

Migration Kit for Solaris OS to Linux



# Migrating applications from Solaris OS to Linux using Source Checking Tool



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**Note:** Before using this information and the product it supports, read the general information in “Notices” on page 31.

**First Edition (September 2005)**

This edition applies to the Source Checking Tool version 1 and to all subsequent releases and modifications until otherwise indicated in new editions.

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# Chapter 1. Introduction

Source Checking Tool is a tool that assists in migrating applications from Sun Solaris Operating System to Linux<sup>®</sup>, reducing the time and skill required.

Source Checking Tool supports the following porting environment:

- You can port **from** the following operating systems: Sun Solaris 8 OS and Sun Solaris 9 OS
- You can port **to** the following environments: Linux kernel version 2.6-based distributions that run on any IBM<sup>®</sup> hardware platform, for example, Red Hat Enterprise Linux 4.0 and Novell SUSE LINUX Enterprise Server 9.

Source Checking Tool simplifies porting work by supplying the following:

- Code analysis.

Source Checking Tool scans files with certain file extensions (.c, .h, .l, .y, .C, .H, .L, .cc, .hh, .cpp, .hpp, .cxx, .hxx) in a code tree. The code tree starts at a directory that you specify. It scans C and C++ code for constructs (APIs, include files, and pragmas) that are specific to Solaris OS and that you need to change for Linux.

Source Checking Tool does not make changes to the source code. Instead, it highlights the constructs that need to be changed, offers recommendations and examples, and provides an analysis of the size and difficulty of the porting effort.

- Different views.

Source Checking Tool provides a summary view that organizes the scanned code in different ways. This allows you to work on the code sorted by categorized API functions. For example, you might approach the port by changing all the code related to threading. The summary function assists with this approach by listing all the files that require changes to threading code. In addition to the summary view, Source Checking Tool offers the following views:

- Portouts. This displays a list of files which have been determined to contain problems. Users can then click a file to open it with an editor.
- Metrics. This displays a high-level analysis of the porting effort.
- Graphics. This displays the analysis of the porting effort graphically, using a pie chart.

- Porting effort analysis.

Source Checking Tool provides a metrics function to give you an idea of the difficulty of the porting effort. Each flagged function has an associated level of difficulty: Low, medium, high, or to be assessed. Source Checking Tool calculates the percentage of code lines that require changes and the percentage of flagged functions by difficulty level.

Source Checking Tool recognizes over 3800 Solaris OS API calls, pragmas, and include files. While the porting effort always depends on the applications being ported, an analysis of all Solaris OS calls show that:

- Slightly less than half of all Solaris OS calls are identical to their Linux equivalents, and need not be changed when porting.
- About ten percent of all Solaris OS calls require minimal changes only.
- About five percent require small changes in their local context.
- About 15 percent require greater changes.

- About 25 percent of calls must be assessed in the context of their application before the porting effort can be analyzed.



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## Chapter 2. Installing Source Checking Tool

This chapter describes the prerequisites and the installation procedure for Source Checking Tool.

---

### Prerequisites

In order to use Source Checking Tool, you need the following:

- ActivePerl version 5.8, which includes the Perl/Tk toolkit. ActivePerl is available from [www.activestate.com](http://www.activestate.com).
- For remote access, a working X server environment. An open source X server is available, for example, from [sources.redhat.com/cygwin/xfree/](http://sources.redhat.com/cygwin/xfree/).
- A packaging tool, for example, the Sun Solaris OS Package tool or tar.

---

### Installation steps

You can install Source Checking Tool by using a pkg file or a tar file.

#### Installing using the pkg file

**Before you begin:** You must have root authority to perform these steps.

Perform these steps to install Source Checking Tool:

1. Copy the package file called SCT.pkg to a temporary directory and change to this directory.
2. Use the **pkgadd** tool to install the package. Issue:

```
# pkgadd -d SCT.pkg SCT
```

This installs Source Checking Tool in /opt/ibm/mksl/SCT.

**Note:** If the /opt/ directory already exists, **pkgadd** might complain about conflicting entries, because the package tries to install /opt/ with default values for the owner and access rights. In this case, you can keep the current values by answering "no" to the question "Do you want to install these conflicting files":

```
## Checking for conflicts with packages already installed.

The following files are already installed on the system and are being
used by another package:
/opt <attribute change only>

Do you want to install these conflicting files [y,n,?,q] n

Do you want to continue with the installation of <SCT> [y,n,?] y
## Checking for setuid/setgid programs.
## Processing package information.
## Processing system information.
```

3. There is a wrapper in /usr/bin. You can run Source Checking Tool by issuing the following command (you do not need to be root to run the tool):

```
$ /usr/bin/sct
```

The shell script /usr/bin/sct tries to detect the location of ActivePerl. If this detection fails, you can change the Perl version that Source Checking Tool looks for by changing the line "PERL=" in the shell script to the appropriate path.

## Uninstalling the pkg file

**Before you begin:** You must have root authority.

Uninstall the package by issuing the following command:

```
# pkgrm SCT
```

## Installing using the tar file

You do not need root authority to perform these steps.

1. Create the folder where you want to install Source Checking Tool and change into it.

2. Unpack the tar file:

```
$ tar xf SCT.tar
```

This installs Source Checking Tool into a subfolder called SCT.

3. You can run the tool by issuing the following command:

```
$ cd SCT
```

```
$ <path to ActivePerl> sct.pl
```

Alternatively, you can change the first line of sct.pl to the path of your Perl version.

## Uninstalling the tar file

To uninstall, remove the folder into which you have installed the tar file.

## Chapter 3. Getting started with Source Checking Tool

This chapter gives a brief introduction to the Source Checking Tool and shows a typical porting workflow.

### Overview of porting steps

The following are the typical steps in porting an application from Solaris OS to Linux with the help of Source Checking Tool (see Figure 1).

1. Make a copy of the application's code tree. This will avoid accidental corruption of the original code.
2. Use Source Checking Tool to scan the source code. See "Scanning the application code for the first time" on page 6 for details.
3. Assess the porting effort using the Source Checking Tool's summary and metrics views, which display information about the size and difficulty of the work. See "Assessing the porting effort" on page 11 for more information.
4. Plan your approach to porting the code. You can replace Solaris OS code with Linux code or make the code multi-platform. See "Creating multi-platform code" on page 15 for details.
5. Make changes to the code. Using your favorite editor, make the changes in the application source code files. See "Making changes to the code" on page 13 for suggestions.

