Assignment 3 Report

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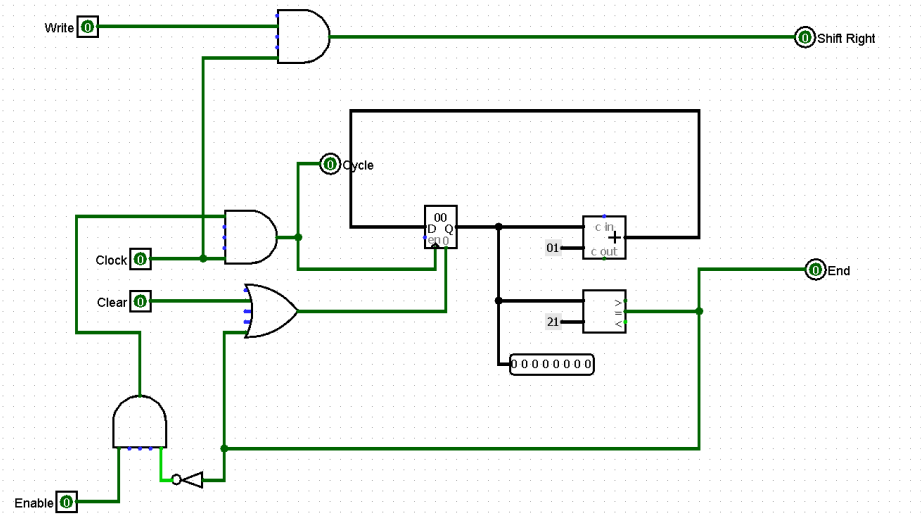
Control Circuit:

Control circuits main objective is track the counter. I managed succesfully add a counter but only flow is that I can not send a message for to end iteration. If managed to that registers would be cleared. Control unit has 4 inputs.



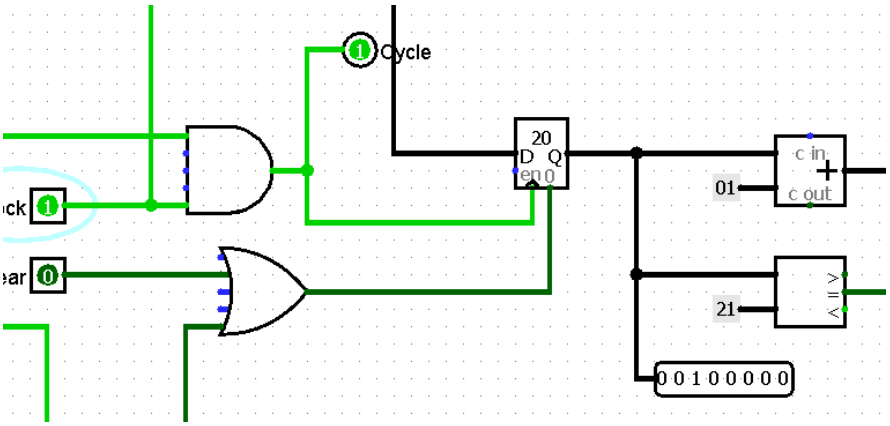
Write: Check if the products last bit zero if yes send write message.

Clock: If enabled counter will be increased by one for once.

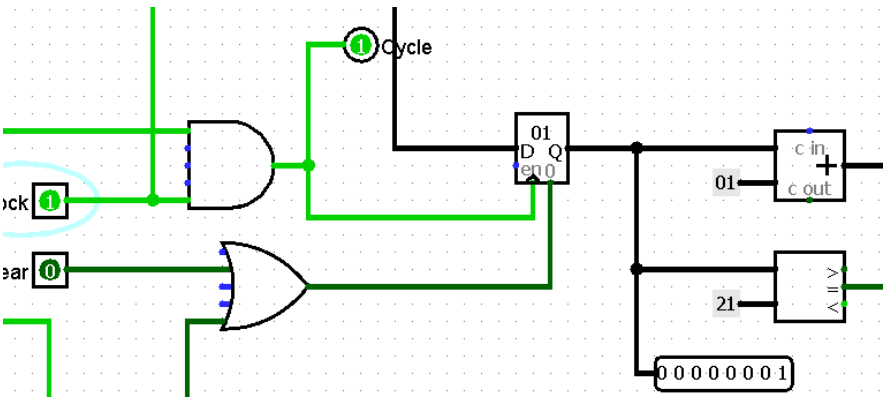
Clear: Clearing all the units values.

