EsD

A Software Centric Approach

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General Thoughts on EsD

- Current ideas and texts on EsD
  - strong focus on integration, engineering, data centre oriented tasks, HW buying.
  - Resembles an Infrastructure but less a FET program
- Where is the research and FET in this program?
- Open EsD call for all European HPC projects
  - Plenty of great HPC solutions and groups not funded by EU so far.
  - Strengthen Europe’s HPC role and impact in the world!
  - Do not fund 4 projects 50 M € each for buying large parallel computers.
  - Instead fund 50 projects for 3 to 5 M € each to explore variety of HPC solutions based on existing HW and SW.
General Thoughts on EsD, cont.

- Reflect the importance of HPC Software in Europe
  - EU HPC HW suppliers market share less than 5%
  - 83% HPC application SW used in Europe is “made in Europe”
  - Europe has world class strengths in HPC software and HPC enabled applications

- HPC funding of FET, FETHPC, and EsD should consider current impact, likelihood of success, and sustainability.

HPC SW

- EsD budget should not be used to buy new HW.
  - Use existing HW
  - European infrastructure program?
EsD is important to have, but

- EsD based on "existing" HW and SW open to all EU groups
- Ask for proposals that combine existing tools, libraries, algorithms, system SW and HW in an innovative way
  - Focus on a few specific topics instead of mega projects
  - Putting together SW with a little bit of integration (engineering) will not work.
- Strengthen role of research and exploration of HPC software
  - Some research and extension (development) is needed.
  - Bridges between software and hardware
  - Tuning of software for extreme scale which requires more research and development.
- Most challenging HPC (exascale) problems will have to be solved by SW not by HW
  - HW provides many opportunities but usually makes life harder for HPC SW
  - Europe has a critical HPC SW mass with impressive potential and impact.
  - Requires research, development, and proper funding.
Role of Testcodes and Applications for EsD program

- Prepare a suite of test codes and input data based on "existing" applications and benchmarks
- Test various aspects of HPC technology (SW and HW)
  - Runtime, memory, IO, energy, power, reliability, scalability, ease of programming, etc.
- Provide range of codes
  - Small (up to 1000 LOC), medium (up to 50000 LOC), large
- Provide range of input data for different runtimes to support fast prototyping, testing, deployment, integration
  - Short runtimes (several minutes)
  - Medium runtimes (1 hour)
  - Large runtime (more than 1 hour)
- For every input data also correct output data should be included to verify semantic correctness.
An EsD Projec Idea

• Focus on Auto-Tuning based on
  • Antarex, Readex, AllScale, Autotune, and other European auto-tuning work
  • Connect with CoT PoP for performance and energy measurement and other European performance tools
  • Explore runtime/energy trade-off
  • Scaling behavior on large scale HPC
• Involve application groups for benchmarks and applications
  • Companies and academic groups
• Involve System integrators and HPC centres
  • Integrate auto-tuning solutions and APIs
  • Full system testing
• Run on „existing“ hardware of HPC data centres