Centre de Calcul
de l'Institut National de Physique Nucléaire
et de Physique des Particules

CC-IN2P3 site report

HEPiX Fall 22' Umea

Sébastien Gadrat & Mattieu Puel

& many other colleagues for providing materials

IN2P3 Computing Center – main figures

Resources

80 people (65 IT engineers)

Budget : 7M€ (HR excluded)

- 2.5M€ buildings (incl. 1.2M€ for electricity)
- 4M€ computing (incl. 2 for WLCG) & 0.5M€ running costs

Facilities

1700 m^2 over two computing rooms
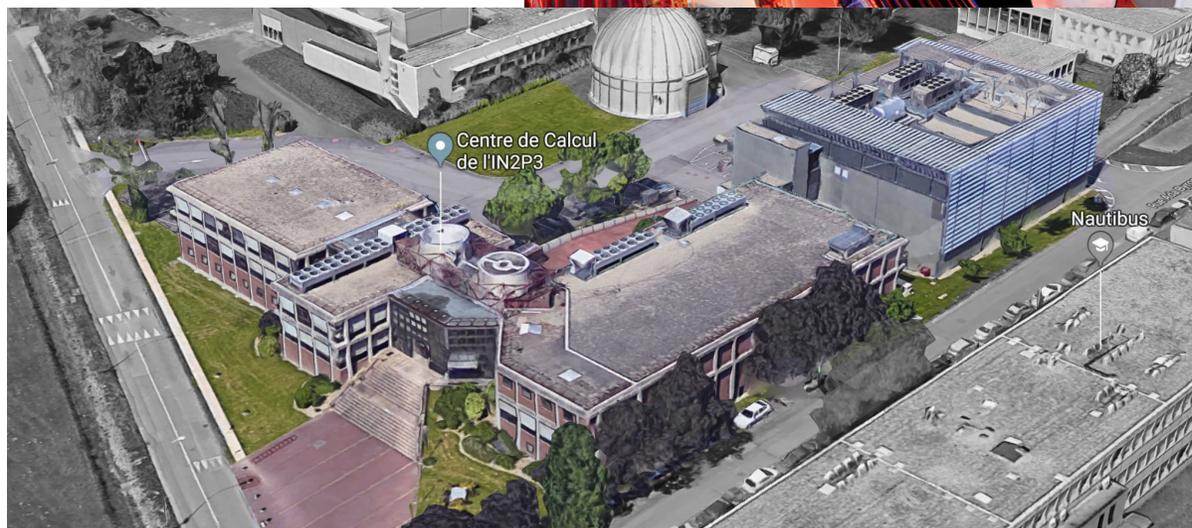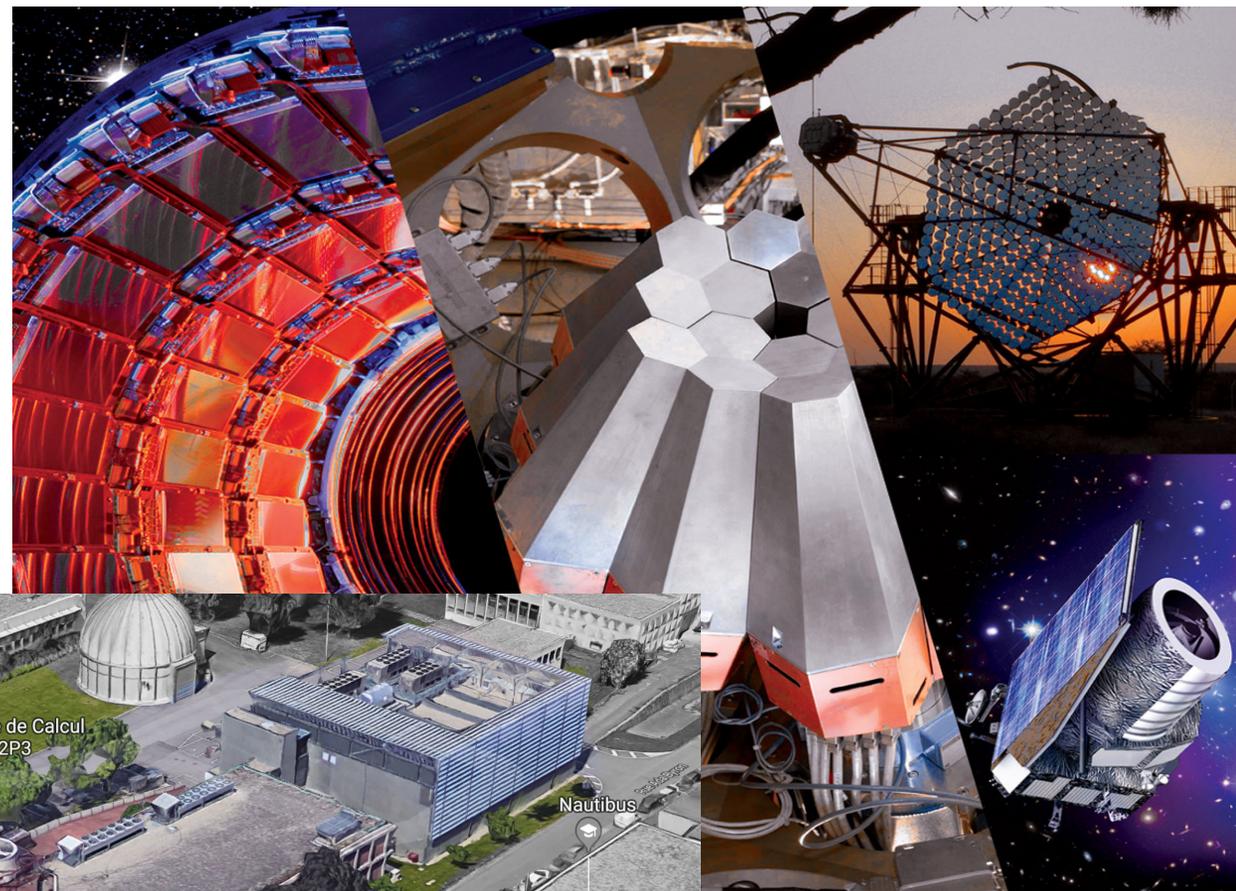
Computing

