

VI-HPS



Analysis report examination with CUBE

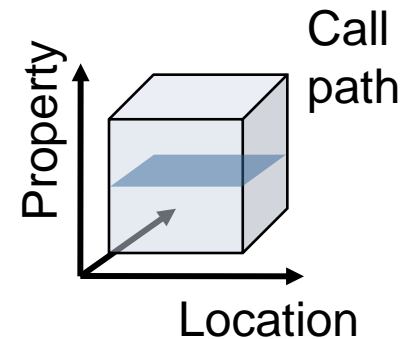
Brian Wylie

Jülich Supercomputing Centre



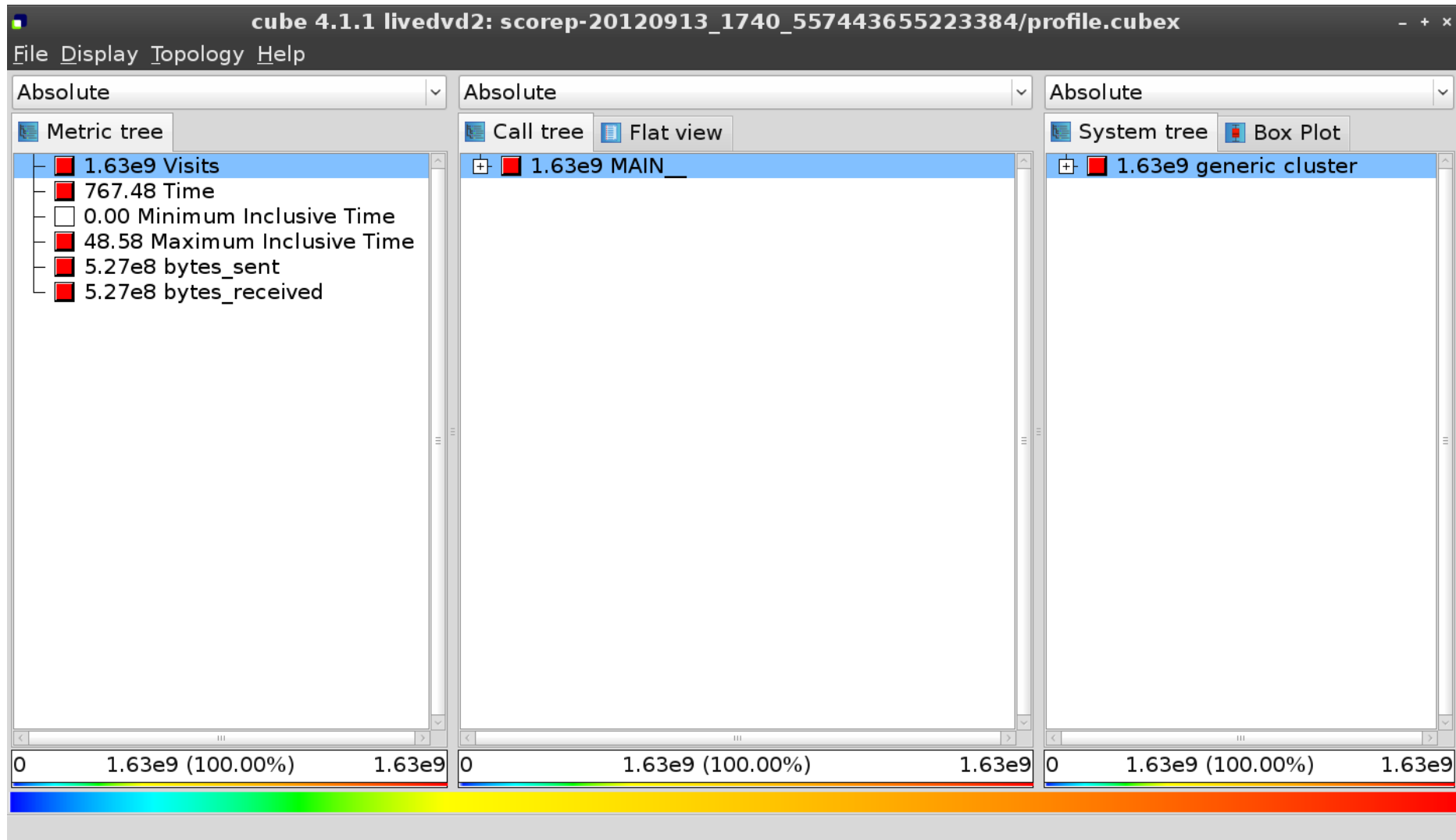
- Parallel program analysis report exploration tools
 - Libraries for XML report reading & writing
 - Algebra utilities for report processing
 - GUI for interactive analysis exploration
 - requires Qt4
- Originally developed as part of Scalasca toolset
- Now available as a separate component
 - Can be installed independently of Score-P, e.g., on laptop or desktop
 - Latest release: CUBE 4.2.2 (February 2014)

