IFIN-HH and ELI-NP pilot / use cases

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DFCTI / IFIN-HH
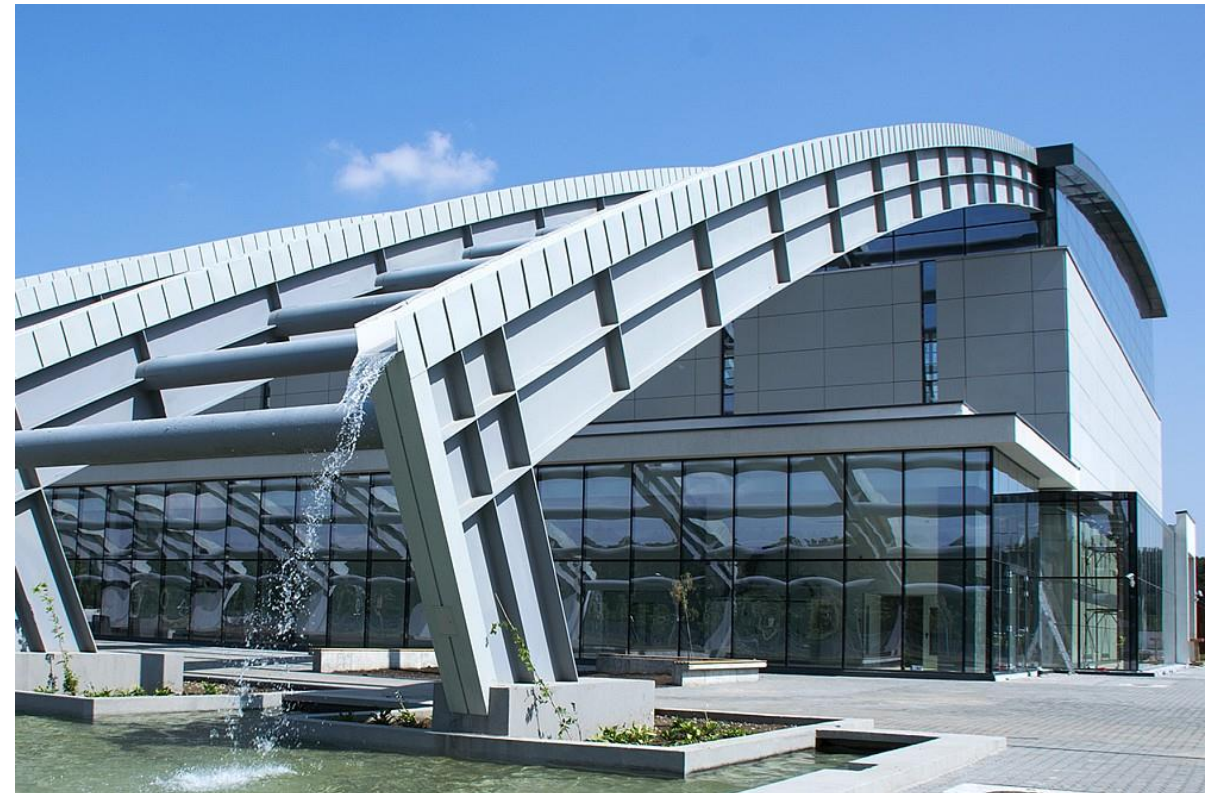
Advanced computing infrastructure @ DFCTI/IFIN-HH

HTC

- Tier-2 contribution to the WLCG collaboration

- Supporting ALICE, ATLAS, LHCb

- CPU cores: 5000; 4 GB RAM/core

- storage: 3.6 PB

HPC

- parallel clusters, since 2006

- Ethernet -> Myrinet -> IB: DDR -> QDR -> FDR, EDR

- Research supported:

  - Nonlinear dynamics in nuclear/mezo physics

  - Nanophysics and nanoelectronics

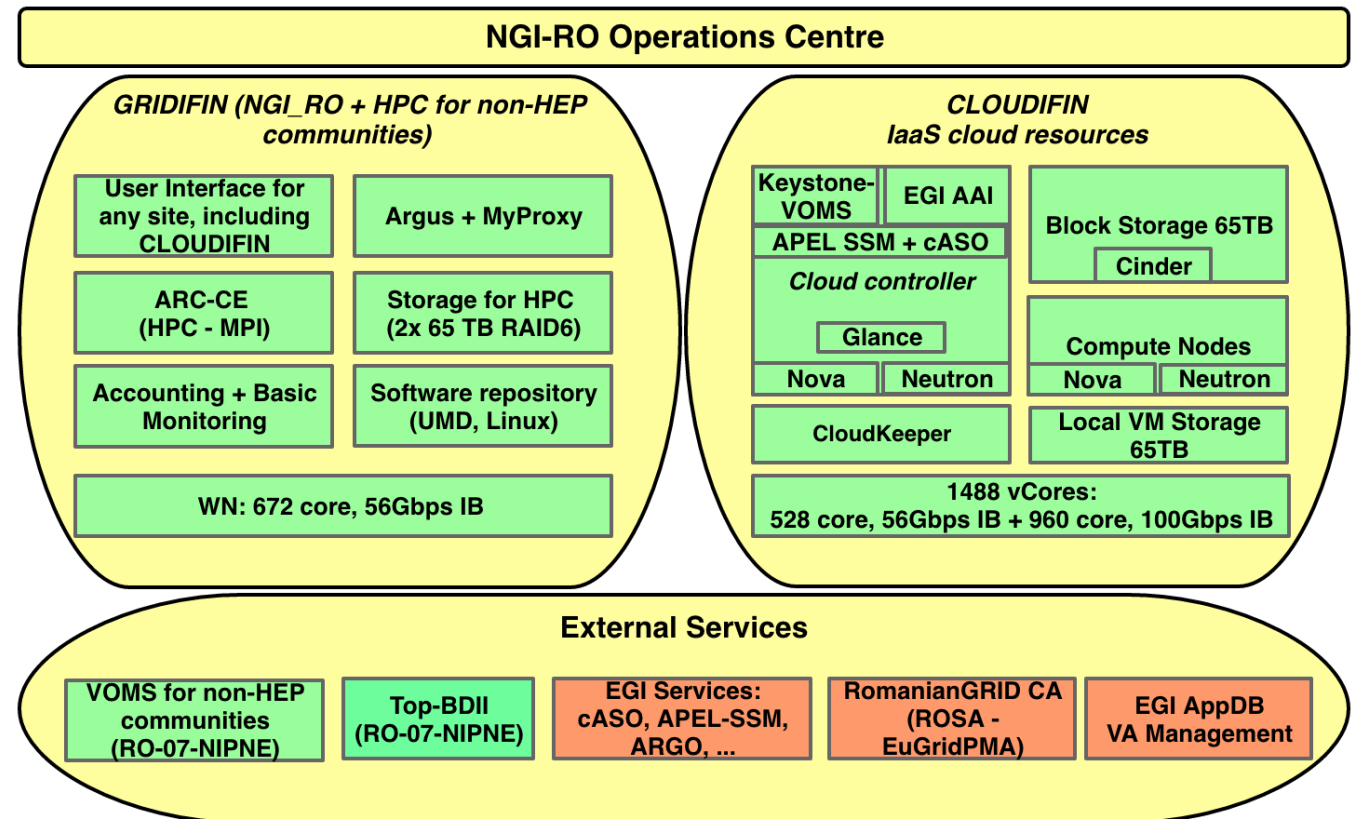 - Computational biology

  - ELI-NP

Cloud and HPC resources @ DFCTI

CLOUDIFIN

- vCores: 1488 (Intel+AMD); 4 GB RAM/core

- storage: 130 TB

- connectivity: IB EDR (960), FDR

HPC

- CPU cores: 672 + 248 (local); Intel

- storage: 130 TB

- connectivity: IB FDR, QDR

- OpenMPI 3.x

- OS: CentOS 7.9
- Access: ssh

NGI-RO Operations Centre

GRIDIFIN (NGI_RO + HPC for non-HEP communities)
- User Interface for any site, including CLOUDIFIN
- Argus + MyProxy
- ARC-CE (HPC - MPI)
- Storage for HPC (2x 65 TB RAID6)
- Accounting + Basic Monitoring
- Software repository (UMD, Linux)
- WN: 672 core, 56Gbps IB

