



CUG 2022 CINES Presentation

May 2022, Monterey



Agenda

- CINES : a National HPC Center
- ADASTRA : enabling exascale technologies
- Deployment and day-to-day operation
- Software stack deployment
- Code porting and optimization

CINES : a national HPC center

➤ CINES (National Computing Center for Higher Education)

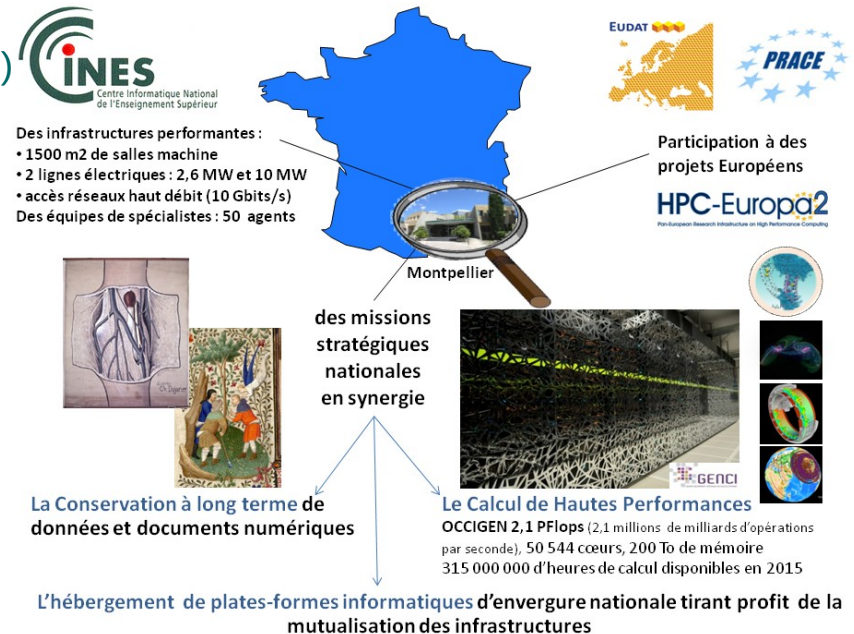
Created in 1980, based in Montpellier (France), supervised by French ministry for Higher Education and Research.

Three strategic missions :

- High Performance Computing (>1000 users)
 - Operated SGI, Atos/Bull, IBM clusters
- Long term digital preservation
- National hosting entity (servers/platforms)

➤ National and European partnerships

- One of the three national centers, with IDRIS(CNRS) and TGCC(CEA)
- Member of PRACE



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Adastra : enabling exascale technologies

