VampirTrace and Vampir

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Overview

- Introduction
- Event Trace Visualization
- Vampir & VampirServer
- Vampir Displays
  - Timeline
  - Process Timeline with Performance Counters
  - Summary Display
  - Message Statistics
- VampirTrace: Instrumentation & Run-Time Measurement
- Conclusions

Why bother with performance analysis?

- Well, why are you here after all?
- efficient usage of expensive and limited resources
- scalability to achieve next bigger simulation

Profiling and Tracing

- have an optimization phase
  - just like testing and debugging phase
- use tools!
- avoid *do-it-yourself-with-printf* solutions, really!

Program Instrumentation

- detect run-time events (points of interest)
- pass information to run-time measurement library

Profile Recording

- collect aggregated information (Time, Counts, …)
- about program and system entities
  - functions, loops, basic blocks
  - application, processes, threads, …

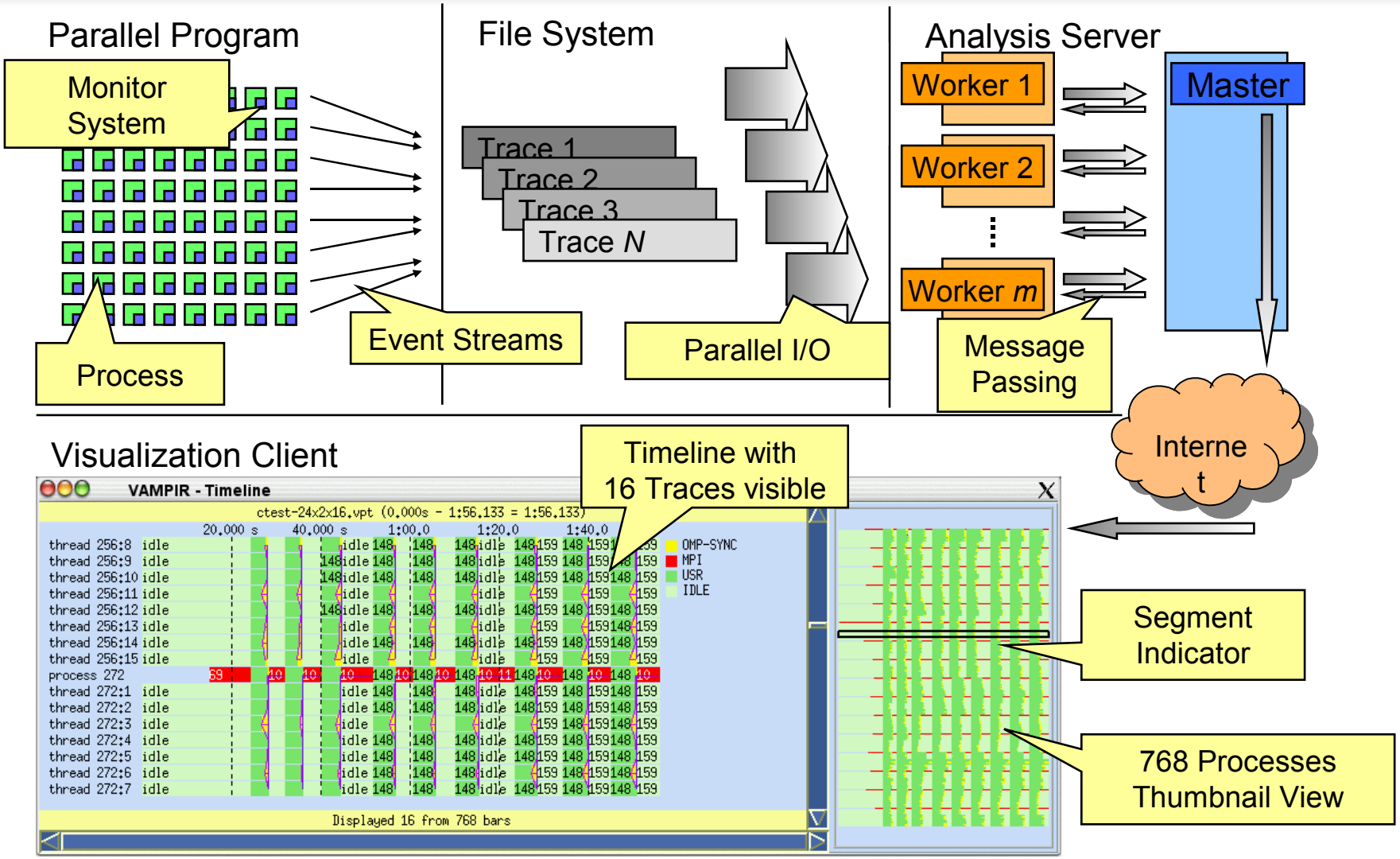
Trace Recording

- save individual event records
- with precise timestamp, process/thread ID, event type
- plus event specific information

Trace Visualization

- visualize trace data
- alternative + supplement to automatic analysis
- show dynamic run-time behavior graphically
- provide adaptive statistics and performance metrics
  - Timeline
  - Process Timeline, plus Performance Counters
  - Statistic Summary Display
  - Message Statistics
  - more
- interactive browsing, zooming, selecting

Vampir & VampirServer

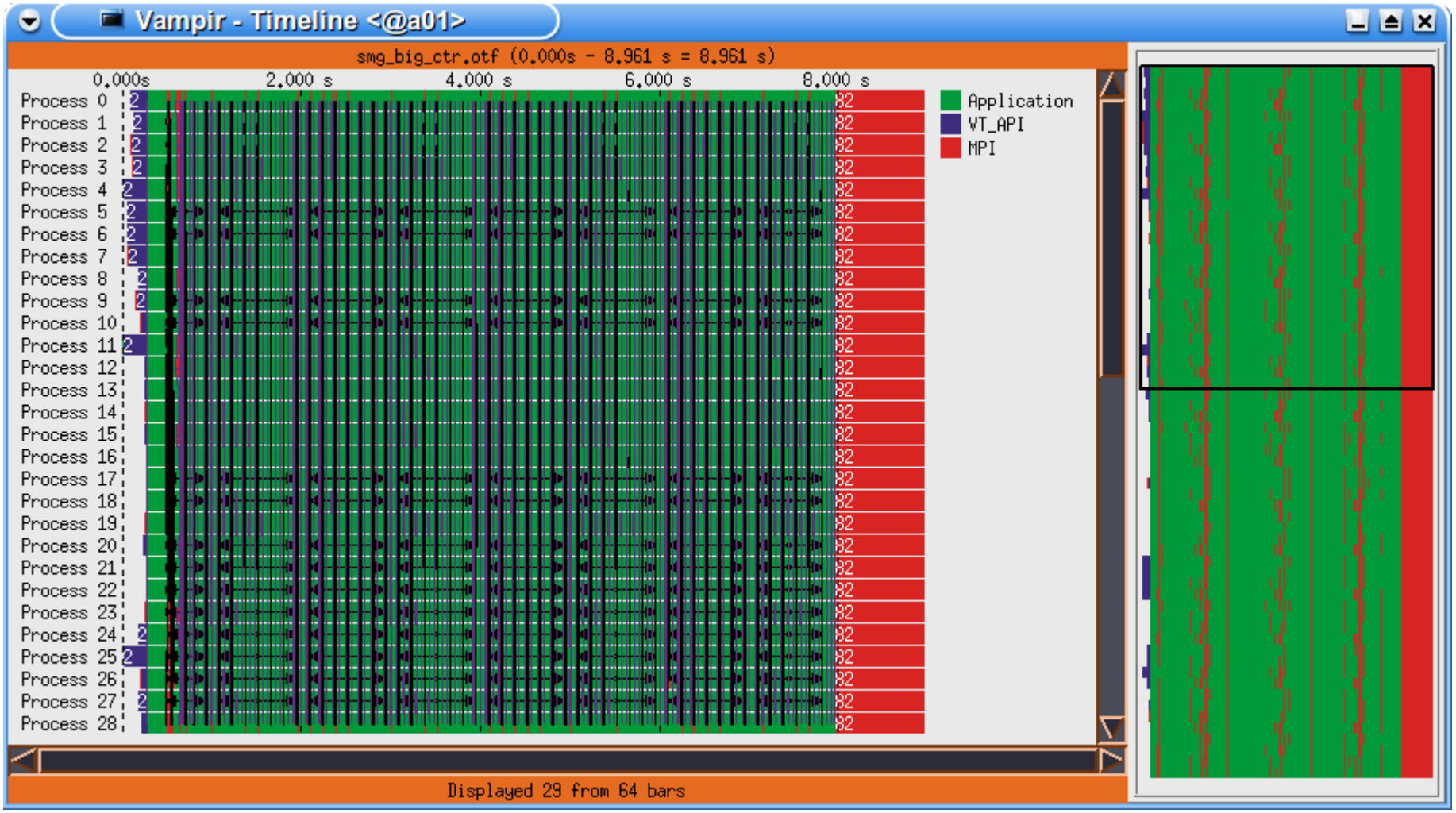


Vampir Displays

- Timeline
- Process Timeline
  - plus Performance Counters
- Statistic Summary
- Message Statistics

- more …

Timeline Display



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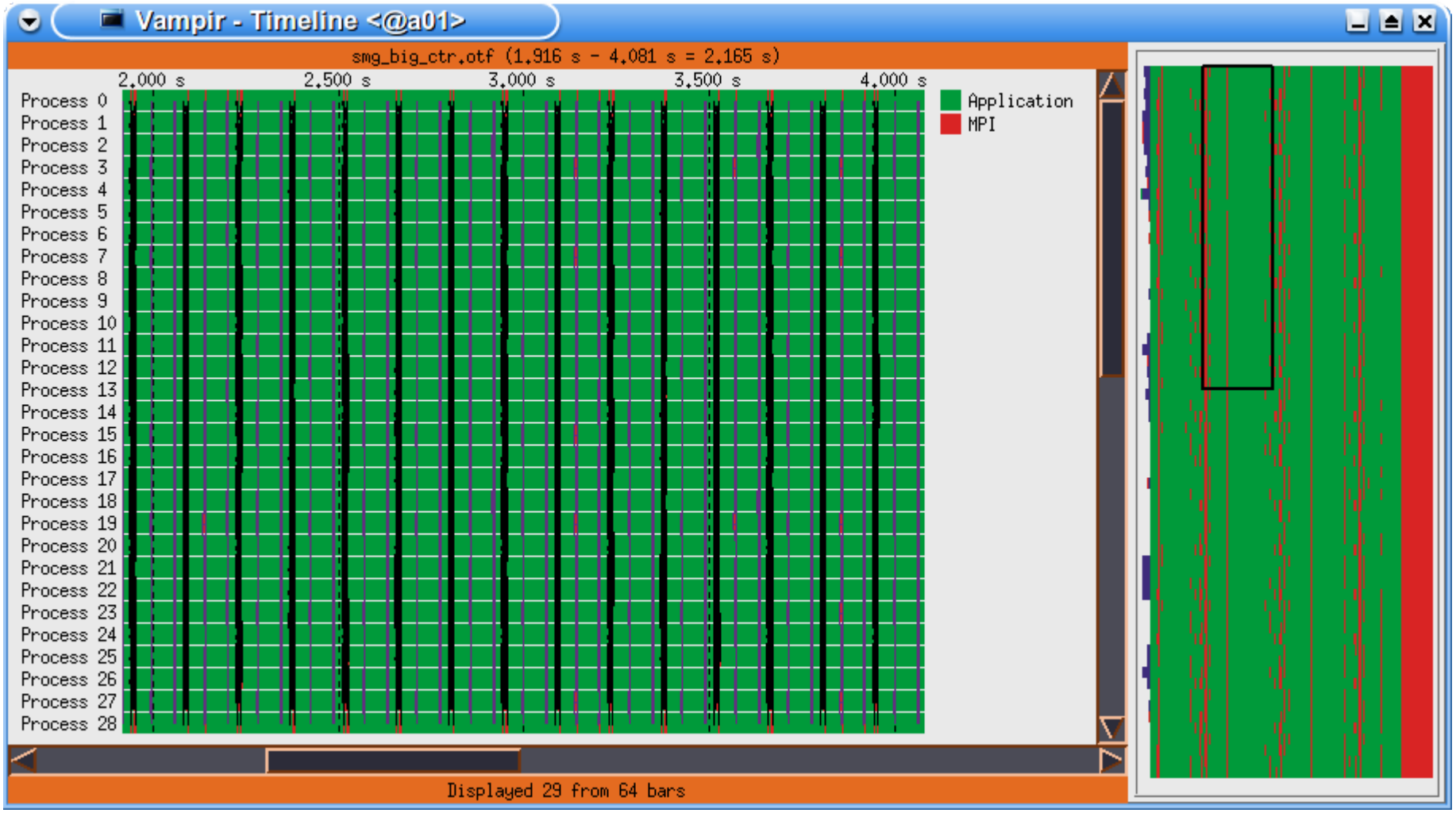

