GRAFANA
Loki / Promtail

Use case in SPHERE & SSHADE

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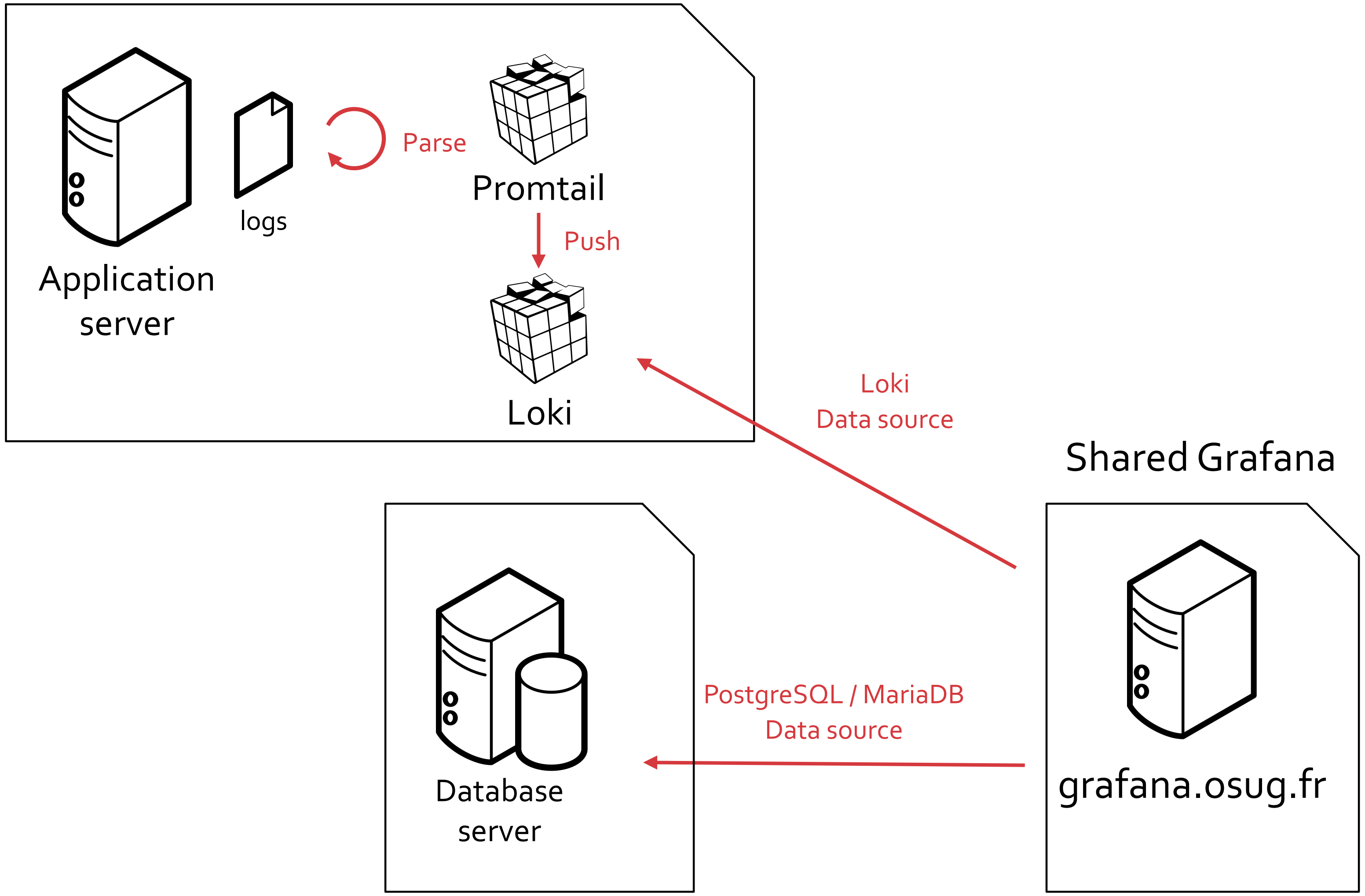
Loki

- https://grafana.com/oss/loki/
- "Loki is a horizontally-scalable, highly-available, multi-tenant log aggregation system inspired by Prometheus. It is designed to be very cost effective and easy to operate. It does not index the contents of the logs, but rather a set of labels for each log stream."

Promtail

- https://grafana.com/docs/loki/latest/clients/promtail/
- "Promtail is an agent which ships the contents of local logs to a private Loki instance or Grafana Cloud. It is usually deployed to every machine that has applications needed to be monitored."

Overview


Application server
logs
Parse
Promtail
Push
Loki
Loki Data source
Shared Grafana
Database server
PostgreSQL / MariaDB Data source
grafana.osug.fr

Installation

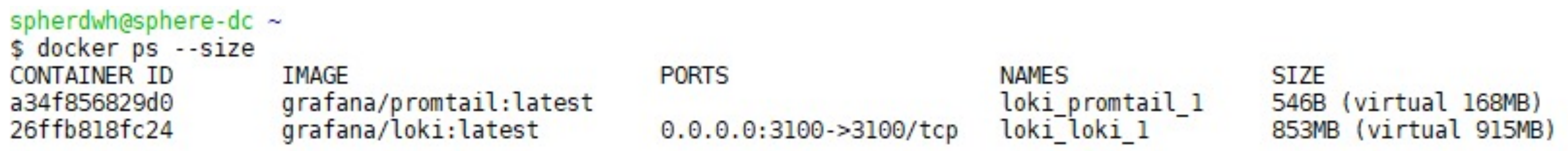
- https://grafana.com/docs/loki/latest/installation/docker/
- Install Loki and Promtail on local machine
- Customized to deploy services configuration from Ansible

Loki retention policy

- https://grafana.com/docs/loki/latest/operations/storage/retention/
- 28 days retention

