Name: Jeeva Elango

Date: March 31st, 2025

Course: CIS 310

Professor: Probir Roy

Assignment 2: Arithmetic Unit Logic (ALU)

**Team Members:** Edwin Salcedo, Riad Heydarzade, Jeeva Elango

**Github Repository:**

**3. Implementing the ALU**

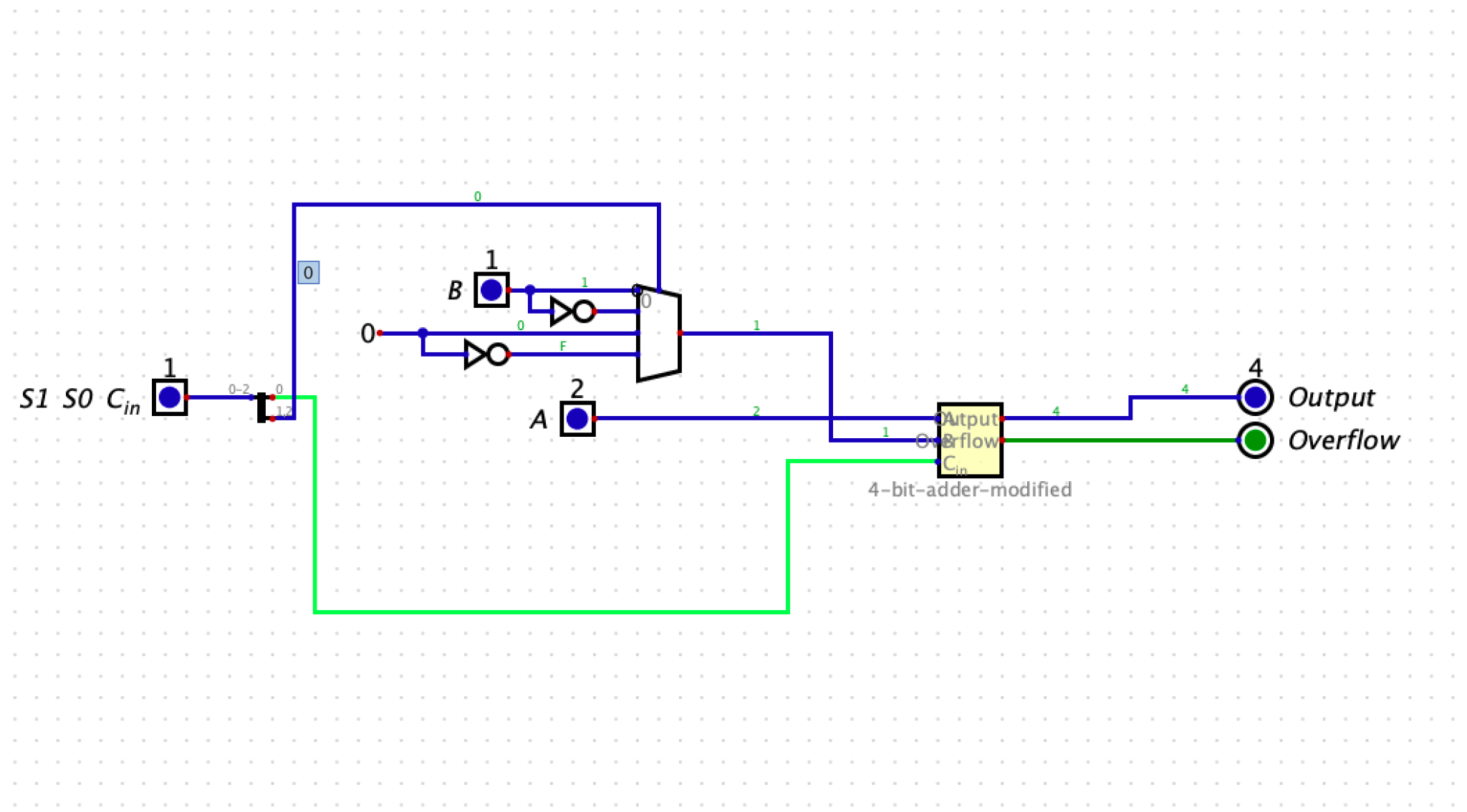
**Overview/Description:**

* I was tasked to build the ALU diagram, for the second half, my partner was tasked to make sure everything is working, check to see if there is any bugs, and gave the explaining on the ALU works, for the first half which I did includes:
* Including the Inputs, Outputs, MUX, NOT with the right bits
* Designing the 4-bit modified adder and implementing it to the ALU
* Having my partner look through it to make sure everything works

**Designing Explanation:**

* 3-Bit-Control Bit (S1, S0, Cin): In connection w/ the splitter that’s ahead is supposed to determine the operation (Addition, Subtraction, Carry/No Carry, Increment/Decrement, Transfer) along with controlling if B is a regular B or !B. The table of inputs for S1S0Cin describes this in better detail but in essence, that’s the job of this particular input. This feeding into the Modified 4-bit Adder as 1 of 3 inputs and the 4-input to 4-bit MUX (as a selector pin) that is talked about next.
* 4-Input to 4-bit Multiplexer: Working in unison with the 3-bit Control bit described above, this component is taking the B-input (4-Bit) and manipulating it(Regular, Inverse or not even using it) to its given needs. As an example, if B were 3 and the control was set to either 0 or 1, it would add it regularly or with a carry meaning A + B (3) + 1 (Carry). This feeds into the Modified 4-bit Adder as 1 of 3 inputs.
* Input A: The Input A (4-Bit) is just a standard input emulating whatever number the user decides it wants A to be. This feeds into the Modified 4-bit Adder as 1 of 3 inputs.
* 4-Bit Modified Adder: This imbedded Adder (Made up of x4 1-bit Adder) is slightly modified in the sense that it takes in a carry bit dedicated by the 3-Bit Control Bit (S1,S0,Cin) to provide a carry or no carry along with the standard A-input and the B-input also modified by the 3-bit Control Bit. These three inputs are provided to then be calculated so to speak for whatever operation is dedicated (Addition, Subtraction, Carry/No Carry, Increment/Decrement, Transfer).
* Output/Overflow: This being the 4-Bit output that intakes whatever the total calculated by the 4-bit modified adder is. Along with the total, if there is an extra bit then the 1-bit overflow also intakes that and displays it.

**Testing:**

****