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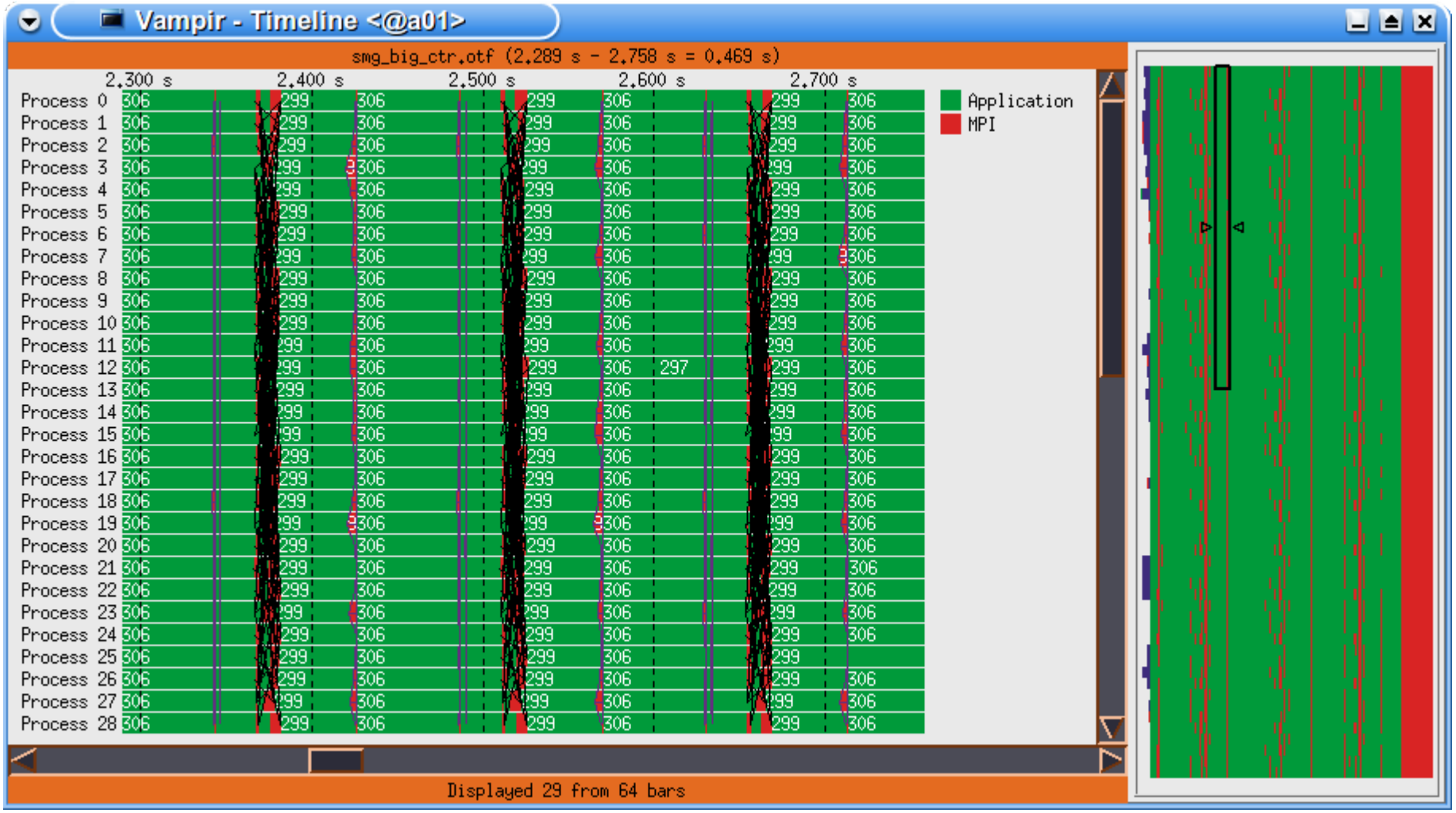

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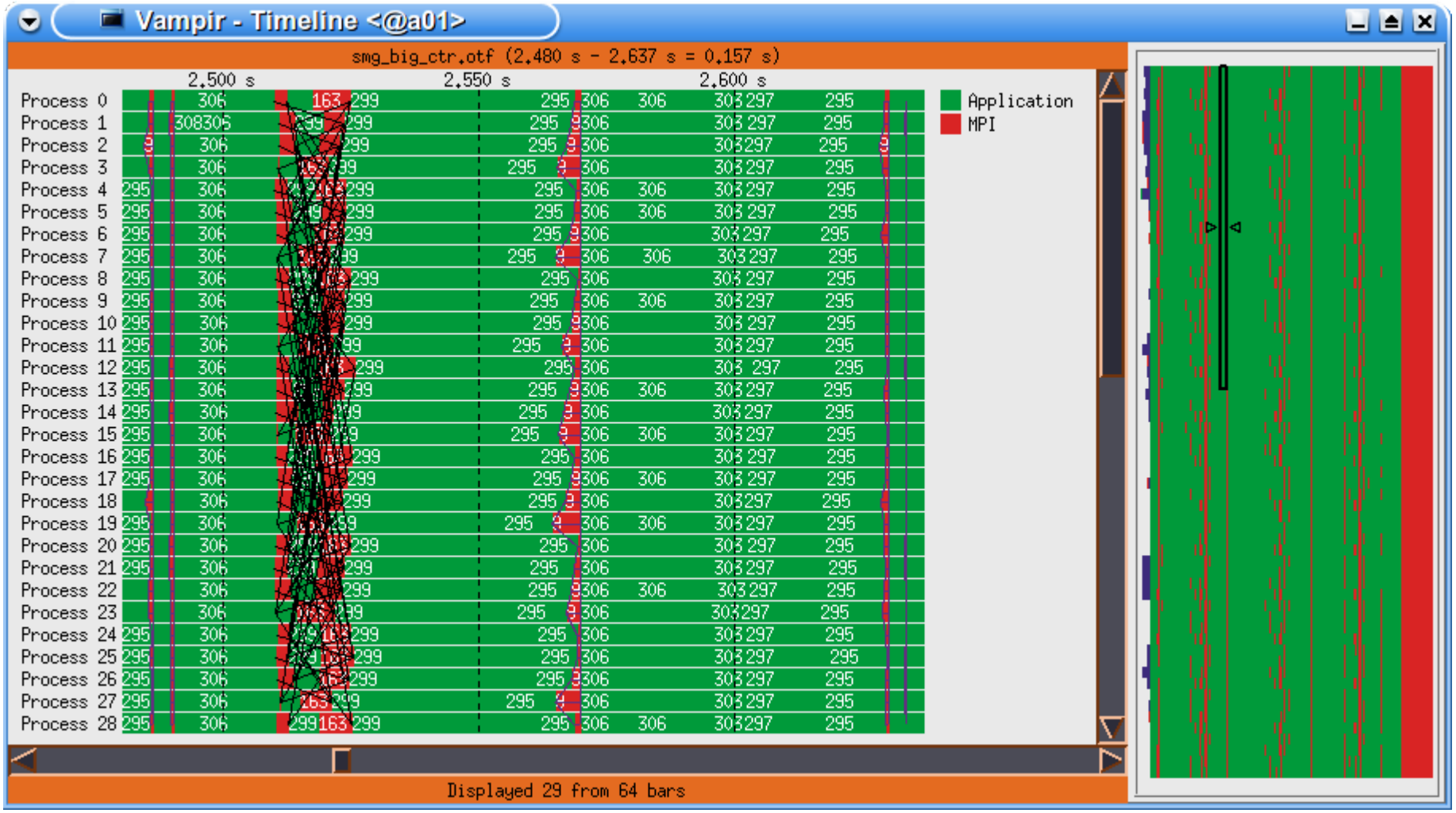

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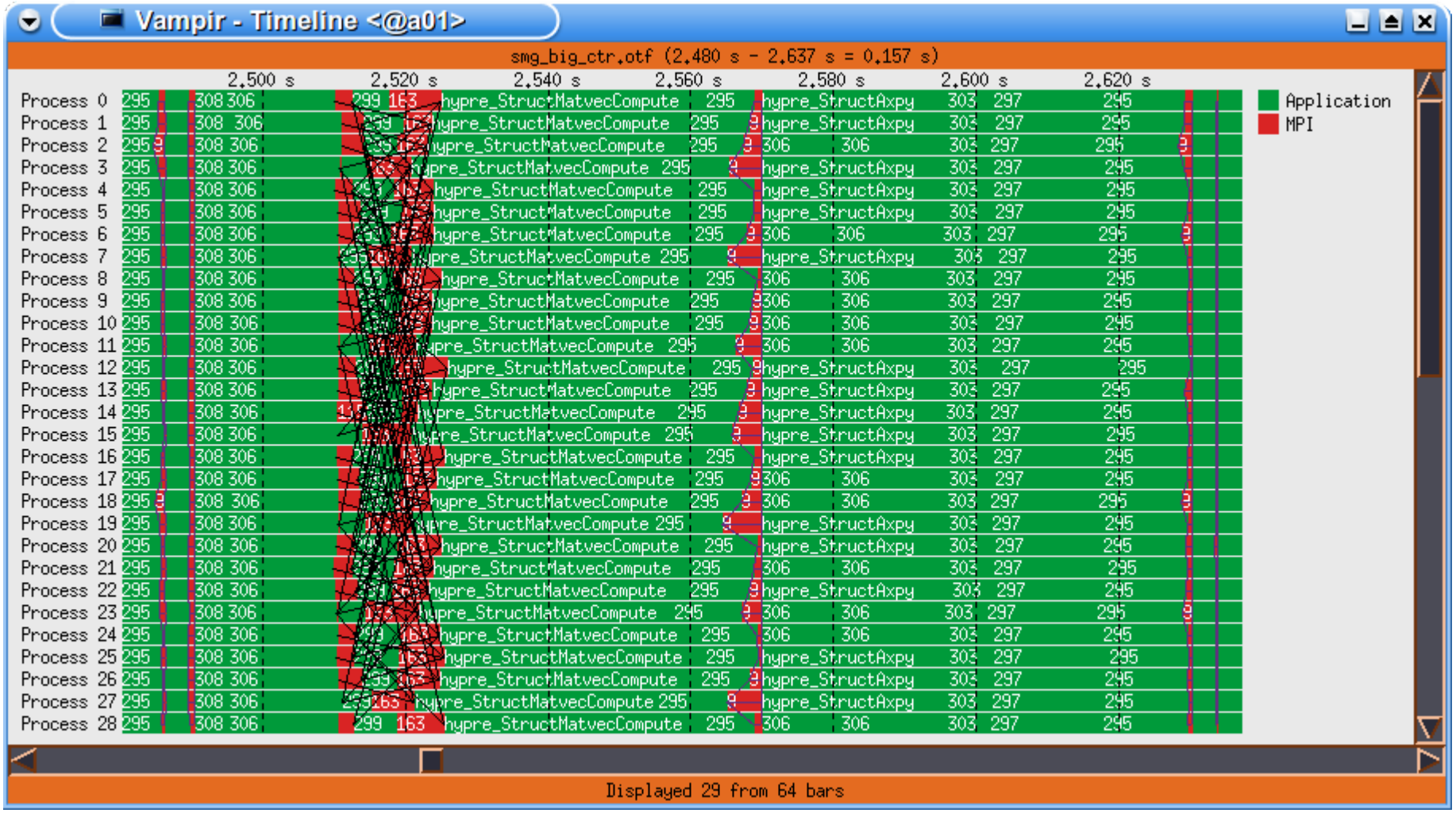