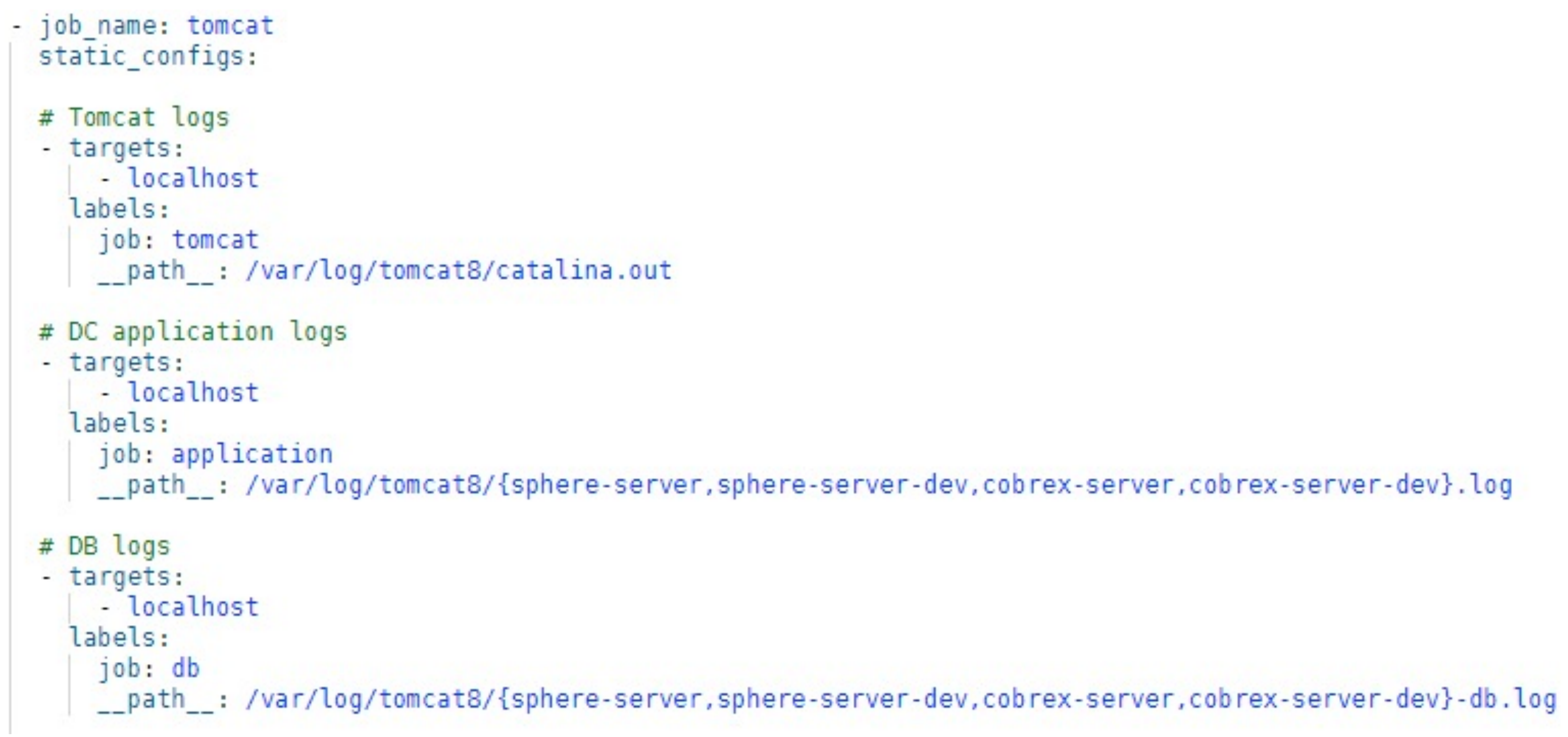
```
chunk_store_config:
  max_look_back_period: 672h

table_manager:
  retention_deletes_enabled: true
  retention_period: 672h
```

- Example of space usage on sphere-dc :



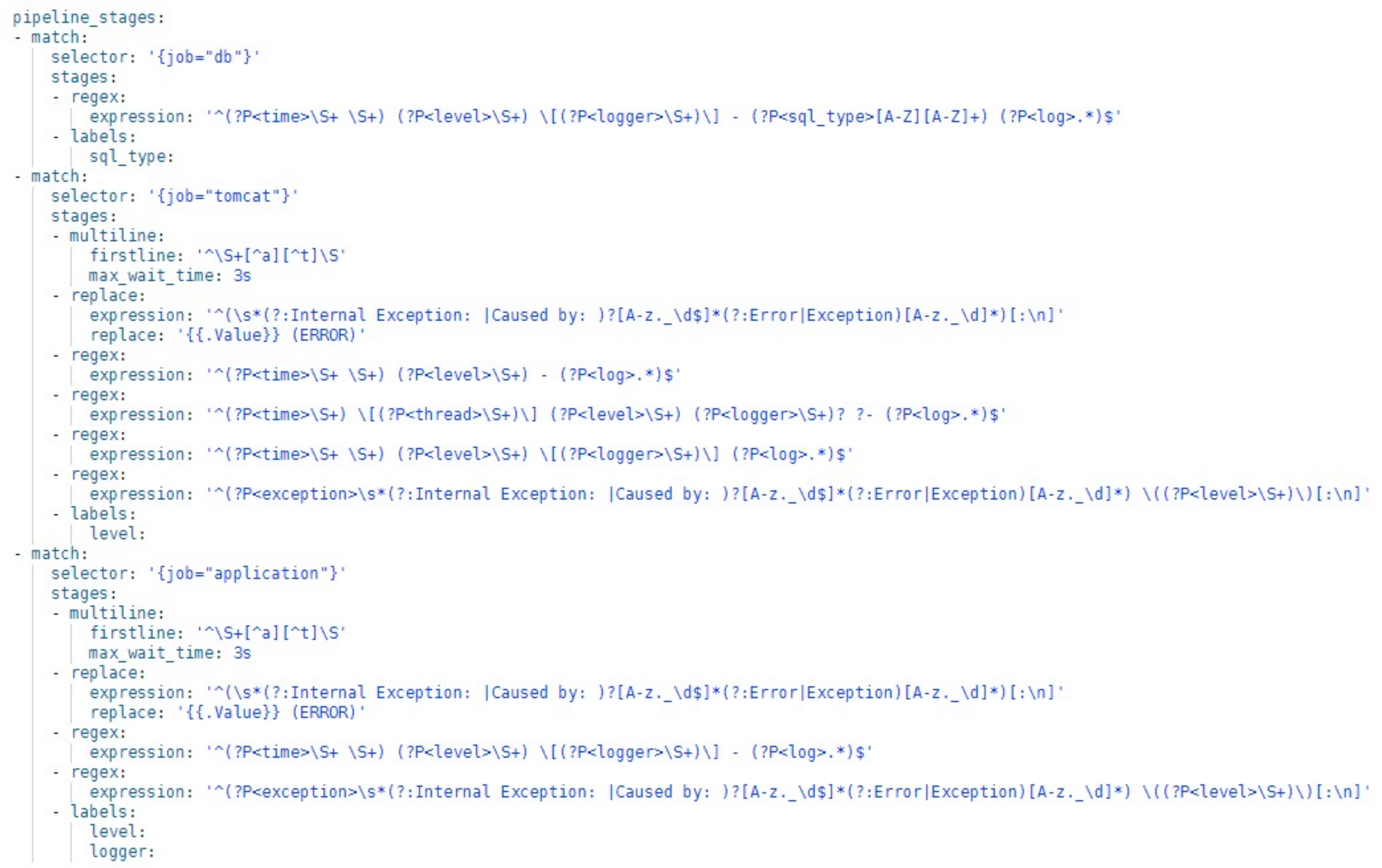
```
spherdwh@sphere-dc ~
$ docker ps --size
CONTAINER ID        IMAGE                          PORTS                        NAMES               SIZE
a34f856829d0        grafana/promtail:latest                                     loki_promtail_1     546B (virtual 168MB)
26ffb818fc24        grafana/loki:latest            0.0.0.0:3100->3100/tcp       loki_loki_1         853MB (virtual 915MB)
```

