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# Contents

**Short Description**............................................................................................................................................. 4

**Recording events**............................................................................................................................................... 5
  Event Sources.......................................................................................................................................................... 5
  Event Recording Process.........................................................................................................................................5

**Viewing Events**................................................................................................................................................... 7
  Main Window Description.........................................................................................................................................7
  Toolbar Description.................................................................................................................................................. 8
  Display Filters...........................................................................................................................................................9
  Examples................................................................................................................................................................ 11
Short Description

Memento is an advanced development and debugging tool available with the Coaxlink driver. During operation, Memento records an accurate log of all the events related to the camera, the frame grabber and its driver as well as the application. It provides the developer with a precise timeline of time-stamped events, along with context information. Memento provides valuable assistance during application development and debugging, as well as during machine operation. Memento is non-intrusive and works with all Coaxlink cards in the PC.
Recording events

Event Sources

Source kinds

Memento records events from various sources. For instance:

- Driver function calls in the user application software
- User application “debug print” statements
- Hardware generated events

Sources are classified into pre-defined groups named “kind”. For instance:

- Driver function calls
- CoaXPress protocol
- DMA operations
- IRQ
- DPC

Severity level

Events sources are characterized by one of the following severity levels (sorted from highest to lowest level):

- Critical
- Error
- Warning
- Notice
- Info
- Debug
- Verbose

Event Recording Process

Recording process efficiency

The Memento event recording process is efficient in terms of processor load and storage requirements. It allows:

- The recording process to run permanently without impeding the application.
- Long-term recording and monitoring of a large set of event sources
Event source recording filtering

The user may configure Memento to record only a subset of the event source by using:

- The global severity mask
- The “kind” severity masks

The global severity mask restricts the recording to the event sources having a severity level equal or above the global mask.

**Note:** By default, the global severity mask is set to Info enabling all severity levels but Debug and Verbose. The “kind” severity mask overrides the global severity mask for one “kind” of event sources.

Event Record Data

All event records include:

- A time-stamp
- An unambiguous identification of the event source.
- A trace description.

For instance in case of a driver function call, the record data includes:

- Time of occurrence
- PID (ID of the calling process) and TID (ID of the calling thread).
- Trace description including function name and arguments.

Time Stamping

Each event occurrence is accurately time-stamped using a unified time base for all the event sources of a system. This allows events of different origins and types to be unambiguously positioned on a time scale.

**Note:** The finest time interval is 1 microsecond.
Viewing Events

Main Window Description

The main window of the Memento viewer is divided from top to bottom into 3 areas:

- **The Activity Plot Area**: a first narrow area at the top just below the buttons.
- **The Events Plot Area**: a second area about the same size of the activity plot area.
- **The Events List Area**: the largest area.

**Activity Plot Area**

The activity plot gives an idea of the level of activity in the system.

The horizontal axis displays the time:
The main division is 1 minute
The subdivision is 2.5 seconds

The vertical axis is a logarithmic scale displaying the number of recorded events per second:

- The lowest horizontal grid line is at 10 events per second
- The second horizontal grid line is at 100 events per second
- ...

**Events Plot Area**

The events plot gives a time plot representation of the events list selection.
The leftmost point in the plot corresponds to the first item in the events list. The rightmost point in the plot corresponds to the last item in the events list.
Right-clicking on a point shows up the record data. It is also possible to zoom in/zoom out, and to measure the time interval between events.
Comment: this is a simple implementation of the event plot. The design goal is to obtain the look and feel of a logic analyzer instrument.

**Events List Area**

The main window displays the time ordered list of event records.
At startup, the list contains 6 columns:

- **Time**: the time of occurrence of the event expressed in seconds with 6 digits after the decimal point.
- **PID**: the process ID of the calling procedure (for driver function calls)
- **TID**: the thread ID of the calling procedure (for driver function calls)
- **Card**: the ID (zero-based GenTL Interface index) of the card concerned the event (only for card-specific events)
- **Connector**: the ID (A, B, C, D) of the CoaXPress host interface connector concerned by the event (only for connector-specific events)
- **Trace**: a description of the event occurrence (source identification, function name and parameters, etc...)

The user may add columns such as:

- **Severity**: the severity level associated with the source event.
- **Comment**: a user-editable field

The user may hide some columns when necessary.

**Toolbar Description**

The toolbar at the top of the window provides the following functions:

**Search Dialog**
Configures the search capability in the Memento records. The "search" feature tries to match text from the "Trace" and "Comment" columns against the regular expression entered by the user. The regular expression syntax is that of Perl regular expressions.

**Verbosity Slider**
Selects the verbosity levels to display. Full right position displays everything.

**Filters Button**
Gives access to the display filter dialog box.
**Follow Button**
When depressed, displays the most recent events. Events are scrolling up!

**Pause Button**
When depressed, stops event scrolling.

**Clear Button**
Clears the events list.

**Go-back Button**
Provides the capability to go back in the history.

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**Display Filters**

**Display Filtering Method**
The user has the capability to restrict the display of recorded events using custom filters. Up to 16 filter rules can be defined. For each record Memento applies successively filter 1, filter 2, filter 3, etc… until a match occurs. The highlighting rule may be used to modify the rendering of the matched record.

**Filters Dialog Box Description**

The **Filter Setup** area of the Filters toolbox provides the following functions:

**Filter Drop-down**
Select one of the 16 filter rules.

**Enabled Check-box**
Enable/disable the selected filter rule.
Level Check-box & Drop-down
Enable/disable and select the severity level criteria.

Include Check-box & Edit-box
Enable/disable and define the include filter. The "include" filter tries to match text from the "Trace" column against the regular expression entered by the user. The regular expression syntax is that of Perl regular expressions.

Kind Check-box & Edit-box
Enable/disable and define the kind criteria.

Pid Check-box & Edit-box
Enable/disable and define the process ID criteria.

Tid Check-box & Edit-box
Enable/disable and define the thread ID criteria.

Card Check-box & Edit-box
Enable/disable and define the card ID criteria.

Connector Check-box & Edit-box
Enable/disable and define the connector ID criteria.

The Highlighting area of the Filters toolbox provides the following functions:

Background
Select the background color for matching records.

Color
Select the test color for matching records.

Hide Check-box
Hide/show the record.
Examples

Example 1: EventGetData driver function calls highlighted in green
Example 2: User application info messages shown in light green

Example 3: Events restricted to DMA activities