~1.2k servers, 56k HTC, 840 kHS06

Storage

- Tapes: ~270 PB (full capacity)
- HDDs: ~75 PB (installed)

Networking

- 100 Gb/s to NREN Renater
- 100 Gb/s to CERN (LHCOPN)
- 100 Gb/s to LHCONE/WLCG
- 100 Gb/s for (shared) backup
  links to LHCONE and Renater

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Outline

- **Computing resources & batch systems**

- **Storage resources**

- **Networking**

- **OS, hardware, services & facilites**

- **New users services**

Computing & Batch Systems

- **Migration away from Univa GE**
  - mostly for licensing reason
  - took about a year (Slurm eval. started in Spring '21)
  - users' migration completed on 4 months (Jan. to April '22)
- **HTCondor manages WLCG/EGI jobs**
  - ~36k cores
  - main users: WLCG, Belle II, Dune, T2K, Juno and CTA
- **Slurm manages site jobs, HPC, GPGPU**
  - ~20k cores
  - 80 Nvidia V100 GPUs

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Computing : batch systems
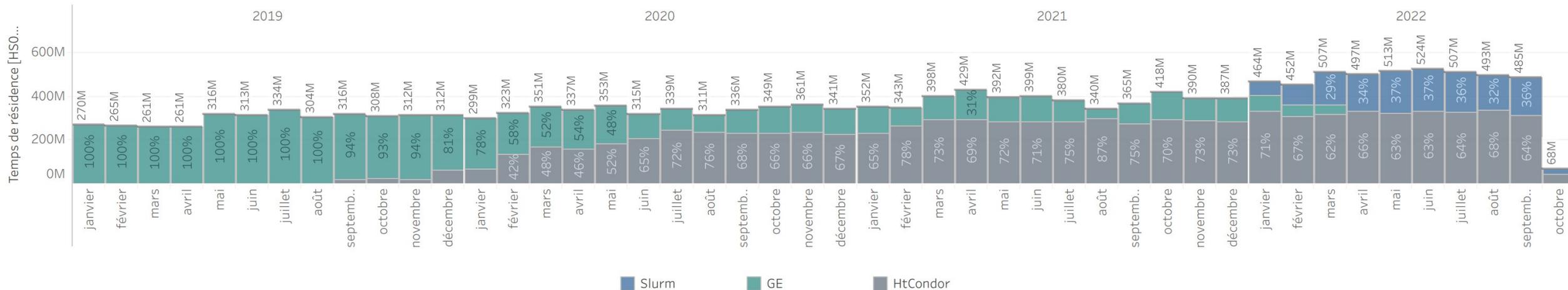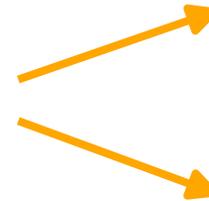
- **Slurm migration**
  - paradigm shift: more HPC oriented
    - documentation and trainings (to help our users to migrate)
  - system stable, no big incident so far
  - 1 year support subscription

- **BBQ (home made monitoring tool)**
  - home made monitoring tool being developed
  - Cover both batch systems
  - provide API
  - follow up at a later workshop