Promtail
- targets



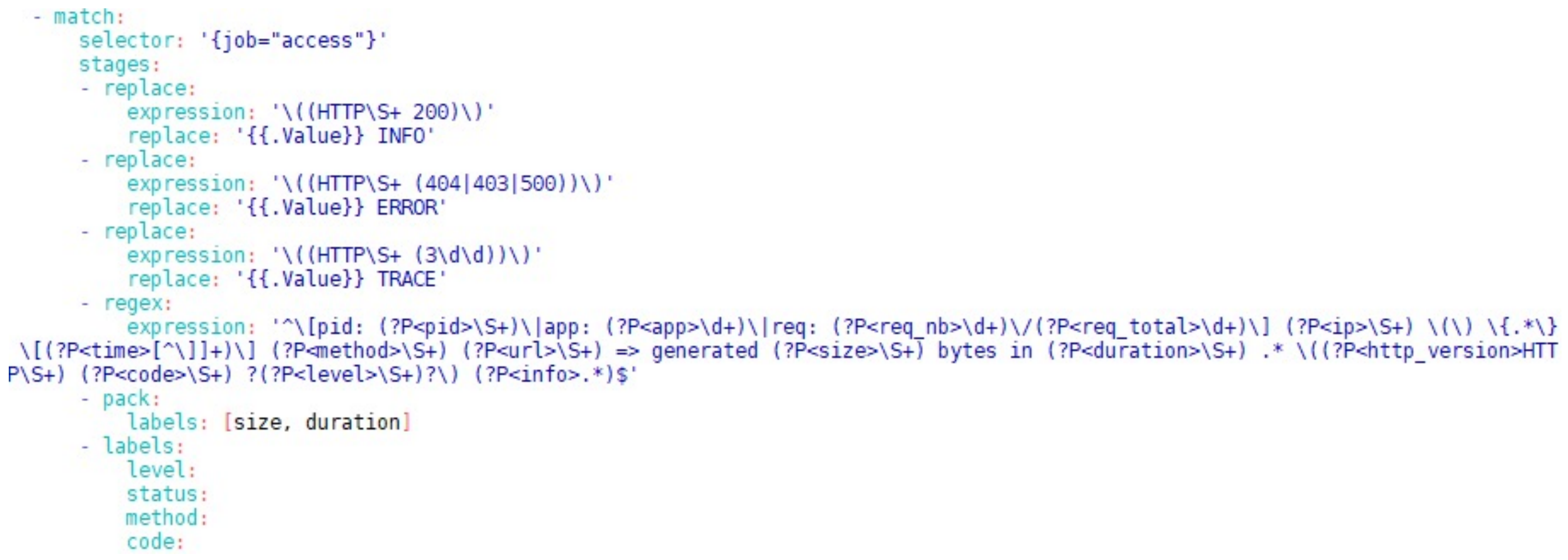
```
- job_name: tomcat
  static_configs:

  # Tomcat logs
  - targets:
      - localhost
    labels:
      job: tomcat
      __path__: /var/log/tomcat8/catalina.out

  # DC application logs
  - targets:
      - localhost
    labels:
      job: application
      __path__: /var/log/tomcat8/{sphere-server,sphere-server-dev,cobrex-server,cobrex-server-dev}.log

  # DB logs
  - targets:
      - localhost
    labels:
      job: db
      __path__: /var/log/tomcat8/{sphere-server,sphere-server-dev,cobrex-server,cobrex-server-dev}-db.log
```

Promtail
- parsing



```yaml
pipeline_stages:
- match:
    selector: '{job="db"}'
    stages:
    - regex:
        expression: '^(?P<time>\S+ \S+) (?P<level>\S+) \[(?P<logger>\S+)\] - (?P<sql_type>[A-Z][A-Z]+) (?P<log>.*)$'
    - labels:
        sql_type:
- match:
    selector: '{job="tomcat"}'
    stages:
    - multiline:
        firstline: '^\S+[^a][^t]\S'
        max_wait_time: 3s
    - replace:
        expression: '^(\s*(?:Internal Exception: |Caused by: )?[A-z._\d$]*(?:Error|Exception)[A-z._\d]*)[:\n]'
        replace: '{{.Value}} (ERROR)'
    - regex:
        expression: '^(?P<time>\S+ \S+) (?P<level>\S+) - (?P<log>.*)$'
    - regex:
        expression: '^(?P<time>\S+) \[(?P<thread>\S+)\] (?P<level>\S+) (?P<logger>\S+)? ?- (?P<log>.*)$'
    - regex:
        expression: '^(?P<time>\S+ \S+) (?P<level>\S+) \[(?P<logger>\S+)\] (?P<log>.*)$'
    - regex:
        expression: '^(?P<exception>\s*(?:Internal Exception: |Caused by: )?[A-z._\d$]*(?:Error|Exception)[A-z._\d]*) \((?P<level>\S+)\)[:\n]'
    - labels:
        level:
- match:
    selector: '{job="application"}'
    stages:
    - multiline:
        firstline: '^\S+[^a][^t]\S'
        max_wait_time: 3s
    - replace:
        expression: '^(\s*(?:Internal Exception: |Caused by: )?[A-z._\d$]*(?:Error|Exception)[A-z._\d]*)[:\n]'
        replace: '{{.Value}} (ERROR)'
    - regex:
        expression: '^(?P<time>\S+ \S+) (?P<level>\S+) \[(?P<logger>\S+)\] - (?P<log>.*)$'
    - regex:
        expression: '^(?P<exception>\s*(?:Internal Exception: |Caused by: )?[A-z._\d$]*(?:Error|Exception)[A-z._\d]*) \((?P<level>\S+)\)[:\n]'
    - labels:
        level:
        logger:
```

