

Installing Cadence IC 6.1

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Abstract

This document explains a working procedure for installing Cadence IC 6.1 for VLSI layout on the Red Hat Enterprise Linux (RHEL) operating system, version 6. Access to the installation media is required to get started.

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1 Installing the Software

Become superuser:

```
su
```

1.1 Additional Software Packages

There are some packages required by the tools which are available from Red Hat. Cadence has a utility called `check_config` which will make sure these packages are installed for RedHat Enterprise 5.0 Workstation x86_64 (64-bit):

NAME	MIN	CURRENT	TITLE
kernel	2.6.18-53.1.14.EL5	2.6.18-53.1.14.EL5	Kernel Version
glibc-2.5	18	18	Glibc
elfutils-0.125	3.el5	3.el5	Elfutils Package
elfutils-libelf-0.125	3.el5	3.el5	Libelf Library

Install the extra packages, including libXp, with yum:

```
yum install elfutils elfutils-libelf libXp
```

1.2 Hostname

You may experience a **segmentation fault** in Virtuoso from IC6.1 if the Cadence tools cannot resolve your IP address properly.

You need to make sure your `hostname` can be resolved to your current IP address. To check your host name, use the `hostname` command. You should add the following line to the `/etc/hosts` configuration file to include your fully-qualified hostname. Replace `x.x.x.x` with your IP address, which can be found with the `/sbin/ifconfig` tool, and replace `hostname` with your hostname, as given by the `hostname` command.

```
x.x.x.x          hostname.ece.unm.edu hostname
```

1.3 IC6.1

Now we want to copy the installation files to the local machine. For this, you will need access to the Cadence website, or in this example, to an existing copy of the installation files over SSH to `vulcan`. If you go this route, replace `username` with your username on `vulcan`.

```
mkdir -p /usr/local/CADENCE_INSTALL/IC6.1/
rsync -avzHP username@vulcan.ece.unm.edu:/usr/local/CADENCE_INSTALL/IC6.1/
      /usr/local/CADENCE_INSTALL/IC6.1/
```

This copied 7.1GB. Open the Installation Guide:

```
firefox /usr/local/CADENCE_INSTALL/IC6.1/Base/IC610_lnx86.Base/CDROM1/
      INSTALL.HTML
```

Go to the Hotfix CDROM1 directory in order to start the installation.

```
cd /usr/local/CADENCE_INSTALL/IC6.1/Hotfix/IC06.13.508-613_lnx86.Hotfix/
      CDROM1
sh SETUP.SH
```

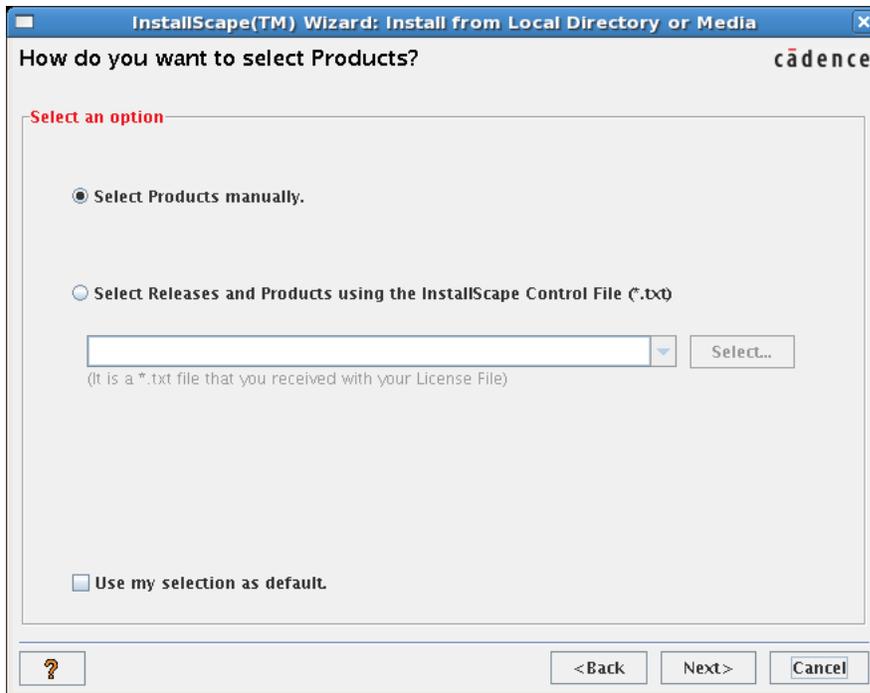
You will be prompted for a series of responses:

```
Specify path of install directory [OR type [RETURN] to exit]: /usr/local/
Cadence/IC6.1
Directory /usr/local/Cadence/IC6.1 does not exist. Create? [y/n]: y
Do you have InstallScape for lnx86 platform installed somewhere [y/n]? n
Do you want to install InstallScape for lnx86[y/n]: y
Type the path to InstallScape installation directory [ (q to quit)]: /usr/
local/Cadence/InstallScape
```

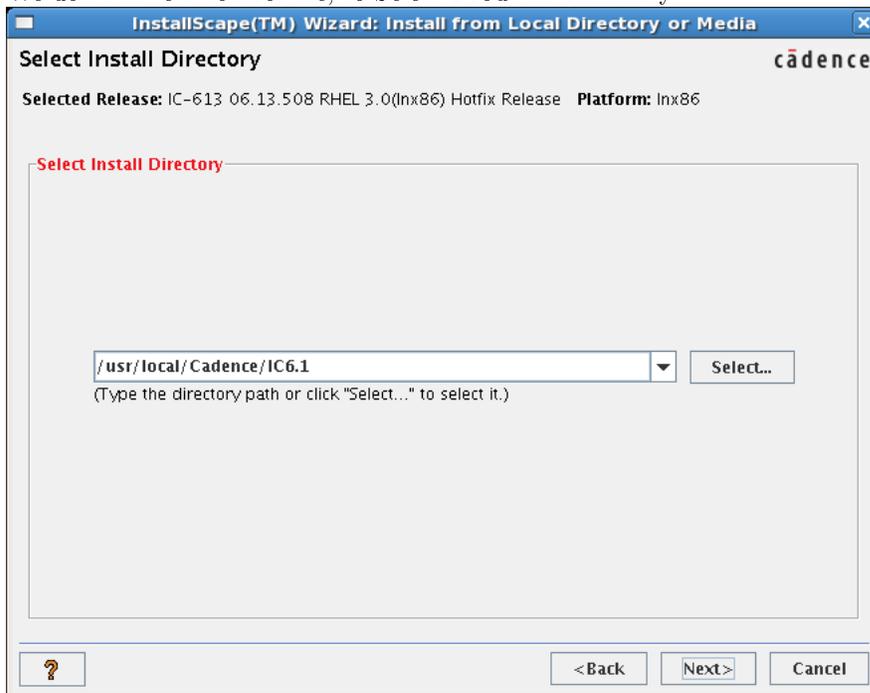
Then a series of GUI dialogs follow.



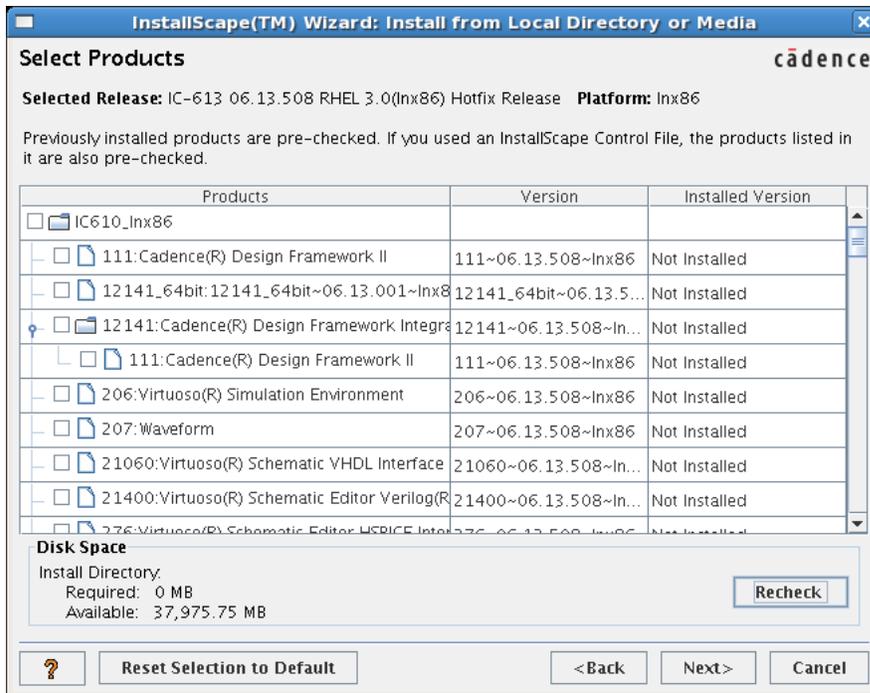
The default path it loads here is correct.



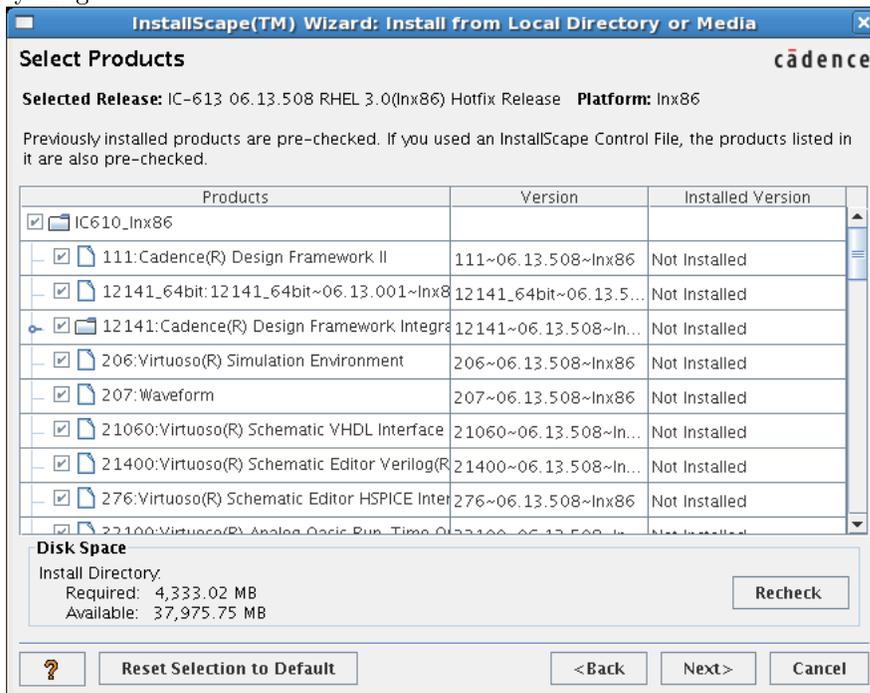
We don't have a control file, so Select Products Manually.



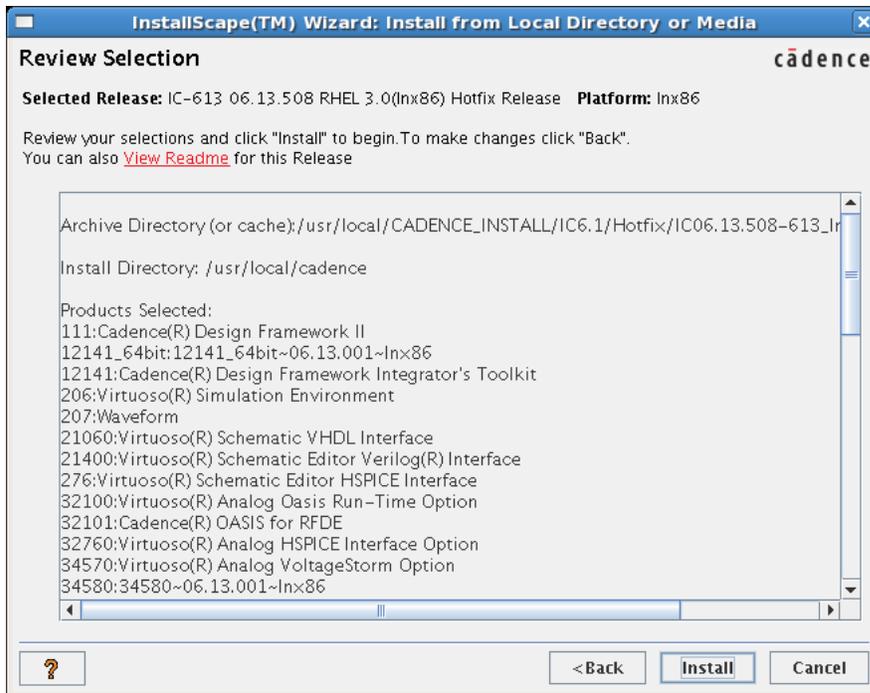
Point it to the place where you want to install IC6.1 here.



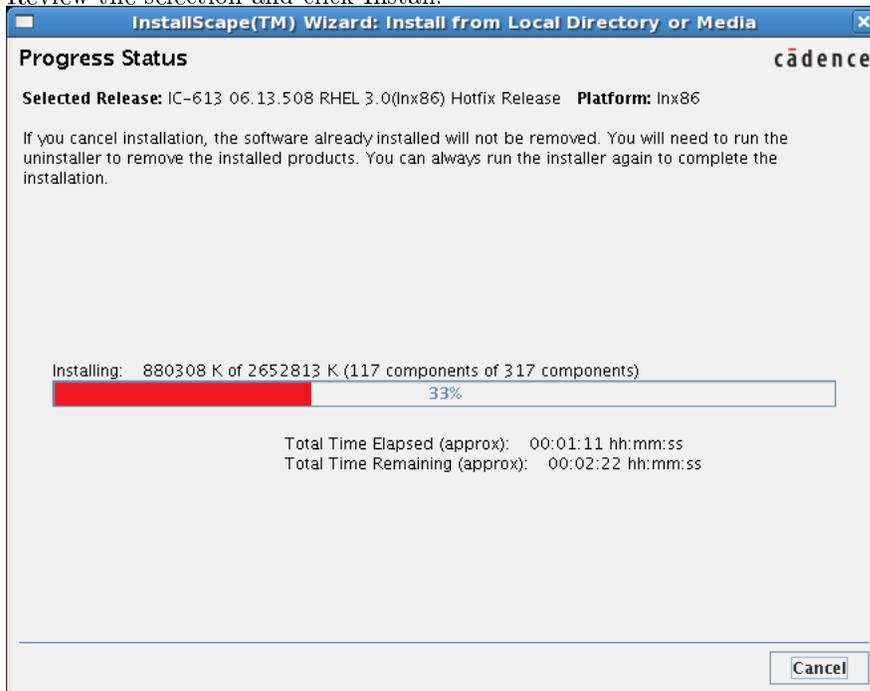
It shows you a list of the available software. I just clicked the check box next to IC610_inx86 to install everything.



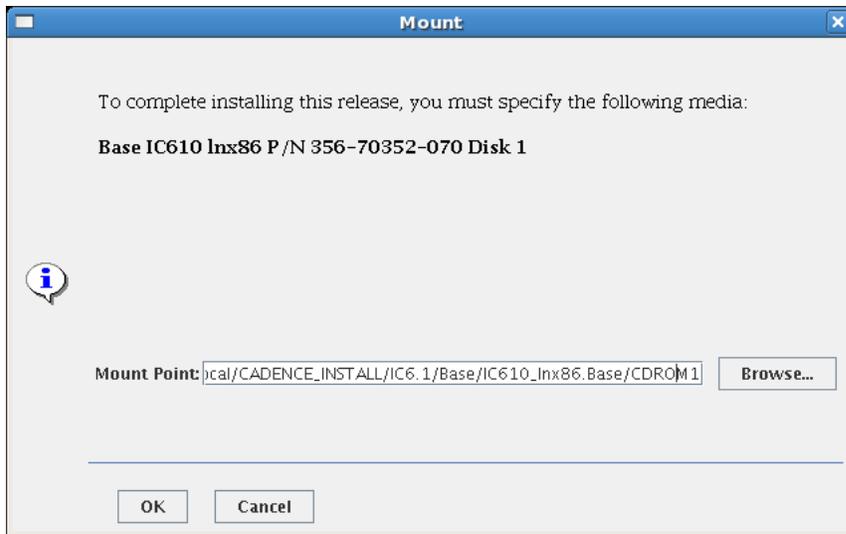
Everything is selected, hit Next.



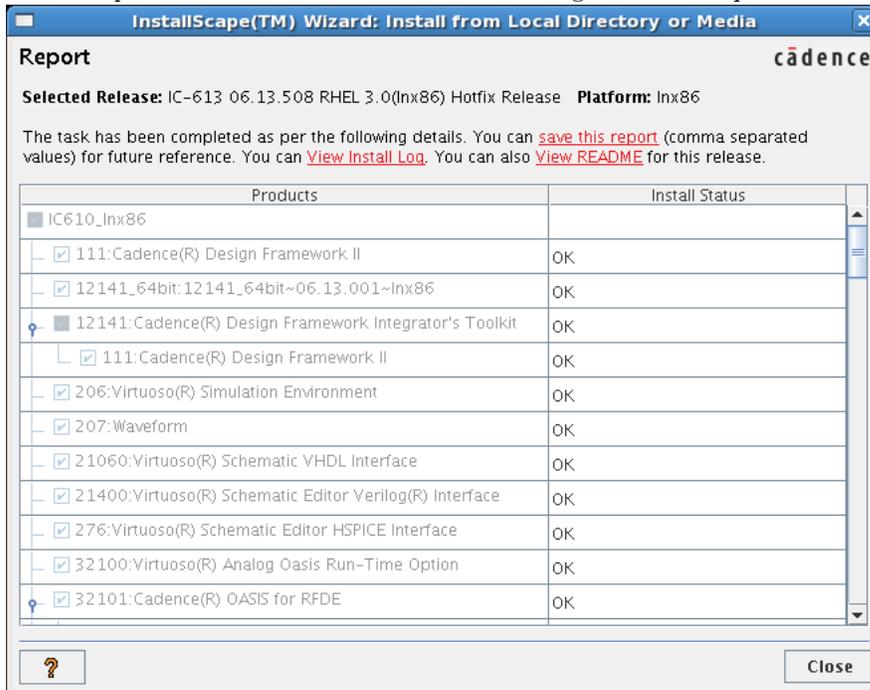
Review the selection and click Install.



Take a break while it copies files.



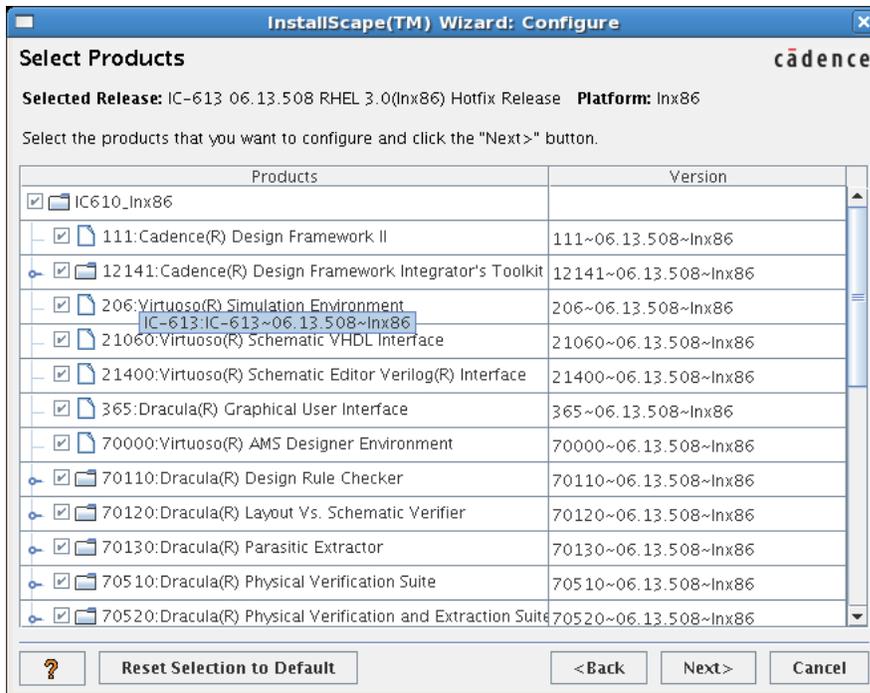
It will require the Base installation media. Change the mount point to what is shown here.



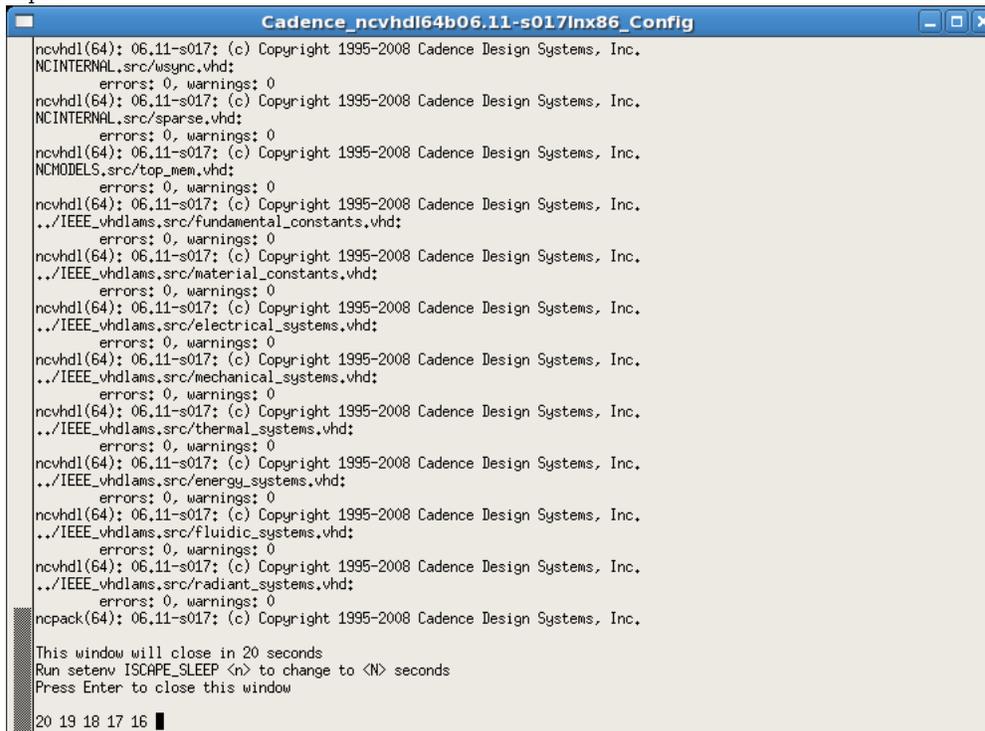
Everything should have installed OK. Click Close.



Yes, we want to configure now. Click Yes.



Let's configure everything now, click the check box at the root of this tree view. The following dialogs will pop up. I accepted the defaults for everything, so you should be able to just hit RETURN at all the prompts.



After all the questions are answered, it waits for you to read the log. Hit enter or wait 20 seconds.

```

Cadence_ncvhd106.11-s017Inx86_Config
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
NCINTERNAL.src/wsync.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
NCINTERNAL.src/sparse.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
NCMODELS.src/top_mem.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/fundamental_constants.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/material_constants.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/electrical_systems.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/mechanical_systems.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/thermal_systems.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/energy_systems.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/fluidic_systems.vhd:
errors: 0, warnings: 0
ncvhd1: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.
../IEEE_vhdlams.src/radiant_systems.vhd:
errors: 0, warnings: 0
ncpack: 06.11-s017: (c) Copyright 1995-2008 Cadence Design Systems, Inc.

This window will close in 20 seconds
Run setenv ISCAPE_SLEEP <n> to change to <N> seconds
Press Enter to close this window

20 19 18 17 █

```

Hit enter or wait 20 seconds.

```

Cadence_amsEnv61.03-s008Inx86_Config
Prepare libraries for AMS Designer

1) Add an IUS installation directory to path
2) Quit
#? 2
In order to compile libraries later, please invoke amsLibCompile.

This window will close in 20 seconds
Run setenv ISCAPE_SLEEP <n> to change to <N> seconds
Press Enter to close this window

20 19 18 17 16 15 14 █

```

I won't be using AMS Designer, so I chose to Quit by typing '2' and hitting ENTER.

```

Cadence_lfvhdComp02.85-a002Inx86_Config

Proceeding with configuration of lfvhdComp

Synergy users must install these libraries
Install Valid library and Sim primitives? (<cr> = n):
Install XL library and Gate primitives? (<cr> = n):
Installing Leapfrog Analyzer and Design library...
Library installation...

vrelocate 2.85-a002: (c) Copyright 1992-1997, Cadence Design Systems, Inc.
vrelocate 2.85-a002: (c) Copyright 1992-1997, Cadence Design Systems, Inc.
vrelocate 2.85-a002: (c) Copyright 1992-1997, Cadence Design Systems, Inc.

Installation of Leapfrog Analyzer and Design libraries complete

This window will close in 20 seconds
Run setenv ISCAPE_SLEEP <n> to change to <N> seconds
Press Enter to close this window

20 19 █

```

Hit enter or wait 20 seconds.

```

Cadence_oaRedist22.04-p038Inx86_Config

-----
Welcome to the OpenAccess 2,2 Configuration Utility.

Important: Before continuing, first close all applications that use OpenAccess
libraries. Then make sure that there are no oaDMTurboServer processes running
(kill these processes with the kill command on UNIX/Linux).

Press Enter to continue (q to quit):
-----

This utility lets you specify a different OpenAccess installation to use.

The current installation is [/usr/local/cadence/oa_v22,04,038]
Do you want to use a different OpenAccess installation (y/n/q) ? [y]
Enter a valid OpenAccess installation directory [/usr/local/cadence/oa_v22,04,038]:

This window will close in 20 seconds
Run setenv ISCAPE_SLEEP <n> to change to <N> seconds
Press Enter to close this window

20 19 █

```

Hit enter or wait 20 seconds.

```

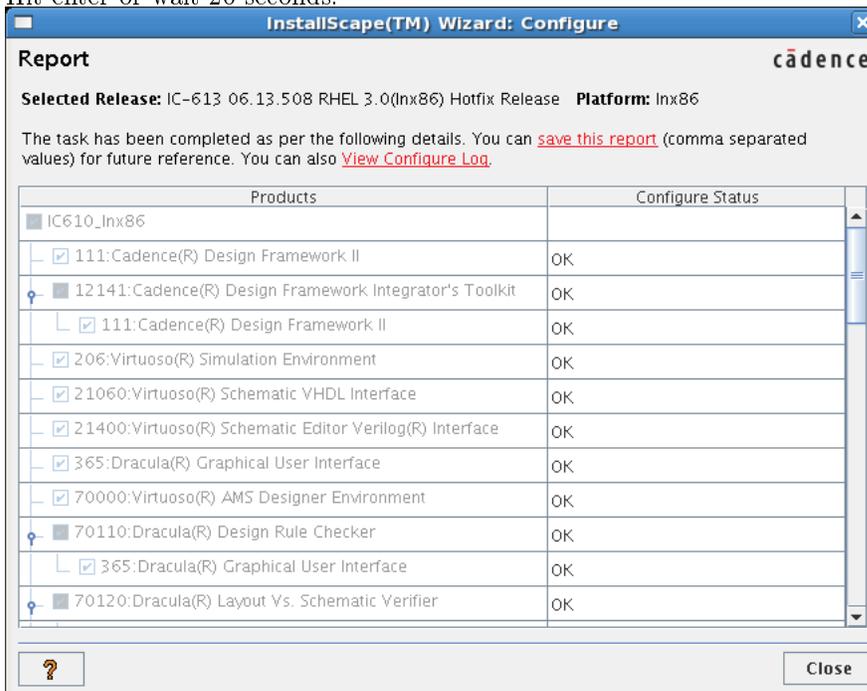
Cadence_ihdl61.03-s008Inx86_Config
Info: tools/bin/ncpack_vhdl_internal removed Successfully!
Info: tools/lib/libvisadev.so removed Successfully!
Info: tools/lib/libabv.so removed Successfully!
Info: tools/lib/libncreadmem.so removed Successfully!
Info: tools/bin/64bit/ncelab removed Successfully!
Info: tools/bin/64bit/ncroot does not exist.
Info: tools/bin/64bit/ncparse removed Successfully!
Info: tools/bin/64bit/nchelp does not exist.
Info: tools/bin/64bit/ncsuffix removed Successfully!
Info: tools/bin/64bit/ncrm removed Successfully!
Info: tools/bin/64bit/ncis removed Successfully!
Info: tools/bin/64bit/ncupdate removed Successfully!
Info: tools/bin/64bit/ncgentb removed Successfully!
Info: tools/bin/64bit/ncpack removed Successfully!
Info: tools/bin/64bit/ncif removed Successfully!
Info: tools/bin/64bit/ncshell removed Successfully!
Info: tools/bin/64bit/ncximport removed Successfully!
Info: tools/bin/64bit/ncsdhc removed Successfully!
Info: tools/bin/64bit/ncbits removed Successfully!
Info: tools/bin/64bit/ncverilog removed Successfully!
Info: tools/bin/64bit/ncxmode removed Successfully!
Info: tools/bin/64bit/ncvlog removed Successfully!
Info: tools/bin/64bit/ncvlog_cg removed Successfully!
Info: tools/bin/64bit/ncdc removed Successfully!
Info: tools/bin/64bit/ncvhd1_p removed Successfully!
Info: tools/bin/64bit/ncvhd1_cg removed Successfully!
Info: tools/bin/64bit/ncvhd1 removed Successfully!
Info: tools/bin/64bit/ncexport removed Successfully!
Info: tools/bin/64bit/ncrelocate removed Successfully!
Info: tools/bin/64bit/ncpack_vhdl_internal removed Successfully!
Info: tools/lib/64bit/libvisadev.so removed Successfully!
Info: tools/lib/64bit/libabv.so removed Successfully!
Info: tools/lib/64bit/libncreadmem.so removed Successfully!
NC-Clean up process completed successfully. Check the ./CleanNC.log file for more details.

This window will close in 20 seconds
Run setenv ISCAPE_SLEEP <n> to change to <N> seconds
Press Enter to close this window

20 19 18 █

```

Hit enter or wait 20 seconds.



Read the report, click Close.

The Installation Wizard window will still be open, its OK to close it at this time.

1.4 MMSIM7.1

1. You will need the installation and control files. Copy these from Vulcan:

```
rsync -avzPH username@vulcan.ece.unm.edu:/usr/local/CADENCE/etc/ /usr/
local/Cadence/etc/
rsync -avzPH username@vulcan.ece.unm.edu:/usr/local/CADENCE_INSTALL/
MMSIM7.1/ /usr/local/CADENCE_INSTALL/MMSIM7.1/
```

2. Go to the MMSIM install Hotfix CDROM1 directory:

```
/usr/local/CADENCE_INSTALL/MMSIM7.1/Hotfix/MMSIM07.10.103_lnx86.Hotfix
/CDROM1
```

3. Make sure you have InstallScape in your PATH:

- (a) For BASH: `PATH=/usr/local/Cadence/InstallScape/iscap/bin:$PATH`
- (b) For TCSH: `setenv PATH /usr/local/Cadence/InstallScape/iscap/bin:$PATH`

4. Invoke `./SETUP.SH`

5. When asked to

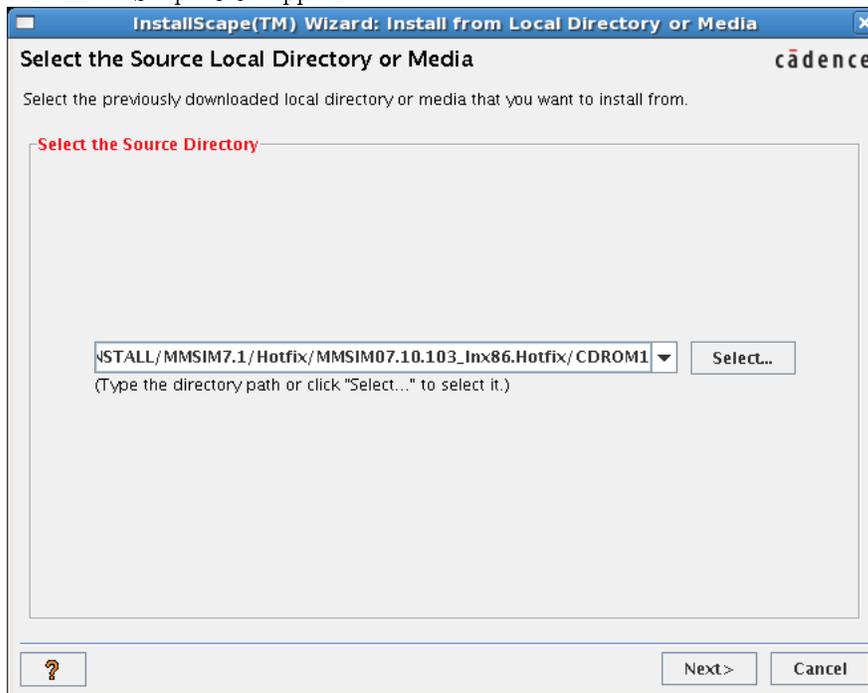
```
Specify path of install directory [OR type [RETURN] to exit]:
```

type:

```
/usr/local/Cadence/MMSIM7.1
```

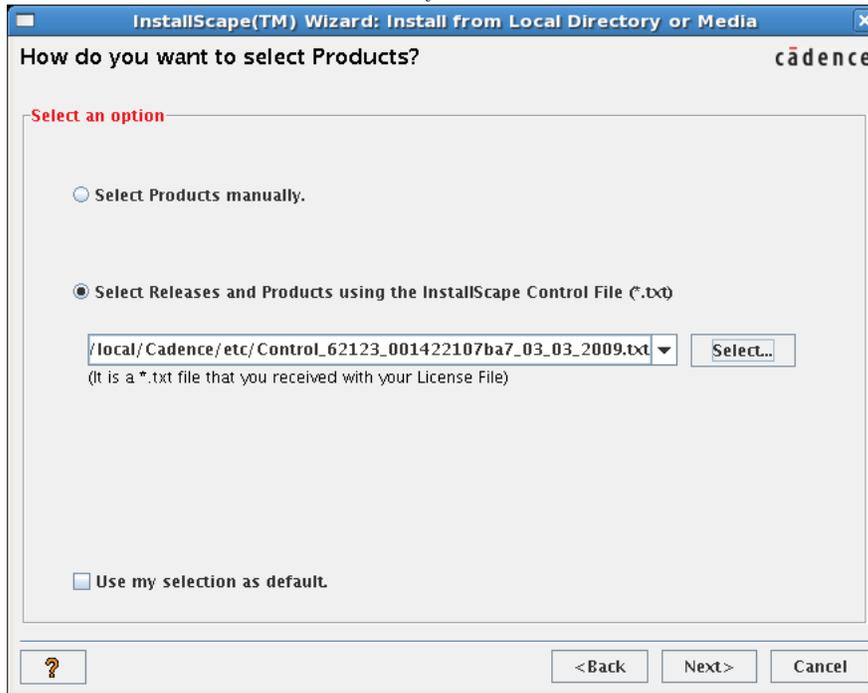
and press 'y' to create the directory.

6. The InstallScape GUI appears.

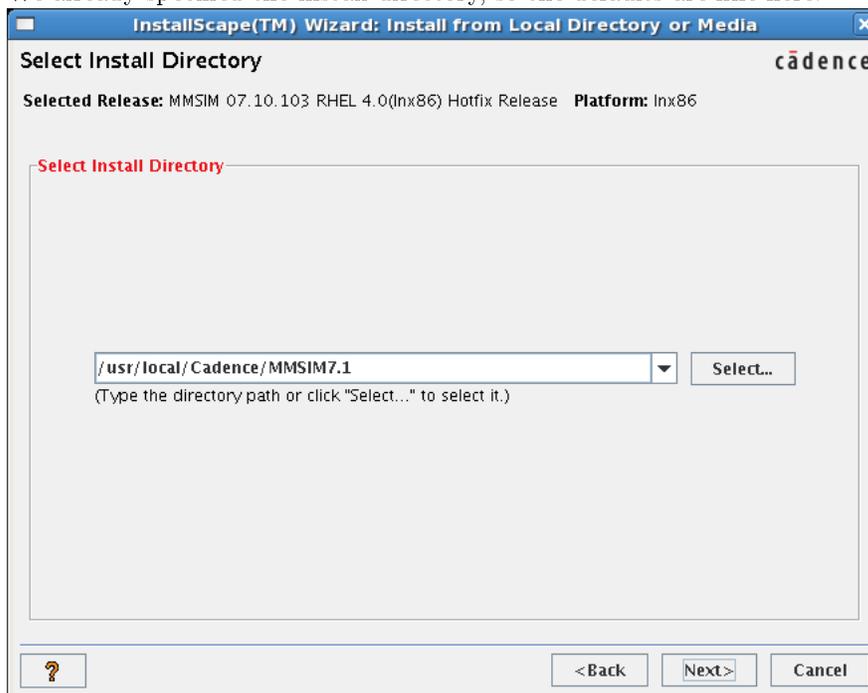


The default source directory is correct.

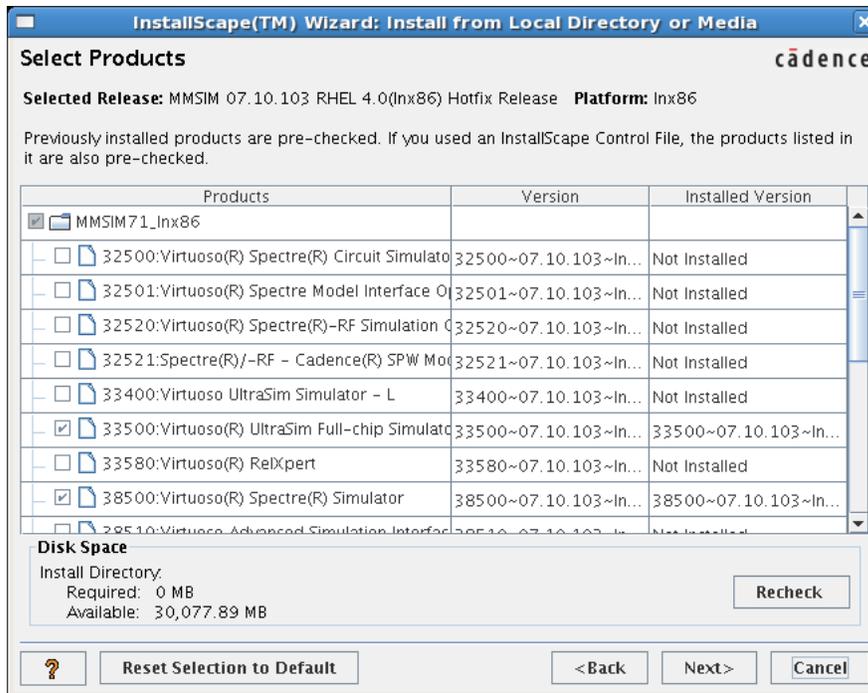
7. Rather than choosing to select the products to install manually, let's utilize the Control file in the /usr/local/Cadence/etc/ directory.



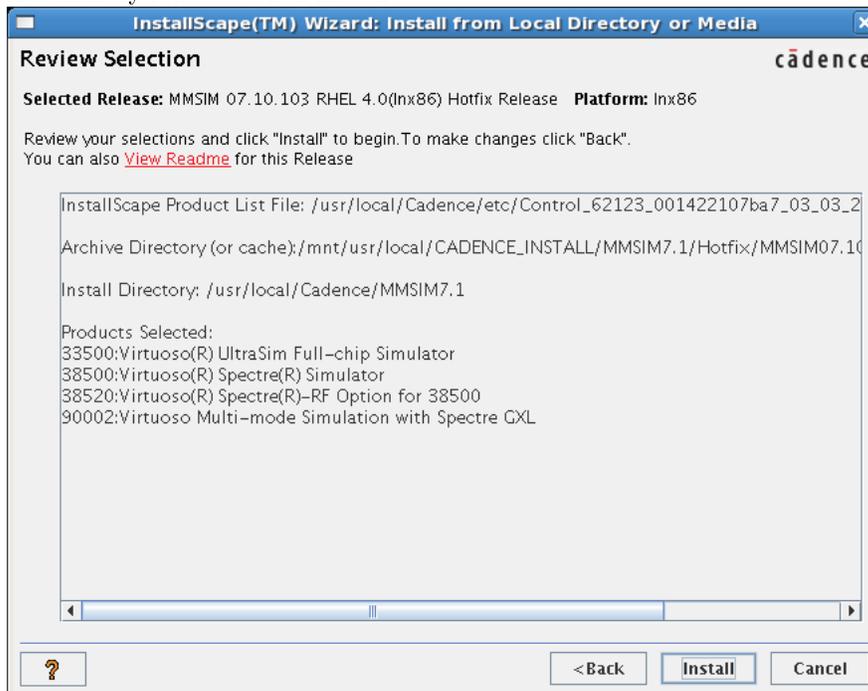
8. We already specified the install directory, so the defaults are fine here:



9. Since we gave InstallScape the install control file, the defaults here are fine:



10. A summary follows. Click Install



11. When asked, point InstallScope to the Base/.../CDROM1 directory:



12. Installation completes. A report is shown. Close the report. Close InstallScope.

1.5 OPTIONAL

We're now done with the installation media. We can remove it:

```
rm -rf /usr/local/CADENCE_INSTALL/
```

2 Configuring the License

Next, we have to install the license file. Go to the IC6.1 installation root.

```
cd /usr/local/Cadence/IC6.1
```

Copy the license configuration from vulcan, using your user name in place of `username`.

```
rsync -avzPH username@vulcan.ece.unm.edu:/usr/local/CADENCE/etc/ /usr/
local/Cadence/etc/
```

Now we want to go to the license tool directory and create a link to the `license.dat` file.

```
cd /usr/local/Cadence/IC6.1/share/license
ln -s ../../../../etc/license.dat .
```

Next run the configuration utility script. All the defaults are fine for this script.

```
./configure
```

It found the installation route correctly for me, just hit enter at this prompt:

```
Enter the top installation directory <q to quit> [/usr/local/Cadence/IC6
.1] ->
```

All the defaults are fine except when asked for the path to the license file, type:

```
/usr/local/Cadence/IC6.1/share/license/license.dat
```

Read the prompts carefully, there is one prompt where you will be put into a root shell, where you are asked to run the script `./rc.add` which modifies your `/etc/init.*` files. Run that script and then type `exit`

to return to the configuration script. The license started working immediately afterwards for me; there was no need to reboot or start license daemons.

Following is an example transcript in case you get lost:

```
[root@hostname license]# ./configure

*****

Configuring licensing involves several procedures:

    o Creating a link between directories

    o Editing the license file

    o Editing a script to start the license daemons

    o Editing a file that lists the client workstations and the
      license files they can access

    o Editing your workstation's boot script to run the license
      daemon startup script (optional)

You can continue with this script to do these tasks. You can
also use an editor, such as vi, to do these by following the
directions in the 'Cadence License Manager' in CSDDoc.

Before you can run the software, you also need to set up users'
workstations as described in the Cadence Installation Guide.

Most prompts list your options as <y/n/q>. You can stop configuring
licensing at any time by typing 'q' at the prompt. Defaults (if
available) are in square brackets. You can select the default by
pressing Return.

However, your configuration is not complete until you see the message
that says your license server configuration is complete.

These next prompts affect the information in the license file.

*****

The installation directory is the top directory in which Cadence
products are installed. All configuration is based on this path.
Occasionally, you might want to use a different path, such as /net,
in the license files. The path must be in a Cadence hierarchy
that includes tools/bin, share/license, etc.

Enter the top installation directory <q to quit>
[/usr/local/Cadence/IC6.1] ->

Usually you only need to configure licensing when you receive
the software. If you want to change it later, the 'Cadence
License Manager' in CSDDoc describes how to change it.
```

```
*****
```

```
Edit the license file or the startup script now? <y/n/q> [y] ->
```

```
You can use the default licensing configuration when
```

- o This workstation is the license server
- o The licensing debug log file is /usr/tmp/license.log
- o The license server does not use an options file
- o All workstations can access the license file
- o This workstation uses the license daemon in the default path
- o You do not need to specify any options to the lmgrd daemon

```
If you want to customize licensing, you can override any or all of these defaults. If you select override, you can use the defaults by pressing <CR> at the appropriate prompt. The 'Cadence License Manager' in CSDoc describes these prompts in detail.
```

```
*****
```

```
Override the defaults? <y/n/q> [n] ->
```

```
Configure license file license.dat? <y/n/q> [y] ->
```

```
Configuring license.dat...
```

```
Verifying FEATURE lines for daemon cdslmd
```

```
.....
```

```
Verifying FEATURE lines for daemon verisityd.
```

```
Verifying FEATURE lines for daemon verplex.....
```

```
License file license.dat modified.
```

```
Old copy moved to license.dat.Mar.2.11:13
```

```
-----
```

```
Configuration of the license files done.
```

```
*****
```

```
Creating Startup script (rc.lic)...done
```

```
Install_dir set to
```

```

    '/usr/local/Cadence/IC6.1'

License file set to
    '/usr/local/Cadence/IC6.1/share/license/license.dat'

Log file set to
    '/usr/tmp/license.log'

lmgrd daemon option set to
    ,,

```

The clients file lists the license files the client workstations can use. Usually, you only configure the clients file when you first receive the software, but you can change it if additional license servers or workstations are added to the network, or any other time you need to change it.

The 'Cadence License Manager' in CSDoc describes how to change the clients file.

```
*****
```

Configure the clients file <y/n/q> [y] ->

You can use the defaults when

- o All workstations access the license files on this workstation
- o All workstations use the exact same <install_dir> path that this workstation uses
- o Workstations do not use automount to access the license files

```
*****
```

Override the default? <y/n/q> [n] ->

The default license file for hostname.ece.unm.edu, license.002564bbcf73, does not exist.

Enter the path to the license file from all workstations <q to quit>

-> /usr/local/Cadence/etc/license.dat

Clients file created.

Client name and path set to:

```
* /usr/local/Cadence/etc/license.dat
```

If you want the license server daemons to start when the license server reboots, add the license daemons startup script to the license server's boot script using `<install_dir>/share/license/rc.add` or a text editor, such as `vi`.

Note: You will need to know the root password in order to edit the workstation's boot script.

For more information about licensing utilities and configurations, see the 'Cadence License Manager' in CSDoc.

Edit hostname.ece.unm.edu's boot script? <y/n/q> [y] ->

Type the root password at the prompt and then type `./rc.add`. Once `rc.add` completes and the UNIX prompt returns, type `'exit'` to continue configuration.

```
[root@hostname license]# ./rc.add
```

```
Copying the startup script (rc.lic) to /etc directory . . .
```

```
Startup script (rc.lic) added to /etc/inittab
```

For more information about licensing utilities, see the 'Cadence License Manager' in CSDoc.

```
[root@hostname license]# exit
exit
```

If you were able to become root and run `rc.add`, you are done editing the boot script.

At this point, you should be able to start the license daemons. However, you can *only* start them successfully on the workstation specified as the license server.

Type `'n'` to the next prompt if

- o The daemons are already running
- o You are configuring the license server files on another workstation

Start the license server daemons? <y/n/q> [n] ->

Now you have finished configuring the license server. You can see the status of the license daemons by running `lmstat`:

```
% /usr/local/Cadence/IC6.1/tools/bin/lmstat -c /usr/local/Cadence/IC6
.1/share/license/license.dat
```

You only have a few more steps.

1. Check the licensing debug log file you specified or `/usr/tmp/license.log` for error messages.
2. Complete the directions in the Cadence Installation Guide.
 - o Export the Cadence file system
 - o Add `<install_dir>/tools/bin` to your path.
 - o On a Sun running OpenWindows, as root, create an additional link

```
ln -s /usr/openwin/lib/X11 /usr/lib/X11
```

- o If you did not create the tools link, create it now.

```
ln -s tools.xxx tools
```

3. Start `CDSdoc`, the Cadence online documentation, to read the Cadence Configuration Guide and see if your Cadence products require any additional configuration. At a UNIX prompt, type

```
cdsdoc
```

```
*****
[root@hostname license]#
```

3 Installing the NCSU CDK

The NCSU Cadence Design Kit (CDK) contains design environment components to help you start working on layouts quickly, using Process Development Kits (PDKs) from AMI, TSMC, etc.

3.1 Downloading the CDK

Direct your browser to

```
http://www.eda.ncsu.edu/wiki/NCSU_CDK
```

and select Download. You'll have to register in order to download. You must choose the most current version that is supported under Cadence Virtuoso version 6.1, which at the time of this writing was 1.6.0beta. You will receive an e-mail and be directed to the download page. You must use the download function of your web browser to save the file. Then, move it to a global directory such as `/usr/local/NCSU`. For example:

```
su
mkdir /usr/local/NCSU
cd /usr/local/NCSU
mv /home/username/Desktop/ncsu-cdk-1.6.0.beta.tar.gz .
```

OPTIONAL To verify the download, also save the corresponding .sig file with your browser and move it to the cadence directory. Instructions for installing the NCSU EDA PGP key and verifying the download are available at:

```
http://www.eda.ncsu.edu/wiki/NCSU_EDA_Wiki:Kit_verification
```

This is what I did to download their key and verify the signature:

```
gpg --recv-keys 0x9E45E7F7
```

You should see the following message in the output:

```
gpg: key 9E45E7F7: public key "NCSU EDA Help Desk <eda_help@ncsu.edu>"
imported
```

Then check the file:

```
gpg --verify ncsu-cdk-1.6.0.beta.tar.gz.sig
```

GPG will assume that the file corresponding to the signature has the same name, but without the .sig suffix. You should see a message similar to:

```
gpg: Signature made Thu 12 Jul 2007 12:16:17 PM MDT using DSA key ID 9
E45E7F7
gpg: BAD signature from "NCSU EDA Help Desk <eda_help@ncsu.edu>"
```

NOTE This in fact didn't work for me. Future versions should be signed properly.