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Storage Resources

Storage overview

Total storage usage

Storage usage per service type / technology

Storage overview
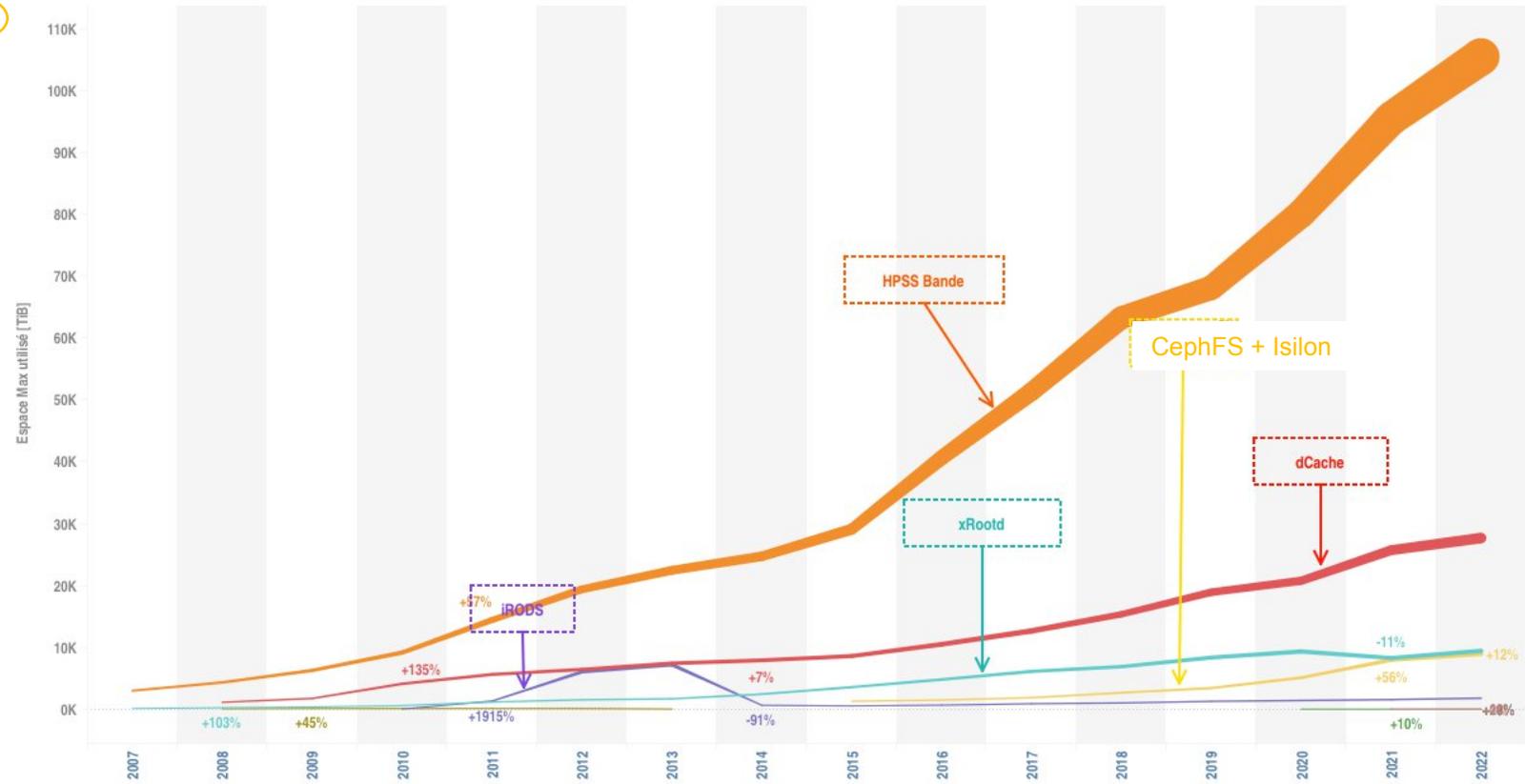
Distributed filesystems

- Spectrum Scale (GPFS) phased out as distributed FS over compute nodes, replaced by Isilon NAS and CephFS
  - Currently 2 clusters of CephFS in production : 2 x 5 PB
- Isilon NAS for HOME directories

Tape management

- Oracle SL8500 libraries phaseout almost completed (12/2022)

- Two Spectra TFinity libraries currently in production
  - 60 PB moved from Oracle SL8500 to Spectra TFinity in 18 months
  - 2 x 48 IBM TS1160 tape drives
  - full capacity : 2 x 135 = 270 PB
  - Current usage ~105 PB