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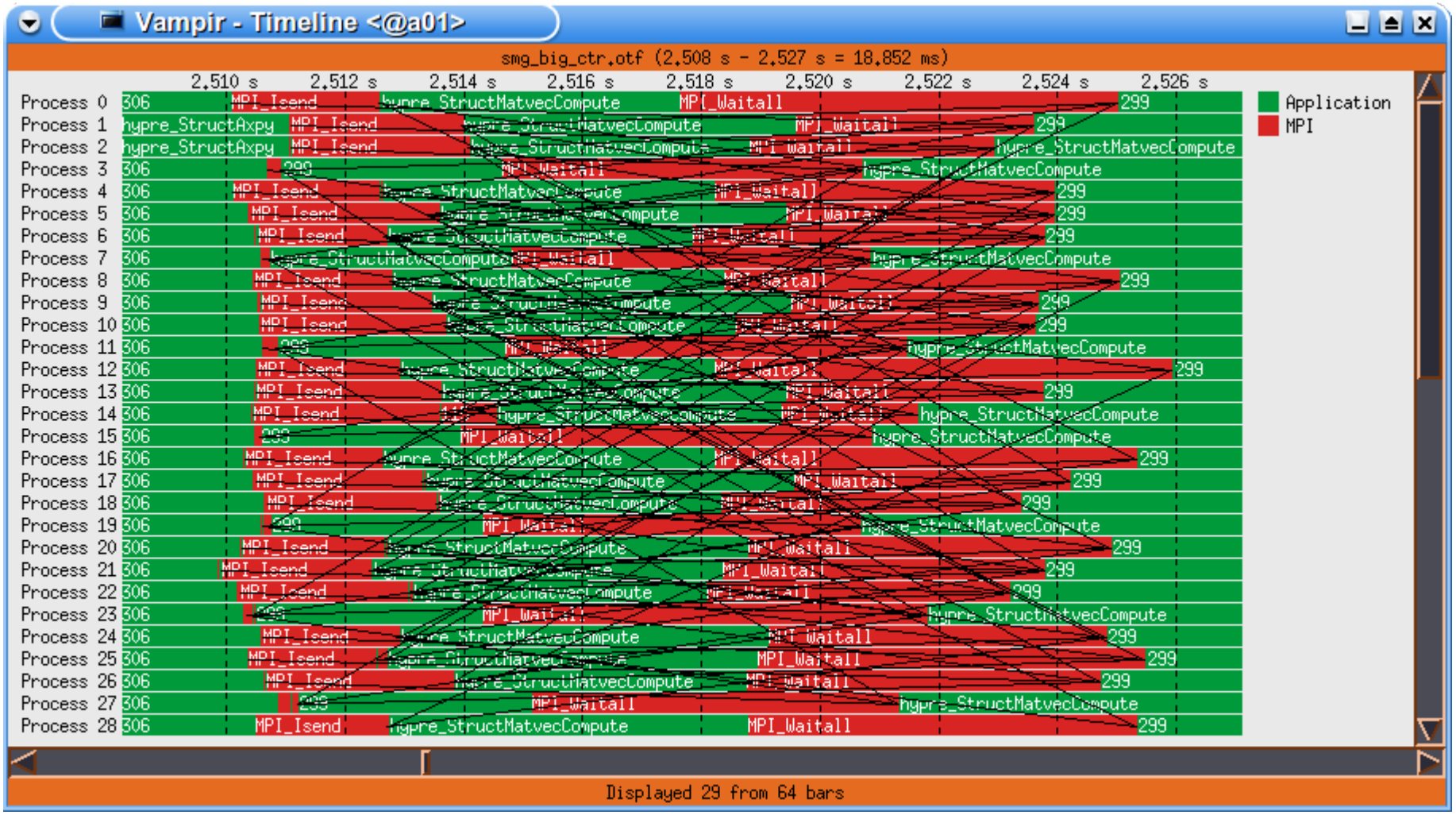

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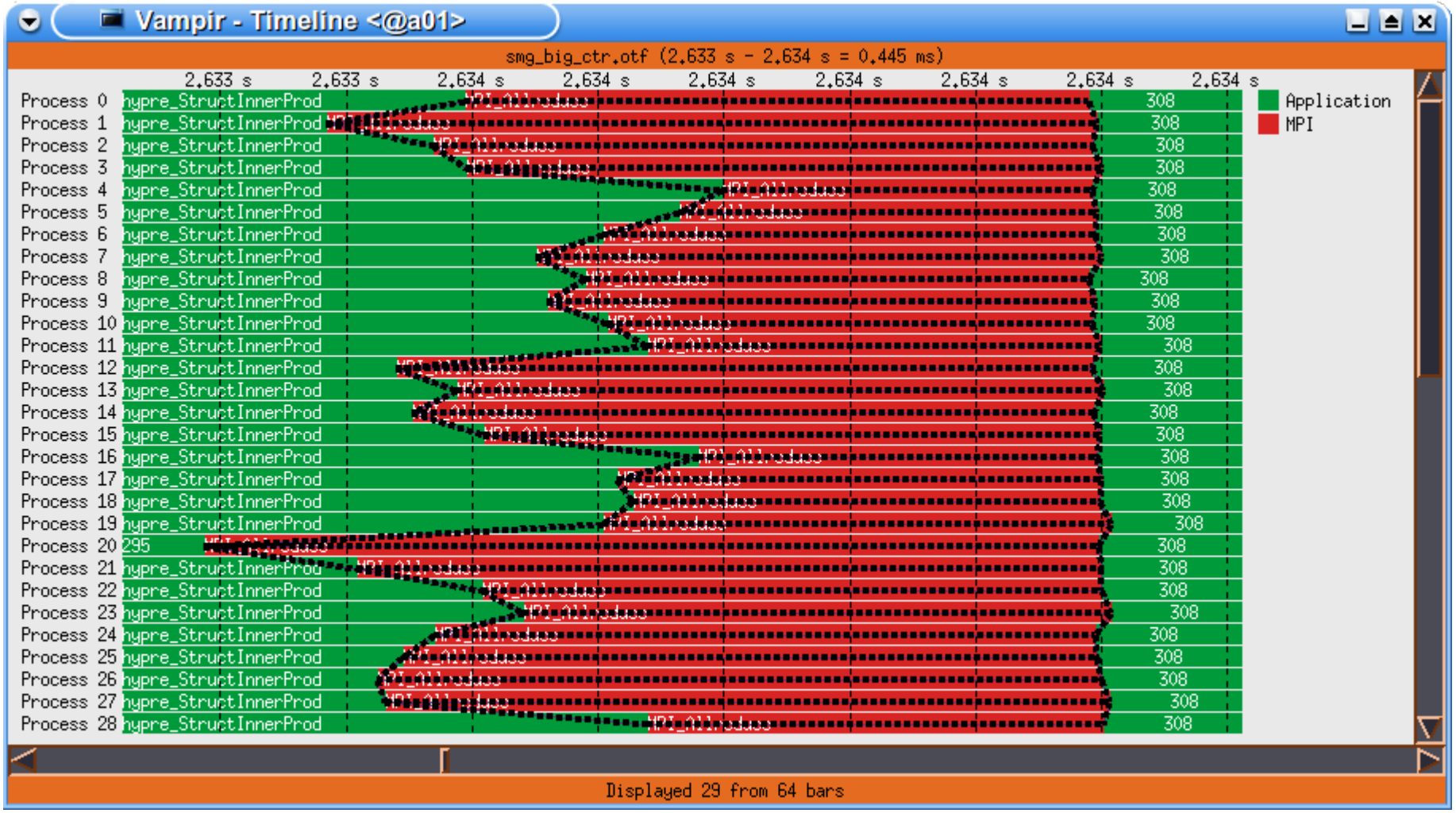