3.2 Unpacking the CDK

Use the tar command to extract the archive:

```
tar -xvf ncsu-cdk-1.6.0.beta.tar.gz
```

NOTE The file I downloaded was not a .gzip file, but in fact just a .tar file, so I omitted the z flag from the tar command.

The CDK will now be installed in /usr/local/NCSU/ncsu-cdk-1.6.0.beta

FIX I found broken symbolic links to the diva DRC, EXT and LVS files. I wrote a script you will find in the zip file along with the other configuration files called /usr/local/NCSU/ncsu-cdk-1.6.0.beta/lib/fix.sh. It is repeated here for convenience:

```
# To be executed under /usr/local/NCSU/ncsu-cdk-1.6.0.beta/lib/

cd /usr/local/NCSU/ncsu-cdk-1.6.0.beta/lib
rm NCSU_TechLib_ami06/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_ami06/divaDRC.rul
rm NCSU_TechLib_ami16/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_ami16/divaDRC.rul
rm NCSU_TechLib_hp06/divaDRC.rul
```

```

ln -s ../../techfile/divaDRC.rul NCSU_TechLib_hp06/divaDRC.rul
rm NCSU_TechLib_tsmc02d/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_tsmc02d/divaDRC.rul
rm NCSU_TechLib_tsmc02/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_tsmc02/divaDRC.rul
rm NCSU_TechLib_tsmc03d/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_tsmc03d/divaDRC.rul
rm NCSU_TechLib_tsmc03/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_tsmc03/divaDRC.rul
rm NCSU_TechLib_tsmc04_4M2P/divaDRC.rul
ln -s ../../techfile/divaDRC.rul NCSU_TechLib_tsmc04_4M2P/divaDRC.rul

rm NCSU_TechLib_ami06/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_ami06/divaEXT.rul
rm NCSU_TechLib_ami16/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_ami16/divaEXT.rul
rm NCSU_TechLib_hp06/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_hp06/divaEXT.rul
rm NCSU_TechLib_tsmc02d/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_tsmc02d/divaEXT.rul
rm NCSU_TechLib_tsmc02/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_tsmc02/divaEXT.rul
rm NCSU_TechLib_tsmc03d/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_tsmc03d/divaEXT.rul
rm NCSU_TechLib_tsmc03/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_tsmc03/divaEXT.rul
rm NCSU_TechLib_tsmc04_4M2P/divaEXT.rul
ln -s ../../techfile/divaEXT.rul NCSU_TechLib_tsmc04_4M2P/divaEXT.rul

rm NCSU_TechLib_ami06/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_ami06/divaLVS.rul
rm NCSU_TechLib_ami16/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_ami16/divaLVS.rul
rm NCSU_TechLib_hp06/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_hp06/divaLVS.rul
rm NCSU_TechLib_tsmc02d/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_tsmc02d/divaLVS.rul
rm NCSU_TechLib_tsmc02/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_tsmc02/divaLVS.rul
rm NCSU_TechLib_tsmc03d/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_tsmc03d/divaLVS.rul
rm NCSU_TechLib_tsmc03/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_tsmc03/divaLVS.rul
rm NCSU_TechLib_tsmc04_4M2P/divaLVS.rul
ln -s ../../techfile/divaLVS.rul NCSU_TechLib_tsmc04_4M2P/divaLVS.rul

```

4 Configuring the User Environment

In this section, we'll edit your environmental variables and create a Cadence working directory. Beyond this point, there is *no need for root privileges*, exit all root shells before proceeding. This has to be repeated for each user on the machine.

4.1 Configuring Your Shell

First, the Cadence tools require that you use C shell. To see which shell you are in at the prompt, type:

```
echo $0
```

If this command returns `cs`, then proceed to the next section, 4.2. If it returns anything else, such as `bash`, then you will need to invoke C Shell before using Cadence tools. To do this, simply type `cs`. To change your default shell, you will need to edit the file `/etc/passwd`, where you will find a line corresponding to your user such as

```
username:x:500:500:Full Name:/home/username:/bin/bash
```

Change `/bin/bash` to `/bin/csh`. This change will take effect after you log out.

4.2 Editing .cshrc

Now that you're in C Shell, you will want to add environmental variables required by the Cadence software. The following is an example configuration file, which should be available for direct download from us. *Don't try to copy and paste this*. If necessary, modify according to your installation.

```
# CADENCE .cshrc
# =====
set cadence_base_dir = "/usr/local/Cadence"
setenv DD_DONT_DO_OS_LOCKS SET
setenv CDS_LIC_FILE $cadence_base_dir/etc/license.dat
setenv LM_LICENSE_FILE $cadence_base_dir/etc/license.dat

setenv IC $cadence_base_dir/IC6.1

setenv SPECTRE_DEFAULTS -E
setenv CDS_Netlisting_Mode Analog

alias prepend 'if (-d \!:2) if ("$\!:1" \!~ *"\!:2"*) setenv \!:1 "\!:2":$
{\!:1}'
alias extend 'if (-d \!:2) if ("$\!:1" \!~ *"\!:2"*) setenv \!:1 $
{\!:1}:\!:2'

setenv LANG C

prepend PATH $IC/tools/bin
prepend PATH $IC/tools/dfII/bin
prepend PATH $IC/share/bin
prepend PATH $IC/share/cdsdoc/bin

# =====
# NCSU
setenv CDK_DIR /usr/local/NCSU/ncsu-cdk-1.6.0.beta
```

If you use VI, merging your `cshrc` files is as easy as

```
vi ~/.cshrc
```

If this file doesn't exist, it will be empty. If it is not, hold `SHIFT` and press `G` to go to the end. Then read in the new settings with the command

```
:r /usr/local/Cadence/IC6.1/tools.lnx86/dfII/cdsuser/.cshrc
```

Then make any modifications necessary, and write & quit with the `:wq` command.

To load the new configuration without logging in and out or opening a new shell, use the command

```
source ~/.cshrc
```

4.3 Creating a Working Directory

You will use different working directories for each project that you work on. This directory will contain files that store the configuration for that project, as well as all the designs for the project in subdirectories. We create one to get started using the tools.

```
cd # go to home directory
mkdir cadence
cd cadence
```

Now we want to copy the project configuration files from the NCSU installation.

```
cp /usr/local/NCSU/ncsu-cdk-1.6.0.beta/cdssetup/cdsenv .cdsenv
cp /usr/local/NCSU/ncsu-cdk-1.6.0.beta/cdssetup/cdsinit .cdsinit
cp /usr/local/NCSU/ncsu-cdk-1.6.0.beta/cdssetup/display.drf display.drf
cp /usr/local/NCSU/ncsu-cdk-1.6.0.beta/cdssetup/cds.lib cds.lib
```

Note that the following line was already added to the example `.cshrc`. To set this variable immediately, you can just enter the command.

```
setenv CDK_DIR /usr/local/NCSU/ncsu-cdk-1.6.0.beta
```

Finally, we can call up the Virtuoso Layout Editor:

```
virtuoso&
```