Trace Compass Scalability Update

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Agenda

1. Background
2. History Tile Backend
3. Experiments
4. Results

Background

- Trace Compass State System Backend:
  - Middle layer storing the analysis results
  - Used in Linux Kernel Analysis, Callstack Analysis and others
- History Tree File:
  - Current implementation in Trace Compass
  - Scales reasonably well
- Partial State System:
  - Stores only part of the intervals
  - Query the trace to dynamically rebuild intervals to answer requests

History Tile Backend

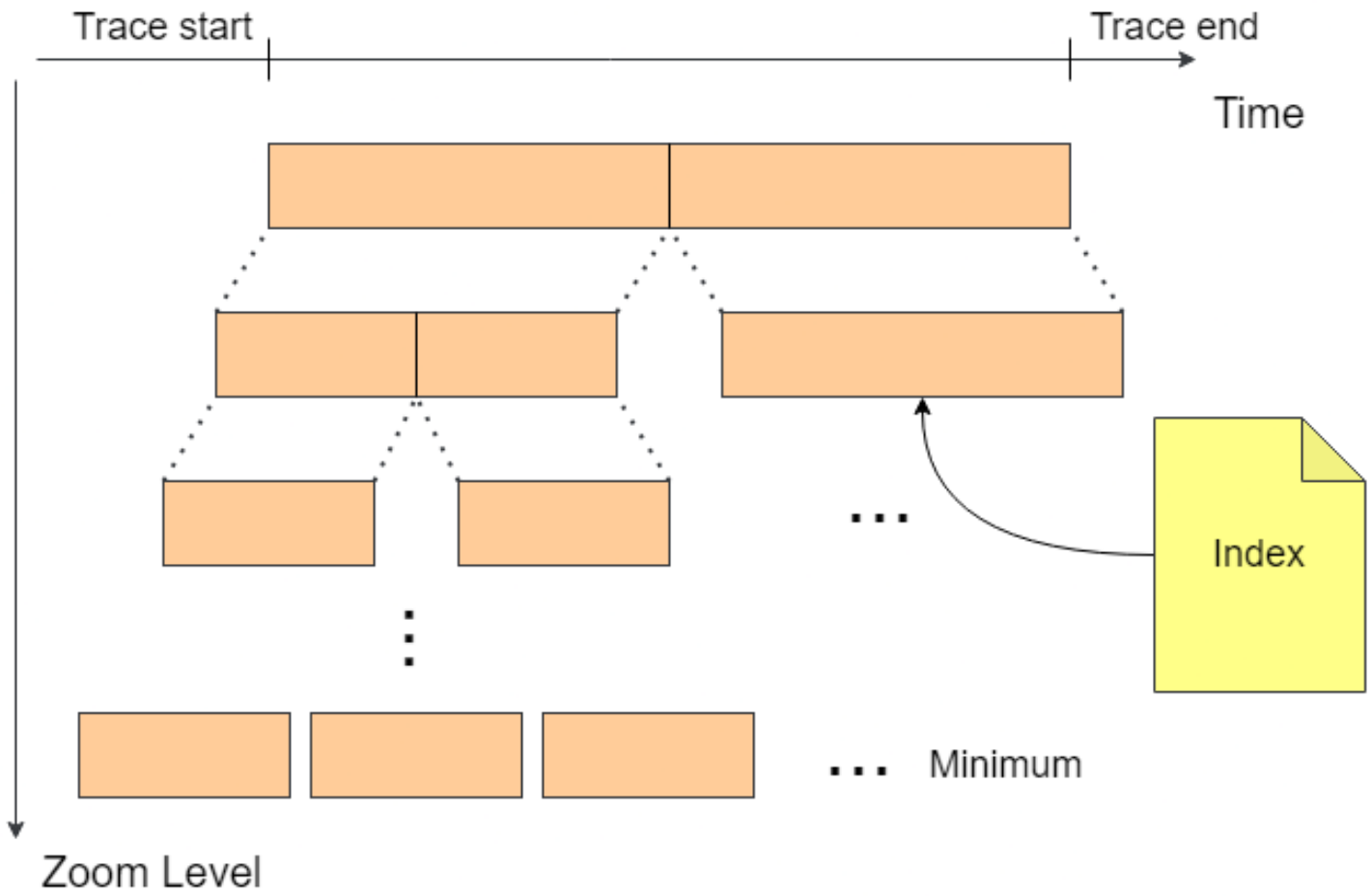


Figure: *History Tile Layers*

History Tile Backend - Possible improvements

- Building the tiles without knowing the trace end
  - Needed for live trace analysis
- Make the tile data size constant
  - Changes the query algorithm significantly
  - Reduces the number of tiles
- Storing the interval state and time separately
  - Should accelerate the search time
- Storing duplicated string state with a key-value store
  - Should reduce the history file size significantly for certain analyses

Experiment

- We compare three different versions:
  - Current implementation (full)
  - History Tree Tile (tile)
  - Partial State using the History Tree Tile (partial)
- We ran a state system analysis on 8 traces of different sizes (8MB - 7GB) using each back-end
- The result of the analysis is queried for 4 different zoom levels (showing 95%, 50%, 2.5% and 0.5%)
- The queries were made between two separated nodes in a SSH tunnel.

