepo` must be the desired plugins repo name, not the full github URL. The repository is not required for the development, but a common part of the plugins meta information.

You now have a new folder called `graylog-plugin-jira-alarmcallback`, which includes a complete plugin skeleton including Maven build files. To be able to make a complete build of the project, you need to add the newly created plugin to the `graylog-project` POM as a module. Open `pom.xml` (residing in your `graylog-project`

directory) and find a couple of `<module>` statements in the file. Add the following line (after adapting it to your naming):

```
<module>../graylog-project-repos/graylog-plugin-jira-alarmcallback</module>
```

Make sure to update the `graylog-plugin-web-parent` version inside the `plugins pom.xml`. You can find the current version inside the related `relativePath` property. The last necessary step, to get started with the development, is to execute `mvn compile` inside the `graylog-project` dir.

You should be finished now, and every Java IDE out there can now import the project automatically without any required further configuration.

In [IntelliJ IDEA](#) for example you can just use the *File -> Open* dialog to open the `graylog-project` directory as a fully configured Java project, which should include the Graylog server and your plugin as submodules.

Please pay close attention to the [README file](#) of the Graylog meta project and follow any further instructions listed there to set up your IDE properly.

If you want to continue working on the command line, you can do the following to compile the server and your plugin:

```
$ mvn package
```

19.3.3 The anatomy of a plugin

Each plugin contains information to describe itself and register the extensions it contains.

Note: A single plugin can contain multiple extensions to Graylog.

For example a hypothetical plugin might contribute an input, an output and alert notifications to communicate with systems. For convenience this would be bundled in a single plugin registering multiple extensions.

Required classes

At the very minimum you need to implement two interfaces:

- `org.graylog2.plugin.Plugin` - which is the entry to your [plugin code](#)
- `org.graylog2.plugin.PluginMetaData` - which [describes your plugin](#)

The `bootstrap-plugin` script generates these implementations for you, and you simply need to fill out the details.

Graylog uses Java's [ServiceLoader](#) mechanism to find your plugin's main class, so if you rename your `Plugin` implementation, you need to also adjust the [service file](#). Please also see Google Guava's [AutoService](#) which Graylog uses in conjunction with the plain `ServiceLoader`.

In addition to the service, Graylog needs an additional resource file called `graylog-plugin.properties` in a special location. This file contains information about the plugin, specifically which classloader the plugin needs to be in, so it needs to be read before the plugin is actually loaded. Typically you can simply take the default that has been [generated for you](#).

Registering your extension

So far the plugin itself does not do anything, because it neither implements any of the available extensions, nor could Graylog know which ones are available from your code.

Graylog uses [dependency injection](#) to wire up its internal components as well as the plugins. Thus the extensions a plugin provides need to be exposed as a [PluginModule](#) which provides you with a lot of helper methods to register the various available extensions to cut down the boiler plate code you have to write.

An [empty module](#) is created for you.

Caution: The `PluginModule` exposes a lot of extension points, but not all of them are considered stable API for external use.

If in doubt, please reach out to us on our [community support channels](#).

Please refer to the available [Plugin Types](#) for detailed information what you can implement. The [Sample Plugin](#) contains stub implementations for each of the supported extensions.

Web Plugin creation

Sometimes your plugin is not only supposed to work under the hoods inside a Graylog server as an input, output, alarm callback, etc. but you also want to contribute previously nonexistent functionality to Graylog's web interface. Since version 2.0 this is now possible. When using the most recent [Graylog meta project](#) to bootstrap the plugin skeleton, you are already good to go for this. Otherwise please see our chapter about [Creating a plugin skeleton](#).

The Graylog web interface is written in JavaScript, based on [React](#). It is built using [webpack](#), which is bundling all JavaScript code (and other files you use, like stylesheets, fonts, images, even audio or video files if you need them) into chunks digestible by your browser and [npm](#), which is managing our external (and own) dependencies. During the build process all of this will be bundled and included in the jar file of your plugin.

This might be overwhelming at first if you are not accustomed to JS-development, but fortunately we have set up a lot to make writing plugins easier for you!

If you use our proposed way for [Creating a plugin skeleton](#), and followed the part about the [Writing Plugins](#), you are already good to go for building a plugin with a web part. **All you need is a running Graylog server on your machine.** Everything else is fetched at build time!

Getting up and running with a web development environment is as easy as this (assuming you have node & yarn installed):

```
$ cd graylog2-server/graylog2-web-interface
$ yarn install
[...]
```

```
$ yarn start
[...]
```

```
$ open http://localhost:8080
```

This starts the development web server. It even tries to open a browser window going to it (probably working on Mac OS X only).

If your Graylog server is not running on `http://localhost:9000/api/`, then you need to edit `graylog2-server/graylog2-web-interface/config.js` (in your graylog-project directory) and adapt the `gl2ServerUrl` parameter.

Web Plugin structure

These are the relevant files and directories in your plugin directory for the web part of it:

webpack.config.js This is the configuration file for the [webpack](#) module bundler. Most of it is already preconfigured by our `PluginWebpackConfig` class, so the file is very small. You can override/extend every configuration option by passing a webpack snippet though.

build.config.js.sample In this file you can customize some of the parameters of the build. There is one mandatory parameter named `web_src_path` which defines the absolute or relative location to a checkout of the [Graylog source repository](#).

package.json This is a standard [npm](#) JSON file describing the web part of your plugin, especially its dependencies. You can read more about its [format](#).

src/web This is where the actual code for the web part of your plugin goes to. For the start there is a simple `index.jsx` file, which shows you how to register your plugin and the parts it provides with the Graylog web interface. We will get to this in detail later.

19.3.4 Required conventions for web plugins

Plugin Entrypoint

There is a single file which is the entry point of your plugin, which means that the execution of your plugin starts there. By convention this is `src/web/index.jsx`. You can rename/move this file, you just have to adapt your webpack configuration to reflect this change, but it is not recommended.

In any case, this file needs to contain the following code at the very top:

```
// eslint-disable-next-line no-unused-vars
import webpackEntry from 'webpack-entry';
```

This part is responsible to include and execute the `webpack-entry` file, which is responsible to set up webpack to use the correct URL format when loading assets for this plugin. If you leave this out, erratic behavior will be the result.

Linking to other pages from your plugin

If you want to generate links from the web frontend to other pages of your plugin or the main web interface, you need to use the `Routes.pluginRoute()` helper method to generate the URLs properly.

See [this file](#) for more information.

19.3.5 Best practices for web plugin development

Using ESLint

[ESLint](#) is an awesome tool for linting JavaScript code. It makes sure that any written code is in line with general best practises and the project-specific coding style/guideline. We at Graylog are striving to make the best use of this tools as possible, to help our developers and you to generate top quality code with little bugs. Therefore we highly recommend to enable it for a Graylog plugin you are writing.

Code Splitting

Both the web interface and plugins for it depend on a number of libraries like React, RefluxJS and others. To prevent those getting bundled into *both* the web interface *and* plugin assets, therefore wasting space or causing problems (especially React does not like to be present more than once), we extract those into a commons chunk which is reused by the web interface and plugins.

This has no consequences for you as a plugin author, because the configuration to make use of this is already generated for you when using the meta project or the maven archetype. But here are some details about it:

Common libraries are built into a separate `vendor` bundle using an own configuration file named `webpack.vendor.js`. Using the `DLLPlugin` a `manifest` is extracted which allow us to reuse the generated bundle. This is then imported in our main web interface `webpack` configuration file and the corresponding generated `webpack config file for plugins`.

19.3.6 Building plugins

Building the plugin is easy because the meta project has created all necessary files and settings for you. Just run `mvn package` either from the meta project's directory `graylog-project` (to build the server *and* the plugin) or from the plugin directory (to build the plugin only):

```
$ mvn package
```

This will generate a `.jar` file in `target/` that is the complete plugin file:

```
$ ls target/jira-alarmcallback-1.0.0-SNAPSHOT.jar
target/jira-alarmcallback-1.0.0-SNAPSHOT.jar
```

19.4 Installing and loading plugins

The only thing you need to do to run the plugin in Graylog is to copy the `.jar` file to your plugins folder that is configured in your `graylog.conf`. The default is just `plugin/` relative from your `graylog-server` directory.

This is a list of default plugin locations for the different installation methods.

Table 1: Plugin Installation Locations

Installation Method	Directory
<i>Operating System Packages</i>	<code>/usr/share/graylog-server/plugin/</code>
<i>Manual Setup</i>	<code>/<extracted-graylog-tarball-path>/plugin/</code>

Restart `graylog-server` and the plugin should be available to use from the web interface immediately.

CONTENT PACKS

20.1 What are content packs?

Content packs are a convenient way to share configuration. A content pack is a JSON file which contains a set of configurations of Graylog components. This JSON file can be uploaded to Graylog instances and then installed. A user who took the time to create a input, pipelines and dashboard for a certain type of log format, can so easily share their efforts with the community.

Content packs can be found on the [Graylog Marketplace](#).

Warning: Content packs in 3.0 have changed fundamentally from previous versions. Graylog will try to support older versions in the future, but at this point there is no guarantee that older content packs still work.

20.1.1 Parameter

Content packs can have parameters. Those parameters help to adjust the configuration to the needs of the user. A good example usage is the port of an input. The creator of the content pack may have their input running on port 55055, but the user of the content pack may already have an input running on that specific port. The creator can specify a parameter and assign it to the port. The user of the content pack will be asked for a value of the parameter on installation. The provided value will then be used as the port of the input on the new system.

20.2 How do I create a Content Pack?

1. Navigate to **System / Content Packs**.
2. Click on **Create a Content Pack** on the upper right side of the page. A new content pack is created in a wizard. On the left side of that page is the navigation of the wizard. There are 3 steps to content pack creation: **Content Selection**, **Parameters** and **Preview**. In the middle part of the page is the form of each wizard step. And on the right side is the summary of the content pack in creation.

Create content packs
Content packs accelerate the set-up process for a specific data source. A content pack can include input/processors, streams, and dashboards.

[Find more content packs in the Graylog Marketplace.](#)

Content Selection
Parameters
Preview
[Previous](#) [Next](#)

General Information

Name
Required. Give a descriptive name for this content pack.

Summary
Required. Give a short summary of the content pack.

Description
Give a long description of the content pack in markdown.

Vendor
Required. Who did this content pack and how can he be reached, e.g. name and email.

URL
Where can I find the content pack, e.g. github url.

Content Pack selection
Enter search query... [Filter](#) [Reset](#)

- ☐ Dashboard
- ☐ Grok pattern
- ☐ Input
- ☐ Lookup adapter
- ☐ Lookup cache
- ☐ Lookup table
- ☐ Output
- ☐ Report
- ☐ Tokenizer or tokenizer

Details

Version: 1
Name:
Summary:
Vendor:
URL:
ID: `EXAMPLE-ADNS-EXAMPLE-EXAMPLE`
Parameters: 0
Entities: 0

3. Fill out the general information of the content pack.
4. The **Content Selection** offers configurations which can be included to the content pack. Necessary dependencies will be included automatically.

Warning: The one exception to this rule is dependencies for pipeline rules. Currently, grok patterns and lookup tables for pipeline rules must be added manually to the content pack. Support for automatic inclusion of pipeline rule dependencies will be added in a future release.

5. Click on **Next** or **Parameter** to go the Parameter Page. Parameter are placeholders which will be filled out during installation of a content pack. That way, parts of the configuration may be adjusted according to the needs of the user. To create a parameter click on **Create Parameter**. In the opening modal can the name, type and default value of the parameter be specified. Graylog supports four types of configuration values: String, Integer, Double and Boolean.

Create content packs
Content packs accelerate the set-up process for a specific data source. A content pack can include input/processors, streams, and dashboards.

[Find more content packs in the Graylog Marketplace.](#)

Content Selection
Parameters
Preview
[Previous](#) [Next](#)

Parameters list
[Create parameter](#)

Enter search query... [Filter](#) [Reset](#)

Title	Name	Description	Value Type	Default Value	Used	Action
Port of input	PORT	The port of the input	Integer	5555		Edit Delete

Entity list
Enter search query... [Filter](#) [Reset](#)

Title	Type	Description	Origin	Used Parameters	Action
ELF TCP (nlog)	Input		DB	1	Edit Delete

Details

Version: 1
Name: Example Content Pack
Summary: This is a example content pack
Vendor: info@graylog.com
URL: https://graylog.com
ID: `EXAMPLE-ADNS-EXAMPLE-EXAMPLE`
Parameters: 1
Entities: 1

Description
Title of description
This description escapes markdown.
`<code>shell command</code>`
Bold text

6. The created parameter can be assigned to a configuration key by pressing **Edit** on one of the previously selected configurations under **Entity List**.
7. The final step of creation can be reached by clicking on **Next** or **Preview**. On the preview page displays a summary of the new content pack. This page is meant for a final close inspection of the content pack before creation.
8. To finish the creation click on **Create** or **Create and Download**.

20.3 Upload a content pack

Content packs may be downloaded at the [Graylog Marketplace](#). To upload these content packs navigate to **System / Content Packs** and click on **Upload**. The now showing modal has a file finder to select the downloaded content pack. Click on **Upload** to finish the process. The uploaded content pack may now be installed on the new Graylog system.

20.4 Installing a content pack

To install the newest version of a content pack, navigate to **System / Content Packs**. This page shows the list of uploaded and created content packs. By clicking **Install** on the desired content pack, a modal will open which will ask for a **Install Comment** and the values of the parameters. It also shows the list of configurations that will be installed on the system. Click on **Install** to complete the installation.

Note: Some entities need a unique title or name (e.g Lookup Table). When installing such an entity and the title is already present on the system, then Graylog will use the installed entity instead of installing a new one. Even when the new configuration differs from the already installed one.

20.5 Uninstalling a content pack

Navigate to **System / Content Packs** and click on the name of the content pack that should be uninstalled. The displayed page shows the details of a uploaded or created content pack.

The screenshot shows the Graylog web interface for the 'Content packs' section. The left sidebar contains a 'Versions' table with one entry (revision 1) and an 'Install' button. Below it is an 'Installations' table with one entry (comment '1') and an 'Uninstall' button. The main content area shows details for the selected pack, including its name, summary, version, URL, and ID. A description box states: 'These are the default Grok patterns provided by Graylog.' Below this is a 'Constraints' table showing a single constraint for 'Graylog' with a fulfilled status. At the bottom is an 'Entity list' table with columns for Title, Type, Description, and Action. The entities listed are USER, TIME, DATESTAMP, HTTPUSER, URI, MONTHDAY, WINKPATH, and SYSLOGBASE, all of type 'grok_pattern'.

Select	Revision	Action
<input checked="" type="checkbox"/>	1	Download Install

Comment	Version	Action
1		Uninstall Info

Details

Version: 1

Name: Default Grok Patterns

Summary: The Graylog default Grok patterns

Vendor: Graylog (https://www.graylog.com)

URL: https://github.com/Graylog2/graylog2-server

ID: asxwzkd-4d7b-7d0c-3d0c-3d0c-3d0c-3d0c

Description

These are the default Grok patterns provided by Graylog.

Constraints

Name	Type	Version	Fulfilled
Graylog	server-version	>=3.0.0-alpha.2-0776689	<input checked="" type="checkbox"/>

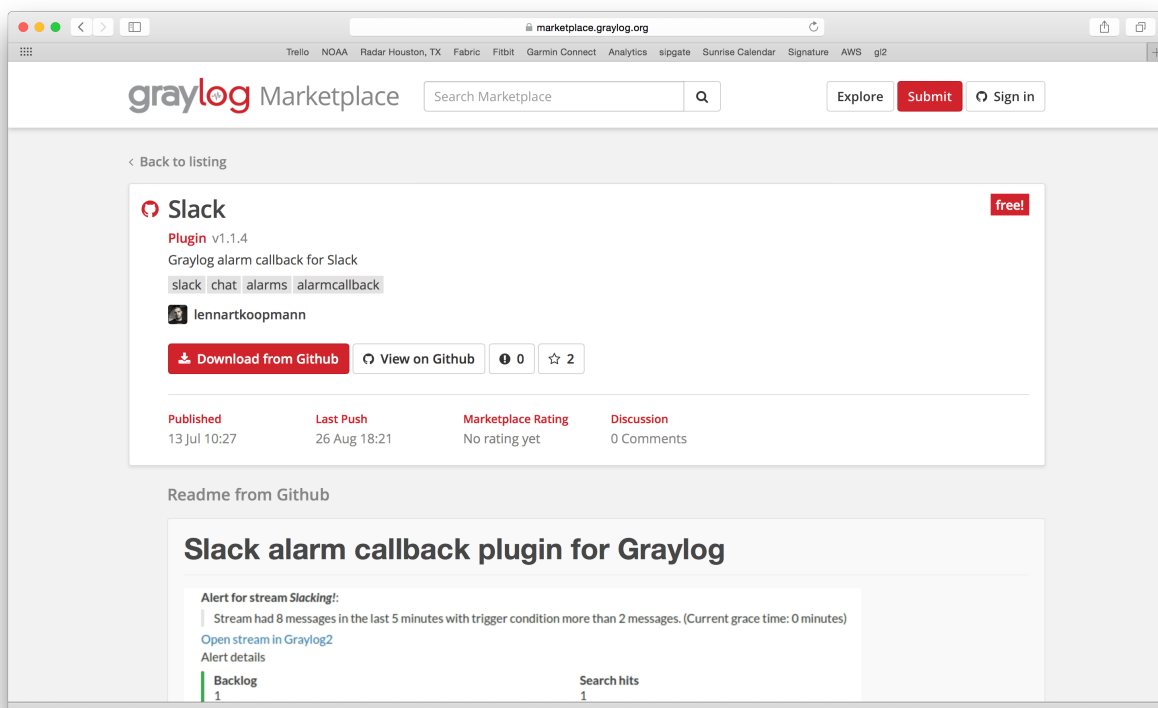
Entity list

Title	Type	Description	Action
USER	grok_pattern		Show
TIME	grok_pattern		Show
DATESTAMP	grok_pattern		Show
HTTPUSER	grok_pattern		Show
URI	grok_pattern		Show
MONTHDAY	grok_pattern		Show
WINKPATH	grok_pattern		Show
SYSLOGBASE	grok_pattern		Show

On the left, select the version of the content pack. Below that is a list of installations of that content pack. Click **Uninstall** next to the desired installation. A list of entities about to be removed will be displayed.

GRAYLOG MARKETPLACE

The [Graylog Marketplace](#) is the central directory of add-ons for Graylog. It contains plugins, content packs, GELF libraries and more content built by Graylog developers and community members.



21.1 GitHub integration

The Marketplace is deeply integrated with GitHub. You sign-in with your GitHub account if you want to submit content and only have to select an existing repository to list on the Marketplace.

From there on you manage your releases and code changes in GitHub. The Marketplace will automatically update your content.

There is no need to sign-in if you only want to browse or download content.

21.2 General best practices

21.2.1 README content

We kindly ask you to provide an as descriptive as possible `README` file with your submission. This file will be displayed on the Marketplace detail page and should provide the following information:

- What is it.
- Why would you want to use it? (Use cases)
- Do you have to register somewhere to get for example an API token?
- How to install and configure it.
- How to use it in a Graylog context.

Take a look at the [Splunk plug-in](#) as an example.

The `README` supports [Markdown](#) for formatting. You cannot submit content that does not contain a `README` file.

21.2.2 License

You cannot submit content that does not contain a `LICENSE` or `COPYING` file. We recommend to consult [ChooseALicense.com](#) if you are unsure which license to use.

21.3 4 Types of Add-Ons

Plug-Ins: Code that extends Graylog to support a specific use case that it doesn't support out of the box.

Content Pack: A file that can be uploaded into your Graylog system that sets up streams, inputs, extractors, dashboards, etc. to support a given log source or use case.

GELF Library: A library for a programming language or logging framework that supports sending log messages in GELF format for easy integration and pre-structured messages.

Other Solutions: Any other content or guide that helps you integrate Graylog with an external system or device. For example, how to configure a specific device to support a format Graylog understands out of the box.

21.4 Contributing plug-ins

You *created a Graylog plugin* and want to list it in the Marketplace? This is great. Here are the simple steps to follow:

1. Create a GitHub repository for your plugin
2. Include a [README](#) and a [LICENSE](#) file in the repository.
3. Push all your code to the repository.
4. [Create a GitHub release](#) and give it the name of the plugin version. For example `0.1`. The Marketplace will always show and link the latest version. You can upload as many release artifacts as you want here. For example the `.jar` file together with `DEB` and `RPM` files. The Marketplace will link to the detail page of a release for downloads.
5. Submit the repository to the Marketplace

21.5 Contributing content packs

Graylog content packs can be shared on the Marketplace by following these steps:

1. Download a Graylog content pack from the Graylog Web Interface and save the generated JSON in a file called `content_pack.json`.
2. Create a GitHub repository for your content pack
3. Include a [README](#) and a [LICENSE](#) file in the repository.
4. Include the `content_pack.json` file in the root of your GitHub repository.
5. Submit the repository to the Marketplace

21.6 Contributing GELF libraries

A GELF library can be added like this:

1. Create a GitHub repository for your GELF library.
2. Include a [README](#) and a [LICENSE](#) file in the repository.
3. Describe where to download and how to use the GELF library in the README.

21.7 Contributing other content

You want to contribute content that does not really fit into the other categories but describes how to integrate a certain system or make it send messages to Graylog?

This is how you can do it:

1. Create a GitHub repository for your content
2. Include a [README](#) and a [LICENSE](#) file in the repository.
3. All content goes into the README.

FREQUENTLY ASKED QUESTIONS

22.1 General

22.1.1 Do I need to buy a license to use Graylog?

We believe software should be open and accessible to all. You should not have to pay to analyze your own data, no matter how much you have.

Graylog is licensed under the [Server Side Public License](#). We do not require license fees for production or non-production use.

22.1.2 How long do you support older versions of the Graylog product?

For our commercial support customers, we support older versions of Graylog up to 12 months after the next major release is available. So if you're using 1.X, you will continue to receive 1.X support up to a full year after 2.0 has been released.

22.2 Architecture

22.2.1 What is MongoDB used for?

Graylog uses MongoDB to store your configuration data, not your log data. Only metadata is stored, such as user information or stream configurations. None of your log messages are ever stored in MongoDB. This is why MongoDB does not have a big system impact, and you won't have to worry too much about scaling it. With our recommended setup architecture, MongoDB will simply run alongside your graylog-server processes and use almost no resources.

22.2.2 Can you guide me on how to replicate MongoDB for High Availability?

MongoDB actually supplies this information as part of their documentation. Check out :

- About [MongoDB Replica Sets](#).
- How to [convert a standalone MongoDB node to a replica set](#).

After you've done this, add all MongoDB nodes into the `replica_set` configuration in all `graylog-server.conf` files.

22.2.3 I have datacenters across the world and do not want logs forwarding from everywhere to a central location due to bandwidth, etc. How do I handle this?

You can have multiple graylog-server instances in a federated structure, and forward select messages to a centralized GL server.

22.2.4 Which load balancers do you recommend we use with Graylog?

You can use any. We have clients running AWS ELB, HAProxy, F5 BIG-IP, and KEMP.

22.2.5 Isn't Java slow? Does it need a lot of memory?

This is a concern that we hear from time to time. We understand Java has a bad reputation from slow and laggy desktop/GUI applications that eat a lot of memory. However, we are usually able to prove this assumption wrong. Well written Java code for server systems is very efficient and does not need a lot of memory resources.

Give it a try, you might be surprised!

22.2.6 Does Graylog encrypt log data?

All log data is stored in Elasticsearch. [Elastic recommends](#) you use *dm-crypt* at the file system level.

22.2.7 Where are the log files Graylog produces?

You can find the log data for Graylog under the below directory with timestamps and levels and exception messages. This is useful for debugging or when the server won't start.

```
/var/log/graylog-server/server.log
```

If you use the pre-build appliances, take a look into

```
/var/log/graylog/<servicename>/current
```

22.3 Installation / Setup

22.3.1 Should I download the OVA appliances or the separate packages?

If you are downloading Graylog for the first time to evaluate it, go for the appliance. It is really easy, and can be quickly setup so you can understand if Graylog is right for you. If you are wanting to use Graylog at some scale in production, and do things like high availability (Mongo replication) we recommend you go for the separate packages.

22.3.2 How do I find out if a specific log source is supported?

We support many log sources – and more are coming everyday. For a complete list, check out [Graylog Marketplace](#), the central repository of Graylog extensions. There are 4 types of content on the Marketplace:

- **Plug-Ins:** Code that extends Graylog to support a specific use case that it doesn't support out of the box.
- **Content Pack:** A file that can be uploaded into your Graylog system that sets up streams, inputs, extractors, dashboards, etc. to support a given log source or use case.
- **GELF Library:** A library for a programming language or logging framework that supports sending log messages in GELF format for easy integration and pre-structured messages.
- **Other Solutions:** Any other content or guide that helps you integrate Graylog with an external system or device. For example, how to configure a specific device to support a format Graylog understands out of the box.

22.3.3 Can I install the Graylog Server on Windows?

Running Graylog on Windows is not supported.

22.3.4 Can I run Graylog on Azure?

You can [create a Linux VM](#) and use our *step-by-step* to install your customized Graylog. As a second option you can use [this guide](#) to convert our *Appliance* into some Azure compatible virtual machine.

22.4 Functionality

22.4.1 Can Graylog automatically clean old data?

Absolutely we have *data retention features*.

22.4.2 Does Graylog support LDAP / Active Directory and its groups?

Yes, Graylog supports user authentication using LDAP and Active Directory. Graylog Enterprise additionally supports synchronization of LDAP and Active Directory groups into Graylog teams. See the *authentication documentation* for details.

22.4.3 Do we have a user audit log for compliance?

Graylog Enterprise includes audit log functionality. You can explore the *documentation* for more details.

22.4.4 Does Graylog have reporting functionality?

Since Graylog 3.0, [Graylog Enterprise](#) includes reporting capabilities. Take a look at the [documentation](#) for more details.

22.4.5 Can I filter inbound messages before they are processed by the Graylog server?

Yes, check out our page on how to use blacklisting.

22.4.6 Dedicated Partition for the Journal

If you create a dedicated Partition for your Kafka Journal, you need to watch that this is a clean directory. Even *lost+found* can break it, for [your reference](#).

22.4.7 Raise the Java Heap

On Systems that run as virtual appliances or are installed with *DEB / APT* this setting can be made in `/etc/default/graylog-server`.

Systems that are installed with *RPM / YUM / DNF* the file is found in `/etc/sysconfig/graylog-server`.

22.4.8 How can I start an input on a port below 1024?

If you try to start an input on one of the [privileged ports](#), it will only work for the “root” user. To be able to use a privileged port, you can use [authbind](#) on Debian-based systems, or you redirect the traffic with an `iptables` rule like this:

```
iptables -t nat -A PREROUTING -p tcp --dport 514 -j REDIRECT --to 1514
iptables -t nat -A PREROUTING -p udp --dport 514 -j REDIRECT --to 1514
```

The input needs to be started on port 1514 in this case and will be made available on port 514 to the outside. The clients can then send data to port 514.

22.5 Graylog & Integrations

22.5.1 What is the best way to integrate my applications to Graylog?

We recommend that you use [GELF](#). It’s easy for your application developers and eliminates the need to store the messages locally. Also, GELF can just send what app person wants so you don’t have to build extractors or do any extra processing in Graylog.

22.5.2 I have a log source that creates dynamic syslog messages based on events and subtypes and grok patterns are difficult to use - what is the best way to handle this?

Not a problem! Use our *key=value extractor*.

22.5.3 I want to archive my log data. Can I write to another database, for example HDFS / Hadoop, from Graylog?

Yes, you can output data from Graylog to a different database. We currently have an HDFS output *plug-in* in the Marketplace - thank you [sivasamyk!](#)

It's also easy and fun to *write your own*, which you can then add to Graylog Marketplace for others to use.

22.5.4 I don't want to use Elasticsearch as my backend storage system – can I use another database, like MySQL, Oracle, etc?

Currently you can't. We only recommend another database if you want it for secondary storage.

22.5.5 How can I create a restricted user to check internal Graylog metrics in my monitoring system?

You can create a restricted user which only has access to the `/system/metrics` resource on the Graylog REST API. This way it will be possible to integrate the internal metrics of Graylog into your monitoring system. Giving the user only restricted access will minimize the impact of these credentials getting compromised.

Send a POST request via the Graylog API Browser or curl to the `/roles` resource of the Graylog REST API:

```
{
  "name": "Metrics Access",
  "description": "Provides read access to all system metrics",
  "permissions": ["metrics:*"],
  "read_only": false
}
```

The following curl command will create the required role (modify the URL of the Graylog REST API, here `http://127.0.0.1:9000/api/`, and the user credentials, here `admin/admin`, according to your setup):

```
$ curl -u admin:admin -H "Content-Type: application/json" -H 'X-Requested-By: cli' -X_
↪POST -d '{"name": "Metrics Access", "description": "Provides read access to all_
↪system metrics", "permissions": ["metrics:*"], "read_only": false}' 'http://127.0.0.
↪1:9000/api/roles'
```

22.6 Troubleshooting

22.6.1 I'm sending in messages, and I can see they are being accepted by Graylog, but I can't see them in the search. What is going wrong?

A common reason for this issue is that the timestamp in the message is wrong. First, confirm that the message was received by selecting 'all messages' as the time range for your search. Then identify and fix the source that is sending the wrong timestamp.

22.6.2 I have configured an SMTP server or an output with TLS connection and receive handshake errors. What should I do?

Outbound TLS connections have CA (*certification authority*) certificate verification enabled by default. In case the target server's certificate is not signed by a CA found from trust store, the connection will fail. A typical symptom for this is the following error message in the server logs:

```
Caused by: javax.mail.MessagingException: Could not convert socket to TLS; nested
↳exception is: javax.net.ssl.SSLHandshakeException: sun.security.validator.
↳ValidatorException: PKIX path building failed: sun.security.provider.certpath.
↳SunCertPathBuilderException: unable to find valid certification path to requested
↳target
```

This should be corrected by either adding the missing CA certificates to the Java default trust store (typically found at `$JAVA_HOME/jre/lib/security/cacerts`), or a custom store that is configured (by using `-Djavax.net.ssl.trustStore`) for the Graylog server process. The same procedure applies for both missing valid CAs and self-signed certificates.

For Debian/Ubuntu-based systems using OpenJDK JRE, CA certificates may be added to the systemwide trust store. After installing the JRE (including `ca-certificates-java`, ergo `ca-certificates` packages), place `name-of-certificate-dot-crt` (in PEM format) into `/usr/local/share/ca-certificates/` and run `/usr/sbin/update-ca-certificates`. The hook script in `/etc/ca-certificates/update.d/` should automatically generate `/etc/ssl/certs/java/cacerts`.

Fedora/RHEL-based systems may refer to [Shared System Certificates in the Fedora Project Wiki](#).

22.6.3 Suddenly parts of Graylog did not work as expected

If you notice multiple different non working parts in Graylog and found something like `java.lang.OutOfMemoryError: unable to create new native thread` in your Graylog Server logfile, you need to raise the process/thread limit of the graylog user. The limit can be checked with `ulimit -u` and you need to check how you can raise `nproc` in your OS.

22.6.4 I cannot go past page 66 in search results

Elasticsearch limits the number of messages per search result to 10000 by default. Graylog displays 150 messages per page, which means that the last full page with default settings will be page 66.

You can increase the maximum result window by adjusting the parameter `index.max_result_window` as described in the [Elasticsearch index modules dynamic settings](#), but be careful as this requires more memory in your Elasticsearch nodes for deep pagination.

This setting can be [dynamically updated](#) in Elasticsearch, so that it does not require a cluster restart to be effective.

22.6.5 My field names contain dots and stream alerts do not match anymore

Due to restrictions in certain Elasticsearch versions, Graylog needs to convert field names that contain `.` characters with another character, by default the replacement character is `_`.

This replacement is done just prior to writing messages to Elasticsearch, which causes a mismatch between what stream rules and alert conditions see as field names when they are evaluated.

Stream rules, the conditions that determine whether or not a message is routed to a stream, are being run as data is being processed by Graylog. These see the field names as containing the dots.

However, alert conditions, which are also attached to streams, are converted to searches and run in the background. They operate on stored data in Elasticsearch and thus see the replacement character for the dots. Thus alert conditions need to use the `_` instead of `.` when referring to fields. There is currently no way to maintain backwards compatibility and transparently fixing this issue, so you need to take action.

The best option, apart from not sending fields with dots, is to remember to write alert conditions using the replacement character, and never use `.` in the field names. In general Graylog will use the version with `_` in searches etc.

For example, if an incoming message contains the field `docker.container` stream rules use that name, whereas alert conditions need to use `docker_container`. You will notice that the search results also use the latter name.

22.6.6 What does “Uncommitted messages deleted from journal” mean?

Some messages were deleted from the Graylog journal before they could be written to Elasticsearch. Please verify that your Elasticsearch cluster is healthy and fast enough. You may also want to review your Graylog journal settings and set a higher limit.

This can happen when Graylog is not able to connect to Elasticsearch or the Elasticsearch Cluster is not able to process the ingested messages in time. Add more resources to Elasticsearch or adjust [the output settings](#) from Graylog to Elasticsearch.

22.6.7 What does “Journal utilization is too high” mean?

Journal utilization is too high and may go over the limit soon. Please verify that your Elasticsearch cluster is healthy and fast enough. You may also want to review your Graylog journal settings and set a higher limit.

This can happen when Graylog is not able to connect to Elasticsearch or the Elasticsearch Cluster is not able to process the ingested messages in time. Add more resources to Elasticsearch or adjust [the output settings](#) from Graylog to Elasticsearch.

22.6.8 How do I fix the “Deflector exists as an index and is not an alias” error message?

Graylog is using an Elasticsearch index alias per index set pointing to the active write index, the so-called “deflector”, to write messages into Elasticsearch such as `graylog_deflector` in the default index set.

Please refer to [Index model](#) for a more in-depth explanation of the Elasticsearch index model used by Graylog.

In some rare situations, there might be an Elasticsearch index with a name which has been reserved for the deflector of an index set managed by Graylog, so that Graylog is unable to create the proper Elasticsearch index alias.

This error situation leads to the following system notification in Graylog:

```
> Deflector exists as an index and is not an alias.
> The deflector is meant to be an alias but exists as an index. Multiple failures of
  ↳ infrastructure can lead to this. Your messages are still indexed but searches and
  ↳ all maintenance tasks will fail or produce incorrect results. It is strongly
  ↳ recommend that you act as soon as possible.
```

The logs of the Graylog *master* node will contain a warning message similar to the following:

```
WARN [IndexRotationThread] There is an index called [graylog_deflector]. Cannot fix_
↪this automatically and published a notification.
```

1. Stop all Graylog nodes
2. (*OPTIONAL*) If you want to keep the already ingested messages, reindex them into the Elasticsearch index with the greatest number, e. g. `graylog_23` if you want to fix the deflector `graylog_deflector`, via the [Elasticsearch Reindex API](#).
3. Delete the `graylog_deflector` index via the [Elasticsearch Delete Index API](#).
4. Add `action.auto_create_index: false` to the configuration files of all Elasticsearch nodes in your cluster and restart these Elasticsearch nodes, see [Elasticsearch Index API - Automatic Index Creation and Creating an Index](#) for details.
5. Start the Graylog *master* node.
6. Manually rotate the active write index of the index set on the *System / Indices / Index Set* page in the *Maintenance* dropdown menu.
7. (*OPTIONAL*) Start all remaining Graylog *slave* nodes.

22.6.9 How do I enable debug logging for a specific plugin or area of Graylog?

When troubleshooting an issue in Graylog, it might be useful to enable debug or trace logging for the entire Graylog subsystem in (*System > Logging*). However, you may find that this generates too much log output (possibly making it difficult to review log messages for a particular area of concern).

Graylog supports the ability to enable debug or trace logging for specific application areas or plugins. To do this, execute the following terminal command against a particular Graylog node.:

```
curl -I -X PUT http://<graylog-username>:<graylog-password>@<graylog-node-ip>:9000/
↪api/system/loggers/<application-package>/level/debug \
-H 'X-Requested-By: graylog-api-user'
```

Note: The `application-package` is the Java package for the area of concern (eg. `org.graylog.aws` for the AWS plugin or `org.graylog2.lookup` for Lookup Tables). You might need to look at the Graylog source code to identify the desired application-package.

22.6.10 Have another troubleshooting question?

See below for some additional support options where you can ask your question.

22.7 Support

22.7.1 I think I've found a bug, how do I report it?

Think you spotted a bug? Oh no! Please report it in our issue trackers so we can take a look at it. All issue trackers are hosted on [GitHub](#), tightly coupled to our code and milestones. Don't hesitate to open issues – we'll just close them if there is nothing to do. Most issues will be in the [Graylog server](#) repository, but you should choose others if you have found a bug in one of the plugins.

22.7.2 I'm having issues installing or configuring Graylog, where can I go for support?

Check out the [Graylog Community Forums](#) – you can search for your problem which may already have an answer, or post a new question.

Another source is the [Graylog channel on Matrix.org](#) or the [#graylog IRC chat channel on freenode](#) (both are bridged, so you'll see messages from either channels). Our developers and a lot of community members hang out here. Just join the channel and add any questions, suggestions or general topics you have.

If you're looking for professional commercial support from the Graylog team, we do that too. Please [get in touch here](#) for more details.

THE THINKING BEHIND THE GRAYLOG ARCHITECTURE AND WHY IT MATTERS TO YOU

23.1 A short history of Graylog

The Graylog project was started by Lennart Koopmann some time around 2009. Back then the most prominent log management software vendor issued a quote for a one year license of their product that was so expensive that he decided to write a log management system himself. Now you might call this a bit over optimistic (*I'll build this in two weeks*, end of quote) but the situation was hopeless: there was basically no other product on the market and especially no open source alternatives.

23.2 The log management market today

Things have changed a bit since 2009. Now there are viable open source projects with serious products and a growing list of SaaS offerings for log management.

23.2.1 Architectural considerations

Graylog has been successful in providing log management software **because it was built for log management from the beginning**. Software that stores and analyzes log data must have a very specific architecture to do it efficiently. It is more than just a database or a full text search engine because it has to deal with both text data and metrics data on a time axis. Searches are always bound to a time frame (relative or absolute) and only going back into the past because future log data has not been written yet. **A general purpose database or full text search engine that could also store and index the private messages of your online platform for search will never be able to effectively manage your log data.** Adding a specialized frontend on top of it makes it look like it could do the job in a good way but is basically just putting lipstick on the wrong stack.

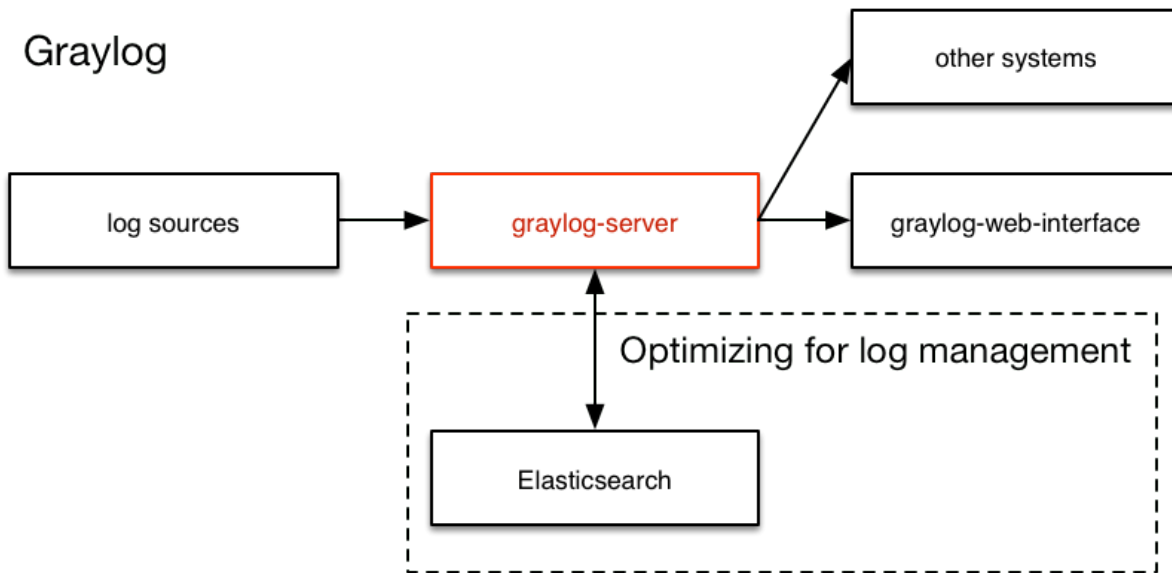
A log management system has to be constructed of several services that take care of processing, indexing, and data access. The most important reason is that you need to scale parts of it horizontally with your changing use cases and usually the different parts of the system have different hardware requirements. All services must be tightly integrated to allow efficient management and configuration of the system as a whole. A data ingestion or forwarder tool is hard to tedious to manage if the configuration **has** to be stored on the client machines and is not possible via for example REST APIs controlled by a simple interface. A system administrator needs to be able to log into the web interface of a log management product and select log files of a remote host (that has a forwarder running) for ingestion into the tool.

You also want to be able to see the health and configuration of all forwarders, data processors and indexers in a central place because the whole log management stack can easily involve thousands of machines if you include the log emitting clients into this calculation. You need to be able to see which clients are forwarding log data and which are not to make sure that you are not missing any important data.

Graylog is coming the closest to the Splunk architecture:

- **Graylog was solely built as a log management system from the first line of code.** This makes it very efficient and easy to use.
- The `graylog-server` component sits in the middle and works around shortcomings of Elasticsearch (a full text search engine, not a log management system) for log management. It also builds an abstraction layer on top of it to make data access as easy as possible without having to select indices and write tedious time range selection filters, etc. - Just submit the search query and Graylog will take care of the rest for you.
- All parts of the system are tightly integrated and many parts speak to each other to make your job easier.
- Like WordPress makes MySQL a good solution for blogging, Graylog makes Elasticsearch a good solution for logging. You should never have a system or frontend query Elasticsearch directly for log management so we are putting `graylog-server` in front of it.

Graylog



ELK



23.2.2 Blackboxes

Closed source systems tend to become black boxes that you cannot extend or adapt to fit the needs of your use case. This is an important thing to consider especially for log management software. The use cases can range from simple syslog centralization to ultra flexible data bus requirements. A closed source system will always make you depending on the vendor because there is no way to adapt. As your setup reaches a certain point of flexibility you might hit a wall earlier than expected.

Consider spending a part of the money you would spend for the wrong license model for developing your own plugins or integrations.

23.3 The future

Graylog is the only open source log management system that will be able to deliver functionality and scaling in a way that Splunk does. It will be possible to replace Elasticsearch with something that is really suited for log data analysis without even changing the public facing APIs.

CHANGELOG

24.1 Graylog 4.0.13

Released: 2021-09-13

24.1.1 Core

Fixed

- Fix resolving alias target for index sets with plus in prefix on ES6. [Graylog2/graylog2-server#11142](#) [Graylog2/graylog2-server#11153](#)
- Cleanup permission grants for deleted users. [Graylog2/graylog2-server#10385](#) [Graylog2/graylog2-server#11265](#)

24.2 Graylog 4.0.12

The 4.0.12 release has been skipped due to build errors.

24.3 Graylog 4.0.11

Released: 2021-08-04

24.3.1 Core

Fixed

- Fix count and grant_total values in search/dashboard pagination. [Graylog2/graylog2-server#11034](#)

24.4 Graylog 4.0.10

Released: 2021-07-28

24.4.1 Core

Security

Session ID leak in Graylog DEBUG log file and audit log.

We recently discovered a session ID leak in the Graylog DEBUG log file as well as the audit log. A user can use a session ID to authenticate against Graylog and then this user has access to all the permissions associated with the owner of the session ID.

The ID was printed in DEBUG level log messages (DEBUG is not enabled by default) as well as the Graylog Enterprise Audit Log. By default, the Graylog Audit Log is only logging to the local database and only accessible by Graylog administrators.

We would like to thank David Herbstmann for discovering and responsibly disclosing this vulnerability.

The following CVE IDs have been assigned: [CVE-2021-37759](#), [CVE-2021-37760](#)

24.5 Graylog 4.0.9

Released: 2021-07-07

24.5.1 Core

Fixed

- Fix Elasticsearch flood-stage handling. [Graylog2/graylog2-server#10887](#) [Graylog2/graylog2-server#10897](#)
- Fixing shared entities overview filter for saved searches. [Graylog2/graylog2-server#10878](#) [Graylog2/graylog2-server#10893](#)
- Fix loading of streams page in some edge cases. [Graylog2/graylog2-server#10514](#) [Graylog2/graylog2-server#10942](#)

24.6 Graylog 4.0.8

Released: 2021-06-02

24.6.1 Core

Fixed

- Don't run index jobs for missing indices. [Graylog2/graylog2-server#10444](#)
- Fix user sessions not timing out. [Graylog2/graylog2-server#10578](#) [Graylog2/graylog2-server#10577](#)

24.6.2 Integrations Plugin

Fixed

- Fix problem with PaloAlto timestamp handling. [Graylog2/graylog-plugin-integrations#816](#)

24.7 Graylog 4.0.7

Released: 2021-05-05

24.7.1 Core

Changed

- Log failed messages and full stack trace on processing errors when DEBUG is enabled. [Graylog2/graylog2-server#10319](#) [Graylog2/graylog2-server#10421](#)

Fixed

- Correctly display ES cluster status in the user interface. [Graylog2/graylog2-server#10407](#) [Graylog2/graylog2-server#10428](#)
- Fix sharing of streams that have outputs attached. [Graylog2/graylog2-server#10443](#)
- Allow using the same LDAP/AD attributes for different config settings. [Graylog2/graylog2-server#10069](#) [Graylog2/graylog2-server#10437](#)
- Support + character in index prefixes for index sets. [Graylog2/graylog2-server#10392](#)
- Encode usernames that are used in URLs. [Graylog2/graylog2-server#10530](#) [Graylog2/graylog2-server#10566](#)

24.8 Graylog 4.0.6

Released: 2021-04-07

24.8.1 Core

Fixed

- Fix rendering of trend color in report generation [Graylog2/graylog2-server#10154](#)
- Update Kafka client to 2.7.0 [Graylog2/graylog2-server#10146](#) [Graylog2/graylog2-server#10184](#)
- Fix content-pack auto installation [Graylog2/graylog2-server#10237](#)
- Initialize ES7 client and sniffer lazily [Graylog2/graylog2-server#10292](#)
- Fix permission check for notifications in event definitions [Graylog2/graylog2-server#10381](#)

24.9 Graylog 4.0.5

Released: 2021-02-22

24.9.1 Core

Fixed

- Prevent NullPointerException in index optimization job [Graylog2/graylog2-server#10119](#)

24.10 Graylog 4.0.4

Released: 2021-02-22

24.10.1 Core

Fixed

- Fixing counting of messages in index for ES7 [Graylog2/graylog2-server#10094](#)
- Provide a timeout for request when optimizing index in ES7 [Graylog2/graylog2-server#10098](#)
- Add missing GRN type for outputs [Graylog2/graylog2-server#10108](#)

24.10.2 Integrations Plugin

Fixed

- Refactor PaloAltoTypeParser to improve performance [Graylog2/graylog-plugin-integrations#737](#)

24.11 Graylog 4.0.3

Released: 2021-02-16

24.11.1 Core

Fixed

- Fix search export to dashboard when running with a proxy and a path prefix. [Graylog2/graylog2-server#9991](#) [Graylog2/graylog2-server#9989](#)
- Fix moving widgets to a different tab when they have been copied from a dashboard. [Graylog2/graylog2-server#9778](#) [Graylog2/graylog2-server#10007](#)
- Fix potential MongoDB performance issue. [Graylog2/graylog2-server#10043](#) [Graylog2/graylog2-server#10046](#)

24.11.2 Integrations Plugin

Added

- Initial support for parsing USERID log type in PaloAlto 9.x inputs. [Graylog2/graylog2-server#729](#)

24.12 Graylog 4.0.2

Released: 2021-01-27

24.12.1 Core

Added

- Show field sort icons in message table. [Graylog2/graylog2-server#9775](#)

Fixed

- Fix missing buttons on sidecars page. [Graylog2/graylog2-server#9677](#) [Graylog2/graylog2-server#9682](#)
- Fix missing microseconds in timestamps in the message table. [Graylog2/graylog2-server#9604](#) [Graylog2/graylog2-server#9698](#)
- Fix notification when updating a user. [Graylog2/graylog2-server#9733](#)
- Keep tab order when installing a dashboard from a content pack. [Graylog2/graylog2-server#8264](#) [Graylog2/graylog2-server#9812](#)
- Allow users to change their own timezone again. [Graylog2/graylog2-server#9814](#)
- Fix search query parsing with \$ characters. [Graylog2/graylog2-server#9497](#) [Graylog2/graylog2-server#9877](#)
- Fix issue on streams page which legacy alert receivers present. [Graylog2/graylog2-server#9637](#) [Graylog2/graylog2-server#9785](#)
- Fix page size change selector on content packs page. [Graylog2/graylog2-server#9629](#) [Graylog2/graylog2-server#9875](#)
- Fix state problem with pipeline stage selection. [Graylog2/graylog2-server#6806](#) [Graylog2/graylog2-server#9916](#)
- Retry Elasticsearch requests on socket timeouts. [Graylog2/graylog2-server#9922](#)
- Fix date format specifiers in index mapping templates to avoid deprecation warnings. [Graylog2/graylog2-server#9690](#) [Graylog2/graylog2-server#9948](#)
- Reset stream rule form after successful rule creation. [Graylog2/graylog2-server#9956](#) [Graylog2/graylog2-server#9968](#)
- Fix pipeline rule syntax highlighting issues. [Graylog2/graylog2-server#9250](#) [Graylog2/graylog2-server#9976](#)
- Fix error using apply and then save & close on a new pipeline rule. [Graylog2/graylog2-server#9252](#) [Graylog2/graylog2-server#9976](#)
- Retry bulk indexing if index alias has invalid target(s) instead of dropping the messages. [Graylog2/graylog2-server#9955](#) [Graylog2/graylog2-server#9962](#) [Graylog2/graylog2-server#9978](#)

24.12.2 Legacy Collector Plugin

Fixed

- Fix collectors table styling. [Graylog2/graylog-plugin-collector#172](#)

24.12.3 Threatintel Plugin

Changed

- Deprecated ransomware data adapter because the service has been shutdown in 2019. [Graylog2/graylog-plugin-threatintel/#183](#)

24.13 Graylog 4.0.1

Released: 2020-11-25

24.13.1 Core

Fixed

- Fix incorrect support link in the UI. [Graylog2/graylog2-server#9527](#)
- Updates to Graylog Schema. [Graylog2/graylog2-server#9556](#)
- Fix an issue when running Graylog on Amazon Elasticsearch Service. [Graylog2/graylog2-server#9599](#)
- Fix problem with sharing dashboards and searches. [Graylog2/graylog2-server#9525](#) [Graylog2/graylog2-server#9594](#)
- Fix share button for event definitions. [Graylog2/graylog2-server#9603](#)
- Fix pagination of synced user accounts in authentication overview. [Graylog2/graylog2-server#9606](#)
- Fix link to the sidecar user's API token management on the sidecars page. [Graylog2/graylog2-server#9613](#)
- Fix scratchpad text area colors in dark mode. [Graylog2/graylog2-server#9607](#) [Graylog2/graylog2-server#9614](#)

24.13.2 Integrations Plugin

Fixed

- Add message backlog limit to Slack plugin. [Graylog2/graylog-plugin-integrations#659](#)
- Add Discord support to Slack plugin. [Graylog2/graylog-plugin-integrations#665](#)
- Update Palo Alto input to support PANOS v10 schemas [Graylog2/graylog-plugin-integrations#658](#)

24.13.3 Threatintel Plugin

Fixed

- Improve WHOIS data adapter parsing. [Graylog2/graylog-plugin-threatintel#181](#)

24.14 Graylog 4.0.0

Released: 2020-11-18

24.14.1 Core

Added

- Add dark theme mode. [Graylog2/graylog2-server#8718](#)
- Add support for Elasticsearch version 7.
- Add improved entity sharing system for streams, searches, dashboards and event definitions.
 - See: *Permission Management*
- Add HTTP trusted header authentication support to replace legacy SSO authentication plugin. [Graylog2/graylog2-server#9278](#)
- Add support for disabling user accounts. [Graylog2/graylog2-server#9374](#) [Graylog2/graylog2-server#9077](#)
- Add pagination to stream overview page. [Graylog2/graylog2-server#5675](#)
- Add pagination to grok pattern overview page. [Graylog2/graylog2-server#5683](#)
- Add support for editing title, description and summary of a saved search. [Graylog2/graylog2-server#8084](#)
- Make it possible to move widgets between dashboard tabs. [Graylog2/graylog2-server#8236](#) [Graylog2/graylog2-server#8152](#)
- Make it possible to display the search page sidebar inline. [Graylog2/graylog2-server#8294](#) [Graylog2/graylog2-server#7860](#)
- Add `facility_num` field to Syslog messages. [Graylog2/graylog2-server#8394](#) (Thanks @huksley)
- Format numbers in data table/plots with decimal comma. [Graylog2/graylog2-server#9318](#)
- Add close button to user notifications. [Graylog2/graylog2-server#9345](#)

Changed

Also see: *4.0 upgrade notes*

- Replace role based stream, search and dashboard sharing with a new entity sharing system.
 - See: *Permission Management*
- Change `/users` resource to use the user ID instead of the user name as parameter.
- Disable CORS support by default. [Graylog2/graylog2-server#8070](#)
- Ensure consistent naming of inputs [Graylog2/graylog2-server#8190](#) [Graylog2/graylog2-server#7345](#) (Thanks @Chunters)
- Increase overall font size in the web interface to improve readability. [Graylog2/graylog2-server#8319](#)
- Improve user management UI.