Old Oracle library

2 new Spectra libraries

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Networking

Links with increased throughput to 100 Gb/s
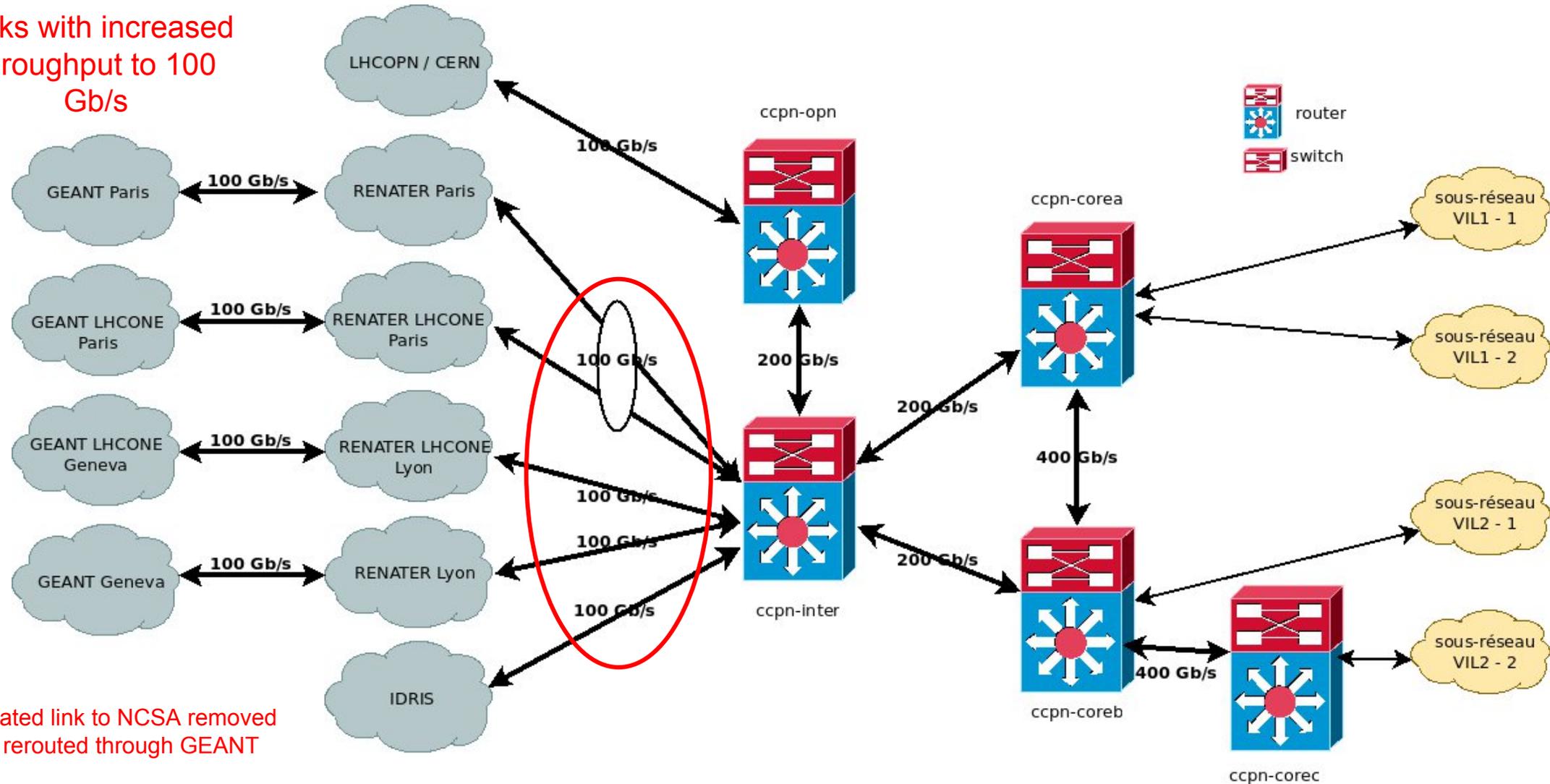
Dedicated link to NCSA removed traffic rerouted through GEANT

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OS, hardware, services & facilities