Results

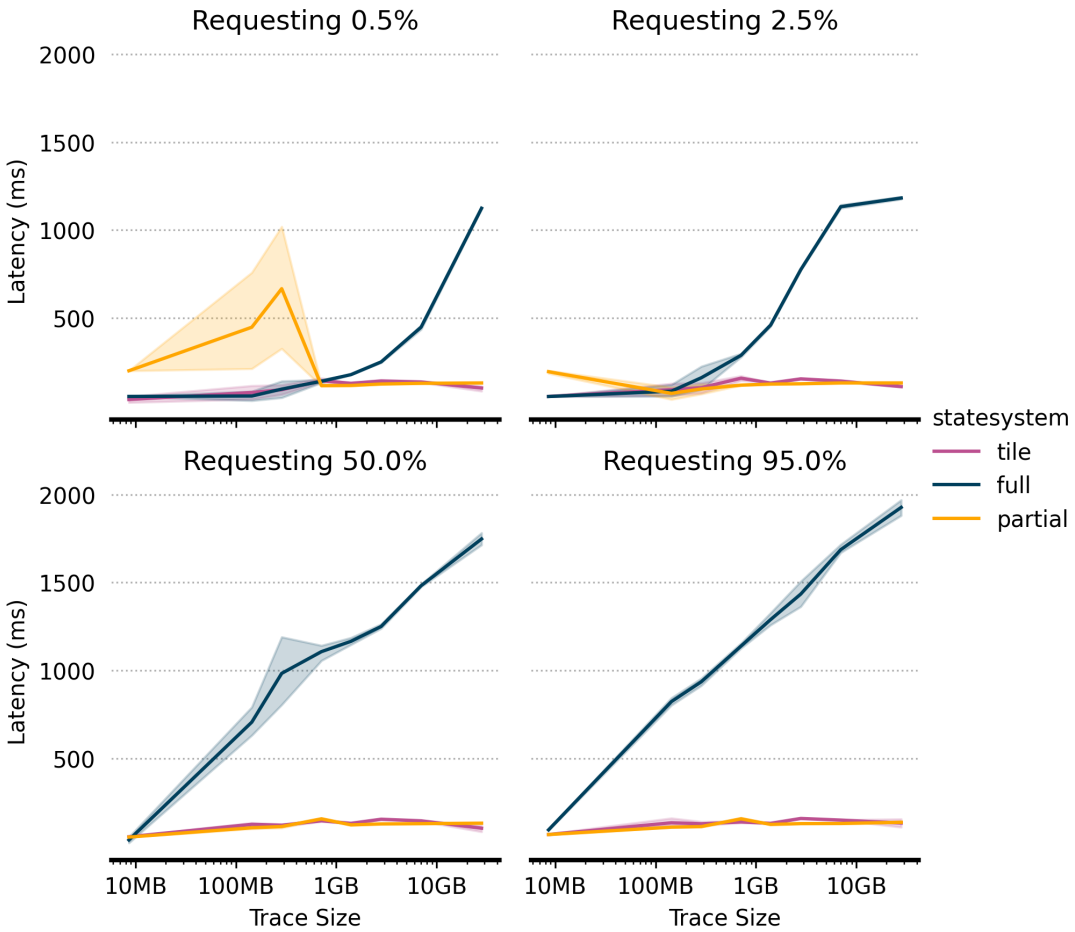


Figure: Request latencies per back-end type

Results

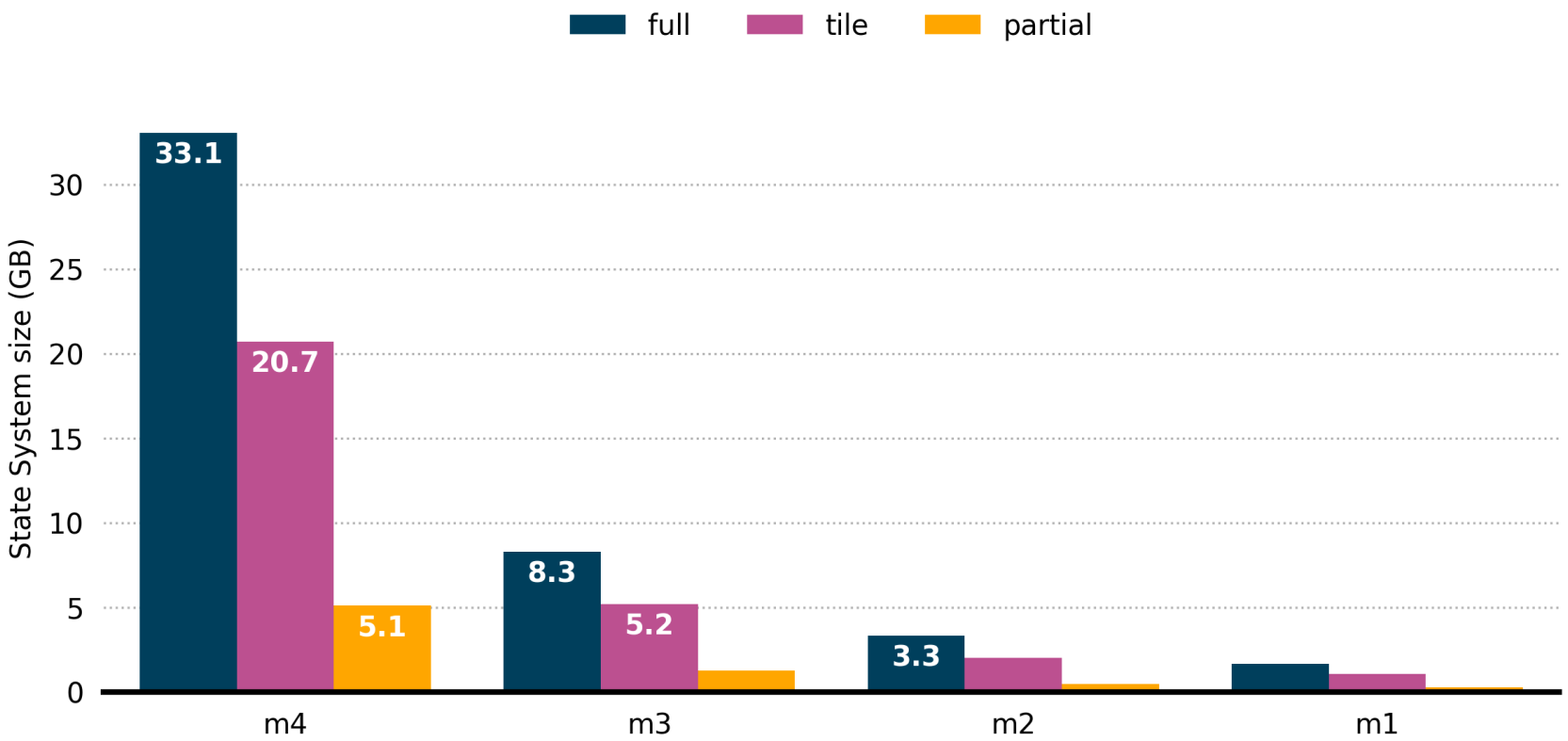
