Deployment and monitoring

Outline

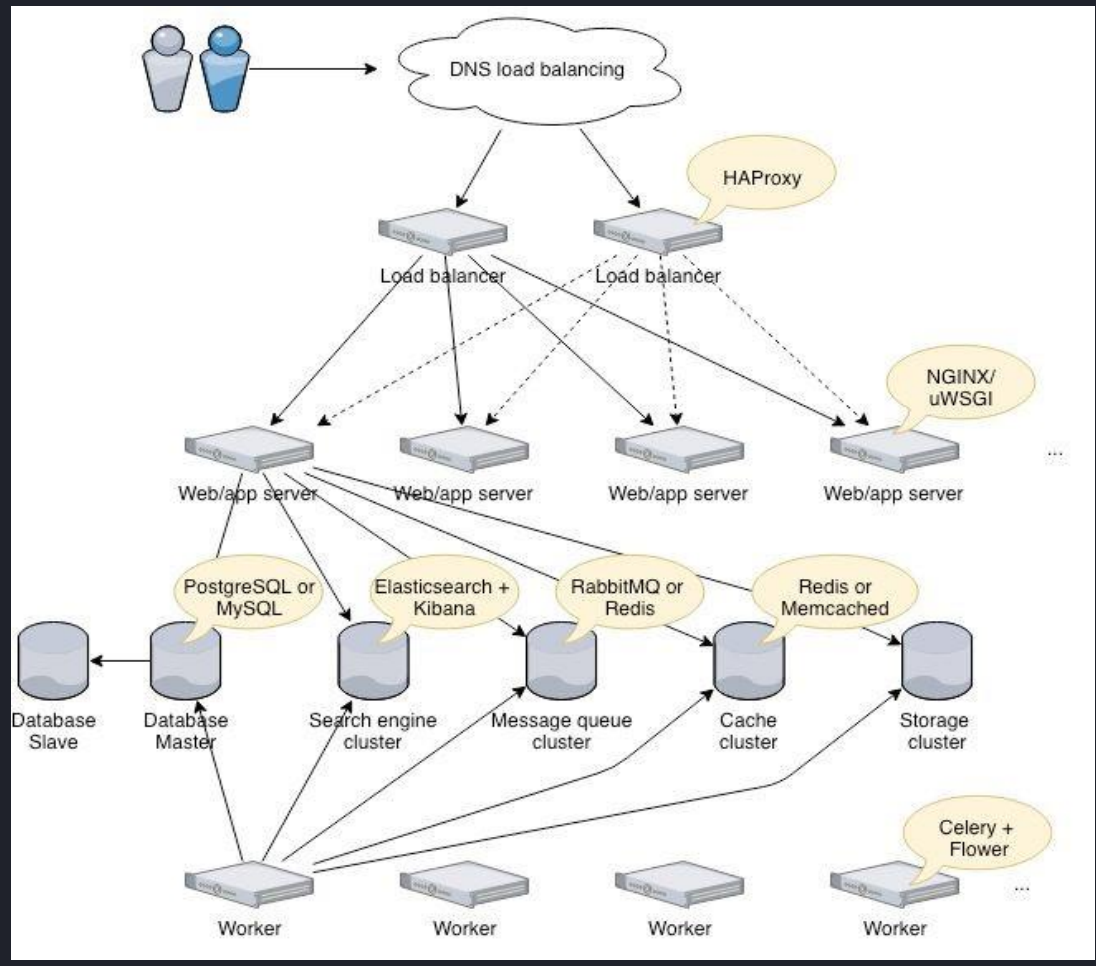
- *Deployment configurations*
- *Dimensions*
- *Monitoring*
- *Logging*

Deployment configurations

Infrastructure overview

- Load balancers: HAProxy, Nginx or others.
- Web servers: Nginx, Apache or others.
- Application servers: uWSGI, Gunicorn or mod_wsgi.
- Distributed task queue: Celery
- Database: PostgreSQL, MySQL or SQLite.
- Search engine: Elasticsearch (v5 and v6).
- Message queue: RabbitMQ, Redis or Amazon SQS.
- Cache system: Redis or Memcache.
- Storage system: Local, S3, XRootD, WebDAV

