Assignment 3

Report

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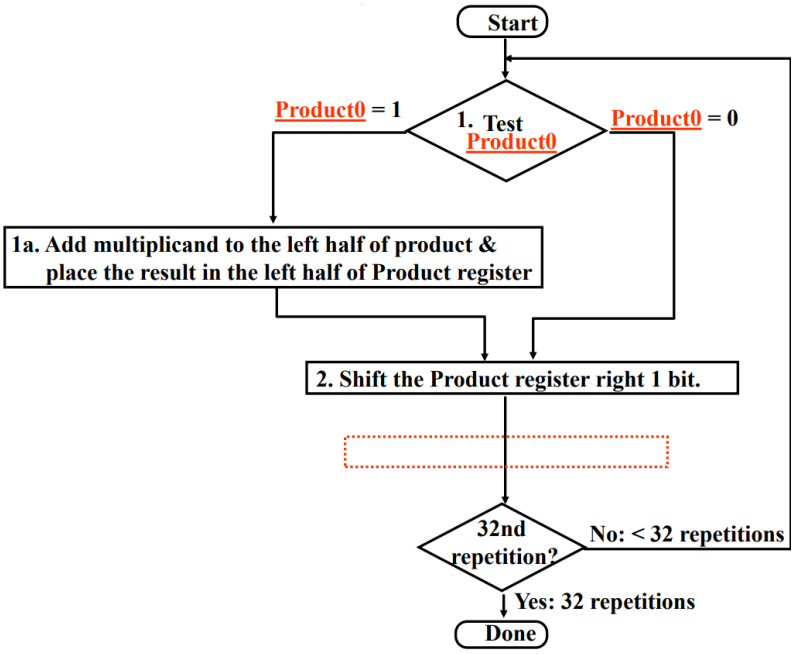
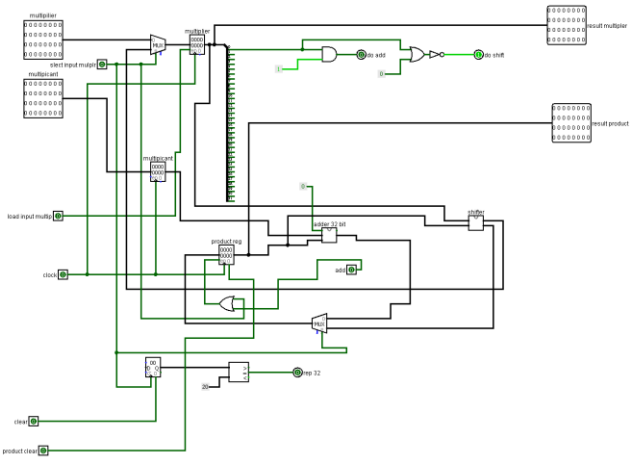
My Logisim design have two circuit files: control.circ and datapath.circ. I combined them in a mult32.circ file to have the 32 bit multiplier.

ASM:



Datapath:



Datapath Input:

1-Select input multiplier

2.Load Input multiplier

3-Clear

4-Product Clear

5-Add

6-Clock

Datapath Output:

1-Do add

2-Do shift

3-Rep 32

Inputs Explanation:

Select input multiplier: This signal determines whether x will get my initial value or the new future value.

Load Input multiplier:This signal determines eneable bit of multiplier

Clear: This signal clear counter for restart button

Add : This signal determines product register enable bit with select input multiplier

Outputs Explanation:

Do add : Thanks to the this signal state register jump to add register

Do add: Thanks to the this signal state register jump to shift register

3-Rep 32 :With this signal, the cycle is terminated.

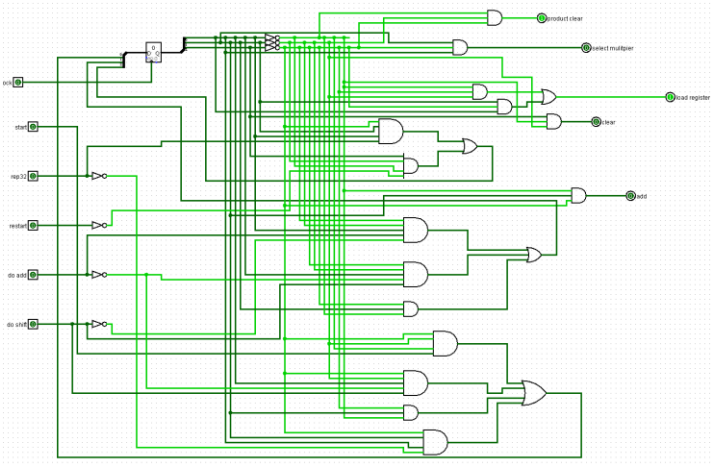
Control Unit:

Truth Tables inputs/outputs;

P2	P1	P0	Start	Rep32	Restart	D.add	D.Shft	N2	N1	N0
0	0	0	0	-	-	-	-	0	0	0
0	0	0	1	-	-	-	-	0	0	1
0	0	1	-	-	-	1	0	0	1	0
0	0	1	-	-	-	0	1	0	1	1
0	1	0	-	-	-	-	-	0	1	1
0	1	1	-	0	-	-	-	0	0	1
0	1	1	-	1	-	-	-	1	0	0
1	0	0	-	-	0	-	-	1	0	0
1	0	0	-	-	1	-	-	0	0	0

P2	P1	P0	S.I.Multip	Clear	Add	P.Clear	L.I.Multip
0	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0
0	1	0	0	0	1	0	0
0	1	1	1	0	0	0	1
1	0	0	1	1	0	0	0

I have a control unit consisting of 5 State in total.



Boolean expression:

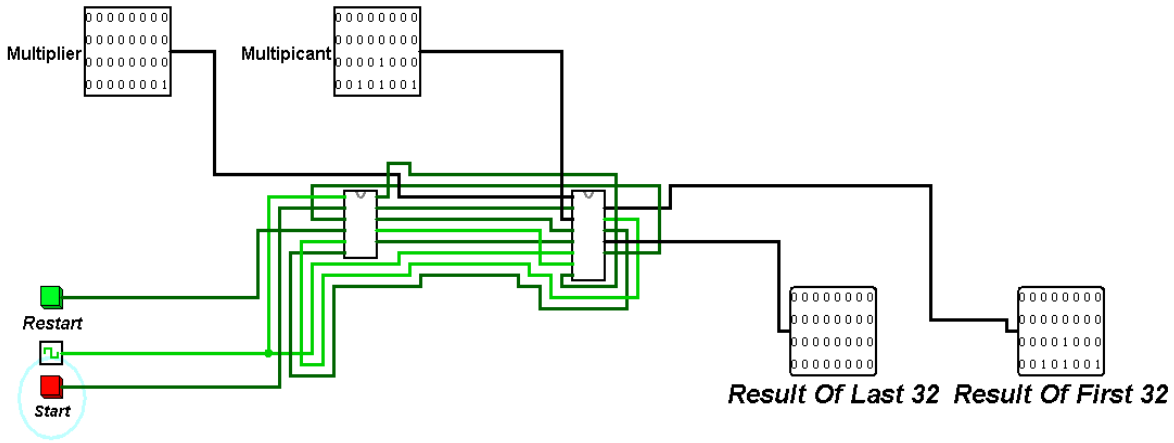
N2:P2’P1P0(R32)+P2P1’P0’(Restart)’

N1:P2’P1’P0(DOADD)(DOSHIFT)’+P2’P1’P0(DOADD)’(DOSHIFT)+P2’P1P0’

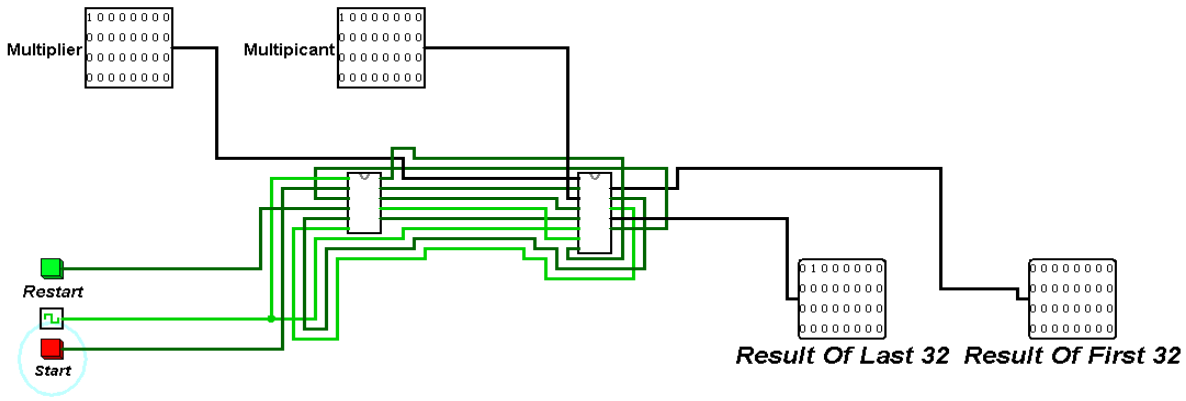
N0:P2’P1’P0’(START)+P2’P1’P0(DOADD)’(DOSHIFT)+P2’P1P0’+P2’P1P0(R32)’

