Agata DAQ Infrastructure

At LNL and Orsay

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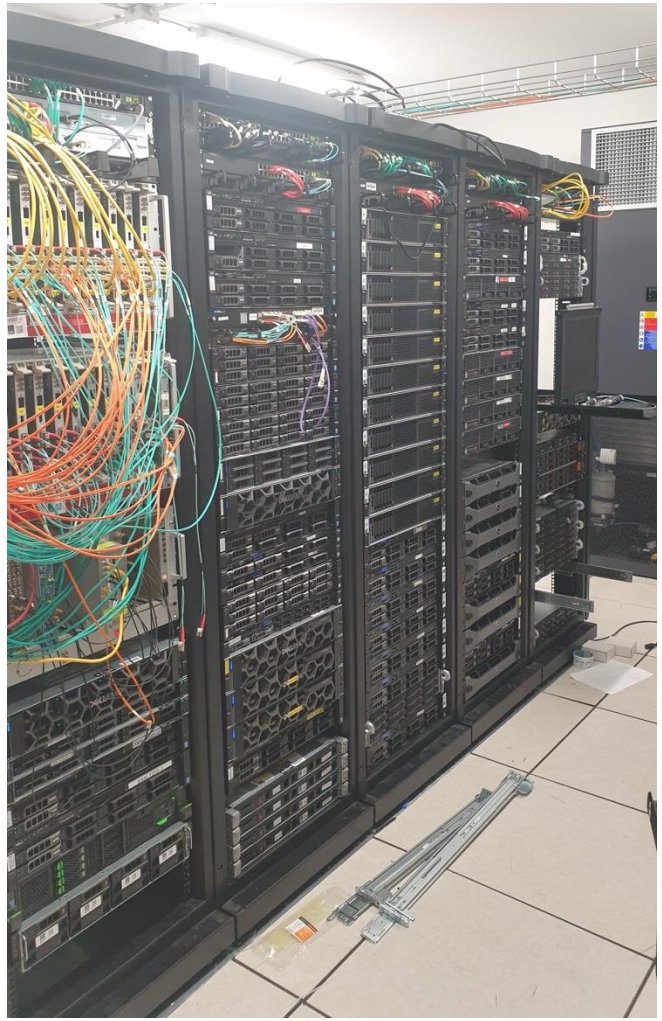
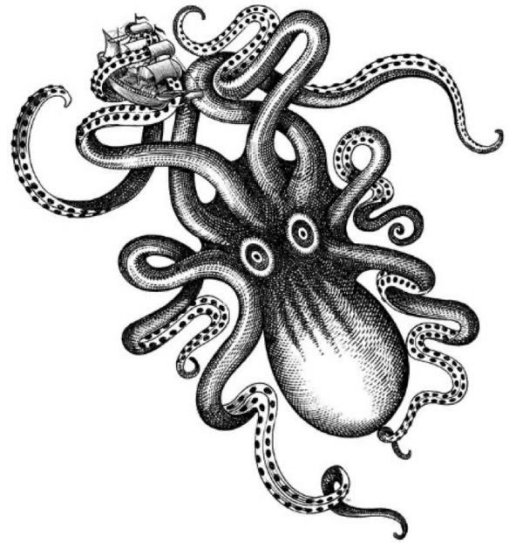
The Agata DAQ Infrastructure at LNL

