INSTITUTE OF TECHNOLOGY, NIRMA UNIVERSITY

2CS401 COMPUTER ARCHITECTURE

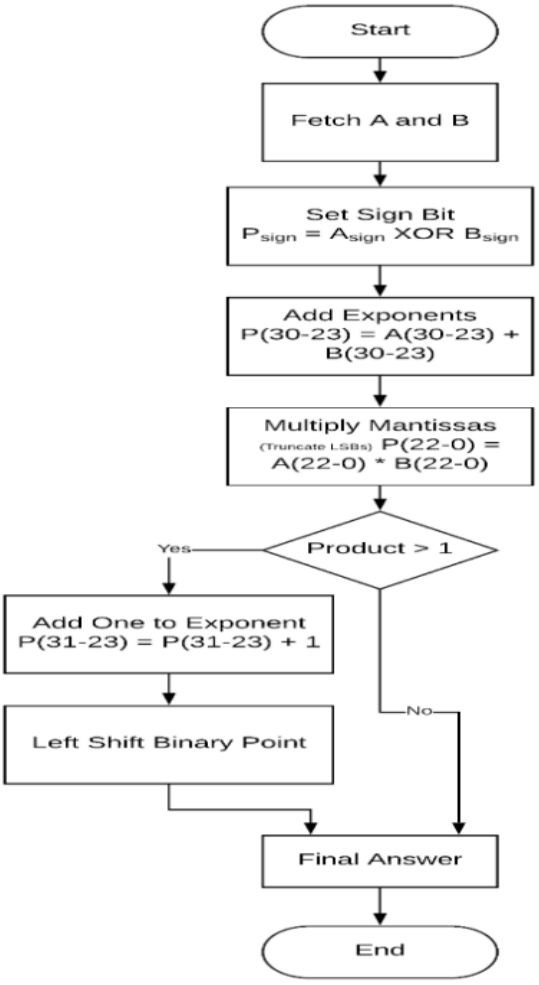
INNOVATIVE ASSIGNMENT

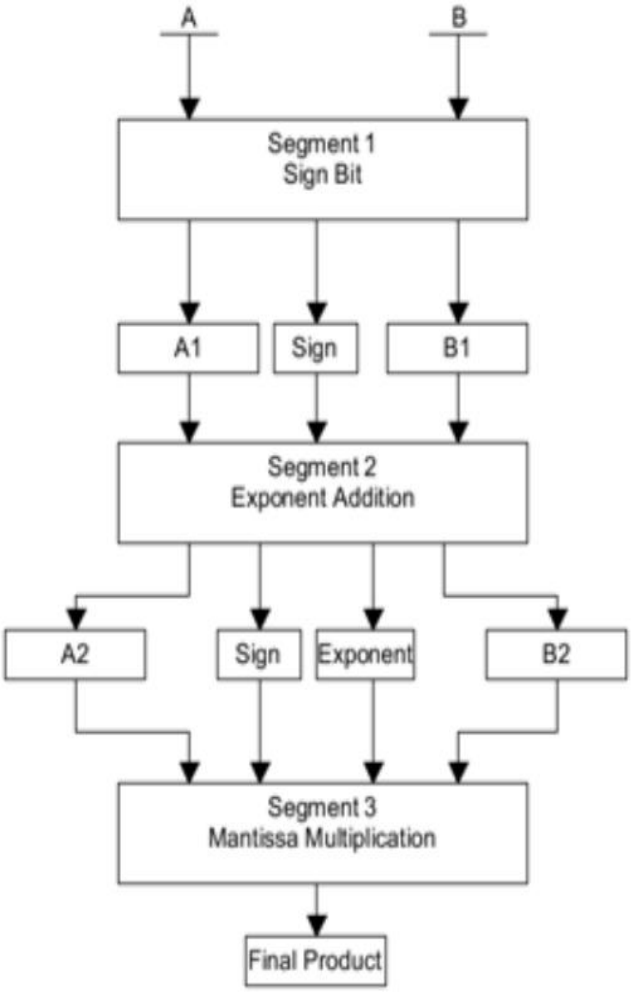
