
Maestro Server - Cloud Inventory Documentation

Versão 0.6

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The docs are separated into 3 parts, the first one is about installation and setup Maestro, the second is User Guide and how you create and manage Maestro in the business point of view, and the last we have a developer guide to help to contribute for the project.

1.1 What is Maestro Server

Maestro Server is an open source software platform for management and discovery servers, apps and system for Hybrid IT. Can manage small and large environments, to be able to visualize the latest multi-cloud environment state.

You will be able to:

- Centralize and visualize the latest state multi-cloud environment
- Continuously discover new servers and services of all environments
- Powerful reports, you can create a relation with servers, services, apps and clients
- Automatically populate inventory with ansible, logging jobs, audit and cordenate multiple teams.
- Tracking all changes of your infrastructure

1.2 What problems does it solve?

Maestro had built to solve some problems founded in operating multi-cloud environments, multi shared devops culture and multi clients, where turns hard to keep track the latest environment state, bottlenecks to apply a compliance in all teams, visualization gaps to understand the infrastructure state, access security flaws for internals employees and out of date documentation.

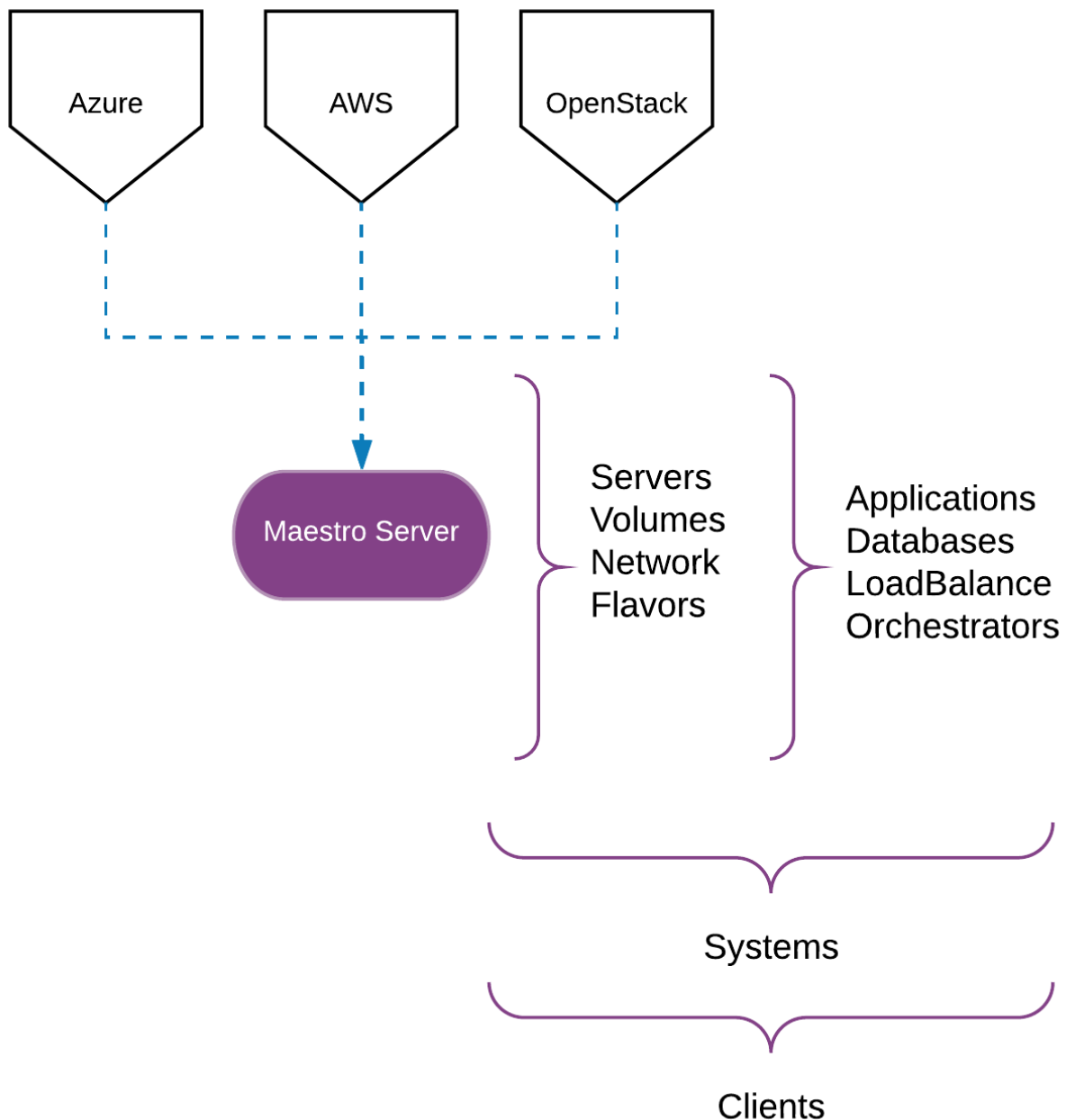
- How can we audit your env?
- How control and keep track your environment?
- How guarantee if my documentation is updated?
- Witch servers belong this client?

Maestro comes to help IT operation teams to organize and audit multicloud infrastructure, it come to substitute CMDB systems, auto-discovery servers, services and apps, be organized in a smart way, it's possible to classify each service, like database, message queues, vpns, api gateway, service mesh and etc, to create a relation between servers and

services, docs clusters and points target, relate services, system and clients. Maestro come for you, to be a complete and simple cloud inventory.

1.3 How do I use it?

It able to analysis your full state environment of all providers you have, centralize all information about datacenters, servers, loadbalance, orchestrations tools, volumes, vpns and etc, keep track their relations, can create complex and powerful reports, analysis costs, growing up velocity, standards services names, network configurations and available deploys for each server.



See [demo cloud inventory here](#).

It had three ways to install maestro. The quick one is to use a standalone docker [easy way], if you like more control over the installation, you can run multiple docker images per service [Recommended], and the last you can install from the source [Dev].

2.1 Running locally

You can use a standalone docker to spin up a single maestro instance.

```
docker run -p 80:80 -p 8888:8888 -p 8000:8000 -p 9999:9999 maestroserver/standalone-  
↪maestro
```

- You need to expose ports **80, 8888, 8000** and **9999**
- You can access by browser over 80 port.

2.2 Persistent data

Docker have a empheral disk, with means if you remove the container all data will be lost. You can handle it making volumes, the list of folder to expose are:

- **/data/db:** It is all data recorded on mongo db.
- **/data/server-app/public/:** Profile images uploaded
- **/data/analytics-front/public:** Architecture artifacts exposed externally.

```
mkdir ./db ./server/public ./analytics/public  
  
docker run  
-v ./db:/data/db  
-v ./server/public:/data/server-app/public/
```

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```
-v ./analytics/public:/data/analytics-front/public
maestroserver/standalone-maestro
```

2.3 Using external Database

It do recommend to spin up a mongodb externally, you can set the `MAESTRO_MONGO_URI` env variable.

Env Variables	Default	Description
<code>MAESTRO_MONGO_URI</code>	<code>mongodb://localhost:27017</code>	Can be mongodb or mongo+srv://

As an example

```
docker run
  -p 80:80
  -p 8888:8888
  -p 8000:8000
  -p 9999:9999
  -e MAESTRO_MONGO_URI=mongodb://external.mongo.com:27017
  maestroserver/standalone-maestro
```

Optionally, you can replace the db name, setting the `MAESTRO_MONGO_DATABASE` env var.

Env Variables	Default	Description
<code>MAESTRO_MONGO_DATABASE</code>	<code>maestro-client</code>	Database name

2.4 Using external RabbitMQ

You can spin up a rabbitmq externally, it's uses `CELERY_BROKER_URL` env variable.

Env Variables	Default	Description
<code>CELERY_BROKER_URL</code>	<code>amqp://localhost:5672</code>	Amqp endpoint

```
docker run
  -p 80:80
  -p 8888:8888
  -p 8000:8000
  -p 9999:9999
  -e CELERY_BROKER_URL=amqp://external.rabbitmq.com:5672
  maestroserver/standalone-maestro
```

2.5 Using S3 to store files

You can use S3 Amazon storage object service to store artifacts and profiles images over a reliable storage system.

Env variables

UPLOAD_TYPE	S3
AWS_ACCESS_KEY_ID	XXXXXXXXXX
AWS_SECRET_ACCESS_KEY	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
AWS_DEFAULT_REGION	us-east-1
AWS_S3_BUCKET_NAME	maestroserver

```
docker run
-e AWS_ACCESS_KEY_ID='XXXXXXXXXX'
-e AWS_SECRET_ACCESS_KEY='XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX'
-e AWS_DEFAULT_REGION='us-east-1'
maestroserver/standalone-maestro
```

2.6 Using external SMTP

You can use a external smtp service as SendGrid, AWS SeS or any smtp server. Go to server application and set:

SMTP_PORT	
SMTP_HOST	
SMTP_SENDER	
SMTP_USERNAME	
SMTP_PASSWORD	
SMTP_USESSL	Enable TLS connect
SMTP_IGNORE	Ignore the validation of security connection

```
docker run
-e SMTP_PORT=465
-e SMTP_HOST=smtp.gmail.com
-e SMTP_SENDER='mysender@gmail.com'
-e SMTP_USERNAME=myusername
-e SMTP_PASSWORD=mysecret
-e SMTP_USESSL=true
maestroserver/standalone-maestro
```

2.7 Complete docker compose

Minimal setup

```
services:
  maestro:
    image: maestroserver/standalone-maestro
    ports:
      - 80:80
      - 8888:8888
      - 8000:8000
      - 9999:9999
    volumes:
      - mongodata:/data/db
      - artifacts_server:/data/server-app/public/
      - artifacts_analytics:/data/artifacts
```

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```
volumes:
  mongodata: {}
  artifacts_server: {}
  artifacts_analytics: {}
```

Recommended reliable setup, using a mongodb, rabbitmq, smtp and store file set externally.

```
services:
  maestro:
    image: maestroserverserver/standalone-maestro
    ports:
      - 80:80
      - 8888:8888
      - 8000:8000
      - 9999:9999
    environment:
      - AWS_ACCESS_KEY_ID='XXXXXXXXXX'
      - AWS_SECRET_ACCESS_KEY='XXXXXXXXXXXXXXXXXXXXXXXXXXXX'
      - AWS_DEFAULT_REGION='us-east-1'
      - MAESTRO_MONGO_URI=mongodb://external.mongo.com:27017
      - CELERY_BROKER_URL=amqp://external.rabbitmq.com:5672
      - SMTP_PORT=465
      - SMTP_HOST=smtp.gmail.com
      - SMTP_SENDER='mysender@gmail.com'
      - SMTP_USERNAME=myusername
      - SMTP_PASSWORD=mysecret
      - SMTP_USE_TLS=true
```

Nota: Standalone docker use the same env vars found it in all services.

Nota: Standalone uses supervisord to manage all services inside of one docker, if you like to spin up one docker per service, go to [installation](#).

Aviso: Don't spin up a multiple standalone docker, it will duplicate the schedule tasks, if you need to make a production high availability setup, go to installation per service.

Installing Maestro

3.1 Using Docker Compose

To get Maestro up in just a few minutes go to [Standalone installation.](#); However if you like to get more control over the installation you can spin up a one docker per service.

3.1.1 Overview

There are a list of all services:

Client App	FrontEnd client	Vue2 + Bootstrap 3
Server App	Primary API, authentication, crud and manager	NodeJs 8.11 Kraken
Discovery App	Auto discovery and crawlers	Python 3.6, flask
Scheduler App	Jobs manager with celery beat	Python 3.6, celery
Reports App	Reports generator	Python 3.6, flask
Analytics App	Analytics Maestro - Graphs Generator	Python 3.6, flask
Analytics Front	Analytics Front	NodeJs 8.11 Kraken
Data DB App	Data layer	Python 3.6, flask
Audit App	History tracker service	NodeJs 8.11 Kraken
WebSocket APP	WebSocket - Events	Go, Centrifugo

3.1.2 Running locally

You can use docker to spin up a maestro bundle, you can copy and execute the docker-compose file describe below.

Nota: PS: Docker compose will be able to create and manager all networks and communication between services.

PS: Containers is prepared to run in production.

Nota: Download docker-compose file.

```
version: '3'

services:
  client:
    image: maestroservers/client-maestro
    ports:
      - "80:80"
    environment:
      - "API_URL=http://localhost:8888"
      - "STATIC_URL=http://localhost:8888/static/" # <- It need to have the slash
      - "ANALYTICS_URL=http://localhost:9999"
      - "WEBSOCKET_URL=ws://localhost:8000"
    depends_on:
      - server

  server:
    image: maestroservers/server-maestro
    ports:
      - "8888:8888"
    environment:
      - "MAESTRO_MONGO_URI=mongodb://mongodb"
      - "MAESTRO_MONGO_DATABASE=maestro-client"
      - "MAESTRO_DISCOVERY_URI=http://discovery:5000"
      - "MAESTRO_ANALYTICS_URI=http://analytics:5020"
      - "MAESTRO_ANALYTICS_FRONT_URI=http://analytics_front:9999"
      - "MAESTRO_REPORT_URI=http://reports:5005"
      - "SMTP_PORT=25"
      - "SMTP_HOST=maildev"
      - "SMTP_SENDER=myemail@gmail.com"
      - "SMTP_IGNORE=true"
    volumes:
      - artifacts_server:/data/public/
    depends_on:
      - mongodb
      - discovery
      - reports

  discovery:
    image: maestroservers/discovery-maestro
    ports:
      - "5000:5000"
    environment:
      - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
      - "MAESTRO_DATA_URI=http://data:5010"
    depends_on:
      - rabbitmq
      - data

  discovery_worker:
    image: maestroservers/discovery-maestro-celery
    environment:
      - "MAESTRO_DATA_URI=http://data:5010"
      - "MAESTRO_WEBSOCKET_URL=http://ws:8000"
      - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
```

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```

depends_on:
- rabbitmq
- data

reports:
image: maestroservers/reports-maestro
environment:
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
- "MAESTRO_MONGO_URI=mongodb://mongodb"
- "MAESTRO_MONGO_DATABASE=maestro-reports"
depends_on:
- rabbitmq
- mongodb

reports_worker:
image: maestroservers/reports-maestro-celery
environment:
- "MAESTRO_REPORT_URI=http://reports:5005"
- "MAESTRO_DATA_URI=http://data:5010"
- "MAESTRO_WEBSOCKET_URI=http://ws:8000"
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
depends_on:
- rabbitmq
- data

scheduler:
image: maestroservers/scheduler-maestro
environment:
- "MAESTRO_DATA_URI=http://data:5010"
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
- "MAESTRO_MONGO_URI=mongodb://mongodb"
- "MAESTRO_MONGO_DATABASE=maestro-client"
depends_on:
- mongodb
- rabbitmq

scheduler_worker:
image: maestroservers/scheduler-maestro-celery
environment:
- "MAESTRO_DATA_URI=http://data:5010"
- "MAESTRO_DISCOVERY_URI=http://discovery:5000"
- "MAESTRO_ANALYTICS_URI=http://analytics:5020"
- "MAESTRO_REPORT_URI=http://reports:5005"
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
depends_on:
- rabbitmq
- data

analytics:
image: maestroservers/analytics-maestro
ports:
- "5020:5020"
environment:
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
- "MAESTRO_DATA_URI=http://data:5010"
depends_on:
- rabbitmq

```

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```

- data

analytics_worker:
  image: maestrosrserver/analytics-maestro-celery
  environment:
    - "MAESTRO_DATA_URI=http://data:5010"
    - "MAESTRO_ANALYTICS_FRONT_URI=http://analytics_front:9999"
    - "MAESTRO_WEBSOCKET_URI=http://ws:8000"
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "CELERYD_MAX_TASKS_PER_CHILD=2"
  depends_on:
    - rabbitmq
    - data

analytics_front:
  image: maestrosrserver/analytics-front-maestro
  ports:
    - "9999:9999"
  volumes:
    - artifacts_analytics:/data/artifacts/
  environment:
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-client"

data:
  image: maestrosrserver/data-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-client"
  depends_on:
    - mongodb

audit:
  image: maestrosrserver/audit-app-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-audit"
    - "MAESTRO_DATA_URI=http://data:5010"

ws:
  image: maestrosrserver/websocket-maestro
  ports:
    - "8000:8000"

rabbitmq:
  hostname: "discovery-rabbit"
  image: rabbitmq:3-management
  ports:
    - "15672:15672"
    - "5672:5672"

mongodb:
  image: mongo
  volumes:
    - mongodata:/data/db
  ports:
    - "27017:27017"

```

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```
maildev:
  image: djfarrelly/maildev
  mem_limit: 80m
  ports:
    - "1025:25"
    - "1080:80"

volumes:
  mongodata: {}
  artifacts_server: {}
  artifacts_analytics: {}
```

3.1.3 Spin up the API server in a different server

By default the client server uses the same domain name to connect into server api, websocket and analytics front api; However if you like to switch this configuration you can use env vars to set all urls.

By default if you run the client service over `//example.maestro`, the client will try to access the server api by `//example.maestro:8888`, the analytic front by `//example.maestro:9999` and the websocket by `ws(s)/example.maestro:8000`

```
services:
  client:
    image: maestroservers/client-maestro
    environment:
      - "API_URL=http://server.api.endpoint:8888"
      - "STATIC_URL=http://server.api.endpoint:8888/static/" # <- It need to have ↵
↵the slash
      - "ANALYTICS_URL=http://analytics.front.endpoint:9999"
      - "WEBSOCKET_URL=ws://websocket.endpoint:8000"
```

3.1.4 Productionize

Should you follow the steps below to run the Maestro on production.

- Using external Database and RabbitMq - [More details about external DB](#).
- Using a reliable store engine as AWS S3 - [More details about upload](#).
- Configuration a third-party SMTP system - [More details about SMTP](#).
- Spin up two or more instance of client, server, discovery, reports, analytics and data. [Expect websocket and scheduler]
- Set a unique value for each SECRETJWT key - [More details about tokens](#).
- Use a external loadbalance to handle ssl connections.

3.2 Advanced setups

3.2.1 SMTP Config

Services

- server
-

You can use an external smtp service as SendGrid, AWS SeS or any smtp server. Go to server application and set:

SMTP_PORT	465	
SMTP_HOST	smtp.gmail.com	
SMTP_SENDER	"maestrosmtp@gmail.com"	
SMTP_USERNAME	"maestrosmtp"	
SMTP_PASSWORD	"XXXX"	
SMTP_USETSL	truelfalse	Enable TLS connect
SMTP_IGNORE	truelfalse	During the connection, validate security connection?

Example

```
services:
  server:
    image: maestroserverserver/server-maestro
    ports:
      - "8888:8888"
    environment:
      - SMTP_PORT=465
      - SMTP_HOST=smtp.gmail.com
      - SMTP_SENDER='mysender@gmail.com'
      - SMTP_USERNAME=myusername
      - SMTP_PASSWORD=mysecret
      - SMTP_USETSL=true
```

3.2.2 Using external store engine as S3

Services

- server
 - analytics_front
-

You can choose two upload mode, a local file or using S3 storage.

The upload system was used on two points:

server-app	Using on avatar users, teams and projects images.
analytics app	To store artifacts such as graphs, svgs and pngs

Local Storage

For a single node, the file will be stored on a local disk.

Env variables

UPLOAD_TYPE	Local
LOCAL_DIR	/public/static/

```
server:
  image: maestroserverserver/server-maestro
  environment:
    - UPLOAD_TYPE=Local
    - LOCAL_DIR=/public/static/

client:
  image: maestroserverserver/client-maestro
  environment:
    - STATIC_URL='http://server-app:8888/static/'
```

Nota: These are the default configurations, you don't need to declare these values.

AWS S3 Storage

You can use a S3 Amazon storage object service to store an upload files.

Env variables

UPLOAD_TYPE	S3
AWS_ACCESS_KEY_ID	XXXXXXXXXX
AWS_SECRET_ACCESS_KEY	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
AWS_DEFAULT_REGION	us-east-1
AWS_S3_BUCKET_NAME	maestroserverserver
AWS_ENDPOINT	S3 endpoint

```
server:
  image: maestroserverserver/server-maestro
  environment:
    - AWS_ACCESS_KEY_ID='XXXXXXXXXX'
    - AWS_SECRET_ACCESS_KEY='XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX'
    - AWS_DEFAULT_REGION='us-east-1'
    - AWS_S3_BUCKET_NAME='maestroserverserver'

client:
  image: maestroserverserver/client-maestro
  environment:
    - STATIC_URL='https://{my_aws_endpoint}.s3.amazonaws.com.br/{mybucketname}/'
```

Nota:

- Remember to set the right path on `STATIC_URL` endpoint into client-app.
 - The bucket need to be public.
-
-

Digital Ocean Spaces

You can use Digital ocean space, they uses the same S3 protocol, but rather than AWS you need to set `AWS_ENDPOINT`.

Env variables

<code>UPLOAD_TYPE</code>	S3
<code>AWS_ACCESS_KEY_ID</code>	XXXXXXXXXX
<code>AWS_SECRET_ACCESS_KEY</code>	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
<code>AWS_DEFAULT_REGION</code>	ny3
<code>AWS_S3_BUCKET_NAME</code>	maestroserver
<code>AWS_ENDPOINT</code>	S3 endpoint

- Endpoint can be `ny3.spacesdigitalocean`
- Access and secret can be get on spaces dashboard.
- `AWS_DEFAULT_REGION` can be `ny3`

3.2.3 Using external Database

Services

- server
 - reports
 - scheduler
 - analytics_front
 - data
 - audit
-

You should spin up a mongodb externally, you can do using the `MAESTRO_MONGO_URI` env variable.

Env Variables	Default	Description
<code>MAESTRO_MONGO_URI</code>	<code>mongodb://localhost:27017</code>	Can be mongodb or mongo+srv://

```
services:
server:
  image: maestroserver/server-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-client"
```

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```

reports:
  image: maestroservers/reports-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-reports"

scheduler:
  image: maestroservers/scheduler-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-scheduler"

analytics_front:
  image: maestroservers/analytics-front-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-client" # <----- It need to be the same db of
↪server-api

data:
  image: maestroservers/data-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-client" # <----- It need to be the same db of
↪server-api

audit:
  image: maestroservers/audit-app-maestro
  environment:
    - "MAESTRO_MONGO_URI=mongodb://{external.mongo.url}"
    - "MAESTRO_MONGO_DATABASE=maestro-audit"

```

You can replace the db name using the MAESTRO_MONGO_DATABASE env var.

Env Variables	Default	Description
MAESTRO_MONGO_DATABASE	maestro-client	Database name

3.2.4 Using external RabbitMQ

Services

- discovery
- discovery_worker
- reports
- reports_worker
- analytics
- analytics_worker
- scheduler
- scheduler_worker

You can spin up a rabbitmq externally, you can do using the *CELERY_BROKER_URL* env variable.

Env Variables	Default	Description
CELERY_BROKER_URL	amqp://localhost:5672	Amqp endpoint

```
services:
discovery:
  image: maestroservers/discovery-maestro
  ports:
  - "5000:5000"
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
  - "MAESTRO_DATA_URI=http://data:5010"
  depends_on:
  - rabbitmq
  - data

discovery_worker:
  image: maestroservers/discovery-maestro-celery
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

reports:
  image: maestroservers/reports-maestro
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

reports_worker:
  image: maestroservers/reports-maestro-celery
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

scheduler:
  image: maestroservers/scheduler-maestro
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

scheduler_worker:
  image: maestroservers/scheduler-maestro-celery
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

analytics:
  image: maestroservers/analytics-maestro
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"

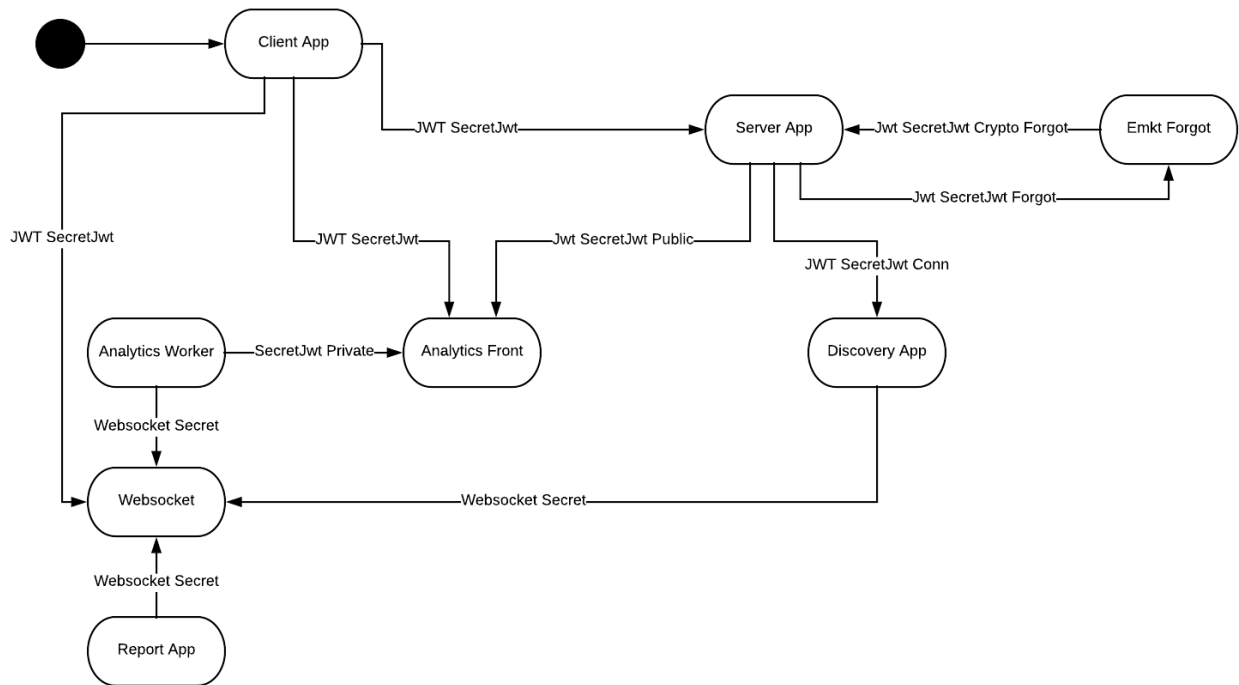
analytics_worker:
  image: maestroservers/analytics-maestro-celery
  environment:
  - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
```

3.2.5 JWT Tokens

Maestro uses JWT token to handle the authentication/authorization task, those tasks are:

- Authenticate users
- Authenticate private requests between the services
- Authenticate public requests as websockets

High level architecture:

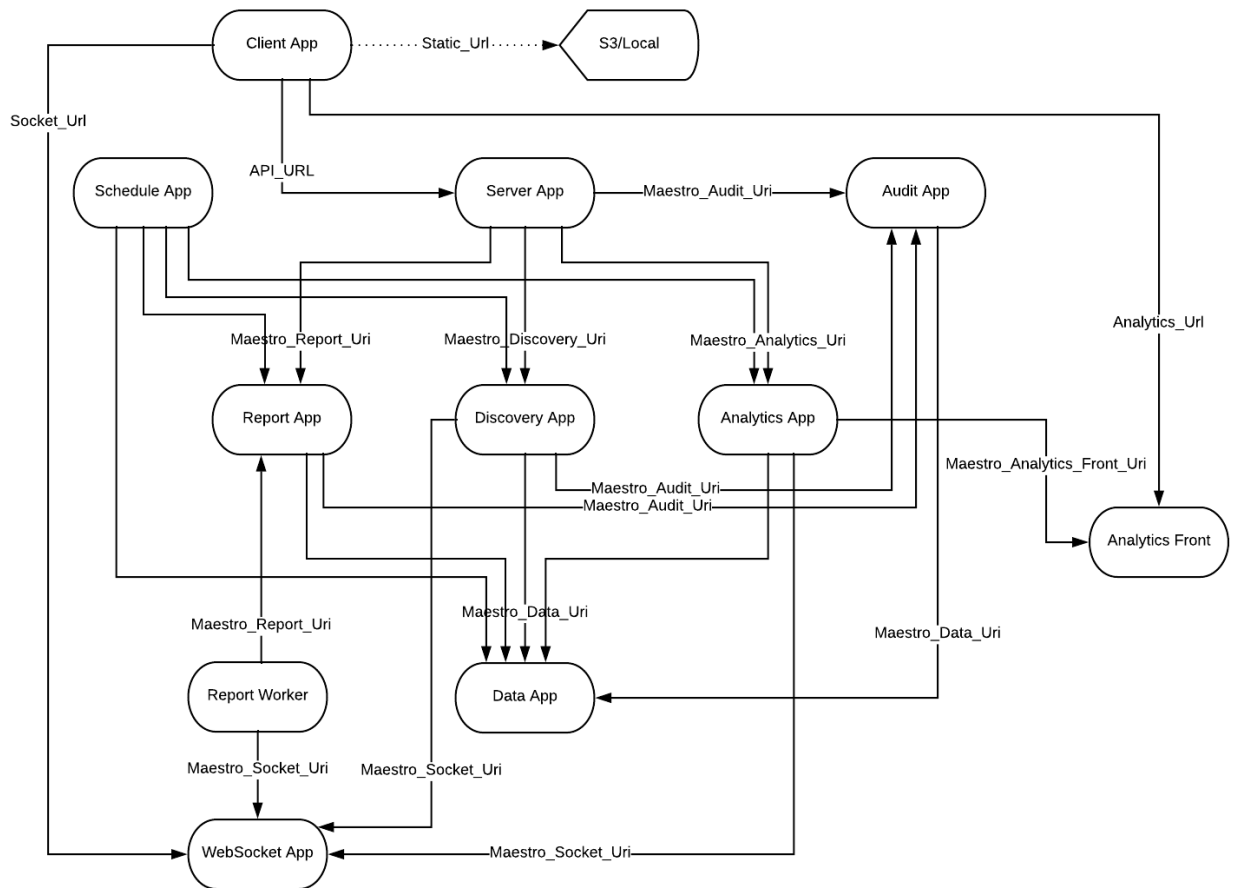


JWT Name	Context	Owned by	Used by	
SecreteJwt	Authenti- cate/Authorization users	Server App	Client App	Jwt user auth
			Disco- very App	To crawler 3 party provider
			Analy- tics Front	Jwt user auth
			WebSoc- ket	To authorize to connect on websoc- ket
SecretJwt Pu- blic	Auth shared links (public access)	Server App	Analy- tics Front	Used to authorize to access a public graphs
SecretJwt Crpto Forgot	First secret key, request forgot password	Server App	Client App	
SecretJwt Forgot	Second secret key, confirm forgot password	Server App	Server App	
SecretJwt Socket	Authorization users to con- nect to websocket	Websocket App	Analy- tics App	To authorize to send a message to websocket message bus
			Disco- very App	
SecretJwt Pri- vate	Private Authenticate	Server	Analy- tics App	Security key between services
			Disco- very App	
			Report App	
		Discovery App	Data App	
			Audit App	
		Reports App	Data App	
			Audit App	
			Report App	Report Worker -> Report Api
		Analytics App	Data App	
		Analytics App (Worker)	Analy- tics Front	To be able to send artifacts to analy- tics front

- **Owned** - Token accountant service
- **Context** - High-level description
- **Used** - It was used by

3.2.6 Service Discovery Configuration

This section describes the service discovery configuration. The Maestro server uses env vars to set the configuration between applications, as an example the server-app uses the `MAESTRO_DISCOVERY_URI` to figure out where the discovery app is.