Enable: Enabling iterations.

➔ Counter at 32



➔ Counter reset



Outputs' purposes:

Cycle: To initiate cycles' duties message for datapath.

End: Clear message for all the registers.

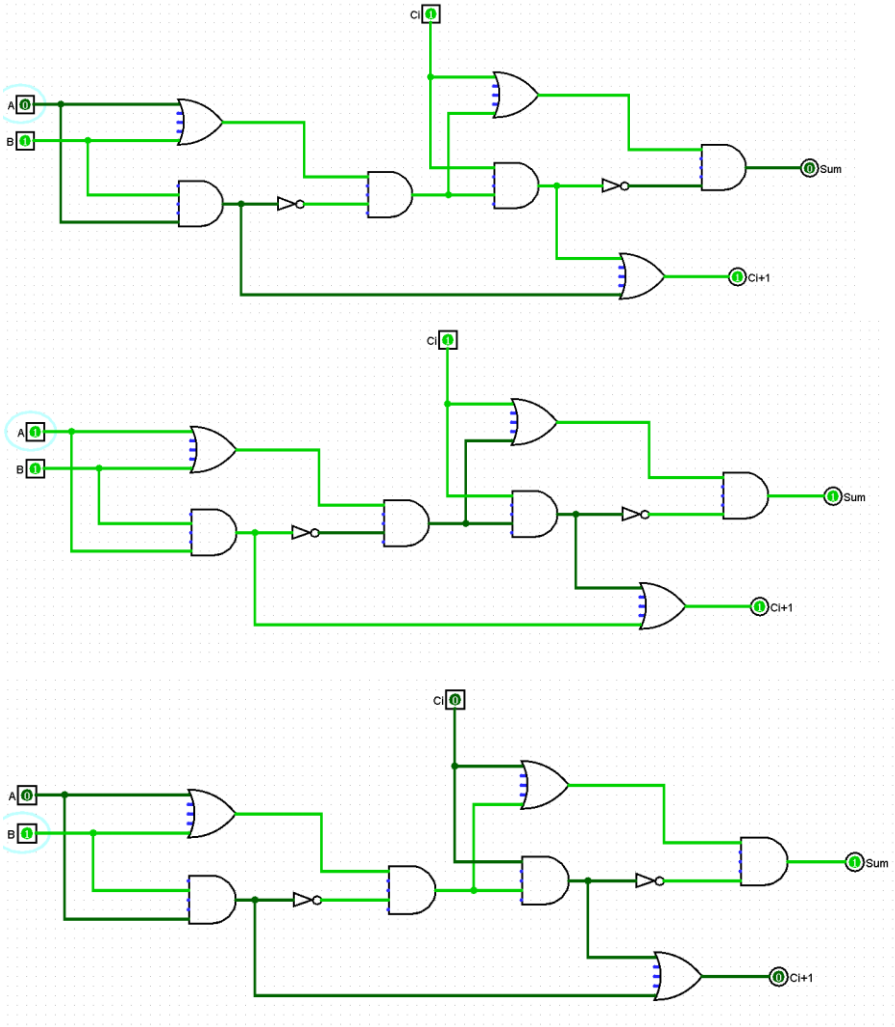
Shift Right: Shift product to right message.