Peak perf : 74,58 Pflops

- ~50Pflops HPL
- <1,6MW

Scalar partition

- 536 Genoa CPU nodes

Accelerated partition

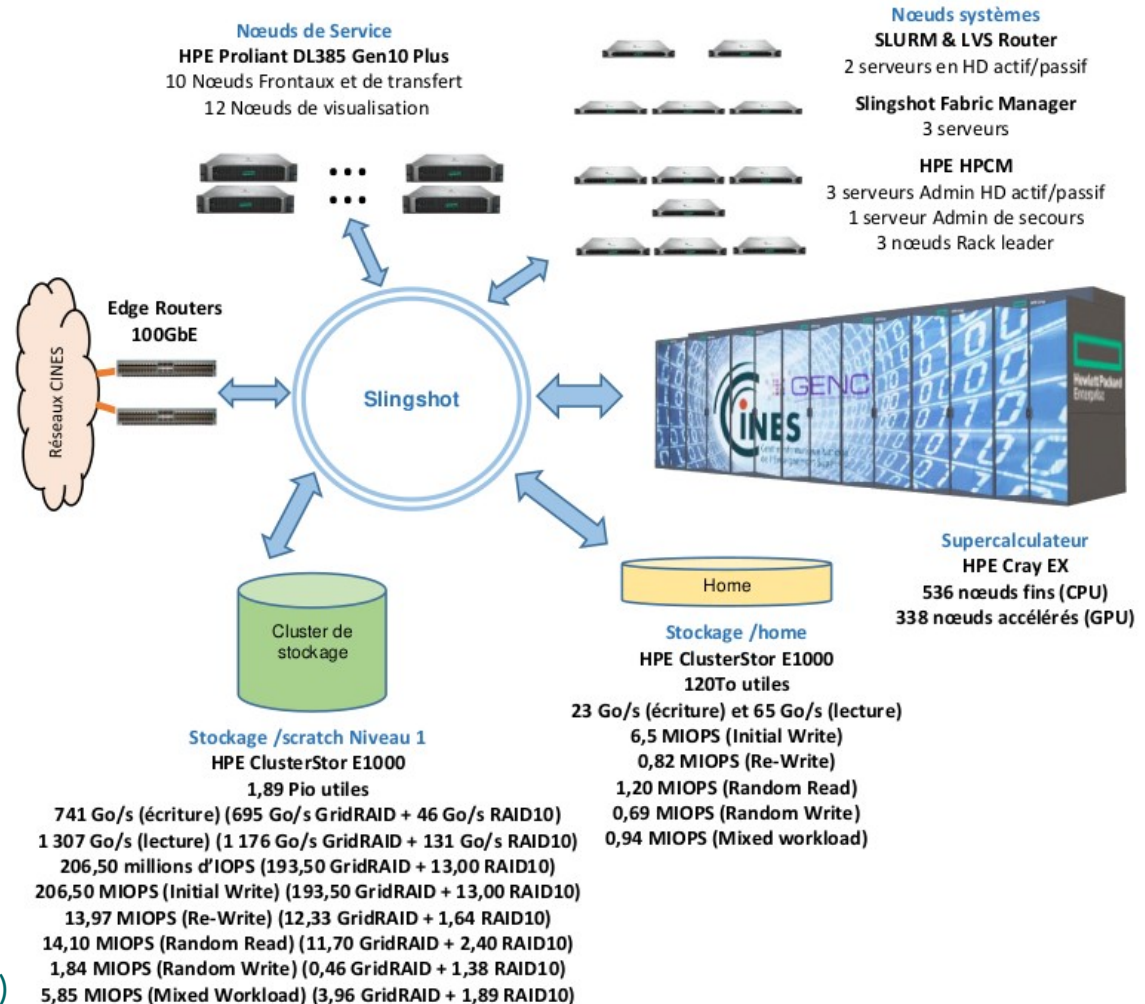
- 338 GPU nodes

Services

- 10 logins +12 hpda nodes

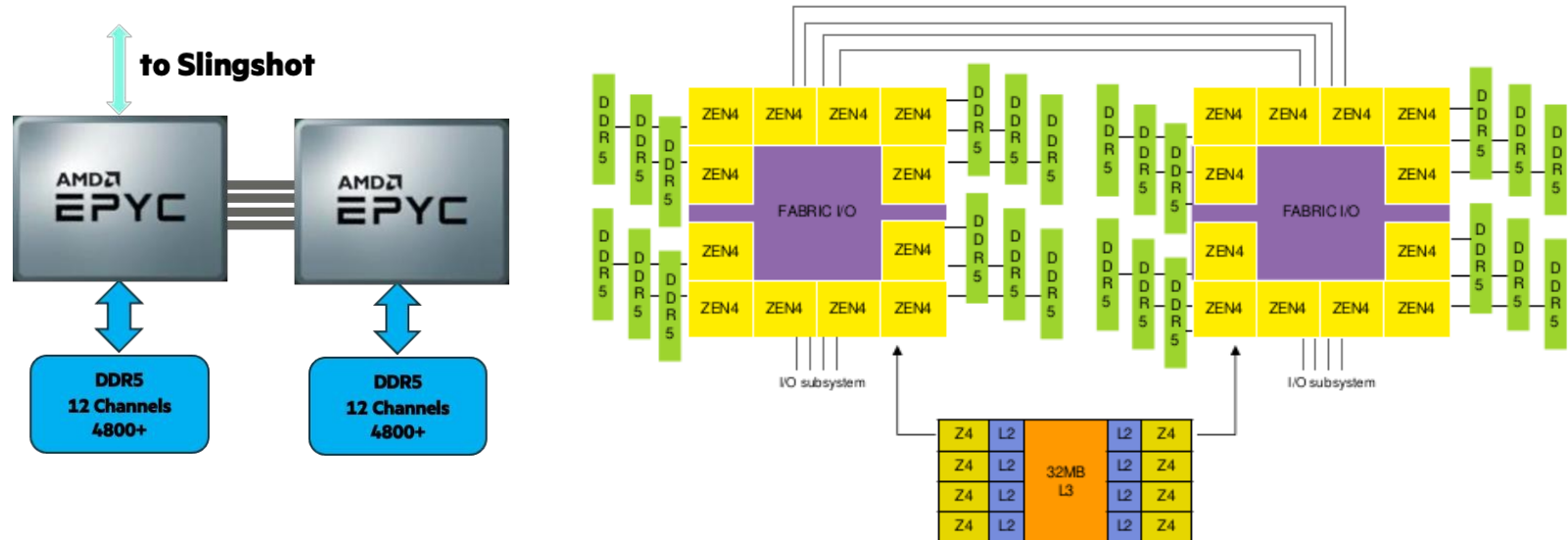
Lustre Filesystems (HPE ClusterStore E1000)

