ClearSpeed Visual Profiler

GUI Overview - Example 1

An Introduction to the features of the
ClearSpeed Visual Profiler GUI

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ClearSpeed Visual Profiler

GUI Overview - Example 1

Introduction

This example for csvprof is designed to demonstrate the features of the visual profiler GUI and allow the user to understand how to use them with a simple trace file. The focus for this example is to give the user the knowledge required to understand how to drive the GUI before moving on to the examples which have a more complicated trace data set.

Running the example

The example trace file used can be found in the directory

`csvprof_examples/gui_overview/example1`

The trace file is called `gui_overview.cst`.

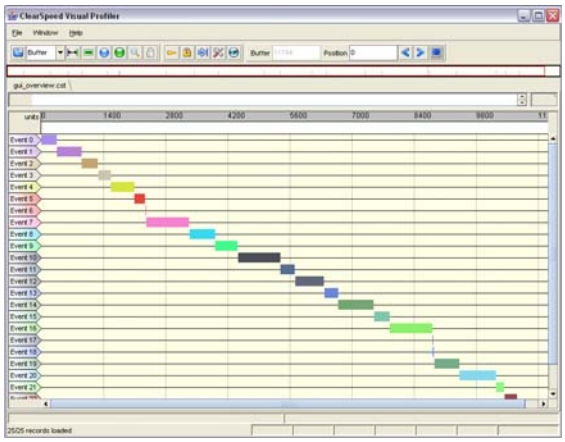
1. Starting the csvprof GUI

The csvprof GUI is started from the command line using the following command. The example trace file is passed on the command line.

```
csvprof gui_overview.cst
```

You can also just load the file from the file menu and not pass it in on the command line by using the file menu. It will perform the same operation.

This will start up the GUI and you should see the following screen.



This is the standard start up screen for the Visual profiler. With a larger trace file there may be a slight delay at start up as the file is loaded into memory

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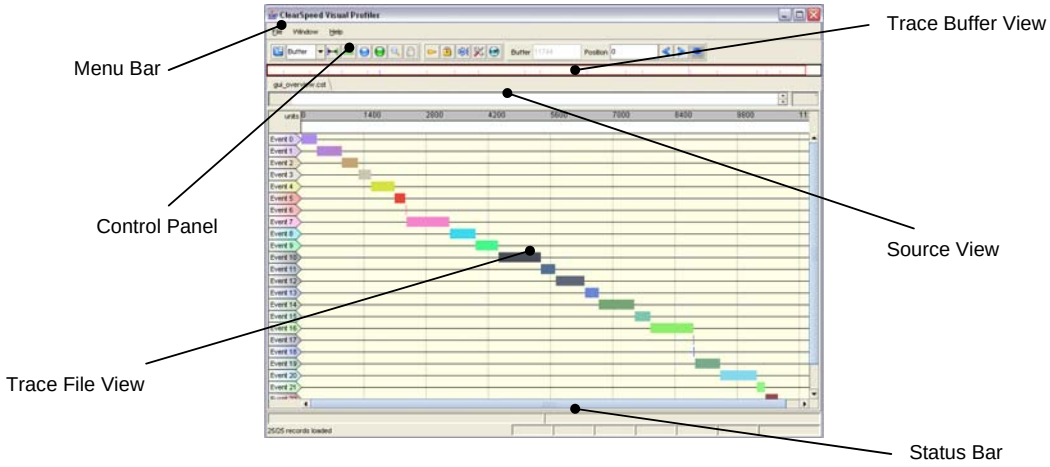
and whilst the file is loading a progress bar will be displayed. The user can specify either a trace file on the command line or load files from the menu. We will cover this later in the example.

2. GUI layout



The GUI layout has the following sections each performing different functions.

Menu Bar
Contains the menu options for opening new trace files, exiting and selecting source code views.

Control Panel
Contains the controls for viewing the trace data file.

Trace File View
Shows the timeline view of the trace data file.

Trace Buffer View
Shows the current size and location within the loaded trace buffer.

Source View
Displays the current source file.

