

# **Trace Analysis with Vampir**

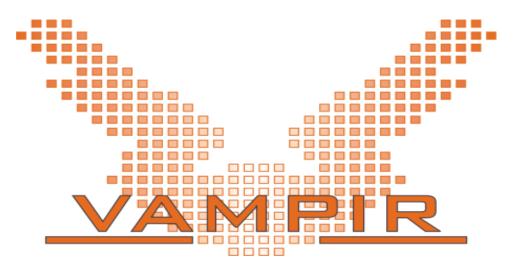
# POP COE - Online April 19-21, 2021



# VI-HPS

# Outline

- 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 heat example
- Part III: Summary and Conclusion



# Ví-HPS

# Mission

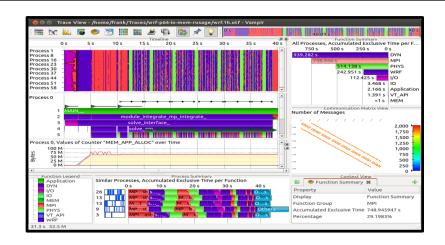
Visualization of dynamics of complex parallel processes

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?



#### **Event Trace Visualization with Vampir**

- 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, which can be zoomed and scrolled
- Master timeline showing all parallel processes/threads
- Process timeline focusing on a single process/thread

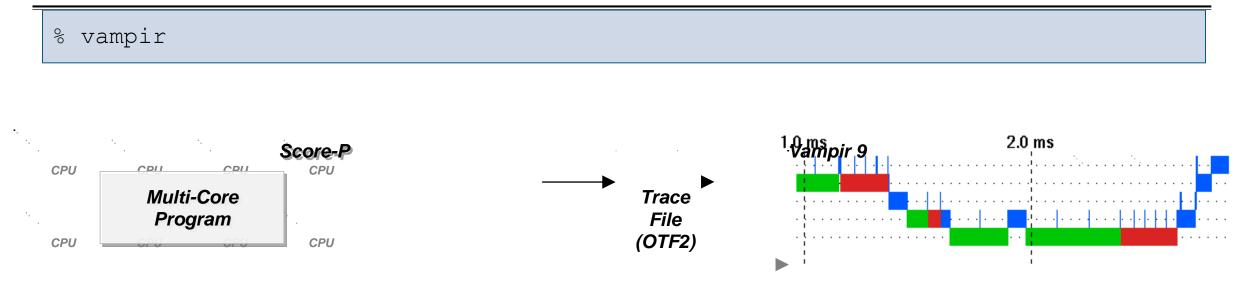
Summary charts

 Provide quantitative results for the currently selected time interval (e.g. Message Summary)