CentOS phaseout

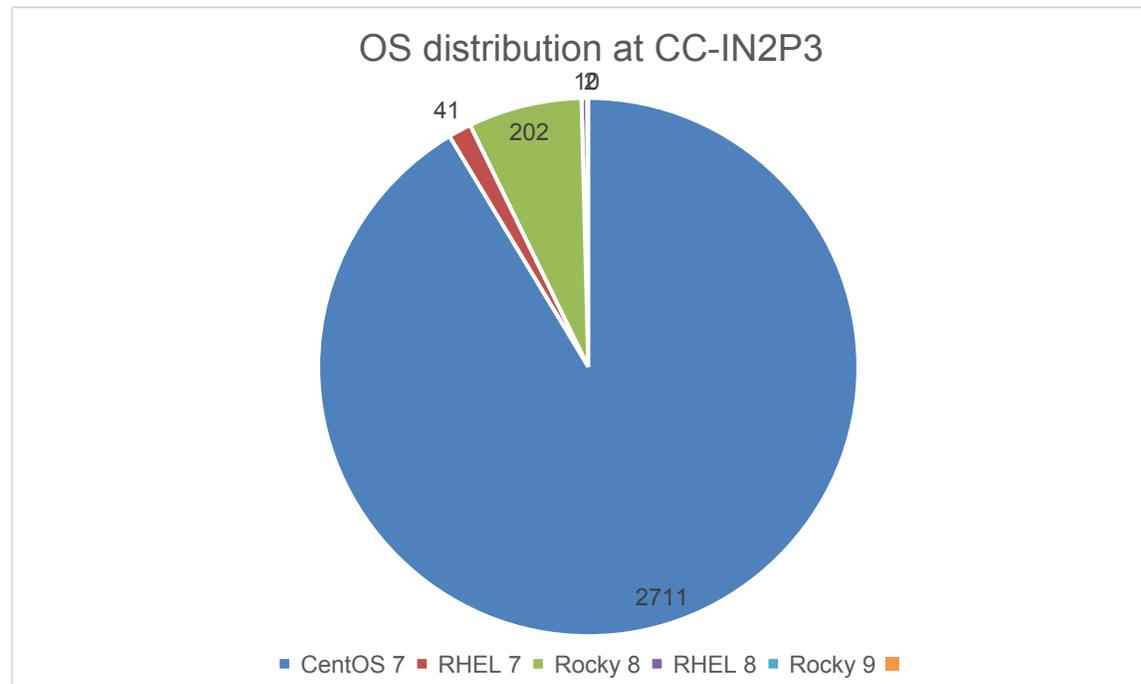OS distribution at CC-IN2P3

- CentOS 7
- RHEL 7
- Rocky 8
- RHEL 8
- Rocky 9

CentOS 8 replacement

- CentOS Stream <u>not retained</u>: short lifetime, not production grade.
- <u>RHEL 8</u> deployed as <u>required for some use cases or critical services</u>, covered by a site license.
- Rocky 8 deployed since production ready, for the other cases.
