



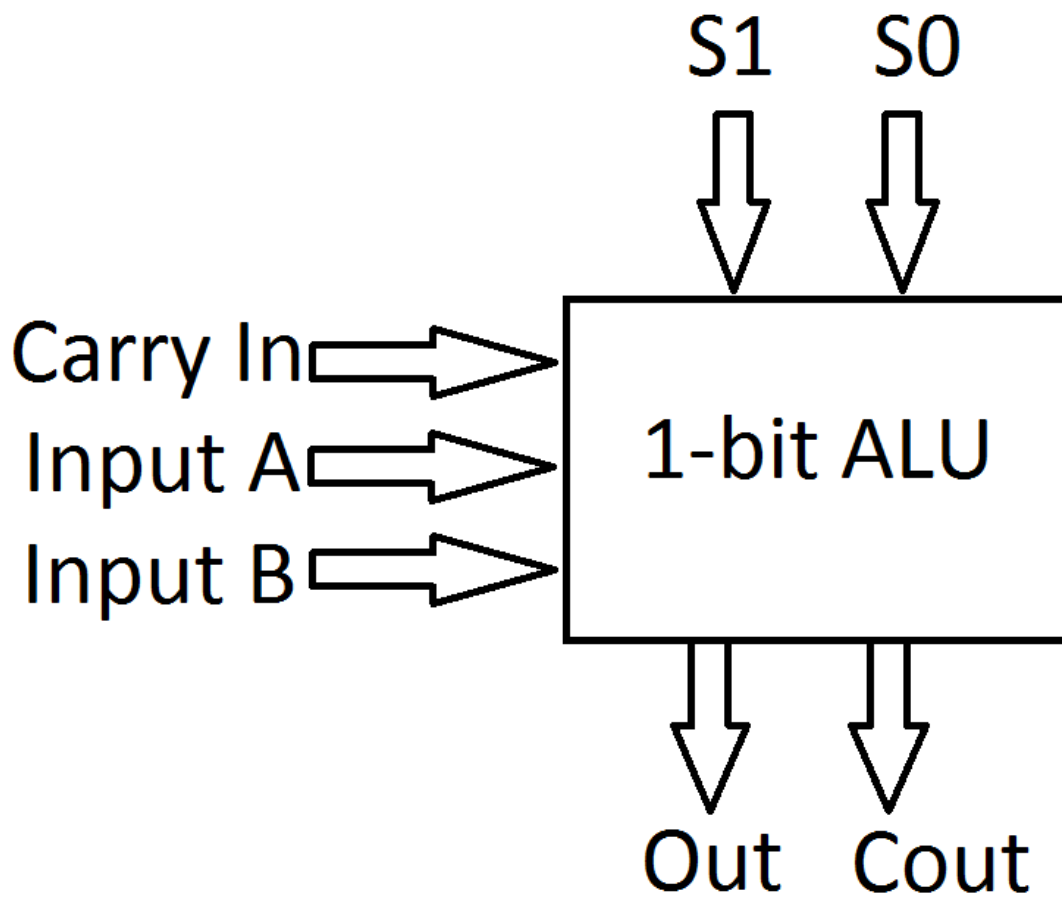
# ECE 451 LAB REPORT

Digital System Design

Ishani Gowaikar

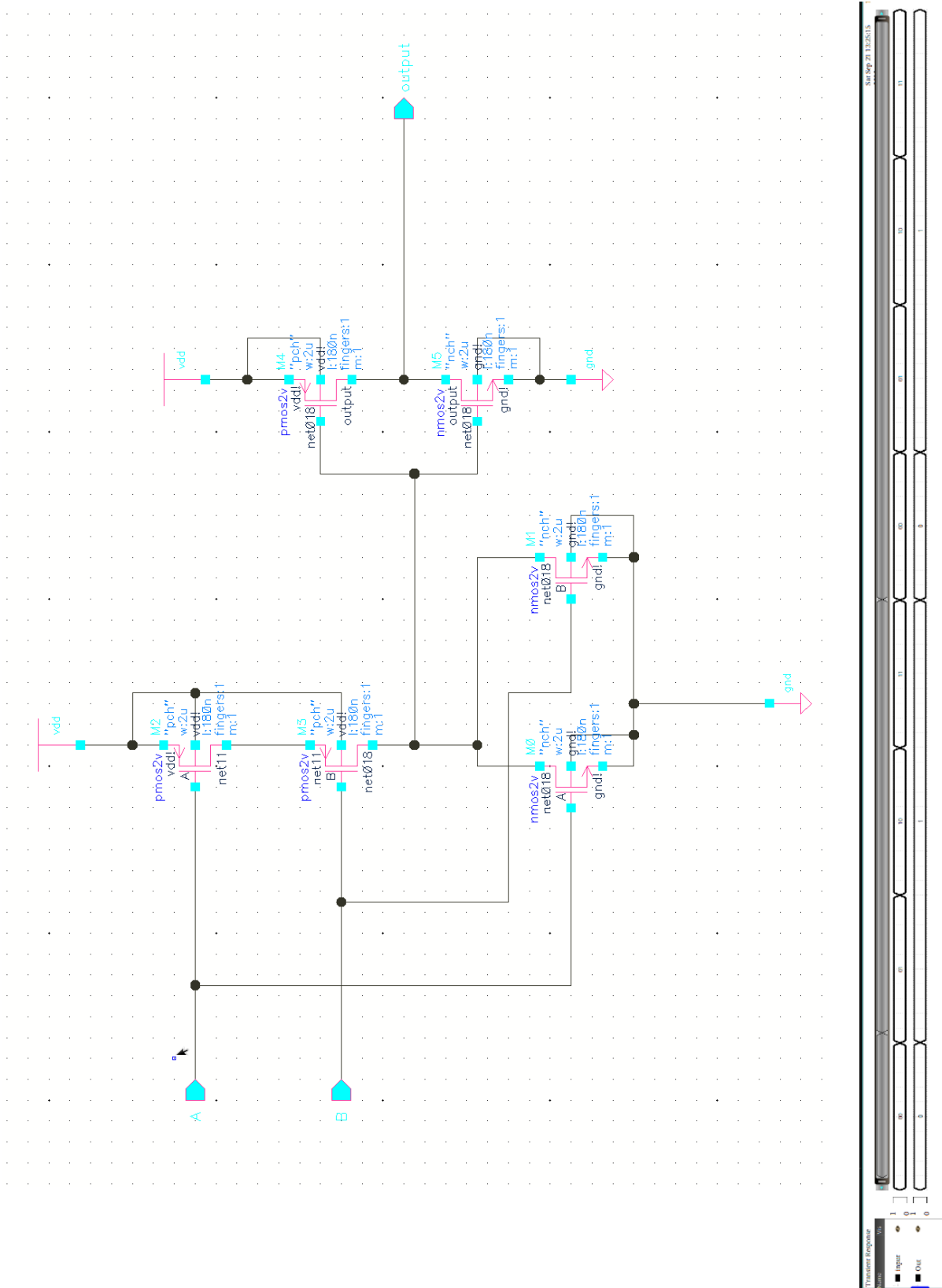
**Objective:** To design a 3-bit Arithmetic Logic Unit (ALU) using 1-bit ALU slices in Cadence using hierarchical design principles

