

Using Synopsys software: MEDICI, TSUPREM-4, HSPICE

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Permanent link: http://www.prism.princeton.edu/PRISM_cleanroom/simulation.htm

Introduction

Several common semiconductor-device modeling tools are now available to the entire Princeton University community. These tools are especially valuable to students in the Department of Electrical Engineering, as they allow users to perform a variety of computer simulations, ranging from device processing to device and circuit performance. The programs are installed on the OIT's 64-bit servers. This document contains instructions for setting up your account to run these simulation software programs. If you have questions, please see the list of resources below.

Available programs

The following programs are currently available:

- TSUPREM-4 – for modeling of the processing of 1-D and 2-D structures on crystalline silicon. The input parameters are the process steps and device layout or cross-section and the output is the device structure.
- MEDICI – for device modeling of 1-D and 2-D structures of single, poly- and amorphous-Si, $\text{Si}_{1-x-y}\text{Ge}_x\text{C}_y$, and many III-Vs, especially modeling of semiconductor heterojunctions. The inputs are the device structure and voltages, and the output consists of the device electrical characteristics. The device structure can be imported from TSUPREM-4.
- HSPICE – for circuit simulation. The circuit is the input and the output consists of currents, voltages, transfer functions, Bode plots, etc.
- TAURUS MODELING ENVIRONMENT – consists of three programs, (1) WORKBENCH, a graphical user interface for simulation and data management, including design of experiments and data plotting; (2) VISUAL for visualizing 1D and 2D data; and (3) LAYOUT, a tool for importing or creating layouts for use with TSUPREM-4.

Additional Synopsys programs are available; see the [attached list](#) for details. If you'd like another program installed, see "Resources" below.

Setting up your account

- Register for Princeton's 64-bit unix environment by clicking on the registration page link at <http://kb.princeton.edu/9682>. Logon to one of the 64-bit servers (e.g. tombstone) with your netID and LDAP password using the SSH Secure Shell or Exceed programs (see below for Exceed directions).
- Add the following lines to the .cshrc file in your home directory, using your favorite editor, e.g. vi (SSH or Exceed) or emacs (Exceed):

```
setenv SNPSLMD_LICENSE_FILE "26585@hermes"
setenv SYNOPSISYS "/usr/licensed/synopsys-2004.09"
setenv LM_LICENSE_FILE "/usr/licensed/licenses/license.synopsys.dat"
setenv PATH "${PATH}:${SYNOPSISYS}/tools/tcad-taurus-medici_vW-2004.09/bin"
setenv PATH "${PATH}:${SYNOPSISYS}/tools/tcad-taurus-ts4_vW-2004.09/bin"
setenv PATH "${PATH}:${SYNOPSISYS}/tools/hspice_vW-2004.09/bin"
setenv PATH "${PATH}:${SYNOPSISYS}/tools/tcad-tme_vV-2004.06/bin"
source ${SYNOPSISYS}/tools/hspice_vW-2004.09/hspice/bin/cshrc.meta.
```

Save changes to the file and quit the editor. Source the modified file in all open terminal windows by typing `source .cshrc`. You only need to source the modified file once. Subsequently, this file will be sourced automatically every time you login.

Using the software

- These programs are available on OIT's 64-bit servers. Logon to one of the 64-bit servers (e.g., tombstone) with your netID and password using the SSH Secure Shell or Exceed programs (see below for Exceed directions).
- There are files available to help get you started. Download files for the software you wish to use. See the `*readme.txt` files for basic information on the packages.
 - http://www.prism.princeton.edu/PRISM_cleanroom/medici_readme.txt
 - http://www.prism.princeton.edu/PRISM_cleanroom/medici_sample.inp
 - http://www.prism.princeton.edu/PRISM_cleanroom/tsuprem_readme.txt
 - http://www.prism.princeton.edu/PRISM_cleanroom/tsuprem_sample.inp
 - http://www.prism.princeton.edu/PRISM_cleanroom/hspice_sample.inp
- MEDICI, TSUPREM-4 and HSPICE can be run from the command line, i.e., using SSH Secure Shell. To start the programs, type the commands `hspice`, `tsuprem4`, or `medici` at the command line. The `*sample.inp` files are sample input files.
- The Taurus Modeling Environment requires an XWindow (see below for directions). Once you are logged into tombstone via an XWindows terminal, type the commands `tme`, `tv1d`, `tv2d` or `tlayout` at the command line to launch the appropriate program.

Running XWindows using Exceed

- Use a computer with the program Exceed (on OIT cluster PCs, such as those in Friend 017, or available for dept. purchase, see <http://www.princeton.edu/~licenses/exceed.htm>)
- Set up an Exceed shortcut to tombstone as follows: Go to Basic Applications and double click on the X Client Wizard. Accept all the default settings except:
 - Host = tombstone, Host type = SUN
 - User ID: your netIDClick Finish. It automatically creates a shortcut entitled XClient (tombstone) on the desktop. Double click to open an XWindow. If you need additional XWindow terminals, just double click again on the desktop icon.

Resources

- *General account, unix, and Exceed questions*
 - OIT Help Desk, 258-HELP, helpdesk@princeton.edu, <http://web.princeton.edu/sites/oit/>
 - Help with unix commands – type `man command`
- *Problems with the Synopsys license or installation, or requests for other Synopsys programs*
 - Costs for the licenses are shared between Prof. Malik and Prof Sturm's groups, since computer engineering also runs several Synopsys VLSI CAD programs. Contacts are:
 - (CE/ISS) Fei Sun, fsun@princeton.edu or Professor Sharad Malik
 - (EMD/OOE) Rebecca Peterson, peterston@princeton.edu, or Professor Jim Sturm
- *Synopsys software questions*
 - Look at the manuals in `/usr/licensed/synopsys-2004.09/manuals`, and at samples and demos in each software directory `/usr/licensed/synopsys-2004.09/tools/...`
 - Go to www.synopsys.com to register for Solvnet and access online documentation