

Tutorial for Cadence Innovus Place & Route

For Innovus Version 16.2

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Contents

1	Preliminary Setup.....	1
2	Starting Tool and Reading in the Design Files.....	2
2.1	Saving and Restoring Your Design.....	10
3	Floorplanning	12
3.1	Specify Floorplan.....	12
4	Power Planning	14
4.1	Connect Global Nets	14
4.2	Power Rings.....	15
4.3	Power Stripes	18
4.4	Connect Power to Standard Cell Rows	22
5	Placing the Standard Cells.....	23
6	Routing.....	24
7	Adding Filler Cells.....	26

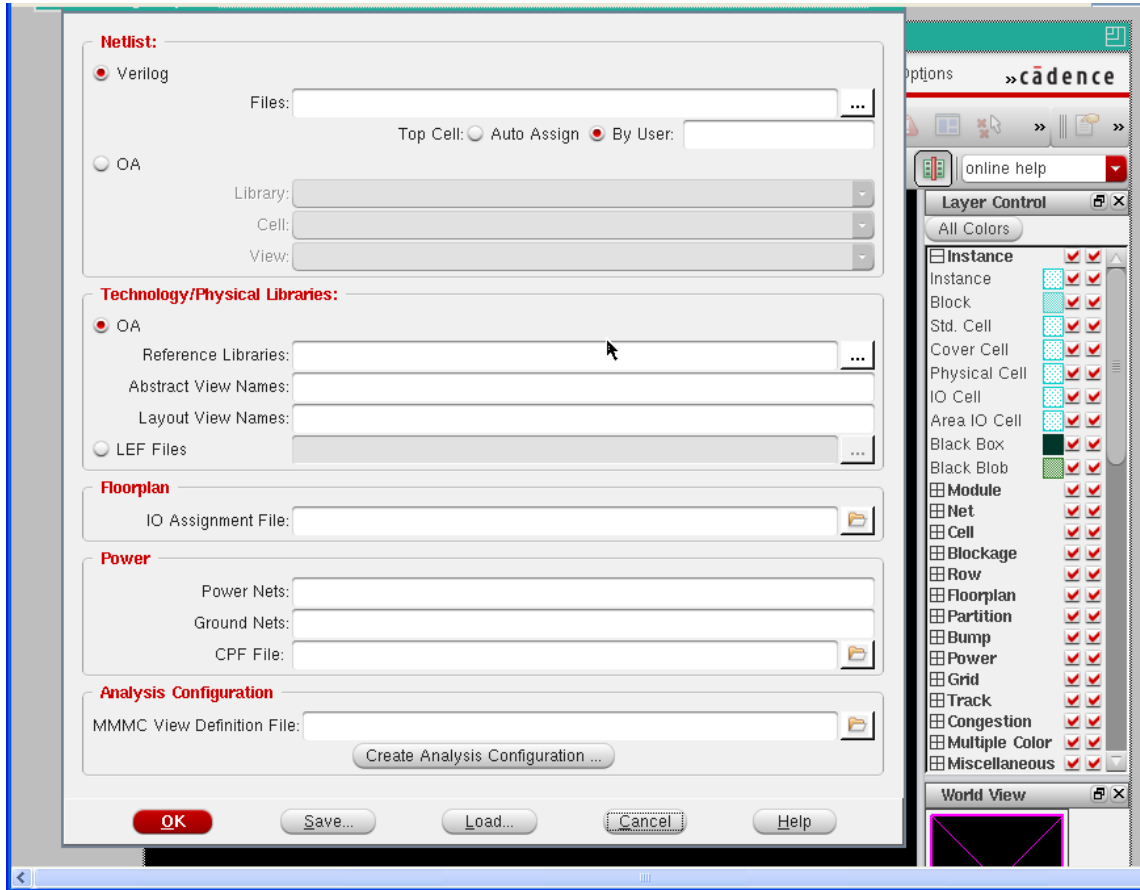
1 Preliminary Setup

Create a separate directory for the above files in your account (e.g., Innovus). Create the subdirectories **synth** and **lib**

1. Move **full_adder_pads_syn.v** to the **synth** directory
2. Move **osu05_stdcells.lef** to the **lib** directory

2 Starting Tool and Reading in the Design Files

1. Make sure that you are in your main separate directory (e.g., Innovus) as mentioned earlier
2. At the Unix prompt, type: **innovus**
3. When the Innovus tool window appears, go to the menu bar and select **File, Import Design** to get the **Design Import** window.

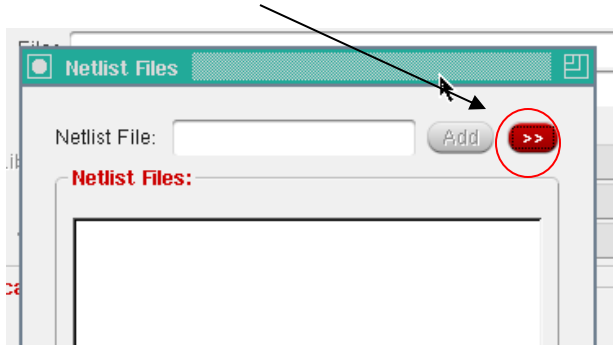


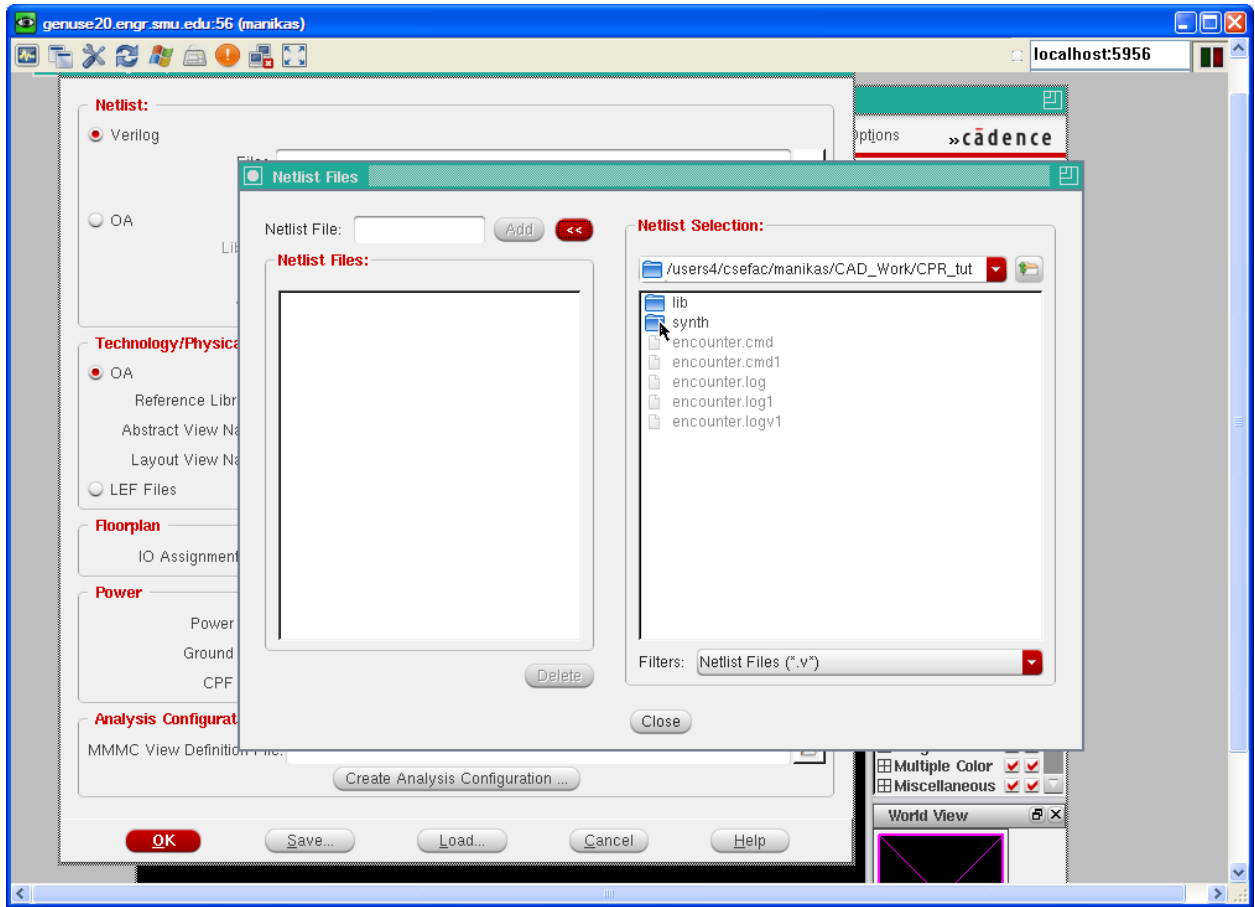
4. For the **Verilog Netlist**, click on the box with the dots [...] to open the **Netlist Files** window



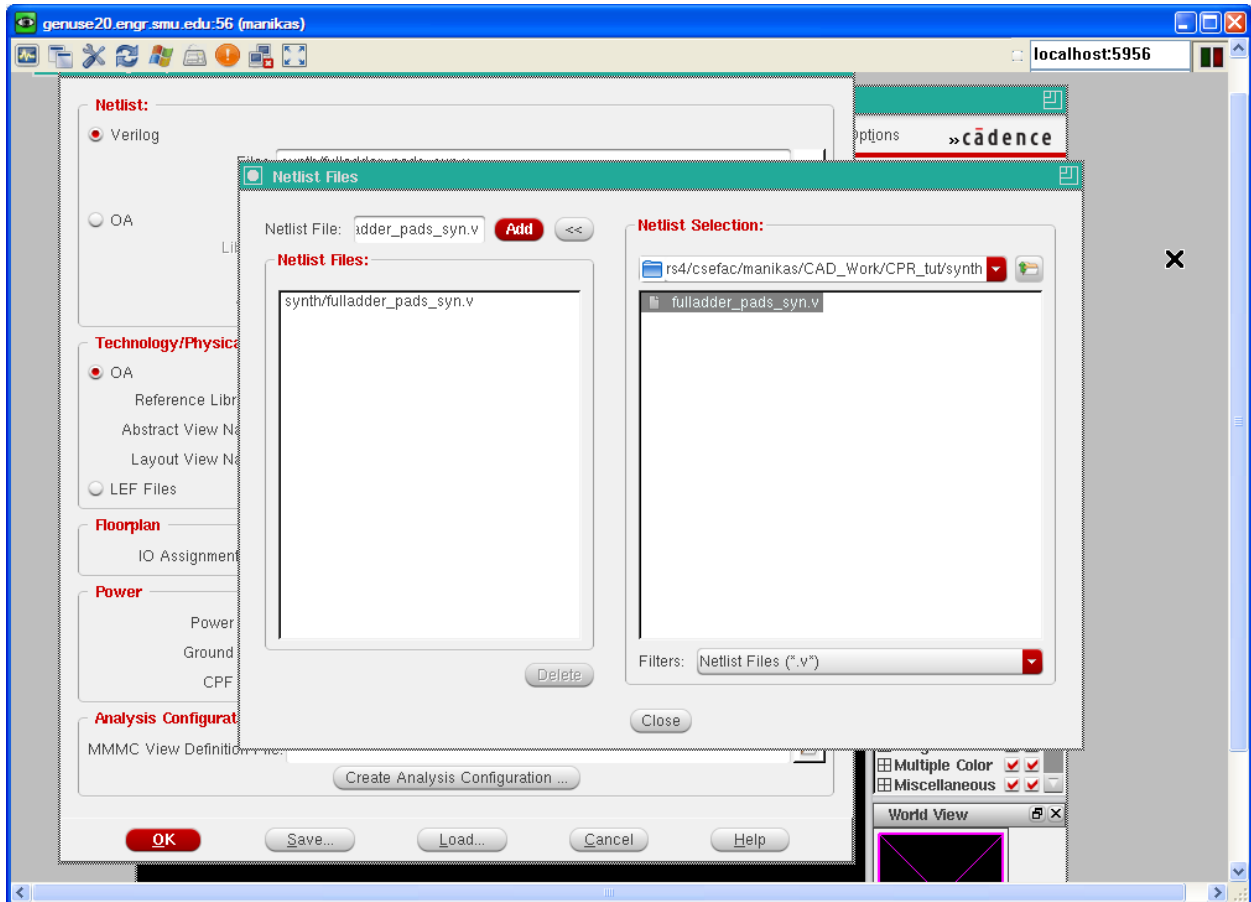


5. Click on the ">>" button to expand the window to show the directories:

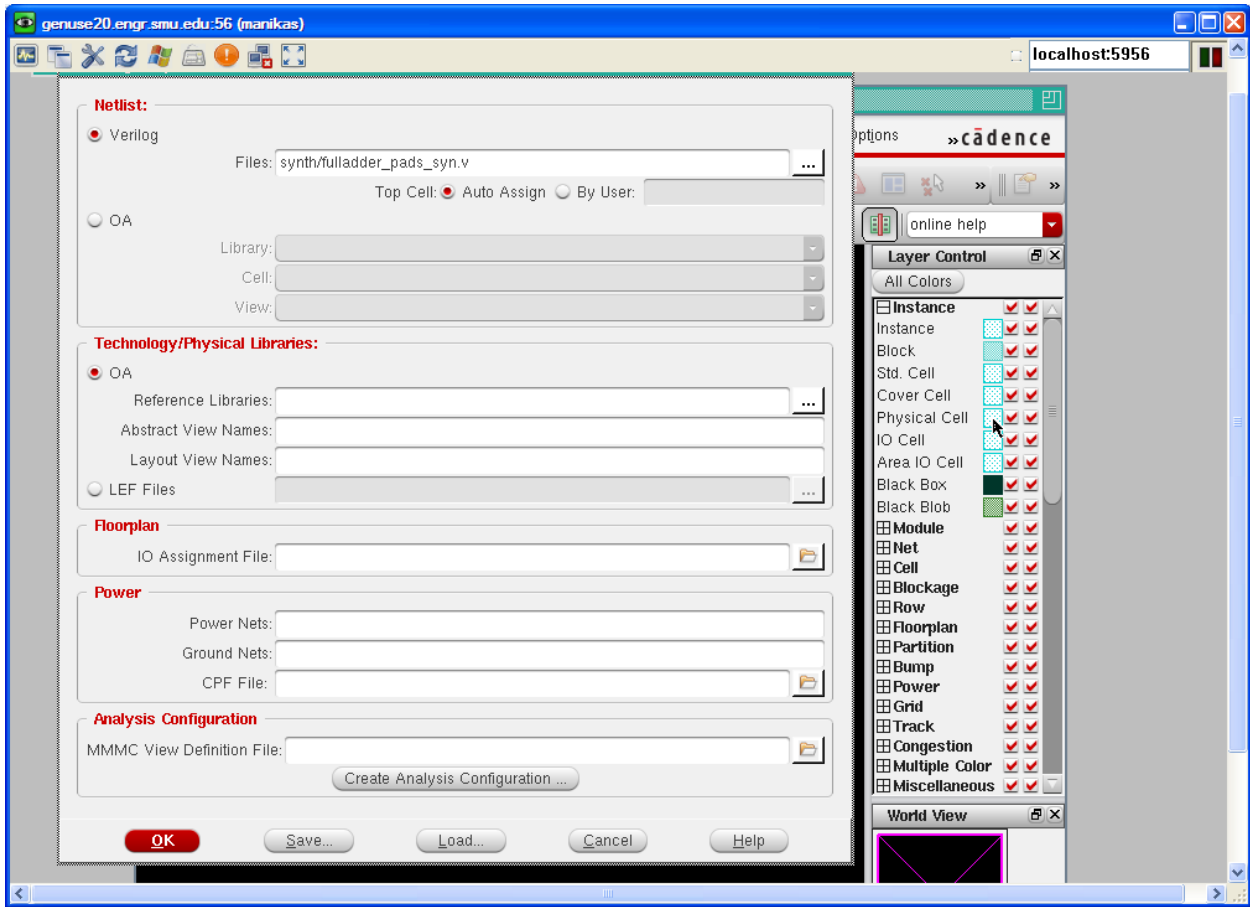




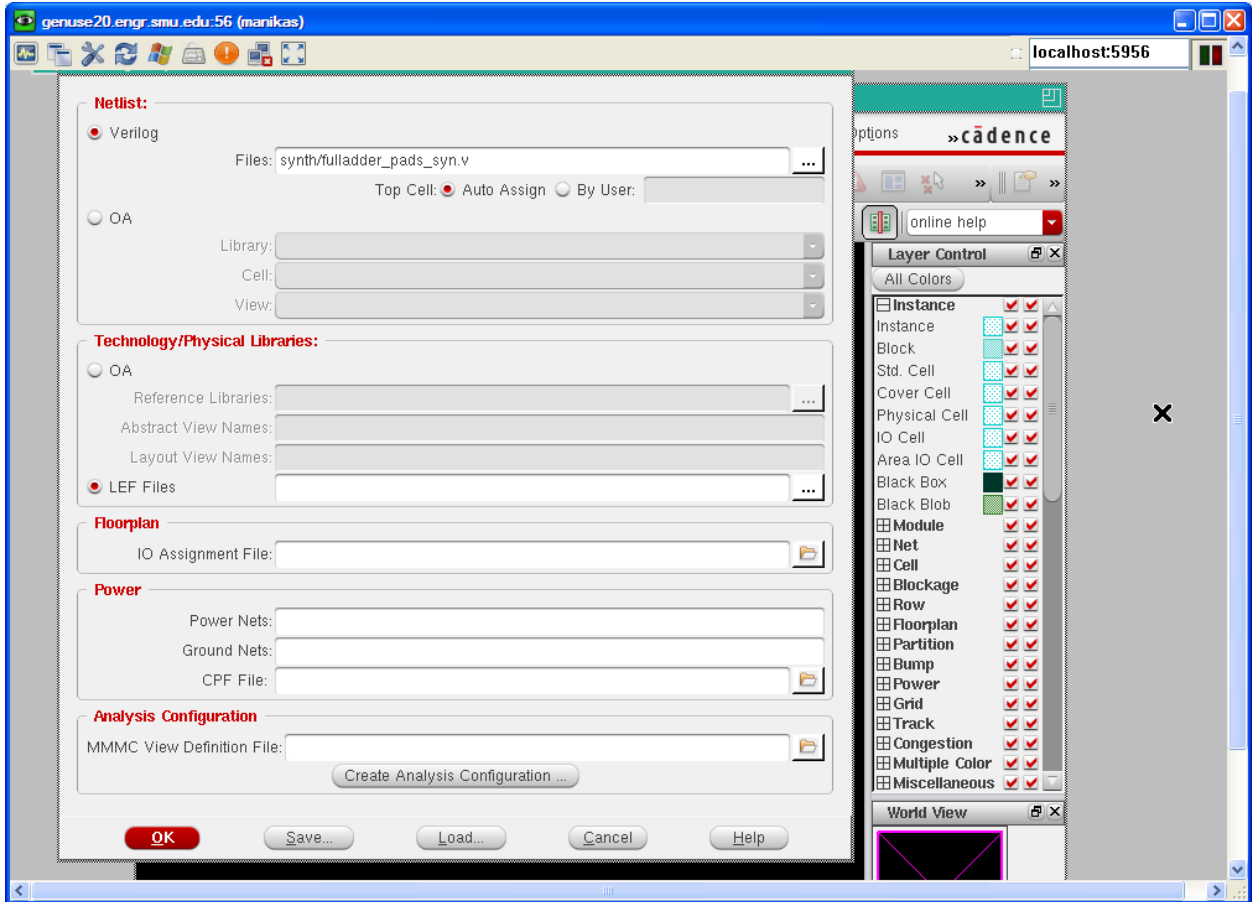
- Double-click on the **synth** folder, then select the file **full_adder_pads_syn.v** and click the **Add** button to add it to the Netlist Files list. Click **Close** to close the Netlist Files window.



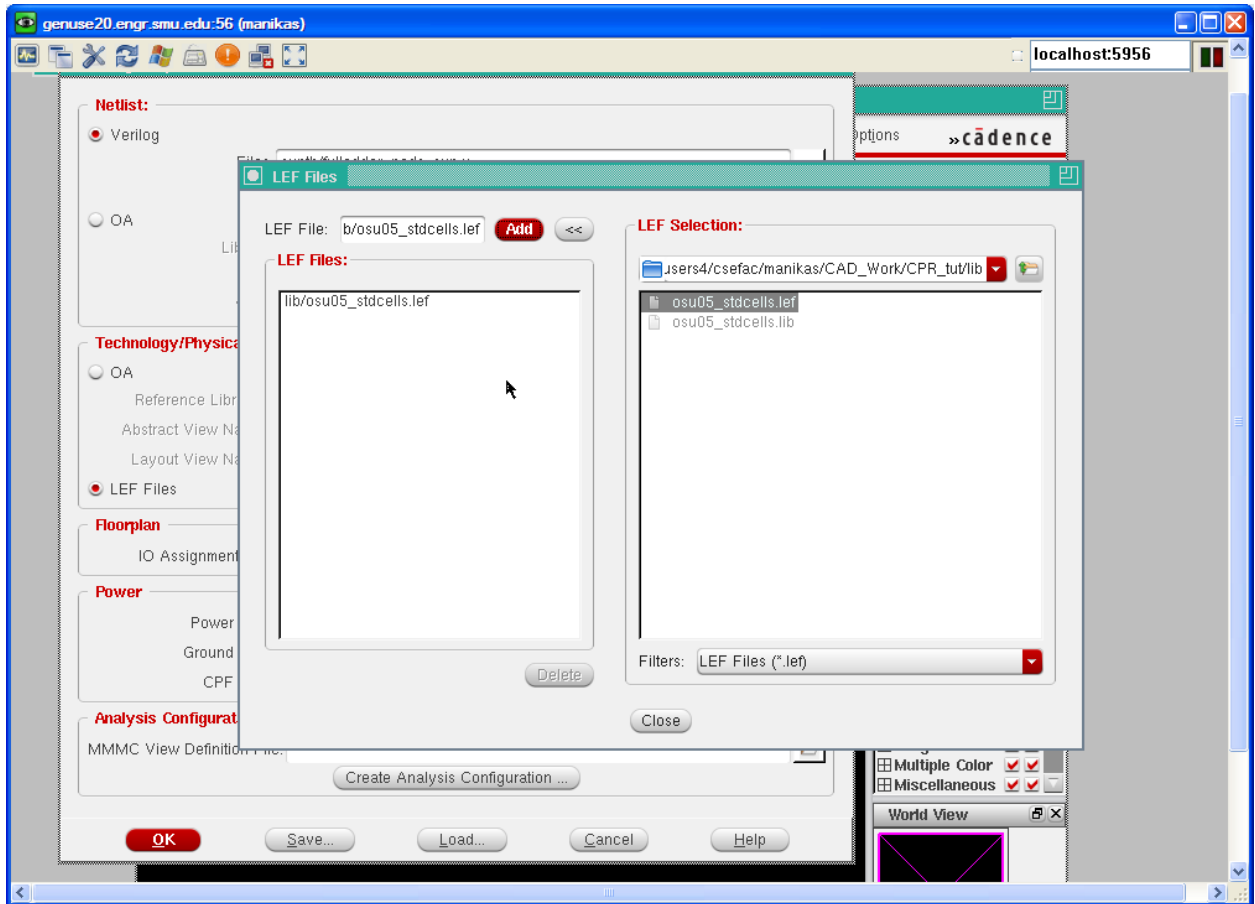
7. In the main window, for **Top Cell**, select "Auto Assign"



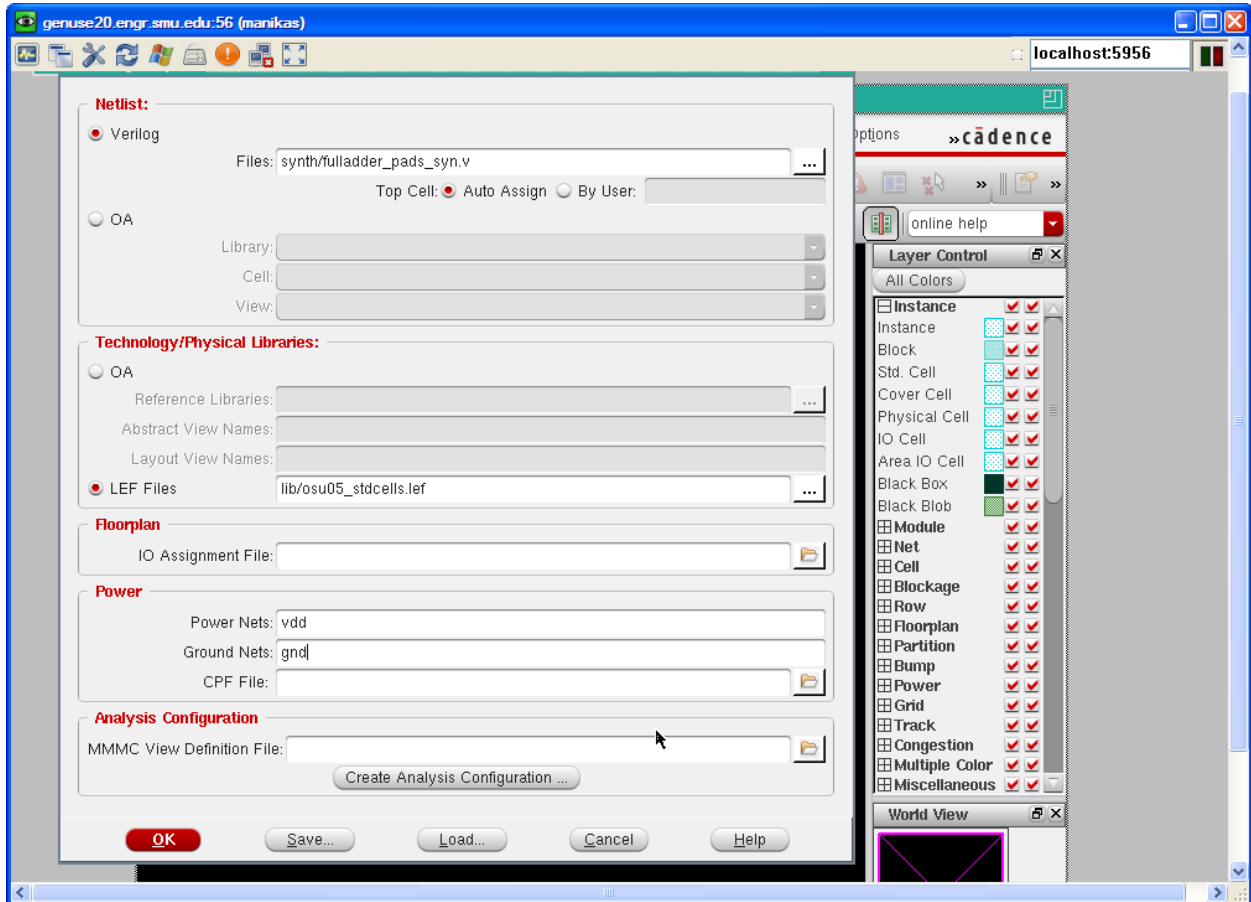
8. For **Technology/Physical Libraries**, select **"LEF Files"**. Click on the [...] button open the LEF Files window.



- Using the same approach as for selecting the Verilog Netlist file, select the file **lib/osu05_stdcells.lef**

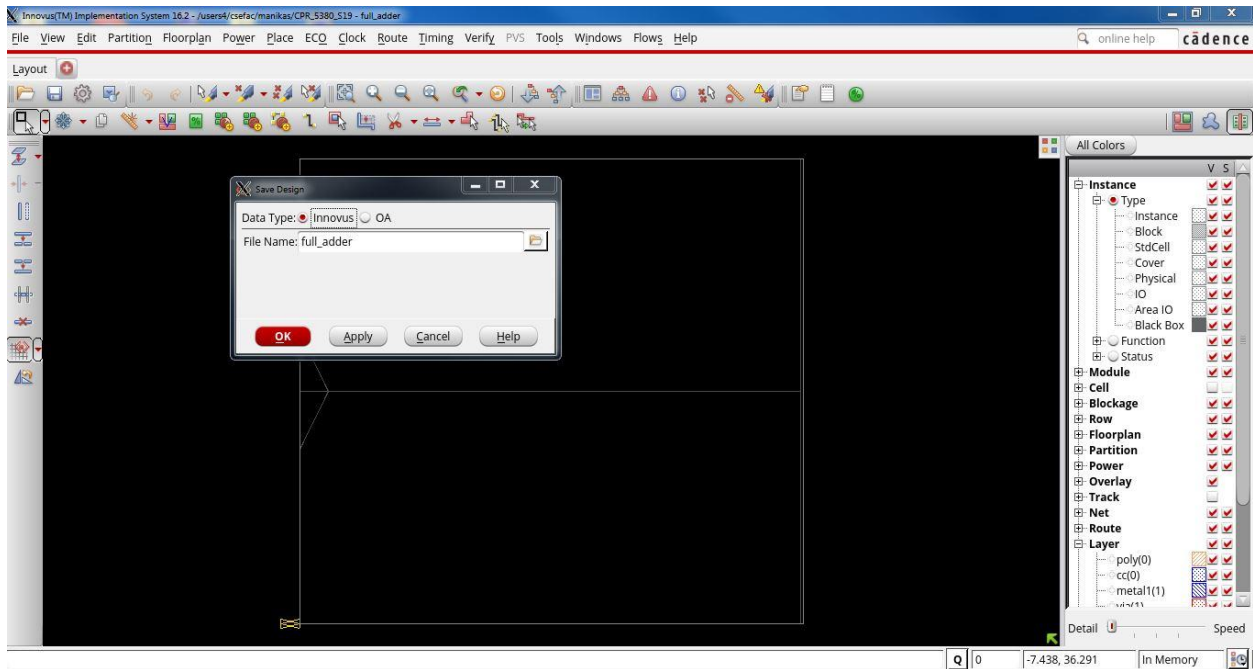


10. For **Power**, enter the following:
 - a. Power Nets: **vdd**
 - b. Ground Nets: **gnd**
11. Click on **OK**.

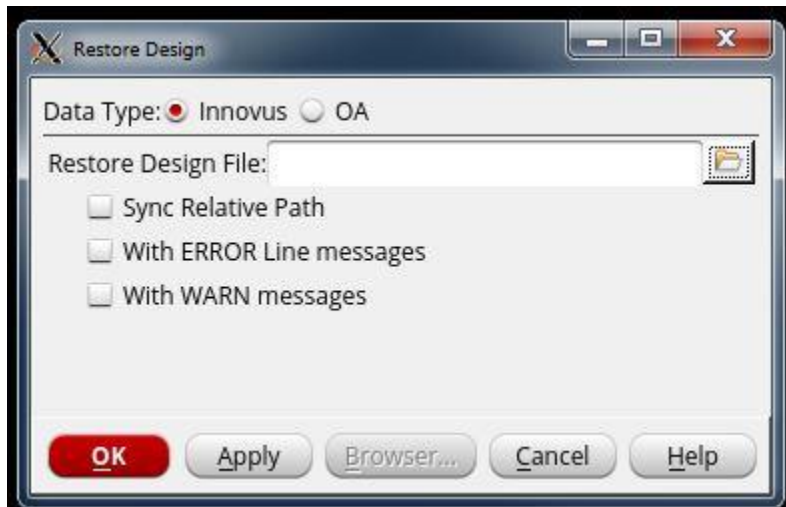


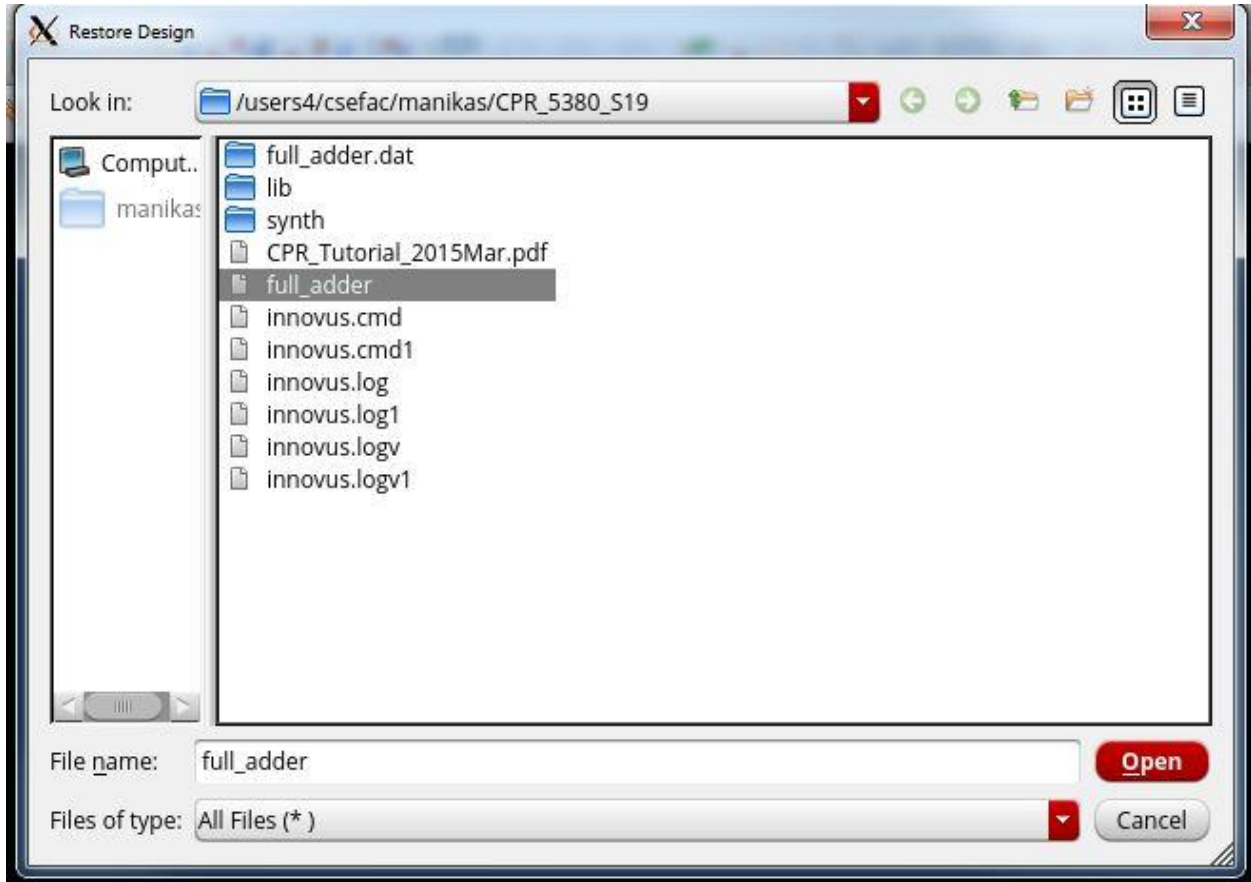
2.1 Saving and Restoring Your Design

NOTE: It is a good idea to save your design periodically. Select **File, Save Design**. In the Save Design Window, select **Data Type: Innovus**.



To load a saved Innovus file, do **File, Restore Design**. In the Restore Design Window, select **Data Type: Innovus**. Select the file to be restored.



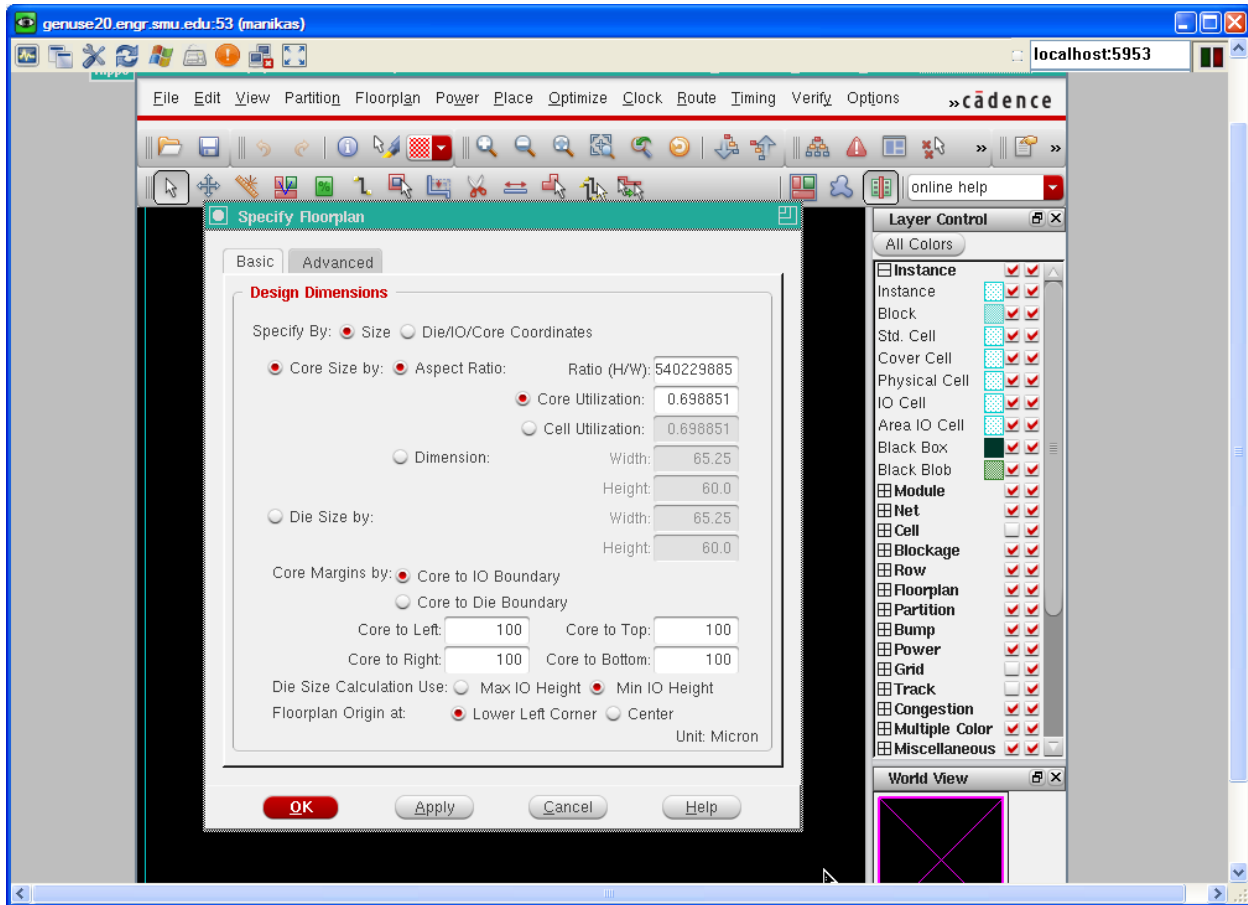


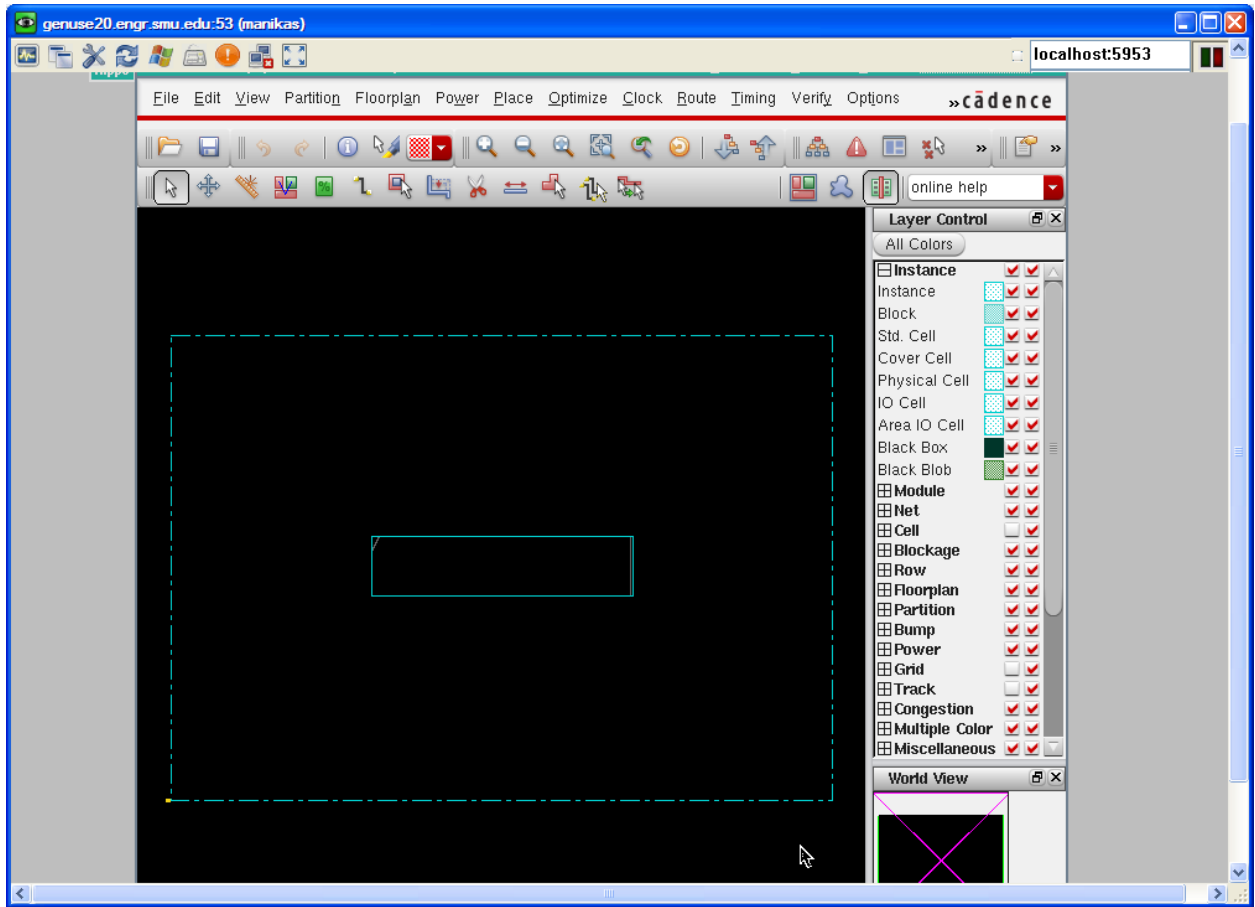
3 Floorplanning

3.1 Specify Floorplan

In Innovus tool menu bar, select **Floorplan, Specify Floorplan** to get the **Specify Floorplan** window.

1. In the **Basic** tab, select the following options:
 - a. **Core Margins** – select Core to IO Boundary and set all margins to **100**
2. Click on **OK**.



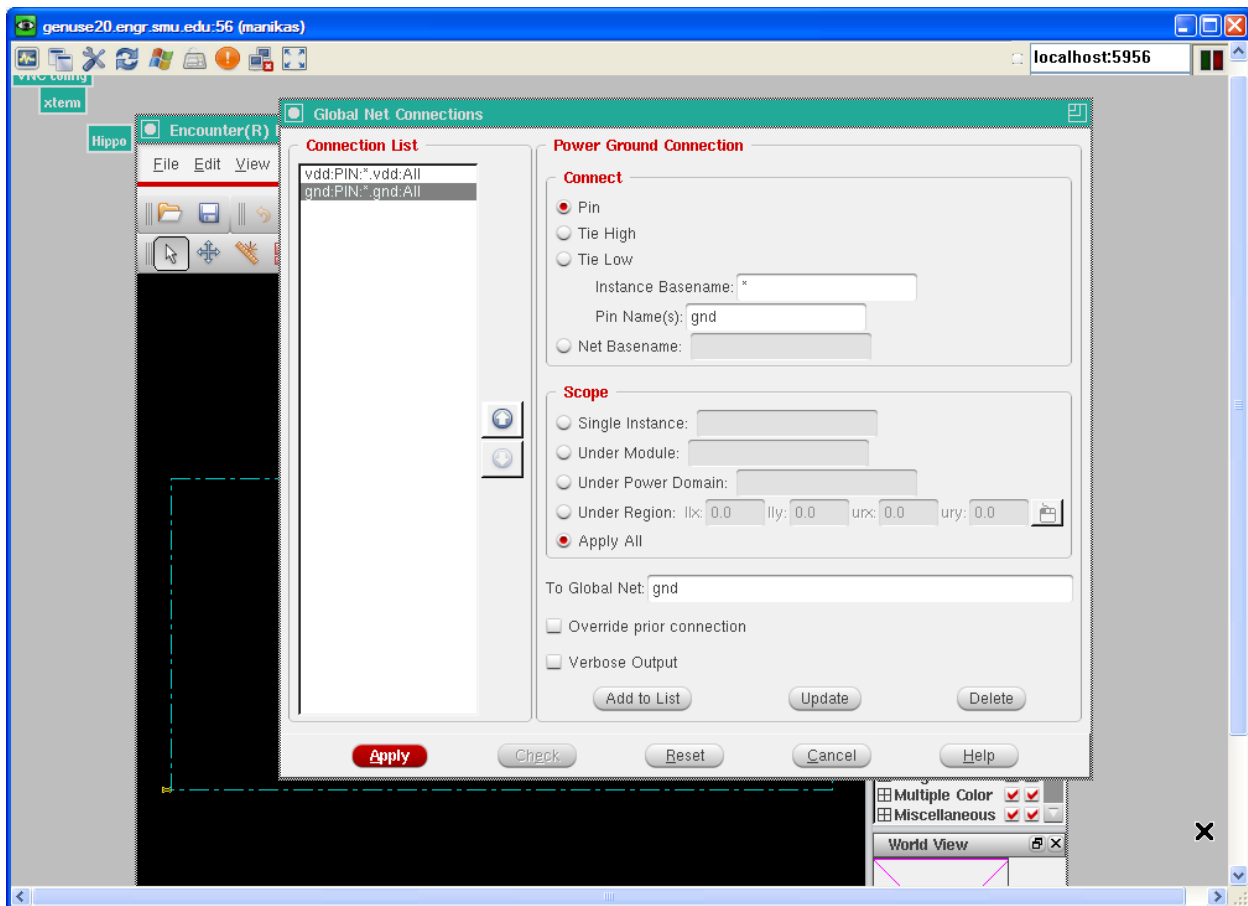


4 Power Planning

4.1 Connect Global Nets

In Innovus tool menu bar, select **Power, Connect Global Nets** to get the **Global Net Connections** Window.

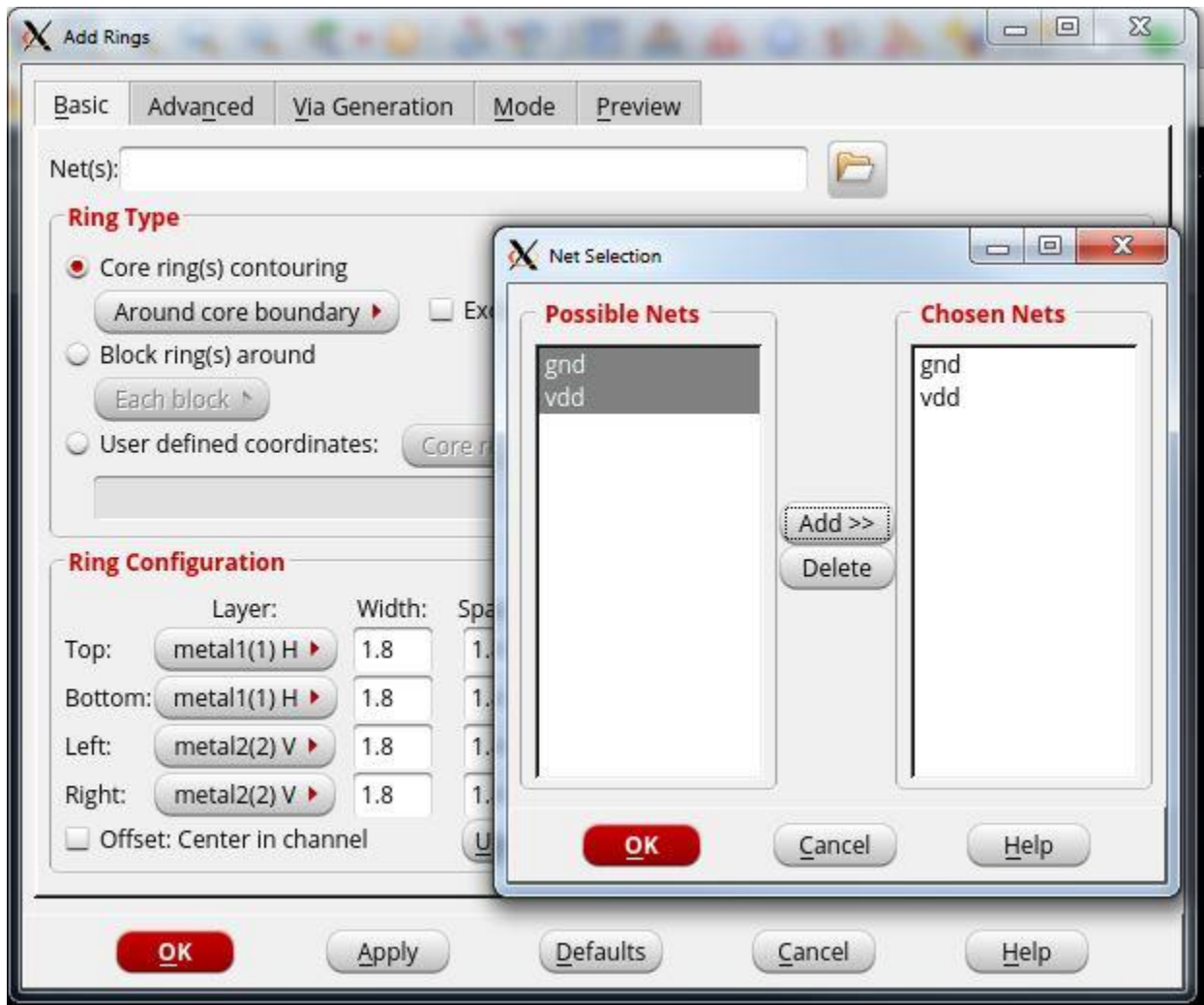
1. In **Power Ground Connection**
 - a. In the **Connect** area, select **Pin**
 - b. In the **Scope** area, select **Apply All**
2. For each net **vdd** and **gnd**, do the following:
 - a. Enter the net name (vdd or gnd) in the following boxes:
 - i. "To Global Net"
 - ii. "Pin Name(s)"
 - b. Click on the "Add to List" button
3. Click Apply, then click Cancel



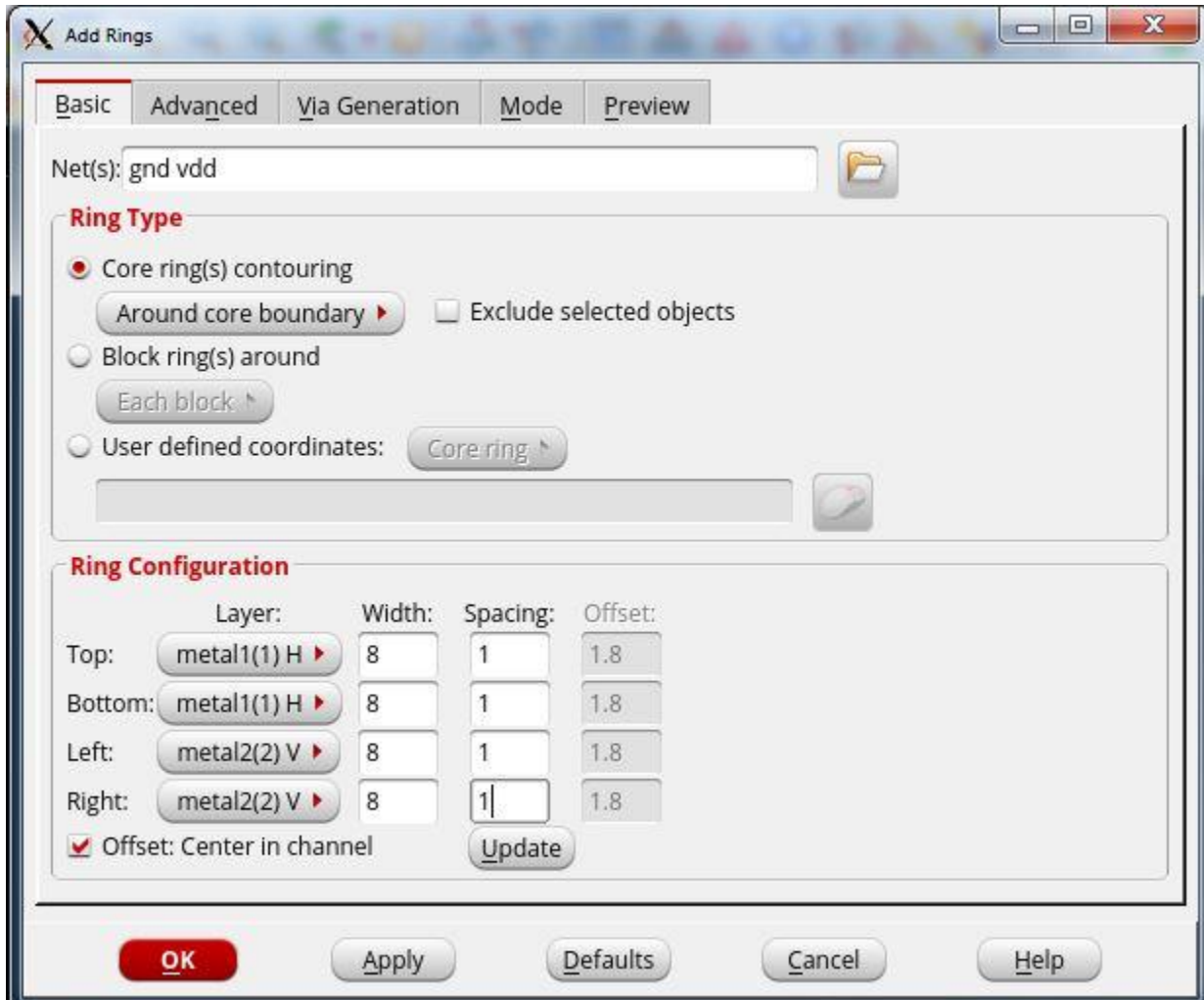
4.2 Power Rings

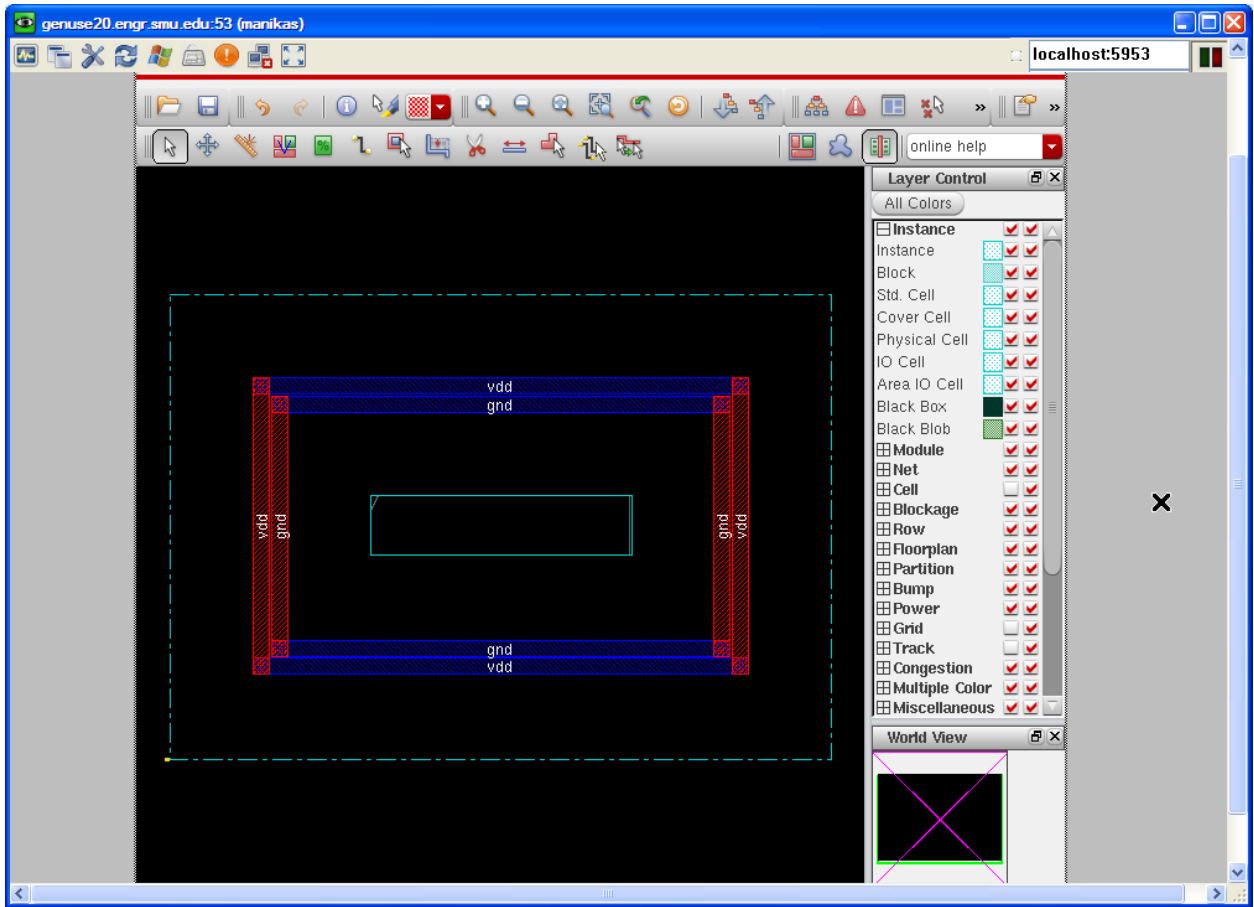
In Innovus tool menu bar, select **Power, Power Planning, Add Ring** to get the **Add Rings** window.

1. For Net(s), enter **vdd** and **gnd** nets as follows:
 - a. Click on folder icon to the right of the **Net(s)** box to get Net Selection window
 - b. Select **vdd** and **gnd** from Possible Nets column
 - c. Click **Add** to copy to Chosen Nets column
 - d. Click **OK**



2. In **Ring Configuration**, select **metal1** for Top and Bottom, **metal2** for Left and Right.
 - a. Width should be 8
 - b. Spacing should be 1
 - c. Offset should be "Center in channel"
3. Click OK



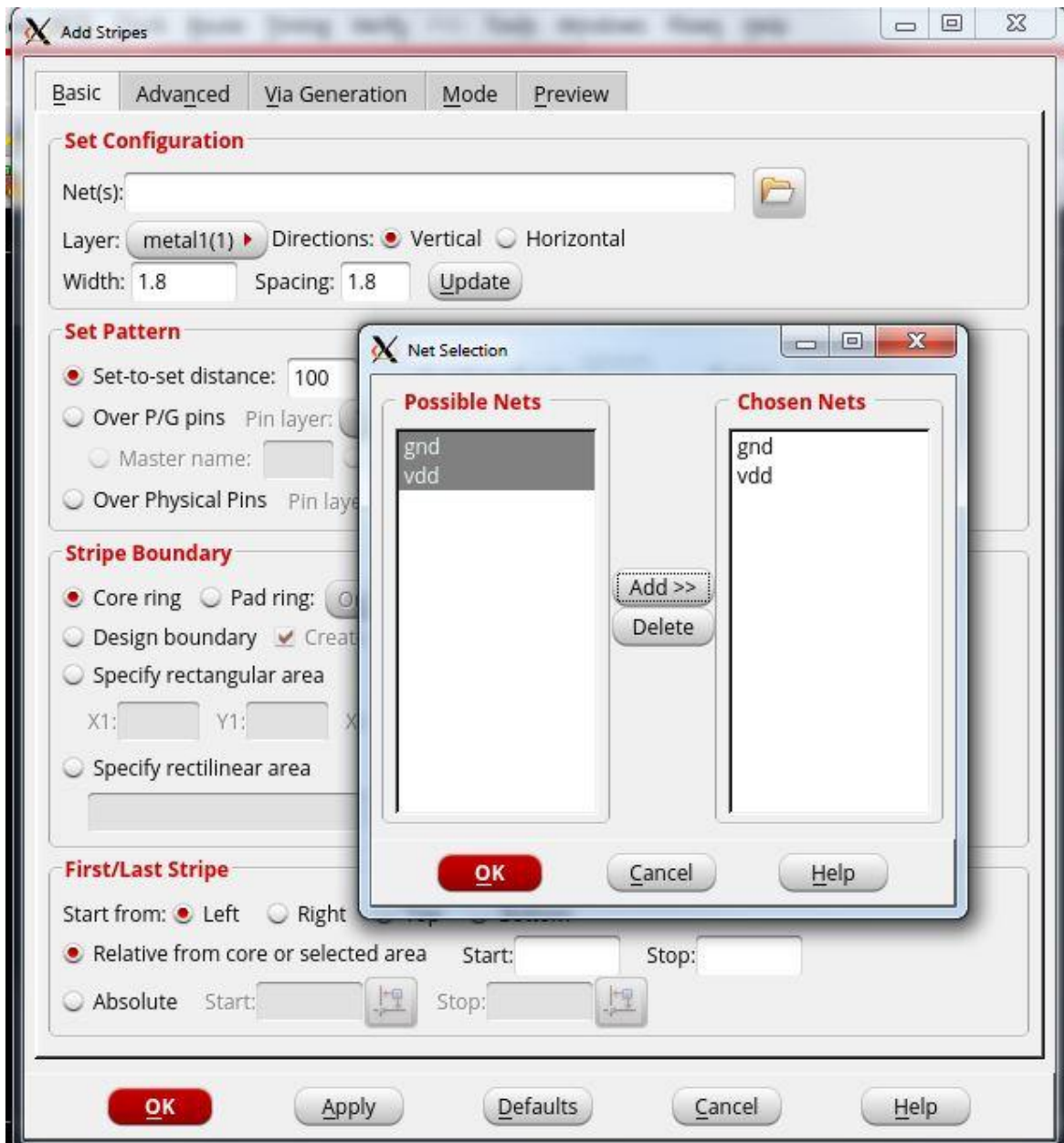


4.3 Power Stripes

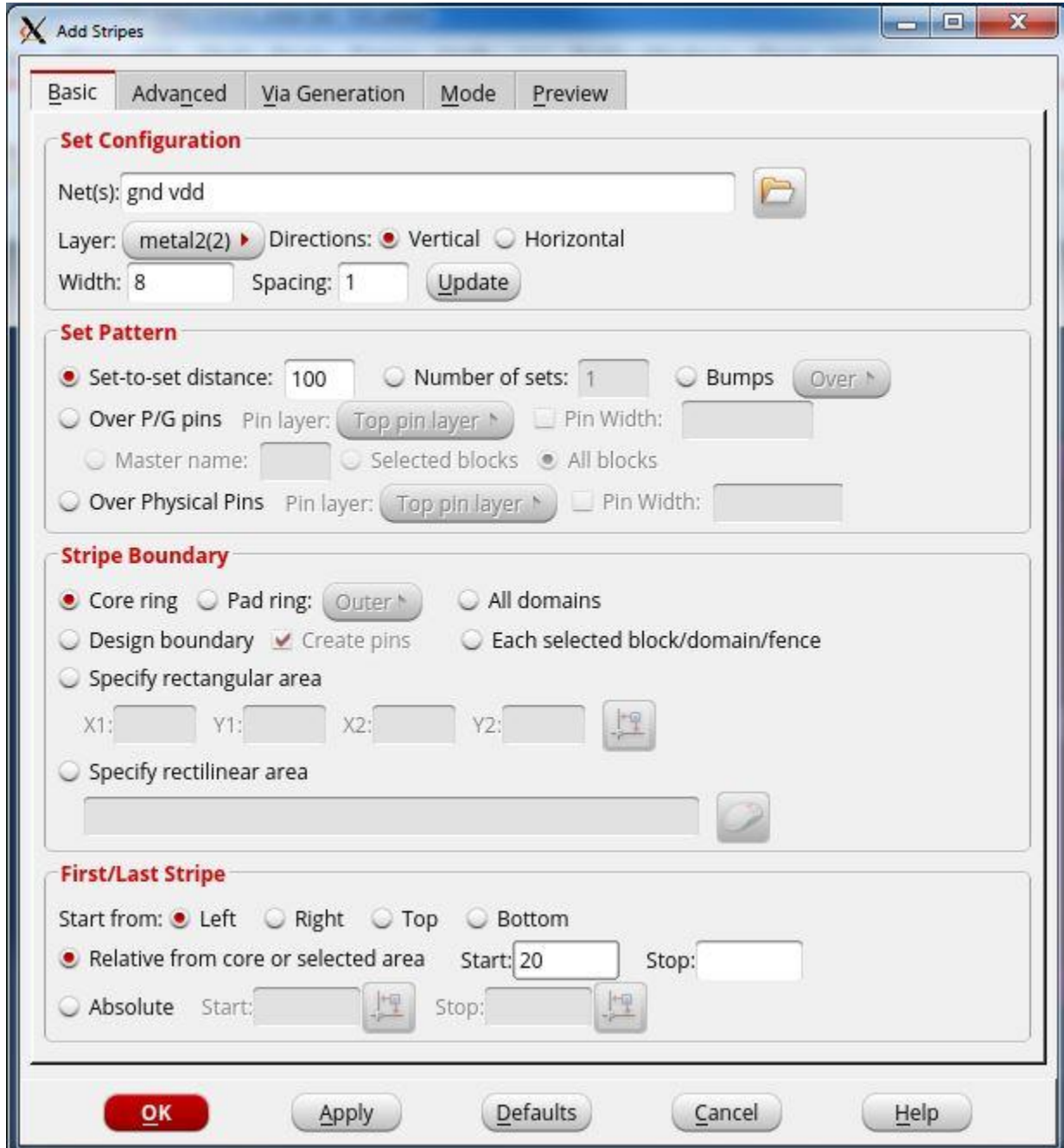
In Innovus tool menu bar, select **Power, Power Planning, Add Stripes** to get the **Add Stripes** window.

1. Basic Tab

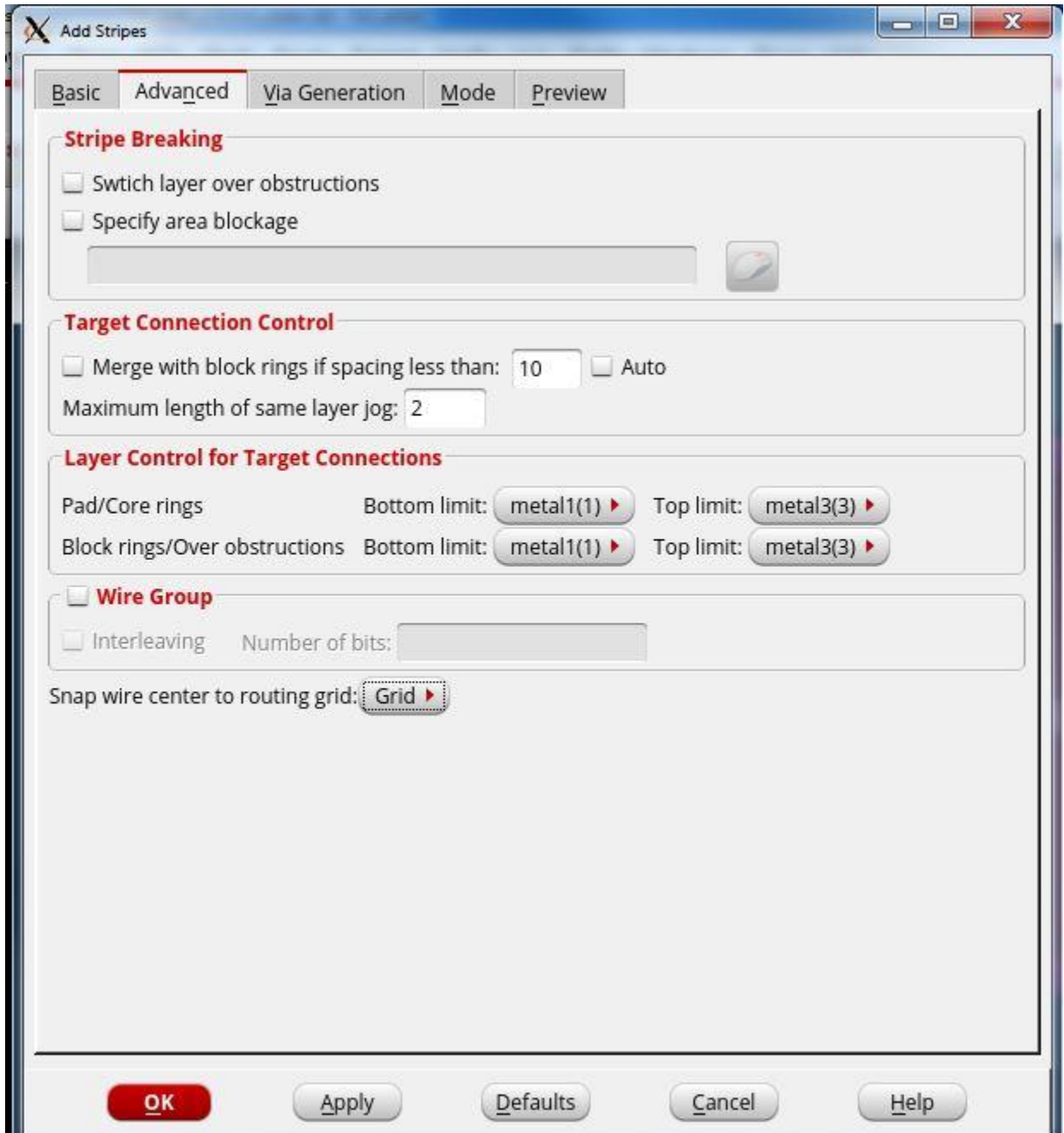
- a. For Net(s), enter **vdd** and **gnd** nets as follows:
 - i. Click on folder icon to the right of the **Net(s)** box to get Net Selection window
 - ii. Select **vdd** and **gnd** from Possible Nets column
 - iii. Click Add to copy to Chosen Nets column
 - iv. Click OK

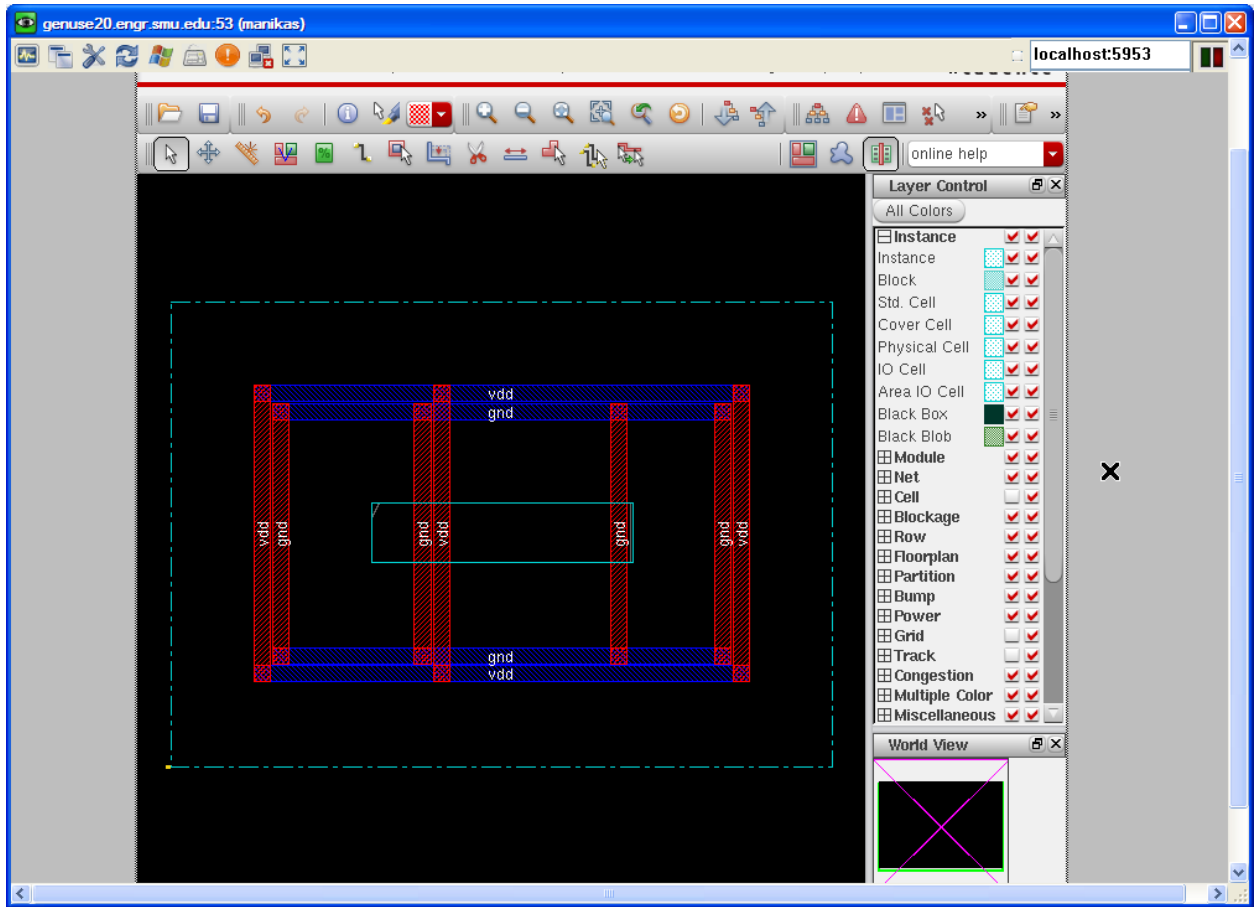


- b. In **Set Configuration**, select Layer metal2 and Direction vertical. Width should be 8 and Spacing should be 1.
- c. In **Set Pattern**, set Set-to-set distance to **100**
- d. In **First/Last Stripe**, select Relative from core or selected area, set start to **20**



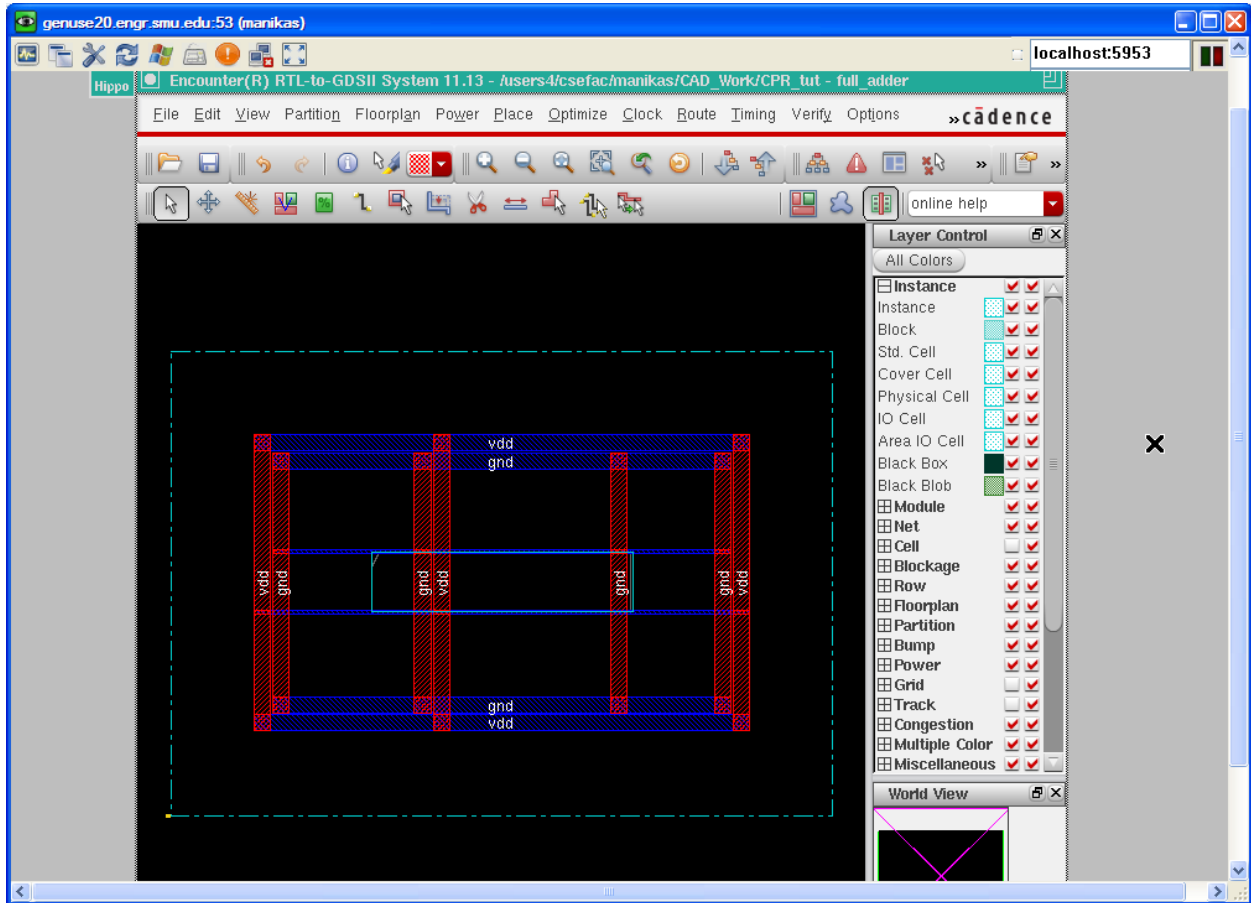
2. **Advanced** Tab
 - a. Set Snap wire center to routing grid as Grid
3. Click OK





4.4 Connect Power to Standard Cell Rows

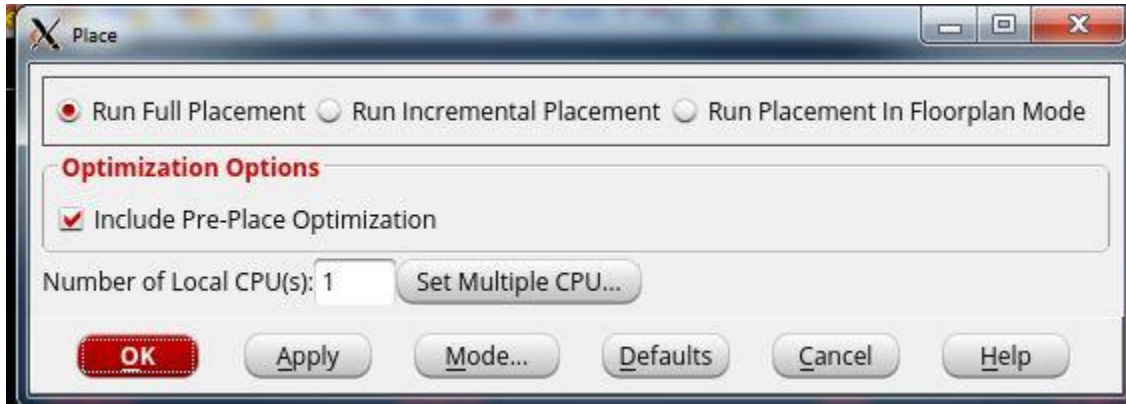
In Innovus tool menu bar, select **Route, Special Route**, and click OK. This will create power (vdd) and ground (gnd) rails for your standard cell rows. **Save your design using the procedure described in Section 0 above.**



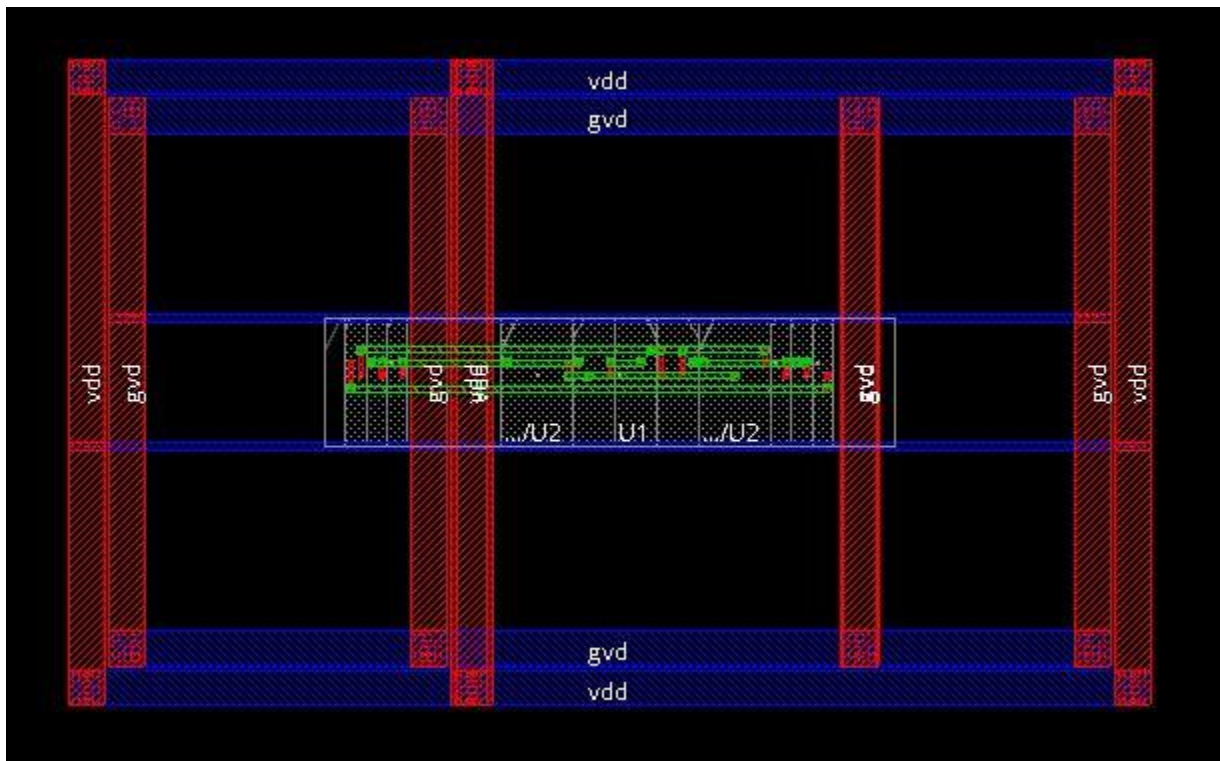
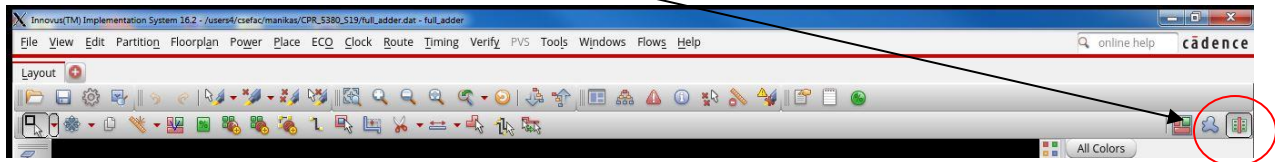
5 Placing the Standard Cells

In Innovus tool menu bar, select **Place, Place Standard Cell** to get the Place window.

1. Select “Run Full Placement” and “Include Pre-Place Optimization”
2. Click OK



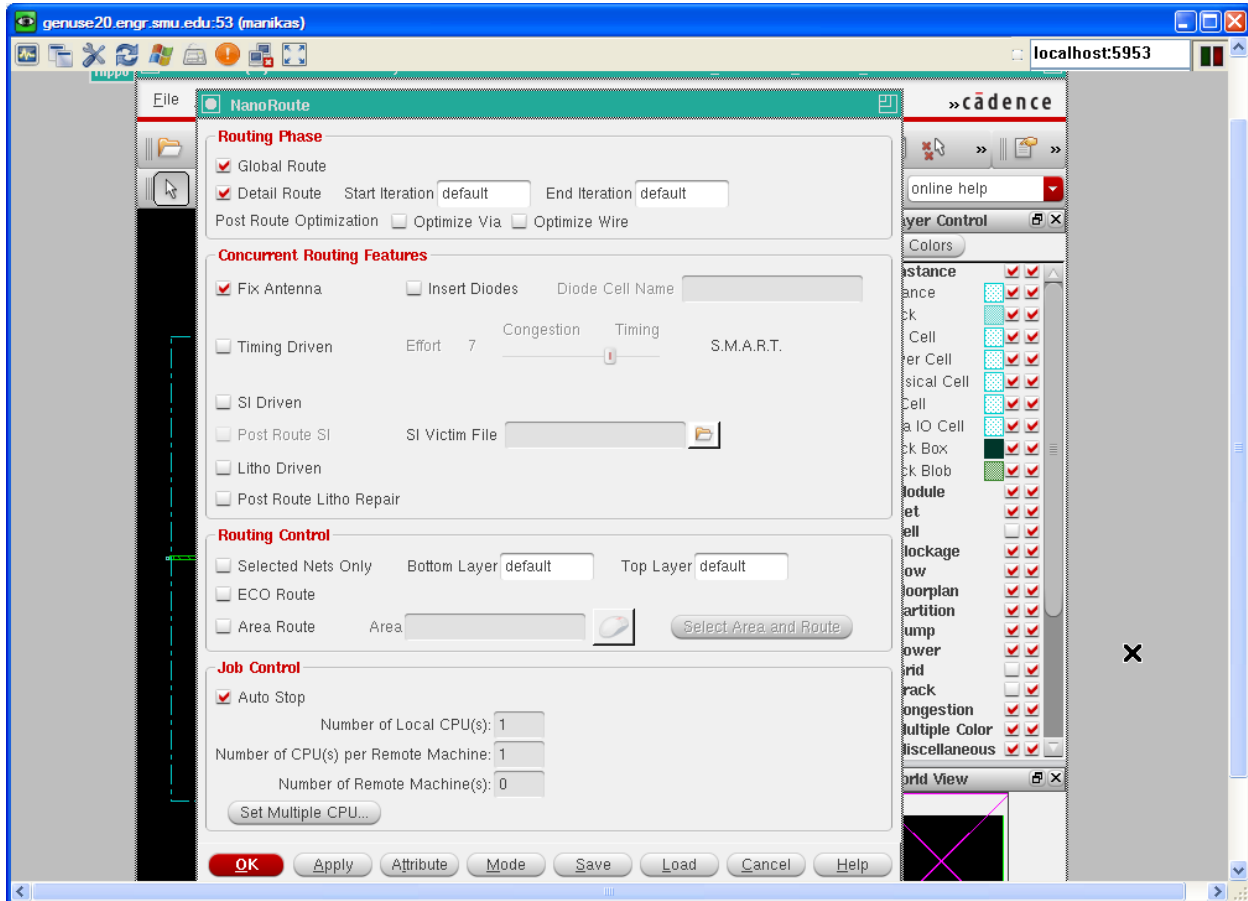
After cells are placed, change to **Physical View** in the Innovus Window to see placement results.

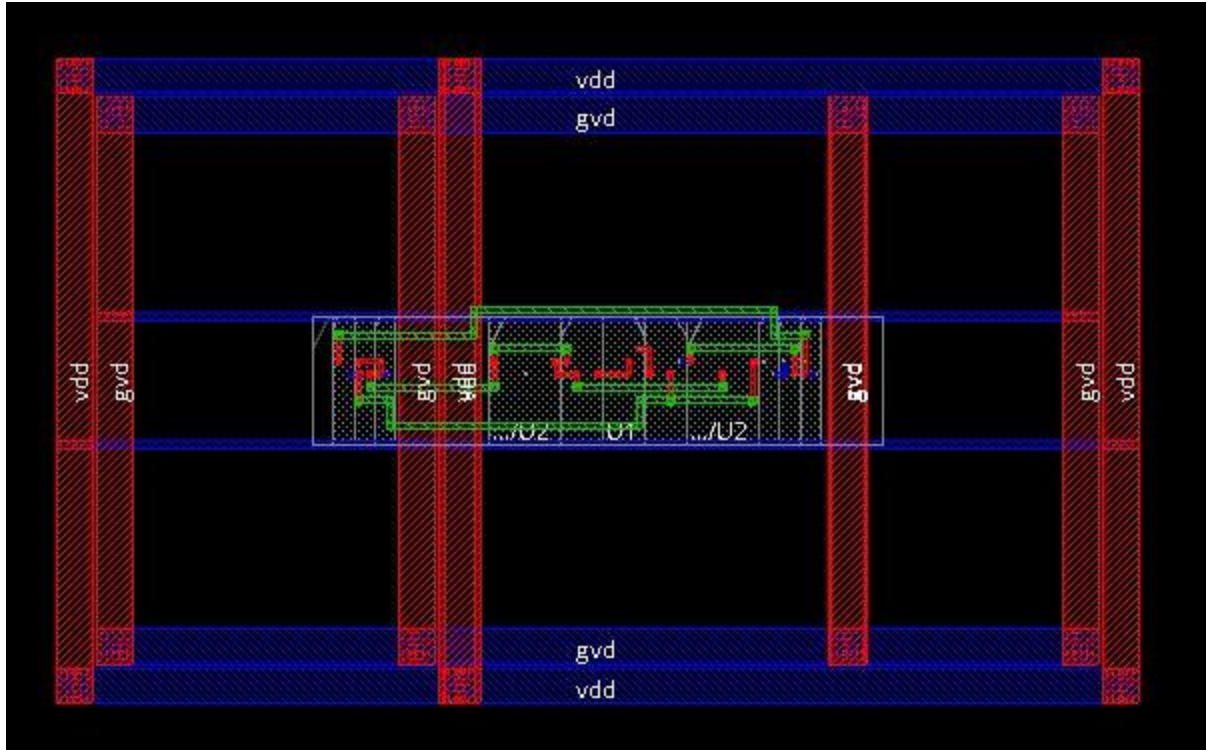


6 Routing

In Innovus tool menu bar, select **Route, NanoRoute, Route** to get the NanoRoute window.

1. Click OK.





7 Adding Filler Cells

1. Now that we have routed all the wires and placed all the cell in our design, we will add empty filler cells to the design. Select **Place, Physical Cell, Add Filler**.
2. In the Add Filler window, enter the Cell Name FILL and check Mark Fixed. Click **OK**.



3. Note that filler cells are added to the layout:

