

VI-HPS

SOFTWARE



0.00 <<time step loop>>
0.00 updatedt
6.62 updatex
372.85 updateien
0.00 gene
0.00 <<iteration loop>>
293.65 genbc



FAST SOLUTIONS

☒ PAPI_L1_DCM
☒ PAPI_L1_ICM
☐ PAPI_L2_DCM
☒ PAPI_L2_ICM
☒ PAPI_L2_TCM
☐ PAPI_L2_TCM

PRODUCTIVITY

Introduction to VI-HPS

Marc-André Hermanns

German Research School for Simulation Sciences

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
 - Training workshops
 - Service
 - Support email lists
 - Application engagement
 - Academic workshops

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



Forschungszentrum Jülich

- Jülich Supercomputing Centre



RWTH Aachen University

- Centre for Computing & Communication



Technical University of Dresden

- Centre for Information Services & HPC



University of Tennessee (Knoxville)

- Innovative Computing Laboratory





Barcelona Supercomputing Center

- Centro Nacional de Supercomputación



**Barcelona
Supercomputing
Center**
Centro Nacional de Supercomputación



German Research School

- Laboratory of Parallel Programming



**German Research School
for Simulation Sciences**



Lawrence Livermore National Lab.

- Centre for Applied Scientific Computing



**Lawrence Livermore
National Laboratory**



Technical University of Munich

- Chair for Computer Architecture



**TECHNISCHE
UNIVERSITÄT
MÜNCHEN**



University of Oregon

- Performance Research Laboratory

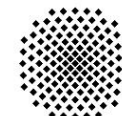


UNIVERSITY OF OREGON



University of Stuttgart

- HPC Centre



Universität Stuttgart



University of Versailles St-Quentin

- LRC ITACA

**UNIVERSITÉ DE
VERSAILLES**
ST-QUENTIN-EN-YVELINES



MUST

- MPI usage correctness checking

PAPI

- Interfacing to hardware performance counters

Periscope

- Automatic analysis via an on-line distributed search

Scalasca

- Large-scale parallel performance analysis

TAU

- Integrated parallel performance system

Vampir

- Interactive graphical trace visualization & analysis

Score-P

- Community instrumentation & measurement infrastructure

KCachegrind

- Callgraph-based cache analysis [x86 only]

MAQAO

- Assembly instrumentation & optimization [x86 only]

mpiP/mpiPview

- MPI profiling tool and analysis viewer

Open MPI

- Integrated memory checking

Open|Speedshop

- Integrated parallel performance analysis environment

Paraver/Extrac

- Event tracing and graphical trace visualization & analysis

Rubik

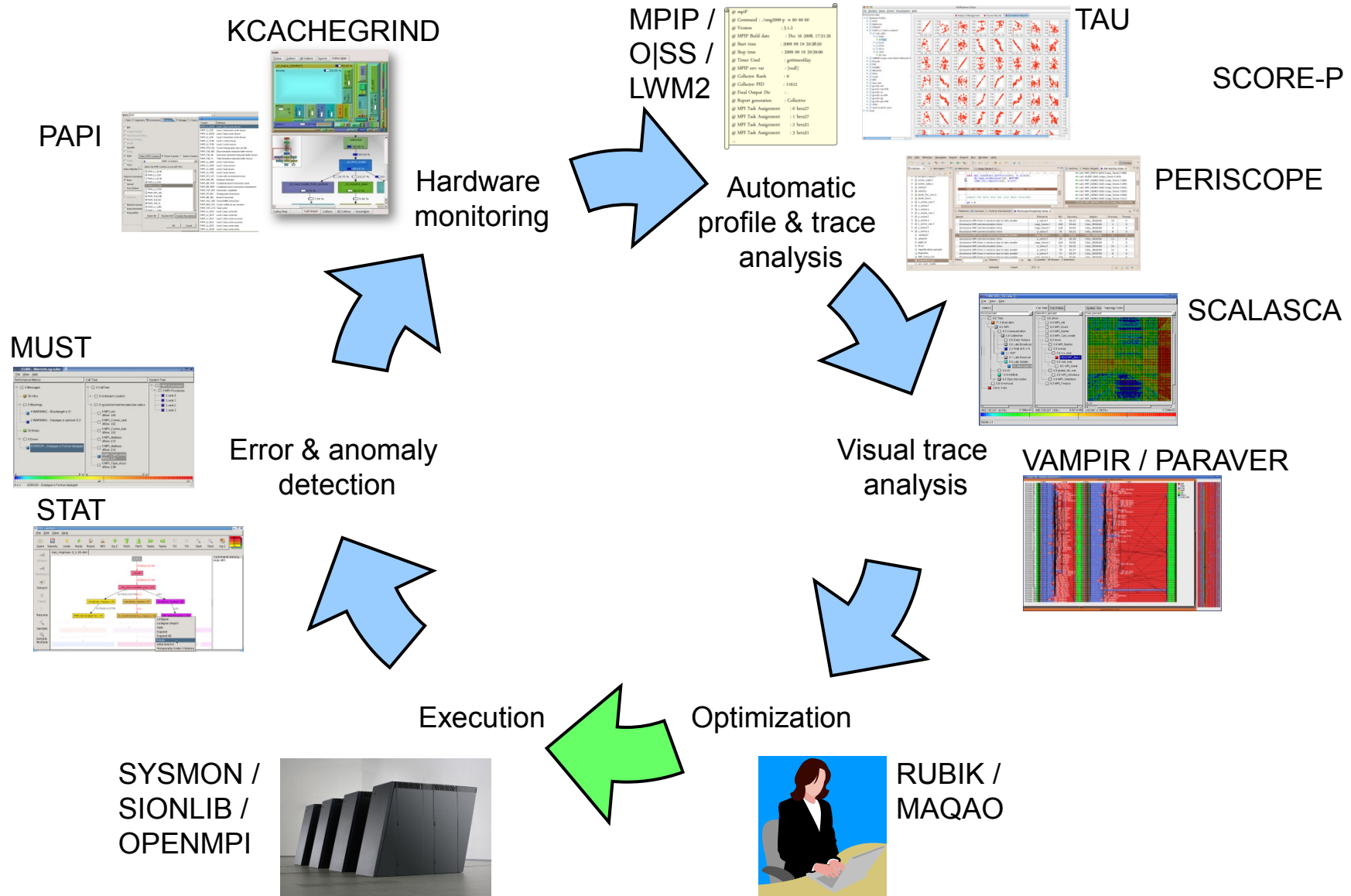
- Process mapping generation & optimization [BG only]

