RÉPUBLIQUE FRANÇAISE
Liberté
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PROGRAMME DE RECHERCHE
NUMÉRIQUE POUR L'EXASCALE

Exa-SofT

High Performance Numerics for Exascale

Raymond Namyst, Alfredo Buttari

Welcome to Toulouse!

And welcome to ENSEEIHT

Rooms

- Presentations: C002 and B00
- Coffee and lunches: B006/B007

WIFI

- Eduroam
- Guest account:
  - ESSID: wifinp
  - Login/pwd: guest_4793 / zJD4QE6

Presentations

- Connect to the Zoom conference and share your screen

Thursday agenda

11:00 - 11:30	Opening talk
11:30 - 12:00	COMET: From Dynamic Data-Parallel Dataflows to Task Graphs
12:00 - 14:00	*Lunch Break*
14:00 - 14:30	Tensor computations
14:30 - 15:30	Workshop: Exa-SofT software stack consolidation
15:30 - 16:00	*Break*
16:00 - 16:30	Polyhedral model for Kokkos code optimization
16:30 - 17:00	Recursive tasks
17:00 - 17:30	Automatic multi-versioning of computation kernels
17:30 - 18:00	Improving energy efficiency of HPC application

Tonight's Dinner at *Les Caves de la Maréchale* (8:00 pm)

