

# Installing TCAD Products

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## Installing TCAD Products

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This document describes how to install the TCAD products.

**Note:**

The installation instructions in this document are the most up-to-date instructions available at the time of production. However, changes might have occurred. For the latest installation information, see the product release notes or documentation on SolvNet.

For TCAD product versions for this release, see [Table 2 on page 4](#).

This document contains the following sections:

- [Media Availability and Supported Platforms](#)
- [Disk Space Requirements](#)
- [Installing the Software](#)
- [Setting Up the User Environment](#)
- [Accessing TCAD Documentation](#)
- [Using Sentaurus Options](#)
- [Troubleshooting](#)

## Media Availability and Supported Platforms

TCAD products are available on CD or by Electronic Software Transfer (EST). Obtain the appropriate binary executable files for your operating system, common files, and example files.

Table 1 lists the supported platforms, operating systems, and corresponding Synopsys platform keywords for this release.

*Table 1 Supported Platforms, Operating Systems, and Keywords*

Platform	Operating system	Synopsys platform keyword	Window environment
AMD Opteron	Red Hat Enterprise Linux v4, v5 <sup>1</sup>	amd64 (64-bit mode) <sup>2</sup>	GNOME
IBM RS6000	AIX 5.3	rs6000 (32-bit mode) aix64 (64-bit mode)	CDE
Sun SPARC	Solaris 9, 10 <sup>1</sup>	sparc64 (64-bit mode) sparcOS5 (32-bit mode)	CDE
x86	Red Hat Enterprise Linux v4, v5 <sup>1</sup>	linux (32-bit mode)	GNOME

1. *Binary-compatible operating system.*

2. *The 64-bit (x86\_64) binary is compatible with the Intel EM64T architecture.*

If you have any questions, contact your Synopsys sales representative.

Table 2 lists TCAD products with their associated versions and supported platforms. For the latest product-specific platform information, see the release notes for your tool.

*Table 2 TCAD Products and Supported Platforms*

Product	Version	Platform keyword
Raphael	C-2009.06	amd64, linux, rs6000, sparc64
TCAD Sentaurus	C-2009.06	amd64, linux, aix64, sparc64
Taurus Medici	C-2009.06	amd64, linux, rs6000, sparc64
Taurus TSUPREM-4	C-2009.06	amd64, linux, rs6000, sparc64

Table 2 TCAD Products and Supported Platforms

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Product	Version	Platform keyword
Taurus Environment Modeling	X-2005.10	hp32, linux, rs6000, sparcOS5

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## Disk Space Requirements

The disk space requirements vary depending on the platform and the features selected for installation. Table 3 shows the maximum space required for installing TCAD products on one platform.

Table 3 TCAD Disk Space Requirements

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Product	Disk space [megabytes]
Raphael	350
TCAD Sentaurus	4700
Taurus Medici	350
Taurus TSUPREM-4	275
Taurus Environment Modeling	355

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## Installing the Software

The TCAD tools use the Synopsys Installer tool, which allows you to use a graphical user interface (GUI) or a text script. For information about downloading Synopsys Installer and the TCAD tools, see *Installing Synopsys Tools*, available at <http://www.synopsys.com/Support/Licensing/Installation/Pages/default.aspx>.

To install the TCAD tools by EST or from the CD, follow the procedures described in *Installing Synopsys Tools*.

*Installing Synopsys Tools* shows an example Synopsys media installation script for the synthesis tools. The TCAD software is installed in a similar manner.

## Installing TCAD Products

### Setting Up the User Environment

The TCAD tools are stand-alone products and cannot be installed over other existing Synopsys products. You must create a new directory for each TCAD product (such as Sentaurus and Taurus).

Sentaurus can be installed in the same Sentaurus directory (`STROOT`) used for earlier Sentaurus releases (this is recommended). However, do not install Sentaurus in an ISE directory (`ISEROOT`) containing an earlier ISE TCAD software release.

The Sentaurus examples and the Sentaurus Device Monte Carlo files are packaged separately from the base Sentaurus package. If you want to install either of these packages, you should install them in the same Sentaurus directory where the base package was installed.

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## Setting Up the User Environment

To set up a new tool user, you must:

- Set the `STROOT` environment variable.
- Modify the search path.
- Set the `SNPSLMD_LICENSE_FILE` or `LM_LICENSE_FILE` variable.
- Set the `STDB` environment variable for Sentaurus Workbench.

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## Setting the `STROOT` Environment Variable

If you are installing Sentaurus, each user must have the `STROOT` environment variable set to the Sentaurus installation directory. In the following example, the Sentaurus installation directory is named `/usr/sentaurus`.

- If you use the C shell, add the following line to your `$HOME/.cshrc` file:

```
setenv STROOT /usr/sentaurus
```

- If you use the Bourne, Korn, or Bash shell, add the following line to the `.profile`, `.kshrc`, or `.bashrc` file:

```
STROOT=/usr/sentaurus  
export STROOT
```

## Modifying Your Search Path

If the TCAD program is not found on the search path, it will need to be added. In the following examples, the TCAD directory on your system is named `/usr/tcad`.

- If you use the C shell, add the following line to your `$HOME/.cshrc` file:

```
set path=(/usr/tcad/bin $path)
```

- If you use the Bourne, Korn, or Bash shell, add the following line to the `.profile`, `.kshrc`, or `.bashrc` file:

```
PATH=/usr/tcad/bin:$PATH
```

### Note:

If you are installing Sentaurus and have earlier ISE TCAD releases installed on your system, ensure the Sentaurus `bin` directory precedes the ISE TCAD installation in your search path. For example:

```
% set path=($STROOT/bin $ISEROOT/bin $path)
```

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## Setting the `SNPSLMD_LICENSE_FILE` or `LM_LICENSE_FILE` Environment Variable

You must install the SCL software and define the `SNPSLMD_LICENSE_FILE` or `LM_LICENSE_FILE` environment variable before you can verify the TCAD installation.

