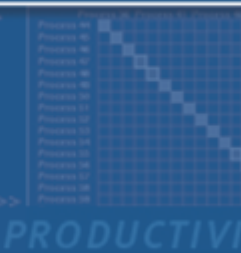
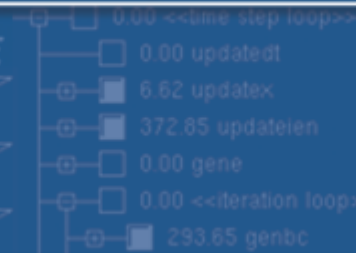


# VI-HPS

SOFTWARE



FAST SOLUTIONS

- ☒ PAPI\_L1\_DCM
- ☒ PAPI\_L1\_ICM
- ☐ PAPI\_L2\_DCM
- ☒ PAPI\_L2\_ICM
- ☒ PAPI\_L2\_TCM
- ☐ PAPI\_L2\_TCM

PRODUCTIVITY

## Performance Analysis with Vampir

**15<sup>th</sup> VI-HPS Tuning Workshop (MdS, Saclay)**  
**7-10 April 2014**

Matthias Weber and Ronny Tschüter  
ZIH, Technische Universität Dresden

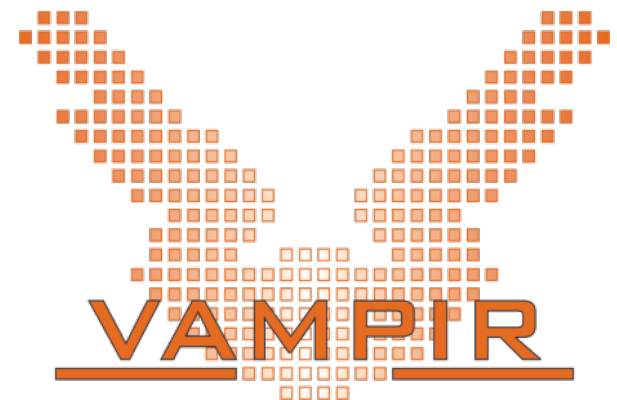
## **Part I: Welcome to the Vampir Tool Suite**

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

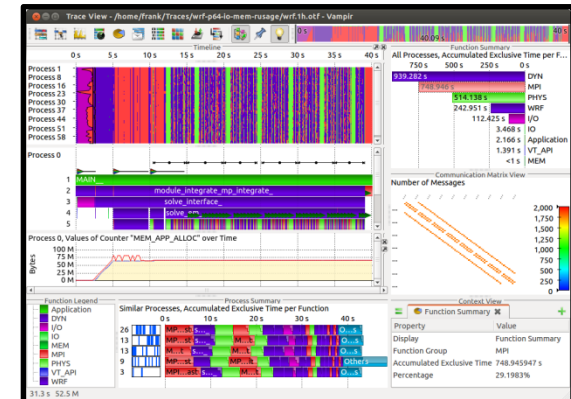
## **Part II: Vampir Hands On**

- Visualizing and analyzing NPB-MZ-MPI / BT

## **Part III: Summary and Conclusion**



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



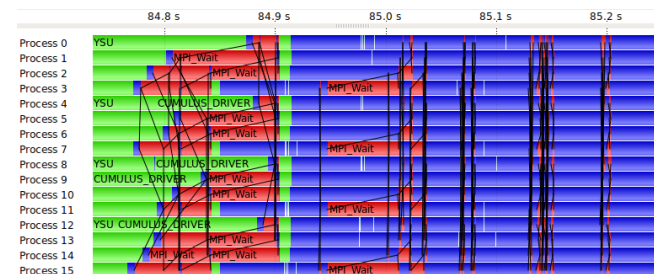
## Typical questions that Vampir helps to answer:

- 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

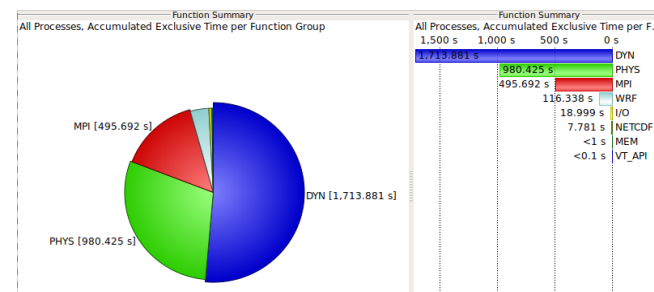
## Timeline charts

- Show application activities and communication along a time axis



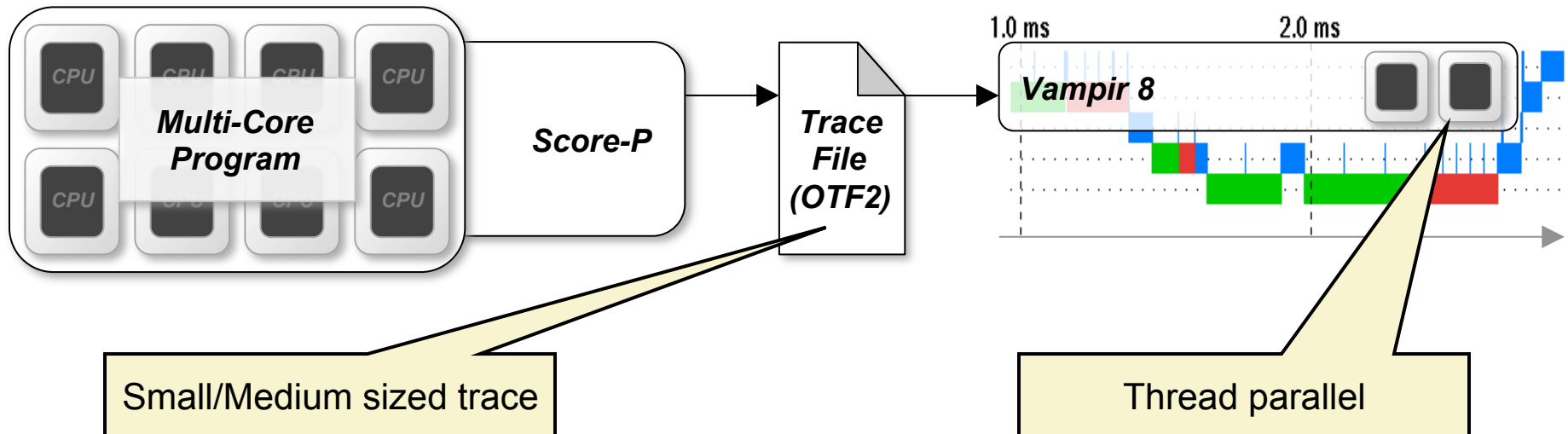
## Summary charts

- Provide quantitative results for the currently selected time interval

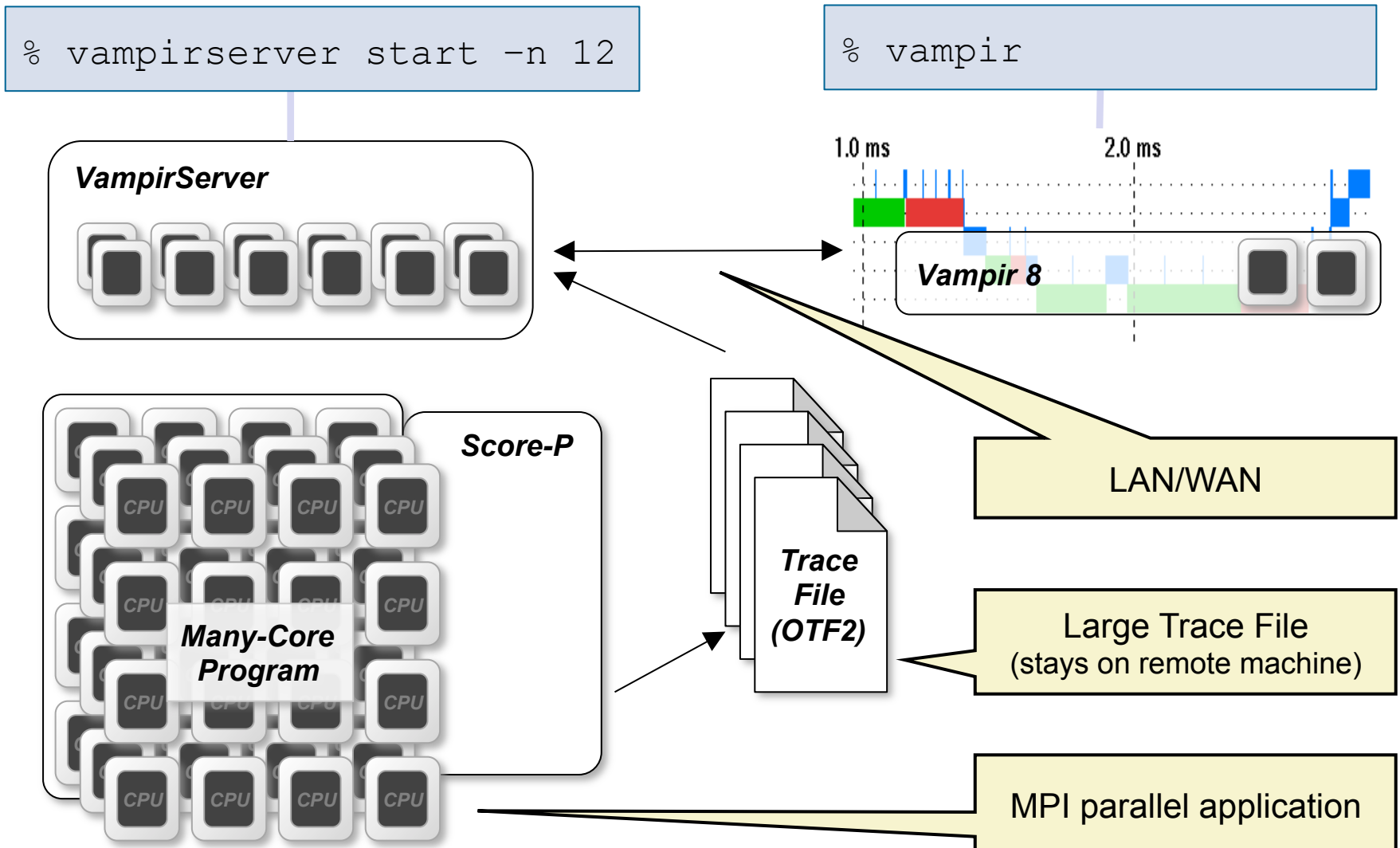


- Directly on front end or local machine

```
% vampir
```







- On local machine with remote VampirServer







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
-  Counter Data Timeline
-  Performance Radar

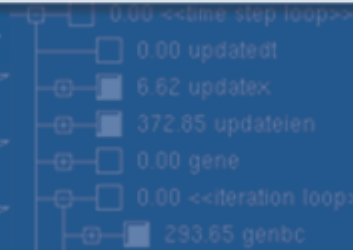
- **Summary Charts:**

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



# VI-HPS

SOFTWARE



FAST SOLUTIONS

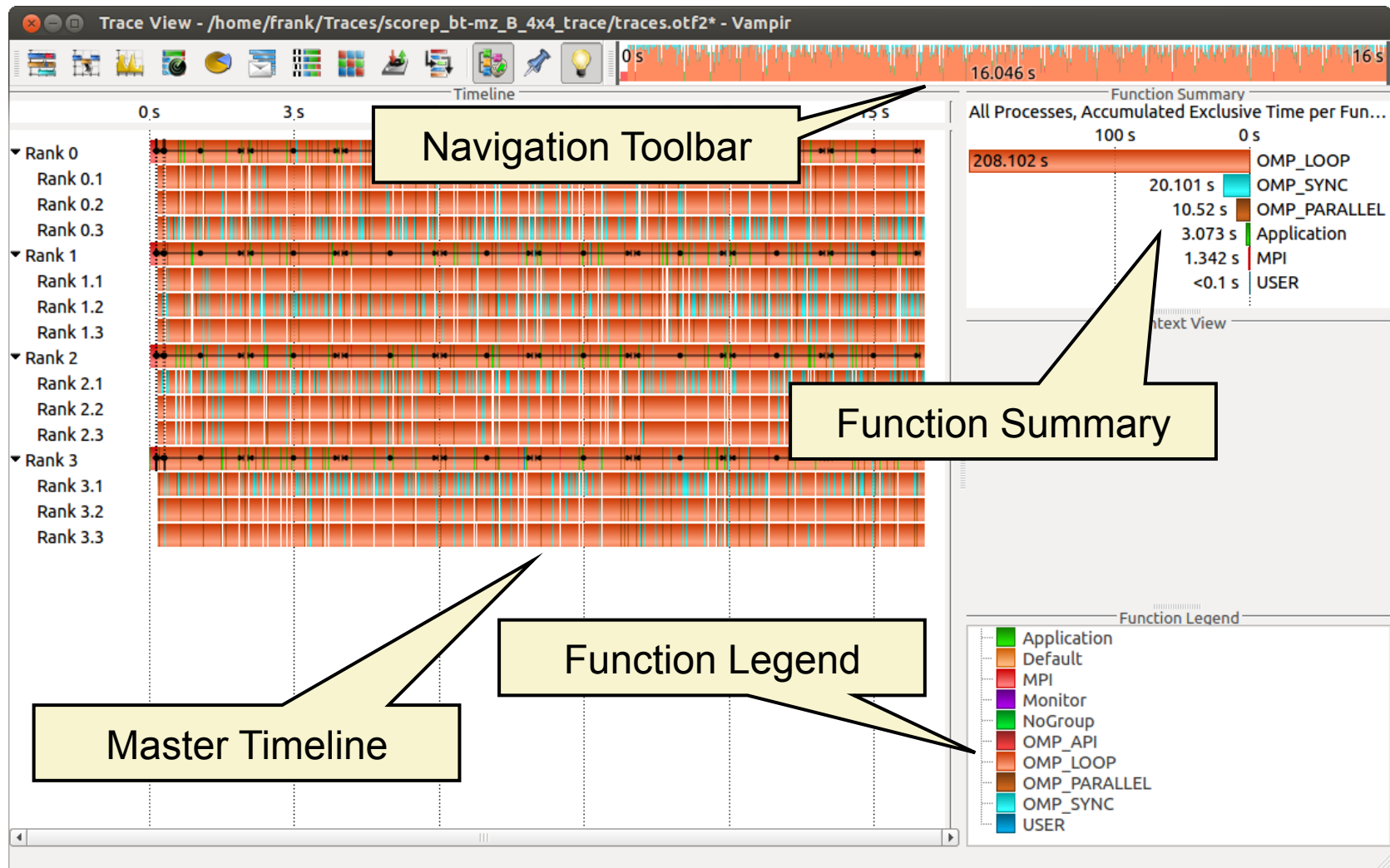
- ☒ PAPI\_L1\_DCM
- ☒ PAPI\_L1\_ICM
- ☐ PAPI\_L2\_DCM
- ☒ PAPI\_L2\_ICM
- ☒ PAPI\_L2\_TCM
- ☐ PAPI\_L2\_TCM