- Improve LDAP and Active Directory management UI.
- Show search link in navigation for all users. [Graylog2/graylog2-server#8917](#) [Graylog2/graylog2-server#8745](#) [Graylog2/graylog2-server#8779](#) [Graylog2/graylog2-server#8921](#)
- Show grok patterns menu entry to all users with reader role. [Graylog2/graylog2-server#9319](#)
- Exclude Illuminate message fields from traffic accounting. [Graylog2/graylog2-server#9408](#) [Graylog2/graylog2-server#9361](#)
- Change license to SSPL. See the following links for details:
 - <https://www.graylog.org/post/graylog-announces-4-0-release-of-its-log-management-platform>
 - <https://www.graylog.org/post/graylog-v4-0-licensing-sspl>

Removed

Also see: [4.0 upgrade notes](#)

- Remove support for Elasticsearch version 5. (supported versions are 6 and 7)
- Remove LDAP groups to role mapping. (replaced by team support in Graylog Enterprise)
 - See: [Permission Management](#)
- Remove legacy redirects for dashboards and saved searches. [Graylog2/graylog2-server#8201](#) [Graylog2/graylog2-server#7151](#) [Graylog2/graylog2-server#8007](#)
- Remove legacy saved searches API. [Graylog2/graylog2-server#8199](#)
- Remove legacy dashboards API. [Graylog2/graylog2-server#8198](#)
- Remove legacy aggregation API. [Graylog2/graylog2-server#8329](#)
- Remove legacy counts API. [Graylog2/graylog2-server#8409](#)
- Remove unused `elasticsearch_request_timeout` config file option. [Graylog2/graylog2-server#8050](#)

Fixed

- Improve styling of search widget action icons. [Graylog2/graylog2-server#8064](#)
- Give search input focus when saved search list is opening. [Graylog2/graylog2-server#8052](#)
- Fix issue with handling PKCS#8 PBES2 keys. [Graylog2/graylog2-server#8133](#) [Graylog2/graylog2-server#7552](#)
- Fix link to sidecar documentation page. [Graylog2/graylog2-server#8144](#) (Thanks @Chunters)
- Fix `NullPointerException` if MongoDB doesn't run with MMAPv1. [Graylog2/graylog2-server#8274](#) [Graylog2/graylog2-server#8273](#) (Thanks @pdcemulator)
- Improve and ensure consistent rendering of monospace fonts. [Graylog2/graylog2-server#8174](#)
- Fix data table rendering for large table values. [Graylog2/graylog2-server#8334](#)
- Fix getting started guide page scroll behavior. [Graylog2/graylog2-server#8131](#)
- Improve rendering of time base bar charts. [Graylog2/graylog2-server#8354](#) [Graylog2/graylog2-server#7167](#)
- Fix sort and sort direction selector in aggregation builder. [Graylog2/graylog2-server#7198](#) [Graylog2/graylog2-server#8355](#)
- Improve error handling for absolute time range inputs. [Graylog2/graylog2-server#8371](#) [Graylog2/graylog2-server#7191](#)
- Fix disk journal utilization chart. [Graylog2/graylog2-server#8420](#) [Graylog2/graylog2-server#8448](#)

- Fix race conditions on “System/Configuration” page. [Graylog2/graylog2-server#8778](#) [Graylog2/graylog2-server#8392](#)
- Improve UI development flow across operating systems. [Graylog2/graylog2-server#8487](#) (Thanks @binyellow)
- Improve image sizes to improve UI performance. [Graylog2/graylog2-server#8976](#)
- Improve pipeline rule link rendering for rules with long titles. [Graylog2/graylog2-server#9016](#) [Graylog2/graylog2-server#9014](#)
- Fix stream search bar issue with empty search results. [Graylog2/graylog2-server#9028](#)
- Retry message indexing when ES primary shards are not active. [#9065](#)
- Fix error when streams are referencing missing outputs. [Graylog2/graylog2-server#9116](#) [Graylog2/graylog2-server#9012](#)
- Fix JDK TLS protocol detection. [Graylog2/graylog2-server#9356](#) [Graylog2/graylog2-server#9446](#) [Graylog2/graylog2-server#9445](#)
- Improve error handling when node metrics cannot be received from the backend. [Graylog2/graylog2-server#9316](#) [Graylog2/graylog2-server#9315](#)
- Don’t allow modifications of email and full name for external users. [Graylog2/graylog2-server#9390](#) [Graylog2/graylog2-server#9222](#)
- Fix pipeline rule parsing issue with unary NOT operators. [Graylog2/graylog2-server#8554](#)

24.14.2 Integrations Plugin

Added

- Add Slack event notification plugin. [Graylog2/graylog-plugin-integrations#569](#)
- Add PagerDuty event notification plugin. [Graylog2/graylog-plugin-integrations#606](#)

24.15 Graylog 3.3.14

Released: 2021-07-28

24.15.1 Core

Security

Session ID leak in Graylog DEBUG log file and audit log.

We recently discovered a session ID leak in the Graylog DEBUG log file as well as the audit log. A user can use a session ID to authenticate against Graylog and then this user has access to all the permissions associated with the owner of the session ID.

The ID was printed in DEBUG level log messages (DEBUG is not enabled by default) as well as the Graylog Enterprise Audit Log. By default, the Graylog Audit Log is only logging to the local database and only accessible by Graylog administrators.

We would like to thank David Herbstmann for discovering and responsibly disclosing this vulnerability.

The following CVE IDs have been assigned: [CVE-2021-37759](#), [CVE-2021-37760](#)

24.16 Graylog 3.3.13

Released: 2021-05-05

No changes since 3.3.12.

24.17 Graylog 3.3.12

Released: 2021-04-14

24.17.1 Core

Fixed

- Fix rendering of trend colors in report generation. [Graylog2/graylog2-server#10157](#)
- Don't show "Enterprise" navigation for non-admin users. [Graylog2/graylog2-server#8936](#) [Graylog2/graylog2-server#10188](#) [Graylog2/graylog2-server#10233](#)
- Fix `NullPointerException` when MongoDB doesn't run with the MMAPv1 storage engine. [Graylog2/graylog2-server#8273](#) [Graylog2/graylog2-server#10300](#)
- Log failed messages and full stack trace on processing errors when DEBUG is enabled. [Graylog2/graylog2-server#10319](#) [Graylog2/graylog2-server#10432](#)

24.18 Graylog 3.3.11

Released: 2021-02-16

24.18.1 Core

Fixed

- Fix search export to dashboard when running with a proxy and a path prefix. [Graylog2/graylog2-server#9992](#) [Graylog2/graylog2-server#9989](#)
- Fix Elasticsearch watermark notifications when running multiple Graylog nodes. [Graylog2/graylog2-server#10066](#)

24.19 Graylog 3.3.10

Released: 2021-01-27

24.19.1 Core

Added

- Show field sort icons in message table. [Graylog2/graylog2-server#9775](#)

Fixed

- Fix search query parsing with \$ characters. [Graylog2/graylog2-server#9497](#) [Graylog2/graylog2-server#9877](#)
- Fix CSV export for shared dashboards. [Graylog2/graylog2-server#9906](#)
- Retry Elasticsearch requests on socket timeouts. [Graylog2/graylog2-server#9922](#)
- Retry bulk indexing if index alias has invalid target(s) instead of dropping the messages. [Graylog2/graylog2-server#9955](#) [Graylog2/graylog2-server#9962](#) [Graylog2/graylog2-server#9978](#)

24.20 Graylog 3.3.9

Released: 2020-11-25

24.20.1 Core

Fixed

- Improve user feedback when the UI cannot fetch data from the metrics API. [Graylog2/graylog2-server#9315](#) [Graylog2/graylog2-server#9316](#)
- Updates to Graylog Schema. [Graylog2/graylog2-server#9567](#)

24.21 Graylog 3.3.8

Released: 2020-10-12

No changes since 3.3.7 (see [Graylog Enterprise](#) for changes there).

24.22 Graylog 3.3.7

Released: 2020-10-08

24.22.1 Core

Security

- Update JavaScript dependencies with security issues. [Graylog2/graylog2-server#9098](#)

Fixed

- Fix issues with changing number of results for a pivot configuration. [Graylog2/graylog2-server#9087](#) [Graylog2/graylog2-server#9085](#)
- Fix permission issue with search and dashboards by respecting ownership. [Graylog2/graylog2-server#9068](#) [Graylog2/graylog2-server#9067](#)

- Fix unintended search bar form submit in widget edit modal. [Graylog2/graylog2-server#9096](#)

24.23 Graylog 3.3.6

Released: 2020-09-28

24.23.1 Core

Security

- Fixing a path traversal issue in the API Browser for **non-standard installations**. [Graylog2/graylog2-server#8986](#) [Graylog2/graylog2-server#8988](#) Due to a check happening before pathname normalization, a directory traversal was possible in the REST resource that serves the API browser UI. If the Graylog server was started with non-standard JRE options (using an additional classpath setting), it could have been used to access files from this additional classpath directory without authentication. Many thanks to Florian Hauser and Christian Fünfhaus of Code White for disclosing this vulnerability.

Changed

- Always show the search page link in the navigation to allow users to access the search without having to go to the streams page first. [Graylog2/graylog2-server#8917](#) [Graylog2/graylog2-server#8745](#) [Graylog2/graylog2-server#8779](#) [Graylog2/graylog2-server#8921](#)

Fixed

- Fix (un)schedule endpoints for event definitions to make them work without explicit content-type header. [Graylog2/graylog2-server#8981](#)
- Fix missing title attribute in pipeline UI. [Graylog2/graylog2-server#9017](#)
- Show better error message on the search page when users have no stream permissions. [Graylog2/graylog2-server#8955](#) [Graylog2/graylog2-server#9011](#)
- Fix problem with updating search controls (query, streams, timerange) in widgets. [Graylog2/graylog2-server#7922](#) [Graylog2/graylog2-server#9043](#)

24.23.2 Legacy AWS Plugin

Added

- Include `additional_event_data` as part of the `graylog` message. [Graylog2/graylog-plugin-aws#419](#) (Thanks [@rongutierrez](#))

24.23.3 Integrations Plugin

Added

- Add “9.1.3 GlobalProtect logs” support to the PaloAlto 9.x input. [Graylog2/graylog-plugin-integrations#540](#) [Graylog2/graylog-plugin-integrations#541](#) [Graylog2/graylog-plugin-integrations#554](#)

Fixed

- Fix “Key & Secret” authentication in CloudWatch input. [Graylog2/graylog-plugin-integrations#577](#)

24.24 Graylog 3.3.5

Released: 2020-08-17

No changes since 3.3.3 (see [Graylog Enterprise](#) for changes there).

24.25 Graylog 3.3.4

Released: 2020-08-06

No changes since 3.3.3.

24.26 Graylog 3.3.3

Released: 2020-07-29

24.26.1 Core

Added

- Add new vendor fields to Graylog schema. [Graylog2/graylog2-server#8471](#) [Graylog2/graylog2-server#8642](#)

Security

- **[BREAKING]:** Enable hostname validation for SSL/TLS-backed LDAP connections. [Graylog2/graylog2-server#8625](#) Prior to v3.3.3, the certificates of LDAP servers which are connected to using a secure connection (SSL or TLS) were not validated, even if the “Allow self-signed certificates” option was unchecked. Starting with v3.3.3, certificates are validated against the local default keystore. This might introduce a breaking change, depending on your local LDAP settings and the validity of the certificates used (if any). Please ensure that all certificates used are valid, their common name matches the host part of your configured LDAP server and your local keystore contains all CA/intermediate certs required for validation.

See also: [CVE-2020-15813](#)

Changed

- Find a better default for `enabled_tls_protocols` setting. [Graylog2/graylog2-server#7726](#) [Graylog2/graylog2-server#8637](#) This change builds the default TLS protocols based on what is supported by the currently running JRE.

Fixed

- Fix message table issue in fullscreen/TV mode. [Graylog2/graylog2-server#8483](#) [Graylog2/graylog2-server#8575](#)

24.27 Graylog 3.3.2

Released: 2020-06-24

24.27.1 Core

Changed

- Mark legacy aggregation API as deprecated in favor of the new views API. (to be removed in 4.0) [Graylog2/graylog2-server#8323](#)
- Update Graylog field schema. [Graylog2/graylog2-server#8331](#)
- Improve search page rendering performance. [Graylog2/graylog2-server#8343](#)

Fixed

- Fix issue with flickering in the single number widget. [Graylog2/graylog2-server#7563](#) [Graylog2/graylog2-server#8341](#)
- Fix issue with extending alert notification grace period. [Graylog2/graylog2-server#8365](#) [Graylog2/graylog2-server#8402](#)
- Fix rendering of message table header. [Graylog2/graylog2-server#8415](#)

24.27.2 Integrations Plugin

Added

- Add new Palo Alto input to support PAN-OS v9.x devices. [Graylog2/graylog-plugin-integrations#496](#)

24.28 Graylog 3.3.1

Released: 2020-06-10

24.28.1 Core

Fixed

- Fix problem with throughput counter in the UI [Graylog2/graylog2-server#8172](#) [Graylog2/graylog2-server#8185](#)
- Fix issue when adding a new header to the HTTPJSONPath lookup data adapter. [Graylog2/graylog2-server#8186](#) [Graylog2/graylog2-server#8266](#)
- Retry message indexing when indices are read-only due to disk space problems in Elasticsearch. [Graylog2/graylog2-server#8211](#) [Graylog2/graylog2-server#8269](#)
- Fix issue with using float numbers in event definitions. [Graylog2/graylog2-server#8290](#)
- Only check data nodes for Elasticsearch disk usage stats. [Graylog2/graylog2-server#8239](#) [Graylog2/graylog2-server#8282](#) (Thanks @radykal-com!)

24.29 Graylog 3.3.0

Released: 2020-05-20

24.29.1 Core

Added

- Make it possible to create new URL whitelist entries inside forms. [Graylog2/graylog2-server#7275](#) [Graylog2/graylog2-server#7169](#) [Graylog2/graylog2-server#7401](#)
- Store API tokens encrypted in MongoDB. [Graylog2/graylog2-server#7556](#)
- Add new CSV export that supports exporting multiple streams. [Graylog2/graylog2-server#7709](#)
- Add string concatenation to pipeline rule language. [Graylog2/graylog2-server#7855](#) [Graylog2/graylog2-server#7863](#) (Thanks [@rmanibus](#))
- Add `first_non_null` pipeline rule function. [Graylog2/graylog2-server#7895](#) [Graylog2/graylog2-server#7916](#) (Thanks [@radykal-com](#))
- Allow users to request a Graylog Enterprise trial license from inside the product. [Graylog2/graylog2-server#7992](#)
- Add option to enable/disable event definitions and alerts. [Graylog2/graylog2-server#7497](#) [Graylog2/graylog2-server#7902](#)

Changed

- Lots of UI styling related changes to make them more consistent.
- Start index retention from the oldest index, not the newest. [Graylog2/graylog2-server#7310](#)
- Update MongoDB driver to the latest version to support MongoDB 4.2. [Graylog2/graylog2-server#7142](#) [Graylog2/graylog2-server#7240](#) (Thanks [@radykal-com](#))
- Improve unit tests. [Graylog2/graylog2-server#7473](#) [Graylog2/graylog2-server#7595](#) (Thanks [@cpugputpu](#))
- Improve progress bar implementation. [Graylog2/graylog2-server#7443](#)
- Don't directly expose "KafkaJournalConfiguration" values in journal API endpoint. [Graylog2/graylog2-server#7521](#) [Graylog2/graylog2-server#7526](#)
- Optimize JavaScript code bundle sizes. [Graylog2/graylog2-server#7598](#)
- Improve dashboard widget legend positioning. [Graylog2/graylog2-server#7743](#)
- Change default title for dashboard tabs to `Page#<num>`. [Graylog2/graylog2-server#7748](#)
- Improve triggering search executions from search bar. [Graylog2/graylog2-server#7829](#) [Graylog2/graylog2-server#7572](#) [Graylog2/graylog2-server#7596](#) [Graylog2/graylog2-server#7724](#)
- Don't truncate messages in process-buffer dump. [Graylog2/graylog2-server#7937](#) [Graylog2/graylog2-server#7938](#)

Removed

- Remove unused frontend code from the legacy search. [Graylog2/graylog2-server#7338](#)
- Remove the unused system HTTP client provider. [Graylog2/graylog2-server#6376](#)
- Remove legacy saved searches API endpoints. [Graylog2/graylog2-server#7804](#) [Graylog2/graylog2-server#7805](#)

Fixed

- Fix race condition when creating admin role. [Graylog2/graylog2-server#7378](#)
- Display getting started guide with full height. [Graylog2/graylog2-server#7529](#)
- Handle absence of field types in search components. [Graylog2/graylog2-server#7538](#)
- Improve compatibility with IE 11. [Graylog2/graylog2-server#7660](#) [Graylog2/graylog2-server#7670](#) [Graylog2/graylog2-server#7951](#)
- Prevent logging `ReadTimeoutException` as an error if `KeepAlive` is configured by the user. [Graylog2/graylog2-server#7819](#) (Thanks @jesseczko)
- Allow dashboard deletion for users with edit rights. [Graylog2/graylog2-server#7729](#) [Graylog2/graylog2-server#7817](#)
- Only show dashboard delete button for users with correct permissions. [Graylog2/graylog2-server#7793](#) [Graylog2/graylog2-server#7846](#)
- Improve field name completion performance by caching field names. [Graylog2/graylog2-server#7827](#)
- Speed up event processing when it's lagging behind. [Graylog2/graylog2-server#6740](#)
- Improve performance loading streams from the database. [Graylog2/graylog2-server#7867](#)
- Improve autocompletion performance in select fields. [Graylog2/graylog2-server#7753](#) [Graylog2/graylog2-server#7818](#)
- Improve performance for field type retrieval endpoint. [Graylog2/graylog2-server#7865](#)
- Reset pagination on page size change. [Graylog2/graylog2-server#7825](#) [Graylog2/graylog2-server#7826](#)
- Ensure that dashboards have empty root query strings. [Graylog2/graylog2-server#7750](#) [Graylog2/graylog2-server#7858](#)
- Fix metric naming options in aggregation builder. [Graylog2/graylog2-server#7771](#) [Graylog2/graylog2-server#7892](#)
- Improve tarball packaging. [Graylog2/graylog2-server#7920](#) (Thanks @mayrstefan)
- Improve error messages when filtering on empty dashboards. [Graylog2/graylog2-server#7807](#) [Graylog2/graylog2-server#7888](#)
- Improve error messages when users don't have required stream permissions. [Graylog2/graylog2-server#7505](#) [Graylog2/graylog2-server#7782](#)
- Fix LDAP errors for local user accounts. [Graylog2/graylog2-server#2267](#) [Graylog2/graylog2-server#7917](#) (Thanks @mayrstefan)
- Fix warning in pipeline rule parser. [Graylog2/graylog2-server#7918](#) [Graylog2/graylog2-server#7919](#) (Thanks @mayrstefan)
- Fix sidebar highlighting layout for field values with a long name. [Graylog2/graylog2-server#7738](#) [Graylog2/graylog2-server#8018](#)
- Improve compatibility with Safari browsers. [Graylog2/graylog2-server#8003](#) [Graylog2/graylog2-server#8030](#)
- Reset job trigger on event definition updates. [Graylog2/graylog2-server#7841](#) [Graylog2/graylog2-server#8060](#)
- Fix problem with event notification grace period. [Graylog2/graylog2-server#8065](#) [Graylog2/graylog2-server#8067](#)
- Improve rendering performance of select fields in event definitions. [Graylog2/graylog2-server#8083](#)
- Improve default email notification template. [Graylog2/graylog2-server#8112](#)
- Fix timezone rendering of event annotations in graphs. [Graylog2/graylog2-server#8125](#)

Security

- Two XSS issues were discovered in the content packs module and the hyperlink string decorator by Juha Laaksonen, Cyber Security Specialist at Solita. A big thanks to Juha for alerting us about these issues. [Graylog2/graylog2-server#8072](#) [Graylog2/graylog2-server#8104](#) [Graylog2/graylog2-server#8150](#)
- Mika Kulmala, Cyber Security Specialist at Solita, reported a leak of the AWS secret key in certain (authenticated) Graylog REST API calls. Graylog is no longer revealing the AWS secret key in REST API responses. A big thanks to Mika for alerting us about this issue. [Graylog2/graylog-plugin-aws#361](#)

24.30 Graylog 3.2.6

Released: 2020-06-10

24.30.1 Core

Fixed

- Retry message indexing when indices are read-only due to disk space problems in Elasticsearch. [Graylog2/graylog2-server#8211](#) [Graylog2/graylog2-server#8269](#)
- Fix issue with using float numbers in event definitions. [Graylog2/graylog2-server#8290](#)

24.31 Graylog 3.2.5

Released: 2020-05-19

24.31.1 Core

Added

- Add minimal support for Beats 7.x to the beats input. [Graylog2/graylog2-server#6501](#) [Graylog2/graylog2-server#7894](#)
- Show system notification when disk in Elasticsearch fills up. [Graylog2/graylog2-server#7899](#) (Thanks @radykal-com)

Changed

- Enforce unix newlines in the sidecar collector configuration file editor. [Graylog2/graylog2-server#7889](#) [Graylog2/collector-sidecar#389](#) [Graylog2/graylog2-server#7975](#)
- Mask passwords in input configuration returned from the `/system/inputstates` endpoint. [Graylog2/graylog2-server#8037](#)
- Sanitize URLs in content packs. [Graylog2/graylog2-server#8072](#) [Graylog2/graylog2-server#8104](#)
- Sanitize URIs in “Hyperlink String” decorator. [Graylog2/graylog2-server#8150](#)

Fixed

- Fix UI issues in sidecar configuration. [Graylog2/graylog2-server#7406](#) [Graylog2/graylog2-server#7754](#)
- Fix dashboard migration issues. [Graylog2/graylog2-server#7732](#) [Graylog2/graylog2-server#7749](#) [Graylog2/graylog2-server#7840](#)

- Fix message list sorting option. [Graylog2/graylog2-server#7758](#) [Graylog2/graylog2-server#7763](#)
- Fix compatibility issue with Safari and the aggregation configuration. [Graylog2/graylog2-server#7806](#) [Graylog2/graylog2-server#7815](#)
- Fix pipeline stage parsing endpoint. [Graylog2/graylog2-server#7322](#) [Graylog2/graylog2-server#7830](#)

24.31.2 AWS Plugin (legacy)

Changed

- Encrypt default AWS secret key with system secret. [Graylog2/graylog-plugin-aws#361](#)

24.32 Graylog 3.2.4

Released: 2020-03-19

24.32.1 Core

Changed

- Display old LDAP group mappings so they can be deleted by the user. [Graylog2/graylog2-server#7502](#) [Graylog2/graylog2-server#7697](#)
- Don't allow aggregations on analyzed fields. [Graylog2/graylog2-server#7508](#) [Graylog2/graylog2-server#7685](#)

Fixed

- Fix problem with message list pagination. [Graylog2/graylog2-server#7680](#) [Graylog2/graylog2-server#7665](#) [Graylog2/graylog2-server#7693](#)
- Fix issue removing custom fields from event definitions. [Graylog2/graylog2-server#7544](#) [Graylog2/graylog2-server#7692](#)
- Fix drop-down overlay placements on search page. [Graylog2/graylog2-server#7723](#)
- Remove streams parameter from URL when the last stream got removed from a search query. [Graylog2/graylog2-server#7717](#) [Graylog2/graylog2-server#7719](#)

24.33 Graylog 3.2.3

Released: 2020-03-11

24.33.1 Core

Added

- Add back auto-completion for `_exists_` queries. [Graylog2/graylog2-server#7441](#) [Graylog2/graylog2-server#7604](#)
- Add back surrounding search feature for searches and dashboards. [Graylog2/graylog2-server#7616](#) [Graylog2/graylog2-server#7621](#)
- Add support for newer Kafka versions and allowing more customization options. [Graylog2/graylog2-server#7504](#) (Thanks [@muralibasani](#))

- Add back field sorting for the message table widget. [Graylog2/graylog2-server#7645](#)
- Add back “replay search” button for dashboard widgets. [Graylog2/graylog2-server#7372](#) [Graylog2/graylog2-server#7648](#)
- Add option to share a saved search with other users. [Graylog2/graylog2-server#7668](#)

Changed

- Improve chart rendering for zero values. [Graylog2/graylog2-server#7605](#)
- Rename “Aggregate” field option to “Show top values” to make it more clear. (this was previously called quick values) [Graylog2/graylog2-server#7663](#)

Fixed

- Fix widget error “n.find is not a function”. [Graylog2/graylog2-server#7365](#) [Graylog2/graylog2-server#7538](#)
- Fix problem with rendering table widgets. [Graylog2/graylog2-server#7565](#) [Graylog2/graylog2-server#7611](#)
- Fix aggregation event definitions when no streams are selected. [Graylog2/graylog2-server#7619](#) [Graylog2/graylog2-server#7625](#)
- Fix problem with showing message journal statistics on the node details page. [Graylog2/graylog2-server#7521](#) [Graylog2/graylog2-server#7633](#)
- Fix sorting problem when sorting over different streams. [Graylog2/graylog2-server#6490](#) [Graylog2/graylog2-server#7569](#)
- Fix search and dashboard issues with Internet Explorer 11. [Graylog2/graylog2-server#7660](#)
- Fix search page refresh handling. [Graylog2/graylog2-server#7661](#)

24.34 Graylog 3.2.2

Released: 2020-02-20

24.34.1 Core

Changed

- Use Graylog data dir for storing netty tcnative libraries. [Graylog2/graylog2-server#5762](#) [Graylog2/graylog2-server#7359](#)
- Add colon (:) when selecting a field from auto-completion. [Graylog2/graylog2-server#7408](#) [Graylog2/graylog2-server#7493](#)

Fixed

- Suppress system notification for whitelist errors from test alerts. [Graylog2/graylog2-server#7350](#) [Graylog2/graylog2-server#7390](#)
- Fix issue with duplicating dashboard tabs. [Graylog2/graylog2-server#7397](#)
- Improve search URL synchronization by avoiding unnecessary entries in browser history. [Graylog2/graylog2-server#7415](#)
- Fix error on system overview page. [Graylog2/graylog2-server#7329](#) [Graylog2/graylog2-server#7351](#)
- Fix issue with content pack creation. [Graylog2/graylog2-server#6690](#) [Graylog2/graylog2-server#7449](#)

- Fix problem with dashboard migration and hidden filters. [Graylog2/graylog2-server#7366](#) [Graylog2/graylog2-server#7420](#)
- Fix dashboard migration issue with field name extraction. [Graylog2/graylog2-server#7452](#)
- Fix widget error “n.find is not a function”. [Graylog2/graylog2-server#7365](#) [Graylog2/graylog2-server#7450](#)
- Fix dashboard widget migration error related to value sorting. [Graylog2/graylog2-server#7476](#) [Graylog2/graylog2-server#7481](#)
- Fix issue with Active Directory authentication support. [Graylog2/graylog2-server#7431](#) [Graylog2/graylog2-server#7498](#)
- Fix issue with field ordering in message table widgets. [Graylog2/graylog2-server#6808](#) [Graylog2/graylog2-server#7501](#)
- Fix problem with running Graylog under a subpath. [Graylog2/graylog2-server#7447](#) [Graylog2/graylog2-server#7500](#)

24.34.2 Integrations Plugin

Fixed

- Fix issue with AWS Kinesis token refresh. [Graylog2/graylog-plugin-integrations#386](#) [Graylog2/graylog-plugin-integrations#389](#)

24.35 Graylog 3.2.1

Released: 2020-02-04

24.35.1 Core

Fixed

- Fix problem with message processing and invalid timestamp fields. [Graylog2/graylog2-server#7364](#) [Graylog2/graylog2-server#7290](#)
- Fix scrolling issue in data table widget for Safari browser. [Graylog2/graylog2-server#7344](#) [Graylog2/graylog2-server#7353](#)
- Fix two issues with saved search migration. [Graylog2/graylog2-server#7362](#) [Graylog2/graylog2-server#7369](#)

24.36 Graylog 3.2.0

Released: 2020-01-31

24.36.1 Core

Added

- Add configuration options for event index set prefixes. [Graylog2/graylog2-server#6340](#) [Graylog2/graylog2-server#6350](#)
- Add support for trailing comma characters in GELF input. [Graylog2/graylog2-server#6325](#)
- Add “apply” button to pipeline rule editor to improve editing workflow. [Graylog2/graylog2-server#6312](#) [Graylog2/graylog2-server#6351](#) (Thanks @radykal-com!)
- Start infrastructure for UI theming.
- Support for percentile aggregations in the aggregation builder. [Graylog2/graylog2-server#6597](#)
- Add support for MaxMind ASN geo IP databases. [Graylog2/graylog2-server#6623](#)
- Introduce cluster global REST API browser button.
- Add heatmap visualization in aggregation builder. [Graylog2/graylog2-server#6678](#)
- Add area chart visualization to aggregation builder. [Graylog2/graylog2-server#6893](#)
- Add support for disabling the built-in root user. [Graylog2/graylog2-server#6688](#)
- Support for string list values in lookup tables. [Graylog2/graylog2-server#6542](#)
- Add pipeline functions to update string list values in lookup tables. [Graylog2/graylog2-server#7189](#)
- Bring back content pack auto-load. [Graylog2/graylog2-server#5744](#) [Graylog2/graylog2-server#6096](#)
- Add scratchpad for short notes. [Graylog2/graylog2-server#6492](#)
- Add content pack support for searches. [Graylog2/graylog2-server#6973](#)
- Add support for multiple conditions in event and alert aggregations. [Graylog2/graylog2-server#6353](#) [Graylog2/graylog2-server#6879](#)
- Configuration option to enforce system wide TLS protocol settings. [Graylog2/graylog2-server#6444](#) [Graylog2/graylog2-server#7130](#)
- Support for multiple dashboard tabs.
- Automatic tab rotation on dashboards in TV/full-screen mode.
- Add `gl2_accounted_message_size` field to every message to help with accounting license traffic. [Graylog2/graylog2-server#6838](#) [Graylog2/graylog2-server#7187](#)
- Remember event/alert display settings in event/alerts overview page. [Graylog2/graylog2-server#6796](#) [Graylog2/graylog2-server#7221](#)
- Add support for dumping the current process buffer state to help debugging slow processing. [Graylog2/graylog2-server#7199](#)
- Add `elasticsearch_discovery_default_scheme` config file setting to improve Elasticsearch node discovery. [Graylog2/graylog2-server#6280](#) [Graylog2/graylog2-server#6315](#) (Thanks @radykal-com!)
- Allow customization of colors in visualizations.
- Add global filter and timerange override for dashboards. [Graylog2/graylog2-server#6424](#) [Graylog2/graylog2-server#6445](#)

Changed

- Improve navigation display on small screens. [Graylog2/graylog2-server#6329](#)
- Introduce abstraction for bootstrap UI components. [Graylog2/graylog2-server#6385](#)

- Improve log level configuration to include more log classes. [Graylog2/graylog2-server#6423](#)
- Improve event notification test button. [Graylog2/graylog2-server#6522](#)
- Don't show event streams in pipeline configuration. [Graylog2/graylog2-server#6454](#) [Graylog2/graylog2-server#6513](#)
- Migrated legacy dashboards into new dashboards.
- Migrated legacy saved searches into new search bookmarks.
- Improve lookup cache error handling. [Graylog2/graylog2-server#6295](#) [Graylog2/graylog2-server#6518](#)
- Migrate "Sources" page into a dashboard. [Graylog2/graylog2-server#7024](#)

Removed

- Remove unused search-type implementations. [Graylog2/graylog2-server#6438](#)
- Sources page has been removed and converted into a dashboard. [Graylog2/graylog2-server#7024](#)

Fixed

- Fix sorting issue on inputs page. [Graylog2/graylog2-server#5921](#) (Thanks @radykal-com!)
- Fix issue creating database indices for processin status. [Graylog2/graylog2-server#6322](#) [Graylog2/graylog2-server#6333](#)
- Fix server shutdown problem with message generator input. [Graylog2/graylog2-server#6305](#)
- Fix issue loading views. [Graylog2/graylog2-server#6346](#) [Graylog2/graylog2-server#6352](#)
- Fix display issues with auto-completion in search bar. [Graylog2/graylog2-server#6461](#)
- Fix issue with compound index field types. [Graylog2/graylog2-server#6313](#) [Graylog2/graylog2-server#6462](#)
- Fix issues with field highlighting. [Graylog2/graylog2-server#6511](#) [Graylog2/graylog2-server#6512](#)
- Fix race condition in index management. [Graylog2/graylog2-server#6383](#) [Graylog2/graylog2-server#6634](#)
- Fix issue with event notification backlog seeting display. [Graylog2/graylog2-server#6580](#)
- Fix sorting in streams selection in search. [Graylog2/graylog2-server#6514](#) [Graylog2/graylog2-server#6655](#)
- Fix issue with managing event index set templates. [Graylog2/graylog2-server#6507](#) [Graylog2/graylog2-server#6656](#)
- Fix issue reloading changed GROK patterns in a cluster setup. [Graylog2/graylog2-server#6666](#)
- Fix pipeline rule parsing error. [Graylog2/graylog2-server#6716](#)
- Fix UI problem modifying pipeline stages. [Graylog2/graylog2-server#5896](#) [Graylog2/graylog2-server#6743](#)
- Fix issue with object validation in REST API. [Graylog2/graylog2-server#5402](#)
- Fix timestamp data type issue with COMMONAPACHELOG GROK pattern. [Graylog2/graylog2-server#1647](#) [Graylog2/graylog2-server#6847](#)
- Fix issue with pipelines and the default stream in content packs. [Graylog2/graylog2-server#6873](#) (Thanks @pschichtel!)
- Improve REST API browser documentation. [Graylog2/graylog2-server#6955](#)
- Fix event aggregation issues with empty fields. [Graylog2/graylog2-server#6933](#) [Graylog2/graylog2-server#7070](#)
- Fix issue with upsert database operations. [Graylog2/graylog2-server#7258](#) [Graylog2/graylog2-server#7259](#)

- Fix issue in DNS adapter that could cause message processing stalls. [Graylog2/graylog2-server#5782](#)
[Graylog2/graylog2-server#7325](#)

24.36.2 Integrations Plugin

Added

- Add IPFIX input plugin.

24.37 Graylog 3.1.4

Released: 2020-01-14

24.37.1 Core

Added

- Add URL whitelist service to make sure that lookup data adapters and event notifications cannot use arbitrary URLs. **Attention:** The URL whitelist is enabled by default! On the first server startup after the upgrade, the URL whitelist service will automatically generate whitelist entries for existing lookup data adapters and event notifications. See [URL whitelist documentation](#) for details.

Changed

- Reduce amount of log messages when job scheduler is disabled on a node. [Graylog2/graylog2-server#6451](#)
[Graylog2/graylog2-server#6816](#)

Fixed

- Fix global API browser link. [Graylog2/graylog2-server#6823](#) [Graylog2/graylog2-server#6826](#)
- Ensure that aggregation events always have a `source_streams` field for permission checks. [Graylog2/graylog2-server#6876](#) [Graylog2/graylog2-server#6877](#)
- Fix caching issue with `route_to_stream` pipeline function. [Graylog2/graylog2-server#4954](#)
[Graylog2/graylog2-server#6788](#)
- Fix issue with calculating index ranges. [Graylog2/graylog2-server#6828](#) [Graylog2/graylog2-server#6957](#) **Attention:** If you are affected by [Graylog2/graylog2-server#6828](#), you have to manually recalculate index ranges for all your index sets.
- Improve API browser for event resources. [Graylog2/graylog2-server#6742](#) [Graylog2/graylog2-server#6955](#)
- Fix message indexing issue that could potentially stop message indexing completely. [Graylog2/graylog2-server#5091](#) [Graylog2/graylog2-server#6965](#) [Graylog2/graylog2-server#7071](#)

24.37.2 Integrations Plugin

Added

- Add support for automatic authentication scheme for the AWS Kinesis integration. (environment variables, Java properties, instance roles) [Graylog2/graylog-plugin-integrations#264](#) [Graylog2/graylog-plugin-integrations#279](#)
- Add “assume role” support for AWS Kinesis integration. [Graylog2/graylog-plugin-integrations#264](#) [Graylog2/graylog-plugin-integrations#279](#)

Fixed

- Fix rate limit issue with AWS Kinesis streams. [Graylog2/graylog-plugin-integrations#341](#) [Graylog2/graylog-plugin-integrations#342](#)

24.38 Graylog 3.1.3

Released: 2019-11-06

24.38.1 Core

Added

- Add test button to allow testing of event notifications. [Graylog2/graylog2-server#6138](#) [Graylog2/graylog2-server#6549](#)
- Add support for MaxMind ASN database type in lookup tables. [Graylog2/graylog2-server#6631](#)
- Add `metric_counter_inc` pipeline function. [Graylog2/graylog2-server#6644](#)
- Add `length` pipeline function. [Graylog2/graylog2-server#6645](#)
- Add `traffic_accounting_size` pipeline function. [Graylog2/graylog2-server#6646](#)
- Implement pipeline rule timers to help debugging slow rules. [Graylog2/graylog2-server#5494](#) [Graylog2/graylog2-server#6680](#)

Changed

- Hide event streams from pipelines because events are currently not supported in pipeline rules. [Graylog2/graylog2-server#6454](#) [Graylog2/graylog2-server#6545](#)
- Increase default connection limits for Elasticsearch connections. [Graylog2/graylog2-server#4637](#) [Graylog2/graylog2-server#6679](#)

Fixed

- Fix problem with message highlighting. [Graylog2/graylog2-server#6511](#) [Graylog2/graylog2-server#6526](#)
- Improve event and alert processing on nodes with low ingest rates. [Graylog2/graylog2-server#6453](#) [Graylog2/graylog2-server#6548](#)
- Remove event streams from global search to fix custom sorting issue. [Graylog2/graylog2-server#6384](#) [Graylog2/graylog2-server#6544](#)
- Fix event processing on nodes with a disabled journal. [Graylog2/graylog2-server#6449](#) [Graylog2/graylog2-server#6547](#)
- Fix UI problem with select components. [Graylog2/graylog2-server#6554](#)

- Fix problem adding multiple percentile aggregations in views. [Graylog2/graylog2-server#6597](#) [Graylog2/graylog2-server#6638](#)
- Fix API browser links in setups with multiple nodes. [Graylog2/graylog2-server#2360](#) [Graylog2/graylog2-server#5920](#) [Graylog2/graylog2-server#6636](#)
- Fix display of backlog size for legacy event notification plugins. [Graylog2/graylog2-server#6647](#)
- Fix issue with MongoDB index creation. [Graylog2/graylog2-server#6383](#) [Graylog2/graylog2-server#6643](#)
- Fix stream permission checks for view searches. [Graylog2/graylog2-server#6651](#)
- Fix stream sorting in streams filter option in views. [Graylog2/graylog2-server#6514](#) [Graylog2/graylog2-server#6657](#)
- Fix problem with event index set migration. [Graylog2/graylog2-server#6507](#) [Graylog2/graylog2-server#6662](#) [Graylog2/graylog2-server#6674](#)
- Ensure Grok pattern reloading on bulk pattern import. [Graylog2/graylog2-server#6673](#)
- Fix error handling in pipeline parser. [Graylog2/graylog2-server#6696](#) [Graylog2/graylog2-server#6731](#)

24.38.2 Integrations Plugin

Fixed

- Fix checkpointing AWS Kinesis streams. [Graylog2/graylog-plugin-integrations#286](#) [Graylog2/graylog-plugin-integrations#294](#)

24.39 Graylog 3.1.2

Released: 2019-09-12

24.39.1 Core

Fixed

- Cannot read property 'query' of undefined when replaying search [Graylog2/graylog2-server#6355](#)
- Cannot focus input fields in modal form (Dashboard) [Graylog2/graylog2-server#6356](#)
- Server start fails with *Index with name: compound_0 already exists with a different name* [Graylog2/graylog2-server#6383](#)
- Alerting not working if cluster contains nodes with no active inputs [Graylog2/graylog2-server#6415](#)

24.40 Graylog 3.1.1

Released: 2019-09-04

24.40.1 Core

Fixed

- Error when loading a view. [Graylog2/graylog2-server#6346](#)
- Fix server startup issue resulting from long index name. [Graylog2/graylog2-server#6322](#)

24.40.2 Integrations Plugin

Added

- Add a new *AWS Kinesis/CloudWatch Input* to Graylog, which guides the user through the setup process and performs checks along the way. It also supports an automated CloudWatch Logs to Kinesis Streams setup which helps to automate much of the complicated manual setup.

24.41 Graylog 3.1.0

Released: 2019-08-16

24.41.1 Views & Extended Search

- This feature was partially (everything besides support for parameters in queries) open-sourced in this version. Formerly it was accessible only through the commercial enterprise plugin.
- The API prefix for the views/extended search endpoints has changed from `/api/plugins/org.graylog.plugins.enterprise/(views|search)` to `/api/views` & `/api/views/search`.
- The configuration file directive specifying the maximum age of an unreferenced search object before it is purged has changed from `enterprise_search_maximum_search_age` to `views_maximum_search_age`.

24.41.2 Core

Added

- Add `GracefulShutdownService` Java API to allow plugins to participate in a graceful server shutdown. [Graylog2/graylog2-server#5738](#)
- Add `MessageOutput.Factory2` Java API to allow writing output plugins that receive the output instance ID. [Graylog2/graylog2-server#5670](#)
- Add metrics for Sidecar HTTP API resources. [Graylog2/graylog2-server#5632](#)
- Add new pipeline rule function `grok_exists` to check for the existence of Grok patterns. [Graylog2/graylog2-server#5699](#) [Graylog2/graylog2-server#5689](#)
- Allow the `group.id` setting in a Kafka input to be configured by users. [Graylog2/graylog2-server#5867](#) [Graylog2/graylog2-server#3976](#) (Thank you @pdepaepe)
- Add “show documents for value” field value action to views.
- Add automatic refresh feature to views search.
- Add support for extractor creation links to views.
- Add support for highlighting terms in message search results in views.