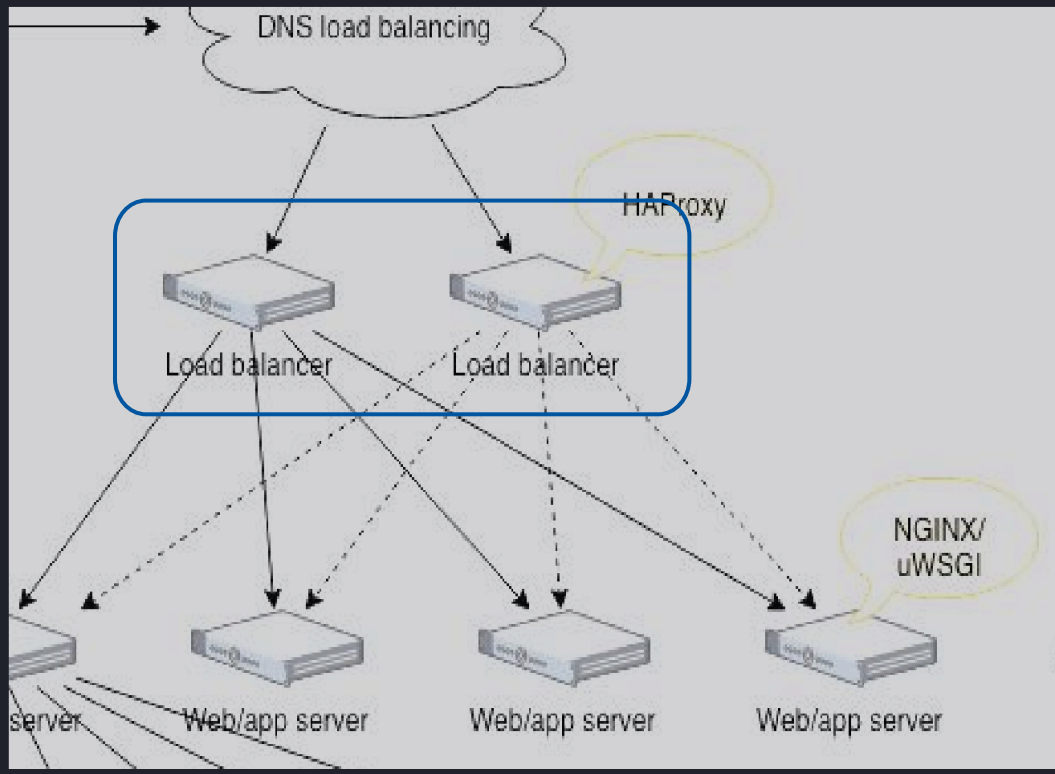
and more.



Deployment configurations

Load balancer: HAProxy

- Traffic distribution depending on its “type”
- /static, /<path>
- URL Rewriting
- SSL Termination
- Downtime static website
- More than 1: redundancy



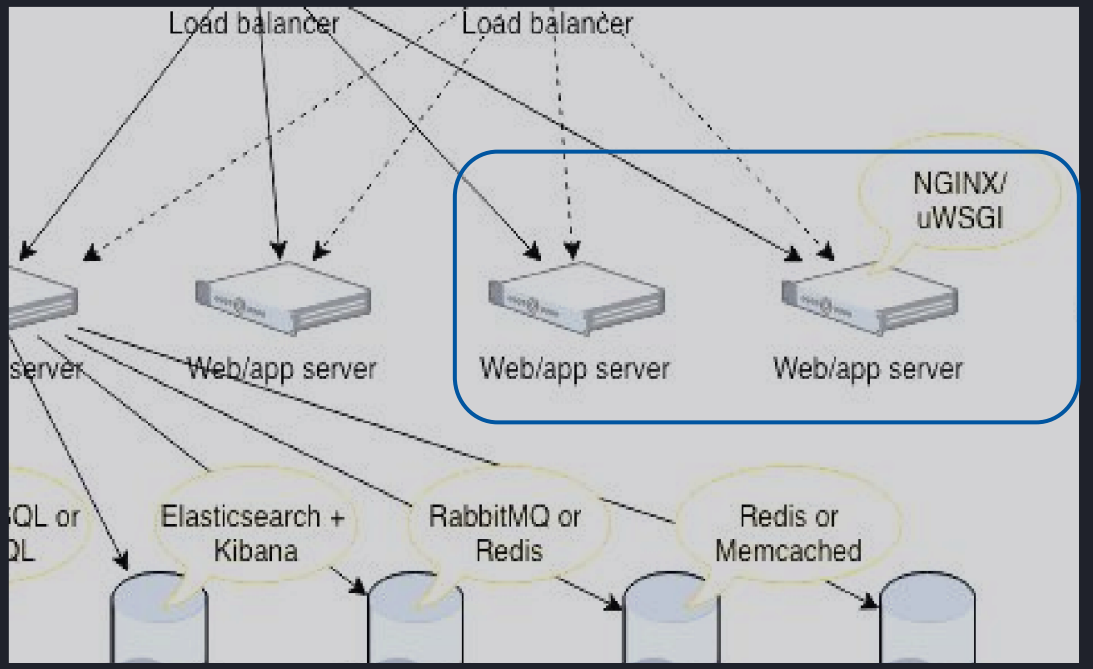
HAProxy configuration

- Frontend
- Backend
- Headers: X-Forwarded-For

Deployment configurations

Web app: uWSGI (behind Nginx)