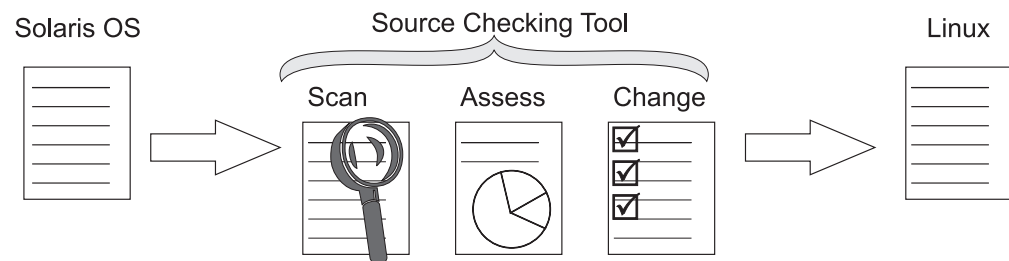


Figure 1. Source Checking Tool supports scanning the code, assessing the work, and changing the code

---

## Scanning the application code for the first time

Scanning a very large code tree may take a few hours. However, you only need to scan once.

To scan the code, follow these steps:

1. On the Source Checking Tool menu bar, click **File --> Scan**.
2. On the Scan Base Directory window, shown in Figure 2, select the directory you want to scan and click **OK**. The tool will also scan any subdirectories under the base directory.

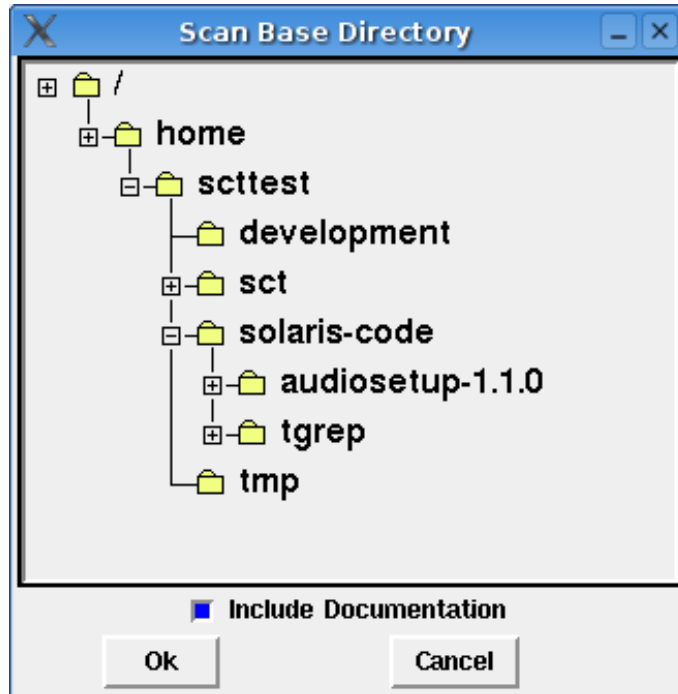


Figure 2. The Scan Base Directory window

Optionally, select **Include documentation** to highlight functions that may require modification and insert documentation about the required modification at each line that it highlights.

You can view the documentation without having inserted it into the file; double-clicking a highlighted function displays the associated documentation in a separate window.

**Note:** If you select **Include documentation**, line numbers in the output files will not correspond to line numbers in the original file. This may make it difficult to go back and forth between the two files.

When Source Checking Tool finishes scanning, it displays the code in the summary view. You can also display the scanned code at a later time.

---

## Displaying scanned code

To display already scanned code:

1. On the menu bar, click **File --> Display** to display the scanned directory tree. The code tree contains the original source files, copies of files that have porting issues identified by Source Checking Tool, and some other files that Source Checking Tool creates for its own use.
2. (Optional) On the menu bar, click **File --> Save As** to save the current view (summary, list of output files, metrics, or graphics). The tool saves the information as a formatted report, with a title, time stamp, and indication of the directory. The graphics view is saved as a postscript file; the other views are saved as text files.

As an example, here is a code excerpt as it appears in the original source file:

```
...
    DP(DLEVEL3,("Cascading on %s\n",fpath));
    if (( dp = opendir(fpath)) == NULL) {
        if (!(flags & FS_NOERROR))
            fprintf(stderr,"tgrep: Can't open dir %s, %s. Ignored.\n",
                    fpath,strerror(errno));
        goto DONE;
    }
    while ((readdir_r(dp,dent)) != NULL) {
        restart_cnt = 10; /* only try to restart the interrupted 10 X */

        if (dent->d_name[0] == '.') {
            if (dent->d_name[1] == '.' && dent->d_name[2] == '\0')
                continue;
        }
    }
}
```

Figure 3 on page 8 shows the same code excerpt, scanned and displayed in the Source Checking Tool summary view, including documentation.