**Design Of 1-Bit ALU slice:**

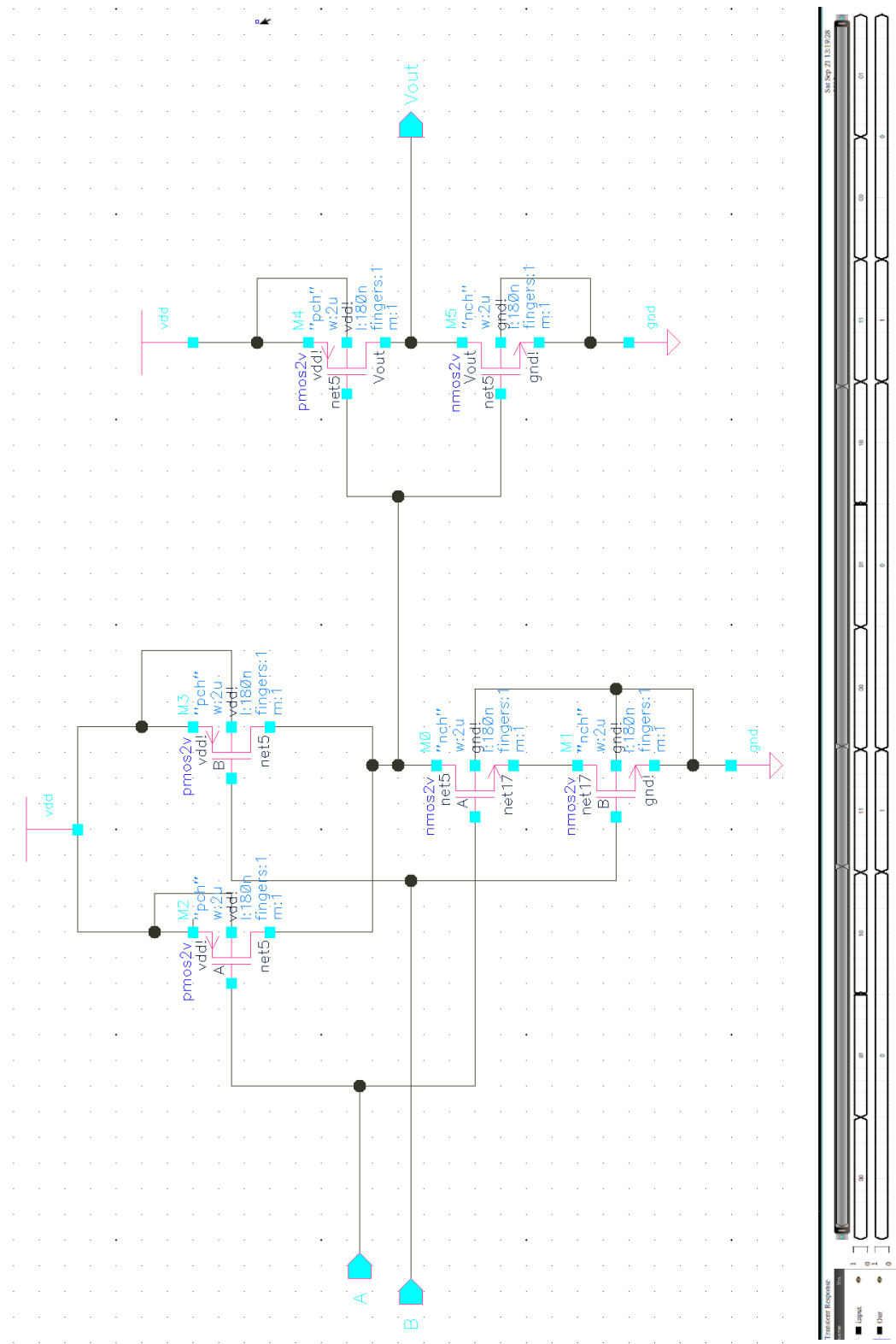


S1	S0	Function
0	0	ADD
