

Performance Analysis with Vampir

15th VI-HPS Tuning Workshop (MdS, Saclay) 7-10 April 2014

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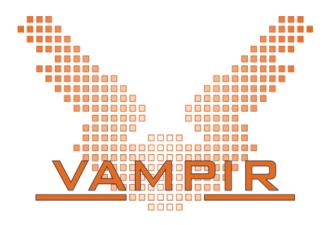
Part I: Welcome to the Vampir Tool Suite

- Mission
- Event Trace Visualization
- Vampir & VampirServer
- The Vampir Displays

Part II: Vampir Hands On

- Visualizing and analyzing NPB-MZ-MPI / BT

Part III: Summary and Conclusion



Mission



- Visualization of dynamics of complex parallel processes
- Requires two components
 - Monitor/Collector (Score-P)
 - Charts/Browser (Vampir)



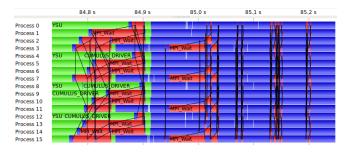
Typical questions that Vampir helps to answer:

- What happens in my application execution during a given time in a given process or thread?
- How do the communication patterns of my application execute on a real system?
- Are there any imbalances in computation, I/O or memory usage and how do they affect the parallel execution of my application?

- Alternative and supplement to automatic analysis
- Show dynamic run-time behavior graphically at any level of detail
- Provide statistics and performance metrics

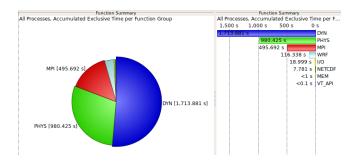
Timeline charts

 Show application activities and communication along a time axis



Summary charts

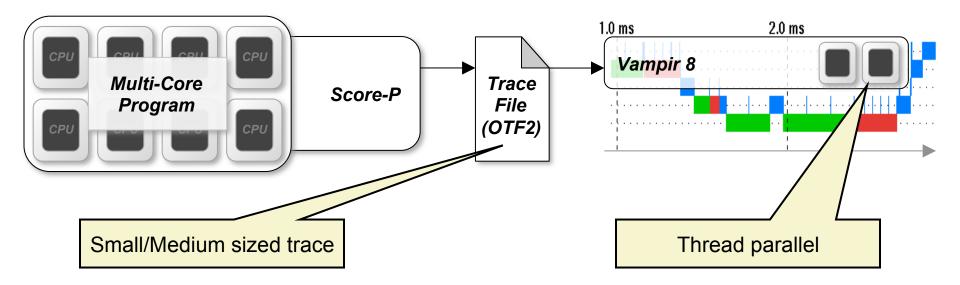
 Provide quantitative results for the currently selected time interval





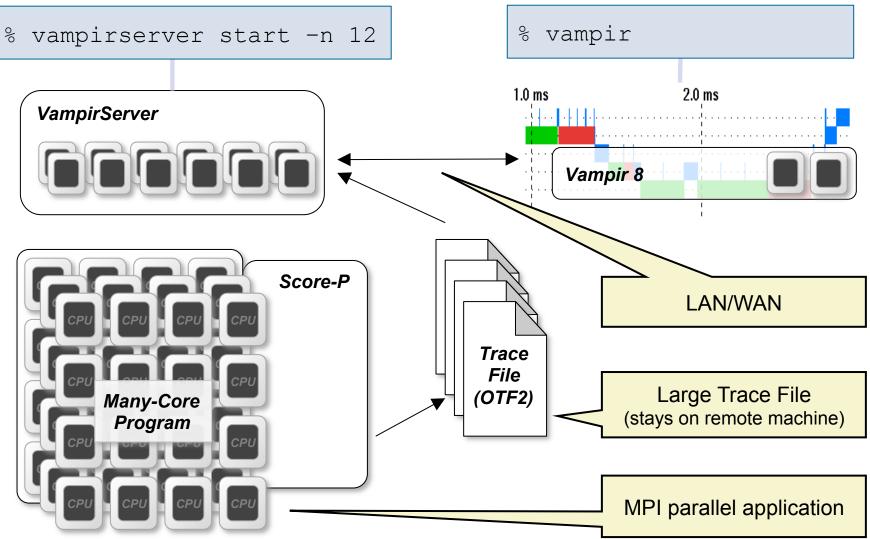
• Directly on front end or local machine