- Allow user defined granularity for auto interval time-bucketing in views.
- Add views action to duplicate query tabs. (including widgets)
- Make message fields in views message list sortable.
- Add support for stacked bar charts in views.
- Make colors in view charts configurable.
- Add support for percentile metrics in views.
- Add syntax highlighting for pipeline rule editor. [Graylog2/graylog2-server#5957](#)
- Add new alerts and events system.
- Add default events and system events streams. [Graylog2/graylog2-server#6089](#) [Graylog2/graylog2-server#6085](#)
- Add default `gl2_message_id` field for each new message. [Graylog2/graylog2-server#6074](#) [Graylog2/graylog2-server#5994](#)
- Add *experimental* JDK 11 support. [Graylog2/graylog2-server#5909](#) (please don't use in production, yet)
- Add default filebeat collector config for Windows. [Graylog2/graylog2-server#6287](#) [Graylog2/collector-sidecar#350](#)

Changed

- Add a high-resolution logo and favicon and optimize all image files. [Graylog2/graylog2-server#5748](#)
- Improve autogenerated UI elements for boolean fields. [Graylog2/graylog2-server#5678](#)
- Make modal dialogs only close with ESC key, Cancel and “X” buttons. They don't close anymore when users click outside of the modal content. [Graylog2/graylog2-server#5823](#)
- Improve error messages when updating Grok patterns. [Graylog2/graylog2-server#5629](#)
- Improve error messages for search errors. [Graylog2/graylog2-server#5681](#)
- Improve navigation bar layout. [Graylog2/graylog2-server#6001](#)
- Improve views query autocompletion suggestions.
- Move Save/Cancel buttons in views widget edit mode.
- Use dynamic pager in views message lists. [Graylog2/graylog2-server#6090](#)
- Set default value for email sender to empty value. [Graylog2/graylog2-server#5981](#) (Thank you @bjoernhaeuser)
- Improve stream router engine performance. [Graylog2/graylog2-server#6170](#)
- Avoid logging excessive exceptions when other Graylog nodes are not reachable via HTTP. [Graylog2/graylog2-server#6229](#)
- Darken disabled inputs on the inputs page, making it easier to see when an input is disabled. [Graylog2/graylog2-server#6257](#)

Removed

- Remove “show documents” action for message widgets.
- Remove old stream alerts system. (replaced by new alerts and events system, including automatic alerts migration)

Fixed

- Fix slow loading HTTP API and UI after server startup. [Graylog2/graylog2-server#5669](#)

- Fix API path prefixing to allow running Graylog with a sub-path again. [Graylog2/graylog2-server#5703](#) [Graylog2/graylog2-server#5702](#)
- Fix issue with dashboard data migration. [Graylog2/graylog2-server#5751](#) [Graylog2/graylog2-server#5737](#)
- Add wildcard support to search page query parser. [Graylog2/graylog2-server#5730](#) [Graylog2/graylog2-server#5719](#)
- Fix “Expect: 100-Continue” handling in HTTP inputs. [Graylog2/graylog2-server#5725](#) [Graylog2/graylog2-server#5690](#)
- Fix HTTP input keep-alive handling. [Graylog2/graylog2-server#5728](#) [Graylog2/graylog2-server#5720](#)
- Fix Grok pattern handling with OR patterns. [Graylog2/graylog2-server#5749](#) [Graylog2/graylog2-server#4773](#)
- Fix issues with Cisco ASA NetFlow handling. [Graylog2/graylog2-server#5729](#) [Graylog2/graylog2-server#5715](#)
- Fix support for underscores (___) in Grok pattern match group names. [Graylog2/graylog2-server#5800](#) [Graylog2/graylog2-server#5704](#) [Graylog2/graylog2-server#5563](#)
- Fix auto-completion in several drop-down fields across the UI. [Graylog2/graylog2-server#5665](#) [Graylog2/graylog2-server#5659](#)
- Fix problem with loading the extractors page in the UI. [Graylog2/graylog2-server#5954](#) [Graylog2/graylog2-server#5948](#)
- Fix links on stream outputs page. [Graylog2/graylog2-server#5953](#) [Graylog2/graylog2-server#5952](#)
- Fix edit mode of message widget in views.
- Don’t refresh view query when changing query tabs.
- Copy widget filter when creating statistics widget for a field in views.
- Support nested maps in lists for content packs. [Graylog2/graylog2-server#6003](#) [Graylog2/graylog2-server#5742](#)
- Reload changed Grok patterns in Grok extractor. [Graylog2/graylog2-server#5982](#) [Graylog2/graylog2-server#5833](#)
- Fix support for TLS trusted certificate directories in inputs. [Graylog2/graylog2-server#5958](#) [Graylog2/graylog2-server#5939](#)
- Fix plugin UI routes when running the web interface with a sub-path. [Graylog2/graylog2-server#6150](#) [Graylog2/graylog2-server#6149](#)
- Fix rendering of events in single message view. [Graylog2/graylog2-server#6156](#) [Graylog2/graylog2-server#6142](#)
- Fix rendering of LDAP page. [Graylog2/graylog2-server#6249](#) [Graylog2/graylog2-server#6247](#)
- Fix pagination issue with newer JDKs. [Graylog2/graylog2-server#6256](#) [Graylog2/graylog2-server#6254](#)
- Fix issue with UDP based inputs becoming unresponsive. [Graylog2/graylog2-server#6263](#) [Graylog2/graylog2-server#5701](#)

24.42 Graylog 3.0.2

Released: 2019-05-03

Integrations Plugin

- Fix issue handling quoted values in PaloAlto input [Graylog2/graylog-plugin-integrations#15](#) [Graylog2/graylog-plugin-integrations#16](#)

24.43 Graylog 3.0.1

Released: 2019-04-01

Core

- Fix dashboard position migration. [Graylog2/graylog2-server#5737](#) [Graylog2/graylog2-server#5763](#)
- Fix HTTP 100 handling in http inputs. [Graylog2/graylog2-server#5690](#) [Graylog2/graylog2-server#5725](#)
- Fix http input keep-alive handling. [Graylog2/graylog2-server#5720](#) [Graylog2/graylog2-server#5728](#)
- Fix running Graylog web interface under a path prefix. [Graylog2/graylog2-server#5702](#) [Graylog2/graylog2-server#5703](#)
- Fix issue with wildcards in the search query parser when running with newer Elasticsearch versions. [Graylog2/graylog2-server#5719](#) [Graylog2/graylog2-server#5766](#)
- Fix Grok patterns that use “OR” to not return “null” values. [Graylog2/graylog2-server#4773](#) [Graylog2/graylog2-server#5749](#)
- Fix NetFlow parsing for Cisco ASA devices. [Graylog2/graylog2-server#5715](#) [Graylog2/graylog2-server#5729](#)
- Fix Grok patterns to support underscores in match group names again. [Graylog2/graylog2-server#5704](#) [Graylog2/graylog2-server#5563](#) [Graylog2/graylog2-server#5800](#)
- Document password escaping issue for the MongoDB connection URL. [Graylog2/graylog2-server#5680](#) [Graylog2/graylog2-server#5764](#)

Integrations Plugin

- Fix input parsing problem in PaloAlto input. [Graylog2/graylog-plugin-integrations#10](#) [Graylog2/graylog-plugin-integrations#11](#)

Threatintel Plugin

- Fix problem with content pack migration. [Graylog2/graylog-plugin-threatintel#123](#)

24.44 Graylog 3.0.0

Released: 2019-02-14

- Announcement blog post: <https://www.graylog.org/post/announcing-graylog-v3-0-ga>
- Upgrade notes: *[Upgrading to Graylog 3.0.x](#)*

A detailed changelog is following soon!

24.45 Graylog 2.5.2

Released: 2019-03-15

Core

- Mask password fields of inputs returned by the REST API. [Graylog2/graylog2-server#5432](#) [Graylog2/graylog2-server#5733](#)

Integrations Plugin

- Fix input parsing problem in PaloAlto input. [Graylog2/graylog-plugin-integrations#10](#) [Graylog2/graylog-plugin-integrations#11](#)

24.46 Graylog 2.5.1

Released: 2018-12-19

Core

- Improve description of `web_endpoint_uri` in `graylog.conf`. [Graylog2/graylog2-server#5359](#)
- Add CSRF backward compatibility for older Sidecars. [Graylog2/graylog2-server#5388](#) [Graylog2/graylog2-server#4987](#)

AWS Plugin

- Remove low limit for GZIP decompression of AWS events. [Graylog2/graylog-plugin-aws#98](#)

Pipeline Processor Plugin

- Fix IPv6 handling in IPv4 `cidr_match` pipeline function. [Graylog2/graylog-plugin-pipeline-processor#254](#) [Graylog2/graylog2-server#5405](#)

24.47 Graylog 2.5.0

Released: 2018-11-30

Core

- Improve CSRF protection by requiring a custom HTTP header for non-GET requests sent to the API. (requires sidecar 0.1.7) [Graylog2/graylog2-server#4998](#) [Graylog2/graylog2-server#5012](#) [Graylog2/graylog2-server#5182](#)
- Improve alert conditions by making the query string configurable. [Graylog2/graylog2-server#5277](#) [Graylog2/graylog2-server#3966](#)
- Improve alert overview for streams. [Graylog2/graylog2-server#5311](#)
- Add test button for alert conditions. [Graylog2/graylog2-server#5322](#)
- Add DNS lookup adapter that supports forward and reverse lookups. [Graylog2/graylog2-server#5274](#) [Graylog2/graylog2-server#4200](#) [Graylog2/graylog2-server#5124](#) [Graylog2/graylog-plugin-threatintel#64](#)
- Add support for Elasticsearch 6.x. [Graylog2/graylog2-server#5020](#) [Graylog2/graylog2-server#5064](#)
- Update time zone database for the web interface. [Graylog2/graylog2-server#5260](#) [Graylog2/graylog2-server#5245](#)

- Fix description and default values for the DSV HTTP lookup table adapter. [Graylog2/graylog2-server#4973](#) @zionio
- Fix slow and unreliable CSV export by using a bigger default batch size. [Graylog2/graylog2-server#5172](#) [Graylog2/graylog2-server#5304](#)
- Fix index stats in index set overview. [Graylog2/graylog2-server#5306](#)
- Fix security issue with the users API where regular users could retrieve details of other users. [Graylog2/graylog2-server#5308](#) [Graylog2/graylog2-server#5068](#) @radykal-com
- Fix backslash escaping for phrase searches. [Graylog2/graylog2-server#5314](#) [Graylog2/graylog2-server#4111](#) [Graylog2/graylog2-server#5266](#)

Integrations Plugin

- Add Palo Alto input

AWS Plugin

- Add throttling support to the AWS Flow Logs input. [Graylog2/graylog-plugin-aws#94](#) [Graylog2/graylog-plugin-aws#85](#)
- Improve logging for the CloudTrail input. [Graylog2/graylog-plugin-aws#95](#) [Graylog2/graylog-plugin-aws#80](#)

Pipeline Processor Plugin

- Fix key-value function to be more robust with splitting values. [Graylog2/graylog-plugin-pipeline-processor#249](#) [Graylog2/graylog2-server#4920](#) @radykal-com
- Add support for decimal IPv4 representation in the `to_ip` function. [Graylog2/graylog-plugin-pipeline-processor#253](#) [Graylog2/graylog2-server#5268](#)

24.48 Graylog 2.4.7

Released: 2019-03-01

Core

- Mask password fields of inputs returned by the REST API. [Graylog2/graylog2-server#5408](#) [Graylog2/graylog2-server#5734](#)

24.49 Graylog 2.4.6

Released: 2018-07-16

Core

- Unbreak input throttling by publishing throttle state again. [Graylog2/graylog2-server#4850](#) [Graylog2/graylog2-server#4321](#)
- Check for permission before terminating input. [Graylog2/graylog2-server#4867](#) [Graylog2/graylog2-server#4858](#)
- Require user to be authenticated to retrieve plugin list. [Graylog2/graylog2-server#4868](#) [Graylog2/graylog2-server#4863](#)
- Add missing permission checks. [Graylog2/graylog2-server#4873](#) [Graylog2/graylog2-server#4861](#) [Graylog2/graylog2-server#4859](#)
- UI fixes for index rotation strategy dropdown. [Graylog2/graylog2-server#4826](#) [Graylog2/graylog2-server#4769](#)

- XSS fix for typeahead components. [Graylog2/graylog2-server#4904](#)
- Fix potential NullPointerException in csv and maxmind data adapters. [Graylog2/graylog2-server#4912](#) [Graylog2/graylog2-server#4748](#)
- Add “http_non_proxy_hosts” configuration option. [Graylog2/graylog2-server#4915](#) [Graylog2/graylog2-server#4905](#) [Graylog2/graylog2-server#4392](#)

24.50 Graylog 2.4.5

Released: 2018-05-28

Core

- Improve HTTP proxy authentication to support more proxy server software. [Graylog2/graylog2-server#4788](#) [Graylog2/graylog2-server#4790](#)
- Fix an issue where the Elasticsearch URL credentials have been written to the Graylog log file. [Graylog2/graylog2-server#4804](#) [Graylog2/graylog2-server#4806](#)
- Fix issue with deleting dashboard widgets. [Graylog2/graylog2-server#4525](#) [Graylog2/graylog2-server#4808](#)

24.51 Graylog 2.4.4

Released: 2018-05-02

Core

- Fix issues with loading example message for extractor. [Graylog2/graylog2-server#4553](#) [Graylog2/graylog2-server#4559](#)
- Allow : character in password. [Graylog2/graylog2-server/#4557](#)
- Fix lookup table cache entry count metric. [Graylog2/graylog2-server#4558](#)
- Simplify plugin development for lookup table plugins. [Graylog2/graylog2-server#4586](#) [Graylog2/graylog2-server#4587](#)
- Fix security issue with unescaped text in notification and dashboard names. [Graylog2/graylog2-server#4727](#) [Graylog2/graylog2-server#4739](#)
- Improve high-availability behavior with missing Elasticsearch nodes. [Graylog2/graylog2-server#4738](#)
- Fix issue with updating saved searches. [Graylog2/graylog2-server#2285](#) [Graylog2/graylog2-server#4743](#)
- Fix issue assigning stream outputs to the default stream. [Graylog2/graylog2-server#4747](#) [Graylog2/graylog2-server#4754](#)
- Improve rendering of input configuration forms. [Graylog2/graylog2-server#4755](#) [Graylog2/graylog2-server#4745](#) by @Al2Klimov
- Add code to allow HTTP proxy authentication in http_proxy_uri config option. [Graylog2/graylog2-server#4594](#) [Graylog2/graylog2-server#4758](#)

ThreatIntel Plugin

- Fix issue with missing threat names in lookup results. [Graylog2/graylog-plugin-threatintel#99](#) by @pbr0ck3r

AWS Plugin

- Support new AWS regions. [Graylog2/graylog-plugin-aws#71](#) [Graylog2/graylog-plugin-aws#73](#)
[Graylog2/graylog-plugin-aws#75](#)

24.52 Graylog 2.4.3

Released: 2018-01-24

<https://www.graylog.org/blog/108-announcing-graylog-v2-4-3>

Core

- Fix timezone issue when using the timestamp field in quick values. [Graylog2/graylog2-server#4519](#)
[Graylog2/graylog2-server#4509](#)

24.53 Graylog 2.4.2

Released: 2018-01-24

Core

- Fix issue with creating dashboards as non-admin user. [Graylog2/graylog2-server#4505](#) [Graylog2/graylog2-server#4511](#)
- Fix edge case in recent message loader for extractors. [Graylog2/graylog2-server#4513](#) [Graylog2/graylog2-server#4510](#)
- Fix formatting issue when using quick values on the timestamp field. [Graylog2/graylog2-server#4423](#)
[Graylog2/graylog2-server#4288](#)
- Fix issue with handling the timestamp field in stacked quick value widgets. [Graylog2/graylog2-server#4516](#)
[Graylog2/graylog2-server#4509](#)

Threatintel Plugin

- Fix README.md about `tor_lookup()` function. [Graylog2/graylog2-server#86](#)

24.54 Graylog 2.4.1

Released: 2018-01-19

<https://www.graylog.org/blog/107-announcing-graylog-v2-4-1>

Core

- Fix SyslogCodecTest.testCiscoSyslogMessages. [Graylog2/graylog2-server#4446](#)
- Fix privileges for input start/stop operations. [Graylog2/graylog2-server#4454](#) [Graylog2/graylog2-server#4455](#)
[Graylog2/graylog2-server#4439](#)
- Fix problem with Elasticsearch indexing over HTTPS. [Graylog2/graylog2-server#4485](#) [Graylog2/graylog2-server#4232](#)
- Fix web plugin compatibility problem. [Graylog2/graylog2-server#4496](#)
- Fix problem that didn't allow a reader user to edit their own profile. [Graylog2/graylog2-server#4488](#)
[Graylog2/graylog2-server#4494](#) [Graylog2/graylog2-server#4442](#) [Graylog2/graylog2-server#4420](#)

Pipeline Processor Plugin

- Fix pipeline interpreter log message by handing change event. [Graylog2/graylog-plugin-pipeline-processor#235](#) [Graylog2/graylog-plugin-pipeline-processor#241](#)

AWS Plugin

- Fix problem updating the AWS configuration in the UI. [Graylog2/graylog-plugin-aws#58](#) [Graylog2/graylog-plugin-aws#60](#)
- Add missing proxy configuration option to UI. [Graylog2/graylog-plugin-aws#59](#) [Graylog2/graylog-plugin-aws#61](#)

Threatintel Plugin

- Fix `otx_lookup_domain` pipeline function. [Graylog2/graylog-plugin-threatintel#83](#) [Graylog2/graylog2-server#4489](#)

24.55 Graylog 2.4.0

Released: 2017-12-22

<https://www.graylog.org/blog/106-announcing-graylog-v2-4-0>

No changes since 2.4.0-rc.2.

24.56 Graylog 2.4.0-rc.2

Released: 2017-12-20

Core

- Fixed node-id validator problem by removing the validator for now. [Graylog2/graylog2-server#4433](#)

24.57 Graylog 2.4.0-rc.1

Released: 2017-12-19

<https://www.graylog.org/blog/105-announcing-graylog-v2-4-0-rc-1>

Core

- Fix problem with new node-id file check that got introduced in 2.4.0-beta.4. [Graylog2/graylog2-server#4428](#) [#4427](#)

Threatintel Plugin

- Improve Whois data adapter to always use the ARIN registry for now. [Graylog2/graylog2-server#78](#) [76](#)
- Fix object comparison in Whois data adapter. [Graylog2/graylog2-server#69](#)

24.58 Graylog 2.4.0-beta.4

Released: 2017-12-15

Core

- Improve HTTPJSONPath lookup table data adapter UI. [Graylog2/graylog2-server#4406](#)
- Add and use ExternalLink and ExternalLinkButton components. [Graylog2/graylog2-server#4414](#)
- Improve UI components when user lacks permissions. [Graylog2/graylog2-server#4416](#) [Graylog2/graylog2-server#4407](#)
- Fix output traffic graph on “System/Overview”. [Graylog2/graylog2-server#4418](#) [Graylog2/graylog2-server#4395](#)
- Improve query suggestions for field existence. [Graylog2/graylog2-server#4422](#) [Graylog2/graylog2-server#4362](#)
- Check node-id file permissions and improve error messages. [Graylog2/graylog2-server#4417](#) [Graylog2/graylog2-server#4410](#)

Pipeline Processor Plugin

- Fix problem with null values in the select_jsonpath function. [Graylog2/graylog-plugin-pipeline-processor#233](#) [Graylog2/graylog-plugin-pipeline-processor#232](#)

Threatintel Plugin

- Fix several issues with OTX and Whois data adapters. [Graylog2/graylog-plugin-threatintel#75](#)

Anonymous Usage-Stats Plugin

- The plugin got removed.

24.59 Graylog 2.4.0-beta.3

Released: 2017-12-04

Core

- Improve documentation for outputbuffer settings. [Graylog2/graylog2-server#4331](#)
- Improve QuickValues stacking. [Graylog2/graylog2-server#4343](#)
- Improve auth providers UI. [Graylog2/graylog2-server#4347](#)
- Add pluggable global notification area to page. [Graylog2/graylog2-server#4353](#) [Graylog2/graylog2-server#4389](#) [Graylog2/graylog2-server#4393](#)
- Fix changing the default index set from the UI. [Graylog2/graylog2-server#4377](#)
- Add global traffic counter to system overview page. [Graylog2/graylog2-server#4357](#)
- Remove anonymous usage-stats plugin. [Graylog2/graylog2-server#4349](#)

AWS Plugin

- Add “logGroup” and “logStream” attributes to flow log and raw log codecs. [Graylog2/graylog-plugin-aws#55](#) [Graylog2/graylog-plugin-aws#54](#)

CEF Plugin

- Upgrade to CEF parser 0.0.1.10. [Graylog2/graylog-plugin-cef#23](#) [Graylog2/graylog-plugin-cef#24](#)

Threatintel Plugin

- Fix lookup table used in `tor_lookup()` function. [Graylog2/graylog-plugin-threatintel#71](#)
- Fix lookup table used in `spamhaus_lookup_ip()` function. [Graylog2/graylog-plugin-threatintel#73](#)

24.60 Graylog 2.4.0-beta.2

Released: 2017-11-07

<https://www.graylog.org/blog/104-announcing-graylog-v2-4-0-beta-2>

Core

- Improve UI elements for field analyzers. [Graylog2/graylog2-server#4280](#) [Graylog2/graylog2-server#4230](#)
- Add upgrade notes for new plugins. [Graylog2/graylog2-server#4187](#)
- Fix query button in QuickValues widget. [Graylog2/graylog2-server#4216](#) [Graylog2/graylog2-server#4278](#)
- Improve QuickValues histogram data. [Graylog2/graylog2-server#4312](#) [Graylog2/graylog2-server#4309](#)
- Add loading indicator when reloading field chart data. [Graylog2/graylog2-server#4319](#)
- Add feedback on create widget modal. [Graylog2/graylog2-server#4320](#) [Graylog2/graylog2-server#4318](#)
- Improve robustness of QuickValues widget with stacked fields. [Graylog2/graylog2-server#4322](#) [Graylog2/graylog2-server#4289](#) [Graylog2/graylog2-server#4287](#) [Graylog2/graylog2-server#4082](#)

24.61 Graylog 2.4.0-beta.1

Released: 2017-10-20

<https://www.graylog.org/blog/103-announcing-graylog-v2-4-0-beta-1>

Core

- Ship NetFlow plugin by default. [Graylog2/graylog2-server#4086](#)
- Ship AWS plugin by default. [Graylog2/graylog2-server#4085](#)
- Ship Threat Intelligence plugin by default. [Graylog2/graylog2-server#4084](#)
- Ship CEF plugin by default. [Graylog2/graylog2-server#4161](#)
- Fix race condition in user session removal. [Graylog2/graylog2-server#4041](#) [Graylog2/graylog2-server#3634](#) [Graylog2/graylog2-server#3948](#) [Graylog2/graylog2-server#3973](#)
- Update web interface dependencies and fix deprecations. [Graylog2/graylog2-server#4057](#) [Graylog2/graylog2-server#4059](#) [Graylog2/graylog2-server#4037](#) [Graylog2/graylog2-server#4192](#) [Graylog2/graylog2-server#4189](#)
- Improve Elasticsearch query performance. [Graylog2/graylog2-server#4056](#) [Graylog2/graylog2-server#4051](#)
- Improve web UI performance by using React production mode. [Graylog2/graylog2-server#4048](#)
- Add possibility for server plugins to add database migrations. [Graylog2/graylog2-server#4095](#)
- Add support for custom HTTP headers in HTTPJSONPath lookup table adapter. [Graylog2/graylog2-server#4094](#)
- Fix HTTP header size settings. [Graylog2/graylog2-server#4128](#) [Graylog2/graylog2-server#4118](#)
- Add `/system/indices/index_sets/{id}/stats` REST API endpoint to fetch stats for a single index set. [Graylog2/graylog2-server#4129](#) [Graylog2/graylog2-server#4088](#)

- Add DSV over HTTP data adapter for lookup tables. [Graylog2/graylog2-server#4096](#)
- Improve and update Elasticsearch testing infrastructure. [Graylog2/graylog2-server#4125](#) [Graylog2/graylog2-server#4165](#)
- Improve dashboard widget layout to show long widget titles. [Graylog2/graylog2-server#4072](#) @billmurrin
- Fix problem in GELF output by removing special handling of the facility. [Graylog2/graylog2-server#4141](#) [Graylog2/graylog2-server#4140](#)
- Expose `LdapUserAuthenticator#syncLdapUser()` method to allow usage from plugins. [Graylog2/graylog2-server#4159](#) @gaspardpetit
- Fix problem with getting Elasticsearch stats. [Graylog2/graylog2-server#4127](#) [Graylog2/graylog2-server#4119](#)
- Fix Elasticsearch document counting with lots of indices. [Graylog2/graylog2-server#4147](#) [Graylog2/graylog2-server#4136](#)
- Fix link placement in multi select UI elements. [Graylog2/graylog2-server#3911](#)
- Fix HTTP problems when searching in lots of indices. [Graylog2/graylog2-server#4149](#) [Graylog2/graylog2-server#4054](#) [Graylog2/graylog2-server#4168](#)
- Fix config issues with stacked charts. [Graylog2/graylog2-server#4151](#) [Graylog2/graylog2-server#4150](#)
- Improve eslint rules for UI development. [Graylog2/graylog2-server#4173](#)
- Update several server dependencies. [Graylog2/graylog2-server#4134](#)
- Add config option to disable analysis features (such a QuickValues) for certain message fields. [Graylog2/graylog2-server#4175](#) [Graylog2/graylog2-server#3957](#)
- Improve message separator handling for TCP based inputs. [Graylog2/graylog2-server#4106](#) [Graylog2/graylog2-server#4105](#)
- Improve CSV lookup table adapter to use the same field for key and value. [Graylog2/graylog2-server#4181](#) [Graylog2/graylog2-server#4177](#)
- Add possibility to create charts for non-numeric fields to show cardinality and total counts. [Graylog2/graylog2-server#4182](#) [Graylog2/graylog2-server#4083](#)
- Improve widget and grid positioning and styling. [Graylog2/graylog2-server#4160](#) [Graylog2/graylog2-server#4209](#)
- Improve UI testing environment. [Graylog2/graylog2-server#4162](#)
- Improve error logging on indexing failures. [Graylog2/graylog2-server#4195](#) [Graylog2/graylog2-server#4166](#)
- Improve styling for highlighting checkbox in the search sidebar. [Graylog2/graylog2-server#4201](#)
- Fix problem with lookup table content pack import. [Graylog2/graylog2-server#4197](#) [Graylog2/graylog-plugin-threatintel#57](#)
- Add configuration options to QuickValue widget. [Graylog2/graylog2-server#4205](#) [Graylog2/graylog2-server#4082](#) [Graylog2/graylog2-server#4259](#) [Graylog2/graylog2-server#4258](#)
- Improve styling and positioning for search page widget buttons. [Graylog2/graylog2-server#4219](#)
- Improve permission handling to allow regular users to create dashboards. [Graylog2/graylog2-server#4155](#)
- Add stats summary for all index sets to the “System/Indices” page. [Graylog2/graylog2-server#4211](#) [Graylog2/graylog2-server#4204](#)
- Improve table layout in lookup table UI for entries with long descriptions. [Graylog2/graylog2-server#4239](#) [Graylog2/graylog2-server#4172](#)

- Fix permission check which was hiding a menu item in the UI. [Graylog2/graylog2-server#4237](#) [Graylog2/graylog2-server#4234](#)
- Fix error with message histogram selection. [Graylog2/graylog2-server#4243](#) [Graylog2/graylog2-server#4214](#)
- Add histogram option to QuickValue widget to show values over time. [Graylog2/graylog2-server#4244](#) [Graylog2/graylog2-server#4082](#)
- Fix permission handling for editing/deleting roles. [Graylog2/graylog2-server#4265](#)
- Fix some smaller lookup table issues. [Graylog2/graylog2-server#4266](#)

Map Widget plugin

- Improve rendering and styling for map widget. [Graylog2/graylog-plugin-map-widget#53](#) [Graylog2/graylog-plugin-map-widget#54](#)
- Improve styling and positioning for search page widget buttons. [Graylog2/graylog-plugin-map-widget#56](#)

Pipeline Processor plugin

- Add various Base encoding functions. (e.g. Base16, Base32, Base64) [Graylog2/graylog-plugin-pipeline-processor#190](#)
- Fix sorting of pipeline rules. [Graylog2/graylog-plugin-pipeline-processor#208](#)
- Fix `parse_json()` function on invalid input. [Graylog2/graylog-plugin-pipeline-processor#210](#) [Graylog2/graylog-plugin-pipeline-processor#209](#)
- Fix `NullPointerException` when parsing invalid rules. [Graylog2/graylog-plugin-pipeline-processor#212](#) [Graylog2/graylog-plugin-pipeline-processor#211](#)
- Improve documentation for lookup table function. [Graylog2/graylog-plugin-pipeline-processor#217](#) @supah-greg
- Fix numeric conversions with `to_double()` and `to_long()`. [Graylog2/graylog-plugin-pipeline-processor#219](#)
- Improve rule function documentation in editor by sorting functions alphabetically by name. [Graylog2/graylog-plugin-pipeline-processor#222](#)
- Add `remove_from_default` option to `route_to_stream()` function. [Graylog2/graylog-plugin-pipeline-processor#220](#)
- Add `remove_from_stream()` function. [Graylog2/graylog-plugin-pipeline-processor#220](#)

Collector plugin

- Add `exclude_files` configuration option for filebeat collectors. [Graylog2/graylog-plugin-collector#63](#) @silenceper

AWS plugin

- Fix problem with parsing SNS notification messages. [Graylog2/graylog-plugin-aws#47](#) [Graylog2/graylog-plugin-aws#44](#)
- Add support for overriding the `source` field for all input types. [Graylog2/graylog-plugin-aws#46](#)
- Add support for cross account role based authentication. [Graylog2/graylog-plugin-aws#49](#) [Graylog2/graylog-plugin-aws#48](#) @radykal-com

CEF plugin

- Improve CEF parser and add proper testing infrastructure.
- Fix problems with Kafka and AMQP inputs.

NetFlow plugin

- Improved NetFlow v9 support. [Graylog2/graylog-plugin-netflow#21](#)

Threat Intelligence plugin

- Convert plugin to use the lookup table system. [Graylog2/graylog-plugin-threatintel#48](#)
- Fix problem with absent OTX API key in plugin configuration. [Graylog2/graylog-plugin-threatintel#54](#) [Graylog2/graylog-plugin-threatintel#53](#)
- Improve pipeline function parameter consistency. [Graylog2/graylog-plugin-threatintel#58](#)
- Improve lookup table based data adapters. [Graylog2/graylog-plugin-threatintel#63](#) [Graylog2/graylog-plugin-threatintel#61](#) [Graylog2/graylog-plugin-threatintel#59](#) [Graylog2/graylog-plugin-threatintel#67](#)

24.62 Graylog 2.3.2

Released: 2017-10-19

<https://www.graylog.org/blog/102-announcing-graylog-v2-3-2>

Core

- Fix permission handling for editing/deleting roles. [Graylog2/graylog2-server#4270](#) [Graylog2/graylog2-server#4254](#)
- Fix CSV export when using lots of Elasticsearch index shards. [Graylog2/graylog2-server#4269](#) [Graylog2/graylog2-server#4190](#)
- Fix infinite redirect loop when accessing non-permitted resources/entities. [Graylog2/graylog2-server#4139](#) [Graylog2/graylog2-server#4117](#)

24.63 Graylog 2.3.1

Released: 2017-08-25

<https://www.graylog.org/blog/100-announcing-graylog-v2-3-1>

Core

- Fix NullPointerException for field stats. [Graylog2/graylog2-server#4026](#) [Graylog2/graylog2-server#4045](#) [Graylog2/graylog2-server#4046](#)
- Make GELF parser less strict. [Graylog2/graylog2-server#4055](#)
- Fix search requests with selected fields by using source filtering. [Graylog2/graylog2-server#4069](#) [Graylog2/graylog2-server#4077](#) [Graylog2/graylog2-server#4068](#)
- Add missing index for *session_id* in “sessions” MongoDB collection. [Graylog2/graylog2-server#4070](#) [Graylog2/graylog2-server#4076](#)
- Fix search errors when lots of indices will be used. [Graylog2/graylog2-server#4062](#) [Graylog2/graylog2-server#4078](#) [Graylog2/graylog2-server#4054](#)
- Upgrade to Jest 2.4.7+jackson. [Graylog2/graylog2-server#4107](#)
- Fix search term highlighting. [Graylog2/graylog2-server#4108](#) [Graylog2/graylog2-server#4101](#)

Pipeline Processor Plugin

- Make `locale` parameter of `parse_date()` optional. [Graylog2/graylog-plugin-pipeline-processor#202](#)

24.64 Graylog 2.3.0

Released: 2017-07-26

<https://www.graylog.org/blog/98-announcing-graylog-v2-3-0>

Core

- Fix remote address field for GELF UDP inputs. [Graylog2/graylog2-server#3982](#) [Graylog2/graylog2-server#3988](#) [Graylog2/graylog2-server#3980](#)
- Improve error messages for rotation strategies. [Graylog2/graylog2-server#3995](#) [Graylog2/graylog2-server#3990](#)
- Fix legend for stacked charts. [Graylog2/graylog2-server#4010](#) [Graylog2/graylog2-server#3996](#)
- Fix size based index rotation strategy. [Graylog2/graylog2-server#4011](#) [Graylog2/graylog2-server#4008](#) [Graylog2/graylog2-server#3997](#)
- Implement retry handling for failed Elasticsearch requests. [Graylog2/graylog2-server#4012](#) [Graylog2/graylog2-server#3993](#)
- Fix NullPointerException in ExceptionUtils. [Graylog2/graylog2-server#4014](#) [Graylog2/graylog2-server#4003](#)
- Avoid noisy stack traces when Elasticsearch is not available. [Graylog2/graylog2-server#3934](#) [Graylog2/graylog2-server#3861](#)
- Do not run SetIndexReadOnlyAndCalculateRangeJob if index is closed. [Graylog2/graylog2-server#3931](#) [Graylog2/graylog2-server#3909](#)
- Fix issues when updating users and user roles. [Graylog2/graylog2-server#3942](#) [Graylog2/graylog2-server#3918](#)
- Improved IPv6 support. [Graylog2/graylog2-server#3926](#) [Graylog2/graylog2-server#3870](#)
- Fix login code to unbreak SSO plugin. [Graylog2/graylog2-server#3973](#) [Graylog2/graylog2-server#3948](#)
- Allow case-insensitive lookups for CSV lookup data adapter. [Graylog2/graylog2-server#3971](#) [Graylog2/graylog2-server#3961](#)
- Allow manual lookup table cache purge via UI and API. [Graylog2/graylog2-server#3967](#) [Graylog2/graylog2-server#3962](#)
- Mark Message class as not thread-safe. [Graylog2/graylog2-server#3978](#) [Graylog2/graylog2-server#3876](#)
- Fail fast and loud for invalid GELF messages. [Graylog2/graylog2-server#3972](#) [Graylog2/graylog2-server#3970](#)
- Add support for automatic Elasticsearch node discovery. [Graylog2/graylog2-server#3805](#)
- Fix DateHistogram-related functionality in Searches class. [Graylog2/graylog2-server#3806](#)
- Hide update spinner with auto-update interval <=5s. [Graylog2/graylog2-server#3738](#) [Graylog2/graylog2-server#3723](#) [@billmurrin](#)
- Small spelling/documentation fixes. [Graylog2/graylog2-server#3817](#)
- Fix pagination and offset/total hits in Searches. [Graylog2/graylog2-server#3821](#) [Graylog2/graylog2-server#3813](#)
- Add sort order to terms API call. [Graylog2/graylog2-server#3829](#)
- Don't start stopped inputs after updating them. [Graylog2/graylog2-server#3824](#) [Graylog2/graylog2-server#3479](#)
- Allow specifying locale for Date converter. [Graylog2/graylog2-server#3820](#)
- Hide "Delete from stream" button if stream is undefined. [Graylog2/graylog2-server#3822](#)

- Don't reload errorstates on pages that don't need them. [Graylog2/graylog2-server#3839](#) [Graylog2/graylog2-server#3834](#)
- Emit StreamsChangedEvent and StreamDeletedEvent in BundleImporter. [Graylog2/graylog2-server#3848](#) [Graylog2/graylog2-server#3842](#)
- Add Lookup Table search result decorator. [Graylog2/graylog2-server#3852](#) [Graylog2/graylog2-server#3844](#)
- Check Elasticsearch version when creating index template. [Graylog2/graylog2-server#3862](#)
- Add admin user to list of receivers in EmailAlarmCallback. [Graylog2/graylog2-server#3864](#) [Graylog2/graylog2-server#3859](#)
- Fix parameters for count query in Searches#count(). [Graylog2/graylog2-server#3865](#) [Graylog2/graylog2-server#3841](#)
- Add search system for objects in MongoDB [Graylog2/graylog2-server#3877](#)
- Make Kafka config setting auto.offset.reset configurable for input. [Graylog2/graylog2-server#3743](#) [Graylog2/graylog2-server#3894](#) [@r4um](#)
- Use preemptive authentication for Elasticsearch if credentials are given. [Graylog2/graylog2-server#3895](#) [Graylog2/graylog2-server#3907](#)
- Add lookup adapter and cache config validation. [Graylog2/graylog2-server#3836](#)
- Unbreak elasticsearch duration config settings. [Graylog2/graylog2-server#3899](#)
- Fix lookup table UI state problem. [Graylog2/graylog2-server#3898](#)
- Enable search for lookup tables, data adapters and caches. [Graylog2/graylog2-server#3878](#)
- Make Elasticsearch version injectable. [Graylog2/graylog2-server#3896](#)
- Refactor lifecycle for lookup adapters and caches. [Graylog2/graylog2-server#3873](#)
- Introduce setting for enabling ES request compression. [Graylog2/graylog2-server#3901](#)
- Add content pack import/export for lookup tables, caches and adapters. [Graylog2/graylog2-server#3892](#)
- Upgrade to Jackson 2.8.9. [Graylog2/graylog2-server#3908](#)
- Fix and centralize lookup adapter/cache error handling. [Graylog2/graylog2-server#3905](#)
- Switch RoleResponse to java.util.Optional to fix serialization. [Graylog2/graylog2-server#3915](#)
- Add lookup table/cache/adapter permissions. [Graylog2/graylog2-server#3914](#)
- Collect and show metrics for lookup caches and adapters. [Graylog2/graylog2-server#3917](#)
- Remove obsolete "disableExpensiveUpdates" user preference. [Graylog2/graylog2-server#3922](#)
- Migrate to Jackson-based release of Jest 2.4.5. [Graylog2/graylog2-server#3925](#)
- Use aliases for reopened indices. [Graylog2/graylog2-server#3897](#)
- Add default values for lookup tables. [Graylog2/graylog2-server#3921](#)
- Add support for updating extractors in InputService. [Graylog2/graylog2-server#3910](#)
- Fix index set overview with closed indices. [Graylog2/graylog2-server#3930](#)
- Don't check ES cluster health when flushing messages. [Graylog2/graylog2-server#3927](#)
- Retrying bulk indexing in case of all IOExceptions. [Graylog2/graylog2-server#3929](#) [Graylog2/graylog2-server#3941](#)
- Add support for automatic Elasticsearch node discovery. [Graylog2/graylog2-server#3805](#)

- Fix DateHistogram-related functionality in Searches class. [Graylog2/graylog2-server#3806](#)
- Hide update spinner with auto-update interval ≤ 5 s. [Graylog2/graylog2-server#3738](#) [Graylog2/graylog2-server#3723](#) [@billmurrin](#)
- Small spelling/documentation fixes. [Graylog2/graylog2-server#3817](#)
- Fix pagination and offset/total hits in Searches. [Graylog2/graylog2-server#3821](#) [Graylog2/graylog2-server#3813](#)
- Add timing metrics to GelfOutput. [Graylog2/graylog2-server#3810](#) [Graylog2/graylog2-server#3716](#)
- Add sort order to terms API call. [Graylog2/graylog2-server#3829](#)
- Don't start stopped inputs after updating them. [Graylog2/graylog2-server#3824](#) [Graylog2/graylog2-server#3479](#)
- Allow specifying locale for Date converter. [Graylog2/graylog2-server#3820](#)
- Hide "Delete from stream" button if stream is undefined. [Graylog2/graylog2-server#3822](#)
- Don't reload errorstates on pages that don't need them. [Graylog2/graylog2-server#3839](#) [Graylog2/graylog2-server#3834](#)
- Emit StreamsChangedEvent and StreamDeletedEvent in BundleImporter. [Graylog2/graylog2-server#3848](#) [Graylog2/graylog2-server#3842](#)
- Add Lookup Table search result decorator. [Graylog2/graylog2-server#3852](#) [Graylog2/graylog2-server#3844](#)
- Check Elasticsearch version when creating index template. [Graylog2/graylog2-server#3862](#)
- Add admin user to list of receivers in EmailAlarmCallback. [Graylog2/graylog2-server#3864](#) [Graylog2/graylog2-server#3859](#)
- Fix parameters for count query in Searches#count(). [Graylog2/graylog2-server#3865](#) [Graylog2/graylog2-server#3841](#)
- Allow version '0' for structured syslog messages. [Graylog2/graylog2-server#3503](#)
- Ignore Content-Type in HttpTransport. [Graylog2/graylog2-server#3508](#) [Graylog2/graylog2-server#3477](#)
- Ensure that index_prefix is lower case. [Graylog2/graylog2-server#3509](#) [Graylog2/graylog2-server#3476](#)
- Make map in MessageInput#asMap() mutable. [Graylog2/graylog2-server#3521](#) [Graylog2/graylog2-server#3515](#)
- Fix pagination for alert conditions. [Graylog2/graylog2-server#3529](#) [Graylog2/graylog2-server#3528](#)
- Wait until alert notification types are loaded. [Graylog2/graylog2-server#3537](#) [Graylog2/graylog2-server#3534](#)
- Upgrade development environment to Webpack v2. [Graylog2/graylog2-server#3460](#)
- Add an option to repeat alert notifications again. [Graylog2/graylog2-server#3536](#) [Graylog2/graylog2-server#3511](#)
- Fix accidentally changed exports of UsersStore [Graylog2/graylog2-server#3560](#) [Graylog2/graylog2-server#3556](#)
- Properly escape username/roles in web interface. [Graylog2/graylog2-server#3570](#) [Graylog2/graylog2-server#3569](#)
- Improved dashboard grid system. [Graylog2/graylog2-server#3575](#)
- Add support for sorting by count to Search#terms(). [Graylog2/graylog2-server#3540](#) ([@billmurrin](#))
- Fix for copy query button. [Graylog2/graylog2-server#3548](#) ([@billmurrin](#))
- Fix issue with cloning streams. [Graylog2/graylog2-server#3615](#) [Graylog2/graylog2-server#3608](#)

- Prevent session extension when polling system messages. [Graylog2/graylog2-server#3632](#) [Graylog2/graylog2-server#3628](#)
- Prevent session extension when polling system jobs. [Graylog2/graylog2-server#3625](#) [Graylog2/graylog2-server#3587](#)
- Prevent NPE due to race between rotation and retention threads. [Graylog2/graylog2-server#3637](#) [Graylog2/graylog2-server#3494](#)
- Fix problem with message decorators and field selection. [Graylog2/graylog2-server#3585](#) [Graylog2/graylog2-server#3584](#)
- Fix issue with loading indicator on an empty search result page. [Graylog2/graylog2-server#3652](#) [Graylog2/graylog2-server#3650](#)
- Fix navigation in LDAP users UI. [Graylog2/graylog2-server#3651](#) [Graylog2/graylog2-server#3485](#)
- Ensure that plugin RPMs will be built for Linux. [Graylog2/graylog2-server#3658](#) [Graylog2/graylog2-server#3657](#)
- Fix reloading problem with content packs and GROK patterns. [Graylog2/graylog2-server#3621](#) [Graylog2/graylog2-server#3610](#)
- Add support for Cisco and FortiGate Syslog messages. [Graylog2/graylog2-server#3599](#)
- Fix permission problem for inputs API. [Graylog2/graylog2-server#3681](#)
- Restore removal of role permissions upon roles update. [Graylog2/graylog2-server#3683](#)
- Comply with grace condition when repeat alert notifications is enabled. [Graylog2/graylog2-server#3676](#) [Graylog2/graylog2-server#3579](#)
- Invalidate dashboards data after logout. [Graylog2/graylog2-server#3700](#) [Graylog2/graylog2-server#3693](#)
- Fix OptionalStringValidator and validations for extractors. [Graylog2/graylog2-server#3633](#) [Graylog2/graylog2-server#3630](#)
- Better time range for “Show Received Messages” button on inputs page. [Graylog2/graylog2-server#3725](#)
- Remove deprecated rotation/retention configuration resources. [Graylog2/graylog2-server#3724](#)
- Introduce lookup tables feature. [Graylog2/graylog2-server#3748](#)
- Creating dashboard from search page does now select the right ID [Graylog2/graylog2-server#3786](#) [Graylog2/graylog2-server#3785](#)
- Fix importing of dashboards from content packs [Graylog2/graylog2-server#3766](#) [Graylog2/graylog2-server#3765](#)

Beats Plugin

- Spelling fixes. [Graylog2/graylog-plugin-beats#22](#) @jsoref

Collector Plugin

- Increase “Show messages” time range.
- Allow collectors list to be filtered by tags. [Graylog2/graylog-plugin-collector#52](#)
- UI and UX improvements. [Graylog2/graylog-plugin-collector#55](#)
- Fix configuration setting usage for collector heartbeat interval. [Graylog2/graylog-plugin-collector#58](#)
- Prevent unwanted session extension. [Graylog2/graylog-plugin-collector#49](#)

Map Widget Plugin

- Adjust to lookup cache and adapter changes in server. [Graylog2/graylog-plugin-map-widget#48](#)
[Graylog2/graylog-plugin-map-widget#50](#)
- Fix refresh handling in error conditions. [Graylog2/graylog-plugin-map-widget#49](#)
- Fix HMR as in [Graylog/graylog2-server#3591](#) [Graylog2/graylog-plugin-map-widget#51](#)
- Update to a new GeoIP2 release.
- Add lookup tables data adapter for the GeoIP2 database. [Graylog2/graylog-plugin-map-widget#40](#)

Pipeline Processor Plugin

- Improve robustness of `clone_message()` pipeline function. [Graylog2/graylog-plugin-pipeline-processor#192](#) [Graylog2/graylog2-server#3880](#)
- Fix pipeline condition handling of “match all”/”match either”. [Graylog2/graylog-plugin-pipeline-processor#193](#)
[Graylog2/graylog2-server#3924](#)
- Fix serialization/deserialization of pipeline StageSource. [Graylog2/graylog-plugin-pipeline-processor#195](#)
[Graylog2/graylog-plugin-pipeline-processor#194](#)
- Improve error handling with invalid expressions. [Graylog2/graylog-plugin-pipeline-processor#196](#)
[Graylog2/graylog-plugin-pipeline-processor#185](#)
- Spelling fixes. [Graylog2/graylog-plugin-pipeline-processor#181](#) @jsoref
- Add support for custom locale in `parse_date()` function. [Graylog2/graylog-plugin-pipeline-processor#184](#)
[Graylog2/graylog-plugin-pipeline-processor#183](#)
- Smaller UI and UX changes. [Graylog2/graylog-plugin-pipeline-processor#186](#)
- New function: `debug()` [Graylog2/graylog-plugin-pipeline-processor#188](#)
- Allow snake-case access to bean objects [Graylog2/graylog-plugin-pipeline-processor#189](#)
- Improve lookup functions. [Graylog2/graylog-plugin-pipeline-processor#191](#)
- Spelling fixes. [Graylog2/graylog-plugin-pipeline-processor#181](#) @jsoref
- Use uppercase timezone in `TimezoneAwareFunction` and fix default value. [Graylog2/graylog2-server#169](#)
[Graylog2/graylog2-server#168](#)
- Add `lookup` and `lookup_value` pipeline functions for lookup table support. [Graylog2/graylog2-server#177](#)

24.65 Graylog 2.2.3

Released: 2017-04-04

<https://www.graylog.org/blog/92-announcing-graylog-v2-2-3>

Core

- Prevent unwanted session extension. [Graylog2/graylog2-server#3583](#)
- Properly escape username/roles in web interface. [Graylog2/graylog2-server#3588](#)
- Allow “-” in the path pattern for the index range rebuild endpoint. [Graylog2/graylog2-server#3600](#)
- Copy Query Button Fix. [Graylog2/graylog2-server#3491](#)
- Fixing slicing of alert notifications in pagination. [Graylog2/graylog2-server#3619](#)
- Fix cloning alert conditions with identical id when cloning stream. [Graylog2/graylog2-server#3616](#)
- Use UTC for embedded Date objects as well. [Graylog2/graylog2-server#3626](#)

- Prevent session extension for polling system messages. [Graylog2/graylog2-server#3638](#)
- Support replacing whitespace in nested keys for JSON extractor. [Graylog2/graylog2-server#3623](#)
- Prevent NPE due to race between rotation and retention threads. [Graylog2/graylog2-server#3640](#)
- Prevent session extension in SystemJobsStore. [Graylog2/graylog2-server#3625](#)
- Render loading indicator on no results page. [Graylog2/graylog2-server#3667](#)
- Using consistent collection of non displayable fields to filter against. [Graylog2/graylog2-server#3668](#)
- Ensure that plugin RPMs will be built for Linux. [Graylog2/graylog2-server#3659](#)
- Fix navigation in LDAP components. [Graylog2/graylog2-server#3670](#)
- Publish GrokPatternsChangedEvent when using content packs. [Graylog2/graylog2-server#3621](#)
- Add support for Cisco and FortiGate syslog messages. [Graylog2/graylog2-server#3599](#)
- Effectively change user permissions when listing inputs. [Graylog2/graylog2-server#3682](#)
- Restore removal of role permissions upon roles update. [Graylog2/graylog2-server#3684](#)
- Comply with grace condition when repeat alert notifications is enabled [Graylog2/graylog2-server#3676](#)

Pipeline Processor

- Use uppercase timezone in TimezoneAwareFunction and fix default value. [Graylog2/graylog-plugin-pipeline-processor#169](#)

24.66 Graylog 2.2.2

Released: 2017-03-03

<https://www.graylog.org/blog/90-announcing-graylog-v2-2-2>

Core

- Give an option to repeat alert notifications. [Graylog2/graylog2-server#3511](#)
- Wait until notification types are loaded. [Graylog2/graylog2-server#3534](#)
- Fixing slicing of alert conditions in pagination. [Graylog2/graylog2-server#3528](#)
- Fix command line help of the server jar. [Graylog2/graylog2-server#3527](#)

24.67 Graylog 2.2.1

Released: 2017-02-20

<https://www.graylog.org/blog/89-announcing-graylog-v2-2-1>

Core

- Allow version '0' for structured syslog messages. [Graylog2/graylog2-server#3502](#)
- Ignore Content-Type in HttpTransport. [Graylog2/graylog2-server#3477](#)
- Ensure that index_prefix is lower case. [Graylog2/graylog2-server#3476](#)
- Add missing whitespace in SystemOutputsPage. [Graylog2/graylog2-server#3505](#)

24.68 Graylog 2.2.0

Released: 2017-02-14

<https://www.graylog.org/blog/88-announcing-graylog-v2-2-0>

Core

- Warn about pipeline stream routing [Graylog2/graylog2-server#3472](#)
- Add npm shrinkwrap for 2.2.0 [Graylog2/graylog2-server#3468](#)
- Use consistent case in old message count conditions [Graylog2/graylog2-server#3454](#)
- Fix stream filter view. [Graylog2/graylog2-server#3390](#)
- Use the default index set by default in stream create form. [Graylog2/graylog2-server#3397](#)
- Fix broken decorator with duplicate messages. [Graylog2/graylog2-server#3400](#)
- Updating index sets store when stream form is opened. [Graylog2/graylog2-server#3410](#)
- Only show extractor actions on string fields. [Graylog2/graylog2-server#3404](#)
- Use correct format when adding timestamp to search. [Graylog2/graylog2-server#3412](#)
- Properly escape strings sent to /messages/{index}/analyze. [Graylog2/graylog2-server#3418](#)
- Retain input and stream IDs in content packs. [Graylog2/graylog2-server#3416](#)
- Use “order”: -1 in default index template to allow override. [Graylog2/graylog2-server#3422](#)
- Improve base-line memory usage. [Graylog2/graylog2-server#3425](#)
- Use condition and notification placeholders. [Graylog2/graylog2-server#3432](#)
- Get field stats for indices only, which contain field. [Graylog2/graylog2-server#3424](#)
- Redirect to overview after editing index set configuration. [Graylog2/graylog2-server#3438](#)
- Send “stream” property when updating a decorator. [Graylog2/graylog2-server#3439](#)
- Adding simple cache for index sets in MongoIndexSetRegistry. [Graylog2/graylog2-server#3440](#)
- Restrict search in RecentMessageLoader to 1 hour. [Graylog2/graylog2-server#3367](#)
- Remove stray whitespace in MongoIndexSet. [Graylog2/graylog2-server#3371](#)
- Add more detail to index range system notification. [Graylog2/graylog2-server#3372](#)
- Suppress error notification when loading a potentially missing input. [Graylog2/graylog2-server#3373](#)
- Ensure resolved at is non-null on resolvedSecondsAgo. [Graylog2/graylog2-server#3376](#)
- Do not allow testing a message against the default stream. [Graylog2/graylog2-server#3377](#)
- Propagate shard failure in multi-index search to global search failure. [Graylog2/graylog2-server#3379](#)
- Add support for arrays to “contains” stream rule. [Graylog2/graylog2-server#3380](#)
- Automatically unsubscribe from DecoratorsStore in SearchPage. [Graylog2/graylog2-server#3363](#)
- Keep modified search bar params when opening modal. [Graylog2/graylog2-server#3384](#)
- Reset keyword content after changing range type. [Graylog2/graylog2-server#3386](#)
- Disable the “set as default” action for the default index set. [Graylog2/graylog2-server#3385](#)
- Unregistering component callbacks from Stream(Rules)Store. [Graylog2/graylog2-server#3378](#)