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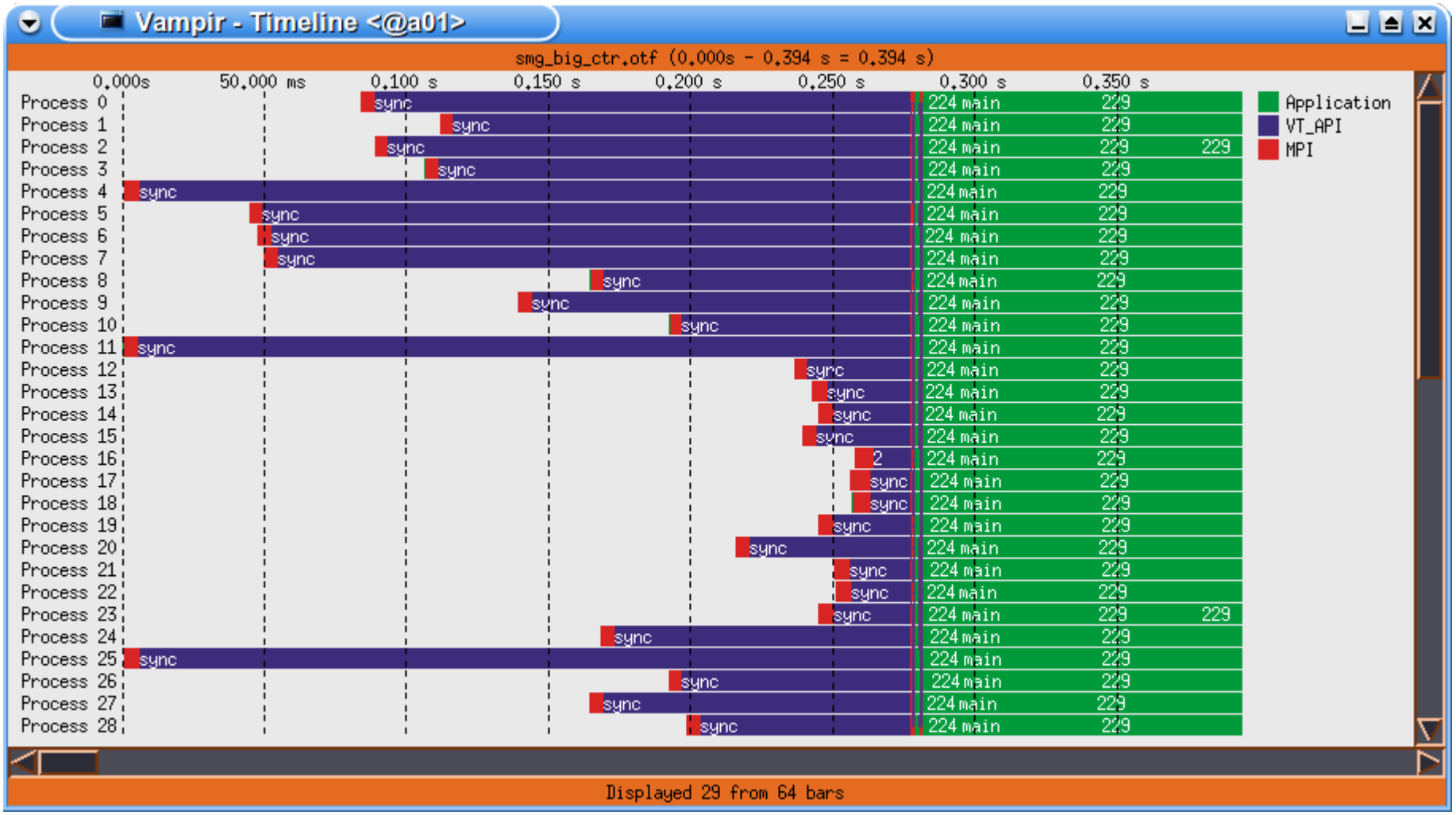
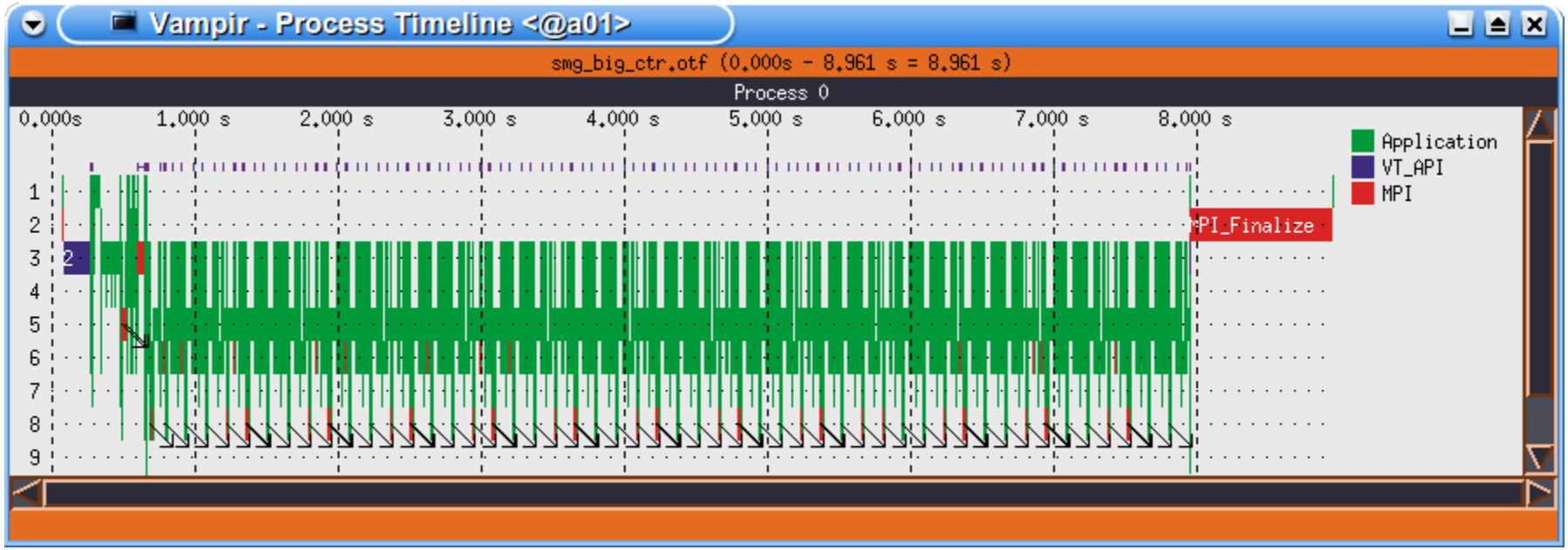


Process Timeline Display



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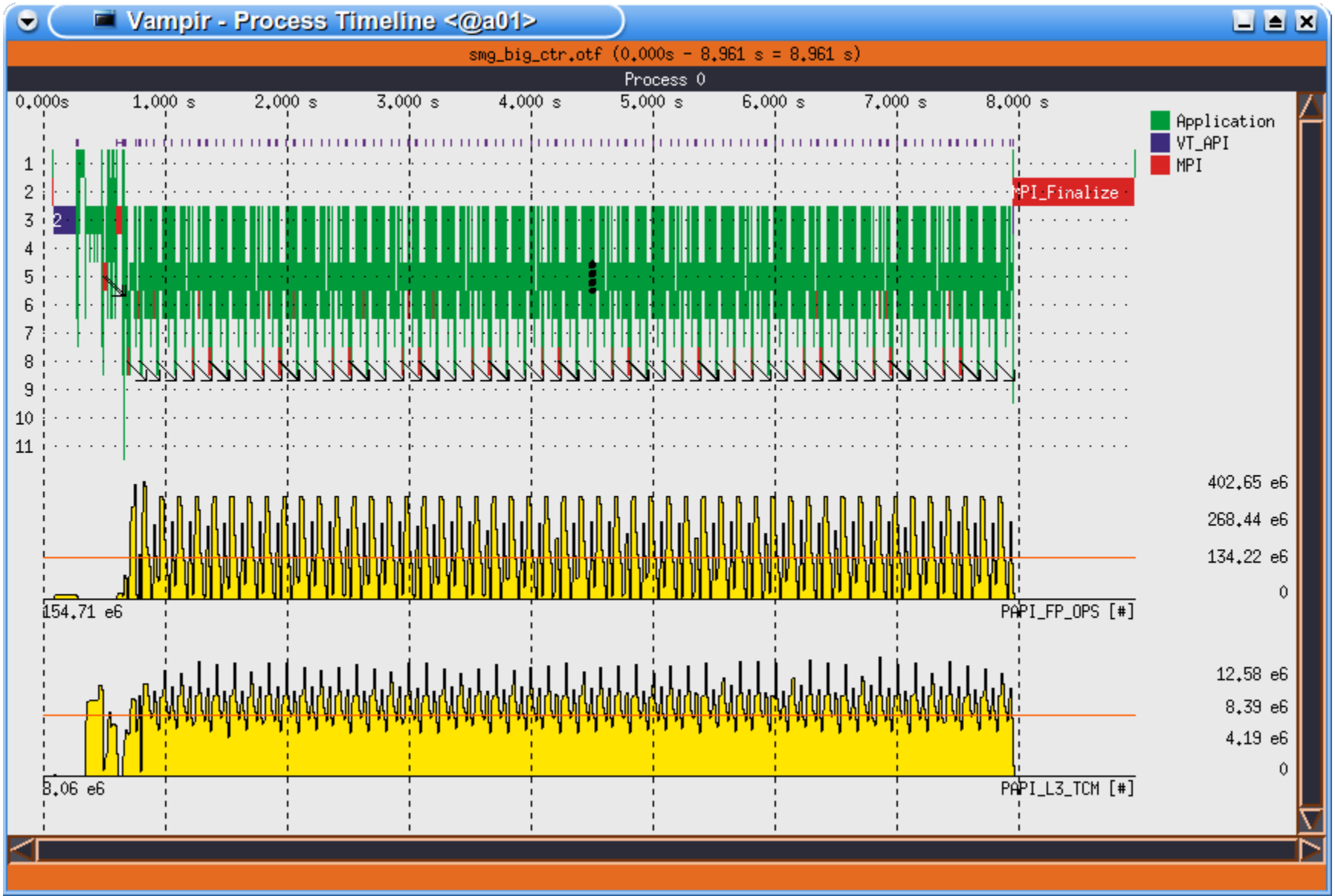

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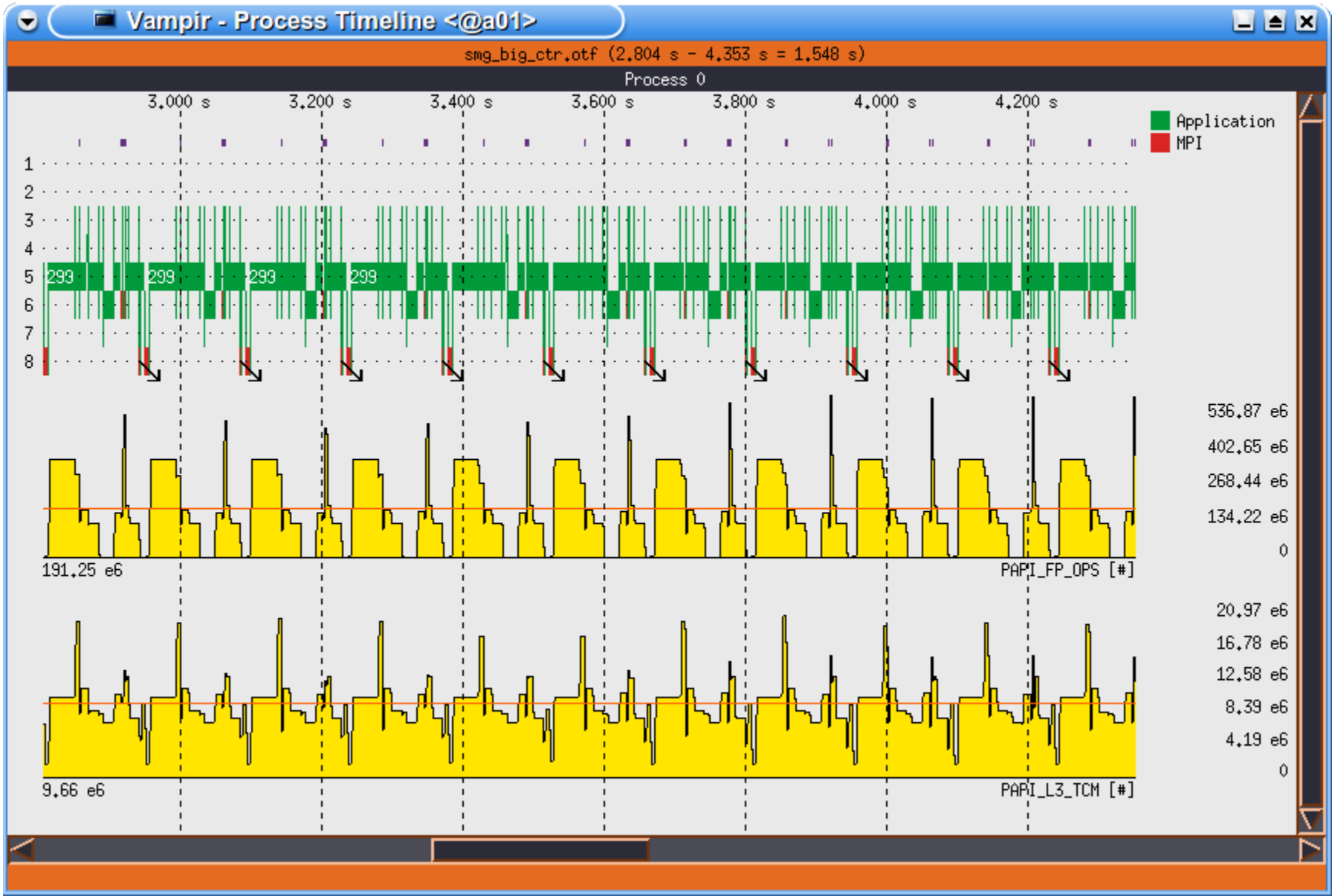