Service	To discovery		Context	Protocol
Client App	Server App	API_URL	SPA application	Rest
	WebSocket App	WEBSOCKET_URL	Received status message (service bus)	WebSoc- ket
	Analytics Front	ANALYTICS_URL	Show graphs on business analytics	Iframe HTTP
Server App	Report App	MAESTRO_REPORT_URI	Create any reports	Rest
	Discovery App	MAESTRO_DISCOVERY_URI	Execute crawler actions	Rest
	Analytics App	MAESTRO_ANALITYCS_URI	Create business graphs	Rest
	Audit App	MAESTRO_AUDIT_URI	Send any update to audit	Rest
Report App	Data App	MAESTRO_DATA_URI	Update report status	Rest
	Audit App	MAESTRO_AUDIT_URI	Send any update to audit	Rest
	WebSocket App	MAESTRO_WEBSOCKET_URI	Send to client any status	WebSoc- ket
Discovery App	Data App	MAESTRO_DATA_URI		Rest
	Audit App	MAESTRO_AUDIT_URI	Send any update to audit	Rest
	WebSocket App	MAESTRO_WEBSOCKET_URI		WebSoc- ket
Analytics App	Data App	MAESTRO_DATA_URI	Populate meta data in analytics entity	Rest
	Analytics Front	MAESTRO_ANALYTICS_FRONT_URI	Post svgs	Rest
	WebSocket App	MAESTRO_WEBSOCKET_URI	Send to client any status	Socket
Scheduler App	Report App	MAESTRO_REPORT_URI	Automated and manage reports	Rest
	Discovery App	MAESTRO_DISCOVERY_URI	Automated and manage discovery	Rest
	Analytics App	MAESTRO_ANALITYCS_URI	Automated and manage analytics	Rest
	Data App	MAESTRO_DATA_URI	Dump connections parameters.	Rest
Audit App	Data App	MAESTRO_DATA_URI	Update any sync rule	Rest

3.2.7 Themes

Services

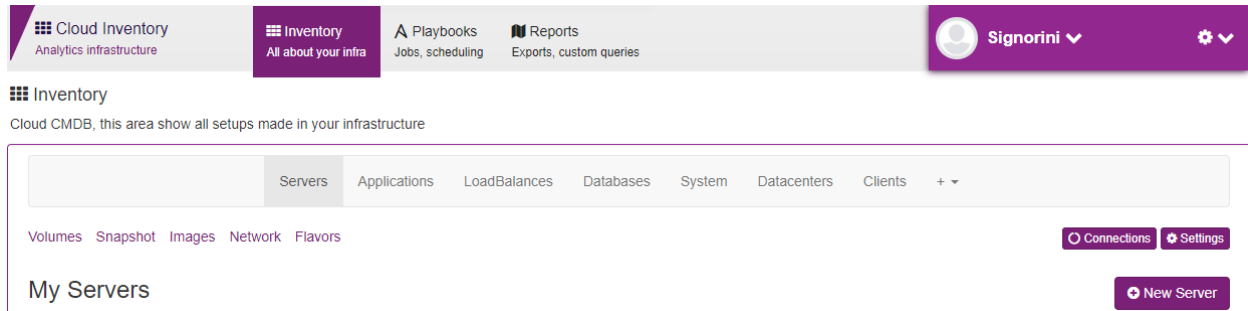
- client

You can change the client theme.

```
client:
  image: maestroserver/client-maestro
  ports:
    - "80:80"
  environment:
    - "API_URL=http://localhost:8888"
    - "THEME=gold"
```

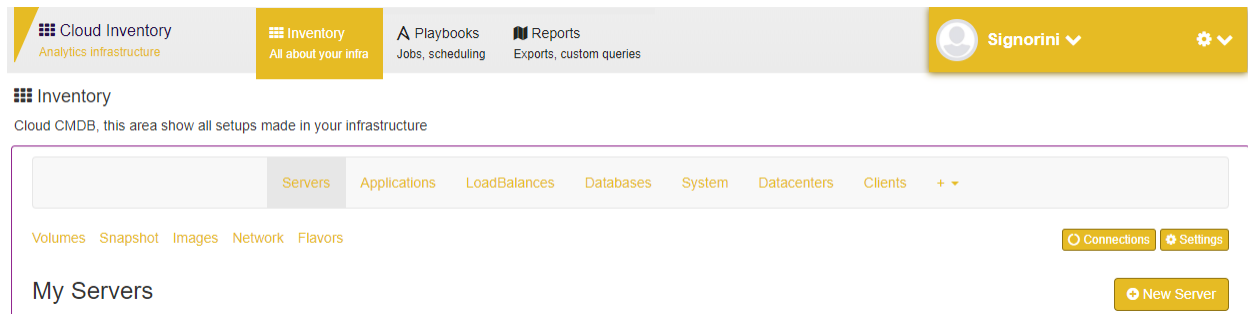
There are some options to choose.

Default



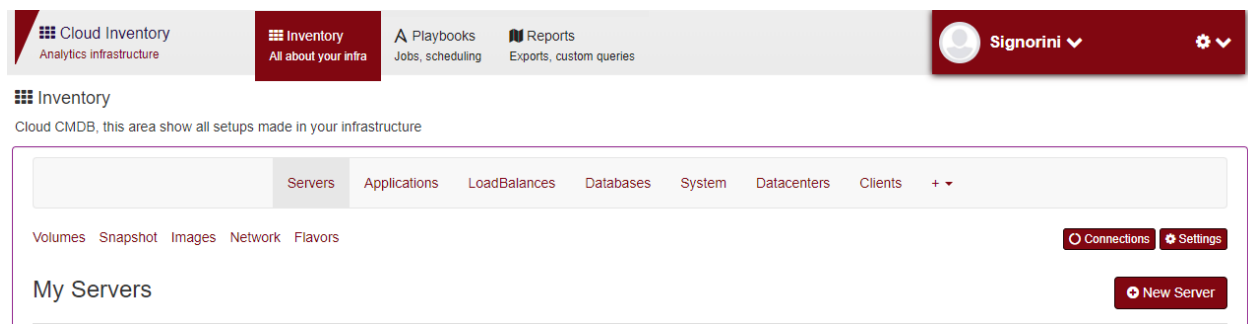
THEME=lotus

Gold



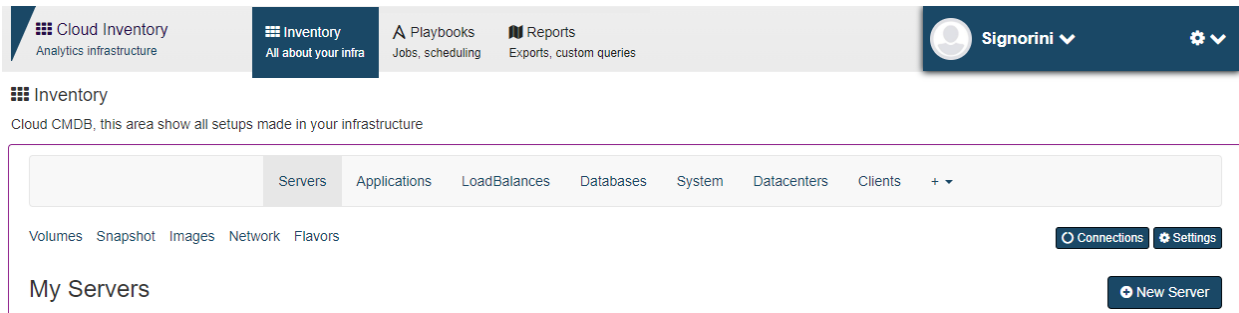
THEME=gold

Wine



THEME=wine

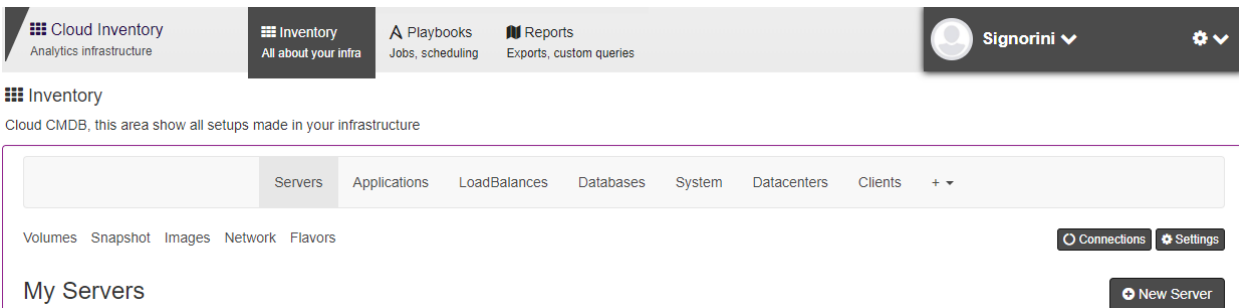
Blue



The screenshot shows the Maestro Server Cloud Inventory interface with a blue theme. The top navigation bar includes 'Cloud Inventory' (Analytics infrastructure), 'Inventory' (All about your infra), 'Playbooks' (Jobs, scheduling), and 'Reports' (Exports, custom queries). The user 'Signorini' is logged in. The main content area is titled 'Inventory' and 'Cloud CMDB, this area show all setups made in your infrastructure'. A horizontal menu shows 'Servers' as the active tab, with other options like 'Applications', 'LoadBalances', 'Databases', 'System', 'Datacenters', and 'Clients'. Below this, there are links for 'Volumes', 'Snapshot', 'Images', 'Network', and 'Flavors'. On the right, there are buttons for 'Connections', 'Settings', and 'New Server'.

THEME=blue

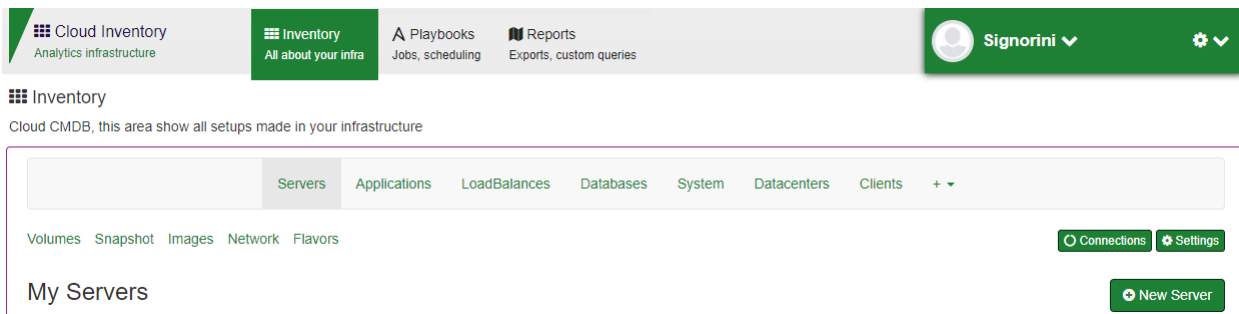
Dark



The screenshot shows the Maestro Server Cloud Inventory interface with a dark theme. The layout is identical to the blue theme, with the same navigation bar, user profile, and main content area. The 'Inventory' section is highlighted in dark blue, and the 'Servers' tab is active in the horizontal menu.

THEME=dark

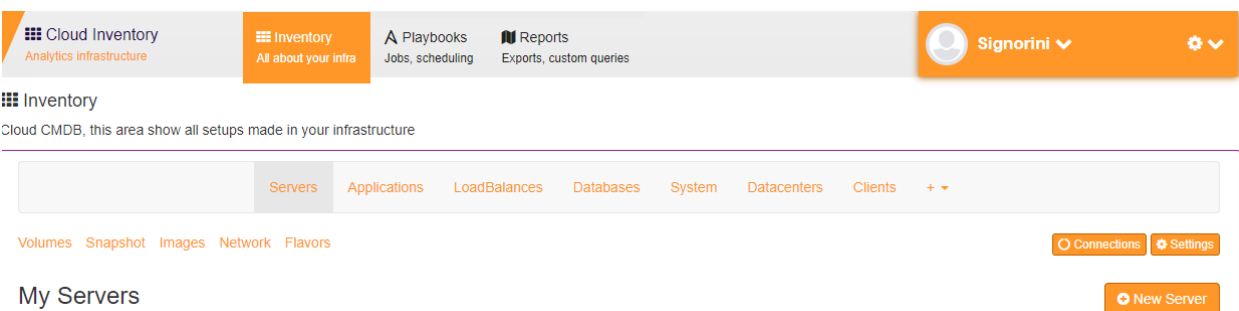
Green



The screenshot shows the Maestro Server Cloud Inventory interface with a green theme. The layout is identical to the previous themes, with the 'Inventory' section and 'Servers' tab highlighted in green.

THEME=green

Orange

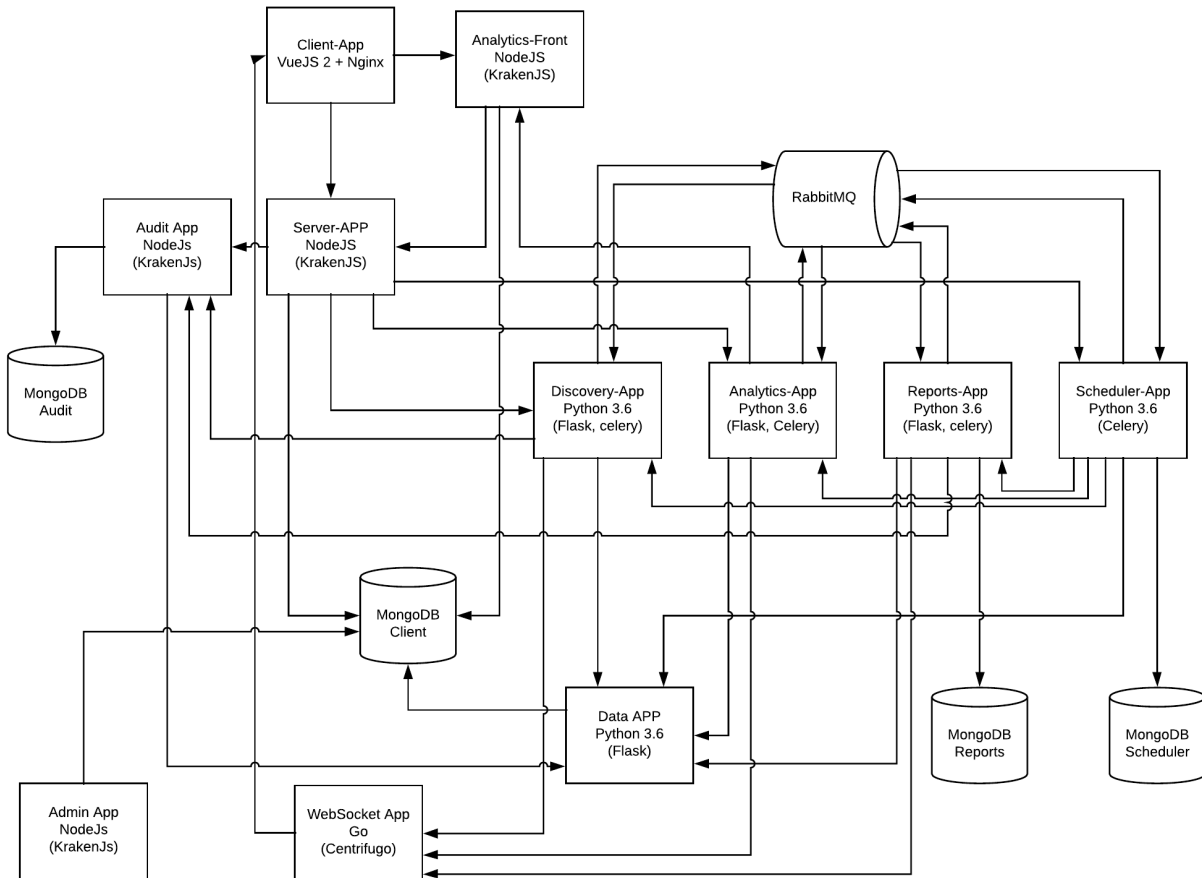


The screenshot shows the Maestro Server Cloud Inventory interface with an orange theme. The layout is identical to the previous themes, with the 'Inventory' section and 'Servers' tab highlighted in orange.

THEME=orange

3.3 Services configurations

3.3.1 High Architecture



This section will deep dive over each configuration found it on each Maestro service.

A minimum installation require:

- Client App
- Server App
- MongoDB

To uses a synchronous discovery features with AWS and/or other providers, do you need:

- Discovery App
- Data App
- RabbitMq

To have an auto update over discovery/reports/analytics api you need to install the scheduler app.

- Scheduler App

To create and export reports you need to have the reports app installed:

- Reports App
- Data App
- RabbitMq

To create a business analytics graphs, public and shared these maps, you need to install these apps:

- Analytics App
- Analytics Front App
- Data App
- RabbitMq

And if you like to tracking history, you should install:

- Audit App
-

3.3.2 Client App

Installation by docker-compose

```
client:
  image: maestroservers/client-maestro
  ports:
    - "80:80"
  environment:
    - "API_URL=http://server-app:8888"
    - "STATIC_URL=http://server-app:8888/static/" # ensure to add slash in the end
    - "ANALYTICS_URL=http://localhost:9999"
```

```
docker run -p 80:80
-e 'API_URL=http://localhost:8888'
-e 'STATIC_URL=http://localhost:8888/static/'
-e "ANALYTICS_URL=http://localhost:9999"
maestroservers/client-maestro
```

Aviso:

- **API_URL:** Set the endpoint provide by server-app.
- **ANALYTICS_URL:** Set the endpoint provide by analytics-front.
- **STATIC_URL:** Set the the static url provide by server-app. - [More details on upload setup.](#)

Env variables

Env Variables	Example	Description
API_URL	http://localhost:8888	Server App Url
STATIC_URL	/static	Full path static files
ANALYTICS_URL	http://localhost:9999	Analytics App Url
WEBSOCKET_URL	ws://localhost:8000	Websocket Url
LOGO	/static/imgs/logo300.png	Logo URL used on login page
THEME	theme-lotus	Theme (gold winelblue green dark)

3.3.3 Server APP

Installation by docker

```
server:
  image: maestroserverserver-maestro
  ports:
    - "8888:8888"
  environment:
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-client"
    - "MAESTRO_DISCOVERY_URI=http://discovery:5000"
    - "MAESTRO_ANALYTICS_URI=http://analytics:5020"
    - "MAESTRO_REPORT_URI=http://reports:5005"
    - "MAESTRO_AUDIT_URI=http://audit:10900"
```

```
docker run -p 8888:8888
-e "MAESTRO_MONGO_URI=mongodb://mongodb"
-e "MAESTRO_MONGO_DATABASE=maestro-client"
-e "MAESTRO_DISCOVERY_URI=http://localhost:5000"
-e "MAESTRO_REPORT_URI=http://localhost:5005"
-e "MAESTRO_ANALYTICS_URI=http://localhost:5020"
-e "MAESTRO_AUDIT_URI=http://audit:10900"
maestroserverserver-maestro
```

Aviso:

- **MAESTRO_MONGO_URI:** - It must be the full url -mongodb://{MAESTRO_MONGO_URI}/{MAESTRO_MONGO_DATABASE}
- **MAESTRO_MONGO_DATABASE:** - The mongodb database name (ex: maestro-client)
- **SMTP_X:** - It used to send transactional emails - [More details about SMTP](#).
- **MAESTRO_UPLOAD_TYPE:** - Can be a local or S3 - [More details about upload](#).
- **MAESTRO_SECRETJWT_PUBLIC:** - Hash used only do public shared resources, must be different of MAESTRO_SECRETJWT - [More details about tokens](#).

Env variables

Env Variables	Example	Description
MAESTRO_PORT	8888	
NODE_ENV	development production	
MAESTRO_MONGO_URI	mongodb://localhost	DB string connection
MAESTRO_MONGO_DATABASE	maestro-client	Database name
MAESTRO_SECRETJWT	XXXX	Secret key - session
MAESTRO_SECRETJWT_FORGOT	XXXX	Secret key - forgot request
MAESTRO_SECRET_CRYPTO_FORGOT	XXXX	Secret key - forgot content
MAESTRO_SECRETJWT_PUBLIC	XXX	Secret key - public shared
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections
MAESTRO_DISCOVERY_URL	http://localhost:5000	Url discovery-app (flask)
MAESTRO_REPORT_URL	http://localhost:5005	Url reports-app (flask)
MAESTRO_ANALYTICS_URI	http://localhost:5020	Url Analytics-app (flask)
MAESTRO_AUDIT_URI	http://localhost:10900	Url Audit-app (krakenjs)
MAESTRO_TIMEOUT	1000	Timeout micro service request
SMTP_PORT	1025	
SMTP_HOST	localhost	
SMTP_SENDER	myemail@XXXX	
SMTP_IGNORE	true false	
SMTP_USESSL	true false	
SMTP_USERNAME		
SMTP_PASSWORD		
AWS_ACCESS_KEY_ID	XXXX	
AWS_SECRET_ACCESS_KEY	XXXX	
AWS_DEFAULT_REGION	us-east-1	
AWS_S3_BUCKET_NAME	maestroserver	Bucket name
AWS_S3_PRIVATE_BUCKET_NAME	privatebucket	Used to upload internal files, as an example ansible facts are
MAESTRO_UPLOAD_TYPE	S3 or Local	Upload mode
LOCAL_DIR	/public/static/	Where files will be uploaded
MAESTRO_TMP	\$rootDirectory	Tmp folder used on upload files process
MAESTRO_AUDIT_DISABLED	false	Disable the audit services
MAESTRO_REPORT_DISABLED	false	Disable the report services
MAESTRO_DISCOVERY_DISABLED	false	Disable the discovery service

3.3.4 Discovery App

Installation by docker

```

discovery:
  image: maestroserver/discovery-maestro
  ports:
    - "5000:5000"
  environment:
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "MAESTRO_DATA_URI=http://data:5010"

discovery_worker:
  image: maestroserver/discovery-maestro-celery
  environment:
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "MAESTRO_DATA_URI=http://data:5010"
    - "MAESTRO_AUDIT_URI=http://audit:10900"

```

```
docker run -p 5000:5000 -e "MAESTRO_DATA_URI=http://localhost:5010" -e "CELERY_
↪BROKER_URL=amqp://rabbitmq:5672" maestroserver/discovery-maestro
```

```
docker run \
-e "MAESTRO_DATA_URI=http://localhost:5010" \
-e "CELERY_BROKER_URL=amqp://rabbitmq:5672" \
-e "MAESTRO_AUDIT_URI=http://localhost:10900" \
-e "MAESTRO_SERVER_URI=http://localhost:8888" \
maestroserver/discovery-maestro-celery
```

Aviso:

- **MAESTRO_DATA_URI:** - Data App endpoint API - default port is 5000
- **MAESTRO_AUDIT_URI:** - Audit App endpoint API - default port is 10900
- **MAESTRO_WEBSOCKET_URI:** - Websocket endpoint, this one is HTTP
- **MAESTRO_SERVER_URI:** - Server endpoint

Env variables

Env Variables	Example	Description
MAESTRO_PORT	5000	Port used
MAESTRO_DATA_URI	http://localhost:5010	Data Layer API URL
MAESTRO_AUDIT_URI	http://localhost:10900	Audit App - API URL
MAESTRO_WEBSOCKET_URI	http://localhost:8000	Websocket App - API URL
MAESTRO_SERVER_URI	http://localhost:8888	Server App - API URL
MAESTRO_SECRETJWT	XXX	Same that Server App
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections
MAESTRO_WEBSOCKET_SECRET	XXX	Secret Key - JWT Websocket connections
MAESTRO_TRANSLATE_QTD	200	Prefetch translation process
MAESTRO_GWORKERS	2	Gunicorn multi process
CELERY_BROKER_URL	amqp://rabbitmq:5672	RabbitMQ connection
CELERYD_TASK_TIME_LIMIT	10	Timeout workers

3.3.5 Reports App

Installation by docker

```
reports:
  image: maestroserver/reports-maestro
  ports:
    - "5005:5005"
  environment:
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-reports"

reports_worker:
  image: maestroserver/reports-maestro-celery
  environment:
```

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```
- "MAESTRO_REPORT_URI=http://reports:5005"
- "MAESTRO_DATA_URI=http://data:5010"
- "MAESTRO_AUDIT_URI=http://audit:10900"
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
```

Aviso:

- **MAESTRO_REPORT_URI:** - Reports endpoint API - default port is 5005, It used by reports workers
- **MAESTRO_DATA_URI:** - Data endpoint API - default port is 5000
- **MAESTRO_AUDIT_URI:** - Audit Endpoint API - default port is 10900
- **MAESTRO_WEBSOCKET_URI:** - Websocket endpoint, this one is HTTP

```
docker run -p 5005 -e "MAESTRO_DATA_URI=http://localhost:5010" -e "CELERY_BROKER_
↪URL=amqp://rabbitmq:5672" -e 'MAESTRO_MONGO_URI=localhost' maestroserver/reports-
↪maestro
```

```
docker run \
-e "MAESTRO_DATA_URI=http://localhost:5010" \
-e "MAESTRO_REPORT_URI=http://localhost:5005" \
-e "CELERY_BROKER_URL=amqp://rabbitmq:5672" \
-e "MAESTRO_AUDIT_URI=http://audit:10900" \
maestroserver/reports-maestro-celery
```

Env variables

Env Variables	Example	Description
MAESTRO_PORT	5005	Port used
MAESTRO_MONGO_URI	localhost	Mongo Url conn
MAESTRO_MONGO_DATABASE	maestro-reports	Db name, its diferente of servers-app
MAESTRO_DATA_URI	http://localhost:5010	Data layer api
MAESTRO_REPORT_URI	http://localhost:5005	Report api
MAESTRO_AUDIT_URI	http://localhost:10900	Audit App - API URL
MAESTRO_WEBSOCKET_URI	http://localhost:8000	Websocket App - API URL
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections
MAESTRO_WEBSOCKET_SECRET	XXX	Secret Key - JWT Websocket connections
MAESTRO_REPORT_RESULT_QTD	1500	Limit default
MAESTRO_INSERT_QTD	20	Prefetch data insert
MAESTRO_GWORKERS	2	Gworkers thread pool
CELERY_BROKER_URL	amqp://rabbitmq:5672	RabbitMQ connection

3.3.6 Analytics App

Installation by docker

```
analytics:
  image: maestroserver/analytics-maestro
  ports:
    - "5020:5020"
```

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```

environment:
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
- "MAESTRO_DATA_URI=http://data:5010"

analytics_worker:
  image: maestroserver/analytics-maestro-celery
  environment:
- "MAESTRO_DATA_URI=http://data:5010"
- "MAESTRO_ANALYTICS_FRONT_URI=http://analytics_front:9999"
- "CELERY_BROKER_URL=amqp://rabbitmq:5672"
- "CELERYD_MAX_TASKS_PER_CHILD=2"

```

Aviso:

- **MAESTRO_ANALYTICS_FRONT_URI:** - Analytics Front endpoint API - default port is 9999
- **MAESTRO_DATA_URI:** - Data endpoint API - default port is 5000
- **MAESTRO_WEBSOCKET_URI:** - Websocket endpoint, this one is HTTP

```

docker run -p 5020
-e "MAESTRO_DATA_URI=http://localhost:5010"
-e "CELERY_BROKER_URL=amqp://rabbitmq:5672"
-e 'MAESTRO_MONGO_URI=localhost'
maestroserver/analytics-maestro

docker run
-e "MAESTRO_DATA_URI=http://localhost:5010"
-e "MAESTRO_ANALYTICS_FRONT_URI=http://localhost:9999"
-e "CELERY_BROKER_URL=amqp://rabbitmq:5672"
maestroserver/analytics-maestro-celery

```

Env variables

Env Variables	Example	Description
MAESTRO_PORT	5020	Port
MAESTRO_DATA_URI	http://localhost:5010	Data Layer API URL
MAESTRO_ANALYTICS_FRONT_URI	http://localhost:9999	Analytics Front URL
MAESTRO_WEBSOCKET_URI	http://localhost:8000	Websocket App - API URL
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections
MAESTRO_WEBSOCKET_SECRET	XXX	Secret Key - JWT Websocket connections
MAESTRO_GWORKERS	2	Gunicorn multi process
CELERY_BROKER_URL	amqp://rabbitmq:5672	RabbitMQ connection
CELERYD_TASK_TIME_LIMIT	10	Timeout workers

3.3.7 Analytics Front

Installation by docker

```

reports:
  image: maestroserver/analytics-front-maestro

```

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```
ports:
- "9999:9999"
environment:
- "MAESTRO_MONGO_URI=mongodb://mongodb"
- "MAESTRO_MONGO_DATABASE=maestro-client"
```

Aviso:

- **MAESTRO_REPORT_URI:** - Reports endpoint API - default port is 5005
- **MAESTRO_DATA_URI:** - Data endpoint API - default port is 5000
- **MAESTRO_WEBSOCKET_URI:** - Websocket endpoint, this one is HTTP

```
docker run -p 5005
-e "MAESTRO_MONGO_URI=mongodb://mongodb"
-e "MAESTRO_MONGO_DATABASE=maestro-client"
maestroserver/analytics-front-maestro
```

Env variables

Env Variables	Example	Description
MAESTRO_PORT	9999	
API_URL	http://localhost:8888	Server app Url
NODE_ENV	development production	
MAESTRO_MONGO_URI	localhost	DB string connection
MAESTRO_MONGO_DATABASE	maestro-client	Database name
MAESTRO_SECRETJWT	XXXX	Secret key - server app
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections
MAESTRO_SECRETJWT_PUBLIC	XXXX	Secret key - same as on server app
AWS_ACCESS_KEY_ID	XXXX	
AWS_SECRET_ACCESS_KEY	XXXX	
AWS_DEFAULT_REGION	us-east-1	
AWS_S3_BUCKET_NAME	maestroserver	
MAESTRO_UPLOAD_TYPE	S3/Local	Upload mode
LOCAL_DIR	/public/static/	Where files will be uploaded
PWD	\$rootDirectory	PWD process

3.3.8 Data App

Installation by docker

```
data:
  image: maestroserver/data-maestro
  ports:
  - "5010:5010"
  environment:
  - "MAESTRO_MONGO_URI=mongodb://mongodb"
  - "MAESTRO_MONGO_DATABASE=maestro-client"
```



```
docker run -p 5010 -e "MAESTRO_MONGO_URI=mongodb://mongodb" -e "MAESTRO_MONGO_
↪DATABASE=maestro-client" maestroserver/data-maestro
```

Env variables

Env Variables	Example	Description
MAESTRO_PORT	5010	Port used
MAESTRO_MONGO_URI	localhost	Mongo Url conn
MAESTRO_MONGO_DATABASE	maestro-client	Db name, its diferente of servers-app
MAESTRO_GWORKERS	2	Gunicorn multi process
MAESTRO_INSERT_QTD	200	Throughput insert used on reports collection
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections

3.3.9 Scheduler App

Installation by docker

```
scheduler:
  image: maestroserver/scheduler-maestro
  environment:
    - "MAESTRO_DATA_URI=http://data:5010"
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-client"

scheduler_worker:
  image: maestroserver/scheduler-maestro-celery
  environment:
    - "MAESTRO_DATA_URI=http://data:5010"
    - "CELERY_BROKER_URL=amqp://rabbitmq:5672"
    - "MAESTRO_DISCOVERY_URI=http://discovery:5000"
    - "MAESTRO_ANALYTICS_URI=http://analytics:5020"
    - "MAESTRO_REPORT_URI=http://reports:5005"
```

```
docker run
  -e "MAESTRO_DATA_URI=http://localhost:5010"
  -e "CELERY_BROKER_URL=amqp://rabbitmq:5672"
  maestroserver/scheduler-maestro

docker run
  -e "MAESTRO_DATA_URI=http://localhost:5010"
  -e "MAESTRO_DISCOVERY_URI=http://localhost:5000"
  -e "MAESTRO_ANALYTICS_URI=http://localhost:5020"
  -e "MAESTRO_REPORT_URI=http://localhost:5005"
  -e "CELERY_BROKER_URL=amqp://rabbitmq:5672"
  maestroserver/scheduler-maestro-celery
```

Aviso:

- **MAESTRO_DATA_URI:** - Data API - default port is 5000

Perigo:

- You can only spin up an one schedule instance, if you do it will have a duplicate job execution.

Env variables

Env Variables	Example	Description
MAESTRO_DATA_URI	http://localhost:5010	Data Layer API URL
MAESTRO_DISCOVERY_URI	http://localhost:5000	Discovery App URL
MAESTRO_ANALYTICS_URI	http://localhost:5020	Analytics App URL
MAESTRO_REPORT_URI	http://localhost:5005	Reports App URL
MAESTRO_MONGO_URI	localhost	MongoDB URI
MAESTRO_MONGO_DATABASE	maestro-client	Mongo Database name
CELERY_BROKER_URL	amqp://rabbitmq:5672	RabbitMQ connection
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections

3.3.10 Audit App

Installation by docker

```
audit:
  image: maestroserver/audit-app-maestro
  ports:
    - "10900:10900"
  environment:
    - "MAESTRO_MONGO_URI=mongodb://mongodb"
    - "MAESTRO_MONGO_DATABASE=maestro-audit"
    - "MAESTRO_DATA_URI=http://data:5010"
```

Aviso:

- MAESTRO_DATA_URI:** - Data API - default port is 5000