### VI-HPS

#### Vampir – Visualization Modes (1)

Directly on front end or local machine



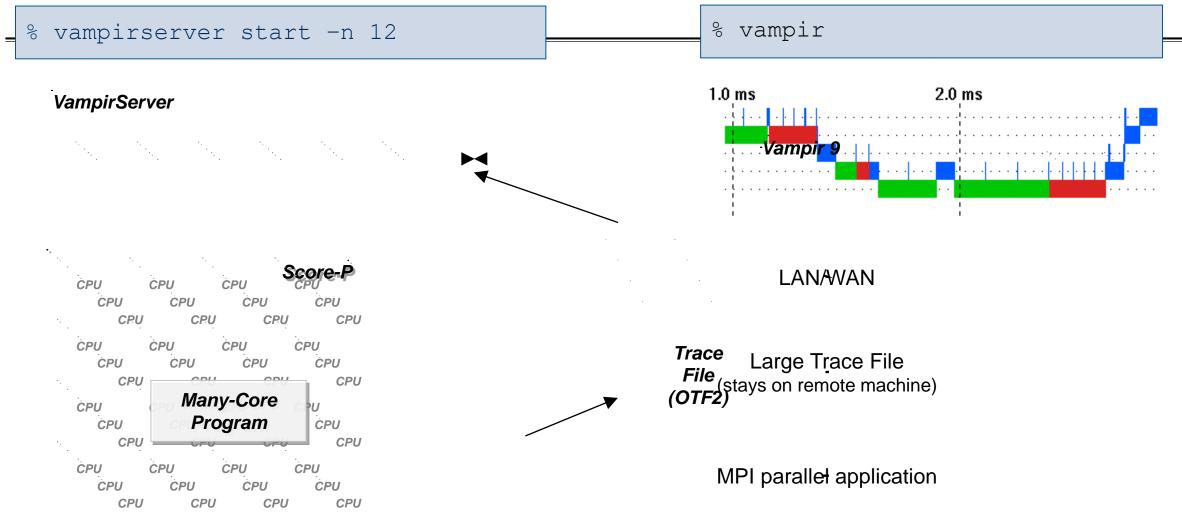
mall/Medium sized trace

Thread parallel

### VI-HPS

# Vampir – Visualization Modes (2)

On local machine with remote VampirServer



#### **Usage of the Vampir Performance Analysis Toolset**

- 1. Instrument your application with Score-P
- 1. Run your application with an appropriate test set
- 1. Analyze your trace file with Vampir
- 2. Small trace files can be analyzed on your local workstation
  - 1. Start your local Vampir
  - 2. Load trace file from your local disk
- 3. 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

#### VI-HPS The main displays of Vampir

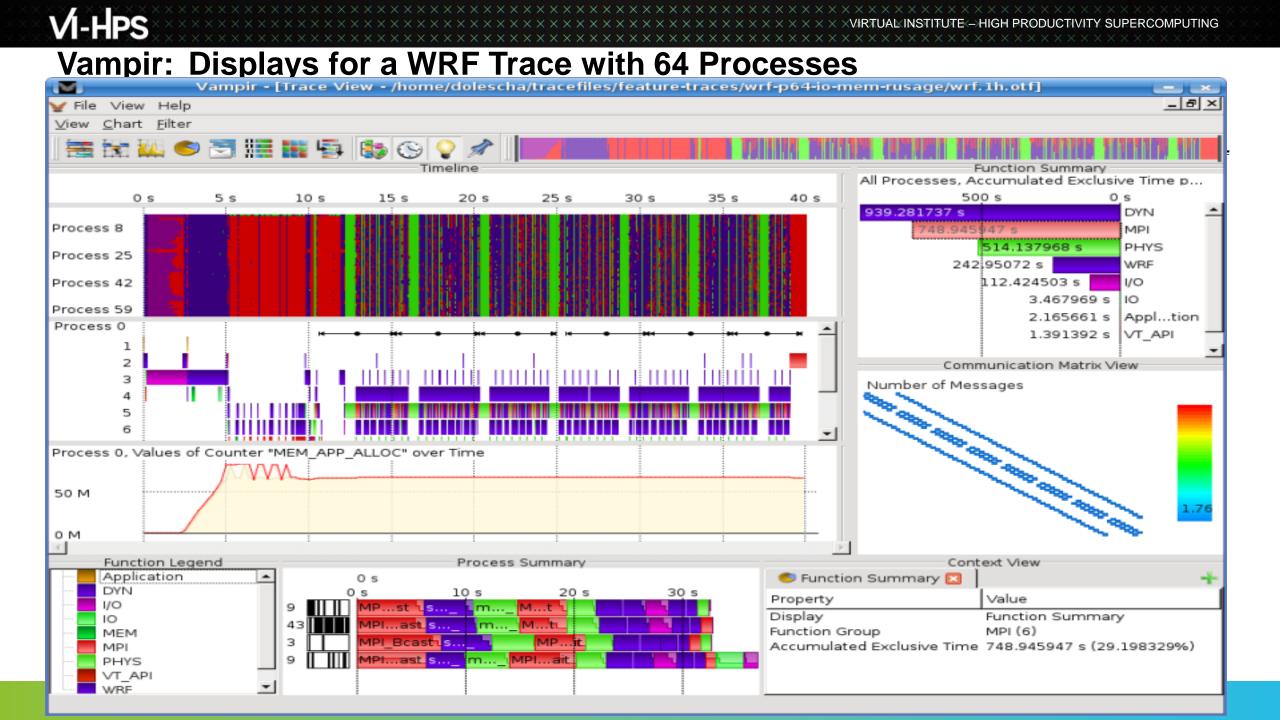
Timeline Charts:

- Master Timeline
- Process Timeline
- Counter Data Timeline

— Performance Radar

#### Summary Charts:

- Function Summary
- Message Summary
- Process Summary
- Communication Matrix View