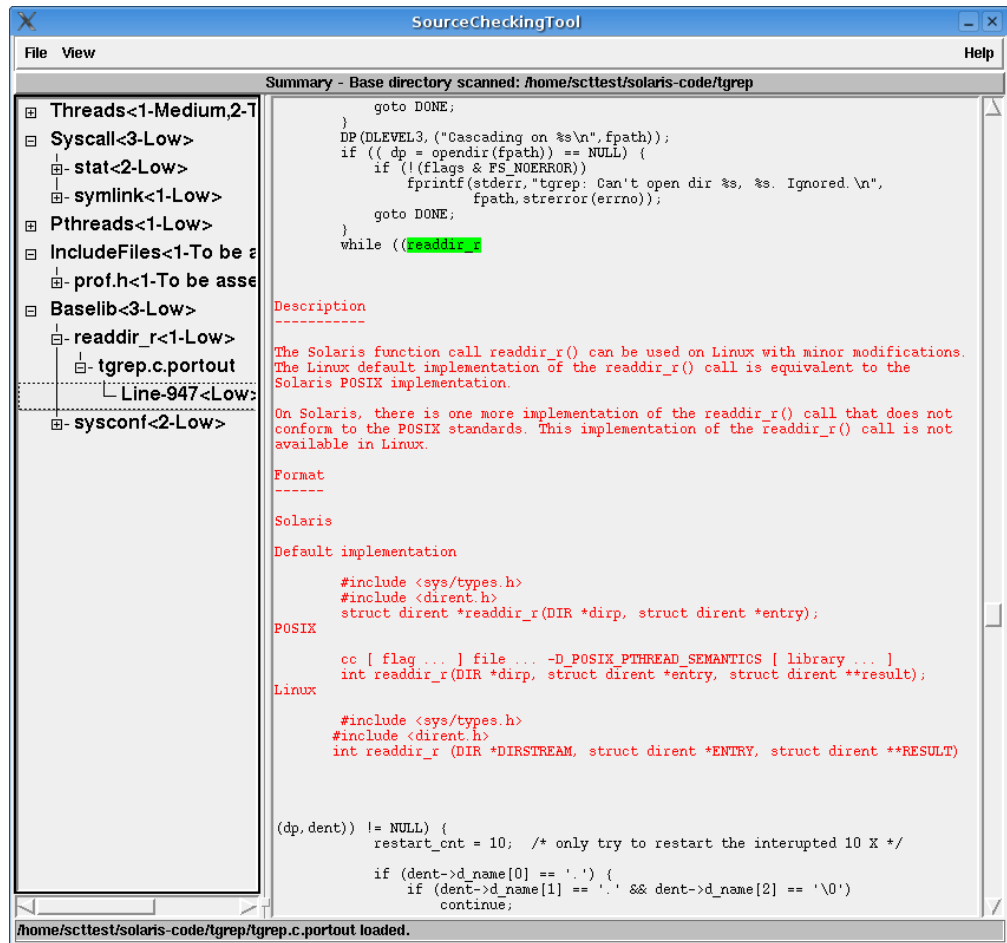


Figure 3. Source Checking Tool summary view example with documentation

## Source Checking Tool output files

This section discusses the files that Source Checking Tool produces, portout files, and an error log file.

### Portout files

As an alternative to working with the GUI, you can work directly with files the tool creates. The copies of source code that Source Checking Tool creates have an extension of .portout. These portout files are copies of the original source files with markers around recognized porting issues. If you selected **Include documentation** when scanning, the portout files also have porting information and tips inserted as comments. The portout files are created in the directory of the source tree where the original file is located.

Here is the same excerpt as it appears in the portout file:

```

        DP(DLEVEL3,("Cascading on %s\n",fpath));
        if (( dp = opendir(fpath)) == NULL) {
            if (!(flags & FS_NOERROR))
                fprintf(stderr,"tgrep: Can't open dir %s, %s. Ignored.\n",
                    fpath,strerror(errno));
            goto DONE;
        }
        while ((!readdir_r%!)

/* Begin SourceCheckingTool Documentation:

Description
-----

The Solaris OS function call readdir_r() can be used on Linux with minor modifications. The
Linux default implementation of the readdir_r() call is equivalent to the Solaris OS POSIX
implementation.

On Solaris OS, there is one more implementation of the readdir_r() call that does not conform
to the POSIX standards. This implementation of the readdir_r() call is not available in Linux.

Format
-----

Solaris OS:
Default implementation
#include <sys>
#include <dirent.h>
struct dirent *readdir_r(DIR *dirp, struct dirent *entry);
POSIX
cc [ flag ... ] file ... -D_POSIX_PTHREAD_SEMANTICS [ library ... ]
int readdir_r(DIR *dirp, struct dirent *entry, struct dirent **result);

Linux:
#include <sys>
#include <dirent.h>
int readdir_r (DIR *DIRSTREAM, struct dirent *ENTRY, struct dirent **RESULT)

*/

(dp,dent)) != NULL) {
    restart_cnt = 10; /* only try to restart the interrupted 10 X */

    if (dent->d_name[0] == '.') {
        if (dent->d_name[1] == '.' && dent->d_name[2] == '\0')
            continue;
        if (dent->d_name[1] == '\0')
            continue;

```

The **bold** indicates text that Source Checking Tool adds to the copy of the file. Note that markers are added to the function name to indicate a degree of difficulty. These markers will cause compiler errors, should you attempt to compile the portout file. Change the portout file before attempting to compile. The markers are explained in Table 1.

Table 1. Portout file markers

| Level of difficulty | Beginning marker | Ending marker | Color  |
|---------------------|------------------|---------------|--------|
| High                | <b>! ~</b>       | <b>~!</b>     | Red    |
| Medium              | <b>!&amp;</b>    | <b>&amp;!</b> | Yellow |
| Low                 | <b>!%</b>        | <b>%!</b>     | Green  |
| To be assessed      | <b>!@</b>        | <b>@!</b>     | White  |

## Error log file

Source Checking Tool creates one log file that is called sct.log. The log file is in the upper-most directory, SCT\_files, of the source code tree. Application error

messages relevant to problem determination are logged in the log file. For details about messages, see “Messages,” on page 29.



---

## Assessing the porting effort

The metrics view of Source Checking Tool helps you assess the amount of effort involved in your porting project. The information in the metrics view consists of the following:

- Base directory that is scanned
- Total number of lines that are scanned (all files)
- Total number of lines flagged
- Total number of lines flagged with each degree of difficulty (high, medium, low and to be assessed)
- Percentage of total lines that were flagged
- Of the lines that were flagged, the percentage for each degree of difficulty
- Number of assembler files found

To display the metrics view, on the menu bar, click **View --> Metrics**.

The metrics view gives an overview of the entire porting effort, including all files, regardless of category. For example:

```
Base of directory tree scanned: /home/scctest/solaris-code/tgrep

Scanned:      1969 lines
Flagged:      20 functions

High difficulty:      0 functions flagged (0% of the total)
Medium difficulty:    13 functions flagged (65% of the total)
Low difficulty:       4 functions flagged (20% of the total)
To be assessed:      3 functions flagged (15% of the total)
```

The degrees of difficulty have the following meanings:

**High** There is no equivalent function in Linux, and the code must be re-written.

**Medium**

There is no exact equivalent function in Linux, but a similar function might be used.

**Low** There is an equivalent function in Linux that can be used with only minor changes.

**To be assessed**

Source Checking Tool cannot determine the degree of difficulty; the porting effort must be assessed in the context of the particular application.

To display the data graphically, on the menu bar, click **View --> Graphics**. Figure 4 on page 12 shows the data represented in a pie chart.