Datapath:

Before talking about datapath let's talk about its' subcomponents:

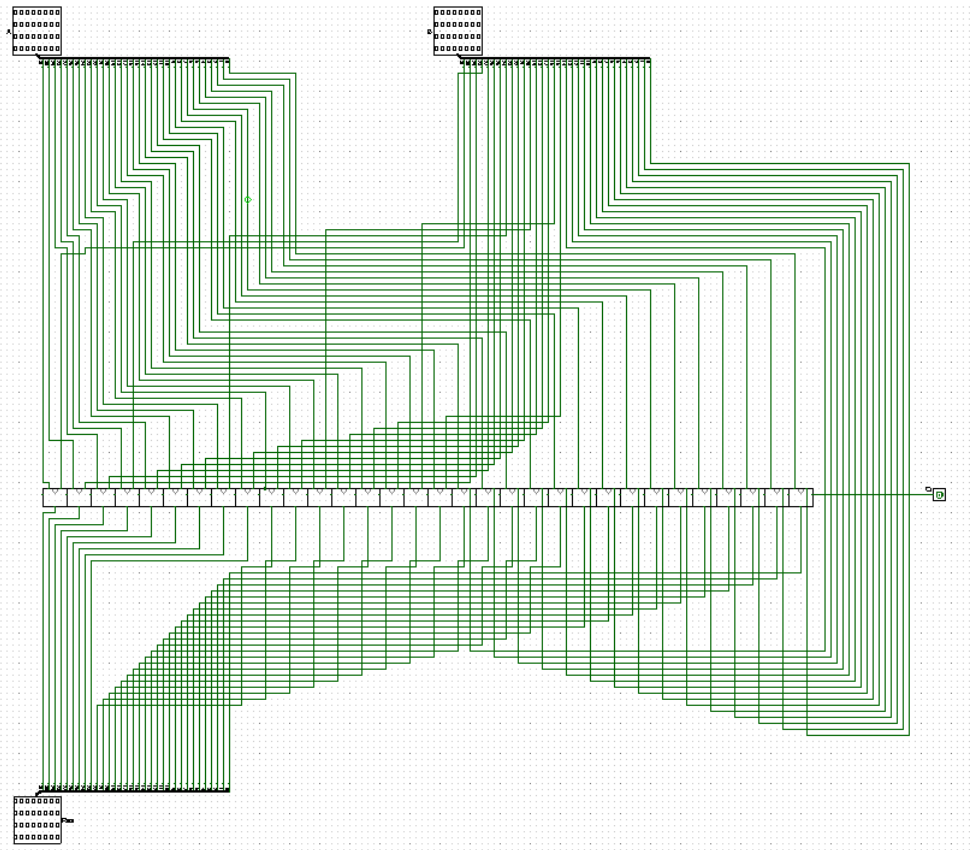
- Full Adder:

  It is simple design to sum up two bits and detect the state of carry output. As shown in the examples results are correct.