PRODUCTIVITY

## Vampir Hands on

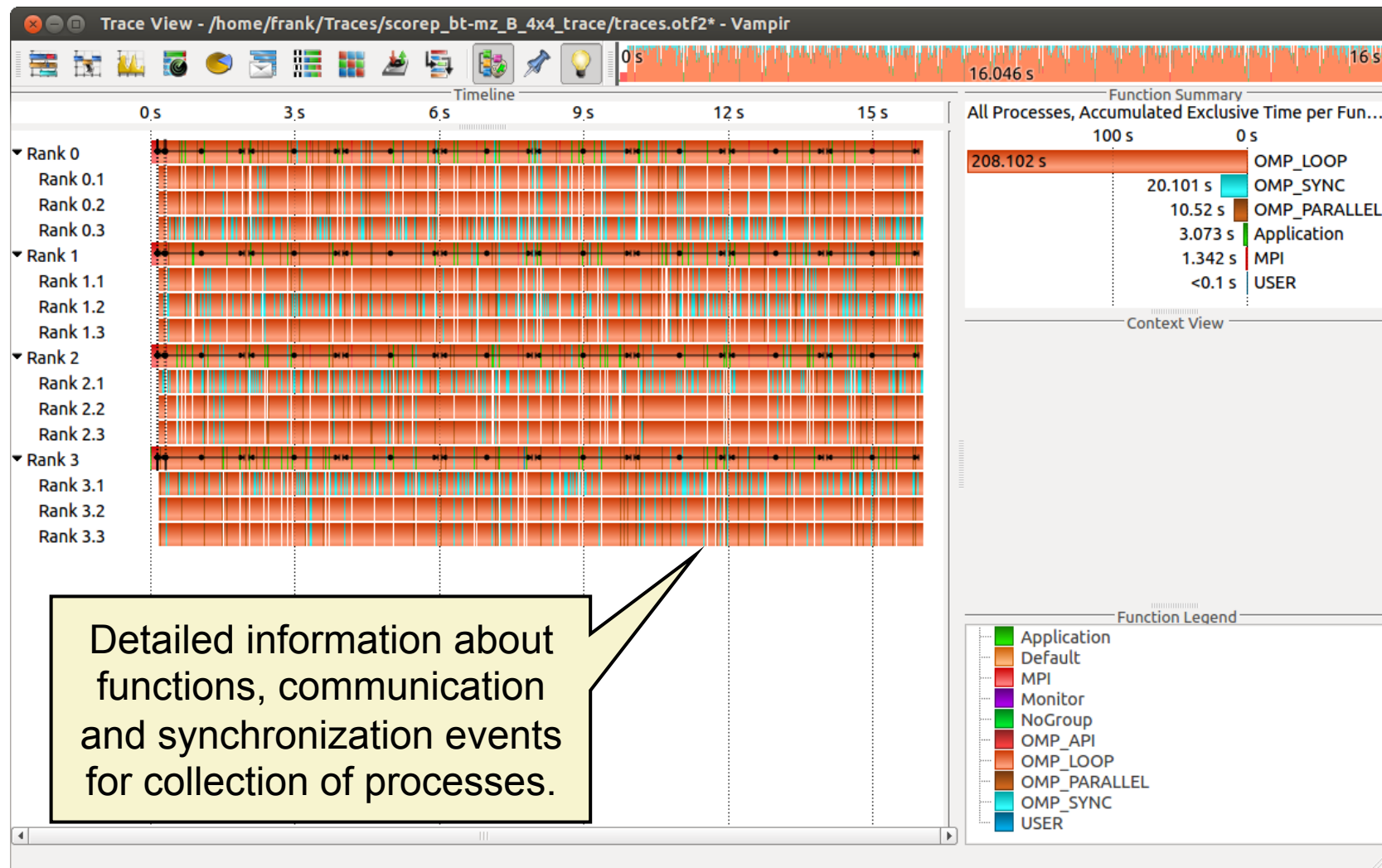
Visualizing and analyzing NPB-MZ-MPI / BT

```
% vampir scorep_bt-mz_B_4x4_trace
```



