



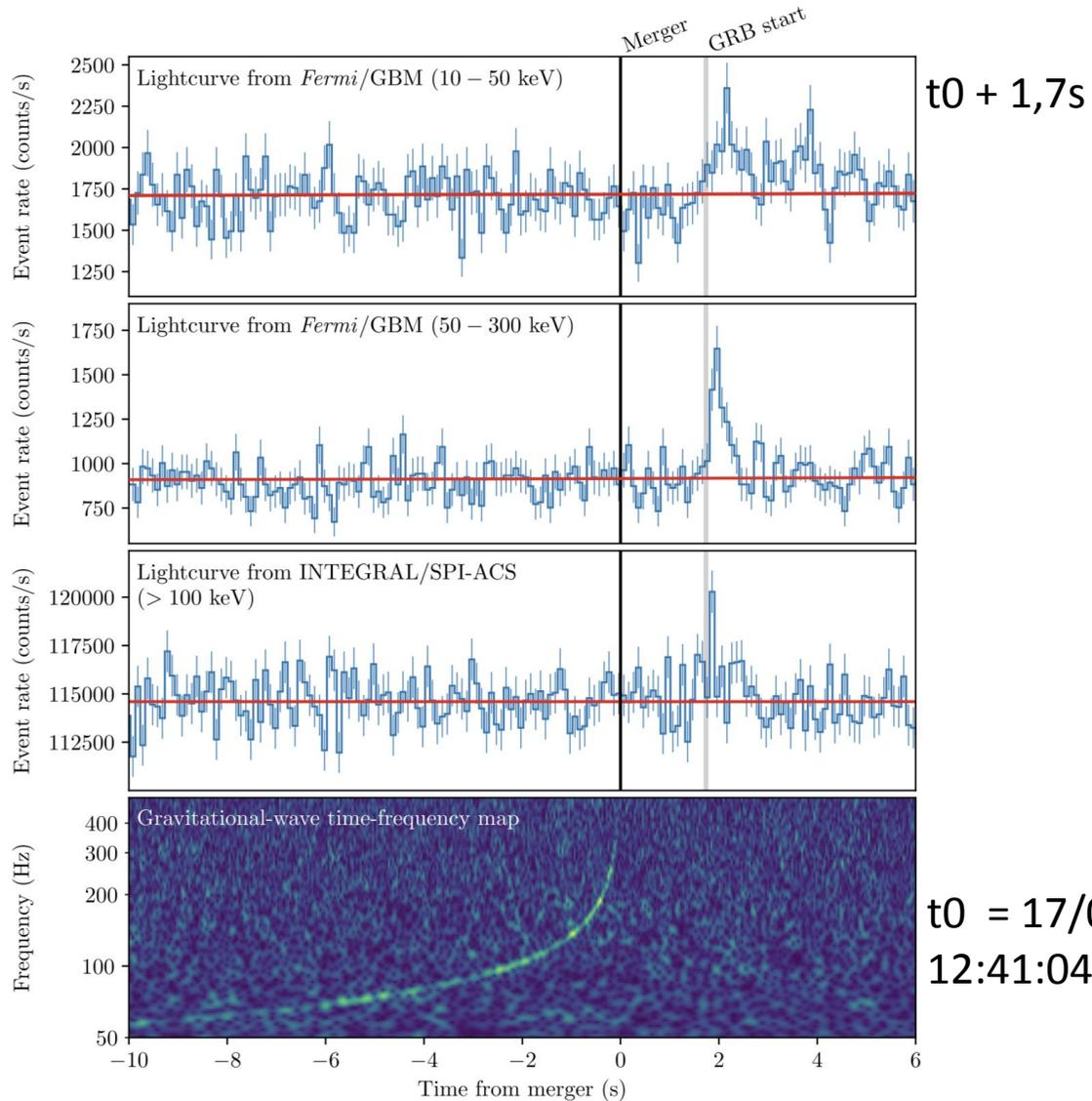
# Kubernetes à l'APC - projet MMO

*Cécile Cavet, Martin Souchal*

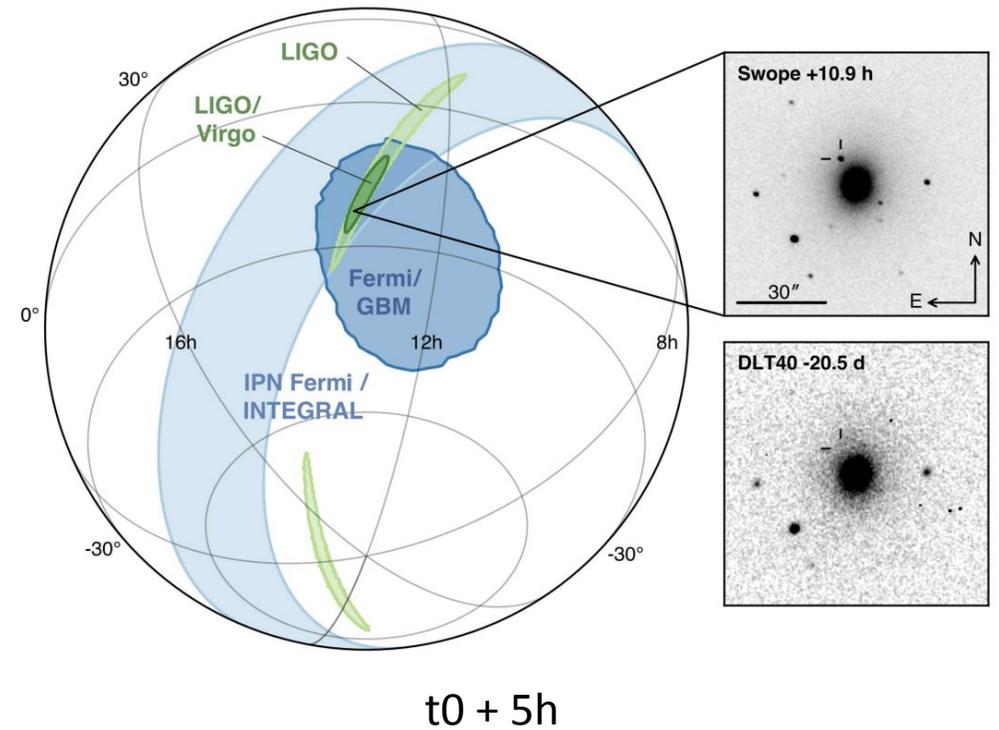
*Andrii Neronov, Denys Savchenko*



# MMO : contexte



Exemple : fusion d'étoiles à neutrons **GW 170817** pour laquelle un signal multi-messager a été détecté sur une échelle de temps de quelques secondes à quelques jours.