```
docker run -p 10900
-e "MAESTRO_MONGO_URI=mongodb://mongodb"
-e "MAESTRO_MONGO_DATABASE=maestro-audit"
maestroserver/audit-app-maestro
```

Env variables

Env Variables	Example	Description
MAESTRO_PORT	10900	
NODE_ENV	development production	
MAESTRO_MONGO_URI	localhost	DB string connection
MAESTRO_MONGO_DATABASE	maestro-audit	Database name
MAESTRO_TIMEOUT	1000	Timeout any http private request
MAESTRO_DATA_URI	http://localhost:5010	Data App - API URL
MAESTRO_SECRETJWT_PRIVATE	XXX	Secret Key - JWT private connections
MAESTRO_NOAUTH	XXX	Secret Pass to validate private connections

3.3.11 WebSocket App

Installation by docker

```
data:
  image: maestroservers/websocket-maestro
  ports:
    - "8000:8000"
```

```
docker run -p 8000:8000 maestroservers/websocket-maestro
```

Env variables

Env Variables	Example	Description
MAESTRO_WEBSOCKET_SECRET	backSecretToken	Token to authenticate backends apps
MAESTRO_SECRETJWT	frontSecretToken	Token to authenticate front end users
CENTRIFUGO_ADMIN	adminPassword	Admin password
CENTRIFUGO_ADMIN_SECRET	adminSecretToken	Token to authenticate administrator users
CENTRIFUGO_TLSAUTO	true	Auto SSL using Let Encrypt
CENTRIFUGO_TLSAUTO_HTTP	true	Auto SSL using AcmeV1 Let Encrypt
CENTRIFUGO_TLS_PORT	:80	Can be used to set address for handling http_01 ACME challenge, default value is :80
CENTRIFUGO_TLS	true	Using dev ssl certs to run custom certs
CENTRIFUGO_TLS_KEY	/tmp/certs/server.key	Full path ssl key (Expose by folder bind on docker)
CENTRIFUGO_TLS_CERT	/tmp/certs/server.crt	Full path ssl certs

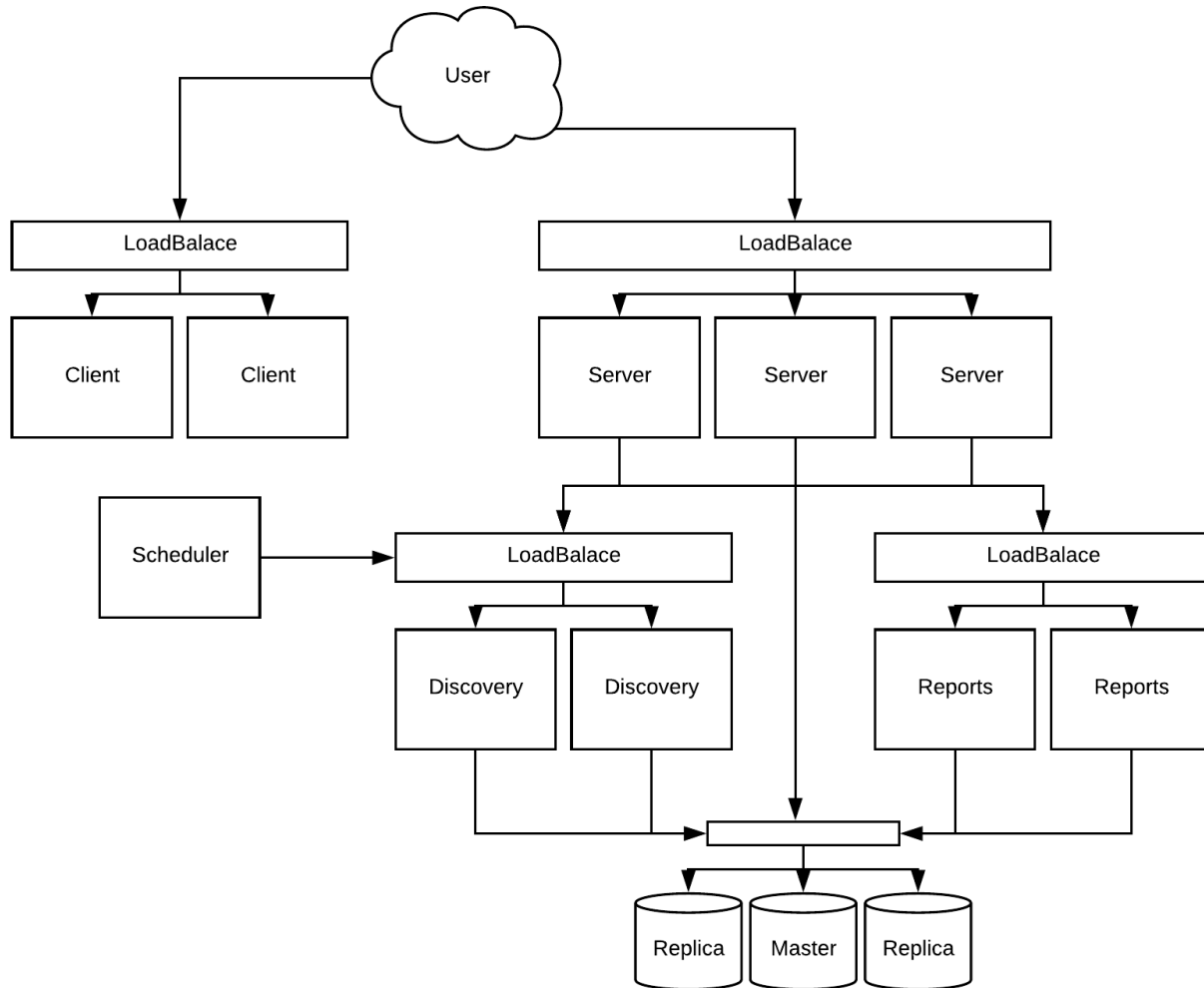
3.4 High availability

3.4.1 12 Factory and Horizontal Scaling

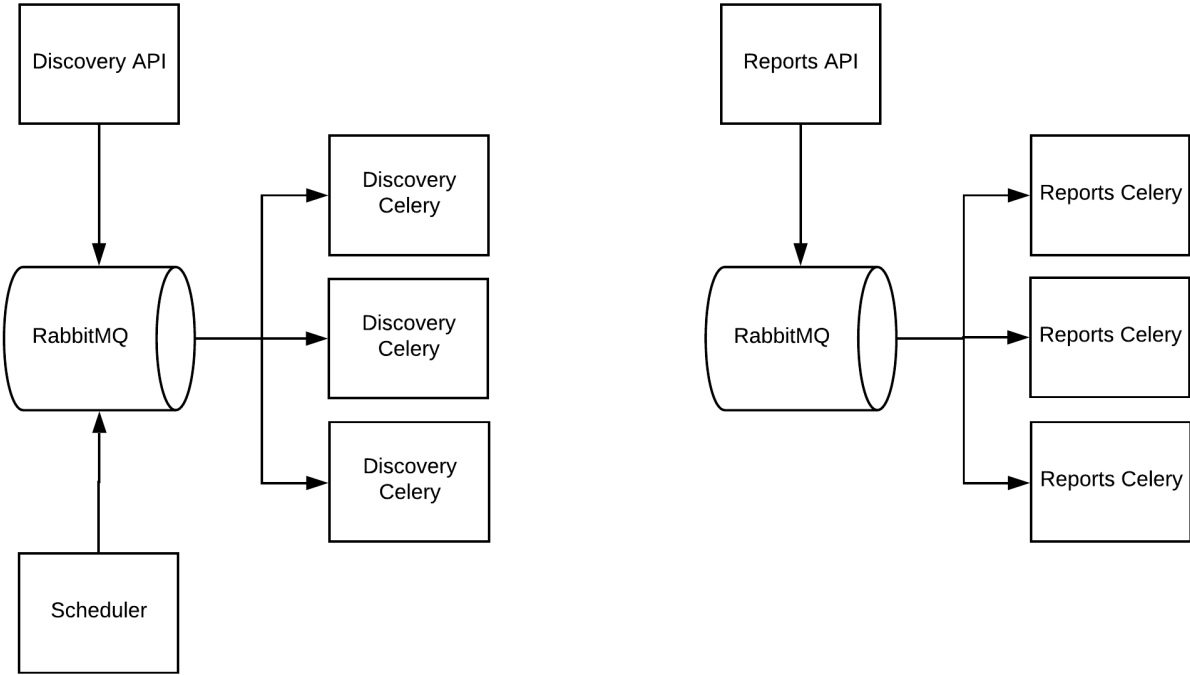
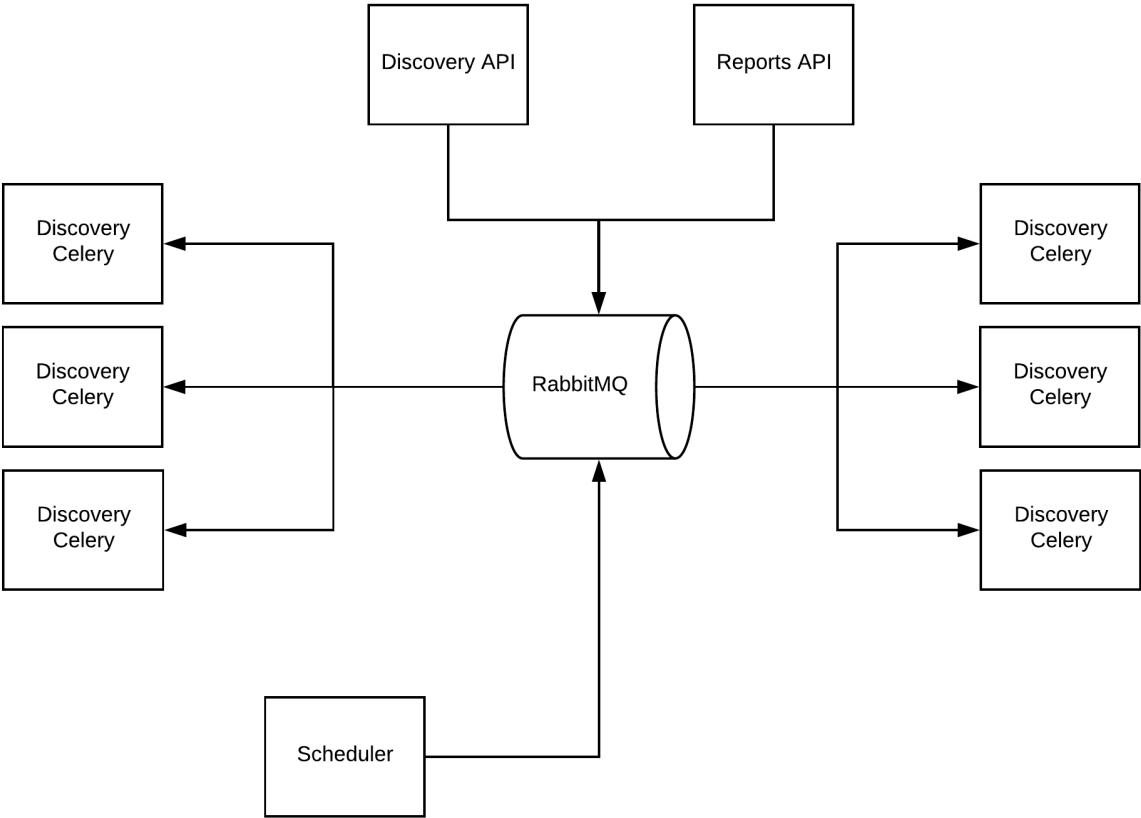
This section describes some tips you can use to be able to productionize the Maestro.

- The first and most important is to avoid to use any local configuration as a local upload file system, local mongodb and rabbitmq.
 - You should use a reliable storage engine as S3 - [More details about upload](#).
 - You can use atlas mongodb to manage your mongo db externally. - [More details about external DB](#).
 - Configuration a third-party SMTP - [More details about SMTP](#).
 - Set a unique value for each SECRETJWT key - [More details about tokens](#).
- Spin up an nginx/loadbalance over any public endpoint to handle ssl configuration.
- Discovery, reports and analytics services are compound by two parts, one it's the api, and the other is the workers, you don't need to deploy it on the same server.

Follow a single example,



It's possible to improve the reliability over discovery and reports services.



3.4.2 Scheduler Beat App

Perigo: Scheduler app have two parts, the producer called beat and the workers, the beat isn't able to have multiple instance on the same time, be careful. To minimize the drawback, the beat schedule is an isolated and an stateless service (if fall, you can call up the beat again).

3.4.3 HealthChecks

You can you the / path to do the healthchecks.

- Front end, show in right-footer.
- <http://{server-api}:8888/>
- <http://{discovery-api}:5000/>
- <http://{reports-api}:5005/>
- <http://{analytics-maestro}:5020/>
- <http://{analytics-front}:9999/>
- <http://{audit}:10900/>

3.4.4 Running on Kubernetes

To run Maestro over kubernetes, you can uses those deployment files found it on [k8s deployments](#),

Creating secrets files

The first step it will be to create those secrets.

- mongo_srv.txt
- smtp.txt
- storage.txt

And populate accordingly. Running these commands.

```
kubectl create secret generic smtp --from-env-file secrets/smtp.txt
kubectl create secret generic mongo_srv --from-env-file secrets/mongo_srv.txt
kubectl create secret generic storage --from-env-file secrets/storage.txt
```

storage.txt

```
AWS_ACCESS_KEY_ID=
AWS_SECRET_ACCESS_KEY=
AWS_DEFAULT_REGION=
AWS_S3_BUCKET_NAME=
```

mongo_srv.txt

```
MAESTRO_MONGO_URI=mongo+srv://mongodb:27017
```

smtp.txt

```
SMTP_PORT=
SMTP_HOST=
SMTP_SENDER=
SMTP_USERNAME=
SMTP_PASSWORD=
SMTP_USE_TLS=
```

To check if everything it's ok, you can run:

```
> kubectl get secrets
```

NAME	TYPE	DATA	AGE
mongosrv	Opaque	1	24d
smtp	Opaque	6	18d
storage	Opaque	4	17d

Deploying services

```
source run.sh
```

And

Create the third-party services.

```
kubectl apply -f mongo/
kubectl apply -f rabbitmq/
kubectl apply -f maildev/
```

Deploying the Maestro bundle services

```
kubectl apply -f maestro-websocket/
kubectl apply -f maestro-data/
kubectl apply -f maestro-discovery/
kubectl apply -f maestro-reports/
kubectl apply -f maestro-analytics/
kubectl apply -f maestro-analytics-front/
kubectl apply -f maestro-audit/
kubectl apply -f maestro-scheduler/
kubectl apply -f maestro-server/
kubectl apply -f maestro-client/
```

Checking deployments

```
> kubectl get deployments
```

NAME	DESIRED	CURRENT	UP-TO-DATE	AVAILABLE	AGE
maestro-client	1	1	1	1	6d
maestro-analytics	1	1	1	1	6d
maestro-analytics-front	1	1	1	1	6d
maestro-analytics-worker	1	1	1	1	6d
maestro-audit	1	1	1	1	6d
maestro-data	1	1	1	1	24d
maestro-discovery	1	1	1	1	6d
maestro-discovery-worker	1	1	1	1	6d

(continues on next page)

(continuação da página anterior)

maestro-reports	1	1	1	1	6d
maestro-reports-worker	1	1	1	1	6d
maestro-scheduler	1	1	1	1	6d
maestro-scheduler-worker	1	1	1	1	6d
maestro-server	2	2	2	2	6d
maestro-websocket	1	1	1	1	6d
rabbitmq	1	1	1	1	24d

Checking exposed services