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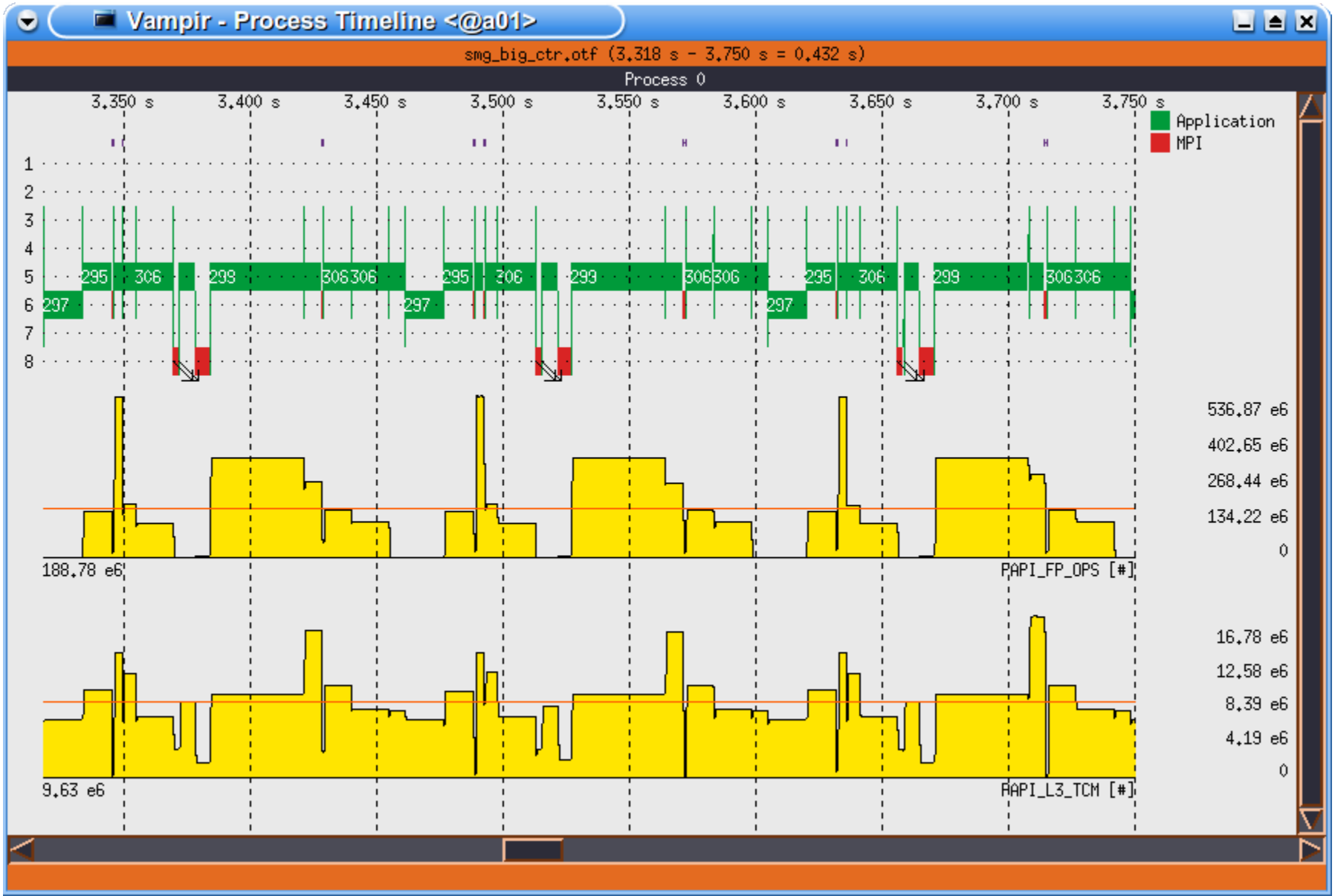

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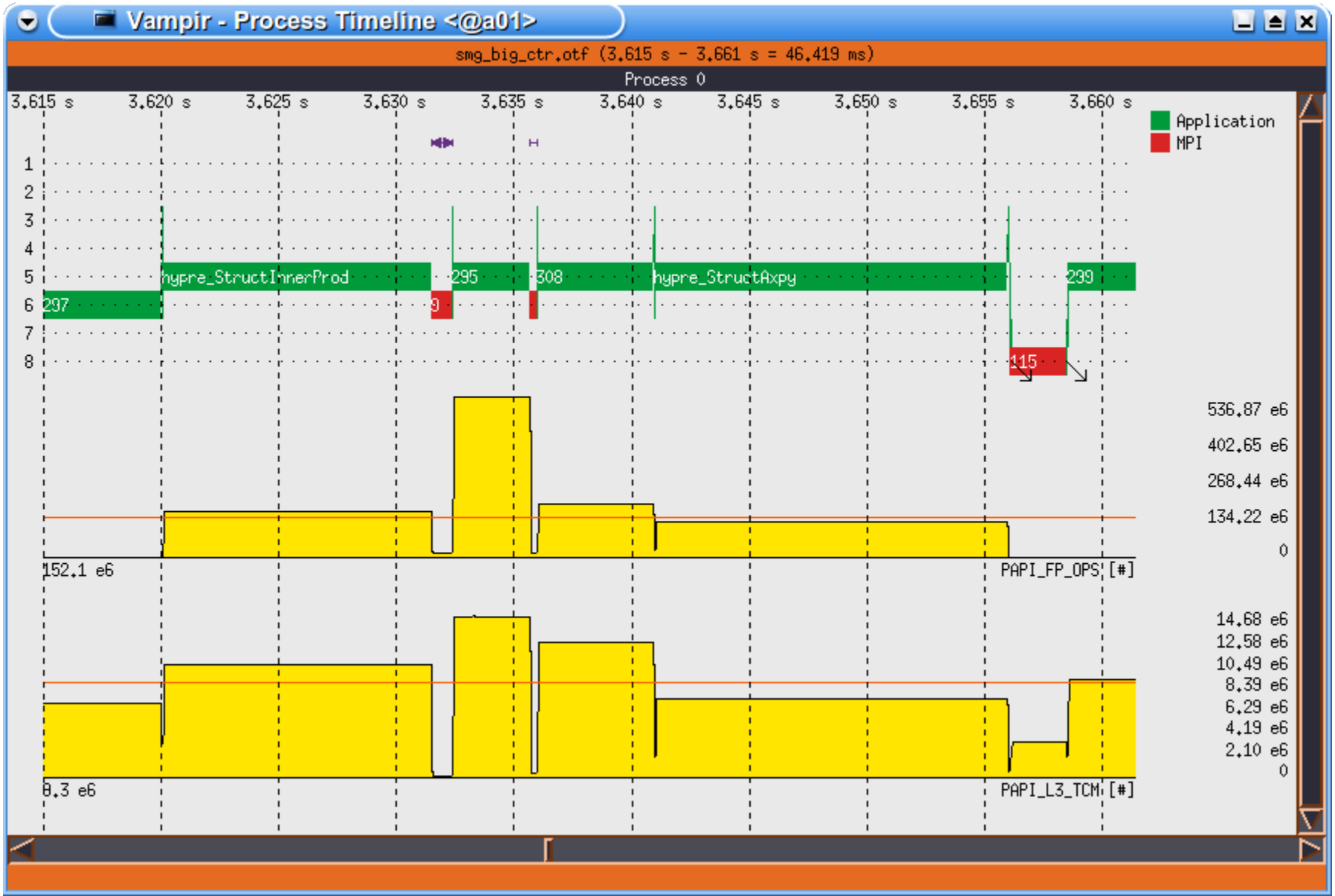
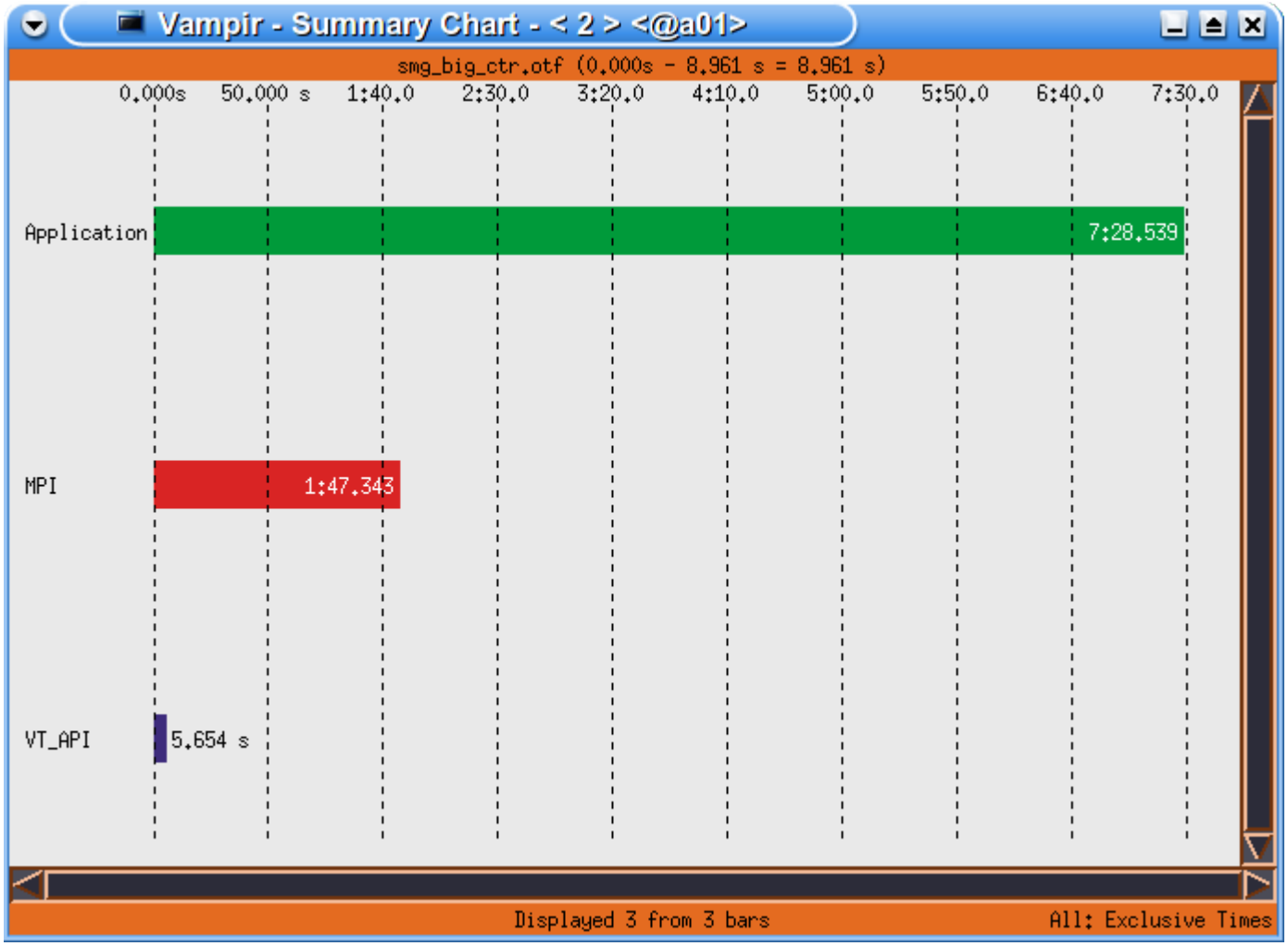