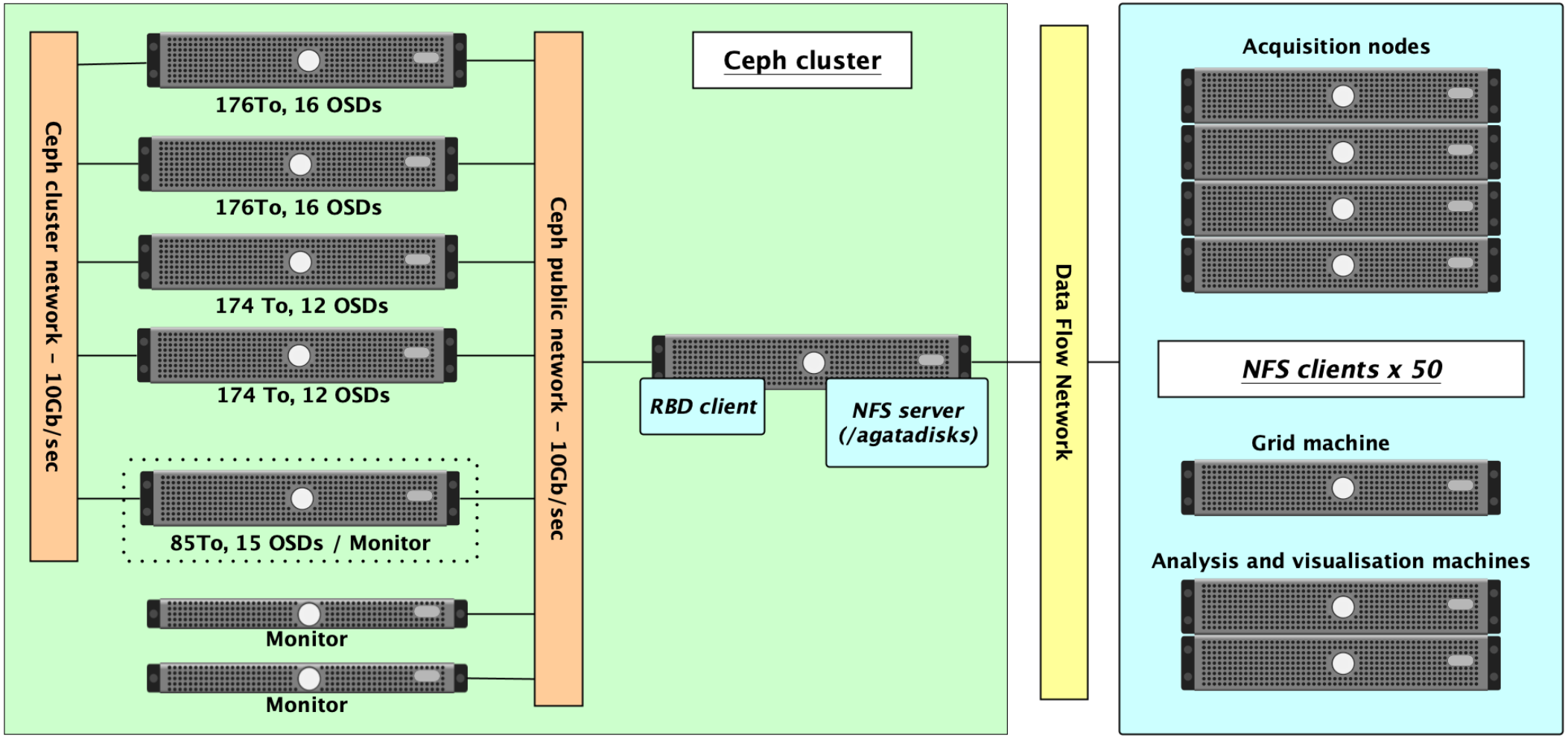
- 70 machines
  - 60 physical servers :
    - 36 acquisition nodes
    - 4 analysis nodes
    - storage nodes
  - Proxmox VMs (services)
  - working stations for visualizations
- 4 computing racks
- 9 switchs
- A 132 TB distributed storage (Ceph cluster)
  - 8 nodes,
  - 4 disk nodes used : 56 disks, 641 TB
  - 132 TB available as a distributed XFS filesytem



- Opensource distributed storage system, maintained by Red Hat, with a large community
- Use of standard hardware running Linux
- Scalable
- Redondancy and failure tolerance : **replicas x 3**, or *erasure coding*
- 3 different storage modes :
  - **block mode : Rados Block Device data pool and XFS file system**
  - file mode : CephFS data pool, Posix filesystem
  - object mode : RadosGW data pool
- ceph services now run in containers, using **docker** or podman



Ceph architecture at Legnaro



Infos at LNL

Past events

- Disk failures on the backup storage NFS server anodeds6 : use of the ancillary disks, or of one old ceph disk servers
- Disk failures on one of the Ceph monitor
- Difficulties to connect to the Grid grom the grid machine : certificates on the grid machine has been updated