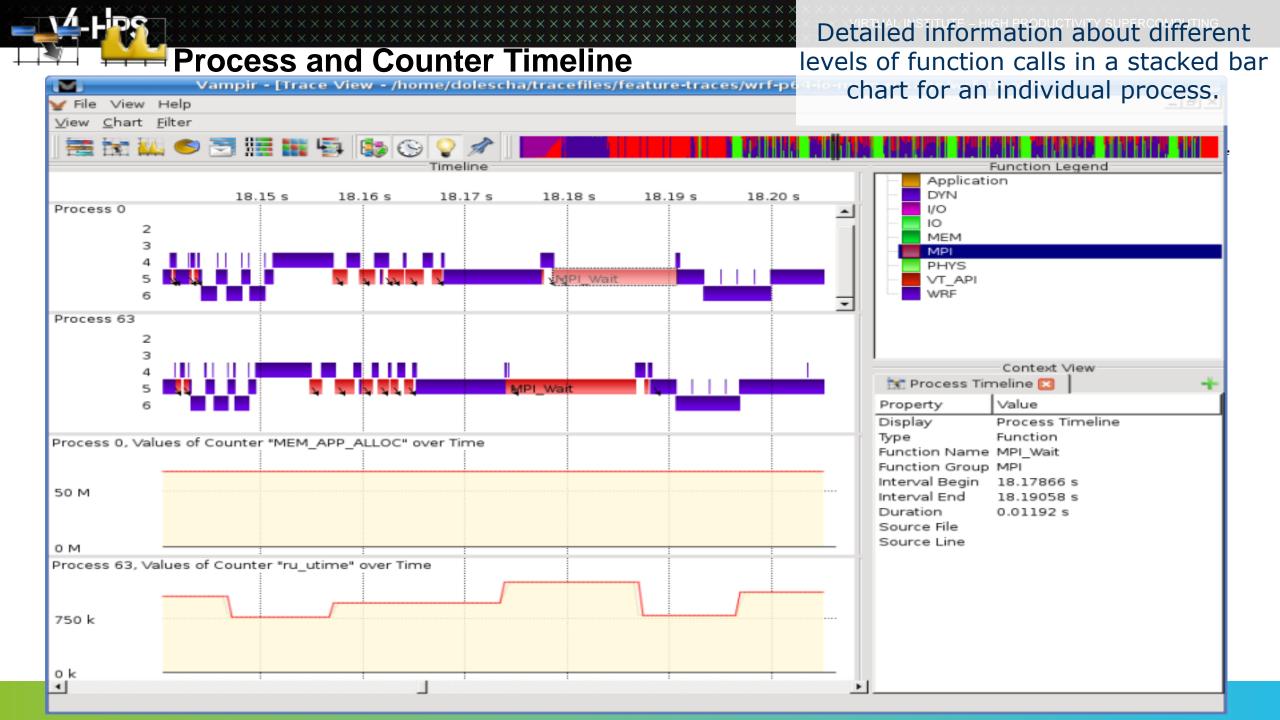




#### Detailed information about functions, communication and synchronization Vampir - [Trace View - /home/dolescha/tracefiles/feature-traces/wrf-p6 events for collection of processes.

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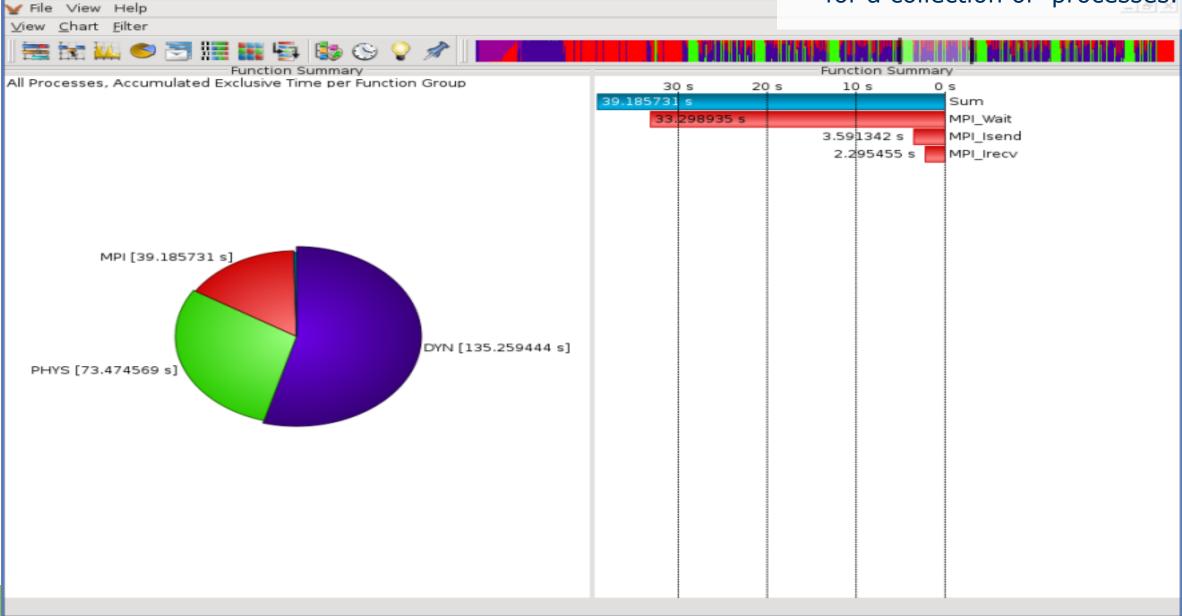