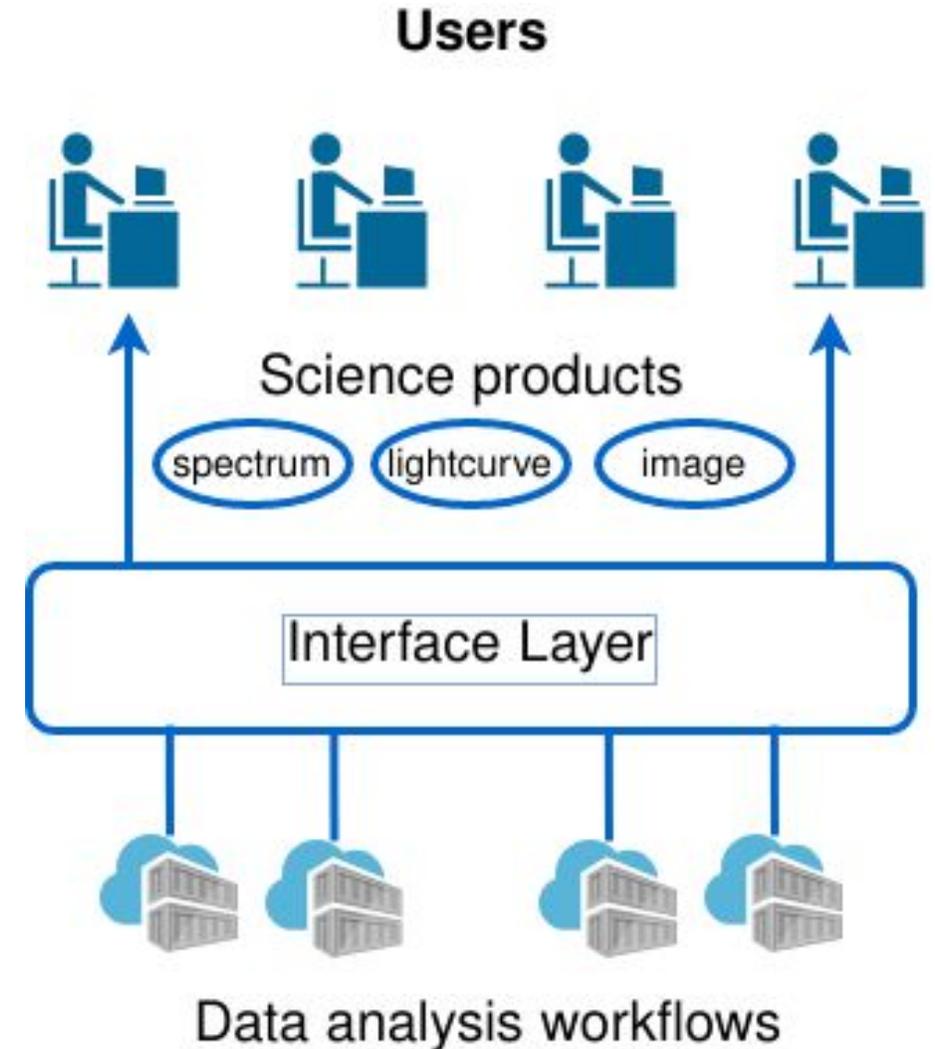
# MMO

- **But :**

- le partage et la réutilisation efficaces des données
- la conservation à long terme des données et des systèmes d'analyse
- la reproductibilité des résultats