For information about downloading and installing SCL and on setting the license variable, see [Installing Synopsys Tools](#).

## Setting the `STDB` Environment Variable

If you will be using Sentaurus Workbench, create a directory to store your Sentaurus Workbench projects (if one does not exist) and set the `STDB` environment variable to it. For example:

- Create a directory to store your Sentaurus Workbench projects:

```
mkdir $HOME/STDB
```

- If you use the C shell, add the following line to your `$HOME/.cshrc` file:

```
setenv STDB $HOME/STDB
```

- If you use the Bourne, Korn, or Bash shell, add the following lines to the `.profile`, `.kshrc`, or `.bashrc` file:

```
STDB=$HOME/STDB  
export STDB
```

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## Accessing TCAD Documentation

The documentation for TCAD products is available as PDF files.

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### Viewing and Printing TCAD Documentation in Portable Document Format

To view and print TCAD documentation in Portable Document Format (PDF), you must have Adobe Acrobat Reader installed on your machine. To determine which version of Adobe your operating system requires, see Table 4.

### Adobe Reader Full-Text Search Issue on UNIX

Table 4 shows which version of Adobe Reader you need to use with a particular release. It also indicates whether full-text search is available for a particular platform and release.

*Table 4 Platform and Supported Version*

Platform	Product documentation version	Full-text search available	Adobe Reader version
Linux	Y-2006.03, Y-2006.06 or later	Yes	Adobe Reader 7.0
	X-2005.12 or earlier	No	Any version
Sun SPARC (Solaris) <sup>1</sup>	Y-2006.03, Y-2006.06 or later	Yes	Adobe Reader 7.0
	X-2005.12 or earlier	Yes	Adobe Reader 5.0 or earlier

*1. On Solaris operating systems, the GNOME desktop manager must be installed to support Adobe Reader 7.0.*

**Note:**

If you use a version of Adobe Reader earlier than 7.0, you may not be able to use the full-text search on UNIX for the current release.

For detailed information, see the SolvNet article, *An error message appears when doing a full-text search of Synopsys product documentation* (go to <https://solvnet.synopsys.com/retrieve/017761.html>).

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## Using Sentaurus Options

The following command-line options can be used with any Sentaurus tool to select specific versions or releases of the Sentaurus tools:

`-releases`

Lists all available releases in the Sentaurus installation directory under `$STROOT` (for example, C-2009.06, A-2008.09-SP1, A-2008.09).

`-versions`

Lists all subversions in a particular release directory. (This may include a patch or engineering release, for example, version 1.0 of A-2008.09.) Use `-releases` and `-versions` together to list the entire set for a given tool.

`-rel release`

Specifies execution of a particular release. For example, `-rel A-2008.09` overrides the `STRELEASE` and `STROOT_LIB` environment variables and executes the A-2008.09 release of the tool.

`-ver version`

Specifies execution of a particular subversion. Uses the specified version instead of the default version. For example, `-ver 1.3` overrides the default version and executes version 1.3 of the tool.

`-64bit`

Invokes the 64-bit binary files when they are available, but not the default. Setting the `STBITS` environment variable to 64 makes this the default behavior.

`-32bit`

Invokes the 32-bit binaries on platforms where both 64-bit and 32-bit binaries are available. The default is 64-bit. Setting the `STBITS` environment variable to 32 makes this the default behavior.

## Troubleshooting

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### Error 1

#### Error Message:

```
Xlib: connection to "machine:0.0" refused by server
Xlib: Client is not authorized to connect to Server
Bad return from XOpenDisplay
```

#### Explanation:

The program does not have permission to open a window on the display.

- Check to be sure the `DISPLAY` environment variable is set correctly on the machine where the tool is being run.
- On the console of the display, enter the command:

```
% xhost +
```

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### Error 2

#### Error Message:

```
tmafork: command not found
```

#### Explanation:

The `tmafork` TCAD utility cannot be found.

- Check to be sure the TCAD `bin` directory is in the search path.
- Check to be sure the TCAD utilities are installed correctly and that `tmafork` is linked to the TCAD `bin` directory.

### Error 3

Error Message:

```
*** Open Pipe = signal 13 code 0
```

Explanation:

The TMAPLOT process is terminating abnormally, leaving the TCAD program piping data to a broken pipe.

- Check to be sure TMAPLOT works correctly outside the TCAD program by entering the following command:

```
% tmaplot x test
```

- If TMAPLOT works correctly outside the TCAD program, the error is most likely caused by insufficient system resources to start the TMAPLOT process. Check your system resources when running the TCAD program to be sure there are enough resources to run the TMAPLOT process.
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### Error 4

System hangs on large simulation in Linux

Explanation:

If your Linux system is configured to enable memory overcommit and you run a simulation that exceeds the memory resources on your system, it can lead to the system hanging. Check whether memory overcommit is switched on, on your machine, by typing the following command in a shell:

```
/sbin/sysctl vm|grep overcommit_memory
```

A value different from 2 means overcommit is switched on.

To avoid this behavior, you can use `ulimit` (bash) or `limit` (csh) to prevent using more memory than your system has available. For example, on a machine with 4 GB RAM, for bash, type:

```
ulimit -d 4096000
```

For csh, type:

```
limit datasize 4096000
```

Alternatively, have your system administrator disable memory overcommit.

**Installing TCAD Products**  
Troubleshooting