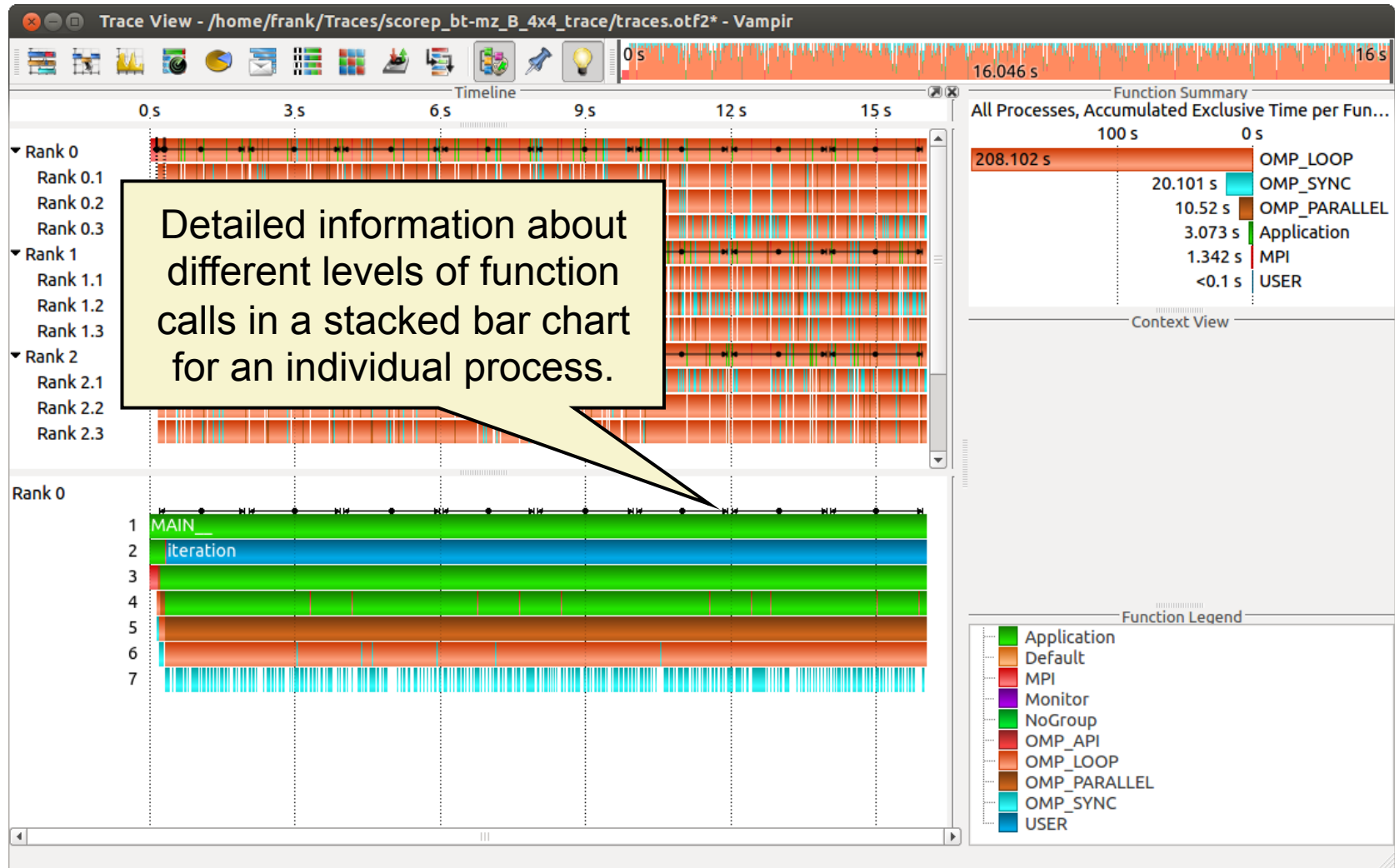


## Master Timeline

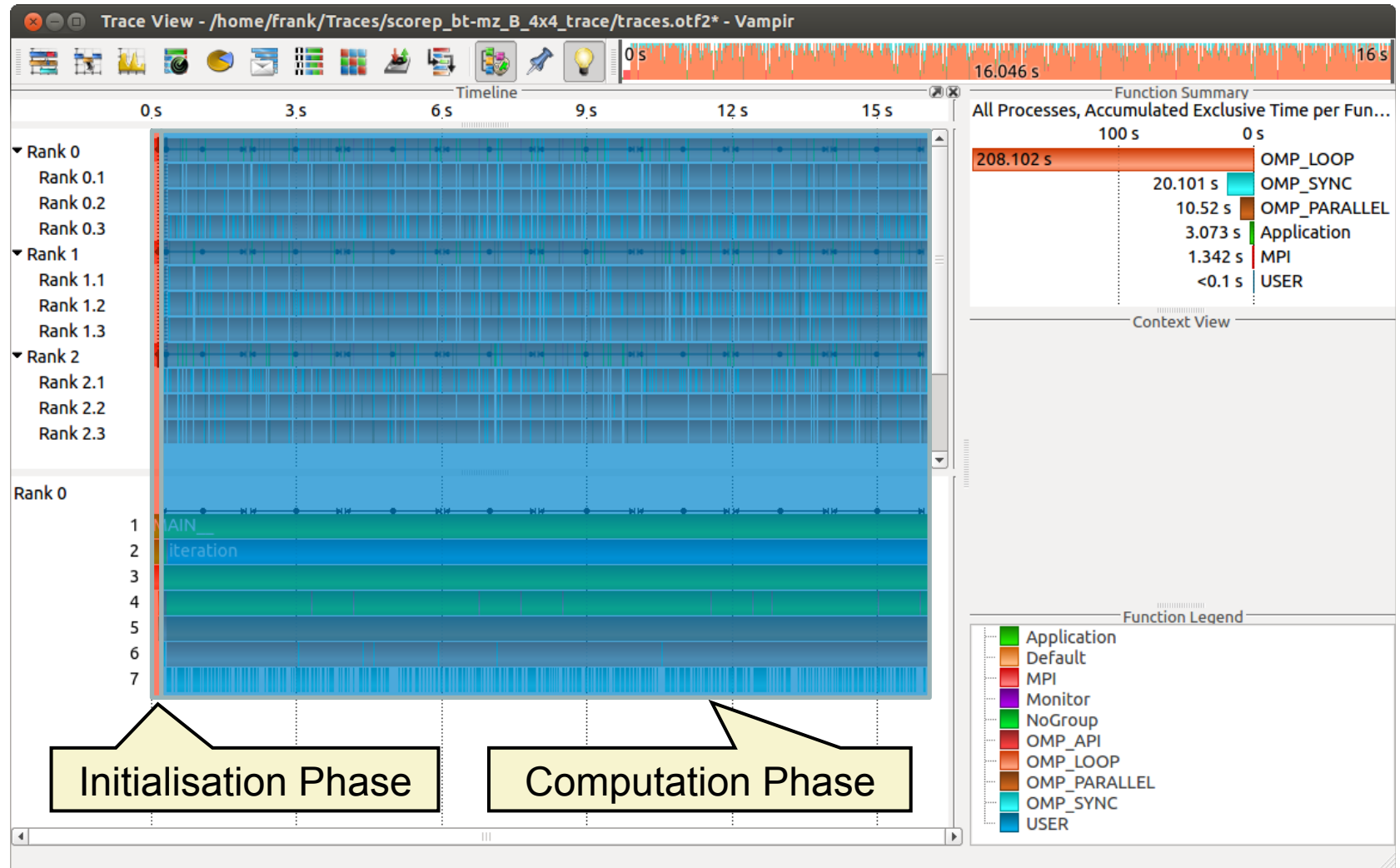




## Process Timeline

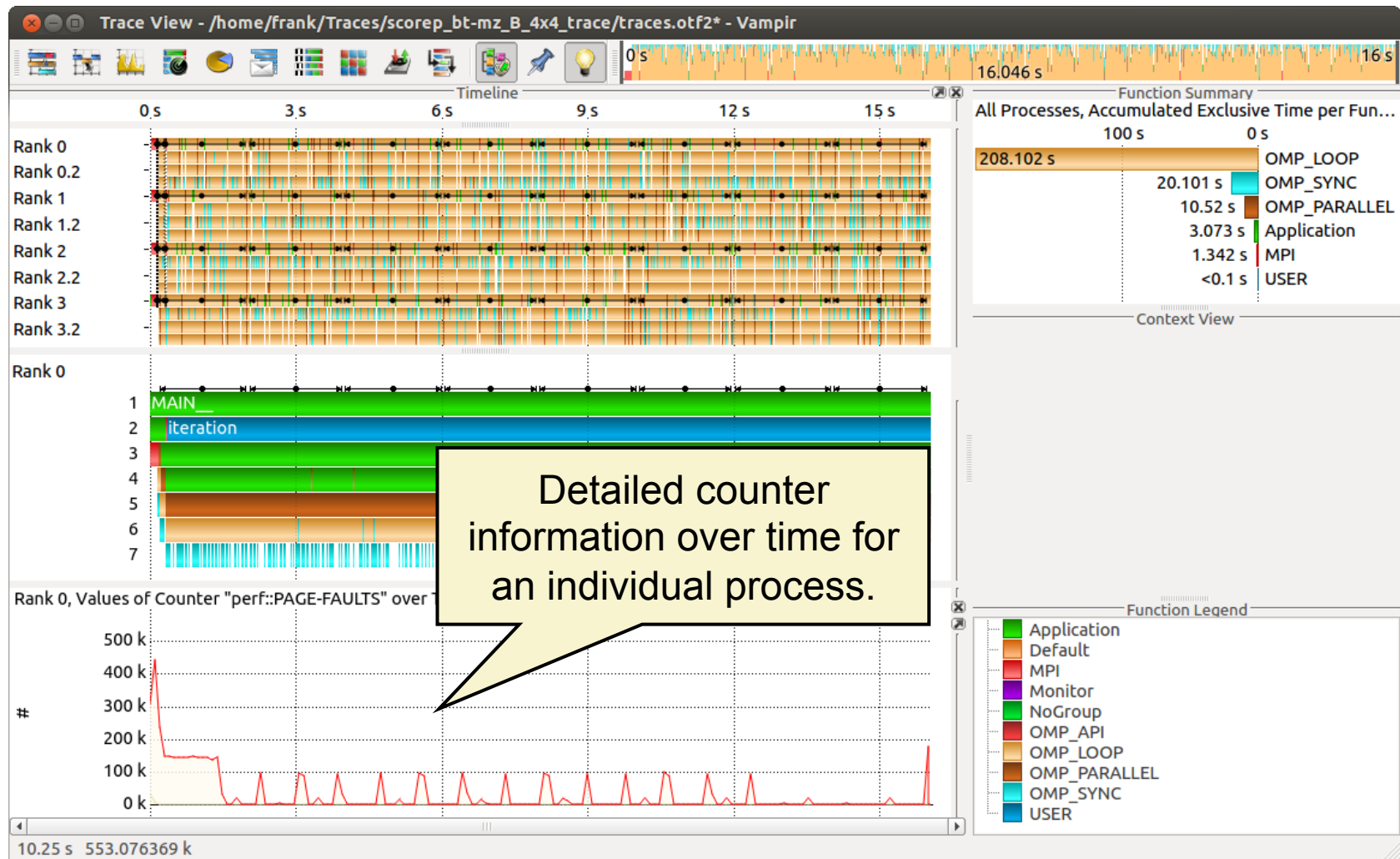


## Typical program phases





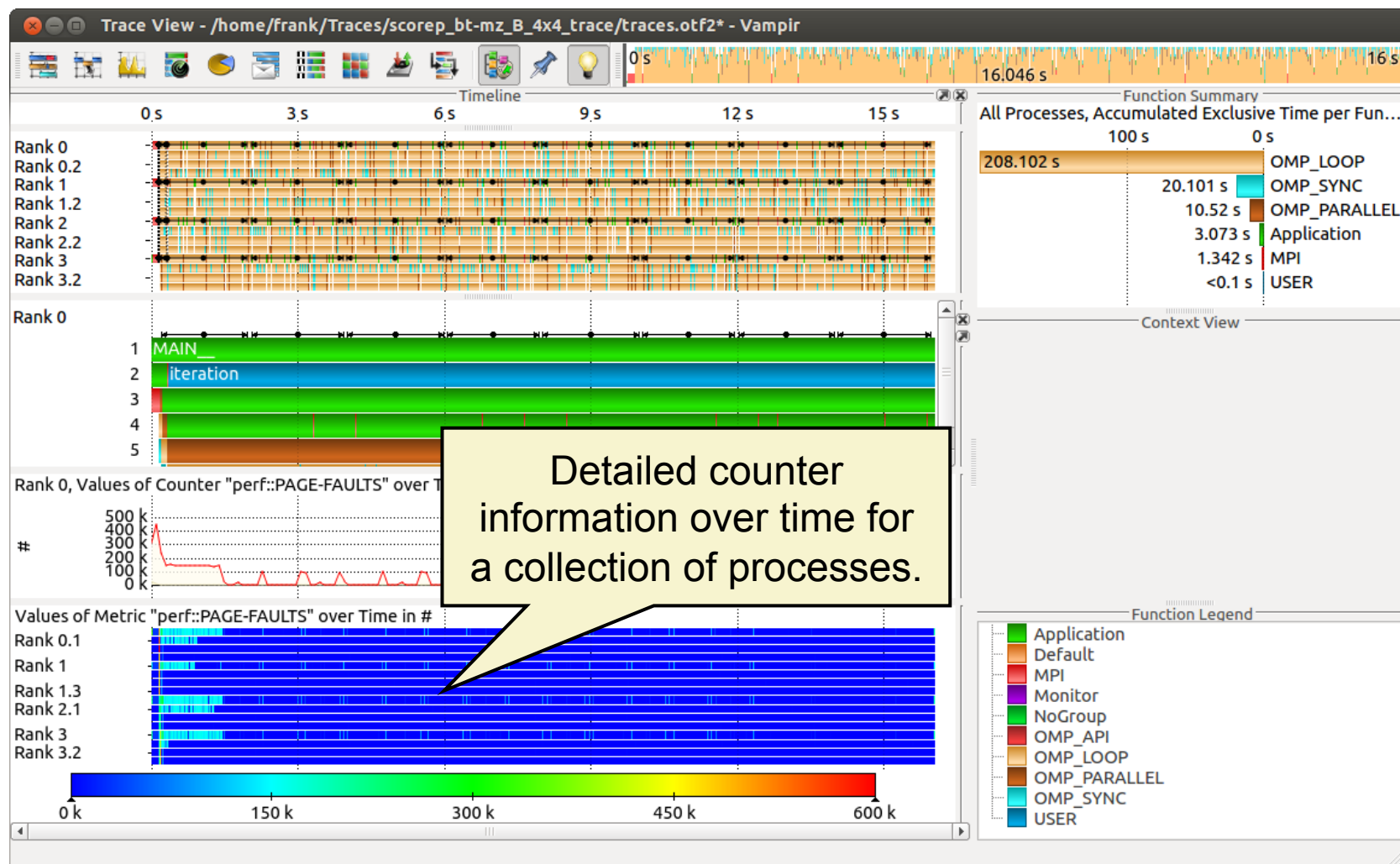