Team Members –

1. Arunima Barik (20BCE016)
2. Golchha Gaurav (20BCE079)
3. Bhargav Modha (21BCE503)

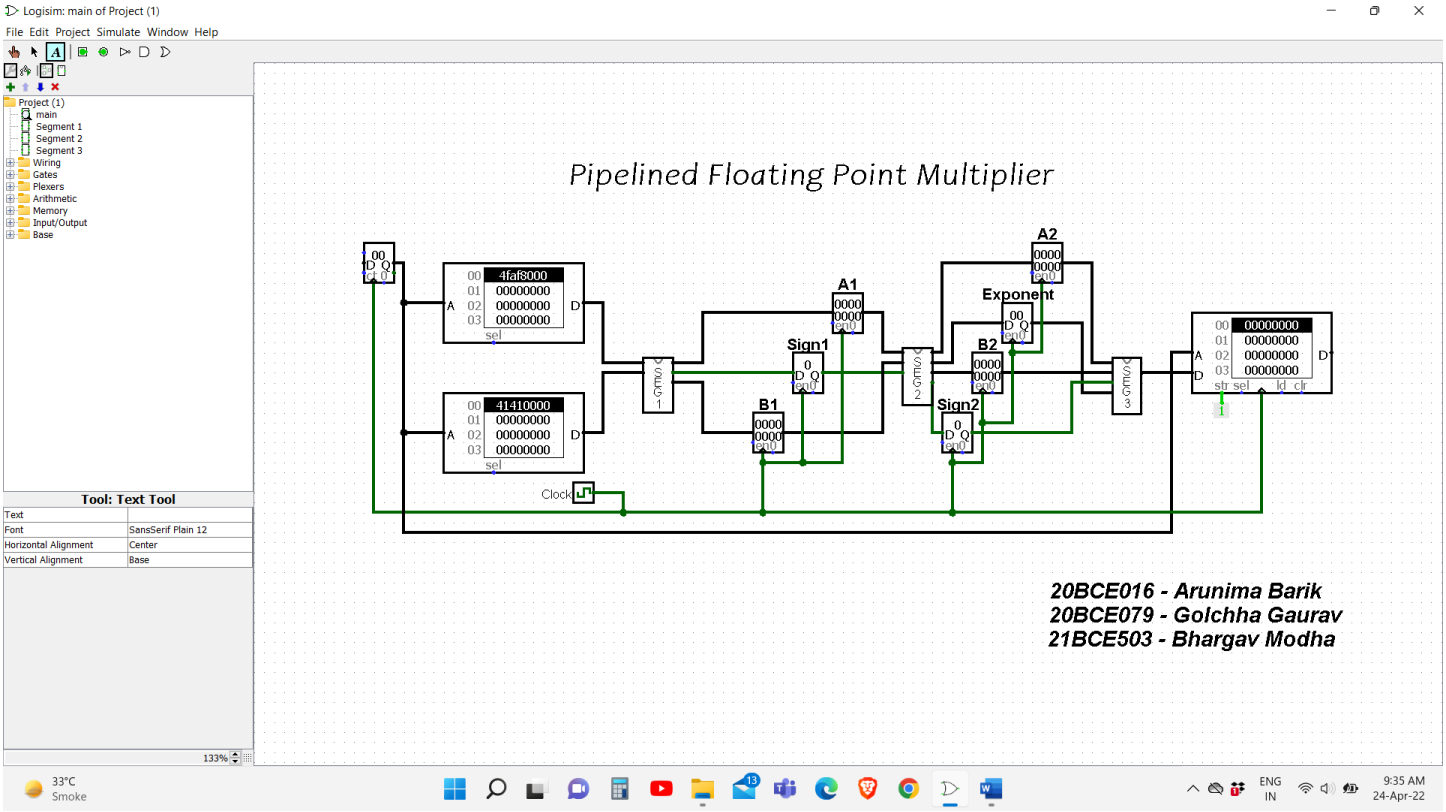
Floating Point Multiplication Using Pipeline

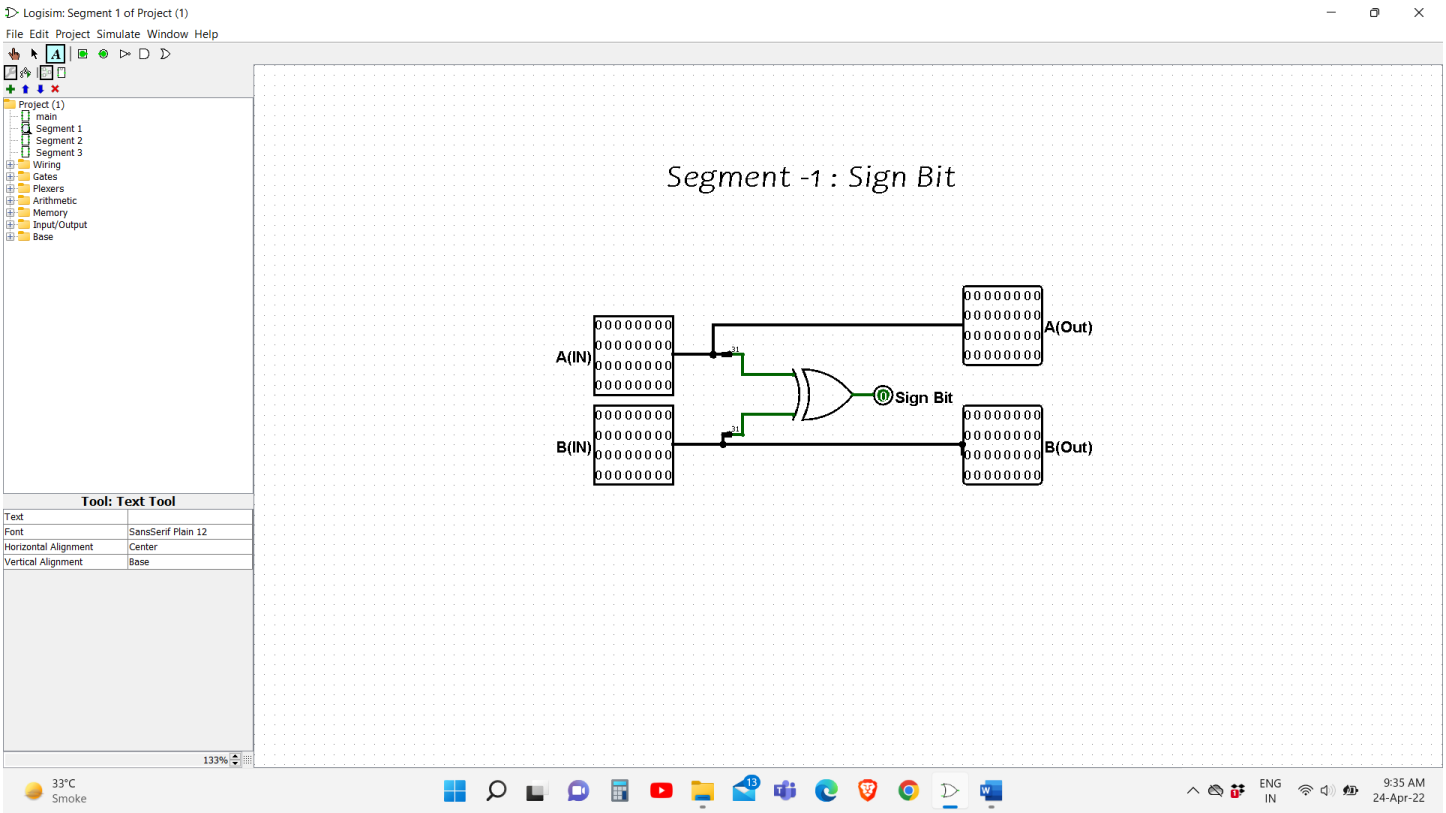
Flowchart –





Logic Circuit -





Logisim: Segment 2 of Project (1)

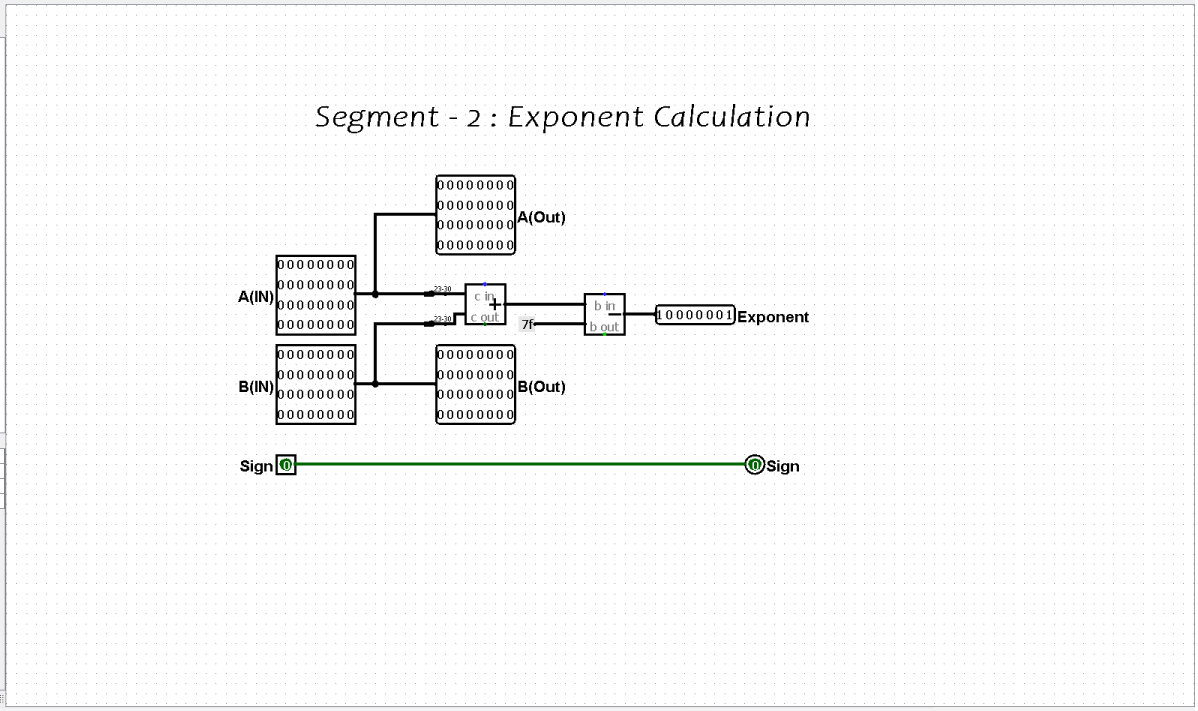
File Edit Project Simulate Window Help

Project (1)
- main
- Segment 1
- Segment 2
- Segment 3
- Wiring
- Gates
- Plexers
- Arithmetic
- Memory
- Input/Output
- Base

Tool: Text Tool

Text	
Font	SansSerif Plain 12
Horizontal Alignment	Center
Vertical Alignment	Base

133%



33°C Smoke

ENG IN 9:36 AM 24-Apr-22

Logisim: Segment 3 of Project (1)

