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PROGRAMME DE RECHERCHE
NUMÉRIQUE POUR L'EXASCALE

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Accelerators working group

Summary

1. Working Group
2. GPU Days
3. Projects call

Accelerators Working Group

- Most large-scale machines leverage accelerators
- Exploiting them is a challenge for applications
  - Sometimes libraries already exist (e.g. cuBLAS, Chameleon)
  - Or a framework allow to express application
  - Or have to write the kernels (low-level or high-level approaches)

- Mailing list numpex_gt_accelerateurs@groupes.renater.fr
  - At least 1 member per PC

Accelerators Working Group

Plan

- Call for projects to complement NumPEx contributions
- Organize tutorials on the different approaches (with NumPEx training WG and CExA)
- Organize workshops with manufacturers to check proposals, solutions, road-maps
- Organize workshops on compilation-based optimization approaches
- Organize workshops on the programming approaches
- Provide application port examples, as mini-apps, to demonstrate effective methodologies
- Publish analysis papers, to describe the current situation an provide rationales for application porting

GPU days (2024 June 12th & 13th)

- Introduction to GPUs (in CUDA)
- Presentation of approaches
  - CUDA/HIP/OpenCL
  - Frameworks
  - Libraries
  - Languages
  - Tasks
- Retex
  - Tasks, OpenACC, Kokkos, Rust/OpenCL

Slides and videos are available!

https://numpex.org/the-first-workshop-of-the-numpex-accelerator-working-group/

Projet call, 3 axes

- Computation kernel programming
  - Taxonomy of application cases and experience
  - Modern C++ approaches
  - Auto-tuning
  - Memory safety
  - Integration of compiler techniques
  - Debugers/profilers/etc.
- Other programming models
  - Tensor computation
  - Non-gpu accelerators (e.g. TPU)
- Code transition
  - Progressive transition
  - Adapting data structures

Projet call, requirements

- Co-conception with NumPEx demonstrators
- Synergy with NumPEx work
- Integration with production code
- Sustainability of solutions
- Integrating existing offer

1-2 projects, 36 months, 1.8M€

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