Address: 3 rue Jules Chalande 31000

Not far from Place du Capitole

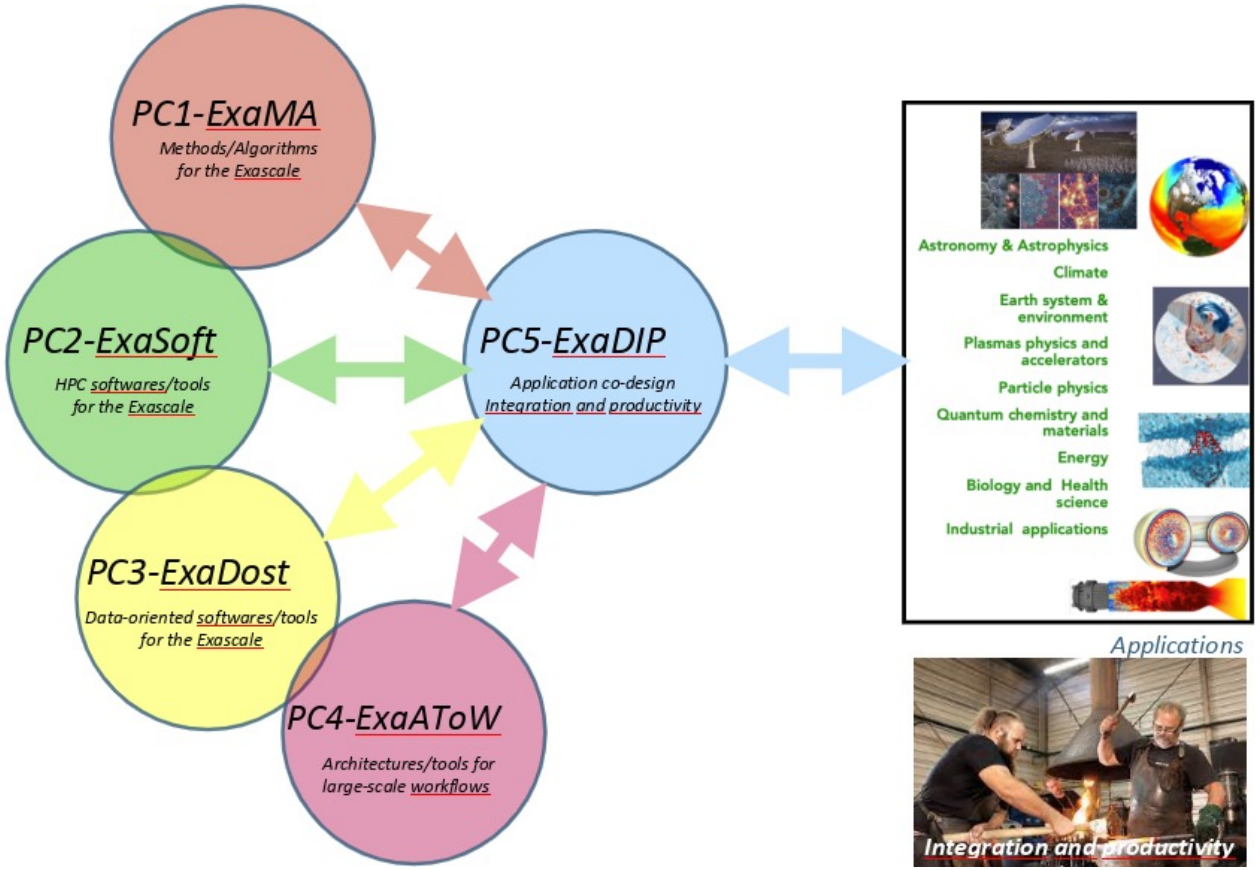
Walking distance from here


JEANNE D'ARC
BELFORT
SAINT-AUBIN
SAINT-GEORGES
Les Caves de la Maréchale
1 min
LES AUGUSTINS
QUARTIER 1
Canal du Midi

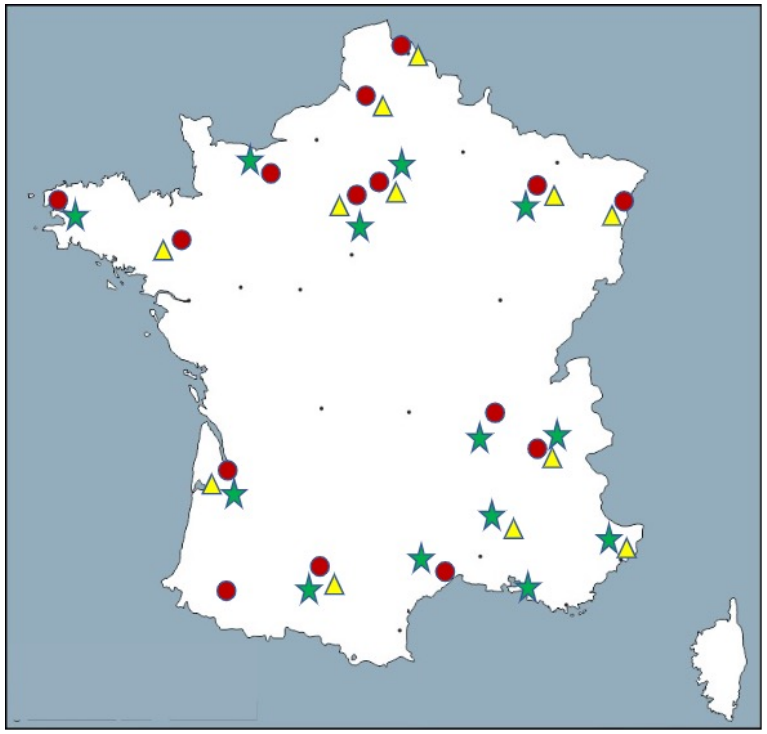
Friday agenda

8:30 - 9:00	Welcome coffee
9:00 - 9:30	NumPEx Energy working group feedback
9:30 - 10:30	General workshop: Exa-SofT developments integration in applications
10:30 - 10:45	*Break*
10:45 - 11:15	PALLAS: a generic trace format for large HPC trace analysis
11:15 - 11:45	Fine-grain energy measurement
11:45 - 12:15	NumPEx GPU working group feedback
12:15 - 12:30	Conclusion
12:30 – 14:00	*Lunch*

NumPEx in a nutshell



NumPEx in a nutshell



5 Years
40,8 M€

A five-year effort

Core Research Institutions

Core national Research Institutions:
CNRS, CEA, INRIA, Universities,
Engineer schools, Industry

3 Focus Area

Software stack development (PC 1-3)
Wide-area workflows and architecture (PC 4)
Integration and application development (PC 5)

