Thread Wait Chain Inspector

by

Software Verify

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Software Verify

Troubleshoot your software

Thread Wait Chain Inspector

Thread Wait Chain Inspector for Windows Operating Systems

by Software Verify Limited

Welcome to the Thread Wait Chain Inspector software tool.
Thread Wait Chain Inspector is a software tool that inspects the wait chain of every thread in a particular process.

We hope you will find this document useful.

Thread Wait Chain Inspector Help

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Foreword

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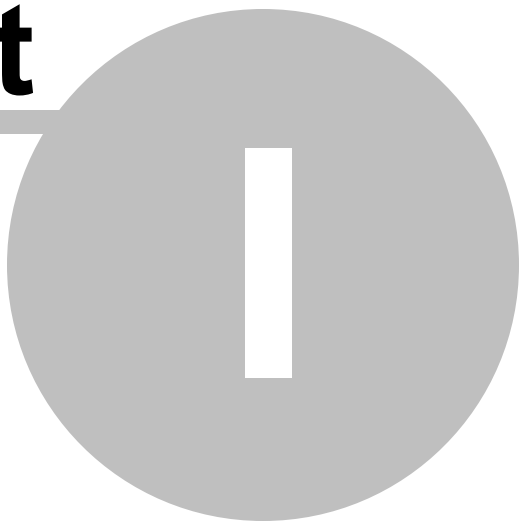
Part



1 How to get Thread Wait Chain Inspector

Thread Wait Chain Inspector is free for commercial use. Thread Wait Chain Inspector can be downloaded for Software Verify's website at https://www.softwareverify.com/product/thread-wait-chain-inspector/.

This help manual is available in Compiled HTML Help (Windows Help files), PDF, and online.

Windows Help	https://www.softwareverify.com/documentation/chm/threadWaitChainInspector.chm
PDF	https://www.softwareverify.com/documentation/pdfs/threadWaitChainInspector.pdf
Online	https://www.softwareverify.com/documentation/html/threadWaitChainInspector/index.html

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Visit our blog to read our articles on debugging techniques and tools.
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Versions

There are two versions of Thread Wait Chain Inspector:
- A version for 32 bit operating systems: **threadWaitChainInspector.exe**
- A version for 64 bit operating systems: **threadWaitChainInspector_x64.exe**.

The 32 bit version will run on 64 bit operating systems but will only show information about 32 bit processes.

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The 64 bit version will only run on 64 bit operating systems and will only show information about 64 bit processes.

Both versions are installed if you are using a 64 bit operating system.

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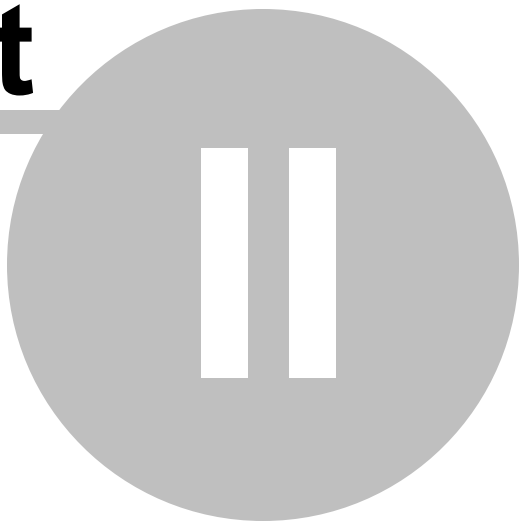


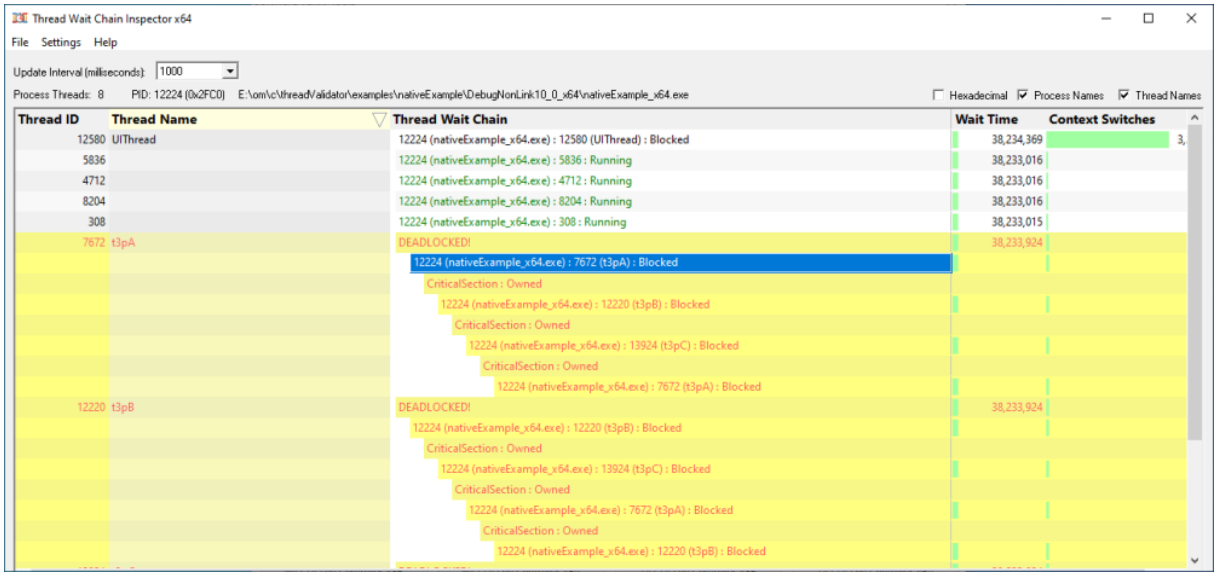
2 What does Thread Wait Chain Inspector do?