% vampir



Vampir – Visualization Modes (2)

On local machine with remote VampirServer



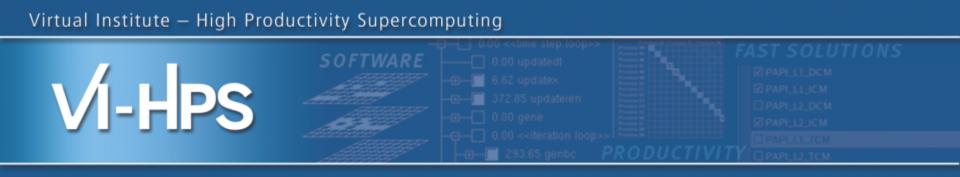
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- 1. Instrument your application with Score-P
- 2. Run your application with an appropriate test set
- 3. Analyze your trace file with Vampir
 - Small trace files can be analyzed on your local workstation
 - 1. Start your local Vampir
 - 2. Load trace file from your local disk
 - Large trace files should be stored on the HPC file system
 - 1. Start VampirServer on your HPC system
 - 2. Start your local Vampir
 - 3. Connect local Vampir with the VampirServer on the HPC system
 - 4. Load trace file from the HPC file system



- Timeline Charts:
 - Master Timeline
 - Process Timeline
 - Ucounter Data Timeline
 - Serformance Radar
- Summary Charts:
 - 🛯 ≶ Function Summary
 - 🔄 Message Summary
 - Process Summary
 - Communication Matrix View

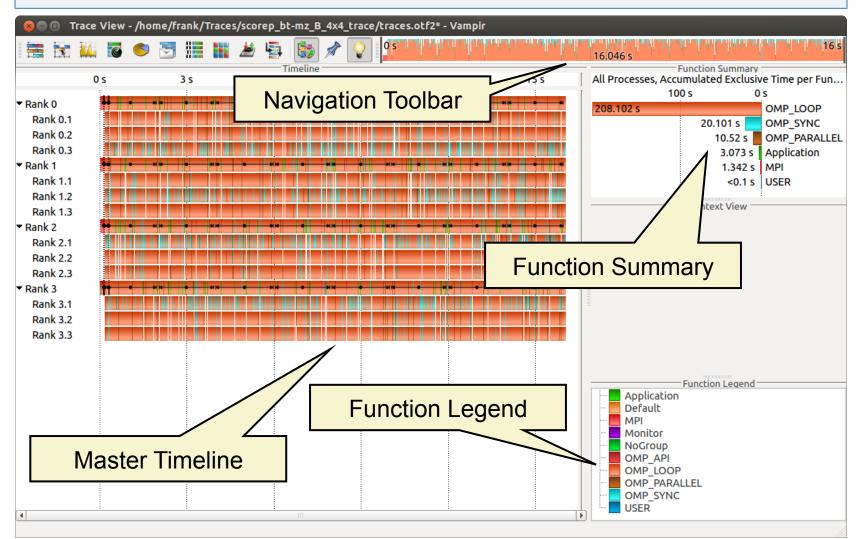


Vampir Hands on

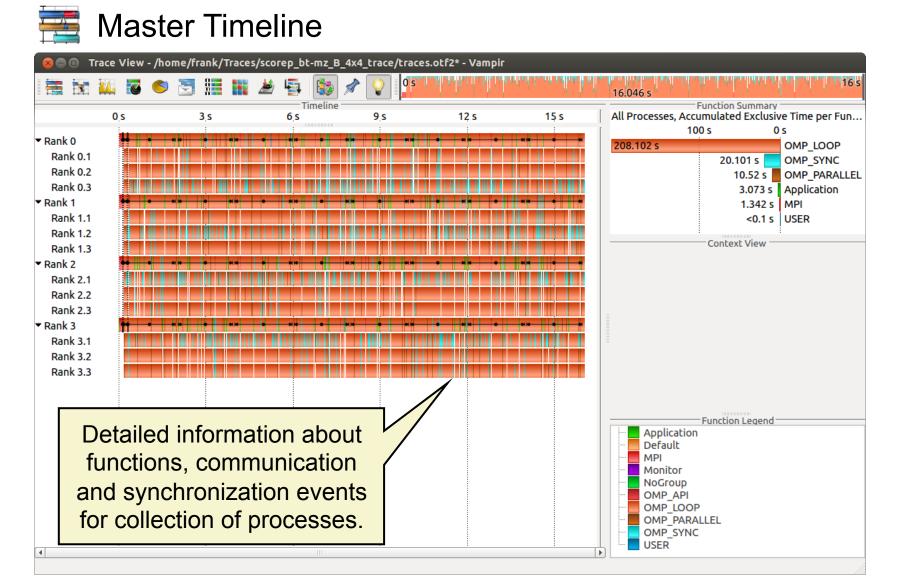
Visualizing and analyzing NPB-MZ-MPI / BT



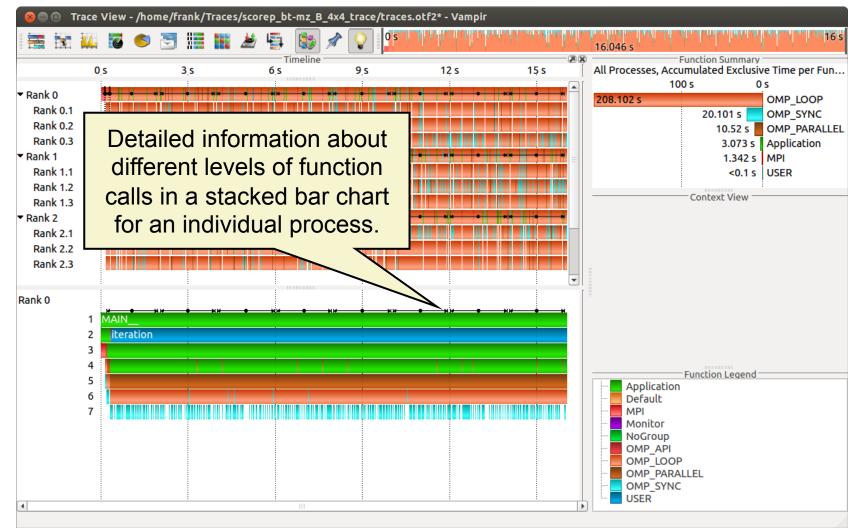
% vampir scorep_bt-mz_B_4x4_trace



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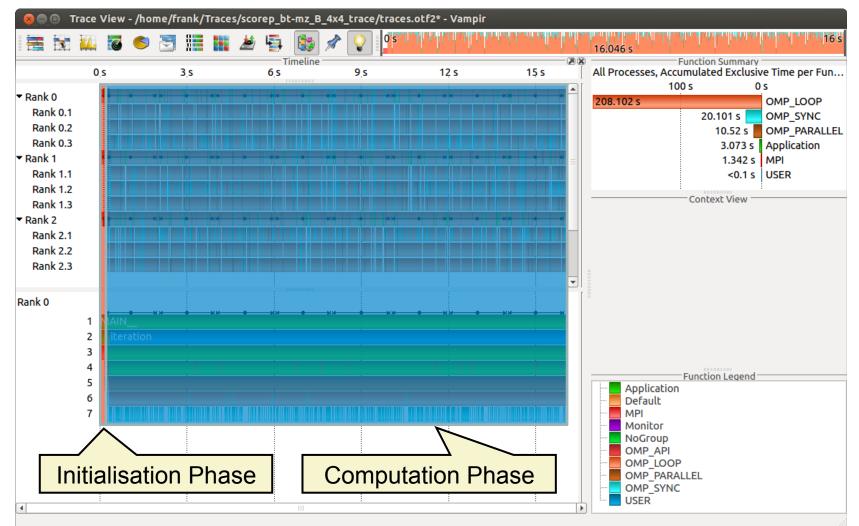


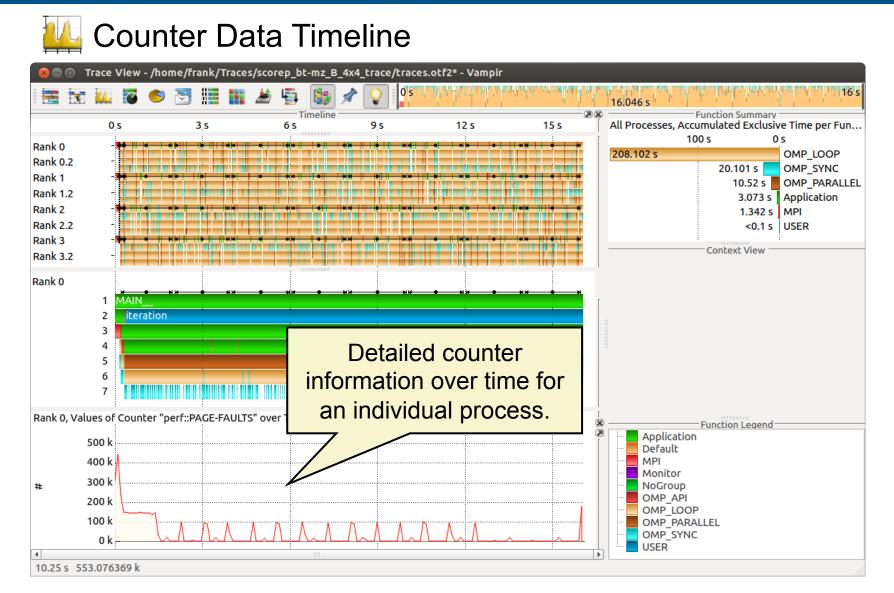
🚦 Process Timeline



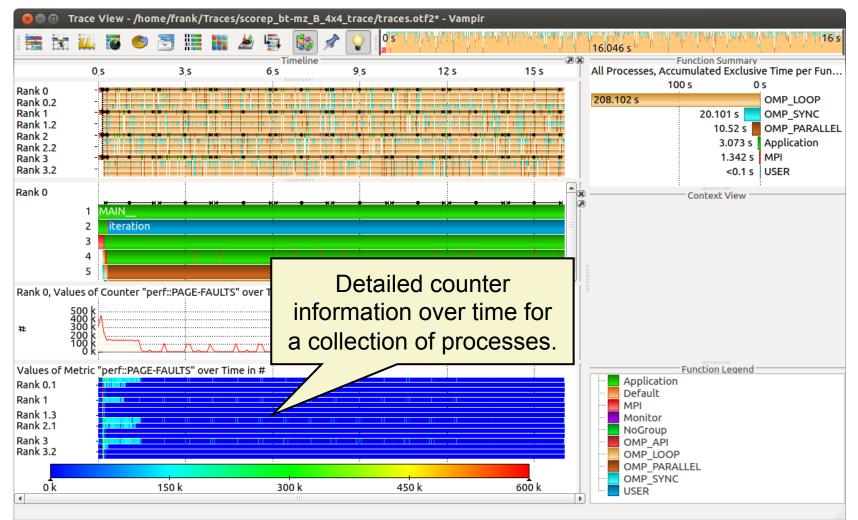
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Typical program phases