Promtail
- parsing



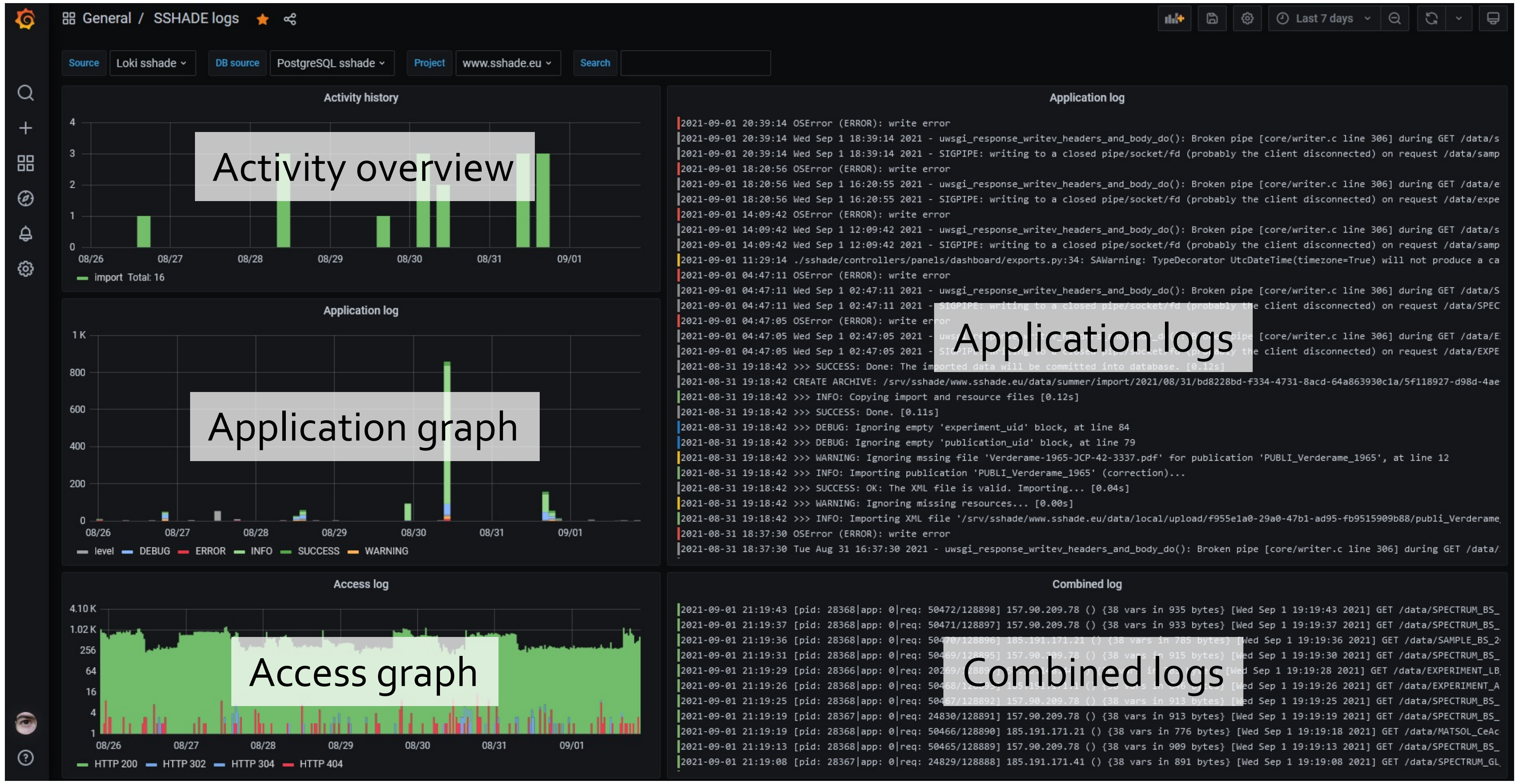
```
  - match:
      selector: '{job="access"}'
      stages:
      - replace:
          expression: '\((HTTP\S+ 200)\)'
          replace: '{{.Value}} INFO'
      - replace:
          expression: '\((HTTP\S+ (404|403|500))\)'
          replace: '{{.Value}} ERROR'
      - replace:
          expression: '\((HTTP\S+ (3\d\d))\)'
          replace: '{{.Value}} TRACE'
      - regex:
          expression: '^\[pid: (?P<pid>\S+)\|app: (?P<app>\d+)\|req: (?P<req_nb>\d+)\/(?P<req_total>\d+)\] (?P<ip>\S+) \(\) \{.*\}
 \[(?P<time>[^\]]+)\] (?P<method>\S+) (?P<url>\S+) => generated (?P<size>\S+) bytes in (?P<duration>\S+) .* \((?P<http_version>HTT
P\S+) (?P<code>\S+) ?(?P<level>\S+)?\) (?P<info>.*)$'
      - pack:
          labels: [size, duration]
      - labels:
          level:
          status:
          method:
          code:
```

Promtail - parsing

- Use named capturing groups `(?P<name>…)`
- Use `multiline` to group stack traces lines
- Use `replace` to inject a customized log level
- Pack captured groups as JSON with `pack`
- Grafana uses Go lang regular expressions, no negative/positive lookahead/lookbehind