- Check for stream existence when displaying replay link. [Graylog2/graylog2-server#3387](#)
- Reuse Generator instance in DocumentationResource. [Graylog2/graylog2-server#3293](#)
- Fix: Refreshing saved searches store after deleting one. [Graylog2/graylog2-server#3309](#)
- Escape curly braces in Swagger resource URIs for challenged browsers. [Graylog2/graylog2-server#3290](#)
- Unbreak Firefox by requesting JSON when ping the API [Graylog2/graylog2-server#3312](#)
- Escape search query when using surrounding search. [Graylog2/graylog2-server#3314](#)
- Close idle GELF HTTP connections after a timeout. [Graylog2/graylog2-server#3315](#)
- Ensure that index ranges are deleted when an index set is removed. [Graylog2/graylog2-server#3310](#)
- Ignore reopened indices for count-based retention strategies. [Graylog2/graylog2-server#3321](#)
- Ignore deprecated “default” field in IndexSetConfig. [Graylog2/graylog2-server#3329](#)
- Use last executed search data on auto-refresh. [Graylog2/graylog2-server#3330](#)
- Show stats for each index set on the index sets overview page. [Graylog2/graylog2-server#3322](#)
- Not fetching/checking unnecessary streams in AlertScannerThread. [Graylog2/graylog2-server#3336](#)
- Add more metrics for extractors. [Graylog2/graylog2-server#3332](#)
- Saved search improvements. [Graylog2/graylog2-server#3338](#)
- Warn when neither reader nor admin roles are selected for a user. [Graylog2/graylog2-server#3337](#)
- Prevent setting default index set readonly. [Graylog2/graylog2-server#3339](#)
- Add migration to fix parameter value types for alert conditions. [Graylog2/graylog2-server#3340](#)
- Fix unlock dashboard from link. [Graylog2/graylog2-server#3344](#)
- Allow re-configuration of shards and replicas in the UI. [Graylog2/graylog2-server#3349](#)
- Adapt grace period to latest changes in alerts. [Graylog2/graylog2-server#3346](#)
- Go back in history instead to users page when canceling user form. [Graylog2/graylog2-server#3350](#)
- Improve wrapping of entity title and description. [Graylog2/graylog2-server#3351](#)
- Keep stream filter after editing stream. [Graylog2/graylog2-server#3352](#)
- Guard against duplication key error from MongoDB. [Graylog2/graylog2-server#3358](#)
- Keep calling convention of SearchPage._refreshData consistent. [Graylog2/graylog2-server#3357](#)
- Creating MongoDB indices in services running conditional queries. [Graylog2/graylog2-server#3345](#)
- Fix NPE in MongoDbSessionDAO#doDelete(). [Graylog2/graylog2-server#3227](#)
- Support syslog messages with ISO-8601 timestamps. [Graylog2/graylog2-server#3228](#)
- Use local copies of Droid Sans font in Swagger UI. [Graylog2/graylog2-server#3229](#)
- Remove empty row if input description is empty. [Graylog2/graylog2-server#3237](#)
- Make “sender” optional in EmailAlarmCallback. [Graylog2/graylog2-server#3224](#)
- Fix URL for throbber image. [Graylog2/graylog2-server#3242](#)
- Remove special handling in SplitAndCountConverter. [Graylog2/graylog2-server#3230](#)
- Add missing AuditBindings to journal commands. [Graylog2/graylog2-server#3226](#)

- Don't check private key/certificate if REST API and web interface on same port. [Graylog2/graylog2-server#3231](#)
- Add configuration settings for timeout and concurrency of `OptimizeIndexJob`. [Graylog2/graylog2-server#3225](#)
- Change way of exporting CSV search results. [Graylog2/graylog2-server#3238](#)
- Add space in processing limit notification. [Graylog2/graylog2-server#3256](#)
- Only recalculate index set ranges in index set maintenance menu. [Graylog2/graylog2-server#3252](#)
- Fix alert condition validations. [Graylog2/graylog2-server#3257](#)
- Validate alarm callbacks before saving them. [Graylog2/graylog2-server#3262](#)
- Only update index ranges for managed indices. [Graylog2/graylog2-server#3259](#)
- Resolve alerts from deleted alert conditions. [Graylog2/graylog2-server#3265](#)
- Alert UI changes. [Graylog2/graylog2-server#3266](#)
- Properly track stream throughput for the default stream. [Graylog2/graylog2-server#3278](#)
- Add support for `OPTIONS` request to `HttpTransport`. [Graylog2/graylog2-server#3234](#)
- Add list of stream IDs to `Message#toElasticSearchObject()`. [Graylog2/graylog2-server#3277](#)
- Fix document counts with an empty index set. [Graylog2/graylog2-server#3291](#)
- Handle `ElasticsearchException` in `Counts` class. [Graylog2/graylog2-server#3288](#)
- Move client-side split/import of Grok pattern files to server. [Graylog2/graylog2-server#3284](#)
- Showing index set in stream listing only if user is permitted to. [Graylog2/graylog2-server#3300](#)
- Fix reloading after notification changes. [Graylog2/graylog2-server#3264](#)
- Add "messages:analyze" permission to reader permission set. [Graylog2/graylog2-server#3305](#)
- Disable alarm notification controls if user is not permitted to edit. [Graylog2/graylog2-server#3303](#)
- Changing conditional to check for presence of index set definition. [Graylog2/graylog2-server#3304](#)
- Allow to get a thread dump as plain text. [Graylog2/graylog2-server#3289](#)
- Add missing authentication to `ClusterResource` and `ClusterStatsResource`. [Graylog2/graylog2-server#3279](#)
- Save anchor and last rotation in `TimeBasedRotationStrategy` depending on `IndexSet`. [Graylog2/graylog2-server#3306](#)
- Fix loading of plugins in development mode. [Graylog2/graylog2-server#3185](#)
- Add contains string tester. [Graylog2/graylog2-server#3186](#)
- Index set fixes. [Graylog2/graylog2-server#3193](#)
- Add synthetic JavaBean getters to `AutoValue` classes. [Graylog2/graylog2-server#3188](#)
- Improve `IndexSetValidator`. [Graylog2/graylog2-server#3197](#)
- Add custom Jackson (de-) serializer for `ZonedDateTime` and `DateTime`. [Graylog2/graylog2-server#3198](#)
- Improved alarm callback testing. [Graylog2/graylog2-server#3196](#)
- Fix `DateTime` serialization. [Graylog2/graylog2-server#3202](#)
- Fix labels on field graphs. [Graylog2/graylog2-server#3204](#)
- Alerts cleanup. [Graylog2/graylog2-server#3205](#)
- Index set UI fixes. [Graylog2/graylog2-server#3203](#)

- Fix quickvalues and field statistics refresh. [Graylog2/graylog2-server#3206](#)
- Allow fetching streams by index set ID. [Graylog2/graylog2-server#3207](#)
- UI improvements. [Graylog2/graylog2-server#3213](#)
- IndexSet default setting. [Graylog2/graylog2-server#3209](#)
- Alerts UI improvements. [Graylog2/graylog2-server#3214](#)
- Create DefaultIndexSetConfig when creating the default index set. [Graylog2/graylog2-server#3215](#)
- ClusterEventPeriodical must use MongoJackObjectMapper. [Graylog2/graylog2-server#3217](#)
- Fix V20161130141500_DefaultStreamRecalcIndexRanges. [Graylog2/graylog2-server#3222](#)
- Migration improvements. [Graylog2/graylog2-server#3211](#)

Beats plugin

- Add support for Metricbeat
- Extract “fields” for every type of beat

Pipeline processor plugin

- Allow duplicate stream titles in route_to_stream. [Graylog2/graylog-plugin-pipeline-processor#154](#)
- Do not use lambdas with gauge metrics. [Graylog2/graylog-plugin-pipeline-processor#152](#)
- Add clone_message() function. [Graylog2/graylog-plugin-pipeline-processor#153](#)
- Track total pipeline interpreter executionTime as a single metric. [Graylog2/graylog-plugin-pipeline-processor#155](#)

Collector sidecar plugin

- Fix: Reload on Beats configuration change.
- Update Beats to version 5.1.1
- Fix race conditions in start/stop/restart code for the exec runner [Graylog2/collector-sidecar#123](#)
- Add debug switch [Graylog2/collector-sidecar#124](#)
- Using Modern UI in a standard way (thanks to @nicozanf) [Graylog2/collector-sidecar#125](#)
- Extract etag cache into its own service. [Graylog2/graylog-plugin-collector#43](#)

24.69 Graylog 2.1.3

Released: 2017-01-26

<https://www.graylog.org/blog/84-announcing-graylog-2-1-3>

Core

- Use “order”: -1 in default index template to allow override. [Graylog2/graylog2-server#3426](#)
- Add missing authentication to ClusterResource and ClusterStatsResource. [Graylog2/graylog2-server#3427](#)
- Unbreak Firefox by requesting JSON when pinging the API. [Graylog2/graylog2-server#3430](#)
- Use custom Grizzly error page to prevent XSS. [Graylog2/graylog2-server#3428](#)

Beats plugin

- Add support for Metricbeat. [Graylog2/graylog-plugin-beats#19](#)

- Extract “fields” for every type of beat. [Graylog2/graylog-plugin-beats#18](#)

24.70 Graylog 2.1.2

Released: 2016-11-04

<https://www.graylog.org/blog/75-announcing-graylog-v2-1-2>

Core

- Improve logging in DecodingProcessor. [Graylog2/graylog2-server#3025](#), [Graylog2/graylog2-server#3034](#)
- Support all ZLIB compression levels for GELF messages. [Graylog2/graylog2-server#3022](#), [Graylog2/graylog2-server#3036](#)
- Implement “contains” stream rule. [Graylog2/graylog2-server#3020](#), [Graylog2/graylog2-server#3037](#)
- Make ValidatorProvider a Singleton. [Graylog2/graylog2-server#3019](#), [Graylog2/graylog2-server#3038](#)
- Fix NPE in MongoProbe if MongoDB doesn’t run with MMAPv1. [Graylog2/graylog2-server#3018](#), [Graylog2/graylog2-server#3039](#)
- Fix NPE in Indices#numberOfMessages(String). [Graylog2/graylog2-server#3016](#), [Graylog2/graylog2-server#3041](#)
- Only create new LdapConnectionConfig if LDAP is enabled. [Graylog2/graylog2-server#3017](#), [Graylog2/graylog2-server#3040](#)
- Properly track replace-all flag and pass through to API. [Graylog2/graylog2-server#3023](#), [Graylog2/graylog2-server#3043](#)
- Replace Jersey GZipEncoder with Grizzly’s GZipFilter. [Graylog2/graylog2-server#3021](#), [Graylog2/graylog2-server#3044](#)
- Prevent n+1 query loading for Stream Rules. [Graylog2/graylog2-server#3024](#), [Graylog2/graylog2-server#3035](#). Thank you @bjoernhaeuser!
- Handle search execution errors. [Graylog2/graylog2-server#3027](#), [Graylog2/graylog2-server#3045](#)
- Calculate cardinality on field graphs. [Graylog2/graylog2-server#3028](#), [Graylog2/graylog2-server#3046](#)
- Update stats function in field graph description. [Graylog2/graylog2-server#3029](#), [Graylog2/graylog2-server#3047](#)
- Use response status 500 if search failed but wasn’t syntax error. [Graylog2/graylog2-server#3026](#), [Graylog2/graylog2-server#3042](#)
- Improved search indicators. [Graylog2/graylog2-server#3031](#), [Graylog2/graylog2-server#3050](#)
- Fix field analyzers loading when search changes. [Graylog2/graylog2-server#3030](#), [Graylog2/graylog2-server#3049](#)
- Close search query autocompletion on enter. [Graylog2/graylog2-server#3032](#), [Graylog2/graylog2-server#3051](#)
- Refresh stream search when stream changes. [Graylog2/graylog2-server#3033](#), [Graylog2/graylog2-server#3052](#)
- Update Joda-Time and moment-timezone. [Graylog2/graylog2-server#3059](#), [Graylog2/graylog2-server#3060](#)
- Search button does not always trigger a new search. [Graylog2/graylog2-server#3062](#), [Graylog2/graylog2-server#3063](#)

Beats plugin

- Fix frame decoding in case of lost connection. [Graylog2/graylog-plugin-beats#14](#), [Graylog2/graylog-plugin-beats#15](#), [Graylog2/graylog-plugin-beats#17](#). Thank you @hc4!
- Support messages >1024 bytes in BeatsFrameDecoder. [Graylog2/graylog-plugin-beats#10](#), [Graylog2/graylog-plugin-beats#12](#)

Pipeline processor plugin

- Don't doubly negate the value of the expression. [Graylog2/graylog-plugin-pipeline-processor#126](#), [Graylog2/graylog-plugin-pipeline-processor#127](#)

24.71 Graylog 2.1.1

Released: 2016-09-14

<https://www.graylog.org/blog/69-announcing-graylog-v2-1-1>

Core

- Proxied requests query other nodes in parallel. [Graylog2/graylog2-server#2764](#), [Graylog2/graylog2-server#2779](#)
- Fix 404s on IE 11 using compatibility view. [Graylog2/graylog2-server#2768](#), [Graylog2/graylog2-server#2782](#)
- Modify actions in search page triggering a page reload. [Graylog2/graylog2-server#2488](#), [Graylog2/graylog2-server#2798](#)
- Do not display login form while loading. [Graylog2/graylog2-server#2770](#), [Graylog2/graylog2-server#2802](#)
- Check in SearchPage if search is in progress, reuse promise then. [Graylog2/graylog2-server#2799](#), [Graylog2/graylog2-server#2803](#)
- Use index and message_id as message identifier. [Graylog2/graylog2-server#2801](#), [Graylog2/graylog2-server#2804](#)
- Fix: file handle leak in KeyUtil (SSL). [Graylog2/graylog2-server#2808](#). Thank you @gbu-censhare!
- Use current search time configuration for CSV export. [Graylog2/graylog2-server#2795](#), [Graylog2/graylog2-server#2809](#)
- Explicitly close okhttp response body, avoiding leak connection warning. [Graylog2/graylog2-server#2811](#). Thank you @chaintkite!
- Properly close OkHttp Response objects to avoid resource leaks. [Graylog2/graylog2-server#2812](#)
- Remove ldap settings check from authenticators. [Graylog2/graylog2-server#2817](#), [Graylog2/graylog2-server#2820](#)

Map plugin

- Ignore internal message fields (starting with "gl2_"). [Graylog2/graylog-plugin-map-widget#17](#)

Pipeline processor plugin

- Display boolean values in pipeline simulator. [Graylog2/graylog-plugin-pipeline-processor#54](#), [Graylog2/graylog-plugin-pipeline-processor#99](#)
- Use case insensitive lookup for timezone IDs. [Graylog2/graylog-plugin-pipeline-processor#100](#), [Graylog2/graylog-plugin-pipeline-processor#102](#)

24.72 Graylog 2.1.0

Released: 2016-09-01

<https://www.graylog.org/blog/68-announcing-graylog-v-2-1-0-ga>

Core

- Refactoring of audit events. [Graylog2/graylog2-server#2687](#)
- Add a prop to display/hide the page selector. [Graylog2/graylog2-server#2711](#)
- Ensure that `rest_transport_uri` can override the URI scheme of `rest_listen_uri`. [Graylog2/graylog2-server#2680](#), [Graylog2/graylog2-server#2704](#)
- Handle indexer cluster down in web interface. [Graylog2/graylog2-server#2623](#), [Graylog2/graylog2-server#2713](#)
- Prevent NPE and verbose logging if converter returns null. [Graylog2/graylog2-server#2717](#), [Graylog2/graylog2-server#2729](#)
- Let widget replay search button open in a new tab or window. [Graylog2/graylog2-server#2725](#), [Graylog2/graylog2-server#2726](#)
- Return "id" instead of "_id" for message decorators. [Graylog2/graylog2-server#2734](#), [Graylog2/graylog2-server#2735](#)
- Make id field consistent for alarm callback histories. [Graylog2/graylog2-server#2737](#)
- Audit event changes. [Graylog2/graylog2-server#2718](#)
- Let specific stores reuse promises if request is in progress. [Graylog2/graylog2-server#2625](#), [Graylog2/graylog2-server#2712](#)
- Disable editing controls for decorator if user lacks permissions. [Graylog2/graylog2-server#2730](#), [Graylog2/graylog2-server#2736](#)
- Styling of decorator list. [Graylog2/graylog2-server#2743](#), [Graylog2/graylog2-server#2744](#)
- Do not load plugins for journal commands. [Graylog2/graylog2-server#2667](#)
- Use proper other count for pie chart slices. [Graylog2/graylog2-server#2639](#), [Graylog2/graylog2-server#2671](#)
- Removing unused prop type in StreamRuleList component. [Graylog2/graylog2-server#2673](#)
- Add a generic search form component. [Graylog2/graylog2-server#2678](#)
- Decorator improvements. [Graylog2/graylog2-server#2519](#), [Graylog2/graylog2-server#2666](#), [Graylog2/graylog2-server#2674](#)
- Only show notification link when there are notifications. [Graylog2/graylog2-server#2677](#)
- Enable gzip per default for REST API listener. [Graylog2/graylog2-server#2670](#), [Graylog2/graylog2-server#2672](#)
- Improvements in raw message loader. [Graylog2/graylog2-server#2684](#)
- Allow users of MessageFields to disable field actions. [Graylog2/graylog2-server#2685](#)
- Generating a relative redirect URL for web interface in root resource. [Graylog2/graylog2-server#2593](#), [Graylog2/graylog2-server#2675](#)
- Add help text for session's client address. [Graylog2/graylog2-server#2656](#), [Graylog2/graylog2-server#2692](#)
- Fix content pack extractor validation. [Graylog2/graylog2-server#2663](#), [Graylog2/graylog2-server#2697](#)

- Reset users' startpages if referenced stream/dashboard is deleted. [Graylog2/graylog2-server#2400](#), [Graylog2/graylog2-server#2695](#), [Graylog2/graylog2-server#2702](#)
- Fix token creation via API browser. [Graylog2/graylog2-server#2668](#), [Graylog2/graylog2-server#2698](#)
- Allow surrounding search to be opened in new tab. [Graylog2/graylog2-server#2531](#), [Graylog2/graylog2-server#2699](#)
- Reformatting component, adding error handler for fetching dashboard. [Graylog2/graylog2-server#2576](#), [Graylog2/graylog2-server#2703](#)
- Add format string message decorator. [Graylog2/graylog2-server#2660](#)
- Reloading CurrentUserStore when updated user is the current user. [Graylog2/graylog2-server#2705](#), [Graylog2/graylog2-server#2706](#)
- General UI improvements [Graylog2/graylog2-server#2700](#)
- Add Syslog severity mapper decorator. [Graylog2/graylog2-server#2590](#)
- Improvements in message decorators. [Graylog2/graylog2-server#2592](#), [Graylog2/graylog2-server#2591](#), [Graylog2/graylog2-server#2598](#), [Graylog2/graylog2-server#2654](#)
- Revert "Move link to API Browser into System menu". [Graylog2/graylog2-server#2586](#), [Graylog2/graylog2-server#2587](#)
- Print - instead of null when client did not provide user agent header. [Graylog2/graylog2-server#2601](#). Thank you @mikkolehtisalo!
- Change logging in normalizeDn() to debug to avoid noisy warnings. [Graylog2/graylog2-server#2599](#)
- Ensure that {rest,web}_{listen,transport,endpoint}_uri settings are absolute URIs. [Graylog2/graylog2-server#2589](#), [Graylog2/graylog2-server#2596](#), [Graylog2/graylog2-server#2600](#)
- Use HTTP and HTTPS default ports for network settings. [Graylog2/graylog2-server#2595](#), [Graylog2/graylog2-server#2605](#)
- Dashboard improvements. [Graylog2/graylog2-server#2084](#), [Graylog2/graylog2-server#2281](#), [Graylog2/graylog2-server#2626](#)
- Ensure that password_secret is at least 16 characters long. [Graylog2/graylog2-server#2619](#), [Graylog2/graylog2-server#2622](#)
- Reduce production .js files sizes by 51%. [Graylog2/graylog2-server#2617](#)
- Allow web_endpoint_uri to be a relative URI. [Graylog2/graylog2-server#2600](#), [Graylog2/graylog2-server#2614](#)
- Use default session attribute for principal. [Graylog2/graylog2-server#2620](#), [Graylog2/graylog2-server#2621](#)
- Compile regex pattern for MetricFilter only once. [Graylog2/graylog2-server#2637](#). Thank you again @mikkolehtisalo!
- Fix NPE in Indices#checkForReopened(IndexMetaData). [Graylog2/graylog2-server#2628](#), [Graylog2/graylog2-server#2635](#)
- Mark message offset as committed in case of a decoding error. [Graylog2/graylog2-server#2627](#), [Graylog2/graylog2-server#2643](#)
- Fix cloning streams and editing legacy stream rules. [Graylog2/graylog2-server#2244](#), [Graylog2/graylog2-server#2346](#), [Graylog2/graylog2-server#2646](#)
- Add back storing of index failures in MongoDB. [Graylog2/graylog2-server#2633](#), [Graylog2/graylog2-server#2644](#)

- Enable running Graylog REST API on different context path. [Graylog2/graylog2-server#2603](#), [Graylog2/graylog2-server#2397](#), [Graylog2/graylog2-server#2634](#)
- Add support for ECDSA private keys to KeyUtil. [Graylog2/graylog2-server#2454](#), [Graylog2/graylog2-server#2641](#)
- Check for conflict of `rest_listen_uri` and `web_listen_uri`. [Graylog2/graylog2-server#2634](#), [Graylog2/graylog2-server#2652](#)
- Remove uppercase example decorator before 2.1 final. [Graylog2/graylog2-server#2588](#), [Graylog2/graylog-plugin-pipeline-processor#73](#)
- Make sure to include charset in `getBytes` and other relevant code sections. [Graylog2/graylog2-server#2567](#), [Graylog2/graylog2-server#2574](#)
- Landing page greets with 2.0 in 2.1. [Graylog2/graylog2-server#2579](#)
- Run `WebAppNotFoundResponseFilter` later and for GET requests only. [Graylog2/graylog2-server#2657](#), [Graylog2/graylog2-server#2664](#)
- Update dependencies. [Graylog2/graylog2-server#2543](#), [Graylog2/graylog2-server#2565](#)
- Allowing to run REST API and web interface on same port. [Graylog2/graylog2-server#2515](#)
- Changing default to make REST API and web if to listen on same host/port. [Graylog2/graylog2-server#2446](#), [Graylog2/graylog2-server#2525](#)
- Change plugin REST resource injection to use Class instances. [Graylog2/graylog2-server#2492](#)
- Validate that Elasticsearch home/data paths are readable. [Graylog2/graylog2-server#2536](#), [Graylog2/graylog2-server#2538](#)
- Fix `Version#fromClasspathProperties()` when loading from JAR plugin. [Graylog2/graylog2-server#2535](#)
- Decorator UI Fixes. [Graylog2/graylog2-server#2539](#)
- Fix timing issue in `MessageCountAlertCondition`. [Graylog2/graylog2-server#1704](#), [Graylog2/graylog2-server#2382](#), [Graylog2/graylog2-server#2546](#)
- For `HttpHeadersToken` pass actual remote address. [Graylog2/graylog2-server#2556](#)
- Do not blindly override permission set of ldap users. [Graylog2/graylog2-server#2516](#), [Graylog2/graylog2-server#2529](#)
- Display original date time of index ranges on hover. [Graylog2/graylog2-server#2549](#), [Graylog2/graylog2-server#2552](#)
- Make it possible for plugins to request a shared class loader. [Graylog2/graylog2-server#2436](#), [Graylog2/graylog2-server#2508](#)
- Fix REST API browser after changes to the `PluginRestResource` injection. [Graylog2/graylog2-server#2550](#)
- Make version comparison more lenient with pre-release versions. [Graylog2/graylog2-server#2462](#), [Graylog2/graylog2-server#2548](#)
- Always trim message field values on `Message` class. [Graylog2/graylog2-server#1936](#), [Graylog2/graylog2-server#2510](#)
- Fix search results console warnings. [Graylog2/graylog2-server#2527](#)
- Fix bulk import of Grok patterns. [Graylog2/graylog2-server#2229](#), [Graylog2/graylog2-server#2561](#)
- Add helper method to add `AuditLogAppenders`. [Graylog2/graylog2-server#2562](#)
- Add explanation about the configuration file format. [Graylog2/graylog2-server#2563](#)

- Display session information, fix usability in user list, editing users. [Graylog2/graylog2-server#2526](#), [Graylog2/graylog2-server#2528](#), [Graylog2/graylog2-server#2540](#), [Graylog2/graylog2-server#2541](#)
- Fix issues with app prefix. [Graylog2/graylog2-server#2564](#), [Graylog2/graylog2-server#2583](#)
- Fix extractor and static fields creation in multi-node setups. [Graylog2/graylog2-server#2580](#), [Graylog2/graylog2-server#2584](#)
- Authentication improvements. [Graylog2/graylog2-server#2572](#), [Graylog2/graylog2-server#2573](#)
- Move Error Prone into default build profile. [Graylog2/graylog2-server#2575](#)
- Journal info command does not work. [Graylog2/graylog2-server#2493](#) and [Graylog2/graylog2-server#2495](#)
- Search result highlighting color similar to white. [Graylog2/graylog2-server#2480](#)
- Cannot POST on Regex Tester (error 500). [Graylog2/graylog2-server#2471](#) and [Graylog2/graylog2-server#2472](#)
- Middle-clicking to open new tab not working for some System menu items. [Graylog2/graylog2-server#2468](#)
- Json extractor should check for valid lucene keys. [Graylog2/graylog2-server#2434](#) and [Graylog2/graylog2-server#2481](#)
- Elasticsearch Red cluster state triggered by index rotation under some conditions. [Graylog2/graylog2-server#2371](#), [Graylog2/graylog2-server#2429](#) and [Graylog2/graylog2-server#2477](#)
- Report syntax error when search query contains unescaped slash. [Graylog2/graylog2-server#2372](#) and [Graylog2/graylog2-server#2450](#)
- Allowing path prefixes in `web_listen_uri` so web interface is accessible via path != `"/`. [Graylog2/graylog2-server#2271](#) and [Graylog2/graylog2-server#2440](#)
- LDAP group mapping: stringwise comparison fails due to different DN formats. [Graylog2/graylog2-server#1790](#) and [Graylog2/graylog2-server#2484](#)
- Json extractor prefix. [Graylog2/graylog2-server#1646](#) and [Graylog2/graylog2-server#2481](#)
- LDAP users are shown a change password form. [Graylog2/graylog2-server#2124](#), [Graylog2/graylog2-server#2327](#) and [Graylog2/graylog2-server#2485](#)
- Switch message filters from polling to subscribing to change events. [Graylog2/graylog2-server#2391](#) and [Graylog2/graylog2-server#2496](#)
- Make auth providers fully pluggable. [Graylog2/graylog2-server#2232](#), [Graylog2/graylog2-server#2367](#) and [Graylog2/graylog2-server#2522](#)
- Grok extractor: Allow returning only named captures. [Graylog2/graylog2-server#1486](#) and [Graylog2/graylog2-server#2500](#)
- Attempt reading DSA key if RSA failed. [Graylog2/graylog2-server#2503](#). Special thanks to @mikkolehtisalo!
- Fix session validation propagation. [Graylog2/graylog2-server#2498](#)
- A wrapper to protect from decompression bombs. [Graylog2/graylog2-server#2339](#). Thank you again, @mikkolehtisalo!
- Make exceptions more useful by providing messages and context. [Graylog2/graylog2-server#2478](#)
- Decorate search results. [Graylog2/graylog2-server#2408](#), [Graylog2/graylog2-server#2482](#), [Graylog2/graylog2-server#2499](#), [Graylog2/graylog-plugin-pipeline-processor#41](#), [Graylog2/graylog-plugin-pipeline-processor#43](#) and [Graylog2/graylog-plugin-pipeline-processor#52](#)
- Introduce CombinedProvider to sync actions and stores initialization. [Graylog2/graylog2-server#2523](#)
- Actually use the bluebird promise in FetchProvider. [Graylog2/graylog2-server#2762](#)

- Audit event cleanup. [Graylog2/graylog2-server#2746](#)
- Update documentation links. [Graylog2/graylog2-server#2759](#)
- Allow child elements in the search form. [Graylog2/graylog2-server#2756](#)
- Make key_prefix configuration optional. [Graylog2/graylog2-server#2755](#), [Graylog2/graylog2-server#2757](#)
- Invalidating widget result cache cluster wide when a widget changes. [Graylog2/graylog2-server#2732](#), [Graylog2/graylog2-server#2745](#)
- Correct documentation links in 'misc/graylog.conf'. [Graylog2/graylog2-server#2747](#). Thank you @supahgreg!
- Throttle LB status if journal utilization is too high. [Graylog2/graylog2-server#1100](#), [Graylog2/graylog2-server#1952](#) and [Graylog2/graylog2-server#2312](#). Thank you @mikkolehtisalo!
- TLS ciphers for inputs should probably be configurable. [Graylog2/graylog2-server#2051](#).
- SelfSignedCertificate should migrate from sun.security.*. [Graylog2/graylog2-server#2132](#) and [Graylog2/graylog2-server#2316](#). Thank you @mikkolehtisalo!
- Fix formatting metric names including more than one namespace prefix. [Graylog2/graylog2-server#2254](#) and [Graylog2/graylog2-server#2425](#).
- Waiting for index range calculation before switching deflector alias. [Graylog2/graylog2-server#2264](#) and [Graylog2/graylog2-server#2278](#).
- Specify application.context. [Graylog2/graylog2-server#2271](#) and [Graylog2/graylog2-server#2440](#).
- Add handler for / in the Graylog REST API. [Graylog2/graylog2-server#2376](#) and [Graylog2/graylog2-server#2377](#).
- User preferred timezone not saved. [Graylog2/graylog2-server#2393](#) and [Graylog2/graylog2-server#2395](#).
- Unable to delete closed index. [Graylog2/graylog2-server#2419](#) and [Graylog2/graylog2-server#2437](#).
- Absolute search results in widget using wrong time. [Graylog2/graylog2-server#2428](#) and [Graylog2/graylog2-server#2452](#).
- Upgrade to Kafka 0.9.0.1. [Graylog2/graylog2-server#1912](#).
- RestAccessLogFilter to use X-Forwarded-For set by trusted proxies. [Graylog2/graylog2-server#1981](#). Thank you @mikkolehtisalo!
- Upgrade to Drools 6.4.0.Final. [Graylog2/graylog2-server#2106](#).
- Stream Rule Titles. [Graylog2/graylog2-server#2244](#).
- Improve search with no results page. [Graylog2/graylog2-server#2253](#).
- Refactor Version class to use com.github.zafarkhaja.semver.Version. [Graylog2/graylog2-server#2275](#).
- Alert condition titles. [Graylog2/graylog2-server#2282](#).
- Upgrade to Jackson 2.7.4. [Graylog2/graylog2-server#2304](#).
- Support changes for pipeline processor simulator. [Graylog2/graylog2-server#2320](#).
- Add dependency on jna to fix chatty Elasticsearch log message. [Graylog2/graylog2-server#2342](#).
- Interfaces and simple implementations of an audit log. [Graylog2/graylog2-server#2344](#).
- Do not init available alarm callback types, fetch them explicitly. [Graylog2/graylog2-server#2353](#).
- Move custom analyzer into index template. [Graylog2/graylog2-server#2354](#).
- Remove automatic private key/certificate generation. [Graylog2/graylog2-server#2355](#).
- Improved feedback. [Graylog2/graylog2-server#2357](#).

- Longer retention interval for journal tests. [Graylog2/graylog2-server#2388](#).
- Remove `elasticsearch_discovery_zen_ping_multicast_enabled` setting. [Graylog2/graylog2-server#2394](#).
- Fix unrequested refresh of configuration forms/Reset configuration forms on cancel. [Graylog2/graylog2-server#2399](#).
- Web If: Updating a few dependencies which are safe to update. [Graylog2/graylog2-server#2407](#).
- Added Information for journal partitions. [Graylog2/graylog2-server#2412](#).
- Fix memory problems with webpack-dev-server in development mode. [Graylog2/graylog2-server#2433](#).
- Remove `_ttl` in index mapping. [Graylog2/graylog2-server#2435](#).
- Add raw message loader. [Graylog2/graylog2-server#2438](#).
- Extracting our customized ESLint config into separate module. [Graylog2/graylog2-server#2441](#).
- Remove deprecated MongoDB metrics reporter. [Graylog2/graylog2-server#2443](#).
- Allow access to MongoDB in MongoConnection. [Graylog2/graylog2-server#2444](#).
- Add some useful FindBugs plugins. [Graylog2/graylog2-server#2447](#).
- Proxies deflector cycle call to make it available on every node. [Graylog2/graylog2-server#2448](#).

Collector sidecar plugin

- Return updated configuration after changing configuration name
- Prevent crashes when failed to propagate state to the server
- Improve compatibility with old API
- Display collector IP address. [Graylog2/graylog-plugin-collector#9](#)
- Ability to clone collector configuration. [Graylog2/graylog-plugin-collector#10](#)
- NXLog GELF/TLS input should work without cert files. [Graylog2/graylog-plugin-collector#13](#)
- Add `tail_files` option
- Expand verbatim text area if value is present
- Validation improvements
- Add buffer option to NXLog outputs
- Make defaults compatible with Windows hosts
- Add support for Beats. Filebeat, Winlogbeat.
- Beats binaries are bundled with the Collector-Sidecar package
- Improve server side validation. [Graylog2/graylog2-server#2247](#) and [Graylog2/graylog-plugin-collector#7](#).
- Add NXlog GELF TCP and TCP/TLS output
- Add support to clone input, outputs and snippets
- Optionally display collector status information in web interface
- Optionally display log directory listing on status page
- If no node-id is given use the hostname as identification
- Linux distribution is detected and can be used in Snippet template
- Silent install on Windows works now

- Collector log files are now auto-rotated
- Collector processes are supervised and restarted on crashes
- NXlog Inputs and Outputs support free text configuration
- Fix web plugin loading on IE 11

Pipeline processor plugin

- Add parse error handler for precompute args failures. [Graylog2/graylog-plugin-pipeline-processor#84](#), [Graylog2/graylog-plugin-pipeline-processor#93](#)
- Add support for DateTime comparison. [Graylog2/graylog-plugin-pipeline-processor#86](#), [Graylog2/graylog-plugin-pipeline-processor#92](#)
- Make some small UI changes around RuleHelper. [Graylog2/graylog-plugin-pipeline-processor#90](#)
- Use shared classloader so other plugins can contribute functions. [Graylog2/graylog-plugin-pipeline-processor#81](#), [Graylog2/graylog-plugin-pipeline-processor#94](#)
- UI improvements. [Graylog2/graylog2-server#2683](#), [Graylog2/graylog-plugin-pipeline-processor#83](#)
- Unregister PipelineInterpreter from event bus . [Graylog2/graylog-plugin-pipeline-processor#79](#)
- Use find in the regex function. [Graylog2/graylog-plugin-pipeline-processor#35](#), [Graylog2/graylog-plugin-pipeline-processor#88](#)
- Dynamic function list. [Graylog2/graylog-plugin-pipeline-processor#89](#)
- Unresolved functions not properly handled. [Graylog2/graylog-plugin-pipeline-processor#24](#), [Graylog2/graylog-plugin-pipeline-processor#25](#)
- Unwrap JsonNode values. [Graylog2/graylog-plugin-pipeline-processor#68](#), [Graylog2/graylog-plugin-pipeline-processor#72](#)
- Add optional prefix/suffix to set_fields functions. [Graylog2/graylog-plugin-pipeline-processor#74](#), [Graylog2/graylog-plugin-pipeline-processor#75](#)
- Add key-value parsing function. [Graylog2/graylog-plugin-pipeline-processor#38](#), [Graylog2/graylog-plugin-pipeline-processor#77](#)
- Allow selection of an input ID for the simulation message. [Graylog2/graylog2-server#2610](#), [Graylog2/graylog2-server#2650](#), [Graylog2/graylog-plugin-pipeline-processor#78](#)
- Support “only named captures” for pipeline grok function. [Graylog2/graylog-plugin-pipeline-processor#59](#), [Graylog2/graylog-plugin-pipeline-processor#65](#), [Graylog2/graylog2-server#2566](#), [Graylog2/graylog2-server#2577](#)
- Make conversion functions more consistent. [Graylog2/graylog2-server#63](#), [Graylog2/graylog2-server#64](#)
- Unescape string literals before using them. [Graylog2/graylog-plugin-pipeline-processor#47](#)
- Add rename_field function. [Graylog2/graylog-plugin-pipeline-processor#50](#)
- Allow null matcher group values in regex function. [Graylog2/graylog-plugin-pipeline-processor#49](#)
- Fix 500 error during simulation. [Graylog2/graylog-plugin-pipeline-processor#51](#)
- IPAddressConversion caught wrong exception. [Graylog2/graylog-plugin-pipeline-processor#32](#)
- Add syslog-related functions. [Graylog2/graylog-plugin-pipeline-processor#19](#).
- Add concat () function. [Graylog2/graylog-plugin-pipeline-processor#20](#).
- NPE during preProcessArgs using Grok pattern. [Graylog2/graylog-plugin-pipeline-processor#24](#) and [Graylog2/graylog-plugin-pipeline-processor#26](#).

- Streams without connections stay visible. [Graylog2/graylog2-server#2322](#).
- Add pipeline simulator. [Graylog2/graylog-plugin-pipeline-processor#34](#), [Graylog2/graylog-plugin-pipeline-processor#36](#) and [Graylog2/graylog-plugin-pipeline-processor#42](#).
- Fix page size in function list. [Graylog2/graylog-plugin-pipeline-processor#97](#)

24.73 Graylog 2.0.3

Released: 2016-06-20

<https://www.graylog.org/blog/58-graylog-v2-0-3-released>

Improvements

- Make `Message#getStreamIds()` more reliable. [Graylog2/graylog2-server#2378](#)
- Disabling a configured proxy for requests to `localhost/127.0.0.1::1`. [Graylog2/graylog2-server#2305](#)

Bug fixes

- Update search query on auto refresh [Graylog2/graylog2-server#2385](#) [Graylog2/graylog2-server#2379](#)
- Fix permission checks for non admin users [Graylog2/graylog2-server#2366](#) [Graylog2/graylog2-server#2358](#)
- Fix display of total count of indices. [Graylog2/graylog2-server#2365](#) [Graylog2/graylog2-server#2359](#)
- Fix base URI for API documentation [Graylog2/graylog2-server#2362](#) [Graylog2/graylog2-server#2360](#)
- Fix link to API Browser on Node pages [Graylog2/graylog2-server#2361](#) [Graylog2/graylog2-server#2360](#)
- Calculate keyword from and to values on the fly [Graylog2/graylog2-server#2335](#) [Graylog2/graylog2-server#2301](#)
- Make `MemoryAppender` thread-safe [Graylog2/graylog2-server#2307](#) [Graylog2/graylog2-server#2302](#)
- Use right metrics to display buffer usage [Graylog2/graylog2-server#2300](#) [Graylog2/graylog2-server#2299](#)
- Check if props actually contain configuration fields before copying them [Graylog2/graylog2-server#2298](#) [Graylog2/graylog2-server#2297](#)

24.74 Graylog 2.0.2

Released: 2016-05-27

<https://www.graylog.org/blog/57-graylog-v2-0-2-released>

Improvements

- Improved user form. [Graylog2/graylog2-server#2261](#)
- Improved logging of plugin list on server startup. [Graylog2/graylog2-server#2290](#)
- Forbid empty passwords when using LDAP. [Graylog2/graylog2-server#2214](#) [Graylog2/graylog2-server#2283](#)
- Improved metrics page. [Graylog2/graylog2-server#2250](#) [Graylog2/graylog2-server#2255](#)
- Improved search histogram resolution auto selection. [Graylog2/graylog2-server#2148](#) [Graylog2/graylog2-server#2289](#)
- Improved cluster overview page. [Graylog2/graylog2-server#2291](#)

Bug Fixes

- Fixed concurrency issue with Drools. [Graylog2/graylog2-server#2119](#) [Graylog2/graylog2-server#2188](#) [Graylog2/graylog2-server#2231](#)
- Fixed problems with Internet Explorer. [Graylog2/graylog2-server#2246](#)
- Fixed issues with old dashboards. [Graylog2/graylog2-server#2262](#) [Graylog2/graylog2-server#2163](#)
- Fixed changing log levels via REST API. [Graylog2/graylog2-server#1904](#) [Graylog2/graylog2-server#2277](#)
- Fixed plugin inter-dependencies by using one class loader for all plugins. [Graylog2/graylog2-server#2280](#)

Plugin: Pipeline Processor

- Add syslog related rule functions. [Graylog2/graylog-plugin-pipeline-processor#19](#)
- Add concat rule functions. [Graylog2/graylog-plugin-pipeline-processor#20](#)
- Fixed problem with IP address function. [Graylog2/graylog-plugin-pipeline-processor#28](#) [Graylog2/graylog-plugin-pipeline-processor#32](#)
- Properly unescape strings in raw literals. [Graylog2/graylog-plugin-pipeline-processor#30](#) [Graylog2/graylog-plugin-pipeline-processor#31](#)

24.75 Graylog 2.0.1

Released: 2016-05-11

<https://www.graylog.org/blog/56-graylog-v2-0-1-released>

Improvements

- Improved session handling. [Graylog2/graylog2-server#2157](#)
- Included UPGRADING file in the build artifact. [Graylog2/graylog2-server#2170](#)
- Added rotation/retention settings back to the config file. [Graylog2/graylog2-server#2181](#)
- Improved proxy setup configuration settings. [Graylog2/graylog2-server#2156](#)
- Forbid wildcard host in `rest_transport_uri`. [Graylog2/graylog2-server#2205](#)
- Improved robustness for unreachable nodes. [Graylog2/graylog2-server#2206](#)
- Use a more lightweight API to get all index names and aliases. [Graylog2/graylog2-server#2194](#) [Graylog2/graylog2-server#2210](#)

Bug Fixes

- Fixed some documentation links.
- Fixed inverted stream rules. [Graylog2/graylog2-server#2160](#) [Graylog2/graylog2-server#2172](#)
- Fixed swallowed LDAP authentication exception. [Graylog2/graylog2-server#2176](#) [Graylog2/graylog2-server#2178](#)
- Fixed insecure handling of PID files. Thanks @juergenhoetzel! [Graylog2/graylog2-server#2174](#)
- Fixed alert conditions that have been created in Graylog 1.x. [Graylog2/graylog2-server#2169](#) [Graylog2/graylog2-server#2182](#)
- Fixed setting of application context. [Graylog2/graylog2-server#2191](#) [Graylog2/graylog2-server#2208](#)
- Fixed setting of custom Elasticsearch analyzer. [Graylog2/graylog2-server#2209](#)
- Fixed masking of password config values in the web interface. [Graylog2/graylog2-server#2198](#) [Graylog2/graylog2-server#2203](#)

- Fixed URL handling. [Graylog2/graylog2-server#2200](#) [Graylog2/graylog2-server#2213](#)

Plugin: Collector

- Rotate nxlog logfiles once a day by default.
- Add GELF TCP output for nxlog.

24.76 Graylog 2.0.0

Released: 2016-04-27

<https://www.graylog.org/blog/55-announcing-graylog-v2-0-ga>

Note: Please make sure to read the *Upgrade Guide* before upgrading to Graylog 2.0. There are breaking changes!

Feature Highlights

See the release announcement for details on the new features.

- Web interface no longer a separate process
- Support for Elasticsearch 2.x
- Live tail support
- Message Processing Pipeline
- Map Widget Plugin
- Collector Sidecar
- Streams filter UI
- Search for surrounding messages
- Query range limit
- Configurable query time ranges
- Archiving (commercial feature)

Bug Fixes

There have been lots of bug fixes since the 1.3 releases. We only list the ones that we worked on since the 2.0 alpha phase.

