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

Experience and perspective from a Virgo Tier 1: CC-IN2P3

Computing infrastructures for ET

- **CC IN2P3**
  - Mission
  - Infrastructures/resources
  - Scientifics domains supported

- **Virgo at CC IN2P3**
  - Status

- **ET at CC IN2P3**
  - Perspectives

CC-IN2P3 : French National Computing Centre of IN2P3 (~20 labs)

- Mission : Providing computing resources and services for experiments supported by IN2P3.
- 85 agents. Most of them are engineer.
  - Providing resources (Computing/Storage/DB)
  - Providing services.
    - For our institute (mail, backup,...).
    - For developer (Gitlab, forge,...).
    - For users/experiment (Dirac, squid,...) .
  - Providing infrastructure (Cloud, Network connection,…).

- Involving on a large landscape of collaboration (~80).
  - Small (few user) to large collaborations (many thousand of people).
  - Short lifetime (few months) to more decade (LHC, LSST,…).
  - Regional collaboration to international (the main part of them).
  - Raw data storage site for some experiments.

2 computing rooms for a total of 1500 m^2
- A new computing room expected end of 2025 in order to replace the old one

Computing Facilities
- HTC (High Throughput Computing) : ~ 60 000 slots
  - Grid (Htcondor)
  - Local (Slurm)
- HPC (High Performance Computing) : ~ 512 physical cores.
- GPU cluster : 64 V100 GPUs + 40 K80 available via Jupyter notebook

Storage
- Tapes : ~ 160 PB used (260 PB of capacity)
- HDDs : ~80 PB used (different technologies: dCache, XRootD, CEPH…)

Network
- LHCOPN : 200 Gb/s (dedicated to LHC data)
- LHCONE : 200 Gb/s (LHC, Belle2, Juno,…)
- Specific link French HPC (100Gb/s)
- Generics link to NREN : (100Gb/s)

Services
- Mail, github, web, institutional services, cloud infrastructure,…

Power consumption : ~1 GWh per month

High Energy Physics

- WLCG (Tier1 for the 4 experiments), BELLE2, JUNO, DUNE,….
  - All this experiments are based on distributed/Grid computing model.
  - Today more than 65% of the site activities.

Astroparticles activities at CC IN2P3

- AMS (cosmic ray), Antares (neutrino), Hess (cosmic ray), Km3net (neutrino), Pierre Auger (cosmic ray),…

Cosmology activities at CC IN2P3

- Old experiments : Planck, Super novae
- Current and future : LSST/Vera Rubin, Euclid (launch mid 2023 and on data acquisition since February), LISA,….

