VLSI Designs

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Submitted To:

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CEP Report

4-Bit ripple carry Adder

Introduction:

In this project we are designing the1.5 x 1.5 mm 40-pin MOSIS “TinyChip” fabricated Fast adder. Ripple carry is a type of electronics adder used in digital logic. A ripple carry adder is a logic circuit in which the carry-out of each full adder is the carry in of the succeeding next most significant full adder. It is called a ripple carry adder because each carry bit gets rippled into the next stage.

Project Plan:

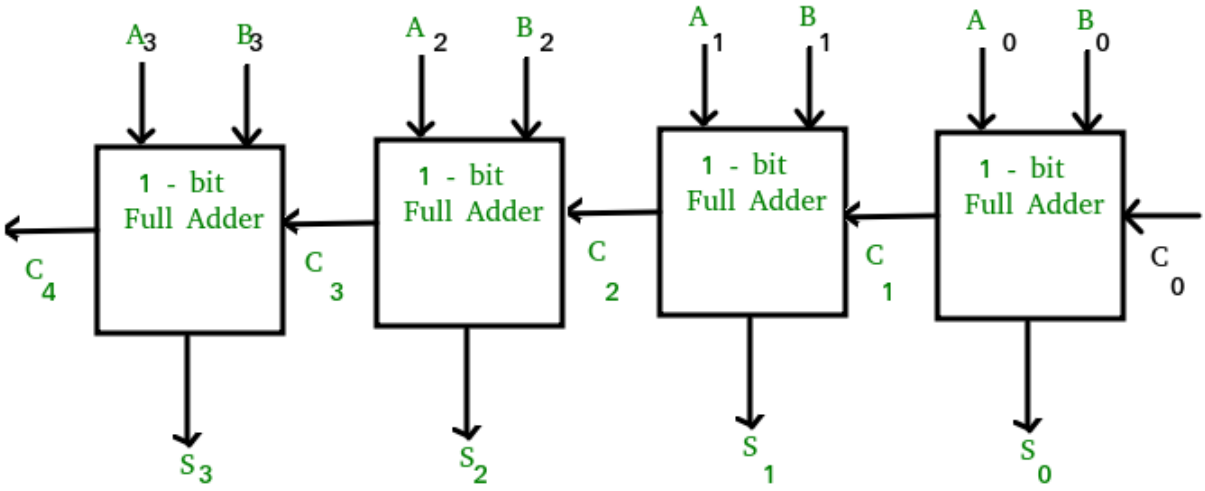
To design the Operational amplifier the software we are using is “Electric VLSI”.

- First of all we will create the schematic for the circuit. For this, 1-Bit full Adders will be created first in order to use them is series to complete the circuit.
- After schematic, layout for the circuit will be created with proper defined Euler’s path.
- Then Layout in a padframe and finally generating GDSII file for fabrication.

Design Strategy:

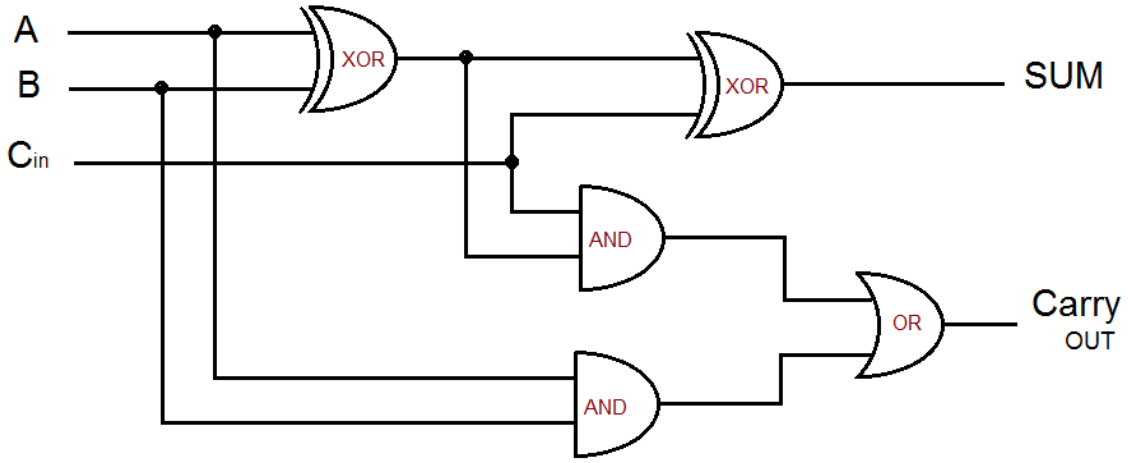
We are creating CMOS design for Ripple Carry adder.

We have created the schematic for ripple carry adder using the 4 full adder. For Full adder we used the standard gates of electric VLSI and created the schematic and layout for full adder.



