

CALMIP / REGIONAL CENTER TURPAN : ARM- ACCELERATED PROTOTYPE

- 43 RD VI-HPS TUNING WORKSHOP – January 29th February 1st - 2024 -



calmip



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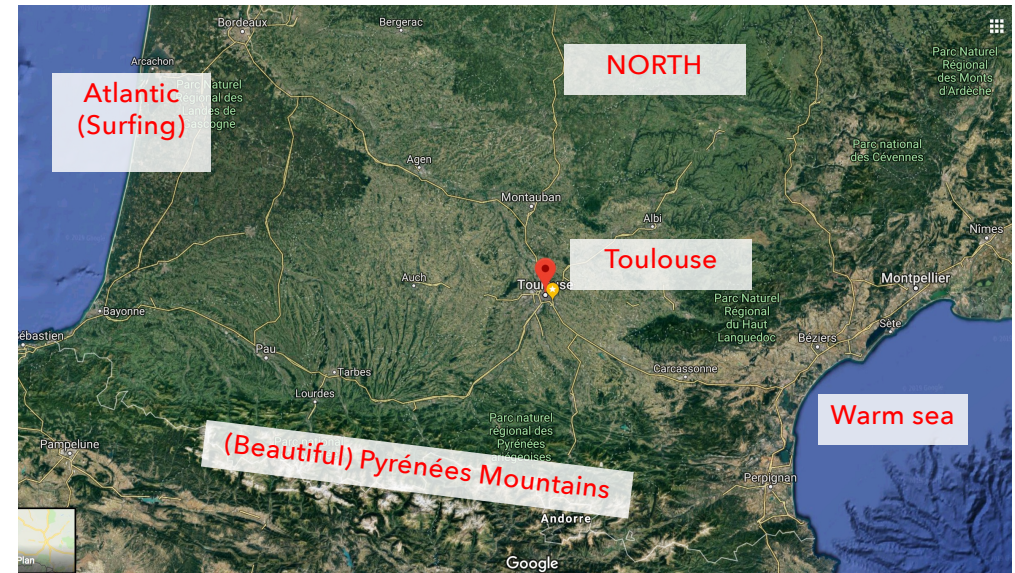




LOCATION

Aerospace Toulouse Campus

- ✓ Data Center « Espace Clément Ader » hosting :
 - 750m² + 3 Mw (redundancy TierIII)
 - French Weather Forecast
 - Toulouse University Computing Center (CALMIP)
- CALMIP :
 - **Provide HPC & AI Ressources and Expertise**
 - **Open to SMB** for their innovative activities;
 - 4 Engineers Devoted to HPC (Admin/Support)
 - Operating « Olympe » : Eviden-BullSequana 1,365 PF/s
 - +13000 core Skylake, 48 V100 SXM2
 - 1.5Po + 3 Po storage



HPC – OLYMPE – 1,365 PF

- Eviden Bull-Sequana Architecture
- **13 464 core** [Intel® Skylake @ 2,3 Ghz]
- **48 GPU Nvidia Volta V100-16Go (Nvlink)**
- Infiniband EDR : 100 Gb/s – Fat Tree
- Storage : **1,5 Po (Lustre) + 3 Po (long term)**
- Production launch : **Septembre 2018**
- **Scientific Topics : CFD, Quantum Chemistry, Climate Change, AI, ...**
- **250 Research project /Year, 40+ Labs ; 900 logins**
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HPC FRANCE AND EUROPE

1 ExaFlop/s : 10^{18} Floating Operation /s



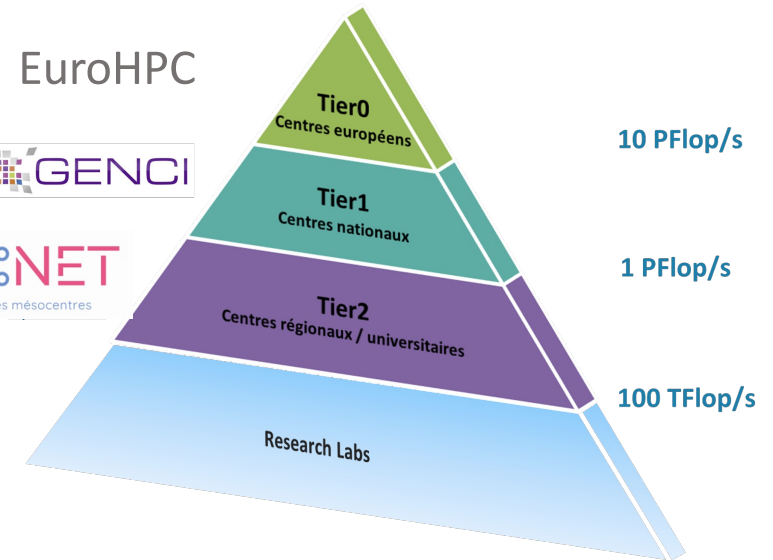
Liste Mésocentre non exhaustive

Mésocentre = Regional Center

EuroHPC

GENCI

MESOCNET
Le mésocentre des mésocentres



EuroHPC : [EXASCALE JUPITER\(JÜLICH\)](#) ; [JULES VERNES \(CEA TGCC\)](#)