- Fixed issues with search page pagination and number of returned results: [Graylog2/graylog2-server#1759](#), [Graylog2/graylog2-server#1775](#), and [Graylog2/graylog2-server#1802](#)
- Avoid creating MongoDB collection multiple times: [Graylog2/graylog2-server#1747](#)
- Removed number of connected nodes in login page: [Graylog2/graylog2-server#1732](#)
- Fix dynamic search result histogram resolution: [Graylog2/graylog2-server#1764](#)
- Show overlay in Graylog web interface when Graylog server is not available: [Graylog2/graylog2-server#1762](#)
- Fix metric types: [Graylog2/graylog2-server#1784](#)
- Only load all metrics on demand: [Graylog2/graylog2-server#1782](#)
- Activate search refresh after selecting a refresh interval: [Graylog2/graylog2-server#1796](#)
- Fix circular dependencies: [Graylog2/graylog2-server#1789](#)

- Only render input forms when input type is available: [Graylog2/graylog2-server#1798](#)
- Document web interface configuration settings in `graylog.conf`. [Graylog2/graylog2-server#1777](#)
- Fix roles link to documentation. [Graylog2/graylog2-server#1805](#)
- Fix issue with field graphs. [Graylog2/graylog2-server#1811](#)
- Fix search result pagination. [Graylog2/graylog2-server#1812](#)
- Fix add to query button on quick values. [Graylog2/graylog2-server#1797](#)
- Fix URL to Graylog marketplace on content pack export page. [Graylog2/graylog2-server#1817](#)
- Fix elasticsearch node name for the Graylog client node. [Graylog2/graylog2-server#1814](#) and [Graylog2/graylog2-server#1820](#)
- Fix widget sorting for dashboards.
- Use `_` as default key separator in JSON Extractor. [Graylog2/graylog2-server#1841](#)
- Clarify that Graylog Collector needs access to `rest_listen_uri`. [Graylog2/graylog2-server#1847](#)
- Fix potential memory leak in GELF UDP handler. [Graylog2/graylog2-server#1857](#) [Graylog2/graylog2-server#1862](#)
- Fix user with correct permissions not allowed to view stream: [Graylog2/graylog2-server#1887](#), [Graylog2/graylog2-server#1902](#)
- Make pattern to check Graylog-managed indices stricter: [Graylog2/graylog2-server#1882](#), [Graylog2/graylog2-server#1888](#)
- Fix throughput counter: [Graylog2/graylog2-server#1876](#)
- Fix replay search link in dashboards: [Graylog2/graylog2-server#1835](#)
- Render server unavailable page more reliably: [Graylog2/graylog2-server#1867](#)
- Fix build issue with maven. [Graylog2/graylog2-server#1907](#) (Thanks @gitfrederic)
- Fix username in REST API access logs. [Graylog2/graylog2-server#1815](#) [Graylog2/graylog2-server#1918](#) (Thanks @mikkolehtisalo)
- Fix alert annotations in message histogram. [Graylog2/graylog2-server#1921](#)
- Fix problem with automatic input form reload. [Graylog2/graylog2-server#1870](#) [Graylog2/graylog2-server#1929](#)
- Fix asset caching. [Graylog2/graylog2-server#1924](#) [Graylog2/graylog2-server#1930](#)
- Fix issue with cursor jumps in the search bar. [Graylog2/graylog2-server#1911](#)
- Fix import of Graylog 1.x extractors. [Graylog2/graylog2-server#1831](#) [Graylog2/graylog2-server#1937](#)
- Field charts will now use the stream and time range of the current search. [Graylog2/graylog2-server#1785](#) [Graylog2/graylog2-web-interface#1620](#) [Graylog2/graylog2-web-interface#1618](#) [Graylog2/graylog2-web-interface#1485](#) [Graylog2/graylog2-server#1938](#)
- Improve browser validations. [Graylog2/graylog2-server#1885](#)
- Fix Internet Explorer support. [Graylog2/graylog2-server#1935](#)
- Fix issue where a user was logged out when accessing an unauthorized resource. [Graylog2/graylog2-server#1944](#)
- Fix issue with surrounding search. [Graylog2/graylog2-server#1946](#)
- Fix problem deleting dashboard widget where the plugin got removed. [Graylog2/graylog2-server#1943](#)

- Fix permission issue on user edit page. [Graylog2/graylog2-server#1964](#)
- Fix histogram time range selection via mouse. [Graylog2/graylog2-server#1895](#)
- Fix problems with duplicate Reflux store instances. [Graylog2/graylog2-server#1967](#)
- Create PID file earlier in the startup process. [Graylog2/graylog2-server#1969](#) [Graylog2/graylog2-server#1978](#)
- Fix content type detection for static assets. [Graylog2/graylog2-server#1982](#) [Graylog2/graylog2-server#1983](#)
- Fix caching of static assets. [Graylog2/graylog2-server#1982](#) [Graylog2/graylog2-server#1983](#)
- Show error message on malformed search query. [Graylog2/graylog2-server#1896](#)
- Fix parsing of GELF chunks. [Graylog2/graylog2-server#1986](#)
- Fix problems editing reader users profile. [Graylog2/graylog2-server#1984](#) [Graylog2/graylog2-server#1987](#)
- Fix problem with lost extractors and static fields on input update. [Graylog2/graylog2-server#1988](#) [Graylog2/graylog2-server#1923](#)
- Improve fetching cluster metrics to avoid multiple HTTP calls. [Graylog2/graylog2-server#1974](#) [Graylog2/graylog2-server#1990](#)
- Properly handle empty messages. [Graylog2/graylog2-server#1584](#) [Graylog2/graylog2-server#1995](#)
- Add 100-Continue support to HTTP inputs. [Graylog2/graylog2-server#1939](#) [Graylog2/graylog2-server#1998](#)
- Fix setting dashboard as start page for reader users. [Graylog2/graylog2-server#2005](#)
- Allow dots (“.”) in LDAP group name mappings. [Graylog2/graylog2-server#1458](#) [Graylog2/graylog2-server#2009](#)
- Update user edit form when username changes. [Graylog2/graylog2-server#2000](#)
- Fix issue with permissions in user form. [Graylog2/graylog2-server#1989](#)
- Update extractor example when message is loaded. [Graylog2/graylog2-server#1957](#) [Graylog2/graylog2-server#2013](#)
- Disable log4j2 shutdown hooks to avoid exception on shutdown. [Graylog2/graylog2-server#1795](#) [Graylog2/graylog2-server#2015](#)
- Fix styling issue with map widget. [Graylog2/graylog2-server#2003](#)
- Fix openstreetmap URL in map widget. [Graylog2/graylog2-server#1994](#)
- Fix problem with collector heartbeat validation. [Graylog2/graylog2-server#2002](#) [Graylog2/graylog2-web-interface#1726](#) [Graylog2/graylog-plugin-collector#3](#)
- Remove unused command line parameters. [Graylog2/graylog2-server#1977](#)
- Fixed timezone issues for date time processing in JSON parser. [Graylog2/graylog2-server#2007](#)
- Fixed JavaScript error with field truncation. [Graylog2/graylog2-server#2025](#)
- Fixed redirection if user is not authorized. [Graylog2/graylog2-server#1985](#) [Graylog2/graylog2-server#2024](#)
- Made changing the sort order in search result table work again. [Graylog2/graylog2-server#2028](#) [Graylog2/graylog2-server#2031](#)
- Performance improvements on “System/Indices” page. [Graylog2/graylog2-server#2017](#)
- Fixed content-type settings for static assets. [Graylog2/graylog2-server#2052](#)
- Fixed return code for invalid input IDs. [Graylog2/graylog2-server#1718](#) [Graylog2/graylog2-server#1767](#)
- Improved field analyzer UI. [Graylog2/graylog2-server#2022](#) [Graylog2/graylog2-server#2023](#)

- Fixed login with LDAP user. [Graylog2/graylog2-server#2045](#) [Graylog2/graylog2-server#2046](#)
[Graylog2/graylog2-server#2069](#)
- Fixed issue with bad message timestamps to avoid data loss. [Graylog2/graylog2-server#2064](#)
[Graylog2/graylog2-server#2065](#)
- Improved handling of Elasticsearch indices. [Graylog2/graylog2-server#2058](#) [Graylog2/graylog2-server#2062](#)
- Extractor form improvements for JSON and Grok extractors. [Graylog2/graylog2-server#1883](#)
[Graylog2/graylog2-server#2020](#)
- Used search refresh to refresh field statistics. [Graylog2/graylog2-server#1961](#) [Graylog2/graylog2-server#2068](#)
- Fixed clicking zoom button in quick values. [Graylog2/graylog2-server#2040](#) [Graylog2/graylog2-server#2067](#)
- Web interface styling improvements.
- Replaced . in message field keys with a _ for ES 2.x compatibility. [Graylog2/graylog2-server#2078](#)
- Fixed unprocessed journal messages reload in node list. [Graylog2/graylog2-server#2083](#)
- Fixed problems with stale sessions on the login page. [Graylog2/graylog2-server#2073](#) [Graylog2/graylog2-server#2059](#) [Graylog2/graylog2-server#1891](#)
- Fixed issue with index retention strategies. [Graylog2/graylog2-server#2100](#)
- Fixed password change form. [Graylog2/graylog2-server#2103](#) [Graylog2/graylog2-server#2105](#)
- Do not show search refresh controls on the sources page. [Graylog2/graylog2-server#1821](#) [Graylog2/graylog2-server#2104](#)
- Wait for index being available before calculating index range. [Graylog2/graylog2-server#2061](#)
[Graylog2/graylog2-server#2098](#)
- Fixed issue with sorting extractors. [Graylog2/graylog2-server#2086](#) [Graylog2/graylog2-server#2088](#)
- Improve DataTable UI component. [Graylog2/graylog-plugin-pipeline-processor#11](#)
- Move TCP keepalive setting into AbstractTcpTransport to simplify input development. [Graylog2/graylog2-server#2112](#)
- Fixed issue with Elasticsearch index template update. [Graylog2/graylog2-server#2089](#) [Graylog2/graylog2-server#2097](#)
- Ensure that tmpDir is writable when generating self-signed certs in TCP transports. [Graylog2/graylog2-server#2054](#) [Graylog2/graylog2-server#2096](#)
- Fixed default values for plugin configuration forms. [Graylog2/graylog2-server#2108](#) [Graylog2/graylog2-server#2114](#)
- Dashboard usability improvements. [Graylog2/graylog2-server#2093](#)
- Include default values in pluggable entities forms. [Graylog2/graylog2-server#2122](#)
- Ignore empty authentication tokens in LdapUserAuthenticator. [Graylog2/graylog2-server#2123](#)
- Add REST API authentication and permissions. [Graylog2/graylog-plugin-pipeline-processor#15](#)
- Require authenticated user in REST resources. [Graylog2/graylog-plugin-pipeline-processor#14](#)
- Lots of UI improvements in the web interface. [Graylog2/graylog2-server#2136](#)
- Fixed link to REST API browser. [Graylog2/graylog2-server#2133](#)
- Fixed CSV export skipping first chunk. [Graylog2/graylog2-server#2128](#)
- Fixed updating content packs. [Graylog2/graylog2-server#2138](#) [Graylog2/graylog2-server#2141](#)

- Added missing 404 page. [Graylog2/graylog2-server#2139](#)

24.77 Graylog 1.3.4

Released: 2016-03-16

<https://www.graylog.org/blog/49-graylog-1-3-4-is-now-available>

- Fix security issue which allowed redirecting users to arbitrary sites on login [Graylog2/graylog2-web-interface#1729](#)
- Fix issue with time-based index rotation strategy [Graylog2/graylog2-server#725](#) [Graylog2/graylog2-server#1693](#)
- Fix issue with `IndexFailureServiceImpl` [Graylog2/graylog2-server#1747](#)
- Add default Content-Type to `GettingStartedResource` [Graylog2/graylog2-server#1700](#)
- Improve OS platform detection [Graylog2/graylog2-server#1737](#)
- Add prefixes `GRAYLOG_` (environment variables) and `graylog.` (system properties) for overriding configuration settings [Graylog2/graylog2-server@48ed88d](#)
- Fix URL to Graylog Marketplace on Extractor/Content Pack pages [Graylog2/graylog2-server#1817](#)
- Use monospace font on message values [Graylog2/graylog2-web-interface@3cce368](#)

24.78 Graylog 1.3.3

Released: 2016-01-14

<https://www.graylog.org/graylog-1-3-3-is-now-available/>

- Absolute and relative time spans give different results [Graylog2/graylog2-server#1572](#) [Graylog2/graylog2-server#1463](#) [Graylog2/graylog2-server#1672](#) [Graylog2/graylog2-server#1679](#)
- Search result count widget not caching [Graylog2/graylog2-server#1640](#) [Graylog2/graylog2-server#1681](#)
- Field Value Condition Alert, does not permit decimal values [Graylog2/graylog2-server#1657](#)
- Correctly handle null values in nested structures in `JsonExtractor` [Graylog2/graylog2-server#1676](#) [Graylog2/graylog2-server#1677](#)
- Add `Content-Type` and `X-Graylog2-No-Session-Extension` to CORS headers [Graylog2/graylog2-server#1682](#) [Graylog2/graylog2-server#1685](#)
- Discard Message Output [Graylog2/graylog2-server#1688](#)

24.79 Graylog 1.3.2

Released: 2015-12-18

<https://www.graylog.org/graylog-1-3-2-is-now-available/>

- Deserializing a blacklist filter (FilterDescription) leads to StackOverflowError [Graylog2/graylog2-server#1641](#)

24.80 Graylog 1.3.1

Released: 2015-12-17

<https://www.graylog.org/graylog-1-3-1-is-now-available/>

- Add option to AMQP transports to bind the queue to the exchange [Graylog2/graylog2-server#1599](#) [Graylog2/graylog2-server#1633](#)
- Install a Graylog index template instead of set mappings on index creation [Graylog2/graylog2-server#1624](#) [Graylog2/graylog2-server#1628](#)

24.81 Graylog 1.3.0

Released: 2015-12-09

<https://www.graylog.org/graylog-1-3-ga-is-ready/>

- Allow index range calculation for a single index. [Graylog2/graylog2-server#1451](#) [Graylog2/graylog2-server#1455](#)
- Performance improvements for index ranges.
- Make internal server logs accessible via REST API. [Graylog2/graylog2-server#1452](#)
- Make specific configuration values accessible via REST API. [Graylog2/graylog2-server#1484](#)
- Added Replace Extractor. [Graylog2/graylog2-server#1485](#)
- Added a default set of Grok patterns. [Graylog2/graylog2-server#1495](#)
- Log operating system details on server startup. [Graylog2/graylog2-server#1244](#) [Graylog2/graylog2-server#1553](#)
- Allow reader users to set a dashboard as start page. [Graylog2/graylog2-web-interface#1681](#)
- Auto content pack loader – download and install content packs automatically
- Appliance pre-configured for log ingestion and analysis
- Show a getting started guide on first install. [Graylog2/graylog2-web-interface#1662](#)
- Include role permissions in “/roles/{rolename}/members” REST API endpoint. [Graylog2/graylog2-server#1549](#)
- Fixed NullPointerException in GELF output. [Graylog2/graylog2-server#1538](#)
- Fixed NullPointerException in GELF input handling. [Graylog2/graylog2-server#1544](#)
- Use the root user’s timezone for LDAP users by default. [Graylog2/graylog2-server#1000](#) [Graylog2/graylog2-server#1554](#)
- Fix display of JSON messages. [Graylog2/graylog2-web-interface#1686](#)

- Improve search robustness with missing Elasticsearch indices. [Graylog2/graylog2-server#1547](#)
[Graylog2/graylog2-server#1533](#)
- Fixed race condition between index creation and index mapping configuration. [Graylog2/graylog2-server#1502](#)
[Graylog2/graylog2-server#1563](#)
- Fixed concurrency problem in GELF input handling. [Graylog2/graylog2-server#1561](#)
- Fixed issue with widget value calculation. [Graylog2/graylog2-server#1588](#)
- Do not extend user sessions when updating widgets. [Graylog2/graylog2-web-interface#1655](#)
- Fixed compatibility mode for Internet Explorer. [Graylog2/graylog2-web-interface#1661](#) [Graylog2/graylog2-web-interface#1668](#)
- Fixed whitespace issue in extractor example. [Graylog2/graylog2-web-interface#1650](#)
- Fixed several issues on the indices page. [Graylog2/graylog2-web-interface#1691](#) [Graylog2/graylog2-web-interface#1692](#)
- Fixed permission issue for stream alert management. [Graylog2/graylog2-web-interface#1659](#)
- Fixed deletion of LDAP group mappings when updating LDAP settings. [Graylog2/graylog2-server#1513](#)
- Fixed dangling role references after deleting a role [Graylog2/graylog2-server#1608](#)
- Support LDAP Group Mapping for Sun Directory Server (new since beta.2) [Graylog2/graylog2-server#1583](#)

24.82 Graylog 1.2.2

Released: 2015-10-27

<https://www.graylog.org/graylog-1-2-2-is-now-available/>

- Fixed a whitespace issue in the extractor UI. [Graylog2/graylog2-web-interface#1650](#)
- Fixed the index description on the indices page. [Graylog2/graylog2-web-interface#1653](#)
- Fixed a memory leak in the GELF UDP handler code. (Analysis and fix contributed by @lightpriest and @onyx-master on GitHub. Thank you!) [Graylog2/graylog2-server#1462](#), [Graylog2/graylog2-server#1488](#)
- Improved the LDAP group handling code to handle more LDAP setups. [Graylog2/graylog2-server#1433](#), [Graylog2/graylog2-server#1453](#), [Graylog2/graylog2-server#1491](#), [Graylog2/graylog2-server#1494](#)
- Fixed email alerts for users with multiple email addresses. (LDAP setups) [Graylog2/graylog2-server#1439](#), [Graylog2/graylog2-server#1492](#)
- Improve index range handling performance. [Graylog2/graylog2-server#1465](#), [Graylog2/graylog2-server#1493](#)
- Fixed JSON extractor with null values. [Graylog2/graylog2-server#1475](#), [Graylog2/graylog2-server#1505](#)
- Fixed role assignment when updating user via REST API. [Graylog2/graylog2-server#1456](#), [Graylog2/graylog2-server#1507](#)

24.83 Graylog 1.2.1

Released: 2015-09-22

<https://www.graylog.org/graylog-1-2-1-is-now-available/>

- Fixed various issues around importing and applying content packs Graylog2/graylog2-server#1423, Graylog2/graylog2-server#1434, Graylog2/graylog2-web-interface#1605, Graylog2/graylog2-web-interface#1614
- Fixed loading existing alarm callbacks that had been created with Graylog 1.0.x or earlier Graylog2/graylog2-server#1428
- Fixed compatibility problem with Elasticsearch 1.5.x and earlier Graylog2/graylog2-server#1426
- Fixed handling of statistical functions in field graphs Graylog2/graylog2-web-interface#1604
- Use correct title when adding quick values to a dashboard Graylog2/graylog2-web-interface#1603

24.84 Graylog 1.2.0

Released: 2015-09-14

<https://www.graylog.org/announcing-graylog-1-2-ga-release-includes-30-new-features/>

- Make sure existing role assignments survive on LDAP account sync. Graylog2/graylog2-server#1405 | Graylog2/graylog2-server#1406
- Use memberOf query for ActiveDirectory to speed up LDAP queries. Graylog2/graylog2-server#1407
- Removed disable_index_range_calculation configuration option. Graylog2/graylog2-server#1411
- Avoid potentially long-running Elasticsearch cluster-level operations by only saving an index range if it actually changed. Graylog2/graylog2-server#1412
- Allow editing the roles of LDAP users. Graylog2/graylog2-web-interface#1598
- Improved quick values widget. Graylog2/graylog2-web-interface#1487

24.85 Graylog 1.2.0-rc.4

Released: 2015-09-08

<https://www.graylog.org/announcing-graylog-1-2-rc-4/>

- Deprecated MongoDB storage of internal metrics feature.
- Added customizable LDAP filter for user groups lookup. Graylog2/graylog2-server#951
- Allow usage of count and cardinality statistical functions in dashboard widgets. Graylog2/graylog2-server#1376
- Disabled index range recalculation on every index rotation. Graylog2/graylog2-server#1388
- Added automatic migration of user permissions to admin or reader roles. Graylog2/graylog2-server#1389
- Fixed widget problem with invalid timestamps. Graylog2/graylog2-web-interface#1390
- Added config option to enable TLS certificate validation in REST client. Graylog2/graylog2-server#1393
- Fixed rule matching issue in stream routing engine. Graylog2/graylog2-server#1397

- Changed default titles for stream widgets. [Graylog2/graylog2-web-interface#1476](#)
- Changed data filters to be case insensitive. [Graylog2/graylog2-web-interface#1585](#)
- Improved padding for stack charts. [Graylog2/graylog2-web-interface#1568](#)
- Improved resiliency when Elasticsearch is not available. [Graylog2/graylog2-web-interface#1518](#)
- Redirect to user edit form after updating a user. [Graylog2/graylog2-web-interface#1588](#)
- Improved dashboard widgets error handling. [Graylog2/graylog2-web-interface#1590](#)
- Fixed timing issue in streams UI. [Graylog2/graylog2-web-interface#1490](#)
- Improved indices overview page. [Graylog2/graylog2-web-interface#1593](#)
- Fixed browser back button behavior. [Graylog2/graylog2-web-interface#1594](#)
- Fixed accidental type conversion for number configuration fields in alarmcallback plugins. [Graylog2/graylog2-web-interface#1596](#)
- Fixed data type problem for extracted timestamps via grok. [Graylog2/graylog2-server#1403](#)

24.86 Graylog 1.2.0-rc.2

Released: 2015-08-31

<https://www.graylog.org/announcing-graylog-1-2-rc/>

- Implement global Elasticsearch timeout and add `elasticsearch_request_timeout` configuration setting. [Graylog2/graylog2-server#1220](#)
- Fixed lots of documentation links. [Graylog2/graylog2-server#1238](#)
- Groovy shell server removed. [Graylog2/graylog2-server#1266](#)
- Lots of index range calculation fixes. [Graylog2/graylog2-server#1274](#)
- New Raw AMQP input. [Graylog2/graylog2-server#1280](#)
- New Syslog AMQP input. [Graylog2/graylog2-server#1280](#)
- Updated bundled Elasticsearch to 1.7.1.
- The fields in configuration dialogs for inputs and outputs are now ordered. [Graylog2/graylog2-server#1282](#)
- Allow server startup without working Elasticsearch cluster. [Graylog2/graylog2-server#1136](#), [Graylog2/graylog2-server#1289](#)
- Added OR operator to stream matching. [Graylog2/graylog2-server#1292](#), [Graylog2/graylog2-web#1552](#)
- New stream router engine with better stream matching performance. [Graylog2/graylog2-server#1305](#), [Graylog2/graylog2-server#1309](#)
- Grok pattern import/export support for content packs. [Graylog2/graylog2-server#1300](#), [Graylog2/graylog2-web#1527](#)
- Added MessageListCodec interface for codec implementations that can decode multiple messages from one raw message. [Graylog2/graylog2-server#1307](#)
- Added keepalive configuration option for all TCP transports. [Graylog2/graylog2-server#1287](#), [Graylog2/graylog2-server#1318](#)
- Support for roles and LDAP groups. [Graylog2/graylog2-server#1321](#), [Graylog2/graylog2-server#951](#)

- Added timezone configuration option to date converter. [Graylog2/graylog2-server#1320](#), [Graylog2/graylog2-server#1324](#)
- Added alarmcallback history feature. [Graylog2/graylog2-server#1313](#), [Graylog2/graylog2-web#1537](#)
- Added more configuration options to GELF output. (TCP settings, TLS support) [Graylog2/graylog2-server#1337](#), [Graylog2/graylog2-server#979](#)
- Store timestamp and some other internal fields in Elasticsearch as doc values. Removed “elasticsearch_store_timestamps_as_doc_values” option from configuration file. [Graylog2/graylog2-server#1335](#), [Graylog2/graylog2-server#1342](#)
- Added TLS support for GELF HTTP input. [Graylog2/graylog2-server#1348](#)
- Added JSON extractor. [Graylog2/graylog2-server#632](#), [Graylog2/graylog2-server#1355](#), [Graylog2/graylog2-web#1555](#)
- Added support for TLS client certificate authentication to all TCP based inputs. [Graylog2/graylog2-server#1357](#), [Graylog2/graylog2-server#1363](#)
- Added stacked chart widget. [Graylog2/graylog2-server#1284](#), [Graylog2/graylog2-web#1513](#)
- Added cardinality option to field histograms. [Graylog2/graylog2-web#1529](#), [Graylog2/graylog2-server#1303](#)
- Lots of dashboard improvements. [Graylog2/graylog2-web#1550](#)
- Replaced Gulp with Webpack. [Graylog2/graylog2-web#1548](#)
- Updated to Play 2.3.10.

24.87 Graylog 1.1.6

Released: 2015-08-06

<https://www.graylog.org/graylog-1-1-6-released/>

- Fix edge case in `SyslogOctetCountFrameDecoder` which caused the Syslog TCP input to reset connections ([Graylog2/graylog2-server#1105](#), [Graylog2/graylog2-server#1339](#))
- Properly log errors in the Netty channel pipeline ([Graylog2/graylog2-server#1340](#))
- Prevent creation of invalid alert conditions ([Graylog2/graylog2-server#1332](#))
- Upgrade to [Elasticsearch 1.6.2](#)

24.88 Graylog 1.1.5

Released: 2015-07-27

<https://www.graylog.org/graylog-1-1-5-released/>

- Improve handling of exceptions in the `JournallingMessageHandler` ([Graylog2/graylog2-server#1286](#))
- Upgrade to [Elasticsearch 1.6.1](#) ([Graylog2/graylog2-server#1312](#))
- Remove hard-coded limit for UDP receive buffer size ([Graylog2/graylog2-server#1290](#))
- Ensure that `elasticsearch_index_prefix` is lowercase ([commit 2173225](#))
- Add configuration option for time zone to `Date` converter ([Graylog2/graylog2-server#1320](#))
- Fix NPE if the disk journal is disabled on a node ([Graylog2/graylog2-web-interface#1520](#))

- Statistic and Chart error: Adding time zone offset caused overflow (Graylog2/graylog2-server#1257)
- Ignore stream alerts and throughput on serialize (Graylog2/graylog2-server#1309)
- Fix dynamic keyword time-ranges for dashboard widgets created from content packs (Graylog2/graylog2-server#1308)
- Upgraded Anonymous Usage Statistics plugin to version 1.1.1

24.89 Graylog 1.1.4

Released: 2015-06-30

<https://www.graylog.org/graylog-v1-1-4-is-now-available/>

- Make heartbeat timeout option for AmqpTransport optional. Graylog2/graylog2-server#1010
- Export as CSV on stream fails with “Invalid range type provided.” Graylog2/graylog2-web-interface#1504

24.90 Graylog 1.1.3

Released: 2015-06-19

<https://www.graylog.org/graylog-v1-1-3-is-now-available/>

- Log error message early if there is a MongoDB connection error. Graylog2/graylog2-server#1249
- Fixed field content value alert condition. Graylog2/graylog2-server#1245
- Extend warning about SO_RCVBUF size to UDP inputs. Graylog2/graylog2-server#1243
- Scroll on button dropdowns. Graylog2/graylog2-web-interface#1477
- Normalize graph widget numbers before drawing them. Graylog2/graylog2-web-interface#1479
- Fix highlight result checkbox position on old Firefox. Graylog2/graylog2-web-interface#1440
- Unescape terms added to search bar. Graylog2/graylog2-web-interface#1484
- Load another message in edit extractor page not working. Graylog2/graylog2-web-interface#1488
- Reader users aren’t able to export search results as CSV. Graylog2/graylog2-web-interface#1492
- List of streams not loaded on message details page. Graylog2/graylog2-web-interface#1496

24.91 Graylog 1.1.2

Released: 2015-06-10

<https://www.graylog.org/graylog-v1-1-2-is-now-available/>

- Get rid of NoSuchElementException if index alias doesn’t exist. Graylog2/graylog2-server#1218
- Make Alarm Callbacks API compatible to Graylog 1.0.x again. Graylog2/graylog2-server#1221, Graylog2/graylog2-server#1222, Graylog2/graylog2-server#1224
- Fixed issues with natural language parser for keyword time range. Graylog2/graylog2-server#1226
- Unable to write Graylog metrics to MongoDB Graylog2/graylog2-server#1228

- Unable to delete user. [Graylog2/graylog2-server#1209](#)
- Unable to unpause streams, despite editing permissions. [Graylog2/graylog2-web-interface#1456](#)
- Choose quick values widget size dynamically. [Graylog2/graylog2-web-interface#1422](#)
- Default field sort order is not guaranteed after reload. [Graylog2/graylog2-web-interface#1436](#)
- Toggling all fields in search list throws error and breaks pagination. [Graylog2/graylog2-web-interface#1434](#)
- Improve multi-line log messages support. [Graylog2/graylog2-web-interface#612](#)
- NPE when clicking a message from a deleted input on a stopped node. [Graylog2/graylog2-web-interface#1444](#)
- Auto created search syntax must use quotes for values with whitespaces in them. [Graylog2/graylog2-web-interface#1448](#)
- Quick Values doesn't update for new field. [Graylog2/graylog2-web-interface#1438](#)
- New Quick Values list too large. [Graylog2/graylog2-web-interface#1442](#)
- Unloading referenced alarm callback plugin breaks alarm callback listing. [Graylog2/graylog2-web-interface#1450](#)
- Add to search button doesn't work as expected for "level" field. [Graylog2/graylog2-web-interface#1453](#)
- Treat "*" query as empty query. [Graylog2/graylog2-web-interface#1420](#)
- Improve title overflow on widgets. [Graylog2/graylog2-web-interface#1430](#)
- Convert NaN to 0 on histograms. [Graylog2/graylog2-web-interface#1417](#)
- "<>" values in fields are unescaped and don't display in Quick Values. [Graylog2/graylog2-web-interface#1455](#)
- New quickvalues are not showing number of terms. [Graylog2/graylog2-web-interface#1411](#)
- Default index for split & index extractor results in an error. [Graylog2/graylog2-web-interface#1464](#)
- Improve behaviour when field graph fails to load. [Graylog2/graylog2-web-interface#1276](#)
- Unable to unpause streams, despite editing permissions. [Graylog2/graylog2-web-interface#1456](#)
- Wrong initial size of quick values pie chart. [Graylog2/graylog2-web-interface#1469](#)
- Problems refreshing data on quick values pie chart. [Graylog2/graylog2-web-interface#1470](#)
- Ignore streams with no permissions on message details. [Graylog2/graylog2-web-interface#1472](#)

24.92 Graylog 1.1.1

Released: 2015-06-05

<https://www.graylog.org/graylog-v1-1-1-is-now-available/>

- Fix problem with missing alarmcallbacks. [Graylog2/graylog2-server#1214](#)
- Add additional newline between messages to alert email. [Graylog2/graylog2-server#1216](#)
- Fix incorrect index range calculation. [Graylog2/graylog2-server#1217](#), [Graylog2/graylog2-web-interface#1266](#)
- Fix sidebar auto-height on old Firefox versions. [Graylog2/graylog2-web-interface#1410](#)
- Fix "create one now" link on stream list page. [Graylog2/graylog2-web-interface#1424](#)
- Do not update StreamThroughput when unmounted. [Graylog2/graylog2-web-interface#1428](#)

- Fix position of alert annotations in search result histogram. [Graylog2/graylog2-web-interface#1421](#)
- Fix NPE when searching. [Graylog2/graylog2-web-interface#1212](#)
- Hide unlock dashboard link for reader users. [Graylog2/graylog2-web-interface#1429](#)
- Open radio documentation link on a new window. [Graylog2/graylog2-web-interface#1427](#)
- Use radio node page on message details. [Graylog2/graylog2-web-interface#1423](#)

24.93 Graylog 1.1.0

Released: 2015-06-04

<https://www.graylog.org/graylog-1-1-is-now-generally-available/>

- Properly set `node_id` on message input [Graylog2/graylog2-server#1210](#)
- Fixed handling of booleans in configuration forms in the web interface
- Various design fixes in the web interface

24.94 Graylog 1.1.0-rc.3

Released: 2015-06-02

<https://www.graylog.org/graylog-v1-1-rc3-is-now-available/>

- Unbreak server startup with collector thresholds set. [Graylog2/graylog2-server#1194](#)
- Adding verbal alert description to alert email templates and subject line defaults. [Graylog2/graylog2-server#1158](#)
- Fix message backlog in default body template in `FormattedEmailAlertSender`. [Graylog2/graylog2-server#1163](#)
- Make `RawMessageEvent`'s fields volatile to guard against cross-cpu visibility issues. [Graylog2/graylog2-server#1207](#)
- Set default for “`disable_index_range_calculation`” to “`true`”.
- Passing in value to text area fields in configuration forms. [Graylog2/graylog2-web-interface#1340](#)
- Stream list has no loading spinner. [Graylog2/graylog2-web-interface#1309](#)
- Showing a helpful notification when there are no active/inactive collectors. [Graylog2/graylog2-web-interface#1302](#)
- Improve behavior when field graphs are stacked. [Graylog2/graylog2-web-interface#1348](#)
- Keep new lines added by users on alert callbacks. [Graylog2/graylog2-web-interface#1270](#)
- Fix duplicate metrics reporting if two components subscribed to the same metric on the same page. [Graylog2/graylog2-server#1199](#)
- Make sidebar visible on small screens. [Graylog2/graylog2-web-interface#1390](#)
- Showing warning and disabling edit button for output if plugin is missing. [Graylog2/graylog2-web-interface#1185](#)
- Using formatted fields in old message loader. [Graylog2/graylog2-web-interface#1393](#)
- Several styling and UX improvements

24.95 Graylog 1.1.0-rc.1

Released: 2015-05-27

<https://www.graylog.org/graylog-v1-1-rc1-is-now-available/>

- Unable to send email alerts. [Graylog2/graylog2-web-interface#1346](#)
- “Show messages from this collector view” displays no messages. [Graylog2/graylog2-web-interface#1334](#)
- Exception error in search page when using escaped characters. [Graylog2/graylog2-web-interface#1356](#)
- Wrong timestamp on stream rule editor. [Graylog2/graylog2-web-interface#1328](#)
- Quickvalue values are not linked to update search query. [Graylog2/graylog2-web-interface#1296](#)
- Stream list has no loading spinner. [Graylog2/graylog2-web-interface#1309](#)
- Collector list with only inactive collectors is confusing. [Graylog2/graylog2-web-interface#1302](#)
- Update sockjs-client to 1.0.0. [Graylog2/graylog2-web-interface#1344](#)
- Scroll to search bar when new query term is added. [Graylog2/graylog2-web-interface#1284](#)
- Scroll to quick values if not visible. [Graylog2/graylog2-web-interface#1284](#)
- Scroll to newly created field graphs. [Graylog2/graylog2-web-interface#1284](#)
- Problems with websockets and even xhr streaming. [Graylog2/graylog2-web-interface#1344](#), [Graylog2/graylog2-web-interface#1353](#), [Graylog2/graylog2-web-interface#1338](#), [Graylog2/graylog2-web-interface#1322](#)
- Add to search bar not working on sources tab. [Graylog2/graylog2-web-interface#1350](#)
- Make field graphs work with streams. [Graylog2/graylog2-web-interface#1352](#)
- Improved page design on outputs page. [Graylog2/graylog2-web-interface#1236](#)
- Set startpage button missing for dashboards. [Graylog2/graylog2-web-interface#1345](#)
- Generating chart for http response code is broken. [Graylog2/graylog2-web-interface#1358](#)

24.96 Graylog 1.1.0-beta.3

Released: 2015-05-27

<https://www.graylog.org/graylog-1-1-beta-3-is-now-available/>

- Kafka inputs now support syslog, GELF and raw messages [Graylog2/graylog2-server#322](#)
- Configurable timezone for the flexdate converter in extractors. [Graylog2/graylog2-server#1166](#)
- Allow decimal values for greater/smaller stream rules. [Graylog2/graylog2-server#1101](#)
- New configuration file option to control the default widget cache time. [Graylog2/graylog2-server#1170](#)
- Expose heartbeat configuration for AMQP inputs. [Graylog2/graylog2-server#1010](#)
- New alert condition to alert on field content. [Graylog2/graylog2-server#537](#)
- Add `Dwebsockets.enabled=false` option for the web interface to disable websockets. [Graylog2/graylog2-web-interface#1322](#)
- Clicking the Graylog logo redirects to the custom startpage now. [Graylog2/graylog2-web-interface#1315](#)
- Improved reset and filter feature in sources tab. [Graylog2/graylog2-web-interface#1337](#)

- Fixed issue with stopping Kafka based inputs. [Graylog2/graylog2-server#1171](#)
- System throughput resource was always returning 0. [Graylog2/graylog2-web-interface#1313](#)
- MongoDB configuration problem with replica sets. [Graylog2/graylog2-server#1173](#)
- Syslog parser did not strip empty structured data fields. [Graylog2/graylog2-server#1161](#)
- Input metrics did not update after input has been stopped and started again. [Graylog2/graylog2-server#1187](#)
- NullPointerException with existing inputs in database fixed. [Graylog2/graylog2-web-interface#1312](#)
- Improved browser input validation for several browsers. [Graylog2/graylog2-web-interface#1318](#)
- Grok pattern upload did not work correctly. [Graylog2/graylog2-web-interface#1321](#)
- Internet Explorer 9 fixes. [Graylog2/graylog2-web-interface#1319](#), [Graylog2/graylog2-web-interface#1320](#)
- Quick values feature did not work with reader users. [Graylog2/graylog2-server#1169](#)
- Replay link for keyword widgets was broken. [Graylog2/graylog2-web-interface#1323](#)
- Provide visual feedback when expanding message details. [Graylog2/graylog2-web-interface#1283](#)
- Allow filtering of saved searches again. [Graylog2/graylog2-web-interface#1277](#)
- Add back “Show details” link for global input metrics. [Graylog2/graylog2-server#1168](#)
- Provide visual feedback when dashboard widgets are loading. [Graylog2/graylog2-web-interface#1324](#)
- Restore preview for keyword time range selector. [Graylog2/graylog2-web-interface#1280](#)
- Fixed issue where widgets loading data looked empty. [Graylog2/graylog2-web-interface#1324](#)

24.97 Graylog 1.1.0-beta.2

Released: 2015-05-20

<https://www.graylog.org/graylog-1-1-beta-is-now-available/>

- CSV output streaming support including full text message
- Simplified MongoDB configuration with URI support
- Improved tokenizer for extractors
- Configurable UDP buffer size for incoming messages
- Enhanced Grok support with type conversions (integers, doubles and dates)
- Elasticsearch 1.5.2 support
- Added support for integrated Log Collector
- Search auto-complete
- Manual widget resize
- Auto resize of widgets based on screen size
- Faster search results
- Moved search filter for usability
- Updated several icons to text boxes for usability
- Search highlight toggle

- Pie charts (Stacked charts are coming too!)
- Improved stream management
- Output plugin and Alarm callback edit support
- Dashboard widget search edit
- Dashboard widget direct search button
- Dashboard background update support for better performance
- Log collector status UI

24.98 Graylog 1.0.2

Released: 2015-04-28

<https://www.graylog.org/graylog-v1-0-2-has-been-released/>

- Regular expression and Grok test failed when example message is a JSON document or contains special characters (Graylog2/graylog2-web-interface#1190, Graylog2/graylog2-web-interface#1195)
- “Show message terms” was broken (Graylog2/graylog2-web-interface#1168)
- Showing message indices was broken (Graylog2/graylog2-web-interface#1211)
- Fixed typo in SetIndexReadOnlyJob (Graylog2/graylog2-web-interface#1206)
- Consistent error messages when trying to create graphs from non-numeric values (Graylog2/graylog2-web-interface#1210)
- Fix message about too few file descriptors for Elasticsearch when number of file descriptors is unlimited (Graylog2/graylog2-web-interface#1220)
- Deleting output globally which was assigned to multiple streams left stale references (Graylog2/graylog2-server#1113)
- Fixed problem with sending alert emails (Graylog2/graylog2-server#1086)
- TokenizerConverter can now handle mixed quoted and un-quoted k/v pairs (Graylog2/graylog2-server#1083)

24.99 Graylog 1.0.1

Released: 2015-03-16

<https://www.graylog.org/graylog-v1-0-1-has-been-released/>

- Properly log stack traces (Graylog2/graylog2-server#970)
- Update REST API browser to new Graylog logo
- Avoid spamming the logs if the original input of a message in the disk journal can't be loaded (Graylog2/graylog2-server#1005)
- Allows reader users to see the journal status (Graylog2/graylog2-server#1009)
- Compatibility with MongoDB 3.0 and Wired Tiger storage engine (Graylog2/graylog2-server#1024)
- Respect `rest_transport_uri` when generating entity URLs in REST API (Graylog2/graylog2-server#1020)
- Properly map `NodeNotFoundException` (Graylog2/graylog2-web-interface#1137)

- Allow replacing all existing Grok patterns on bulk import (Graylog2/graylog2-web-interface#1150)
- Configuration option for discarding messages on error in AMQP inputs (Graylog2/graylog2-server#1018)
- Configuration option of maximum HTTP chunk size for HTTP-based inputs (Graylog2/graylog2-server#1011)
- Clone alarm callbacks when cloning a stream (Graylog2/graylog2-server#990)
- Add `hasField()` and `getField()` methods to `MessageSummary` class (Graylog2/graylog2-server#923)
- Add per input parse time metrics (Graylog2/graylog2-web-interface#1106)
- Allow the use of <https://logging.apache.org/log4j/extras/> log4j-extras classes in log4j configuration (Graylog2/graylog2-server#1042)
- Fix updating of input statistics for Radio nodes (Graylog2/graylog2-web-interface#1022)
- Emit proper error message when a regular expression in an Extractor doesn't match example message (Graylog2/graylog2-web-interface#1157)
- Add additional information to system jobs (Graylog2/graylog2-server#920)
- Fix false positive message on LDAP login test (Graylog2/graylog2-web-interface#1138)
- Calculate saved search resolution dynamically (Graylog2/graylog2-web-interface#943)
- Only enable LDAP test buttons when data is present (Graylog2/graylog2-web-interface#1097)
- Load more than 1 message on Extractor form (Graylog2/graylog2-web-interface#1105)
- Fix NPE when listing alarm callback using non-existent plugin (Graylog2/graylog2-web-interface#1152)
- Redirect to nodes overview when node is not found (Graylog2/graylog2-web-interface#1137)
- Fix documentation links to integrations and data sources (Graylog2/graylog2-web-interface#1136)
- Prevent accidental indexing of web interface by web crawlers (Graylog2/graylog2-web-interface#1151)
- Validate grok pattern name on the client to avoid duplicate names (Graylog2/graylog2-server#937)
- Add message journal usage to nodes overview page (Graylog2/graylog2-web-interface#1083)
- Properly format numbers according to locale (Graylog2/graylog2-web-interface#1128, Graylog2/graylog2-web-interface#1129)

24.100 Graylog 1.0.0

Released: 2015-02-19

<https://www.graylog.org/announcing-graylog-v1-0-ga/>

- No changes since Graylog 1.0.0-rc.4

24.101 Graylog 1.0.0-rc.4

Released: 2015-02-13

<https://www.graylog.org/graylog-v1-0-rc-4-has-been-released/>

- Default configuration file locations have changed. [Graylog2/graylog2-server#950](#)
- Improved error handling on search errors. [Graylog2/graylog2-server#954](#)
- Dynamically update dashboard widgets with keyword range. [Graylog2/graylog2-server#956](#), [Graylog2/graylog2-web-interface#958](#)
- Prevent duplicate loading of plugins. [Graylog2/graylog2-server#948](#)
- Fixed password handling when editing inputs. [Graylog2/graylog2-web-interface#1103](#)
- Fixed issues getting Elasticsearch cluster health. [Graylog2/graylog2-server#953](#)
- Better error handling for extractor imports. [Graylog2/graylog2-server#942](#)
- Fixed structured syslog parsing of keys containing special characters. [Graylog2/graylog2-server#845](#)
- Improved layout on Grok patterns page. [Graylog2/graylog2-web-interface#1109](#)
- Improved formatting large numbers. [Graylog2/graylog2-web-interface#1111](#)
- New Graylog logo.

24.102 Graylog 1.0.0-rc.3

Released: 2015-02-05

<https://www.graylog.org/graylog-v1-0-rc-3-has-been-released/>

- Fixed compatibility with MongoDB version 2.2. [Graylog2/graylog2-server#941](#)
- Fixed performance regression in process buffer handling. [Graylog2/graylog2-server#944](#)
- Fixed data type for the `max_size_per_index` config option value. [Graylog2/graylog2-web-interface#1100](#)
- Fixed problem with indexer error page. [Graylog2/graylog2-web-interface#1102](#)

24.103 Graylog 1.0.0-rc.2

Released: 2015-02-04

<https://www.graylog.org/graylog-v1-0-rc-2-has-been-released/>

- Better Windows compatibility. [Graylog2/graylog2-server#930](#)
- Added helper methods for the plugin API to simplify plugin development.
- Fixed problem with input removal on radio nodes. [Graylog2/graylog2-server#932](#)
- Improved buffer information for input, process and output buffers. [Graylog2/graylog2-web-interface#1096](#)
- Fixed API return value incompatibility regarding node objects. [Graylog2/graylog2-server#933](#)
- Fixed reloading of LDAP settings. [Graylog2/graylog2-server#934](#)
- Fixed ordering of message input state labels. [Graylog2/graylog2-web-interface#1094](#)

- Improved error messages for journal related errors. [Graylog2/graylog2-server#931](#)
- Fixed browser compatibility for stream rules form. [Graylog2/graylog2-web-interface#1095](#)
- Improved grok pattern management. [Graylog2/graylog2-web-interface#1099](#), [Graylog2/graylog2-web-interface#1098](#)

24.104 Graylog 1.0.0-rc.1

Released: 2015-01-28

<https://www.graylog.org/graylog-v1-0-rc-1-has-been-released/>

- Cleaned up internal metrics when input is terminating. [Graylog2/graylog2-server#915](#)
- Added Telemetry plugin options to example graylog.conf. [Graylog2/graylog2-server#914](#)
- Fixed problems with user permissions on streams. [Graylog2/graylog2-web-interface#1058](#)
- Added information about different rotation strategies to REST API. [Graylog2/graylog2-server#913](#)
- Added better error messages for failing inputs. [Graylog2/graylog2-web-interface#1056](#)
- Fixed problem with JVM options in bin/radioctrl script. [Graylog2/graylog2-server#918](#)
- Fixed issue with updating input configuration. [Graylog2/graylog2-server#919](#)
- Fixed password updating for reader users by the admin. [Graylog2/graylog2-web-interface#1075](#)
- Enabled the message_journal_enabled config option by default. [Graylog2/graylog2-server#924](#)
- Add REST API endpoint to list reopened indices. [Graylog2/graylog2-web-interface#1072](#)
- Fixed problem with GELF stream output. [Graylog2/graylog2-server#921](#)
- Show an error message on the indices page if the Elasticsearch cluster is not available. [Graylog2/graylog2-web-interface#1070](#)
- Fixed a problem with stopping inputs. [Graylog2/graylog2-server#926](#)
- Changed output configuration display to mask passwords. [Graylog2/graylog2-web-interface#1066](#)
- Disabled message journal on radio nodes. [Graylog2/graylog2-server#927](#)
- Create new message representation format for search results in alarm callback messages. [Graylog2/graylog2-server#923](#)
- Fixed stream router to update the stream engine if a stream has been changed. [Graylog2/graylog2-server#922](#)
- Fixed focus problem in stream rule modal windows. [Graylog2/graylog2-web-interface#1063](#)
- Do not show new dashboard link for reader users. [Graylog2/graylog2-web-interface#1057](#)
- Do not show stream output menu for reader users. [Graylog2/graylog2-web-interface#1059](#)
- Do not show user forms of other users for reader users. [Graylog2/graylog2-web-interface#1064](#)
- Do not show permission settings in the user profile for reader users. [Graylog2/graylog2-web-interface#1055](#)
- Fixed extractor edit form with no messages available. [Graylog2/graylog2-web-interface#1061](#)
- Fixed problem with node details page and JVM locale settings. [Graylog2/graylog2-web-interface#1062](#)
- Improved page layout for Grok patterns.
- Improved layout for the message journal information. [Graylog2/graylog2-web-interface#1084](#), [Graylog2/graylog2-web-interface#1085](#)

- Fixed wording on radio inputs page. [Graylog2/graylog2-web-interface#1077](#)
- Fixed formatting on indices page. [Graylog2/graylog2-web-interface#1086](#)
- Improved error handling in stream rule form. [Graylog2/graylog2-web-interface#1076](#)
- Fixed time range selection problem for the sources page. [Graylog2/graylog2-web-interface#1080](#)
- Several improvements regarding permission checks for user creation. [Graylog2/graylog2-web-interface#1088](#)
- Do not show stream alert test button for reader users. [Graylog2/graylog2-web-interface#1089](#)
- Fixed node processing status not updating on the nodes page. [Graylog2/graylog2-web-interface#1090](#)
- Fixed filename handling on Windows. [Graylog2/graylog2-server#928](#), [Graylog2/graylog2-server#732](#)

24.105 Graylog 1.0.0-beta.2

Released: 2015-01-21

<https://www.graylog.org/graylog-v1-0-beta-3-has-been-released/>

- Fixed stream alert creation. [Graylog2/graylog2-server#891](#)
- Suppress warning message when PID file doesn't exist. [Graylog2/graylog2-server#889](#)
- Fixed an error on outputs page with missing output plugin. [Graylog2/graylog2-server#894](#)
- Change default heap and garbage collector settings in scripts.
- Add extractor information to log message about failing extractor.
- Fixed problem in SplitAndIndexExtractor. [Graylog2/graylog2-server#896](#)
- Improved rendering time for indices page. [Graylog2/graylog2-web-interface#1060](#)
- Allow user to edit its own preferences. [Graylog2/graylog2-web-interface#1049](#)
- Fixed updating stream attributes. [Graylog2/graylog2-server#902](#)
- Stream throughput now shows combined value over all nodes. [Graylog2/graylog2-web-interface#1047](#)
- Fixed resource leak in JVM PermGen memory. [Graylog2/graylog2-server#907](#)
- Update to gelfclient-1.1.0 to fix DNS resolving issue. [Graylog2/graylog2-server#882](#)
- Allow arbitrary characters in user names (in fact in any resource url). [Graylog2/graylog2-web-interface#1005](#), [Graylog2/graylog2-web-interface#1006](#)
- Fixed search result CSV export. [Graylog2/graylog2-server#901](#)
- Skip GC collection notifications for parallel collector. [Graylog2/graylog2-server#899](#)
- Shorter reconnect timeout for Radio AMQP connections. [Graylog2/graylog2-server#900](#)
- Fixed random startup error in Radio. [Graylog2/graylog2-server#911](#)
- Fixed updating an alert condition. [Graylog2/graylog2-server#912](#)
- Add system notifications for journal related warnings. [Graylog2/graylog2-server#897](#)
- Add system notifications for failing outputs. [Graylog2/graylog2-server#741](#)
- Improve search result pagination. [Graylog2/graylog2-web-interface#834](#)
- Improved regex error handling in extractor testing. [Graylog2/graylog2-web-interface#1044](#)
- Wrap long names for node metrics. [Graylog2/graylog2-web-interface#1028](#)

- Fixed node information progress bars. [Graylog2/graylog2-web-interface#1046](#)
- Improve node buffer utilization readability. [Graylog2/graylog2-web-interface#1046](#)
- Fixed username alert receiver form field. [Graylog2/graylog2-web-interface#1050](#)
- Wrap long messages without break characters. [Graylog2/graylog2-web-interface#1052](#)
- Hide list of node plugins if there aren't any plugins installed.
- Warn user before leaving page with unpinned graphs. [Graylog2/graylog2-web-interface#808](#)

24.106 Graylog 1.0.0-beta.2

Released: 2015-01-16

<https://www.graylog.org/graylog-v1-0-0-beta2/>

- SIGAR native libraries are now found correctly (for getting system information)
- plugins can now state if they want to run in server or radio
- Fixed LDAP settings testing. [Graylog2/graylog2-web-interface#1026](#)
- Improved RFC5425 syslog message parsing. [Graylog2/graylog2-server#845](#)
- JVM arguments are now being logged on start. [Graylog2/graylog2-server#875](#)
- Improvements to log messages when Elasticsearch connection fails during start.
- Fixed an issue with AMQP transport shutdown. [Graylog2/graylog2-server#874](#)
- After index cycling the System overview page could be broken. [Graylog2/graylog2-server#880](#)
- Extractors can now be edited. [Graylog2/graylog2-web-interface#549](#)
- Fixed saving user preferences. [Graylog2/graylog2-web-interface#1027](#)
- Scripts now return proper exit codes. [Graylog2/graylog2-server#886](#)
- Grok patterns can now be uploaded in bulk. [Graylog2/graylog2-server#377](#)
- During extractor creation the test display could be offset. [Graylog2/graylog2-server#804](#)
- Performance fix for the System/Indices page. [Graylog2/graylog2-web-interface#1035](#)
- A create dashboard link was shown to reader users, leading to an error when followed. [Graylog2/graylog2-web-interface#1032](#)
- Content pack section was shown to reader users, leading to an error when followed. [Graylog2/graylog2-web-interface#1033](#)
- Failing stream outputs were being restarted constantly. [Graylog2/graylog2-server#741](#)

24.107 Graylog2 0.92.4

Released: 2015-01-14

<https://www.graylog.org/graylog2-v0-92-4/>

- [SERVER] Ensure that Radio inputs can only be started on server nodes (Graylog2/graylog2-server#843)
- [SERVER] Avoid division by zero when finding rotation anchor in the time-based rotation strategy (Graylog2/graylog2-server#836)
- [SERVER] Use username as fallback if display name in LDAP is empty (Graylog2/graylog2-server#837)

24.108 Graylog 1.0.0-beta.1

Released: 2015-01-12

<https://www.graylog.org/graylog-v1-0-0-beta1/>

- Message Journaling
- New Widgets
- Grok Extractor Support
- Overall stability and resource efficiency improvements
- Single binary for `graylog2-server` and `graylog2-radio`
- Inputs are now editable
- Order of field charts rendered inside the search results page is now maintained.
- Improvements in focus and keyboard behaviour on modal windows and forms.
- You can now define whether to disable expensive, frequent real-time updates of the UI in the settings of each user. (For example the updating of total messages in the system)
- Experimental search query auto-completion that can be enabled in the user preferences.
- The API browser now documents server response payloads in a better way so you know what to expect as an answer to your call.
- Now using the standard Java ServiceLoader for plugins.