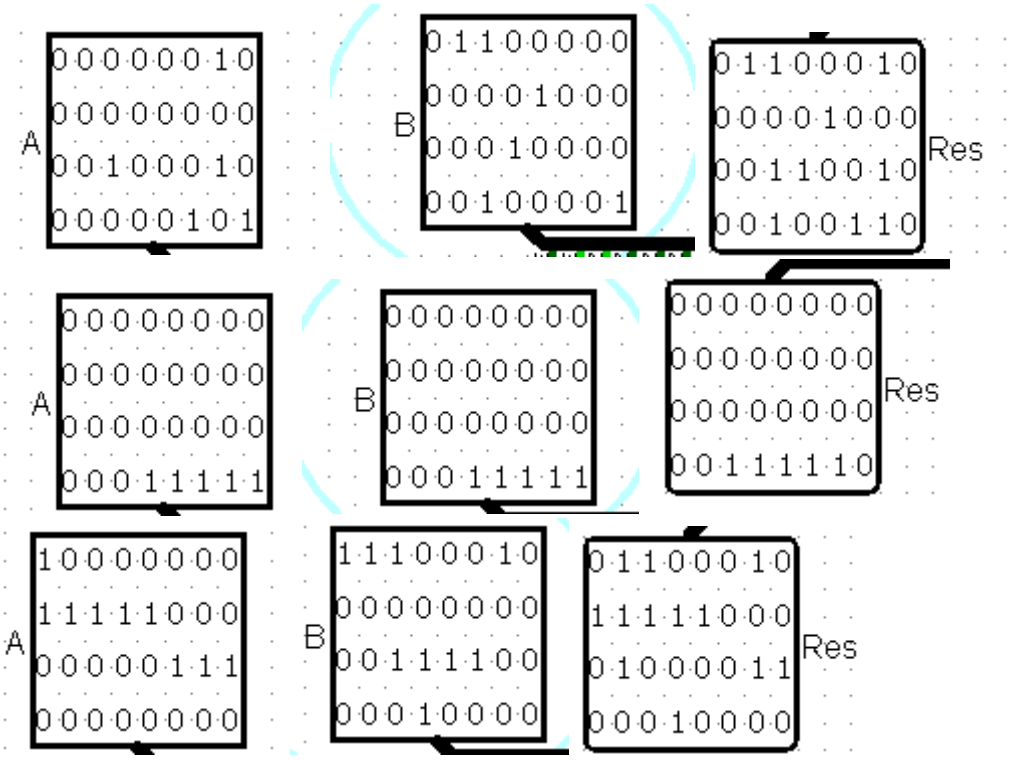


- 32 bit adder:

  Circuit made out of 32 full-adder components combination. Transfering every carry out bit to next carry input bit.

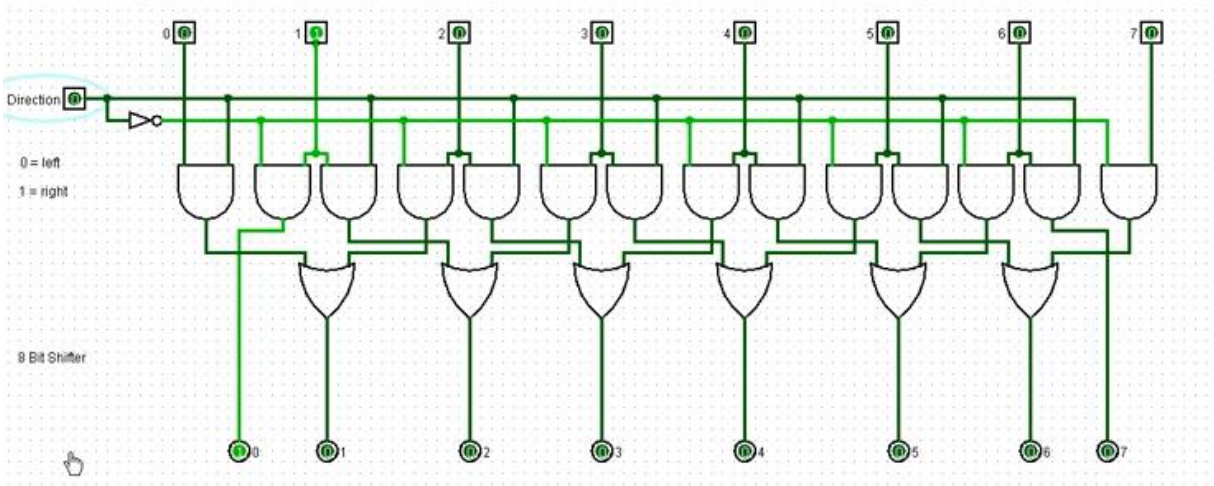


Let use us show some examples:

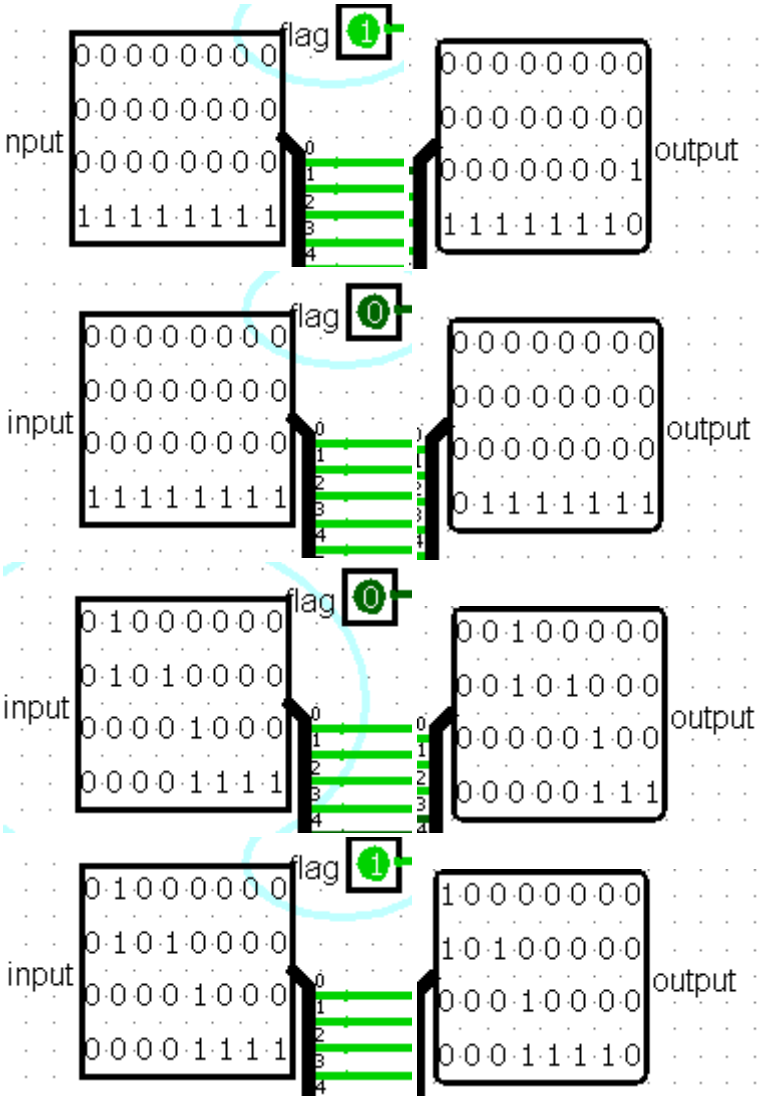


- 32 bit shifter:

For the shifter circuit we expand this circuit into 32 bits (Of course it can be expanded into 64 for bits.But we used 32 bits for the convenience for datapath). In my design circuit will shift the bits left for flag bit “1” and it will shift to right for flag bit “0”.

