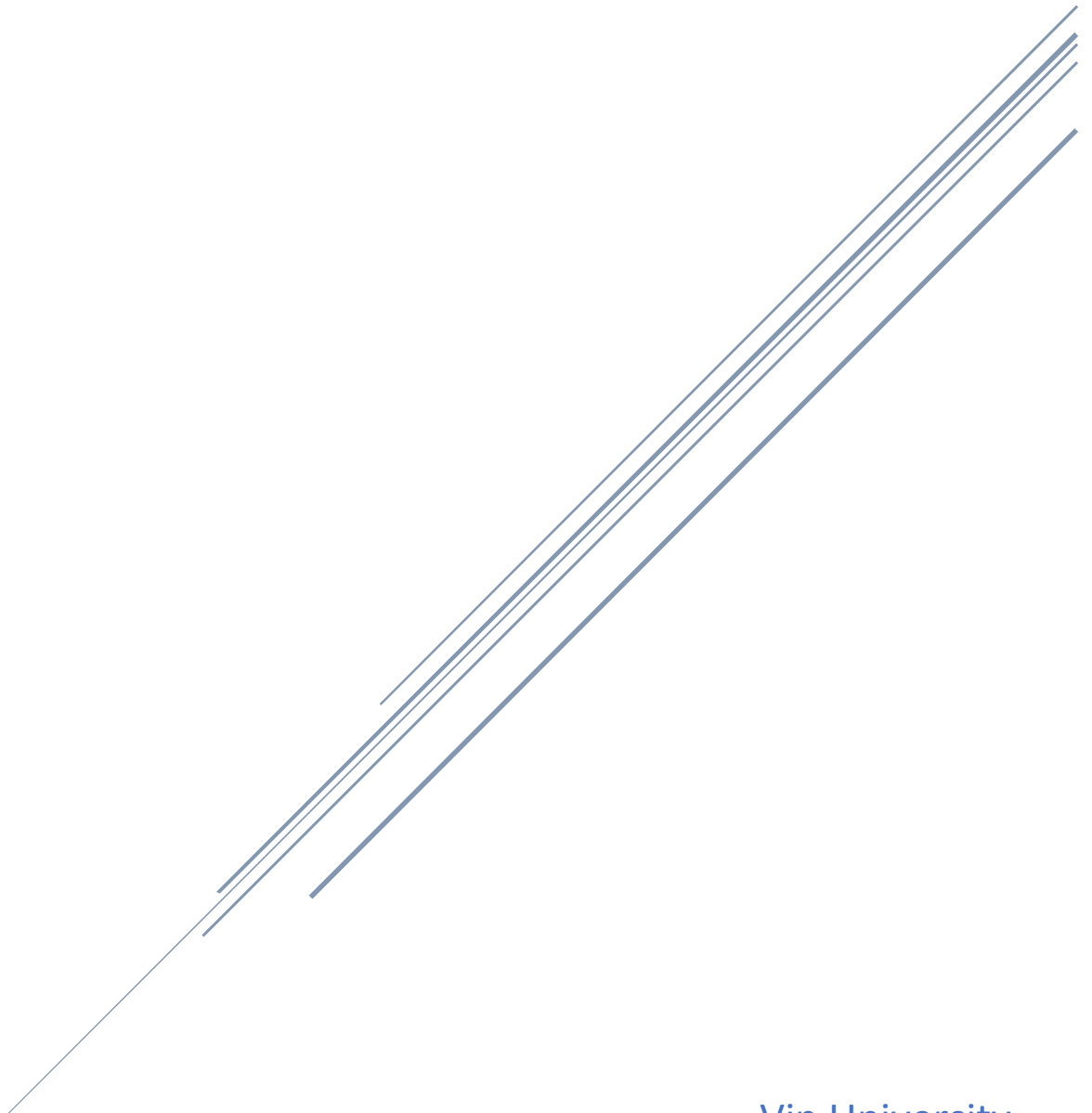


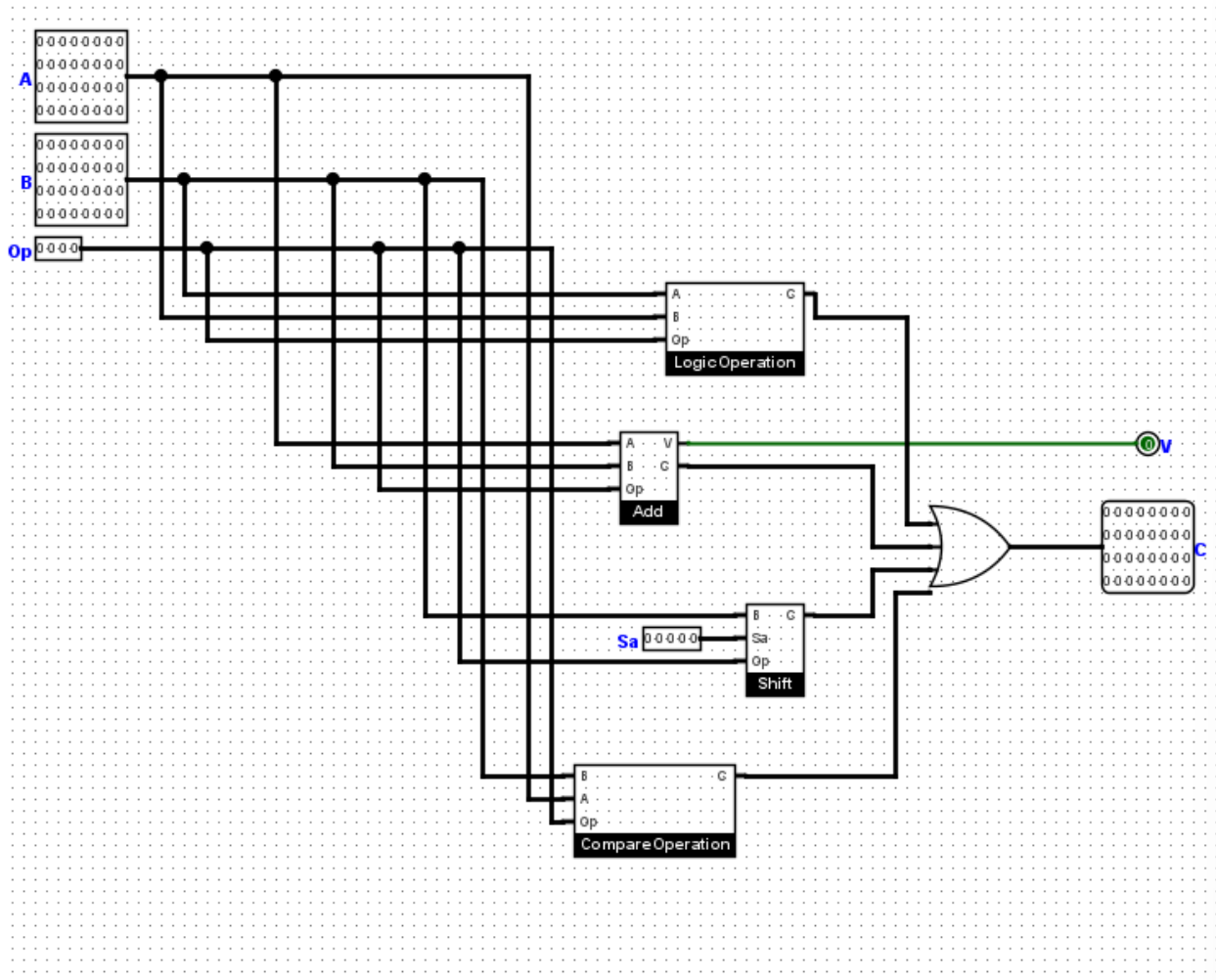
# ALU DESIGN

Vu Ky



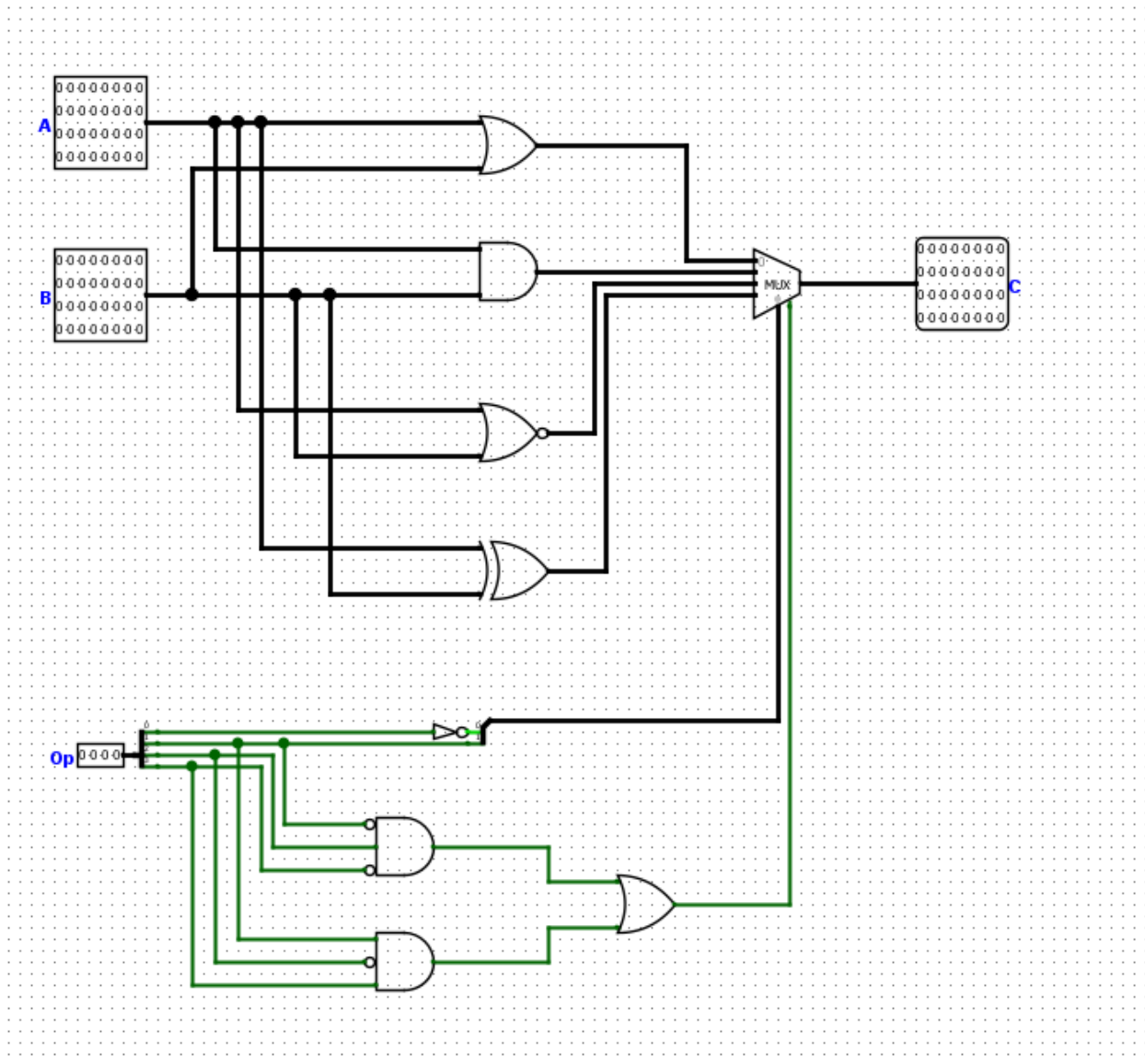
### 1. Overview:

This is the RISC-V ALU, which contains four sub circuits. The first one the logic operation circuit, the second circuit is the addition. Next, it is the bit shift circuit and finally the compare operation circuit.



