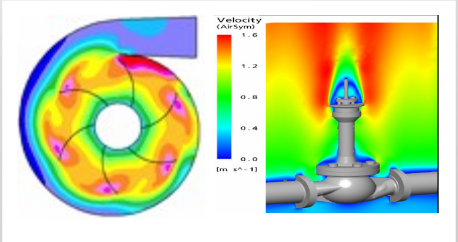
www.t-platforms.com

T-Platforms collaboration in Europe

October 27,2011

T-Platforms Overview

- Established in 2002
- Over 200 supercomputer installations
- Rapidly emerging as one of the leading global HPC companies
- Comprehensive supercomputing systems, software and services
- Multiple installations are on TOP500 worldwide supercomputer list
- Headquarted in Moscow (Russia) with regional headquarters in Germany , Taiwan and China



Success Stories: Lomonosov at MSU

Lomonosov supercomputer is the most powerful HPC system in Eastern Europe, delivering 1,3 PFlops of peak performance. T-Platforms deployed Lomonosov as a turn-key solution, preparing a class 3 datacenter and the entire infrastructure

- 1,3 PFlops of peak performance
- Based on TB2-XN & TB2-TL systems
- QDR InfiniBand 40Gb/s
- 3-level parallel file storage with 1,8 PB capacity
- ClustrX T-Platforms Edition OS and management stack
- #18 on the new Top500

European Cooperation

- T-Platforms is a member of PROSPECT (Promotion of Supercomputers and Petacomputing Technology) and the newly formed joined consortium to set up the European Technological Platform for HPC
- T-Platforms is one of the founders of the European Open File System (EOFS) Society
- Collaborating with PRACE and STRATOS workgroups on initiatives to spur development for the entire HPC marketplace in the EU
- Collaborating with FZJ, DESY, European XFEL
- A member of Holistic Performance System Analysis (HOPSA) EU-Russia initiative

PRACE WP11: International Collaboration on Prototype Proposal

- "Evolutionary Scalable Hybrid Architecture"
- Combination of evolutionary HPC technologies
- Focus on addressing the most relevant challenges faced in HPC in the near future
- Intelligent energy management
- Accelerator co-processor integration (MIC, GPGPU)
- Massive, multilevel parallelization
- System management on a massive scale
- A relatively large prototype needed to extrapolate results reliably to huge system sizes

CSC – IT Center for Science (Finland)	System hosting and evaluation Application development
T-Platforms (Russia)	System hardware and software development
CSCS (Switzerland)	Novel programming paradigms
SARA (Netherlands)	Energy efficiency

Prototype Features and Timeline

- T-Platforms next-gen hi-end HPC solution, codename ”T-REX”
- 192 nodes in the final system (300TFlop/s)
- Next-generation CPUs, accelerators and interconnect
- Efficient hot-water cooling
- Budget 1M€

Timeline:

October 2012	Proposal submitted
January 2012	Funding decision
June 2012	Phase 1 system deployed (air-cooled)
November 2012	Phase 2 system deployed (water-cooled)
June, August 2013	Final reports due

Collaboration With EU Centers

DESY, European XFEL, FZJ, T-Platforms

- Collaboration to develop data management and data analysis solutions for large-scale scientific experimental facilities
- Utilizing T-Platforms expertise to tackle major challenges of data acquisition, storage and analysis in next-gen photon science by means of HPC

FZJ, T-Platforms

- Scientific collaboration to improve efficiency of key high performance computing applications
- Utilizing T-Platforms performance optimization tools to increase sustained performance of scientific applications developed in FZJ

- Collaborations undertaken under the assignments of the MoI signed in Hannover on July 19, 2011 between BMBF and MSERF
- MoUs to be signed in December, 2011

HOlistic Performance System Analysis (HOPSA)

ICT EU-Russia Coordinated Project (FP7-2011-EU-Russia)

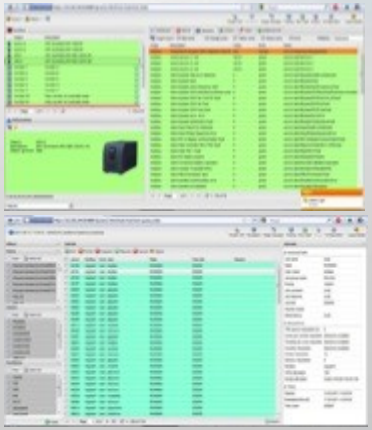
- Coordinator: Forschungszentrum Juelich, Germany
- Rogue Wave Software AB, Sweden
- Barcelona Supercomputing Center, Spain
- German Research School for Simulation Sciences GmbH, Germany
- Technical University Dresden, Germany

- Coordinator: Research Computing Center, Moscow State University, Moscow
- T-Platforms, Moscow
- Joint Supercomputer Center, Russian Academy of Sciences, Moscow
- Scientific Research Institute of Multiprocessor Computer Systems, Southern Federal University, Taganrog

Clustrx HPC Software Family

Component

Clustrx.CNL | Compute node OS
Clustrx.C-Management | System and user management
Clustrx.TaskMng | Scheduling and task management
Clustrx Watch | Node, Cluster, DC Status Monitoring
Clustrx Safe | Emergency Shutdown and Cluster reboot



Advantages

- Unified and optimised program code
- Modular services stack
- Centralized cluster setup, deployment, provisioning and management
- Covers the entire ecosphere from cluster node to datacenter infrastructure, homogeneous both on HW and SW levels

Next Step: Efficient Power Management

Enhancing power management and energy efficiency in
next-gen HPC systems

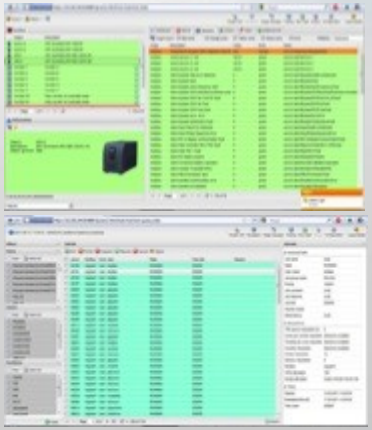
- Advanced power management hardware support in T-REX platform: energy consumption sensors on node level
- Introducing flexible power management support features in Clustrx system software stack

Advantages

- Ability to decrease power consumption, ex. by dynamically adjusting CPU frequency, without compromising application performance or pertaining desired level of performance

Building on HOPSA

- Extensive analysis of application and hardware monitoring data enables rational decision making while managing power consumption during a particular application run



Proposed Eu-Russia Joint Call Subject

Highly effective power management tools for next generation multi-petaflop computing systems

- Building on highly advanced hardware and software monitoring data analysis infrastructure designed by HOPSA, and utilizing next-generation power management hardware features of T-REX multi-petaflops supercomputer platform, to establish a collaboration with the aim of developing highly effective power management tools on the level of system software stack
- Collaboration will create flexible software tools to increase energy efficiency of hi-end computing systems without compromising application performance

Thank you!