VLSI
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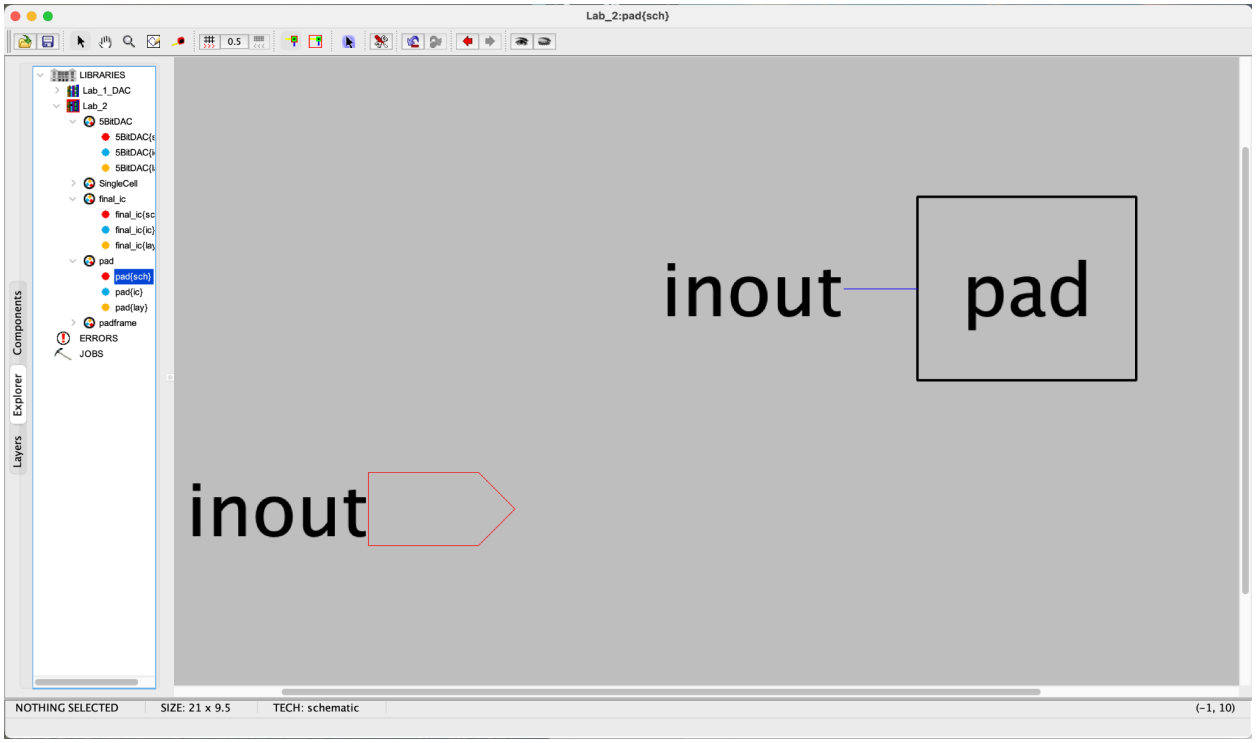
Lab 2: DAC

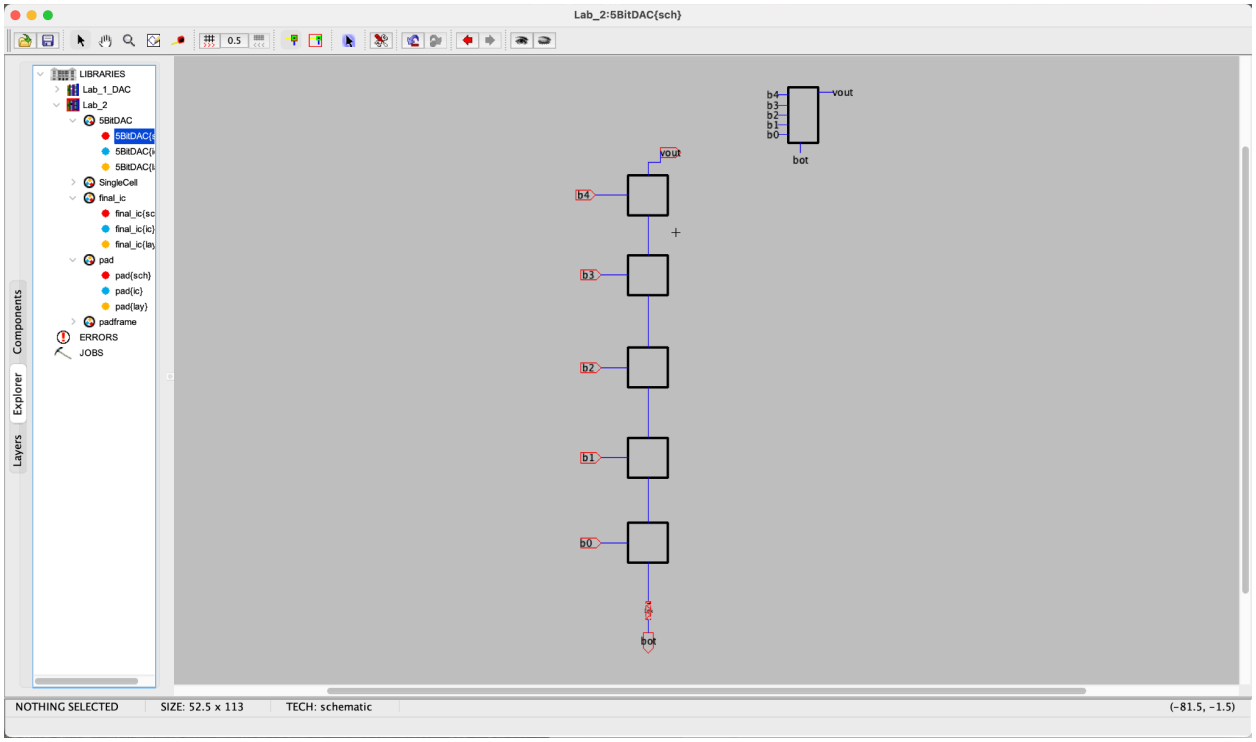
Introduction:
In this lab I was tasked to create a pad frame that would work to hook up the 5bit dac that I created in the last lab. Firstly I was able to use the general pad from the in class work, so that gave me the base pad layout. During the work process I will need to determine the number of pads necessary, lay them out in a square then connect each of the pads to an output of the DAC. I will also need to adjust the DAC to take in a gnd input.