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« Turpan » Arm Prototype (EVIDEN/Nvidia)



•Compute Nodes

- 15 Arm and Nvidia compute nodes, 1200 CPU cores, 30 GPU units
- 1 Arm Ampere Q80-30 processor, 80 CPU cores, 3,0 GHz, 512 RAM
- 2 NVIDIA A100-80GB GPU cards, 6912 CUDA cores, 80GB HBM2 (PCIe)

•Login Nodes

- 2 Arm login nodes

•Network :

- Mellanox Infiniband HDR, 2 x 200 Gb/s

•Visualization nodes

- 2 Intel x86 Visual Nodes
- 2 Intel Icelake 6326 processors, 16 cores, 2.8GHz, RAM (16 x 32GB) 512GB
- 2 NVIDIA A40-48GB GPU cards

•Storage

- 1 NetApp E5760 + DE224C storage, 25TB with SSD, 350TB with HDD
- 10 x 3.8 TB SSD, 3GB/s write, 8GB/s read
- 60 x 8 TB HDD, 8GB/s write, 10GB/s read



« Turpan » Arm Prototype

•Admin :

- RH 8.0, Slurm 22.x(recompile), Ansible
- Monitoring Solution : Prometheus

•Support : Eviden/Nvidia

•Compilers

- ARM compiler suite (C/C++/Fortran) + ArmPL
- GNU compilers (C/C++/Fortran)
- nvhpc SDK (C/C++/Fortran + CUDA)

•MPI

- OpenMPI 4.1.4 (Compilation « Custom »)
- OpenMPI Nvhpc (3.1.5, 4.0.5, hpcx, nccl)

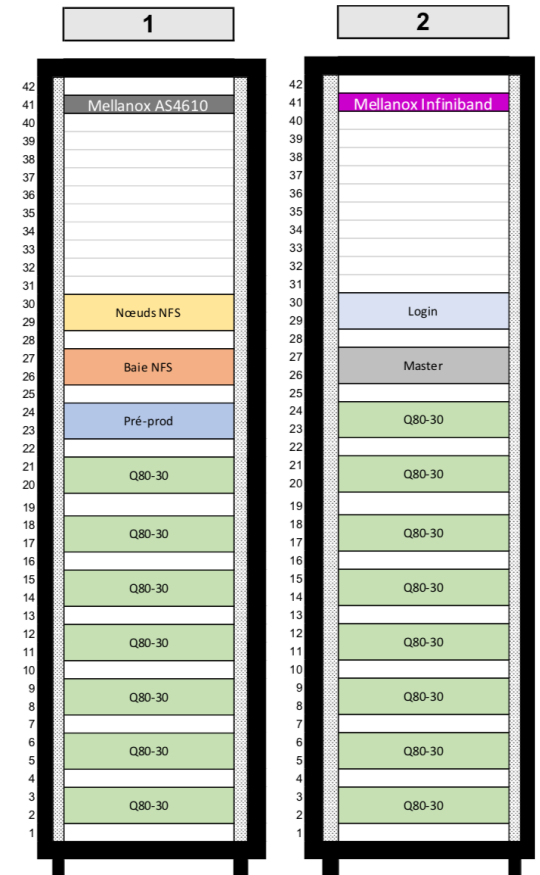
•Scientific lib. (CPU/GPU)

- Blas/Lapack/FFTw (armPL, nvhpc, Magma)
- Petsc, AMGx, ...

- [Online Doc.](https://www.calmip.univ-toulouse.fr/espace-utilisateurs/doc-technique-turpan) : <https://www.calmip.univ-toulouse.fr/espace-utilisateurs/doc-technique-turpan>

MESONET

Le mésocentre des mésocentres



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« Turpan » Arm Prototype

•Calendar :

- November/December 2022 : Installation/Linpack/HPCG
- January 2023 : start opening users (workshop/bootcamp)

•Admin :

- Recompile slurm
- Ansible
- ?

•Porting

- MPI GPU-RDMA ?
- Users Code :

Code	Compute	Env.	Porting ARM
AVBP (CFD)	CPU+GPU	Fortran MPI+OpenACC	OK
Jadim GPU (CFD)	CPU+GPU	Fortran+MPI	OK
EDF CFD Solver	CPU	C+Fortran+MPI	OK
QuantumPackage (Chemistry)	CPU	Fortran+OCAML+OPENMP	OK
OpenFOAM (CFD)	CPU	C++/MPI	OK
MesoNH (Climate)	CPU+GPU	Fortran+MPI+OpenACC	OK