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Vampir - [Trace View - /home/dolescha/tracefiles/feature-traces/wrf-p64-i

#### **Function Summary**

Overview of the accumulated information across all functions and for a collection of processes.





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Vampir - [Trace View - /home/dolescha/tracefiles/feature-traces/wrf-p64-io-mem-r

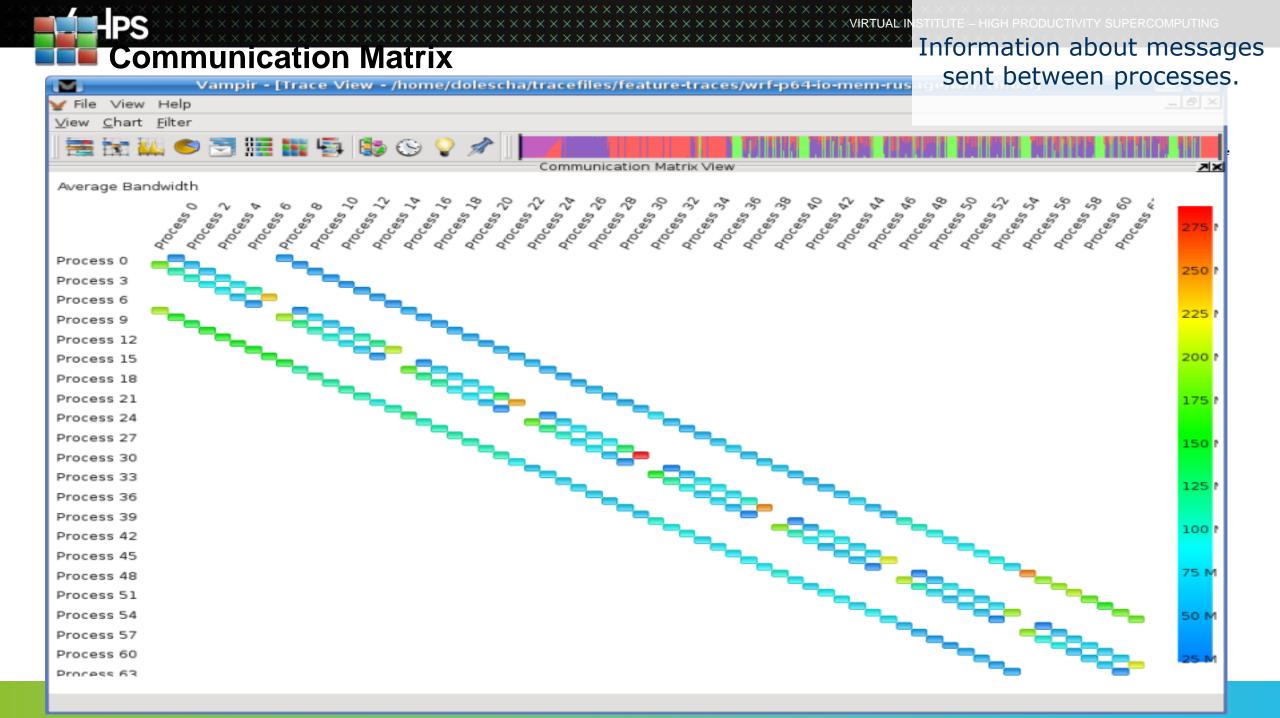
#### Process Summary

smuFind groups of similar processes and threads by using summarized function

information.