Lab work:

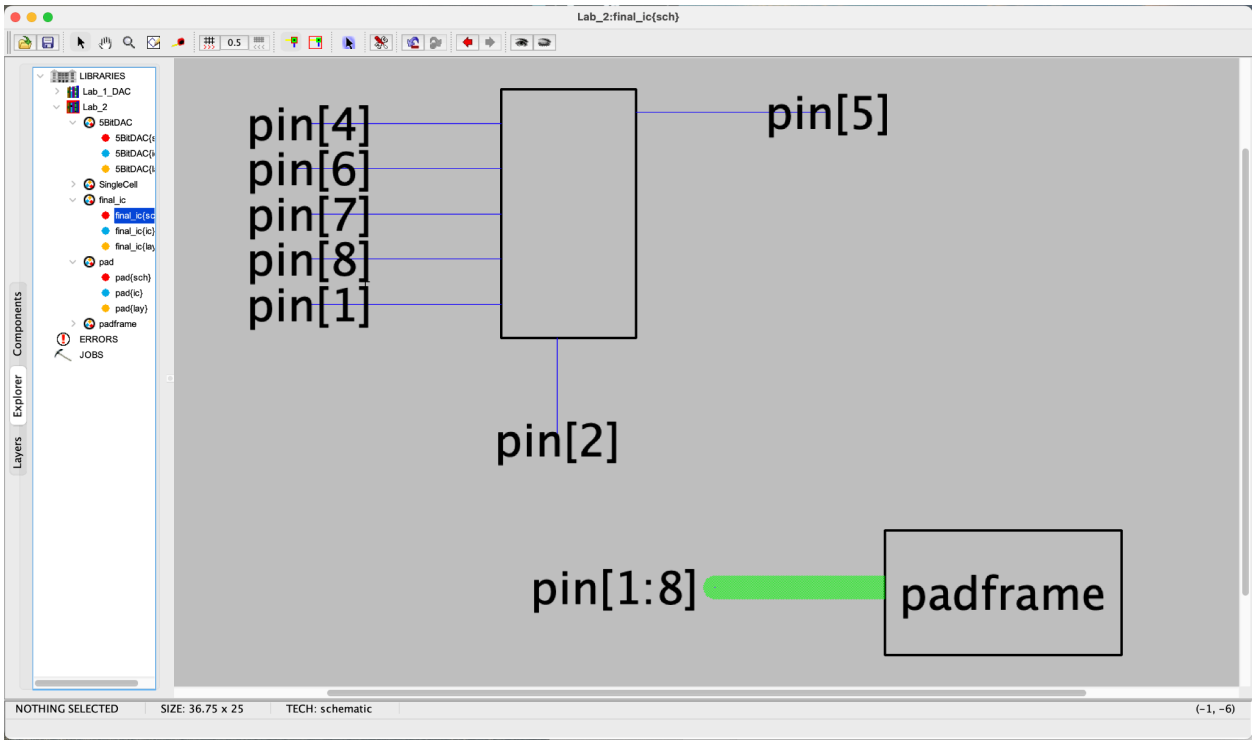
SCHEMATIC
- The schematic of the pad cell



- The schematic of the DAC



- The schematic of the padframe with the DAC. The padframe should be a square and you should design it to have the minimum number of required pad cells to connect all the DAC pinouts.