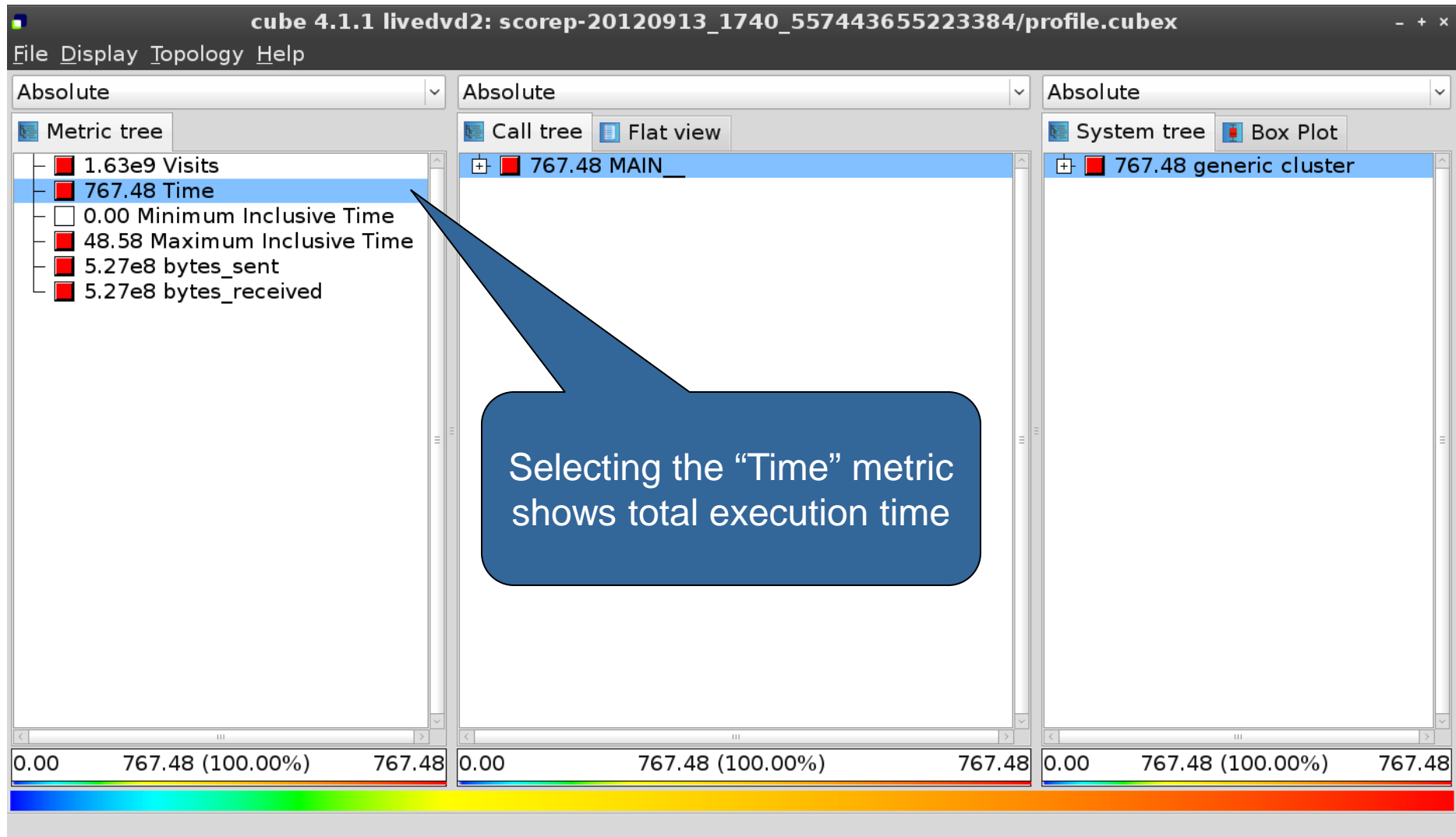
- Representation of values (severity matrix) on three hierarchical axes
 - Performance property (metric)
 - Call path (program location)
 - System location (process/thread)
- Three coupled tree browsers
- CUBE displays severities
 - As value: for precise comparison
 - As colour: for easy identification of hotspots
 - Inclusive value when closed & exclusive value when expanded
 - Customizable via display modes