```
> kubectl get svc
```

NAME	AGE	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	
external-analytics-front	23d	LoadBalancer	10.XX.252.63	XX.XX.XX.XX	9999:30859/	
external-server	23d	LoadBalancer	10.XX.245.248	XX.XX.XX.XX	8888:31254/	
external-client	23d	LoadBalancer	10.XX.245.248	XX.XX.XX.XX	80:31254/	
external-websocket	21d	LoadBalancer	10.XX.253.161	XX.XX.XX.XX	8443:30705/	
internal-analytics	6d	ClusterIP	10.XX.240.129	<none>	5020/TCP	
internal-analytics-front	23d	ClusterIP	10.XX.243.157	<none>	9999/TCP	
internal-audit	6d	ClusterIP	10.XX.243.250	<none>	10900/TCP	
internal-data	24d	ClusterIP	10.XX.244.111	<none>	5010/TCP	
internal-discovery	6d	ClusterIP	10.XX.240.202	<none>	5000/TCP	
internal-rabbit	24d	ClusterIP	10.XX.243.117	<none>	5672/TCP,	
internal-reports	6d	ClusterIP	10.XX.241.218	<none>	5005/TCP	
internal-websocket	21d	ClusterIP	10.XX.241.159	<none>	8000/TCP	

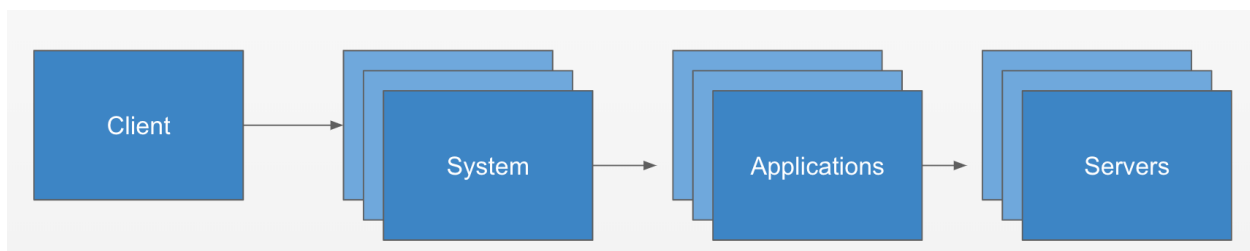
Nota: It must have 4 public endpoint, the client service, server app, analytics front and websocket system.

In this section we will cover how the maestro server works from the user's point of view, if you want to install and configure the Maestro server you should go to the installation section, if you would like to develop a new functionality or a new service, you should go to the developer section.

Maestro is an inventory system for multi platform environments, multi-cloud for enterprise companies. It aim to organize in a single dashboard with relation between servers, applications, systems and clients.

The dashboard was divided into three parts:

- **Cloud inventory:** The first part you will figure out the whole inventory, such as servers, applications and systems as well as the relationship between them. In this area you can also connect third-party providers to self-discover and self-update.
- **Analytics:** In the second part you can view the relationships between applications, systems architecture, a map of dependencies and can even share these information in third-party applications as Confluence, GitHub and more.
- **Reports:** In this area you can generate advanced reports such as the list of servers for a given client.



4.1 Cloud Inventory

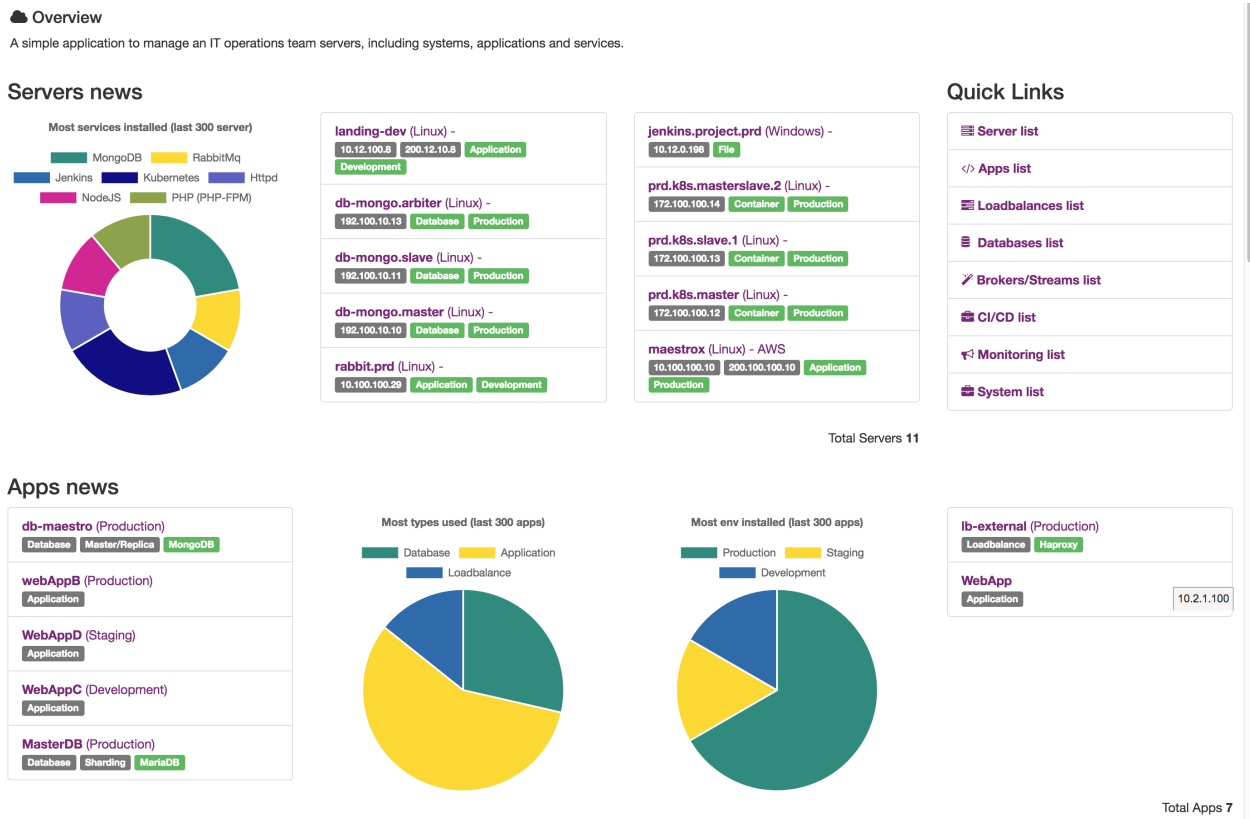
We can use to organize each part of our architecture by:

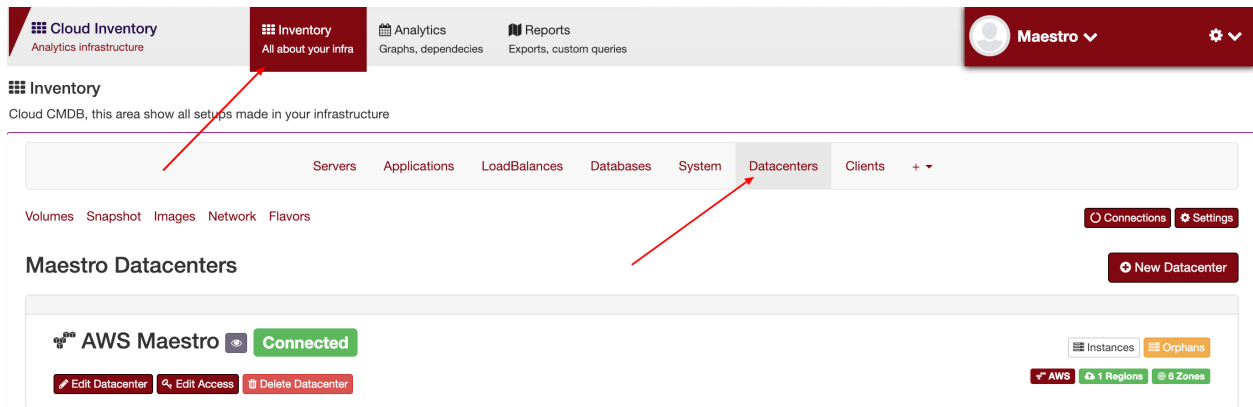
4.1.1 Inventory

You can organize your servers, applications, cloud resources, systems, and clients on a single and powerful dashboard.

You will be able to:

- Control multi-environment, multi-cloud and multi-regions using a single dashboard.
- Track an application ownership
- Easy to visualize a relationship between microservices
- Correlation between teams/systems
- Track costs
- Easy way to do documents of high architecture systems

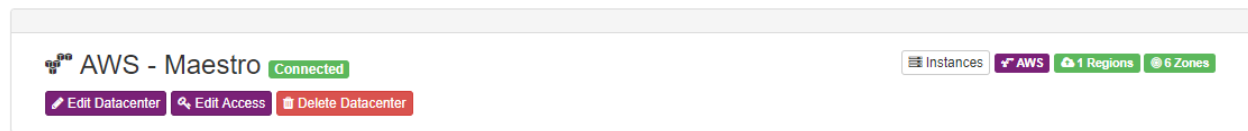




You should insert any type of datacenters can be a cloud third-party datacenter, a specific space or a group of bare metal servers.

Field	Description
Name	Datacenter name
Provider	The third-party provider, or create a new one
Regions	Selecting a region/s
Zones	Selecting a zone/s

My Datacenters



List of your datacenters.

Provider

Regions

 0 regions available

Zones

 0 zones available

You can select a provider, regions and zones.

Selecting an existed region.

Choose and delimit which regions can be used.

Region

us-east-1 (N. Virginia)
▼

us-east-2 (Ohio)
✕

us-east-1 (N. Virginia)
✕

2 Regions

Servers

Inventory > Server

Server is a computer or a single program instance, which manages access to a centralized resource.

Field	Description
Hostname	Hostname
Ipv4 Private	Ipv4 private, It will warning if there are any duplication,
Ipv4 Public	Ipv4 public, only for external servers.
OS	Operation system can be Linux adn Windows. Distro can be ubuntu, centos or any other.
CPU	CPU
Memory	Memory
Environment	Production Development Stage ...

Selecting the OS

OS*

Linux



Distro

Version

Server details

Field	Description
Storage	Storage configuration as a mount path, size in GB and if is a boot device.
Data-center	Providers, region and zones, used by cloud datacenters, you can put the instance id on id_instance field, avoiding Maestro to duplicate this server.
Auth	Dummy information about how the team can login into servers.
Service	Show up all services running, It can be used on Application Manager page to track the service configuration.

Datacenter

AWS - Maestro



Region

us-east-1 (N. Virginia)



Zones

us-east-1a



Assing a dc name, region and zone on that server.

describe how you can to access and authenticate on that server.

Nota: Services can be a very usefull field, Maestro are able to correlate services installed on servers and applications, as an example, you can create an Oracle Database on Databases applications, then you can create a new server and assign this server to that database, Maestro automatically do a service/application bound.

Auth type

PKI

AD

LDAP

Password

Key name*

master.pem

Username

ec2-user

Auth

PKI

ec2-user (master.pem)

1 Auth

Service

Logstash

Version

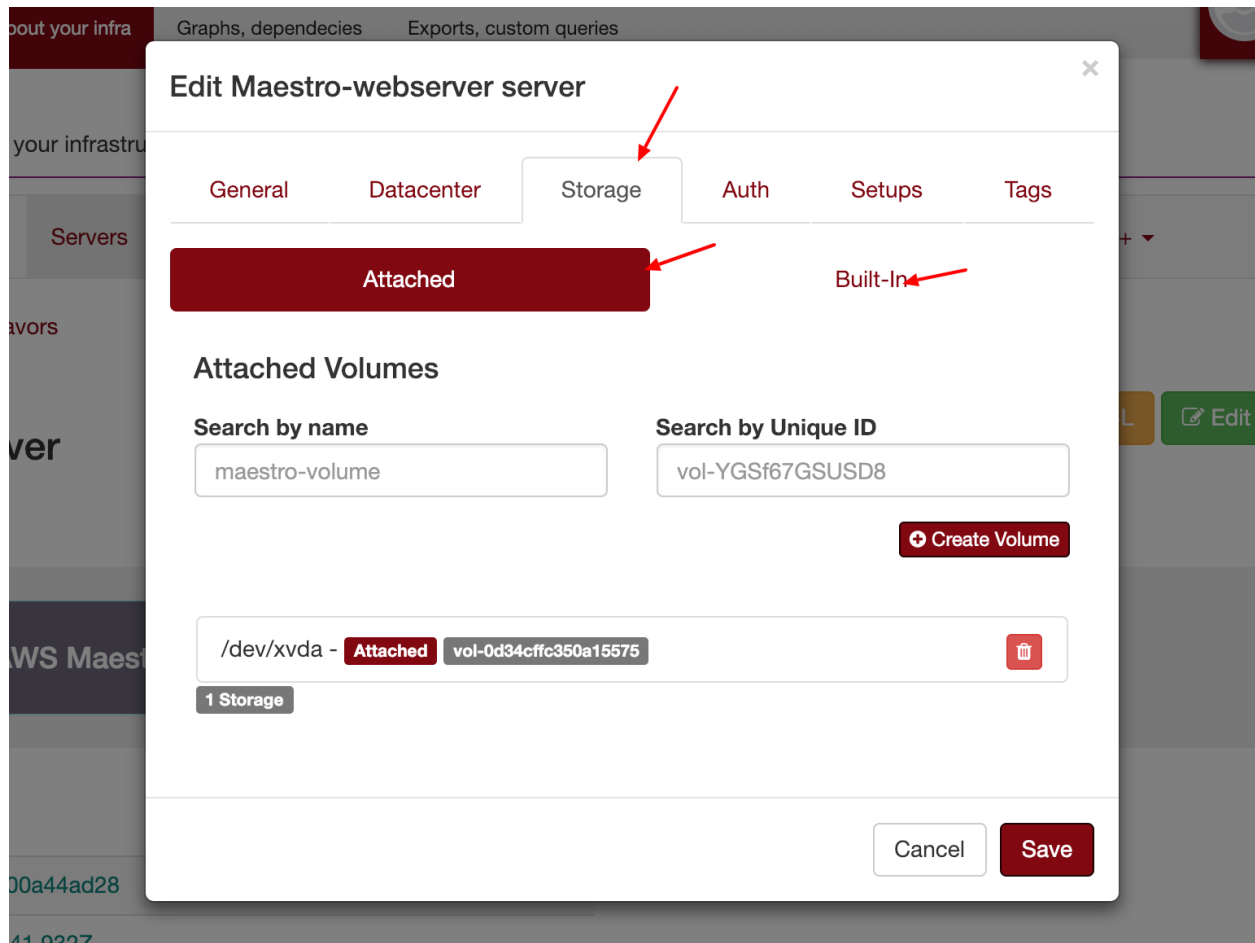
Setup

Httpd -> 1.7

Logstash

Related services.

Volumes



Can be attached or built-in:

- **Attached** is a network storage or distributed storage service (ex: NFS)
- **built-in** is a hard drive set in that server, very common on bare metal.

You will be able to describe where the mount path are, which file type, and a virtual volume configuration (LVM).

Volumes, flavors and images are servers resources provide by cloud providers, on top of servers you can create/list those resources.

- **Volumes:** List of volumes (ex: EBS, HardDisk)
- **Flavors:** Instance flavors.

- **Images:** List of images, it used to build new servers. [As a template]
- **Network:** Network provider resources, as an example security groups, acls, vpcs, subnets and etc.

Apps

Inventory > Application

Applications are a program or group of programs designed for business responsibility.

Apps fields:

Field	Description
Name	Hostname
Environment	Production Development Stage
Language	What language this application was made.
Cluster mode	

Specification

Field	Description
Role	Endpoint, commands, health check and more.
System	Accountant system/s.
Server	Where the application are running.
Deploy	List of ways to deploy this app.

Language

Scala



Cluster mode

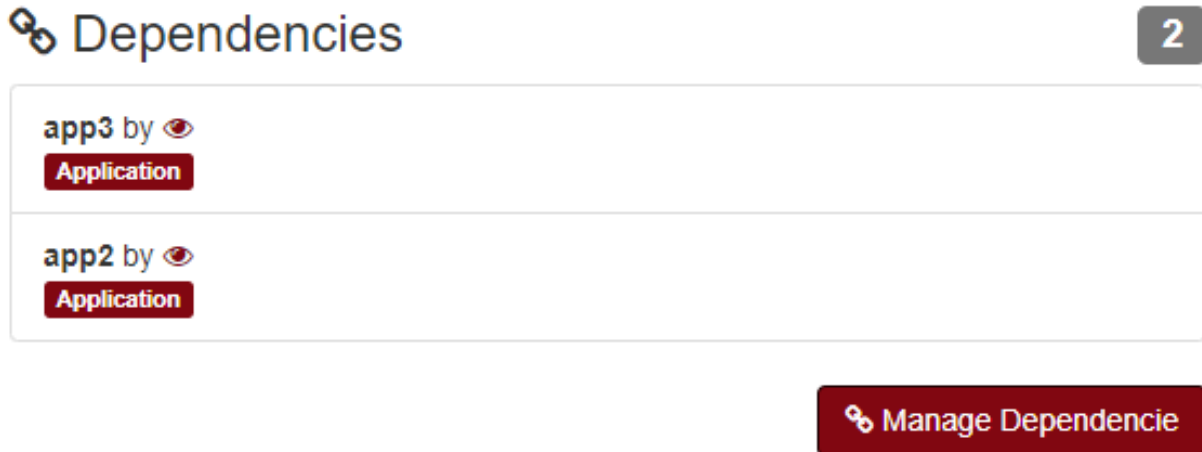
12 Factor



Selecting a language that applications was made. As an example, node or php.

Add dependency

Nota: A given applications with connects to this application, as an example webserver connects to database, so database is a dependency of webserver.

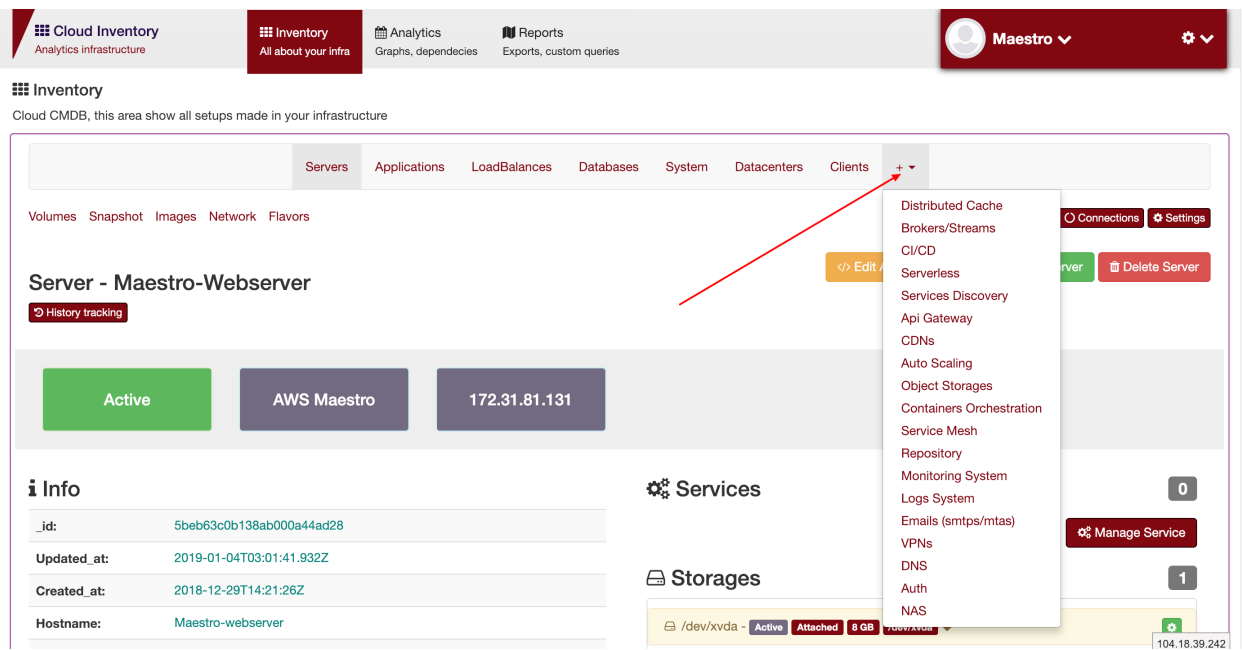


Adding dependencies.

Resources

Inventory > \${Resource}

Resources is a no-business application, can be brokers, databases, loadbalances, service logs, dns and more.



Resources types:

Family	Description
Distributed cache	Cache system, as a Redis, Memcache and etc.
Brokers/Streams	Message or streams system, can be RabbitMQ, SQS, Kafka, Spark Streams and more.
CI/CD	Ci Tools, as an Jenkins, Atlassian Stack, AWS Pipeline and more.
Serverless	Cloud functions, as an AWS lambdas, step functions, google function, Kubeless and more.
Services Discovery	Consul, etcD, hystrix can be consired as a service discovery.
Api Gateway	Api Gateway service, like Kong, AWS api gateway and/or a nginx.
CDNs	CDNs services, cloudflare, akamai, cloud front and etc.
Auto Scaling	Autoscaling setup
Objects Storages	Objects storages, S3, GlusterFS, Ceph, DO Storages and more.
Containers Orchestration	Main pieces of orchestration tools, kubernetes master/slave node, eks nodes, docker swarm nodes, mesos and etc
Service Mesh	Like Linkerd, IstIO, Consul or AWS x-ray
Repository	Nexus3, npm repository, docker repository, S3, private pip, nuget, gems, maven and more
Monitoring System	Prometheus, New Relic, Data dog, zabbix, nagios and etc
Logs System	ELK stack, data dog, graylog and etc
Emails	SMTP servers, postfix, or third service as a sendgrid
VPNs	VPNs Gateways
DNS	Bind9, route 53 and etc.
Auth	Authentication/Authorization systems, as an AD, LDAP, IAMs and etc
NAS	NAS Gateway
Corporate	ERP, internal services, as an Hana SAP, Protheus and more.

Specification

Field	Description
System	Accountant system/s.
Server	Where the resource are running.
Cluster	The service are running on a cluster mode.
Spec	Endpoint, commands, health check and more.

The screenshot shows a 'Create new Cache' modal window. It has a title bar with a close button. Below the title are five tabs: 'General' (selected), 'Spec', 'Datacenters', 'System', and 'Tags'. In the 'General' tab, there is a label 'Endpoint' followed by a text input field. At the bottom right of the modal are two buttons: 'Cancel' and 'Save'.

Databases

Inventory > Database

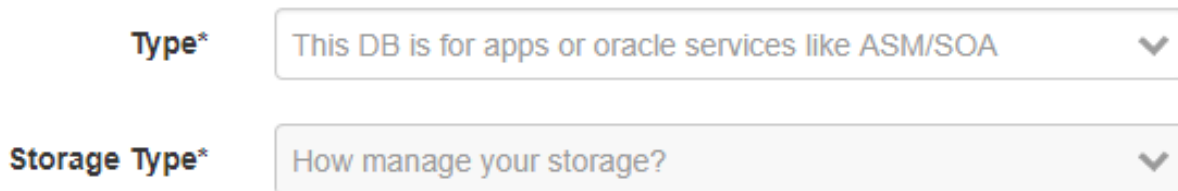
Databases are a programs to manage data store, can be relational and no relational.

The database inventory have a exclusive form for Oracle and MySQL, otherwise the generic form are able to fit on all databases types.

Field	Description
Oracle	You can register ASM DB, CDBs, RAC, grid system and/or golden gate backups
MySQL	It able to register features as Master/Slave, Aurora cluster, backups setups and more.

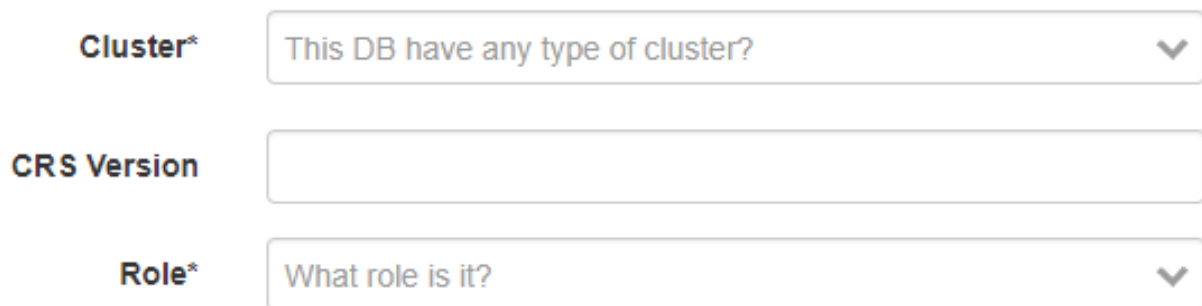
Oracle

Support version 10g, 11g and 12g



The screenshot shows two dropdown menus in a form. The first dropdown is labeled 'Type*' and has the text 'This DB is for apps or oracle services like ASM/SOA' with a downward arrow. The second dropdown is labeled 'Storage Type*' and has the text 'How manage your storage?' with a downward arrow.

Fig. 1: Choose how Oracle will be storage the data, as a local disk, ASM or distributed storage system.



The screenshot shows three form fields. The first is a dropdown menu labeled 'Cluster*' with the text 'This DB have any type of cluster?' and a downward arrow. The second is a text input field labeled 'CRS Version'. The third is a dropdown menu labeled 'Role*' with the text 'What role is it?' and a downward arrow.

Choose how Oracle will be run, single node, RAC/Grid mode.

Name

Which CDBS run on oracle database.

Select one or more servers belongs database.

Search by Hostname

Search by Private IP

☐ Show only server with role Database

None Server

After, you have possibility to insert a db name and especific role in each instance

Which servers this db ran, if is a single node, a rac or it running on multiple servers.

MySQL

Support MySQL, AWS Aurora, MariaDB, Percona and etc

Service

Cluster*

Which version and mode this db are.

Generic database

Generic support for all databases

+ Service

Service

Type*

Cluster*

Field	Description
Spec	Endpoint, port, commands, health check and more.
Datacenter	A given datacenter.
Server	Which servers this database are running.
CDBS	CDBS used by Oracle DBs.
System	Accountant system/s.

LoadBalances

Inventory > Loadbalance

In computing, load balancing refers to the process of distributing a set of tasks over a set of resources, with the aim of making their overall processing more efficient. Wikipedia

Field	Description
Service	The loadbalance source.
Targets	To proxied applications
Servers	To proxied servers
Spec	Endpoint, healthcheck and more

Endpoint

Healthcheck

Adding the healthcheck rule.

Selecting applications.

List all targets behind the loadbalance, using the form below to search in servers.

Search by Hostname

Search by Private IP

Maestro-Stack - AWS - Maestro



1 Target

System

Inventory > System

A group of application and resources.

Field	Description
Links	Useful links
Clients	Accountant client/s.

Clients

Clients

None Client

Selecting the accountant client.

Clients

Inventory > Clients

Client can be a company and/or a team and/or a person, who owned a group of systems.

Field	Description
Contacts/Channel	Contact information

Services

Inventory > Settings > Services

The screenshot shows the Maestro Cloud Inventory interface. The top navigation bar includes 'Cloud Inventory' (Analytics infrastructure), 'Inventory' (All about your infra), 'Analytics' (Graphs, dependencies), and 'Reports' (Exports, custom queries). The user 'Maestro' is logged in. The 'Inventory' section is active, showing a list of infrastructure components: Servers, Applications, LoadBalances, Databases, System, Datacenters, and Clients. Below this, there are tabs for Volumes, Snapshot, Images, Network, and Flavors. The 'Connections' tab is selected, showing a table of Maestro Connections. The table has columns for Name, Dc, Updated At, Created At, and Actions. One connection is listed: 'AWS Maestro - us-east-1 (N. Virginia)' with Dc 'AWS Maestro', Updated At '12/30/2018, 1:15:41 AM', and Created At '12/29/2018, 11:36:13 PM'. A 'New Connection' button is visible.

Name	Dc	Updated At	Created At	Actions
<input type="text" value="Filter by Name"/>	<input type="text" value="Filter by Dc"/>			
AWS Maestro - us-east-1 (N. Virginia)	AWS Maestro	12/30/2018, 1:15:41 AM	12/29/2018, 11:36:13 PM	

Services running on that server.

The form is for creating a new service. It has two tabs: 'General' and 'Tags'. The 'General' tab is active. It contains a 'Name*' field and a 'Choose the families belongs:' section. The 'Add family' dropdown menu is open, showing 'None Family' as an option.

General **Tags**

Name*

Choose the families belongs:

Add family

Creating a new service.

4.1.2 Options and configurations

The screenshot shows the Maestro Cloud Inventory interface. The top navigation bar includes 'Cloud Inventory', 'Inventory', 'Analytics', and 'Reports'. The 'Inventory' section is active, showing a description: 'Cloud CMDB, this area show all setups made in your infrastructure'. Below this, there are tabs for 'Servers', 'Applications', 'LoadBalances', 'Databases', 'System', 'Datacenters', and 'Clients'. A 'Settings' button is visible in the top right corner. The 'Maestro Connections' section displays a table with columns: Name, Dc, Updated At, Created At, and Actions. A 'New Connection' button is also present.

Name	Dc	Updated At	Created At	Actions
Filter by Name	Filter by Dc			
AWS Maestro - us-east-1 (N. Virginia)	AWS Maestro	12/30/2018, 1:15:41 AM	12/29/2018, 11:36:13 PM	

Services

To create a new service, you can go to settings -> services and click on add new service:

The screenshot shows the 'Add new service' form. It has two tabs: 'General' and 'Tags'. The 'General' tab is active. The form includes a 'Name*' field, an 'Add family' button, and a dropdown menu labeled 'Choose the families belongs:'. The dropdown menu shows 'None Family' as the selected option.

You can add, remove or update any service filled on Maestro database.


Config Options

You can add or change any option value.

application_options	Applications options
clients_options	
connections	Time scheduler and crawler connections
database_options	
datacenter_options	
env_options	
server_options	
services_options	Services initial setup
system_options	

As an example, those are contacts found out it on `clients_options`.

Name

 channels

Email



HipChat



Slack



MS Teams



RocketChat



Skype



Phone



Glitter



8 channelss

Regions and zones

You can add a new region and/or a zone, go to settings -> regions and zones:

Us-East-1 (N. Virginia) (6)

Name

+ Zone

us-east-1a

us-east-1b

us-east-1c

us-east-1d

us-east-1e

us-east-1f

6 Zones

The default regions and zones.

4.1.3 History Track

Inventory > Single Application > History Track

You can visualise all changes were made by users or by crawlers as a discovery or analytics. The audit service can analyse the difference between an old and a new entry and then record it.

Server - Maestro-Webserver

Edit ACL
Edit Maestro-Webserver
Delete Server

History tracking

Active

AWS Maestro

172.31.81.131

Info

Services

0

_id: 5beb63c0b138ab000a44ad28

Manage Service

Example of tracking changes page.

1/3/2019,
11:33:46 PM
by
MaestroServer

Cpu: 1

Memory: 1

Updated_at:

1/3/2019, 11:40:21 PM
by MaestroServer

Cpu: 1

Hostname: Maestro-webserver

Memory: 1

Updated_at:

1/4/2019, 1:01:41 AM
by
felipeklerk@yahoo.com.br

Cpu: 1

Memory: 1

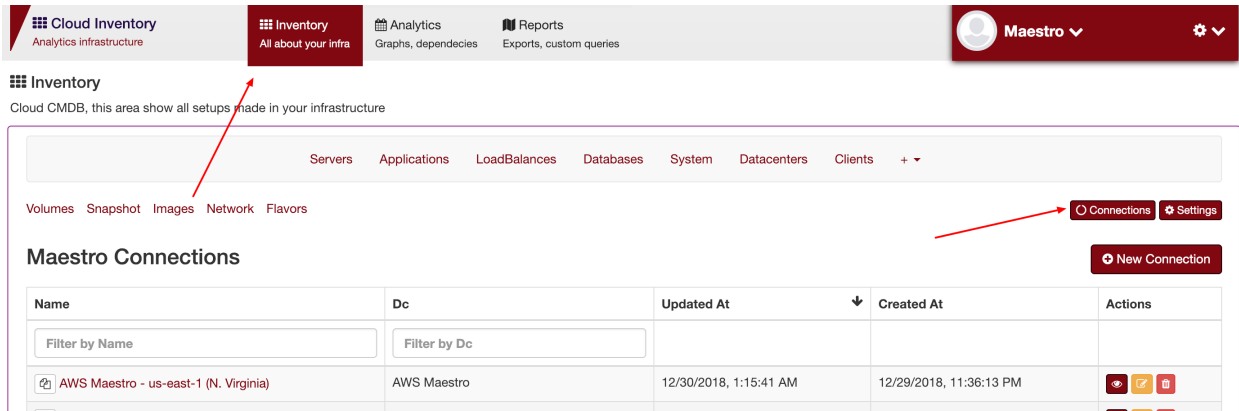
Updated_at:

4.2 Auto Discovery

Maestro can connect in multiples cloud providers. You can track in a single dashboard, everything was created on multi-cloud and multi-region architecture.

To set up a new connection, you should follow three steps.

- 1 - Create datacenter on Maestro (select all regions used on that provider)
- 2 - Create a new connection on a given datacenter. - Go to inventory > connections.



3 - Allowing Maestro server to reach out a third provider using a readonly cloud credential such as aws access/secret key, azure subscription and more.

Maestro is able to connect on:

4.2.1 Connecting on AWS

To connect an one aws account, Maestro need to have an `access_key` and `secret_key`

Go to IAM service

Go to iam services on you AWS account dashboard.

Create an user - SecurityAudit

1. Go to user tab
2. Add user, select the access type as a `programmatic access`
3. Choose to attach an existed policy on user
4. Select `SecurityAudit` policy

Getting AWS Key and Secret Key

Copy and paste the aws key and secret key

List of permissions to grant.

server-List	ec2 describe_instances
loadbalance-list	describe_load_balancers and describe_load_balancers
dbs-list	rds describe_db_instances
storage-object-list	s3 list_buckets
volumes-list	ec2 describe_volumes
cdns-list	cloudfront list_distributions
snapshot-list	ec2 describe_snapshots
images-list	ec2 describe_images
autoscaling-List	autoscaling describe_auto_scaling_groups
brokers-List	sqs list_queues
cache-List	elasticache describe_cache_clusters
smtp-List	ses list_identities
serverless-List	lambda list_functions
serverless-support-List	lambda list_layers
dynamodb-List	dynamodb list_tables
gateway-List	apigateway get_rest_apis
security-list	ec2 describe_security_groups
network-list	ec2 describe_vpcs, describe_subnets, describe_vpc_peering_connections, describe_vpn_gateways, describe_vpc_endpoints, describe_route_tables, describe_network_interfaces, describe_nat_gateways and describe_network_acls



Please add your AWS Access Key ID and Secret Access Key.

Datcenter

AWS - Maestro

Regions

us-east-1 (N. Virginia) ✕

AWS AccessKey ID*

felipeklerk@yahoo.com.br

AWS SecretAccess Key*

The secret field is required.

Just copy the following code and paste it under your Policy Document at AWS Console.

```
{ "Version": "2012-10-17", "Statement": [ {
  "Effect": "Allow", "Action": [
    "ec2:RunInstances",
    "ec2:AssociateIamInstanceProfile",
    "ec2:ReplaceIamInstanceProfileAssociation"
  ], "Resource": "*" }, { "Effect": "Allow",
  "Action": "iam:PassRole", "Resource": "*" }
  ] }
```

Setup connection on AWS

Nota: PS: There is scheduler job activated by default, each resource type have your own window time, server-list will be updated for every 5 minutes, networks for every 2 weeks.

4.2.2 Connecting on Azure

To register use client id, tenant id, subscription id and secret token

Create and/or get Client ID

Create application in Azure Active Directory and you can then note the application ID.

1. Sign in to your Azure Account through the Azure portal.
2. Select Azure Active Directory.
3. Select App registrations.
4. Get Client ID and Tenant ID.

Generate Authentication Key

Provide Permission, select the application created and

1. Go to Settings, then Required permissions.
2. Click Add -> Select an API -> Windows Azure Service Management API and click Select.
3. Select required Delegated Permissions, click Select and then click Done.
4. Create a secret key
5. Select the application and go to Settings and Keys.
6. Add a description and expiry duration for the key and click Save.
7. The value of the key appears in the Value field.

Get tenant ID

When programmatically signing in, you need to pass the tenant ID with your authentication request.

1. Select Azure Active Directory.
2. Select Properties.
3. Copy the Directory ID to get your tenant ID.

Acquire Subscription ID

Grant permission for the application to access subscription that you want to configure.

1. Assign a role to the new application.
2. On the Azure portal, navigate to Subscriptions.
3. Select the subscription for which you want to grant permission to the application and note the subscription ID.
4. To grant permission to the application you created, choose Access Control (IAM).
5. Go to Add and Select a role. Pick the role as Reader. A Reader can view everything, but cannot make any changes to the resources of a subscription.
6. Select Azure AD user, group, or application in Assign Access to dropdown.
7. Type the application name in Select drop-down and select the application you created.

List of permissions to grant.

server-List	compute virtual_machines
volumes-list	compute disks
snapshot-list	compute snapshots
images-list	compute images
network-list	network network_interfaces network public_ip_addresses network route_tables network virtual_networks


Analytics

Reports

Config access to provider

Configure yours connections,
you able to use multiple connections with single datacenter.

Back

 **AZURE**

Please add your Client Id, Secret, Tenant id and subscription Id.

Datacenter

Select Datacenter

Client ID*

Secret Key*

Tenant ID*

Subscription Id*

Create and get Application ID

Generate Authentication Key

Get tenant ID

Acquire Subscription ID

Details on [Maestro Azure](#).
Can see more on [Portal Azure - Services](#)

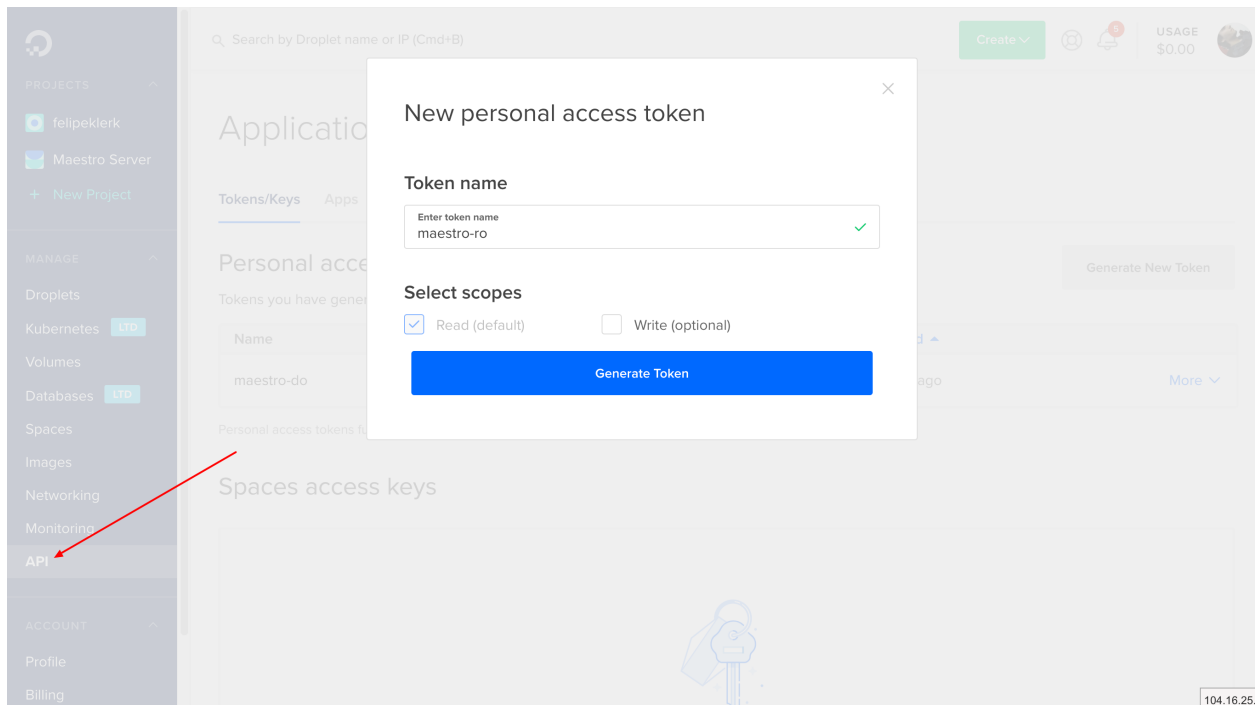
Cancel

Save

Setup connection with Azure

4.2.3 Connecting on Digital Ocean

To get the application token. Go to:



Getting the App Token

To create a new token, go to Digital Ocean dashboard:

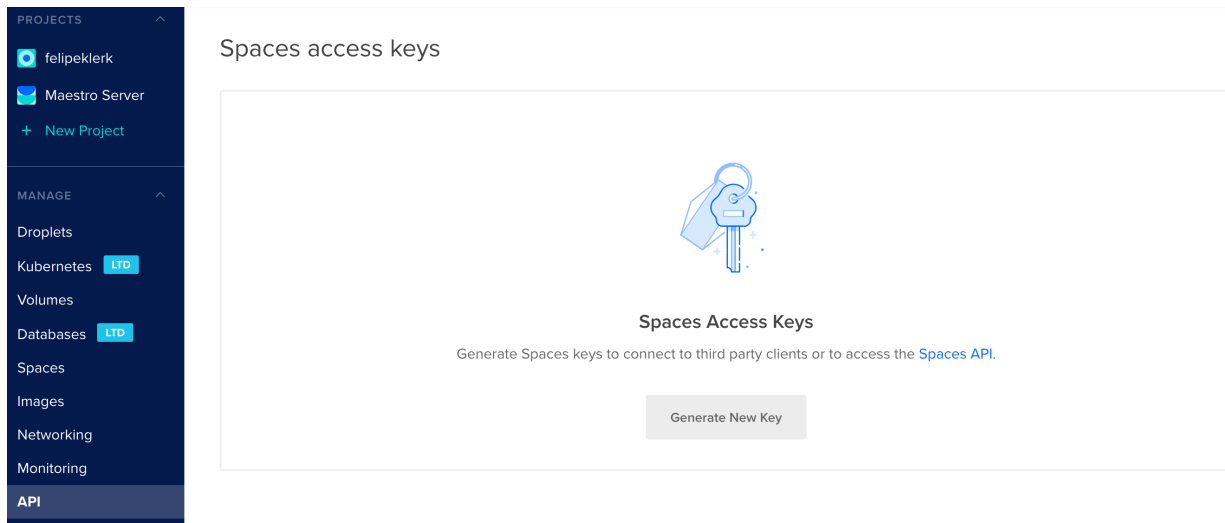
1. Click on the API on the main menu
2. Go to the Applications & API
3. On the Tokens/Keys tab. Go to the Personal access tokens section
4. Click on to Generate New Token.

List of permissions to grant.

server-list	get_all_droplets
loadbalance-list	get_all_load_balancers
volumes-list	get_all_volumes
snapshot-list	get_all_snapshots
cdns-list	get_all_cdns
container-orchestration-list	get_all_kubernetes
images-list	get_my_images
network-list	get_all_firewalls

To register spaces key and secret key.

To register spaces key and secret key.



Getting Spaces Token

1. Click on the API on the main menu
 2. Go to the Spaces token
 3. On the Tokens/Keys tab.
 4. Click on the `Generate New Token` on Spaces, and gets the key and secret key.
-

Config access to provider

Configure yours connections,
you able to use multiple connections with single datacenter.

DIGITAL OCEAN

Please add your Spaces token.

Datacenter

Select Datacenter ▼

Regions

Select Regions ▼

Space AccessKey ID*

The access field is required.

Space SecretAccess Key*

The secret field is required.

[Get Spaces Token](#)

Details on [Maestro Digital Ocean](#).
Can see more on [Portal Digital Ocean - Spaces](#)

Cancel Save

Setup connection on Digital Ocean Spaces

4.2.5 Connecting on OpenStack

To register one openstack account, use project name, url api, user, and password.

List of permissions to grant.

Server-List:	servers compute
Loadbalance-list:	load_balancers load_balancer
volumes-list:	volumes block_store
snapshot-list:	block_store snapshots
images-list:	compute images
security-list:	network security_groups
flavor-list:	compute flavors
network-list:	network networks, subnets, ports and routers

If you like, choose how the resource will be synchronized with an active and inactive button.

Inventory

Playbooks

Reports

about you

S

de in you

Servers

Flavors

↑

At

18, 4:22:3

18, 7:29:3

18, 7:29:0

18, 7:29:0

18, 7:29:1

openstack

5/29/2018 7:29:16 PM

5/29/2018 7:29:1

Setupconnection with OpenStack

Nota: PS: PS: There is scheduler job activated by default, each resource type have specific window time, server-list will be updated for every 5 minutes, networks for every 2 weeks.

Status (enabled)

Disabled

Access user/team owner

The crawler uses this user/team to find, insert and update entities.

User/Teams

teams - (5af61cc8edd1b90014ebf28f)

Save

Templates ACL

When crawler create a new entity, they copy this acl template.

ACL template

Info

Tasks and Permissions

Server-List Success

Success. At 2018-05-15 17:23:10.301544

Permissions Required: ec2 describe_instances

On Sync

Loadbalance-List Warning

Empty result At 2018-05-15 16:44:02.703464

Permissions Required: elbv2 describe_load_balancers elb describe_load_balancers

Missing job Sync

Dbs-List Warning

Empty result At 2018-05-14 23:04:52.760392

Off Sync

Enable and disable the job

4.2.6 Using Ansible Facts

You can use ansible as a CMDB, first, you can generate Ansible output for your hosts, running

```
mkdir out
ansible -m setup --tree out/ all
```

Ansible will generate one file per host, next is to create a new connection on the resulting folder, Maestro can uses three method to get those files.

- Upload file
- Over ssh
- On S3 Bucket

Automatize the update process.

You can create cron jobs over ansible facts onto ansible manager server to automatize the update process.

Resources

Server-List:
volumes-list:

A Ansible

Upload file

Get over SSH

Get from S3

Upload it the ansible fact gathering.

Datacenter

Select Datacenter

Generating ansible fact

Details on [Maestro Ansible](#).
More about [Ansible setup module](#)

Upload your ansible facts

Select your profile

✕

Cancel

Save

Upload ansible facts

4.2. Auto Discovery

Ansible

Upload file Get over SSH Get from S3

Get ansible facts from S3.

Datacenter

Select Datacenter ▼

Bucket name

Bucket path

/

AWS AccessKey ID*

The access field is required

AWS SecretAccess Key*

The secret field is required

Get AWS Key and Secret Key

Generating ansible fact

Details on [Maestro Ansible](#).
More about [Ansible setup module](#)

Using S3 bucket

Nota: PS: PS: There is scheduler job activated by default, each resource type have specific window time, server-list will be updated for every 5 minutes, networks for every 2 weeks.

4.2.7 Using Terraform State File

You can use terraform statefile as a CMDB.

Maestro can use three methods to get those files.

- By upload file
- Over ssh
- On S3 Bucket

You can use the same directory as the remote state folder.

Providers Support

Maestro can crawler and find information based on:

Provider	Servers	Volumes	Network	Images	Flavors	Applications
AWS	yes	yes				
Azure						
OpenStack						
DigitalOcean						
VMSphere						

yes - Maestro can find and get informations about that resource {empty} - That resource will be supported in a future releases. no - Maestro won't support that feature

Nota: PS: There is scheduler job activated by default, each resource type have specific window time, server-list will be updated for every 5 minutes, networks for every 2 weeks.

4.2.8 Import using JSON files

You can import servers from json files. Maestro can use three methods to get those files.

- By upload file
- Over ssh
- On S3 Bucket

Resources

server-List:
volumes-list:
snapshot-list:
images-list:
applications-list
flavor-list:

Example of json file

```
{
  "servers": [{
    "name" : "myname",
    "hostname" : "myhostname",
    "ipv4_private" : "127.0.0.2",
    "ipv4_public" : "89.89.89.89",
    "os" : {
      "base" : "Linux",
      "dist" : "Ubuntu",
      "version" : "14"
    },
    "datacenters" : {
      "name" : "random-1",
      "provider" : "randomdc",
      "region" : "region-1",
      "zone" : "zon1"
    },
    "role" : "Application",
    "environment" : "Production",
    "services" : [{}],
    "tags" : [{}],
    "cpu" : 2,
    "memory" : 2,
    "storage" : []
  }],
  "applications": [{
    "name" : "myname",
    "family": "Applications"
  }],
  "volumes": [{
    "name" : "vvolume",
    "size": "500"
  }],
  "flavors": [{
    "name" : "flavors"
  }],
  "snapshots": [{
    "name" : "snashots",
    "size": "500"
  }],
  "images": [{
    "name" : "myimages",

```

(continues on next page)

(continuação da página anterior)