0	1	SUBTRACT
1	0	XOR
1	1	Left Shift

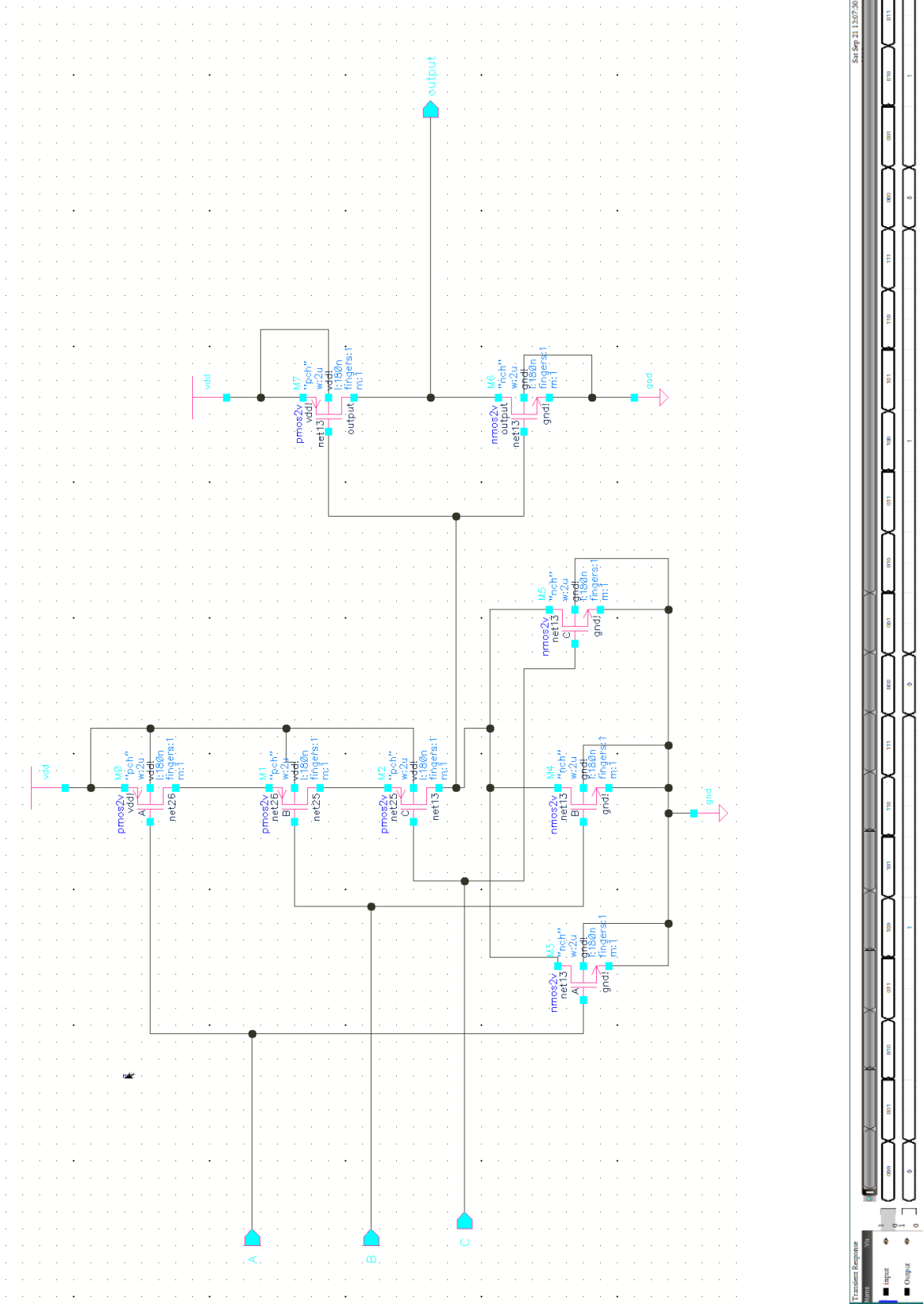
2 Input OR schematic with Waveform