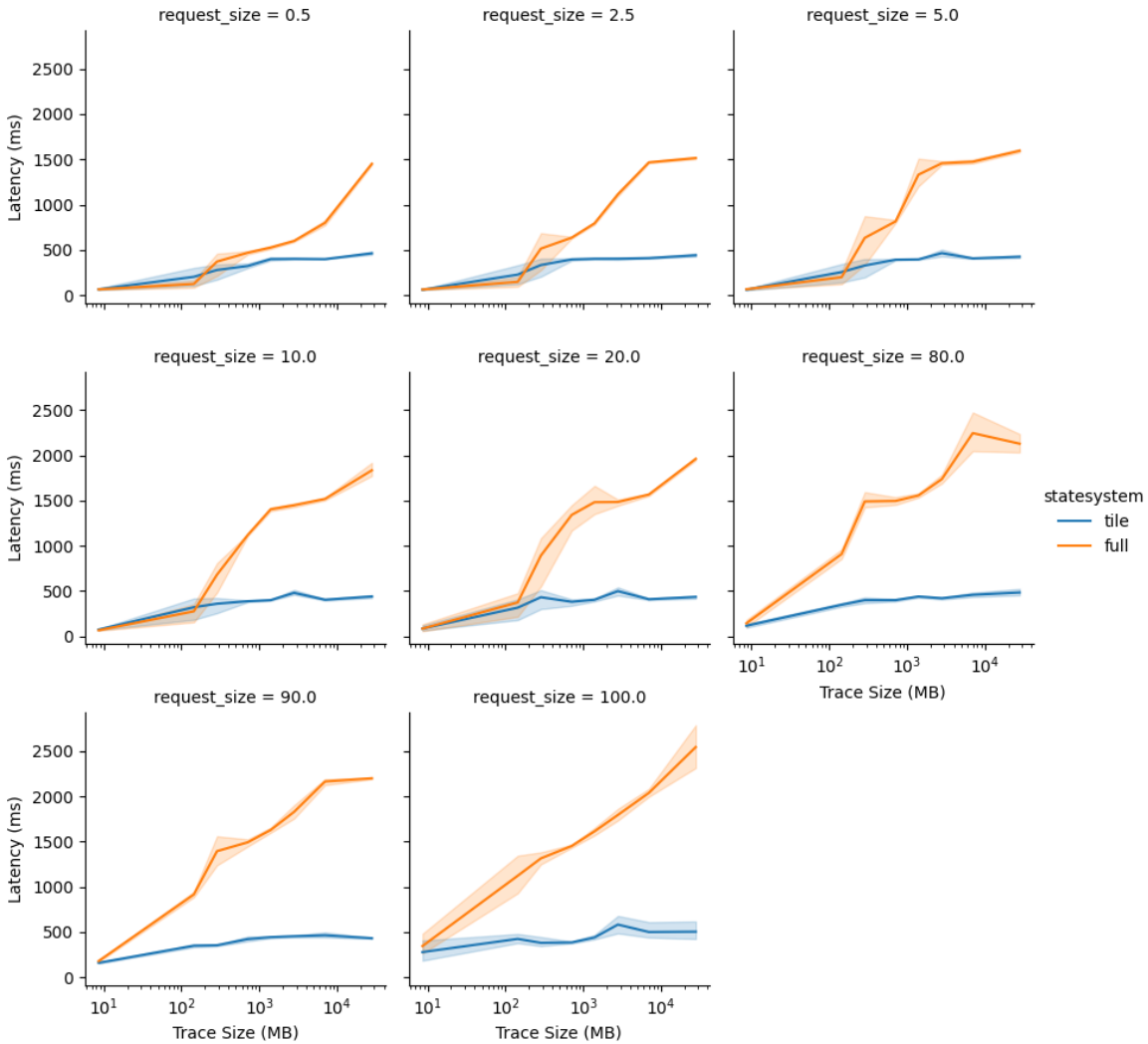