- **This is the current landscape, but we can make it evolved if necessary.**

DCIM – CMDB : NetBox
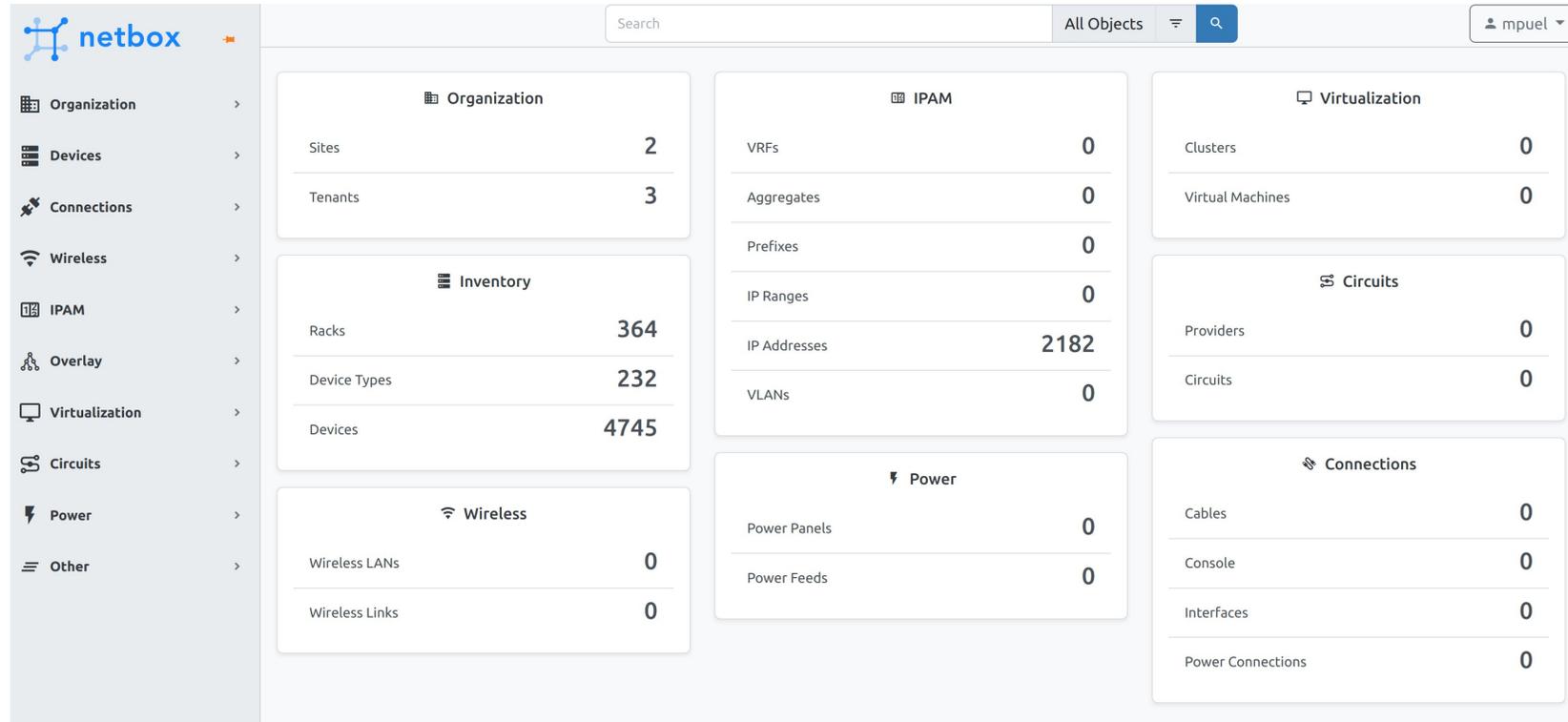
- Codename HAMAC (Hardware Asset Management At CC-IN2P3)
- Replacement for our former home made solution (Smurf)
- Full featured, APIs, fast pace development (3 minor and 29 patch versions last year)
- Migration is ongoing (deployment tools, Puppet configuration management…).
- Full production for S1 2023.