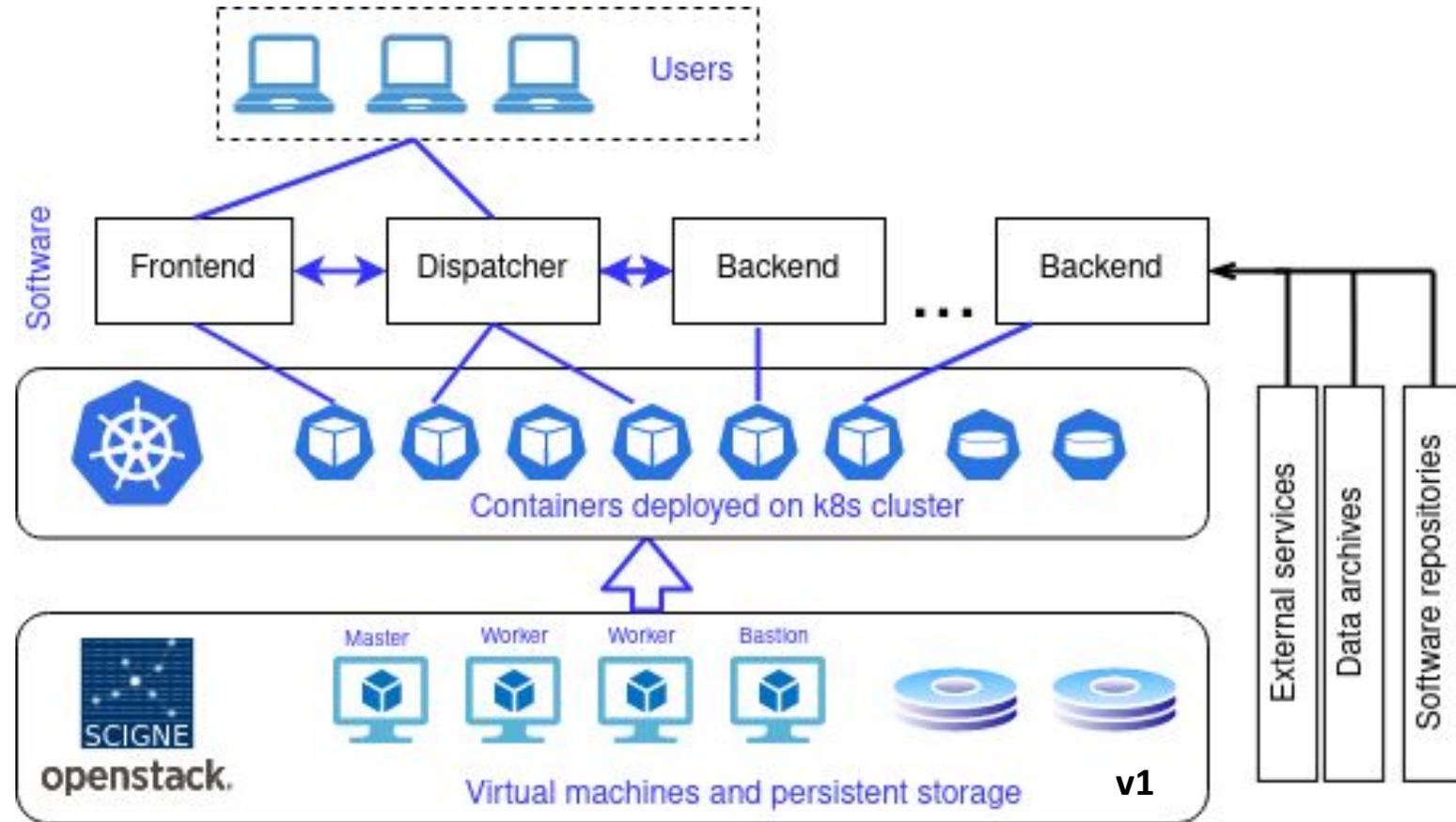
- **Collaboration :**

- FAcE@Paris, U.@Genève, KAU@Kiev
- @FAcE : financement CDD





- **Multi-Messenger Online Data Analysis (MMODA)**
- **Pile logicielle moderne** basée sur les technologies de virtualisation (cloud, conteneurs)