80 R&D teams 500 Researchers

80+top-notch R&D teams
About 500 researchers

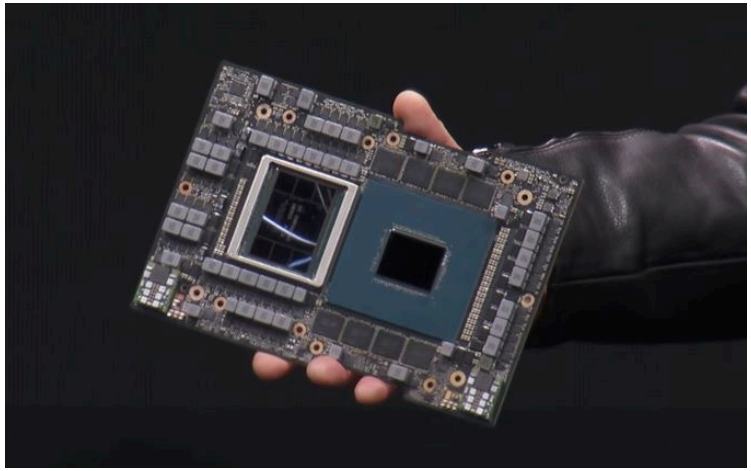
25+to be hired for co-design development

Exa-SofT = Software stack @ Exascale

Consolidating a sound HPC software stack for Exascale supercomputers

(and most notably for Alice Recoque)

- How to write efficient and portable code on accelerated architectures?
  - Loop parallelism vs task-based parallelism
  - Compilers and optimizers
  - Runtime systems
- Mathematics libraries must be redesigned
  - Design of numerical algorithms and patterns able to cope with heterogeneous architectures
- Do we still understand performance? Can we drive power consumption?
  - Low intrusive profiling and analysis tools



Integrate HPC in a larger ecosystem

- IA, Cloud, workflows, in situ, code coupling

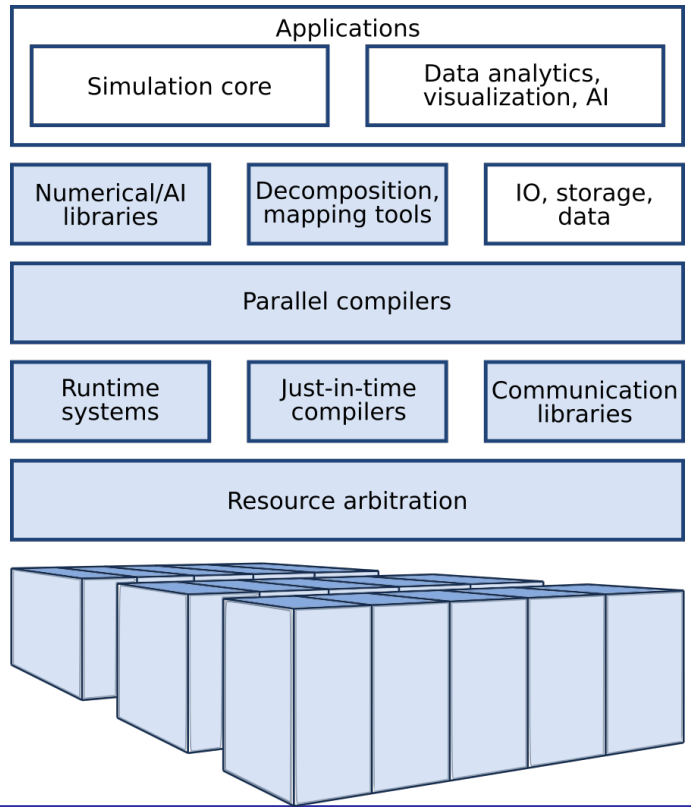
Exa-SofT = Software stack @ Exascale

Contribute to the international software effort

Make sure most bricks fit together

Bridge gaps in the Exascale Software Stack

Leverage French research outcomes



Exa-SofT = Software stack @ Exascale

Workplan Overview

- High-productivity programming models for composability, code coupling and dynamism
- Develop just-in-time compilation techniques to generate better code using runtime feedback
- Extend task-based runtime systems to address large scale heterogeneous architectures
- Produce a new generation of scalable, portable and composable numerical libraries
- Develop performance and energy profiling tools, as well as optimization approaches for dynamic software stacks