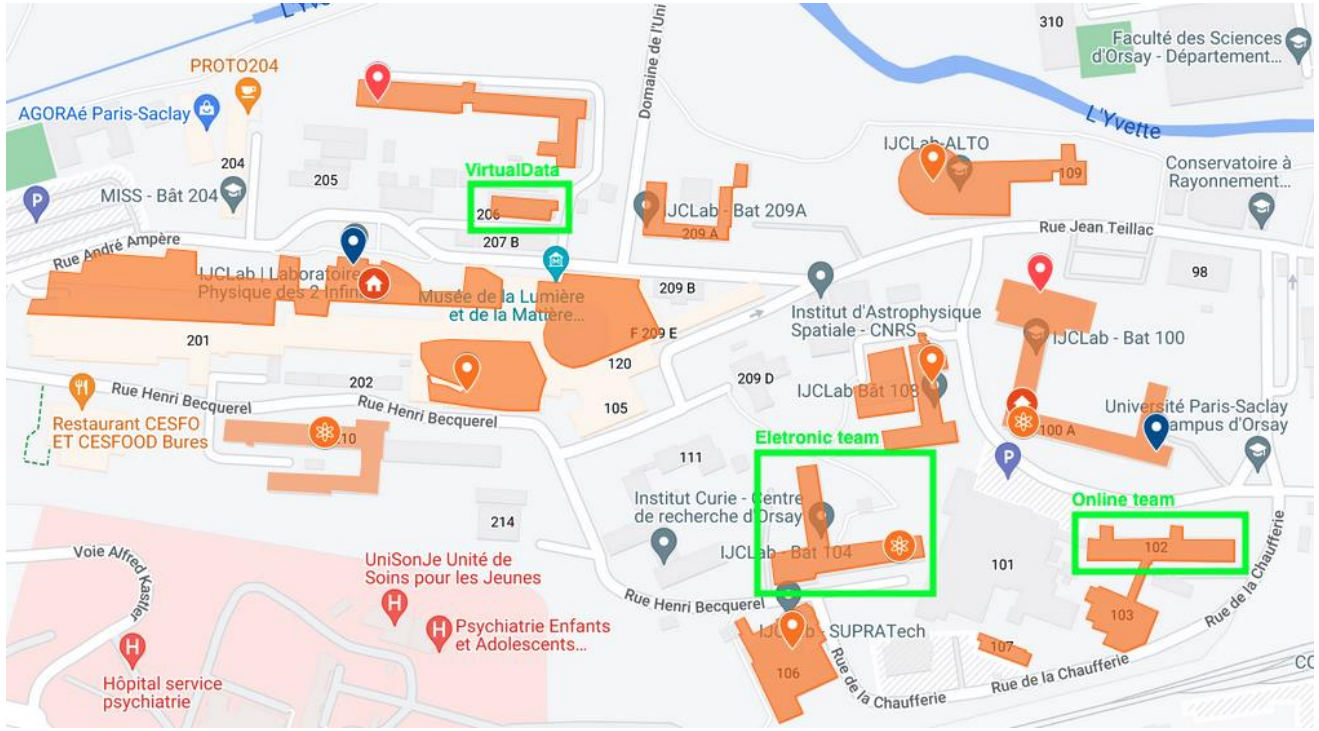
Coming soon

- replacement of the 2 oldest Ceph disk nodes : 2 x HP Appolo 4200 or Altera 4120 (24 disks each, ~300 TB). The shared XFS filesystem will be extended to 300 TB
- replacement of the backup storage server : 1 x Appolo 4200 or Altera 4120
- adding memory to the acquisition nodes which don’t have 96 GB of RAM

Future developments

- upgrade of the CEPH cluster to a newer version (Reef 18)
- use of a cephFS data pool (to avoid the bottleneck invoid by the actual NFS architecture)

Agata DAQ at Orsay

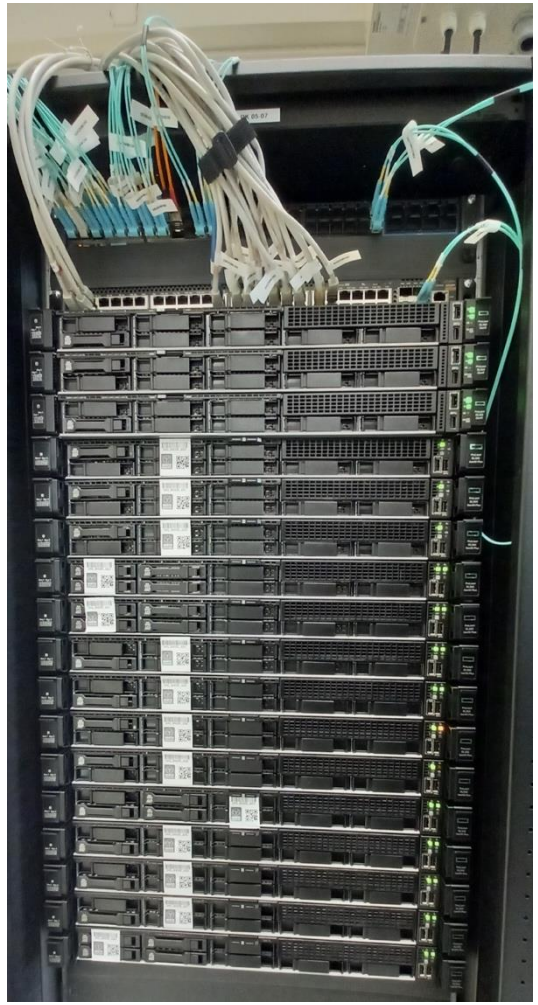


- used for R&D
- split into 3 buildings (102, 104 and 206/datacenter VirtualData)
- uses the online high speed network (dedicated vlan and inter buildings FC links)

Hardware at Orsay

- Building 102 (online development)
  - 2 x Dell C3400 (8 nodes, compact 2U format)
  - **1x Dell P7920 - GPU : 2 x Nvidia RTX A500**
- Building 104 (electronic)
  - 1 x Dell C3400 (4 nodes, compact 2U format)
- Virtualdata (building 206, datacenter at Orsay mainly run by Ijclab - https://virtualdata.fr)
  - **14 x HP DL360 Gen 11+**
  - **2 x HP DL360 Gen 11+**
  - **1 x HP DL365 Gen 11+ (AMD processor)**
  - **1 x HP Appolo n2600 (4 nodes, compact 2U format)**
- Also received, fiber channel network switche for Phase 2, aimed to replace the switches at LNL
  - **2 HP *Aruba 8360***
  - **10 FS *S5860-48SC***

Agata rack at Virtual Data



Infos at Orsay

- Some of the machines will to stay at Orsay for future developments, most will go to LNL as acquisitions nodes when needed (named *snodeXXX*). The timing depends on the electronic Phase 2 advancement
- Since then we can use them for testing : DAC softwares, last version of Ceph with a cephFS data pool (cepfs mounts, nfs Ganesha)…
- Quick to install/reinstall the machines once connected to network
  - Use of a portable system : notebook connected to the internet (gateway, DNS, DHCP and PXE server)
  - Using the HP iLo management to boot in PXE mode using one of the spare network interfaces, and get a UEFI mode Debian installation (disk partitionning, first user, some packages, ssh authorized keys…)
  - Ansible deployment for the rest of the configuration
- the GPU server and one of the Dell C6400 actually at the buidding 102 will soon move to the Agata rack at Vitualdata/206

Ansible: a tool to deploy software and configurations on hosts

- We need to be efficient to (re)install new nodes, and be able to scale up.

- DAQ configuration is versionized
  - using Mercurial
  - it's easy to upload an download configuration updates
  - still accessible when everything is off

- Open source software
- Uses ssh and python on the hosts
- Agentless, compared to Puppet
- Text files with Yaml syntax
- Easy to replay configuration scenarios
- One-shot commands (*ansible)*
- Run playbooks on hosts (*ansible-playbook)*
- Can store passwords using encrypted files