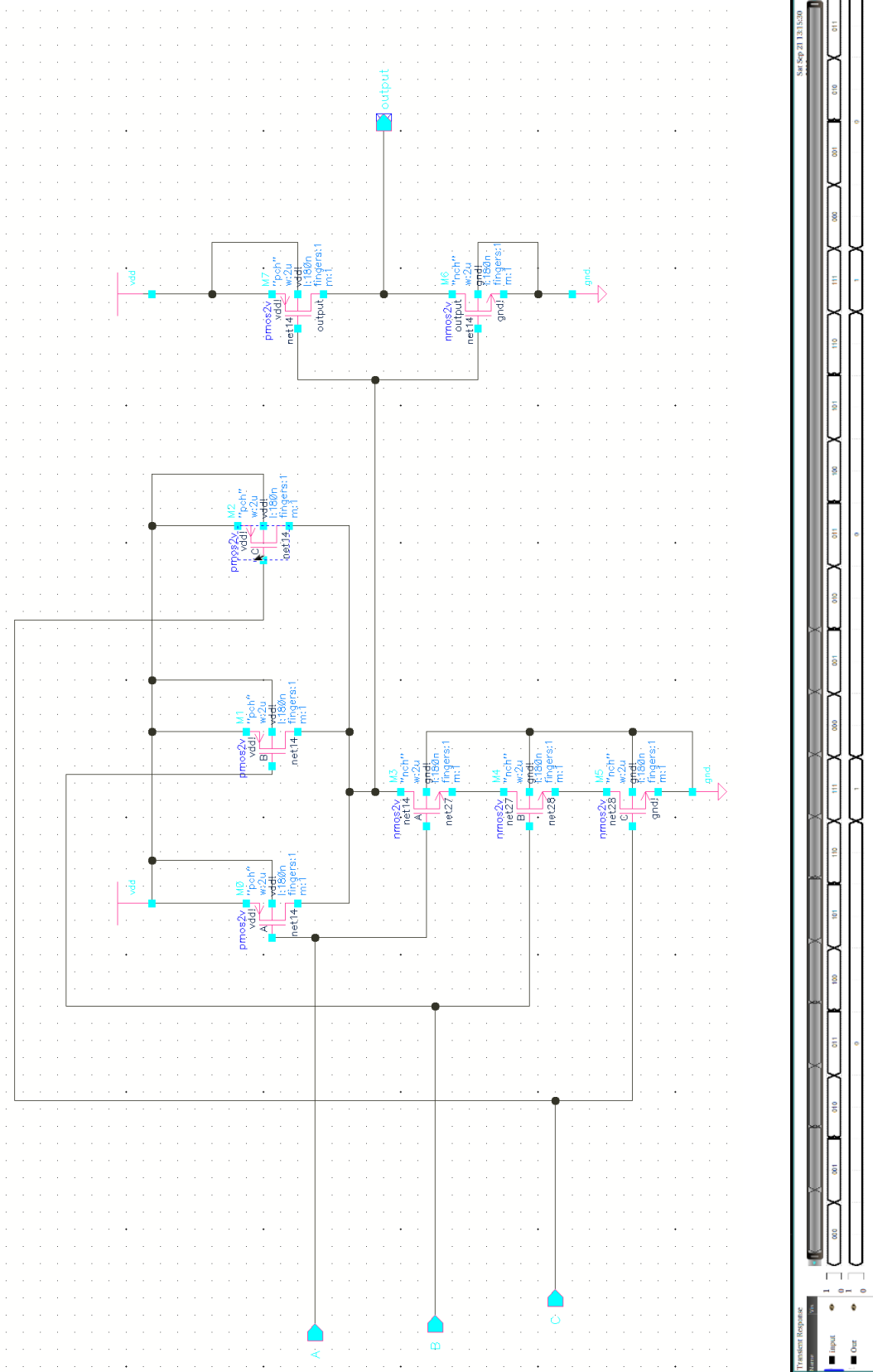
2 Input AND schematic with Waveform