- 2PB SSD /scratch
- 12PB /work
- 12PB /store (HSM with DMF)



Scalar partition

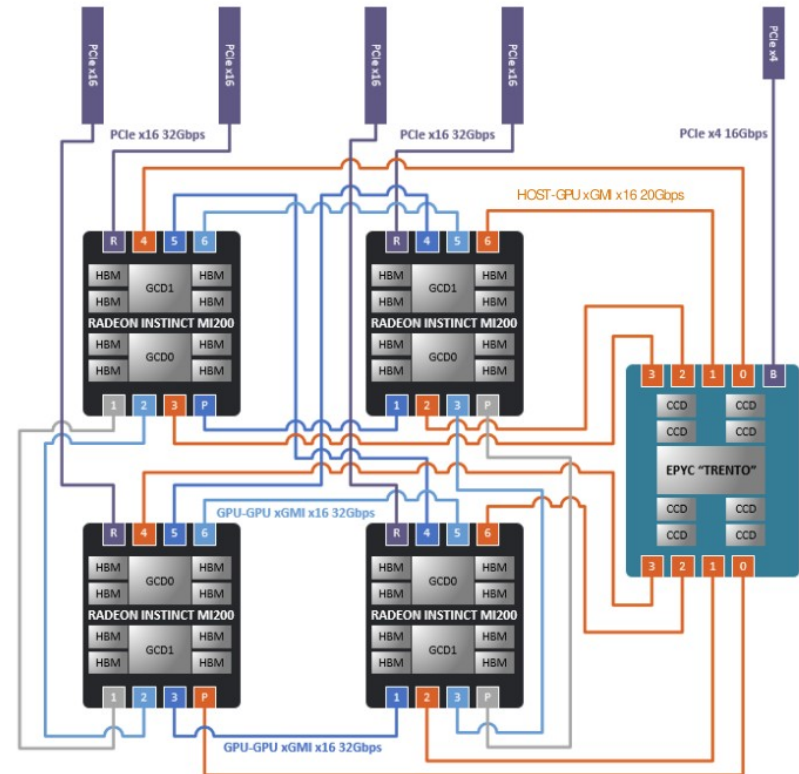
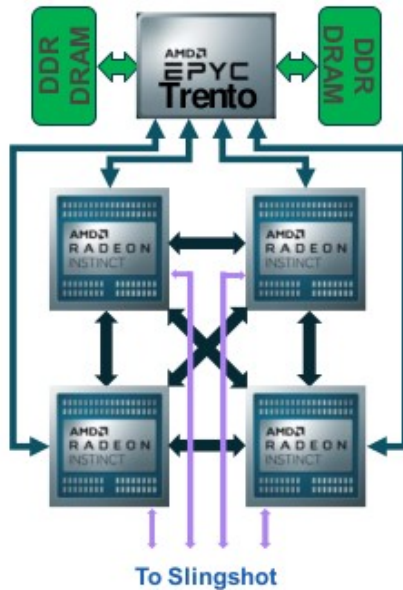
- Peak performance 3,45 Pflops (~3Pflops HPL), equivalent to our current CPU machine (Occigen)
- Bi-socket AMD Genoa 2x96 cores, estimated 2.1 GHz (TDP 280W) + 768 Go DDR5-5200
 - 536 nodes → ~100k Zen4 cores and 402TB of aggregated memory !



