

UNIVERSITY OF  
CAMBRIDGE



**22nd VI-HPS Tuning Workshop**  
**PATC Performance Analysis Workshop**

<http://www.vi-hps.org/training/tws/tw22.html>

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**Marc-André Hermanns**  
Jülich Supercomputing Centre

**Florent Lebeau**  
Allinea Ltd.

**Joachim Protze**  
RWTH Aachen

**Sameer Shende**  
University of Oregon

**Brian Wylie**  
Jülich Supercomputing Centre

## Agenda (Wednesday)

Time	Topic	Presenter
09:00	Welcome	Spiga, Bareford
09:15	Introduction to VI-HPS & overview of tools	Wylie
	Introduction to parallel performance engineering	Hermanns
	Introduction to Lab Setup	
10:30	<i>Coffee break</i>	
11:00	TAU performance system	Shende
12:30	<i>Lunch break</i>	
14:00	Hands-on coaching to apply tools to analyze your own code(s)	all
17:00	Review of day and schedule for remainder of workshop	
17:30	<i>Adjourn</i>	

## Agenda (Thursday)

Time	Topic	Presenter
09:00	Instrumentation & measurement with Score-P	Wylie
	Execution profile analysis report exploration with CUBE	Hermanns
10:30	<i>Coffee break</i>	
11:00	Configuring & customising Score-P measurements	Wylie
	Automated trace analysis with Scalasca	Hermanns
12:30	<i>Lunch break</i>	
14:00	Hands-on coaching to apply tools to analyze your own code(s)	all
17:00	Review of day and schedule for remainder of workshop	
17:30	<i>Adjourn</i>	

## Agenda (Friday)

Time	Topic	Presenter
09:00	MUST MPI runtime error detection	Protze
	ARCHER OpenMP runtime error detection	
10:30	<i>Coffee break</i>	
11:00	Allinea tools suite	Lebeau
12:30	<i>Lunch break</i>	
14:00	Review of workshop	Wylie
14:30	Hands-on coaching to apply tools to analyze your own code(s)	all
16:00	<i>Adjourn</i>	

# Virtual Institute – High Productivity Supercomputing

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- **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



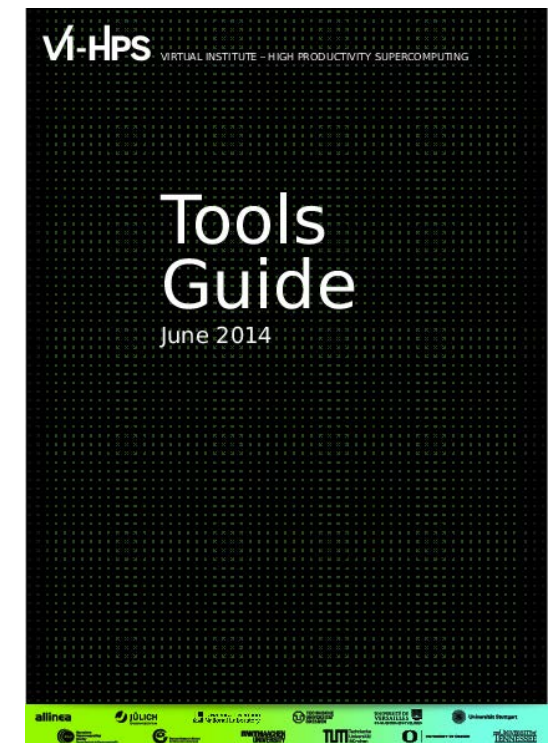
<http://www.vi-hps.org>

# Productivity tools

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- **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:

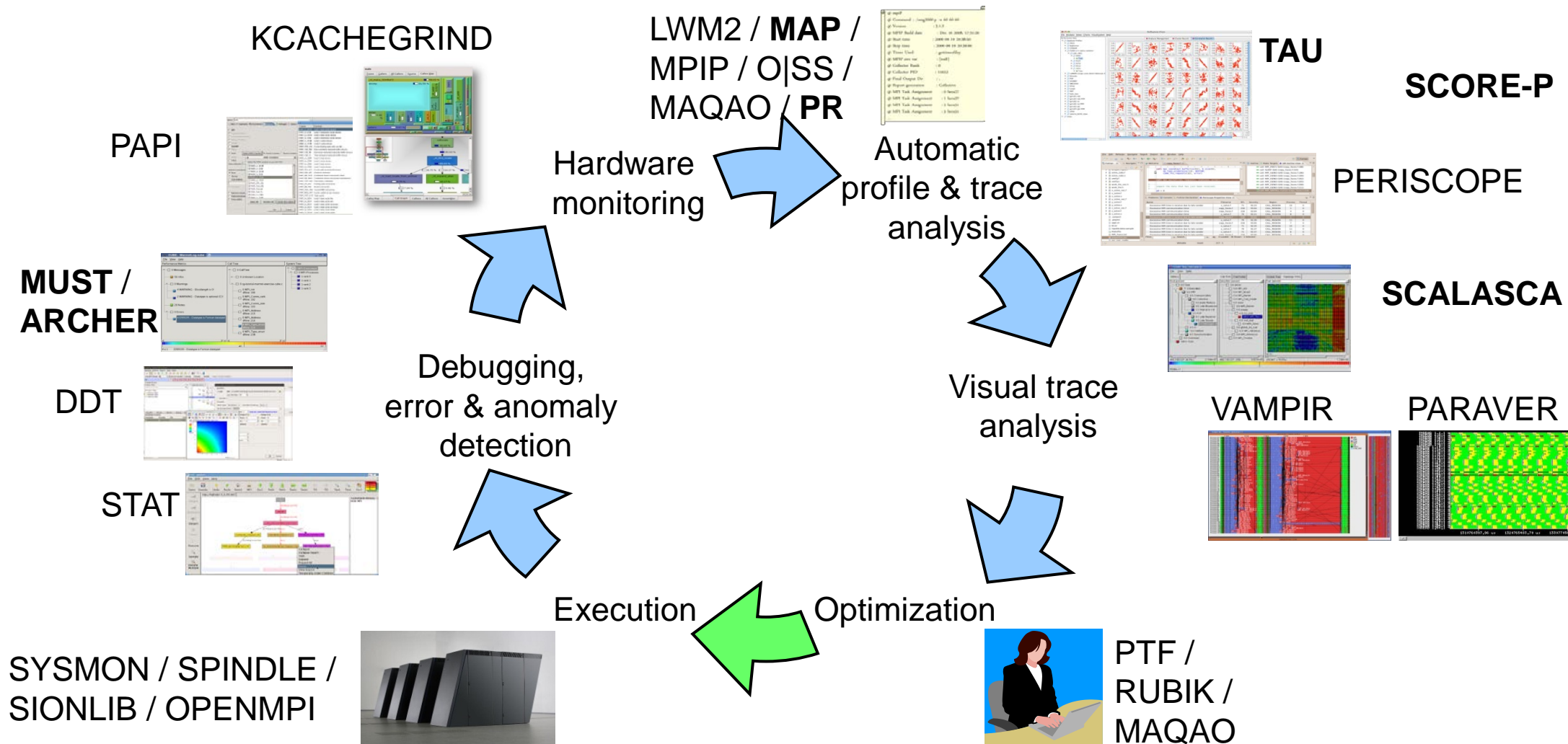


## Productivity tools (cont.)

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- **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/Extrac**: 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





## Disclaimer

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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

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- 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/Japan, [Saclay/F](#), [Edinburgh/UK](#))
  - 2015 ([Stuttgart](#), [Grenoble](#) & Santiago/Chile), 2016 (Kobe/J, [Garching](#), [Cambridge/UK](#))

