

DAQ Infrastructure(s)

At LNL and at Orsay (IJCLab)

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LNL - Production infrastructure – Vax room



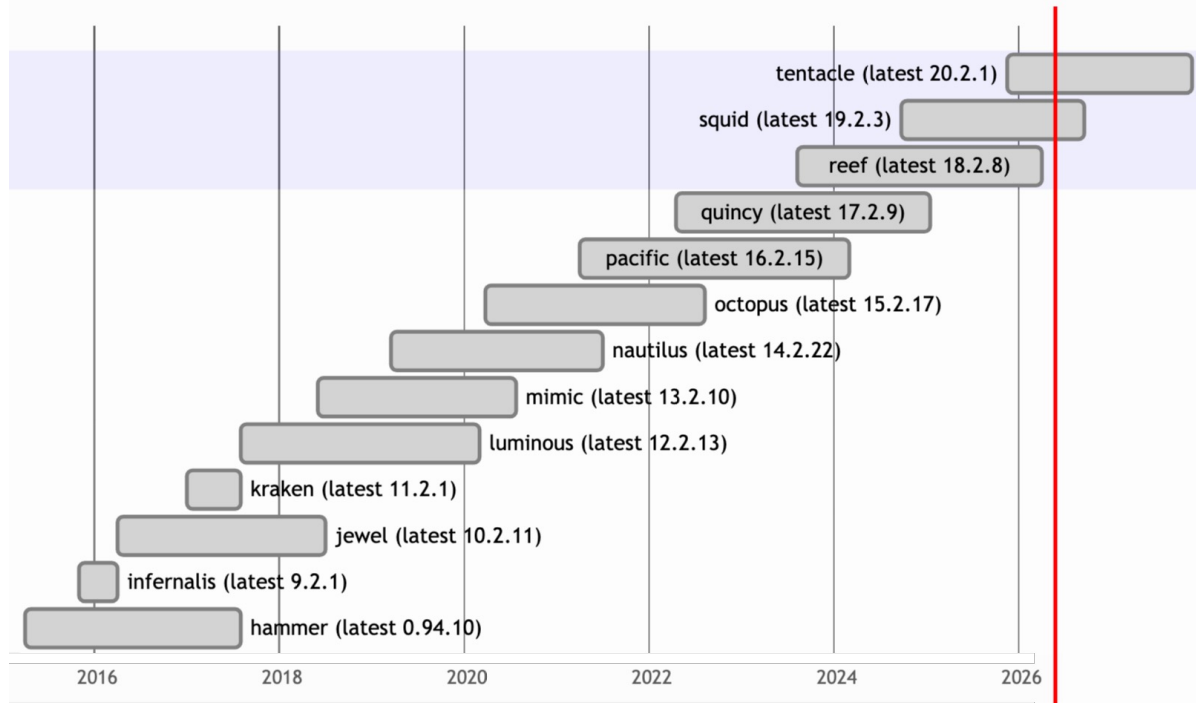


- Mostly in the VAX room
- ± 70 machines:
 - 41 acquisition nodes *anodes* (GGP card inside, 1Gb/sec network cards)
 - OS = mostly Debian 8 Jessie , 5 Debian 10 Buster
 - Debian releases ends of life : 2020 / 2024
 - Ceph distributed storage system
 - 8 servers, 5 disk servers (Debian 11)
 - 300 TB XFS file system (162 TB used)
 - 7 analysis servers
 - 2 Proxmox VM servers : network services DHCP/DNS, monitoring, deployment
 - a grid machine to archive the data (upgraded to Centos 7.9)
- 10 switches: services network, DAQ network, Ceph cluster