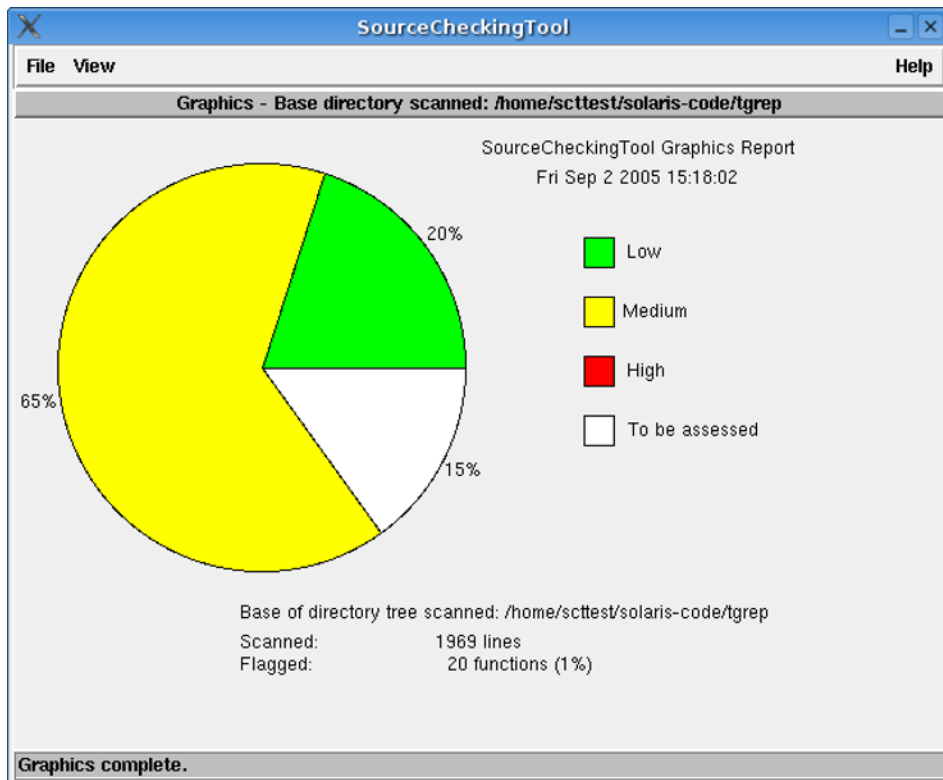


Figure 4. The graphics view

---

## Making changes to the code

When making changes to the code, you can use Source Checking Tool for guidance and planning. Choose the view that suits your approach. Use Source Checking Tool's summary view to display categorized APIs. The summary view lets you find the files and lines in those files that need changing. Use the portout view when you want to work from the list of files that require changes.

There are many possibilities to access the code and adopt it to Linux, for example:

- Use the Source Checking Tool editor for smaller changes and use **Save As** to replace the original source code file.
- Use Source Checking Tool in conjunction with your favorite editor. In this case you should not enable the option **Include documentation** because the line numbers will not match.
- Use the Source Checking Tool **Include documentation** option to build output files (.portout) with included porting remarks. Copy these files back to your working source code tree and continue with your favorite editor.

The last approach is appropriate for large scale projects that are handled in a larger team and that involve lots of mechanical changes. With the first two approaches you can coordinate your porting work and process the source code by category and function using the Source Checking Tool summary view.

## Changing code using the Source Checking Tool editor

Source Checking Tool has a built-in editor (invoked from the summary view or portout file list). The editor has basic editor functions, such as, save as, search, and cut and paste. To invoke these functions, use the context menus by clicking and holding the right mouse button. See "The editor" on page 20 for more details about the editor.

You can use the Source Checking Tool editor for minor editing of the code. However, for larger projects or redesigns, it might be more productive to use your favorite IDE or editor.

When displaying a portout file, the editor highlights the identified problems in the source code. Color expresses the level of difficulty:

- Red for high
- Yellow for medium
- Green for low
- White for to be assessed

The summary view, shown in Figure 5 on page 14, shows all the identified problems grouped by categorized APIs. You can then expand each category to show a particular issue and the file name and line number for each occurrence. The line numbers of problems that are identified by Source Checking Tool are line numbers in the portout files.

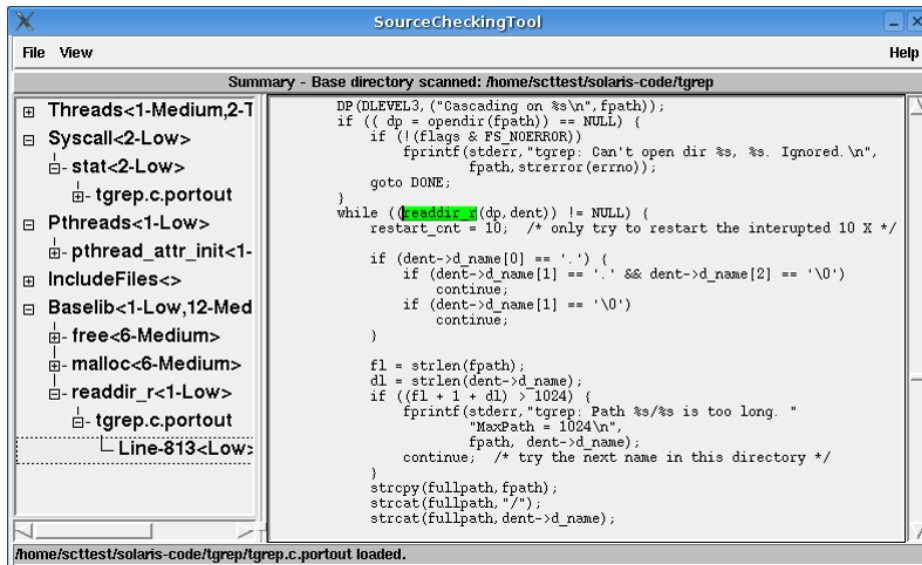


Figure 5. The summary view. An example of a split window with a summary on the left and an editor session on the right

**Note:** The line numbers in the portout file do not correspond to line numbers in the original file if you selected the **Include documentation** option.

The summary provides the number of lines flagged and a degree of difficulty. For example, a line in the summary would show <1-High> to indicate one line is flagged and it is considered to be a high degree of difficulty. The degree of difficulty can be low, medium, high, or to be assessed.

From the tree in the left panel you can:

- Expand or collapse branches by clicking the nodes, marked by a + (when the branch is collapsed) or a - (when the branch is expanded).
- Open the file in an edit session by double-clicking the file name or a line number. Clicking a line number opens the file to that line number. The edit session is in the right pane. Users who wish to use another editor must launch that editor separately. See "The editor" on page 20 for more information.
- Display porting documentation by double-clicking a category or function. The editor displays the documentation in the right pane. The documentation is appropriate to the selected category or function.

From the portout view in the right panel, you can double-click the highlighted function to get a documentation text. If you use the **Include documentation** option, the documentation is displayed intermixed with the source code.

## Creating multi-platform code

You may choose to simply replace Solaris OS code with Linux code, or to make the code multi-platform, including both the Solaris OS and Linux code. To do this, use `#ifdef` statements to tell the compiler what set of code to use.

For example:

```
#ifdef __s390__
pthread_create(&tid[i], NULL, sleeping, (void *)SLEEP_TIME);
#elif __sun__
thr_create(NULL, 0, sleeping, (void *)SLEEP_TIME, 0, &tid[i]);
#endif
```

The symbols “`__s390__`” and “`__sun__`” are examples of symbols that are defined on Sun Solaris OS and Linux for zSeries® systems. You can either use other system-defined symbols or use the `-D` compiler option to define user-created symbols.

When using gcc, there are a number of predefined preprocessor `#defines`. These include:

`__s390__`

When compiling for an IBM zSeries in 64- or 31-bit mode, or an S/390® in 31-bit mode.

`__s390x__`

When compiling for a zSeries processor which supports 64-bit addressing.

`__powerpc__` or `__PPC__`

When compiling for a PowerPC® processor.

`__powerpc64__` or `__PPC64__`

When compiling for a 64-bit PowerPC processor.

`__gnu_linux__`

When compiling for Linux.



## Chapter 4. Source Checking Tool reference

This chapter presents the details of the Source Checking Tool graphical user interface and lists Source Checking Tool menu items and functions.

### The Source Checking Tool window

Figure 6 shows the parts of the Source Checking Tool window.

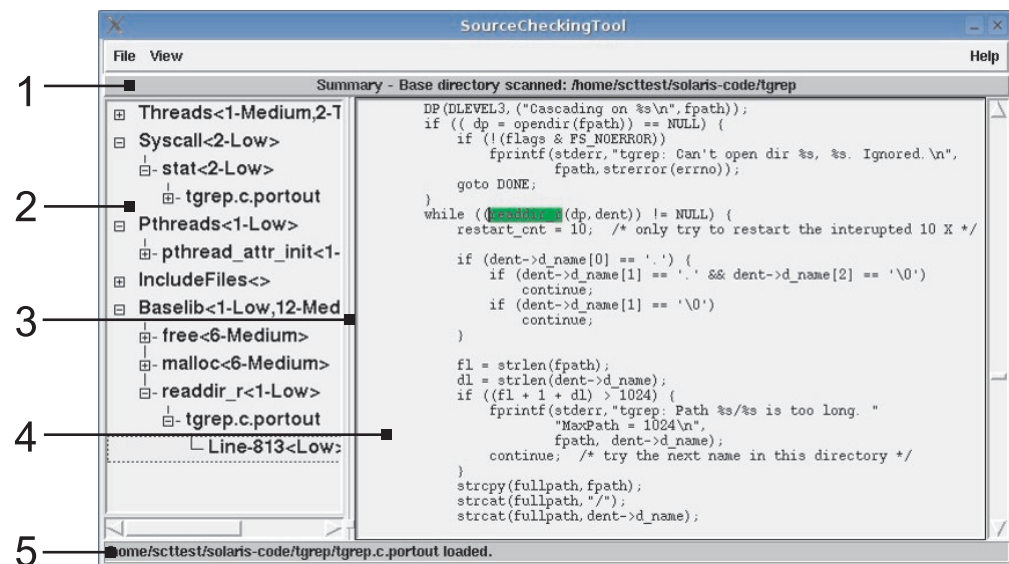


Figure 6. The Source Checking Tool main window

The window parts are:

1. Title line, showing the title of the current view, either Summary, Portout list, Metrics or Graphics, and the base directory that was scanned.
2. Left pane, used for the summary or the list of portout files.
3. Vertical separator between the panes; it can be slid right and left to resize the panes.
4. Right pane, used for displaying the porting documentation or portout file with an editor.
5. Message line or status bar.

Metrics and graphics are shown in a single pane. See “Functions” on page 18 for more examples of the window.

### The menu bar

The items on the menu bar are described below. For details on the associated functions, see “Functions” on page 18.

#### File

- Scan** This displays a tree in a pop-up window, from which you can select the directory that contains the files you want to scan.

**Display**

This displays the tree from which you can select a previously scanned directory. Select the directory to open the summary view (the default).

**Save Summary As | Save Portout List As | Save Metrics As | Save Graphics As**

This saves the current view (in contrast to **Save As** in the edit window). It displays a file selection that lets you select a path for saving the current view (Summary, Portout list, Metrics, or Graphics). This action is not available when the window is empty. It does not save the contents of the right pane when the window is split.

**Exit** This ends the tool.

**View** Mutually exclusive actions under **View** control the contents of the main window. They also control the results of the next **File-->Scan** action, so the options are available even if the window is empty.

**Portouts**

This displays a list of files which have been determined to contain problems. Users can then click a file to open it with an editor.

**Summary**

This is the default. It displays the summary, which describes and acts as a map to the porting effort.

**Metrics**

This displays a high-level analysis of the porting effort.

**Graphics**

This displays the metrics in a graphical format, using a pie chart.

**Help**

**Help** This displays help for the tool in a pop-up window.

**About** This displays copyright and release information in a pop-up window

---

## Functions

This section describes the main functions of Source Checking Tool.

### Scan

Launch the scan function by clicking **File -->Scan**. The Scan Base Directory window, which contains a directory tree, opens as shown in Figure 7 on page 19.



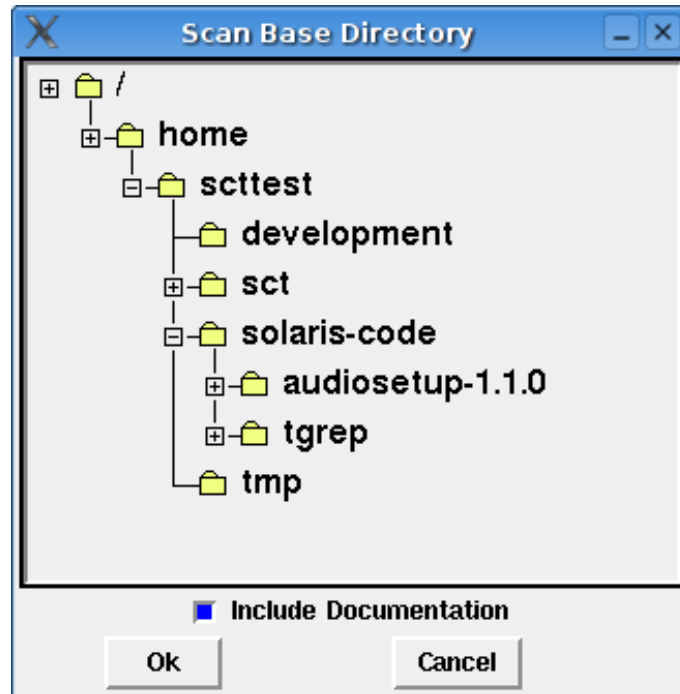


Figure 7. Directory tree example

The window includes an **Include documentation** option. When the option is selected the scan inserts porting documentation at each line that it flags. The default is that the option is not selected. The option is most useful when viewing the portout files outside of Source Checking Tool. When viewing the portout files within Source Checking Tool, users can click a highlighted function to display the documentation in a separate window.

Select a directory from the tree and click **OK** to dismiss the window and cause the tool to scan the files in the directory for potential problems. When the tool finds a file that requires code changes, it creates the portout copy of the file. When the scan is complete, the main window opens with the appropriate output (by default, the summary).

## Display

Launch the Display function by clicking **File -->Display** from the action bar. This displays the Display Base Directory window, which contains the same tree as the Scan function. The directory selected on the window is searched for the results of a previous scan, which are then displayed. Note that this pop-up does not include the option to include documentation, as that option cannot be changed with the Display function.

## Save as

To launch the **Save as** function, click **File -->Save As** on the menu bar. This displays a file chooser that lets you specify where to save the current view (summary, list of portout files, metrics or graphics). The information is saved as a formatted report, with a title, time stamp and indication of the directory. The graphics view is saved as a postscript file; the other views are saved as text files.

The following example shows a list of portout files saved and then viewed with the vi editor:

#### SourceCheckingTool Summary Report

```
-----  
Time stamp      : Fri Sep 2 2005 15:37:40  
Search directory: /home/scttest/solaris-code/tgrep  
  
Threads<1-Medium,2-To be assessed>  
  thr_getconcurrency<1-To be assessed>  
    tgrep.c.portout
```

When a summary is saved, the report uses indentation to indicate the tree structure, for example:

```
Syscall<2-Low>  
  stat<2-Low>  
    tgrep.c.portout  
      Line-456<Low>  
        Line-1192<Low>
```

## The editor

The editor (invoked from the summary or portout file list) indicates the level of difficulty of flagged functions with color when it is used to display a portout file:

- Red for high
- Yellow for medium
- Green for low
- White for to be assessed

If you have specified that porting documentation be included, the documentation is displayed in red. Figure 8 on page 21 shows a Source Checking Tool window with documentation included (on screen, the documentation will be displayed in red).

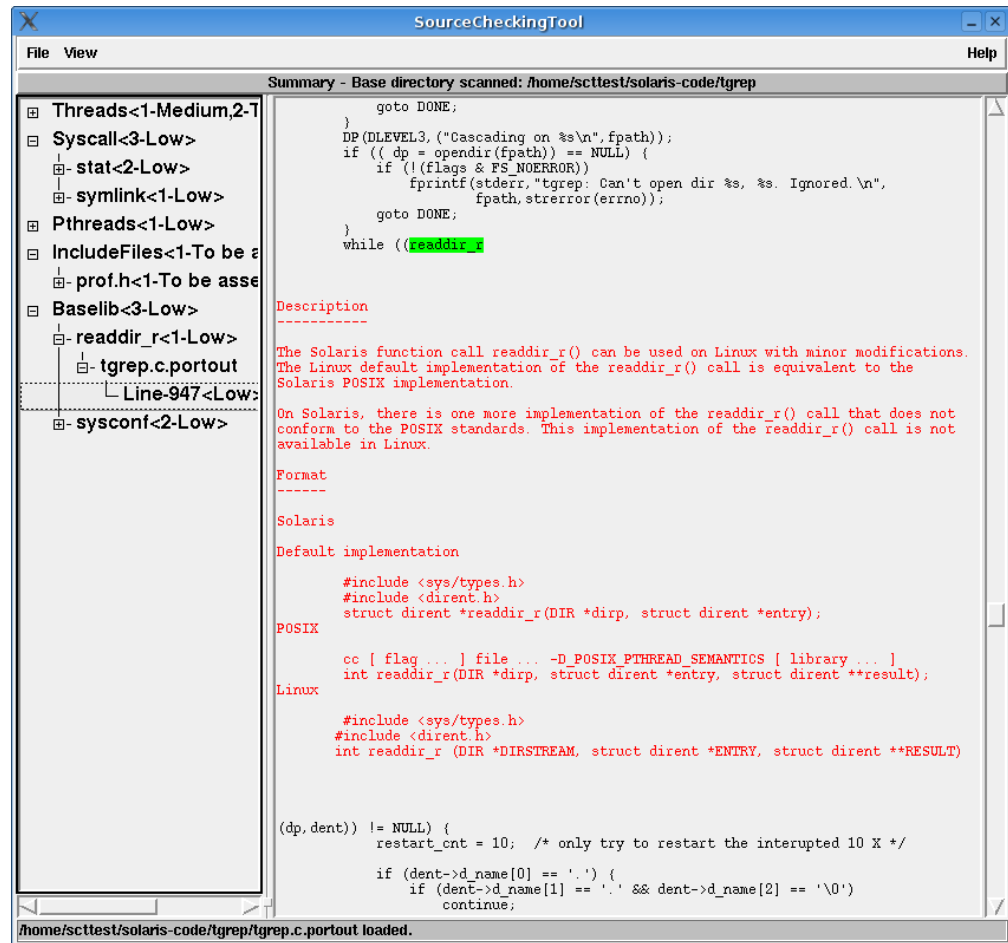


Figure 8. Source Checking Tool example with documentation

The editor provides basic editor functions, for example, save as, cut and paste and search. These functions can be invoked from context menus, displayed by pressing and holding the right mouse button. Figure 9 on page 22 shows the editor with a context menu displayed.

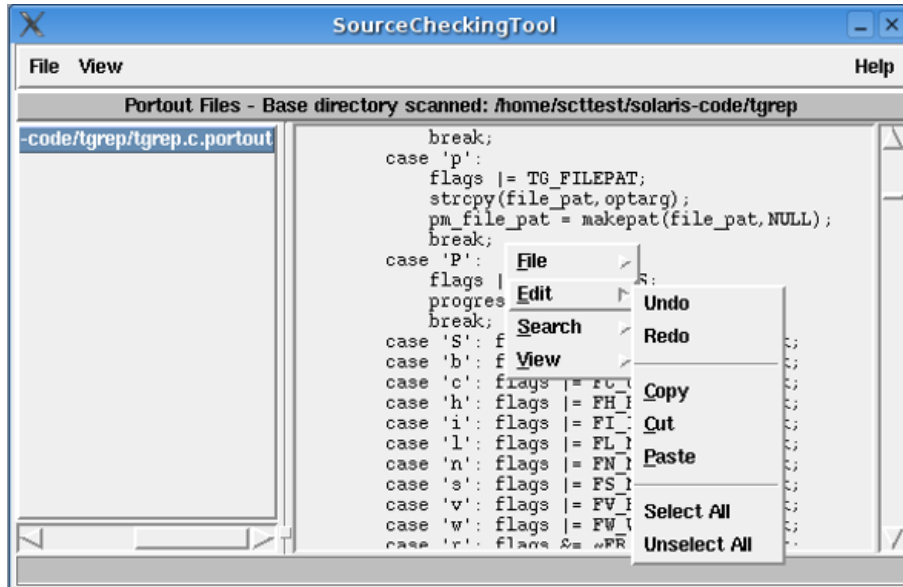


Figure 9. Editor with context menu

The context menu has the following items:

#### File

- **Open** (opens a file selection to select a file; this file replaces the contents of the edit window)
- **Save As** (opens a file selection for saving the contents of the edit window)
- **Include** (opens a file selection to select a file to insert at the cursor)
- **Clear** (clears the contents of the edit window)

#### Edit

- **Undo** (undo last change)
- **Redo** (redo last undone change)
- **Copy** (put selected text into clipboard)
- **Cut** (remove selected text from the file and put it in clipboard)
- **Paste** (place the contents of the clipboard at the cursor)
- **Select All** (select the contents of the file that is being displayed)
- **Unselect All** (clear selections)

#### Search

- **Find** (opens a window for entering a search string)
- **Find Next** (scroll forward to the next instance of the search string)
- **Find Previous** (scroll backward to the previous instance of the search string)
- **Replace** (opens a window for entering a search string and the string with which to replace it)

#### View

- **Goto Line** (opens a window for entering line number to which you want to scroll)
- **Which Line?** (opens a window that shows the number of the current line)
- **Wrap** (set the wrap option from a menu)

---

## Views

This section describes the summary, metrics, and graphics views.

### The summary view

The summary is displayed in the left pane of the Source Checking Tool window. It uses one tree to show functions and a second tree to show include files.

The summary groups problem functions by category. The categories are sorted in descending alphabetical order. The functions are in alphabetical order within the category. Under each function within a category is a list of files that were found to contain it. Under each file name is a list of the specific lines containing the function. The file list uses the portout files rather than the original source files.

The summary also provides some metrics. This includes both a quantitative assessment, the number of lines flagged, and a qualitative assessment, a degree of difficulty. For example, a line in the summary would show <1-High> to indicate one line is flagged. It is considered to be a high degree of difficulty. The degree of difficulty can be low, medium, high, or to be assessed.

A degree of difficulty is omitted if no lines were flagged for it. The summary shows the degree of difficulty for every level of the tree except portout files.

From the tree you can:

- Expand or collapse branches by clicking the nodes, marked by a + (when the branch is collapsed) or a – (when the branch is expanded).
- Open the file in an edit session by double-clicking the file name or a line number. Clicking a line number opens the file to that line number. The edit session is in the right pane. The editor is a simple editor, which includes basic function such as search and save as. Users who wish to use another editor must launch that editor separately. See “The editor” on page 20 for more information.
- Display porting documentation by double-clicking a category or function. The documentation is displayed in the right pane, using the editor, and is appropriate to the selected category or function.

An example of the split window with a summary on the left and a portout file on the right is shown in Figure 10 on page 24.

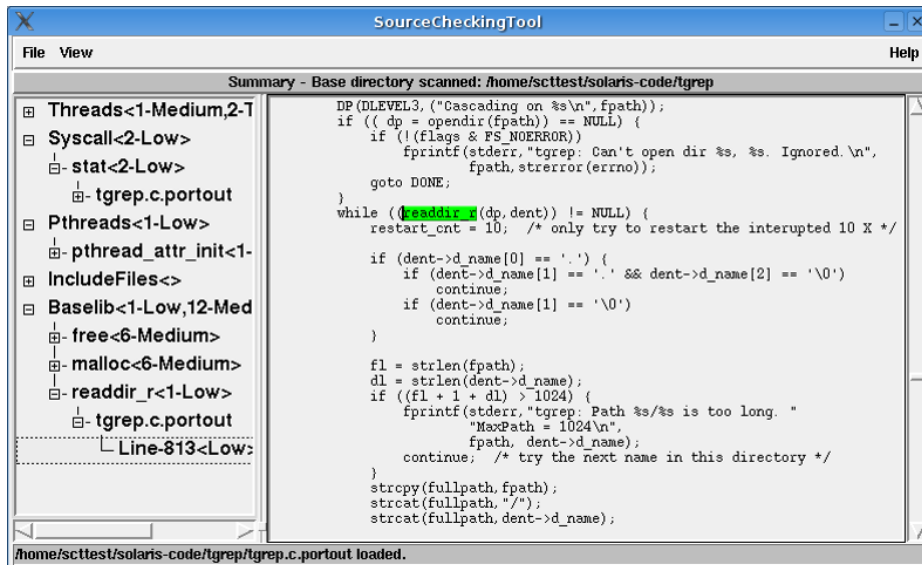


Figure 10. Example of a split window

## The metrics view

The metrics view gives an overview in a single pane of the entire porting effort, including all files being ported, regardless of category.

The information in the metrics view consists of:

- Base directory scanned
- Total number of lines scanned (all files)
- Total number of lines flagged
- Total number of lines flagged with each degree of difficulty (high, medium, low and to be assessed)
- Percentage of total lines that were flagged
- Of the lines that were flagged, the percentage for each degree of difficulty
- Number of assembler files (for example, ".s") found

For example:

```
Base of directory tree scanned: /home/sctest/solaris-code/tgrep

Scanned:      1969 lines
Flagged:      20 functions

High difficulty: 0 functions flagged (0% of the total)
Medium difficulty: 13 functions flagged (65% of the total)
Low difficulty: 4 functions flagged (20% of the total)
To be assessed: 3 functions flagged (15% of the total)
```

## The graphics view

The graphics view shows the metrics in graphical form, using a pie chart in a single pane. Levels of difficulty with no lines flagged are omitted from the pie, though the level of difficulty is included in the legend. For example, the following graphics view shows a case with no high degree of difficulty lines.