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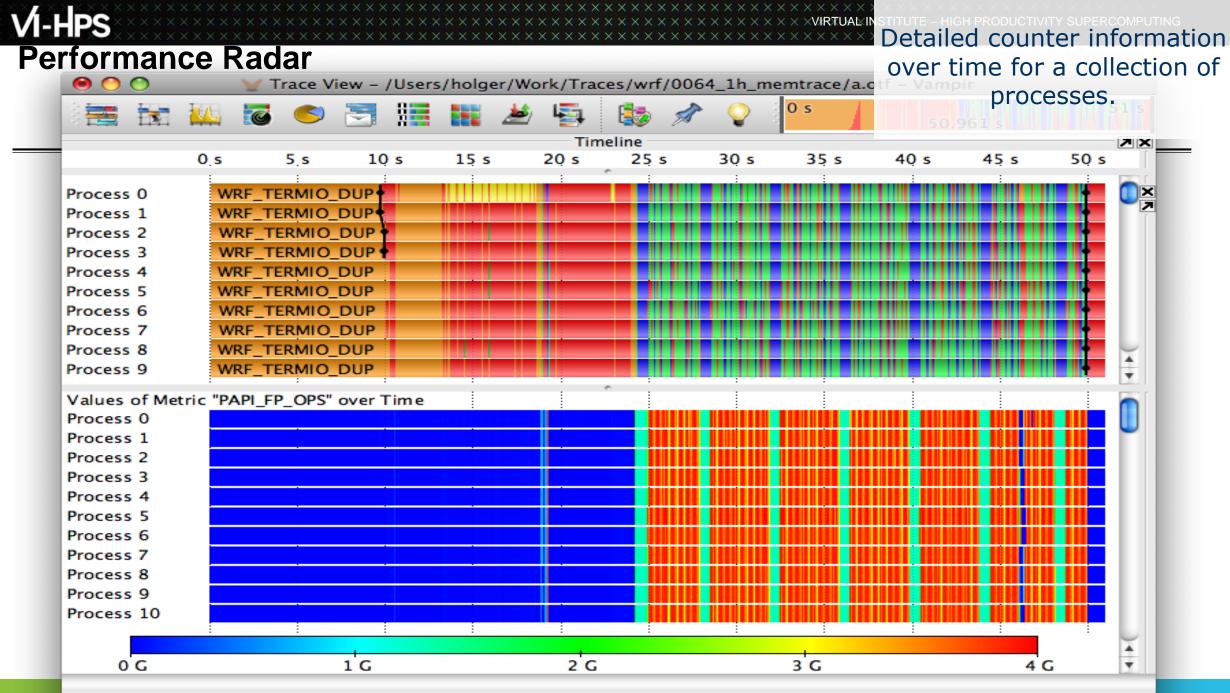
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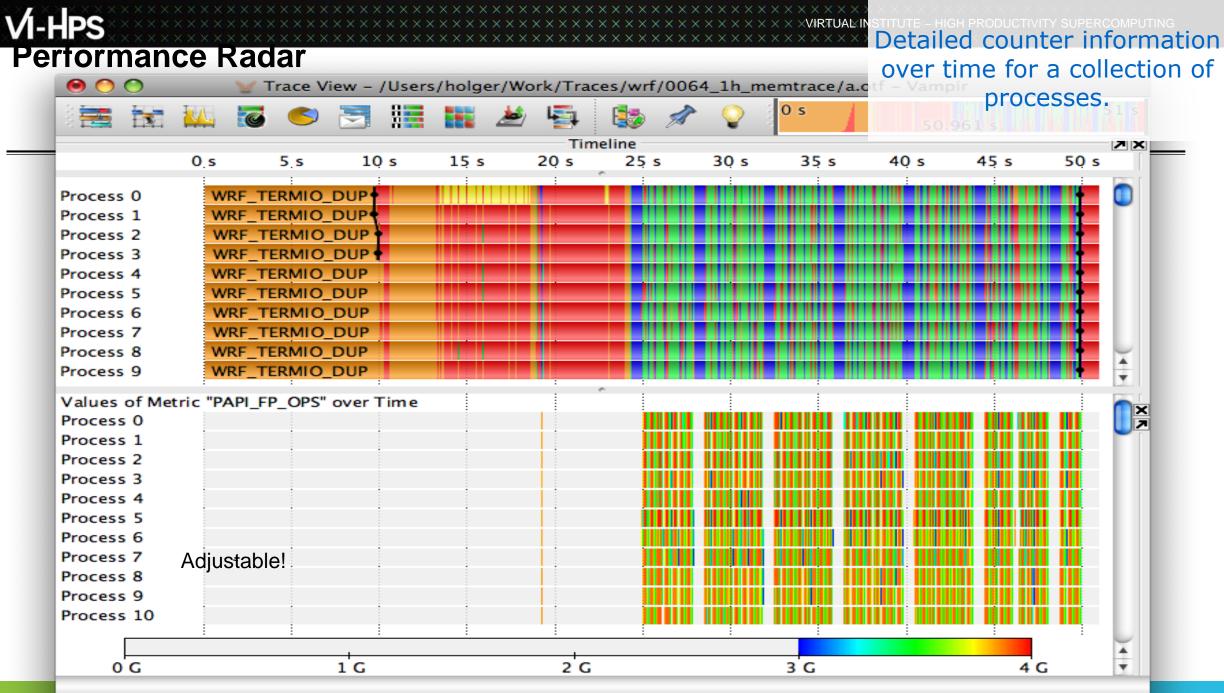