Nuclear

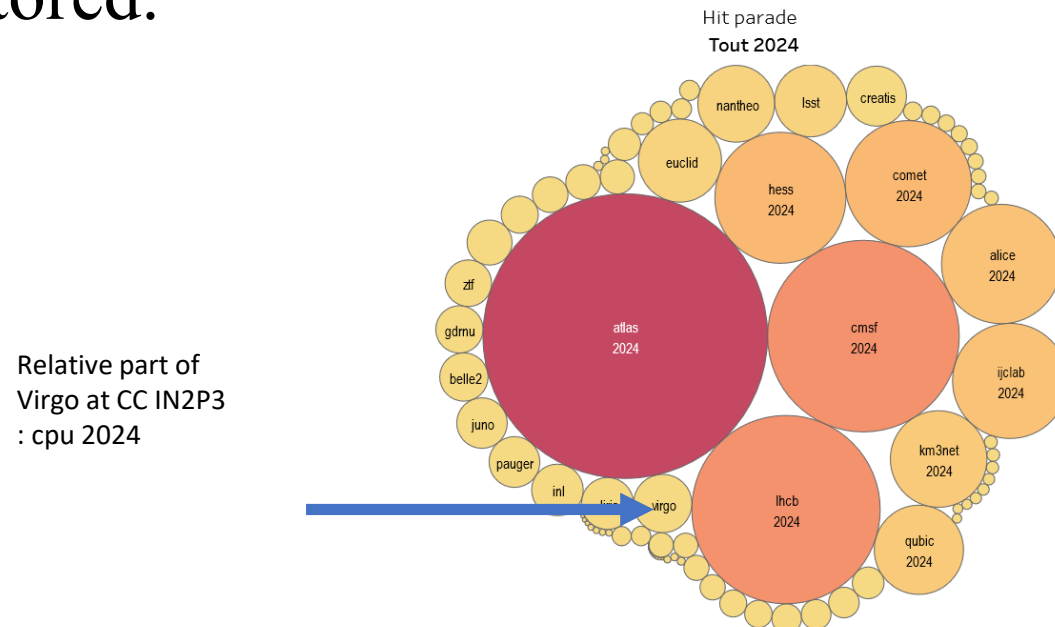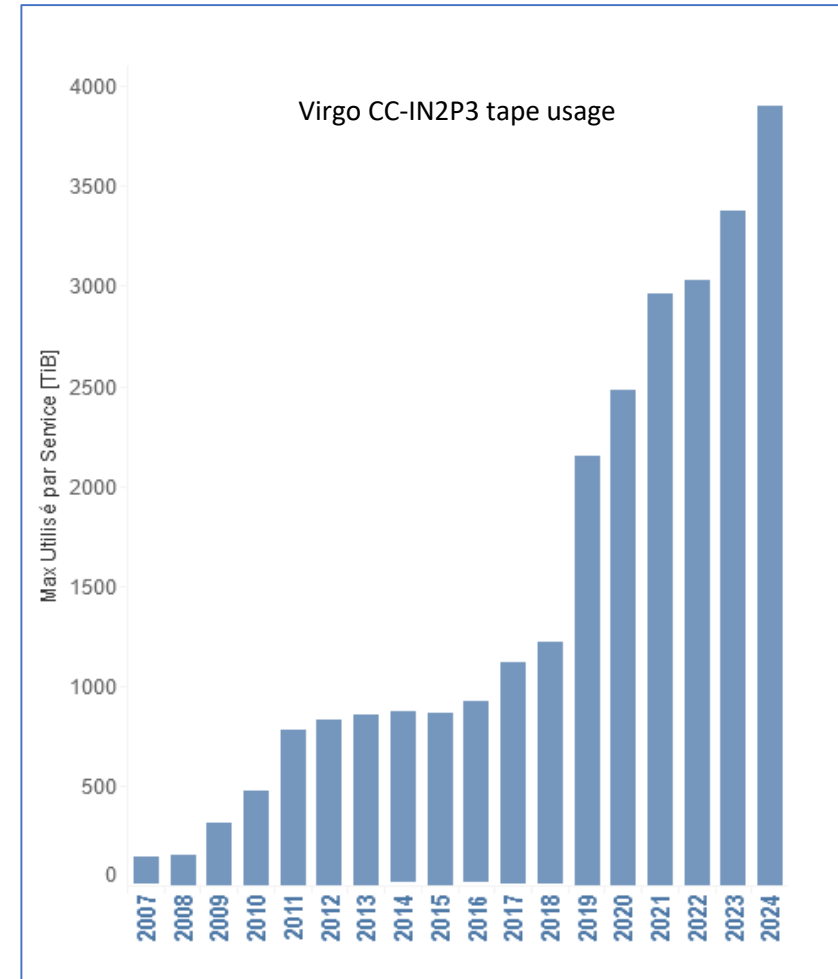- A small set of experiments

Others

- 5% of the resource open to "others scientifics domains"

A long story

- On our information system since 2007.
- 105 locals accounts.

Activities

- CC IN2P3 one of the two sites (with CNAF) where raw data and manged copies are stored.

Relative part of Virgo at CC IN2P3 : cpu 2024

Hit parade
Tout 2024

Virgo CC-IN2P3 tape usage

Activities

- Disk mainly for caching
  - Cache tape access
  - Stashcache for analysis (40TB)
- 2 access for Virgo computing
  - Via grid
    - HTcondor CE
  - Via local submission
    - Slurm batch system