## Counter Data Timeline



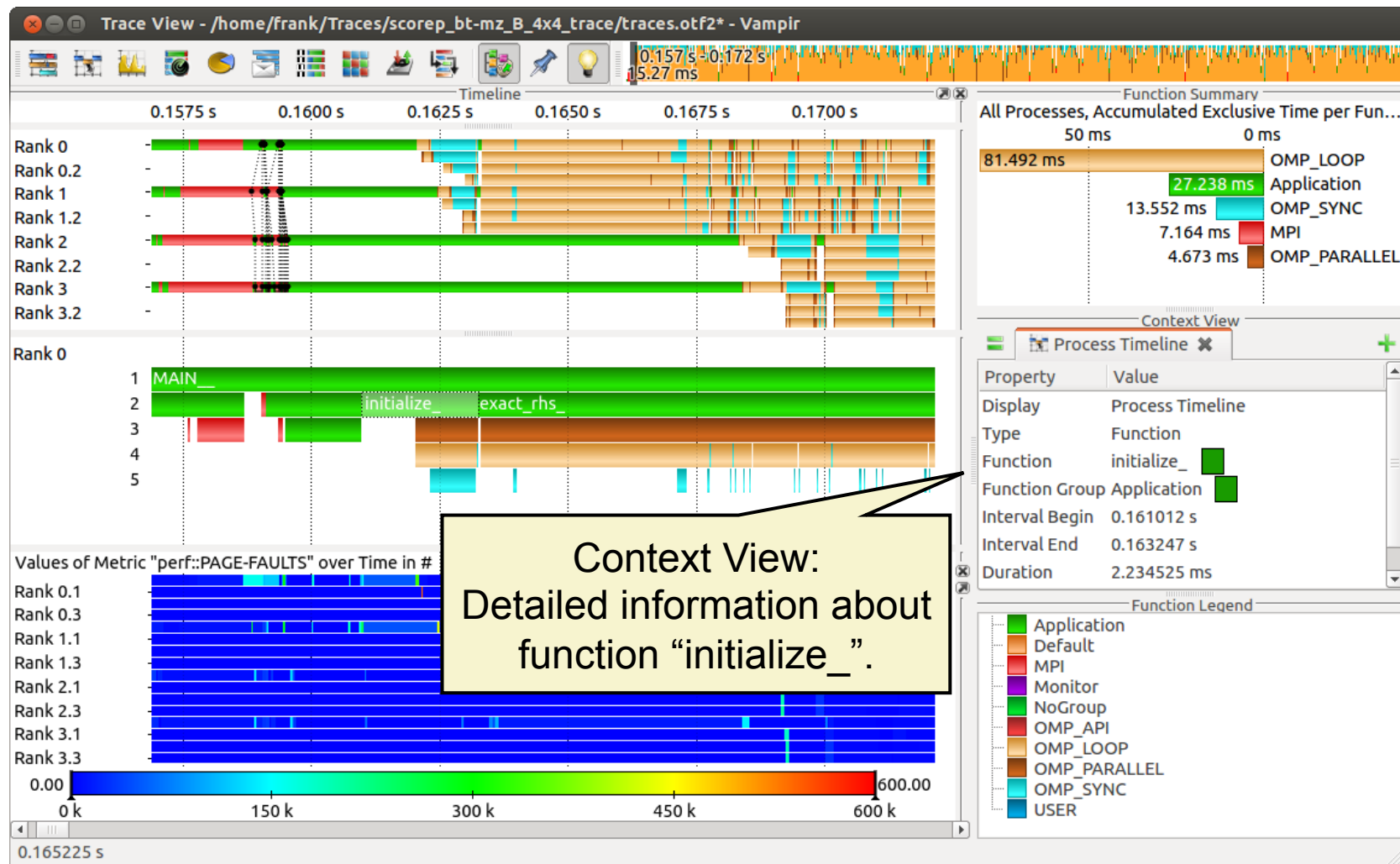




## Performance Radar

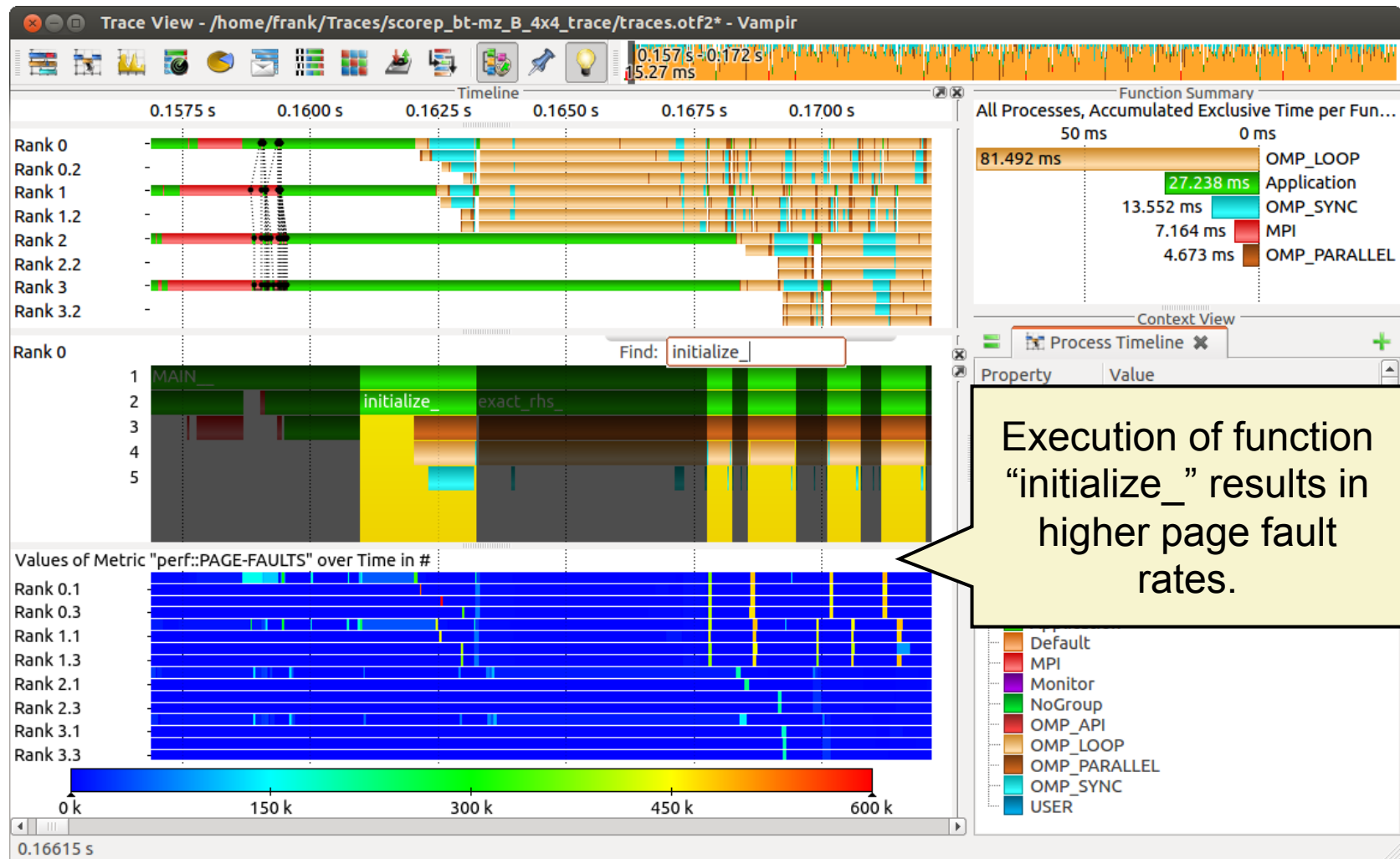


## Zoom in: Initialisation Phase

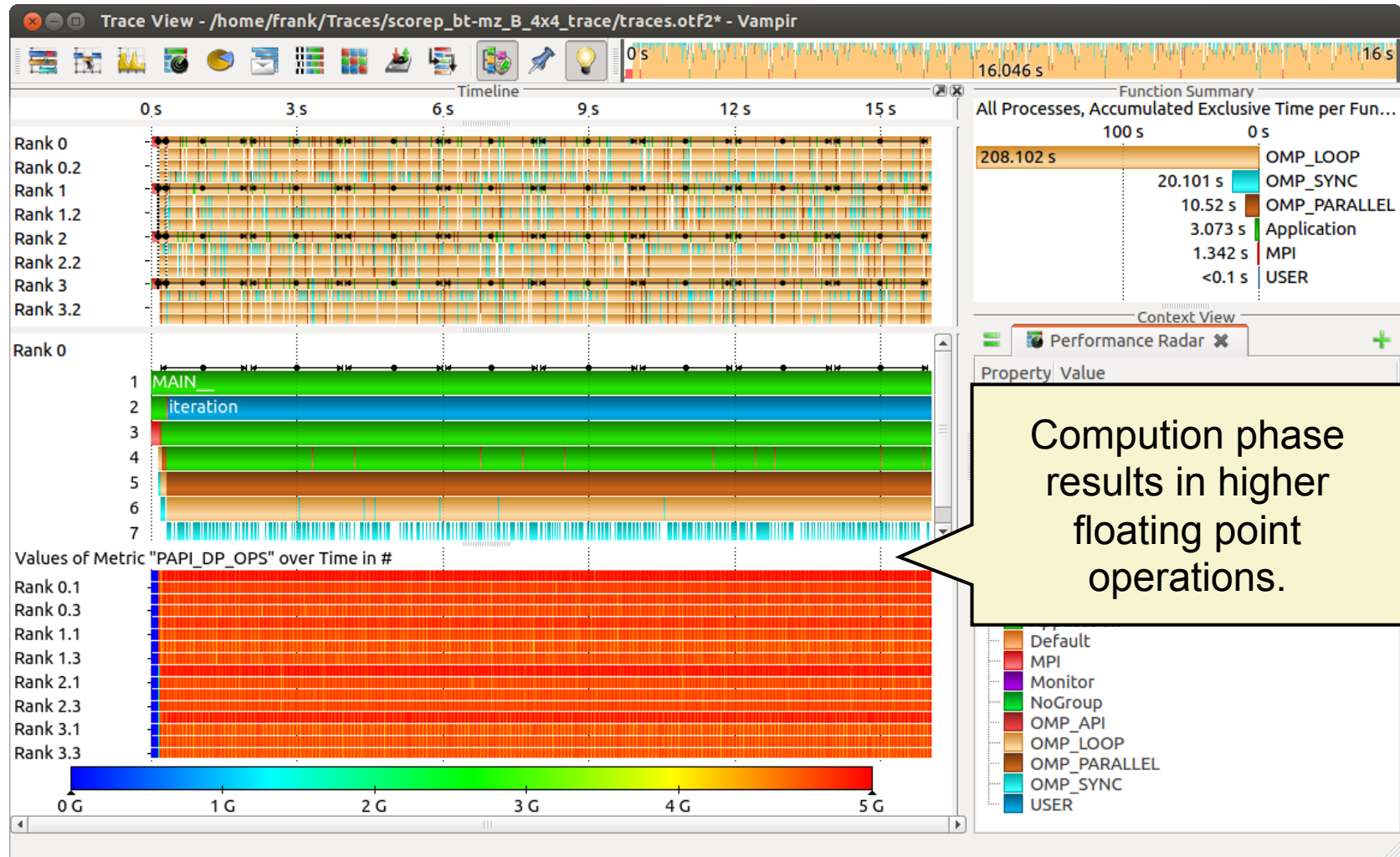




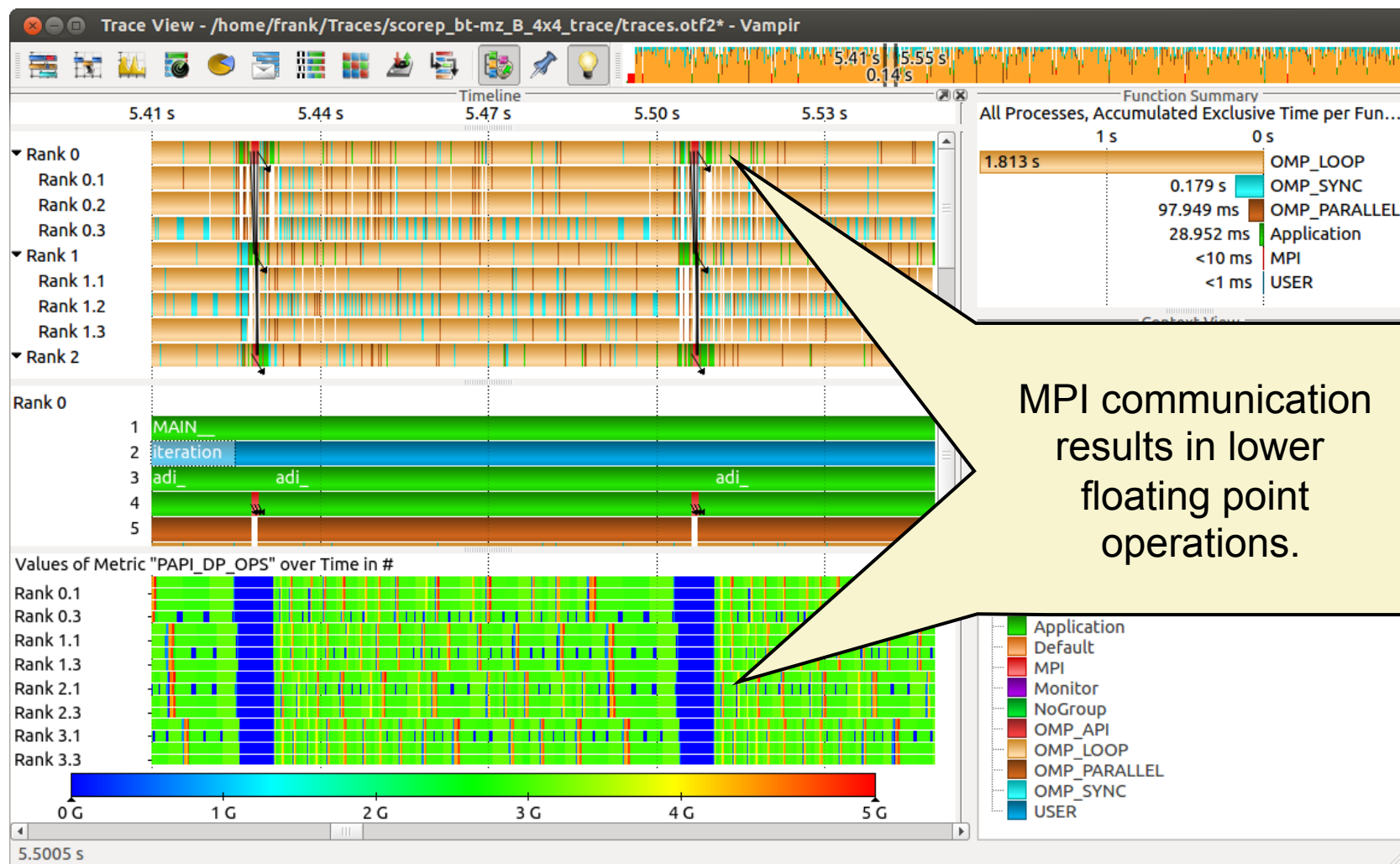