Figure: State system file sizes per trace analyzed

Conclusion & Future work

- Indicates that the history tiles scales much better
- Partial state system allows for much smaller intermediate files
- Partial state system does not allow for live trace analysis and worsens query latencies
- The improvements discussed in this presentation need to be tested

Appendix


request_size = 0.5
request_size = 2.5
request_size = 5.0
request_size = 10.0
request_size = 20.0
request_size = 80.0
request_size = 90.0
request_size = 100.0
Latency (ms)
0
500
1000
1500
2000
2500
10^1
10^2
10^3
10^4
Trace Size (MB)
statesystem
tile
full

Appendix

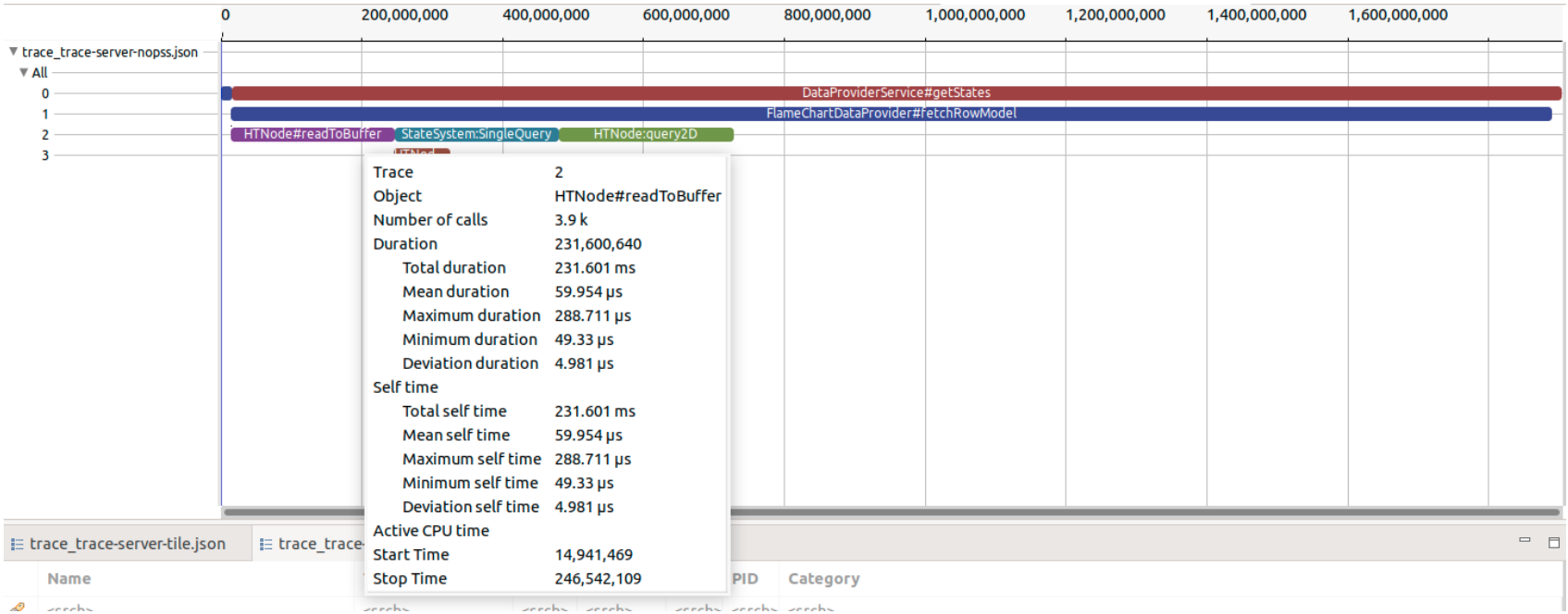


Figure: Flamegraph showing experiment requests before (full)