- Global feedback
  - Ad hoc services and procedure to support.
  - Some technology choice
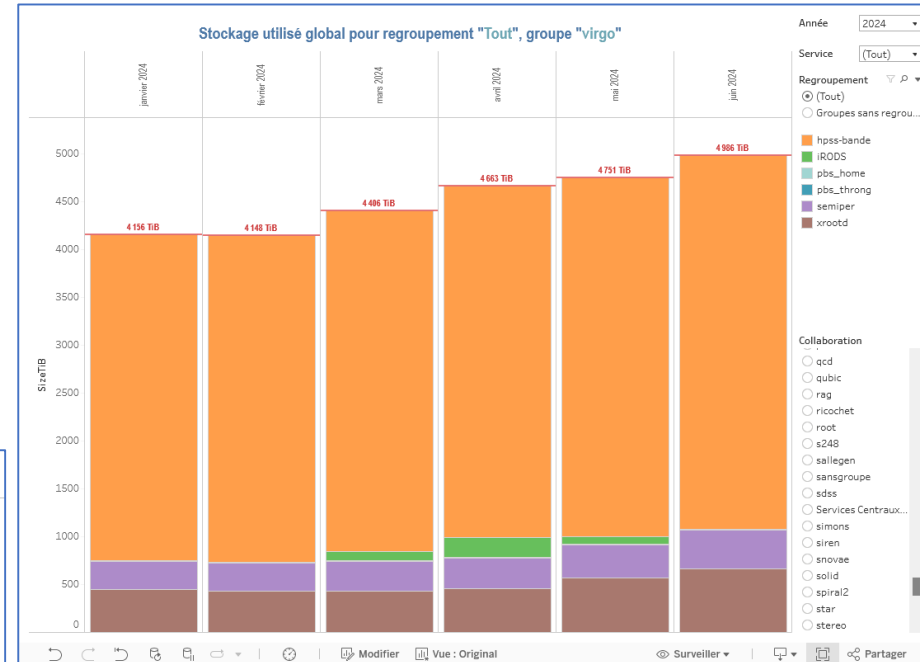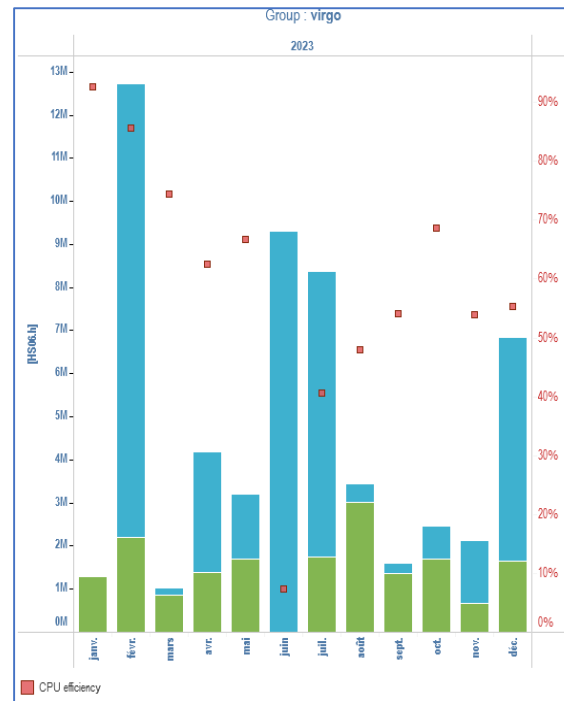
Virgo CC-IN2P3 Storage usage

Virgo CC-IN2P3 2023 cpu
local usage
grid usage

- **Groupe created since 6 months on our SI**
  - Access to the local farm is opening (require a local account)
  - Cloud openstack infrastructure is open to build virtual machine (hosting service)

- **Need to be validate by IN2P3, but computing centre might participate to a distributed infrastructure for ET :**
  - For computing as a part of computing resource available for the collaboration.
  - For storage including raw data, analysis object and whatever data used by ET
  - Providing infrastructure (Virtual Machine, bare metal host) to host collaboration services.
  - Providing collaboration services, including database,…

- **From CC IN2P3 site point of view**
  - As closer are the ET infrastructure as others collaboration who are using the CC IN2P3, better it is for us.
    - Skill sharing
    - Infrastructure homogeneity
    - Mutualisation
    - Economics optimisation

  - Ideally requirements from an collaboration should be put in terms of :
    - Protocols.
    - Performances required.
    - Service level needs.
    - Capabilities.
  - Instead than in terms of technologies.

- **Today CC IN2P3 is able to contribute to the definition of the ET computing models.**
  - Deploying services for tests/validation
  - Opening some resources (computing and storage)
  - Giving a site point of view feedback about some technologies
  - Given to ET some feedback about CC IN2P3 services evaluation.
  - ....

- **In the perimeter of resources that IN2P3 allow us to deploy for ET.**