CLOUDIFIN IaaS cloud resources
- Keystone-VOMS
- EGI AAI
- APEL SSM + cASO
- Cloud controller
- Glance
- Nova
- Neutron
- CloudKeeper
- Block Storage 65TB
- Cinder
- Compute Nodes
- Nova
- Neutron
- Local VM Storage 65TB
- 1488 vCores: 528 core, 56Gbps IB + 960 core, 100Gbps IB

External Services
- VOMS for non-HEP communities (RO-07-NIPNE)
- Top-BDII (RO-07-NIPNE)
- EGI Services: cASO, APEL-SSM, ARGO, ...
- RomanianGRID CA (ROSA - EuGridPMA)
- EGI AppDB VA Management

## Extreme Light Infrastructure Nuclear Physics (ELI-NP)

The High-Power Laser System commissioned

Pulses delivered: - 2x 10 PW at 1 shot/minute
- 2x 1 PW at 1 Hz
- 2x 100 PW at 10 Hz.

First experiments will be soon commissioned

Estimation of overall data requirements:

Experiment	Disk Storage	Tape Storage	Analysis Cores	Simulation Cores	Network bandwidth
Gamma	1,9PB/y+50%	Same as Disk	800	900	8 Gbps
HPLS	360TB/y+50%	Same as Disk	400	20000	20Gbps
TOTAL	2,26PB/y+50% **7PB**	Same as Disk	**1200**	**20900**	**40/100Gbps**
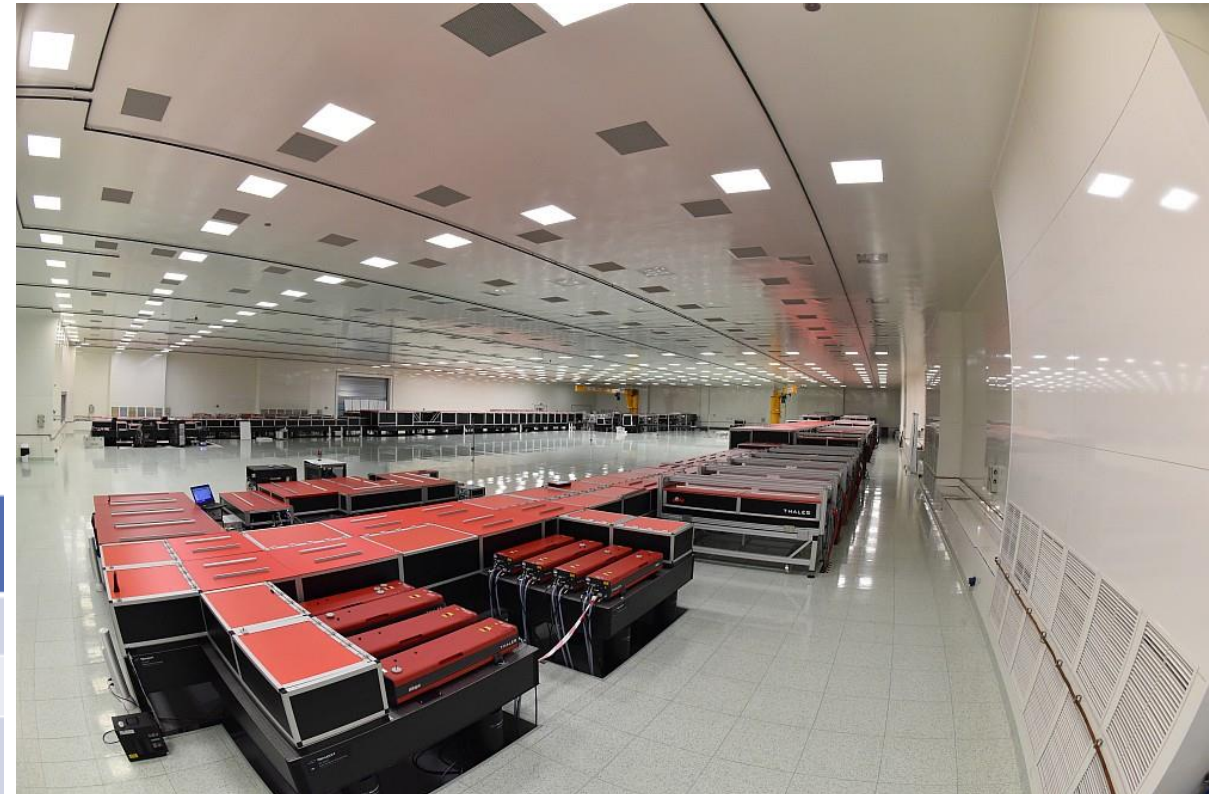
Motivation: ELI-NP's needs for HPC