Grafana logs dashboard

SSHADE



Application log

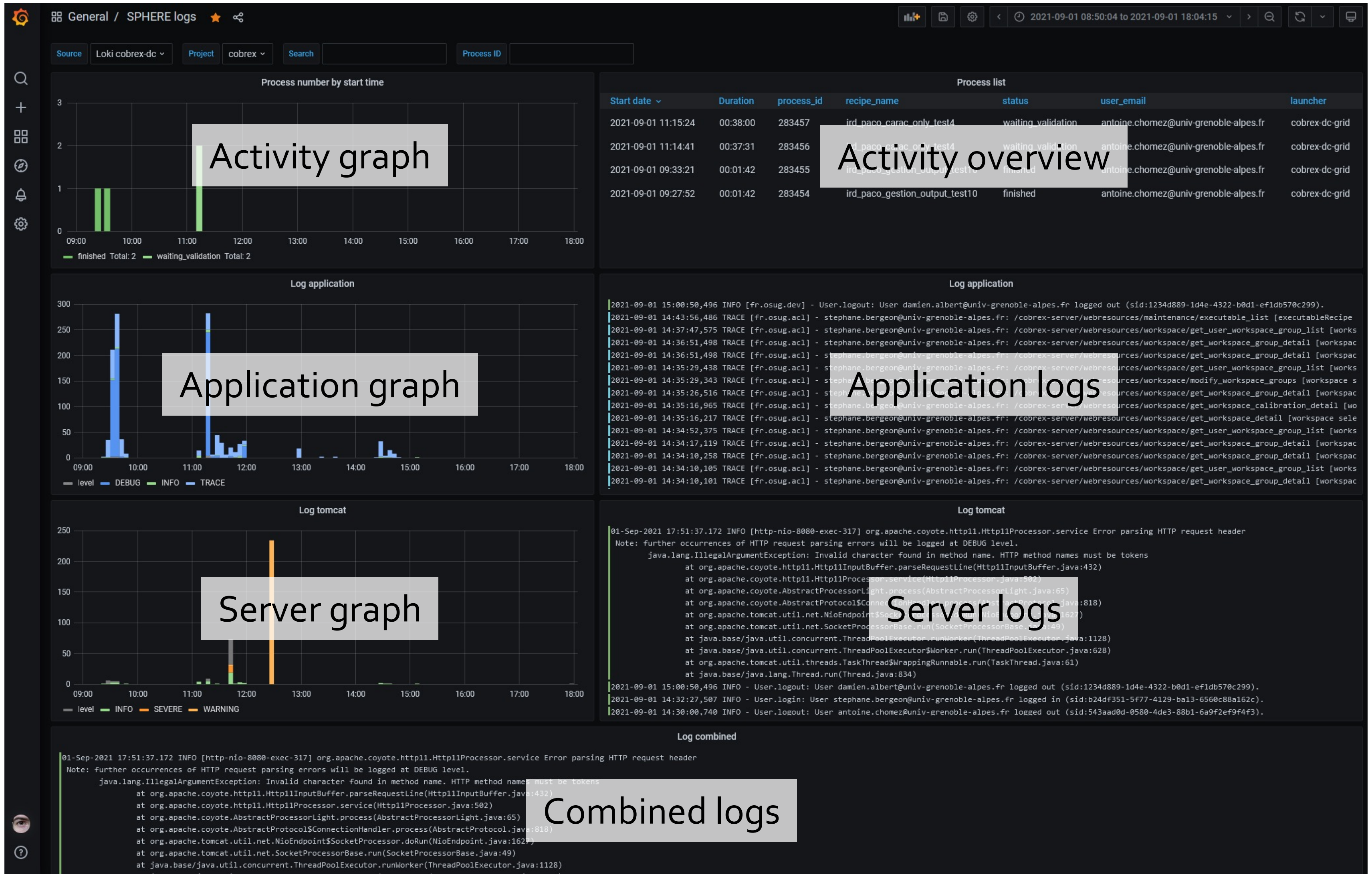
```
2021-09-01 20:39:14 OSError (ERROR): write error
2021-09-01 20:39:14 Wed Sep 1 18:39:14 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/s
2021-09-01 20:39:14 Wed Sep 1 18:39:14 2021 - SIGPIPE: writing to a closed pipe/socket/fd (probably the client disconnected) on request /data/samp
2021-09-01 18:20:56 OSError (ERROR): write error
2021-09-01 18:20:56 Wed Sep 1 16:20:55 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/e
2021-09-01 18:20:56 Wed Sep 1 16:20:55 2021 - SIGPIPE: writing to a closed pipe/socket/fd (probably the client disconnected) on request /data/expe
2021-09-01 14:09:42 OSError (ERROR): write error
2021-09-01 14:09:42 Wed Sep 1 12:09:42 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/s
2021-09-01 14:09:42 Wed Sep 1 12:09:42 2021 - SIGPIPE: writing to a closed pipe/socket/fd (probably the client disconnected) on request /data/samp
2021-09-01 11:29:14 ./sshade/controllers/panels/dashboard/exports.py:34: SAWarning: TypeDecorator UtcDateTime(timezone=True) will not produce a ca
2021-09-01 04:47:11 OSError (ERROR): write error
2021-09-01 04:47:11 Wed Sep 1 02:47:11 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/S
2021-09-01 04:47:11 Wed Sep 1 02:47:11 2021 - SIGPIPE: writing to a closed pipe/socket/fd (probably the client disconnected) on request /data/SPEC
2021-09-01 04:47:05 OSError (ERROR): write error
2021-09-01 04:47:05 Wed Sep 1 02:47:05 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/E
2021-09-01 04:47:05 Wed Sep 1 02:47:05 2021 - SIGPIPE: writing to a closed pipe/socket/fd (probably the client disconnected) on request /data/EXPE
2021-08-31 19:18:42 >>> SUCCESS: Done: The imported data will be committed into database. [0.12s]
2021-08-31 19:18:42 CREATE ARCHIVE: /srv/sshade/www.sshade.eu/data/summer/import/2021/08/31/bd8228bd-f334-4731-8acd-64a863930c1a/5f118927-d98d-4ae
2021-08-31 19:18:42 >>> INFO: Copying import and resource files [0.12s]
2021-08-31 19:18:42 >>> SUCCESS: Done. [0.11s]
2021-08-31 19:18:42 >>> DEBUG: Ignoring empty 'experiment_uid' block, at line 84
2021-08-31 19:18:42 >>> DEBUG: Ignoring empty 'publication_uid' block, at line 79
2021-08-31 19:18:42 >>> WARNING: Ignoring mssing file 'Verderame-1965-JCP-42-3337.pdf' for publication 'PUBLI_Verderame_1965', at line 12
2021-08-31 19:18:42 >>> INFO: Importing publication 'PUBLI_Verderame_1965' (correction)...
2021-08-31 19:18:42 >>> SUCCESS: OK: The XML file is valid. Importing... [0.04s]
2021-08-31 19:18:42 >>> WARNING: Ignoring missing resources... [0.00s]
2021-08-31 19:18:42 >>> INFO: Importing XML file '/srv/sshade/www.sshade.eu/data/local/upload/f955e1a0-29a0-47b1-ad95-fb9515909b88/publi_Verderame
2021-08-31 18:37:30 OSError (ERROR): write error
2021-08-31 18:37:30 Tue Aug 31 16:37:30 2021 - uwsgi_response_writev_headers_and_body_do(): Broken pipe [core/writer.c line 306] during GET /data/
```