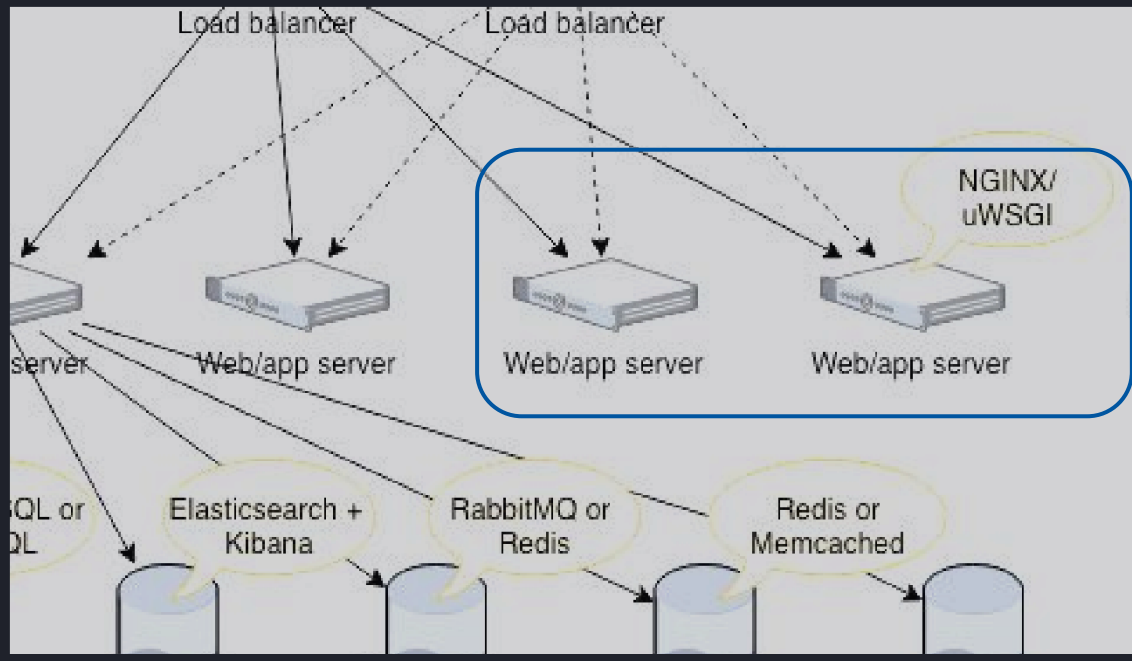
- PEP 333 (TL;DR)
- Invenio UI and REST
- processes and threads



Deployment configurations

Web app: Nginx

- ngx_http_uwsgi_module: translate HTTP -> WSGI
- Reverse proxy to distribute traffic
- ui, api, static, files
- protocols and ciphers
- logging
- headers: X-Request-ID



Dimensions

Processes and Threads

Example: 200 max connections

```
$ less /var/lib/pgsql/data/postgresql.conf

max_connections = 200

$ mysql

> SET GLOBAL max_connections = 200;
```

Max processes per web node
12
• SQLAlchemy: pool of db connections `pool_size` (default 5) per process
• Each uWSGI process -> 5 db connections
• 8 process per web node -> 5 * 8 = 40 connections
• 200 max connections on db / 40 per web node = ???
5 web nodes max
BUT
• You have to count all Invenio apps (your workers, celery apps)!

