

# Cheat Sheet on using Electric for Design and Simulations

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# Instructions before Starting

- Wherever you see the word <username>, replace it with your CAT account Username.
- All the commands will be in italics. eg:  
*mkdir models*
- Log on to Asynchronous Research Center's Website @ <http://arc.cecs.pdx.edu/>

# Downloading Electric on your machine

- Electric can be used to build designs on Windows, Linux and Mac OS which are later converted into a netlist file by Electric.
- The netlist can be used for simulating designs with the Hspice Simulator. Hspice is licensed to run on server “nemo”.
- This tutorial will explain the procedure to simulate designs using Hspice on nemo.
- First of all download Electric by logging on to: <http://arc.cecs.pdx.edu/teaching> and by clicking on the download link: [electricBinary8.11.jar](#) given on the webpage.
- The next 3 slides guide you in setting up the nemo from Windows, Linux and Mac machines respectively.

# Downloading software packages for Windows

- Before you can start building designs on Electric, you have to download and install the following software packages:
  1. Java Runtime Environment 6
  2. Putty
  3. WinScp
- Download Java Runtime Environment : select the online java version at <http://www.java.com/en/download/manual.jsp#win>
- Download WinScp Client at <http://sourceforge.net/projects/winscp/files/WinSCP/4.2.8/winscp428setup.exe/download>
- Download Putty on to your windows machine at <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>
- Install all these packages.

# Setting up nemo from Windows

- After downloading and installing the software packages, you need to setup Hspice on nemo.
- Putty is used for remote login to nemo.
- Open Putty and type in  [<username>@nemo.ece.pdx.edu](mailto:<username>@nemo.ece.pdx.edu)  in the Host Name slot and click open.
- Type in your nemo server password.
- You will be logged on to the nemo server from your windows machine.

# Using WinScp software

- WinScp can be used to transfer files from your Windows machine to nemo.
- Open WinScp and type the following in the slots:
  - Hostname: nemo.ece.pdx.edu
  - Username: your CAT account username
  - Password: your CAT account password
- Save and login. You will see two windows; files on the left are on your windows machine, the files on the right are on nemo.
- In order to transfer files from windows to nemo or vice versa, you can just drag and drop the files into the directory you want.

# Setting up nemo for Linux

- If you use Electric on a linux machine, you need java on linux.
- Download JRE 6 package at <http://www.java.com/en/download/manual.jsp#win> and select the suitable version.
- After you are done with JRE download and install, open a terminal and type:
- `ssh -X username@nemo.ece.pdx.edu` and then type in your nemo server password.
- You will be logged on to the nemo server from your Linux machine.

# Setting up nemo for Mac

- If you use Electric on a Mac machine, you need to download the Java version supplied by Apple and available at: [http://support.apple.com/kb/HT1338?viewlocale=en\\_US](http://support.apple.com/kb/HT1338?viewlocale=en_US)
- After you are done with downloading and installing Java, open a terminal and type:
- `ssh -X <username>@nemo.ece.pdx.edu` and then type in your nemo server password.
- You will be logged on to the nemo server from your Mac machine.



# Adding Hspice and Java Packages on nemo

- Java version 6 is required to run Electric on nemo, and so is hspice.
- Add hspice and Java\_6 packages
  - I. use the command: *addpkg* and hit return.
- Select hspice and Java\_6 from the list that *addpkg* offers. Log out and Log back in for these changes to take effect.
- After logging on to nemo , create a work directory “YOU” for your Electric and hspice simulations below your username:
  - “YOU” = /u/<username>/ (wherever you want to create a folder)
  - e.g. “YOU” can be: /u/<username>/electricsim/
- Use the following commands to create the following directories under your work directory “YOU”:
  - I. *mkdir models*
  - II. *mkdir simulations*

# Download necessary files for Electric

- All the files that you need for running the simulations are on the website at <http://arc.cecs.pdx.edu/fall10>
- Here are the list of files you need:
  1. MOSIS\_180nm\_header.hsp
  2. MOSIS\_180nm\_trailer.hsp
  3. models.sp
- Download the files mentioned above and save them under “YOU” on your nemo machine.
- Download the library “a180Library-20sep10.zip” on your machine, unzip it and transfer the resulting directory to nemo directory “YOU”.
- Windows users can use WinScp to transfer the file. Linux and Mac users can use the scp protocol to transfer the file.

# Edit the MOSIS\_180nm\_header.hsp

- In the .INCLUDE statement replace the sub-path /u/kashyap/models by sub-path YOU/models/.

```
*****
* Header File for Simulation with 180nm MOSIS Transistor Models
*
* Header Written by William Koven, 26 June 2009
*****

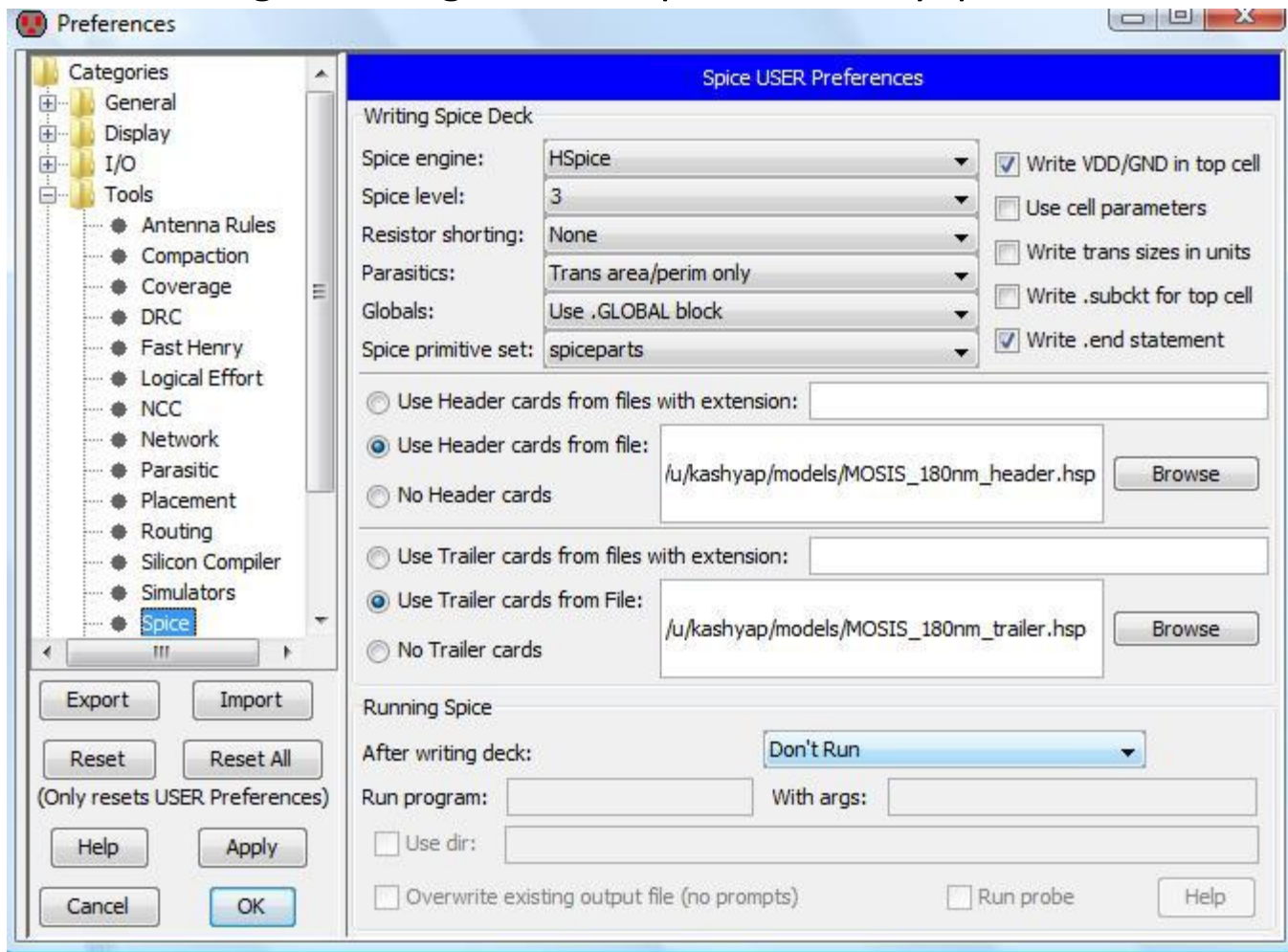
*****
* Transistor models
* Currently location of models is assumed to be /u/ivans/models.sp
* on the PSU ECE nemo server.
* EDIT THE PATH IN THE .INCLUDE STATEMENT
*****
.INCLUDE /u/kashyap/models/models.sp

*****
* Options and Parameters
*****
.OPTION POST
.OPTION SCALE=90n
.PARAM ABN=0
.PARAM ABP=0
.PARAM AVTOP=0
.PARAM AVTON=0
.PARAM hdifn=0
.PARAM hdifp=0
.PARAM SUPPLY=1.8V

*****
* Netlist
*****
```

# Change Electric preferences

- Open Electric and go to File → Preferences. Then Click on Tools → Spice and make sure the simulator preferences look like this and then click apply and OK to save the changes. Change the sub-path /u/kashyap/models to YOU/models.



# Example –Ring Oscillator

- Download Class1\_ringOsc-01oct10.jelib file from <http://arc.cecs.pdx.edu/fall10/class1> and save it on your machine.
- Now open Electric and open the library a180Library-20sep10 you have downloaded earlier. In the a180Library-20sep10 library select the sub-library “ anOpener”. A schematic window opens.
- Now open Class1\_ringOsc-01oct10.jelib by clicking File → Open Library → Class1\_ringOsc-01oct10. If you open Class1\_ringOsc-01oct10 library without opening a180Library-20sep10 , you will have errors in Electric.
- ..... Continued on next slide.....

# Example –Ring Oscillator Cont. (1)

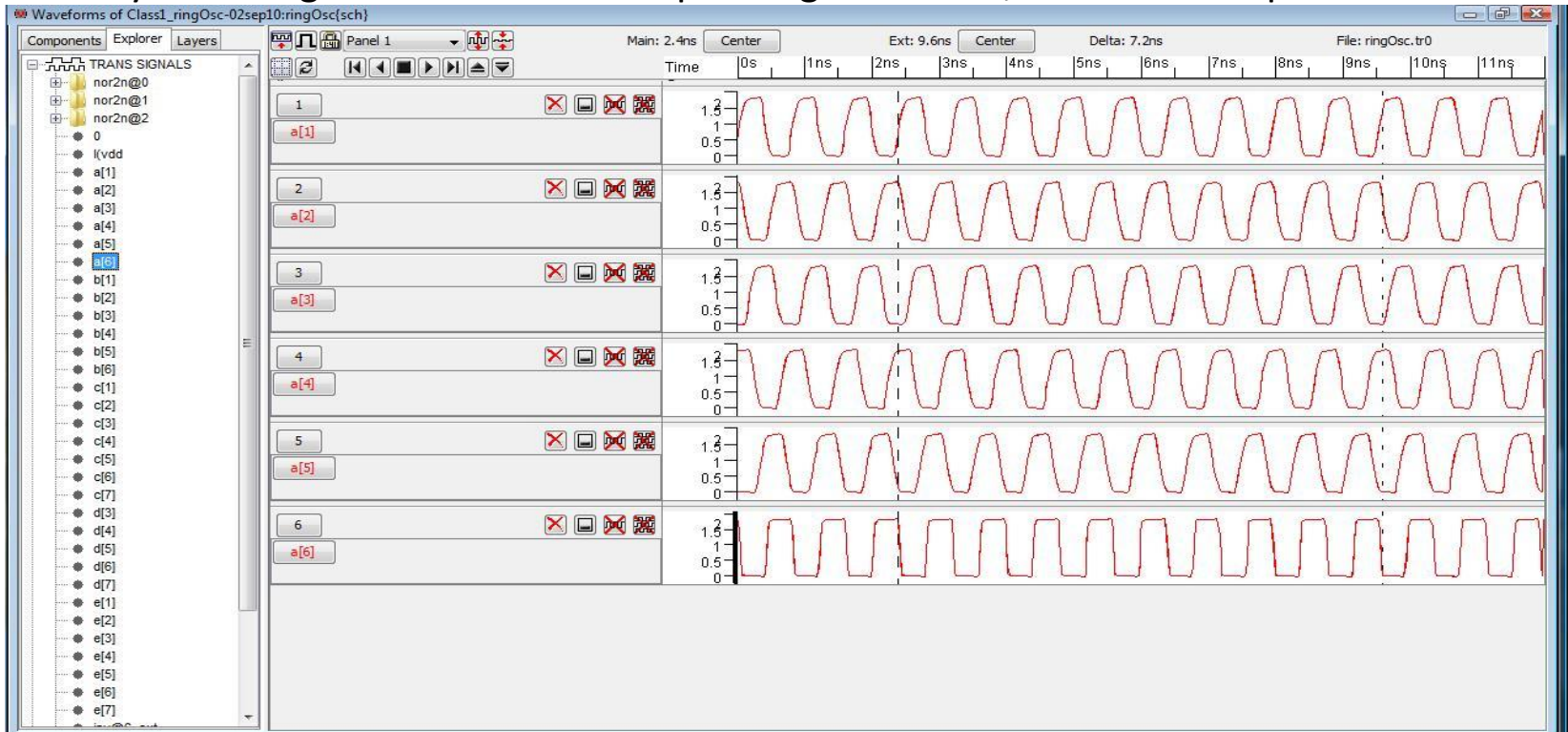
- The left side now shows the name Class1\_ringOsc-01oct10 with three tabs underneath it: Components, Explorer, Layers. In tab Explorer, select ringOsc{sch} under libraries/class1\_ringOsc\_01Oct10
- Generate the spice netlist for this schematic, by clicking Tools → Simulation (Spice) → Write Spice Deck and write the result file ringOsc.spi on your machine.
- Transfer ringOsc.spi from your machine to your simulation directory “YOU”/simulations on nemo by using WinScp (windows) or the scp protocol (linux or Mac users).
- ..... Continued on next slide

# Example –Ring Oscillator Cont. (2)

- You should now have a file called ringOsc.spi in your directory “YOU”/simulations on nemo.
- Run Hspice, as follows:
  - *cd “YOU”/simulations*
  - *hspice64 ringOsc.spi*
- If you see “hspice job aborted”, then fix the errors.
- Once the spice simulation is error-free, you should a message “hspice job concluded”.
- If there are no errors you will see a file with extension .tr0 in “YOU”/simulations. We will use this file to plot waveforms.
- If you don’t run Electric on nemo, then transfer ringOsc.tr0 to the machine where you run Electric using WinScp (windows) or the scp protocol (Linux and Mac users).

# Example –Ring Oscillator Cont.(3)

- In Electric, click:  
Tools → Simulation (Spice) → Plot Simulation Output (guess file)
- You get a new window with simulation data. From tab Explorer in the new window, open the drop-down menu for TRANS SIGNALS by clicking on its “+” symbol.
- You will now see a set of signal names from the design schematics. You can double click on any of the signals to see its corresponding waveform, similar to the picture below.





# Manual on using Electric

- If you want to explore Electric and learn all its features and start using them, refer to the manual available at this link  
<http://arc.cecs.pdx.edu/fall10>
- The manual can also be found at  
<http://www.staticfreesoft.com/jmanual/ElectricManual-8.11.pdf>