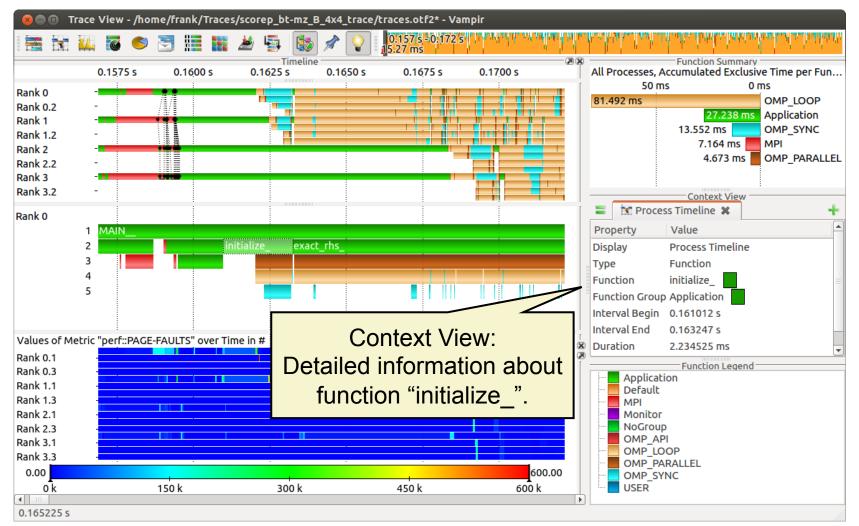




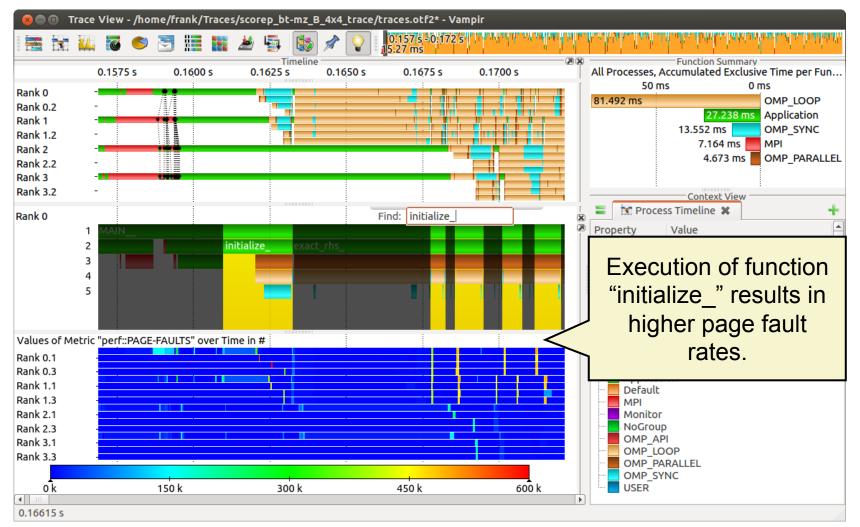
Performance Radar



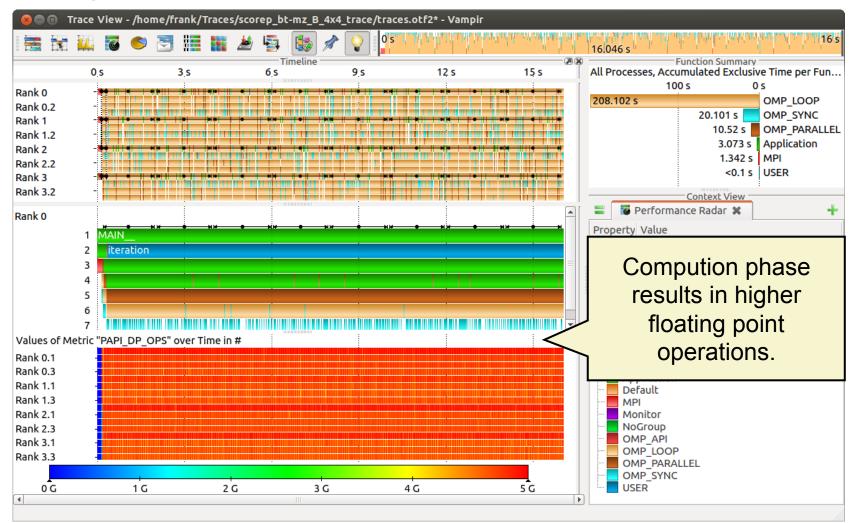
Zoom in: Inititialisation Phase



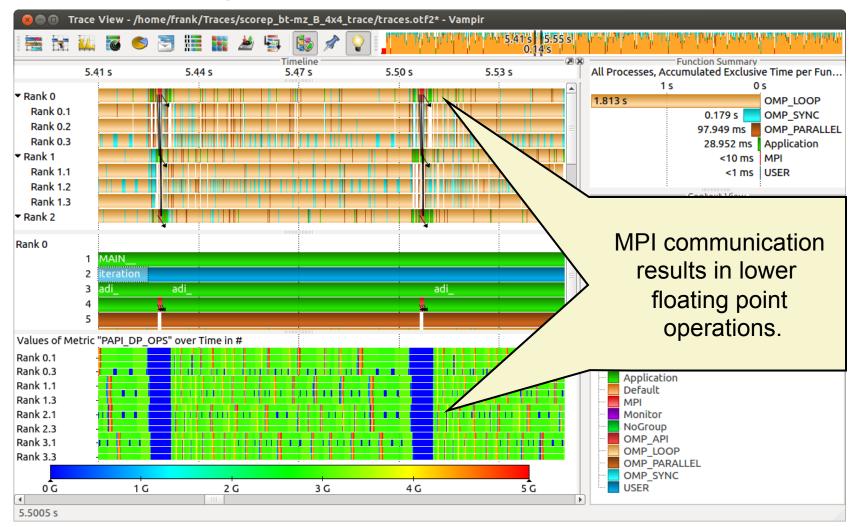
Feature: Find Function



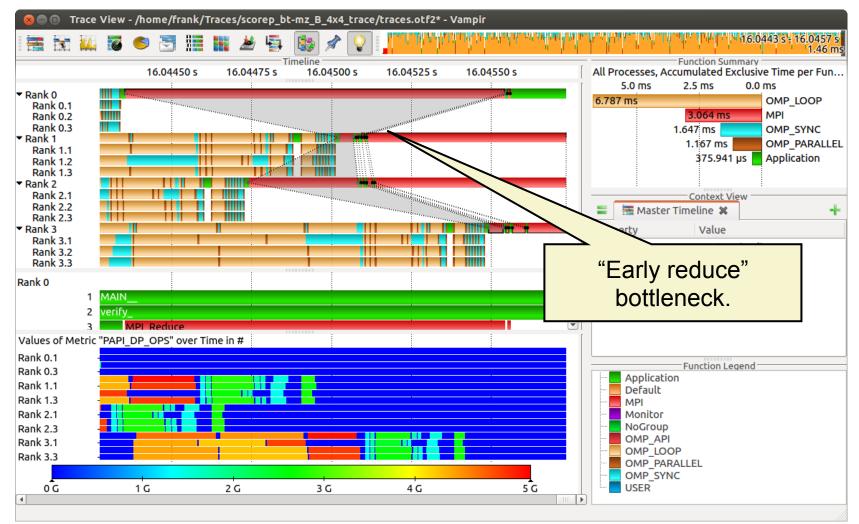
Computation Phase



Zoom in: Computation Phase



Zoom in: Finalisation Phase



Process Summary

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Summary and Conclusion





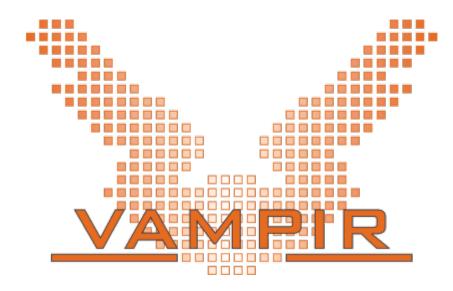


- Vampir & VampirServer
 - Interactive trace visualization and analysis
 - Intuitive browsing and zooming
 - Scalable to large trace data sizes (20 TByte)
 - Scalable to high parallelism (200000 processes)
- Vampir for Linux, Windows and Mac OS X
- Note: Vampir does neither solve your problems automatically nor point you directly at them. It does, however, give you FULL insight into the execution of your application.



- performance analysis very important in HPC
- use performance analysis tools for profiling and tracing
- do not spend effort in DIY solutions, e.g. like printf-debugging
- use tracing tools with some precautions
 - overhead
 - data volume
- let us know about problems and about feature wishes
- vampirsupport@zih.tu-dresden.de





Vampir is available at http://www.vampir.eu, get support via vampirsupport@zih.tu-dresden.de