LNL - The Ceph storage system

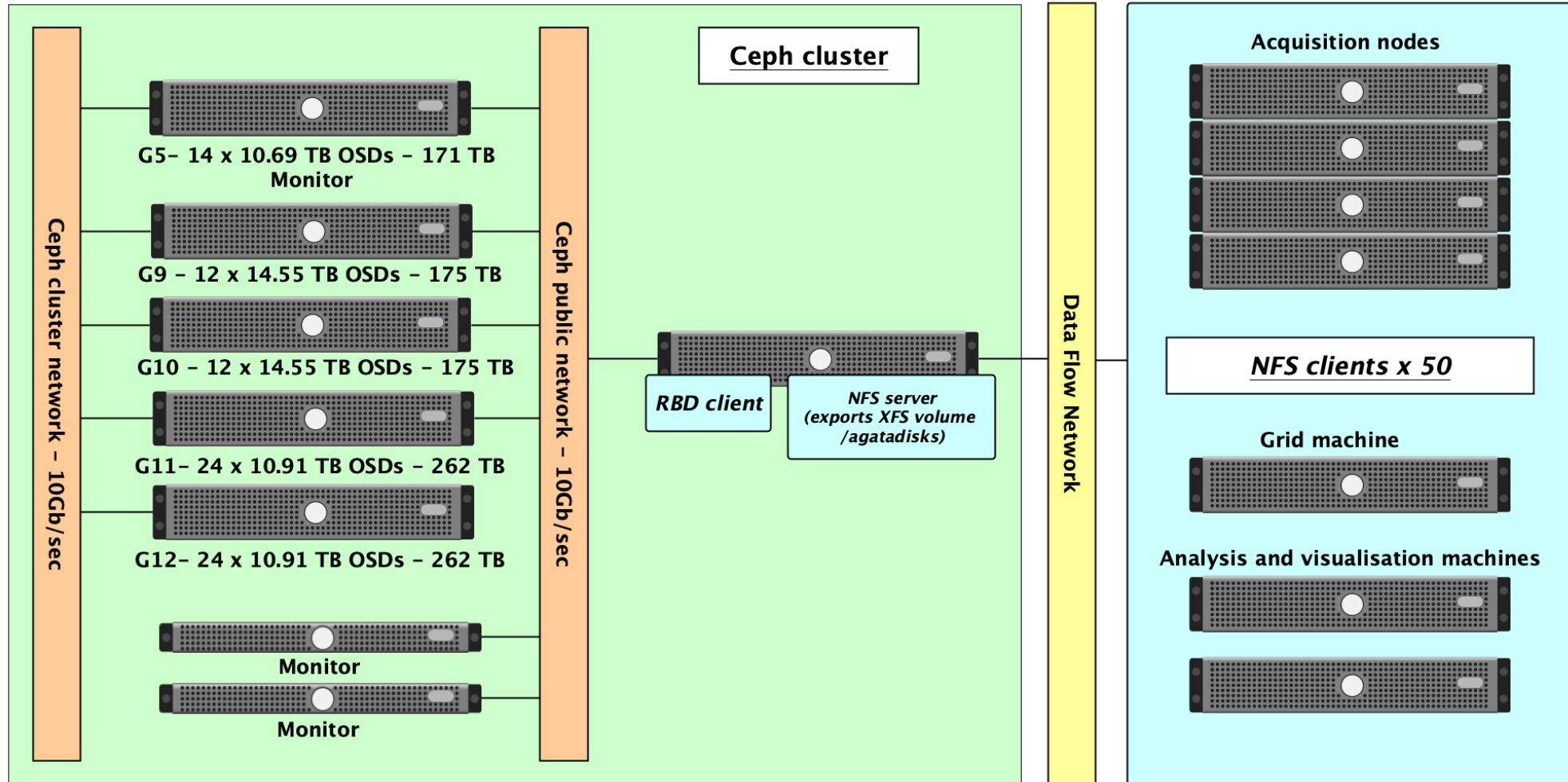
- RBD (Rados Block Device) data pool, with a 300 TB XFS filesystem exported via NFS
- Upgraded from Quincy (v17.2.8) to Reef v18.2.7 first then to 18.2.8 (last Reef version)



- Oldest disk server globicephala4 has been removed from (still 86 active OSDs)



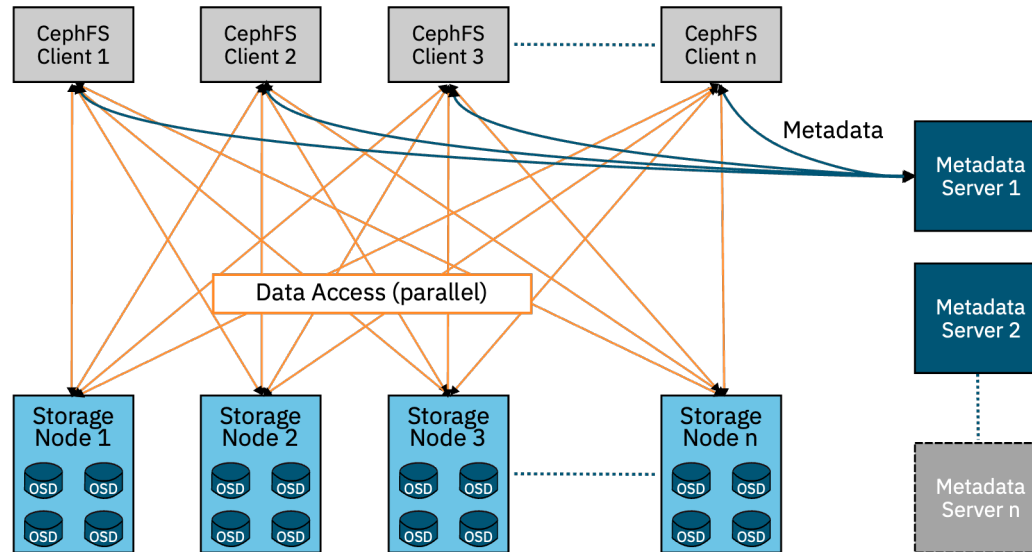
LNL - Ceph architecture, with an RBD data pool