Status Bar
Show the status information related to the current trace file.
This example will now focus on the control panel area of the GUI in order to explain the options that are available to the user.

The control panel in closer detail looks like this.

3. Scaling options

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The scaling options are available from the control panel using the drop down box highlighted below.

This box allows a user to specify the scale at which they are viewing the trace file. When a file is loaded as it currently is in this example, the default scale is set to “Buffer”, allowing the user to view all events in the current file buffer. There are several fixed scale options available in this box but a user can also type in any arbitrary value.

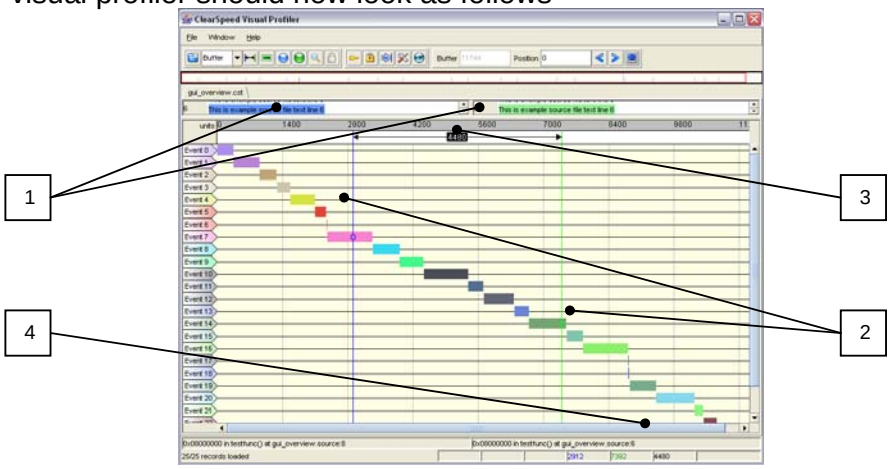
4. Setting markers

The visual profiler has the ability to set markers in the trace file in order to allow a user to see information about particular events. There are two markers available in the GUI one coloured blue which is attached to the left mouse button and one coloured green which is attached to the right. When both markers are set the GUI will show the distance between them in the trace file view. The information for the individual markers will be shown in the status bar.

You can select events with the mouse buttons. If you select one of the coloured event bars in using the left mouse button you will see that the blue marker is set within the trace file view. Performing the same operation with the right button will do the same but with the green marker.

 # Select coloured events from the trace file view, one with the left mouse button and one with the right. This is done by clicking on one of the coloured bars in the trace file view.

The visual profiler should now look as follows



The following numbered items are now visible in the visual profiler GUI.

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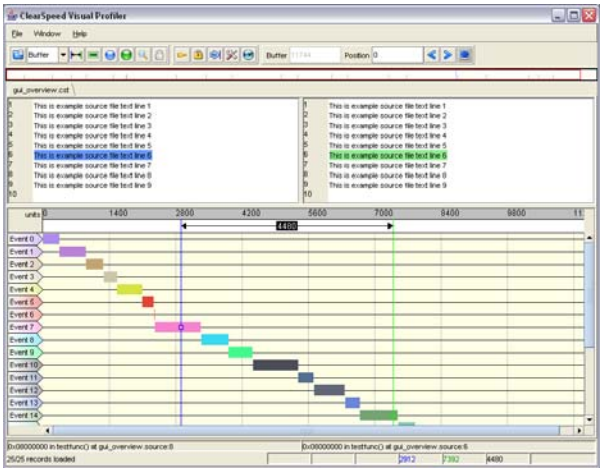
1. The source code window is now showing the code for the blue and green markers in the left and right source code panels.
2. The blue and green markers are visible in the trace file on top of the selected events. The selected event is shown with a marker on the blue and green lines.
3. The distance between the blue and green markers is visible in the GUI.
4. The points at which the markers are set are displayed in the status panel along with the difference between them.

The source code is currently hidden to some extent as this is the default behaviour of the source code window. You can expand the source code view by dragging the bottom bar around it down. The timeline and source code panels can be moved by the user to allow a different sized split.

 # Drag the bottom bar of the source code view down to expand the window

The GUI should now look as follows



The source code window is now much more visible.

5. Event tooltips

The specific trace events displayed in the GUI provide the user with additional information about each one if there is any available. If you hover the mouse over a particular event then a tooltip will be displayed showing information for that event.

 # Move the mouse pointer over a particular event and get the tool tip event data to be displayed.

The GUI should look as follows with the tooltip displayed.

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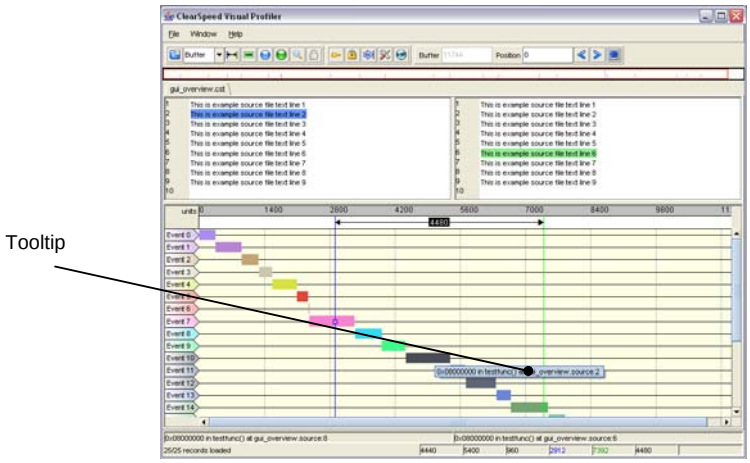

6. Controls for markers

It is possible to use the controls for the markers to change the view of the trace file. The options that are available are “fit to markers”, “jump to blue marker” and “jump to green marker”. They are highlighted below.

The fit to markers option will rescale the current view to allow the user to zoom in on a particular trace section they are interested in. This is very useful to allow you to zoom in quickly on a part of the trace file that has interesting properties for investigation. It will auto set the scale to display the current view between the markers. A user can then re-adjust the scale using the scale change box .

The jump to blue and jump to green buttons allow the user to centre the trace file view around the current blue or green markers. This will happen at the current scale and no adjustment will be made to the current zoom level. This is very useful to allow a user to return to a particular point of interest once they have moved away from a particular point.

The blue and green markers will stay in the location set until either a user selects the idle space in the trace with the left or right mouse button or they select another event. The makes the markers very useful for finding a particular point of interest in the file and then investigating events around that point and having the ability to return there by clicking the blue or green button. The markers are also used to get accurate timing information between two points so are a good way or setting the time period over which you want to see the trace by using the fit to markers option.

 # Press the “fit to markers” button and see how the view changes to zoom in to the area between the blue and green markers.

The GUI should look as follows with the view zoomed in between the markers.

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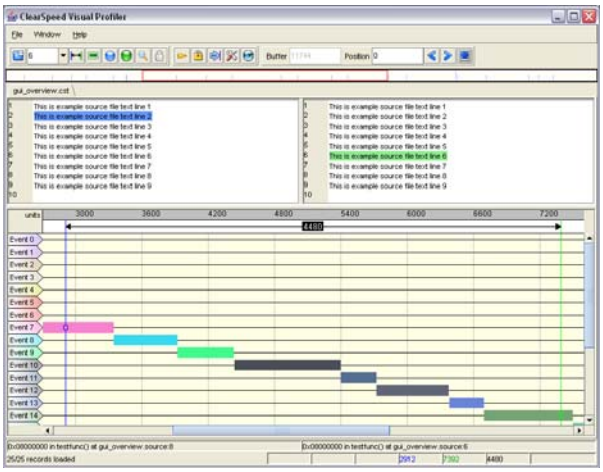
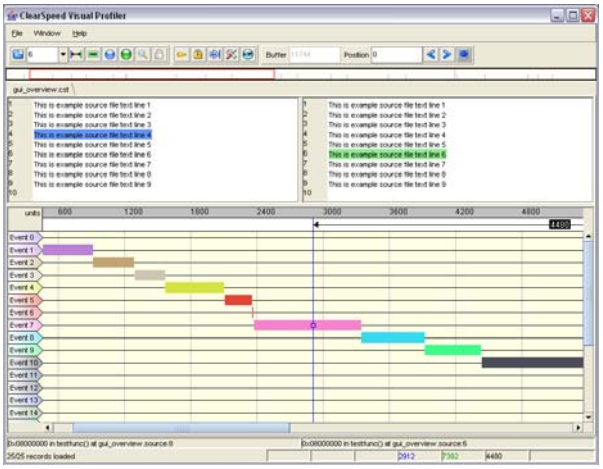


You can now use the options to centre around the blue and green cursors to see their effect.

 # Press the "display blue marker" button and see how the view changes to centre around the blue marker.

The GUI should look as follows with the view centred around the blue marker.



 # Select the "buffer" option from the scale menu to zoom back out the view of the current trace file.

7. Collapse / Expand view

The control panel provides an option to collapse and expand the view of the trace data. This is very useful when there are a large number of trace event types. This view allows the user to compress all of the event types down and just get a view of the trace data itself.

The collapse / expand option is shown on the toolbar as the following.

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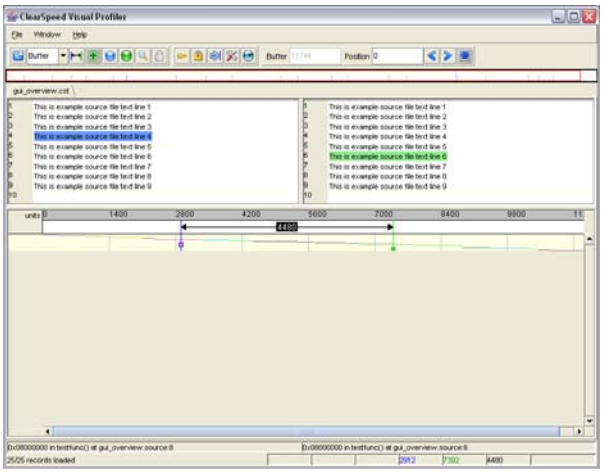
We can now use this option to show its effect on our demo trace file.

 # Press the collapse button and then select buffer from the scale options to demonstrate this option.

The visual profiler GUI should now look as follows.



Note how the collapse button now changes to a + symbol to denote the view can now be expanded. Also note that the markers remain set in this view.

 # Press the expand button to return the view to its previous state.

8. Search facilities

The visual profiler contains facilities for searching the trace records to find particular events. It allows the user to search for a particular string in the trace information or to search for a particular source code line. A user can also click on the source code line number in the blue source code marker window. This will bring up the search box but with the selected line number set as the attribute for the search. This allows a user to easily search for an event associated with a particular source line. The button to bring up the search menu is highlighted below.

 # Click on the search button and bring up the search window.

The search window will now be displayed, containing the controls for searching.

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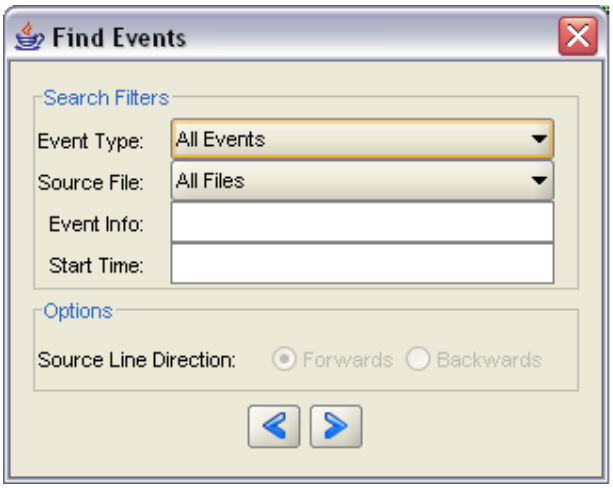

The options available to a user of the search facility are as follows.

Event Type
The event type can be used to select a particular event to search. If a user wants to limit the search to a specific event type, this drop down list will allow them to select the one they are interested in. The search mechanism will then only look for a match in this particular event type.

Source File
When there is more than one source file in the trace data the user may wish to specify which one to use. This again allows the searching to be filtered down to a subset of records.

Event Info
The event info box is where a user can enter the string that they wish to search for. Any string can be entered into this box and the GUI will attempt to match the entered values against the trace record info.

Start Time
The start time allows a user to specify where in the trace data to begin the search. It can either be entered manually or the value can be taken from the current event selected by the blue cursor if the lock cursors button is enabled (The lock markers function will be described later in the tutorial).

Direction
The source line direction option is only available when using the search via source code line by selecting the line number in the source code view. Otherwise this option is disabled.

Now we can go through examples of using the search facility and show how it works both with the standard method of entering a string to search for in the trace record info and also the selection of a source code line from the source window.

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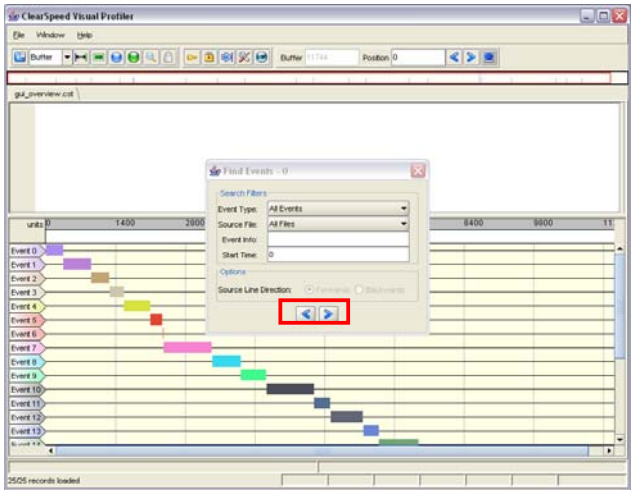
 # Close the search box, make sure the buffer option is selected from the scale box and that the blue and green markers are de-activated by clicking the left and right button in the idle space around the coloured trace blocks.

We can now look at using the search facility.

 # Press the search button from the control panel to open the search window.

You can now use the search window to find events in the file. The window should look like this:



Pressing the arrow buttons will move you forwards and backwards through the trace records. The arrow buttons are highlighted above.

 # Experiment with the forward and backwards arrows, see how the blue marker is moved to the start of the next record.

This functionality allows you to quickly jump to the start of the next record and the GUI will re-focus the current view to keep the new record centred.

You can also change the “Event Type” box. This will force the GUI to only search this particular event. This is useful when there are many records with the same information but you are only interested in one.

The start time can also be modified to allow the records to be searched from a particular location. You can enter a value for the start point in this box.

If you enter a string to search in the “Event Info” box then you can start to filter out events based on their information. If you notice from the tooltip of a particular event it currently looks something like this.

```
0x80000000 in testfunc() at gui_overview.source:3
```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This is the information that can be searched using the search box. If you now enter ":4" in the "Event Info" box you can see that it will now only search backwards and forwards through events which have this information.

 # Enter :4 in the Event Info box and then use the forwards and back arrows to search through the records.

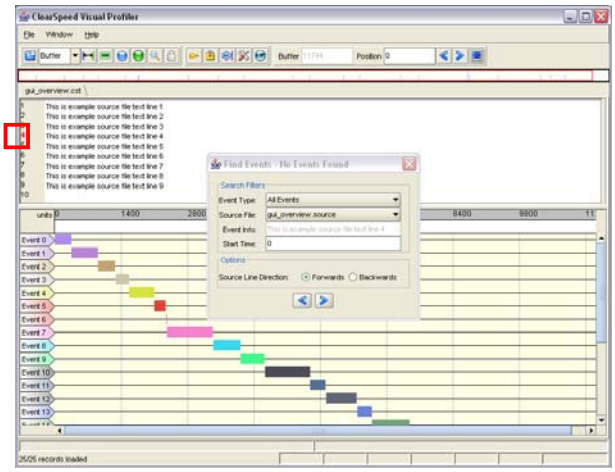
You will note that it only selects the events with this information. This is very useful for jumping to a particular point in the trace file such as a function start.

The other way of searching is to use the source code window.

 # Close the search box and release the blue marker by clicking in the idle space around the trace records.

A user can click on the source code line numbers in the source code window to bring up the source code specific search window. This looks as follows.

 # Select the source code from the Window menu, with the left mouse button click on line 4 from the source code window.



You will notice that the source code line number is highlighted in red and that the search window automatically opens up.

 # Press the forward arrow and note that it now finds the first record that is associated with line 4. Close down the search window and release the blue marker by selecting the idle space.

The forwards and backwards options for the source code line search are for when the search mechanism cannot find trace records relating to the selected line. With forwards set it searches for the next line (e.g. if you are on line 4 and it cannot find any record it will try line 5). This is so when searching source files you can follow the program control flow. When set to backwards it will look for line 3. The arrows control the search directions through the trace records in the same way as doing a standard search.

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9. Locking scroll bars

When viewing files which have a lot of trace records (i.e. they have a lot of data in the y direction) there is a facility to allow the GUI to adjust the screen as to keep the records centred as you move in the x direction. This option is called “Lock Scroll Bars”.

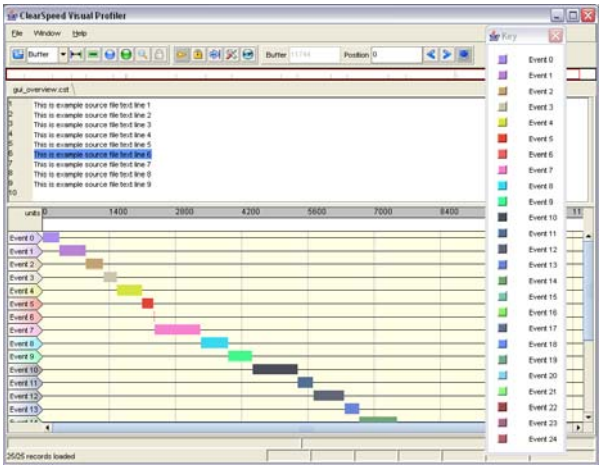
 # Select the lock scroll bars option from the control panel and then move the trace data window scroll bars. Once finished de-select the option.

You can see from this example that the view stays centred on the records if you move the scroll bars. With this option disabled the view does not adjust.

10. Using the key

If supported by a trace record file the GUI can display a key. This is a graphical window displaying the event types and the associated colours. The key is highlighted below on the control panel.

 # Press the key button using the left mouse button.



The key is displayed in its own window so that the user can position it out of the way of the trace records.

 # Press the key button again to close the key window.

11. Locking cursors

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When cursors are set by default the blue cursor will stay on the screen but moving the mouse over other events will cause the blue cursor to remain in its current location but the event info state to be updated to the new events in the GUI. Using the lock cursors button from the control panel will keep the current record set when the mouse is moved in the GUI. The following highlighted button controls the cursor locking. When the lock to cursors option is on the highlighted source code line will also be locked until the user selects another event.

 # Experiment with the lock cursors option and selecting events in the trace file view. Note how the source code view and the status bar view stay locked with the blue and green selected events. When finished de-select the lock cursors option.

12. Snap to boundaries

In order to easily set the markers to the start and end of an event there is a snap to boundaries option. The marker will automatically move to the start or end of a record depending on which you are closest to when the record is selected. This is a very useful mode when using the GUI to get accurate timing as you can set the cursors to the exact start and end of events.

The highlighted option above is the button to enable the snap to boundaries command.

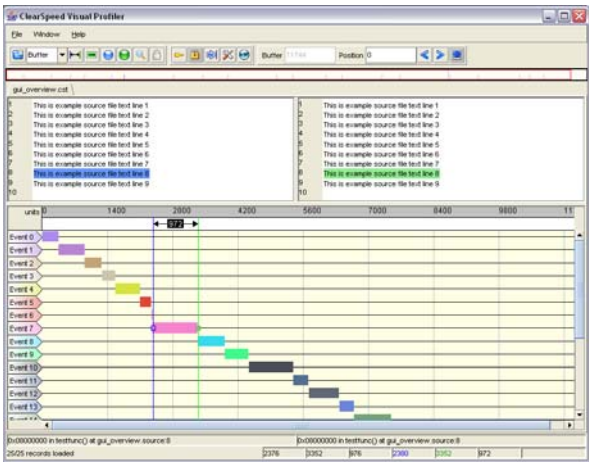
 # Experiment with the snap to boundaries command and see how where you select the record determines which end the marker is set. Note how selecting an event below half way will set the marker on the start and after half way will set the marker at the event end When finished de-select the snap to boundaries option.

13. Status bar

The status bar at the bottom of the GUI shows information about particular selected events. It shows the timing information for the blue and green cursors and also the trace record information.

 # Enable the lock cursors option and select a location for the blue and green cursors.

The screen should look as follows.

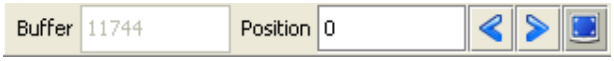


A zoomed in view of the status bar looks as follows.

The first 2 fields at the top show the event info for the blue and green markers with blue on the left and green on the right. Then in the bottom row going from right to left there are the records loaded information, currently selected record's start, end and difference and finally blue marker position, green marker position and difference between markers.

14. Buffer options

The buffer options are used in conjunction with the buffer display to change and select the set of trace records viewed. When a file is too large to be loaded into memory a sub section of it is loaded into the current viewing buffer. A user can alter the view of the current buffer. The buffer options are next to the button control panel and look as follows.



These controls are used for changing the current trace buffer settings. The 'Buffer' box shows the current size of the trace buffer, the 'Position' box shows the overall position in the global trace records and the controls on the end allow a user to skip forwards and backwards through the buffer and to disable the default buffer size. The buffer controls work in conjunction with the buffer display panel which looks as follows.

This shows the current view of the trace buffer and the highlighted red section shows what is displayed in the trace record panel. The space from start to end of this display is an overview of what is contained within the trace file. The markers within it show the location where there are high concentrations of trace records.

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If we de-select the default buffer size option (highlighted below) then we can manually edit the buffer settings.

 # Disable the default buffer size option and enter the value 5000 in the now enabled 'Buffer' box.

You will notice that the buffer display panel now looks as follows and the trace record view has adjusted itself to show the new view.

You can now drag the white section of the buffer display panel around to select a different section of the file. Notice how the trace record view adjusts itself accordingly.

 # Experiment with the buffer settings and see how to change the view of the trace file. Then reset the default buffer size option to get the whole file back into the buffer.

These options are mainly used with very large files when the data is too large to fit in memory on the machine. With a large file you will see that the default buffer setting does not include the whole file and that you may have to select a different section to see the information you require. The search facilities only work within the currently enabled buffer.

15. Preferences

The GUI has a set of default preferences that the user can configure to allow specific options to be enabled on start up. The button to bring up the preferences view is highlighted below.

Selecting this option will bring up the preferences menu which allows a user to set some default options which will be saved between sessions. The preferences file is stored in a .csvprof directory in a users home directory. This allows the visual profiler GUI to remember preferences between session.

 # Open the preferences window by selecting it with the left mouse button from the control panel.

The preferences window should open and look as follows.

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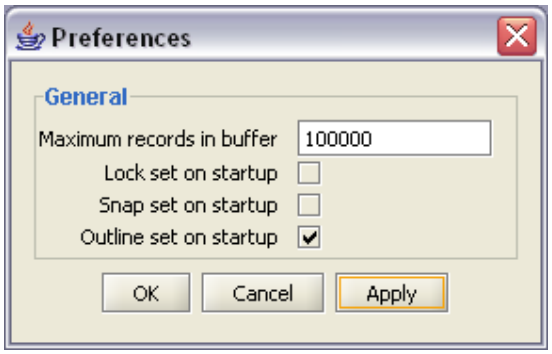

The following options are available to a user to set as default start up preferences. These options are saved into a .csvprof directory which will be created in your home directory.