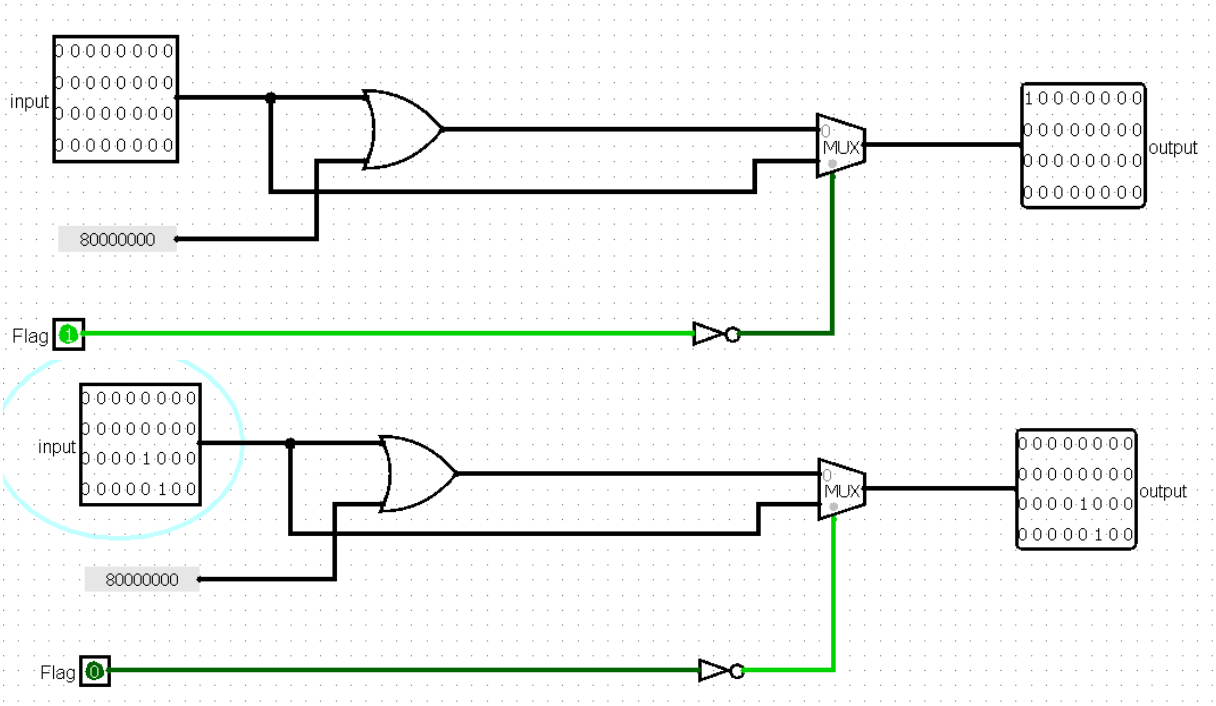


Examples:

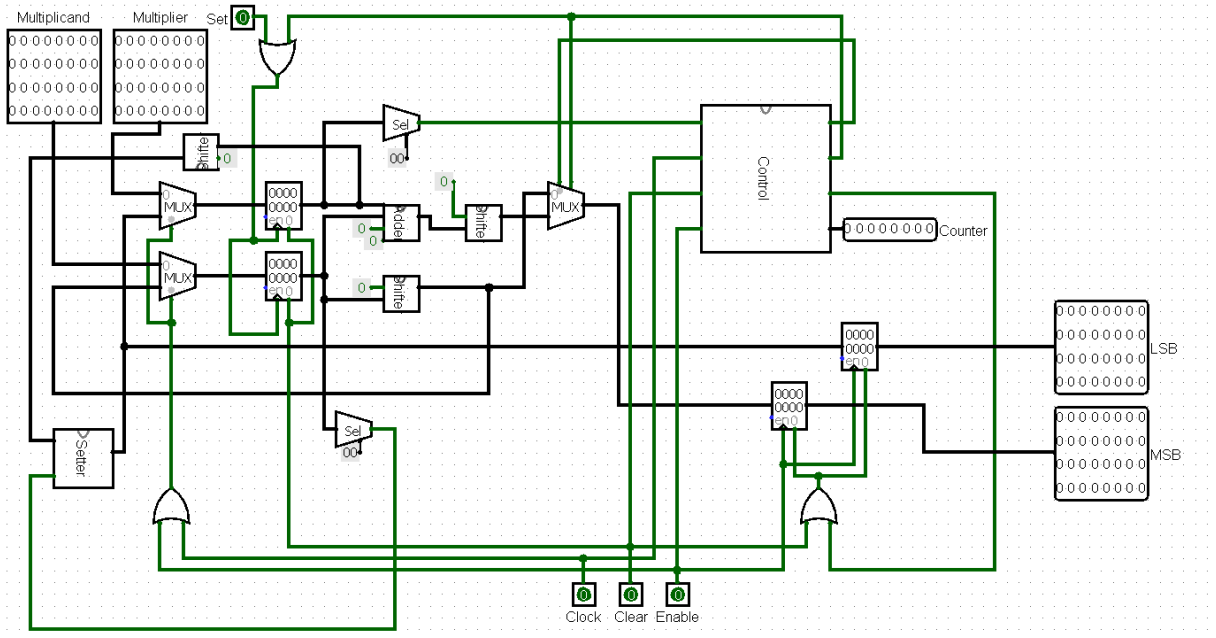


- Most significant bit setter:

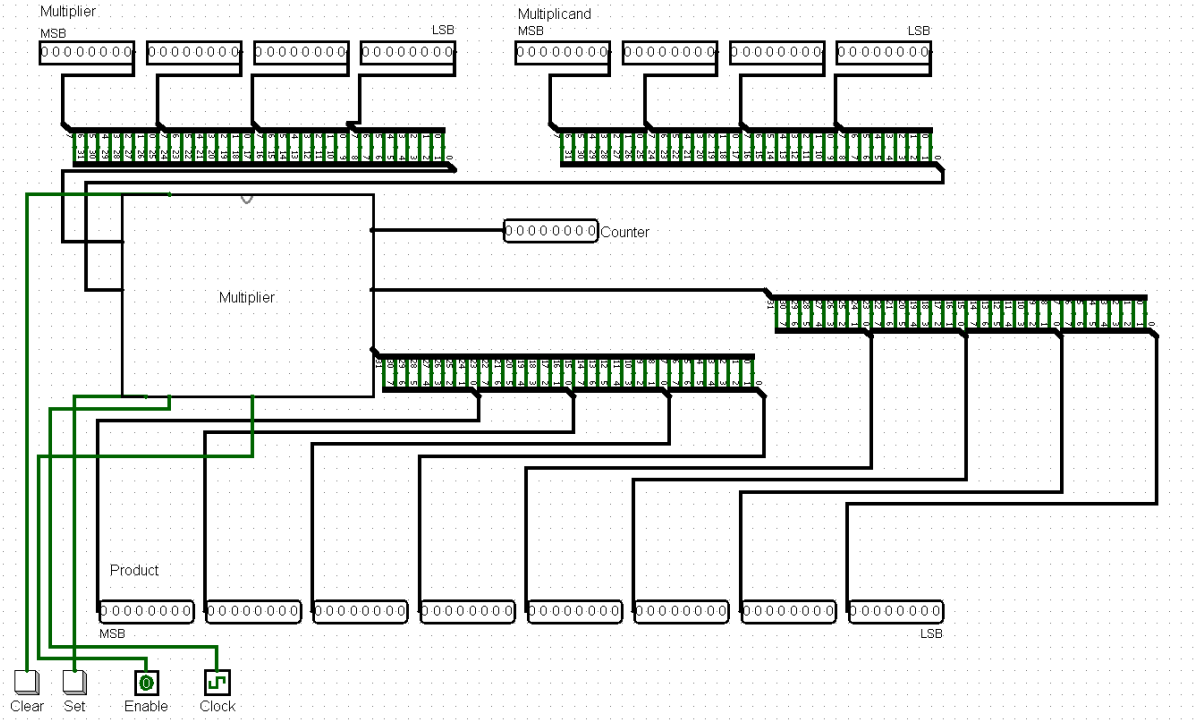
  This circuit's goal is to set LSB part's most significant bit to wheter "0" or "1". To do that we check multicands least significant bit, if it is "1" we will "OR" the LSB part with 0x80000000. That will put 1 on the most significant bit.



Now lets talk about datapath. It is a cycled structure controled by different inputs. Muxes defining the shifted product by bit selectors.



Mult32 Circuit:



In conclusion circuit will iterate until 32 cycles done. But only downside it won't be cleared on the output before another output came. Set button will set the values for multiplicand and multiplier. Clear will clear all the registers inside the circuit. Enable will start the iteration.