IPS Message Summary

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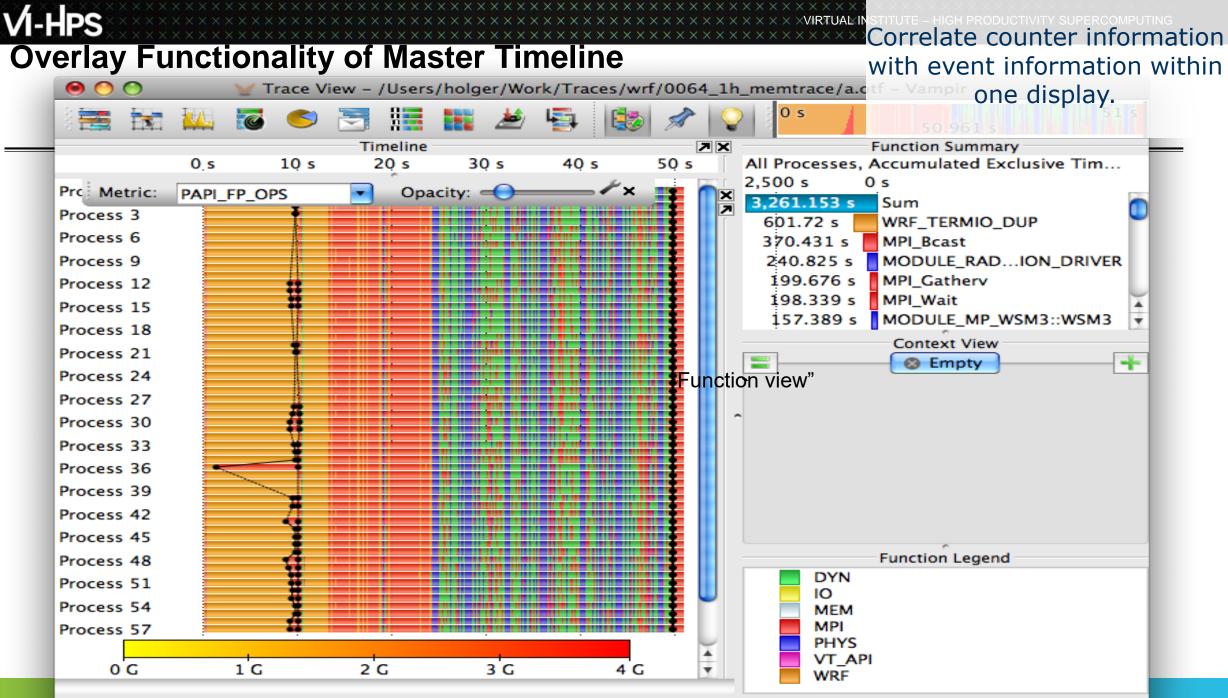