LNL - Ceph infrastructure evolution expected

- Use a CephFS data pool : better performance (parallel access to the storage servers), more resilient and scalable



- Requires changes
 - modern Linux kernels on the clients (> v4.0) : anodes OS upgrade needed
 - acquisition nodes must access the Ceph public network
 - Add MDS Ceph MDS (*Meta Data Servers*)



- Installed (may 2025)
 - 2 storage servers HP Apollo 4200, to extend the Ceph cluster
 - 1 storage server HP Apollo 4200, new spare
 - 1 HP Apollo n2600, 4 analysis machines
 - 2 HP switches (48 FC ports, 10 Gb/sec)
- Sent in november 2025
 - 15 *snode* servers, HP DL360 => snode20-22, 24-33 and 50-51
13 Gen10 bought 2 years ago + 2 new Gen11 (out of 15)
 - 8 FS switches, fiber chanel ports 10Gb/sec min
 - 6 HP powerblocks to replace those in the last storage servers (1250W vs 800W)



System:

- install the snodes sent last november
- Upgrade GGP acquisitions nodes to Debian 13 (depending on GGP module)
- Server upgrade : grids machine, Ceph cluster, Proxmox

Network:

- Configure the new DAQ switches, evolution to a 10Gb/sec Fiber Channel DAQ network
- Connect acquisition nodes to the ceph public network to be able to use CephFS

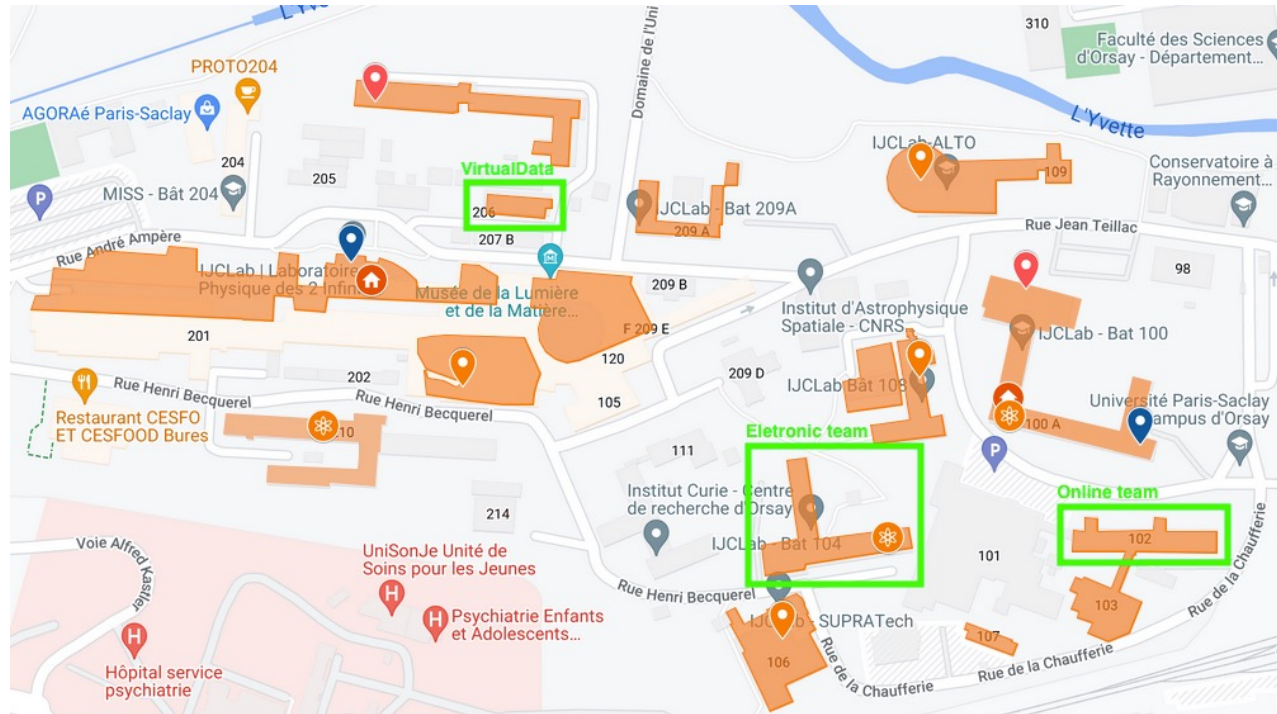
Else:

- Physically remove the oldest Ceph server
- Improve monitoring to check network traffic



Orsay - Agata DAQ

- Used for Phase 2 developments
- Split between 3 buildings (102, 104 and 206/VirtualData datacenter)
- High speed networks, dedicated vlans (*ijclab-online*, *ijclab-agata*)





Orsay - Agata rack at Virtual Data



2 x 100Gb/sec links

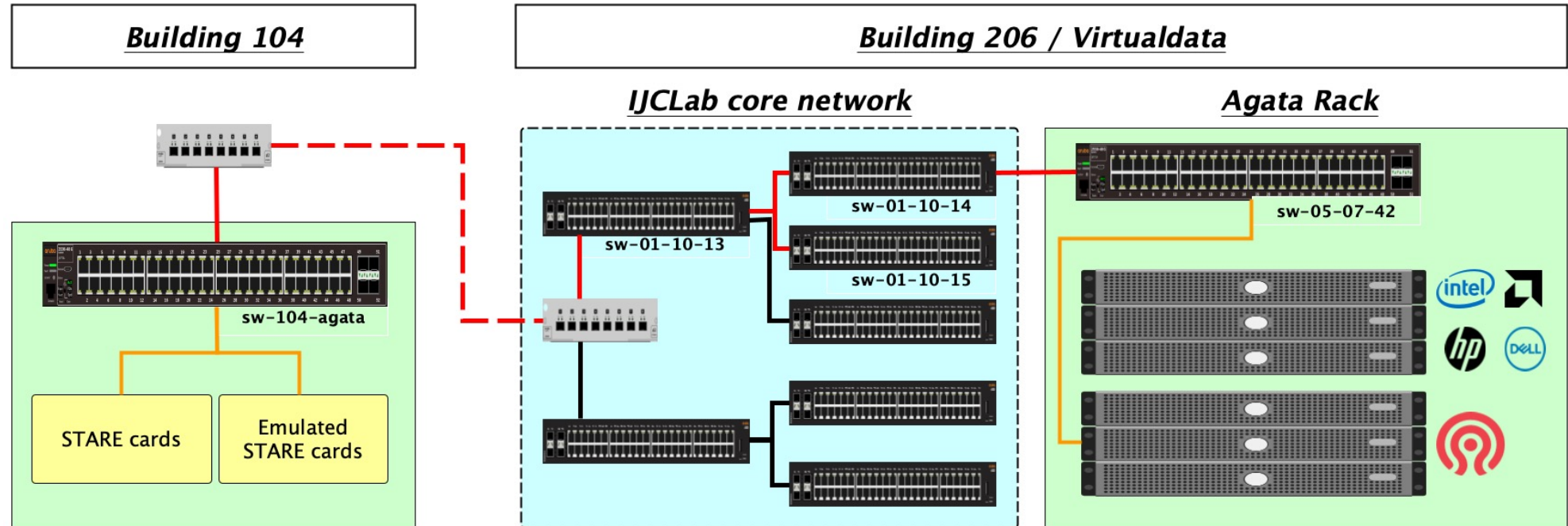




- Building 102 :
 - 2 x Dell C3400 (8 nodes => *snode000-007*)
- Building 104 :
 - 1 x Dell C3400 (4 nodes) => *snode008-011*
- Building 206, datacenter Virtualdata (<https://virtualdata.fr>)
 - 1 HP DL360 Gen10 (2 x Xeon Gold 5317, RAM 192 Go) => *snode023*
 - 1 HP Apollo n2600 (4 nodes : 2 x Xeon Silver 4314, RAM 128 Go) => *snode034-037*
 - 1 HP DL365 Gen10 (processeur AMD EPYC 9124) => *snode038*
 - **13** HP DL360 Gen11 (2 x Xeon Silver 4410, RAM 96 Go) => *snode042-048, 051-056*
 - 1 Dell PowerEdge R670 (2 x Xeon 6527P, RAM 512 Go) => *snode057*
 - 1 HP DL360 Gen10 (2 x Xeon Gold 5416S, RAM 64 Go) => DPDK tests
 - 1 Dell P7920 - GPU : 2 x Nvidia RTX A500
 - 1 HP DL360 + 2 HP DL320 => Ceph test cluster : upgrades, CephFS
- In progress : reinstall of the snodes that where first install in Debian 12, fix network tuning at boot