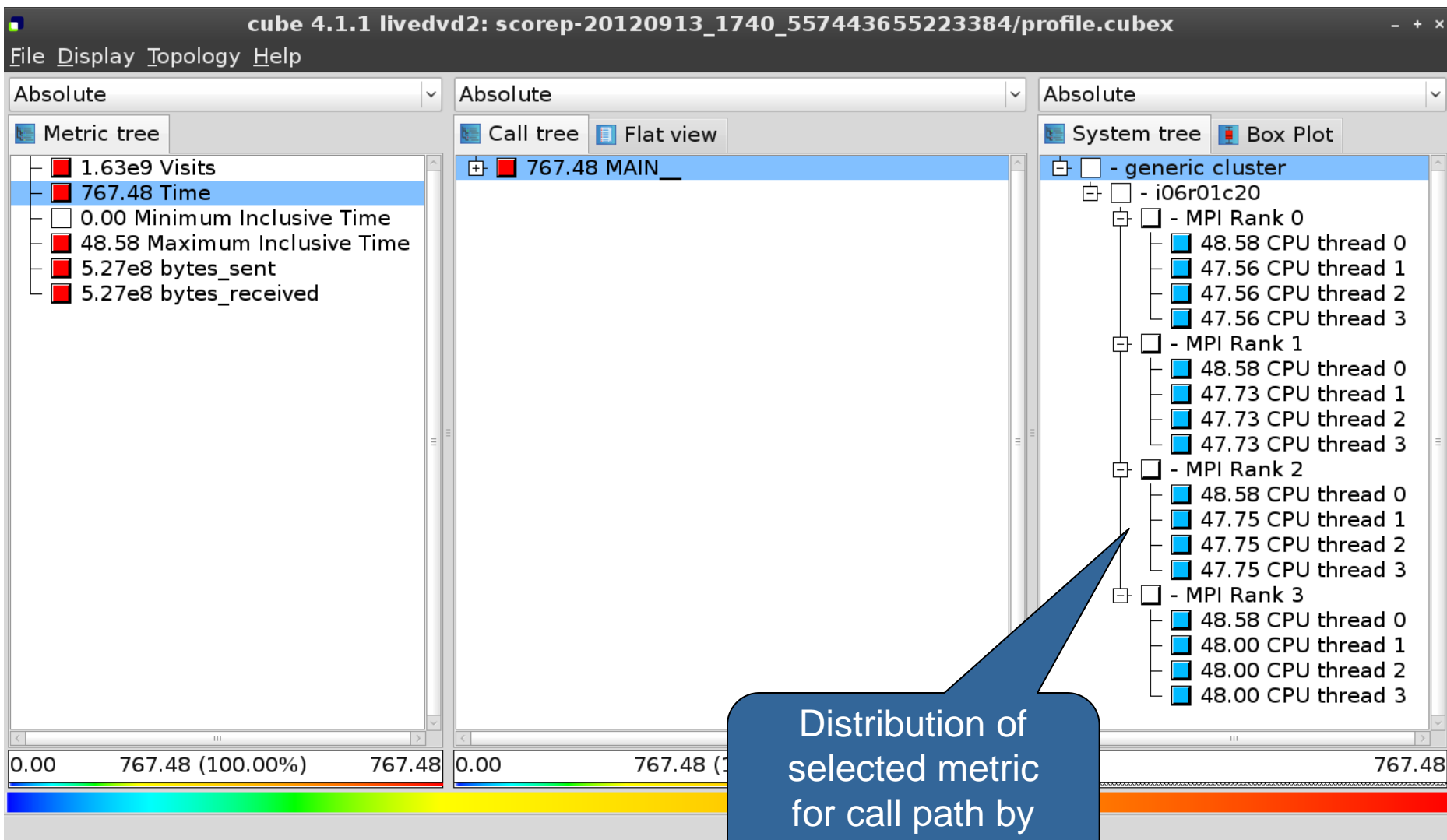


Analysis report exploration (opening view)

