

General

- VAMPIR is a commercially-licensed toolset for interactively visualising and analysing parallel execution traces, working with OTF2 execution traces generated by the community-developed measurement system SCORE-P.
- GUI for interactive trace analysis is highly customisable and provides a variety of timeline and additional displays, showing dynamic execution behaviour graphically at any level of detail.

Generic presentation

- Timeline charts show states or value evolution with a common horizontal time axis, while additional summary charts provide quantitative calculations for the current time interval.
- Initial presentation of the entire trace can be refined to reveal additional detail of shorter time intervals, with zooming and scrolling the time axis changes the time interval presented. For orientation, a navigation toolbar showing the currently selected time interval from the entire trace is upper right next to the icon toolbar.
- Event regions (referred to as ‘functions’) are grouped into categories for Application, MPI, OpenMP, etc., with a default colour which can be individually customised. MPI routines are typically red. Three of the green Application routines in Figures 1 & 2 have been distinguished with different shades. (See *Function Legend* in figure.)

Display details

- *Master Timeline* (Figure 1 upper-right) has processes and threads on vertical axis of chart, showing their states and interactions. Additional state lines in the chart may be used for GPUs and other devices. Process/thread labels are shown to the extent that space permits (however, when only a few pixels are available most labels will be omitted). Events with a particular region name can be highlight to reveal when they are executing on each thread. White intervals of the chart indicate the absence of recorded events, often indicating threads which are not executing (and may therefore be considered ‘idle’).
- Communication and synchronisation events are optionally rendered in timelines when display resolution permits. Point-to-point message transfers are shown with arrows connecting sender and receiver, whereas collective events connect all participating processes or threads. When there are too many messages to resolve in the space available, a circle indicator is used instead for a burst of messages.
- *Process Timeline* (Figure 1 centre-right) shows the stack of region events for an individual (specifiable) process or thread. The base is typically `main` or `MAIN_` for Master threads of each process with each additional frame stacked below it, and the lowest frame corresponding to the event currently executing (and shown in the *Master* timeline). Additional threads typically have different base frames, e.g., corresponding to the current OpenMP parallel region.
- *Summary Timeline* (Figure 1 lower-right) shows a stacked histogram of the proportion of time in each category of region. Additional timeline charts are available to show the evolution of recorded counter values with time (for individual or all threads).
- *Function Summary* shows a profile calculated for the current time interval. Can be customised to show metric values in different presentations for individual regions or groups, as a histogram or pie-chart, for all or a subset of processes or threads. Additional summary charts are provided for messages, file I/O and a communication matrix.
- *Context View* shows detailed information about a selected region or interaction.

Miscellaneous

- Charts can be added/removed, resized and re-arranged as desired within the window, or undocked entirely. Simultaneous synchronised views of multiple traces in a single window are also possible.
- Generally all processes and threads are included in aggregate views, even when they are not all visible (without vertical scrolling). Subsets of processes and threads can be specified when desired, to appear in the *Master* and other timelines and associated summary charts.

Further information

- VAMPIR and SCORE-P training is coordinated via Virtual Institute – High Productivity Supercomputing (VI-HPS) and recent training material from tutorials and workshops is available from <http://www.vi-hps.org/training/>.

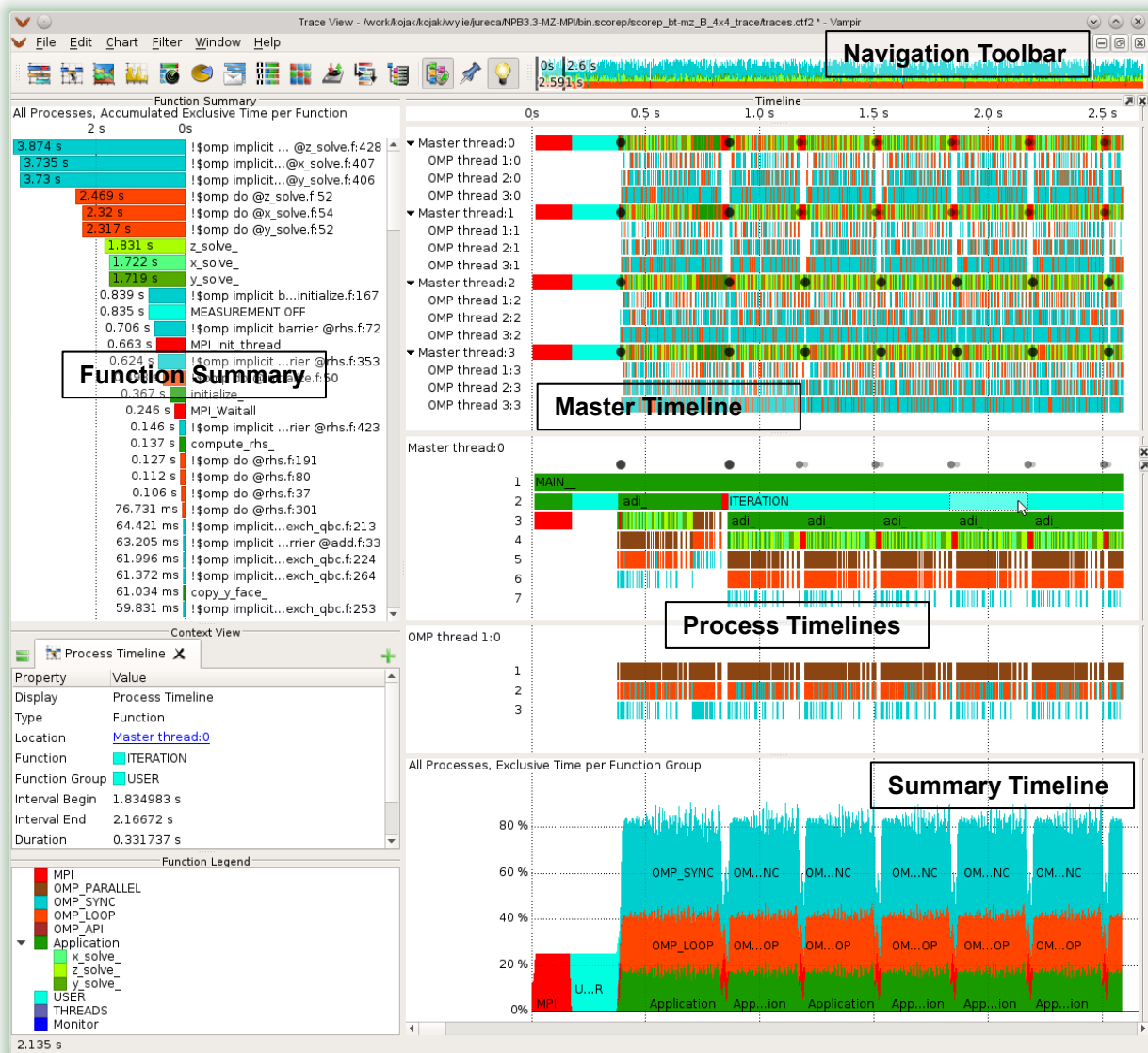


Figure 1: Timeline views of start of 64-second execution trace of 4 MPI processes each with 4 OpenMP threads covering five of 200 iterations in first 2.6 seconds, with associated summary profile for this interval and legend.

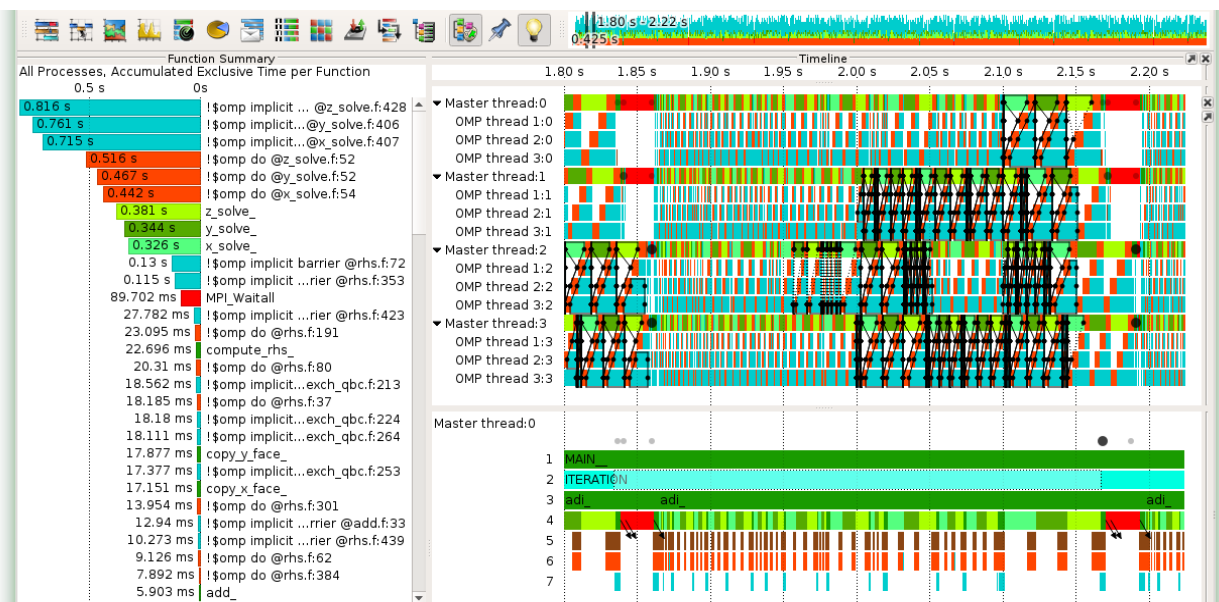


Figure 2: Timeline zoom for a single 0.33s iteration revealing detail of individual communications and synchronisations.