Accelerated partition

- Peak performance 71,13 Pflops (~50 PFlops HPL)
- AMD Trento 64 cores, 2.4 GHz, 256 Go DDR4-3200 + 4 GPU AMD MI250X, 4x128 Go HBM2, 4 Slingshot 200 Gbps

- Infinity fabric
- ~200Tflops per node



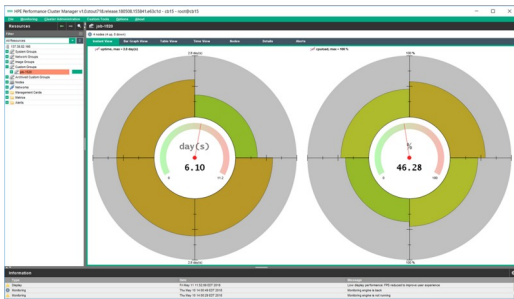
Deployment and day-to-day operation

☐ Schedule shifted

- Should have been operational on May 1st, should be on September 23rd

☐ Deployment stack

- HPCM (HPE Performance Cluster Manager)
- RedHat 8.5 (hopefully 8.6 with LTS!)
- Ansible



Software stack deployment

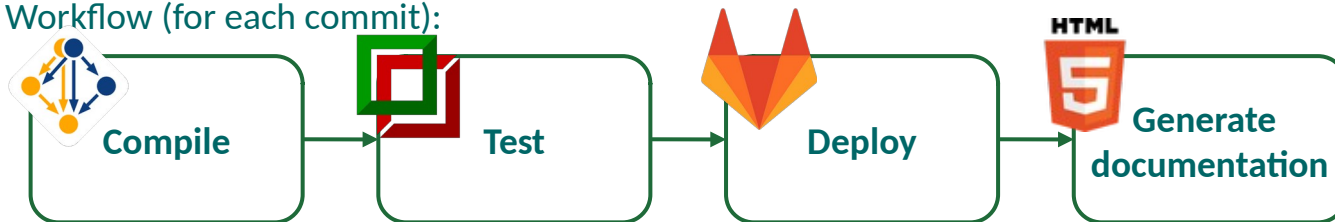
GAIA project

Objectives : Automated and versionned deployment of the software stack for **ADASTRA**

Using the following tools :

- ❖ **GITLAB** : sources/configurations , using Gitlab-CI (for CI/CD) for automation + Pages for documentation
- ❖ **SPACK** : software deployment database
- ❖ **REFRAME** : fonctionnality and regression tests

Standard Workflow (for each commit):



Challenges : being exhaustive ! Mainly having all **Spack** recipes and all **Reframe** test available for MI250X **Sharing expertise with other MI250X operators will be the key**

Code porting and optimization

□ Contract with HPE for application porting

- 5 applications
- speed-up commitment from **5x** to **7x**
- Speed-up between :
 - Genoa CPU nodes
 - Trento GPU nodes

Software	Test Case	#Nodes	Metric
GYSELA	gpu	1	Total time (s) (without init & diag)
	gpu	8	Total time (s) (without init & diag)
Magic	medium	1	Mean wall time for one pure time step
	large	8	Mean wall time for one pure time step
MesoNH	256x256 grid	1	Time to solution 101 time step (step 4)
	512x512 grid	10	Time to solution 101 time step (step 4)
MUMPS	1N_unsym	1	BENCH: TIME (seconds) factorization
	10N_unsym	10	BENCH: TIME (seconds) factorization
TRUST	1N	1	Seconds / pas de temps
	10N	10	Seconds / pas de temps

- CINES is also committed to help the French research community to port their applications to MI250X. European funds will surely help to leverage this activity as the perspective to use the LUMI supercomputer for our users is clear.

Q/A

Thank you for your attention.