Appendix

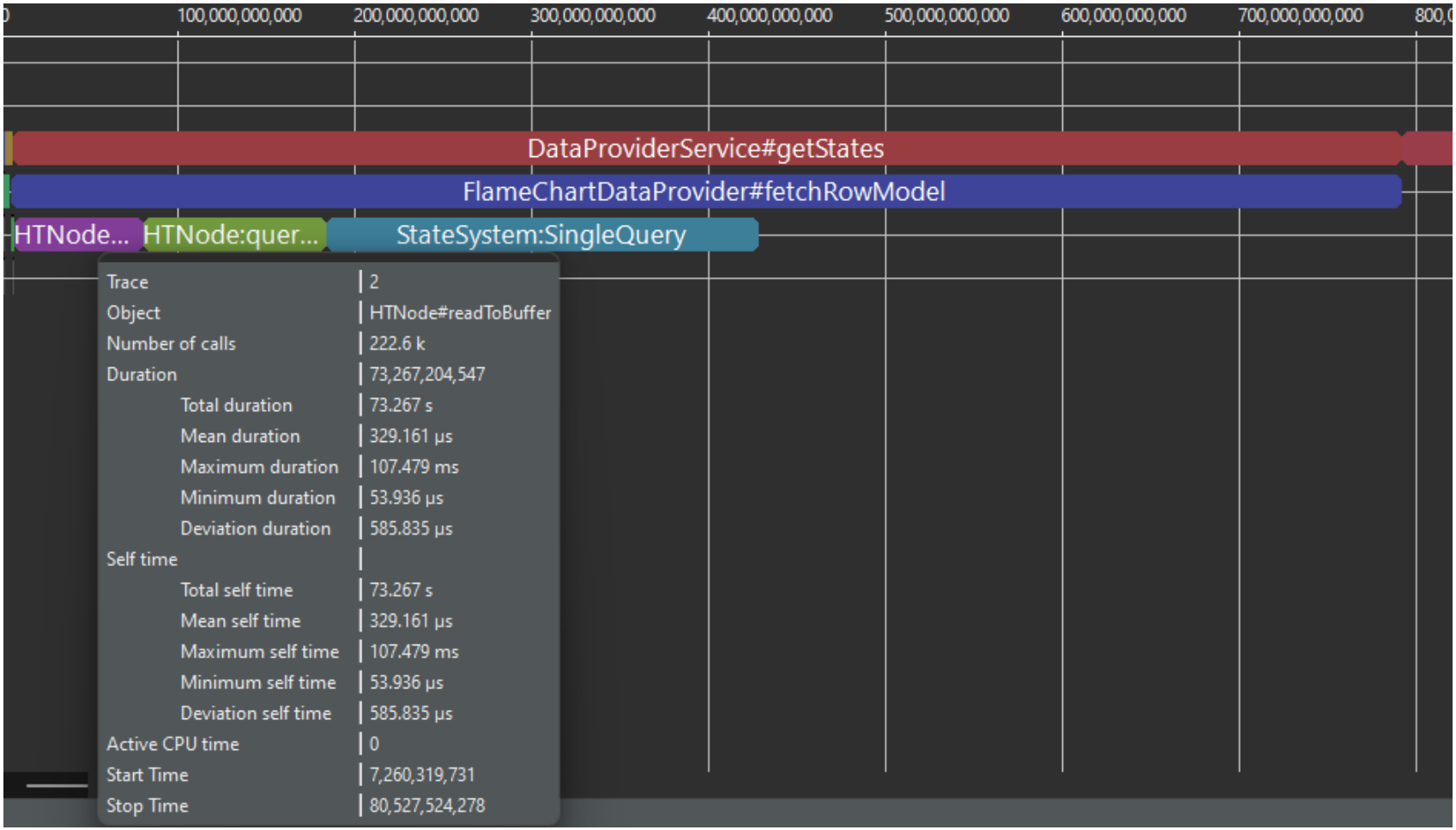


Figure: Flamegraph showing experiment requests after (full)