Tests:

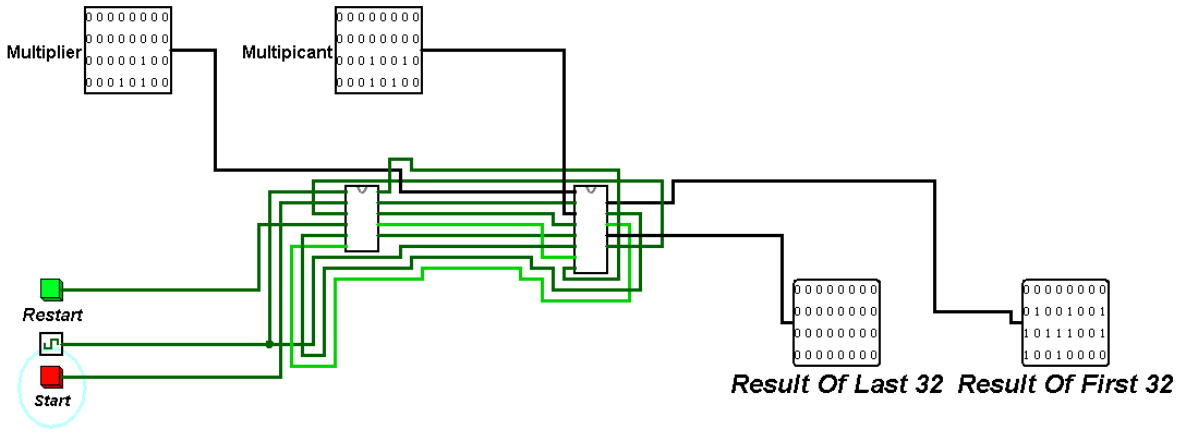
2089*1



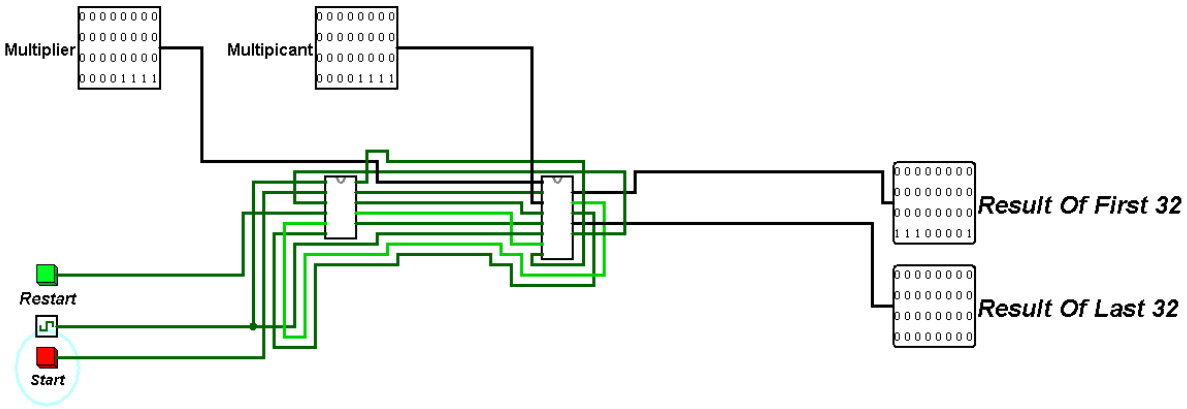
2^31*2^31=2^62