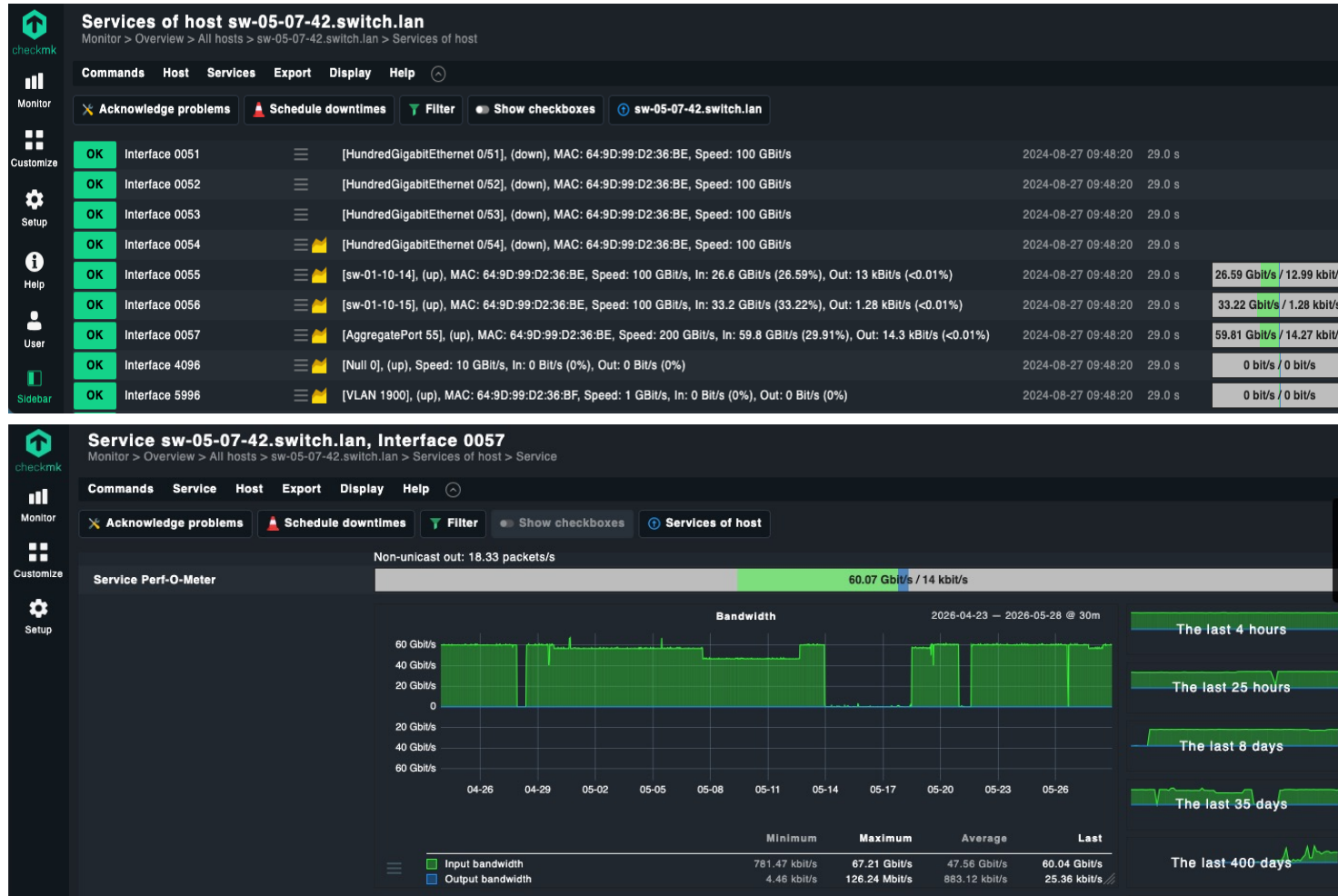
Orsay – DAQ test architecture



- Tests produce high rate UDP traffic accross the network
- Monitoring needed to investigate packets lost and undesired traffic