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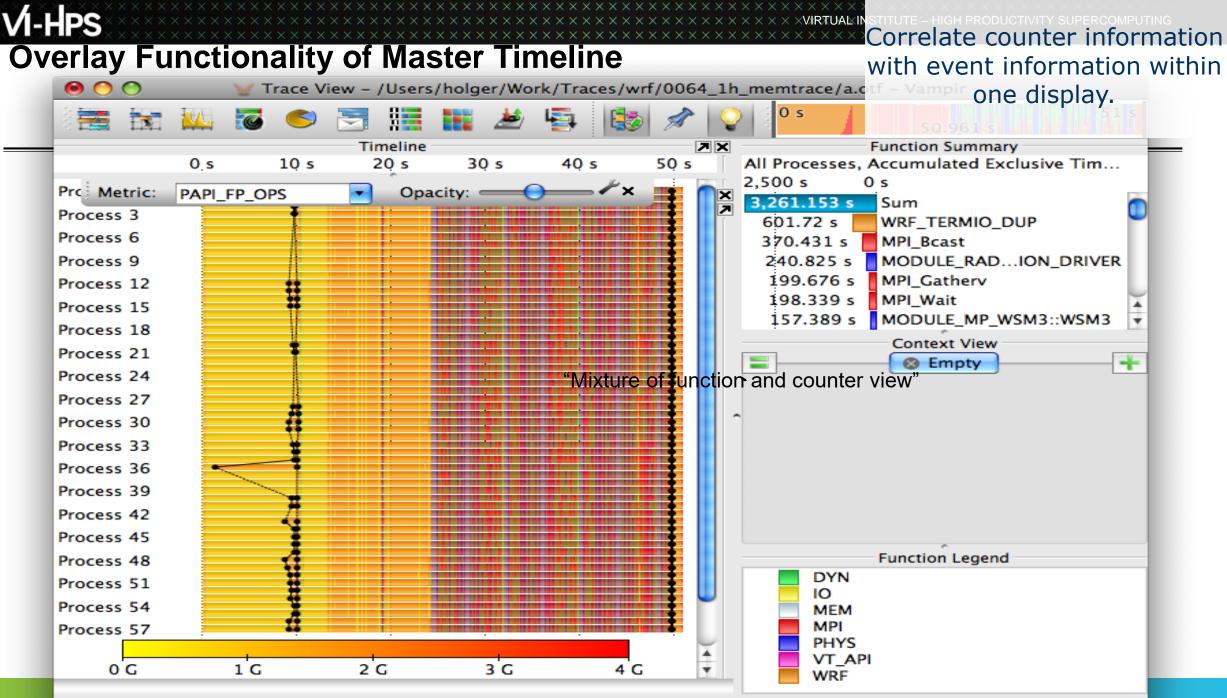
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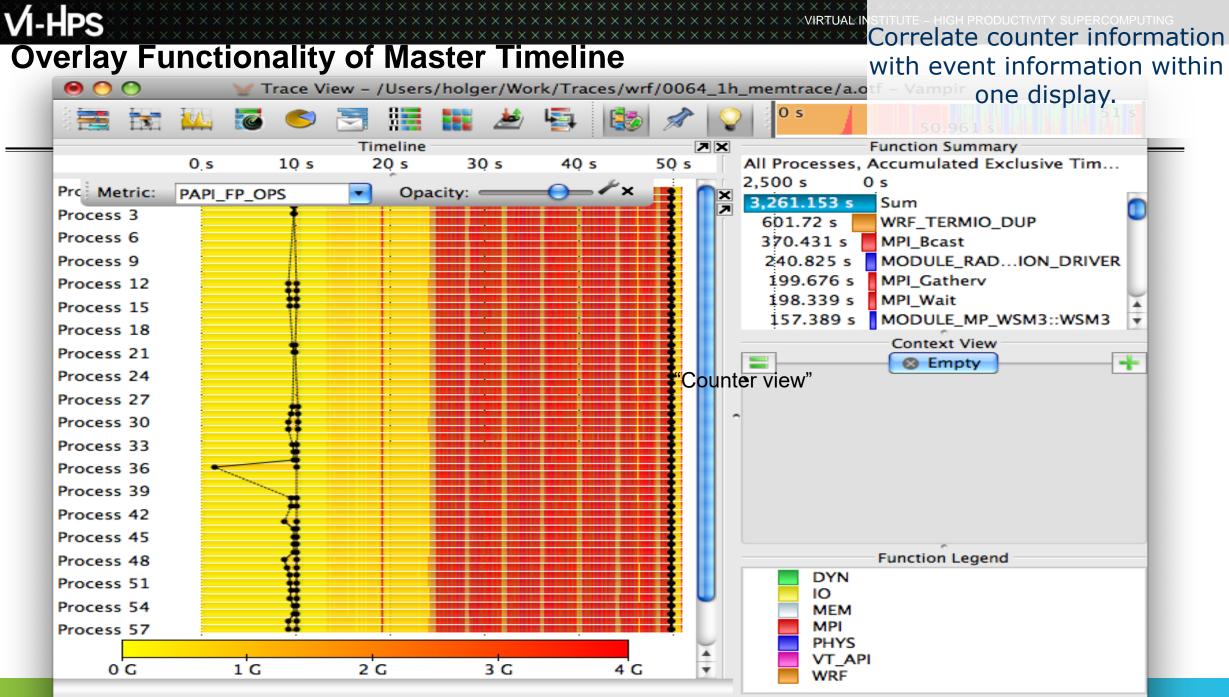


