



Data Processing and Simulation (R&D3)

P2IO Scientific Council , Dec. 17, 2014

P2IO R&D3: VirtualData

- Shared effort of the 8 P2IO labs since 2010 to build a scientific computing platform shared by all labs and to foster synergies between people around it
 - **130 people** dedicated to computing activities + many physicist
 - operation (40%), development (60%)
 - Covering many expertizes: visualization, data management, databases, numeric computations, parallelism, new HW architectures (GPU), online and real-time environments, grid, clouds...
- Initial focus: shared hosting facilities with an high energy efficiency to optimize the operation cost
 - Initial situation: 1 or several rooms per lab, mostly inefficient (PUE ≥ 2)
 - Target: 2 state-of-the-art facilities with a PUE < 1.3 (Vallée and Plateau)
- Several initiatives to initiate/foster cross-laboratory relationships
 - Computing operations, online to start

P2IO Datacenters

- Vallée and Plateau: 2 different contexts...
 - Vallée: P2IO legitimate to take an initiative on its own (biggest labs, existing free buildings...)
 - Plateau: a moving landscape, many newcomers, no preexisting building
- ... leading to 2 different approaches
 - Vallée: first phase of an extensible project to address urgent situations, funded only by P2IO
 - Plateau: « piggybacked » refurbishment of Ecole Polytechnique computing room, funded by Ecole Polytechnique, P2IO as a one of the technical advisors
- Very intense work in the last 2 years... now over!
 - Vallée: already one year of (smooth!) operation, 6 labs from Orsay moved all or part of their resources, almost full!
 - Plateau: refurbished room in operation since 2 months

Salle Vallée : 30/10/2014



- 25 racks out of 30 full
- 200 kW deployed (capacity = 400 kW)
- Chillers redundancy

- Cost = 1 M€
- **Labex : 20%**, Orsay Labs : 80%

Extension

- Up to 84 racks and 1.5 MW
- Increment size = 300 kW
- Cost = 2 M€
- Foreseen 1st step : 800 k€ (600-900 kW, 60 racks)

Salle Plateau : 15/12/2014



- Rack capacity: 42
- Electrical/cooling capacity: 650 kW
- Cooling redundancy

- Building cost covered by Ecole Polytechnique
- P2IO: racks (90 k€)

Extension

- Proposal to build a new building (3x300 m²) shared by UPSay partners
- Funding still being discussed
- Waiting answer from CPER

Synergy of Competencies

- The ultimate goal: skills in each lab are very complementary
 - Also the most difficult! Most people have their priorities determined by the project they work for...
- Common operation of computing facilities fostered the links between our labs
 - Currently mainly salle Vallée, to extended to Salle Plateau
 - Has been working well since one year: real involvement of all labs
- Current driver for SW developers: online developments
 - Already 3 meetings in the last year
 - One CSNSM development that could be useful for all
- Other identified challenges where P2IO may help
 - Parallelism and new HW architectures: GridCL project, P2IO funded
 - HEP Software Foundation: several potential actors

Beyond P2IO

- P2IO Labs strongly involved in Université Paris Sud (UPSud) and Université Paris Saclay (UPSay)
- Quarterly meetings with UPSud IT division since 2012
 - P2IO seen as a positive example: attempt to leverage on P2IO initiative to provide a scientific computing infrastructure at UPSud, driven by Scientific Computing WG created 2 years ago
 - Use Salle Vallée for hosting of non P2IO computing resources: already 4 labs
 - Funding for doubling StratusLab computing resources and open them to UPSud users
- UPSay: Salle Vallée now recognized as part of the overall datacenter infrastructure of UPSay
 - Still a project as no funding has been allocated so far to scientific computing hosting in UPSay but several partners interested
 - Ecole Polytechnique driving an effort to build a facility similar to Salle Vallée on the Plateau

2015 Planned Work

- Experiment with services spread over the 2 datacenters
 - Prototype of service failover
 - Impact/requirements on UPSay network
- Build initial governance model for this shared computing platform
 - Failed to finalize it in 2014 despite a broad agreement on principles
 - Experience with Salle Vallée since one year validates the model agreed with directors: be as inclusive as possible for the technical work
- Progress with building the competency network, taking advantage of projects with several labs involved
 - GridCL platform for experimenting with new architectures
 - LPaso: ANR proposal about LHC software optimization
 - HEP Software Foundation: a possible framework to improve synergies between various expertises and projects

Conclusion

- Major milestone this year for P2IO computing with the availability of 2 shared energy-efficient datacenters
 - LABEX was critical to bootstrap the common process, providing the “seed money”
 - Optimized operational cost will help the funding of our future needs
 - Planning of future extensions must begin now...
- P2IO has the potential to build a world-class network of computing expertise around a large, common flexible platform
 - Governance still to be formalized: **must keep people in their labs**, close to the users
 - Significant expertise in many computing areas: LABEX should help to increase collaboration across labs
 - P2IO should be able to take new responsibilities in the computing of future experiments, not accessible to a single lab