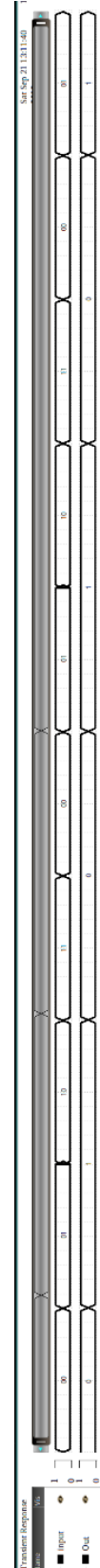
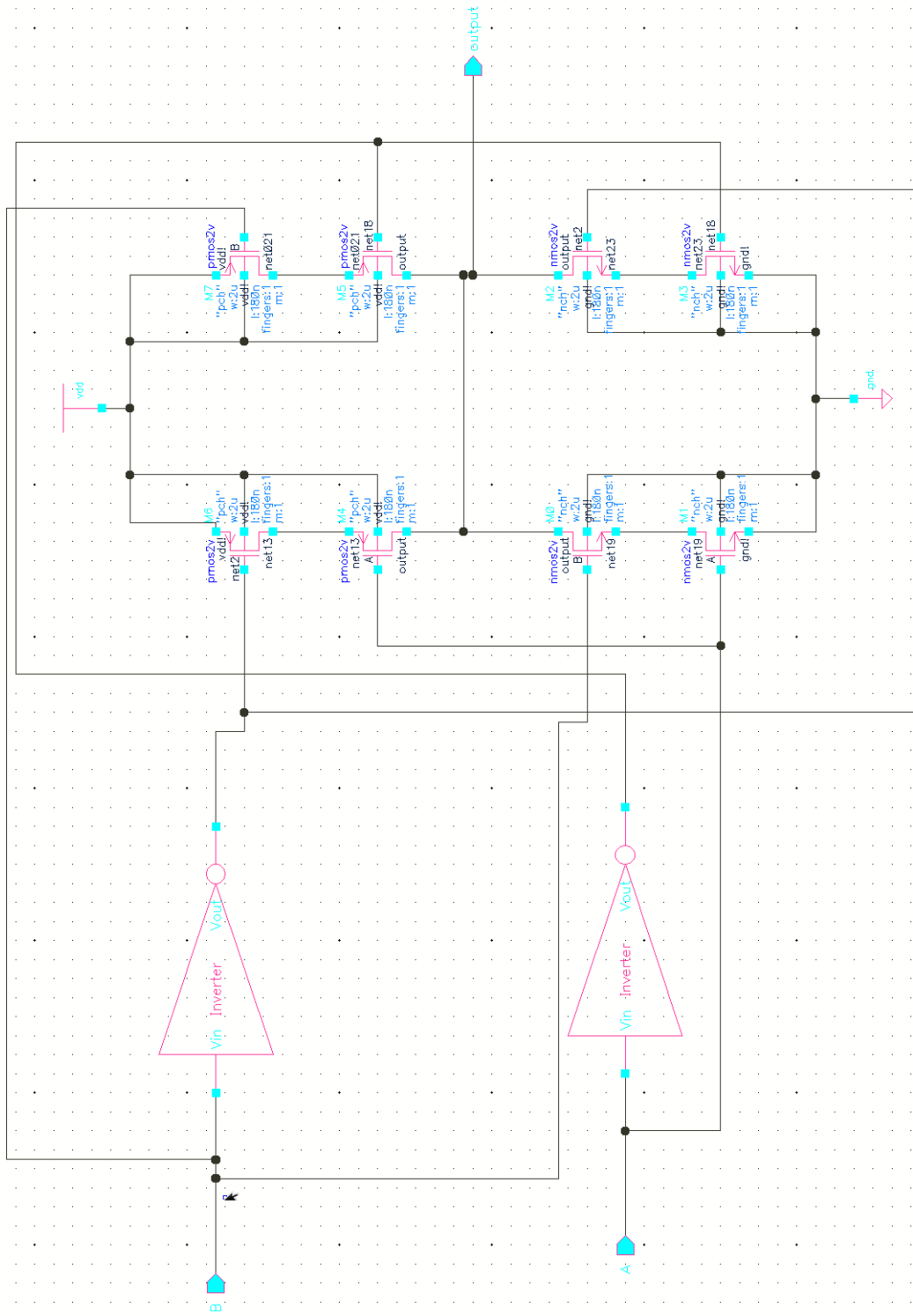
### 3 Input OR schematic with Waveform