Combined log

```
2021-09-01 21:19:43 [pid: 28368|app: 0|req: 50472/128898] 157.90.209.78 () {38 vars in 935 bytes} [Wed Sep 1 19:19:43 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:37 [pid: 28368|app: 0|req: 50471/128897] 157.90.209.78 () {38 vars in 933 bytes} [Wed Sep 1 19:19:37 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:36 [pid: 28368|app: 0|req: 50470/128896] 185.191.171.21 () {38 vars in 785 bytes} [Wed Sep 1 19:19:36 2021] GET /data/SAMPLE_BS_2
2021-09-01 21:19:31 [pid: 28368|app: 0|req: 50469/128895] 157.90.209.78 () {38 vars in 915 bytes} [Wed Sep 1 19:19:30 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:29 [pid: 28366|app: 0|req: 20269/[illegible] [Wed Sep 1 19:19:28 2021] GET /data/EXPERIMENT_LB
2021-09-01 21:19:26 [pid: 28368|app: 0|req: 50468/[illegible] [Wed Sep 1 19:19:26 2021] GET /data/EXPERIMENT_A
2021-09-01 21:19:25 [pid: 28368|app: 0|req: 50467/128892] 157.90.209.78 () {38 vars in 913 bytes} [Wed Sep 1 19:19:25 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:19 [pid: 28367|app: 0|req: 24830/128891] 157.90.209.78 () {38 vars in 913 bytes} [Wed Sep 1 19:19:19 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:19 [pid: 28368|app: 0|req: 50466/128890] 185.191.171.21 () {38 vars in 776 bytes} [Wed Sep 1 19:19:18 2021] GET /data/MATSOL_CeAc
2021-09-01 21:19:13 [pid: 28368|app: 0|req: 50465/128889] 157.90.209.78 () {38 vars in 909 bytes} [Wed Sep 1 19:19:13 2021] GET /data/SPECTRUM_BS_
2021-09-01 21:19:08 [pid: 28367|app: 0|req: 24829/128888] 185.191.171.41 () {38 vars in 891 bytes} [Wed Sep 1 19:19:08 2021] GET /data/SPECTRUM_GL
```

Grafana logs dashboard

SPHERE



Process list

Start date	Duration	process_id	recipe_name	status	user_email	launcher
2021-09-01 11:15:24	00:38:00	283457	ird_paco_carac_only_test4	waiting_validation	antoine.chomez@univ-grenoble-alpes.fr	cobrex-dc-grid
2021-09-01 11:14:41	00:37:31	283456	ird_paco_carac_only_test4	waiting_validation	antoine.chomez@univ-grenoble-alpes.fr	cobrex-dc-grid
2021-09-01 09:33:21	00:01:42	283455	ird_paco_gestion_output_test10	finished	antoine.chomez@univ-grenoble-alpes.fr	cobrex-dc-grid
2021-09-01 09:27:52	00:01:42	283454	ird_paco_gestion_output_test10	finished	antoine.chomez@univ-grenoble-alpes.fr	cobrex-dc-grid

Log application

```
2021-09-01 15:00:50,496 INFO [fr.osug.dev] - User.logout: User damien.albert@univ-grenoble-alpes.fr logged out (sid:1234d889-1d4e-4322-b0d1-ef1db570c299).
2021-09-01 14:43:56,486 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/maintenance/executable_list [executableRecipe
2021-09-01 14:37:47,575 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_user_workspace_group_list [works
2021-09-01 14:36:51,498 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
2021-09-01 14:36:51,498 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
2021-09-01 14:35:29,438 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_user_workspace_group_list [works
2021-09-01 14:35:29,343 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/modify_workspace_groups [workspace s
2021-09-01 14:35:26,516 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
2021-09-01 14:35:16,965 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_calibration_detail [wo
2021-09-01 14:35:16,217 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_detail [workspace sele
2021-09-01 14:34:52,375 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_user_workspace_group_list [works
2021-09-01 14:34:17,119 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
2021-09-01 14:34:10,258 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
2021-09-01 14:34:10,105 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_user_workspace_group_list [works
2021-09-01 14:34:10,101 TRACE [fr.osug.acl] - stephane.bergeon@univ-grenoble-alpes.fr: /cobrex-server/webresources/workspace/get_workspace_group_detail [workspac
```

Log tomcat

```
01-Sep-2021 17:51:37.172 INFO [http-nio-8080-exec-317] org.apache.coyote.http11.Http11Processor.service Error parsing HTTP request header
 Note: further occurrences of HTTP request parsing errors will be logged at DEBUG level.
        java.lang.IllegalArgumentException: Invalid character found in method name. HTTP method names must be tokens
                at org.apache.coyote.http11.Http11InputBuffer.parseRequestLine(Http11InputBuffer.java:432)
                at org.apache.coyote.http11.Http11Processor.service(Http11Processor.java:502)
                at org.apache.coyote.AbstractProcessorLight.process(AbstractProcessorLight.java:65)
                at org.apache.coyote.AbstractProtocol$ConnectionHandler.process(AbstractProtocol.java:818)
                at org.apache.tomcat.util.net.NioEndpoint$SocketProcessor.doRun(NioEndpoint.java:1627)
                at org.apache.tomcat.util.net.SocketProcessorBase.run(SocketProcessorBase.java:49)
                at java.base/java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1128)
                at java.base/java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:628)
                at org.apache.tomcat.util.threads.TaskThread$WrappingRunnable.run(TaskThread.java:61)
                at java.base/java.lang.Thread.run(Thread.java:834)
2021-09-01 15:00:50,496 INFO - User.logout: User damien.albert@univ-grenoble-alpes.fr logged out (sid:1234d889-1d4e-4322-b0d1-ef1db570c299).
2021-09-01 14:32:27,507 INFO - User.login: User stephane.bergeon@univ-grenoble-alpes.fr logged in (sid:b24df351-5f77-4129-ba13-6560c88a162c).
2021-09-01 14:30:00,740 INFO - User.logout: User antoine.chomez@univ-grenoble-alpes.fr logged out (sid:543aad0d-0580-4de3-88b1-6a9f2ef9f4f3).
```