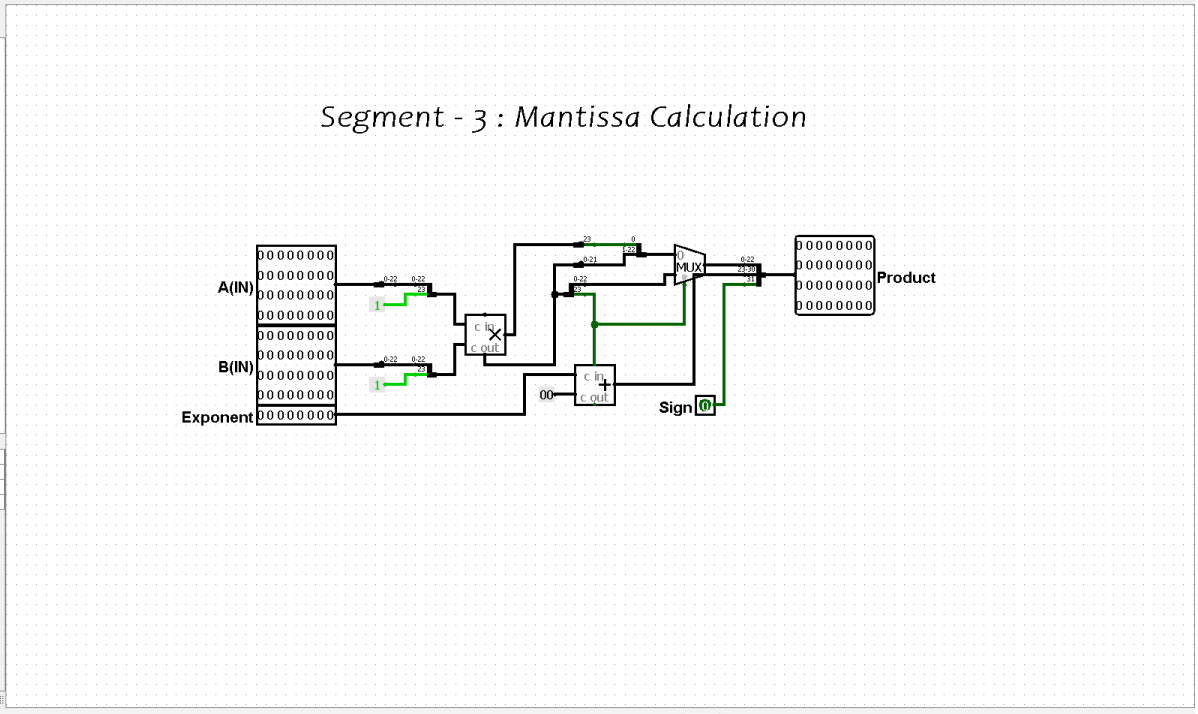
File Edit Project Simulate Window Help

Project (1)
- main
- Segment 1
- Segment 2
- Segment 3
- Wiring
- Gates
- Plexers
- Arithmetic
- Memory
- Input/Output
- Base

Circuit: Segment 3

Circuit Name	Segment 3
Shared Label	
Shared Label Facing	East
Shared Label Font	SansSerif Plain 12

133%



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$A = (125.125)_{10}$

$= (1111101.001)_2$

$= (1.1111010001 \times 2^6)_2$

exponent → $127 + 6$

$= (133)_{10}$

$= (10000101)_2$

mantissa → $(11110100100000000000000)_2$

sign bit → 0

final representation →

$(01000010111101001000000000000000)_2$

$= (4FAF8000)_{16}$

$B = (12.0625)_{10}$

$= (1100.0001)_2$

$= (1.1000001 \times 2^3)_2$

exponent → 127 + 3

$= (130)_{10}$

$= (1\ 0\ 0\ 0\ 0\ 0\ 1\ 0)_2$

mantissa → $(1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0)_2$

sign bit → 0

final representation →

$(0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 1\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0\ 0)_2$

$= (4141\ 0000)_{16}$

Multiply A and B

Segment 1 - sign bit

$P_{sign} = A_{sign} \oplus B_{sign}$

$= 0 \oplus 0$

$= 0$

Segment 2 - Exponent addition

$P_{exp} = A_{exp} + B_{exp}$ $= 6 + 3 + (1)$ carry from segment 3

$= 10 + 127$ (bias) $= 137$

Segment 3 - Mantissa multiplication

mantissa of A * mantissa of B

$= (1111\,0101\,0001\,0000\,0000\,0000\,0000\,0000)_2 \times (1000\,0010\,0000\,0000\,0000\,0000\,0000\,0000)_2$

$= (1)(0\,1111\,0010\,1010\,1010\,0010\,0000\,000)_2$

carry

final representation →

0 1 0 0 0 1 0 0 1 0 1 1 1 1 0 0
1 0 1 0 1 0 1 0 0 1 0 0 0 0 0 0

hexadecimal representation →

$(4\ 4\ B\ C\ A\ A\ 4\ 0)_{16}$

decimal representation →

$= (1.0111100101010010000000 \times 2^{10})_2$

$= (10111100101.0101001000)_2$

$= (1509.3203)_{10}$