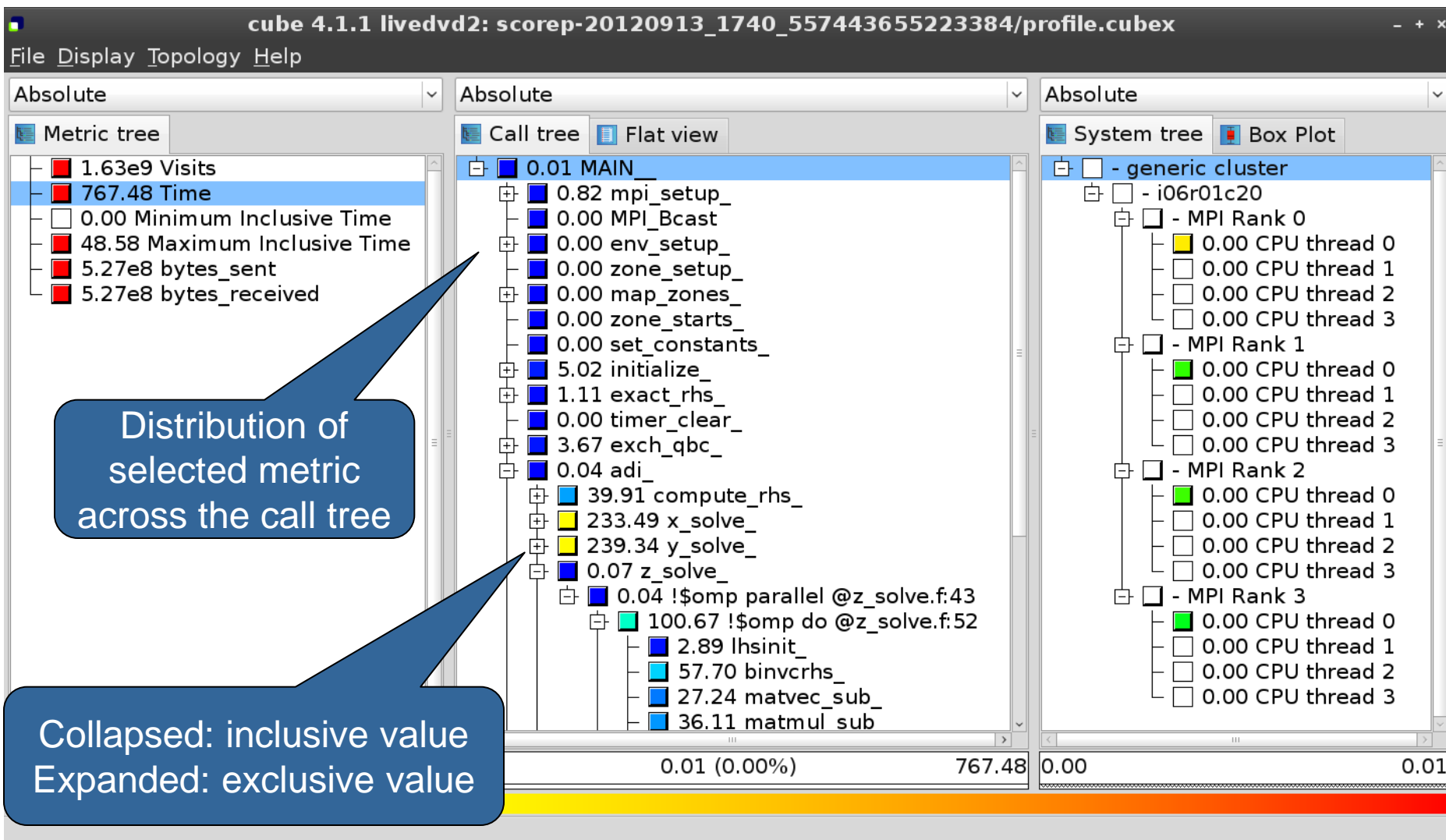




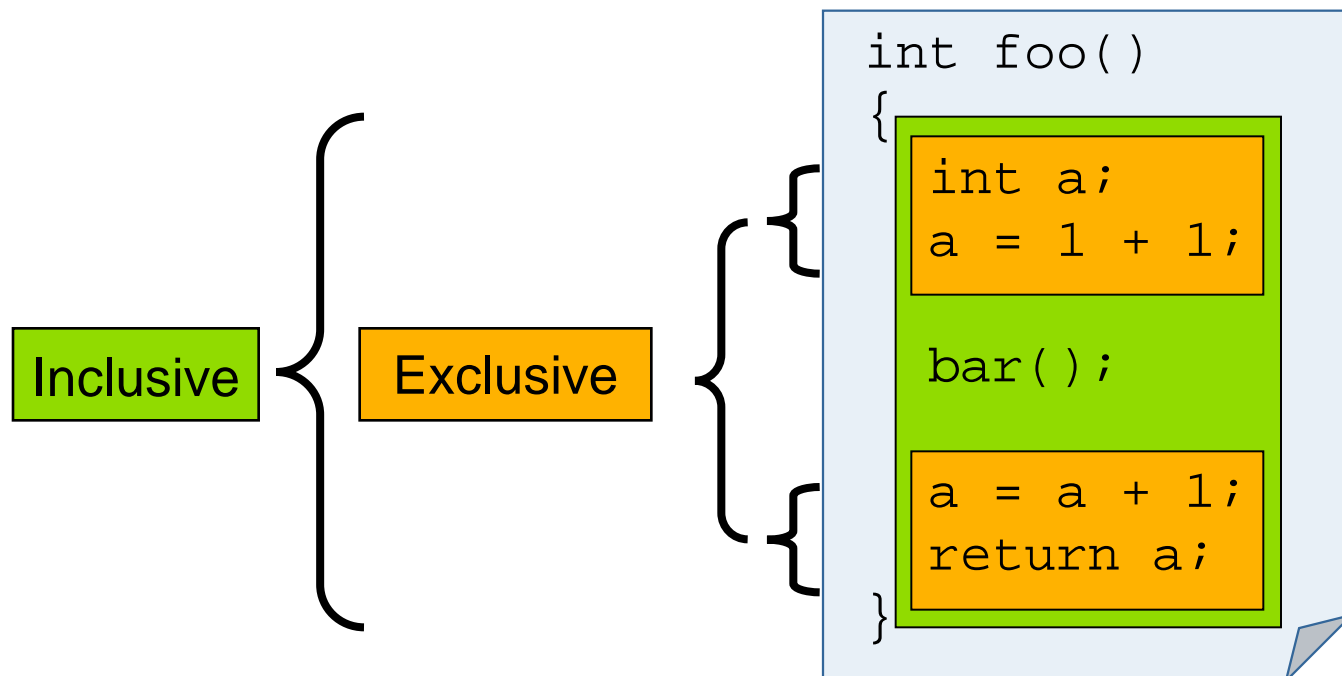
Expanding the system tree



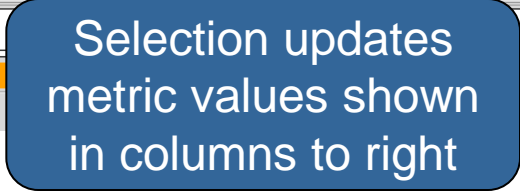
Expanding the call tree



- Inclusive
 - Information of all sub-elements aggregated into single value
- Exclusive
 - Information cannot be subdivided further