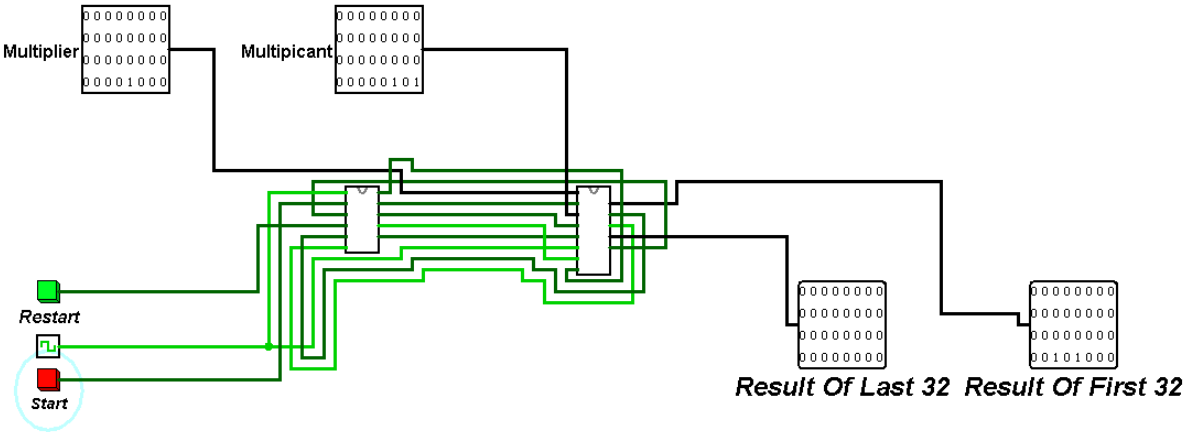
1044*4628=4831632



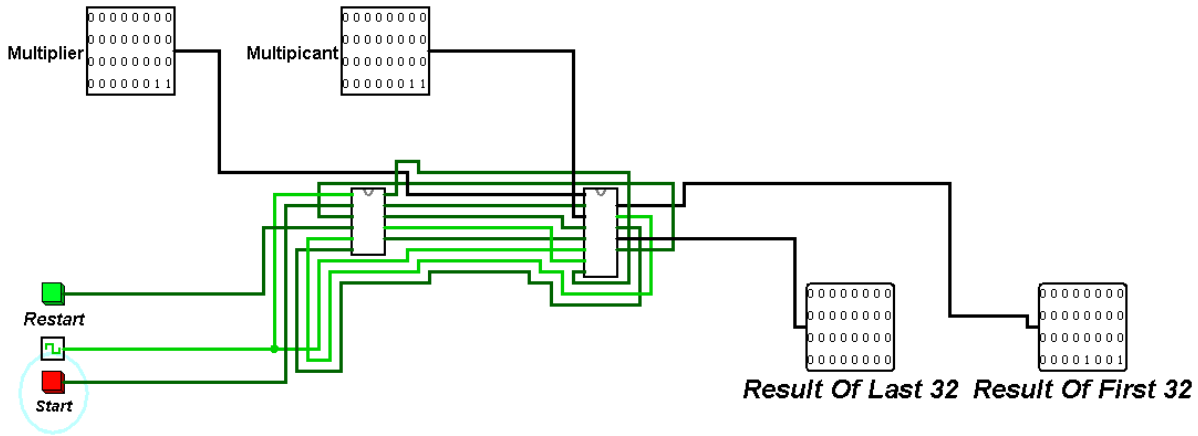
15*15=225



5*8=40