24.109 Graylog2 0.92.3

Released: 2014-12-23

<https://www.graylog.org/graylog2-v0-92-3/>

- [SERVER] Removed unnecessary instrumentation in certain places to reduce GC pressure caused by many short living objects (Graylog2/graylog2-server#800)
- [SERVER] Limit Netty worker thread pool to 16 threads by default (see `rest_worker_threads_max_pool_size` in `graylog2.conf`)
- [WEB] Fixed upload of content packs when a URI path prefix (`application.context` in `graylog2-web-interface.conf`) is being used (Graylog2/graylog2-web-interface#1009)
- [WEB] Fixed display of metrics of type Counter (Graylog2/graylog2-server#795)

24.110 Graylog2 0.92.1

Released: 2014-12-11

<https://www.graylog.org/graylog2-v0-92-1/>

- [SERVER] Fixed name resolution and overriding sources for network inputs.
- [SERVER] Fixed wrong delimiter in GELF TCP input.
- [SERVER] Disabled the output cache by default. The output cache is the source of all sorts of interesting problems. If you want to keep using it, please read the upgrade notes.
- [SERVER] Fixed message timestamps in GELF output.
- [SERVER] Fixed connection counter for network inputs.
- [SERVER] Added warning message if the receive buffer size (SO_RECV) couldn't be set for network inputs.
- [WEB] Improved keyboard shortcuts with most modal dialogs (e. g. hitting Enter submits the form instead of just closing the dialogs).
- [WEB] Upgraded to play2-graylog2 1.2.1 (compatible with Play 2.3.x and Java 7).

24.111 Graylog2 0.92.0

Released: 2014-12-01

<https://www.graylog.org/graylog2-v0-92/>

- [SERVER] IMPORTANT SECURITY FIX: It was possible to perform LDAP logins with crafted wildcards. (A big thank you to Jose Tozo who discovered this issue and disclosed it very responsibly.)
- [SERVER] Generate a system notification if garbage collection takes longer than a configurable threshold.
- [SERVER] Added several JVM-related metrics.
- [SERVER] Added support for Elasticsearch 1.4.x which brings a lot of stability and resilience features to Elasticsearch clusters.
- [SERVER] Made version check of Elasticsearch version optional. Disabling this check is not recommended.
- [SERVER] Added an option to disable optimizing Elasticsearch indices on index cycling.
- [SERVER] Added an option to disable time-range calculation for indices on index cycling.
- [SERVER] Lots of other performance enhancements for large setups (i.e. involving several Radio nodes and multiple Graylog2 Servers).
- [SERVER] Support for Syslog Octet Counting, as used by syslog-ng for syslog via TCP (#743)
- [SERVER] Improved support for structured syslog messages (#744)
- [SERVER] Bug fixes regarding IPv6 literals in mongodb_replica_set and elastic-search_discovery_zen_ping_unicast_hosts
- [WEB] Added additional details to system notification about Elasticsearch max. open file descriptors.
- [WEB] Fixed several bugs and inconsistencies regarding time zones.
- [WEB] Improved graphs and diagrams
- [WEB] Allow to update dashboards when browser window is not on focus (#738)
- [WEB] Bug fixes regarding timezone handling

- Numerous internal bug fixes

24.112 Graylog2 0.92.0-rc.1

Released: 2014-11-21

<https://www.graylog.org/graylog2-v0-92-rc-1/>

- [SERVER] Generate a system notification if garbage collection takes longer than a configurable threshold.
- [SERVER] Added several JVM-related metrics.
- [SERVER] Added support for Elasticsearch 1.4.x which brings a lot of stability and resilience features to Elasticsearch clusters.
- [SERVER] Made version check of Elasticsearch version optional. Disabling this check is not recommended.
- [SERVER] Added an option to disable optimizing Elasticsearch indices on index cycling.
- [SERVER] Added an option to disable time-range calculation for indices on index cycling.
- [SERVER] Lots of other performance enhancements for large setups (i. e. involving several Radio nodes and multiple Graylog2 Servers).
- [WEB] Upgraded to Play 2.3.6.
- [WEB] Added additional details to system notification about Elasticsearch max. open file descriptors.
- [WEB] Fixed several bugs and inconsistencies regarding time zones.
- Numerous internal bug fixes

24.113 Graylog2 0.91.3

Released: 2014-11-05

<https://www.graylog.org/graylog2-v0-90-3-and-v0-91-3-has-been-released/>

- Fixed date and time issues related to DST changes
- Requires Elasticsearch 1.3.4; Elasticsearch 1.3.2 had a bug that can cause index corruptions.
- The `mongodb_replica_set` configuration variable now supports IPv6
- Messages read from the on-disk caches could be stored with missing fields

24.114 Graylog2 0.91.3

Released: 2014-11-05

<https://www.graylog.org/graylog2-v0-90-3-and-v0-91-3-has-been-released/>

- Fixed date and time issues related to DST changes
- The `mongodb_replica_set` configuration variable now supports IPv6
- Messages read from the on-disk caches could be stored with missing fields

24.115 Graylog2 0.92.0-beta.1

Released: 2014-11-05

<https://www.graylog.org/graylog2-v0-92-beta-1/>

- Content packs
- [SERVER] SSL/TLS support for Graylog2 REST API
- [SERVER] Support for time based retention cleaning of your messages. The old message count based approach is still the default.
- [SERVER] Support for Syslog Octet Counting, as used by syslog-ng for syslog via TCP ([Graylog2/graylog2-server#743](#))
- [SERVER] Improved support for structured syslog messages ([Graylog2/graylog2-server#744](#))
- [SERVER] Bug fixes regarding IPv6 literals in `mongodb_replica_set` and `elasticsearch_discovery_zen_ping_unicast_hosts`
- [WEB] Revamped “Sources” page in the web interface
- [WEB] Improved graphs and diagrams
- [WEB] Allow to update dashboards when browser window is not on focus ([Graylog2/graylog2-web-interface#738](#))
- [WEB] Bug fixes regarding timezone handling
- Numerous internal bug fixes

24.116 Graylog2 0.91.1

Released: 2014-10-17

<https://www.graylog.org/two-new-graylog2-releases/>

- Messages written to the persisted master caches were written to the system with unreadable timestamps, leading to
- errors when trying to open the message.
- Extractors were only being deleted from running inputs but not from all inputs
- Output plugins were not always properly loaded
- You can now configure the `alert_check_interval` in your `graylog2.conf`
- Parsing of configured Elasticsearch unicast discovery addresses could break when including spaces

24.117 Graylog2 0.90.1

Released: 2014-10-17

<https://www.graylog.org/two-new-graylog2-releases/>

- Messages written to the persisted master caches were written to the system with unreadable timestamps, leading to errors when trying to open the message.
- Extractors were only being deleted from running inputs but not from all inputs
- Output plugins were not always properly loaded
- You can now configure the `alert_check_interval` in your `graylog2.conf`
- Parsing of configured Elasticsearch unicast discovery addresses could break when including spaces

24.118 Graylog2 0.91.0-rc.1

Released: 2014-09-23

<https://www.graylog.org/graylog2-v0-90-has-been-released/>

- Optional Elasticsearch v1.3.2 support

24.119 Graylog2 0.90.0

Released: 2014-09-23

<https://www.graylog.org/graylog2-v0-90-has-been-released/>

- Real-time data forwarding to Splunk or other systems
- Alert callbacks for greater flexibility
- New disk-based architecture for buffering in load spike situations
- Improved graphing
- Plugin API
- Huge performance and stability improvements across the whole stack
- Small possibility of losing messages in certain scenarios has been fixed
- Improvements to internal logging from threads to avoid swallowing Graylog2 error messages
- Paused streams are no longer checked for alerts
- Several improvements to timezone handling
- JavaScript performance fixes in the web interface and especially a fixed memory leak of charts on dashboards
- The GELF HTTP input now supports CORS
- Stream matching now has a configurable timeout to avoid stalling message processing in case of too complex rules or erroneous regular expressions
- Stability improvements for Kafka and AMQP inputs
- Inputs can now be paused and resumed

- Dozens of bug fixes and other improvements

24.120 Graylog2 0.20.3

Released: 2014-08-09

<https://www.graylog.org/graylog2-v0-20-3-has-been-released/>

- Bugfix: Storing saved searches was not accounting custom application contexts
- Bugfix: Editing stream rules could have a wrong a pre-filled value
- Bugfix: The create dashboard link was shown even if the user has no permission to so. This caused an ugly error page because of the missing permissions.
- Bugfix: graylog2-radio could lose numeric fields when writing to the message broker
- Better default batch size values for the Elasticsearch output
- Improved `rest_transport_uri` default settings to avoid confusion with loopback interfaces
- The deflector index is now also using the configured index prefix

24.121 Graylog2 0.20.2

Released: 2014-05-24

<https://www.graylog.org/graylog2-v0-20-2-has-been-released/>

- Search result highlighting
- Reintroduces AMQP support
- Extractor improvements and sharing
- Graceful shutdowns, Lifecycles, Load Balancer integration
- Improved stream alert emails
- Alert annotations
- CSV exports via the REST API now support chunked transfers and avoid heap size problems with huge result sets
- Login now redirects to page you visited before if there was one
- More live updating information in node detail pages
- Empty dashboards no longer show lock/unlock buttons
- Global inputs now also show IO metrics
- You can now easily copy message IDs into native clipboard with one click
- Improved message field selection in the sidebar
- Fixed display of floating point numbers in several places
- Now supporting application contexts in the web interface like `http://example.org/graylog2`
- Several fixes for LDAP configuration form
- Message fields in the search result sidebar now survive pagination

- Only admin users are allowed to change the session timeout for reader users
- New extractor: Copy whole input
- New converters: uppercase/lowercase, flexdate (tries to parse any string as date)
- New stream rule to check for presence or absence of fields
- Message processing now supports trace logging
- Better error message for ES discovery problems
- Fixes to GELF HTTP input and it holding open connections
- Some timezone fixes
- CSV exports now only contain selected fields
- Improvements for bin/graylog* control scripts
- UDP inputs now allow for custom receive buffer sizes
- Numeric extractor converter now supports floating point values
- Bugfix: Several small fixes to system notifications and closing them
- Bugfix: Carriage returns were not escaped properly in CSV exports
- Bugfix: Some AJAX calls redirected to the startpage when they failed
- Bugfix: Wrong sorting in sources table
- Bugfix: Quickvalues widget was broken with very long values
- Bugfix: Quickvalues modal was positioned wrong in some cases
- Bugfix: Indexer failures list could break when you had a lot of failures
- Custom application prefix was not working for field chart analytics
- Bugfix: Memory leaks in the dashboards
- Bugfix: NullPointerException when Elasticsearch discovery failed and unicast discovery was disabled
- Message backlog in alert emails did not always include the correct number of messages
- Improvements for message outputs: No longer only waiting for filled buffers but also flushing them regularly. This avoids problems that make Graylog2 look like it misses messages in cheap benchmark scenarios combined with only little throughput.

INTRODUCTION

Graylog Enterprise is made of the combination of the open source core and several plugins that contribute functionality. This way someone coming from open source can add Enterprise simply by installing a new operating system package.

When the Graylog enterprise plugins and Graylog enterprise integrations plugin is installed the some additional features are added to Graylog. The following list should give a brief overview what is added to Graylog. All of this will only work with a valid enterprise license.

- *Archiving*
 - Archiving allows you to store the data to long term retention location, for an infinite amount of time. This can be local or removable media. This will allow most users to meet compliance regulation around data retention
- *Audit log*
 - Audit log enables Graylog to keep a record about changes done in-product, on all levels of users.
- *Reporting - Extension of Dashboards*
 - Take any of your current dashboard widgets, and put them into a scheduled report you can have delivered to your Inbox.
- **Search extensions**
 - *Parameter support* - placeholders in the query, which asks users for values to put into queries, without having to copy&paste queries themselves
- **Alerting extensions (basic Alerting is part of open source)**
 - Event Correlation
 - *Dynamic Lists* - allows Graylog to lookup values in lookup tables and use the result in the alert query field in the correlation rule. This feature is based on Search Parameters.
 - Cluster-wide scheduler - Open Source runs alerts on a single node only, Enterprise runs them on all Graylog nodes, increasing capacity.
 - *Script Notification* (Integrations) - ability to run a custom native program in response to a generated alert, useful for the integration of third-party systems.
- *MongoDB Lookup Table*
 - This allows settings values from pipelines, e.g. to maintain a list of suspicious IP addresses to be used in Dynamic Lists
- **Forwarding (Integrations)**
 - Cluster-to-cluster forwarder output - requires two fully functioning Graylog clusters. The forwarder adds the ability to forward specific data streams to remote locations with journaling support incase of outages.

- ***Output Framework (Integrations)***

- plugable solution to forward events from Graylog to any other system. Including advanced options to manipulate the events before hand over, formatted as syslog message, json or any way.

- **Inputs (Integrations)**

- *Okta Events Input* - get Okta events into Graylog
- *O365 Events Input* - get O365 events into Graylog

Please see the [Graylog Enterprise Page](#) for more details.

SETUP

Graylog Enterprise comes as a single package that includes Graylog Server and the following plugins:

- Enterprise plugin
- Integrations plugin
- Enterprise Integrations plugin

If you're already running an open source instance, you can *install these plugins separately* to convert it to an Enterprise instance.

26.1 Requirements

Warning: We caution you not to install or upgrade Elasticsearch to 7.11 and later! It is not supported. If you do so, it will break your instance!

Graylog Enterprise has the following prerequisites:

- Some modern Linux distribution (Debian Linux, Ubuntu Linux, or CentOS recommended)
- Elasticsearch 6.8, 7.7 up to 7.10
- MongoDB 3.6, 4.0 or 4.2
- Oracle Java SE 8 (OpenJDK 8 also works; latest stable update is recommended)

26.2 Installation

26.2.1 DEB / APT

For installation on apt-based systems (such as Debian or Ubuntu), run the following commands:

```
$ sudo apt-get install apt-transport-https
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update
$ sudo apt-get install graylog-enterprise
```

26.2.2 RPM / YUM / DNF

For installation on rpm-based systems (such as CentOS or Redhat), run the following commands:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
→latest.rpm
$ sudo yum install graylog-enterprise
```

26.2.3 Edit the Configuration File

Read the instructions *within* the configuration file and edit as needed. It is located at: `/etc/graylog/server/server.conf`. Additionally add `password_secret` and `root_password_sha2` as these are *mandatory* and **Graylog will not start without them**.

To create your `root_password_sha2` run the following command:

```
$ echo -n "Enter Password: " && head -1 </dev/stdin | tr -d '\n' | sha256sum | cut -d
→" " -f1
```

To be able to connect to Graylog you should set `http_bind_address` to the public host name or a public IP address of the machine you can connect to. More information about these settings can be found in [Configuring the web interface](#).

Note: If you're operating a single-node setup and would like to use HTTPS for the Graylog web interface and the Graylog REST API, it's possible to use [NGINX or Apache as a reverse proxy](#).

26.2.4 Starting Graylog

Graylog can be started with the following commands. Make sure to use the correct command for your operating system.

OS	Init System	Command
CentOS 6	SysV	<code>sudo service graylog-server start</code>
CentOS 7, 8	systemd	<code>sudo systemctl start graylog-server</code>
Debian 7	SysV	<code>sudo service graylog-server start</code>
Debian 8 & 9, Ubuntu 16.04, 18.04, 20.04	systemd	<code>sudo systemctl start graylog-server</code>

The packages are configured to **not** start any Graylog services during boot. You can use the following commands to start Graylog when the operating system is booting.

OS	Init Sys-tem	Command
CentOS 6	SysV	<code>sudo update-rc.d graylog-server defaults 95 10</code>
CentOS 7, 8	systemd	<code>sudo systemctl enable graylog-server</code>
Debian 7	SysV	<code>sudo update-rc.d graylog-server defaults 95 10</code>
Debian 8 & 9, Ubuntu 16.06, 18.04, 20.04	systemd	<code>sudo systemctl enable graylog-server</code>

26.3 Cluster Setup

If you run a Graylog cluster you need to add the enterprise plugins to every Graylog node. Additionally your load-balancer must route `/api/plugins/org.graylog.plugins.archive/` only to the Graylog master node. Future versions of Graylog will forward these requests automatically to the correct node.

26.4 Update Graylog Enterprise

26.4.1 Update Enterprise

If you've been using the repository package to install Graylog before, it has to be updated first. The new package will replace the repository URL, without which you will only be able to get bugfix releases of your previously installed version of Graylog.

The update basically works like a fresh installation. For apt-based systems, run the following commands:

```
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update
$ sudo apt-get install graylog-enterprise
```

For rpm-based systems, run the following commands:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
↪latest.rpm
$ sudo yum clean all
$ sudo yum install graylog-enterprise
```

Running `yum clean all` is required because YUM might use a stale cache and thus might be unable to find the latest version of the `graylog-enterprise` package.

26.4.2 Graylog OSS to Graylog Enterprise

If you have an existing Graylog open source instance, you can convert it to an Enterprise instance by installing the Graylog Enterprise plugin.

Once you've installed the Graylog Enterprise plugin, you need to obtain a license from [the Graylog Enterprise web page](#).

Important: The Graylog Enterprise plugin need to be installed on all your Graylog nodes!

DEB / RPM Package

The default installation should be done with the system package tools. It includes the repository installation that is described in the *Operating System Packages* installation guides.

When the usage of online repositories is not possible in your environment, you can download the Graylog Enterprise plugins at <https://packages.graylog2.org>.

Note: These packages can **only** be used when you installed Graylog via the *Operating System Packages*!

DEB

The installation on distributions like Debian or Ubuntu can be done with *apt-get* as installation tool from the previous installed online repository.

```
$ sudo apt-get install graylog-enterprise
```

RPM

The installation on distributions like CentOS or RedHat can be done with *yum* as installation tool from the previous installed online repository.

```
$ sudo yum install graylog-enterprise
```

Tarball

If you have done a manual installation, you can get the tarball from the download locations listed in the following table.

Table 1: Enterprise Plugins download

Enterprise Version	Download URL
4.0.0	https://downloads.graylog.org/releases/graylog-enterprise/graylog-enterprise-plugins-4.0.0.tgz
4.0.1	https://downloads.graylog.org/releases/graylog-enterprise/graylog-enterprise-plugins-4.0.1.tgz

The tarball includes the enterprise plugin JAR file and required binaries that need to be installed.

```
$ tar -tzf graylog-enterprise-plugins-4.0.1.tgz
graylog-enterprise-plugins-4.0.1/LICENSE
graylog-enterprise-plugins-4.0.1/plugin/graylog-plugin-enterprise-3.3.8.jar
graylog-enterprise-plugins-4.0.1/bin/headless_shell
graylog-enterprise-plugins-4.0.1/bin/chromedriver
graylog-enterprise-plugins-4.0.1/bin/chromedriver_start.sh
```

JAR file

Depending on the Graylog setup method you have used, you have to install the plugin into different locations.

Table 2: Plugin Installation Locations

Installation Method	Directory
<i>Operating System Packages</i>	/usr/share/graylog-server/plugin/
<i>Manual Setup</i>	/<extracted-graylog-tarball-path>/plugin/

Also check the `plugin_dir` config option in your Graylog server configuration file. The default might have been changed.

Make sure to install the enterprise plugin JAR files alongside the other Graylog plugins. Your plugin directory should look similar to this after installing the enterprise plugins.

```
plugin/
├── graylog-plugin-aws-4.0.1.jar
├── graylog-plugin-collector-4.0.1.jar
├── graylog-plugin-enterprise-4.0.1.jar
└── graylog-plugin-threatintel-4.0.1.jar
```

Binary files

Depending on the Graylog setup method you have used, you have to copy the binaries into different locations.

Table 3: Binaries Installation Locations

Installation Method	Directory
<i>Operating System Packages</i>	/usr/share/graylog-server/bin/
<i>Manual Setup</i>	/<extracted-graylog-tarball-path>/bin/

Make sure to check the `bin_dir` configuration option set in your Graylog server configuration file, as the default may have changed.

Server Restart

After you installed the Graylog Enterprise plugins you have to restart each of your Graylog servers to load the plugins.

Note: We recommend restarting one server at a time!

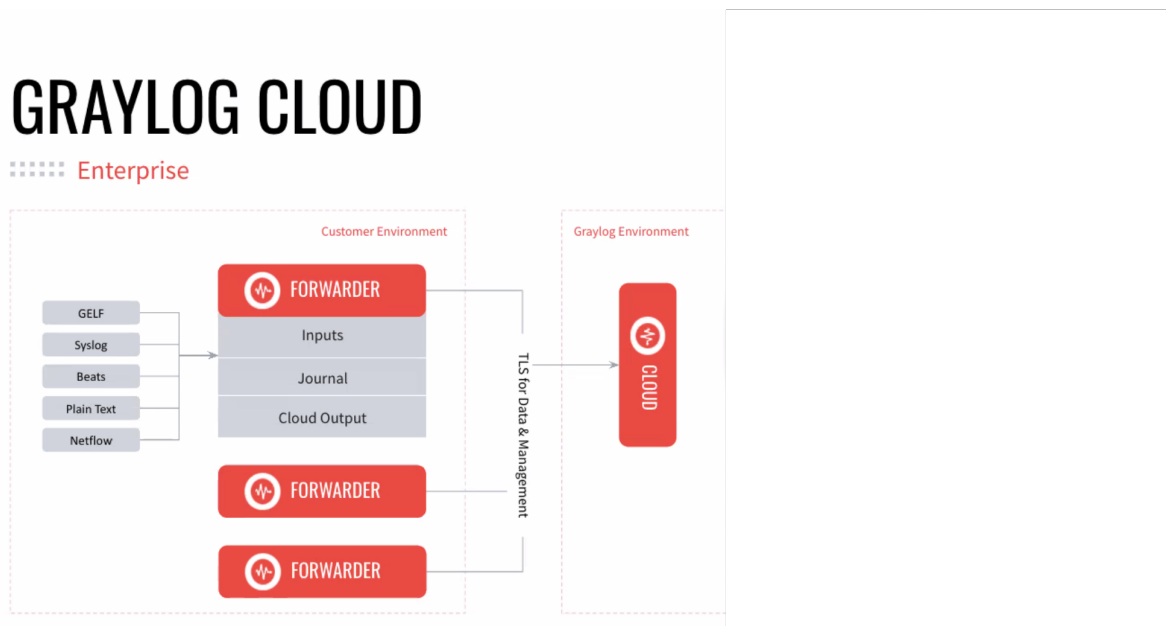
You should see something like the following in your Graylog server logs. It indicates that the plugins have been successfully loaded.

```
2017-12-18T17:39:10.797+01:00 INFO [CmdLineTool] Loaded plugin: AWS plugins 3.3.2
↳ [org.graylog.aws.plugin.AWSPlugin]
2017-12-18T17:39:10.809+01:00 INFO [CmdLineTool] Loaded plugin: Collector 3.3.2 [org.
↳ graylog.plugins.collector.CollectorPlugin]
2017-12-18T17:39:10.811+01:00 INFO [CmdLineTool] Loaded plugin: Enterprise
↳ Integration Plugin 3.3.2 [org.graylog.plugins.enterprise_integration.
↳ EnterpriseIntegrationPlugin]
2017-12-18T17:39:10.805+01:00 INFO [CmdLineTool] Loaded plugin: Graylog Enterprise 3.
↳ 3.2 [org.graylog.plugins.enterprise.EnterprisePlugin]
2017-12-18T17:39:10.827+01:00 INFO [CmdLineTool] Loaded plugin: Threat Intelligence
↳ Plugin 3.3.2 [org.graylog.plugins.threatintel.ThreatIntelPlugin]
```


CLOUD FORWARDER

27.1 Introduction

The Graylog Cloud Forwarder is the solution to get your data into Graylog Cloud. Graylog Cloud allows you to set up a connection so one or more Forwarders can send messages. Since it's hosted in the cloud you can run the Forwarder anywhere.



The Cloud Forwarder is not a one-and-done migration tool; therefore, it's an integral part of your cloud architecture. Your Forwarder must run 24-7 in your environment in order to send data to Graylog Cloud.

27.2 Security

The Forwarder connects to Graylog Cloud over TLS. This ensures data moves securely and reliably.

Another layer of security required for the Forwarder is an API token. To ensure only Forwarders you trust can connect to your Graylog Cloud instance, Forwarders must be assigned and configured with a token to authenticate with Graylog Cloud. Any tokens used by the Forwarder must belong to the user Forwarder System User (built-in). You can find information about creating an [API token in the documentation](#).

27.3 Input Profile

Input Profiles are a set of Inputs that can be configured to run on one or more Forwarders of your choice. This aspect is critical to your Forwarder because it provides a gateway to move data to Graylog Cloud.

Input Profiles helps you to avoid re-doing the same configuration for all Forwarders since you can start new Forwarders and assign them a set of Inputs you already defined and tested beforehand. This is especially helpful if you want to collect the same kind of logs in different parts of your Infrastructure or to have a more redundant set-up.

As you create your Cloud Forwarder, you must create an Input Profile from the wizard, explained in Add Inputs. Provide a descriptive name for the Input Profile, a short description of its intention, and then create all the input necessary for the Forwarder.

27.4 Configuration

27.4.1 File

On the client-side of your Forwarder, modify the configuration file to address your Graylog host and authentication. The default values for `forwarder.conf` are:

- `forwarder_server_hostname`: (required) The Graylog Cloud Forwarder ingest hostname (eg. `ingest-<your-account>.graylog.cloud`). It's found on the Forwarder Setup Wizard in Graylog Cloud.
- `forwarder_grpc_api_token`: (required) The API Token for authenticating the Forwarder.

Here's an example of the configuration file, with the following values:

```
$ forwarder_server_hostname = ingest-<your-account-url>.graylog.cloud
$ forwarder_grpc_api_token = <your-api-token>
```


27.4.2 Wizard

When you login to the Cloud instance, you'll walk through a guided process to configure your Forwarder.

New Forwarder

Set up a Graylog Forwarder to start sending data into Graylog Cloud.

[Exit Forwarder Setup](#)

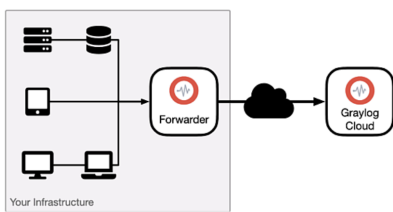
 [Learn more about Graylog Forwarders in the Documentation.](#)

Welcome
Select Forwarder
Configure Forwarder
Add Inputs
Summary

Send data to Graylog Cloud

In order to send data to Graylog Cloud, you need to use a Graylog Forwarder. The Graylog Forwarder runs in your infrastructure and can run Inputs that receive logs from your applications and systems.

[Start configuration](#)



Your Infrastructure

Complete the wizard by following the sections below:

1. Go to the Graylog user interface to select *Forwarders*, found in the *System* menu.

2. Click the *New Forwarder* button.
3. Press the *Start configuration* button to navigate to the *Select Forwarder* accordion.

Install Forwarder

1. Download the Forwarder.
2. Press *Continue* to navigate to the next step in the accordion.

Create API Token

We recommend using a single API token for each Forwarder, ensuring that you can revoke tokens for individual Forwarders no longer used.

Start new Forwarder

Follow these steps to connect a new Forwarder to Graylog Cloud.

1. Install Forwarder

2. Create API Token

Create an API Token to authenticate the Forwarder with Graylog Cloud.
Token Name Create Token
Skip this step (not recommended)

3. Configure Forwarder

4. Select Forwarder

1. Enter your *Token Name* in the available field.
2. Create the new name by clicking the *Create Token* button.

Configure Forwarder (Accordion/Wizard Menu)

1. Install Forwarder

2. Create API Token

3. Configure Forwarder

Once Graylog Forwarder is installed, add the following configuration options in order to connect to this Graylog Cloud instance:

```
forwarder_server_hostname  
ingest.test-dev.graylog.cloud
```

```
forwarder_grpc_api_token  
17n6ll54dp622jeam7fs48k82qtni875qsm7flmhft718dv418al
```

```
forwarder_grpc_tls_trust_chain_cert_file  
/path/to/cert.pem
```

 Copy as configuration snippet

1. Open your text editor of choice to access your `forwarder.conf` file
2. Click *Copy as configuration snippet* to copy the configuration details displayed to your `forwarder.conf` file, i.e. `forwarder_server_hostname` and `forwarder_grpc_api_token` with corresponding values.
3. Paste all values in the configuration file, and save the new changes.

Start the Forwarder

Before you begin the last step in the accordion:

1. Open your terminal
2. Locate the startup script found in your application directory.
3. Run the startup script with the command `./bin/graylog-forwarder run --configfile forwarder.conf`.
4. Return to the wizard after the Forwarder successfully runs.

Select Forwarder

Once the Forwarder makes a connection to Graylog Cloud, see it listed among your routers.

4. Select Forwarder

Once the new Forwarder is configured as stated above and started, it will register with Graylog Cloud and appear in the list below.

- ☐ dulanis-mbp.fios-router.home (5d2e1511-cc95-4063-bb76-4503783347fd)
- ☐ 63cb840e6343 (aec89e89-965e-4487-bda6-852084410bf6)
- ☐ instance (69d1321e-d24a-4426-8ee9-15024b21841d)
- ☐ instance (c7926b91-2fb2-404e-a1c2-ec8f44341c6a)
- ☐ instance (7ea88fcd-fc02-4cc7-8bde-7b55fe372f4b)
- ☐ instance (ef7c13aa-f976-4932-84e2-51e44510983f)
- ☐ instance (70936f2a-490f-436d-9a57-51a12c685846)

1. Click the radio button to select the new Forwarder you just created.
2. Click *Configure selected Forwarder* to navigate to the next menu: *Configure Forwarder*.

Configure Forwarder (Wizard Menu)

In this section, you have the option to customize the identity of your Forwarder.

1. Add a title.
2. Enter a long-form description, in case you want to distinguish it from other Forwarders (if they exist).
3. Click *Add Forwarder* inputs to complete this section.

Add Inputs

In this section, select an Input Profile. When you design this type of profile, it contains a collection of inputs that multiple Forwarders can use. In this case, create one:

1. Click *Create Input Profile*.
2. Add a name in the *Title* field.
3. Enter a description that corresponds to the *Title*.
4. Click *Add Inputs* to complete the form.
5. Select an *Input Type* from the dropdown menu.

6. Fill in the details for your input in the form.
7. Click *Create Input*, then save the configuration.

Summary

Review your summary, then select *Exit configuration*. You'll see the new Forwarder on the *Forwarder* page.

After installing, configuring, and starting a Forwarder instance, it will register with Graylog Cloud and appear on the Forwarders page in Graylog Cloud. Each Forwarder will have a *Configure* button to begin the configuration process for it. In case the Forwarder is not displayed yet, clicking on New Forwarder will give you information on how to configure and start it.

27.5 Operating System Package Configuration

If you don't install the Forwarder with the binary, you can install it with Linux packages. You can choose from DEB and RPM. If either of those tools is your method, be sure Java is available on your operating system. In addition, be sure to have access to a TLS certificate and an API token generated from Graylog.

27.5.1 Install via DEB

1. Download the DEB package:

```
$ sudo apt-get install apt-transport-https
$ wget https://packages.graylog2.org/repo/packages/graylog-4.0-repository_
  ↪latest.deb
$ sudo dpkg -i graylog-4.0-repository_latest.deb
$ sudo apt-get update
```

2. Install the package:

```
$ sudo apt-get install graylog-forwarder
```

3. Create the certificate and update the config file:

```
$ sudo vi /etc/graylog/forwarder/forwarder.conf
```

4. Start the service:

```
$ sudo systemctl start graylog-forwarder.service
```

27.5.2 RPM Install Instructions

1. Install the Graylog repository configuration:

```
$ sudo rpm -Uvh https://packages.graylog2.org/repo/packages/graylog-4.0-
  ↪repository_latest.rpm
```

2. Install the graylog-forwarder package:

```
$ sudo yum install graylog-forwarder
```

3. Create the certificate and update the configuration file:

```
$ sudo vi /etc/graylog/forwarder/forwarder.conf
```

4. Start the service:

```
$ sudo systemctl start graylog-forwarder.service
```

27.5.3 Docker Installation

Additionally, your Forwarder is available as a Docker image. Regardless of your installation method, you're required to create a digital certificate to ensure better security. The forwarder is also available as a docker image. To download the image, run the following command: `docker pull graylog/graylog-forwarder:<release-version>`.

To run the container, you will need to pass it the following environment variables:

```
$ GRAYLOG_FORWARDER_SERVER_HOSTNAME
$ GRAYLOG_FORWARDER_GRPC_API_TOKEN
```

You'll also need to mount the certificate file as a volume. Here is an example command:

```
$ docker run -e GRAYLOG_FORWARDER_SERVER_HOSTNAME=ingest.<SERVER NAME> -e
↪GRAYLOG_FORWARDER_GRPC_API_TOKEN=<INSERT_API_TOKEN_HERE> -v /path/to/cert/
↪cert.pem:/etc/graylog/forwarder/cert.pem graylog/graylog-forwarder:
↪<release-version>
```

27.6 Monitoring Forwarder Activity and Health

After you connect your Forwarder to Graylog Cloud, get to know methods to access metrics and other information on your Forwarder(s) and corresponding input(s). Here are a few methods to analyze and extract details on Forwarder activity:

- Review active Forwarder(s) on your Graylog Cloud instance
- Call Forwarder REST endpoints to consume information on health and list of inputs
- Export Forwarder metrics from Prometheus, a third-party monitoring tool

27.6.1 Forwarder Overview

Forwarders 6 Total

Enter search query... Search Reset New Forwarder

Connected Disconnected Any Show 10

Title	Status	Description	Hostname	Input Profile	Metrics	Actions
Forwarder	Connected			Cloud Meeting	1,955 msg/s	Edit Choose action
Forwarder	Disconnected			Cloud Meeting	Not available	Edit Choose action
Forwarder	Disconnected			No input profile	Not available	Configure Delete
Test Forwarder	Disconnected			Rob's Test Input Profile	Not available	Edit Choose action
Test Forwarder	Disconnected			Dulani's input profile	Not available	Edit Choose action
Test Forwarder	Disconnected			Othello's Input Profile	Not available	Edit Choose action

One place to review Cloud Forwarder connectivity is the *Forwarders* screen, under the *Systems* menu. This page provides a summary of all Forwarders. Identify the green Connected badge on the Status column. This tells you that a Forwarder is actively sending messages to your cloud instance. Another key indicator is found on the Metrics column. The cells that show active message rates, again, prove your Cloud Forwarders works.

27.6.2 REST API

The Forwarder supports a local REST API for checking health status, inputs, and exporting Prometheus metrics. To enable the Forwarder API:

- Open your `forwarder.conf` file
- Add the `forwarder_api_enabled = true` configuration option.

When enabled, the API will listen on a Unix Domain Socket using the file indicated with `forwarder_api_socket_path` unless you provide a value for `forwarder_api_tcp_bind_address`. For example, you can run a curl command to access the endpoint. If you need a refresher on how to use Unix sockets, [review this guide](#).

Health Status Endpoint

To check the health of your Forwarder, query the endpoint `GET /api/health`:

```
{
  "healthy": true,
  "inputs": {
    "healthy": true,
    "running": 2,
    "failed": 0,
    "not running": 0
  },
  "upstream": {
    "healthy": true
  }
}
```


Input Endpoint

To obtain a list of Inputs running on the Forwarder, query the endpoint `GET /api/inputs`.

```
{
  "inputs": [
    {
      "id": "5fc91564d44bfd2000249e8c",
      "title": "Random"
    },
    {
      "id": "5fc91550d44bfd2000249e74",
      "title": "Beats"
    }
  ]
}
```

Drill down to the input profile and view the Forwarder sub-menu to ensure it receives messages. If data still doesn't come through, create a new input. Click the name of your input which takes you to its main profile with the details you added at initial configuration.

If an input is in a failed state, the input endpoint returns no information on `id` nor `title`.

Additionally, you can get deeper insights into Forwarder messaging and node health. Click the Details button on your node, to get information about your message cache (buffers). One metric to pay attention to is the number of messages in the journal. The journal is the on-disk persistent storage location that stores Forwarder messages. So, if the rest of Graylog malfunctions, we can still keep all the messages we still have a place to put them.

Prometheus Metrics Exports

The Forwarder, alone, has no interface for insight into the internal operations. To that end, you must configure a local Prometheus container; this becomes the interface for Forwarder metrics. These are similar to the traditional Graylog Server metrics but instead are exported to Prometheus. The response format is the standard Prometheus HTTP export format.

To start this process:

1. Download and start [Prometheus](#).
2. Install [Docker](#) on your machine.
3. Create a Prometheus Dockerfile, e.g. `touch /tmp/prometheus.yml`:

```
global:
  scrape_interval: 15s
  scrape_timeout: 10s
  evaluation_interval: 15s
alerting:
  alertmanagers:
  - static_configs:
    - targets: []
    scheme: http
    timeout: 10s
    api_version: v1
scrape_configs:
- job_name: prometheus
  honor_timestamps: true
  scrape_interval: 15s
```

(continues on next page)

(continued from previous page)

```

scrape_timeout: 10s
metrics_path: /api/metrics/prometheus
scheme: http
static_configs:
- targets:
  - host.docker.internal:9001

```

4. Run this Docker command to start the container:

```

docker run \
  -p 9090:9090 \
  -v /tmp/prometheus.yml:/etc/prometheus/prometheus.yml \
  prom/prometheus

```

27.7 Resiliency Models

When you think about scaling your deployment – that is, add more Forwarders – you must incorporate tools, procedures, and policies that let you continue operating in the case of a major outage – widespread, long-lasting, destructive, or all three. If all the above pose a threat to your Forwarder consider both message recovery and load balancing.

27.7.1 Message Recovery

The Cloud Forwarder’s disk journal is capable of caching data in case of a network outage. From there, they are read and sent to Graylog Cloud.

As mentioned in the [Output Framework chapter](#), if the internet is unavailable, the Forwarder is still capable of receiving messages. So, once the internet is back the workflow will resume. Messages from the journal are sent to Graylog Cloud.

27.7.2 Load Balancing Options

A larger deployment means more throughput i.e., requests passing through your systems. So, in a more mature, multi-Forwarder scenario we recommend you configure a load balancer to evenly distribute data transfer. This helps your deployment manage bulk requests and potential latency issues while ensuring resiliency.

More to the point, the load balancer distributes requests among healthy nodes in your local and/or external data centers. In our help docs, you can test and configure tools such as Apache HTTP server, Nginx, or HAProxy to handle requests among multiple Cloud Forwarders.

27.8 Distinguishing Forwarders

Type	Purpose	Details
Enterprise Data Forwarder	The Data Forwarder allows you to configure an Output to forward messages from a source to a destination cluster.	This Forwarder has an open-source instance. However, it is only available within the Enterprise Integrations plugin.
Enterprise Cloud Forwarder	The Cloud Forwarder allows you cloud instance, via input profiles.	Your input profile can host multiple Forwarders.

ARCHIVING

Graylog enables you to configure a retention period to automatically delete older messages - this is to help you control the costs of storage in Elasticsearch. But we know it's not ideal deciding between keeping less messages in Graylog or paying more for hardware. Additionally, many of you are required to store data for long periods of time due to compliance requirements like PCI or HIPAA.

The Archiving functionality allows you to archive log messages until you need to re-import them into Graylog for analysis. You can instruct Graylog to automatically archive log messages to compressed flat files on the local filesystem before retention cleaning kicks in and messages are deleted from Elasticsearch. Archiving also works through a REST call or the web interface if you don't want to wait until retention cleaning to happen. We chose flat files for this because they are vendor agnostic so you will always be able to access your data.

You can then do whatever you want with the archived files: move them to cheap storage, write them on tape, or even print them out if you need to! If you need to search through archived data in the future, you can move any selection of archived messages back into the Graylog archive folder, and the web interface will enable you to temporarily import the archive so you can analyze the messages again in Graylog.

Note: Archiving is a commercial feature and part of [Graylog Enterprise](#).

28.1 Setup

Graylog Archive is a commercial feature that can be installed in addition to the Graylog open source server.

28.1.1 Installation

Archiving is part of the Graylog Enterprise plugin, please check the [Graylog Enterprise setup page](#) for details on how to install it.

28.1.2 Configuration

Graylog Archive can be configured via the Graylog web interface and does not need any changes in the Graylog server configuration file.

In the web interface menu navigate to "Enterprise/Archives" and click "Configuration" to adjust the configuration.

graylog
Search Streams Alerts Dashboards Sources System / Archives
In 16 / Out 16 msg/s Help Administrator

Edit archives configuration
The Graylog archive feature allows you to create archives from indices.
Backend configuration Manage archives Archive documentation

Archive your old indices automatically by setting archive as index retention strategy. Set the option in the [indices](#) page.

Archives configuration
Backend File System (File System)
Storage backend for the archived data.
Max Segment Size 524288000
Maximum size for each message segment in bytes.
Compression Type gzip
Compression to use on archived indices. Read the [documentation](#) for more information on the different options.
Checksum Type CRC32 (little endian)
Checksum to calculate on archived indices. Read the [documentation](#) for more information on the different options.
Restore index batch size 1000
The batch size that will be used to index document on archive restore.
Streams to archive Filter streams Reset
☐ Select all available streams
☒ All messages - Stream containing all messages
☒ Flow Packets - All flow logs
☒ MongoDB Packets - All MongoDB packets received from packetbeat
Select streams that should be included in the archive. New streams will be archived by default.
Update configuration

Archive Options

There are several configuration options to configure archiving.

Table 1: Configuration Options

Name	Description
Backend	Backend on the master node where the archive files will be stored.
Max Segment Size	Maximum size (in <i>bytes</i>) of archive segment files.
Compression Type	Compression type that will be used to compress the archives.
Checksum Type	Checksum algorithm that is used to calculate the checksum for archives.
Restore index batch size	Elasticsearch batch size when restoring archive files.
Streams to archive	Streams that should be included in the archive.

Backend

The archived indices will be stored in a backend. A backend that stores the data in `/tmp/graylog-archive` is created when the server starts for the first time but you can create a new backend if you want to store the data in a different path.

Max Segment Size

When archiving an index, the archive job writes the data into segments. The *Max Segment Size* setting sets the size limit for each of these data segments.

This allows control over the file size of the segment files to make it possible to process them with tools which have a size limit for files.

Once the size limit is reached, a new segment file will be started.

Example:

```
/path/to/archive/
graylog_201/
  archive-metadata.json
  archive-segment-0.gz
  archive-segment-1.gz
  archive-segment-2.gz
```

Compression Type

Archives will be compressed with gzip by default. This option can be changed to use a different compression type.

The selected compression type has a big impact on the time it takes to archive an index. Gzip for example is pretty slow but has a great compression rate. Snappy and LZ4 are way faster but the archives will be bigger.

Here is a comparison between the available compression algorithms with test data.

Table 2: Compression Type Comparison

Type	Index Size	Archive Size	Duration
gzip	1 GB	134 MB	15 minutes, 23 seconds
Snappy	1 GB	291 MB	2 minutes, 31 seconds
LZ4	1 GB	266 MB	2 minutes, 25 seconds

Note: Results with your data may vary! Make sure to test the different compression types to find the one that is best for your data.

Warning: The current implementation of LZ4 is not compatible with the LZ4 CLI tools, thus decompressing the LZ4 archives outside of Graylog is currently not possible.

Checksum Type

When writing archives Graylog computes a CRC32 checksum over the files. This option can be changed to use a different checksum algorithm.

The type of checksum depends on the use case. CRC32 and MD5 are quick to compute and a reasonable choice to be able to detect damaged files, but neither is suitable as protection against malicious changes in the files. Graylog also supports using SHA-1 or SHA-256 checksums which can be used to make sure the files were not modified, as they are cryptographic hashes.

The best choice of checksum types depends on whether the necessary system tools are installed to compute them later (not all systems come with a SHA-256 utility for example), speed of checksum calculation for larger files as well as the security considerations.

Restore Index Batch Size

This setting controls the batch size for re-indexing archive data into Elasticsearch. When set to 1000, the restore job will re-index the archived data in document batches of 1000.

You can use this setting to control the speed of the restore process and also how much load it will generate on the Elasticsearch cluster. The **higher** the batch size, the **faster** the restore will progress and the **more** load will be put on your Elasticsearch cluster in addition to the normal message processing.

Make sure to tune this **carefully** to avoid any negative impact on your message indexing throughput and search speed!

Streams To Archive

This option can be used to select which streams should be included in the archive. With this you are able to archive only your important data instead of archiving everything that is arriving in Graylog.

Note: New streams will be archived automatically. If you create a new stream and don't want it to be archived, you have to disable it in this configuration dialog.

Backends

A backend can be used to store the archived data. For now, we only support a single file system backend type.

File System

The archived indices will be stored in the *Output base path* directory. This directory **needs to exist and be writable for the Graylog server process** so the files can be stored.

Note: Only the **master** node needs access to the *Output base path* directory because the archiving process runs on the master node.

We recommend to put the *Output base path* directory onto a **separate disk or partition** to avoid any negative impact on the message processing should the archiving fill up the disk.

Edit archive backend configuration

The Graylog archive feature allows you to create archives from indices.

[Configuration](#) [Manage archives](#) [Archive documentation](#)

Backend configuration

Title

My file system backend

Descriptive name of the backend.

Description

Backend to store my index archives

Backend description.

Output base path

/data/graylog-archives/\${year}/\${month}/\${day}

Base path where the archives should be stored. Can only be set on backend creation!

Example output path

/data/graylog-archives/2017/04/04/index_name_0-20170404-153725-436

Shows the processed output path template.

[Save](#) [Cancel](#)

Table 3: Configuration Options

Name	Description
Title	A simple title to identify the backend.
Description	Longer description for the backend.
Output base path	Directory path where the archive files should be stored.

Output base path

The output base path can either be a simple directory path string or a template string to build dynamic paths.

You could use a template string to store the archive data in a directory tree that is based on the archival date.

Example:

```
# Template
/data/graylog-archive/${year}/${month}/${day}

# Result
/data/graylog-archive/2017/04/01/graylog_0
```

Table 4: Available Template Variables

Name	Description
<code>\${year}</code>	Archival date year. (e.g. “2017”)
<code>\${month}</code>	Archival date month. (e.g. “04”)
<code>\${day}</code>	Archival date day. (e.g. “01”)
<code>\${hour}</code>	Archival date hour. (e.g. “23”)
<code>\${minute}</code>	Archival date minute. (e.g. “24”)
<code>\${second}</code>	Archival date second. (e.g. “59”)
<code>\${index-name}</code>	Name of the archived index. (e.g. “graylog_0”)

Index Retention

Graylog is using configurable index retention strategies to delete old indices. By default indices can be *closed* or *deleted* if you have more than the configured limit.

Graylog Archive offers a new index retention strategy that you can configure to automatically archive an index before closing or deleting it.

Index retention strategies can be configured in the system menu under “System/Indices”. Select an index set and click “Edit” to change the index rotation and retention strategies.

graylog Search Streams Alerts Dashboards Sources System ▾ In 165 / Out 165 msg/s Help ▾ Administrator ▾

Configure Index Set

Modify the current configuration for this index set, allowing you to customize the retention, sharding, and replication of messages coming from one or more streams.

You can learn more about the index model in the [documentation](#)

[Index sets overview](#)

Title
MongoDB Packets
Descriptive name of the index set.

Description
All MongoDB packetbeat data
Add a description of this index set.

Index shards
4
Number of Elasticsearch shards used per index in this index set.

Index replicas
0
Number of Elasticsearch replicas used per index in this index set.

Max. number of segments
1
Maximum number of segments per Elasticsearch index after optimization (force merge).

☐ **Disable index optimization after rotation**
Disable Elasticsearch index optimization (force merge) after rotation.

Index Rotation Configuration
Graylog uses multiple indices to store documents in. You can configure the strategy it uses to determine when to rotate the currently active write index.

Select rotation strategy
Index Message Count × ▾

Max documents per index
20000000
Maximum number of documents in an index before it gets rotated

Index Retention Configuration
Graylog uses a retention strategy to clean up old indices.

Select retention strategy
Archive Index × ▾

The archive index retention strategy creates an archive for an index before deleting or closing it.

Max number of indices
20
Maximum number of indices to keep before archiving the oldest ones

Please select which action should be performed once an index has been archived.

CLOSE DELETE NONE

Save Cancel

As with the regular index retention strategies, you can configure a max number of Elasticsearch indices. Once there are more indices than the configured limit, the oldest ones will be archived into the backend and then closed or deleted. You can also decide to not do anything (*NONE*) after archiving an index. In that case **no cleanup of old indices will happen** and you have to take care of that yourself!

28.2 Usage

28.2.1 Creating Archives

There are three ways to create archives from the Graylog Elasticsearch indices.

- [Web Interface](#)
- [Index Retention](#)
- [REST API](#)

Web Interface

You can manually create an archive on the “Enterprise/Archives” page in the web interface.

The screenshot shows the Graylog Archives web interface. At the top, there's a navigation bar with links like Search, Streams, Alerts, Dashboards, Sources, and System / Archives. Below the navigation bar, the 'Archives' section is displayed. It includes a 'Create Archive for Index' form where an index can be selected from a dropdown menu. The configuration panel on the right shows settings for the archive, such as Backend, Max segment size, Compression type, Checksum type, and Restore index batch size. At the bottom, there's a table listing existing archives with columns for Index, Created, Range, Content, Streams, and Restored.