Thread Wait Chain Inspector allows you to inspect information about each running thread in an application.

The display shows wait chain data in the the lower window for the process that is selected in the upper window.

For any selected thread, that thread and related threads are shown with a yellow background.

Any deadlocked threads have their wait chains shown in red.



Information that is displayed about each thread:

Thread id
This is the numeric identifer assigned to the thread by the Windows operating system.

Thread Name
This is the name of the thread if the thread has been given a name using the `SetThreadDescription()` API. This is only available on Windows 10.

If a thread description is not available we attempt to provide a name for this thread by querying the thread's start address, and if successful we try to turn this start address into a useful symbolic name. Depending on the process and the operating system these operations may success, in which we display a name, or they may fail in which case we display nothing.

Thread Wait Chain
This is the wait chain for this thread. For each entry we show the process id and the thread id and if the object being waited upon has a name, we show that too. If process names and thread names have been

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enabled we show these as well. Some wait chains rely on waiting for other processes, which are more readily identified by process name than process id. Any deadlocks that are detected are shown in red.

Wait Time
This is how long the thread has been waiting.

Context switches
This is the number of context switches this thread has been involved in.

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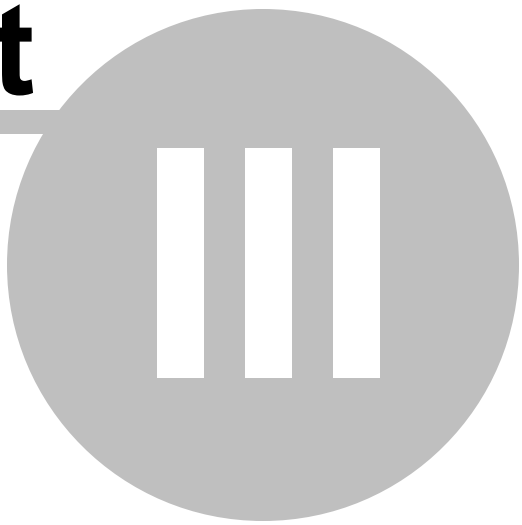
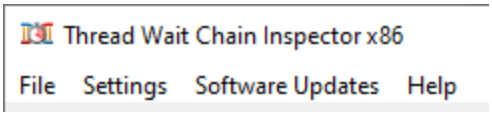


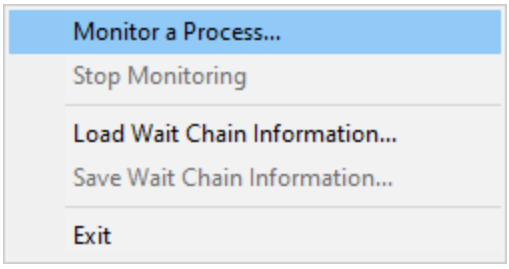
3 Menu

The main menu contains four menus, File, Settings, Software Updates and Help.



3.1 File

The File menu allows you to close the program.



File menu › **Monitor a Process...** › displays the process chooser to allow you to choose which process to monitor.

File menu › **Stop Monitoring** › stops monitoring the process and clears the display.

File menu › **Load Wait Chain Information...** › loads wait chain information from a file and displays it.

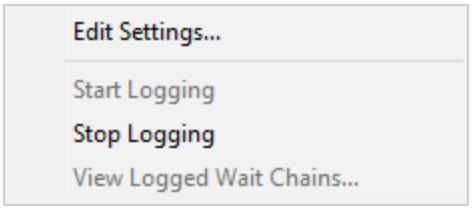
File menu › **Save Wait Chain Information...** › save wait chain information to a file.

This can be useful for saving wait chain information for diagnosis at a later time, and for diagnosis by a colleague.

File menu › **Exit** › closes Thread Wait Chain Inspector

3.2 Settings

The Settings menu allows you to modify the behaviour of Thread Wait Chain Inspector.



File menu › **Edit Settings...** › displays the settings dialog.

File menu › **Start Logging** › starts logging wait chains.

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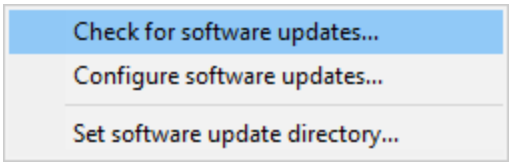
File menu › **Stops Logging** › stops logging wait chains.

File menu › **View Logged Wait Chains...** › opens the log file in the registered application for .txt files (notepad.exe on most computers).

3.3 Software Updates

The Software Updates menu controls how often software updates are downloaded.

If you've been notified of a new software release to Thread Wait Chain Inspector or just want to see if there's a new version, this feature makes it easy to update.

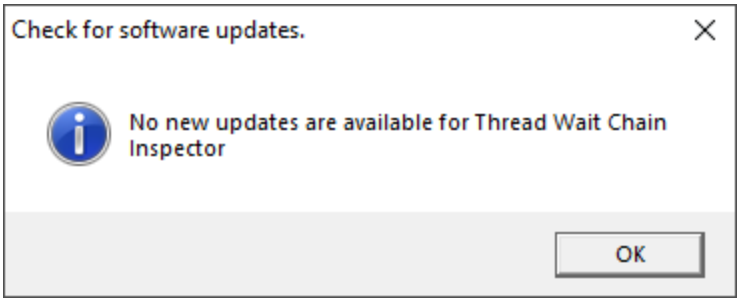


Software Updates menu › **Check for software updates** › checks for updates and shows the software update dialog if any exist

An internet connection is needed to be able to make contact with our servers.

Before updating the software, close the help manual, and end any active session by closing target programs.

If no updates are available, you'll just see this message:



Software Update dialog

If a software update is available for Thread Wait Chain Inspector you'll see the software update dialog.

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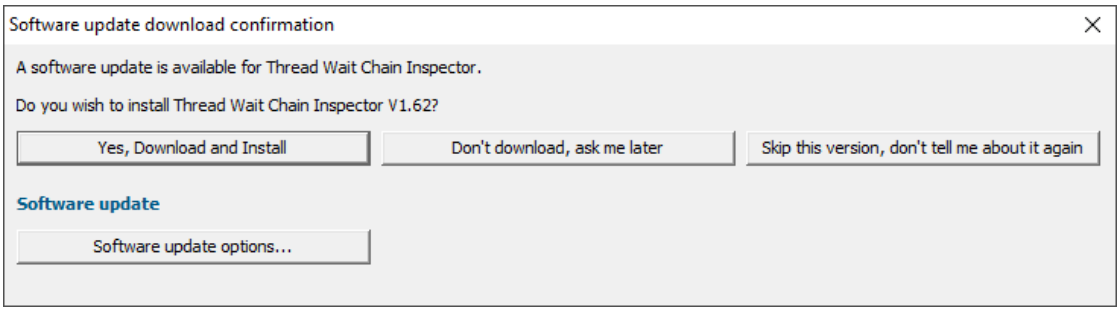
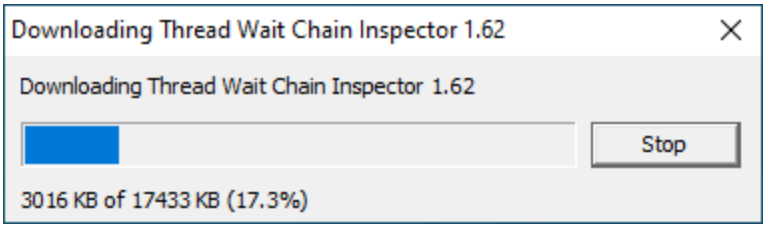


- **Download and install** › downloads the update, showing progress



  Once the update has downloaded, Thread Wait Chain Inspector will close, run the installer, and restart.

  You can stop the download at any time, if necessary.

- **Don't download...** › Doesn't download, but you'll be prompted for it again next time you start Thread Wait Chain Inspector
- **Skip this version...** › Doesn't download the update and doesn't bother you again until there's an even newer update
- **Software update options...** › edit the software update schedule

Problems downloading or installing?

If for whatever reason, automatic download and installation fails to complete:

- Download the latest installer manually from the software verify website.

Make some checks for possible scenarios where files may be locked by Thread Wait Chain Inspector as follows:

- Ensure Thread Wait Chain Inspector and its help manual is also closed
- Ensure any error dialogs from the previous installation are closed

You should now be ready to run the new version.

Software update schedule

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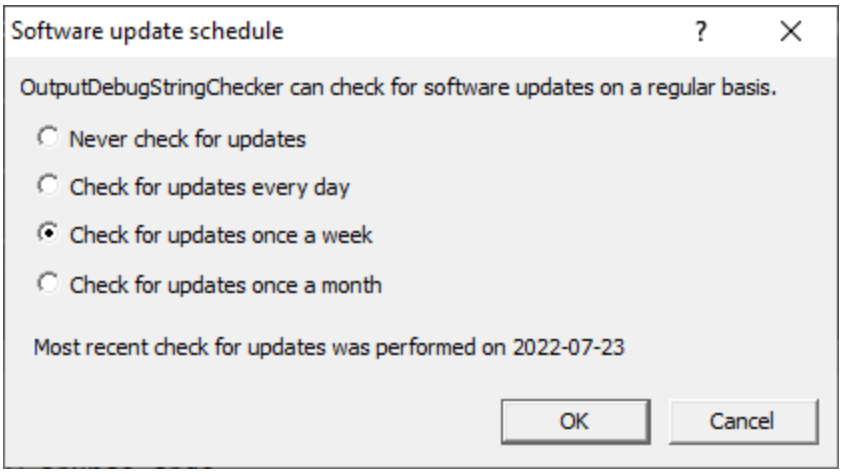
Thread Wait Chain Inspector can automatically check to see if a new version of Thread Wait Chain Inspector is available for downloading.

Software Updates menu › **Configure software updates** › shows the software update schedule dialog

The update options are:

- never check for updates
- check daily (the default)
- check weekly
- check monthly

The most recent check for updates is shown at the bottom.



Software update directory

It's important to be able to specify where software updates are downloaded to because of potential security risks that may arise from allowing the `TMP` directory to be executable. For example, to counteract security threats it's possible that account ownership permissions or antivirus software blocks program execution directly from the `TMP` directory.

The `TMP` directory is the default location but if for whatever reason you're not comfortable with that, you can specify your preferred download directory. This allows you to set permissions for `TMP` to deny execute privileges if you wish.

Software Updates menu › **Set software update directory** › shows the Software update download directory dialog

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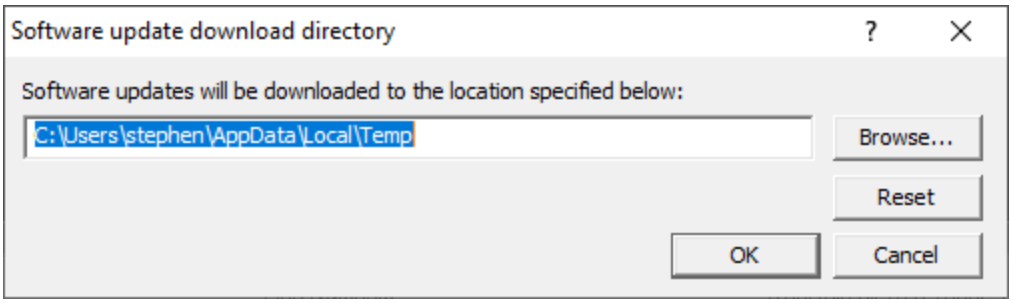


An invalid directory will show the path in red and will not be accepted until a valid folder is entered.

Example reasons for invalid directories include:

- the directory doesn't exist
- the directory doesn't have write privilege (update can't be downloaded)
- the directory doesn't have execute privilege (downloaded update can't be run)

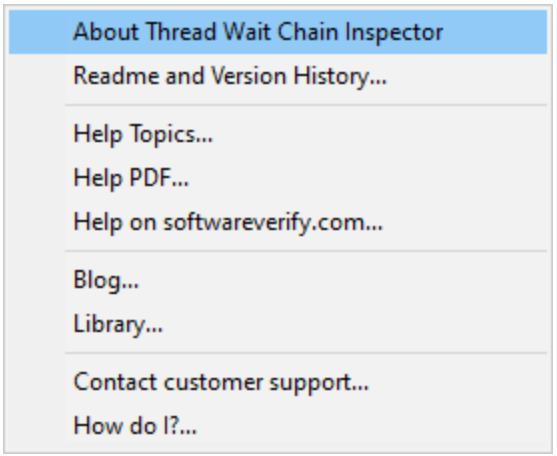
When modifying the download directory, you should ensure the directory will continue to be valid. Updates may no longer occur if the download location is later invalidated.

- **Reset** › reverts the download location to the user's `TMP` directory

  The default location is `c:\users\[username]\AppData\Local\Temp`

3.4 Help

The Help menu controls displaying this help document and displaying information about Thread Wait Chain Inspector.



Help menu › **About Thread Wait Chain Inspector...** › displays information about Thread Wait Chain Inspector.

Help menu › **Readme and Version History...** › displays the readme and version history.

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Help menu › **Help Topics...** › displays this help file.

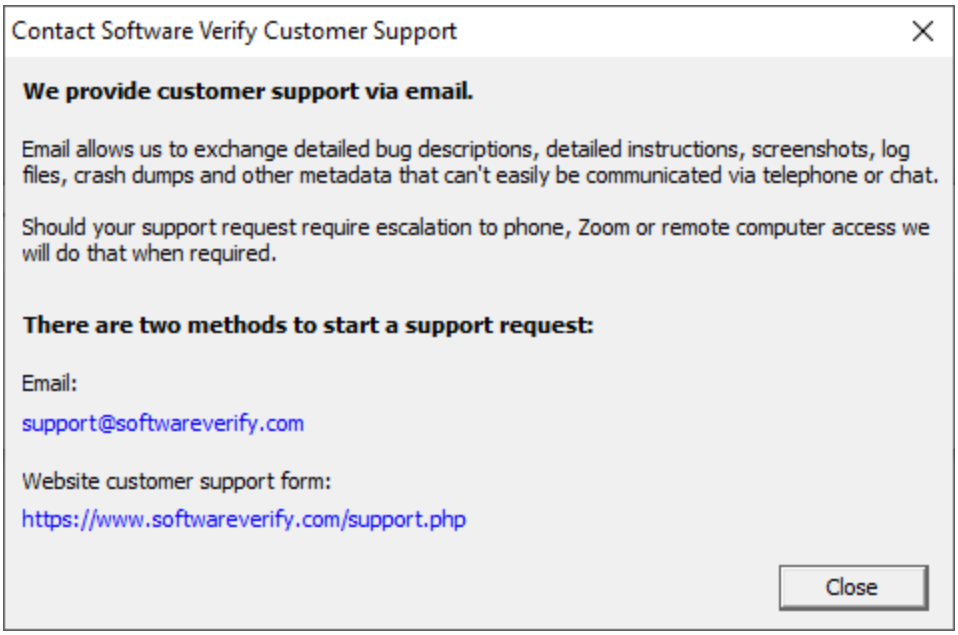
Help menu › **Help PDF...** › displays this help file in PDF format.

Help menu › **Help on softwareverify.com...** › display the Software Verify documentation web page where you can view online documentation or download compiled HTML Help and PDF help documents.

Help menu › **Blog...** › display the Software Verify blog.

Help menu › **Library...** › display the Software Verify library - our best blog articles grouped by related topics.

Help menu › **Contact customer support...** › displays the options for contacting customer support.



Click a link to contact customer support.

Help menu › **How do I?...** › displays the options for asking us how to do a particular task.

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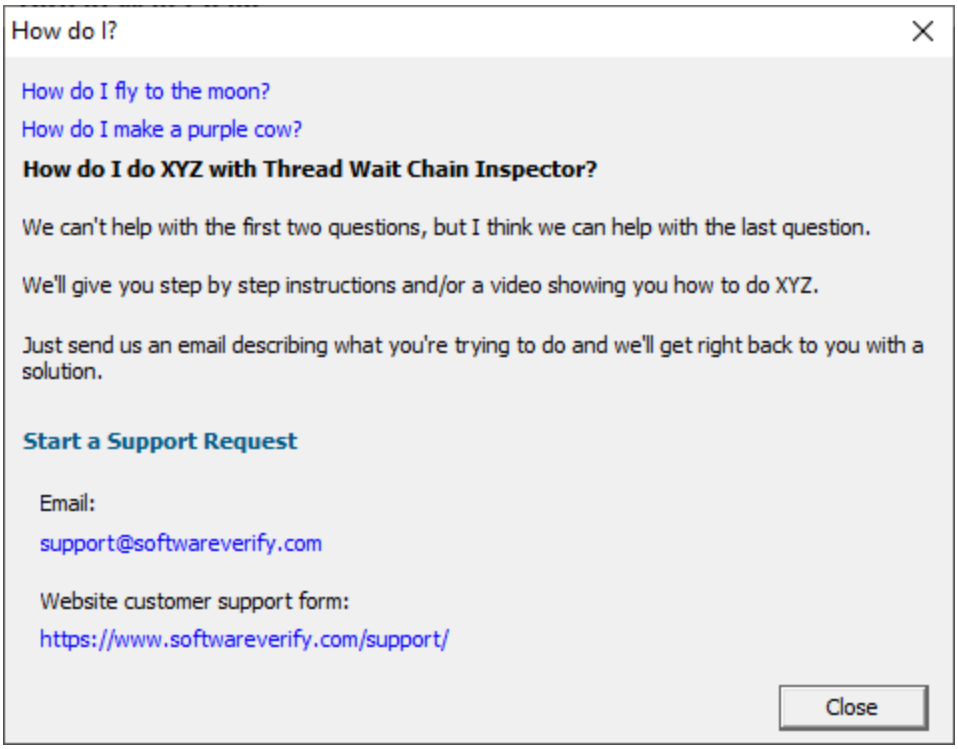

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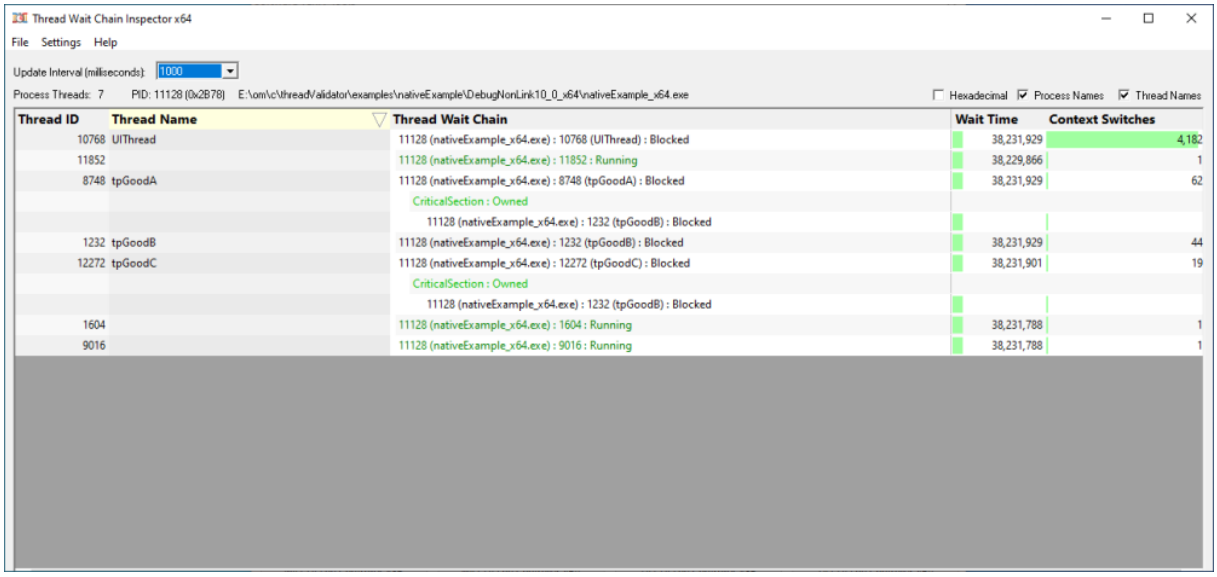
Part

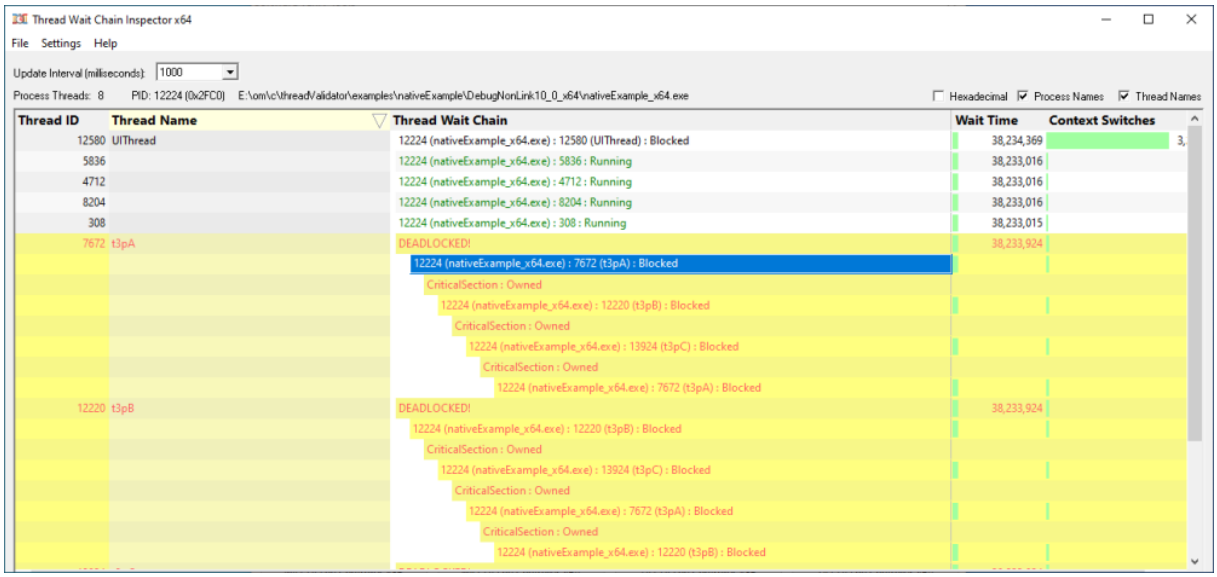
4 The user interface

The Thread Wait Chain Inspector user interface displays the threads of the selected process:



Usage

You can sort the thread list by clicking the column header to select the column. Clicking the already selected column header again reverses the sort direction.



The values shown for each thread are described here. A graphical representation of these values is shown behind the numeric values where possible.

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Thread Controls

Refresh
You can update the display manually by clicking the Refresh button. This is useful if you have disabled automatic updates via the the Update Interval control.

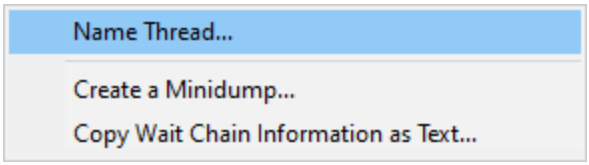
Update Interval
You can change how frequently the display is updated using the Update Interval control. The default is to update every one second.

Process Names
As well as showing the process id in the wait chain the process name is displayed. This is enabled by default.

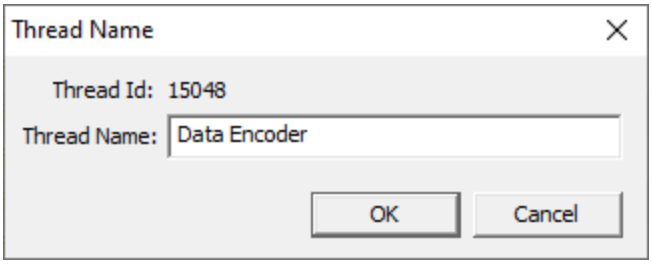
Thread Names
As well as showing the thread id in the wait chain the thread name is displayed. This is enabled by default.

Context Menu

The grid has a context menu. Each row in the grid represents a thread in the selected process.



Name Thread...
Display the Name Thread dialog so that you can name an un-named thread or rename a thread to have a more useful name.



Create a Minidump...
This creates a minidump for the process that has been selected by the context menu (this may not be the process selected in the process list).

A create minidump dialog is displayed asking you where to save the minidump.

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Copy Wait Chain Information as Text...
This copies the wait chain information that is displayed to the clipboard.

Example:

```
11104 (waitChainTester.exe) : 3216 : Blocked   Wait Time: 48,823,605   Context Switches: 7,383
11104 (waitChainTester.exe) : 7300 (threadProcess2) : Blocked   Wait Time: 48,820,804   Context
   Process Wait : Owned
      12436 (notepad.exe) : 0 : Pid Only
11104 (waitChainTester.exe) : 12588 : Running   Wait Time: 48,822,522   Context Switches: 3
11104 (waitChainTester.exe) : 12812 : Running   Wait Time: 48,822,522   Context Switches: 1
```

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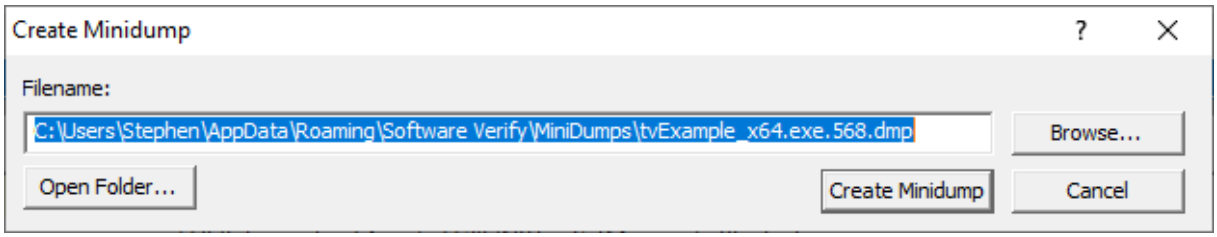
Part V

5 Create a minidump

The Create Minidump dialog is provided to allow you to choose where to save your minidump.



A suggested filename will be provided in the edit field. You can edit this filename or choose a new filename using the **Browse...** button to display the system file chooser.

Open Folder... displays the contents of the folder identified by the filename. You can use this to browse any existing minidumps.

Create Minidump will create the minidump for the selected process.