Statistic Summary Display



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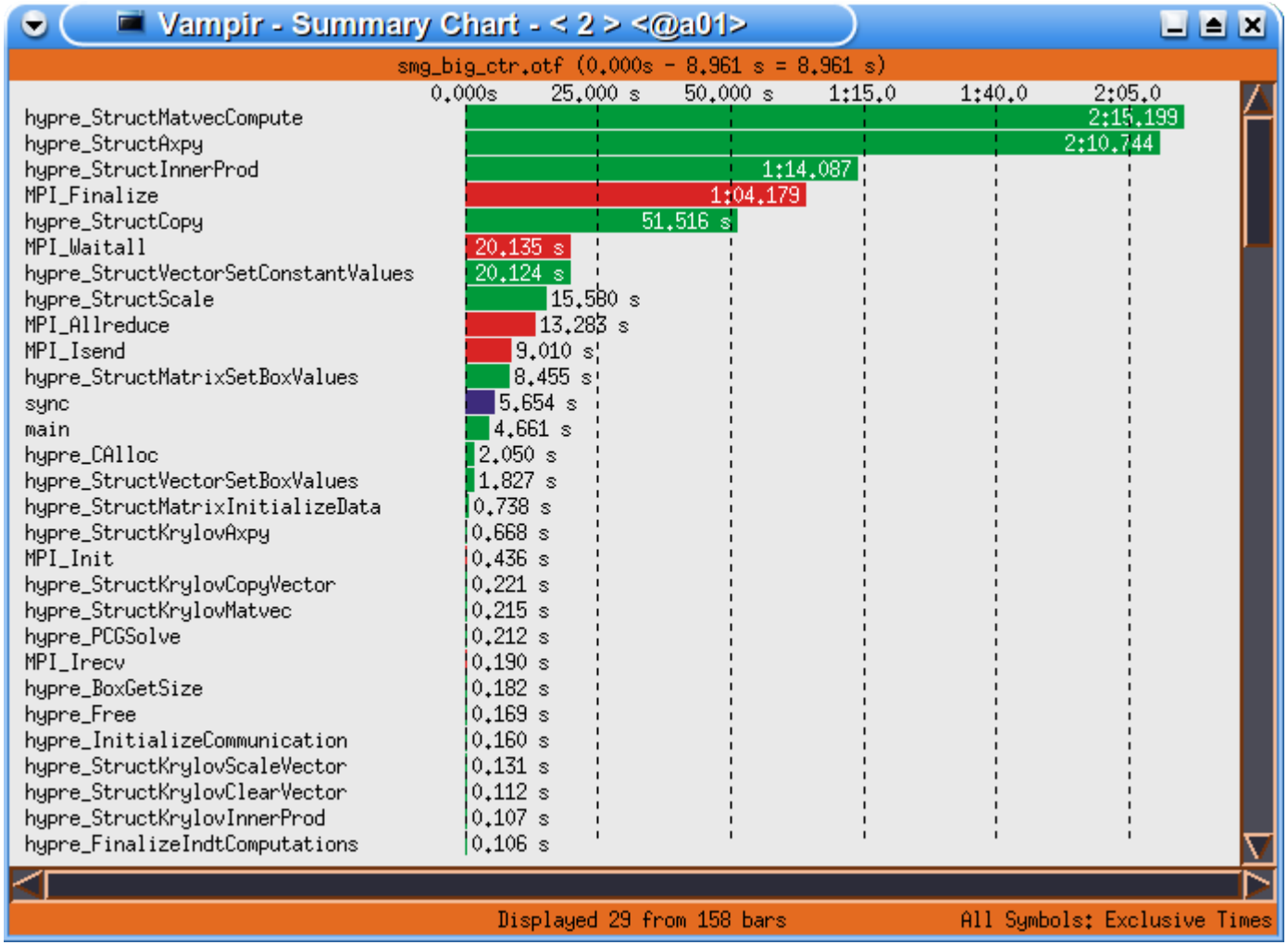

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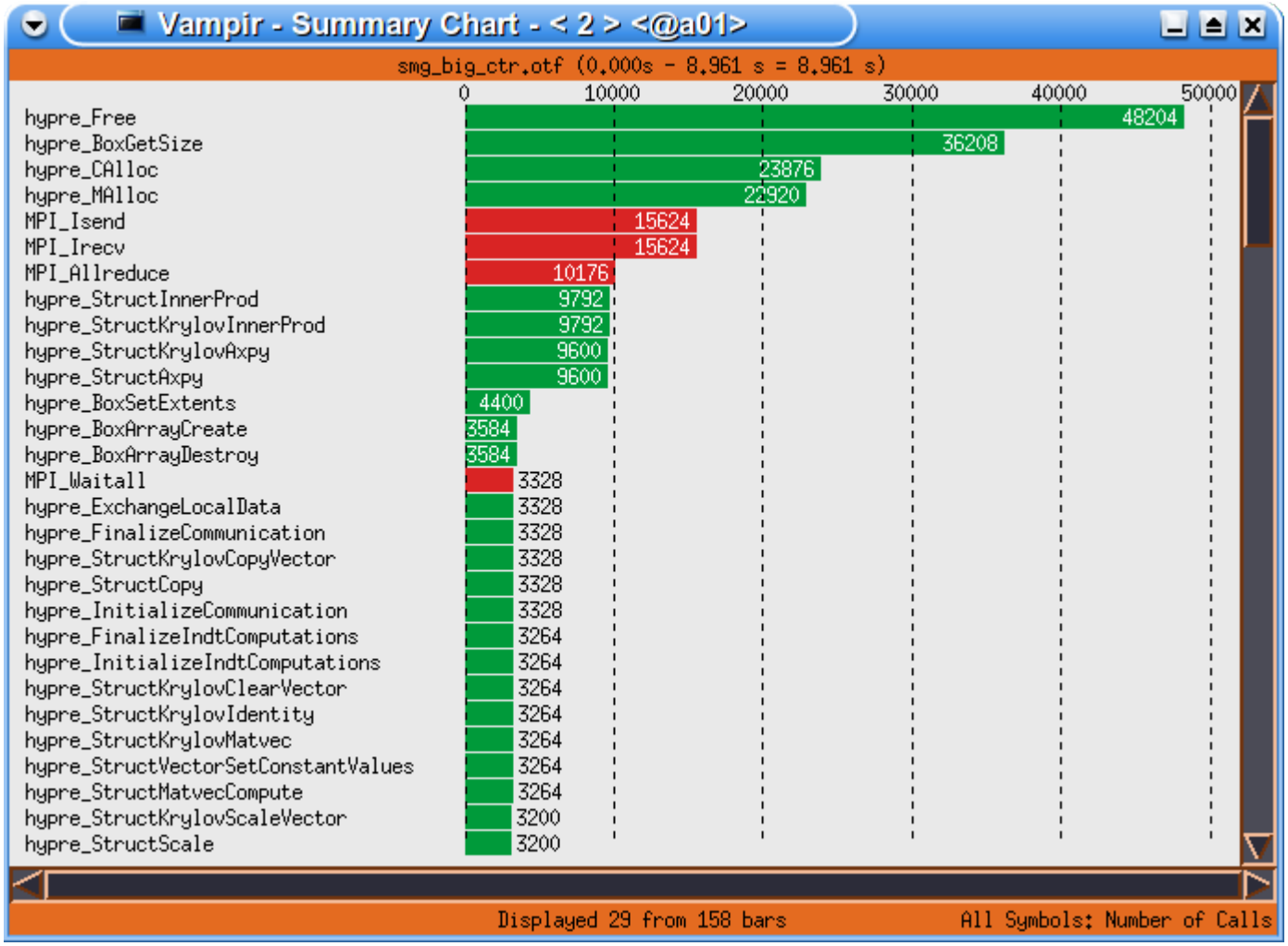

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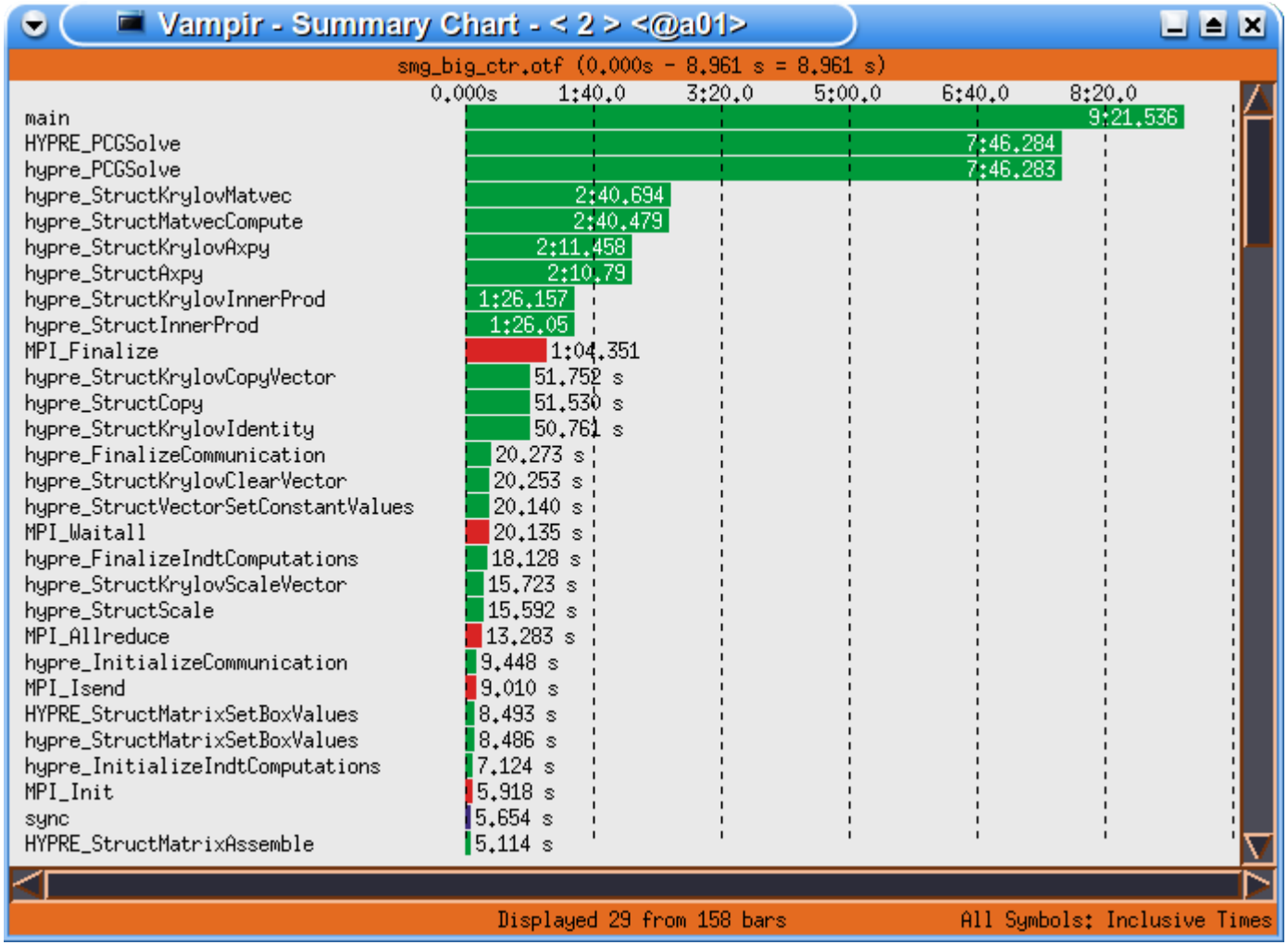

