VI-HPS

SPPEXA

SC14 New Orleans, LA | hpc matters.

# 3rd Workshop on Extreme-Scale Programming Tools

17 November 2014

http://www.**vi-hps.org**/symposia/other/espt-sc14.html

**Mission**: 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
    - diagnose programming errors and optimization opportunities
  - Training & support to apply tools
  - Academic workshops to exchange ideas and to promote young scientists

www.vi-hps.org

# Members


allinea


BSC
Barcelona
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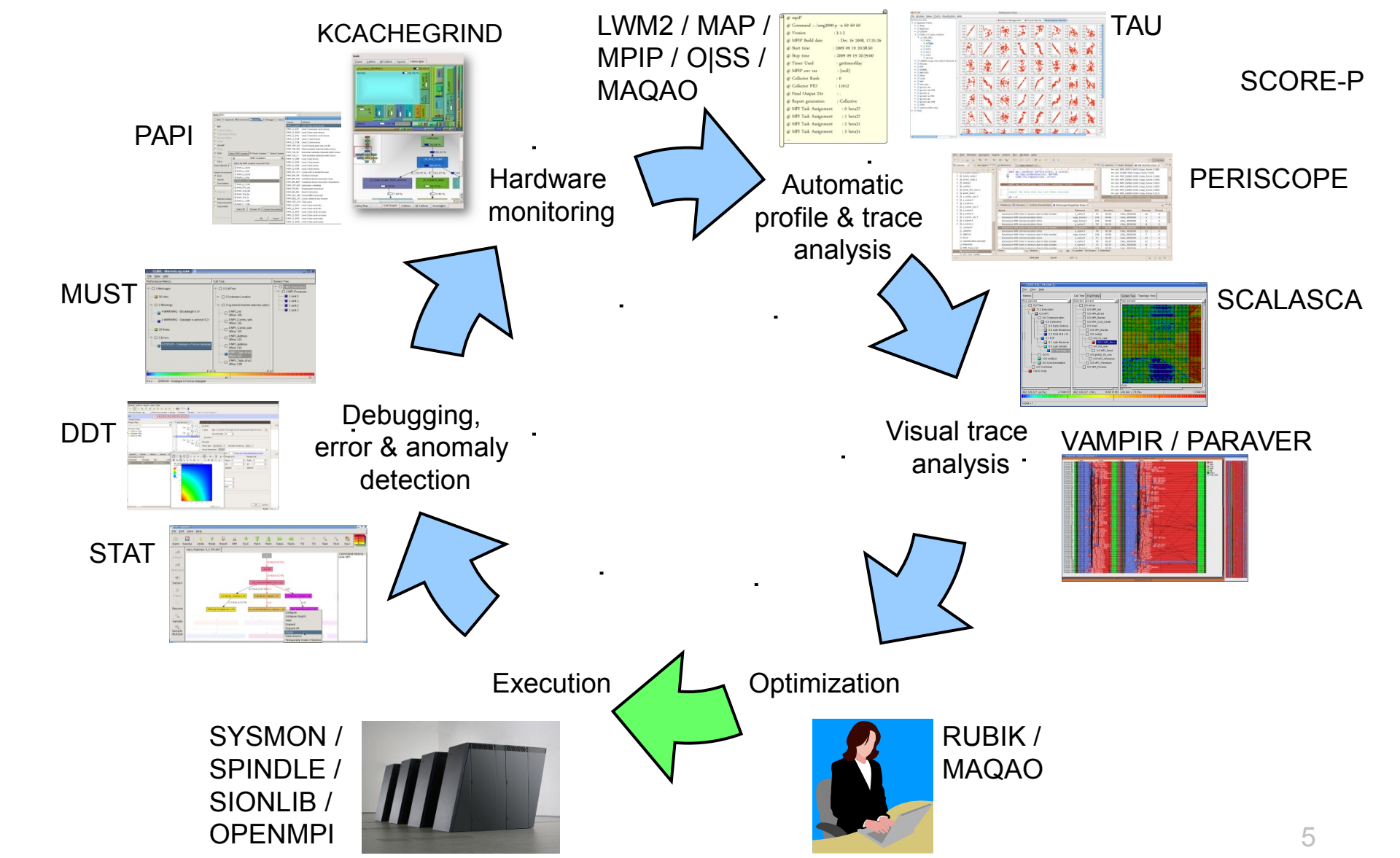
THE UNIVERSITY of
TENNESSEE