Dimensions

HTTP Connections

How many connections per web node? How do I distribute traffic?

uWSGI: Start small

1. Predict/Estimate the n. of request/sec you need
2. Take one web node
3. Configure number of uWSGI processes
4. Benchmark by increasing number of requests

locust --host=https://www.google.com --no-web -c 1000 -r 100

Dimensions

HTTP Connections

HAProxy: distribute load

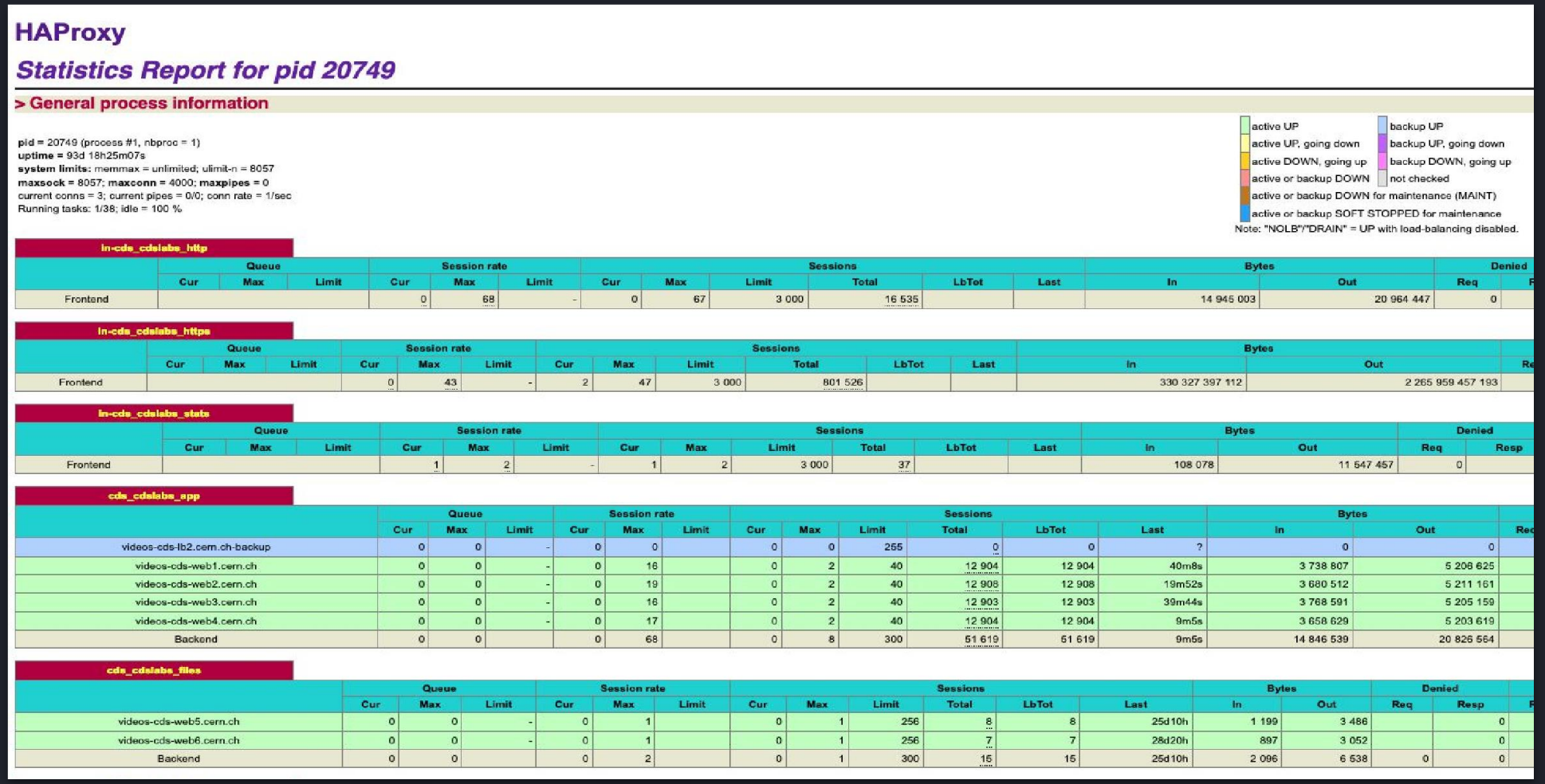
Since we now know how many connections per node, we can distribute the load

```
backend ssl_invenio_app
  ...
  server web-backup 127.0.0.1:444 backup check check-ssl fall 2 inter 5000 maxconn 255 rise 1 ssl verify none weight 2
  server web1 frontend:443 check check-ssl fall 2 inter 5000 maxconn 40 rise 1 ssl verify none weight 2
  server web2 frontend:443 check check-ssl fall 2 inter 5000 maxconn 40 rise 1 ssl verify none weight 2

backend ssl_invenio_files
  ...
  server web5 frontend:443 check check-ssl fall 2 inter 5000 maxconn 100 rise 1 ssl verify none weight 2
  server web6 frontend:443 check check-ssl fall 2 inter 5000 maxconn 100 rise 1 ssl verify none weight 2

backend ssl_invenio_static
  ...
  server web3 frontend:443 check check-ssl fall 2 inter 5000 maxconn 255 rise 1 ssl verify none weight 2
  server web4 frontend:443 check check-ssl fall 2 inter 5000 maxconn 255 rise 1 ssl verify none weight 2
```