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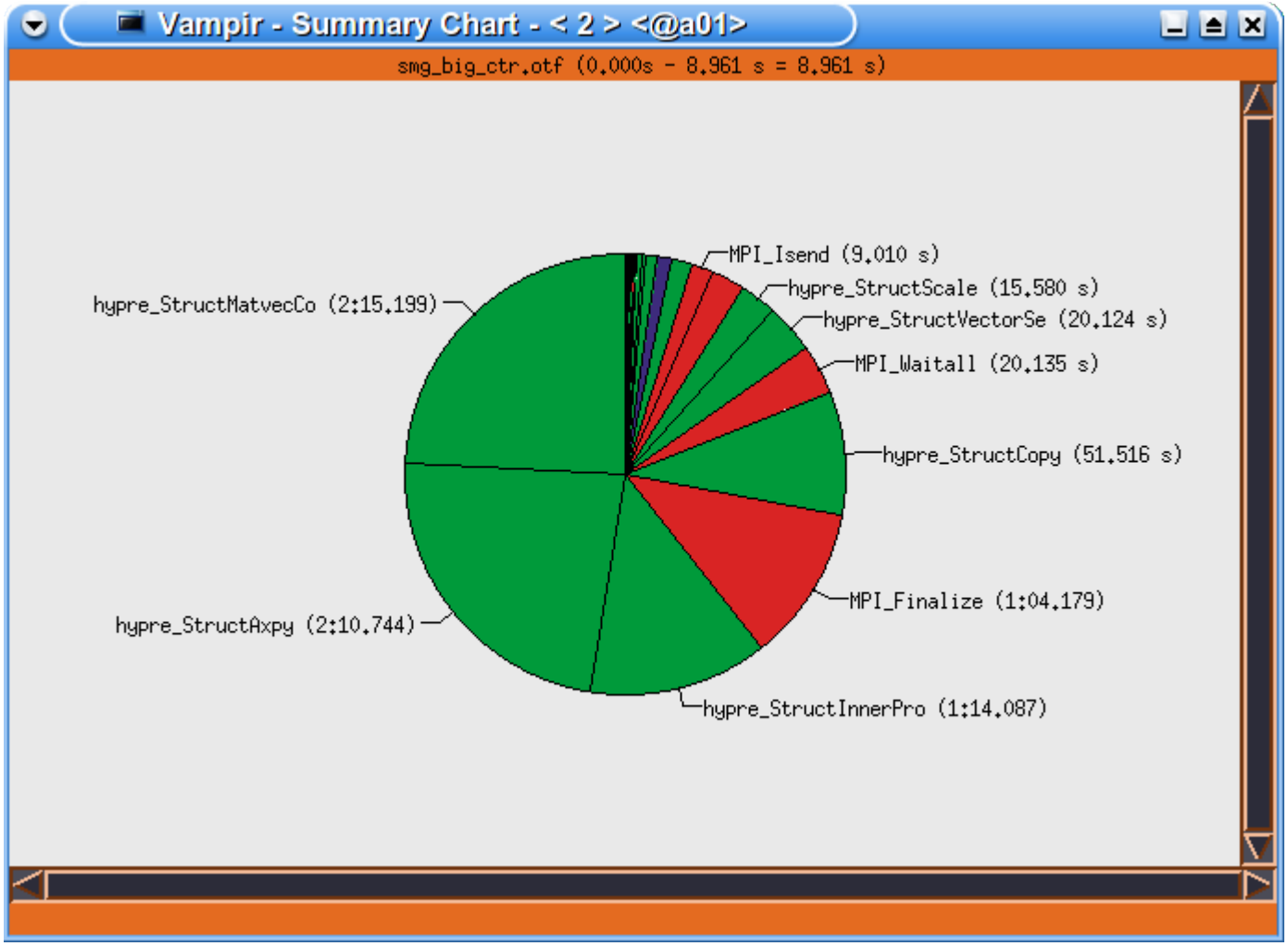
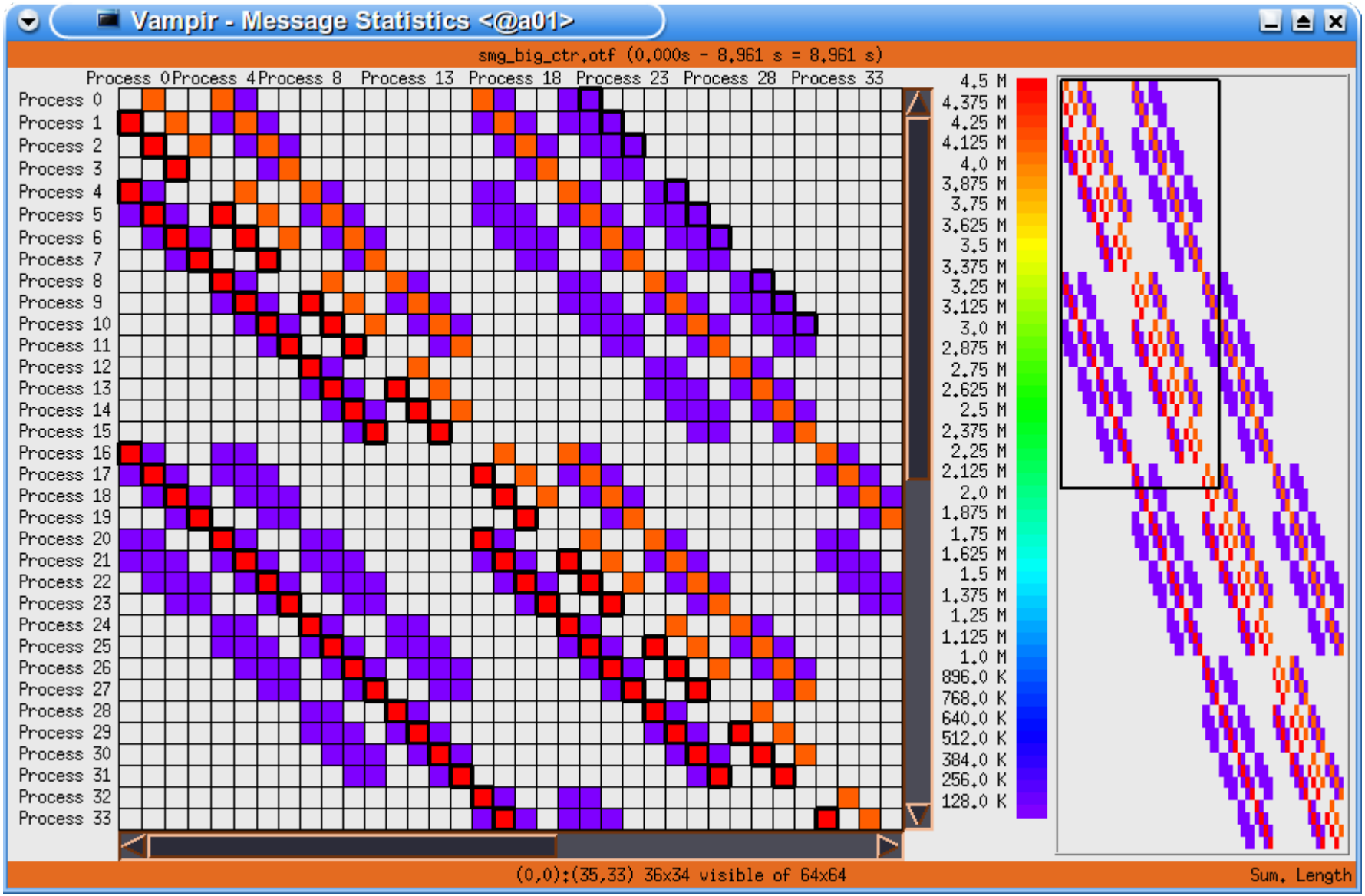


Message Statistics Display



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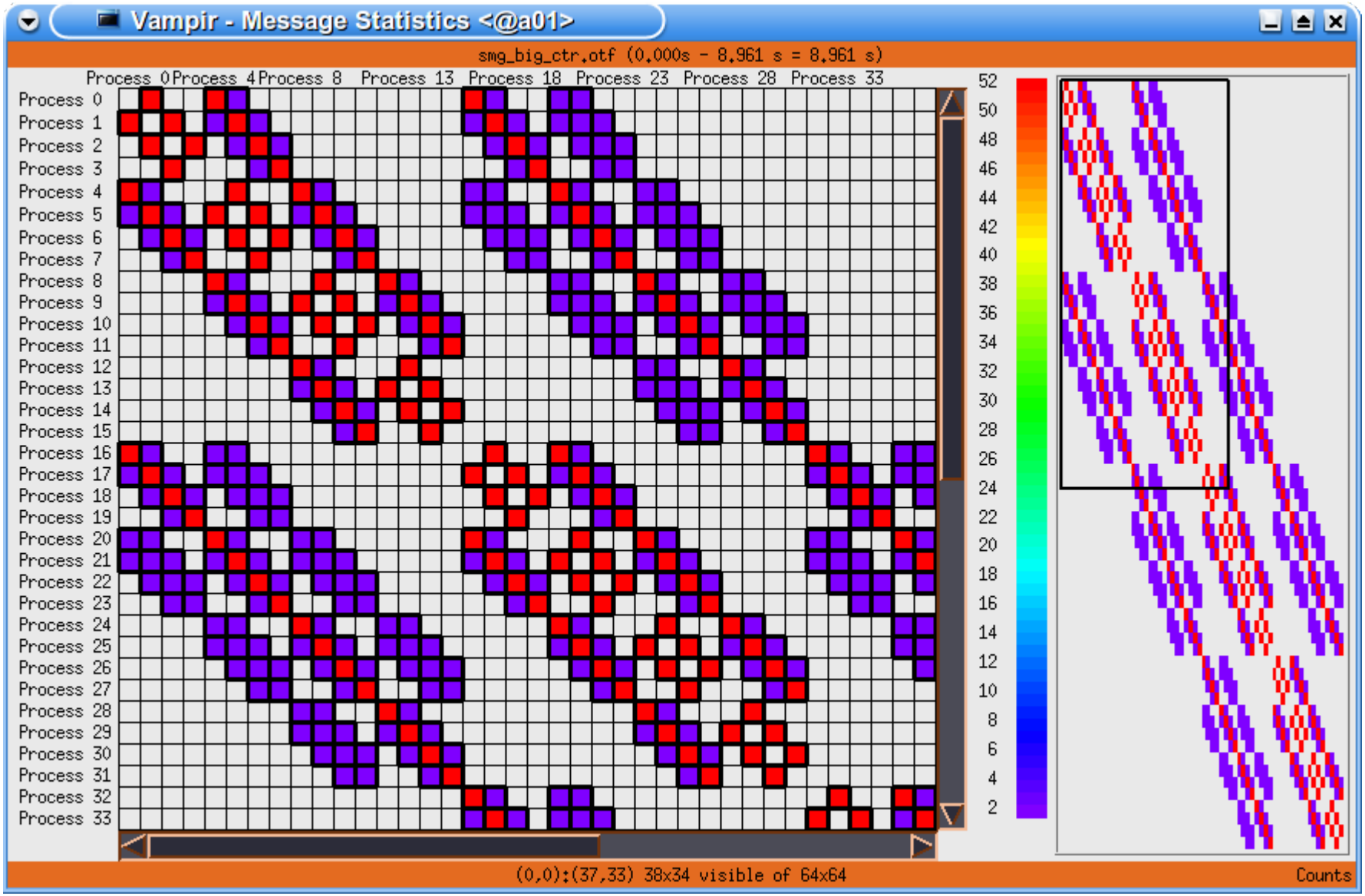