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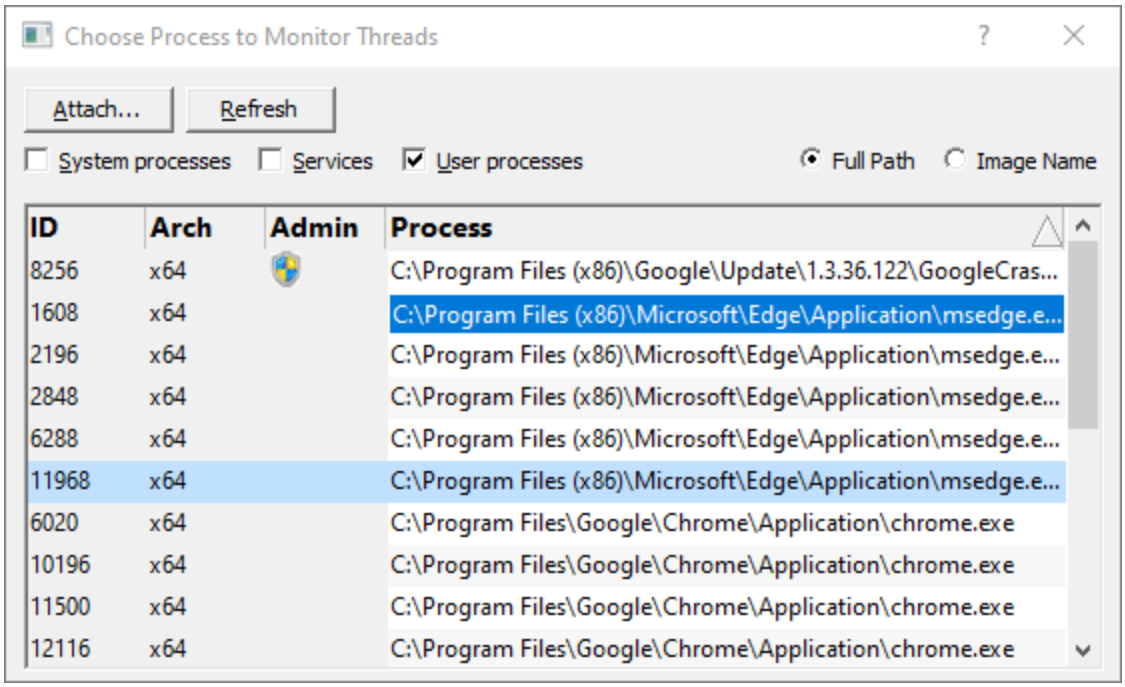
Part VI

6 Process chooser dialog

The Attach to process dialog allows you to choose a user process, system process or service to attach to.



- **System processes / Services / User processes** › show either of system or services or user processes in the list, or both
- **Full path** › shows the full path to the process executable in the list
- **Image Name** › shows the short program name without path
- **Refresh** › update the list with currently running processes
- **Attach** › attach to the selected process and start collecting debug events

Clicking on the headers of the list will sort them by ID or by name using the full name or short name, depending on what's displayed.

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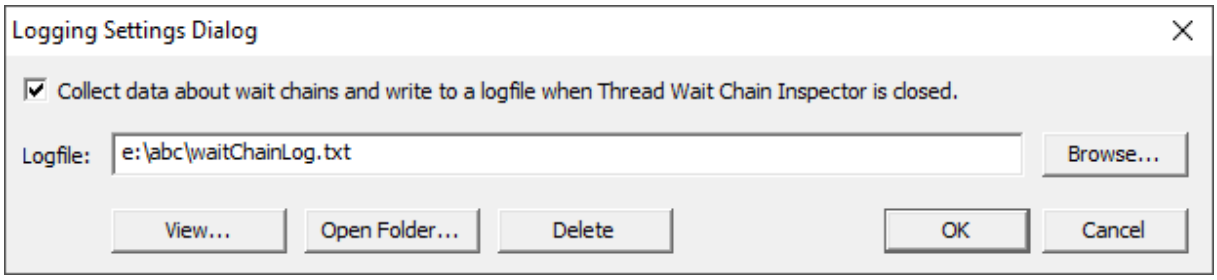
Part VII

7 Settings dialog

The settings dialog allows you to modify the behaviour of Thread Wait Chain Inspector.



- **Collect data about wait chains...** › turn collect of wait chain logging on or off
- **Logfile** › the file when the wait chain log will be written
- **Browse...** › open a Windows file dialog to choose the log file name
- **View...** › opens the log file in the registered application for .txt files (notepad.exe on most computers)
- **Open Folder...** › opens Windows file explorer to show the directory that contains the log file
- **Delete** › deletes the log file

When logging is enabled the log file will be written when Thread Wait Chain Inspector is closed.

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Part

8 Command Line Interface

Thread Wait Chain Inspector can be used from the command line as well as with the GUI.

8.1 Alphabetic Reference

/logWaitChains

Turn wait chain logging on or off

/logWaitChains:On|Off

Example:

/logWaitChains:On
/logWaitChains:Off

/logWaitChainFileName

Specifies a file to write the wait chain log to. The wait chain log is written when Thread Wait Chain Inspector is closed.

/logWaitChainFileName filename

Example:

/logWaitChainFileName e:\tests\testWaitChain\waitChainLog.txt

/processId

Specify a process to monitor. The process must already be running.

/processId process-id

Example:

/processId 256

/process

Specify a process to monitor. The process must already be running.

/process process-name

Example:

/process test.exe
/process e:\om\c\testApps\native\test\debug\test.exe

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