## • Services :

- Charts Helm  
+ images  
Docker

## • Adaptateurs correspondant aux analyses scientifiques

## Software layer

-- API access using dedicated python library

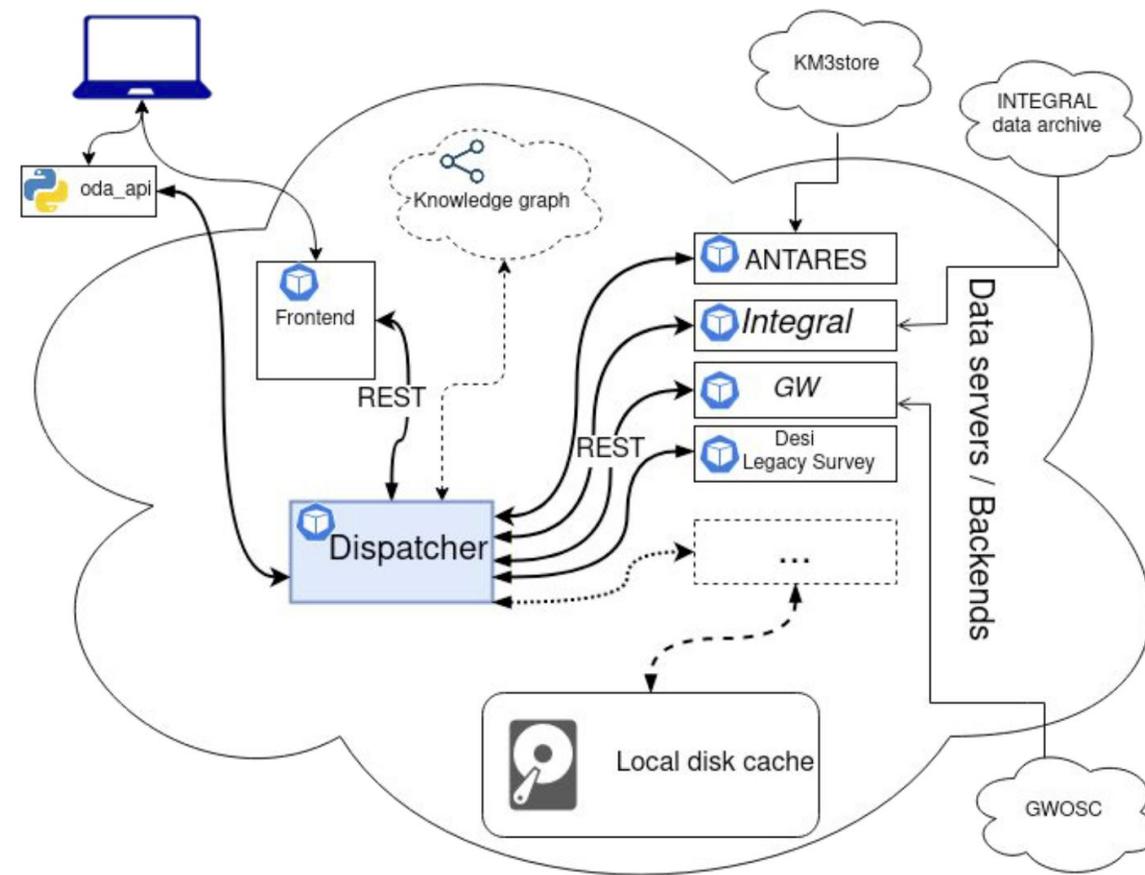
-- WEB-frontend

-- dispatcher coordinates data flow and job provisioning

-- data products are cached for later use

-- raw data from external services/archives

-- provenance metadata in Knowledge Graph





# MMODA : interface web

Multi-Messenger Online Data Analysis



Name resolver including GW events

Object name \*  
gw170817 Resolve

Name resolved by local resolver:

RA \* 197.45035416666664 Dec \* -23.38148416666667

Start time \* 2017-08-17T12:40:59.400 End time \* 2017-08-17T12:41:14.400 Time unit ISO/ISO1

INTEGRAL ISGRI INTEGRAL JEM-X INTEGRAL SPI-ACS Polar Antares GW LegacySurvey

Instrument query parameters :

Detector H1

Product Type

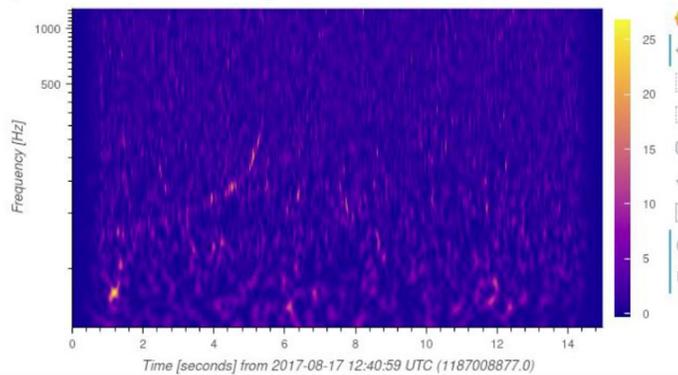
- Skymap & Catalog
- Strain time series
- Spectrogram