Index	Created	Range	Content	Streams	Restored
packetbeat-flows_6	4 minutes ago	Apr 5, 9:34 - 9:41	5,108 msgs (8 minutes)	Flow Packets	
packetbeat-flows_5	9 minutes ago	Apr 5, 9:27 - 9:34	5,063 msgs (7 minutes)	Flow Packets	
packetbeat-flows_1	14 minutes ago	Apr 4, 18:00 - 18:06	5,108 msgs (6 minutes)	Flow Packets	
packetbeat-flows_4	19 minutes ago	Apr 5, 9:20 - 9:27	5,049 msgs (7 minutes)	Flow Packets	
packetbeat-flows_3	24 minutes ago	Apr 5, 9:16 - 9:20	5,030 msgs (4 minutes)	Flow Packets	
packetbeat-flows_2	29 minutes ago	Apr 4, 18:06 - Apr 5, 9:16	5,446 msgs (15 hours)	Flow Packets	
testgraylog_0	16 hours ago	Jan 25, 17:13 - Apr 4, 18:00	12,540 msgs (2 months)	All messages, MongoDB Packets	
packetbeat-mongodb_0	16 hours ago	Apr 4, 17:11 - 17:59	72,705 msgs (an hour)	MongoDB Packets	

On the “Create Archive for Index” section of the page is a form where you can select an index and archive it by pressing “Archive Index”.

Using this will just archive the index to disk and does not close it or delete it. This is a great way to test the archiving feature without changing your *index retention configuration*.

Index Retention

Graylog Archive ships with an index retention strategy that can be used to automatically create archives before closing or deleting Elasticsearch indices.

This is the easiest way to automatically create archives without custom scripting.

Please see the [Index Retention Configuration](#) on how to configure it.

REST API

Graylog Archive also offers a REST API that you can use to automate archive creation if you have some special requirements and need a more flexible way to do this.

Plugins/Archive/Archives : Manage index archives

[Show/Hide](#) | [List Operations](#) | [Expand Operations](#) | [Raw](#)

GET	/plugins/org.graylog.plugins.archive/archives	Returns all existing archives
POST	/plugins/org.graylog.plugins.archive/archives/{indexName}	Archive the given index
DELETE	/plugins/org.graylog.plugins.archive/archives/{indexName}	Delete the archive for the given index
POST	/plugins/org.graylog.plugins.archive/archives/{indexName}/restore	Restore the given index

An index can be archived with a simple curl command:

```
$ curl -s -u admin -H 'X-Requested-By: cli' -X POST http://127.0.0.1:9000/api/plugins/
→org.graylog.plugins.archive/archives/graylog_386
Enter host password for user 'admin': *****
{
  "archive_job_config" : {
    "archive_path" : "/tmp/graylog-archive",
    "max_segment_size" : 524288000,
    "segment_filename_prefix" : "archive-segment",
    "metadata_filename" : "archive-metadata.json",
    "source_histogram_bucket_size" : 86400000,
    "restore_index_batch_size" : 1001,
    "segment_compression_type": "SNAPPY"
  },
  "system_job" : {
    "id" : "cd7ebfa0-079b-11e6-9e1b-fa163e6e9b8a",
    "description" : "Archives indices and deletes them",
    "name" : "org.graylog.plugins.archive.job.ArchiveCreateSystemJob",
    "info" : "Archiving documents in index: graylog_386",
    "node_id" : "c5df7bff-cafd-4546-ac0a-5ccd2ba4c847",
    "started_at" : "2016-04-21T08:34:03.034Z",
    "percent_complete" : 0,
    "provides_progress" : true,
    "is_cancelable" : true
  }
}
```

That command started a system job in the Graylog server to create an archive for index `graylog_386`. The `system_job.id` can be used to check the progress of the job.

The REST API can be used to automate other archive related tasks as well, like restoring and deleting archives or updating the archive config. See the REST API browser on your Graylog server for details.

28.2.2 Restoring Archives

Note: The restore process adds load to your Elasticsearch cluster because all messages are basically **re-indexed**. Please make sure to keep this in mind and test with smaller archives to see how your cluster behaves. Also use the *Restore Index Batch Size* setting to control the Elasticsearch batch size on re-index.

Graylog Archive offers two ways to restore archived indices.

- *Web Interface*
- *REST API*

Graylog Archive restores all indices into the “Restored Archives” index set to avoid conflicts with the original indices. (should those still exist)

The screenshot shows the Graylog web interface for the 'Index Set: Restored Archives'. The top navigation bar includes links for Search, Streams, Alerts, Dashboards, Sources, and System. The main content area displays the index set details, including the index prefix 'restored-archive', 4 shards, and 0 replicas. A status bar indicates that 1 index with a total of 5,108 messages is under management. A green status bar at the bottom indicates that the Elasticsearch cluster is green. The bottom section shows a list of indices, including 'restored-archive-packetbeat-flows_6' with a 'reopened' status.

Restored indices are also marked as reopened so they are **ignored** by index retention jobs and are not closed or deleted. That means you have to manually delete any restored indices **manually** once you do not need them anymore.

Web Interface

In the web interface you can restore an archive on the “Enterprise/Archives” page by selecting an archive from the list, open the archive details and clicking the “Restore Index” button.

Archives
The Graylog archive feature allows you to create archives from indices.

[Configuration](#) [Rebuild Catalog](#) [Archive documentation](#)

Create Archive for Index
Select an index to be archived to disk. This action will not close or delete the original index.

testgraylog_1 (2,626 documents / 1.8MB) [Archive index](#)

Configuration

Backend: File System - /tmp/graylog-archive
Max segment size: 500.0MB
Compression type: Snappy
Checksum type: CRC32 (little endian)
Restore index batch size: 1,000

[Edit configuration](#)

Archive Catalog 0 total

Enter search query... [Search](#) [Reset](#) [Export Results](#) [Show: 20](#)

Index	Created	Range	Content	Streams	Restored
packetbeat-flows_9	3 minutes ago	Apr 4, 17:13 - 18:00	37,465 msgs (an hour)	Flow Packets	
packetbeat-flows_6	8 minutes ago	Apr 5, 9:34 - 9:41	5,108 msgs (8 minutes)	Flow Packets	

Index details for packetbeat-flows_6:

Index name: packetbeat-flows_6
Created: 2017-04-05 07:43:06.623 (took 724 ms)
Message count: 5,108
Earliest message: 2017-04-05 07:34:29.900
Latest message: 2017-04-05 07:41:59.900
Segment count: 1
Segments size: 511.4KB (compressed with SNAPPY / 4.6MB uncompressed)
Segment directory: /tmp/graylog-archive/packetbeat-flows_6
Archive availability: [Archive available](#)

[Restore index](#) [Delete archive](#)

Number of archived messages per stream. **Note:** Messages can be in multiple streams. [Show: 5](#)

Stream	Message count
Flow Packets	5,108

[packetbeat-flows_5](#) 13 minutes ago Apr 5, 9:27 - 9:34 5,063 msgs (7 minutes) Flow Packets
[packetbeat-flows_1](#) 18 minutes ago Apr 4, 18:00 - 18:06 5,108 msgs (6 minutes) Flow Packets
[packetbeat-flows_4](#) 23 minutes ago Apr 5, 9:20 - 9:27 5,049 msgs (7 minutes) Flow Packets
[packetbeat-flows_3](#) 28 minutes ago Apr 5, 9:16 - 9:20 5,030 msgs (4 minutes) Flow Packets

REST API

As with archive creation you can also use the REST API to restore an archived index into the Elasticsearch cluster:

```
$ curl -s -u admin -H 'X-Requested-By: cli' -X POST http://127.0.0.1:9000/api/plugins/
↪org.graylog.plugins.archive/archives/graylog_386/restore
Enter host password for user 'admin': *****
{
  "archive_metadata": {
    "archive_id": "graylog_307",
    "index_name": "graylog_307",
    "document_count": 491906,
    "created_at": "2016-04-14T14:31:50.787Z",
    "creation_duration": 142663,
    "timestamp_min": "2016-04-14T14:00:01.008Z",
    "timestamp_max": "2016-04-14T14:29:27.639Z",
    "id_mappings": {
      "streams": {
        "56fbafe0fb121a5309cef297": "nginx requests"
      },
      "inputs": {
        "56fbafe0fb121a5309cef290": "nginx error_log",
        "56fbafe0fb121a5309cef28d": "nginx access_log"
      },
      "nodes": {
        "c5df7bff-cafd-4546-ac0a-5ccd2ba4c847": "graylog.example.org"
      }
    },
    "histogram_bucket_size": 86400000,
    "source_histogram": {
      "2016-04-14T00:00:00.000Z": {
```

(continues on next page)

(continued from previous page)

```

      "example.org": 227567
    }
  },
  "segments": [
    {
      "path": "archive-segment-0.gz",
      "size": 21653755,
      "raw_size": 2359745839,
      "compression_type": "SNAPPY",
      "checksum": "751e6e76",
      "checksum_type": "CRC32"
    }
  ],
  "index_size": 12509063,
  "index_shard_count": 4
},
"system_job": {
  "id": "e680dcc0-07a2-11e6-9e1b-fa163e6e9b8a",
  "description": "Restores an index from the archive",
  "name": "org.graylog.plugins.archive.job.ArchiveRestoreSystemJob",
  "info": "Restoring documents from archived index: graylog_307",
  "node_id": "c5df7bff-cafd-4546-ac0a-5ccd2ba4c847",
  "started_at": "2016-04-21T09:24:51.468Z",
  "percent_complete": 0,
  "provides_progress": true,
  "is_cancelable": true
}
}

```

The returned JSON payload contains the archive metadata and the system job description that runs the index restore process.

Restore into a separate cluster

As said earlier, restoring archived indices slow down your indexing speed because of added load. If you want to completely avoid adding more load to your Elasticsearch cluster, you can restore the archived indices on a different cluster.

To do that, you only have to transfer the archived indices to a different machine and put them into a configured *Backend*.

Each index archive is in a separate directory, so if you only want to transfer one index to a different machine, you only have to copy the corresponding directory into the backend.

Example:

```

$ tree /tmp/graylog-archive
/tmp/graylog-archive
├── graylog_171
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
├── graylog_201
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
└── graylog_268
    └── archive-metadata.json

```

(continues on next page)

(continued from previous page)

```

├── archive-segment-0.gz
├── graylog_293
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
├── graylog_307
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
├── graylog_386
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
├── graylog_81
│   ├── archive-metadata.json
│   └── archive-segment-0.gz
7 directories, 14 files

```

28.2.3 Searching in Restored Indices

Once an index has been restored from an archive it will be used by search queries automatically.

Every message that gets restored into an Elasticsearch index gets a special `gl2_archive_restored` field with value `true`. This allows you to only search in restored messages by using a query like:

```
_exists_:gl2_archive_restored AND <your search query>
```

Example:

The screenshot shows the Graylog search interface. The search bar contains the query `_exists_:gl2_archive_restored AND delete`. The search result shows 24,558 messages found in 90 ms, searched in 119 indices. A histogram shows the distribution of messages over time, with a peak around April 11. The messages list shows several entries, including messages from `mysql.graylog.org`, `marketplace.graylog.org`, and `example.org`.

If you want to exclude all restored messages from you query you can use:

```
_missing_:gl2_archive_restored AND <your search query>
```

AUDIT LOG

Audit Log keeps track of changes made by users to a Graylog system.

It records all state changes into the database and makes it possible to search, filter and export all audit log entries.

Note: Audit Log is a commercial feature and part of [Graylog Enterprise](#).

29.1 Setup

Graylog Audit Log is a commercial feature that can be installed in addition to the Graylog open source server.

29.1.1 Installation

Audit Log functionality is part of the Graylog Enterprise plugin, please check the [Graylog Enterprise setup page](#) for details on how to install it.

29.1.2 Configuration

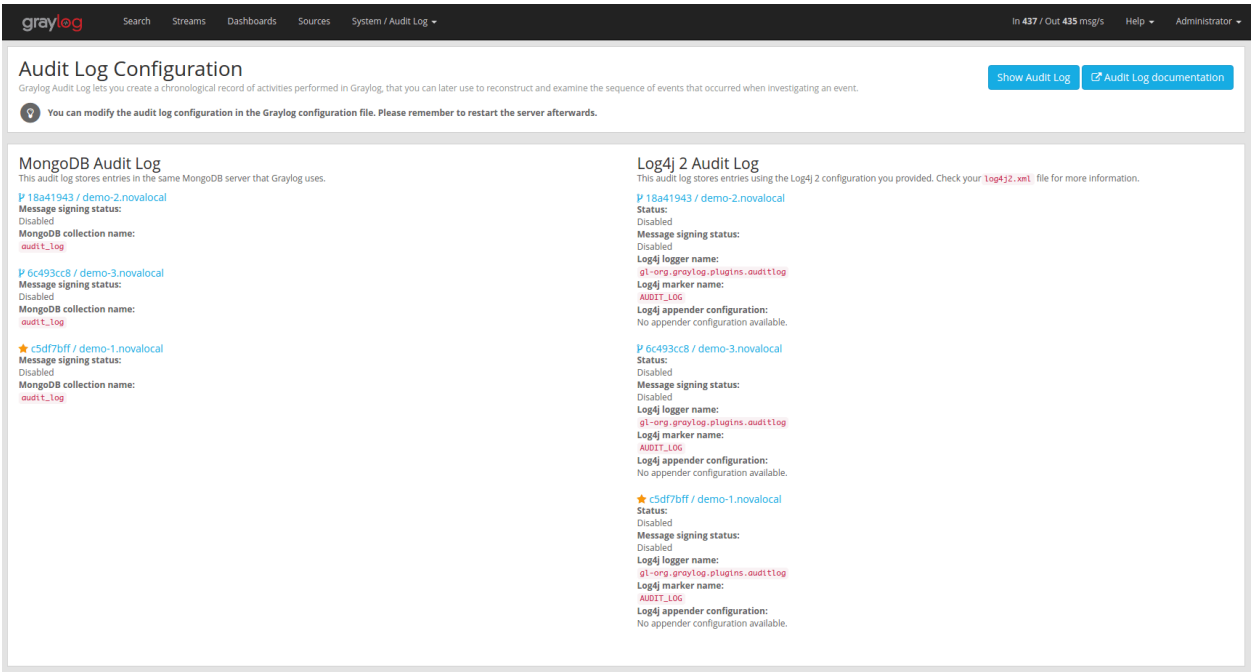
Graylog Audit Log provides two ways of writing audit log entries:

1. Database
2. Log file via `log4j2` appender

Logging to the database is always enabled and cannot be disabled.

Note: All configuration needs to be done in the Graylog server configuration file **and** in the logging configuration. (only if the `log4j2` appender is enabled) Check the [default file locations page](#) for details.

The web interface can show the current configuration.



Database Configuration Options

The default MongoDB audit log has a few configuration options available.

Table 1: Configuration Options

Name	Description
auditlog_mongodb_keep_entries	delete audit log entries older that configured interval
auditlog_mongodb_cleanup_interval	interval of the audit log entry cleanup job
auditlog_mongodb_collection	the MongoDB collection to store the audit log entries in

auditlog_mongodb_keep_entries

This configures the interval after which old audit log entries in the MongoDB database will be deleted. You have to use values like 90d (90 days) to configure the interval.

Warning: Make sure to configure this to fit your needs. Deleted audit log entries are gone forever!

The default value for this is 365d.

Example:

```
auditlog_mongodb_keep_entries = 365d
```


auditlog_mongodb_cleanup_interval

This configures the interval of the background job that periodically deletes old audit log entries from the MongoDB database. You have to use values like 1h (1 hour) to configure the interval.

The default value for this is 1h.

Example:

```
auditlog_mongodb_cleanup_interval = 1h
```

auditlog_mongodb_collection

This configures the name of the MongoDB collection where audit log entries will be stored.

The default value for this is audit_log.

Example:

```
auditlog_mongodb_collection = audit_log
```

Log4j2 Configuration Options

The optional log4j2 audit log appender has a few configuration options available.

Note: To configure the log4j2 appender you have to edit the Graylog server configuration file **and** the log4j2.xml file for your setup!

Table 2: Configuration Options

Name	Description
auditlog_log4j_enabled	whether the log4j2 appender is enabled or not
auditlog_log4j_logger	log4j2 logger name
auditlog_log4j_marker	log4j2 marker name

auditlog_log4j_enabled

The log4j2 audit log appender is disabled by default and can be enabled by setting this option to true.

The default value for this is false.

Example:

```
auditlog_log4j_enabled = true
```

auditlog_log4j_logger_name

This configures the log4j2 logger name of the audit log.

The default value for this is `gl-org.graylog.plugins.auditlog`.

Example:

```
auditlog_log4j_logger_name = graylog-auditlog
```

auditlog_log4j_marker_name

This configures the log4j2 marker name for the audit log.

The default value for this is `AUDIT_LOG`.

Example:

```
auditlog_log4j_marker_name = AUDIT_LOG
```

Log4j2 Appender Configuration

To write audit log entries into a file you have to enable the log4j2 appender in your Graylog configuration file **and** add some configuration to the `log4j2.xml` file that is used by your server process.

The `log4j2.xml` file location is dependent on your deployment method. so please check the [default file locations page](#).

An existing `log4j2.xml` config file needs another `<Logger/>` statement in the `<Loggers/>` section and an additional appender in the `<Appenders/>` section of the file.

Warning: The file on your system might look different than the following example. Make sure to only add the audit log related snippets to your config and do not remove anything else!

Example `log4j2.xml` file with audit log enabled:

```
<?xml version="1.0" encoding="UTF-8"?>
<Configuration packages="org.graylog2.log4j" shutdownHook="disable">
  <Appenders>
    <!-- Graylog server log file appender -->
    <RollingFile name="rolling-file" fileName="/var/log/graylog-server/server.log
↪" filePattern="/var/log/graylog-server/server.log.%i.gz">
      <PatternLayout pattern="%d{yyyy-MM-dd'T'HH:mm:ss.SSSXXX} %-5p [%c{1}] %m%n
↪"/>

    <Policies>
      <SizeBasedTriggeringPolicy size="50MB"/>
    </Policies>
    <DefaultRolloverStrategy max="10" fileIndex="min"/>
  </RollingFile>

  <!-- ##### -->
  <!-- Rotate audit logs daily -->
  <RollingFile name="AUDITLOG" fileName="/var/log/graylog-server/audit.log"
↪filePattern="/var/log/graylog-server/audit-%d{yyyy-MM-dd}.log.gz">
```

(continues on next page)

(continued from previous page)

```

        <PatternLayout>
            <Pattern>%d - %m - %X%n</Pattern>
        </PatternLayout>
    <Policies>
        <TimeBasedTriggeringPolicy />
    </Policies>
</RollingFile>
<!-- ##### -->
</Appenders>
<Loggers>
    <Logger name="org.graylog2" level="info"/>

    <!-- ##### -->
    <!-- Graylog Audit Log. The logger name has to match the "auditlog_log4j_
    ↪logger_name" setting in the Graylog configuration file -->
    <Logger name="graylog-auditlog" level="info" additivity="false">
        <AppenderRef ref="AUDITLOG"/>
    </Logger>
    <!-- ##### -->

    <Root level="warn">
        <AppenderRef ref="rolling-file"/>
    </Root>
</Loggers>
</Configuration>

```

The config snippets between the `<!-- ##### -->` tags have been added to the existing `log4j2.xml` file.

Make sure that the name in the `<Logger />` tag matches the configured `auditlog_log4j_logger_name` in your Graylog server configuration. Otherwise you will not see any log entries in the log file.

Caveats

You have to make sure that the `log4j2` related settings in the Graylog server config file and the `log4j2.xml` file are the same on **every node in your cluster**!

Since every Graylog server writes its own audit log entries when the Graylog Enterprise plugin is installed, the log files configured in the `log4j2.xml` file are written on every node. But **only** the entries from the local node will show up in that file.

If you have more than one node, you have to search in all configured files on all nodes to get a complete view of the audit trail.

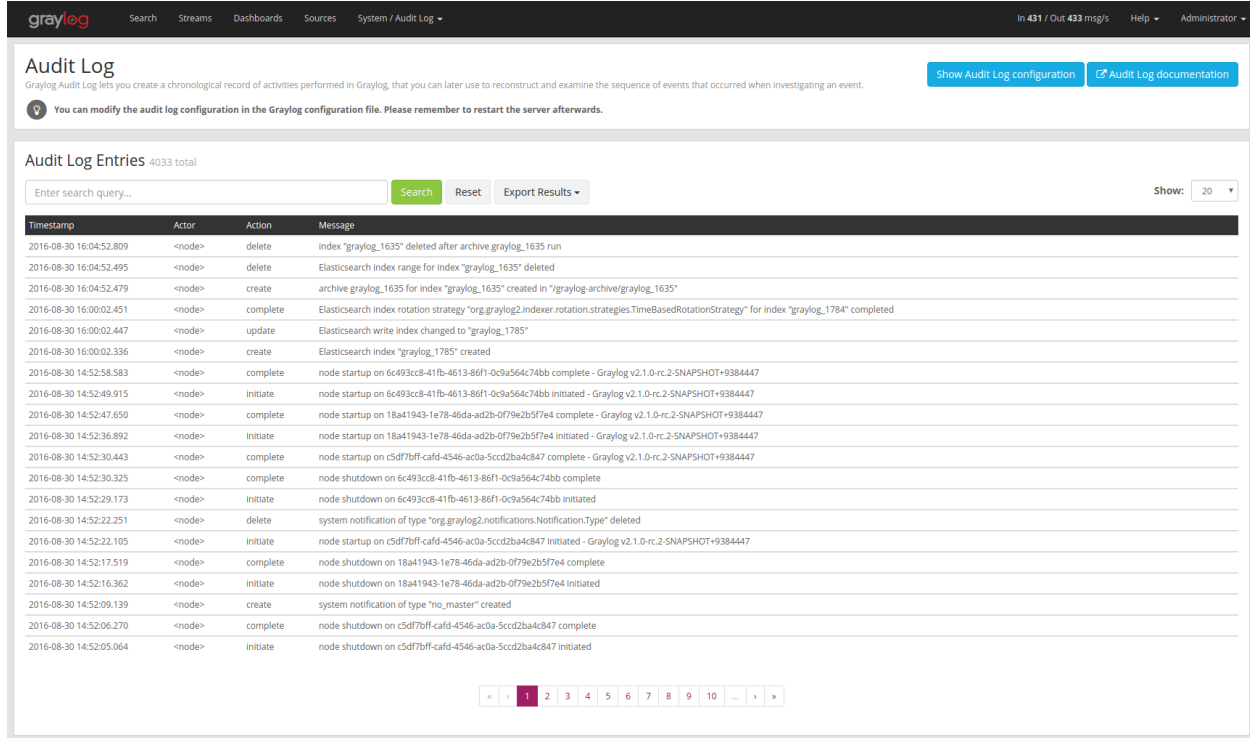
29.2 Usage

Once you installed the Graylog Enterprise plugin, Graylog will automatically write audit log entries into the database.

29.2.1 View Audit Log Entries

Graylog Audit Log adds a new page to the web interface which can be reached via “Enterprise/Audit Log”. You can view and export existing audit log entries in the database.

It also provides a simple search form to search and filter for audit events you are interested in.



The screenshot shows the Graylog web interface for the Audit Log. At the top, there's a navigation bar with links like Search, Streams, Dashboards, Sources, and System / Audit Log. Below the navigation bar, the page title is "Audit Log" with a subtitle explaining its purpose. There are two buttons: "Show Audit Log configuration" and "Audit Log documentation". A message states: "You can modify the audit log configuration in the Graylog configuration file. Please remember to restart the server afterwards."

The main section is titled "Audit Log Entries" with a count of 4033 total. It includes a search bar with a "Search" button, a "Reset" button, and an "Export Results" button. A "Show:" dropdown is set to 20. Below this is a table of audit log entries:

Timestamp	Actor	Action	Message
2016-08-30 16:04:52.809	<node>	delete	index "graylog_1635" deleted after archive graylog_1635 run
2016-08-30 16:04:52.495	<node>	delete	Elasticsearch index range for index "graylog_1635" deleted
2016-08-30 16:04:52.479	<node>	create	archive graylog_1635 for index "graylog_1635" created in "/graylog-archive/graylog_1635"
2016-08-30 16:00:02.451	<node>	complete	Elasticsearch index rotation strategy "org.graylog2.indexer.rotation.strategies.TimeBasedRotationStrategy" for index "graylog_1784" completed
2016-08-30 16:00:02.447	<node>	update	Elasticsearch write index changed to "graylog_1785"
2016-08-30 16:00:02.336	<node>	create	Elasticsearch index "graylog_1785" created
2016-08-30 14:52:58.583	<node>	complete	node startup on 6c493cc8-41fb-4613-86f1-0c9a564c74bb complete - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:49.915	<node>	initiate	node startup on 6c493cc8-41fb-4613-86f1-0c9a564c74bb initiated - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:47.650	<node>	complete	node startup on 18a41943-1e78-46da-ad2b-0f79e2b5f7e4 complete - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:36.892	<node>	initiate	node startup on 18a41943-1e78-46da-ad2b-0f79e2b5f7e4 initiated - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:30.443	<node>	complete	node startup on c5d7bffc-cafd-4546-ac0a-5ccd2ba4c847 complete - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:30.325	<node>	complete	node shutdown on 6c493cc8-41fb-4613-86f1-0c9a564c74bb complete
2016-08-30 14:52:29.173	<node>	initiate	node shutdown on 6c493cc8-41fb-4613-86f1-0c9a564c74bb initiated
2016-08-30 14:52:22.251	<node>	delete	system notification of type "org.graylog2.notifications.Notification.Type" deleted
2016-08-30 14:52:22.105	<node>	initiate	node startup on c5d7bffc-cafd-4546-ac0a-5ccd2ba4c847 initiated - Graylog v2.1.0-rc.2-SNAPSHOT+9384447
2016-08-30 14:52:17.519	<node>	complete	node shutdown on 18a41943-1e78-46da-ad2b-0f79e2b5f7e4 complete
2016-08-30 14:52:16.362	<node>	initiate	node shutdown on 18a41943-1e78-46da-ad2b-0f79e2b5f7e4 initiated
2016-08-30 14:52:09.139	<node>	create	system notification of type "no_master" created
2016-08-30 14:52:06.270	<node>	complete	node shutdown on c5d7bffc-cafd-4546-ac0a-5ccd2ba4c847 complete
2016-08-30 14:52:05.064	<node>	initiate	node shutdown on c5d7bffc-cafd-4546-ac0a-5ccd2ba4c847 initiated

At the bottom of the table, there is a pagination control showing page 1 of 205, with links for previous, next, and other pages.

29.2.2 Expand Event Details

Every row in the audit event entry table is clickable. Once clicked it will reveal the details of the audit event.

All audit events have static fields like *actor*, *object* and others. In addition to that, every event has some event specific fields.

The fields on the left side in the details are the static fields every event has and the fields on the right side are the event specific fields.

graylog Search Streams Dashboards Sources System / Audit Log ▾ In 435 / Out 435 msg/s Help ▾ Administrator ▾

Audit Log

Graylog Audit Log lets you create a chronological record of activities performed in Graylog, that you can later use to reconstruct and examine the sequence of events that occurred when investigating an event.

[Show Audit Log configuration](#) [Audit Log documentation](#)

You can modify the audit log configuration in the Graylog configuration file. Please remember to restart the server afterwards.

Audit Log Entries 4033 total

Enter search query... [Search](#) [Reset](#) [Export Results ▾](#) Show: 20 ▾

Timestamp	Actor	Action	Message
2016-08-30 16:04:52.809	<node>	delete	Index "graylog_1635" deleted after archive graylog_1635 run
<div> <div>Actor</div> <div>urn:graylog:node:c5df7bff-cafd-4546-ac0a-5ccd2ba4c847</div> </div> <div> <div>archiveId</div> <div>graylog_1635</div> </div> <div> <div>Namespace</div> <div>archive</div> </div> <div> <div>indexName</div> <div>graylog_1635</div> </div> <div> <div>Object</div> <div>urn:graylog:archives:es_index</div> </div> <div> <div>Action</div> <div>delete</div> </div> <div> <div>Success status</div> <div>SUCCESS</div> </div> <div> <div>Node ID</div> <div>c5df7bff-cafd-4546-ac0a-5ccd2ba4c847</div> </div>			
2016-08-30 16:04:52.495	<node>	delete	Elasticsearch index range for index "graylog_1635" deleted
2016-08-30 16:04:52.479	<node>	create	archive graylog_1635 for index "graylog_1635" created in "graylog-archive/graylog_1635"

29.2.3 Search & Filter

To make it easier to get to the audit log entries you need, the audit log UI provides a simple query language to search and filter the audit log entries.

You can either enter one or more words into the search field or choose to look for some specific fields in the audit log entries.

Table 3: Available Fields

Name	Description
actor	the user that triggered the audit event
namespace	the namespace of the audit event; might be different in plugins
object	the object of the audit event; what has been changed
action	name of the action that has been executed on the object
success_status	if the action failed or succeeded
message	the actual audit event message

Search for text in the message

If you just want to find some text in the audit event message, you can enter the word you are looking for into the search bar

Audit Log Entries 6 total

Index [Search](#) [Reset](#) [Export Results ▾](#) Show: 20 ▾

Timestamp	Actor	Action	Message
2016-08-30 16:04:52.809	<node>	delete	Index "graylog_1635" deleted after archive graylog_1635 run
2016-08-30 16:04:52.495	<node>	delete	Elasticsearch index range for index "graylog_1635" deleted
2016-08-30 16:04:52.479	<node>	create	archive graylog_1635 for index "graylog_1635" created in "graylog-archive/graylog_1635"
2016-08-30 16:00:02.451	<node>	complete	Elasticsearch index rotation strategy "org.graylog2.indexer.rotation.strategies.TimeBasedRotationStrategy" for index "graylog_1784" completed
2016-08-30 16:00:02.447	<node>	update	Elasticsearch write index changed to "graylog_1785"
2016-08-30 16:00:02.336	<node>	create	Elasticsearch index "graylog_1785" created

Search for specific fields

You can also filter the entries for specific fields like the `actor`.

If you want to filter for all events triggered by the user *jane* you can enter `actor:jane` into the search bar.

Maybe you want to filter for events for more than one actor. That can be done by using either `actor:jane, john` or `actor:jane actor:john`.

Or you want to find all audit events which have **not** been triggered by a user. Add a `-` in front of the field name to negate the condition. To show all events **except** those created by user *jane* you can add `-actor:jane` to the search field.

You can mix and match several field queries to find the entries you need. Here are some more examples.

- `actor:jane, john -namespace:server` get all events by users *jane* and *john* which are not in the *server* namespace
- `index action:create` get all events which have the word *index* in the event message and where the action is *create*
- `message:index action:create` same as above, just with an explicit field selector for the message field

The screenshot shows the Graylog Audit Log interface. At the top, there's a navigation bar with 'graylog' logo and links for Search, Streams, Dashboards, Sources, and System / Audit Log. The main header shows 'Audit Log' with a description and two buttons: 'Show Audit Log configuration' and 'Audit Log documentation'. Below the header, there's a search bar with the query '-namespace:server action:create' and buttons for 'Search', 'Reset', and 'Export Results'. A 'Show: 20' dropdown is on the right. The main content area displays a table of audit log entries. The first entry is expanded, showing details like Actor, Namespace, Object, Action, Success status, and Node ID on the left, and archiveId, indexName, indexAction, and outputPath on the right. The table lists several 'create' actions for archiving Graylog logs.

Timestamp	Actor	Action	Message
2016-08-30 16:04:52.479	<node>	create	archive graylog_1635 for index "graylog_1635" created in "/graylog-archive/graylog_1635"
2016-08-30 14:03:27.642	<node>	create	archive graylog_1634 for index "graylog_1634" created in "/graylog-archive/graylog_1634"
2016-08-30 12:04:15.230	<node>	create	archive graylog_1633 for index "graylog_1633" created in "/graylog-archive/graylog_1633"
2016-08-30 10:04:08.522	<node>	create	archive graylog_1632 for index "graylog_1632" created in "/graylog-archive/graylog_1632"
2016-08-30 08:04:09.328	<node>	create	archive graylog_1631 for index "graylog_1631" created in "/graylog-archive/graylog_1631"
2016-08-30 06:04:11.246	<node>	create	archive graylog_1630 for index "graylog_1630" created in "/graylog-archive/graylog_1630"
2016-08-30 04:04:07.774	<node>	create	archive graylog_1629 for index "graylog_1629" created in "/graylog-archive/graylog_1629"

29.2.4 Export Entries

If the simple entry viewer is not enough, you can also export the result of your query as JSON or CSV to further process it.

The “Export Results” button next to the search bar can be used to do that.

Note: The export from the UI is currently limited to the newest 10,000 entries. Use the REST API if you need a bigger export.

Export via REST API

If you want to backup the audit log entries or make them available to another system, you can use the REST API to export them.

Example:

```
# Export 20,000 audit log entries in JSON format
curl -u admin:<admin-password> http://127.0.0.1:9000/api/plugins/org.graylog.plugins.
↪auditlog/entries/export/json?limit=20000

# Export 5,000 audit log entries with actor "jane" in CSV format
curl -u admin:<admin-password> http://127.0.0.1:9000/api/plugins/org.graylog.plugins.
↪auditlog/entries/export/csv?limit=5000&query=actor:jane
```

Note: Make sure the query parameter is properly escaped if it contains whitespace.

REPORTING

The Reporting feature enables you to create and customize your own reports by using dashboard widgets, schedule reports to be automatically delivered to the people who require them, and manually send or download reports as PDF files at any time.

Additionally we also offer you historic information of report delivery, so you can verify that the scheduled reporting deliveries are working as expected.

Note: Reporting is a commercial feature and part of [Graylog Enterprise](#).

30.1 Setup

Reporting is a commercial Graylog feature that can be installed in addition to the Graylog open source server.

30.1.1 Installation

Reporting is part of the Graylog Enterprise plugin, please check the [Graylog Enterprise setup page](#) for details on how to install it.

The PDF generation needs the `fontconfig` and the `dejavu font` package installed on the server it is running on.

On a Debian based system use `apt` to install it, e.g.:

```
$ sudo apt-get install fontconfig fonts-dejavu
```

Respectively on a RedHat based systems use:

```
$ sudo yum install fontconfig dejavu-sans-fonts dejavu-serif-fonts
```

30.1.2 Configuration

In most cases you can use the Reporting functionality without making any changes to your Graylog configuration file (check the [default file locations page](#) to see where you can find it). Below, you will find all available configuration options in case you need to do some advanced configuration.

Table 1: Configuration Options

Name	Description
<code>bin_dir</code>	Directory with binaries needed for PDF generation.
<code>data_dir</code>	Cache directory for PDF generation.
<code>report_disable_sandbox</code>	Disables report generation sandbox.
<code>report_generation_timeout</code>	Timeout in seconds to wait for a report generation.
<code>report_user</code>	Internal user to generate reports.
<code>report_render_uri</code>	URI to connect to Graylog Web Interface.
<code>report_render_engine_port</code>	Port to communicate with background process.

`bin_dir`

Default value: `bin` - relative to Graylog working directory

The default distribution comes with two binaries needed for PDF generation ‘headless_shell’ and ‘chromedriver’. These binaries are usually located in `/usr/share/graylog-server/bin`.

`data_dir`

Default value: `data` - relative to Graylog working directory

The PDF generation happens on disk in the first place so Graylog needs a place to write out temporary files. The system packages create `/var/lib/graylog-server` for this purpose. Make sure this directory is correctly configured and read-, and writable for the Graylog Server user.

`report_disable_sandbox`

Default value: `false`.

To ensure the maximum security in your system, the reporting generation process runs inside a sandbox, which provides a restricted environment for the application. That sandbox can only be used when the process is executed as a normal user, as the `root` user has special administrative privileges that could grant a potential attacker full access to your system.

We recommend leaving this configuration option set to `false`.

Unfortunately, there are two scenarios where the security features provided by the sandbox cannot be used:

- Environments where you want or must use the `root` user to run reporting generation.
- Environments that provide limited kernel capabilities. On the one hand Docker containers limit the kernel capabilities in a way that sandboxing doesn’t work. On the other hand some RedHat/CentOS based systems come with older kernel versions which also lack the necessary capabilities. Systems with a kernel version `>= 4.x` should be fine for the default settings.

In case your Graylog server runs in one of those scenarios, you may consider disabling the sandbox.

Please note that this option only affects the reporting generation process, not the Graylog server.

report_generation_timeout_seconds

Default value: 180.

Time in seconds to wait for a report to load in the background.

To ensure all widgets in your report have time to fetch their data and load, Graylog will wait up to the value set to this configuration option. When a report takes longer than that to load, the report generation will fail and Graylog will log the error in its logs.

In case reports in your Graylog setup are not being generated and the server displays a timeout error, you may need to increase this value.

report_user

Default value: `graylog-report`.

Graylog user that will be used internally to generate reports in the background. To ensure the user has access to all required information, this user must have the *Report System (Internal)* role assigned.

report_render_uri

Default value: `$http_publish_uri`.

Customize the URI the background process uses to connect to the web interface. By default it uses the value of the *http_publish_uri* option in your Graylog configuration file.

report_render_engine_port

Default value: 9515.

Customize the port used to communicate with the background process.

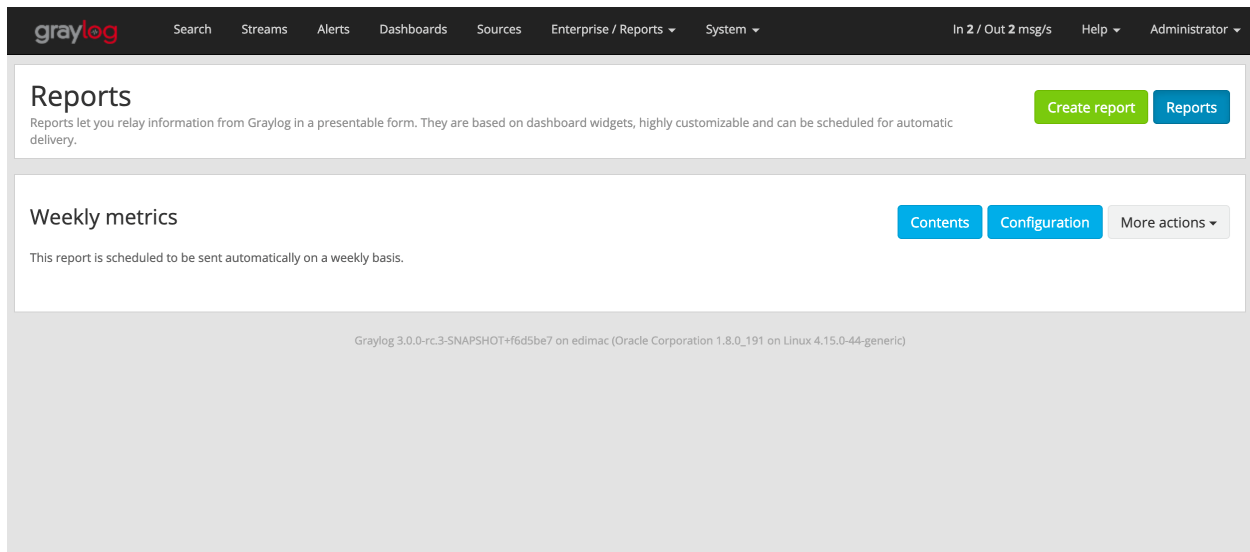
30.2 Usage

Reports let you combine multiple Dashboard widgets to create a document that can display certain information contained within a Graylog system in an organized format for specific purposes.

Note: Reports are based on Dashboard widgets, so please ensure you understand *Dashboards* before you get started.

30.2.1 Creating Reports

You can create a report on the “Enterprise/Reports” page in the web interface.



Click on the “Create Report” button to get started. That page contains two different sections:

- **Contents** You can use the form to configure the report’s cover page, a short description, and select the widgets that will be part of the report.
- **Summary** This information will usually appear on your right and will follow you as you scroll through the page. It displays a summary of the data included in the report.

graylog
Search Streams Alerts Dashboards Sources Enterprise / Reports System
In 34 / Out 34 msg/s Help Administrator

Edit report Weekly metrics
Reports Modify content Edit configuration History

Decide which content should be part of the report while you see its preview. You can schedule and configure the report in the next screen.

Contents

Write a title and description for the report and select the widgets that will be include in it.


Title

Set a title to use in the report's cover page.

Subtitle (Optional)

Set a subtitle to use in the report's cover page.

Logo (Optional)



Remove logo
Browse... No file selected.

Choose an image to use as a logo in the report's cover page. The image must be in JPEG or PNG formats and cannot exceed 1 MB.

Description (Optional)

Add a description to include at the beginning of the report.

Widgets

Select the widgets to include in the report. You can create new widgets and add them to the report later on.

☐ Team Graylog dashboard contains 4 widgets


Report summary

This is a summary of contents included in the report. You may modify them later if necessary.

Title
Weekly metrics

Subtitle
Graylog, Inc.

Logo



Description
No report description given.

Widgets
3 widgets currently included in the report.

Update report Cancel

Once you are satisfied with the content that will make part of your report, click on “Create report” to store that configuration in the database.

You can change the selected contents of a report any time by going to the “Enterprise/Reports” page and clicking on the “Contents” button for the report you wish to modify.

30.2.2 Configure Reports

The Report Configuration page provides options to schedule the report for delivery and also to configure the layout of the report.

Go to the “Enterprise/Reports” page and click on “Configuration” to open the Report Configuration page.

graylog
Search Streams Alerts Dashboards Sources Enterprise / Reports ▼ System ▼
In 2 / Out 2 msg/s Help ▼ Administrator ▼

Report *Weekly metrics* configuration
Configure the report layout and schedule, adapting it to your needs.
Reports Modify content Edit configuration History

Scheduling

Choose the recipients for this report and when the report should be scheduled for delivery.

☒ Send this report automatically on a regular basis

Frequency

Weekly

Select how often this report should be sent out.

Weekly frequency options

Report will be sent every Monday at 09:00 local time (08:00 UTC).

Monday 09:00

Select the day of the week and time of the day when the report should be sent out.

Email subject

Your weekly metrics

Set an email subject to use when sending the report.

Email body

Good morning,

Hope you have a great weekend! Here are your weekly metrics.

Regards,

Foobar

Add an email body to use when sending the report.

User recipients

poppy (Poppy Taylor) Isla (Isla Williams)

Select Graylog usernames that will receive this report.

Email recipients

metrics@graylog.local

Layout

This is a preview of the report. Drag and drop widgets to sort the report contents, your changes will be updated automatically.

Weekly metrics

Graylog, Inc.

graylog

end of cover page

Avg usage

Time	Messges
17:45	4500
17:46	1000
17:47	6500
17:48	5500
17:49	500

Scheduling

Warning: Please ensure the *email configuration* in your Graylog configuration file is working before you enable report scheduling.

Note: Scheduling Reports will use resources in the background on both your Graylog and ES cluster. To avoid performance issues, make sure to allocate enough resources for your setup and also disable scheduling of Reports you don't need to be sent automatically.

In the Scheduling section you can configure how often the report will be sent. It is possible to send reports on a daily, weekly or monthly basis.

Here you can also add a subject and body to the email that will contain the report and select Graylog users or external email addresses that should receive the report as email.

Once you update the information, make sure to click on “Update scheduling” to save your changes.

Layout

Much like in a Dashboard, you can drag and drop widgets on the virtual sheet of paper to select the orders the widgets should go in the report. Rearranging widgets will save the change in the layout automatically.

Please note that the cover page will always be the first page of the report, and the next page will start with the report description followed by all widgets in the configured order.

30.2.3 History

As the background generation of reports may fail, the Report History page can help you discover if there were any errors while generating and sending a report in the background.

To open the Report history page for a report, click on the “More actions” button for that report, and select “Report history”.

The screenshot shows the Graylog web interface. The top navigation bar includes 'graylog', 'Search', 'Streams', 'Alerts', 'Dashboards', 'Sources', 'Enterprise / Reports', and 'System'. On the right, it shows 'In 1 / Out 1 msg/s', 'Help', and 'Administrator'. The main content area is titled 'Report *Weekly metrics* history' with a subtitle 'Review the generation and delivery status of any report.' To the right of the title are four buttons: 'Reports', 'Modify content', 'Edit configuration', and 'History'. Below the title, there is a table with columns 'Status', 'Message', and 'Date'. A single row is visible with a red status icon, the message 'Report could not be sent, please review your Graylog server email settings.', and the date 'Thursday 7 February 2019, 17:48 +0100'. To the right of the table is a 'Show:' dropdown menu set to '10'. At the bottom of the table, there is a pagination control showing '1' in a red box, indicating the current page. The footer of the page states 'Graylog 3.0.0-rc.3-SNAPSHOT+f6d5be7 on edimac (Oracle Corporation 1.8.0_191 on Linux 4.15.0-44-generic)'.

30.2.4 Generating Report On Demand

Download manually

You can generate and download a report manually from the web interface. To do so, go to the “Enterprise/Reports” page, click on the “More actions” button for the report you want to download, and select “Download report now”.

Please take into account that the report generation may take a while.

Send report as email manually

In addition to downloading a report on demand, you may also generate and send the report at any time by clicking on “More actions” and “Send report now” on the “Enterprise/Reports” page.

31.1 License Installation

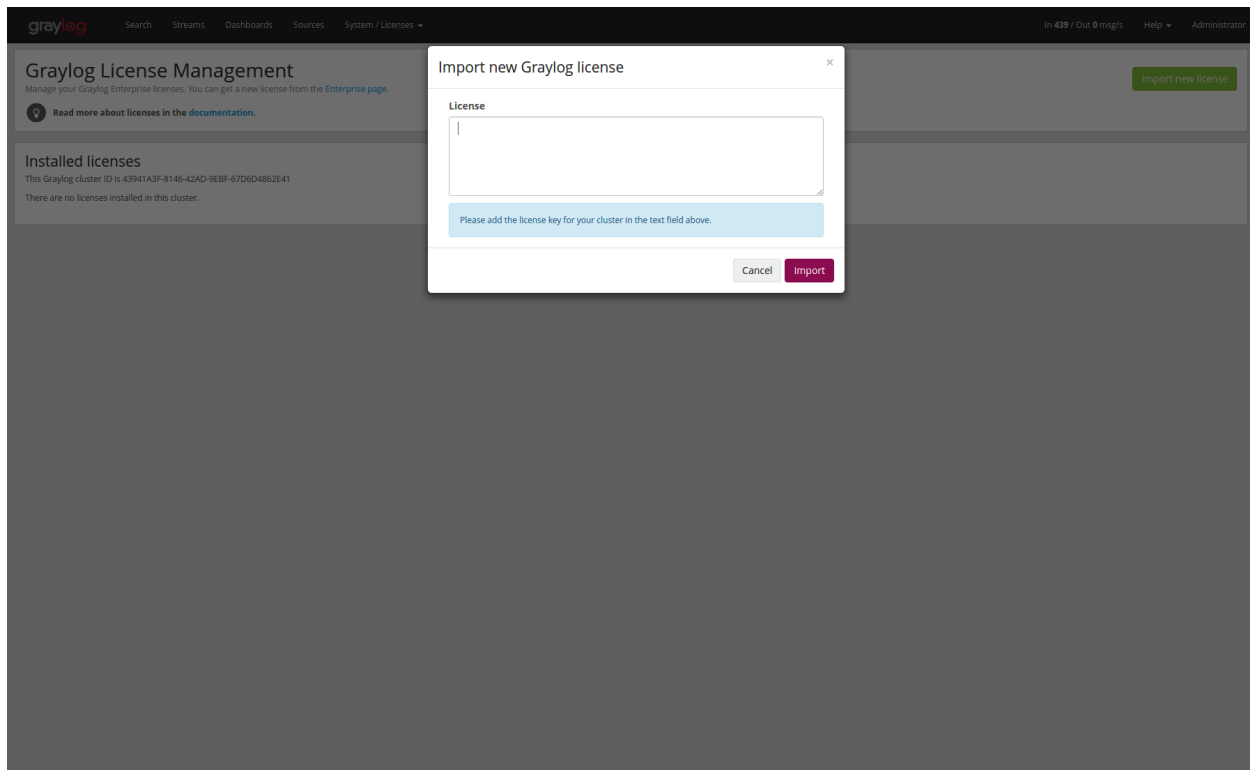
The Graylog Enterprise plugins require a valid license to use the additional features.

Once you have [obtained a license](#) you can import it into your Graylog setup by going through the following steps.

1. As an admin user, open the “Enterprise/License” page from the menu in the web interface.
2. Click the Import new license button in the top right hand corner.
3. Copy the license text from the confirmation email and paste it into the text field.
4. The license should be valid and a preview of your license details should appear below the text field.
5. Click Import to activate the license.

The license automatically applies to all nodes in your cluster without the need to restart your server nodes.

Note: If there are errors, please check that you copied the entire license from the email without line breaks. The same license is also attached as a text file in case it is wrongly formatted in the email.



31.2 License Verification

Some Graylog licenses require to check their validity on a regular basis. This includes the free Graylog Enterprise license with a specific amount of traffic included.

If your network environment requires Graylog to use a proxy server in order to communicate with the external services via HTTPS, you'll have to configure the proxy server in the *Graylog configuration file*.

The Graylog web interface shows all details about the license, but if you are still unclear about the requirements, please contact our [sales team](#) with your questions.

31.2.1 Details on License Verification

Graylog Enterprise periodically sends the following information to 'api.graylog.com' via HTTPS on TCP port 443 for each installed license:

- A nonce to avoid modified reports
- The ID of the license
- The ID of the Graylog cluster
- A flag indicating if the license is violated
- A flag indicating if the license has expired
- A flag indicating if Graylog detected that the traffic measuring mechanisms have been modified
- A list of how much traffic was received and written by Graylog in the recent days, in bytes

31.2.2 Details on licensed traffic

Graylog has four counters, only the last is counted for the licensed traffic.