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Service management : the service catalog

- A comprehensive listing of all IT services deployed at CC-IN2P3
- Home made software, in production for 2 years
- Integrated to CMDBs, configuration management, monitoring, IAM… that is, everything "service" related
- REST/API available

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New IT room : VIL3 (by 2025)

National call for tender submitted with
IDRIS CNRS HPC center

- replacement of VIL1 (for energy efficiency purpose)
- 132 racks
- 550 m^2
- 2MW power
- PUE 1.3 (for >80% usage)

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2023 : energy concerns

Evolution du prix de l'électricité baseload (€/MWh) — www.energiesdev.fr
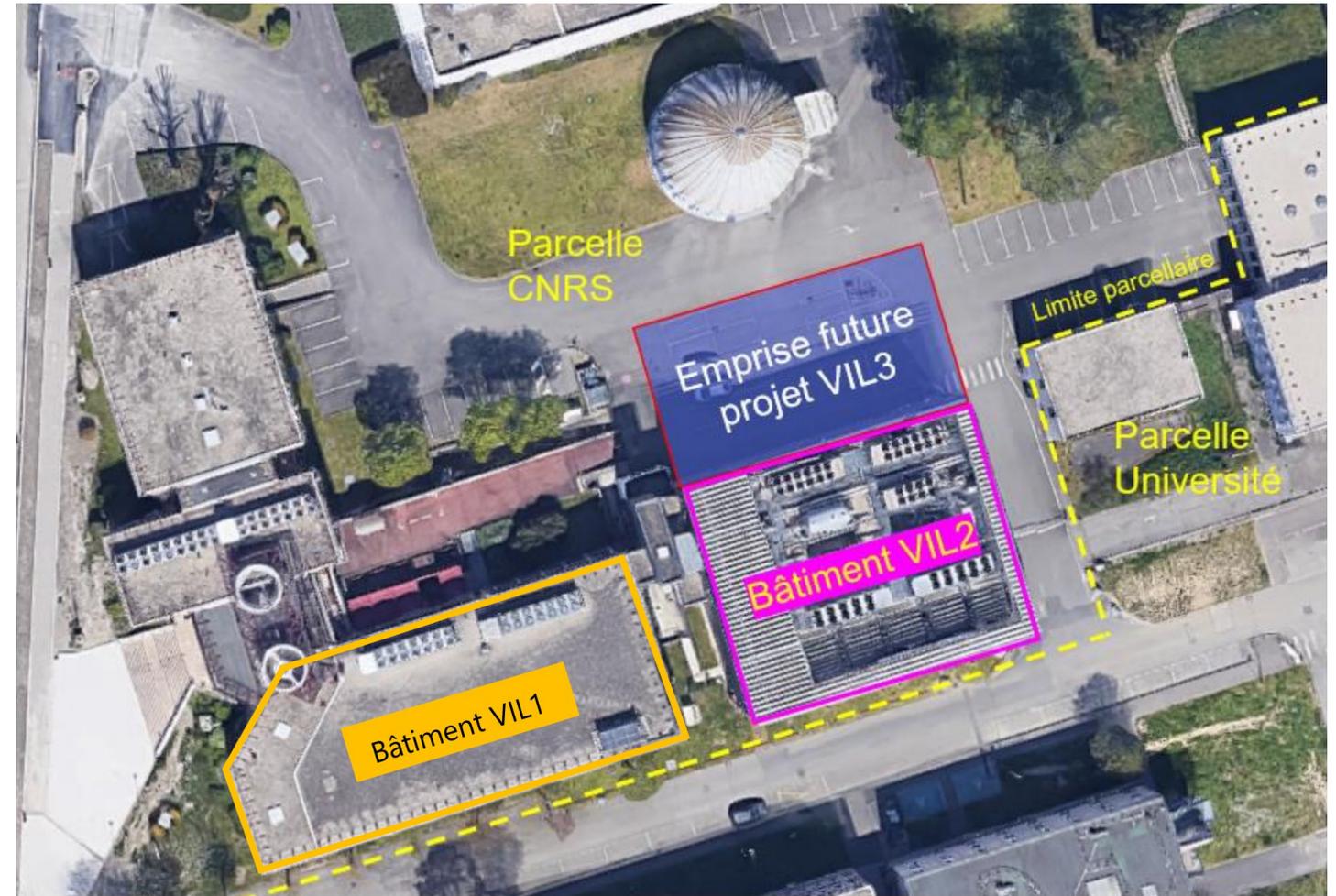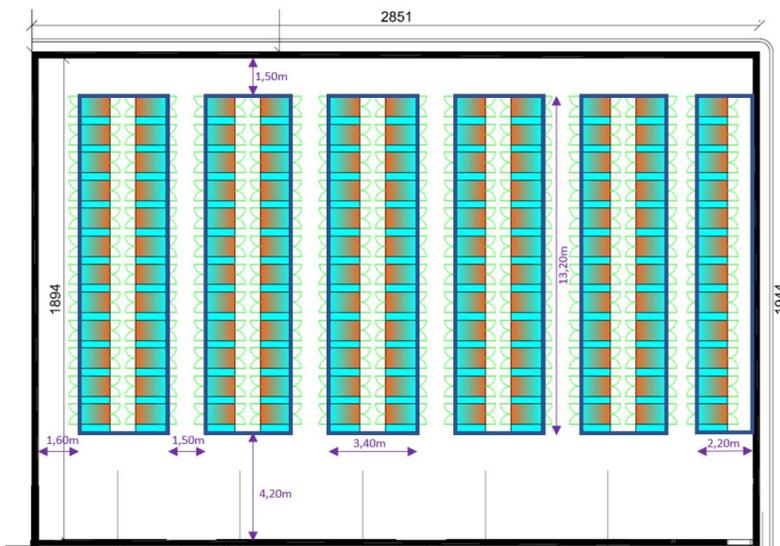
Budget

- Electricity budget increase contained in 2022 (+8%)
  - Foreseen (hugh) increase in 2023 (no clear estimation yet)
- Options on the table
  - Cut off computing power (2/3 of the electricity expenses) : globally ? Keep critical experiments ?
 - Freeze IT expenses for 2023 (investments / hardware renewal) ?

Cut-offs

- Actively preparing unilateral cut-offs from electricity providers.
- Hypothesis : 2 hours a day, notification 2/3 days in advance
- Two rooms with different constraints :
  - VIL1 equipped with a power generator, (mostly) sustainable in production
  - VIL2 with two power feeds that would be shut off at the same time