Checkmk switch monitoring example at IJCLab





Grafana monitoring example: servers power consumption

Dashboards > Servers Consumption

Search...

ctrl+k

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Last 90 days

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Refresh

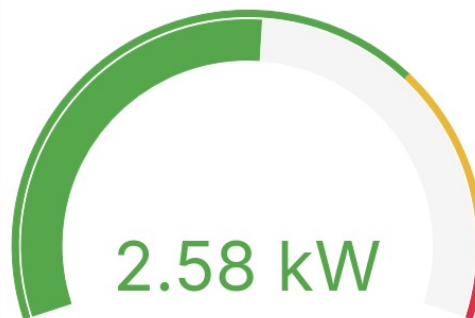
Consumption on period

253 kgCO₂eq

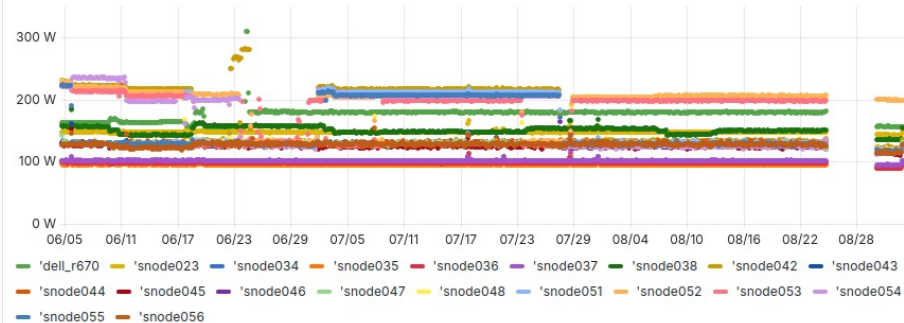
5.73 MWh

€1.11k

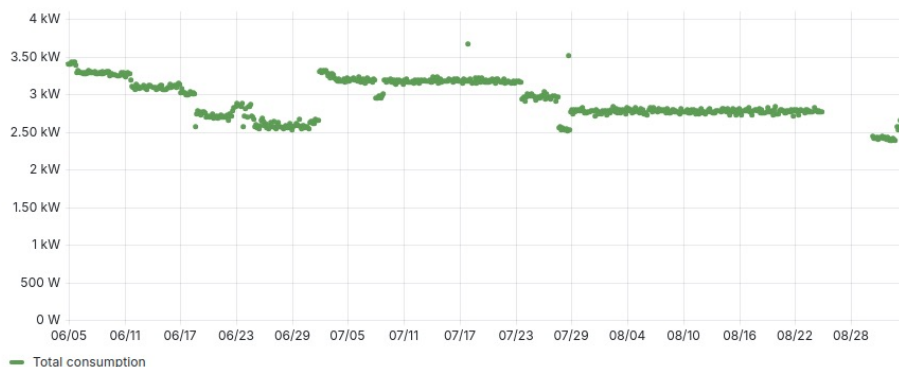
Instant Consumption



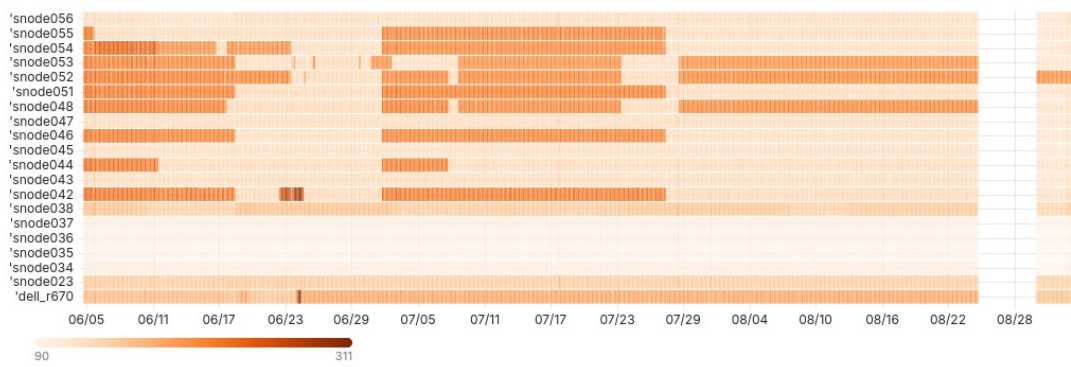
Server Consumption



Total Consumption



Server Consumption Heatmap





THANK YOU