```
    "size": "500"
  } ]
}
```

4.3 Graphs - Architecture maps

Visualize your cloud architecture

4.3.1 Business Graphs

You can create a diagram of your architecture, can be one or more systems/application. To create a diagram, Maestro uses the dependency field, the fast way to set connections between applications it using the dependency tree feature.

Go to Analytics > business Graph > New Graph

The screenshot shows the Maestro Server Analytics interface. The top navigation bar includes 'Cloud Inventory', 'Inventory', 'Analytics' (highlighted with a red arrow), and 'Reports'. The 'Analytics' section is active, showing 'Create bussiness graphs, visualize dependencies.' Below this, there are tabs for 'Business Graph' (selected with a red arrow) and 'Projects'. On the right, there are buttons for 'Dependency Maker' and 'New Graph' (highlighted with a red arrow). The main area is titled 'My Graphs' and contains a table with columns: Status, Name, System, Updated At, Created At, and Actions. The 'Name' column has a search filter 'Filter by Name'. The table is currently empty, showing 'No matching records'.

The first modal shows three options, you can start using a client, a system or an application.

Create new Graph

Choose one type of filter, you can filter by client, system or application.

Graph Name

by System **by Client** **by App**

System **+ System**

None System

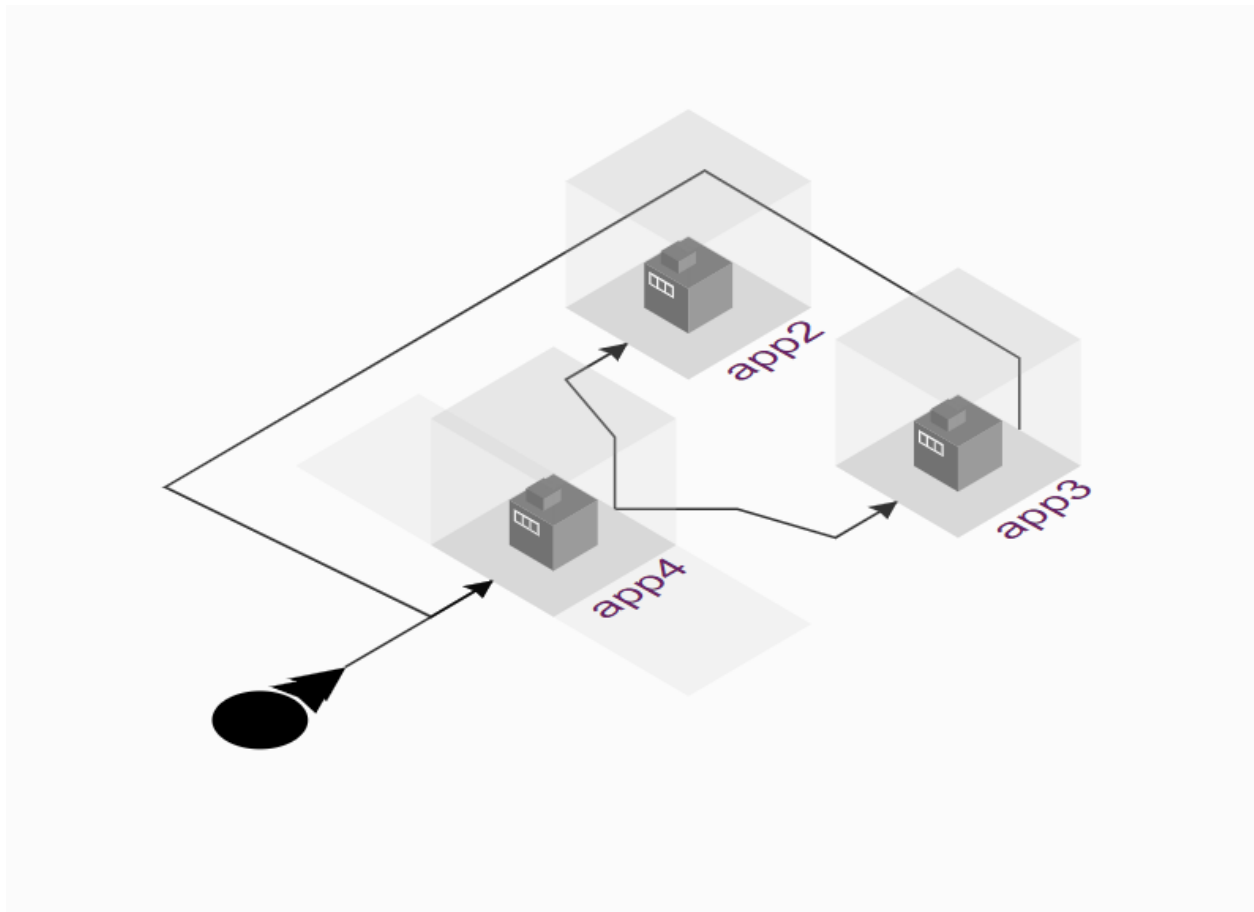
Cancel **Save**

by System	It uses all entry applications set on those systems.
by Client	It uses all systems set on those clients.
by App	A entry given application

Entries applications

Entry applications are the diagram root branch, normally represents the first application hit by users, common categories are cdns, proxies, loadbalances and/or webservices.

Using the dependency tree wizard.



In this example, app4 is the entry application.

Nota: You can choose with applications can be used as an entry point on each system. (On entry app tab).

Creating a new diagram, selecting an entry application.

Create new Graph

Choose one type of filter, you can filter by client, system or application.

Graph Name

by System by Client by App

Select any specific application.

Component

Application

Applications

MyWebApp

App4

Applications

Cancel Save

You can analyse density, total connections, histograms, accountant clients, systems and applications linked on that architecture.

- **Density** - The density for undirected graphs is $[d = \frac{m}{n(n-1)}]$, where (n) is the number of nodes and (m) is the number of edges in (G).

The density is 0 for a graph without any edges and 1 for a complete balance diagram. The density of multigraphs can be higher than 1.

More detail - [NetworkX Graph - Density](#).

- **Histogram** - Total by deep dependency.

Graphs - Tesete

Dependency Maker

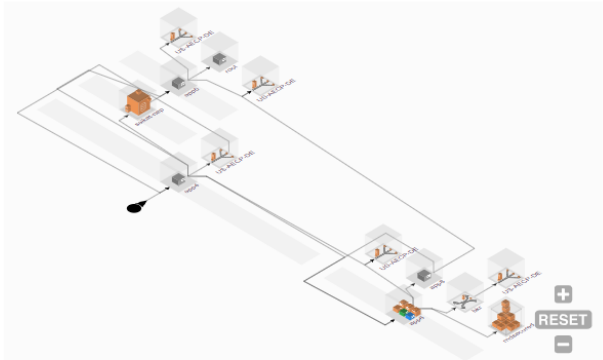
Edit ACLEdit TeseteDelete Graphs

Status

FinishedView graph

Graph

Density	0.11
Connections	17
Histogram	<div><div>2</div><div>6</div><div>2</div><div>3</div></div>



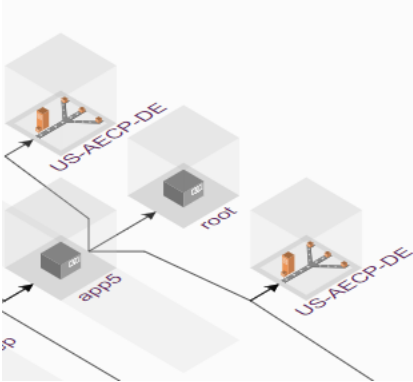
You can expand the diagram.

You can export the diagram in SVG, png or share that graph. Also, you can mouse over on lines to see each type of connection between each application.

Bussiness GraphProjects

Dependency Maker

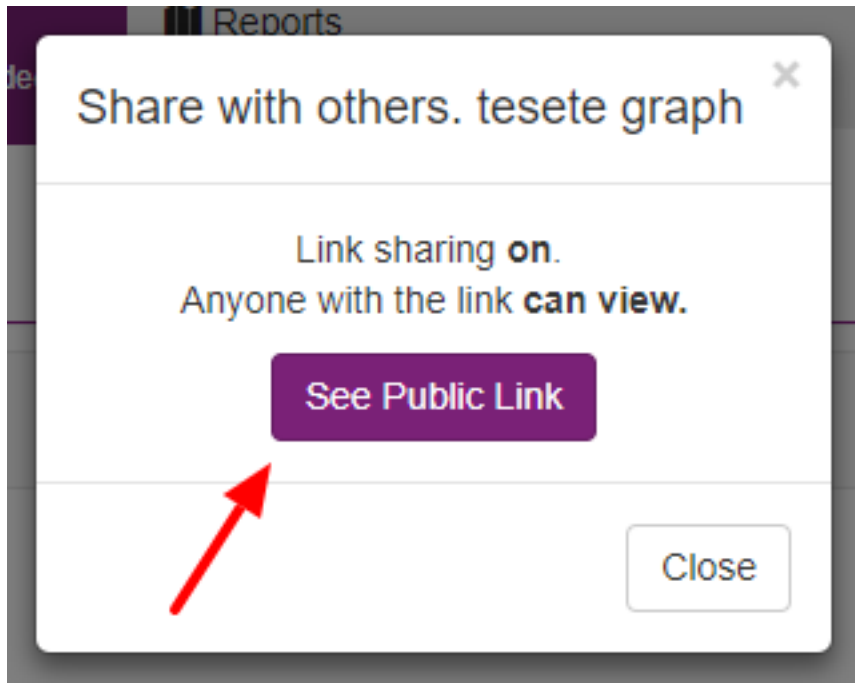
Export to:svgpngShared:Embed



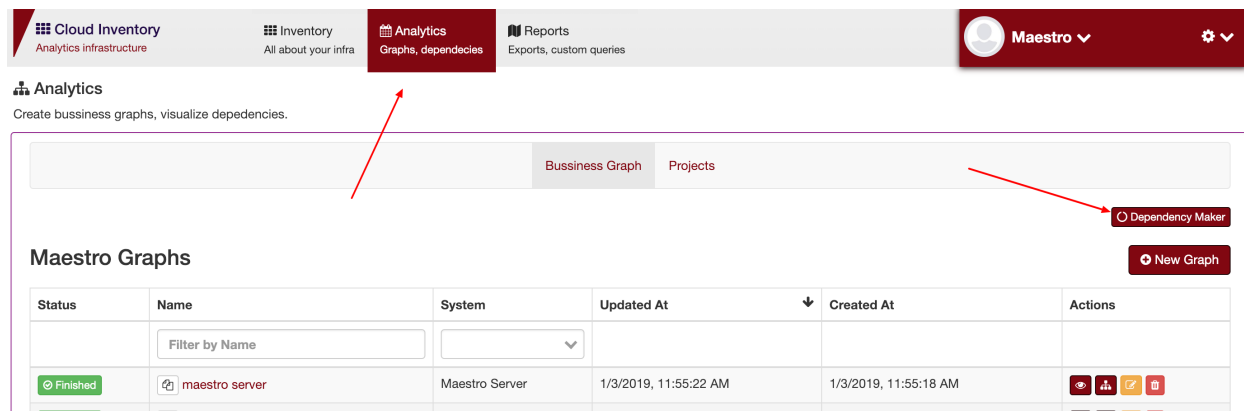
On a shared page, you can click on «see a public link», it will generate a shared link to embed on external tools, such as Confluence.

4.3. Graphs - Architecture maps

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4.3.2 Using the dependency tree wizard



To create diagrams you need to link each applications using the dependency field. However, you can use the Dependency wizard, and this feature allows you to create and connect each application in a single and fast page.

Go to dependency tree, and you can use an existed system, or a client or an application.

Dependency Maker - Applications

Choose a system/s or application to be entry point

by System by Application

Select entry point applications.

Component Applications

Application MyWebApp

App4

1 Applications

Next

To connect in an application, you can click on plus button and select those applications; you can set the way those applications are connected, can be rest, grpc, tcp and etc.

Create bussiness graphs, visualize dependencies.

Business Graph Projects

Dependency Maker

Dependency Maker - App

Add Dependency

Entry point

MyWebApp

Protocol

Add Dep

app6

thrift

Production

Application

app8

rest

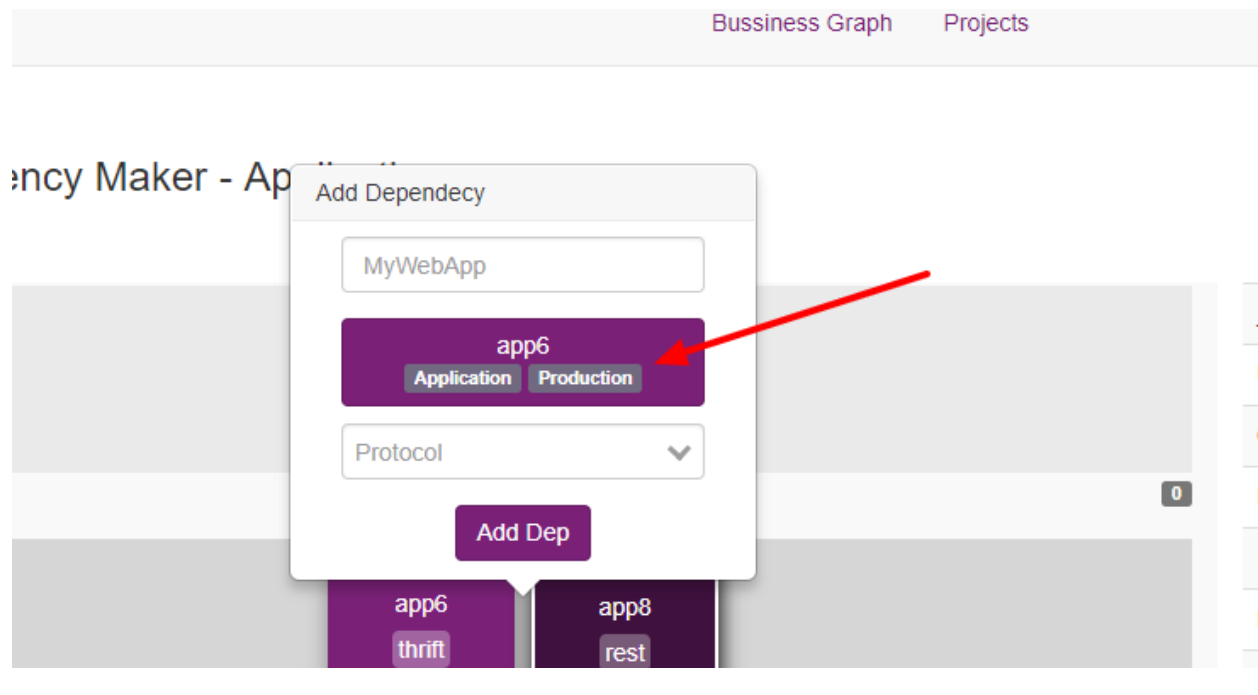
Application

Commit - Tree Dependency

0

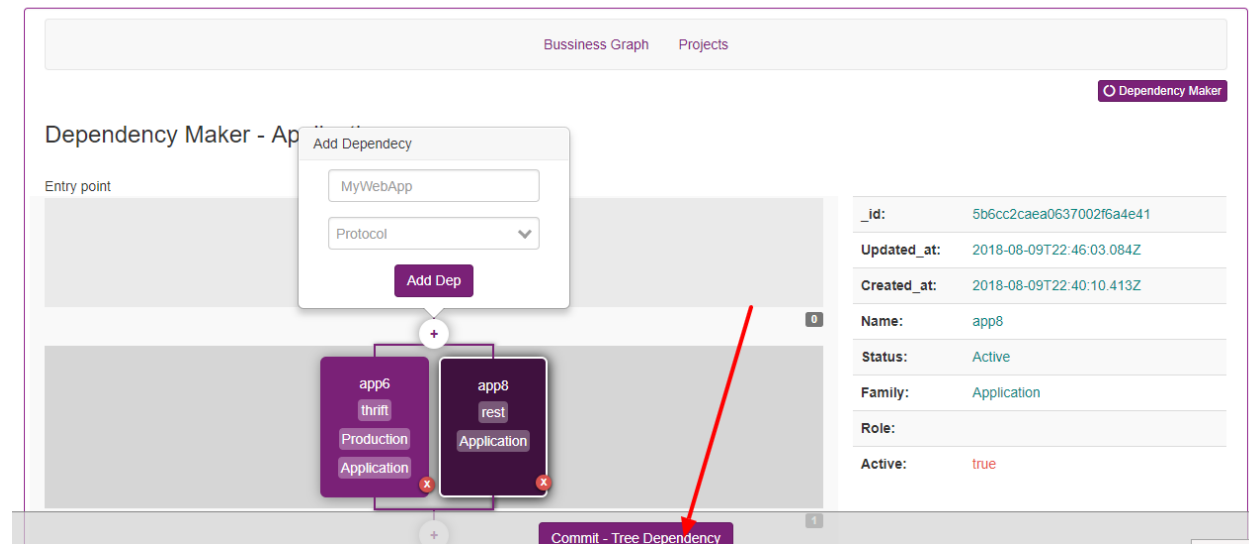
_id: 5b6cc2caea0637002f6a4e41
 Updated_at: 2018-08-09T22:46:03.084Z
 Created_at: 2018-08-09T22:40:10.413Z
 Name: app8
 Status: Active
 Family: Application
 Role:
 Active: true

Clicking in an app



To finish the diagram, click on commit. All done.

Create bussiness graphs, visualize depedencies.



4.4 Reports - Generate advanced reports

4.4.1 Reports

Maestro has two types of reports.

- **Generic:** it is a single resource, it can have any filter
- **Pivot:** It is a multi-resource, you can create a report link clients -> system -> applications -> servers.

Cloud Inventory
Analytics infrastructure

Inventory
All about your infra

Analytics
Graphs, dependencies

Reports
Exports, custom queries

Maestro

Reports
Create your own reports, schedule and exports.

Reports

Schedulers

Maestro Reports

New Report

Status	Name	Report	Updated At	Actions
	Filter by Name			
Finished	general Servers 11/28/2018, 10:17:09 PM	general	1/5/2019, 2:06:00 PM	
Finished	Applications - AWS Maestro	general	1/4/2019, 11:17:17 AM	
Finished	general Servers 1/3/2019, 11:54:57 AM	general	1/3/2019, 11:54:58 AM	
Finished	general Servers 12/12/2018, 7:01:30 PM	general	12/12/2018, 6:58:12 PM	
Finished	general Applications 12/12/2018, 7:01:17 PM	general	12/12/2018, 6:57:59 PM	

Single table report

The general report is a single resource report, you can add any type of filters such as by datacenters, a name, a type, any field can be used as a filter.

Follow some filters examples:

			<div>Filters</div> <div>hostname</div> <div>contain</div> <div>stg</div> <div>Add Filters</div>
Hostname/name	string	equal/contains	
Get all hostname contains stg.			

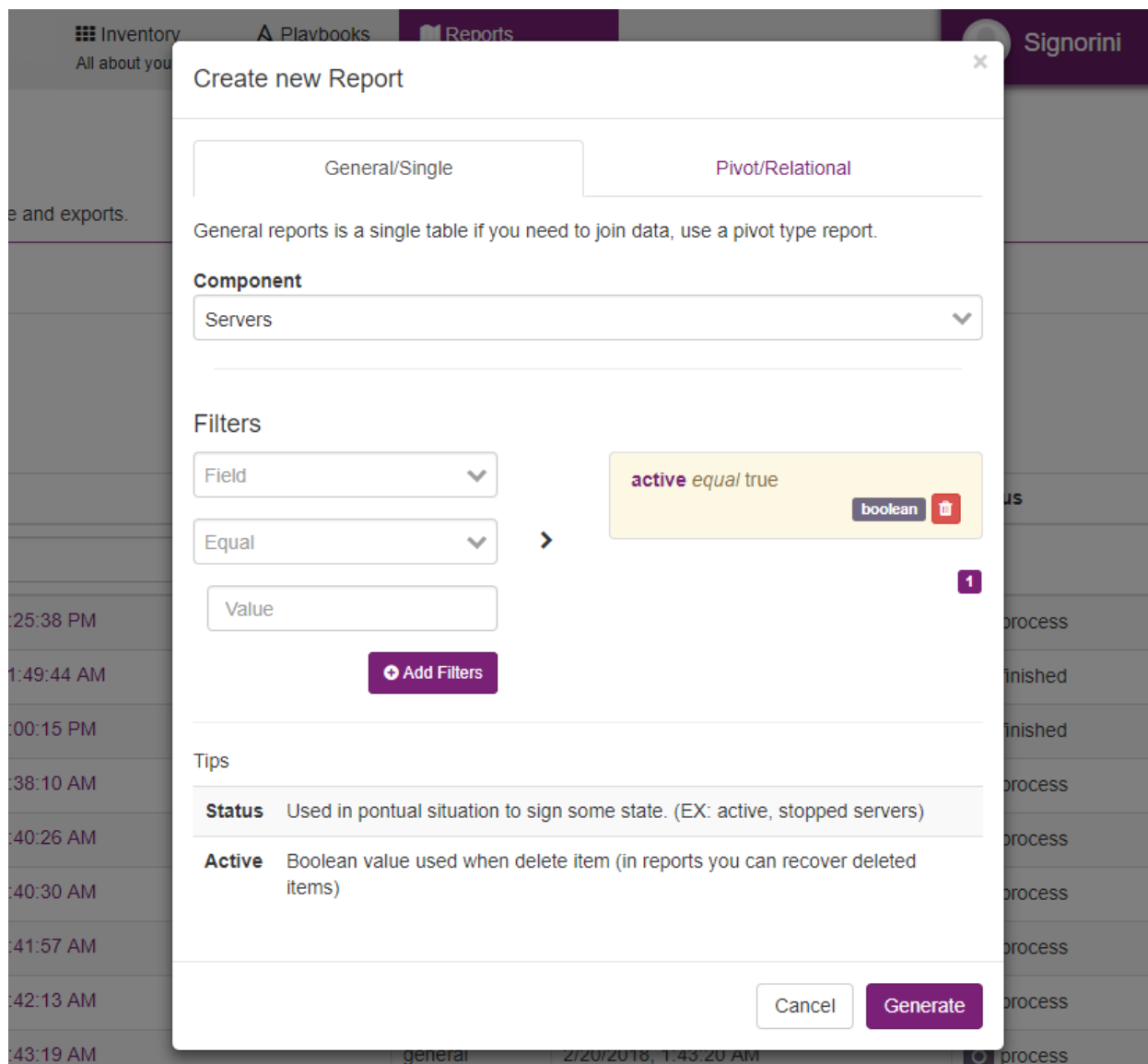
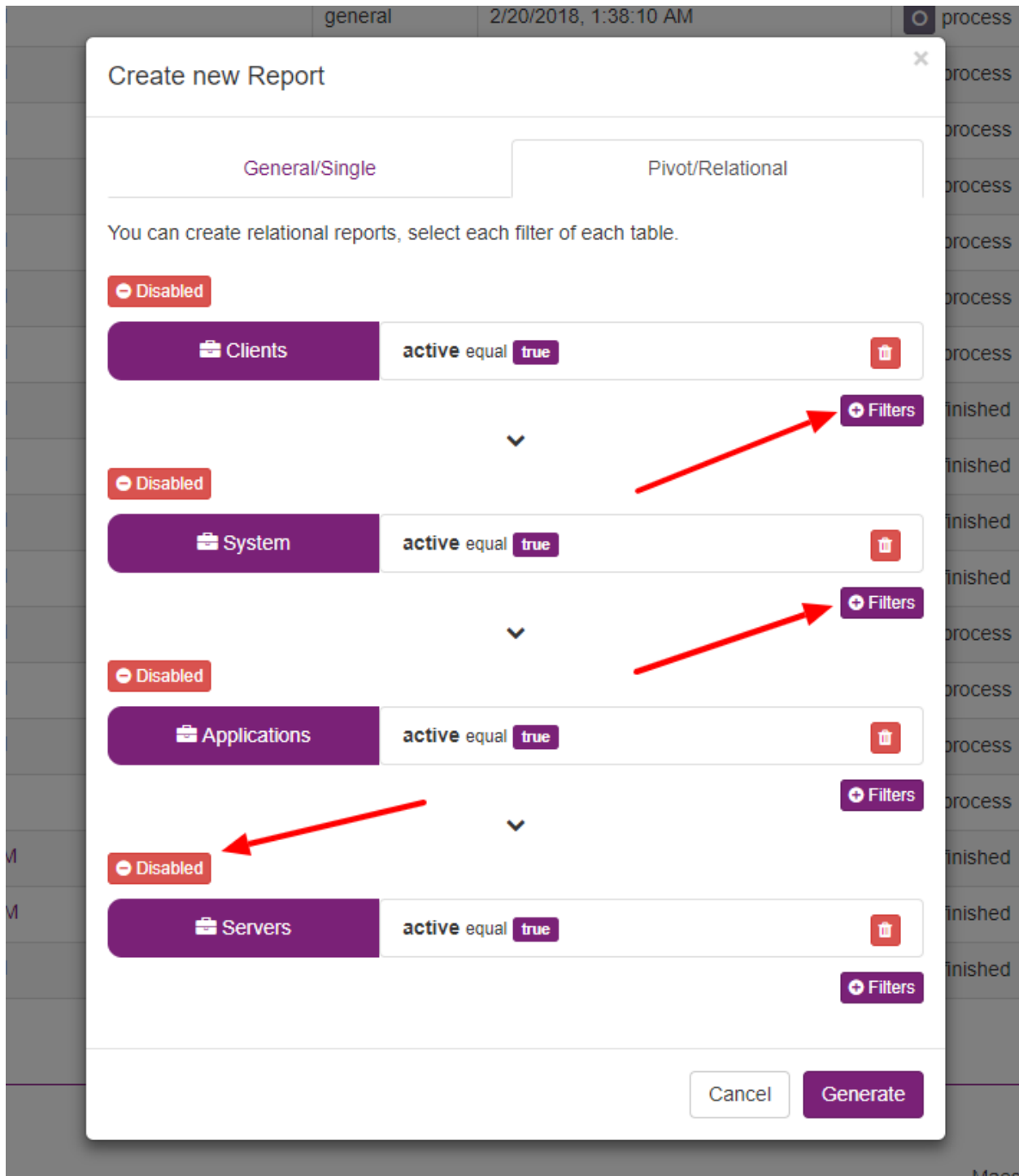


Fig. 2: Generic report

			<h3>Filters</h3> <div> <input type="text" value="updated_at"/> </div> <div> <input type="text" value="after"/> </div> <div> <input type="text" value="2018-02-26"/> </div> <div> <input type="button" value="+ Add Filters"/> </div>
Updated_at	date	after/equal/before	
Select only items updated on this month			

Pivot table reports

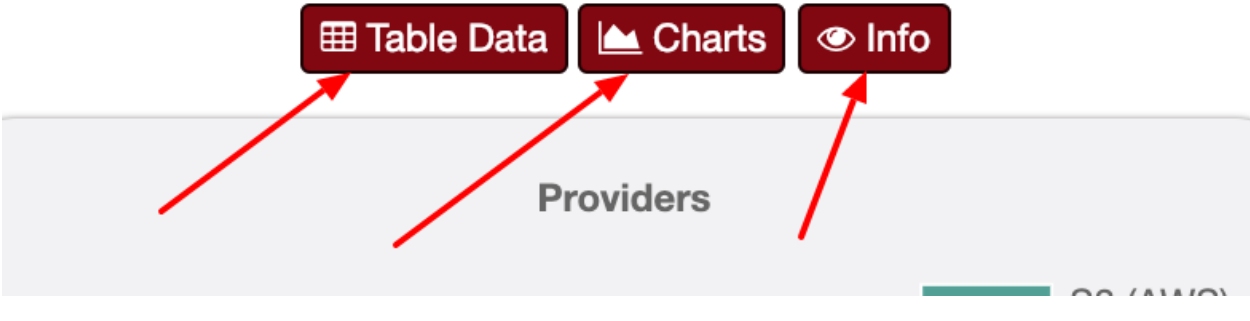
Pivot reports can create reports using multiple resources, and there are well-defined connections between each resource, the order is a client -> system -> app -> servers, you can remove one resource type. However, you need to have a link between them, for example, you can create a report with clients and systems, but can't to create a client -> servers.



Nesting resources.

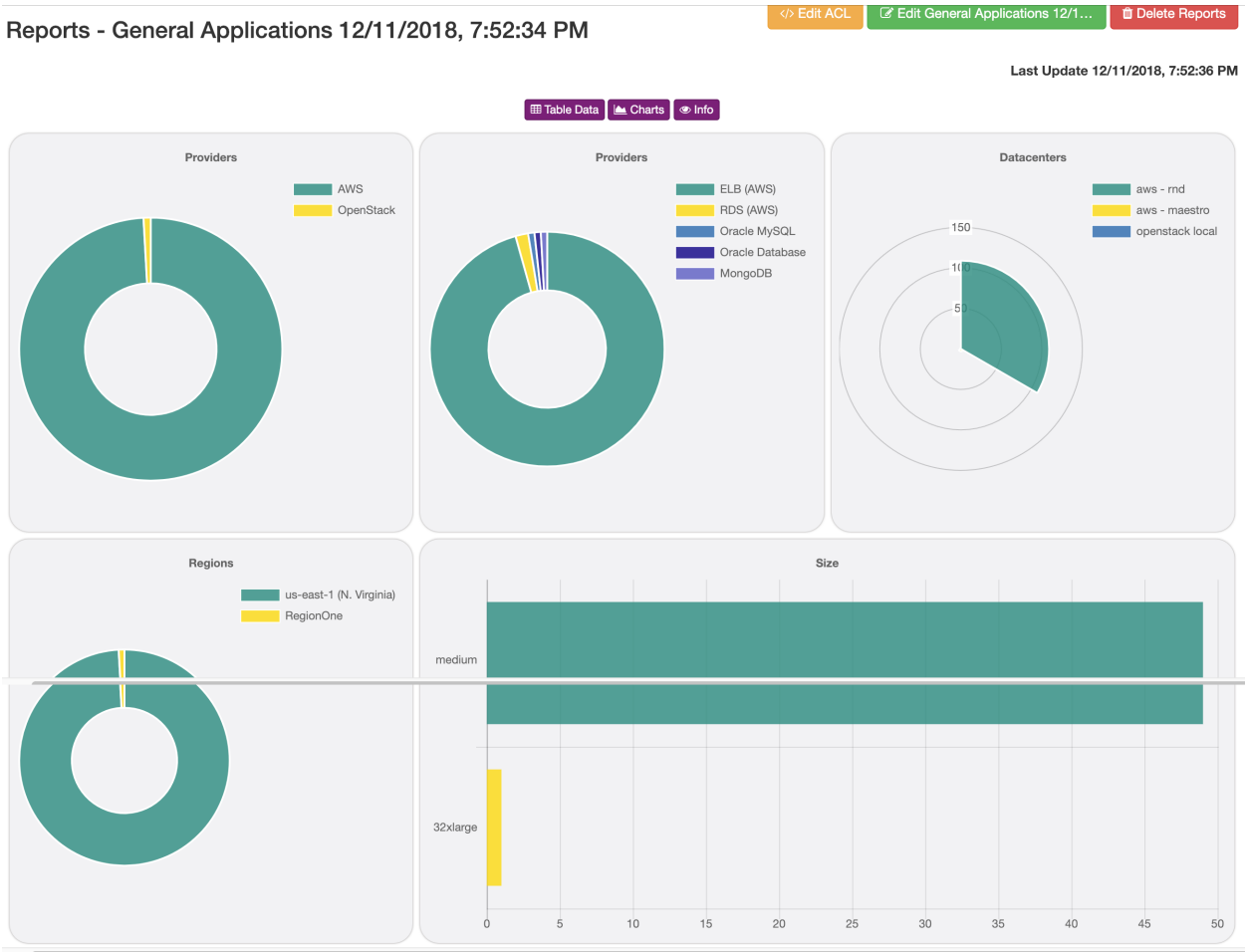
Each report has three pages

- **Charts:** Visualize the result on charts and diagrams.
- **Table:** Raw result table.
- **Info:** Information about the reports, such as status, filters and more.

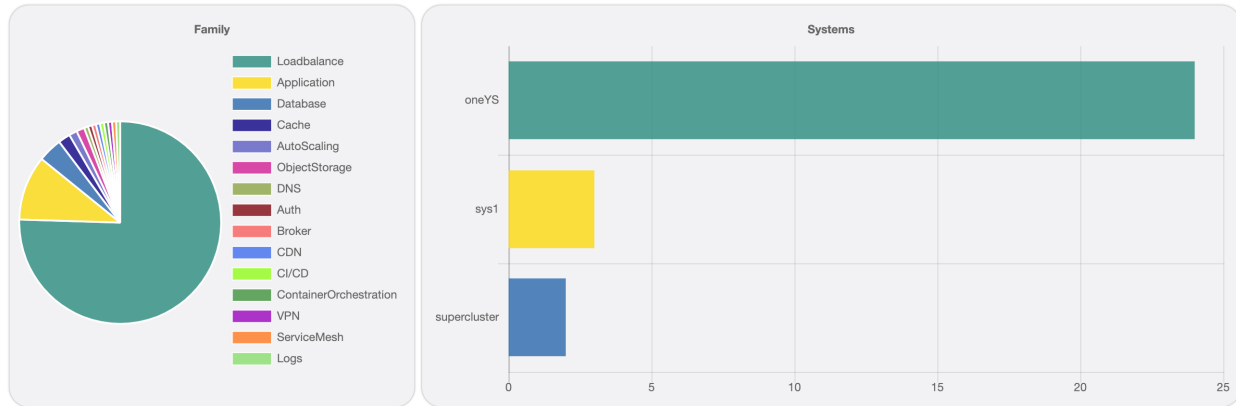


4.4.2 Report Charts

Reports > Single Report > Charts



Applications charts



Aggregate fields:

- Datacenter - Providers
- Datacenter - Resource
- Datacenter - Instance type
- Datacenter - Regions
- Datacenter - Zones
- Tags
- Sizes
- Application - Family
- Application - Dependencies
- Application - Deploys
- System by Application
- Clients by System
- System - Entry Applications















4.4.3 Scheduler

The scheduler is a time-based job scheduler, and it is responsible for managing and executing job cross Maestro, it used to synchronize the cloud providers data, to update reports and can be used by users.

To list all schedules, go to reports -> scheduler.

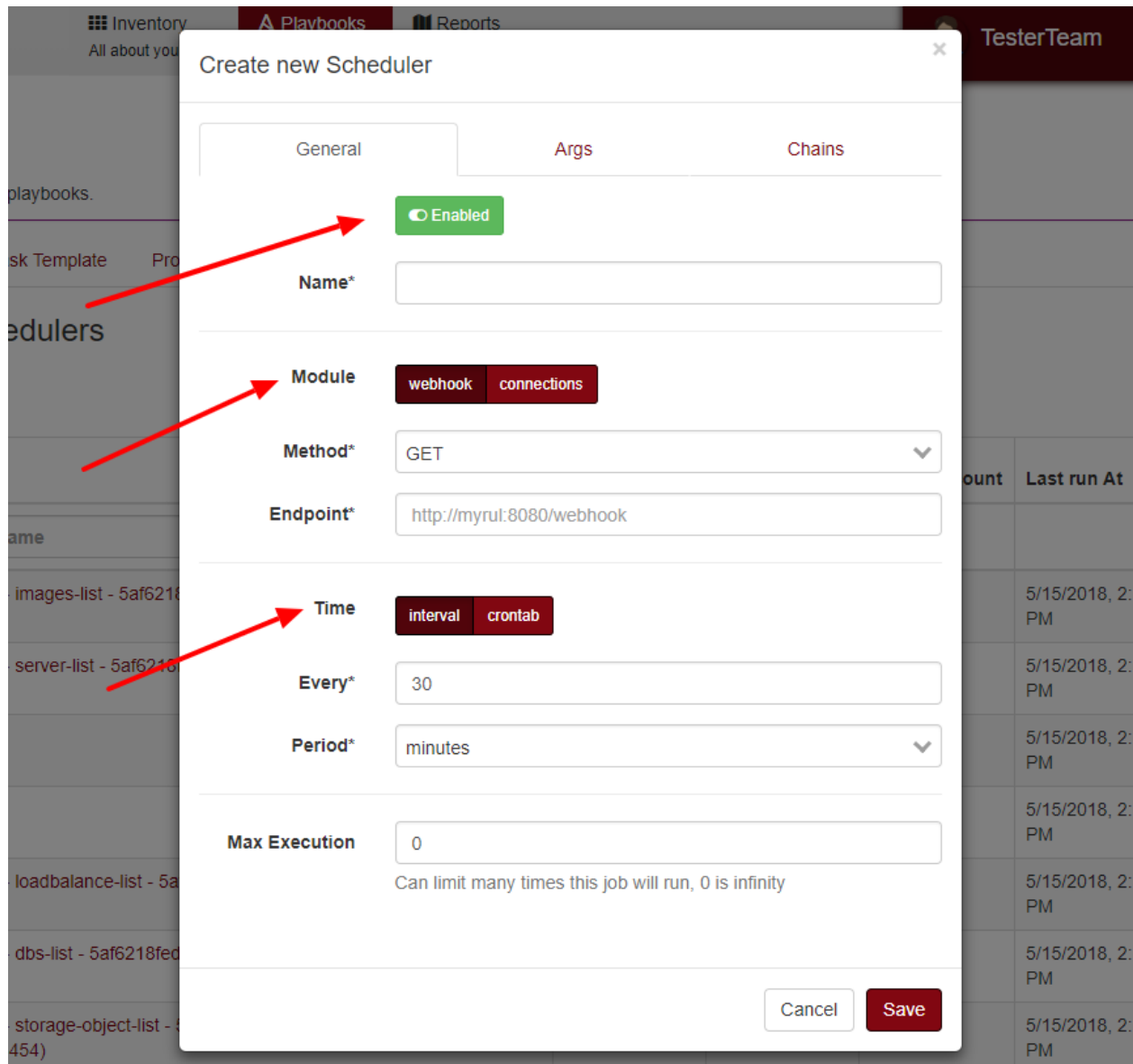
Enabled	Name	Modules	Period type	Total run count	Last run At	Actions
	<input type="text" value="Filter by Name"/>					
	connections - images-list - 5af6218fedd1b90014ebf291 (1526403642643)	connections	interval	1	5/15/2018, 2:00:46 PM	
	connections - server-list - 5af6218fedd1b90014ebf291 (1526400982609)	connections	interval	27	5/15/2018, 2:23:09 PM	

As an example, we can see schedulers accountable to automatic sync a cloud provider data on Maestro.

	connections - server-list - 5af6218fedd1b90014ebf291 (1526400982609)	connections	interval	27	5/15/2018, 2:23:09 PM	  
	localhost	webhook	interval	229	5/15/2018, 2:24:06 PM	  
	discovery	webhook	interval	224	5/15/2018, 2:24:06 PM	  
	connections - loadbalance-list - 5af6218fedd1b90014ebf291 (1526403636203)	connections	interval	1	5/15/2018, 2:00:40 PM	  
	connections - dbs-list - 5af6218fedd1b90014ebf291 (1526403637338)	connections	interval	1	5/15/2018, 2:00:40 PM	  

Creating a custom job.

You can create a custom job.



Create new Scheduler

General Args Chains

☒ Enabled

Name*

Module **webhook** **connections**

Method* GET

Endpoint* http://myrul:8080/webhook

Time **interval** **cronTab**

Every* 30

Period* minutes

Max Execution 0

Can limit many times this job will run, 0 is infinity

Cancel Save

4.5 ACLs - Users and Teams

4.5.1 Access rules

The Maestro ACL is composed of multiple entity type and each entity has a one rule.

Entities can be:

- a user
- a team

Rules can be:

Read:	Read access
Write:	Can read and update
Admin:	Can create and delete

- The authentication control system is set at the resource level, that means each record has your own acl rule.
- You can create teams to share the same access to multiple users, and under the hood the user assume the team identity and then the team can access that record.

The ACL modal can be found on any resources such as servers, applications, graphs, reports and more.

Users

Teams

Search teams by name

What is the name team?

felipeklerk@yahoo.com.br

users

Read

Write

Admin

(MY TEAM)

teams

Read

Write

Admin

2 Members

Users

You can update your profile.

Change Profile

The information you provide below will be shown on your invoices.



Upload your avatar

Select your profile



Username

signorini

Full Name

Phone number

Company

Job

Country

Select your Country



State/Province

Select your state



City

Address

Update profile

Change password

If you like to change the access password, you can go to profile > change password

Change or password

Change your password or recover your current one.

Current password

New password

Verify password

Save a new password

4.5.2 Teams

To create a team, go to the main menu on the right corner, and click on the Teams page.

Each team has a name, email, avatar and members.



Upload your avatar

Select your profile	✕
---------------------	---

Name*

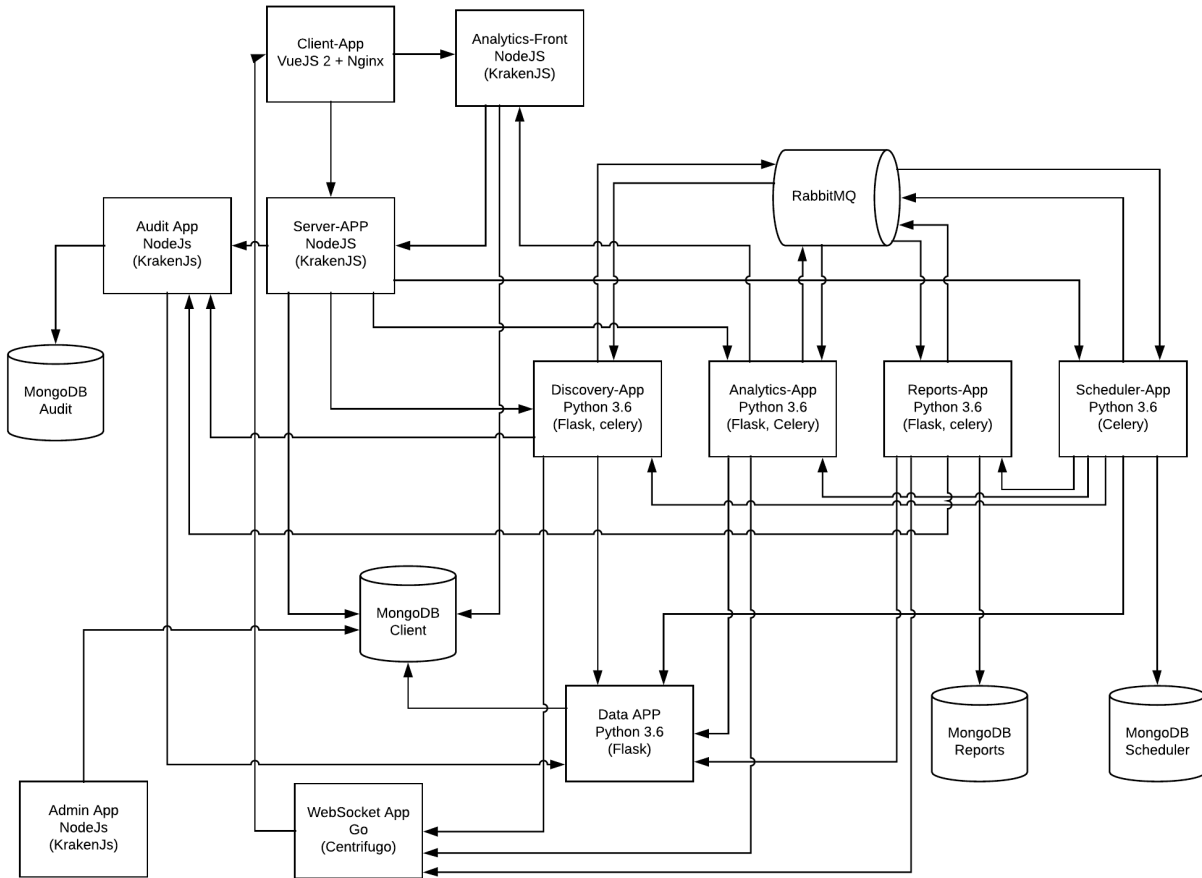
Email

Url

This chapter will explain a internal concepts about Maestro, if you like to contribute to the code this is the right place to start.

5.1 Architecture

This section describes advanced configurations, architecture and setups for developer. Maestro are organized by services made in nodejs and python, and they use mongodb as a datastore and rabbitmq as a broker, we build and deploy the application using docker.

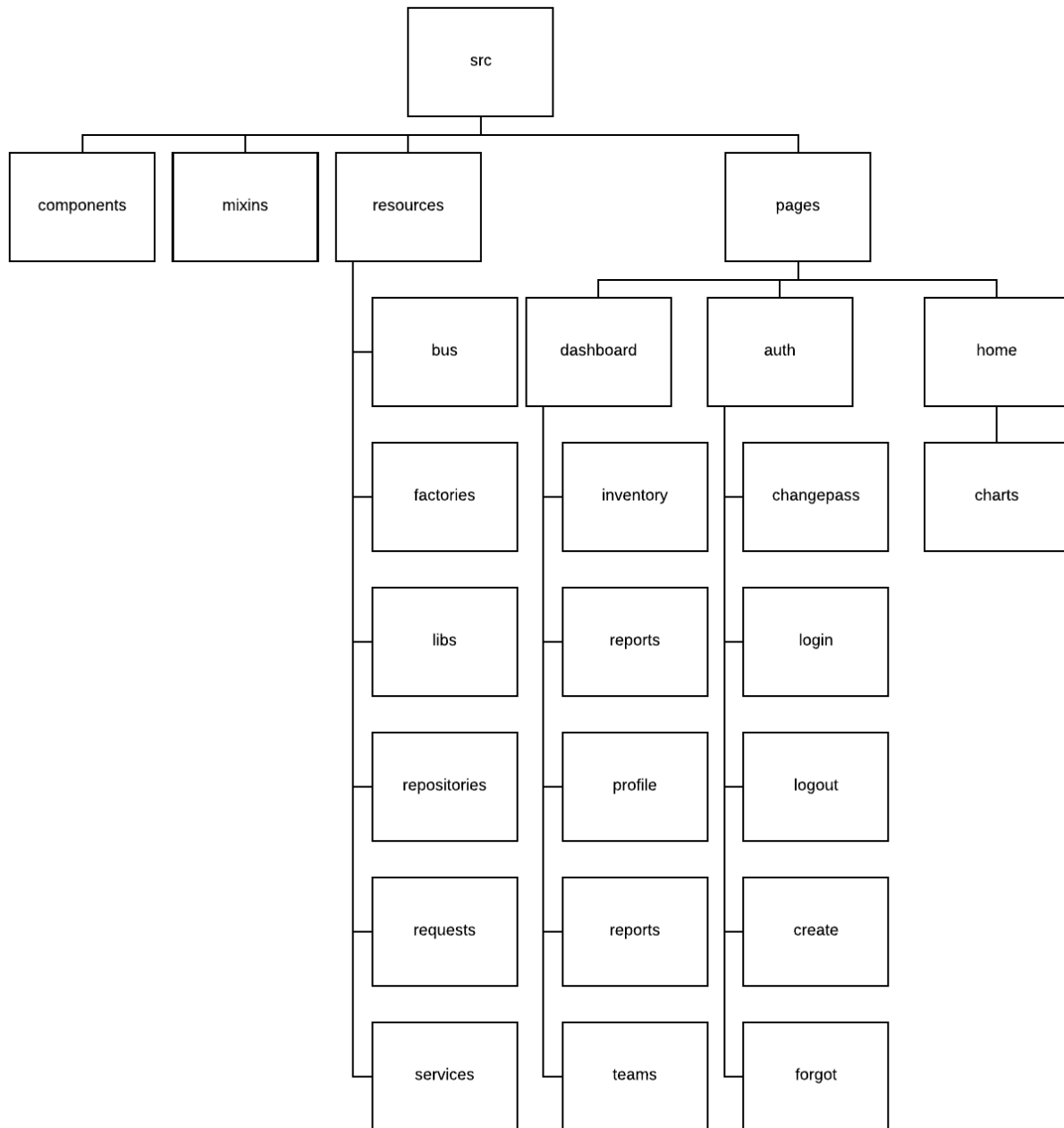


5.1.1 FrontEnd - Client App

The front end application, made using Vue2.

- Html and Js client
- Single page app (SPA)
- Cache layer

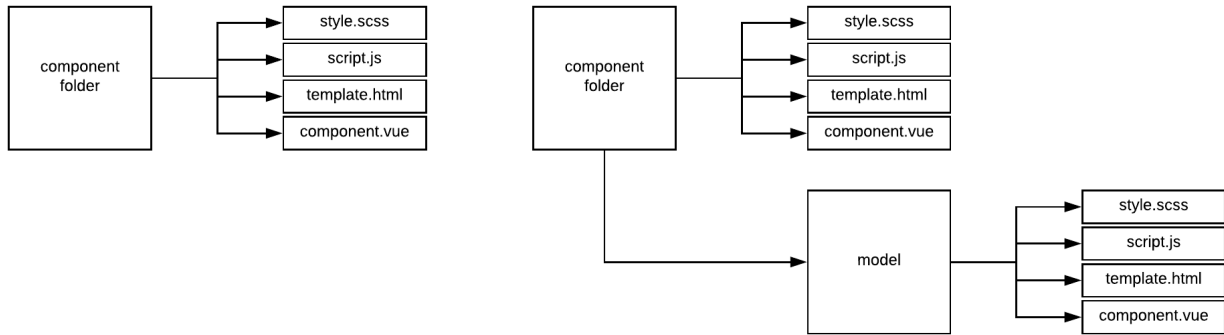
Vue2 Macro Architecture



Important topics

- Front end application are divided on:
 - **src/pages:** templates and business rules (domain layer)
 - **resources:** factories, modals, and cache managers (infrastructure layer)

A single component structure:



Installing node

- Nodejs >= 7.4

Download the repository

```
git clone https://github.com/maestro-server/client-app.git
```

Installing dependencies

```
npm install
```

Build

```
npm run build
```

Dev server

```
npm run serve
```

5.1.2 Server App

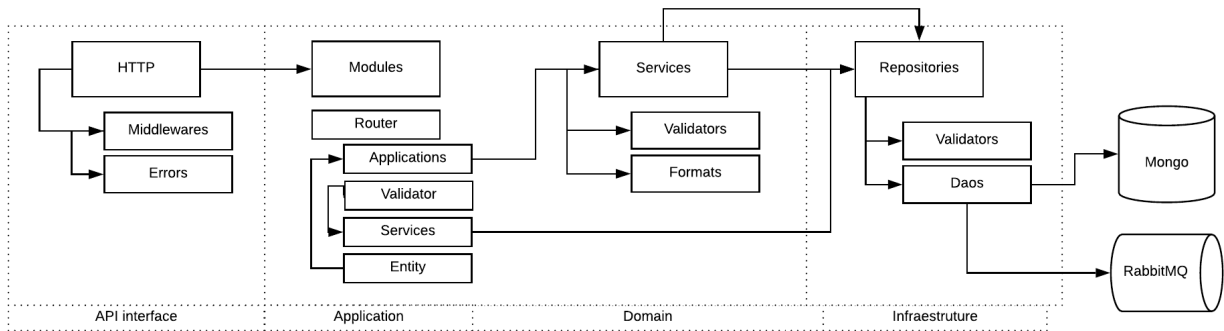
Server app is the main service; also they act as a middleware to authenticate and authorize users, it connect to the database and connect to others services.

- Authentication and authorization
- Validate and create entities (crud ops)
- Proxy to others services

Aviso: This service need to be expose externally

- Server is made with [KrakenJs](#).

- We use DDD to organize the code, they have an infra, repositories, entities (values objects), interfaces, application, and domain folders. [DDD in Node Apps](#)



Setup dev env

```
cd devtool/
docker-compose up -d
```

It will run a mongodb and a fake smtp server

Installing node

- Nodejs >=8
- MongoDB
- Gcc + python (bcrypt package)

Download the repository

```
git clone https://github.com/maestro-server/server-app.git
```

Installing dependencies

```
cd server-app
npm install
```

Configure env variables

create .env file

```
SMTP_PORT=1025
SMTP_HOST=localhost
SMTP_SENDER='maestro@gmail.com'
SMTP_IGNORE=true

MAESTRO_PORT=8888
MAESTRO_MONGO_URI='localhost'
MAESTRO_MONGO_DATABASE='maestro-client'

MAESTRO_DISCOVERY_URI=http://localhost:5000 // list and get status connection
```

(continues on next page)

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```
MAESTRO_REPORT_URI=http://localhost:5005 // create and get reports data
MAESTRO_ANALYTICS_URI=http://analytics:5020 // create analytics report
MAESTRO_ANALYTICS_FRONT_URI=http://analytics_front:9999 // get analytics html
MAESTRO_AUDIT_URI=http://audit:10900 // notify audit update event and get history_
↪track
```

and run the app

```
npm run server
```

Multiple env

Every config can be pass by env variables, but if you like, can be organize by .env files,

Name	Desc
.env	Default
.env.test	Used on run test
.env.development	node_env is set development
.env.production	node_env is set production

Database migration

Run the migration command.

```
npm run migrate

# to rollback the migration, run
npm run down_migration
```

We use PM2 to handle multiple threads, following the configuration.

PM2:

```
npm install -g pm2

# Create a file pm2.json

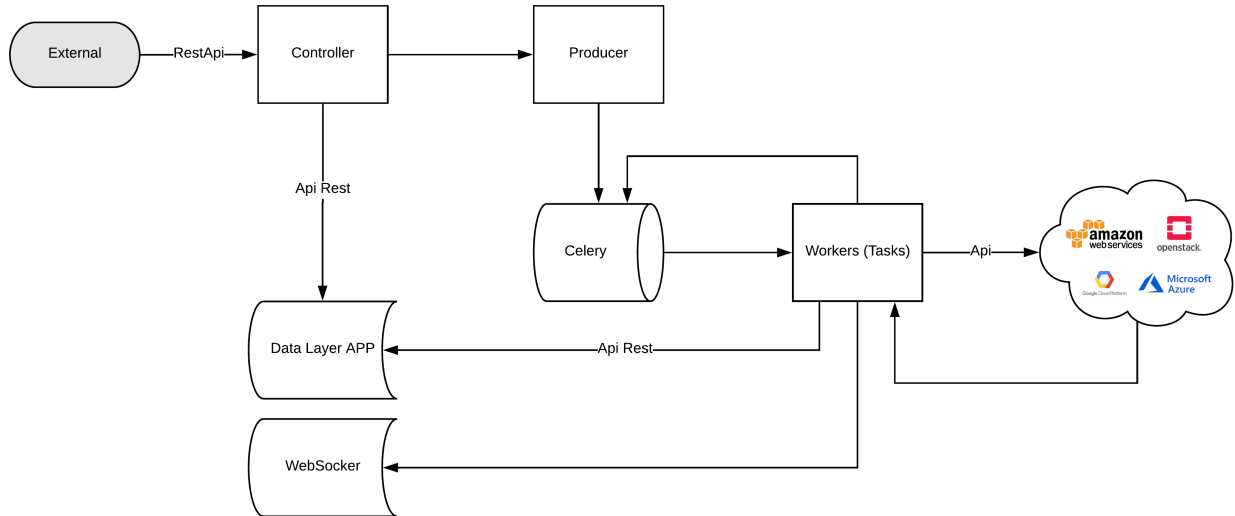
{
  "apps": [{
    "name": "server-maestro",
    "script": "./server.js",
    "env": {
      "production": true,
      "PORT": 8888
    }
  }]
}
```

```
pm2 start --json pm2.json
```

5.1.3 Discovery App

Discovery App is a crawler accountable to connect to cloud providers.

- To manager and authenticate on each cloud provider
- Translate cloud data to maestro data.

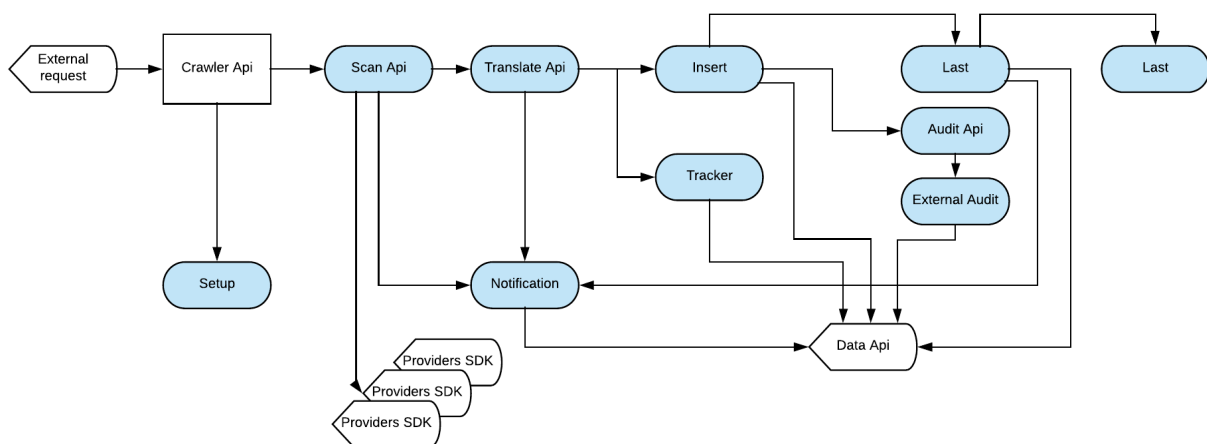


Discovery app use [Flask](#), on python >3.5.

Setup dev env

```
cd devtool/
docker-compose up -d
```

Highlights

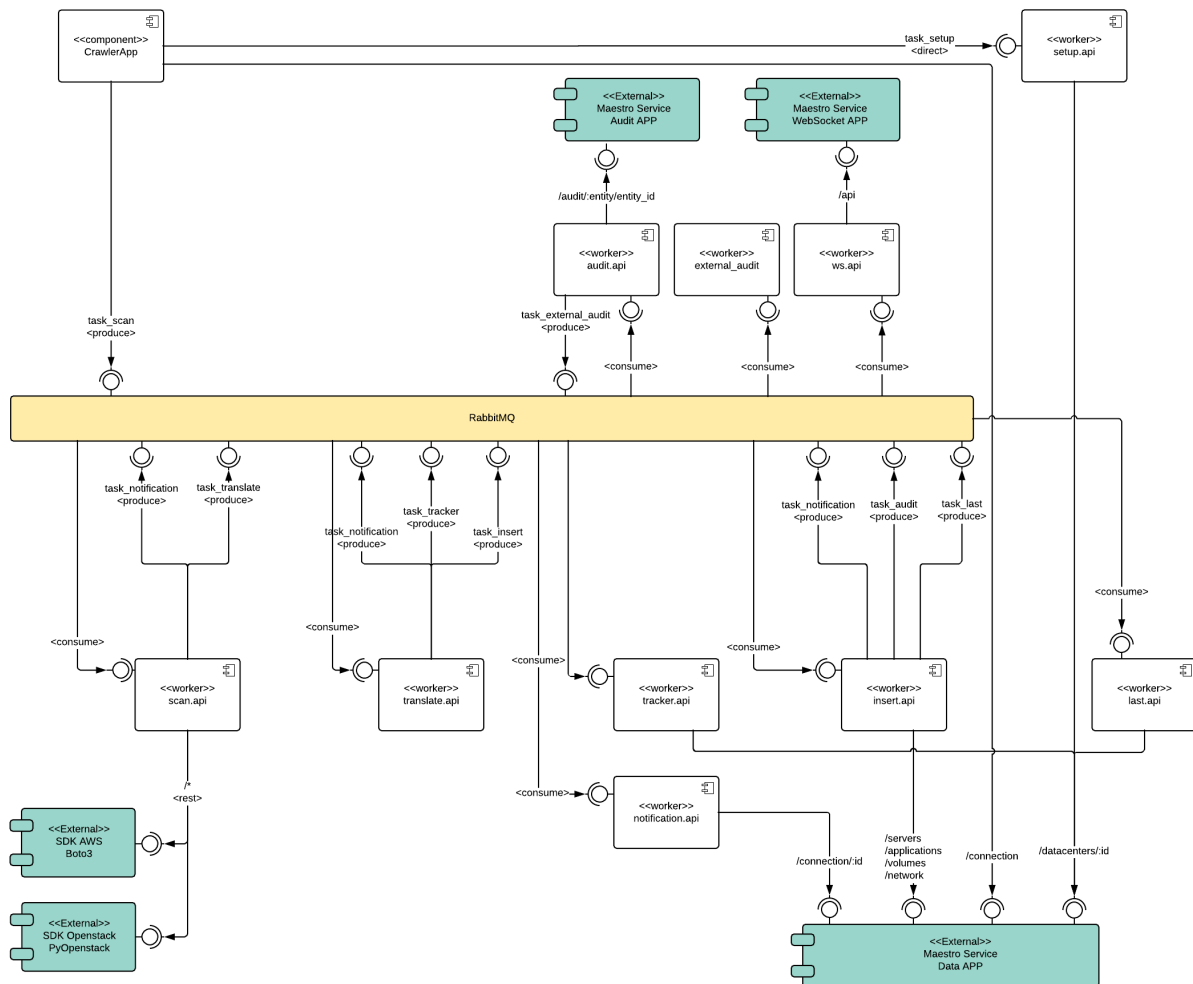


- The discovery are divided in modules:
 - **api**: To authenticate on cloud providers.
 - **translate**: Normalize the data.

- **setup:** Reset the tracker stats (it used on datacenters to get the orphans instances)
- **tracker:** recreate the tracker stats
- **insert:** insert/update data on mongodb
- **audit:** prepare and transform a data to send to the external audit
- **external_audit:** Send a http request to Audit app
- **ws:** Send a http notification to websocket api

Components Diagram

Follow an example of request flow.



Flower - Debug Celery

Real-time monitoring using Celery Events

- Task progress and history
- Ability to show task details (arguments, start time, runtime, and more)

- Graphs and statistics

```
pip install flower  
flower -A app.celery  
npm run flower
```

Installation with python 3

- Python >3.4
- RabbitMQ

Download the repository

```
git clone https://github.com/maestro-server/discovery-api.git
```

Installing dependencies

```
pip install -r requirements.txt
```

Running

```
python -m flask run.py  
or  
FLASK_APP=run.py FLASK_DEBUG=1 flask run  
or  
npm run server
```

Running workers

```
celery -A app.celery worker -E -Q discovery --hostname=discovery@%h --loglevel=info  
or  
npm run celery
```

Aviso: On production we use gunicorn to handle multiple threads.

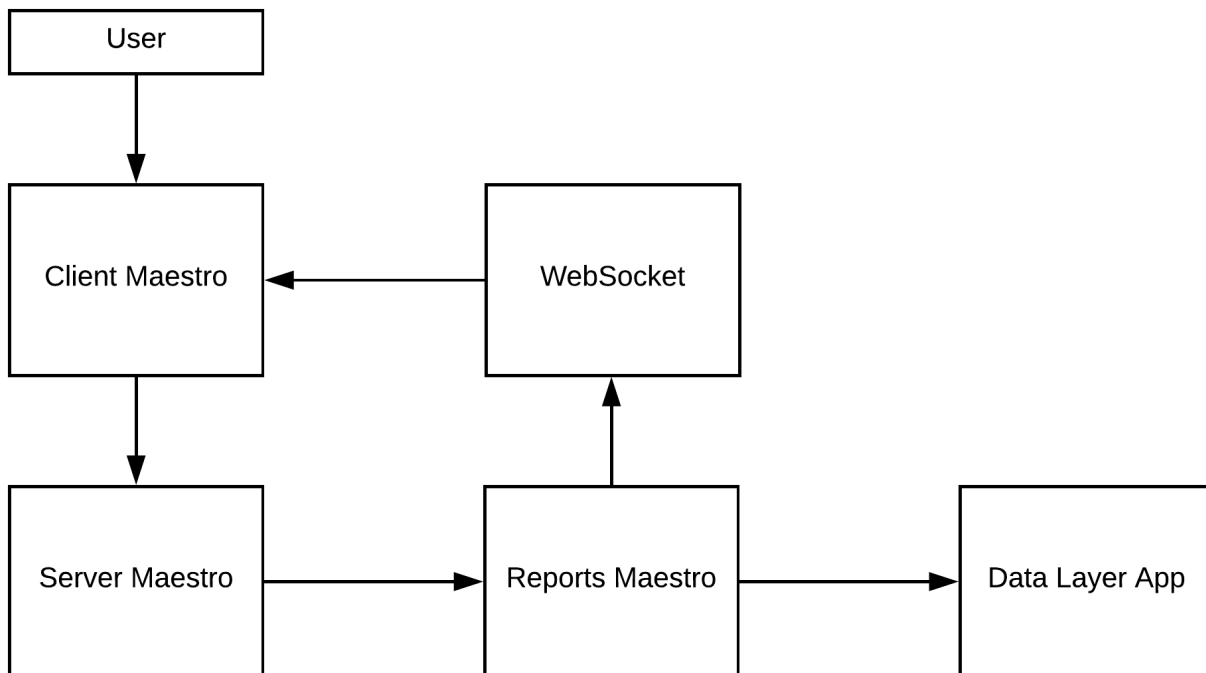
```
# gunicorn_config.py  
  
import os  
  
bind = "0.0.0.0:" + str(os.environ.get("MAESTRO_PORT", 5000))  
workers = os.environ.get("MAESTRO_GWORKERS", 2)
```

5.1.4 Reports App

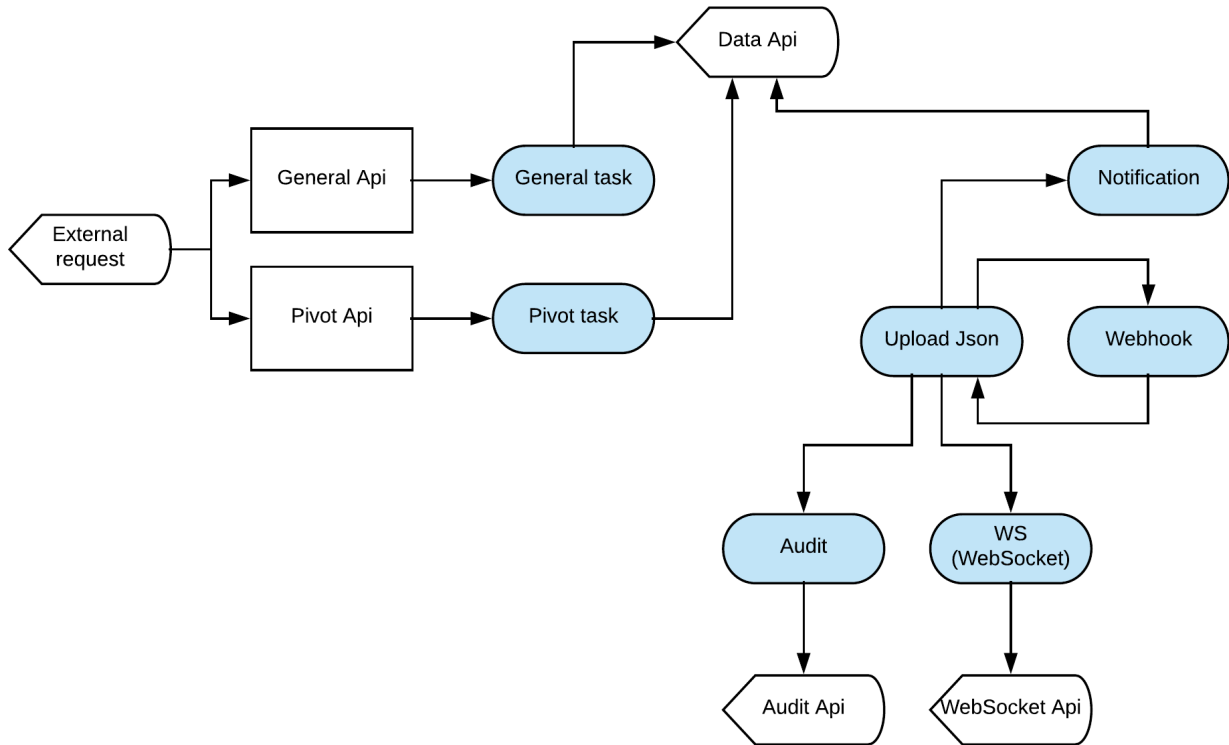
Application to aggregate, filter and generate reports.

- Parse complex queries and generate reports
- Manage storage and control each technical flow
- Transform reports on artifacts such as pdf, csv or json
- Save results on database

-
- Reports app use [Flask](#), on python >3.5.



Highlights



- The module description:
 - **general/pivot:** get and filter data (communicate with discovery api)
 - **notification:** send a notification to data/audit services
 - **upload:** send results to the webhook
 - **webhook:** insert/update data on mongodb [report database]
 - **aggregation** - Execute aggregation tasks and save on report collections
 - **notify** - Send a notification to data app

Installation with python 3

- Python >3.4
- RabbitMQ
- MongoDB

Download the repository

```
git clone https://github.com/maestro-server/report-app.git
```

Running

```
python -m flask run.py --port 5005
```

or

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```
FLASK_APP=run.py FLASK_DEBUG=1 flask run --port 5005
```

or

```
npm run server
```

Running workers

```
celery -A app.celery worker -E -Q report --hostname=report@%h --loglevel=info
```

or

```
npm run celery
```

Aviso: On production we use gunicorn to handle multiple threads.

```
# gunicorn_config.py

import os

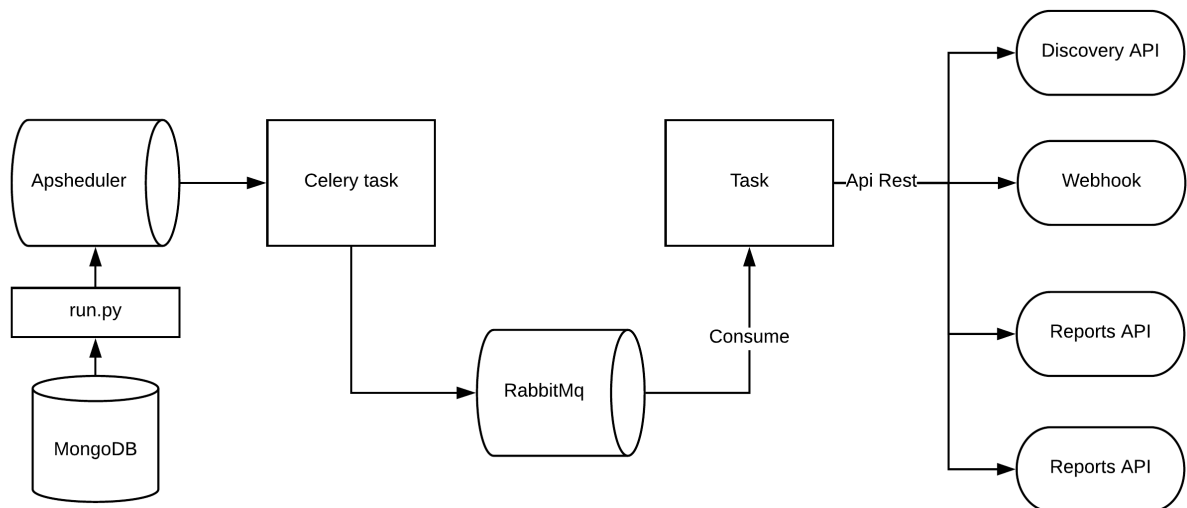
bind = "0.0.0.0:" + str(os.environ.get("MAESTRO_PORT", 5005))
workers = os.environ.get("MAESTRO_GWORKERS", 2)
```

5.1.5 Scheduler App

Scheduler App is accountable to manage and execute internal jobs.

- Schedule jobs, interval or crontab
- Do chain jobs

Scheduler use apscheduler to control scheduler jobs, [Apscheduler documentation](#)



Installation with python 3

- Python >3.4
- RabbitMQ
- MongoDB

Download the repository

```
git clone https://github.com/maestro-server/scheduler-app.git
```

Highlights

- Every 5 seconds the beat gets jobs on `schedulers` collection on mongodb.
- Beat can do:
 - **webhook:** Call HTTP request accordingly arguments.
 - **connection:** Sync a cloud data.
 - **report:** Generate/update a report.
- Support tasks.
 - **chain and chain_exec:** If this job have a chain job this tasks will do it.
 - **depleted_job:** Error handler to get any error and take the job out.
 - **notify_event:** Send a notification.

Installation with python 3

- Python >3.4
- RabbitMQ
- MongoDB

Download the repository

```
git clone https://github.com/maestro-server/scheduler-app.git
```

Running scheduler beat

```
npm run beat
```

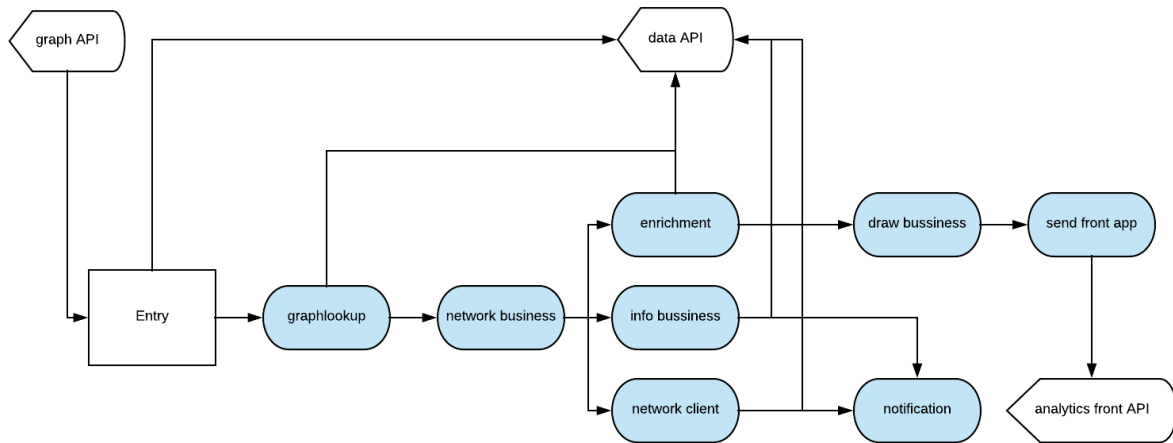
Running workers

```
celery -A app.celery worker -E --hostname=scheduler@%h --loglevel=info  
or  
npm run celery
```

5.1.6 Analytics Maestro

Accountant to get and create a application dependency tree and build diagrams:

- Create business graphs
- Drawing diagrams



Analytics app use [Flask](#), on python >3.5.

Setup dev env

```
cd devtool/
docker-compose up -d
```

It will be set a rabbitmq and a redis

Highlights

- The diagram lookup and draw process are compound by:
 - **entry:** The first task, they get all entries application and send to graphlookup.
 - **graphlookup:** Requesting the db data over Data App, doing an application lookup using a MongoDB \$graphLookup feature.
 - **network business:** Do a grid tree, and then send to enrichment task and info task.
 - **enrichment:** Getting servers.
 - **info business:** Calculate histogram, counts, density and connections.
 - **network client:** Getting clients.
 - **draw business:** Draw svgs.
 - **notification:** Send updates to Data App.
 - **send front app:** Send the svg to Analytics Front app.

Flower - Debug Celery

Real-time monitoring using Celery Events

- Task progress and history
- Ability to show task details (arguments, start time, runtime, and more)
- Graphs and statistics

```
pip install flower  
  
flower -A app.celery  
  
npm run flower
```

Installation guide

- Python >3.4
- RabbitMQ

Download the repository

```
git clone https://github.com/maestro-server/discovery-api.git
```

Installing dependencies

```
pip install -r requirements.txt
```

Running

```
python -m flask run.py  
  
or  
  
FLASK_APP=run.py FLASK_DEBUG=1 flask run  
  
or  
  
npm run server
```

Running workers

```
celery -A app.celery worker -E -Q analytics --loglevel=info  
  
or  
  
npm run celery
```

Aviso: On production we use gunicorn to handle multiple threads.

```
# gunicorn_config.py  
  
import os  
  
bind = "0.0.0.0:" + str(os.environ.get("MAESTRO_PORT", 5020))  
workers = os.environ.get("MAESTRO_GWORKERS", 2)
```

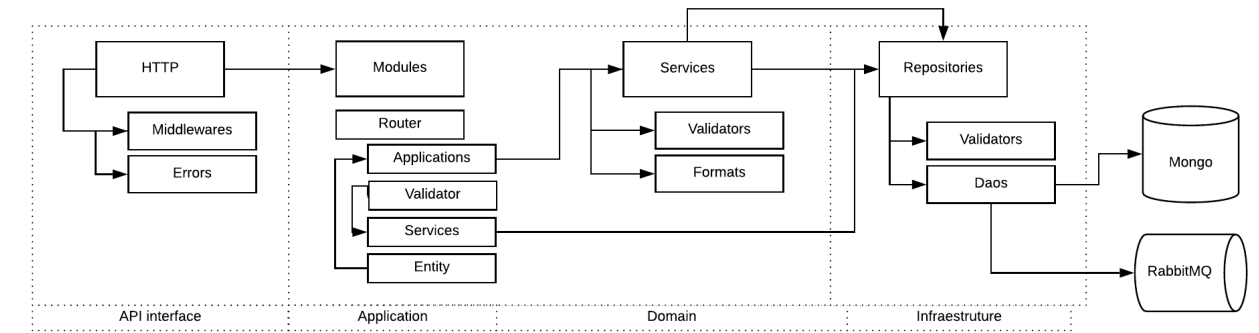
5.1.7 Analytics Front

Analytics Front Application is accountable to expose diagrams to the user:

- Public/private authorization
- Expose svgs diagrams
- Upload private SVGs

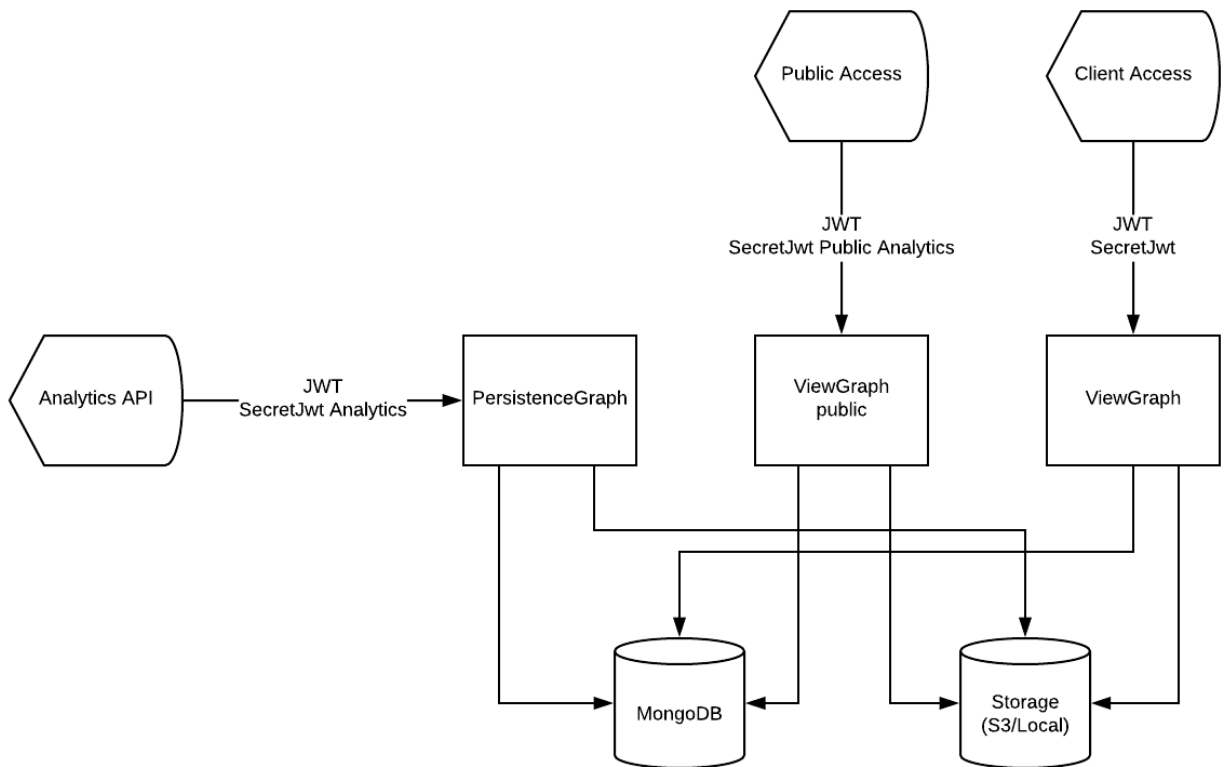
Aviso: This service need to expose an external access

We use DDD approach to organize a code, they have an infra, repositories, entities (values objects), interfaces, application, and domain folders. [DDD in Node Apps](#)



Analytics is made with [KrakenJs](#).

Follow a module flow diagram:



Installing node

- Nodejs >=8
- MongoDB >=3.4
- RabbitMQ
- AWS S3 (To use as a external storage)

To Download the repository, go to:

```
git clone https://github.com/maestro-server/analytics-front.git
```

Installing dependencies

```
cd analytics-front
npm install
```

Configure env variables

create .env file

```
MAESTRO_PORT=9999
MAESTRO_MONGO_URI='localhost'
MAESTRO_MONGO_DATABASE='maestro-client'
```

and

```
npm run server
```

Multiple env

Every config can be pass by env variables, but if you like, can be organize by .env files,

Name	Desc
.env	Default
.env.test	Used on run test
.env.development	node_env is set development
.env.production	node_env is set production

Migrate setup data

create .env file

```
npm run migrate
```

We use PM2 to handle multiple threads, following the configuration.

PM2:

```
npm install -g pm2

# Create a file pm2.json

{
  "apps": [{
    "name": "analytics-front",
    "script": "./server.js",
    "env": {
      "production": true,
      "NODE_ENV": "production",
      "PORT": 9999
    }
  }]
}
```

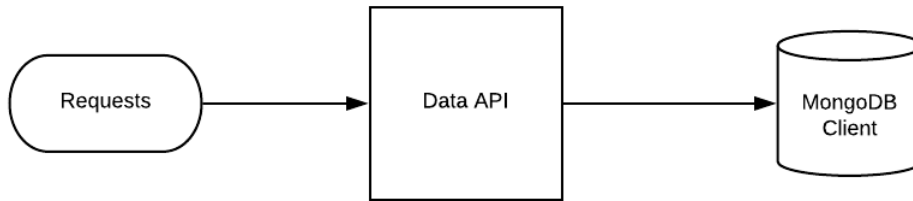
```
pm2 start --json pm2.json
```

5.1.8 Data APP

Data app is a gateway connection to the mongodb.

- CRUD database operations

Data app use [Flask](#), on python >3.5.



Setup dev env

```
pip install  
  
FLASK_APP=run.py FLASK_DEBUG=1 flask run --port=5010  
  
or  
  
npm run server
```

Mongo service

```
cd devtool/  
  
docker-compose up -d
```

Running a mongodb

Installation with python 3

- Python >3.4
- MongoDB

Download the repository

```
git clone https://github.com/maestro-server/data-app.git
```

Install run api

```
python -m flask run.py --port 5010  
  
or  
  
FLASK_APP=run.py FLASK_DEBUG=1 flask run --port 5010  
  
or  
  
npm run server
```

Aviso: On production we use gunicorn to handle multiple threads.

```
# gunicorn_config.py

import os

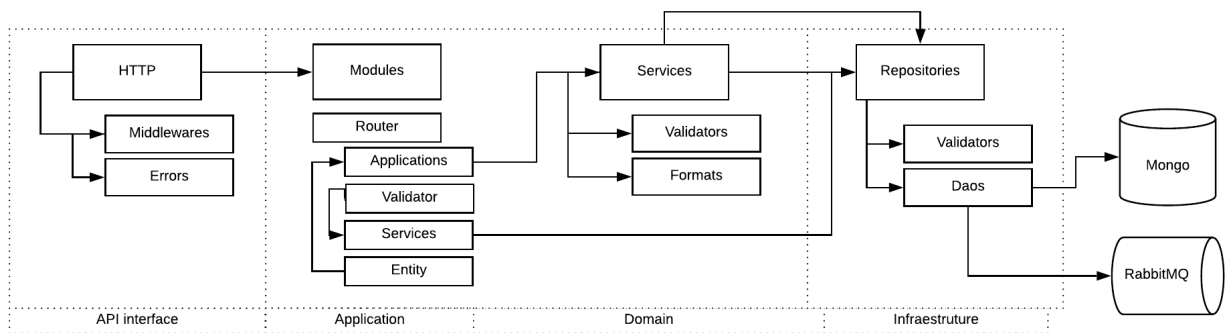
bind = "0.0.0.0:" + str(os.environ.get("MAESTRO_PORT", 5010))
workers = os.environ.get("MAESTRO_GWORKERS", 2)
```

5.1.9 Audit App

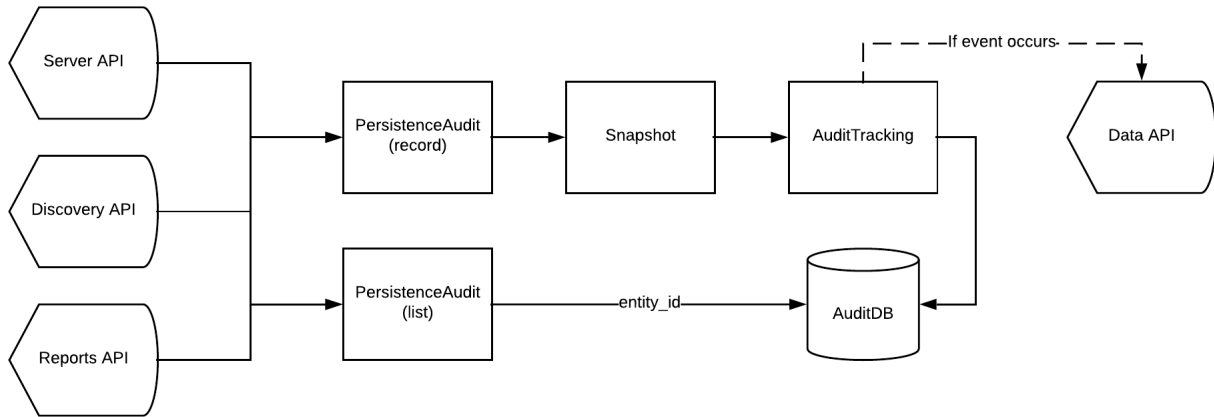
Audit App is a single application to track and record resources change:

- Track resources changes
- Create a change tree
- Store those data

- Audit is made with [KrakenJs](#).
- We use DDD approach to organize a code, they have an infra, repositories, entities (values objects), interfaces, application, and domain folders. [DDD in Node Apps](#)



Follow a module flow diagram:



Installing node

- Nodejs 8 or above
- MongoDB 3.x

Download the repository

```
git clone https://github.com/maestro-server/audit-app.git
```

Installing dependencies

```
cd audit-app
npm install
```

Configure env variables

create .env file

```
MAESTRO_PORT=10900
MAESTRO_MONGO_URI='localhost'
MAESTRO_MONGO_DATABASE='maestro-audit'
MAESTRO_DATA_URI="localhost:5005"
```

and

```
npm run server
```

Multiple env

You can use .env files the set configurations

Name	Desc
.env	Default
.env.test	Used on tests
.env.development	node_env was set development
.env.production	node_env was set production

We use PM2 to handle multiple threads, following the configuration.

PM2:

```
npm install -g pm2

# Create a file pm2.json

{
  "apps": [{
    "name": "audit-app",
    "script": "./server.js",
    "env": {
      "production": true,
      "NODE_ENV": "production",
      "PORT": 10900
    }
  }]
}
```

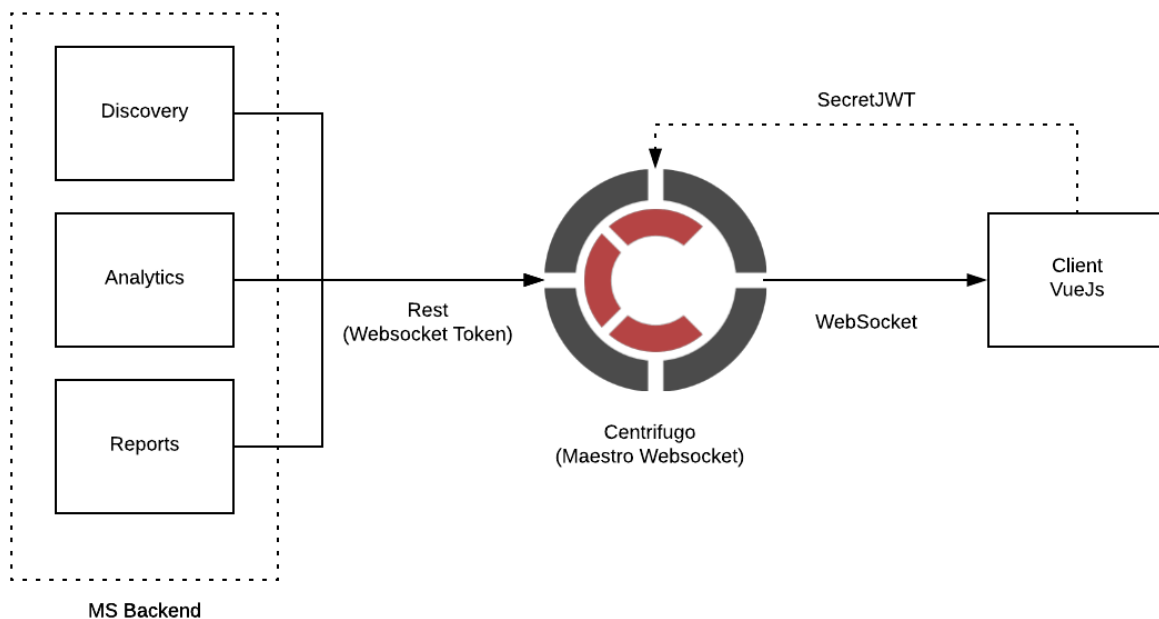
```
pm2 start --json pm2.json
```

5.1.10 WebSocket APP

Centrifugo server. It is a websocket + rest server, the websocket is used by client to get a real time notification, and the rest is used by internal maestro do send a notification to the client.

- Client notification using websockets

Websocket implement a [Centrifugo OpenSource project](#) (Centrifugo OpenSource project).



Setup dev env

```
# Generate config
docker run maestro-websocket centrifugo genconfig

# Run websocket
docker run -e MAESTRO_WEBSOCKET_SECRET='secret' -e MAESTRO_SECRETJWT='jwttoken' \
↪maestroserver/websocket-maestro

# Run centrifugo with admin enabled
docker run -e CENTRIFUGO_ADMIN='pass' -e CENTRIFUGO_ADMIN_SECRET='jwttoken' \
↪maestroserver/websocket-maestro
```

Download the repository (Centrifugal project)

```
git clone https://github.com/centrifugal/centrifugo
```

Endpoints

Client access

```
var centrifuge = new Centrifuge('ws://{server}/connection/websocket');

centrifuge.subscribe("news", function(message) {
  console.log(message);
});

centrifuge.connect();
```

Backend access

```
import json
import requests

command = {
  "method": "publish",
  "params": {
    "channel": "maestro#{ID-USER}",
    "data": {
      "notify": { // call notify
        "title": "<string>",
        "msg": "<string>",
        "type": "danger|warning|info|success"
      },
      "event": {
        "caller": "<string>" //custom event on client
      }
    }
  }
}
```

5.2 APIs

The communication between each service was made by *rest*, and we use the *api docs* tool to create the api doc.

5.2.1 Server API

You can see the server docs [here](#).

5.2.2 Discovery API

You can see the discovery docs [here](#).

5.2.3 Report API

You can see the report docs [here](#).

5.2.4 Analytics API

You can see the analytics docs [here](#).

5.2.5 Data API

You can see the data server docs [here](#).

5.2.6 Analytics Front API

You can see the analytics front docs [here](#).

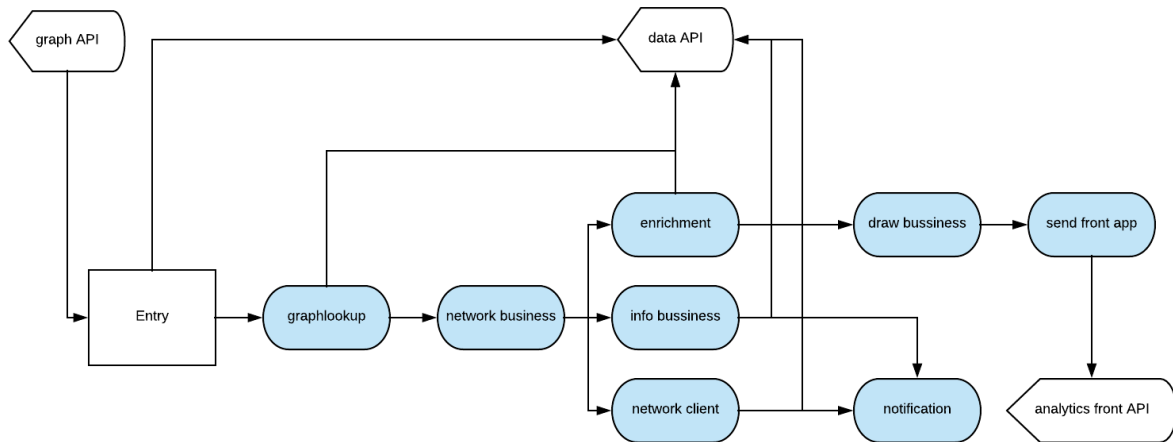
5.2.7 Audit API

You can see the audit docs [here](#).

5.3 Graphs Analytics Algorithm

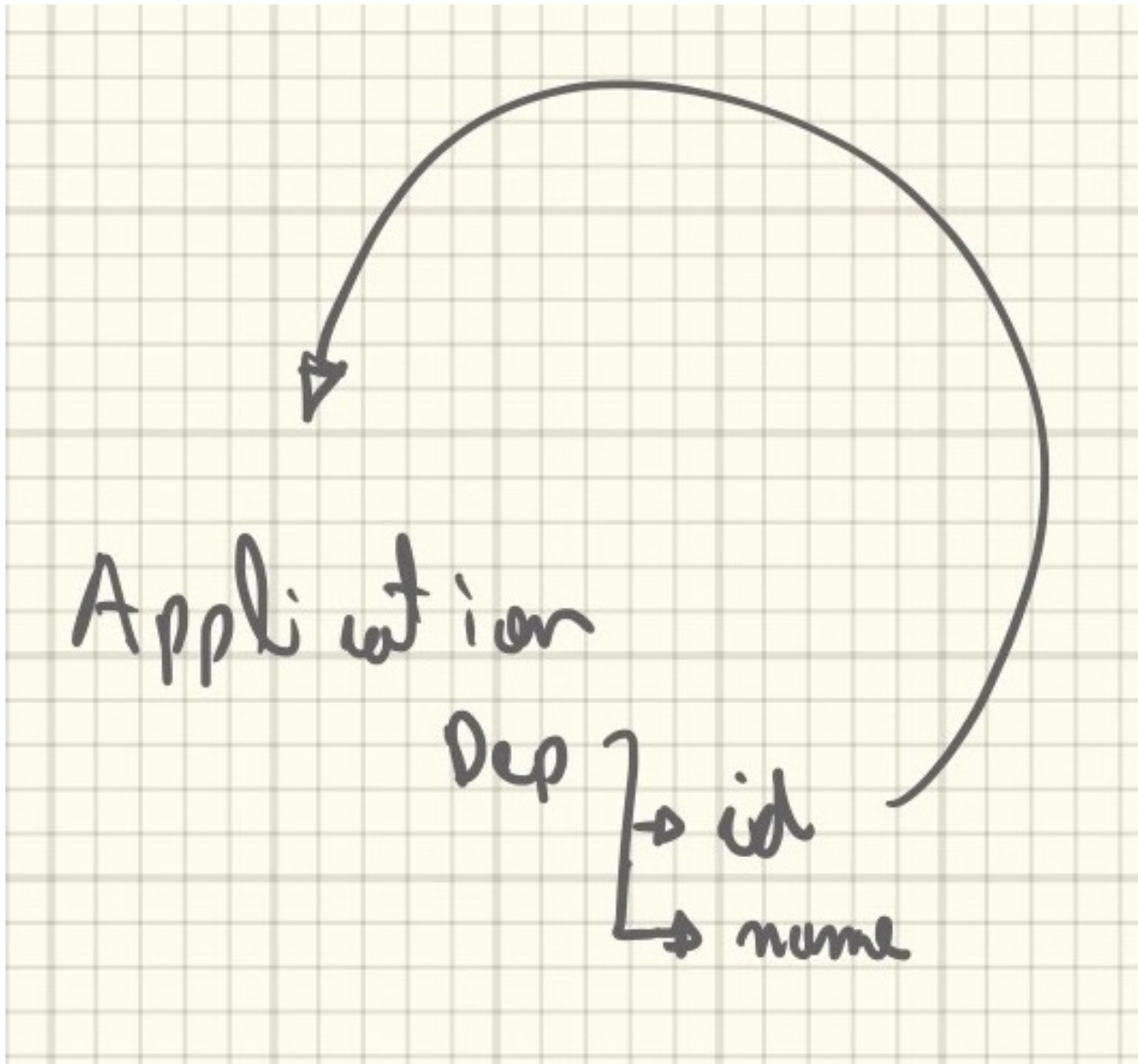
This section will describe about analytics graph algorithm.

- The analytics work flow



5.3.1 Making graph lookup on the mongodb

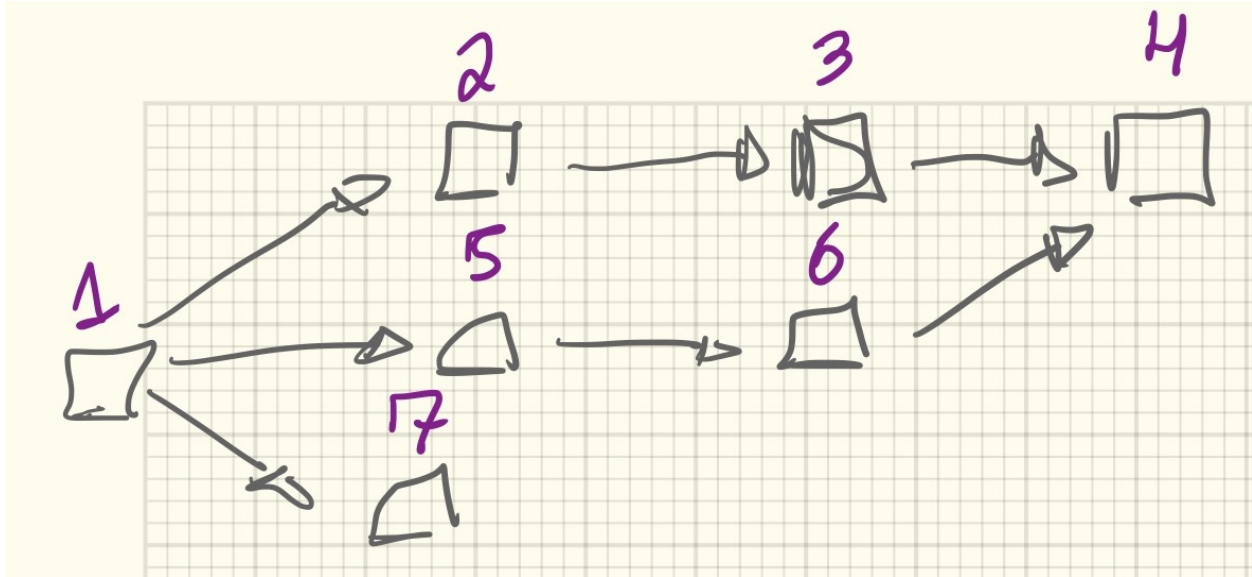
The graph lookup creates a python dict using mongodb graph lookup feature, they use the `application_id` on `dependency` field.



5.3.2 Creating a networkX graph

The next step is to create a networkX object based on graph lookup.

We have a recursive function inside each leaf on the tree, the order will be applied using a well defined rules, the results will be a new graph tree and a position matrix for each leaf, this result fixed sorts, duplication and conflicts issues.



An example of code example showing a recursive function

```
def _recursive_draw(self, app, i=0, OHelper=HelperOrderedSuccers):
    if i > 30:
        return

    for item in app:
        if not self._grid.in_index(item):
            node = self._graph.nodes[item]
            helper = self.add_pos_grid(node)

            succ = OHelper(helper).get_succers()
            self._recursive_draw(succ, i + 1)
```

5.3.3 Rules

Follow all rules with can be applied during the create of a new tree. Those rules can be overread each other.

Growing node

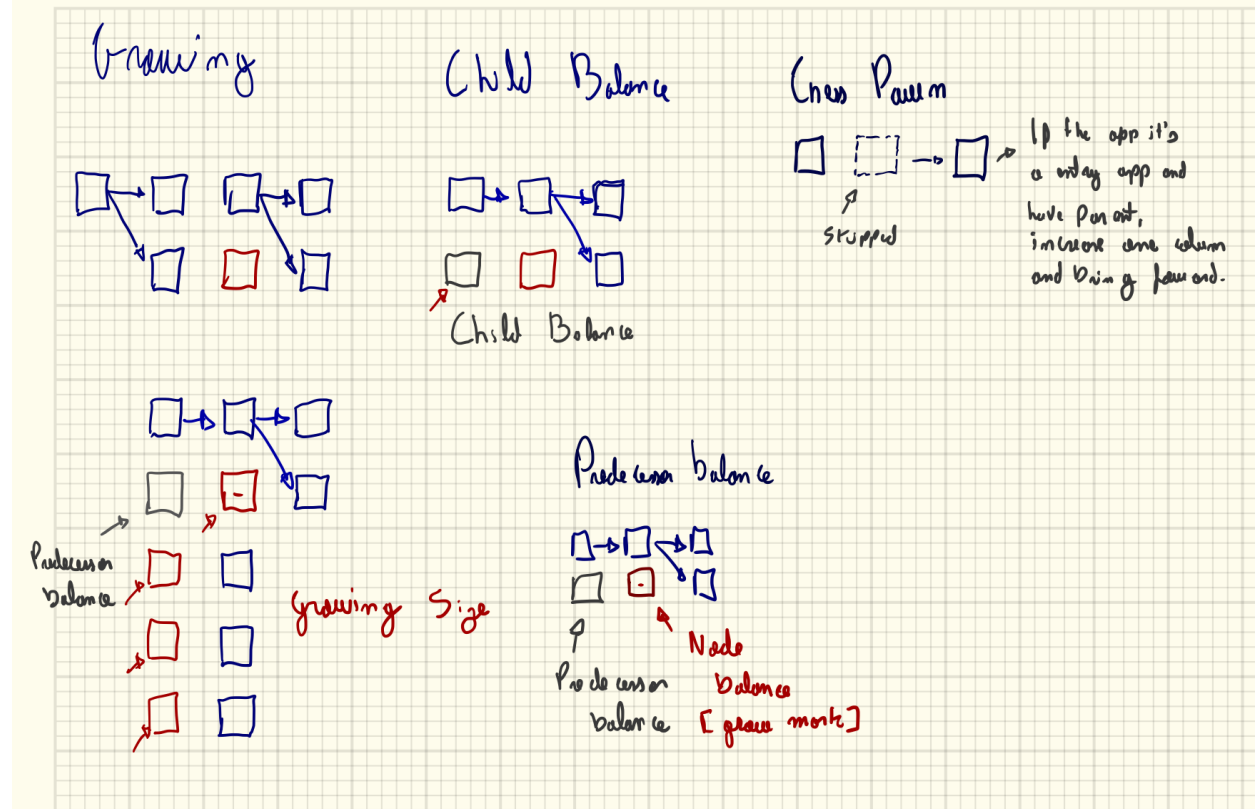
- **When:** If the node have more than one child, growing the node to be equal of the number of child
- **Transform:** Set the node size to be equal to the number of child

Child Balance

- **When:** If the parent node have more than two child.
- **Transform:** Create a dummy item beside to node parent.

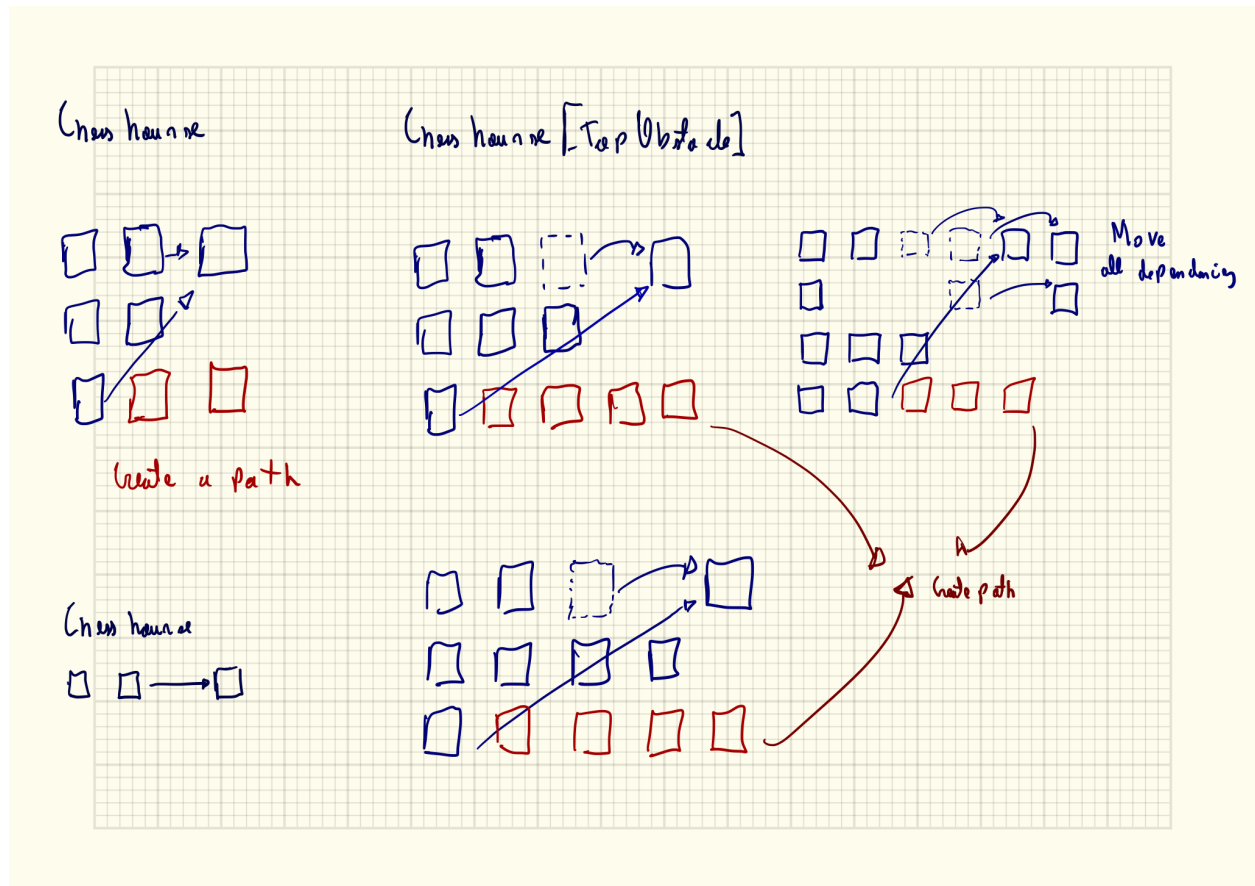
Chess Pawn

- **When:** If the app is an entry point and have parent.
- **Transform:** Skipped one column



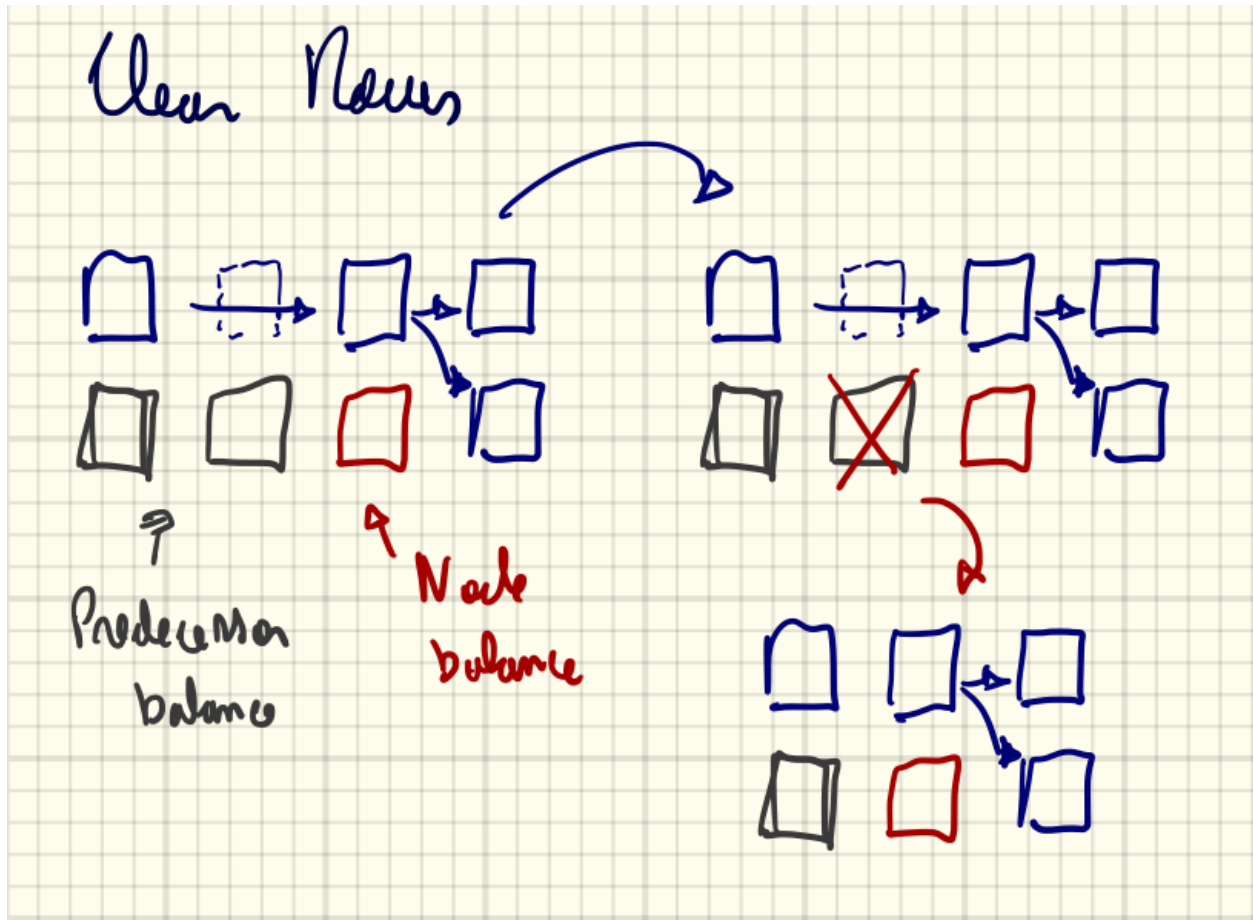
Chess horse

- **When:** If the node have a top obstacle which other nodes point out to a common dependency.
- **Transform:** First push back the dependency to a clear column, and then create a dummy path to the new column.



Clear rows

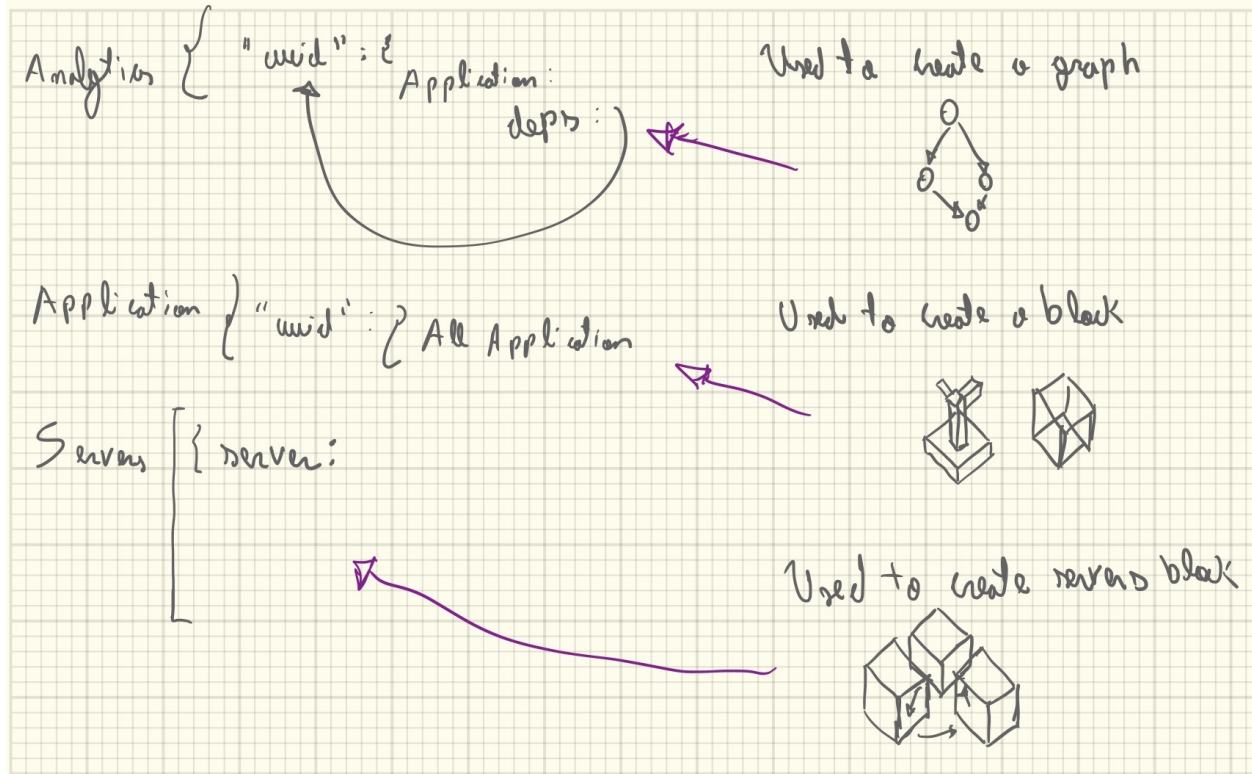
- **When:** If a whole column was empty.
- **Transform:** Delete these column and rebalance the grid.



5.3.4 Enrichment data phase

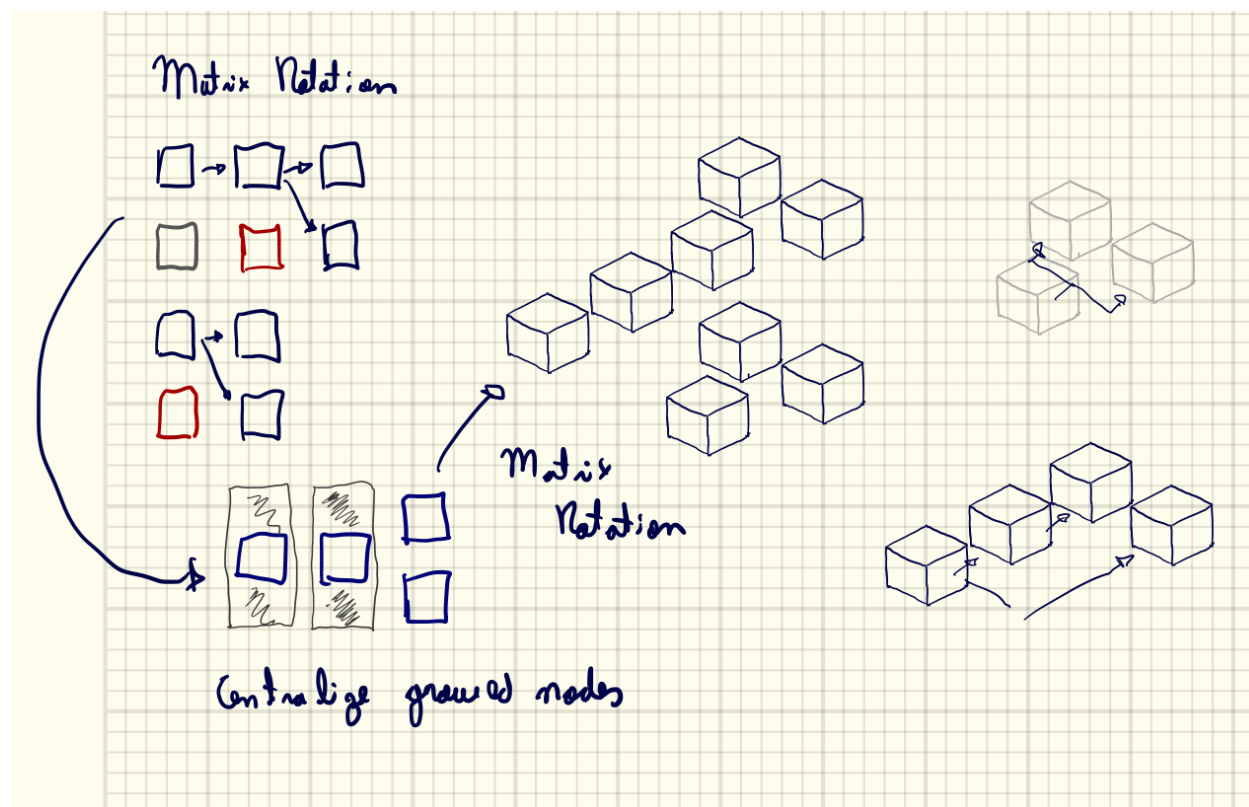
Next step is an enrichment data layer. To filled with a data server information.

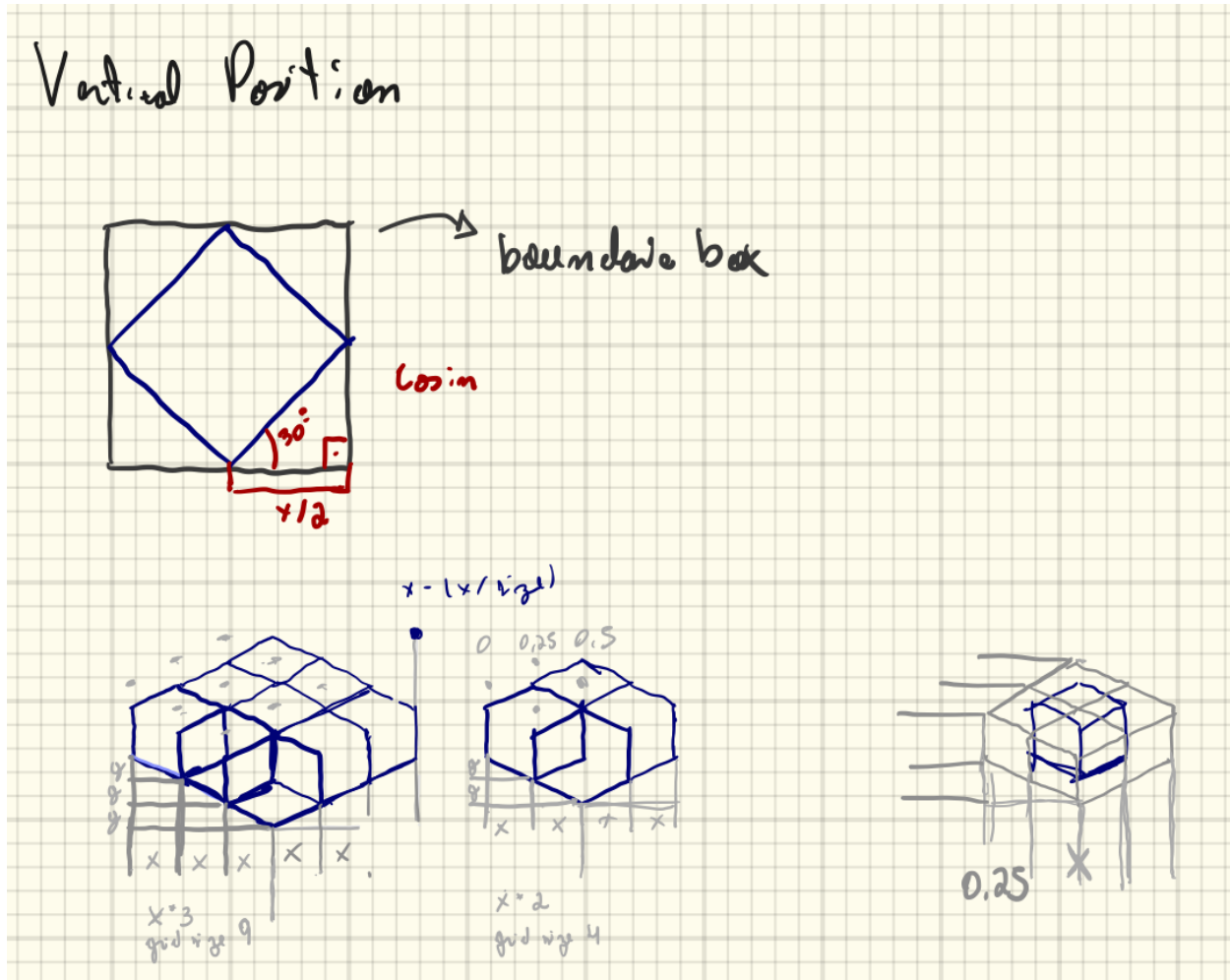
The enrichment step gets two dataset the first one is a json python dict represent as a graph tree, and the second one is a matrix position grid.



5.3.5 Draw phase

The last but not least, it is the dra step, they get the graph tree, matrix position and servers data to make the svgs.





5.4 Lints

This section describe about lint tools.

5.4.1 JavaScript (Client App)

Uses `eslint`,

```
npm run lint
```

5.4.2 NodeJs (Server App)

Describe on `server-app/.eslintrc`

```
npm run lint
```

5.4.3 Python 3 (Discovery, Scheduler and Reports)

pylint using the default config.

```
npm run lint
```

5.5 Tests

This section describe about test tools.

5.5.1 Server APP

Server uses Mocha + Chai and Sinon to execute tests, and to create a coverage report they use Istanbul

```
npm run test  
npm run e2e  
npm run unit  
#you can use a tdd approach to test the code  
npm run tdd
```

```
gulp test_e2e
```

Coverage

```
istanbul cover ./node_modules/mocha/bin/_mocha test/**/*.js
```

Coveralls	
-----------	--

5.5.2 Discovery APP

Testing with pytest

```
npm run test  
python -m unittest discover
```

Coveralls	
-----------	--

5.5.3 Reports APP

Uses pytest

```
npm run test  
python -m unittest discover
```

Coveralls	
-----------	--

5.5.4 Data Layer APP

Testing with pytest

```
npm run test
python -m unittest discover
```

Coveralls	
-----------	--

5.5.5 Analytics Apps

Testing with pytest

```
npm run test
python -m unittest discover
```

Coveralls	
-----------	--

5.5.6 Analytics Front

Testing with pytest

```
npm run e2e
```

Coveralls	
-----------	--

5.5.7 Audit App

Testing with pytest

```
npm run e2e
```

Coveralls	
-----------	--

5.6 Quality Assurance

5.6.1 Client Maestro

Codacy	
Travis	
CodeClimate	

5.6.2 Server App

CodeClimate	
Travis	
DavidDm	
Codacy	
Coveralls	

5.6.3 Discovery Maestro

Codacy	
Travis	
CodeClimate	

5.6.4 Report Maestro

Codacy	
Travis	
CodeClimate	

5.6.5 Scheduler Maestro

Codacy	
Travis	
CodeClimate	

5.6.6 Data Layer API

Codacy	
Travis	
CodeClimate	

5.6.7 Analytics App

Codacy	
Travis	
CodeClimate	

5.6.8 Analytics Front

Codacy	
Travis	
CodeClimate	

5.6.9 Audit App

Codacy	
Travis	
CodeClimate	

5.7 Third Party

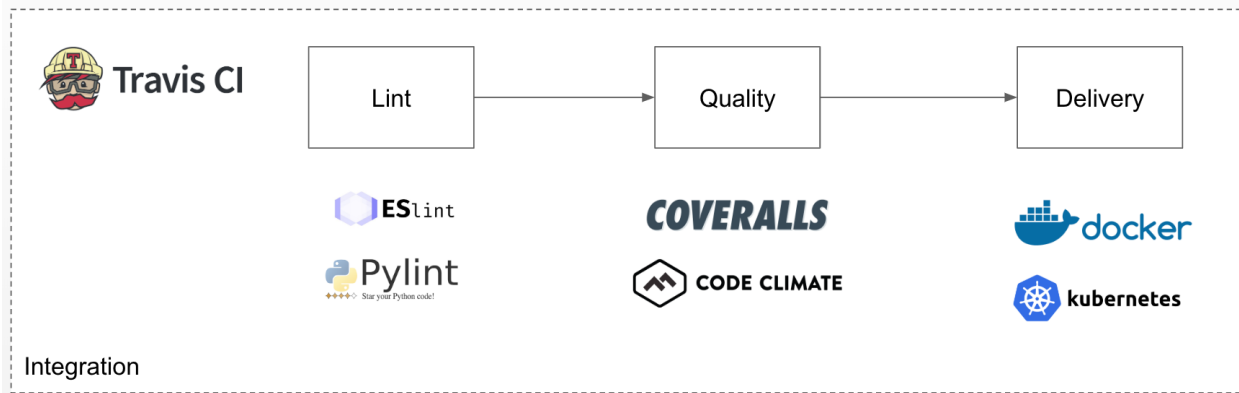
Third Party Support

Provider	Library
AWS	Boto3
OpenStack	OpenStackSDK
Azure	Azure sdk
DigitalOcean	Do SDK

5.8 CI and CD

We use Travis as a CI.

Travis - Maestro dashboard



5.9 Versions

Compatible mapping versions between services

5.9.1 v0.6x - Candidate release

Client	0.15.x
Server	0.6.x
Discovery	0.6.x
Scheduler	0.6.x
Data	0.6.x
Reports	0.6.x
Analytics	0.6.x
Analytics Front	0.6.x
Audit	0.6.x

5.9.2 v0.5x - Beta

Break changes - All services of version 0.5.x isn't compatible with early versions.

Client	0.14.x
Server	0.5.x
Discovery	0.5.x
Scheduler	0.5.x
Data	0.5.x
Reports	0.5.x
Analytics	0.5.x
Analytics Front	0.5.x
Audit	0.5.x

5.9.3 v0.4x - Beta

Break changes - All services of version 0.4.x isn't compatible with early versions.

Client	0.13.x
Server	0.4.x
Discovery	0.4.x
Scheduler	0.4.x
Data	0.4.x
Reports	0.4.x
Analytics	0.4.x
Analytics Front	0.4.x
WebSocket	0.4.x

5.9.4 v0.3x - Beta

Client	0.12.x
Server	0.3.x
Discovery	0.3.x
Scheduler	0.3.x
Data	0.3.x
Reports	0.2.x

5.9.5 v0.2x - Alpha

Client	0.11.x
Server	0.2.x
Discovery	0.2.x
Scheduler	0.2.x
Data	0.1.x
Reports	0.1.x

Troubleshooting

1 - AWS was not able to validate the provided access credentials

I got this error using a valid AWS AK/SK the DescribeInstances operation consistently fails. The other BOTO3 calls work so it's something with this specific call.

```
server-list:
state: danger
msg: An error occurred (AuthFailure) when calling the DescribeInstances operation:
↪AWS was not able to validate the provided access credentials At XXXXX
```

- Do the clock is right on your host?

This message error normally happens when it has a wrong clock configuration, docker uses the host timezone. If yes can you try to use ntpdate on the host and then spin up again the discovery-maestro and discovery-maestro-workers <https://stackoverflow.com/questions/24551592/how-to-make-sure-dockers-time-syncs-with-that-of-the-host>

- Can be caused by a weird circumstance of running a local version at the same time as a cloud hosted one. Some services ran locally others on the cloud due to the way docker-compose was setup.

2 - My client got Can't connect to Maestro Server

- The server api are running?
- Your client service have the right configuration?

```
client:
  image: maestroserver/client-maestro
  environment:
    - "API_URL=//maestro.xxx:8888" <----- Server API
    - "STATIC_URL=//maestro.xxx:8888/static" <----- Static Files
    - "ANALYTICS_URL=//maestro.xxx:9999" <----- Analytics Front
    - "WEBSOCKET_URL=wss://xxx:8000" <----- WebSocket
```

3 - Through Unauthorized error during the synchronization - Permission error

If through Unauthorized error, you need to grant ready only permission, as an example on AWS you should create IAM and grant full ready only permissions.

4 - The warning status never change

Can be a RabbitMq issue or the Discovery workers weren't running, you can restart the rabbitmq and start the service discovery workers.

You always can check the service logs:

```
docker-compose logs discovery-maestro
# or
docker-compose logs discovery-celery # this one is the discovery workers
```

7.1 Reporting issues

- Describe what you expected to happen.
- If possible, include a minimal, complete, and verifiable example to help us identify the issue. This also helps check that the issue is not with your own code.
- Describe what actually happened. Include the full traceback if there was an exception.

7.2 Submitting patches

- All test need to be pass
- All lint need to be green
- Include tests if your patch is supposed to solve a bug, and explain clearly under which circumstances the bug happens. Make sure the test fails without your patch.

Nota: All contribution will be accept by Pull Request

Donate

I have made Maestro Server with my heart, think to solve a real operation IT problem. Its not easy, take time and resources.

The donation will be user to:

- Create new features, implement new providers.
- Maintenance libs, securities flaws, and technical points.
- All pages are hosted on AWS
- Demo service is hosted on AWS, and we would like to use kubernetes environment.
- Use telemetry and monitoring services to improve the system.

If you could, you can help me, buy me a coffee, together we can keep the project up and create excited new features.



Contact

Do you have any question, comments, feedback or question about Maestro Server? Please send me a message.

9.1 Feature request

Do you like a new feature? You can open a new request on Github.

[Feature request](#).

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