



# Si2 OpenAccess Scripting Interface

A Fast and Easy Way to Use  
the Si2 OpenAccess Database

**Click the links and watch the videos**



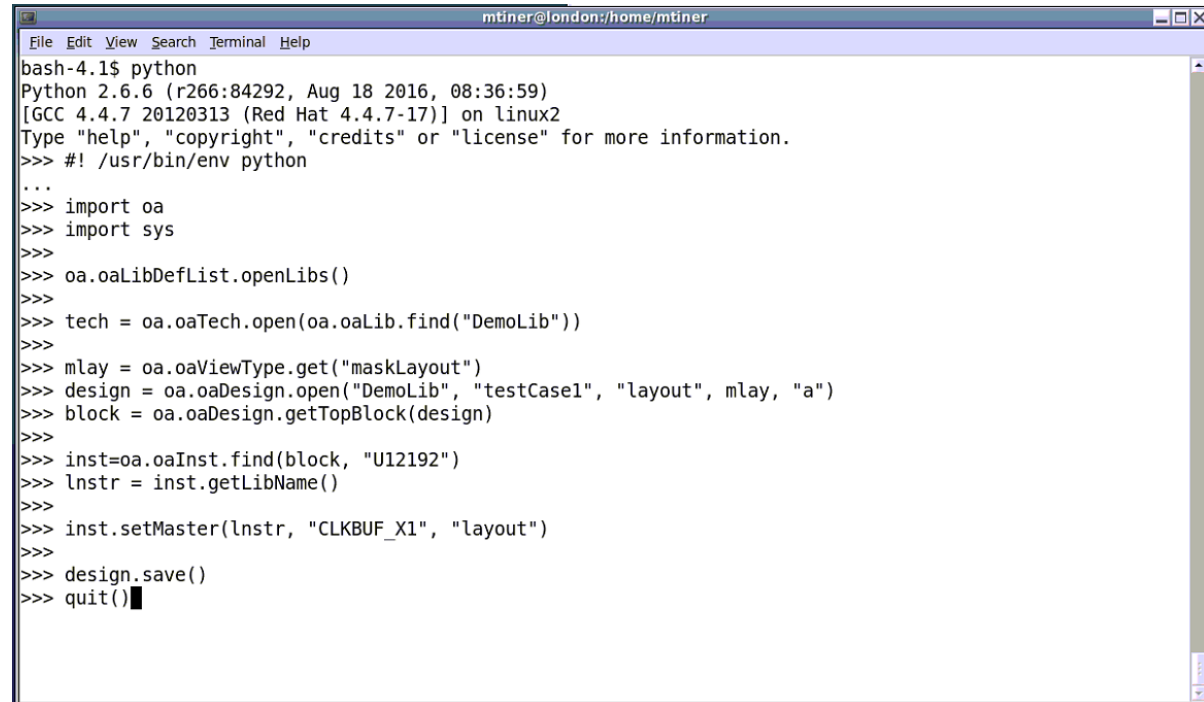
# Interrogate Design

Change a cell in a design layout from the shell in ten lines.

Search a 50,000-gate design and find a net with an electromigration failure.

After discovering the failure is inside a library book, incorrectly used, we simply swap the instance for the correct library book.

This is done directly from the python shell without even writing a script.



```
mtiner@london:/home/mtiner
File Edit View Search Terminal Help
bash-4.1$ python
Python 2.6.6 (r266:84292, Aug 18 2016, 08:36:59)
[GCC 4.4.7 20120313 (Red Hat 4.4.7-17)] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>> #! /usr/bin/env python
...
>>> import oa
>>> import sys
>>>
>>> oa.oaLibDefList.openLibs()
>>>
>>> tech = oa.oaTech.open(oa.oaLib.find("DemoLib"))
>>>
>>> mlay = oa.oaViewType.get("maskLayout")
>>> design = oa.oaDesign.open("DemoLib", "testCase1", "layout", mlay, "a")
>>> block = oa.oaDesign.getTopBlock(design)
>>>
>>> inst=oa.oaInst.find(block, "U12192")
>>> lnstr = inst.getLibName()
>>>
>>> inst.setMaster(lnstr, "CLKBUF_X1", "layout")
>>>
>>> design.save()
>>> quit()
```

<https://youtu.be/zK-6ykFCyTc>

# Counting FETs

Get the total FET area and count for a design layout directly from the shell.

Our Polygon Operators Extension to Si2 OpenAccess is also available in our Scripting Interface. This gives the user the power to perform shape manipulations on sets of polygons (figure sets).

In this demonstration we logically AND the poly shapes with the active shapes producing a new set of shapes defining all of the FETs in a 50,000-gate design.

Next, we logically AND the FET shapes with the nwell shapes to get the P-channel FETs.

Finally, we use the count and area methods to get exact counts and area for both P-channel and N-channel FETs.

## 5.2.1.1 AND

The "AND" Boolean operation (OpenAccess oacAndLayerOp) creates shapes that correspond to the common areas of both FigSets.

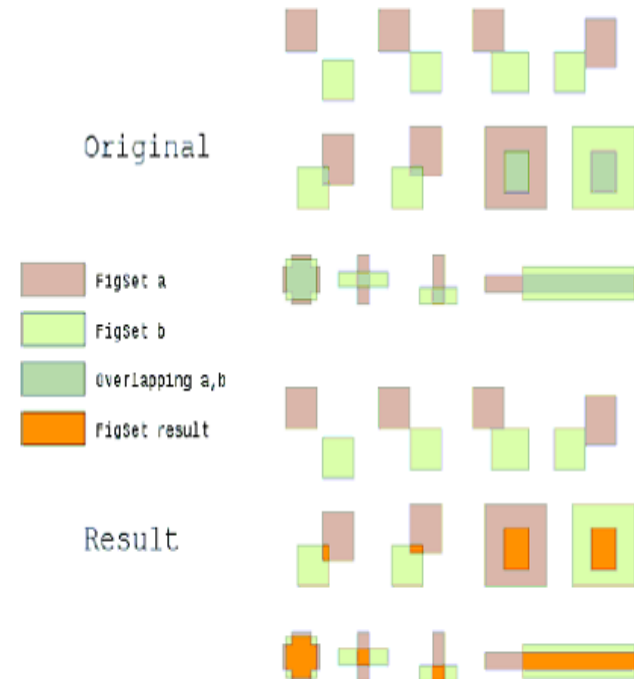


Figure 5.2: The following figure shows the shapes resulting from "AND" output.

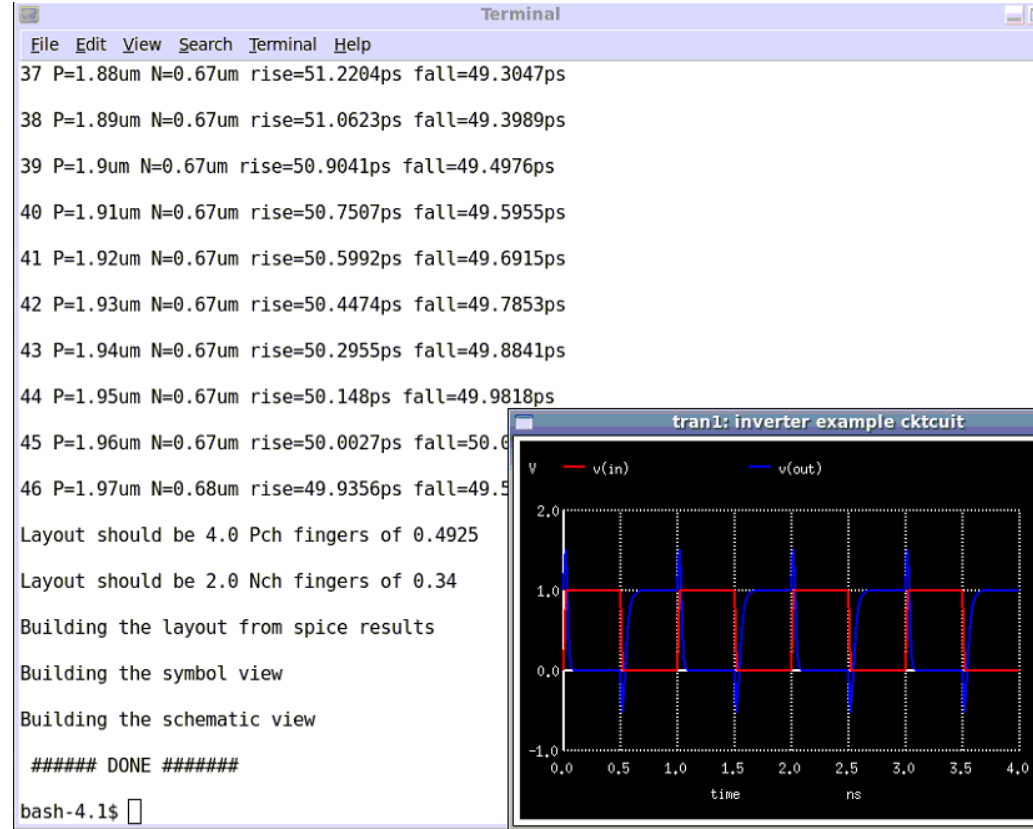
## Two Tool Interoperability

Use another tool to act on a design from the same shell.

Si2 OpenAccess is known for enabling tool interoperability. This demonstration shows an additional kind of interoperability between design tools.

The shell provides a common ground to run Ngspice from the same script where we build the layout, schematic, and symbol for the design simulated in successive runs of the Ngspice simulator.

We ultimately produce a symmetric inverter design for a library, on the fly, from a python script.



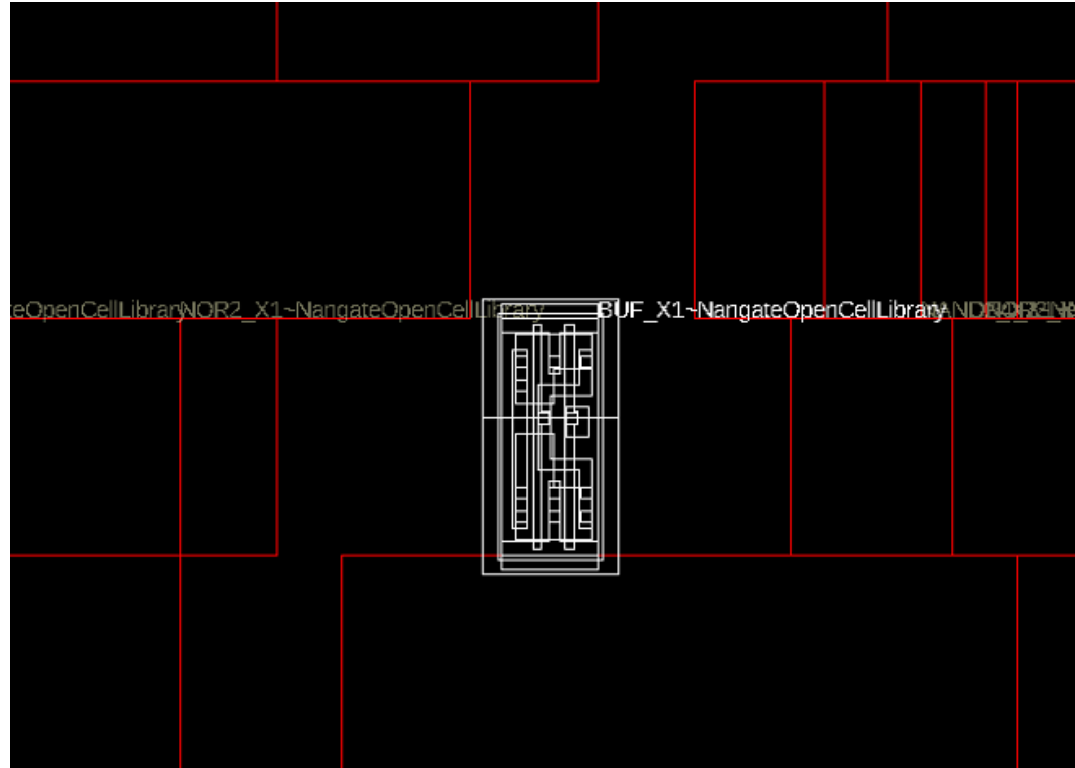
## Wiggleroom

Find the available adjacent space to a layout cell from the shell.

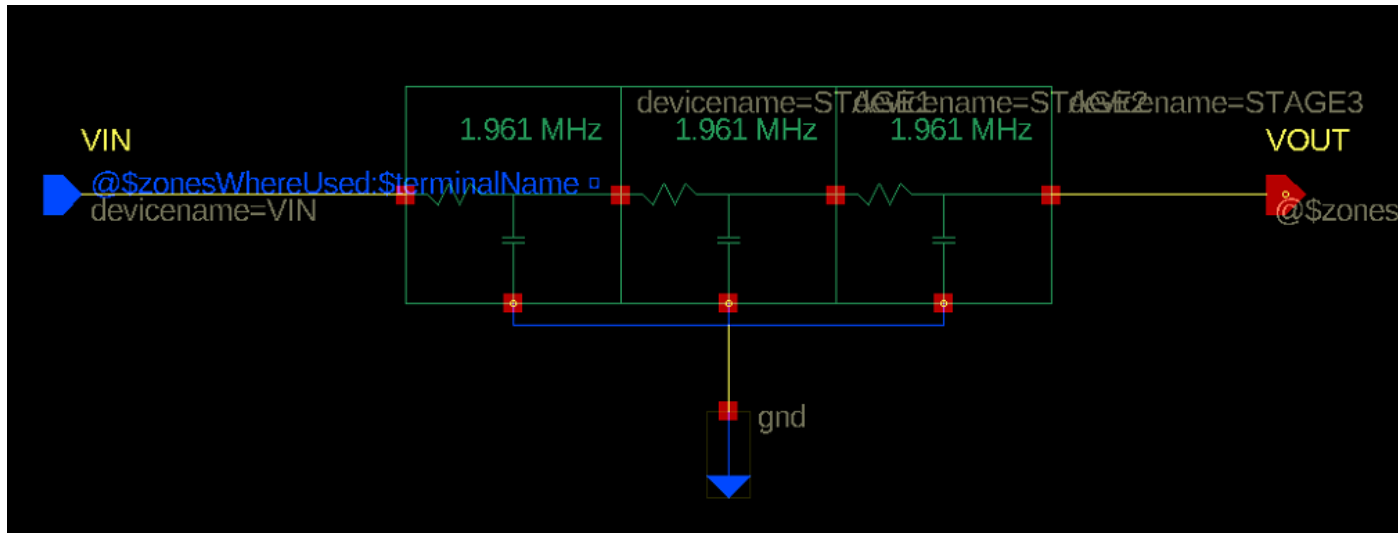
In a digital design there are cases where you need to make an emergency change and you need just a little more room. In this demonstration we write a script to locate a cell and find all its neighboring cells.

Next we look through the list of neighboring cells, find the closest neighbors, and then calculate how many adjacent placement grids are available. Call it *wiggleroom*, a *shoe-horn*, or just *a squeeze it in*. It happens.

Here we speed up the search by using the power of the Polygon Operators Extension to search, using figure sets detected touching a resized version of our selected cell.

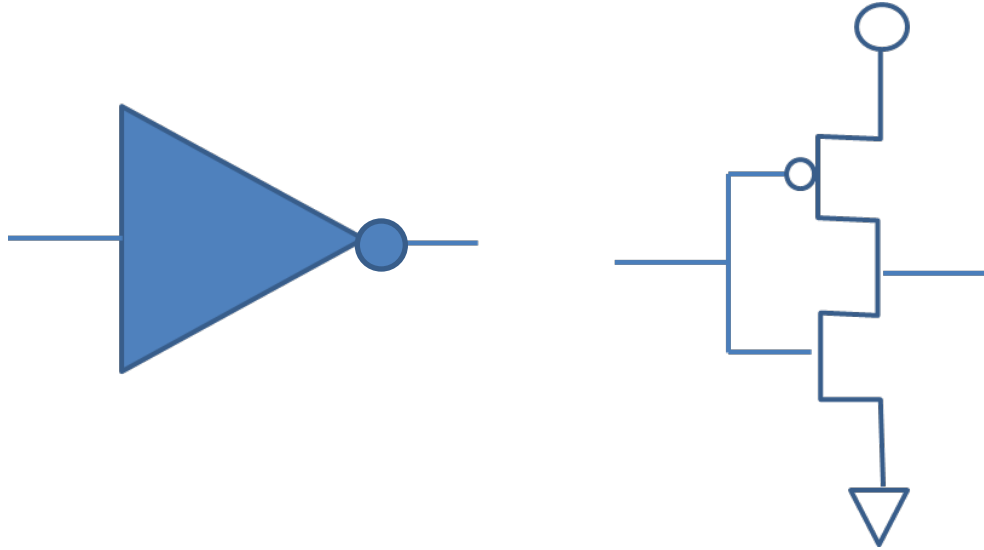


# Low Pass Filter



- ❑ Building a Low Pass Filter can be tedious. As you add stages the frequency is reduced, so you design each stage to a higher target. If the target is too high another pass is needed.
- ❑ The RC product is what defines the 3db frequency but that must be planned at minimum C to reduce the final physical design size.
- ❑ We use a script to build our library stage, then another script to combine them into a final design.

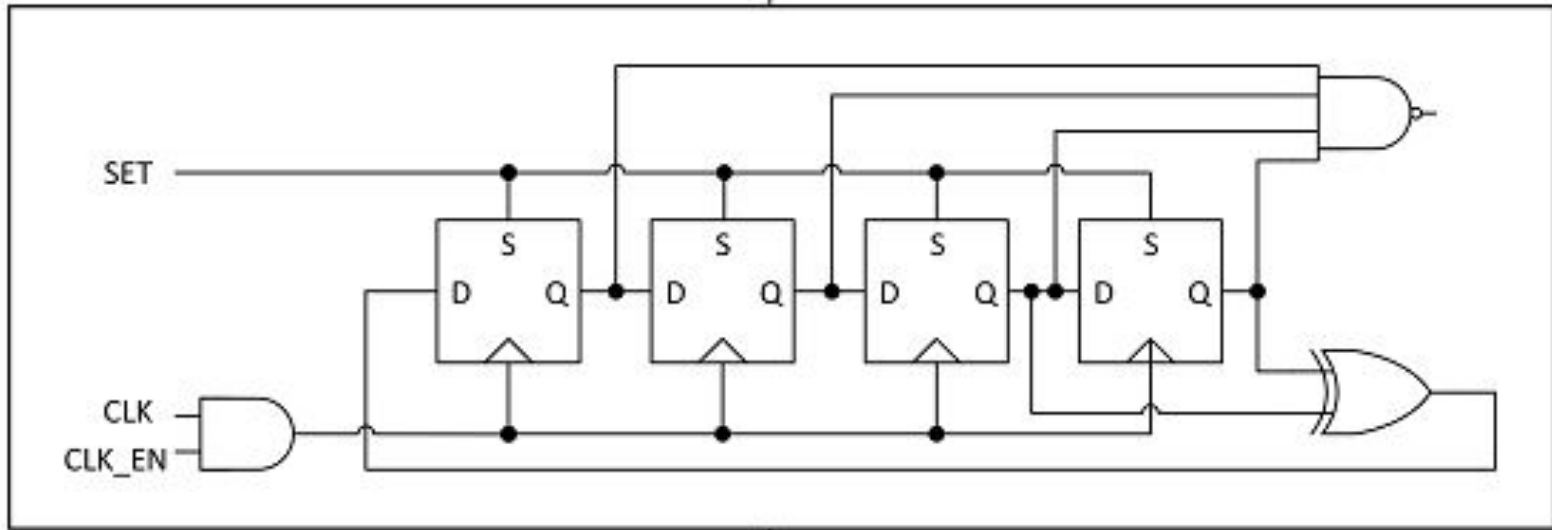
# Build A Simple Inverter



Write a script to build a simple inverter and see how it is done in python.

Perhaps the script could be reused on the next technology.

# Design From The Shell?



Can you do a design from the shell?

Sure you can.

Watch us build an LFSR design from shell scripts.