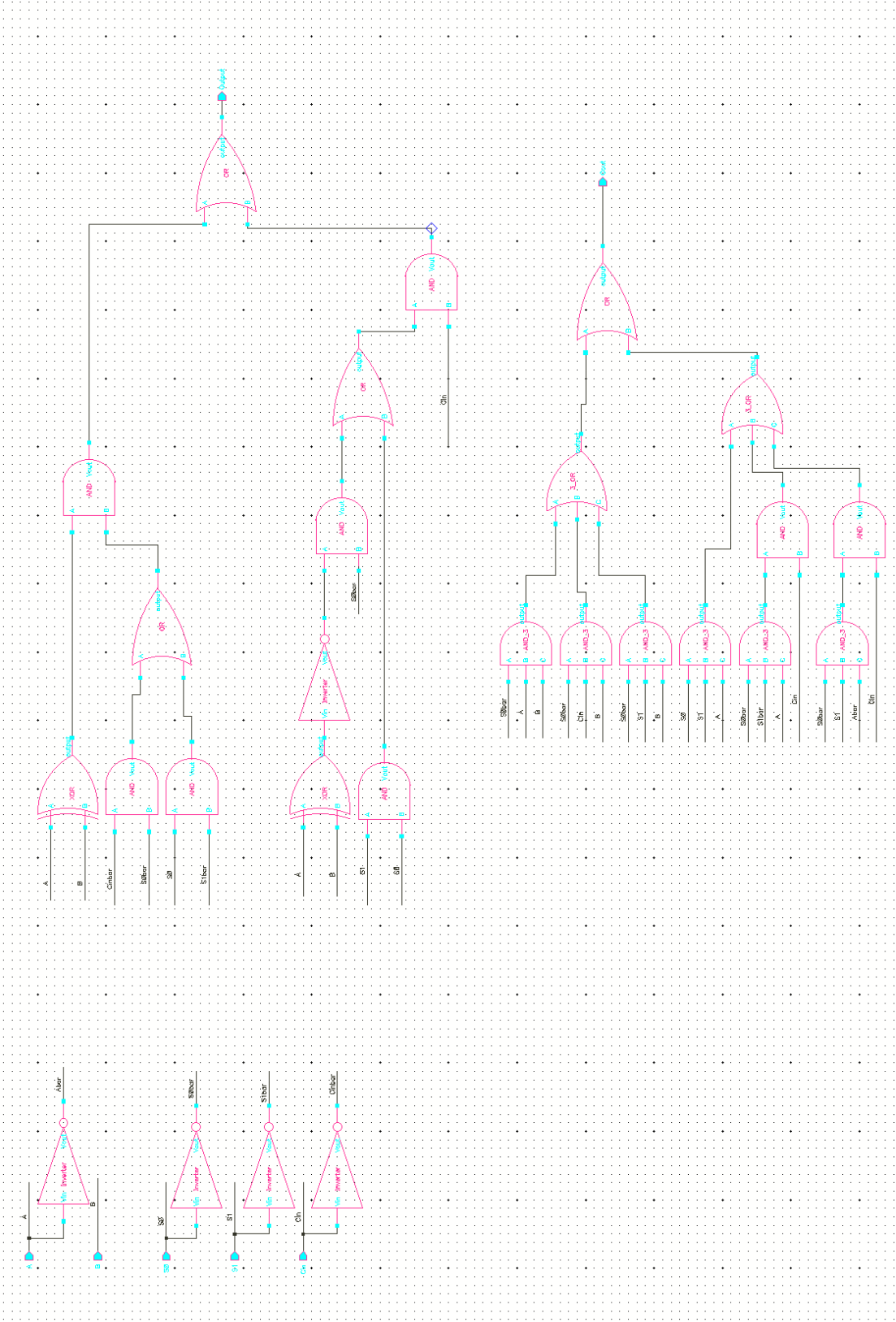
3 Input AND schematic with Waveform



## 2 Input XOR schematic with Waveform

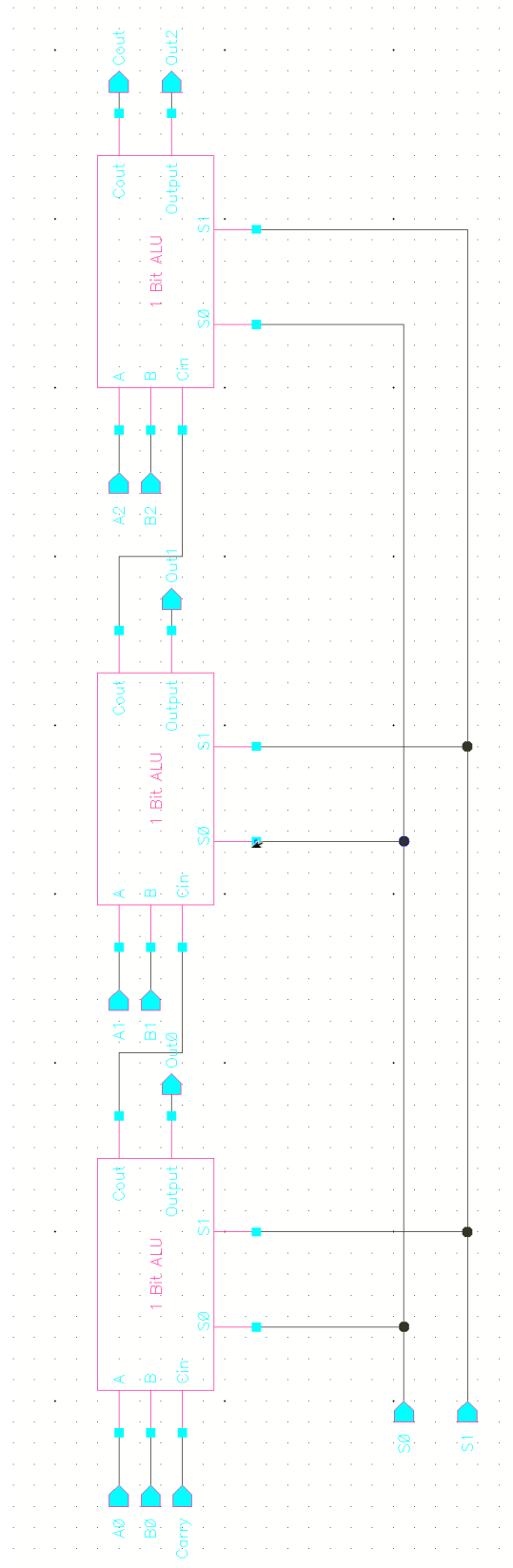


Schematic of 1-Bit ALU slice using Cadence

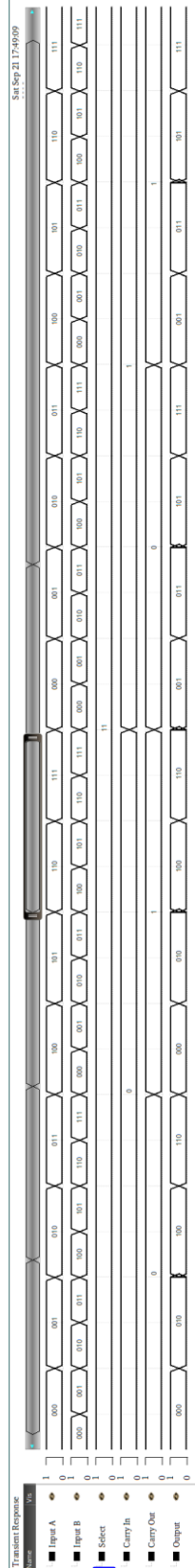
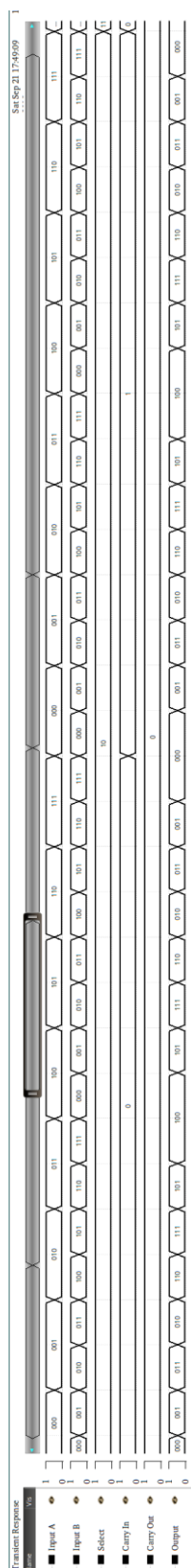
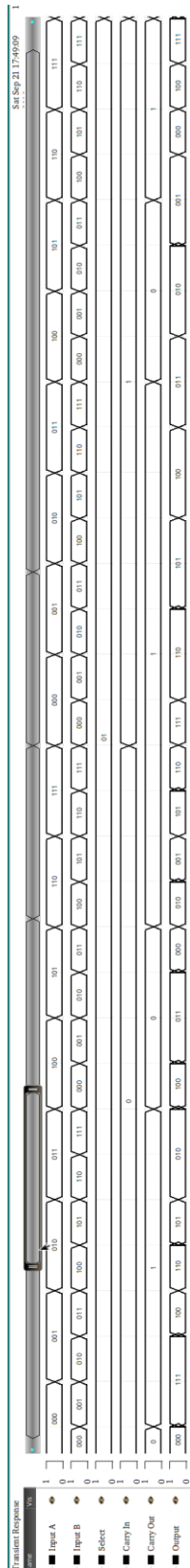




### Design of 3-Bit ALU using 1-Bit slice



### 3 bit ALU Waveforms



## **Conclusion:**

Hence, I have implemented 3 bit ALU using 1 bit ALU slices in Cadence.

## **Questions:**

1. Hierarchical design is basically dividing a design into multiple blocks (sometimes referred to as sub-chips, sub-blocks, modules, hierarchical blocks, etc).
2. Advantages of a hierarchical design :
  - a. The hierarchical design helps us to work on blocks separately and in parallel from RTL through physical implementations.
  - b. Working with smaller blocks results in the tool run time being shorter and less complex.
  - c. In case of any timing issue, we can fix individual blocks relatively easily.