## Feature: Find Function



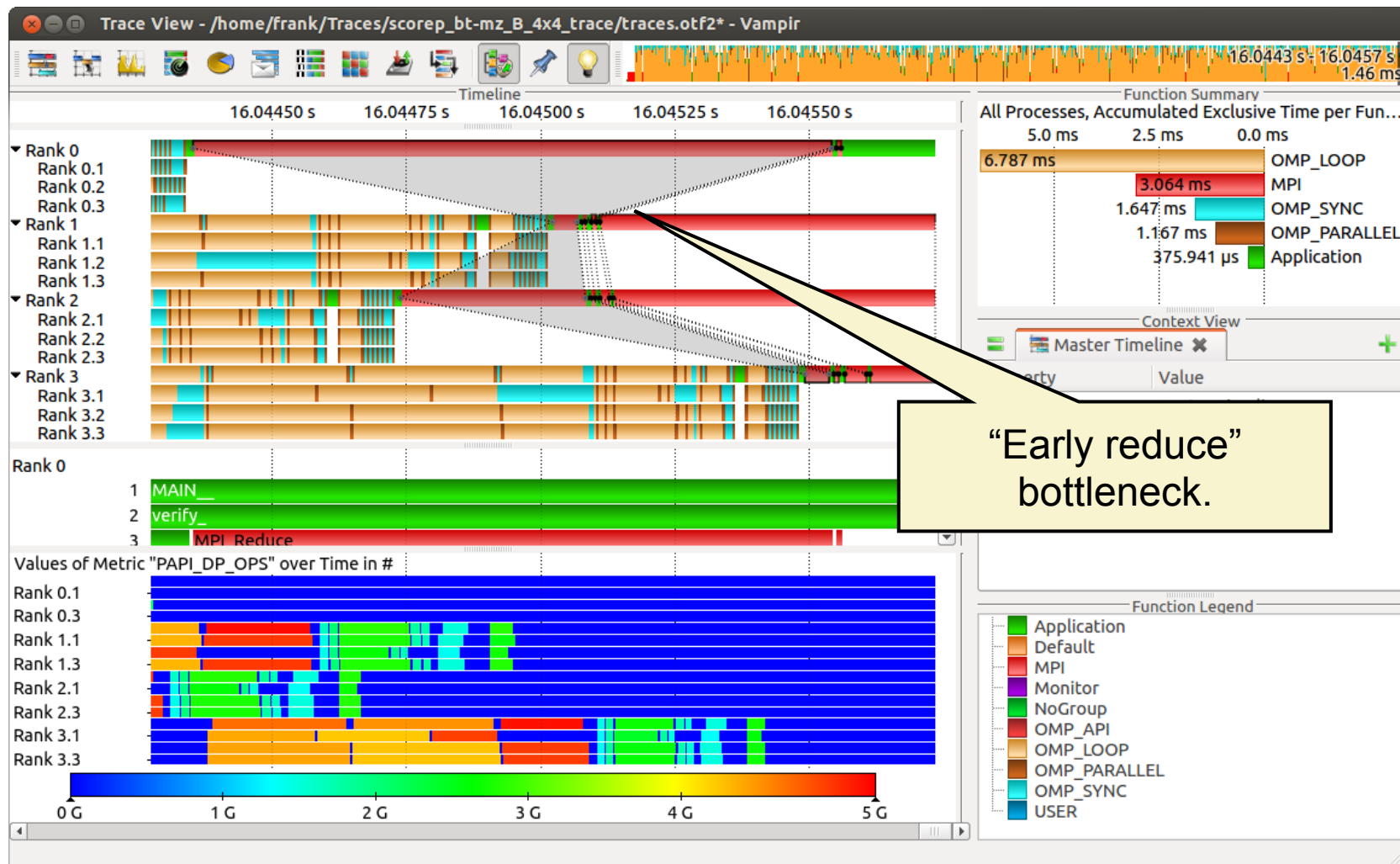
## Computation Phase



## Zoom in: Computation Phase

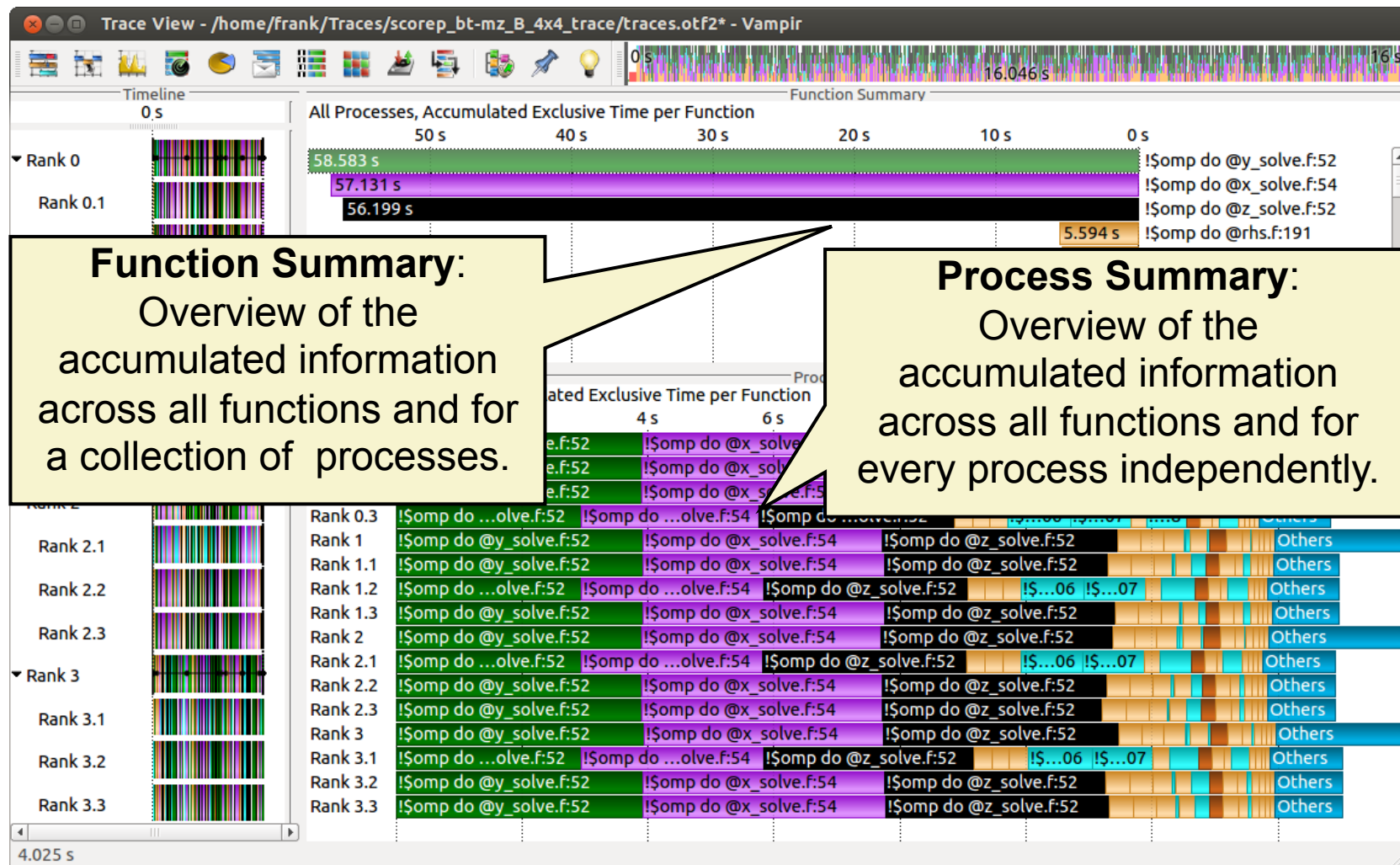


## Zoom in: Finalisation Phase





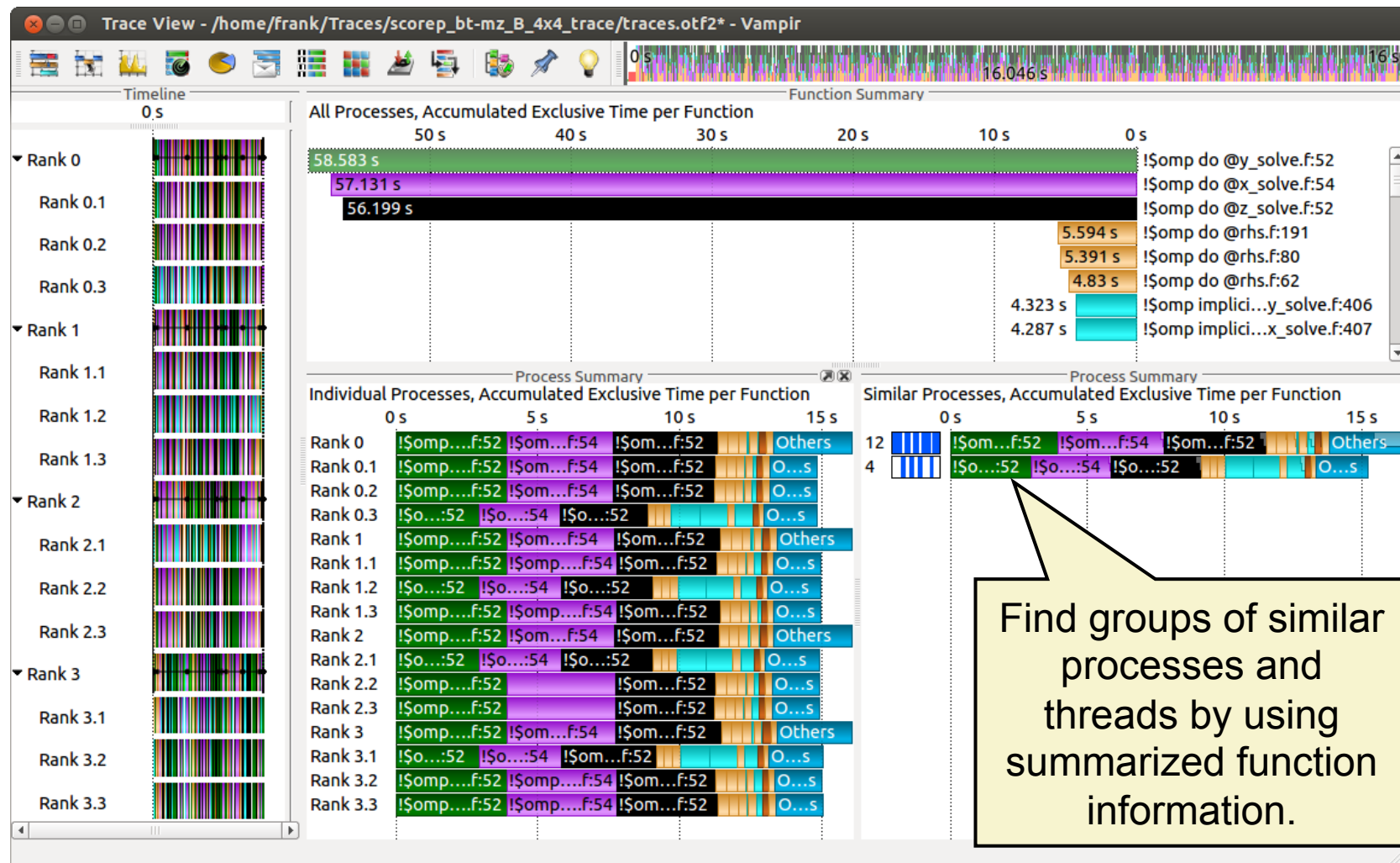