VI-HPS

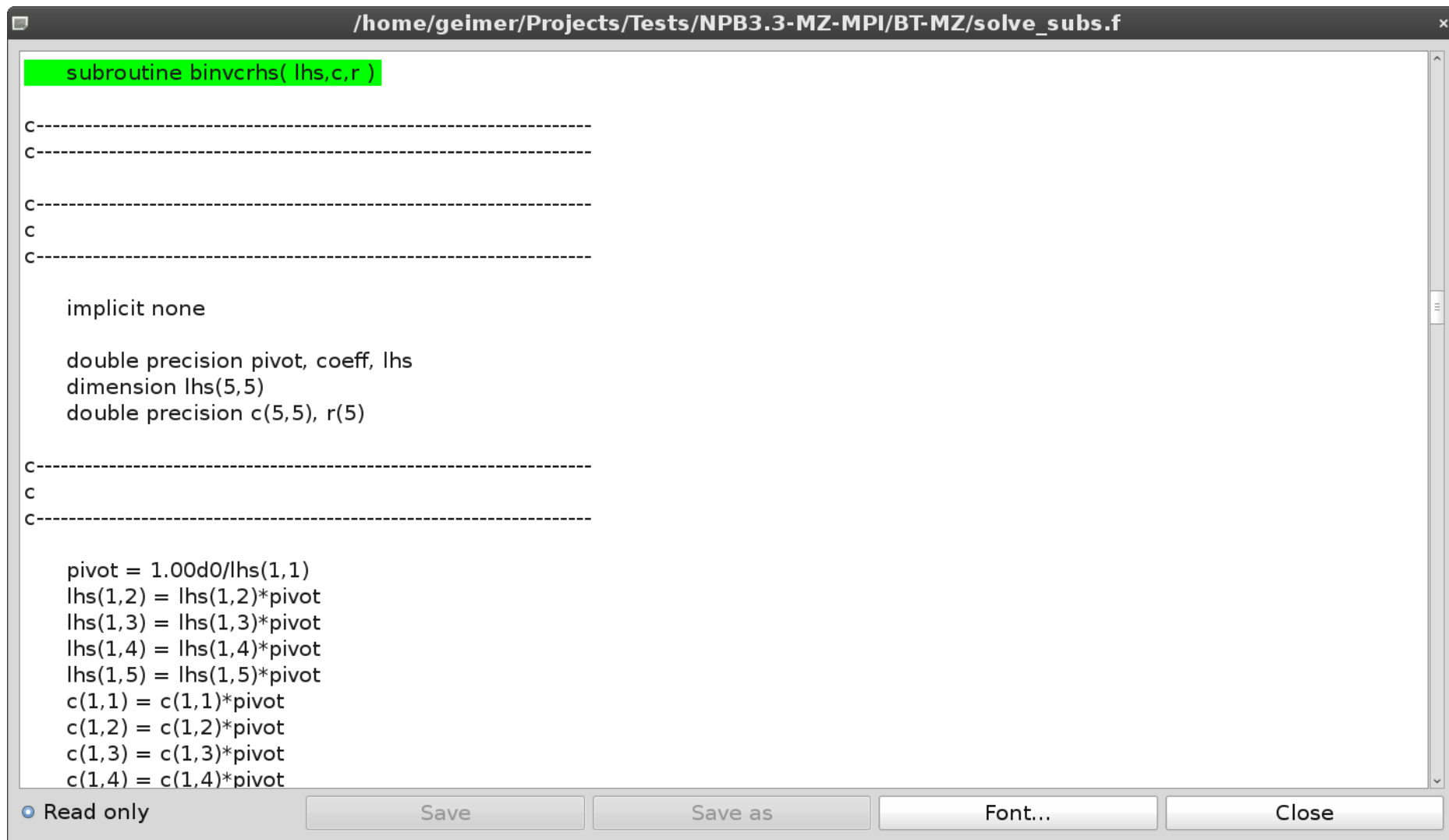


Source-code view via context menu

The screenshot displays the VI-HPS application window titled "cube 4.1.1 livedvd2: scorep-20120913_1740_557443655223384/profile.cubex". The interface is divided into three main panels, each with a dropdown menu set to "Absolute".