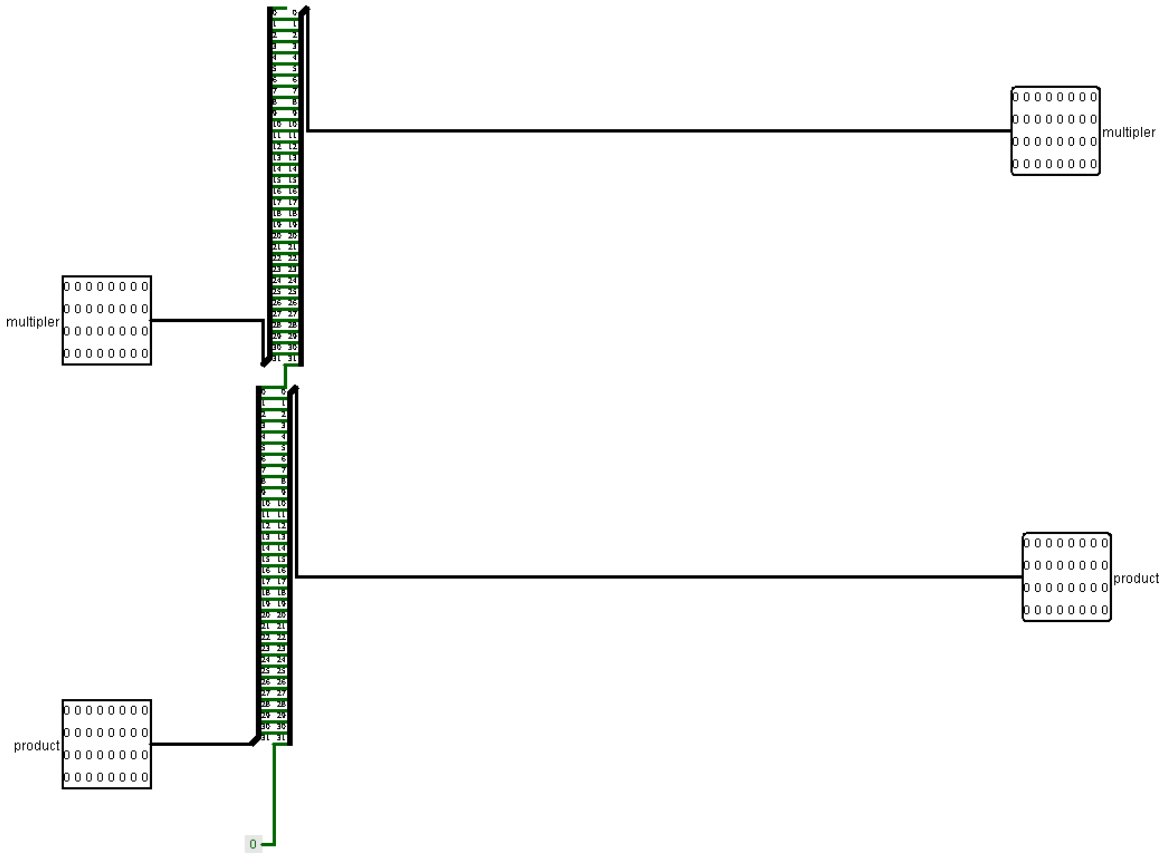


3*3=9

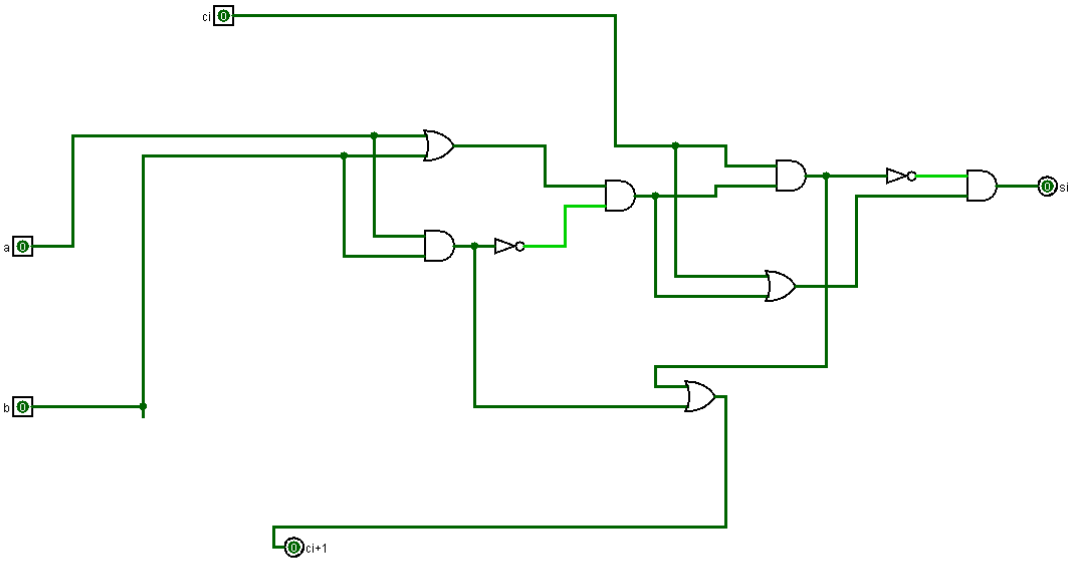


Bonus Part:

Shifter:



1 Bit Adder:



32 Bit Adder: