

30th VI-HPS Tuning Workshop

BSC, Barcelona, 21-25 January 2019

<http://www.vi-hps.org/training/tws/tw30.html>

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RWTH Aachen University

Cédric Valensi & Emmanuel Oseret
UVSQ

Egor Kazachkov
Intel

Agenda (Monday)

Time	Topic	Presenter
09:00	Welcome	
	Introduction to VI-HPS & overview of tools	Giménez
	Introduction to parallel performance engineering	Shende
	Introduction to lab setup; Building and running NPB-MZ-MPI	Llort
10:45	<i>Break</i>	
11:15	Paraver & Extrae performance analysis tools	Giménez
	Paraver & Extrae hands-on exercises	
13:00	<i>Lunch</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 (Tuesday)

Time	Topic	Presenter
09:00	Score-P & CUBE	Knobloch
	Score-P & CUBE hands-on exercises	
10:45	<i>Break</i>	
11:15	TAU performance system	Shende
	TAU hands-on exercises	
13:00	<i>Lunch</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 (Wednesday)

Time	Topic	Presenter
09:00	Scalasca automated trace analysis	Knobloch
	Scalasca hands-on exercises	
10:45	Break	
11:15	Extra-P automated scaling analysis	Calotoiu
	Extra-P hands-on exercises	
13:00	Lunch	
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	Adjourn	

Agenda (Thursday)

Time	Topic	Presenter
09:00	Vampir interactive trace analysis	Brunst
	Vampir hands-on exercises	
10:45	Break	
11:15	MUST & ARCHER correctness checking of MPI & OpenMP	Protze
	MUST & ARCHER hands-on exercises	
13:00	Lunch	
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	Adjourn	

Agenda (Friday)

Time	Topic	Presenter
09:00	MAQAO x86 performance analysis tools	Oseret & Valensi
	MAQAO hands-on exercises	
10:45	Break	
11:15	Intel Advisor & roofline model	Kazachkov
12:30	Review of workshop	
13:00	Lunch	
14:00	Hands-on coaching to apply tools to analyze your own code(s)	all
17:00	Adjourn	

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

HELMHOLTZ
RESEARCH FOR GRAND CHALLENGES

<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

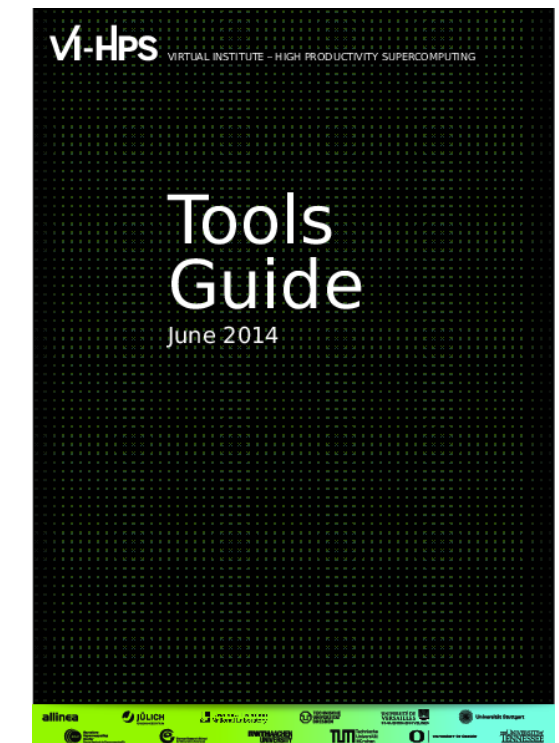
- **Vampir**

- Interactive graphical trace visualization & analysis

- **Score-P**

- Community-developed instrumentation & measurement infrastructure

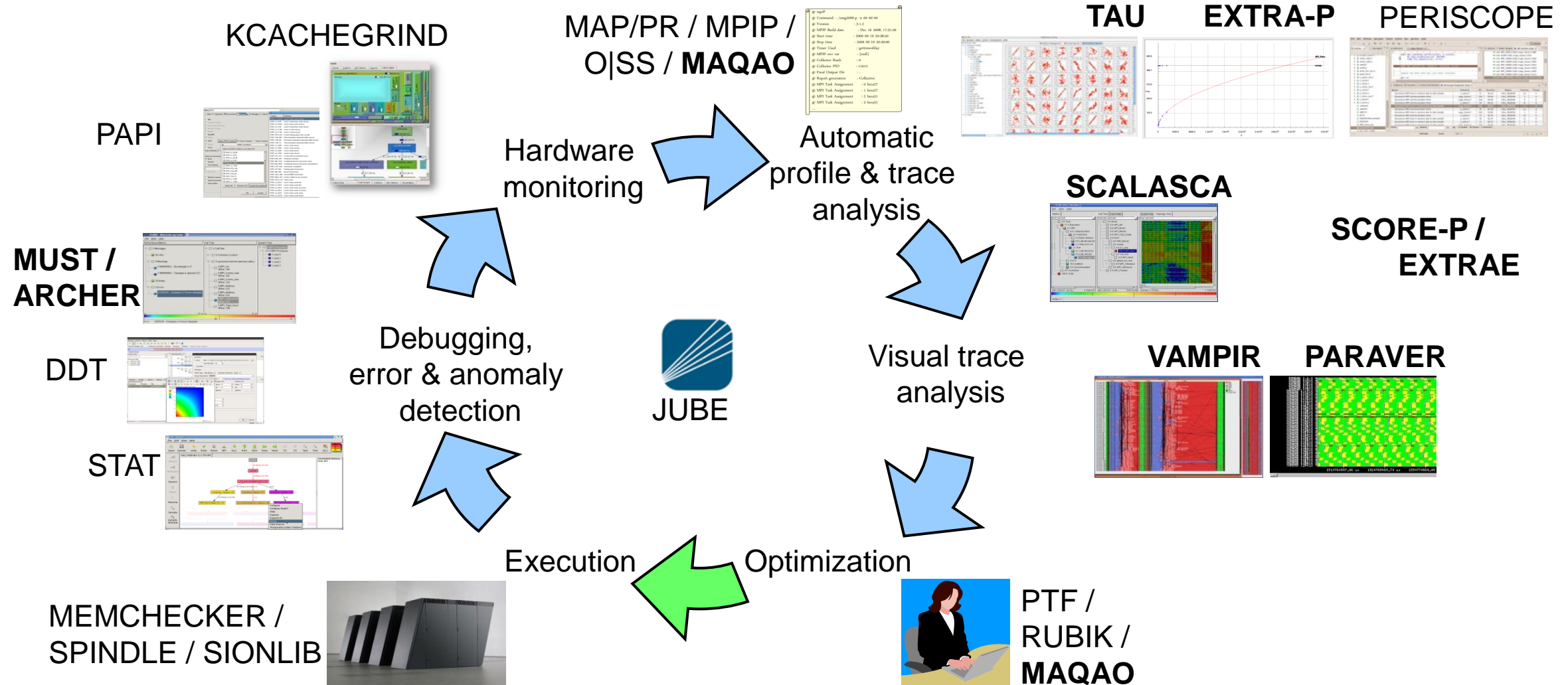
For a brief overview of tools consult the VI-HPS Tools Guide:



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, 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