SIONlib

- Optimized native parallel file I/O

STAT

- Stack trace analysis tools



Tools will ***not*** automatically make you,
your applications or computer systems
more *productive*.

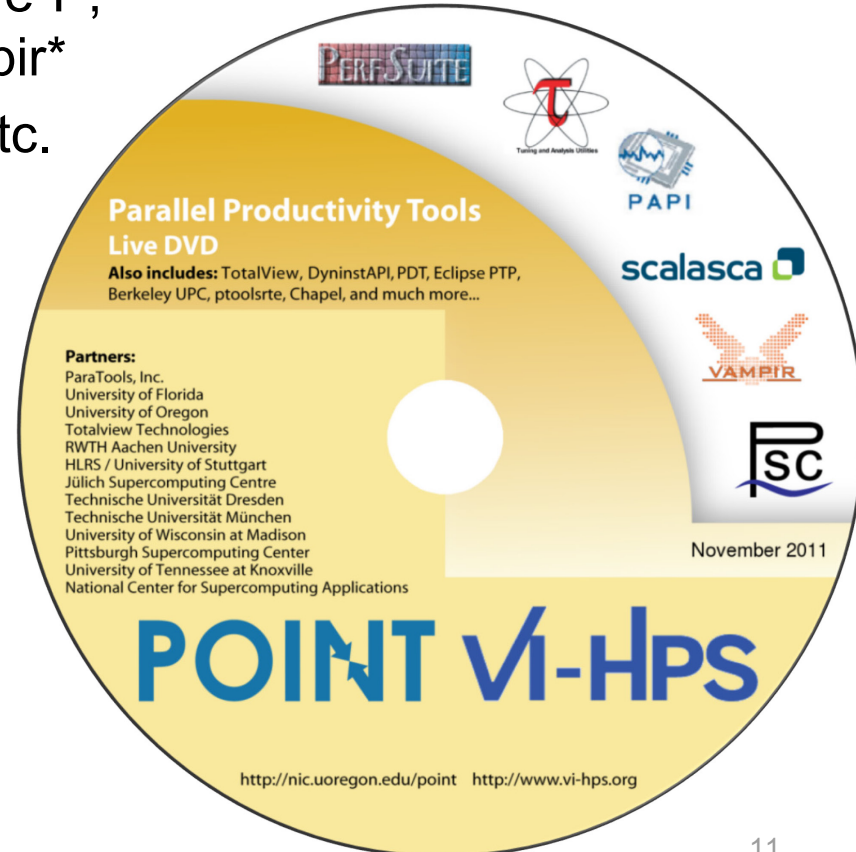
However, they can help you understand
how your parallel code executes and
when / where it's necessary to work on
correctness and *performance* issues.

- 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, ICCS'09, SC'09, Cluster'10, SC'10, SC'11, EuroMPI'12, XSEDE'13 (San Diego), SC'13 (Denver)
- 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/Spain, Kobe/Japan, Saclay/France, Edinburgh/UK)

- 16th VI-HPS Tuning Workshop (29.04-01.05, Edinburgh)
 - Hosted by EPCC (UK PATC), using *Archer* Cray XC30
 - Allinea, Score-P, Scalasca, Vampir
- Further events to be determined
 - (one-day) tutorials
 - With guided exercises usually using a Live-ISO
 - (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 an event



- Bootable Linux installation on DVD (or USB memory stick)
- Includes everything needed to try out our parallel tools on an 64-bit x86-architecture notebook computer
 - VI-HPS tools: MUST, PAPI, Score-P, Periscope, Scalasca, TAU, Vampir*
 - Also: Eclipse/PTP, TotalView*, etc.
 - * time/capability-limited evaluation licences provided for commercial products
 - GCC (w/ OpenMP), OpenMPI
 - Manuals/User Guides
 - Tutorial exercises & examples
- Produced by U. Oregon PRL
 - Sameer Shende



- ISO image approximately 5GB
 - download latest version from website
 - <http://www.vi-hps.org/training/live-iso/>
 - optionally create bootable DVD or USB drive
- Boot directly from disk
 - enables hardware counter access and offers best performance, but no save/resume
- Boot within virtual machine (e.g., VirtualBox)
 - faster boot time and can save/resume state, but may not allow hardware counter access
- Boots into Linux environment for HPC
 - supports building and running provided MPI and/or OpenMP parallel application codes
 - and experimentation with VI-HPS (and third-party) tools