Lower Q 4 Upper Q 64

Submit

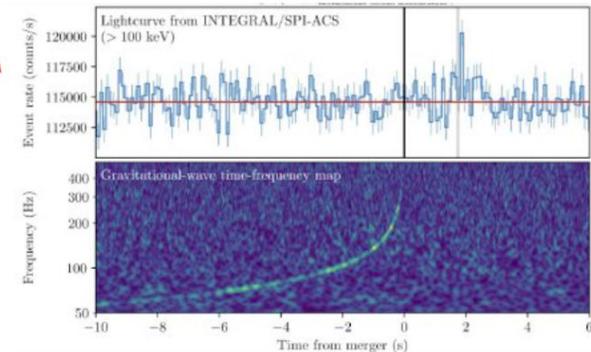
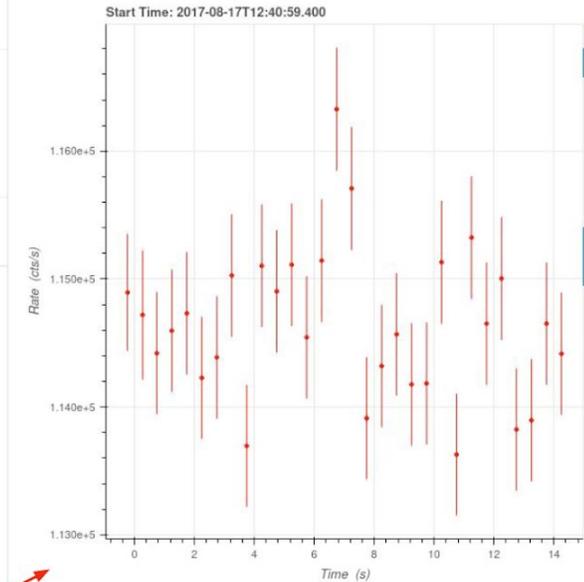
Download Query parameters Log Share API code View on Renku

Sig. Range: -0.29 .. 21.51



Source: query, 0.5 sec

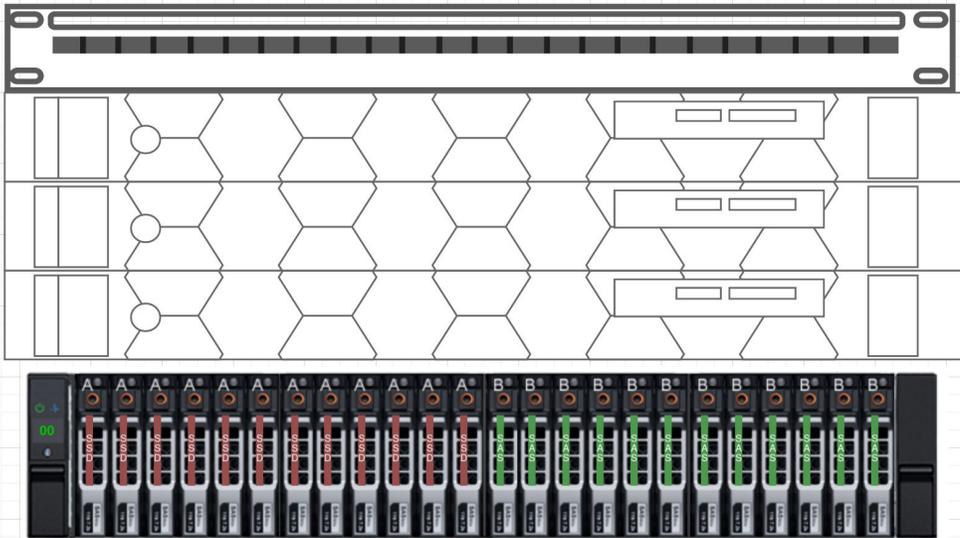
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# MMODA : infrastructure

Multi-Messenger Online Data Analysis



- 3 Dell R640 (2\*24 coeurs, 196 G RAM)
- Interco 10gb/s
- 1 baie SAN ME4024 iscsi (SSD / SAS)
- Ubuntu 20.04
- Budget 50k€
- Rancher 2.6 - RKE 1 - K8S 1.24.4
- 2 etcd, 2 controlplane, 3 workers



