Performance Evaluation of in situ Applications through Simulation using SimGrid

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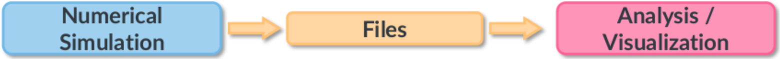
Presentation of HPDA/PDS Research Projects

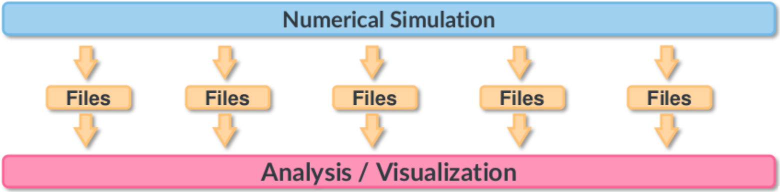
In situ processing: historical meaning

- Post-hoc

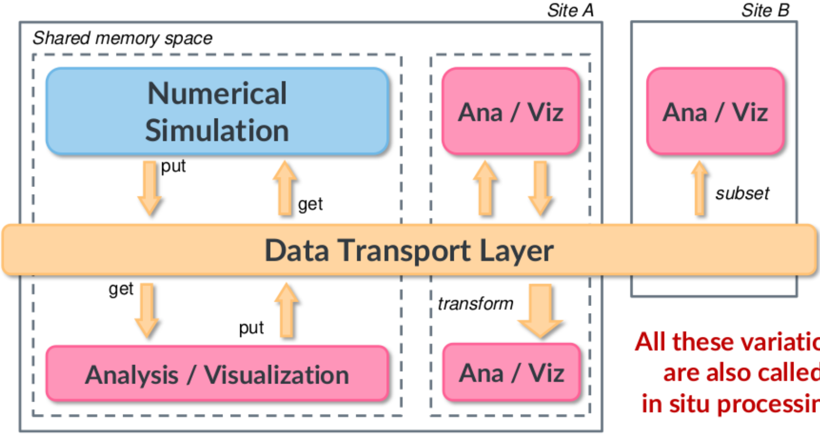


☹ Files becoming too big + Gap increase between CPU and I/O ☹

- In situ



In situ processing: modern approach



All these variations are also called in situ processing!

- How much resources give to simulation, analysis, viz? [ALLOCATION]
- Where and when run the analysis/visualization? [MAPPING]
- Files out of question? In-memory or network? [DATA TRANSPORT]

Sim-Situ: a tool for performance evaluation using Simgrid

- ▷ Answer RQs → **Performance evaluation**
  - Take good decisions → **Objective performance indicators**
- ▷ **Go beyond the traditional empiric guess** → **Speed and Flexibility**
  - Explore many unconventional scenarios
  - Consider unconventional performance metrics

Experiments	**Simulation**
→ Time- and resource-consuming	→ Run on a laptop
→ Complex to set up	→ Highly flexible
→ Limited in scope	→ What-if scenarios
→ Sensitive to exogenous factors	→ Reproducibility and control

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Goal of the project

- **Goal:** enhance the Sim-Situ tool introduced in [1]
- Proposed steps of the project
  1. Create a Git repository with Continuous Integration for Sim-Situ [1]
  2. Test Sim-Situ with different applications: other proxy-applications such as CabanaMD or QuickSilver, more complex simulation codes (such as Gromacs [2], LAMMPS [3] etc)
  3. Code refinement: introduce generic descriptions of simulation and analysis components
  4. Externalize the application description: description of analysis/viz component
  5. Add new features: evaluation of more mapping and allocation strategies, implementing state-of-the-art DTLs (ADIOS [4], DataSpaces [5]) etc
- Requirements: Git, taste for programming and compiling

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