Ripple Carry Adder Diagram

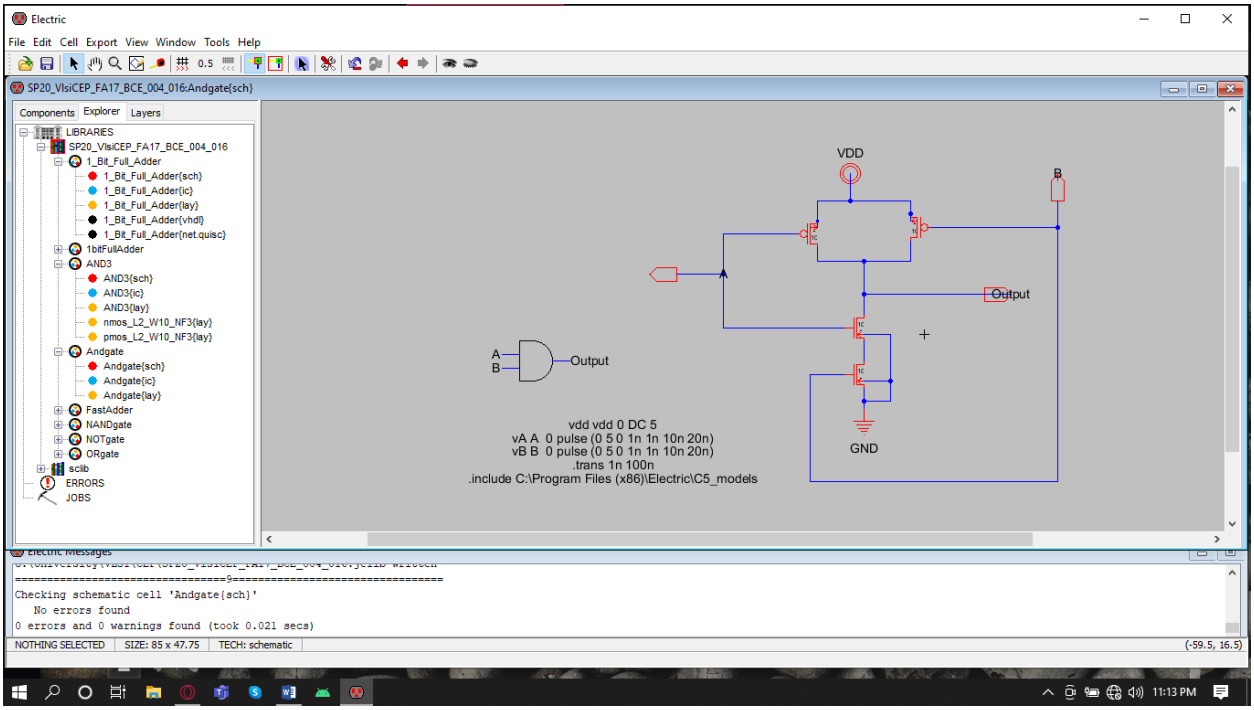
Full Adder:



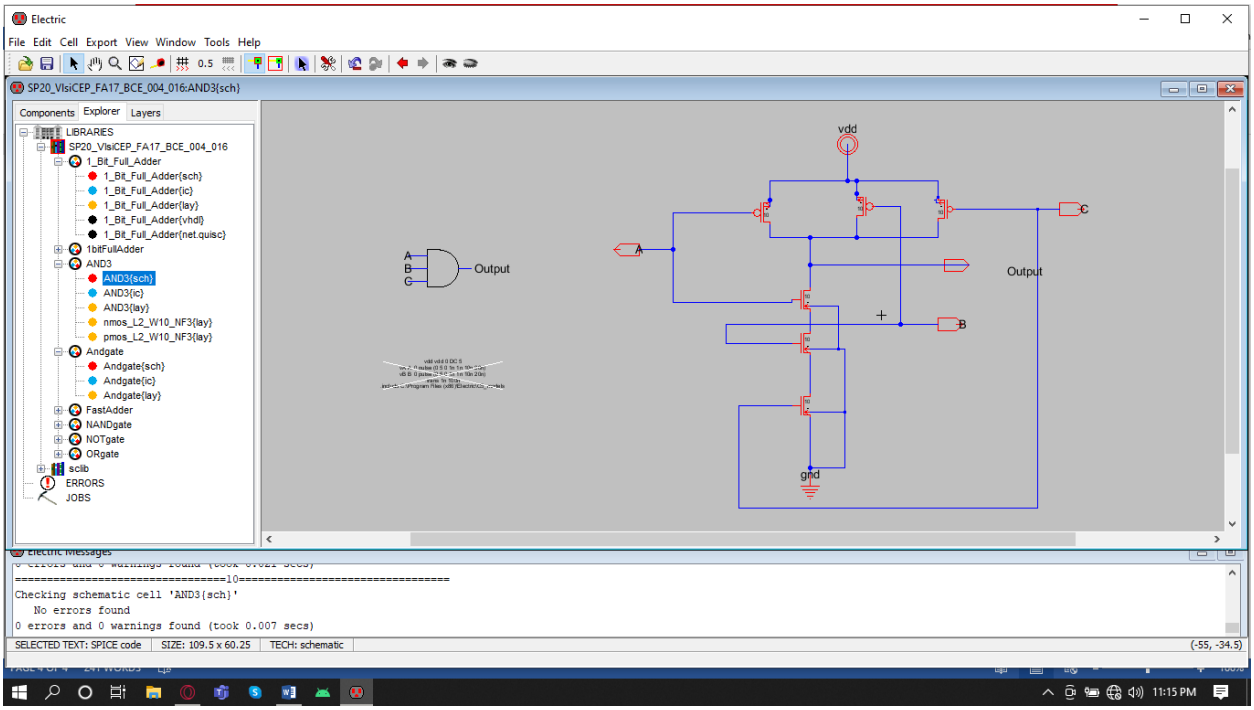
Full Adder

Schematic and Icon View:

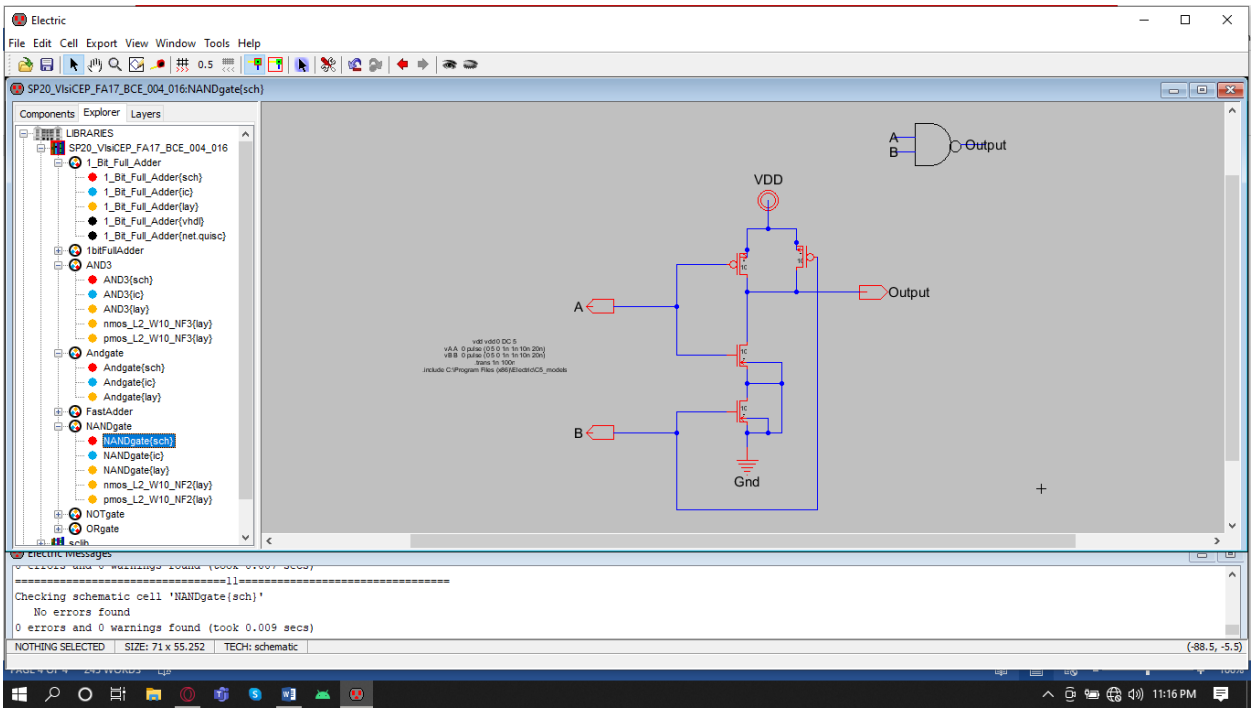
AND Gate with 2-inputs:



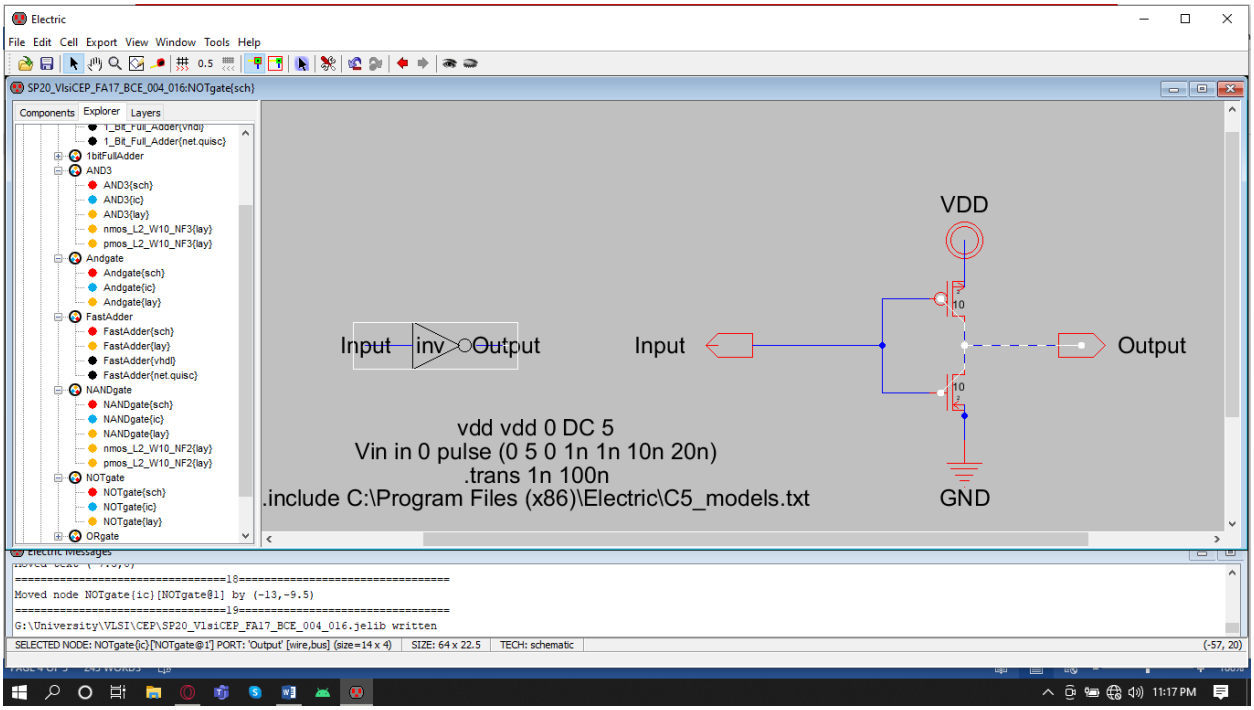
AND Gate with 3-inputs:



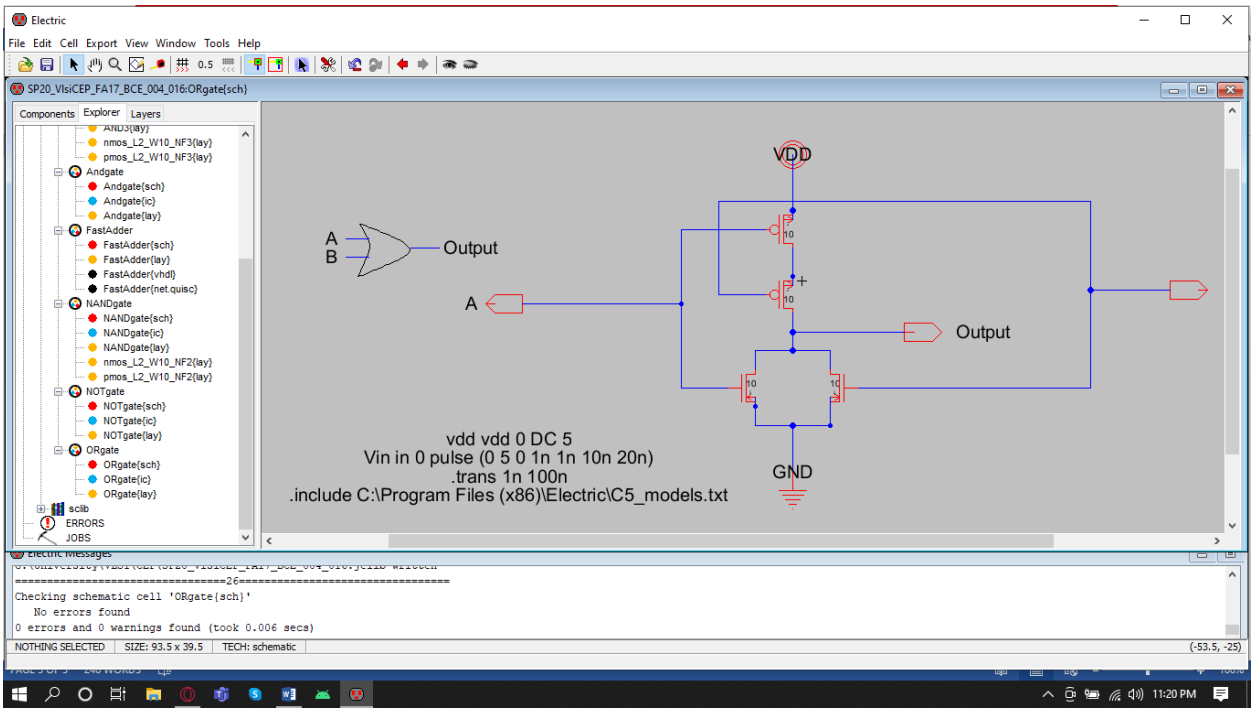
NAND gate:



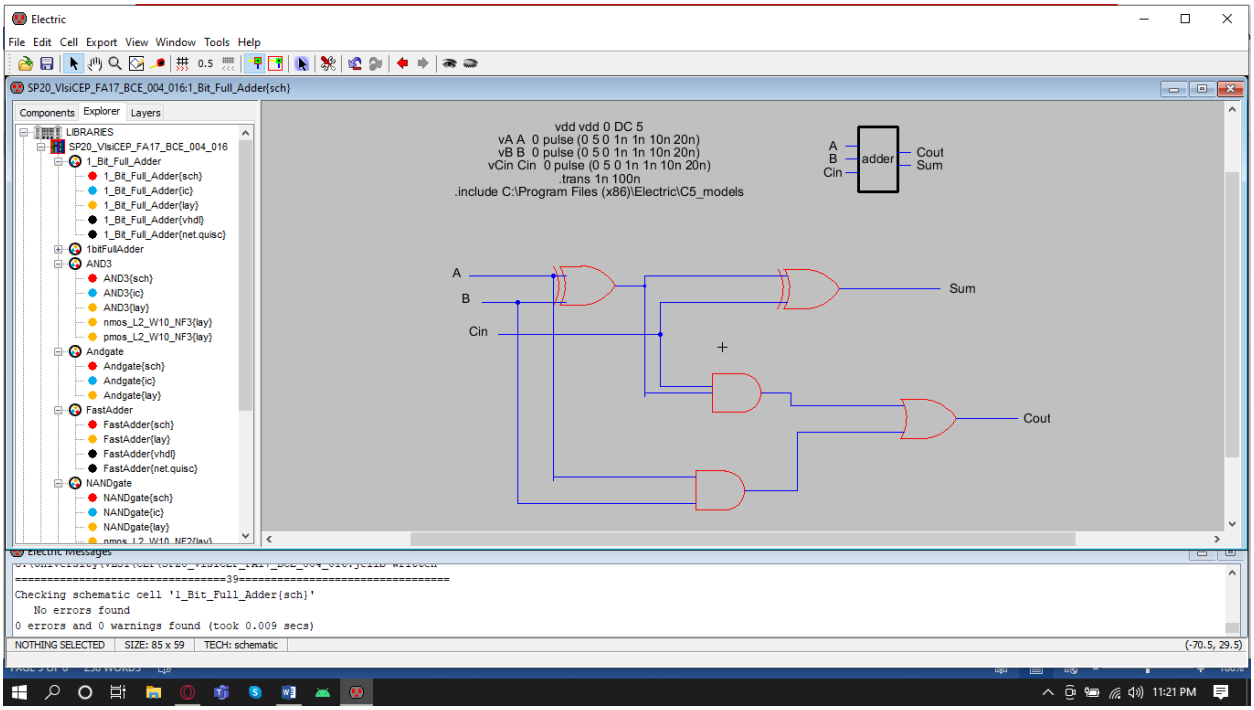
Invertor:



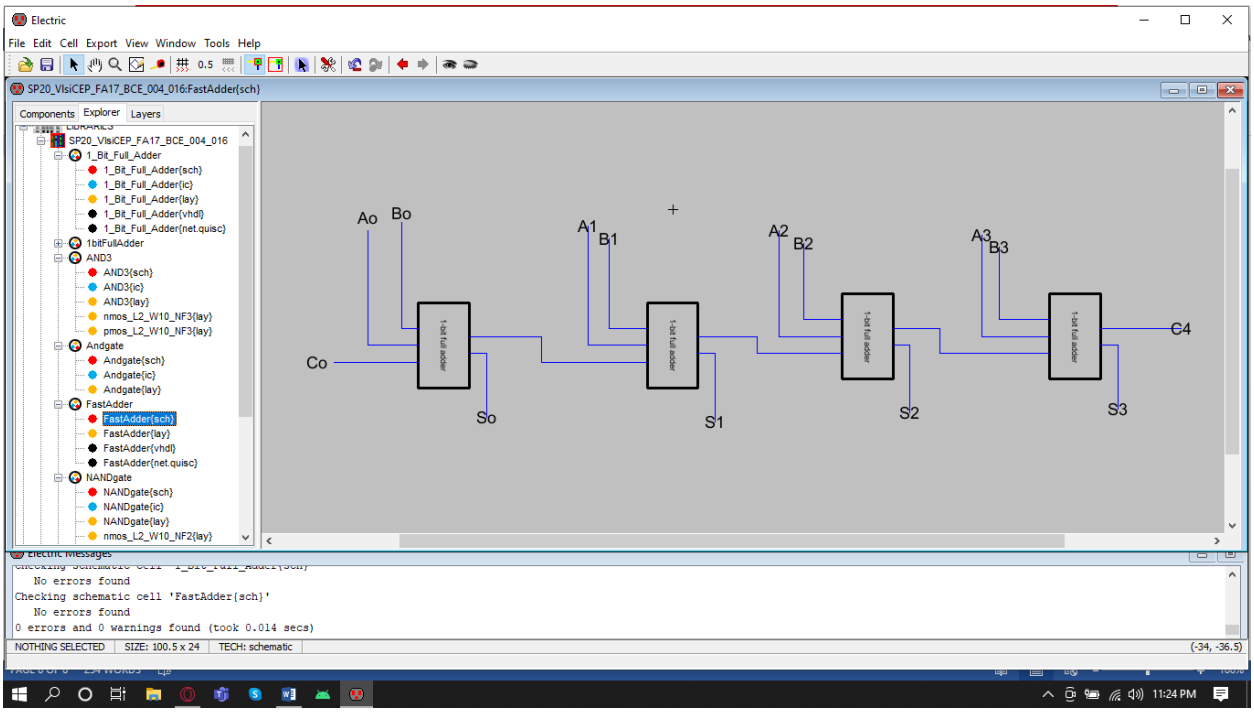
OR gate:



1-bit full adder:

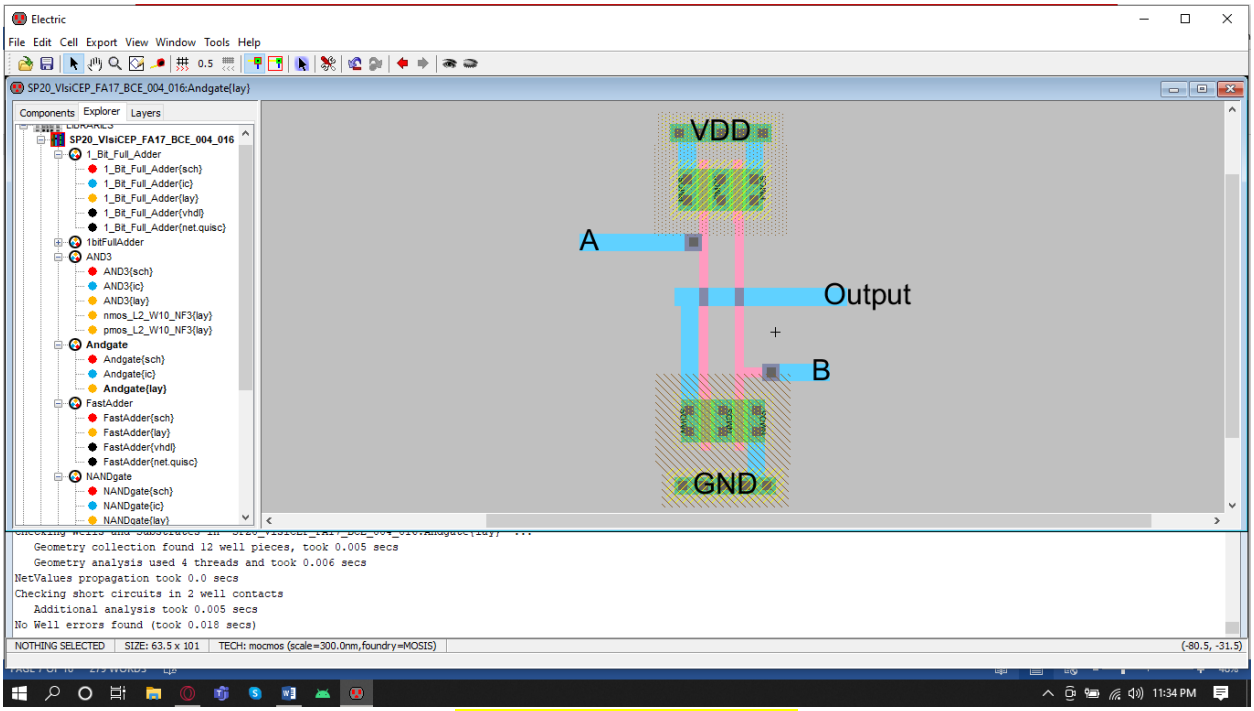


4-bit Ripple Carry Adder:

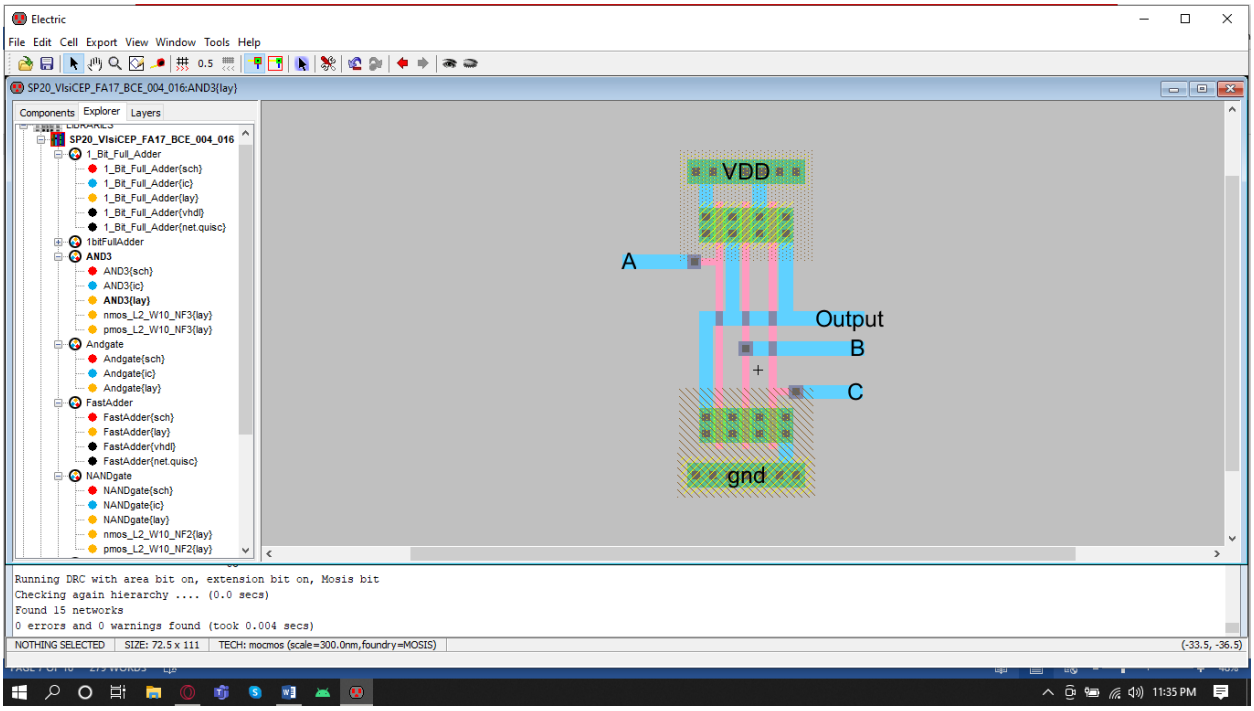


Layout View:

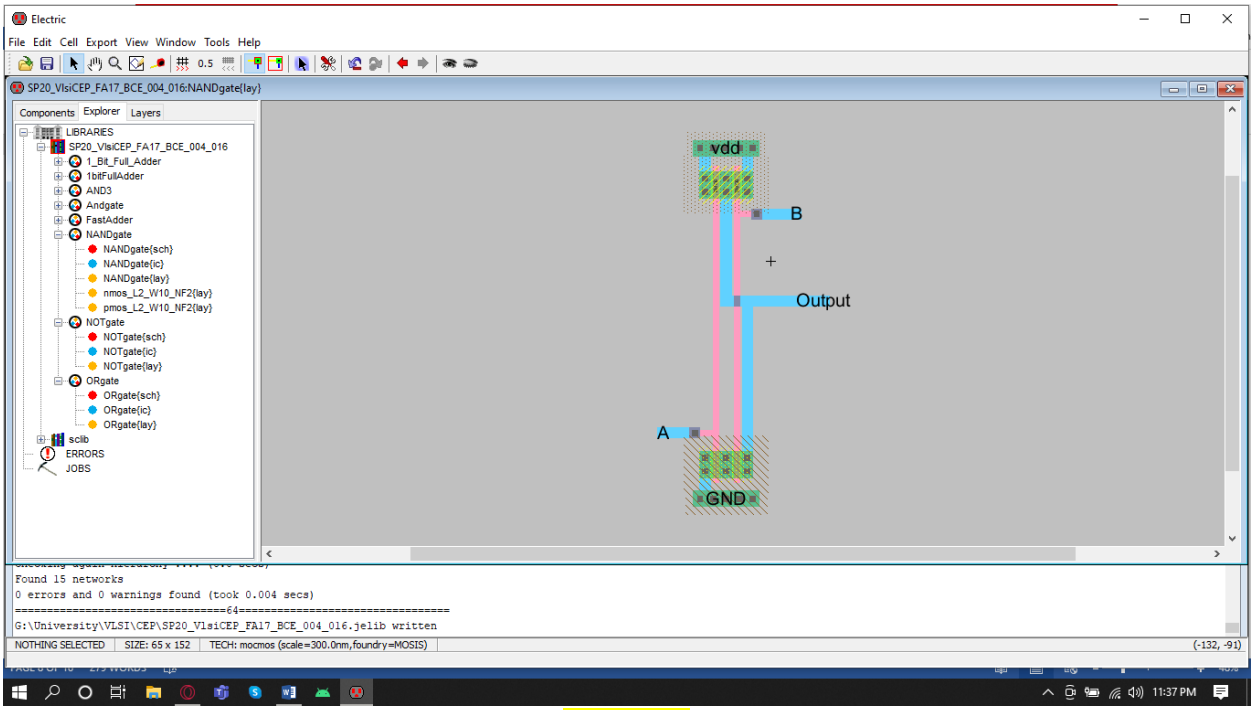
AND Gate with 2-inputs:



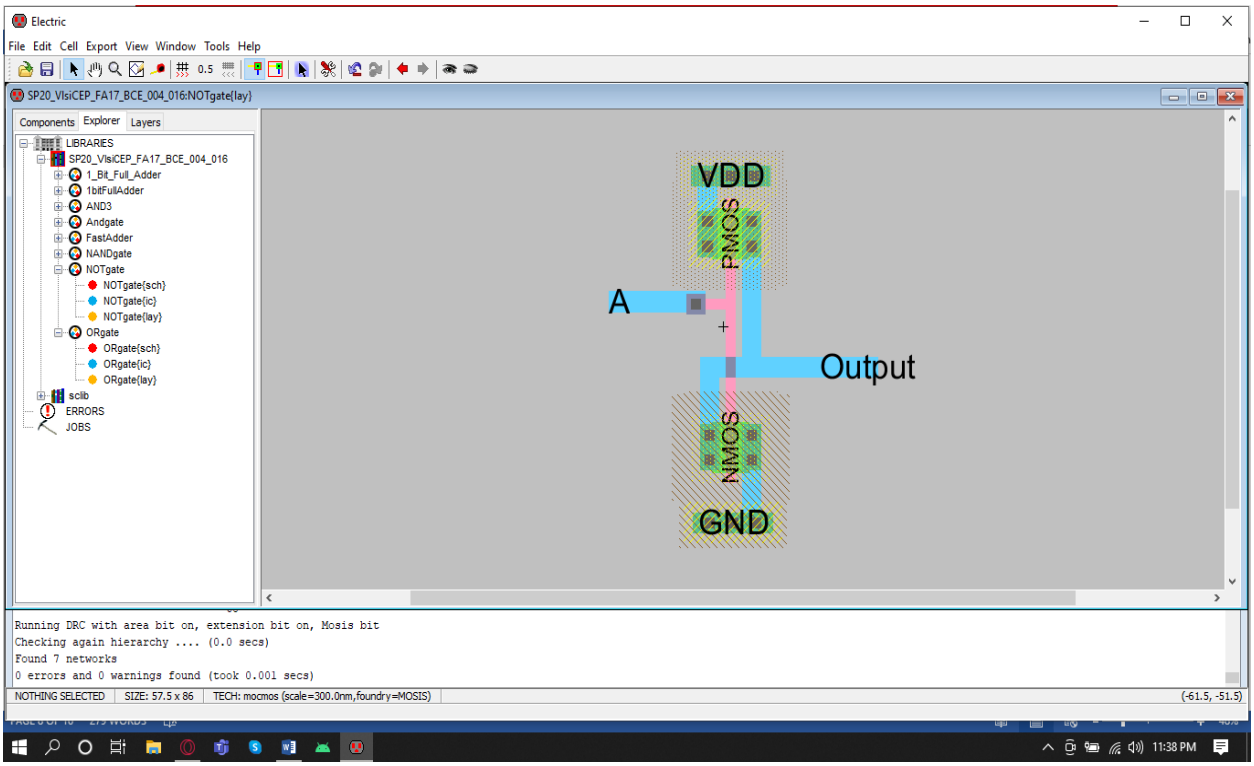
AND Gate with 3-inputs:



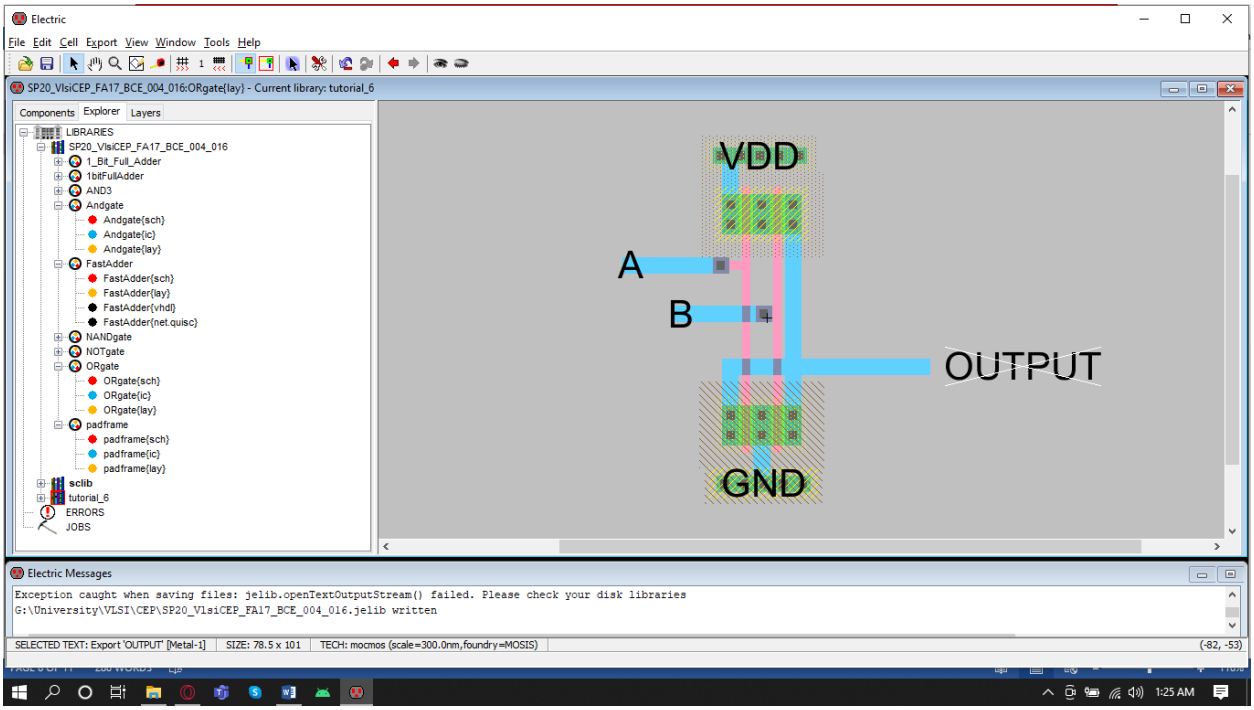
NAND gate:



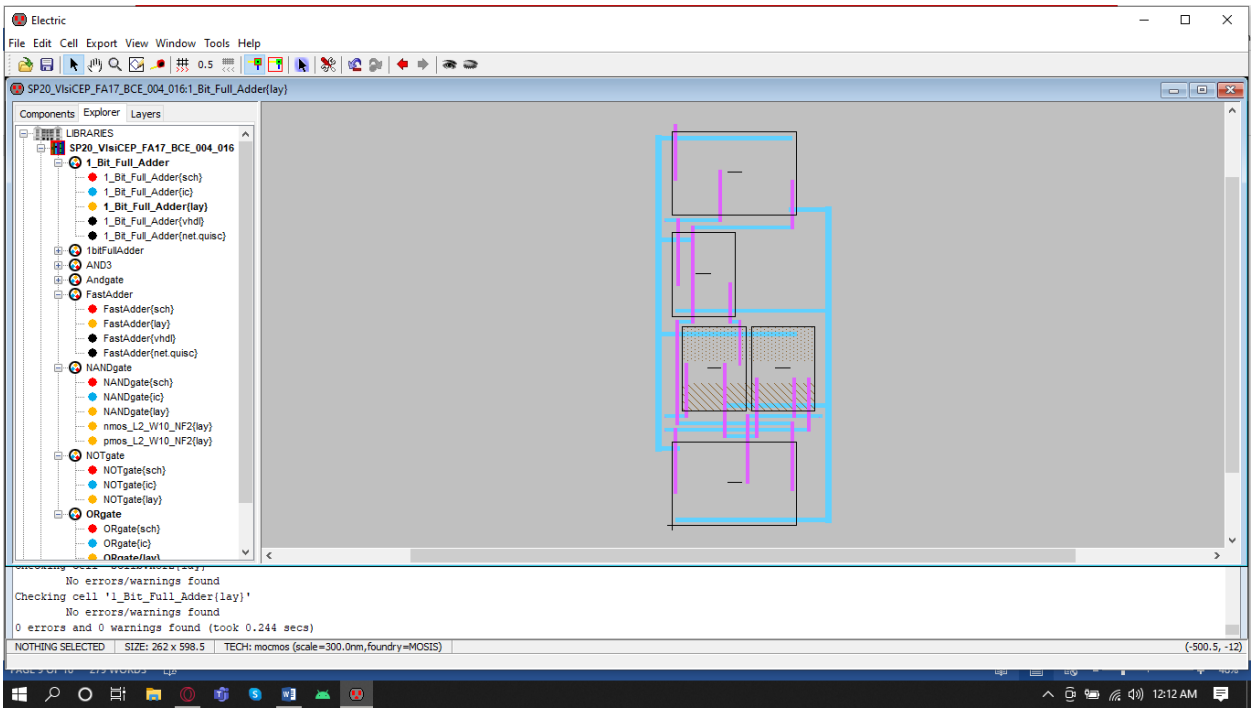
Invertor:



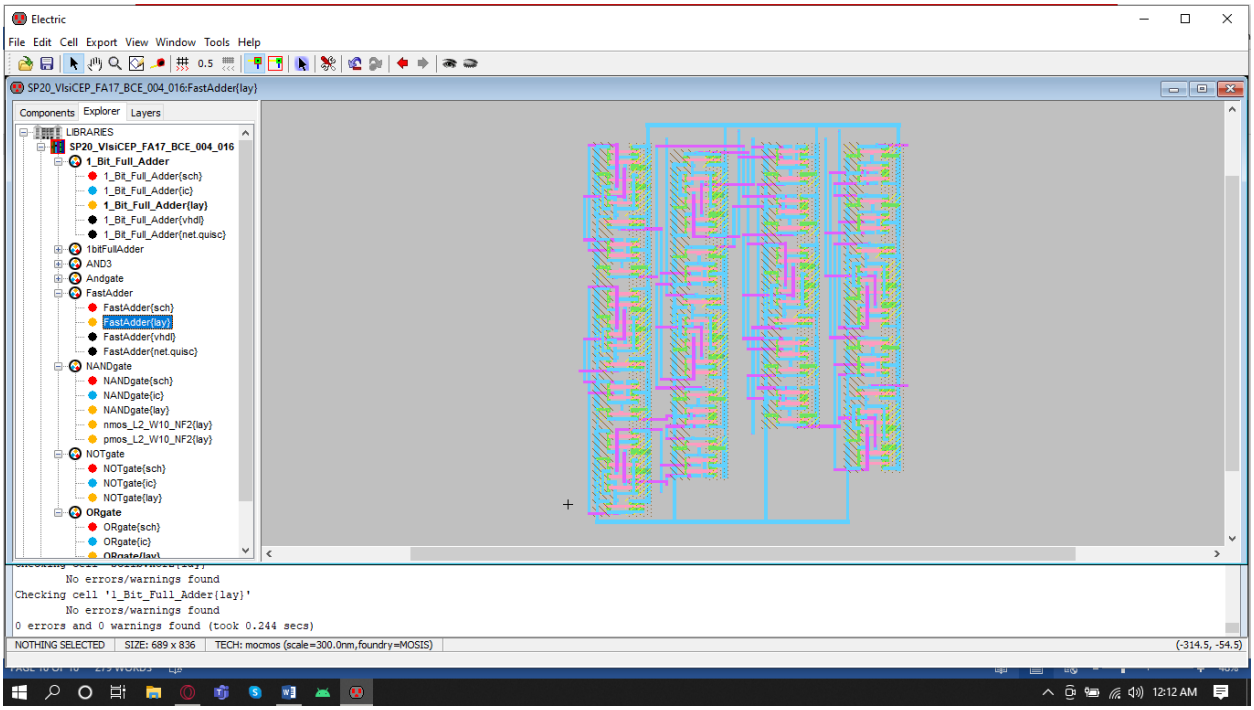
OR gate:



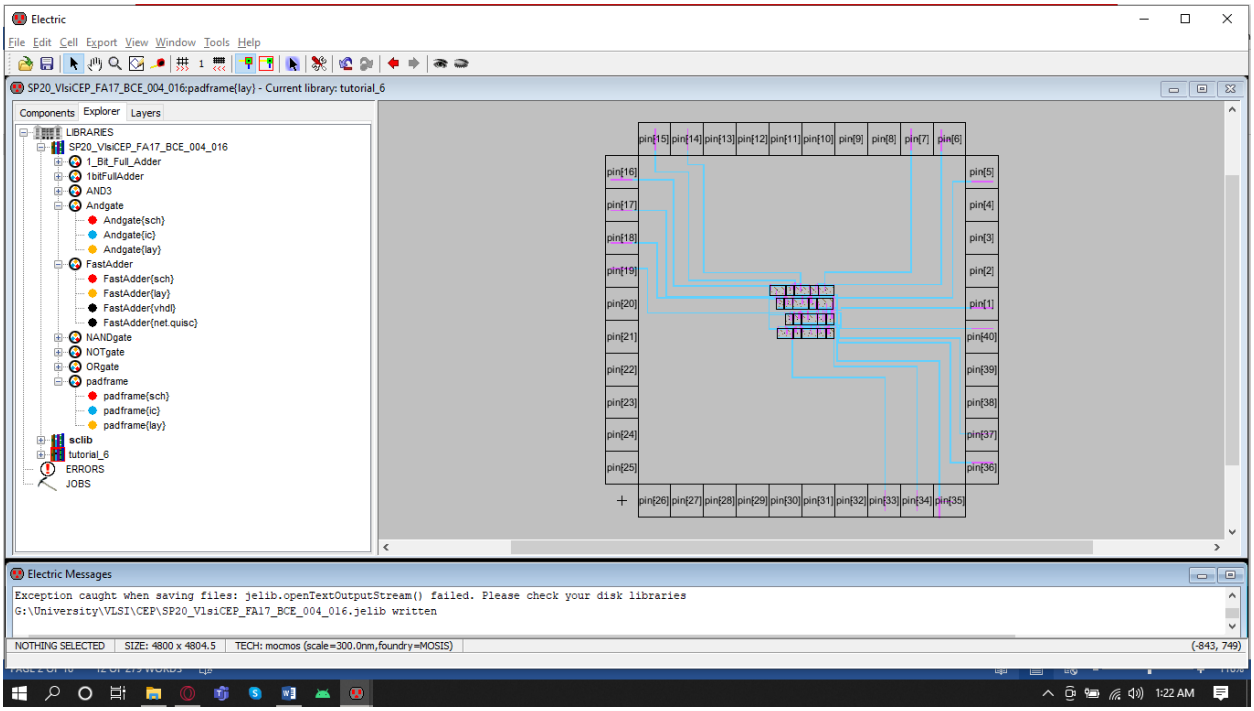
1-bit full adder :



4-bit Ripple Carry Adder:



PadFrame:



Conclusion:

Carry lookahead reduces the propagation delay by introducing more complex hardware. It is used for fast calculating. As Its circuit diagram shows that it uses the carry bit from the each of the other full adder to calculate the sum.

Reference:

https://www.elprocus.com/carry-look-ahead-adder/

https://www.electronicshub.org/carry-look-ahead-adder/