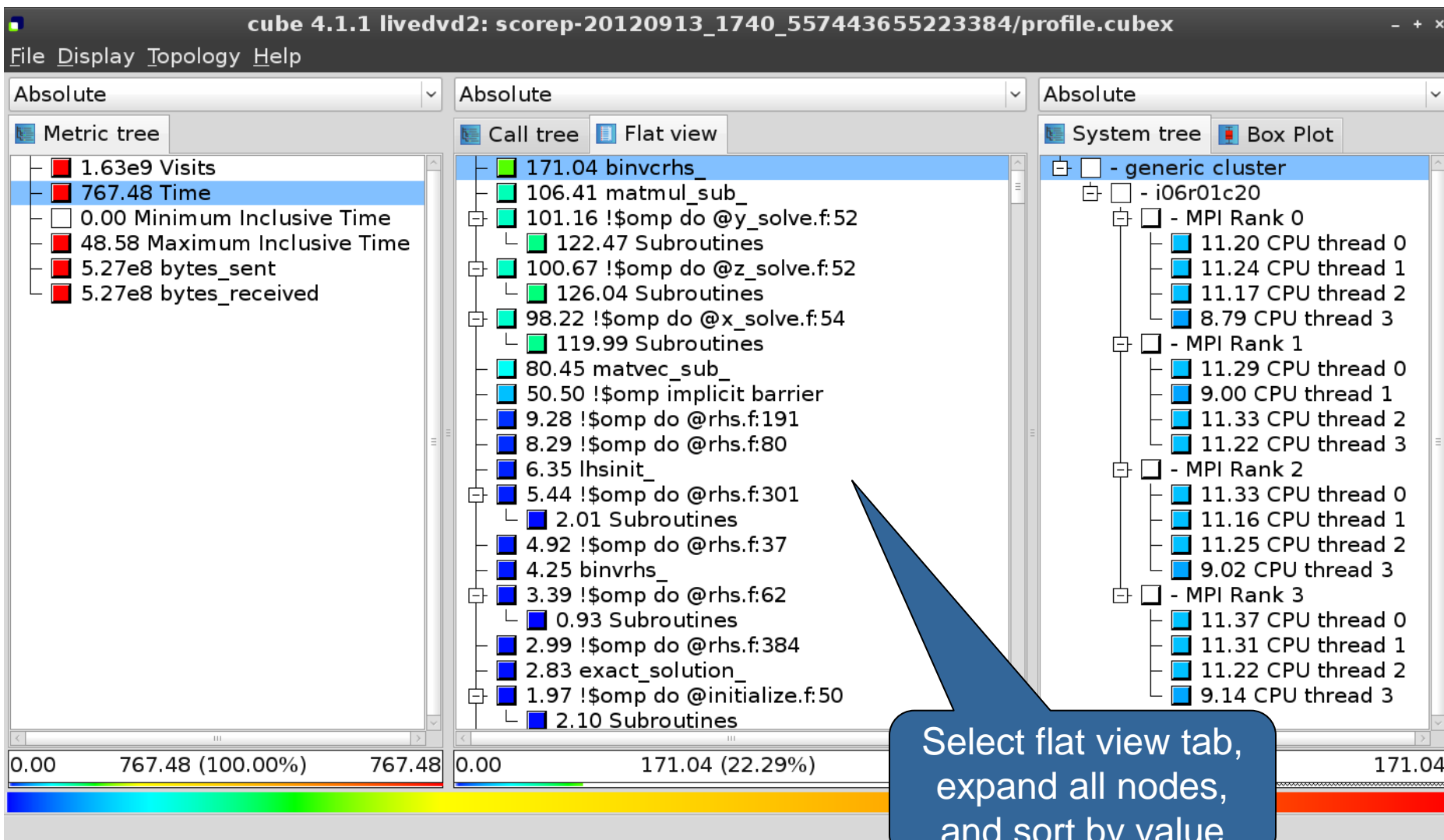
- Metric tree:** Shows a list of metrics including "1.63e9 Visits", "767.48 Time", "0.00 Minimum Inclusive Time", "48.58 Maximum Inclusive Time", "5.27e8 bytes_sent", and "5.27e8 bytes_received".
- Call tree:** Displays a hierarchical tree of function calls. The "binvcrhs" node is highlighted, and a context menu is open over it. The menu options are: "Call site", "Called region", "Expand/collapse", "Hiding", "Cut call tree", "Find items", "Find Next", "Clear found items", "Copy to clipboard", and "Min/max values". The "Source code" option is selected.
- System tree:** Shows a tree of system components, including "generic cluster", "i06r01c20", and "MPI Rank 0" through "MPI Rank 3".

A blue callout bubble with the text "Right-click opens context menu" points to the context menu. At the bottom, a status bar shows the time "767.48 (100.00%) 767.48" and a color-coded progress bar.

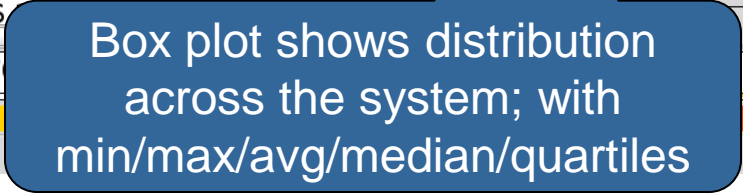


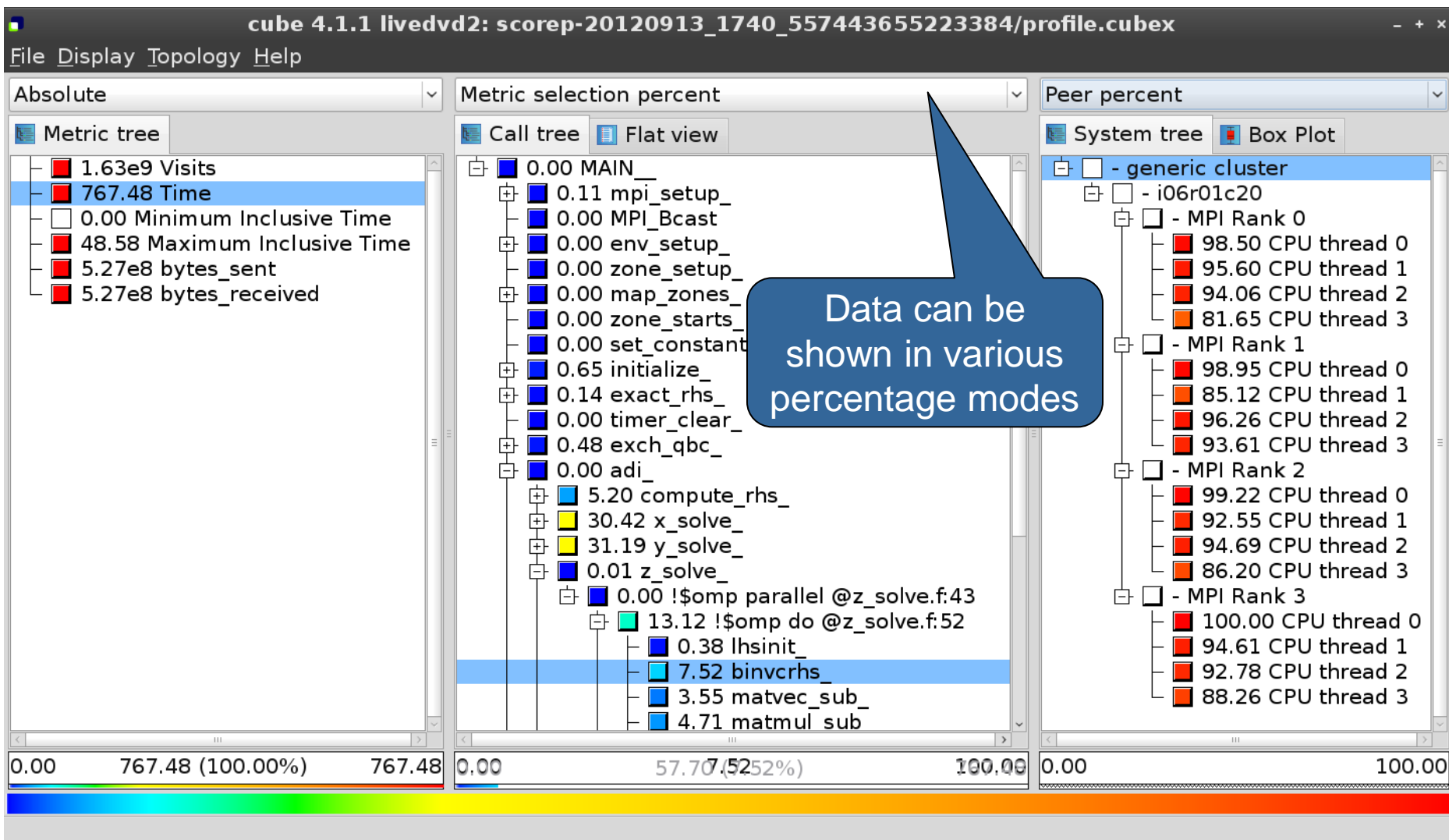
```
subroutine binvcrhs( lhs,c,r )  
  
C-----  
C-----  
  
C-----  
C  
C-----  
  
implicit none  
  
double precision pivot, coeff, lhs  
dimension lhs(5,5)  
double precision c(5,5), r(5)  
  
C-----  
C  
C-----  
  
pivot = 1.00d0/lhs(1,1)  
lhs(1,2) = lhs(1,2)*pivot  
lhs(1,3) = lhs(1,3)*pivot  
lhs(1,4) = lhs(1,4)*pivot  
lhs(1,5) = lhs(1,5)*pivot  
c(1,1) = c(1,1)*pivot  
c(1,2) = c(1,2)*pivot  
c(1,3) = c(1,3)*pivot  
c(1,4) = c(1,4)*pivot
```

Read only Save Save as Font... Close



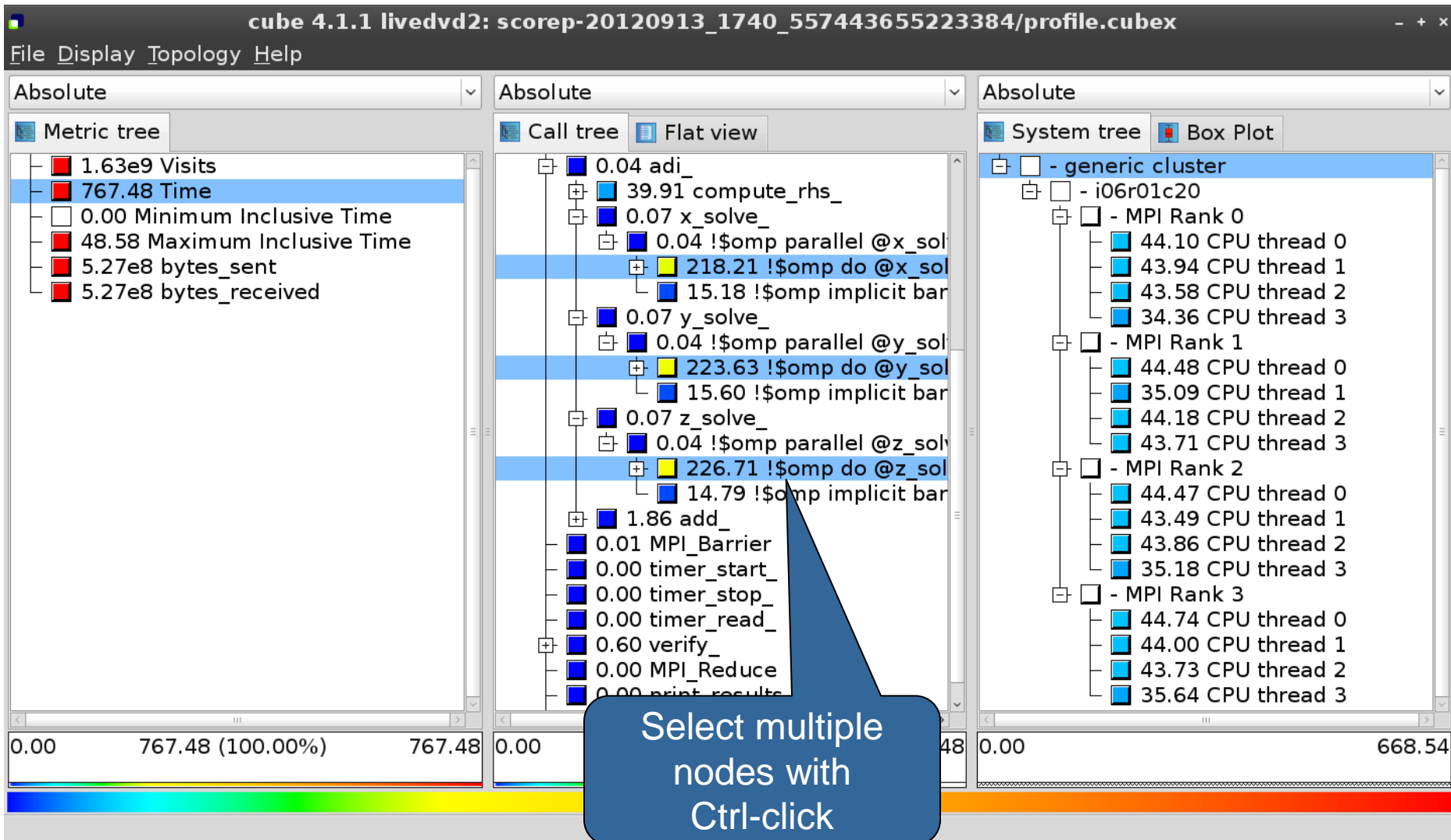
V-HPS





- Absolute
 - Absolute value shown in seconds/bytes/counts
- Selection percent
 - Value shown as percentage w.r.t. the selected node “on the left” (metric/call path)
- Peer percent (system tree only)
 - Value shown as percentage relative to the maximum peer value

Multiple selection



The screenshot displays the VI-HPS application window titled "cube 4.1.1 livedvd2: scorep-20120913_1740_557443655223384/profile.cubex". The interface includes a menu bar with "File", "Display", "Topology", and "Help". The "Help" menu is open, showing options: "Getting started", "Mouse and keyboard control", "What's This? (Shift+F1)", "About", "Selected metrics description", and "Selected regions description". A blue callout bubble points to the "What's This?" option, containing the text: "Context-sensitive help available for all GUI items".

The main window is divided into three panels:

- Metric tree (Left):** Displays a list of metrics with color-coded bars. The "767.48 Time" metric is highlighted in blue. Below the list, a progress bar shows "0.00 767.48 (100.00%) 767.48".
- System tree (Right):** Displays a hierarchical tree of system components. The "generic cluster" is expanded, showing "i06r01c20" and four MPI Ranks (0-3). Each rank lists CPU threads and their times. Below the tree, a progress bar shows "0.00 668.54 (87.11%) 767.48".
- Bottom Panel:** A color-coded progress bar spanning the width of the application, with a label "Change into help mode for display components".



- Extracting solver sub-tree from analysis report

```
% cube_cut -r '<<ITERATION>>' scorep_bt-mz_W_4x4_sum/profile.cubex  
Writing cut.cubex... done.
```

- Calculating difference of two reports

```
% cube_diff scorep_bt-mz_W_4x4_sum/profile.cubex cut.cubex  
Writing diff.cubex... done.
```

- Additional utilities for merging, calculating mean, etc.
 - Default output of `cube_utility` is a new report *utility.cubex*
- Further utilities for report scoring & statistics
- Run utility with “-h” (or no arguments) for brief usage info

- CUBE
 - Parallel program analysis report exploration tools
 - Libraries for XML report reading & writing
 - Algebra utilities for report processing
 - GUI for interactive analysis exploration
 - Available under New BSD open-source license
 - Documentation & sources:
 - <http://www.scalasca.org>
 - User guide also part of installation:
 - ``cube-config --cube-dir`/share/doc/CubeGuide.pdf`
 - Contact:
 - `mailto:scalasca@fz-juelich.de`