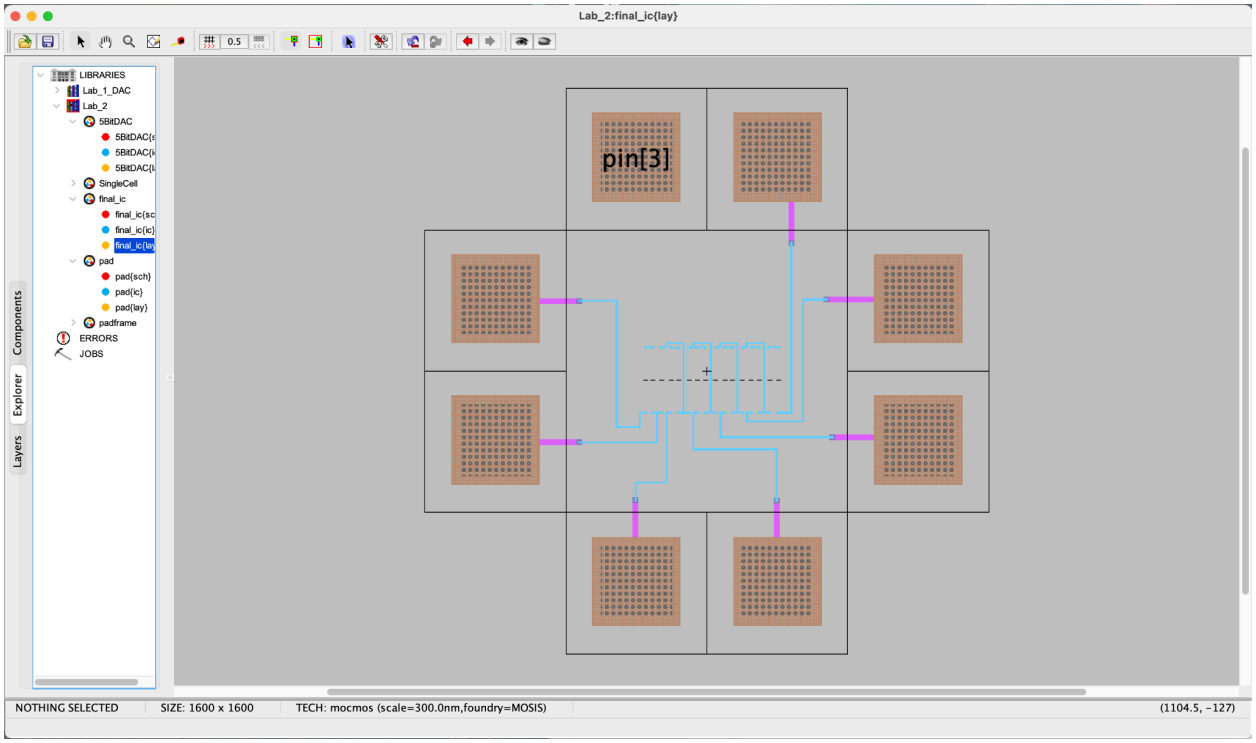


- All necessary explanations to support all the decisions taken during the design of the schematics.

So as I said in the intro I was able to reuse the design of the pad from the in class work we did. Basically it's just an export (for that schematic). The schematic for the DAC was recycled from the previous lab as well. to use it I just dropped in the collection for each module of the dac (1 through 5) and then the collection of the 5 bit DAC itself. There was a slight modification for the schematic for the 5 bit DAC, instead of putting a ground for the bottom pin, I created export pin[2], which is there the ground from the package would theoretically route to. From there I created a schematic for the padframe, in it is the icon of the 5 bit DAC and the icon for the single pad. The green line shows that there are 8 of these pad's (pins 0 through 7). Now all there was to do is layout all 8 pads, place the DAC in the centre and connect the pins of the DAC to the pins of the pads.

LAYOUT

- The layout of the padframe with the DAC inside of it.



- All necessary explanations to support all the decisions taken during the design of the layout.

The process of making the layout was fairly smooth. I really appreciated when you (Prof Goncalo) helped us understand the purple wire and metal 1-metal 2 conn, that was key! So to make the layout all I needed to do is place one pad on the layout, then make a 4x4 array, delete then corner and center pads, and take care of any stray duplicates. From there I then places the layout of the 5 bit dac in the center of the pads, zoomed all the way in, and extended the in/out's from the DAC to be able to easier see them. Then I determined which pad to leave empty (pad 3) as there are only 7 outputs. I then selected the metal-2 arc wire and extended them out a little ways out from each pad I was using. Then placed a metal 1-metal 2 conn for each metal-2 arc wire. Then routed each in/out to

a metal 1-metal 2 conn, making sure to never cross over a wire anywhere. Overall not too bad.

Conclusion:
Overall this lab wasn't bad at all. It really helped to be in person during the friday lab session. I got a lot of good advice and pointers on how and exactly what I needed to do for the lab. That made the progress smooth, and combined with the greater experience I have from lab 1, everything went well. I think through the process of this lab that I have a better idea of how pad and IC routing works in VLSI.