Some user services

Computing : Jupyter notebooks

CC total ~150 groups
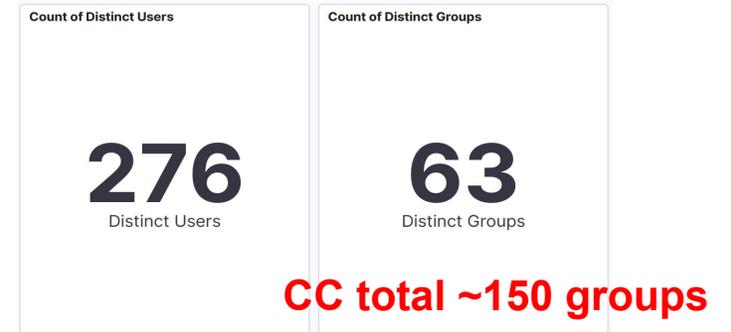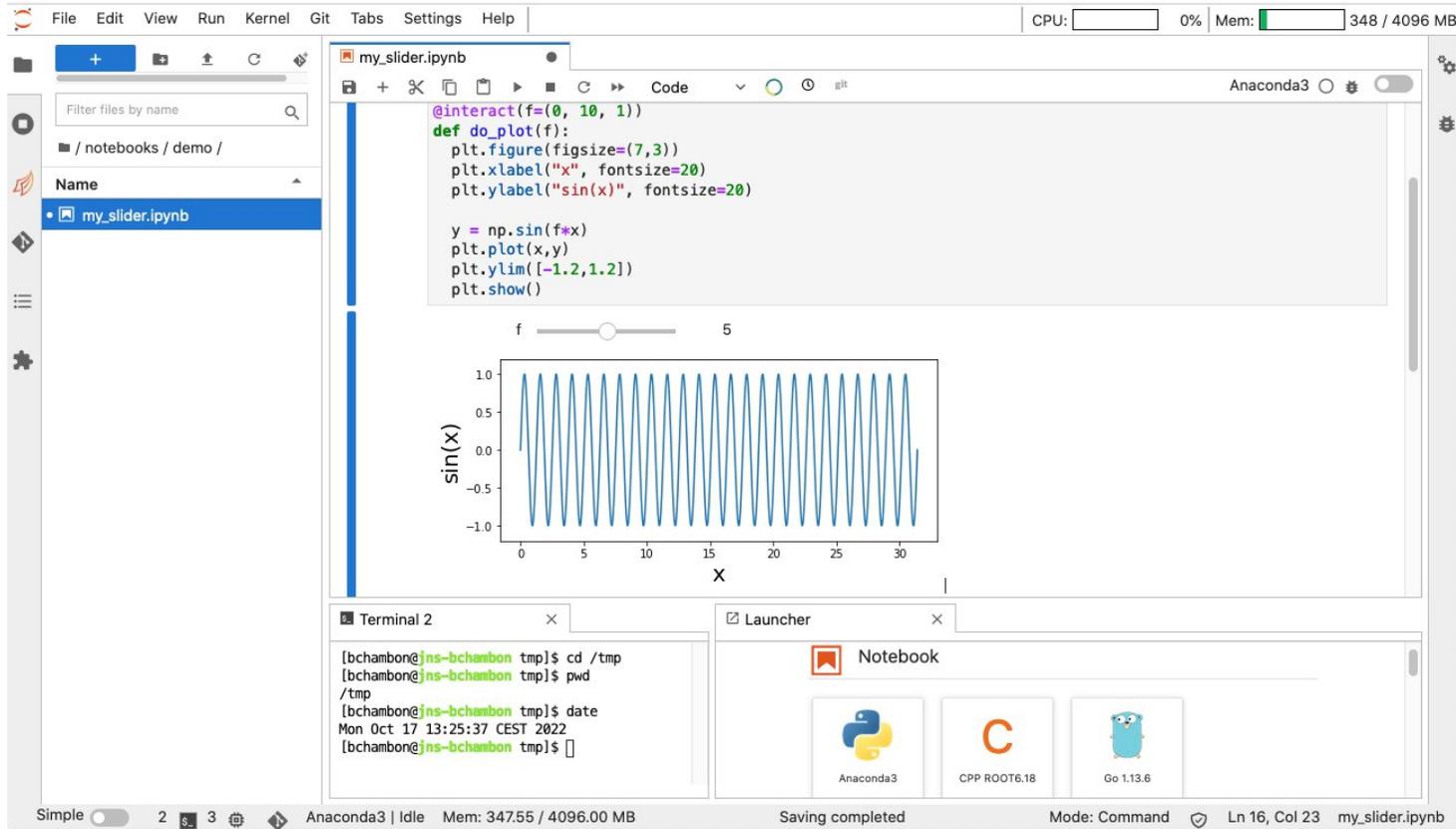
- provides various programming languages and (JupyterLab's) extensions to extend the features of the service
- provides Nvidia K80 GPUs
- tests currently being made to submit jobs into Slurm (using DASK)

Miscellaneous user services

CAD Computer Aided Design

- On-going migration to 3D Experience from Catia v5 / Smarteam (Dassault Systems)
- 20 labs involved, 20k digital mock-ups designed

Elias

- ElasticSearch On Demand service with a Grafana frontend for data visualisation

Various collaborative services provided to the IN2P3 labs

- Indico
- Zimbra
- IN2P3 Box (NextCloud with OnlyOffice)
- IN2P3 Forge (Redmine) for projects management
- Atrium (Nuxeo based, with laptop clients) for documents management

Thank You ! Questions ?