23rd VI-HPS Tuning Workshop & LLNL Performance Tools Deep-Dive

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http://www.vi-hps.org/training/tws/tw23.html
https://computing.llnl.gov/training/2016/2016.07.27-29.html

https://lc.llnl.gov/confluence/display/tools/Performance+Tool+Deep-Dive+Workshop+July+2016

Virtual Institute – High Productivity Supercomputing
http://www.vi-hps.org 23rd

- Organization of tool developers
- **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 in Germany
- Activities
  - Development and integration of HPC programming tools
  - Academic and training workshops
  - Outreach

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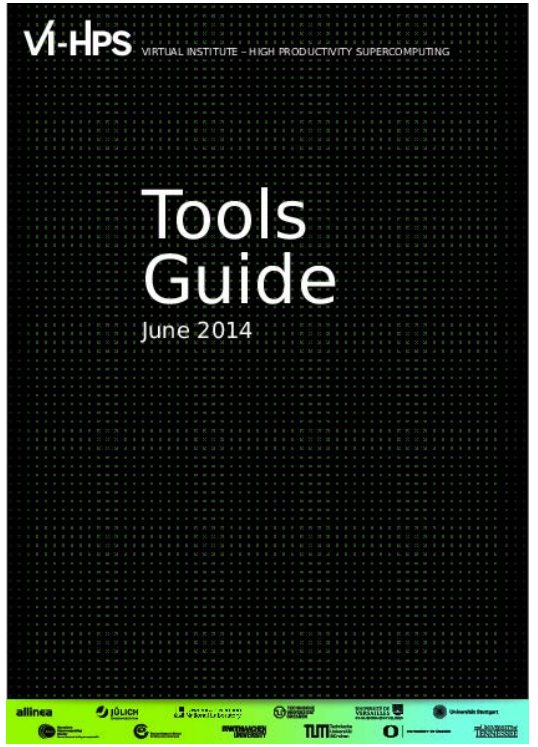
Productivity tools
http://www.vi-hps.org/upload/material/general/ToolsGuide.pdf

- TAU
  - Integrated parallel performance system
- Open|SpeedShop:
  - Integrated parallel performance analysis environment
- Scalasca / CUBE
  - Large-scale parallel performance analysis
- Vampir
  - Interactive graphical trace visualization & analysis
- MAQAO:
  - Assembly instrumentation & optimization [x86-64 only]
- mpiP/mpiPview:
  - MPI profiling tool and analysis viewer
- MUST & Archer
  - MPI & OpenMP usage correctness checking

For a brief overview of tools consult the VI-HPS Tools Guide:



Productivity tools (cont.)
http://www.vi-hps.org/upload/material/general/ToolsGuide.pdf

- Score-P: Community-developed instrumentation & measurement infrastructure
- STAT: Stack trace analysis tools
- PAPI: Interfacing to hardware performance counters
- Periscope Tuning Framework: Automatic analysis and Tuning
- DDT/MAP/PR: Parallel debugging, profiling & performance reports
- Extra-P: Automated performance modelling
- Kcachegrind: Callgraph-based cache analysis [x86 only]
- Open MPI: Integrated memory checking
- 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
- SysMon: Batch system monitor plugin for Eclipse PTP

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/NL),
    2011 (Stuttgart & Aachen), 2012 (St-Quentin/F & Garching), 2013 (Saclay/F & Jülich)
    2014 (Barcelona, Kobe/J, Saclay/F, Edinburgh/UK)
    2015 (Stuttgart, Grenoble & Santiago/Chile), 2016 (Kobe/J, LRZ Munich/GER, LLNL/US)

Scope for this Workshop / Deep-Dive

- **Score-P**
  - Instrumentation and measurement
- **CUBE**
  - Analysis report exploration and processing
- **Scalasca**
  - Automated trace analysis
- **Vampir**
  - Interactive trace analysis
- **MAQAO**
  - Performance analysis and optimization
- **MUST**
  - Runtime error detection for MPI
- **ARCHER**
  - Runtime error detection for OpenMP

Christian Feld
David Boehme (LLNL)

Bert Wesarg

Cedric Valensi
Emmanuel Oseret

Joachim Protze

Agenda

Wednesday 7/27

9:30-noon / Armadillo Room

- Introduction into performance engineering
- Instrumenting with Score-P
- Profile analysis with CUBE
- Trace analysis with Scalasca
- Introduction into Vampir

Thursday 7/28

9:30-noon / Armadillo Room

- Interactive trace analysis with Vampir
- Analysis and optimization with MAQAO

- MPI error detection with MUST
- OpenMP race detection with ARCHER

Wednesday 7/27 (pm), Thursday 7/28 (pm), Friday 7/29 (am)

- 1:1 Sessions with the tool developers
- Bring your own codes and try them out with the various tools (target system: sierra)
- Please contact Martin Schulz / schulzm@llnl.gov