Score-P and Scalasca Performance Tools Training

http://www.nersc.gov/users/training/events/scorep-and-scalasca

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David Böhme
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## Agenda

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Welcome</td>
<td>Yang</td>
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<tr>
<td>09:10</td>
<td>Introduction to VI-HPS &amp; overview of tools</td>
<td>Feld</td>
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<td>Introduction to parallel performance engineering</td>
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<td>Building and running NPB-MZ-MPI/BT-MZ on Cori</td>
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<td>Instrumentation &amp; measurement with Score-P</td>
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<td>11:00</td>
<td>Coffee break</td>
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<td>11:15</td>
<td>Profile analysis report exploration with Cube</td>
<td>Böhme</td>
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<td>Configuring &amp; customizing Score-P measurements</td>
<td>Feld</td>
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<td>Automated trace analysis with Scalasca</td>
<td>Böhme</td>
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<td>13:00</td>
<td>Lunch</td>
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<td>14:00</td>
<td>Hands-on coaching to apply tools to your own codes</td>
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<td>17:00</td>
<td>Adjourn</td>
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Virtual Institute – High Productivity Supercomputing

- **Goal**: Improve the quality and accelerate the development process of complex simulation codes running on highly-parallel computer systems.
- **Start-up funding (2006–2011)** by Helmholtz Association of German Research Centres.

**Activities**
- Development and integration of HPC programming tools:
  - Correctness checking & performance analysis
- Academic workshops
- Training workshops
- Service:
  - Support email lists
  - Application engagement

http://www.vi-hps.org
Productivity tools

- MUST & Archer
  - MPI & OpenMP usage correctness checking
- PAPI
  - Interfacing to hardware performance counters
- Periscope Tuning Framework
  - Automatic analysis and Tuning
- **Scalasca**
  - Large-scale parallel performance analysis
- TAU
  - Integrated parallel performance system
- Vampir
  - Interactive graphical trace visualization & analysis
- **Score-P**
  - Community-developed instrumentation & measurement infrastructure

For a brief overview of tools consult the VI-HPS Tools Guide:
Productivity tools (cont.)

- **DDT/MAP/PR**: Parallel debugging, profiling & performance reports
- **Extra-P**: Automated performance modelling
- **KcacheGrind**: Callgraph-based cache analysis [x86 only]
- **MAQAO**: Assembly instrumentation & optimization [x86-64 only]
- **mpiP/mpiPview**: MPI profiling tool and analysis viewer
- **Open MPI**: Integrated memory checking
- **Open|SpeedShop**: Integrated parallel performance analysis environment
- **Paraver/Dimemas/Extrae**: Event tracing and graphical trace visualization & analysis
- **Rubik**: Process mapping generation & optimization [BG only]
- **SIONlib/Spindle**: Optimized native parallel file I/O & shared library loading
- **STAT**: Stack trace analysis tools
- **SysMon**: Batch system monitor plugin for Eclipse PTP
Technologies and their integration
Tools will not automatically make you, your applications or computer systems more productive. However, they can help you understand how your parallel code executes and when/where it's necessary to work on correctness and performance issues.
 VI-HPS training & Tuning Workshops

- **Goals**
  - Give an overview of the programming tools suite
  - Explain the functionality of individual tools
  - Teach how to use the tools effectively
  - Offer hands-on experience and expert assistance using tools
  - Receive feedback from users to guide future development

- For best results, bring & analyze/tune your own code(s)!

- **VI-HPS Hands-on Tutorial series**
  - SC’08/09/10/11/13/14/15/16, ICCS’09, Cluster’10, EuroMPI’12/14, XSEDE’13, ISC-HPC’15/16

- **VI-HPS Tuning Workshop series**
  - 2008 (Aachen & Dresden), 2009 (Jülich & Bremen), 2010 (Garching & Amsterdam), 2011 (Stuttgart & Aachen), 2012 (St-Quentin & Garching), 2013 (Saclay & Jülich) 2014 (Barcelona, Kobe, Saclay, Edinburgh) 2015 (Stuttgart, Grenoble & Santiago), 2016 (Kobe, Garching, Cambridge)
Performance Audits/Plans/Proof-of-concepts

- Performance Optimization and Productivity (POP)
  - Offers performance optimization and productivity services
  - Time-limited offer/project
  - Using VI-HPS tools
  - Funded by European Unions Horizon 2020 research and innovation program
  - https://pop-coe.eu/services
  - The services are **free of charge to organizations in the EU!**