## Process Summary





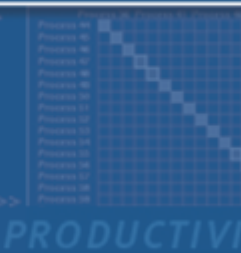
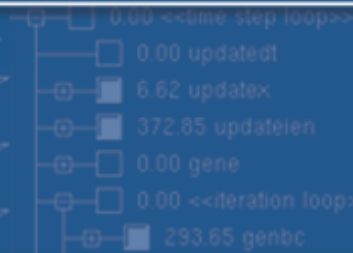


## Process Summary



# VI-HPS

SOFTWARE



FAST SOLUTIONS

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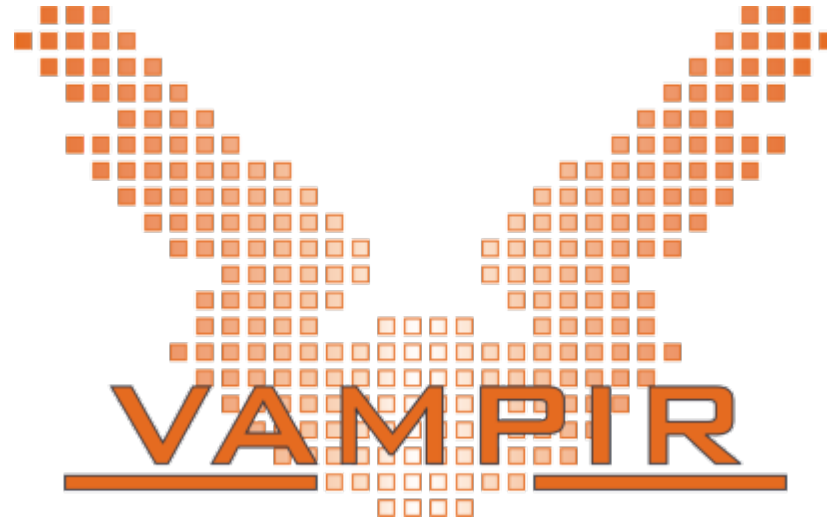
PRODUCTIVITY

## 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](mailto:vampirsupport@zih.tu-dresden.de)



Vampir is available at <http://www.vampir.eu>,  
get support via [vampirsupport@zih.tu-dresden.de](mailto:vampirsupport@zih.tu-dresden.de)