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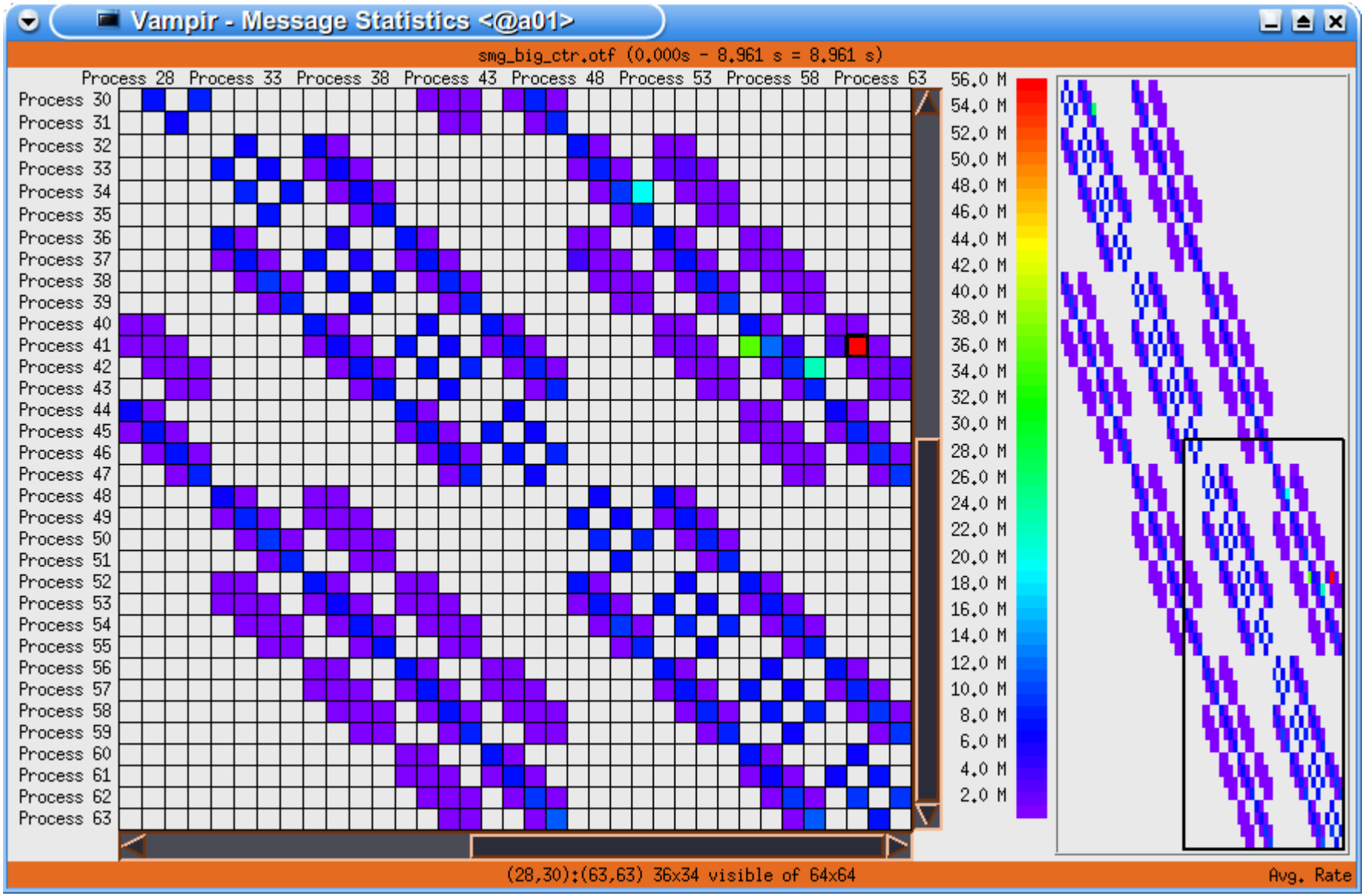

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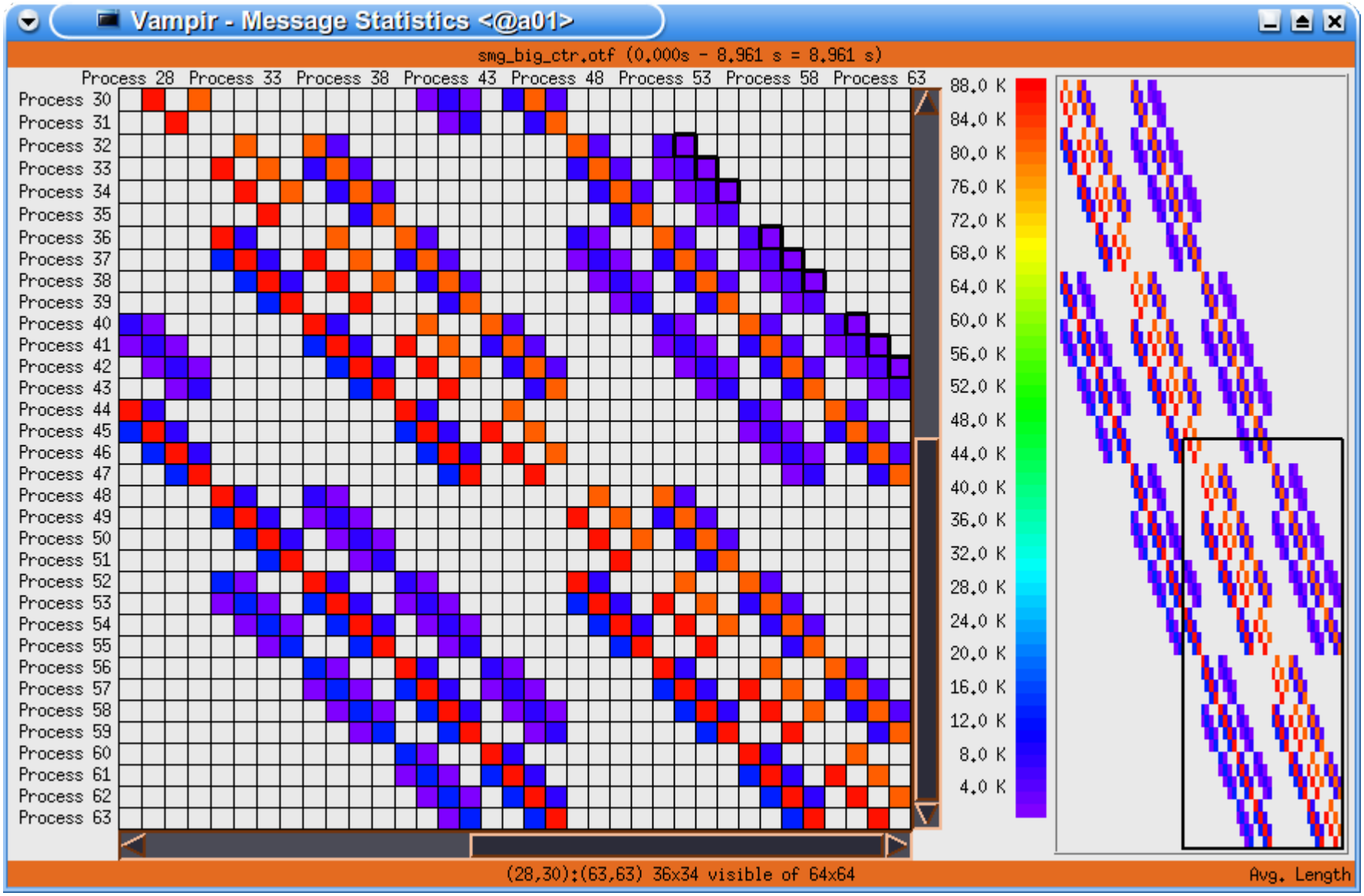

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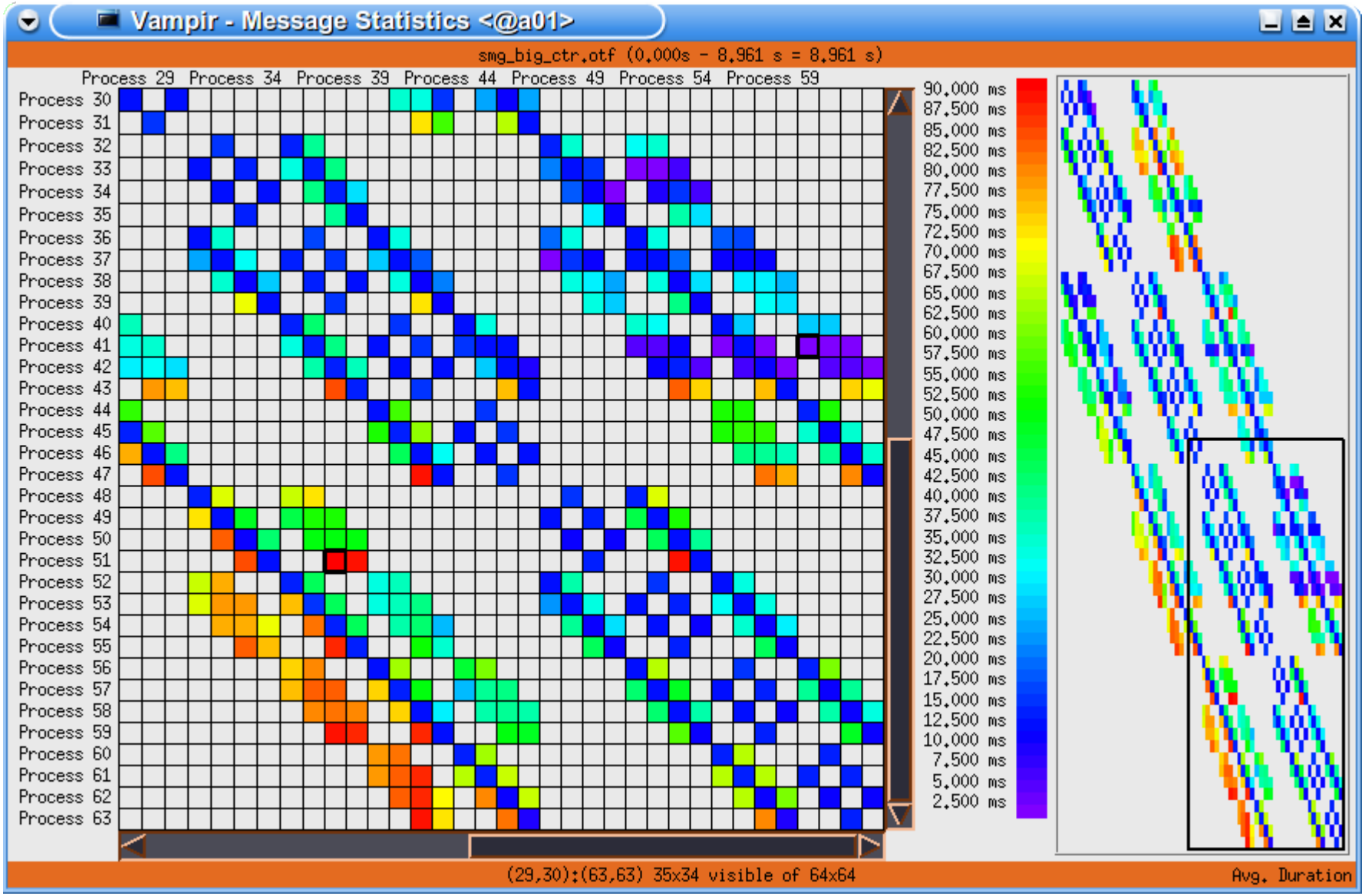

Vampir Displays

- there are more displays
- plus special features for extended scalability

- there are more kinds of performance data

- see Holger's Vampir presentation

What do you need to do for it?

- Instrumentation
  - via compiler wrappers, specific for underlying compiler

```
icc hello.c -o hello

vtcc hello.c -o hello
```

```
mpicc hello.c -o hello

vtcc hello.c -o hello
```

```
CC=icc    CXX=icpc

F90=ifc   MPICC=mpicc
```

```
CC=vtcc    CXX=vtcxx

F90=vtf90  MPICC=vtcc
```

- Re-Compile & Re-Link
  - use compiler instrumentation, add measurement library
- Trace Run
  - run with appropriate test data set
- more details in my separate VampirTrace presentation

Conclusions

- VampirTrace
  - convenient instrumentation and measurement package
  - hides away complicated details
  - provides many options and switches for experts
- Vampir & VampirServer
  - interactive trace visualization and analysis
  - intuitive browsing and zooming
  - scalable to large trace data sizes (100GB)
  - scalable to many processes/threads in a trace (2000)