Maximum records in buffer
On some older machines with limited amounts of memory it may be preferable to set the number of default records loaded into the trace buffer from the trace file. This option allows the user to specify a number of records to load.

Lock set on start up
Some users may wish to have the lock to event set as a default option in the GUI when it starts up. This tick box allows a user to set this option and the next time csvprof is restarted the lock will be set on as default.

Snap set on start up
The snap to event start and end option may also be configured so that it is enabled by default when the GUI is started. By selecting this tick box the option will be enabled the next time csvprof starts.

Outline set on start up
In a similar fashion to the other options if a user selects the outline option to be on by default, the event outline mode will be applied next time the GUI restarts.

16. Opening files

Along with passing in options on the command line a user can also open files from the GUI itself. This is done by either selecting the open option from the file menu or by selecting the file open icon from the control panel. The file open option from the control panel is highlighted below.

Selecting this menu will bring up the file open window.

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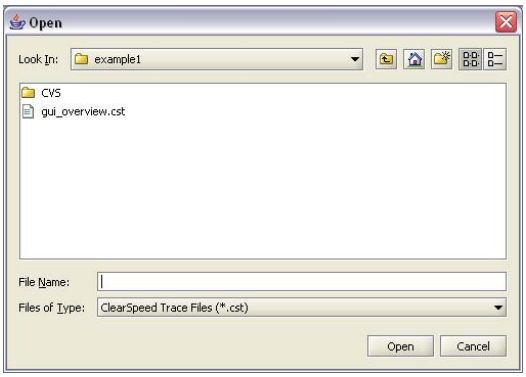
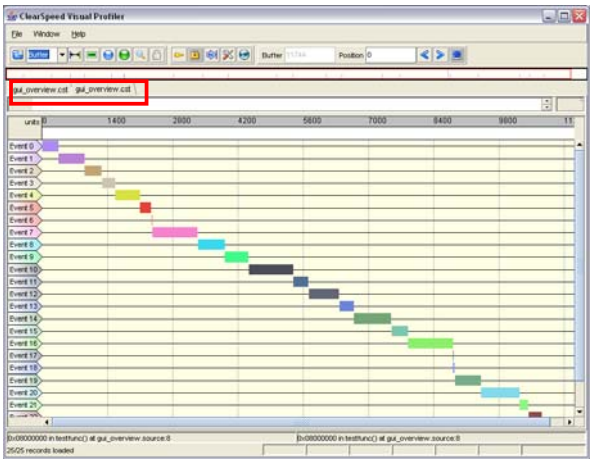


 # Open up the same file as is currently in use gui_overview.cst into the GUI view the file open window.

17. Tabbed panes

Once you have opened the file you should now have two copies of the same trace data open within csvprof. The way in which the GUI deals with having multiple files open is via the use of tabbed panes. This option is useful when viewing and comparing multiple trace files. The way of selecting these is highlighted below.



 # Experiment with the tabbed view of trace records, note how you can set markers in both and that both can have a separate scale applied.

We can now look at options to coordinate multiple tabs.
18. Global markers

The global markers option which is highlighted below on the control panel allows the user to set markers in one tab and have them update in another. This allows multiple trace files based on the same time line to be coordinated easily.

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With this option selected any markers that are set in one tab will be applied when you switch to another. When both markers are set the fit to markers option allows multiple trace files to be kept in sync by selecting that option when switching into the tab.

 # Experiment with setting markers and switching tabs when the global markers option is set.

19. Menu bar

The menu contains several sub menus which are documented below.

File

File contains the options open and exit which allow the user to open a new trace record file and to exit csvprof.

Window

When there are multiple source files loaded the window option allows a user to select which source file they are viewing in the source window. This is used when using the search mechanism and wanting to search from a different file.

Help

The help menu contains the csvprof online help and an about menu containing the version number of this particular build of the GUI.

20. Exiting csvprof

This is the end of the GUI overview demo and we can now exit the visual profiler.

 # Select exit from the file menu and close the visual profiler GUI.

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