UNIVERSITÉ DE
VERSAILLES
ST-QUENTIN-EN-YVELINES

# Collaboration projects

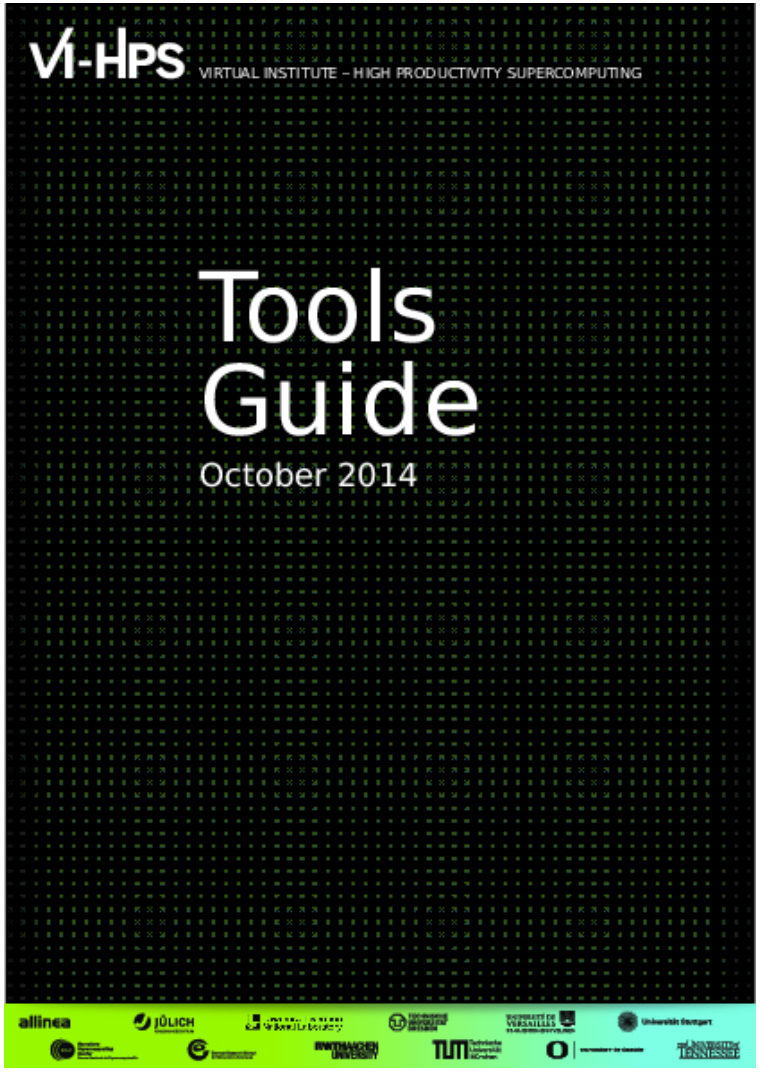

- SILC (BMBF, 2009-2011)
- PRIMA (DOE, 2009-2012)
- TEXT (EU-FP7, 2010-2012)
- H4H (ITEA-2, 2010-2013)
- HOPSA (EU-FP7, 2011-2012)
- Mont-Blanc (EU-FP7, 2011-2016)
- DEEP (EU-FP7, 2011-2015)
- ECS (G8, 2011-2014)
- LMAC (BMBF, 2011-2014)
- Catwalk (DFG, 2013-2015)
- Score-E (BMBF, 2014-2016)
- PRIMA-X (DOE, 2014-2016)

# Tools and their integration



# Tools Guide

- Brief tools overviews
  - capabilities
  - support for systems, programming models and languages
- To assist with selection of best-suited tools