Two representative cases:

Laser Driven Experiments Dept.

Necessity: numerical simulations of the intense laser - plasma interaction

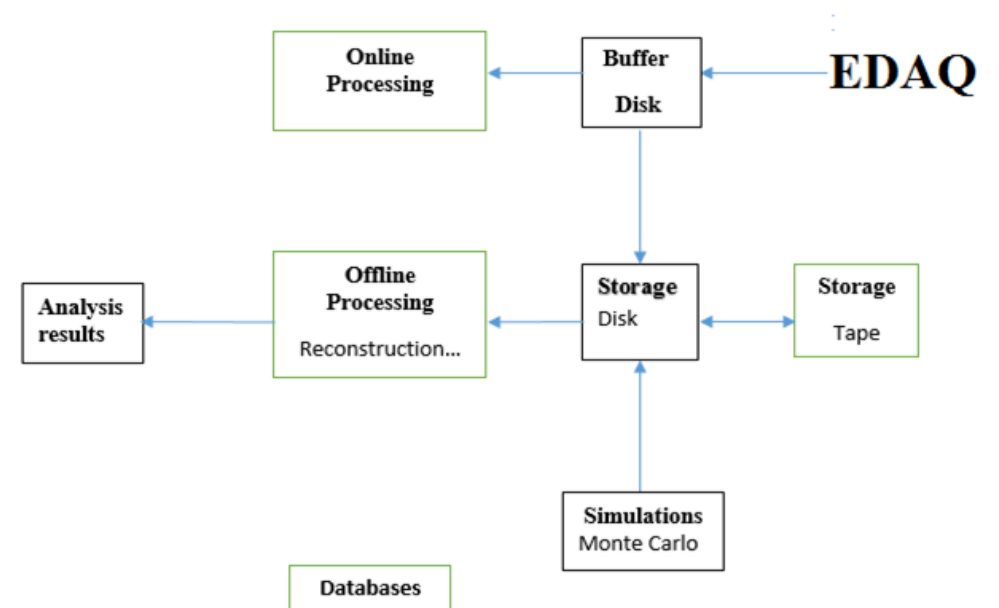Code: EPOCH (*Extendable PIC Open Collaboration,* https://github.com/Warwick-Plasma/epoch

Parallel paradigm: MPI

Target laboratory

Necessity: simulations for the development of special materials used as targets in experiments

Code: Elk (https://elk.sourceforge.io/)

Parallel paradigms: MPI+OpenMP hybrid

ELF (ELI-NP Local Facility)

Activity planning

Goal: Contribute to the elaboration of the guidelines regarding the implementation and provision of HPC over cloud within the EOSC.

IFIN-HH/ELI-NP pilot: Integration in the EOSC infrastructure of the HPC-over-cloud support for user communities interested in the investigation of the **laser-matter interaction and applications**

Use cases:

    1) EPOCH

    2) Elk

Activity Planning

For the two applications, benchmarks for finding the most efficient method of running HPC in cloud, comparing different technologies using:

- VMs (for testing different architectures)

Containerization:

- Docker (using Kubernetes)

- Singularity

- udocker

Compare with the efficiency achieved on the HPC cluster and published data for larger clusters.

Use deployment tools also provided within EGI infrastructure.

THANK YOU FOR YOUR ATTENTION !