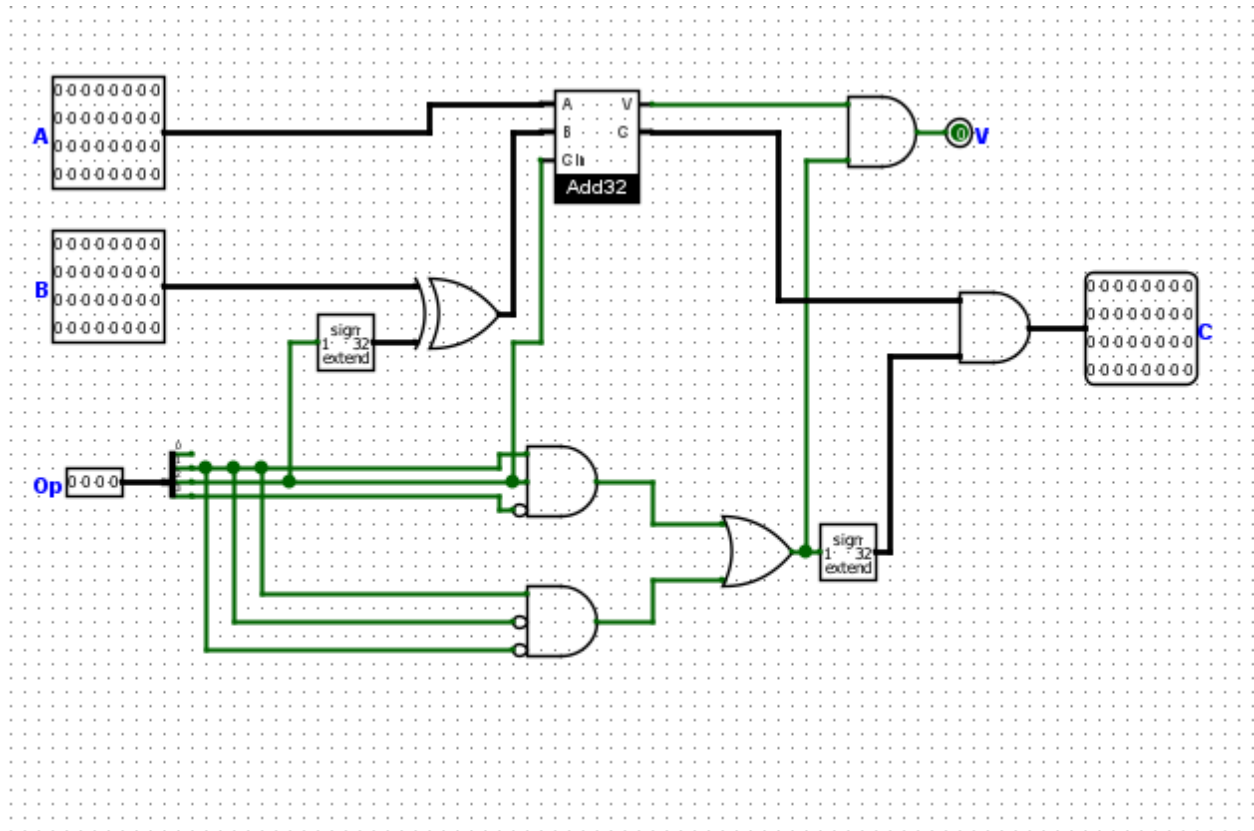
### 2. Logic Operation Circuit:

This circuit has four 32-bit gates: OR, AND, XOR, NOR. The mux is used to choose the output with the Op as a condition.