- **`org.graylog2.traffic.input`** the incoming message without any decoding, what is written to the journal before any processing.
- **`org.graylog2.traffic.decoded`** the message after the codec of the input has parsed the message (for example syslog parser)
- **`org.graylog2.traffic.system-output-traffic`** currently, this is stored in memory only and includes the traffic from archive restores.
- **`org.graylog2.traffic.output`** what is written to Elasticsearch after all processing is done.

Only the Elasticsearch output is measured, all other outgoing traffic does not count. The measurement happens when the message is serialized to elasticsearch. If a message is written to multiple indices the message will count for each index. It does not matter how many copies (replicas) the index has configured as this is done in elasticsearch.

Each of the counters follows these rules:

- count the length of the field name.
- If the content of the field is a string, the length of the string is counted not the bytes of that string
- **for non-string content in the field, the byte length of that content is counted**
 - byte = 1 byte
 - char/short = 2 bytes
 - bool/int/float = 4 bytes
 - long/double = 8 bytes
 - dates = 8 bytes
- all internal fields are not counted (those meta information that are created by Graylog)

CHANGELOG

32.1 Graylog Enterprise 4.0.13

Released: 2021-09-13

32.1.1 Enterprise

No changes since 4.0.11.

32.2 Graylog Enterprise 4.0.12

The 4.0.12 release has been skipped due to build errors.

32.3 Graylog Enterprise 4.0.11

Released: 2021-08-04

32.3.1 Enterprise

No changes since 4.0.10.

32.4 Graylog Enterprise 4.0.10

Released: 2021-07-28

32.4.1 Enterprise

Security

Session ID leak in Graylog DEBUG log file and audit log.

We recently discovered a session ID leak in the Graylog DEBUG log file as well as the audit log. A user can use a session ID to authenticate against Graylog and then this user has access to all the permissions associated with the owner of the session ID.

The ID was printed in DEBUG level log messages (DEBUG is not enabled by default) as well as the Graylog Enterprise Audit Log. By default, the Graylog Audit Log is only logging to the local database and only accessible by Graylog administrators.

We would like to thank David Herbstmann for discovering and responsibly disclosing this vulnerability.

The following CVE IDs have been assigned: [CVE-2021-37759](#), [CVE-2021-37760](#)

32.5 Graylog Enterprise 4.0.9

Released: 2021-07-07

No changes since 4.0.8.

32.6 Graylog Enterprise 4.0.8

Released: 2021-06-02

32.6.1 Enterprise

Fixed

- Lower log level for irregular traffic record check.

32.7 Graylog Enterprise 4.0.7

Released: 2021-05-05

32.7.1 Enterprise

Fixed

- Fix rendering of the world map visualization in reports.

32.8 Graylog Enterprise 4.0.6

Released: 2021-04-07

32.8.1 Enterprise

Fixed

- Change LDAPGroupResolver to use case-insensitive matching

32.8.2 Enterprise Integrations Plugin

Added

- Add “drop sensitive data” option to Microsoft365 input

32.9 Graylog Enterprise 4.0.5

Released: 2021-02-22

32.9.1 Enterprise

No changes since 4.0.4.

32.10 Graylog Enterprise 4.0.4

Released: 2021-02-22

32.10.1 Enterprise

No changes since 4.0.3.

32.11 Graylog Enterprise 4.0.3

Released: 2021-02-16

32.11.1 Enterprise

No changes since 4.0.2.

32.11.2 Enterprise Integrations Plugin

Added

- Add full-message transformer to Enterprise Output Framework.

32.12 Graylog Enterprise 4.0.2

Released: 2021-01-27

32.12.1 Enterprise

Added

- Allow modification of timezone in report scheduling settings.

Fixed

- Fix report preview styling when dark mode is active.

32.12.2 Enterprise Integrations Plugin

Fixed

- Reduce noise of legacy script alarm callback notification.
- Fix timing issue with old checkpoints in Office365 plugin.
- Properly shut down TCP connections when stopping Enterprise outputs.

32.13 Graylog Enterprise 4.0.1

Released: 2020-11-25

32.13.1 Enterprise

No changes since 4.0.0.

32.13.2 Enterprise Integrations Plugin

- Do not shut down Okta input on errors.
- Let Office 365 plugin use configured proxy settings.

32.14 Graylog Enterprise 4.0.0

Released: 2020-11-18

32.14.1 Enterprise

Added

- Add support for grouping users in teams.
 - See: *Permission Management*
- Add support for managing access to streams, searches and dashboards through teams.
 - See: *Permission Management*
- Add support for syncing groups from LDAP and Active Directory into Graylog teams.
 - See: *Permission Management*
- Add configurable header badge.
- Create notification for failed Enterprise outputs.
- Add cluster resources for archiving to allow archiving to be managed from all server nodes.

Fixed

- Don't fail reports migration if a widget is missing.
- Improve error logging for report generation.

32.14.2 Enterprise Integrations Plugin

Added

- Script event notification plugin to replace the legacy script alarm callback plugin.

32.15 Graylog Enterprise 3.3.14

Released: 2021-07-28

32.15.1 Enterprise

Security

Session ID leak in Graylog DEBUG log file and audit log.

We recently discovered a session ID leak in the Graylog DEBUG log file as well as the audit log. A user can use a session ID to authenticate against Graylog and then this user has access to all the permissions associated with the owner of the session ID.

The ID was printed in DEBUG level log messages (DEBUG is not enabled by default) as well as the Graylog Enterprise Audit Log. By default, the Graylog Audit Log is only logging to the local database and only accessible by Graylog administrators.

We would like to thank David Herbstmann for discovering and responsibly disclosing this vulnerability.

The following CVE IDs have been assigned: [CVE-2021-37759](#), [CVE-2021-37760](#)

32.16 Graylog Enterprise 3.3.13

Released: 2021-05-05

32.16.1 Enterprise

Fixed

- Fix rendering of the world map visualization in reports.

32.17 Graylog Enterprise 3.3.12

Released: 2021-04-14

No changes since 3.3.11.

32.18 Graylog Enterprise 3.3.11

Released: 2021-02-16

No changes since 3.3.10.

32.19 Graylog Enterprise 3.3.10

Released: 2021-01-27

32.19.1 Enterprise

Added

- Allow modification of timezone in report scheduling settings.

32.20 Graylog Enterprise 3.3.9

Released: 2020-11-25

32.20.1 Enterprise

Fixed

- Fix audit formatting for file resource.
- Fix permission issue with reports.
- Fix logo images in reports.
- Fix issue with rendering help buttons.

32.20.2 Enterprise Integrations Plugin

Fixed

- Do not shut down Office 365 input on errors.
- Do not shut down Okta input on errors.
- Fix issue with Office 365 logon data parsing.
- Let Office 365 plugin use configured proxy settings.

32.21 Graylog Enterprise 3.3.8

Released: 2020-10-12

32.21.1 Enterprise Integrations Plugin

Fixed

- Fixed an issue with the O365 codec where it was not handling the event timestamp correctly.

32.22 Graylog Enterprise 3.3.7

Released: 2020-10-08

32.22.1 Enterprise Integrations Plugin

Fixed

- Ensure cleanup of on-disk journal when Enterprise Output is deleted.

32.23 Graylog Enterprise 3.3.6

Released: 2020-09-28

32.23.1 Enterprise

Fixed

- Improve error logging during report generation.

32.23.2 Enterprise Integrations Plugin

Added

- Add Google BigQuery output to the enterprise output framework.

Fixed

- Fix `NullPointerException` and thread-safety issues in the enterprise output framework.
- Fix retry logic and overall robustness of the office365 input.
- Improve error detection and error handling in the enterprise output framework.

32.24 Graylog Enterprise 3.3.5

Released: 2020-08-17

Fixed

- Fix `NullPointerException` when deleting an output, which caused the on-disk journal to not get cleaned up.

32.25 Graylog Enterprise 3.3.4

Released: 2020-08-06

Changed

- Fix pipeline selection on output creation to make the pipeline optional rather than required.

Fixed

- Fixed a bug which occurred during the setup of the O365 Input.
- Fix error when starting the Forwarder with the Enterprise Integrations plugin.

32.26 Graylog Enterprise 3.3.3

Released: 2020-07-29

Added

- Add office365 input plugin.
- Add reliable output framework and TCP and TCP Syslog outputs.

32.27 Graylog Enterprise 3.3.2

Released: 2020-06-24

Fixed

- Fix message table headers in reports.

32.28 Graylog Enterprise 3.3.1

Released: 2020-06-10

Fixed

- Fix issue with reports database migration when widgets are missing.
- Add a cluster resource for the archiving HTTP API and use it in the UI. All endpoints in the cluster resource are routed to the regular endpoints on the master node to avoid the need for custom proxy configuration.

32.29 Graylog Enterprise 3.3.0

Released: 2020-05-20

Added

- Input for Okta log events.
- Create detailed audit log messages for search jobs.
- Create detailed audit log messages for message exports.
- Automatically install trial licenses requested from the UI.

- Add 1 day mute option to trial license reminders.

Changed

- Implement message list limit in reports.

Fixed

- Fix archive catalog response with different backends having the same archive.
- Improve keyboard input for search/dashboard parameter fields.
- Improve error messages with missing parameters in reports.
- Fix problem with non-ascii characters in correlation field names.
- Fix unintended selection of multiple widgets in report widget selection.
- Fix detection of value-less parameters in reports.
- Hide license warning on search/dashboard page if no license is installed.
- Use user defined chart colors in reports.

32.30 Graylog Enterprise 3.2.6

Released: 2020-06-10

No changes since 3.2.5.

32.31 Graylog Enterprise 3.2.5

Released: 2020-05-19

No changes since 3.2.4.

32.32 Graylog Enterprise 3.2.4

Released: 2020-03-19

Fixed

- Fix issue with search parameter input fields.
- Fix error exporting a correlation event definition in content packs.

32.33 Graylog Enterprise 3.2.3

Released: 2020-03-11

Fixed

- Fix issue with custom fields and correlation event definitions.

32.34 Graylog Enterprise 3.2.2

Released: 2020-02-20

Fixed

- Fix missing rows in message table widget in reports. [Graylog2/graylog2-server#7349](#) [Graylog2/graylog2-server#7492](#)
- Don't try to archive indices which have already been archived.

32.35 Graylog Enterprise 3.2.1

Released: 2020-02-04

Fixed

- Gracefully handle missing dashboards and widgets when collecting parameters for reports. [Graylog2/graylog2-server#7347](#)

32.36 Graylog Enterprise 3.2.0

Released: 2020-01-14

Added

- Dynamic list support for events and alert definition queries.
- Search parameter support for reports.
- MongoDB lookup data adapter.

Fixed

- Remove incomplete archive directory when archiving process fails.
- Fix race condition with archive catalog writing.

32.37 Graylog Enterprise 3.1.4

Released: 2020-01-14

Fixed

- Only write archive metadata if the archiving process succeeded.
- Improve resiliency of widgets in reports.

32.38 Graylog Enterprise 3.1.3

Released: 2019-11-06

Fixed

- Fix problem with correlating events created by aggregation event definitions.
- Remove incomplete archive directory when archive job fails or is stopped.

32.39 Graylog Enterprise 3.1.2

Released: 2019-09-12

No changes since 3.1.1.

32.40 Graylog Enterprise 3.1.1

Released: 2019-09-04

No changes since 3.1.0.

32.41 Graylog Enterprise 3.1.0

Released: 2019-08-16

Added

- Add correlation engine and UI for new alerts and events system.
- Add Enterprise job scheduler implementation.

Removed

- Moved views feature to open-source. (except parameter support)

Fixed

- Fix report service memory leak.
- Fix auto-completion in drop-down fields.
- Fix rendering of archive configuration page

32.42 Graylog Enterprise 3.0.2

Released: 2019-05-03

Integrations Plugin

- Improve Graylog Forwarder configuration defaults.
- Improve Graylog Forwarder error handling.
- Update Graylog Forwarder dependencies.

32.43 Graylog Enterprise 3.0.1

Released: 2019-04-01

- Fix missing authorization checks in the license management.
- Fix view sharing issue for regular users.
- Fix memory leak in the reporting system.

Integrations Plugin

- Add Graylog Forwarder feature.

32.44 Graylog Enterprise 3.0.0

Released: 2019-02-14

- Announcement blog post: <https://www.graylog.org/post/announcing-graylog-v3-0-ga>
- Upgrade notes: *Upgrading to Graylog 3.0.x*

A detailed changelog is following soon!

Integrations Plugin

- Add Script Alert Notification

32.45 Graylog Enterprise 2.5.2

Released: 2019-03-15

32.45.1 Plugin: License

- Add missing permissions to license HTTP API resources.
- Only show upcoming license expiration warning to admin users.

32.46 Graylog Enterprise 2.5.1

Released: 2018-12-19

No changes since 2.5.0.

32.47 Graylog Enterprise 2.5.0

Released: 2018-11-30

No changes since 2.4.6.

32.48 Graylog Enterprise 2.4.7

Released: 2019-03-01

32.48.1 Plugin: License

- Add missing authorization checks to license resources.

32.49 Graylog Enterprise 2.4.6

Released: 2018-07-16

No changes since 2.4.5.

32.50 Graylog Enterprise 2.4.5

Released: 2018-05-28

No changes since 2.4.4.

32.51 Graylog Enterprise 2.4.4

Released: 2018-05-02

No changes since 2.4.3.

32.52 Graylog Enterprise 2.4.3

Released: 2018-01-24

No changes since 2.4.2.

32.53 Graylog Enterprise 2.4.2

Released: 2018-01-24

No changes since 2.4.1.

32.54 Graylog Enterprise 2.4.1

Released: 2018-01-19

No changes since 2.4.0.

32.55 Graylog Enterprise 2.4.0

Released: 2017-12-22

No changes since 2.4.0-rc.2.

32.56 Graylog Enterprise 2.4.0-rc.2

Released: 2017-12-20

No changes since 2.4.0-rc.1.

32.57 Graylog Enterprise 2.4.0-rc.1

Released: 2017-12-19

No changes since 2.4.0-beta.4.

32.58 Graylog Enterprise 2.4.0-beta.4

Released: 2017-12-15

32.58.1 Plugin: License

- The license page now shows more details about the installed licenses.

32.59 Graylog Enterprise 2.4.0-beta.3

Released: 2017-12-04

No changes since 2.4.0-beta.2.

32.60 Graylog Enterprise 2.4.0-beta.2

Released: 2017-11-07

No changes since 2.4.0-beta.1.

32.61 Graylog Enterprise 2.4.0-beta.1

Released: 2017-10-20

32.61.1 Plugin: Archive

- Add support for Zstandard compression codec.

32.62 Graylog Enterprise 2.3.2

Released: 2017-10-19

32.62.1 Plugin: Archive

- Fix archive creation for indices with lots of shards.

32.63 Graylog Enterprise 2.3.1

Released: 2017-08-25

32.63.1 Plugin: Archive

- Lots of performance improvements (up to 7 times faster)
- Do not delete an index if not all of its documents have been archived

32.64 Graylog Enterprise 2.3.0

Released: 2017-07-26

32.64.1 Plugin: Archive

- Record checksums for archive segment files
- Add two archive permission roles “admin” and “viewer”
- Allow export of filenames from catalog search

32.65 Graylog Enterprise 2.2.3

Released: 2017-04-04

32.65.1 Plugin: Archive

- Metadata is now stored in MongoDB
- Preparation for storage backend support

32.66 Graylog Enterprise 2.2.2

Released: 2017-03-02

32.66.1 Plugin: Audit Log

- Extend integration with the Archive plugin

32.67 Graylog Enterprise 2.2.1

Released: 2017-02-20

32.67.1 Plugin: Archive

- Improve stability and smaller UI fixes

32.68 Graylog Enterprise 2.2.0

Released: 2017-02-09

32.68.1 Plugin: Archive

- Improve index set support

32.69 Graylog Enterprise 1.2.1

Released: 2017-01-26

32.69.1 Plugin: Archive

- Prepare the plugin to be compatible with the new default stream.

32.69.2 Plugin: Audit Log

- Add support for index sets and fix potential NPEs.
- Smaller UI improvements.

32.70 Graylog Enterprise 1.2.0

Released: 2016-09-14

<https://www.graylog.org/blog/70-announcing-graylog-enterprise-v1-2>

32.70.1 Plugin: Archive

- Add support for selecting which streams should be included in your archives.

32.70.2 Plugin: Audit Log

New plugin to keep track of changes made by users to a Graylog system by automatically saving them in MongoDB.

32.71 Graylog Enterprise 1.1

Released: 2016-09-01

- Added support for Graylog 2.1.0.

32.72 Graylog Enterprise 1.0.1

Released: 2016-06-08

Bugfix release for the archive plugin.

32.72.1 Plugin: Archive

Fixed problem when writing multiple archive segments

There was a problem when exceeding the max segment size so that multiple archive segments are written. The problem has been fixed and wrongly written segments can be read again.

32.73 Graylog Enterprise 1.0.0

Released: 2016-05-27

Initial Release including the Archive plugin.

32.73.1 Plugin: Archive

New features since the last beta plugin:

- Support for multiple compression strategies. (Snappy, LZ4, Gzip, None)

GRAYLOG INTEGRATIONS

33.1 Integrations Setup

Integrations are tools that help Graylog work with external systems and will typically be content packs, inputs, or lookup tables.

Integrations are distributed in two plugins:

- `graylog-integrations-plugins`
- `graylog-enterprise-integrations-plugins`

Important: The plugins need to be installed on all your Graylog nodes!

33.1.1 Installation

To install the plugins, you can use one of the following options.

Operating System Packages

If you have installed Graylog using linux system packages (as described in the *Operating System Packages* installation guides), then you can use the following DEB or RPM operating system packages.

DEB

The installation on distributions like Debian or Ubuntu can be done with *apt-get* as installation tool from the previous installed online repository.

```
$ sudo apt-get install graylog-integrations-plugins graylog-enterprise-integrations-  
↳ plugins
```

RPM

The installation on distributions like CentOS or RedHat can be done with *yum* as installation tool from the previous installed online repository.

```
$ sudo yum install graylog-integrations-plugins graylog-enterprise-integrations-
  ↪plugins
```

Tarballs

If you have done a manual installation, you download the tarballs from the following links.

Table 1: Integrations Plugins download

Integrations Version	Download URL
3.3.0	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.0.tgz
3.3.1	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.1.tgz
3.3.2	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.2.tgz
3.3.3	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.3.tgz
3.3.4	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.4.tgz
3.3.5	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.5.tgz
3.3.6	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.6.tgz
3.3.7	https://downloads.graylog.org/releases/graylog-integrations/graylog-integrations-plugins-3.3.7.tgz

Table 2: Enterprise Integrations Plugins download

Enterprise Integrations Version	Download URL
3.3.0	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.0.tgz
3.3.1	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.1.tgz
3.3.2	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.2.tgz
3.3.3	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.3.tgz
3.3.4	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.4.tgz
3.3.5	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.5.tgz
3.3.6	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.6.tgz
3.3.7	https://downloads.graylog.org/releases/graylog-enterprise-integrations/graylog-enterprise-integrations-plugins-3.3.7.tgz

Note: The integrations plugins need to be the same version as the Graylog server.

33.1.2 Server Restart

Make sure to restart your Graylog servers once the plugins are installed.

33.1.3 Installation Success

The following server log message will indicate that each plugin was installed properly.

```
INFO: [CmdLineTool] Loaded plugin: Integrations Plugin 3.2.0 [org.graylog.  
↪integrations.IntegrationsPlugin]  
INFO: [CmdLineTool] Loaded plugin: Enterprise Integrations Plugin 3.2.0 [org.graylog.  
↪integrations.EnterpriseIntegrationsPlugin]
```

Integrations are tools that help Graylog work with external systems. Integrations will typically be content packs, inputs, or lookup tables and can be either Open Source or Enterprise.

Reference the *Integrations Setup* document for installation instructions.

Below are the available features:

33.2 Open Source

- *AWS Kinesis/CloudWatch Input*
- *Palo Alto Network Input*
- *IPFIX Input*

33.3 Enterprise

Enterprise Integrations features require a [Graylog Enterprise license](#) . For a comprehensive list of available features included, see our *Enterprise List page*

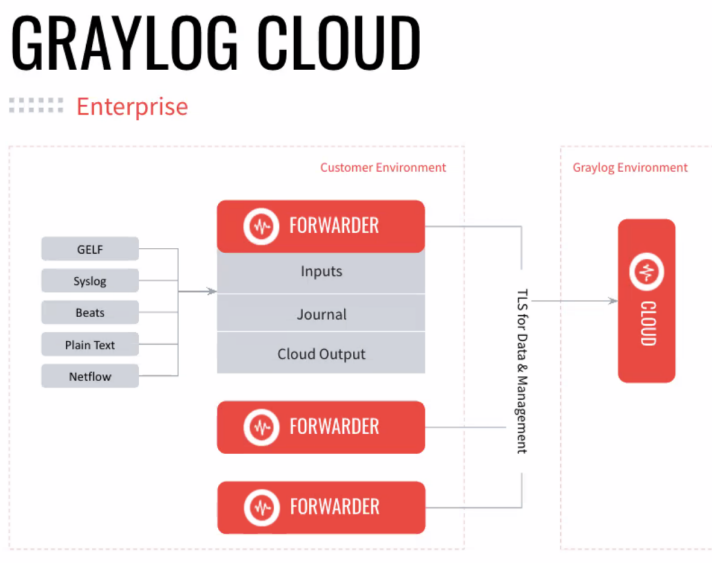
- *Forwarder*
- *Enterprise Output Framework*
- *Script Alert Notification*
- *Okta Log Events Input*
- *Office 365 Log Events Input*

33.3.1 Forwarder

The Forwarder provides the ability to forward messages from one Graylog cluster to another over HTTP/2. This centralizes log messages from multiple distributed Graylog source clusters into one destination cluster, which allows centralized alerting, reporting, and oversight.

Two Graylog clusters are required to use the Forwarder: A Graylog source cluster (Forwarder Output) and a Graylog destination cluster (Forwarder Input). The Graylog source cluster will forward messages, and the Graylog destination cluster will receive messages being forwarded.

Note: This is an Enterprise Integrations feature and is only available since Graylog version 3.0.1 and thus requires an Enterprise license. See the [Integrations Setup](#) page for more info.



Forwarder Output

The Forwarder Output (Graylog source cluster) is responsible for forwarding messages to the Graylog destination cluster. It first writes the messages to an on-disk journal in the Graylog source cluster (Forwarder Output). Messages stay in the on-disk journal until the Graylog destination cluster is available to receive messages.

Messages are only forwarded until after they are done being processed through the pipeline of the Graylog source cluster, but simultaneously as they are written to Elasticsearch.

Forwarder Journal

The Forwarder is equipped with a disk journal. This journal immediately persists messages received from the Graylog Output system to disk before attempting to send them to the remote Graylog destination cluster. This allows the Forwarder to keep receiving and reliably queuing messages, even if the remote Graylog destination cluster is temporarily unavailable due to network issues. The Journal has many configuration options (such as Maximum Journal Size) available and described on below.

Forwarder Output Options

The Graylog Forwarder is capable of forwarding messages at very high throughput rates. Many hardware factors will affect throughput (such as CPU clock speed, number of CPU cores, available memory, and network bandwidth). Several Forwarder Output configuration options are also available to help you tune performance for your throughput requirements and environment.

Create new Output

Title

Select a name of your new output that describes it.

Hostname

The destination host name or IP address where the Graylog Forwarder input is running.

Port

The destination port that the Graylog Forwarder input is listening on.

Journal Segment Size

The soft maximum for the size of a segment file in the log.

Journal Segment Age

The disk journal segment age.

Maximum Journal Size

The maximum size for the disk journal.

Maximum Journal Message Age

The maximum time that a message will be stored in the disk journal.

Journal Message Flush Interval

The number of messages that can be written to the log before a flush is forced.

Maximum Journal Flush Age

The amount of time the log can have dirty data before a flush is forced.

Journal Buffer Size

The size of the pre-journal buffer. This number must be a power of two.

Number of Handlers Journal Buffer Encoders

The number of concurrent journal encoders. This is a fast operation. A low number (3) is probably acceptable.

Send Buffer Size

The size of the post-journal send buffer. This number must be a power of two.

Sender Encoders

The number of concurrent send encoders. This is a fast operation. A low number (3) is probably acceptable.

Concurrent Network Senders

The number of concurrent network senders. Use multiple senders to increase throughput. This number generally should not exceed the number of cores on a machine.

GRPC Request Timeout

Request timeout for GRPC in milliseconds

Maximum Journal Read Batch Size

The maximum number of messages read from the journal at once.

☐ Enable Compression

The option to compress messages when they are transported

TLS Trusted Certificate Chain File (optional)

Path to the trusted certificate chain file for verifying the remote endpoint's certificate. The file should contain an X.509 certificate collection in PEM format.

☐ Enable TLS

Option to enable TLS.

Cancel

Save

Forwarder Input

The Forwarder Input (Graylog destination cluster) is responsible for receiving messages that have been forwarded from the Graylog cluster source.

When the Graylog destination cluster (Forwarder Input) receives the forwarded messages, the following relevant fields are added to help track which Graylog cluster and node the messages originated from.

- **gl2_source_cluster_id**
 - The id of the source Graylog cluster.
- **gl2_source_node_id**
 - The id of the source Graylog node.

Forwarder Input Options

Launch new *Forwarder* input

☐ Global

Should this input start on all nodes

Node

Select Node

On which node should this input start

Title

Select a name of your new input that describes it.

Bind Address

0.0.0.0

Address to listen on. For example 0.0.0.0 or 127.0.0.1.

Port

13301

Port number to listen on

☐ Enable TLS

Option to enable TLS for connection

TLS Trusted Certificate Chain File (optional)

Path to the trusted certificate chain file. The file should contain an X.509 certificate collection in PEM format.

TLS Private Key File (optional)

Path to the TLS private key file. The file should be in PEM format

Cancel

Save

SSL/TLS

TLS encryption is supported to ensure secure transport of forwarded messages. You can enable it by checking the Enable TLS check box on both the Forwarder input and output. The Forwarder Input requires that both the certificate and key locations must be specified. The Forwarder Output requires only the certification location be specified.

Note: Only X.509 certificates and keys in PEM format are supported. TLS Authentication is not currently supported.

Load Balancing

The Forwarder uses HTTP/2 (gRPC) for transport. When only one Concurrent Network Sender is used, then load balancing is not supported. However, if more than one Concurrent Network Senders are used, then load balancing is supported, which allows each of these sender connections to be distributed to the destination host. For more information see [Load Balancing gRPC](#).

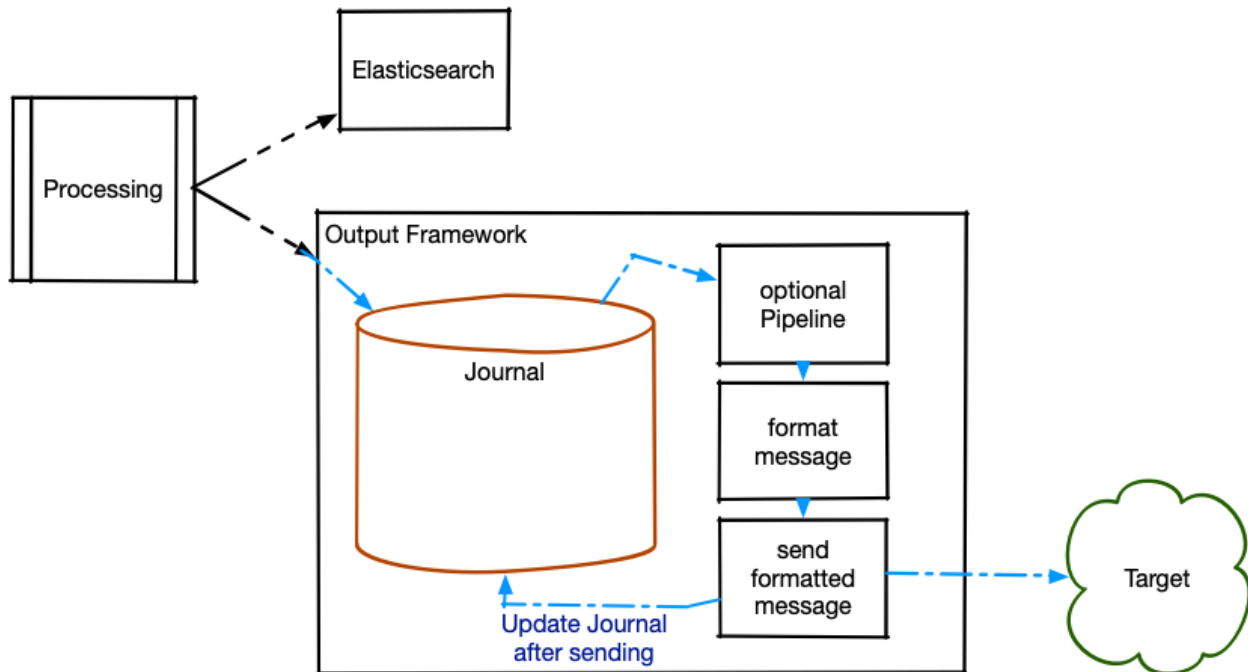
33.3.2 Enterprise Output Framework

The Enterprise Output Framework provides the ability to forward data from your Graylog cluster to external systems using a variety of network transport methods and payload formats. In addition, you can configure Framework-based Outputs to use *Processing Pipelines* to filter, modify, and enrich the outbound messages.

Note: This is an Enterprise Integrations feature and is only available since Graylog version 3.3.3, thus an Enterprise license is required. See the *Integrations Setup* page for more info.

About the Framework

The Enterprise Output Framework provides a number of new Outputs for various network transport types. All of these Outputs first write messages to an on-disk journal in the Graylog cluster. Messages stay in the on-disk journal until the Output is able to successfully send the data to the external receiver.



Once the messages have been written to the journal, they are optionally run through a processing pipeline to modify or enrich logs with additional data, transform the message contents, or filter out any some logs before sending.

Following the processing pipeline, the output payload is converted to the desired format and then sent using the selected transport method.

Messages are only passed to the Output Framework once they are done being processed in the Graylog source cluster, at the same time the data is written to Elasticsearch.

On-Disk Journal

The Output Framework is equipped with an on-disk journal. This journal immediately persists messages received from the Graylog Output system to disk before attempting to send them to the external receiver. This allows the Output Framework to keep receiving and reliably queuing messages, even if the external receiver is temporarily unavailable due to network issues. The journal has many configuration options which will be described below.

The directory in which journal data will be stored is controlled by the `data_dir` value in your Graylog configuration file. Journal data for Framework Outputs will be stored in `<data_dir>/stream_output/<OutputID>`. As with the “[Output base path](#)” directory or the [Input Journal](#), it is recommended to use a separate partition for Output Framework journals to ensure journal growth does not impact overall system performance.

Note: While `Maximum Journal Size` can be configured for Enterprise Outputs, this is a soft limit and the on-disk journal can grow larger. If you want to guarantee journal data is cleaned up in a timely fashion, you should adjust the `Maximum Journal Message Age` and `Journal Segment Age` configuration values. Be aware that even unsent messages in the journal will be purged once they are older than `Maximum Journal Message Age`.

Pipeline Integration

When creating or editing a Framework-based Output, you will have the option to select a processing pipeline which will be executed on each message coming from the source *stream*. This pipeline can be used to filter out messages that you do not wish to forward. It can also be used to add data to modify the contents of the outgoing message or to enrich it with additional data.

Outbound Payload Formatting

Prior to sending data out over the wire, Graylog must format the outgoing payload. Payload formatting options include:

- **JSON Formatter**
 - The Output Framework will convert the message’s key-value pairs into a JSON object.
- **Pipeline-Generated**
 - The Output Framework will expect your pipeline to generate the outgoing payload and store it in the `pipeline_output` field of the message. This can be accomplished in the pipeline by using the `set_field` *built-in function*.
- **Full Message**
 - Some inputs support storing the full received message in the `full_message` field. When this output formatter is selected, the contents `full_message` will be used as the payload of the outgoing message. Messages without a `full_message` field or messages where the field is empty will be ignored. The Full Message formatter is available in Graylog version 4.0.3 and above.
- **No-op Formatter**
 - No payload will be generated from the message. This formatter is currently only intended for use with the Google Cloud BigQuery output. If used with any other Output, the Output payloads will be empty.

Framework Outputs

- *Enterprise TCP Raw/Plaintext Output*
 - Formatted messages will be sent as UTF-8 encoded plain text to the configured TCP endpoint (IP address and port).
- *Enterprise TCP Syslog Output*
 - Formatted messages will be sent as the MSG portion of a standard Syslog message per section 6.4 of the *Syslog specification*. The Syslog message will be sent to the configured TCP endpoint (IP address and port).
- *Enterprise Google Cloud BigQuery Output*
 - The Output Framework will convert the message’s key-value pairs into a new row for insertion into the specified Google BigQuery table.
- **Enterprise STDOUT Output**
 - Formatted messages will be displayed on the system’s console. This is included primarily as a debugging tool for pipeline changes.

Enterprise TCP Raw/Plaintext Output

This Output allows you to send data as UTF-8 encoded text to an arbitrary TCP endpoint (server and port). The data will be sent with no additional formatting or encapsulation.

Note: This is an Enterprise Integrations feature and is only available since Graylog version 3.3.3, thus an Enterprise license is required. See the [Integrations Setup](#) page for more info.

Output Configuration

The Raw/Plaintext TCP Output supports all of the standard Enterprise Output Framework [configuration options](#).

TCP Configuration

- **Destination IP Address**
 - The IP address of the system which will receive the messages.
- **Destination Port**
 - The port on which the destination system will listen for messages.
- **Frame Delimiting Method**
 - The method which will be used to separate individual messages in the stream.
 - **Frame delimiting methods are defined in Sections 3.4.1 and 3.4.2 of IETF RFC 6587.**
 - * **Newline Character** A newline character will be appended to each message to mark the end of the message. Any newline characters within the message will be escaped prior to sending.
 - * **Null Character** A null character will be appended to each message to mark the end of the message. Any null characters within the message will be escaped prior to sending.
 - * **Octet Counting** The length of the message (in bytes) and a space character for separation will be prepended to the message. The contents of the message will not be altered.

Enterprise TCP Syslog Output

This Output allows you to send data as UTF-8 encoded text to an arbitrary TCP Syslog receiver. The formatted payload will be sent as as the MSG portion of a standard Syslog message per section 6.4 of the [Syslog specification](#).

Note: This is an Enterprise Integrations feature and is only available since Graylog version 3.3.3, thus an Enterprise license is required. See the [Integrations Setup](#) page for more info.

Output Configuration

The TCP Syslog Output supports all of the standard Enterprise Output Framework [configuration options](#).

TCP Configuration

See: [TCP Configuration](#)

TCP Syslog Configuration

- **Syslog Facility**
 - A numeric value in the range of 0 - 23 (inclusive)
 - Defined in [Section 6.2.1](#) of the Syslog specification.
- **Syslog Severity**
 - A numeric value in the range of 0 - 7 (inclusive)
 - Defined in [Section 6.2.1](#) of the Syslog specification.

Enterprise Google Cloud BigQuery Output

This Output allows you to send data to your Google Cloud BigQuery tables. Each message in the stream will be inserted as a new row in the configured BigQuery table.

Note: This is an Enterprise Integrations feature and is only available since Graylog version 3.3.6, thus an Enterprise license is required. See the [Integrations Setup](#) page for more info.

Unlike the [Raw TCP](#) and [TCP Syslog](#) Outputs, which require a payload formatter in order to work, the BigQuery Output does not rely on a payload formatter. Since the `Outbound Payload Format` is required when setting up any Enterprise Framework Output, we have provided a `No-op Formatter` specifically for use with the BigQuery Output.

The BigQuery Output uses the key-value pairs in each Graylog message to build a row to be inserted into your BigQuery table with the Graylog message keys mapping to your BigQuery table's columns. Any Graylog message key which does not have a corresponding column in your BigQuery table will be dropped by Google when the insert is performed. You can use a processing pipeline or the `Excluded Fields` list in the BigQuery Output configuration to prevent unwanted fields from being included when each row is sent to your BigQuery table.

Required Google Cloud Setup

Prerequisites

In order to use the Google Cloud BigQuery Output, you will need to create and authorize a service account through your Google Cloud console.

It is assumed that you already have a working Google Cloud account and access to the console.

Create Service Account

- 1) Log in to the [Google Cloud console](#)
- 2) Navigate to `IAM & Admin` in the left-hand menu
- 3) Select `Service Accounts` in the left-hand menu
- 4) Select `+ CREATE SERVICE ACCOUNT` in the top of the right-hand pane
- 5) Create the new service account
 - a) Provide a name for the service account (i.e. “Graylog Data”)
 - b) Enter a description for the service account
 - c) Click the `CREATE` button
 - d) Select appropriate permissions for the new service account. At a minimum, the service account will need the ability to write to your BigQuery table
 - e) Click the “CONTINUE” button
 - f) If desired, grant other users access to the service account
 - g) Click the “DONE” button to finish service account creation

Generate and Download Service Account Credentials

- 1) Click on the newly created service account in your list of service accounts
- 2) In the `Keys` section, select `Create new key` from the `ADD KEY` drop-down menu
- 3) Select `JSON` as the key type
- 4) Click on the `CREATE` button
- 5) Save the generated JSON file
- 6) Copy the downloaded JSON credentials file to your Graylog host(s). The credentials file should be stored in the same location on each host. We strongly recommend that you take appropriate steps to protect the credentials file (e.g. assigning ownership of the file to the account which runs your Graylog server and setting file permissions to 400).

Output Configuration

The Google Cloud BigQuery Output supports all of the standard Enterprise Output Framework [configuration options](#).

BigQuery Configuration

- **Project ID**
 - Google Cloud Project ID
- **Dataset**
 - Output BigQuery Dataset
- **Table**
 - Output BigQuery Table

- **Excluded Fields**
 - A comma-separated list of fields that will be filtered out when data is sent to BigQuery
- **Credentials File Location**
 - Path to the Service Account credentials file located on your Graylog Node(s)

Output Configuration

The Enterprise Output Framework is capable of processing messages at very high throughput rates. Many hardware factors will affect throughput (such as CPU clock speed, number of CPU cores, available memory, and network bandwidth). Several Output Framework configuration options are available to help you tune performance for your throughput requirements and environment.

Common Configuration

- **Title**
 - The name of the Output
- **Send Buffer Size**
 - The number of messages the Output can hold in its buffer waiting to be written to the Journal
- **Concurrent message processing pipelines**
 - The number of pipeline instances that will be allowed to run at any given time.
 - If this is set to 0, pipeline execution will be skipped even if a pipeline is selected from the Pipeline dropdown.
- **Concurrent output payload formatters**
 - The number of formatter instances that will be allowed to run at any given time.
 - If this is set to 0, the Output will fail.
- **Concurrent message senders**
 - The number of sender instances that will be allowed to run at any given time.
 - If this is set to 0, the Output will fail.
- **Journal Segment Size**
 - The soft maximum for the size of a journal segment file
- **Journal Segment Age**
 - The maximum amount of time journal segments will be retained if there is storage to do so
- **Maximum Journal Size**
 - The maximum size of the journal
- **Maximum Journal Message Age**
 - The maximum time that a message will be stored in the disk journal
- **Journal Buffer Size**
 - The size of the memory buffer for messages waiting to be written to the journal.
 - This value must be a power of two.

- **Journal Buffer Encoders**
 - The number of concurrent encoders for messages being written to the journal.
- **Output Processing Pipeline**
 - The pipeline which will process all messages sent to the Output
- **Outbound Payload Format**
 - The format that will be used for outgoing message payloads

33.3.3 Microsoft Office 365 Input

Microsoft Office 365 is a widely used cloud-based suite of productivity tools. This plugin allows you to pull your organization's Office 365 logs into Graylog for processing, monitoring, and alarming.

Note: This is a Graylog Enterprise Integrations feature and is only available since Graylog version 3.3.3. A valid Graylog Enterprise license is required.

Required Office 365 Setup

Prerequisites

In order to use the Office 365 plugin, you will need to create and authorize a Client Application through your organization's Microsoft Azure portal.

It is assumed that you already have a working Office 365 subscription and access to the Microsoft Azure portal for your organization. It is also assumed you have the correct account type which allows access to the audit logs. Generally this is an E5/A5 account.

The following steps are mandatory.

Azure Configuration

- 1) Log in to [Microsoft Azure](#)
- 2) Navigate to `Azure Active Directory` in the left-hand menu
- 3) Select `App Registrations` under the **Manage** heading in the left-hand menu
- 4) Select `New Registration` in the top of the right-hand pane
- 5) Register a new application
 - a) Provide a name for the application (i.e. "Graylog Log Access")
 - b) Select the appropriate account type. This should be either `Single Tenant` or `Multitenant` depending on whether your organization has a single Active Directory instance or multiple
 - c) Do not add a `Redirect URI`
 - d) Click the `Register` button
- 6) Once the application has been created, take note of the following fields, which will be needed to set up the O365 plugin:
 - a) `Application (client) ID`

- b) Directory (tenant) ID
- 7) For the newly-created Application, navigate to `Certificates & Secrets`
- 8) Click on `New Client Secret`
- 9) Add a description for the new secret, select an expiration time, and then click `Add`
- 10) Make a note of the generated value, you will need this to set up the O365 Plugin

Client Application Permissions in O365

- 1) For the newly-created Application, navigate to `API permissions`
- 2) Click on `Add a permission`
- 3) Select `Office 365 Management APIs`
- 4) Select `Application Permissions`
- 5) Select all available permissions on the list and click `Add permissions`
- 6) Click on `Grant admin consent for...` and confirm by clicking `Yes` in the popup dialog

Enable Unified Audit Logging

Navigate to the [Audit Log Search](#) page in Microsoft Office 365 and enable Unified Audit Logging. If this is the first time enabling Unified Audit Log, it can take up to 24 hours before logs start coming into Graylog.

Plugin Configuration

Note: You will need the `Client ID`, `Tenant ID`, and `Client Secret` from the previous sections in order to proceed.

O365 Connection Configuration

- **Input Name**
 - Provide a unique name for your new O365 Input
- **Directory (tenant) ID**
 - This is the ID of the Active Directory instance for which Graylog will collect log data
- **Application (client) ID**
 - This is the ID of the Client Application created above
- **Client Secret**
 - This is the client secret generated above
- **Subscription Type**
 - This indicates what type of Office 365 subscription you have
 - `Enterprise` and `GCC government plans` is the most common value

O365 Content Subscription

- **Log Types To Collect**

- This determines which of the five available log types the Input will pull from Office 365 (Options are: AZURE_ACTIVE_DIRECTORY, SHAREPOINT, EXCHANGE, GENERAL, DLP_ALL)

- **Polling Interval**

- This determines how often (in minutes) the Input will check for new log data
- This value cannot be less than 1 (checking every minute)

- **Drop DLP logs containing sensitive data**

- For each DLP event, O365 produces a summary log with no sensitive data and a detailed log with sensitive data. When set, this option will cause the detailed logs to be dropped to prevent sensitive data from being stored in Graylog. This option is only available since Graylog version 4.0.6.

- **Enable Throttling**

- If selected, this will enable Graylog to stop reading new data for this Input if the system gets behind on message processing and needs to catch up

- **Store Full Message**

- If selected, this will cause Graylog to store the raw log data in the `full_message` field for each log message
- Selecting this option can result in a significant increase in the amount of data stored

34.1 Structured events from anywhere. Compressed and chunked.

The Graylog Extended Log Format (GELF) is a log format that avoids the shortcomings of classic plain syslog:

- Limited to length of 1024 bytes – Not much space for payloads like backtraces
- No data types in structured syslog. You don't know what is a number and what is a string.
- The RFCs are strict enough but there are so many syslog dialects out there that you cannot possibly parse all of them.
- No compression

Syslog is okay for logging system messages of your machines or network gear. GELF is a great choice for logging from within applications. There are libraries and appenders for many programming languages and logging frameworks so it is easy to implement. You could use GELF to send every exception as a log message to your Graylog cluster. You don't have to care about timeouts, connection problems or anything that might break your application from within your logging class because GELF can be sent via UDP.

34.2 GELF via UDP

34.2.1 Chunking

UDP datagrams are limited to a size of 65536 bytes. Some Graylog components are limited to processing up to 8192 bytes. A lot of compressed information fits in there but you sometimes might just have more information to send. This is why Graylog supports chunked GELF.

You can define chunks of messages by prepending a byte header to a GELF message including a message ID and sequence number to reassemble the message later.

Most GELF libraries support chunking transparently and will detect if a message is too big to be sent in one datagram.

Of course TCP would solve this problem on a transport layer but it brings other problems that are even harder to tackle: You would have to care about slow connections, timeouts and other nasty network problems.

With UDP you may just lose a message while with TCP it could bring your whole application down when not designed with care.

Of course TCP makes sense in some (especially high volume environments) so it is your decision. Many GELF libraries support both TCP and UDP as transport. Some do even support HTTP.

Prepend the following structure to your GELF message to make it chunked:

- **Chunked GELF magic bytes - 2 bytes:** 0x1e 0x0f

- **Message ID - 8 bytes:** Must be the same for every chunk of this message. Identifying the whole message and is used to reassemble the chunks later. Generate from millisecond timestamp + hostname for example.
- **Sequence number - 1 byte:** The sequence number of this chunk. Starting at 0 and always less than the sequence count.
- **Sequence count - 1 byte:** Total number of chunks this message has.

All chunks **MUST** arrive within 5 seconds or the server will discard all already arrived and still arriving chunks. A message **MUST NOT** consist of more than 128 chunks.

Attention: Please note, that the UDP-Inputs of Graylog use the `SO_REUSEPORT` socket option, which was introduced in Linux kernel version 3.9. So be aware, that UDP inputs will **NOT** work on Linux kernel versions prior to 3.9.

34.2.2 Compression

When using UDP as transport layer, GELF messages can be sent uncompressed or compressed with either GZIP or ZLIB.

Graylog nodes detect the compression type in the GELF magic byte header automatically.

Decide if you want to trade a bit more CPU load for saving a lot of network bandwidth. GZIP is the protocol default.

34.3 GELF via TCP

At the current time, GELF TCP only supports uncompressed and non-chunked payloads. Each message needs to be delimited with a null byte (`\0`) when sent in the same TCP connection.

Attention: GELF TCP **does not support** compression due to the use of the null byte (`\0`) as frame delimiter.

34.4 GELF Payload Specification

Version 1.1 (11/2013)

A GELF message is a JSON string with the following fields:

- **version string (UTF-8)**
 - GELF spec version – “1.1”; **MUST** be set by client library.
- **host string (UTF-8)**
 - the name of the host, source or application that sent this message; **MUST** be set by client library.
- **short_message string (UTF-8)**
 - a short descriptive message; **MUST** be set by client library.
- **full_message string (UTF-8)**
 - a long message that can i.e. contain a backtrace; optional.
- **timestamp number**

- Seconds since UNIX epoch with optional decimal places for milliseconds; *SHOULD* be set by client library. Will be set to the current timestamp (now) by the server if absent.
- **level number**
 - the level equal to the standard syslog levels; optional, default is 1 (ALERT).
- **facility string (UTF-8)**
 - optional, deprecated. Send as additional field instead.
- **line number**
 - the line in a file that caused the error (decimal); optional, deprecated. Send as additional field instead.
- **file string (UTF-8)**
 - the file (with path if you want) that caused the error (string); optional, deprecated. Send as additional field instead.
- **_[additional field] string (UTF-8) or number**
 - every field you send and prefix with an underscore (_) will be treated as an additional field. Allowed characters in field names are any word character (letter, number, underscore), dashes and dots. The verifying regular expression is: `^[\\w\\.\\-]*$`. Libraries *SHOULD* not allow to send id as additional field (`_id`). Graylog server nodes omit this field automatically.

34.5 Example payload

This is an example GELF message payload. Any graylog-server node accepts and stores this as a message when GZIP/ZLIB compressed or even when sent uncompressed over a plain socket (without newlines).

Note: Newlines must be denoted with the `\n` escape sequence to ensure the payload is valid JSON as per [RFC 7159](#).

```
{
  "version": "1.1",
  "host": "example.org",
  "short_message": "A short message that helps you identify what is going on",
  "full_message": "Backtrace here\n\nmore stuff",
  "timestamp": 1385053862.3072,
  "level": 1,
  "_user_id": 9001,
  "_some_info": "foo",
  "_some_env_var": "bar"
}
```

Note: Currently the server implementation of GELF in Graylog does not support boolean values. Those will be dropped on ingest ([for reference](#)).

34.5.1 Sending GELF messages via UDP using netcat

Sending an example message to a GELF UDP input (running on host `graylog.example.com` on port 12201):

```
echo -n '{ "version": "1.1", "host": "example.org", "short_message": "A short message", "level": 5, "_some_info": "foo" }' | nc -w0 -u graylog.example.com 12201
```

34.5.2 Sending GELF messages via TCP using netcat

Sending an example message to a GELF TCP input (running on host `graylog.example.com` on port 12201):

```
echo -n -e '{ "version": "1.1", "host": "example.org", "short_message": "A short_message", "level": 5, "_some_info": "foo" }'\0 | nc -w0 graylog.example.com 12201
```

34.5.3 Sending GELF messages via HTTP using curl

Sending an example message to a GELF HTTP input (running on `http://graylog.example.com:12201/gelf`):

```
curl -X POST -H 'Content-Type: application/json' -d '{ "version": "1.1", "host": "example.org", "short_message": "A short message", "level": 5, "_some_info": "foo" }' -u 'http://graylog.example.com:12201/gelf'
```