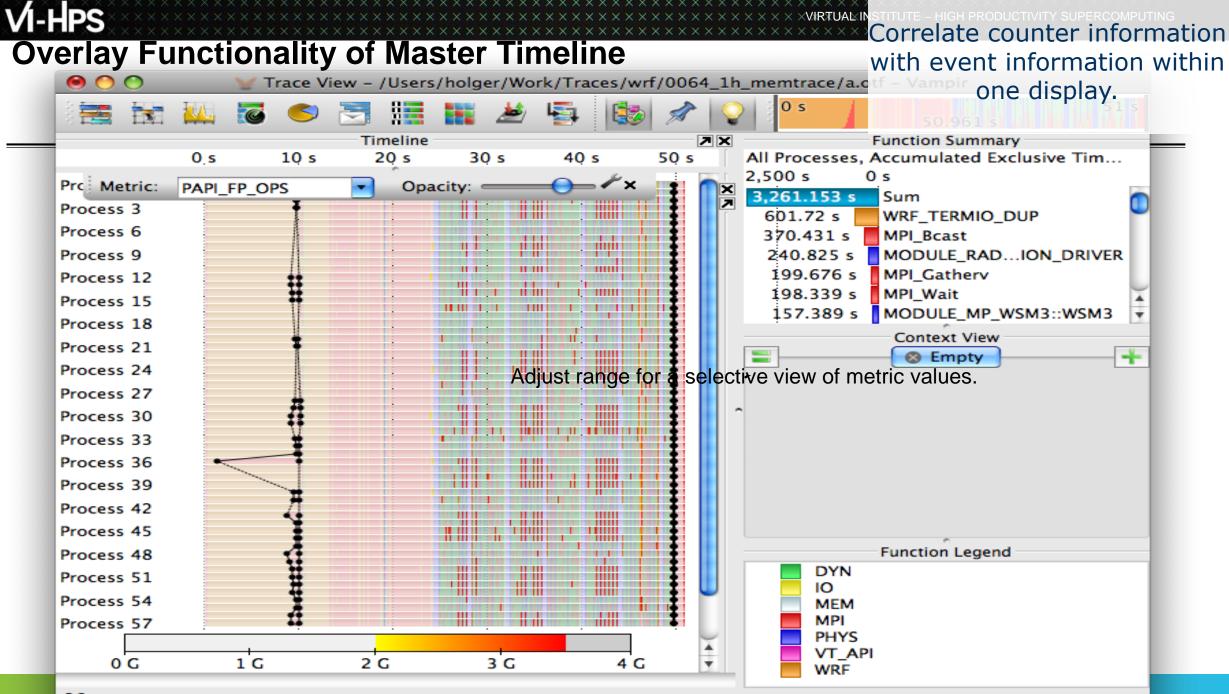
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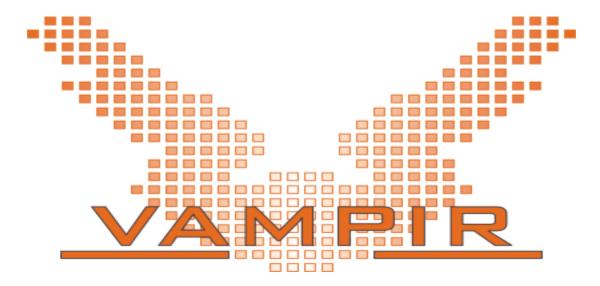
#### Summary

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.



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