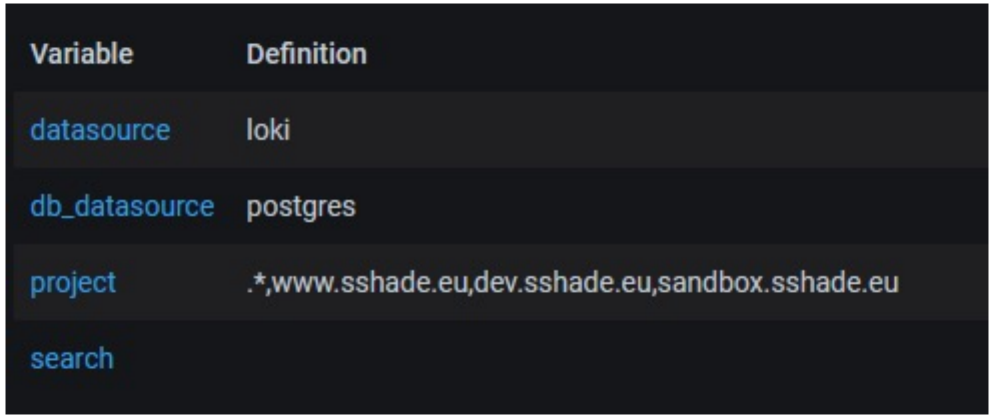
Log combined

```
01-Sep-2021 17:51:37.172 INFO [http-nio-8080-exec-317] org.apache.coyote.http11.Http11Processor.service Error parsing HTTP request header
 Note: further occurrences of HTTP request parsing errors will be logged at DEBUG level.
        java.lang.IllegalArgumentException: Invalid character found in method name. HTTP method names must be tokens
                at org.apache.coyote.http11.Http11InputBuffer.parseRequestLine(Http11InputBuffer.java:432)
                at org.apache.coyote.http11.Http11Processor.service(Http11Processor.java:502)
                at org.apache.coyote.AbstractProcessorLight.process(AbstractProcessorLight.java:65)
                at org.apache.coyote.AbstractProtocol$ConnectionHandler.process(AbstractProtocol.java:818)
                at org.apache.tomcat.util.net.NioEndpoint$SocketProcessor.doRun(NioEndpoint.java:1627)
                at org.apache.tomcat.util.net.SocketProcessorBase.run(SocketProcessorBase.java:49)
                at java.base/java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1128)
```

Grafana - logs

- Use database requests to correlate activity to logs
- Explore combined logs : use labels, wrap, dedup, show/hide, split
- Unpack JSON with `| unpack`, refine query with `| var = "value"`