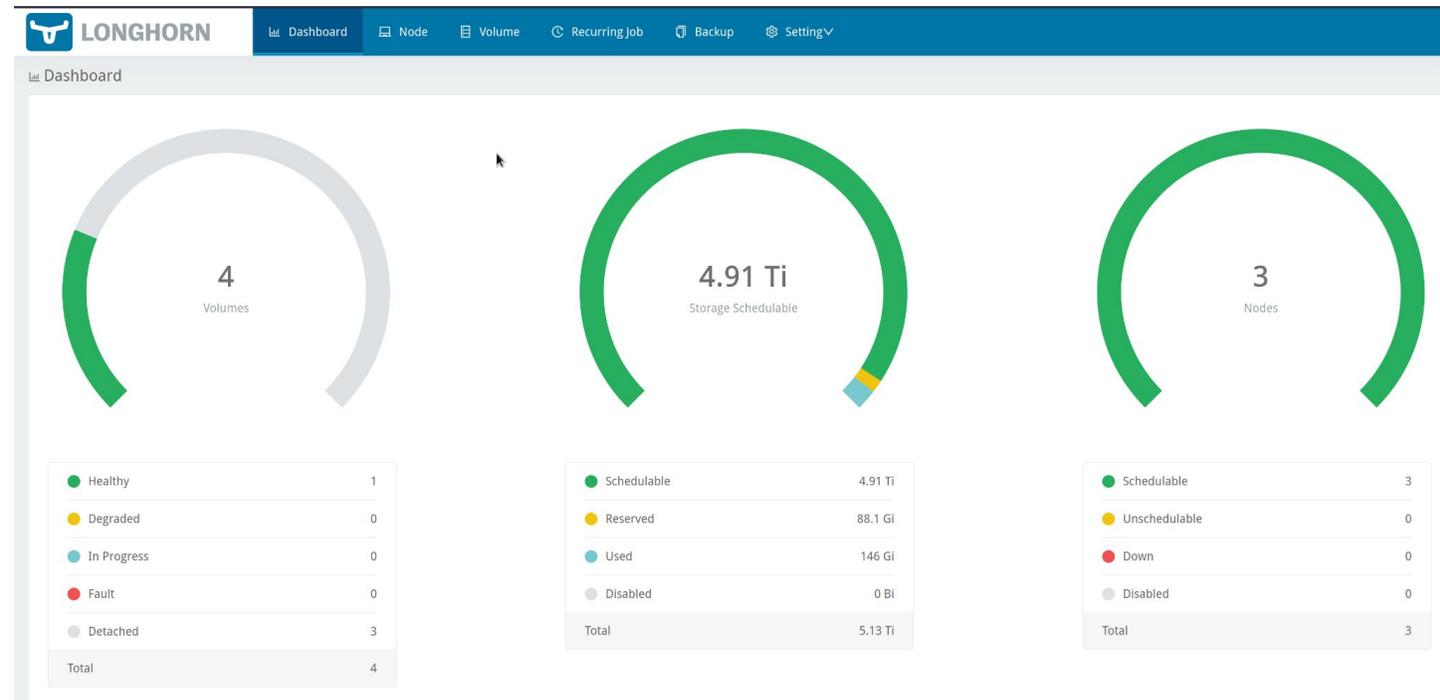


# MMODA: infrastructure

Multi-Messenger Online Data Analysis



- Monitoring : kube-prometheus-stack, scaphandre pour conso électrique per process
- Stockage persistant : Longhorn avec volumes statiques (car pas de CSI drivers)
- 2 storage class : HDD et SSD





# MMODA: infrastructure réseau

Multi-Messenger Online Data Analysis

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- Ingress Nginx (clusterIP), 3 IPs publiques
- Cert-manager pour https (gestion des certificats lets encrypt)
- Pas de Loadbalancer
  - OpenELB layer 2 : nécessite strictARP for kube-proxy, pas possible dans RKE 1
  - MetalLB layer 2 : version de calico incompatible