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EsD

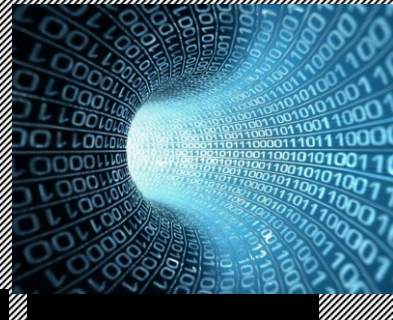
A Software Centric Approach

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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 Project Idea



- Focus on Auto-Tuning based on
 - Antarex, Readex, AllScale, Autotune, and other European auto-tuning work
 - Connect with CoE 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