# Training

- Tuning workshops
  - 3-5 days with dedicated HPC system or cluster
  - Bring your own application codes
  - Mostly now via PRACE Advanced Training Centre curriculum
- Short courses
  - Reduced tuning workshops (2-3 days)
  - CSCS, DKRZ, DLR, KAUST, NCAR, NLHPC, VŠB
- Conference tutorials
  - Half-day or full-day with hands-on exercises
  - Generally using Live-ISO image within virtual machine
  - Cluster, EuroMPI, Euro-Par, ICCS, ISC, **SC**, XSEDE
- Other invited training events
  - DEISA, PRACE

# VI-HPS Tuning Workshops

TW1 (03/08, RWTH, Aachen)
TW2 (10/08, ZIH, Dresden)
TW3 (02/09, JSC, Jülich)
TW4 (09/09, HLRN, Bremen)
TW5 (03/10, TUM, Garching)
TW6 (05/10, SARA, Amsterdam)
TW7 (03/11, HLRS, Stuttgart)
TW8 (09/11, GRS, Aachen)
TW9 (04/12, UVSQ, St-Quentin)
TW10 (10/12, LRZ, Garching)
TW11 (04/13, MdS, Saclay)
TW12 (10/13, JSC, Jülich)
TW13 (02/14, BSC, Barcelona)
TW14 (03/14, RIKEN AICS, Kobe)
TW15 (04/14, MdS, Saclay)
TW16 (05/14, EPCC, Edinburgh)
**TW17 (02/15, HLRS, Stuttgart)**
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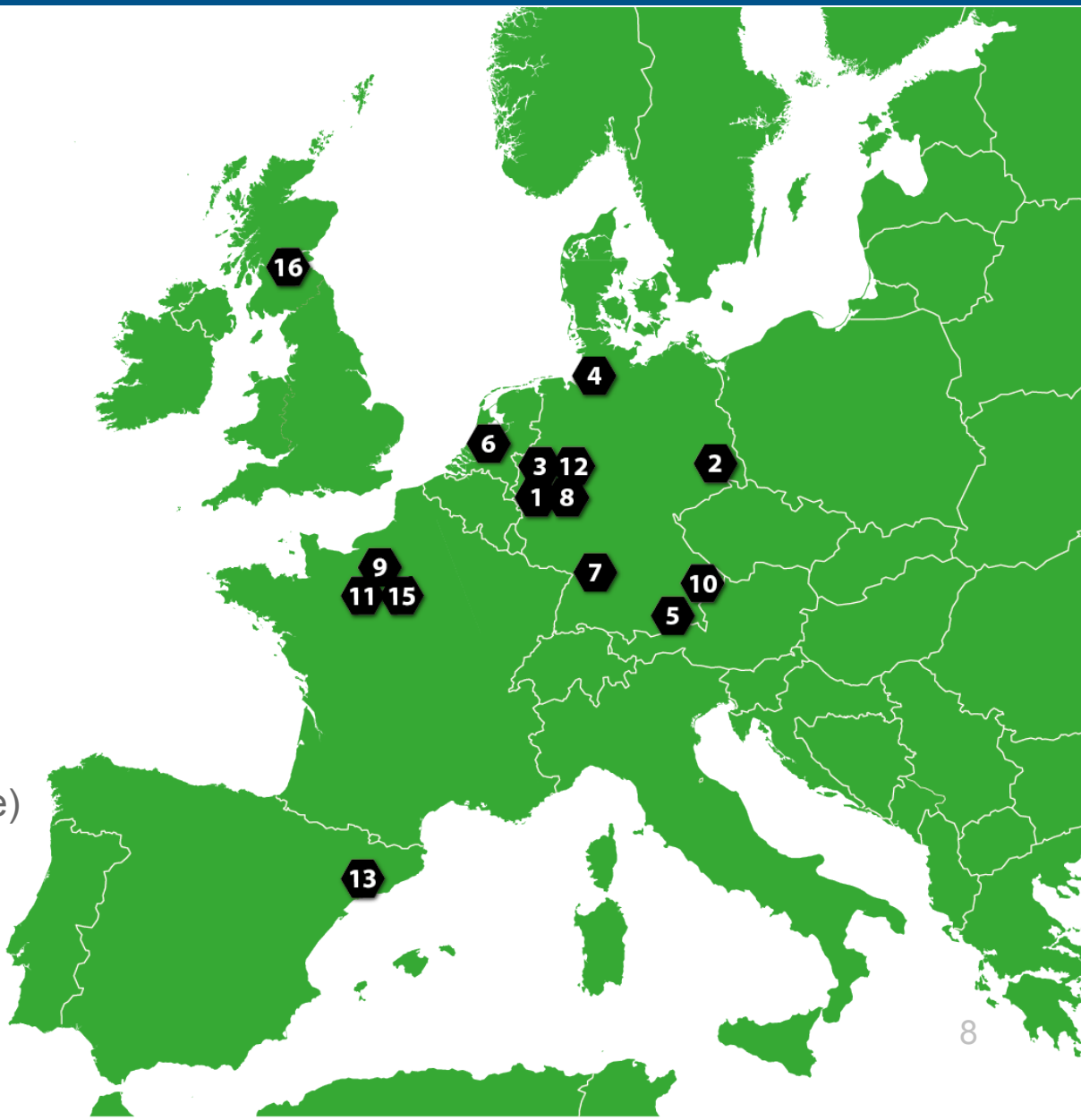

# Scientific workshops

- PROPER workshop series
  - Productivity & performance
  - Focus on tools and their application
  - Forum for young scientists
  - In conjunction with Euro-Par since 2008


- SC conference workshops
  - Extreme-scale performance tools (2012)
  - Extreme-scale programming tools (2013, 2014)
    - In cooperation with SPPEXA
    - Open call for abstracts

# ESPT@SC14 workshop

| Extreme-Scale Programming Tools | |
|---|---|
| Session 1<br>09:00-10:00 | Keynote: ***Japanese HPC Update: Exascale Research and the Next-Generation Flagship Supercomputer***<br>*– Naoya Maruyama (RIKEN AICS)* |
| Session 2<br>10:30-12:30 | Tools for measurement and analysis of parallel execution performance & efficiency<br>» 5 talks (each 20 minute slots) |
| Session 3<br>14:00-15:00 | Keynote: ***The Exascale Challenge – Are Tools the Key to Success?***<br>*– Michèle Weiland (EPCC)* |
| Session 4<br>15:30-17:30 | Frameworks for parallel application development and engineering<br>» 6 talks (each 20 minute slots) |

# Extreme-Scale Programming Tools: Session 2


| Tools for measurement and analysis of parallel execution efficiency | |
|---|---|
| 10:30 | Uncovering Degraded Application Performance with LWM²<br>– *Aamer Shah (German Research School for Simulation Sciences)* |
| 10:50 | Interactive Exploration of Fine-Grained Scalability Models<br>– *Paul Wiedeking (RWTH Aachen University)* |
| 11:10 | A Prototype of a Power API Framework<br>– *David DeBonis (Sandia National Labs)* |
| 11:30 | Whitelisting MSRs with msr-safe<br>– *Kathleen Shoga (University of the Pacific)* |
| 11:50 | Efficiently Visualizing Power, I/O, Memory and CPU Over Time at Extreme Scale<br>– *Mark O'Connor (Allinea)* |
| 12:10 | *Discussion* |

# Extreme-Scale Programming Tools: Session 3+4


| **Frameworks for parallel application development and engineering** | |
|---|---|
| 14:40 | Case Studies in Dataflow Composition of Scalable High Performance Applications – *Justin Wozniak (Argonne National Lab)* |
| 15:00 | *Break* |
| 15:30 | ExaStencils: Advanced Stencil-Code Engineering<br>– *Christian Lengauer (University of Passau)* |
| 15:50 | Generating Highly Parallel Geometric Multigrid Solvers with the ExaStencils Approach<br>– *Sebastian Kuckuk & Christian Schmitt (FAU Erlangen-Nürnberg)* |
| 16:10 | A Scalable Auto Tuning Framework using Machine Learning Techniques<br>– *Abid Malik (University of Houston)* |
| 16:30 | Reducing Measurement Overhead by Leveraging Static and Profile Information for Automated and Application-specific Instrumentation<br>– *Christian Iwainsky (Technische Universität Darmstadt)* |
| 16:50 | Intuitive Performance Engineering at the Exascale with TAU and TAU Commander – *John Linford (ParaTools, Inc.)* |
| 17:10 | *Discussion* |