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

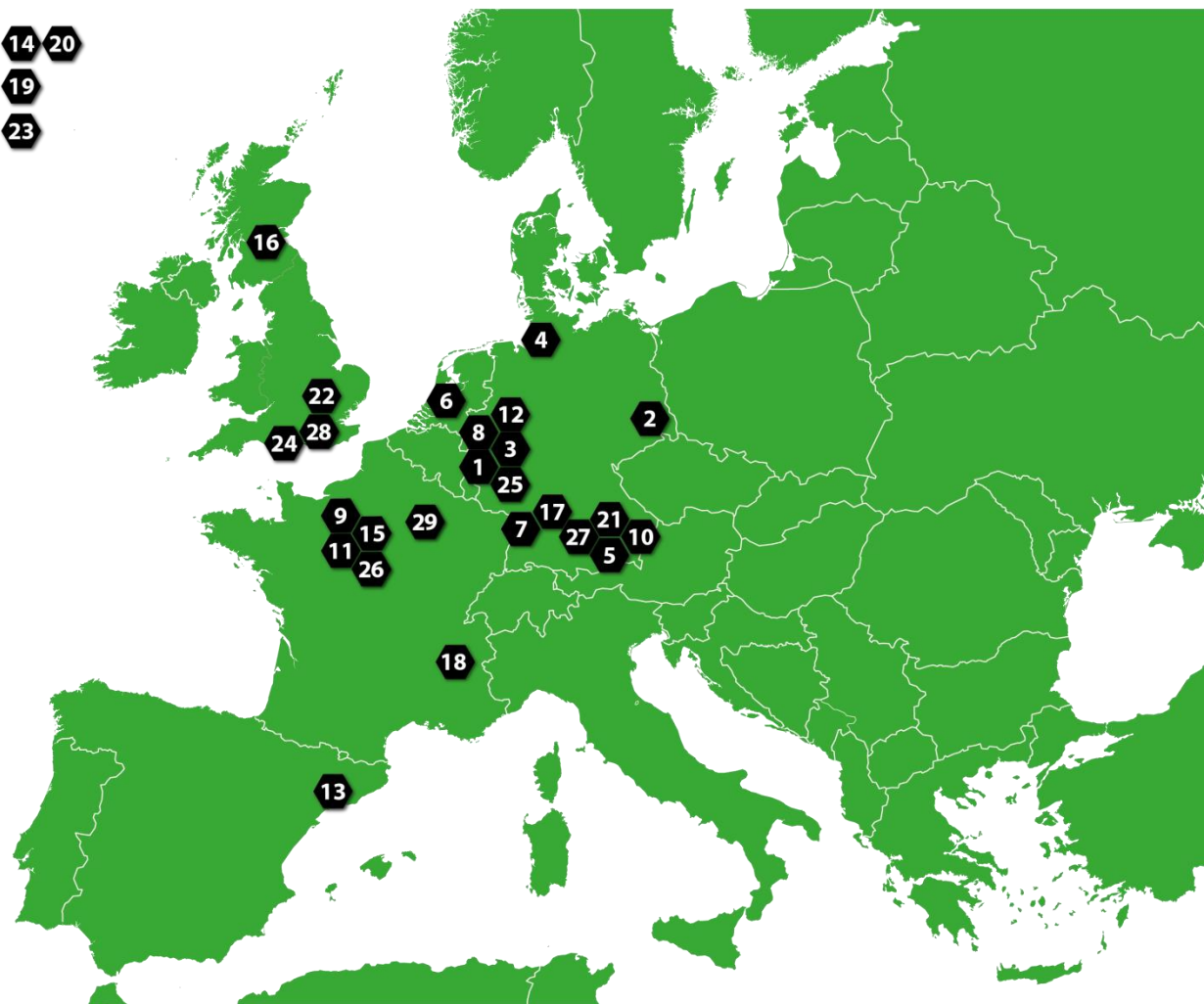
- Goals
 - Give an overview of the programming tools suite
 - Explain the functionality of individual tools
 - Teach how to use the tools effectively
 - Offer hands-on experience and expert assistance using tools
 - Receive feedback from users to guide future development
- For best results, bring & analyze/tune your own code(s)!
- VI-HPS Hands-on Tutorial series
 - **SC'08-11/13/14/15/16/17**, ICCS'09, Cluster'10, EuroMPI'12/14, XSEDE'13, **ISC-HPC'15-18**
- VI-HPS Tuning Workshop series
 - 2008 (x2), 2009 (x2), 2010 (x2), 2011 (x2), 2012 (x2), 2013 (x2), 2014(x4)
 - 2015 ([Stuttgart/Germany](#), [Grenoble/France](#), Santiago/Chile)
 - 2016 (Kobe/Japan, [Garching/Germany](#), [Cambridge/UK](#), Livermore/USA)
 - 2017 ([Southampton/UK](#), [Aachen/Germany](#), Bruyères-le-Châtel/France)
 - 2018 ([Garching/Germany](#), [London/UK](#), [Reims/France](#))





VI-HPS Tuning Workshop series

JP 14 20
CL 19
US 23



1. 2008/03/05+3: RWTH, Aachen, Germany
2. 2008/10/08+3: ZIH, Dresden, Germany
3. 2009/02/16+5: JSC, Jülich, Germany
4. 2009/09/09+3: HLRN, Bremen, Germany
5. 2010/03/08+3: TUM, Garching, Germany
6. 2010/05/26+3: SARA, Amsterdam, Netherlands
7. 2011/03/28+3: HLRS, Stuttgart, Germany
8. 2011/09/05+5: GRS, Aachen, Germany
9. 2012/04/23+5: UVSQ, St-Quentin, France
10. 2012/10/16+4: LRZ, Garching, Germany
11. 2013/04/22+4: MdS, Saclay, France
12. 2013/10/07+5: JSC, Jülich, Germany
13. 2014/02/10+5: BSC, Barcelona, Spain
14. 2014/03/25+3: RIKEN AICS, Kobe, Japan
15. 2014/04/07+4: MdS, Saclay, France
16. 2014/04/29+3: EPCC, Edinburgh, Scotland
17. 2015/02/23+5: HLRS, Stuttgart, Germany
18. 2015/05/18+5: UGA, Grenoble, France
19. 2015/10/27+3: NLHPC, Santiago, Chile
20. 2016/02/24+3: RIKEN AICS, Kobe, Japan
21. 2016/04/18+5: LRZ, Garching, Germany
22. 2016/07/06+3: Uni. Cambridge, England
23. 2016/07/27+3: LLNL, Livermore, California, USA
24. 2017/02/08+3: Uni. Southampton, England
25. 2017/03/27+5: RWTH, Aachen, Germany
26. 2017/10/16+5: Lab. ECR, Ter@tec, France
27. 2018/04/23+5: LRZ, Garching, Germany
28. 2018/06/21+3: UCL, London, England
29. 2018/10/15+5: ROMEO, Reims, France

Upcoming events

- VI-HPS Tuning Workshop (24-29 June 2019, Jülich Supercomputing Centre, Germany)
- Further events to be determined
 - (one-day) tutorials: with guided exercises sometimes using a Live-ISO/OVA
 - (multi-day) training workshops: with your own applications on actual HPC systems
- Check www.vi-hps.org/training for announced events
- Contact us if you might be interested in hosting a training event