Variables

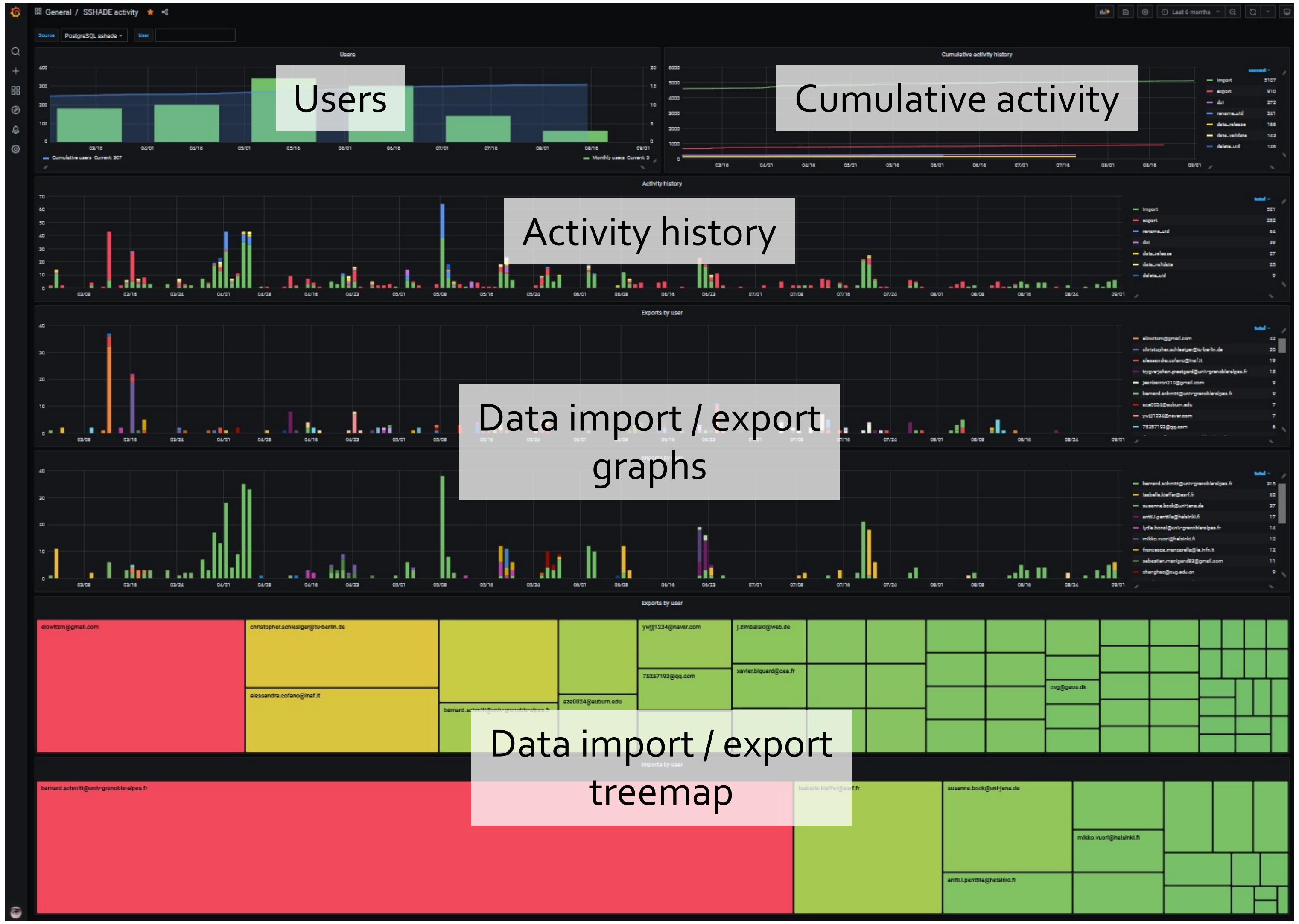


Variable	Definition
datasource	loki
db_datasource	postgres
project	.*,www.sshade.eu,dev.sshade.eu,sandbox.sshade.eu
search	

- Use variables for Loki and database sources
- Restrict logs to project : `filename=~".*$project.*"`
- Search field on all queries : `|~ "$search"`
- Exclude query, either :
  - exclude a non existing string by default (ie. `"_no_exclusion_"`)
  - hack the search field with `"!~ "value`

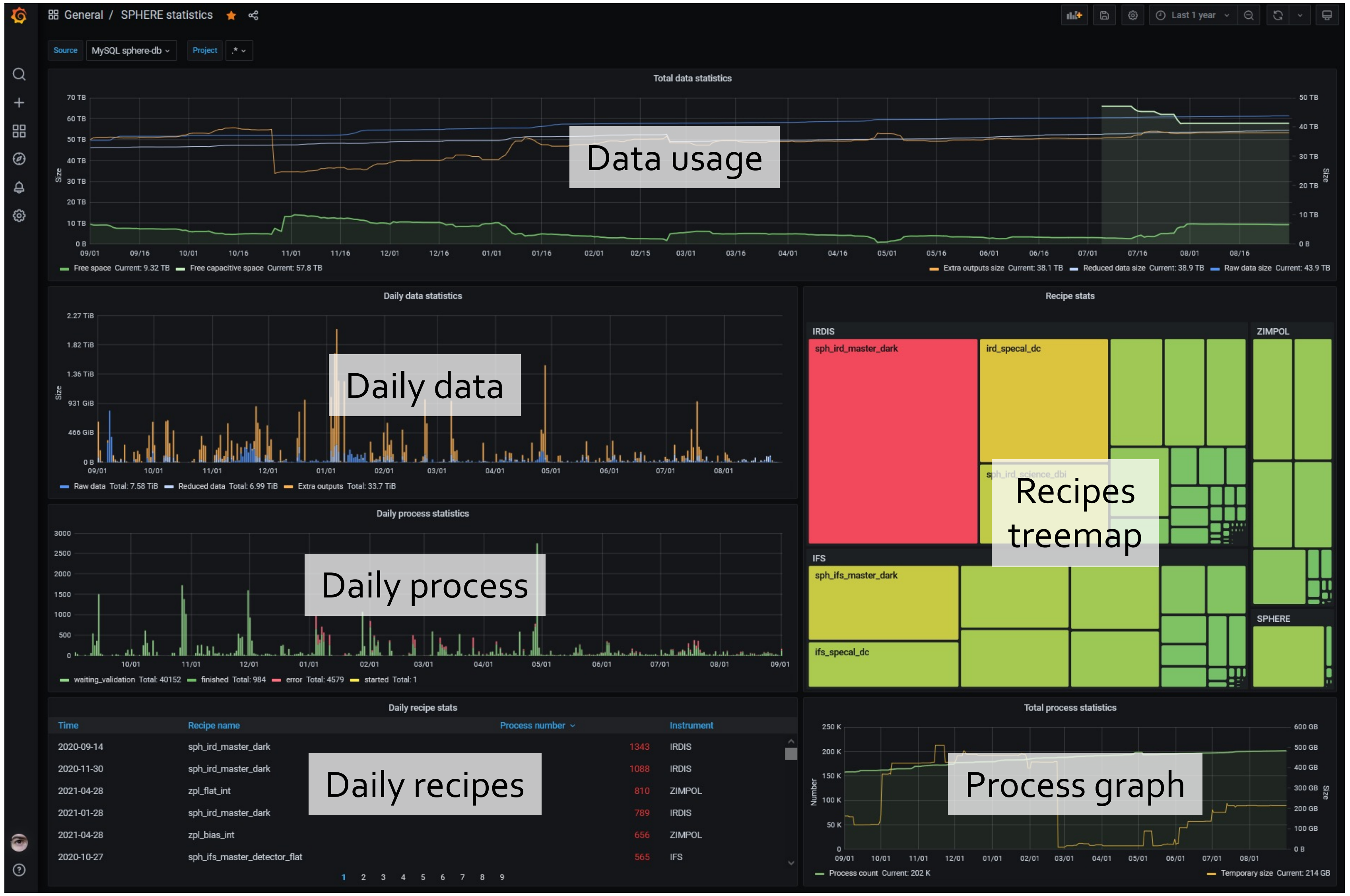
Grafana
- activity

SSHADE


General / SSHADE activity
Users
Cumulative activity
Activity history
Data import / export graphs
Data import / export treemap

Grafana
- activity

SPHERE



Daily recipe stats

Daily recipes

Time	Recipe name	Process number	Instrument
2020-09-14	sph_ird_master_dark	1343	IRDIS
2020-11-30	sph_ird_master_dark	1088	IRDIS
2021-04-28	zpl_flat_int	810	ZIMPOL
2021-01-28	sph_ird_master_dark	789	IRDIS
2021-04-28	zpl_bias_int	656	ZIMPOL
2020-10-27	sph_ifs_master_detector_flat	565	IFS

1 2 3 4 5 6 7 8 9

Tips

- Use query option Max data points, Min interval to improve readability
- Use SQL `sum(count(id)) OVER (ORDER BY date)` to display cumulative graphs
- Use Legend `{{field}}` to display a field value
- Use Inspect / Panel JSON `"aliasColors"` to override colors consistently