Monitoring

Load balancer: HAProxy

http://127.0.0.1:8080



HAProxy

Statistics Report for pid 20749

> General process information

pid = 20749 (process #1, nbproc = 1)
uptime = 93d 18h25m07s
system limits: memmax = unlimited; ulimit-n = 8057
maxsock = 8057; maxconn = 4000; maxpipes = 0
current conns = 3; current pipes = 0/0; conn rate = 1/sec
Running tasks: 1/38; idle = 100 %

active UP | backup UP
active UP, going down | backup UP, going down
active DOWN, going up | backup DOWN, going up
active or backup DOWN | not checked
active or backup DOWN for maintenance (MAINT)
active or backup SOFT STOPPED for maintenance
Note: "NOLB"/"DRAIN" = UP with load-balancing disabled.

in-cds_cdslabs_http

	Queue			Session rate			Sessions						Bytes		Denied	
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	R
Frontend				0	68	-	0	67	3 000	16 535			14 945 003	20 964 447	0	

in-cds_cdslabs_https

	Queue			Session rate			Sessions						Bytes		
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Re
Frontend				0	43	-	2	47	3 000	801 526			330 327 397 112	2 265 959 457 193	

in-cds_cdslabs_stats

	Queue			Session rate			Sessions						Bytes		Denied	
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp
Frontend				1	2	-	1	2	3 000	37			108 078	11 547 457	0	

cds_cdslabs_app

	Queue			Session rate			Sessions						Bytes		
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Rec
videos-cds-lb2.cern.ch-backup	0	0	-	0	0		0	0	255	0	0	?	0	0	
videos-cds-web1.cern.ch	0	0	-	0	16		0	2	40	12 904	12 904	40m8s	3 738 807	5 208 625	
videos-cds-web2.cern.ch	0	0	-	0	19		0	2	40	12 908	12 908	19m52s	3 680 512	5 211 161	
videos-cds-web3.cern.ch	0	0	-	0	16		0	2	40	12 903	12 903	39m44s	3 768 591	5 205 159	
videos-cds-web4.cern.ch	0	0	-	0	17		0	2	40	12 904	12 904	9m5s	3 658 629	5 203 619	
Backend	0	0		0	68		0	8	300	51 619	51 619	9m5s	14 846 539	20 826 564	

cds_cdslabs_files

	Queue			Session rate			Sessions						Bytes		Denied		
	Cur	Max	Limit	Cur	Max	Limit	Cur	Max	Limit	Total	LbTot	Last	In	Out	Req	Resp	R
videos-cds-web5.cern.ch	0	0	-	0	1		0	1	256	8	8	25d10h	1 199	3 486		0	
videos-cds-web6.cern.ch	0	0	-	0	1		0	1	256	7	7	28d20h	897	3 052		0	
Backend	0	0		0	2		0	1	300	15	15	25d10h	2 096	6 538	0	0	

Monitoring

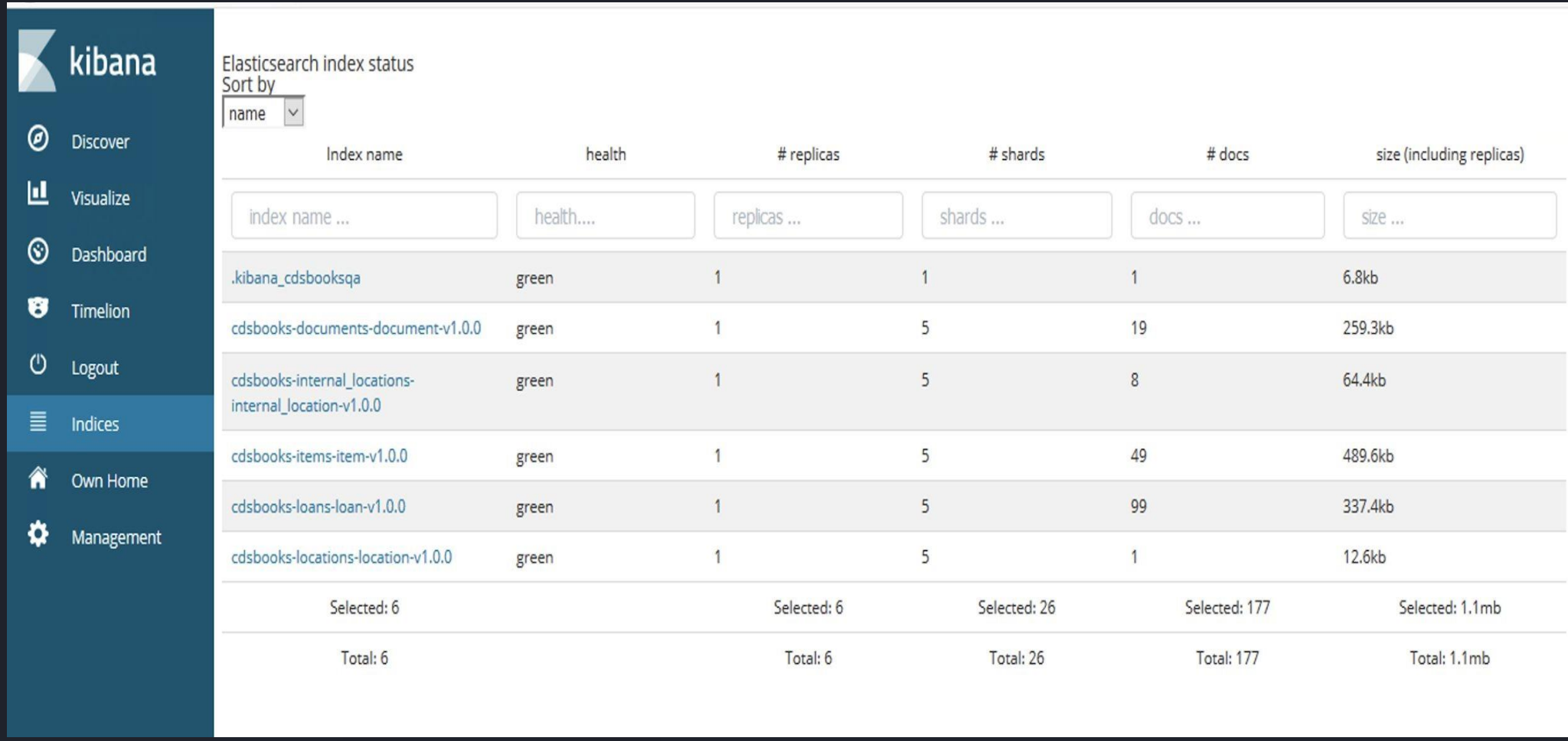
Web app: uWSGI

- uWSGI Stats Server
- uwsgitop

Monitoring

ElasticSearch: Kibana

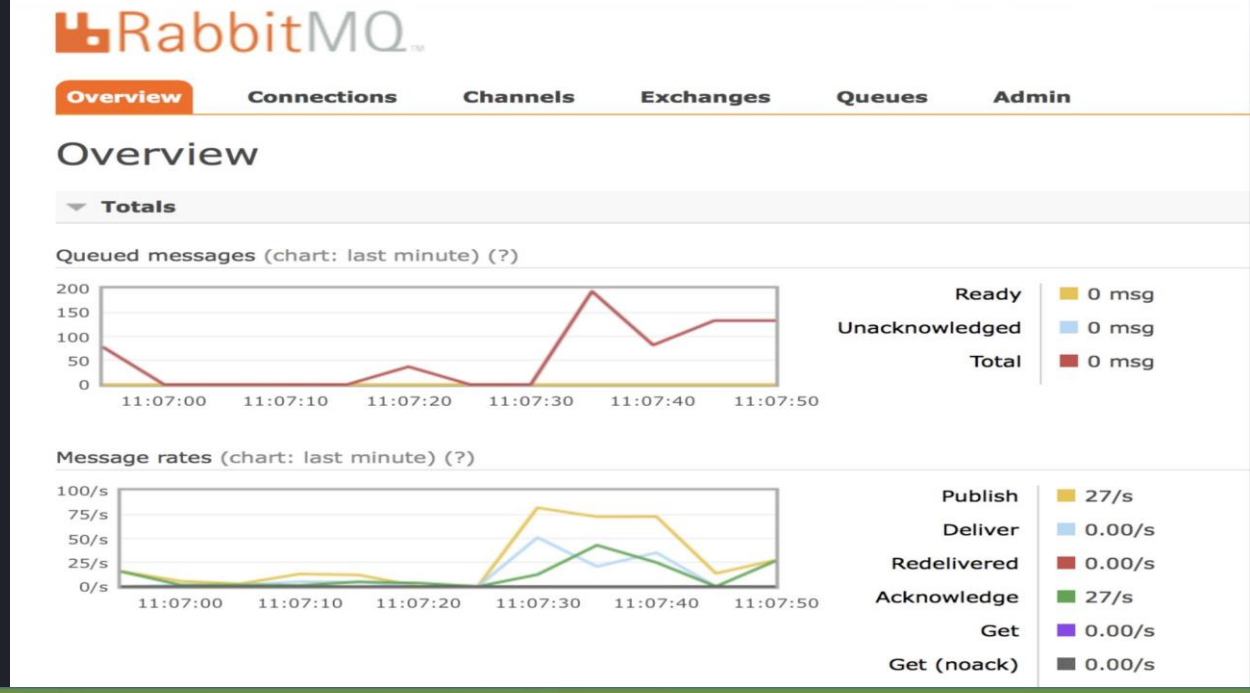
http://127.0.0.1:5601



Monitoring

Job queue

http://127.0.0.1:15672 - guest:guest



Celery Flower | Dashboard | Tasks | Broker | Monitor | Docs | Code

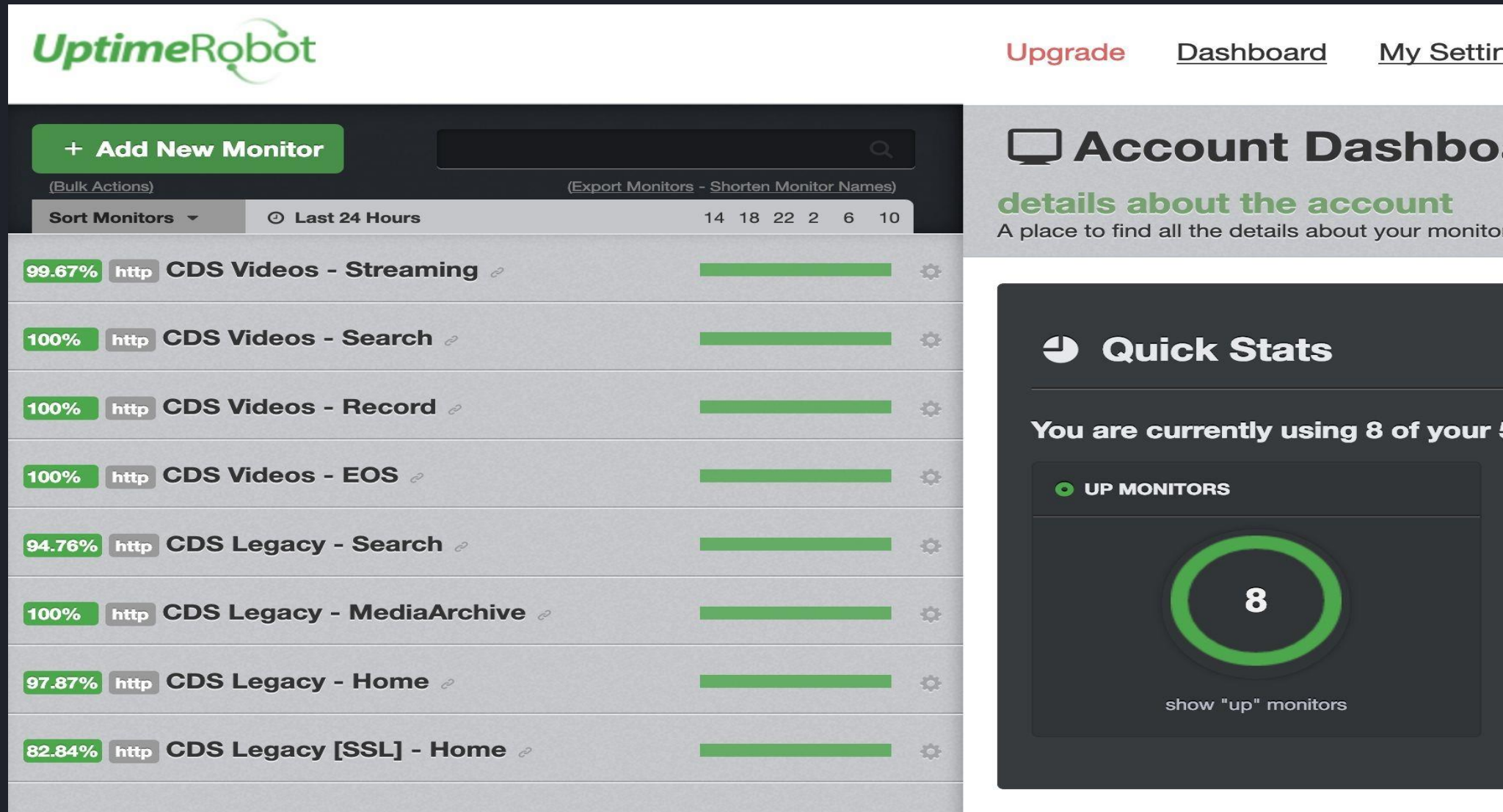
Active: 0	Processed: 19781	Failed: 759	Succeeded: 18687	Retried: 361

Shut Down

	Worker Name	Status	Active	Processed	Failed	Succeeded	Retried	Load Average
☐	celery@zenodo-task7.cern.ch	Online	0	4929	202	4633	93	0.04, 0.03, 0.05
☐	celery@zenodo-task5.cern.ch	Online	0	4954	255	4607	101	0.08, 0.08, 0.05
☐	celery@zenodo-task6.cern.ch	Online	0	4953	133	4759	80	0.0, 0.01, 0.05
☐	celery@zenodo-task4.cern.ch	Online	0	4945	169	4688	87	0.0, 0.01, 0.05

Monitoring

Alerting: UpTimeRobot



Logging

Load balancer: HAProxy

```
backend ssl_app
  balance leastconn
  http-check disable-on-404
  option http-server-close
  option forwardfor except 127.0.0.0/8
  option httpchk HEAD /ping HTTP/1.0
  server web1 frontend:443 check check-ssl fall 2 inter 20000 maxconn 30 rise 1 ssl verify none weight 2

backend ssl_static
  balance leastconn
  http-check disable-on-404
  option http-server-close
  option forwardfor except 127.0.0.0/8
  option httpchk HEAD /ping HTTP/1.0
  server web1 frontend:443 check check-ssl fall 2 inter 5000 maxconn 255 rise 1 ssl verify none weight 2
```

Logging

Web app: Nginx

Infrastructure IPs

```
172.22.0.12 my-site_lb_1
172.22.0.11 my-site_frontend_1
172.22.0.10 my-site_web-ui_1
172.22.0.7 my-site_worker_1
172.22.0.9 my-site_web-api_1
172.22.0.6 my-site_flower_1
172.22.0.8 my-site_kibana_1
172.22.0.4 my-site_mq_1
172.22.0.5 my-site_db_1
172.22.0.3 my-site_cache_1
172.22.0.2 my-site_es_1
```

Nginx log config

```
log_format trace '$remote_addr - [$time_local] "$request" '
                 '$status $body_bytes_sent "$http_referer" '
                 '"$http_user_agent" '
                 '"$http_x_forwarded_for" $request_id '
                 '$msec $request_time '
                 '$upstream_http_x_session_id $upstream_http
```

Log example

```
172.22.0.12 - [15/Mar/2019:14:56:27 +0000] "GET /api/records
200 209 "https://127.0.0.1/search?q=" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10.14; rv:65.0) Geck
"172.22.0.1" 00fdb97e91fe18238733045e9c23a331 1552661787.662 2.242
84e4ee86efbf0e53_5c8bb8cc -
```

Logging

Web app: Nginx

Nginx passes params to the uWSGI server

```
location /api/files {
    gzip off;
    uwsgi_pass api_server;
    include uwsgi_params;
    uwsgi_buffering off;
    uwsgi_request_buffering off;
    uwsgi_param Host $host;
    uwsgi_param X-Forwarded-For $proxy_add_x_forwarded_for;
    uwsgi_param X-Forwarded-Proto $scheme;
    # Pass request id to api server
    uwsgi_param X-Request-ID $request_id;
    # X-Session-ID / X-User-ID is read by nginx and included in the logs,
    # however we don't want to expose them to clients so we are hiding them.
    uwsgi_hide_header X-Session-ID;
    uwsgi_hide_header X-User-ID;
    # Max upload size for files is set to 50GB (configure as needed).
    client_max_body_size 50G;
}
```

Logging

Web app: uWSGI

- invenio-app can read the header X-Forwarded-For and the request_id
- It will contain the list of all IPs (HAProxy, Nginx, etc…)

Error reporting

- invenio-logging
- Sentry

Invenio Logging

- Log to file
- Configure logging level
- Configure file rotation
- Configure Sentry integration

Logging

Sentry