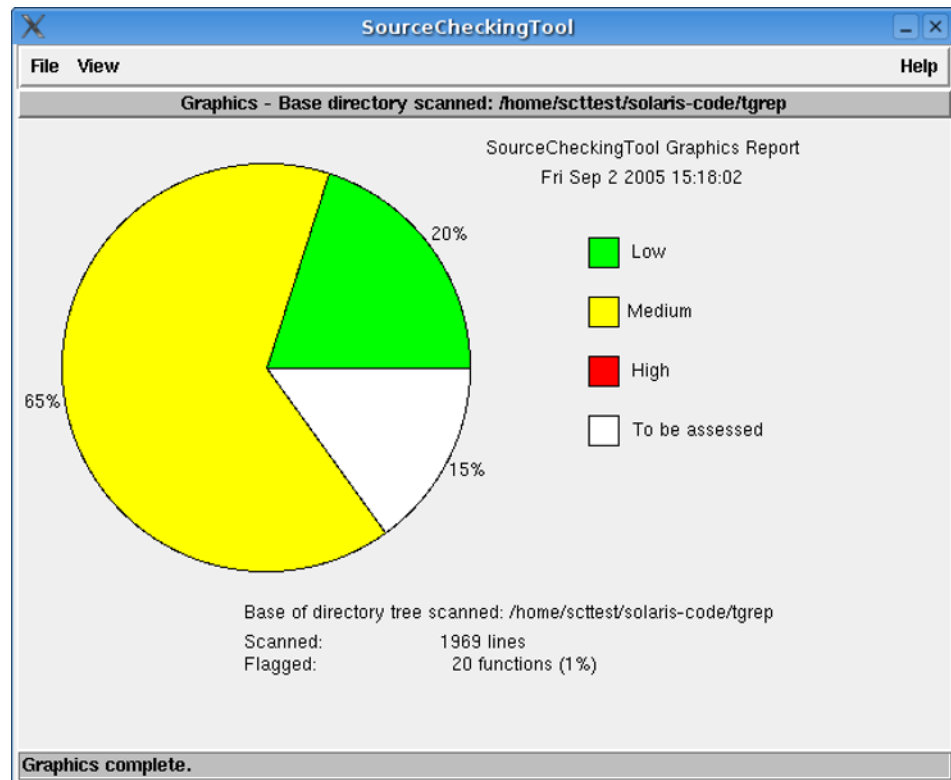


Figure 11. The graphics view





---

## Chapter 5. Hints and tips

### Search strings are found outside code

Source Checking Tool can search for APIs, include files, and pragmas for text strings. When searching, Source Checking Tool will not only detect API calls that are part of the executable code, but also those in comments and character constants. Finding API names in comments is useful in order to keep comments and code consistent. Example: Searching for "monitor" in the following code will find one occurrence.

```
#include <stdio.h>
int
main ()
{
    printf(" SCT will find this occurrence of monitor()\n");
}
```

Similar effects exist concerning comments, and combinations of nested comments and string constants.

A typical example of where this might be useful is a program generator where the text output is itself a C program.

### Large code samples

When scanning large code samples (more than 100 MB), the tool needs several hours. You might want to plan accordingly and run the scan during lunch break, or another convenient time.

### Line numbers in original code and portout files differ

In rare cases, the line breaks in the original file and the portout file differ. All given line numbers refer to the line numbers in the portout file.

### Code markers

If a code marker (see Table 1 on page 9) occurs without a corresponding end marker, the code will not show up as marked in the GUI. Code that is surrounded by a pair of code markers will show up as marked in the GUI, even though the code might not need porting.



---

## Appendix. Messages

Interactive messages are displayed in a message area at the bottom of the main window; error messages are displayed in a pop-up window.

---

**Cannot create the output file *file*. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** Source Checking Tool could not create a portout file.

**User response:** See the message log for more information. This may be a problem with permissions. If the permissions are correct, the disk may have been corrupted. The message log is located in SCT\_files under the directory that was scanned.

---

**Cannot find the file *file* under the installation directory. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** Source Checking Tool could not find a required file.

**User response:** Source Checking Tool may not have been installed correctly. Try reinstalling Source Checking Tool as root.

---

**Cannot open the file *file* under the installation directory. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** Source Checking Tool could not open a required file.

**User response:** Source Checking Tool may not have been installed correctly. Try reinstalling Source Checking Tool as root.

---

**Could not open all files under *base-directory*. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** Source Checking Tool could not open all files to scan, due to permission errors with one or more of the files.

**User response:** See the log file for a complete list of files that could not be opened. The message log is located in SCT\_files under the directory that was scanned.

---

**Could not open the file *file*. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** The file may have been corrupted, or the permissions for the file may have been changed while Source Checking Tool was running.

**User response:** See the message log. The message log is located in SCT\_files under the directory that was scanned.

---

**Could not read one or more of the documentation files. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** Source Checking Tool could not open one or more documentation files.

**User response:** See the message log for more information. Ensure that permissions on the documentation folder are correct. If that does not solve the problem, reinstall Source Checking Tool. The message log is located in SCT\_files under the directory that was scanned.

---

**Could not remove one or more pre-existing .portout files.**

**Explanation:** Source Checking Tool cannot remove one or more .portout files.

**User response:** None required.

---

**Could not save *view file*.**

**Explanation:** The indicated view could not be saved to the indicated file.

**User response:** Specify another file, ensuring that you have the necessary permissions.

---

**Could not scan all folders under *base-directory*. Please see the Source Checking Tool log file located at *directory/SCT\_files* for more information. (Remove "please")**

**Explanation:** Source Checking Tool could not open all the folders in the tree structure to scan for source files.

**User response:** See the message log for more information. The message log is located in SCT\_files under the directory that was scanned.

---

***file loaded.***

**Explanation:** The indicated file has been loaded for display in the Source Checking Tool window.

**User response:** None required.

---

***file not found.***

**Explanation:** The indicated file could not be loaded for

display in the Source Checking Tool window.

**User response:** If it is a portout file that was inadvertently deleted, you can recreate the file by scanning the source again.

---

**file not found. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** The indicated file could not be found.

**User response:** See the message log for more information. If the missing file is a documentation file, there may have been an error during the installation process. Reinstall Source Checking Tool as root to avoid any possible permission errors. If the missing file is `port_categories.out` or `port_metrics`, the file or disk may have been corrupted, or the file may have been deleted while Source Checking Tool was running. Try scanning your source code again. If this does not solve the problem, trying reinstalling Source Checking Tool as root.

---

**Nothing to display. You must first scan a directory.**

**Explanation:** You have changed the view without conducting a scan.

**User response:** None required. The view will apply to the next scan.

---

**No data found in *file*. See the Source Checking Tool log file located at *directory/SCT\_files* for more information.**

**Explanation:** There has been an internal error with Source Checking Tool.

**User response:** Try scanning the source code again. The message log is located in `/SCT_files` under the directory that was scanned.

---

**No source code found under *base-directory*.**

**Explanation:** Source Checking Tool did not find any source code files to scan.

**User response:** Ensure that you selected the correct directory, and that you have the required permissions.

---

***view file* was saved.**

**Explanation:** The indicated view was saved to the indicated file.

**User response:** None required.

---

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