### 3. Addition circuit:

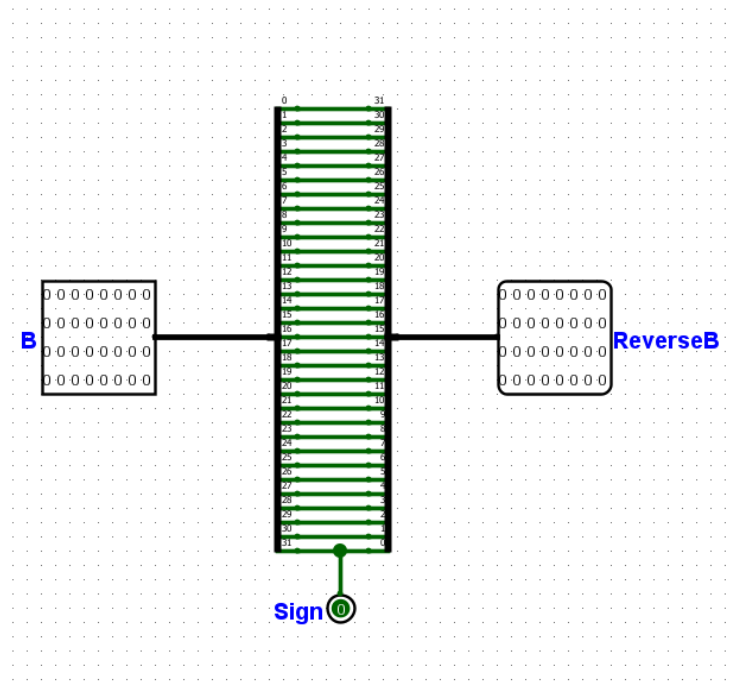
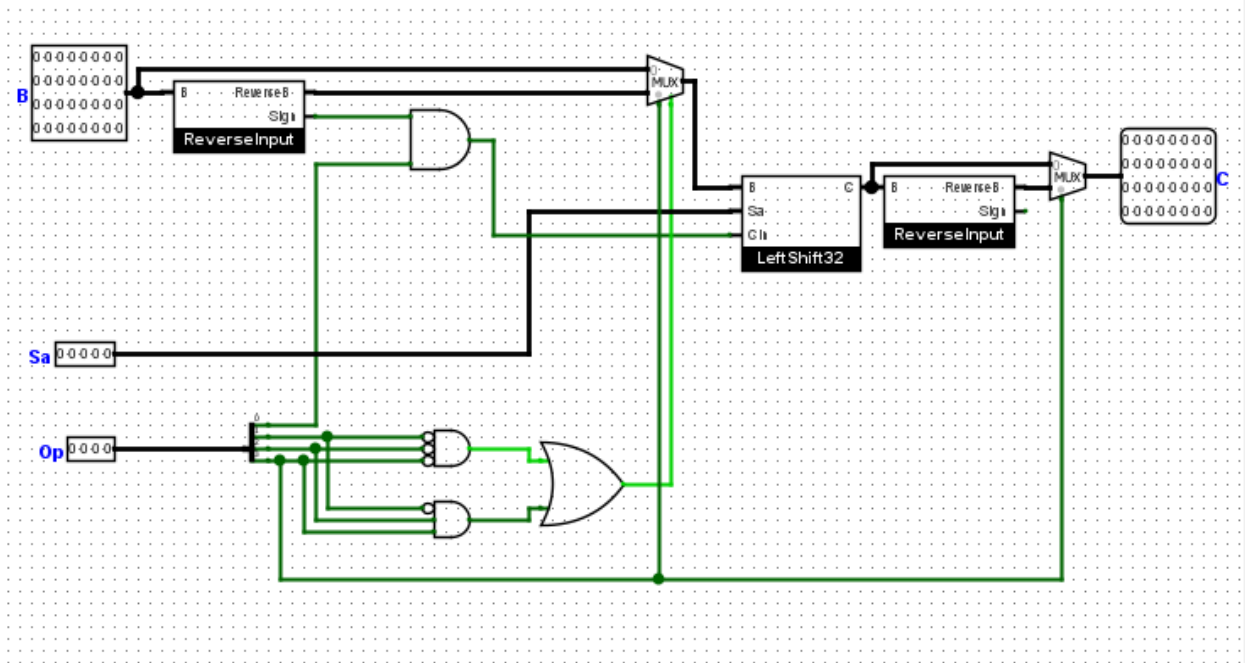
To create this circuits, 1-bit adder is needed and from it, the construction of the circuit moves on to 4-bit adder, 16-bit adder and finally 32-bit adder. Then the 32-bit adder is putted to the Add circuit which has Op to determent the output C and V as overflow signal.



#### 4. Shift circuit:

This circuit is constructed from 1 bit shifter to change one bit of B to C. Then 2-bit shifter is built from two 1-bit shifter and so on until we have 32-bit shifter.

The reverse circuit is used to reverse the order of 32-bit input B and output the Sign bit so that C in can be sent into.



##### 5. Comparison Operation Circuit:

This circuit is used to compare A and B by using XNOR gate and compare A with 0. Everything is dictated by Op.