Appendix

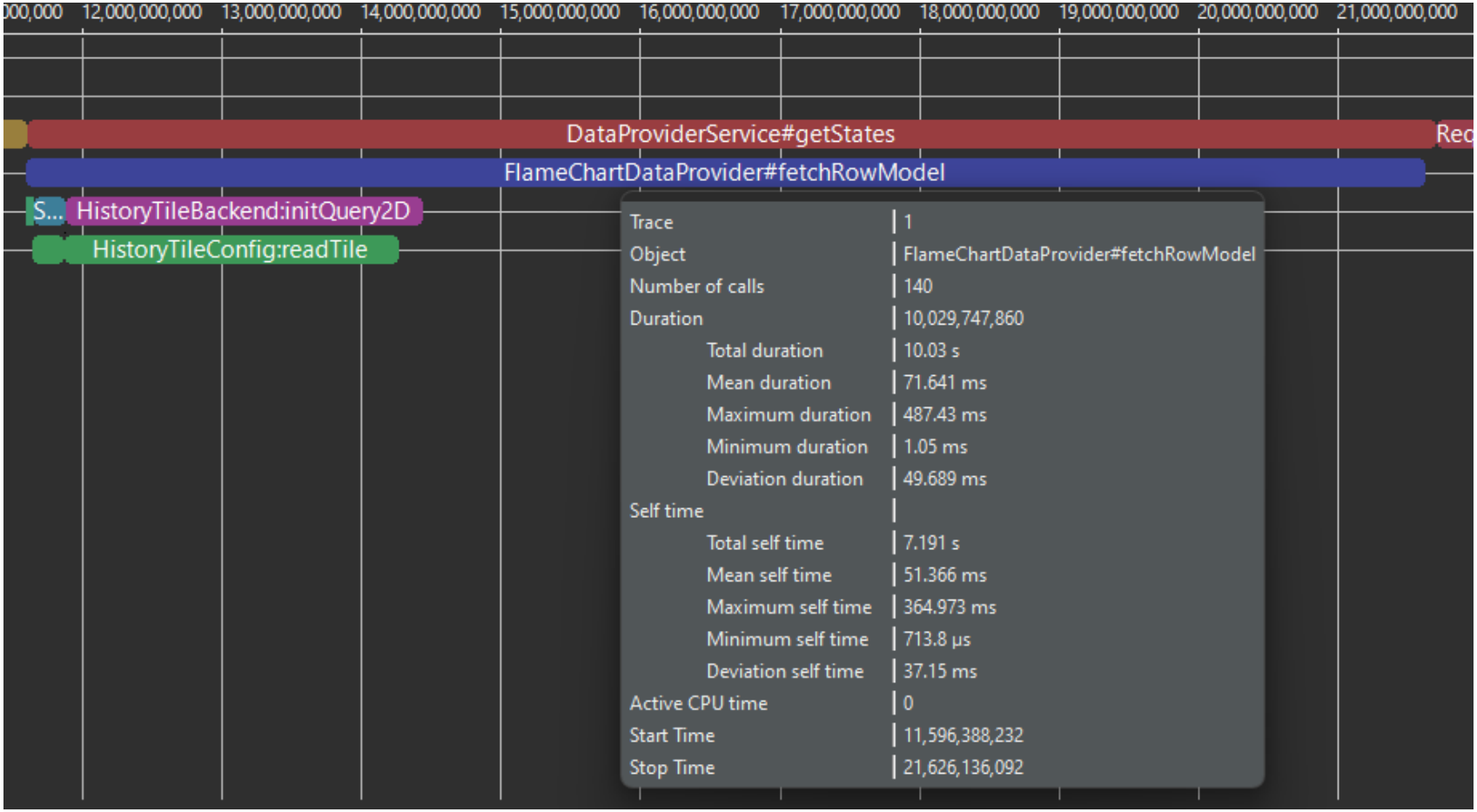


Figure: Flamegraph showing experiment requests with statistics (tile)

Appendix

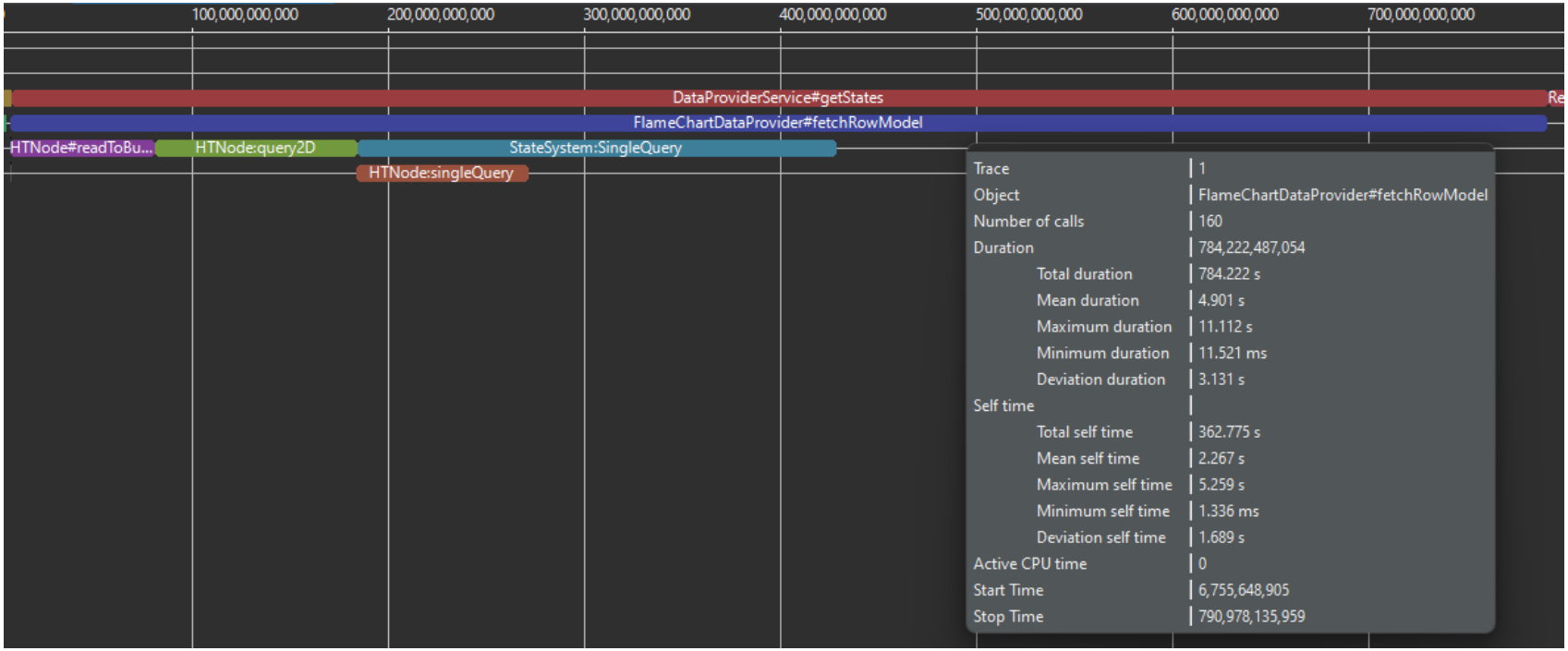


Figure: Flamegraph showing experiment requests with statistics (full)