COMPUTER ORGANIZATION ASSIGMENT02 REPORT

Descriptions of files:

alu32.v: Main Verilog file. It contains adder , multiplier , 8x1(32-bit) mux and other components for add,orr,xor,nor. Also there is 2x1 muxes for control inputs of adder. Because same adder using for addition, subtraction , multiplication and set-ong-less-than.

adder.v: Adder has 32 half adder for 32-bit .

half_adder.v:Addition component for add two bit.

c_a.v: Control a input for adder. If it's out 0 than adder does addition , otherwise it does multiplication.

c_b.v: Control b input for adder. If it's out 0 than adder does addition, otherwise it does subtraction.

mult32.v:Verilog file for multiplication process . Multiplier has datapath and control units.

datapath.v: Datapath does shift and write operations.

control.v: Controller control datapath unit when writing and shifting.

and32.v: Verilog file for and operation of two 32-bit number.

not32: Verilog file for not operation for 32-bit number.

xor32: Verilog file for xor operation of two 32-bit number.

or32.v: Verilog file for or operation of two 32-bit number.

ander4.v: Verilog file for and four bit.

or8_bit: Verilog file for or 8 bit.

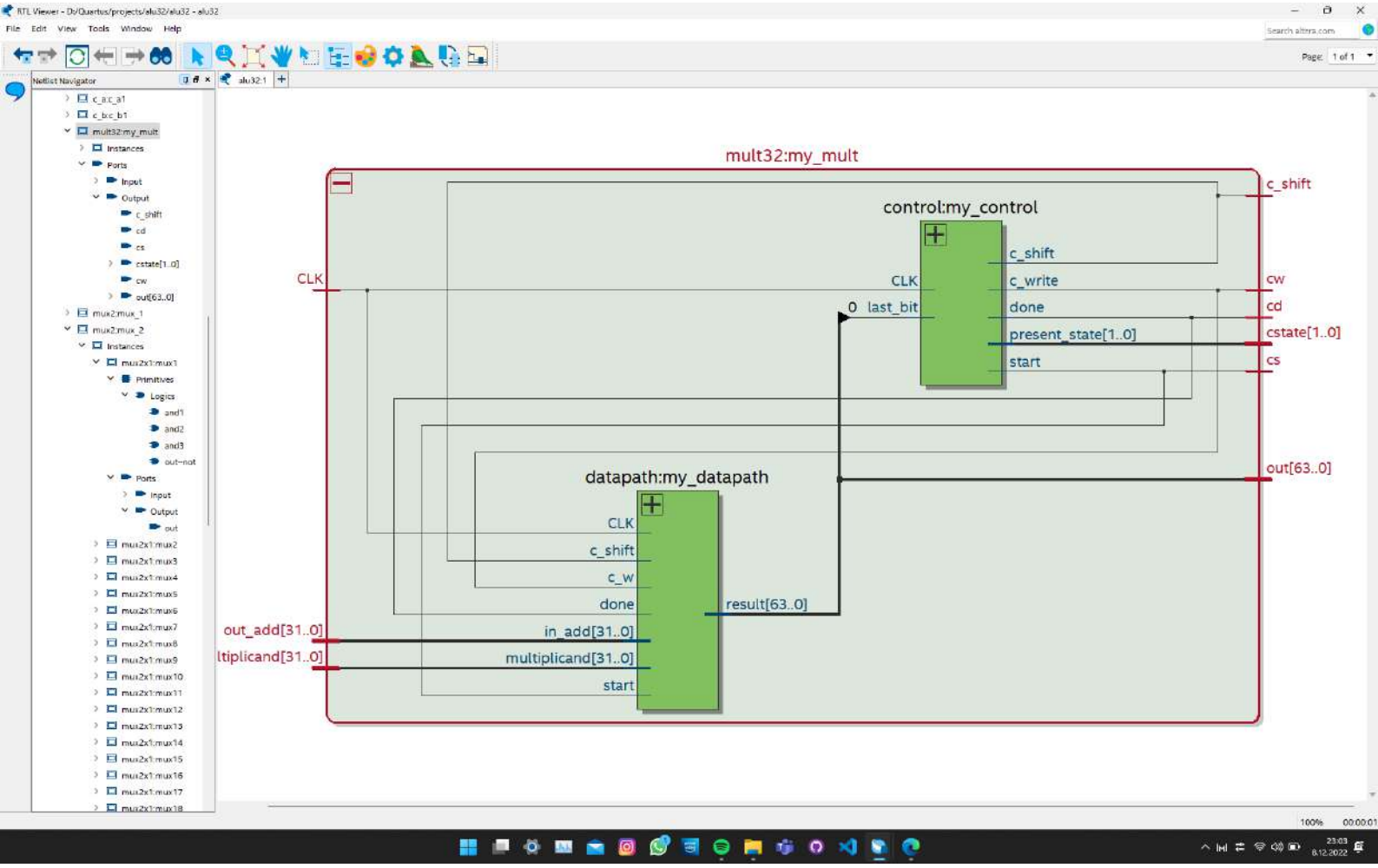
mux2.v: Verilog file for 2x1 mux. It contains 32 mux2x1 unit for 32-bit numbers. It used to control inputs of adder.

mux2x1.v: Verilog file for 2x1 mux of 1-bit numbers.

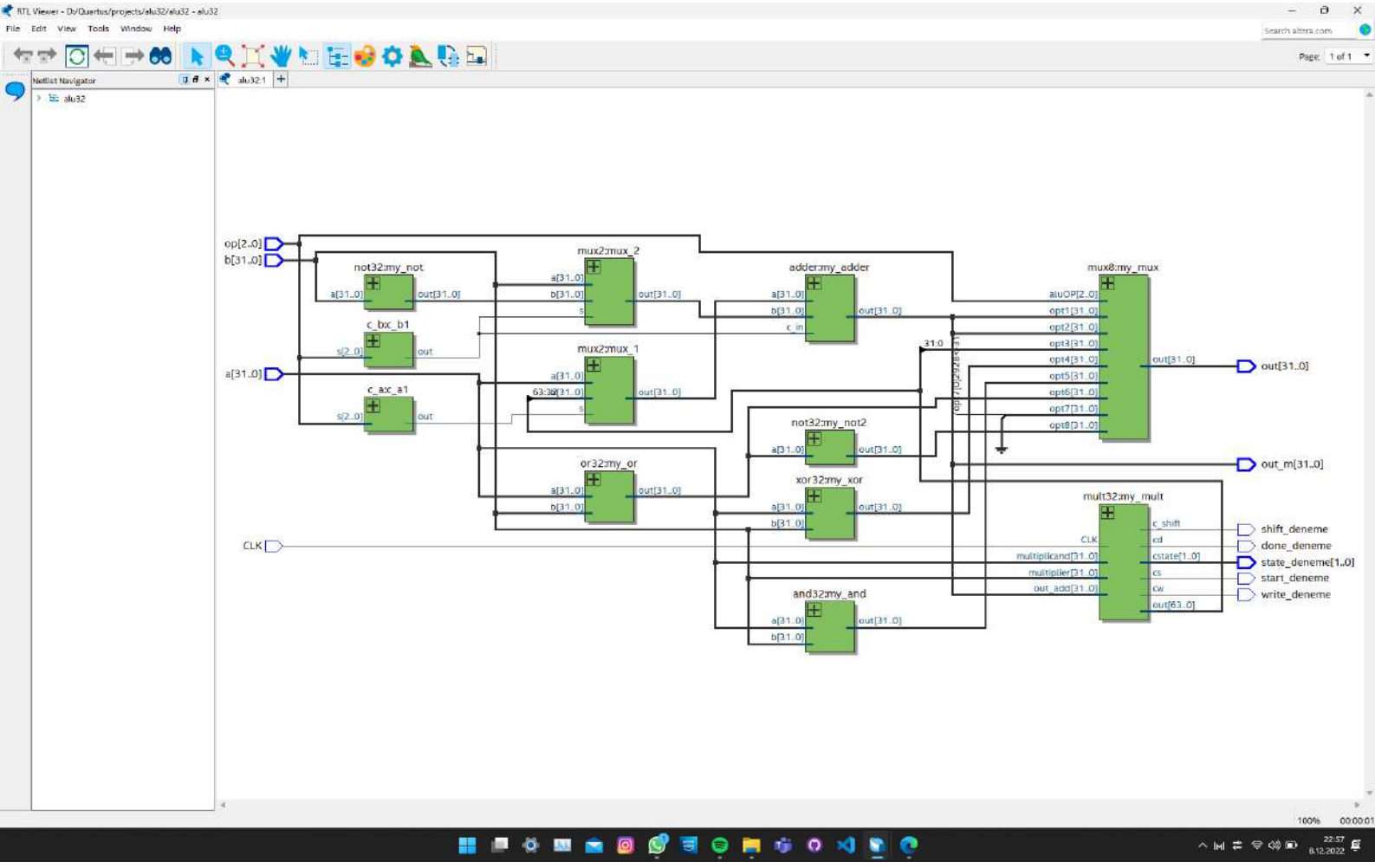
mux8.v: Verilog file for 8x1 mux. It contains 32 mux8_bit unit for 32-bit numbers. It used to control output of alu32 unit.

mux8_bit.v: Verilog file for 8x1 mux of 1-bit numbers.

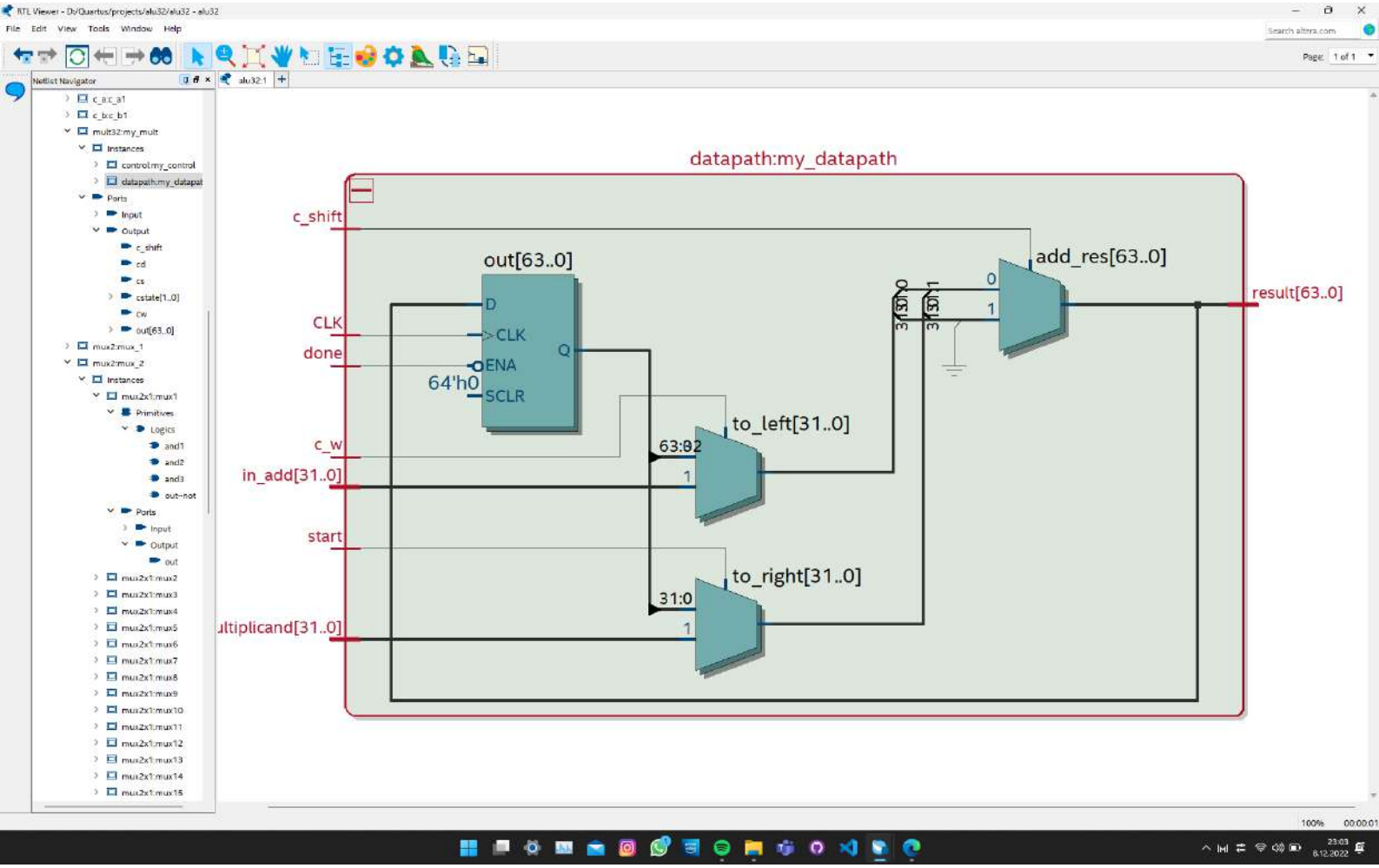
mult32_design



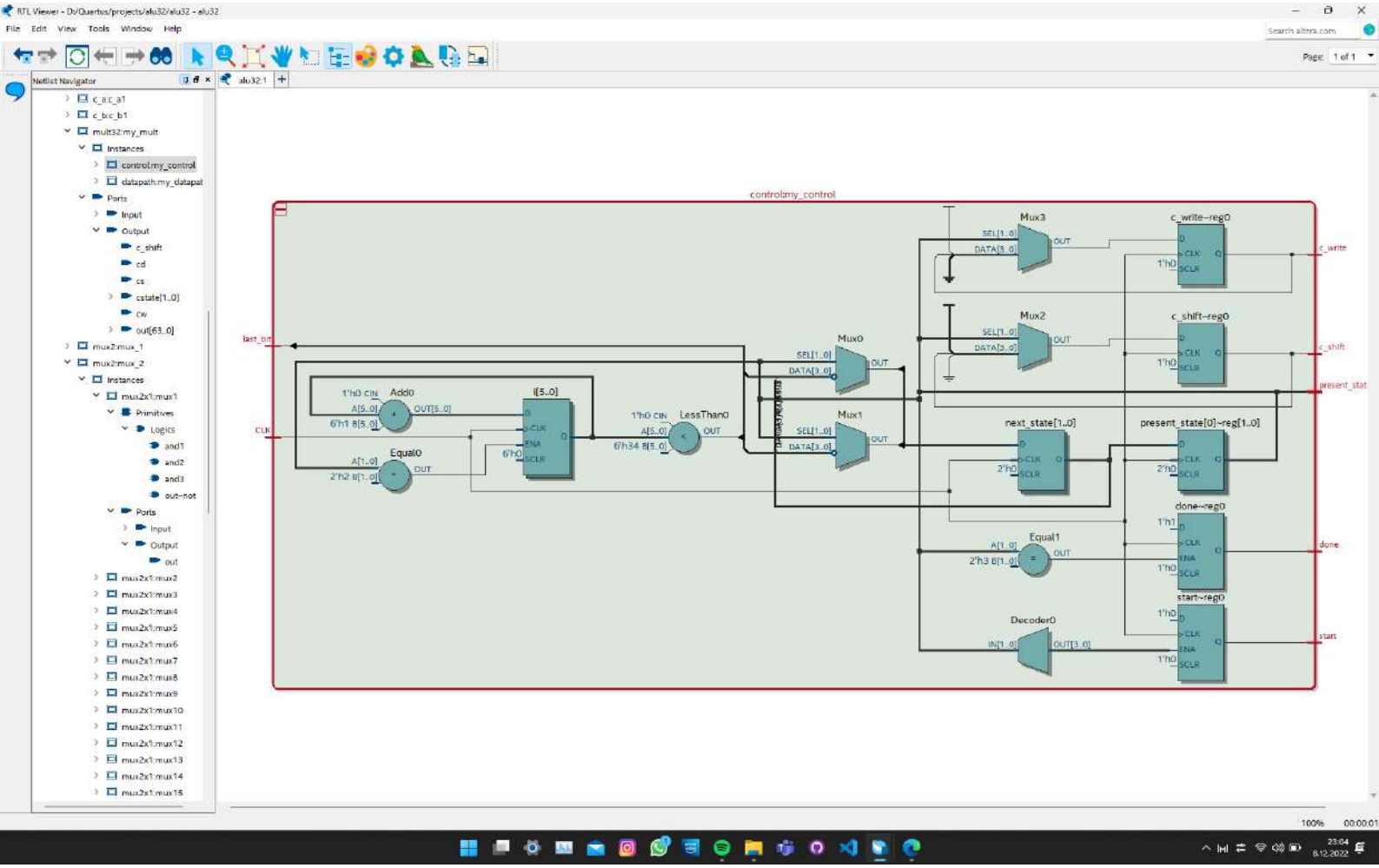
alu32_design



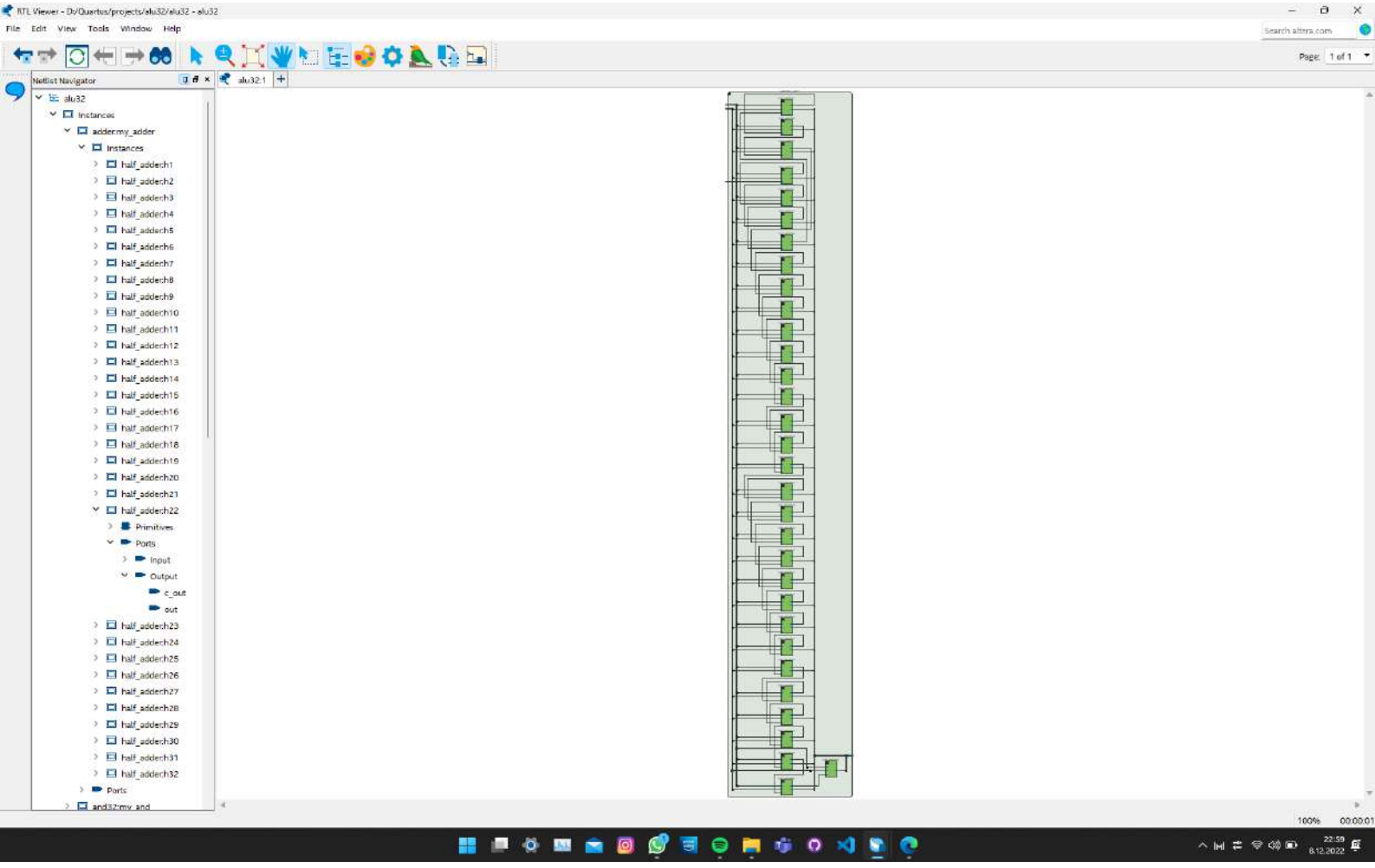
datapath_design



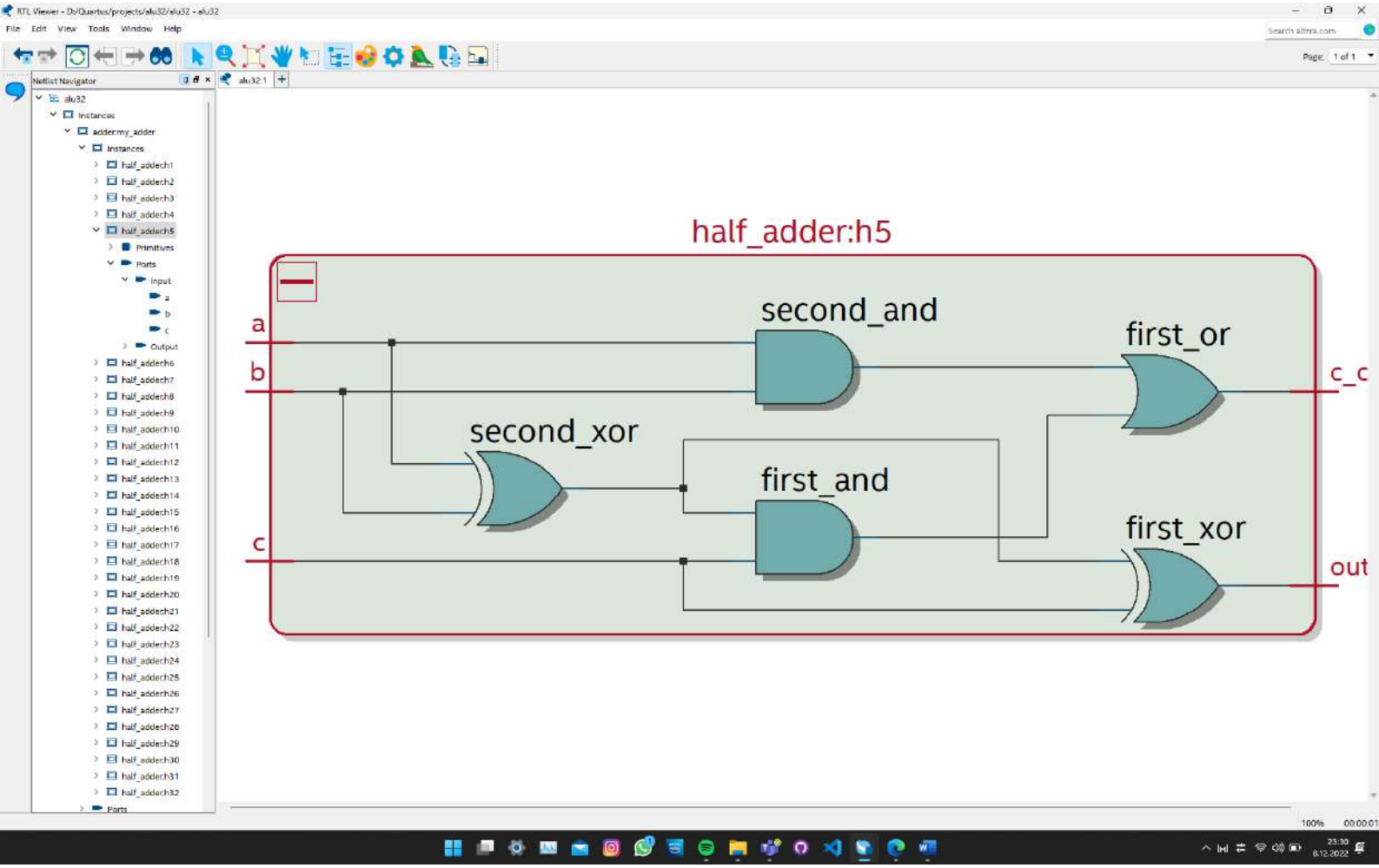
control_design



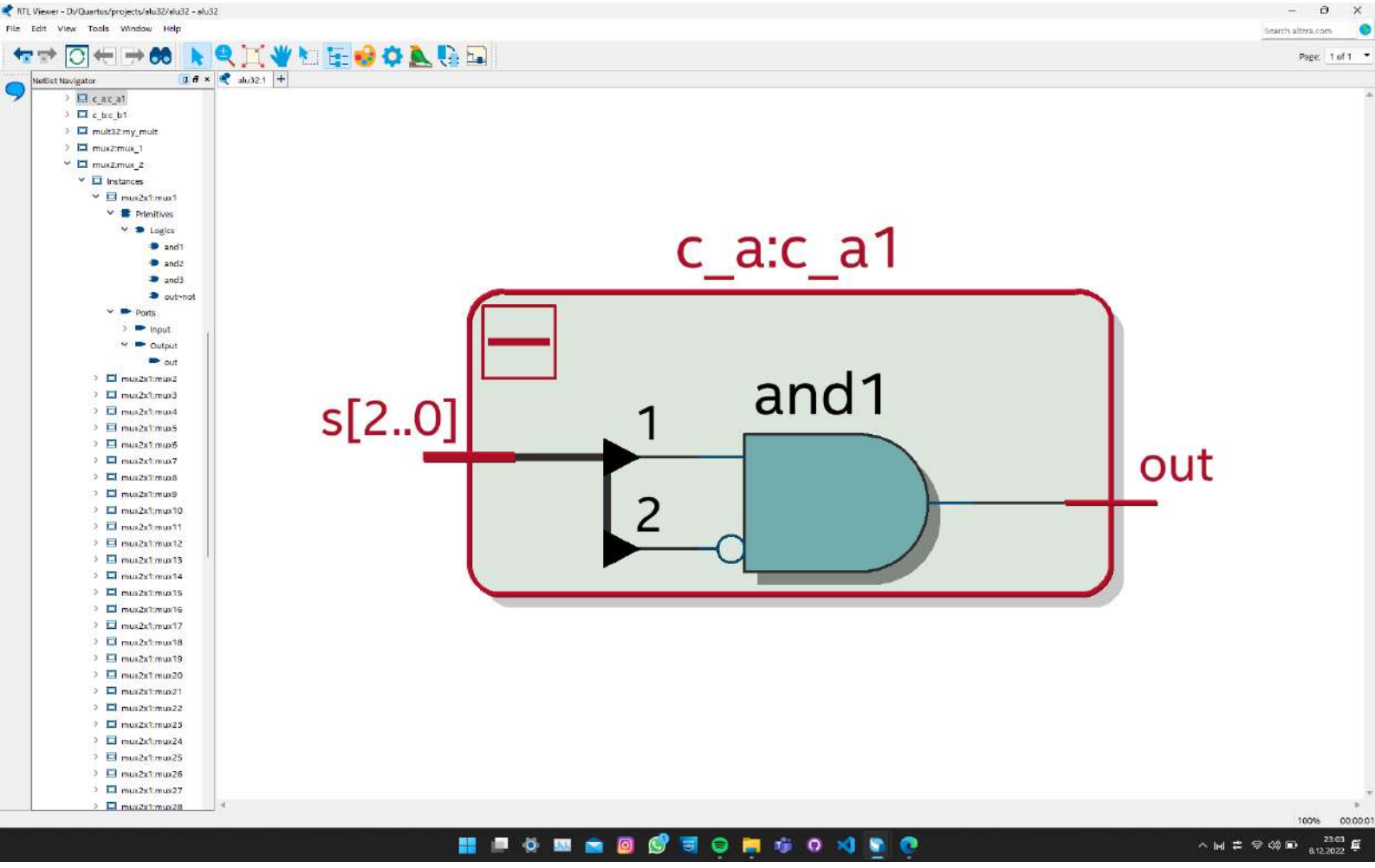
adder_design



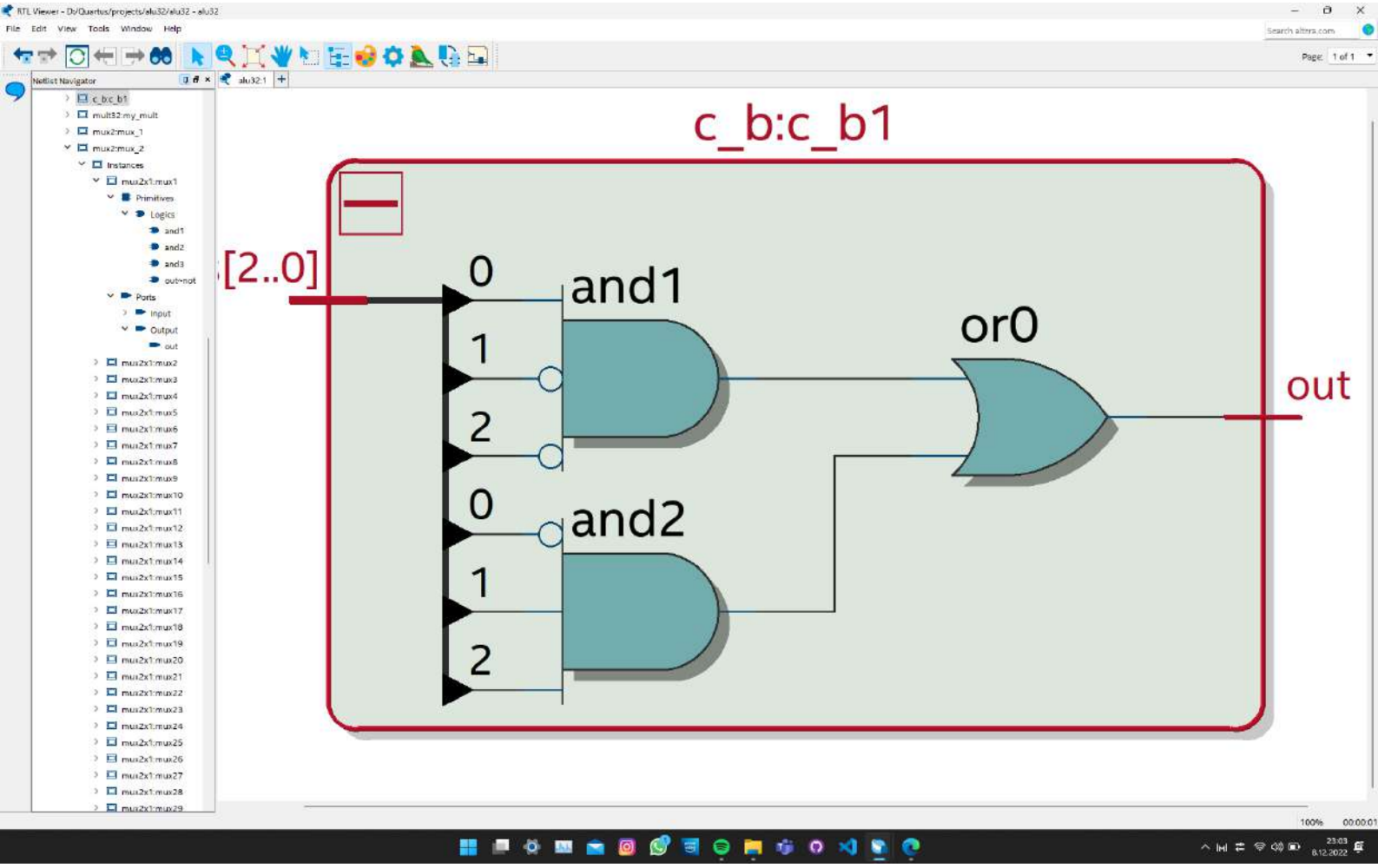
half_adder_design



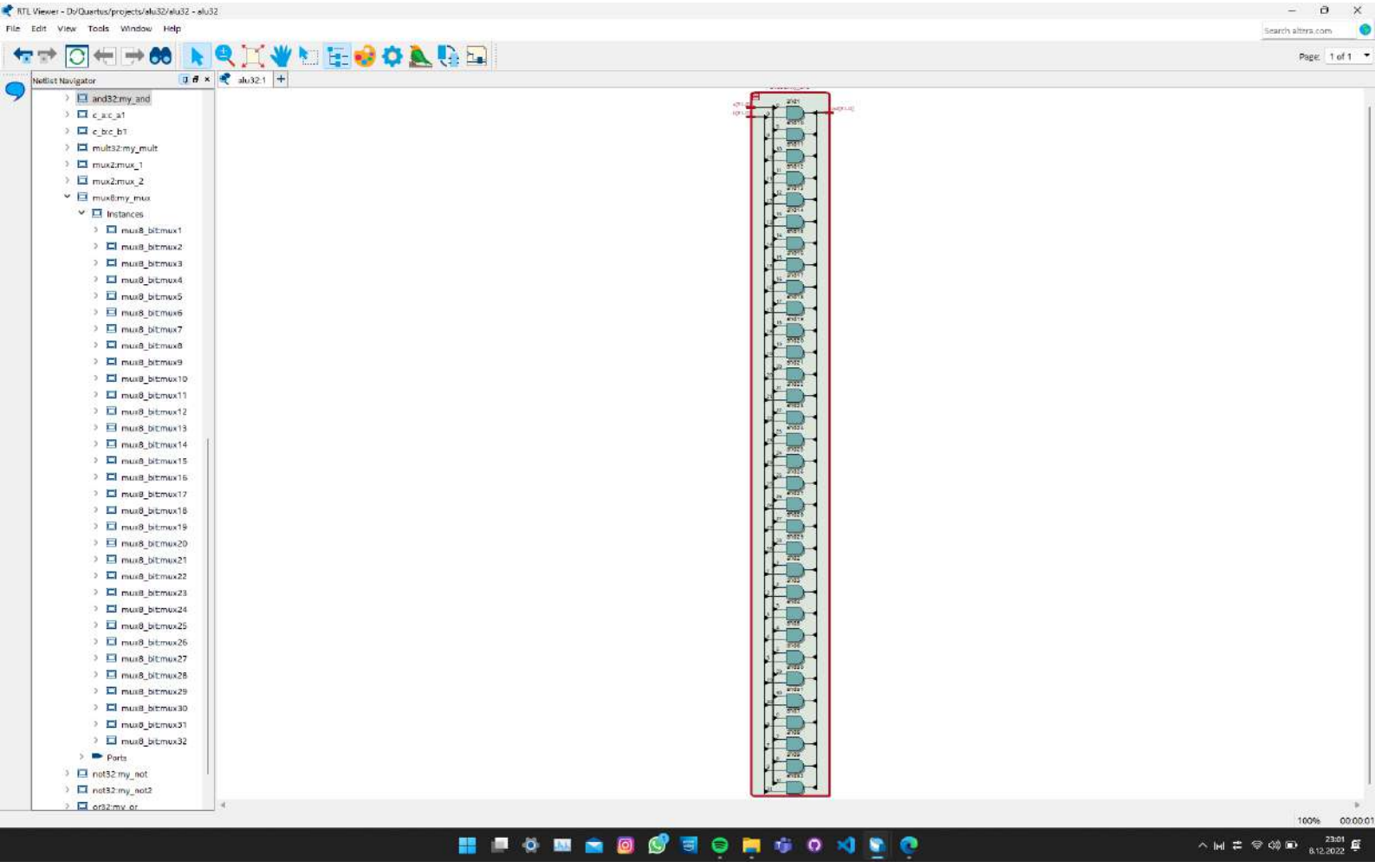
c_a_design



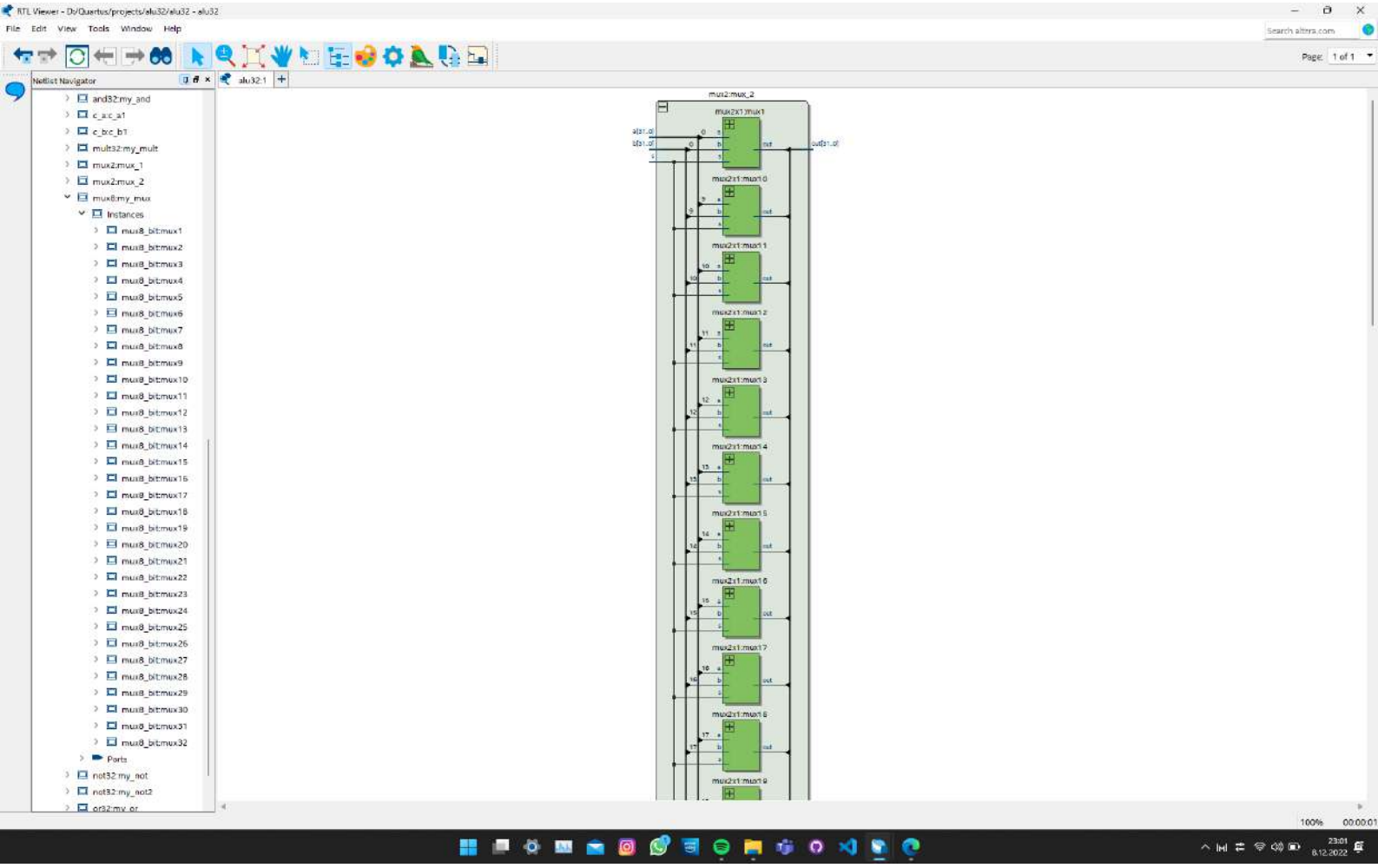
c_b_design



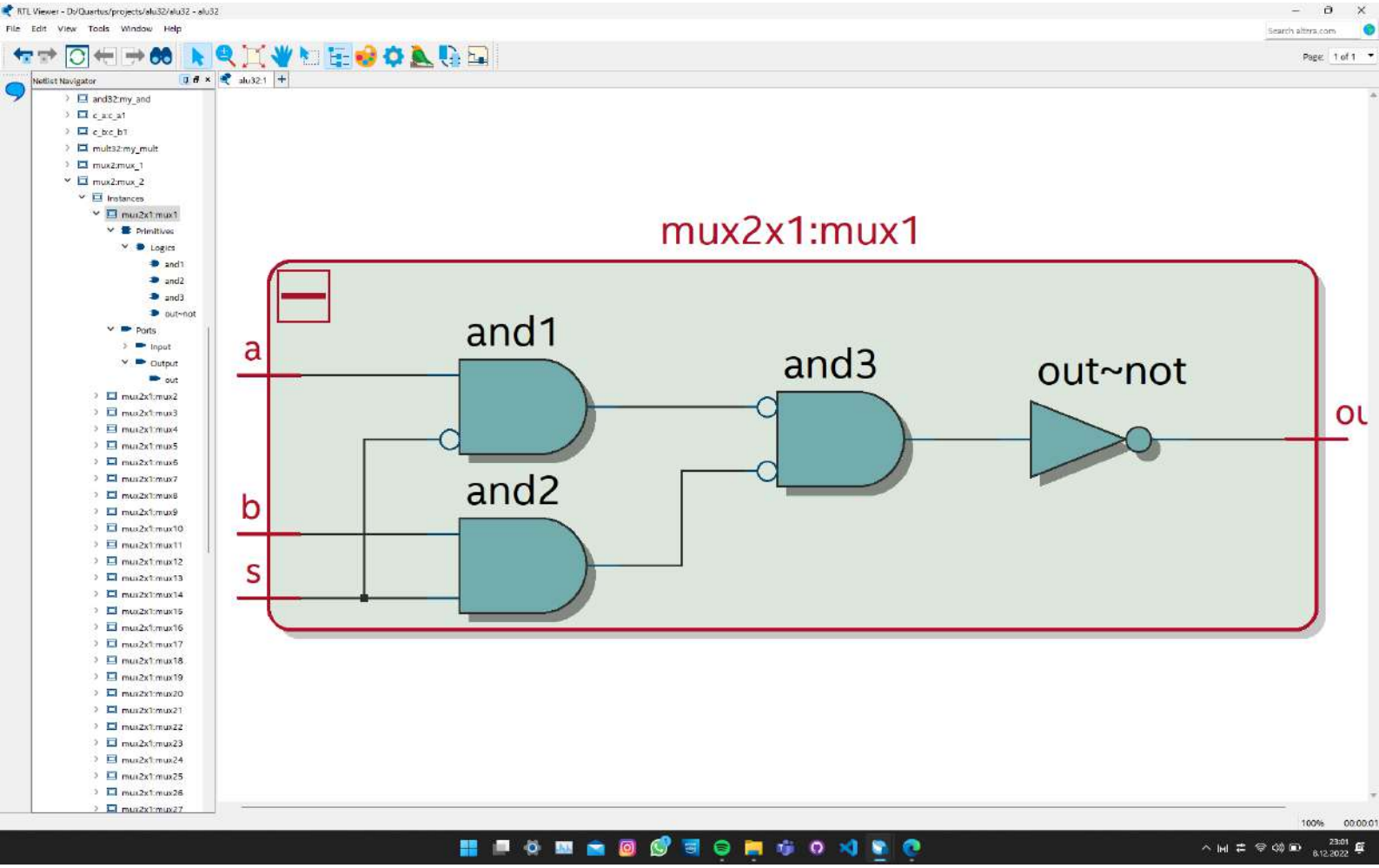
and32_design



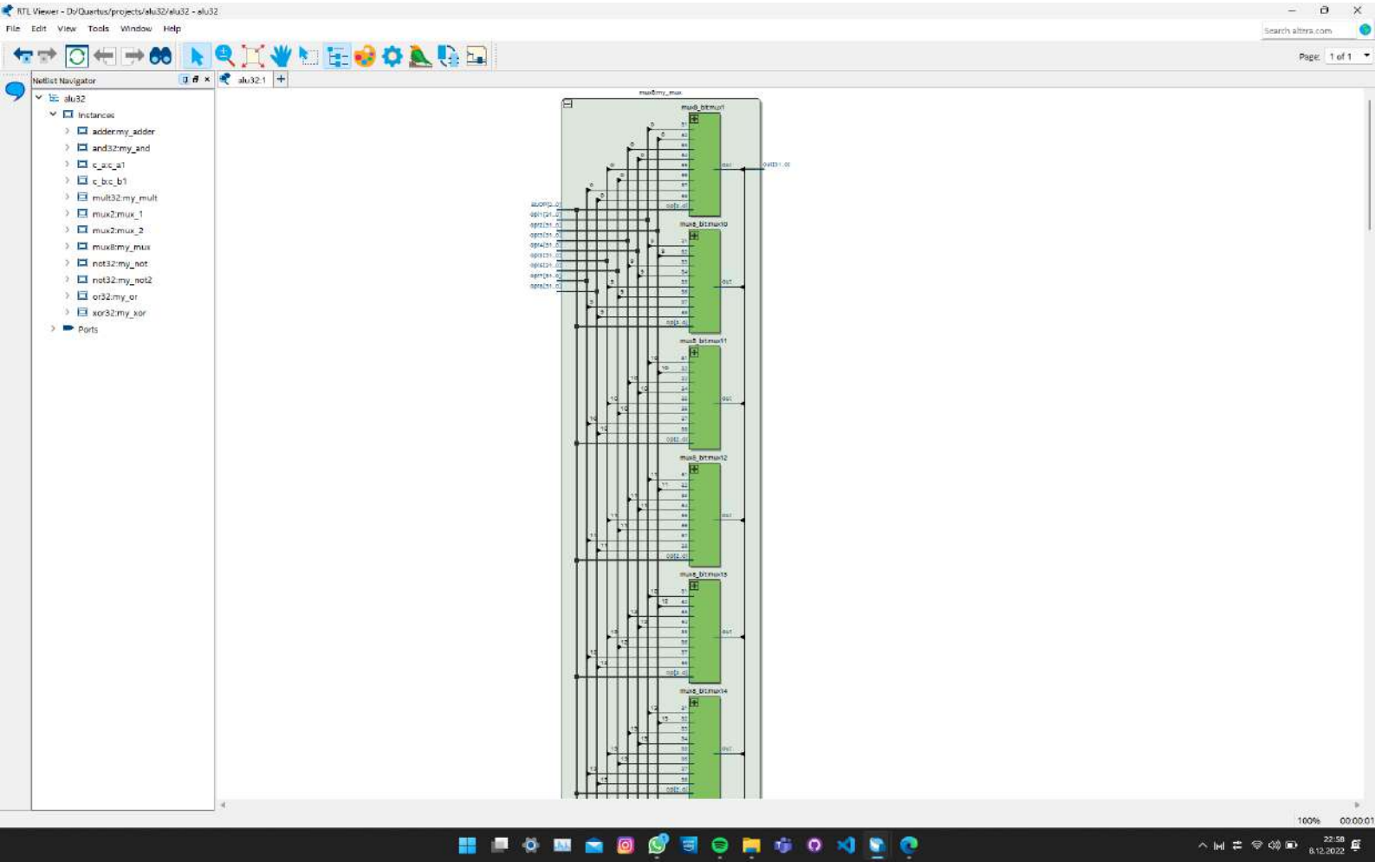
mux2_design


RTL Viewer - D:/Quartus/projects/alu32/alu32 - alu32
File Edit View Tools Window Help
Netlist Navigator
alu32:1
and32:my_and
c_a:c_a1
c_b:c_b1
mult32:my_mult
mux2:mux_1
mux2:mux_2
mux8:my_mux
Instances
mux8_bit:mux1
mux8_bit:mux2
mux8_bit:mux3
mux8_bit:mux4
mux8_bit:mux5
mux8_bit:mux6
mux8_bit:mux7
mux8_bit:mux8
mux8_bit:mux9
mux8_bit:mux10
mux8_bit:mux11
mux8_bit:mux12
mux8_bit:mux13
mux8_bit:mux14
mux8_bit:mux15
mux8_bit:mux16
mux8_bit:mux17
mux8_bit:mux18
mux8_bit:mux19
mux8_bit:mux20
mux8_bit:mux21
mux8_bit:mux22
mux8_bit:mux23
mux8_bit:mux24
mux8_bit:mux25
mux8_bit:mux26
mux8_bit:mux27
mux8_bit:mux28
mux8_bit:mux29
mux8_bit:mux30
mux8_bit:mux31
mux8_bit:mux32
Ports
not32:my_not
not32:my_not2
or32:my_or
mux2:mux_2
mux2x1:mux1
mux2x1:mux1 0
mux2x1:mux1 1
mux2x1:mux1 2
mux2x1:mux1 3
mux2x1:mux1 4
mux2x1:mux1 5
mux2x1:mux1 6
mux2x1:mux1 7
mux2x1:mux1 8
mux2x1:mux1 9
a[31..0]
b[31..0]
out
out[31..0]
100%
00:00:01
23:01
8.12.2022

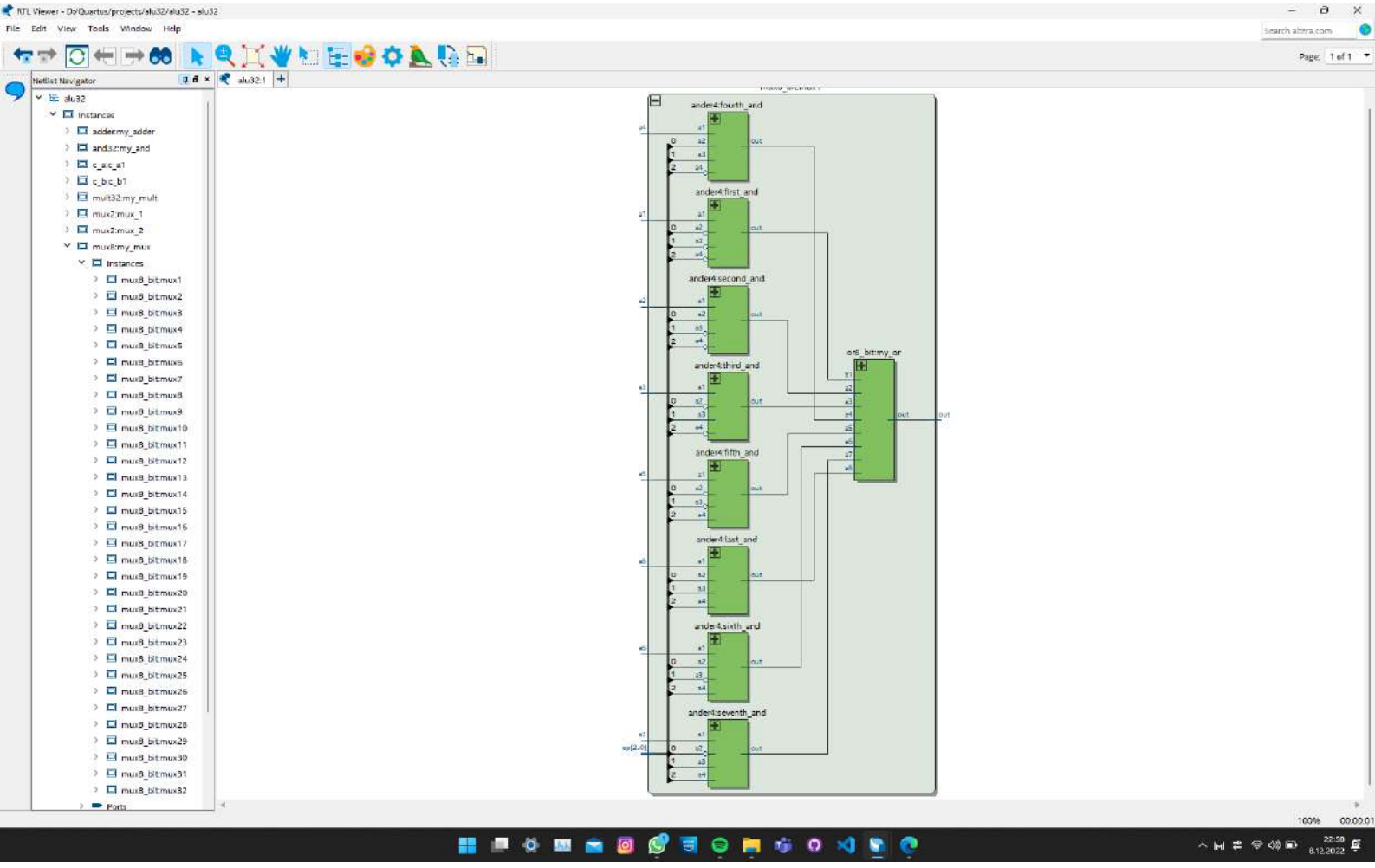
mux2x1_design



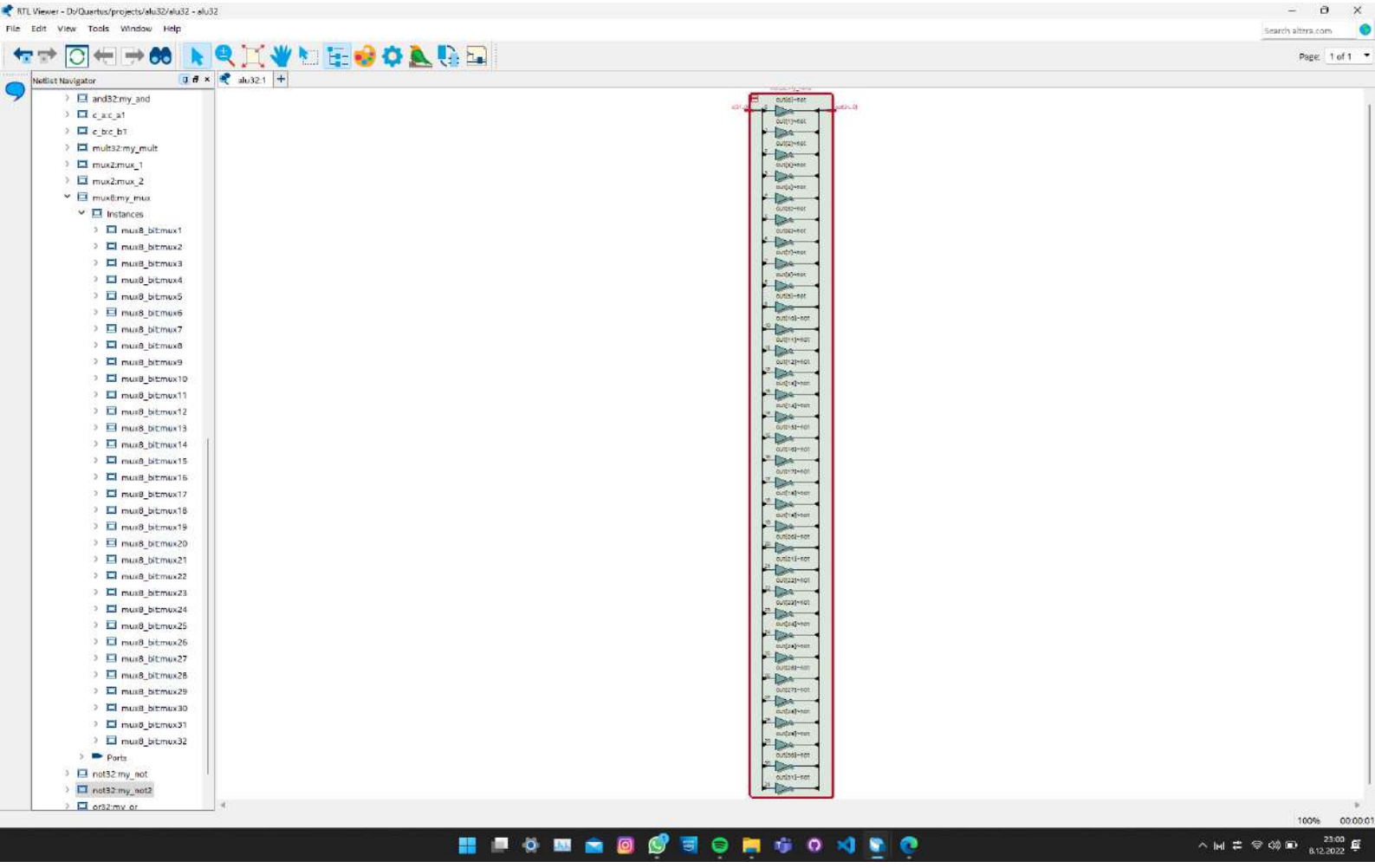
mux8_design


RTL Viewer - D:/Quartus/projects/alu32/alu32 - alu32
File Edit View Tools Window Help
Netlist Navigator
alu32
Instances
adder:my_adder
and32:my_and
c_a:c_a1
c_b:c_b1
mult32:my_mult
mux2:mux_1
mux2:mux_2
mux8:my_mux
not32:my_not
not32:my_not2
or32:my_or
xor32:my_xor
Ports
alu32:1
mux8:my_mux
mux8_bitmux1
mux8_bitmux10
mux8_bitmux11
mux8_bitmux12
mux8_bitmux13
mux8_bitmux14
100%
00:00:01
22:58
8.12.2022

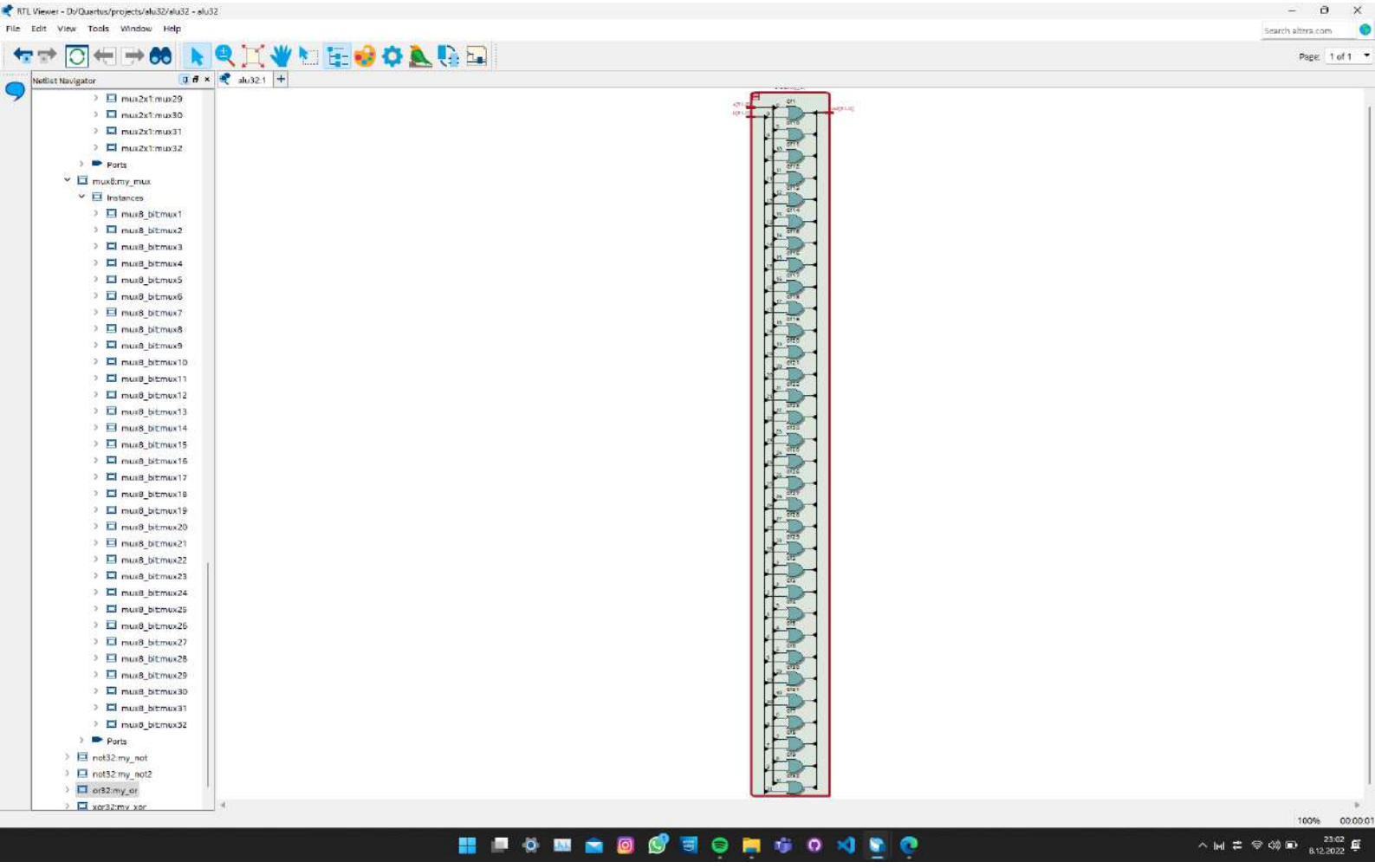
mux8_bit_design



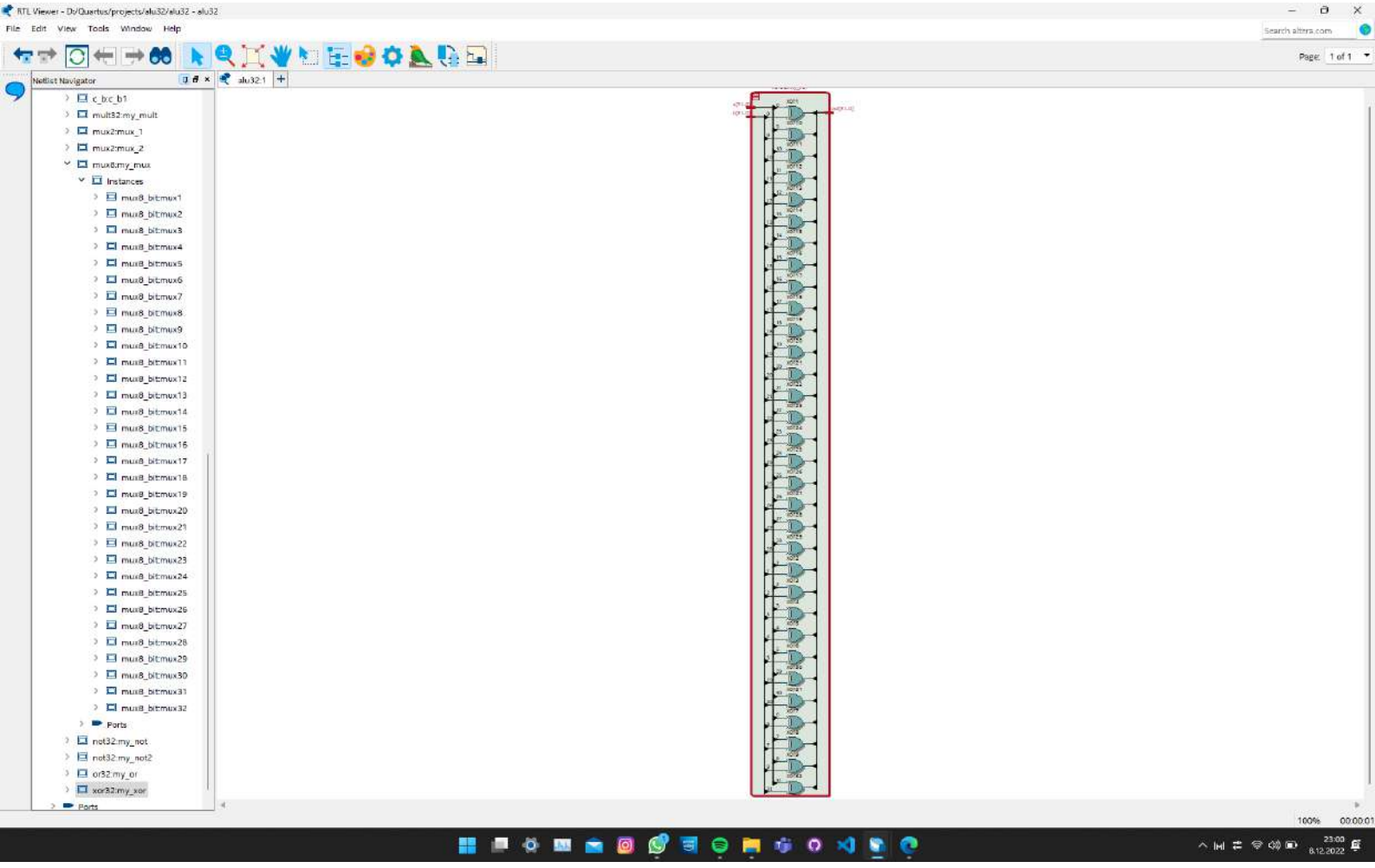
not32_design

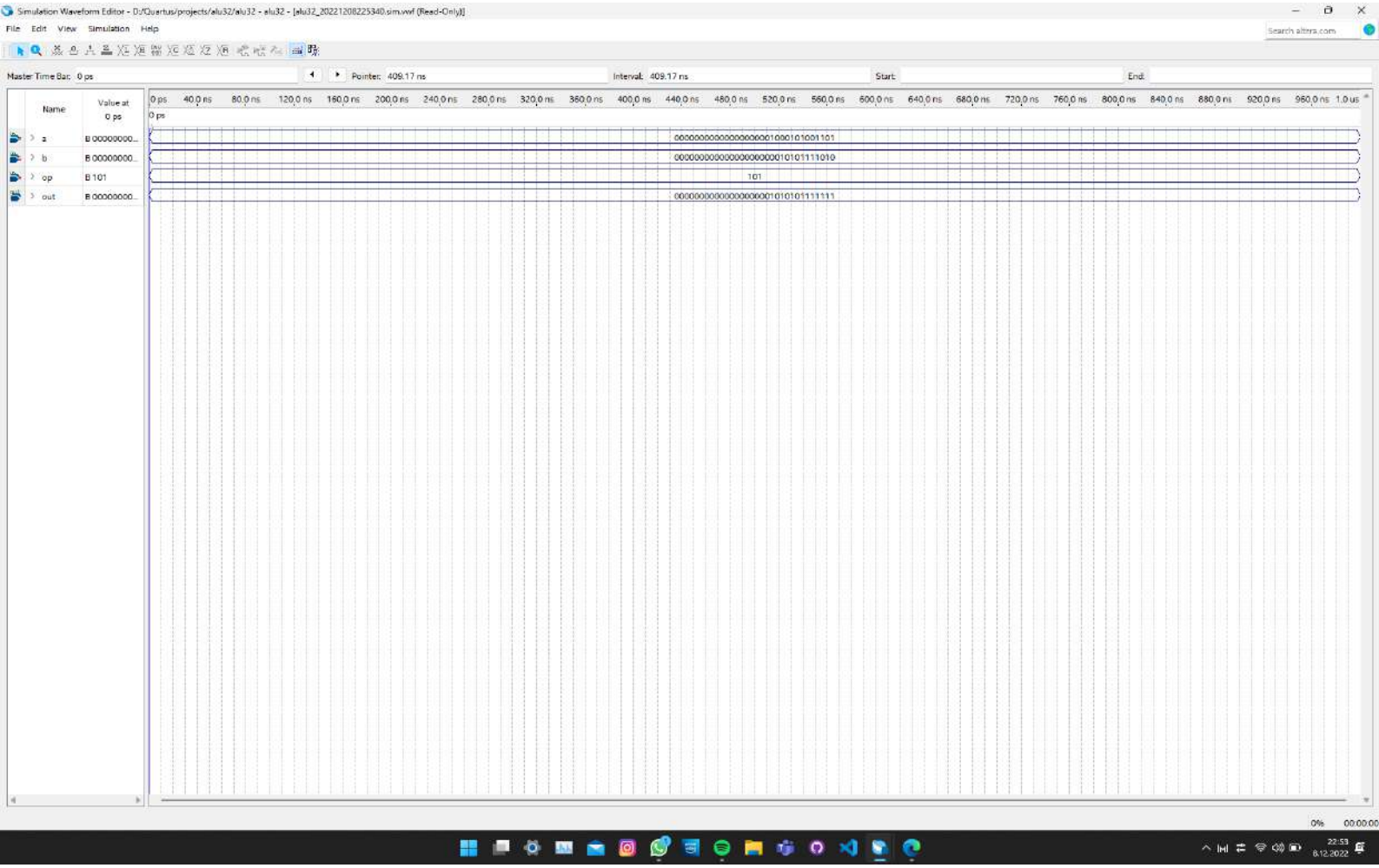


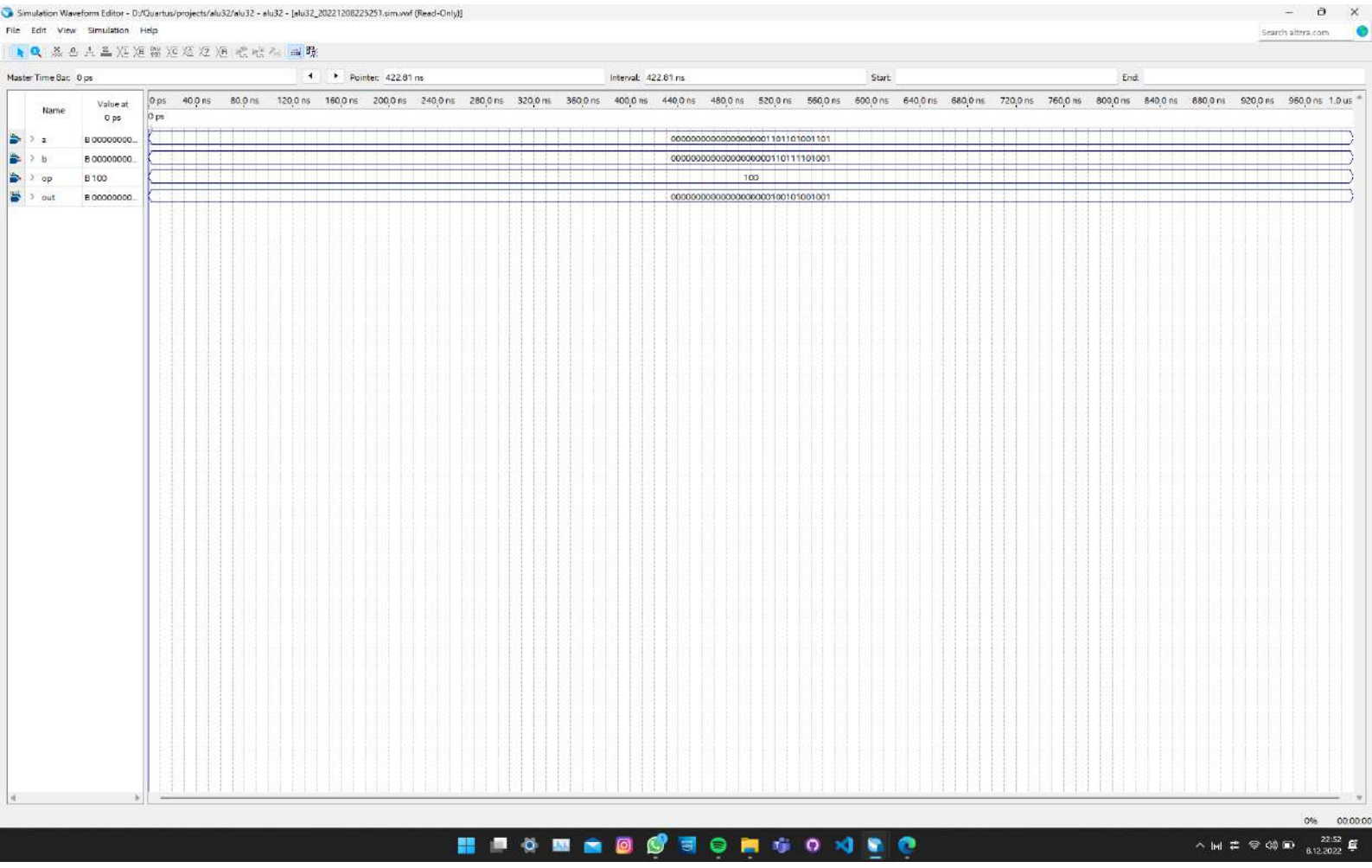
or32_design

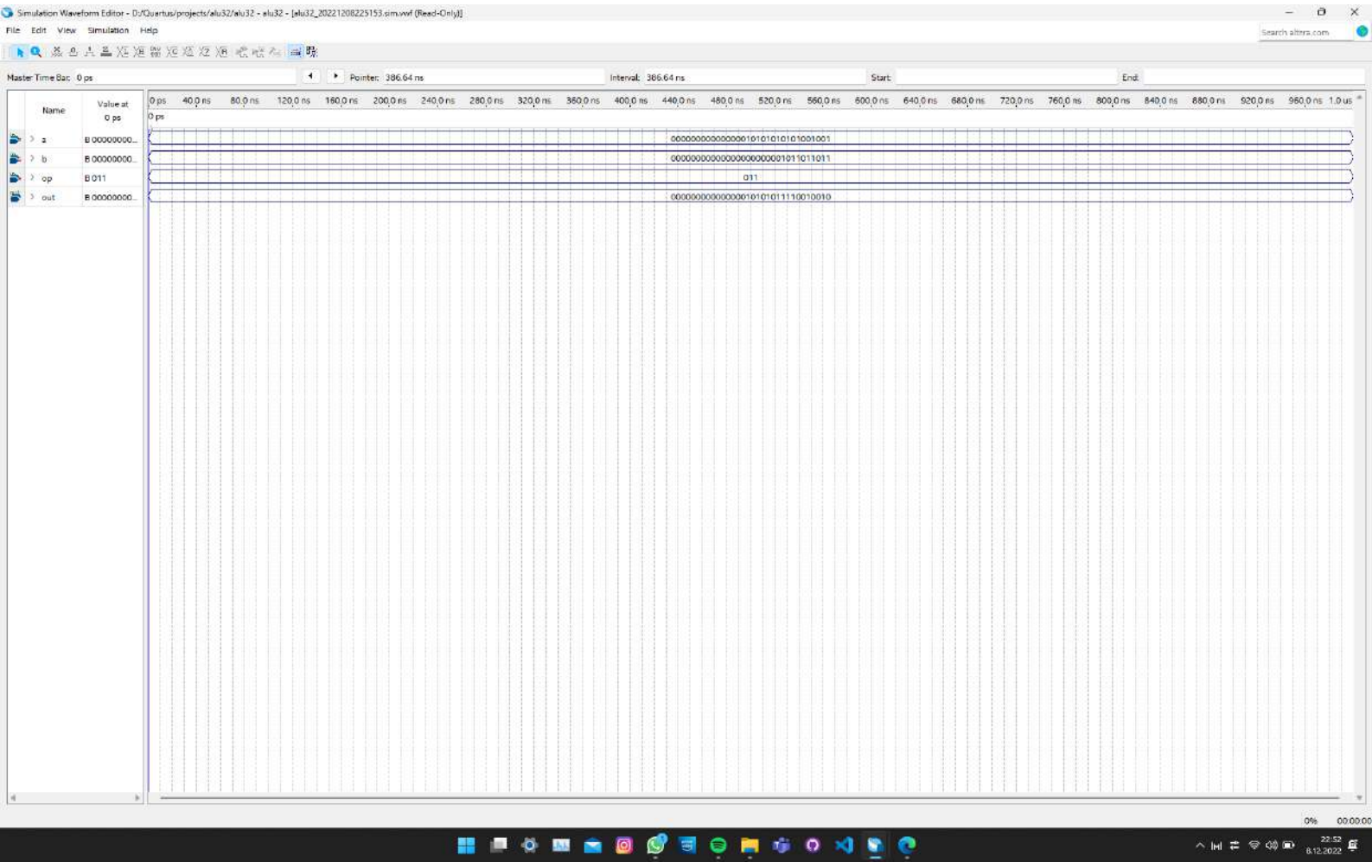

RTL Viewer - D:/Quartus/projects/alu32/alu32 - alu32
File Edit View Tools Window Help
Netlist Navigator
alu32:1
mux2x1:mux29
mux2x1:mux30
mux2x1:mux31
mux2x1:mux32
Ports
mux8:my_mux
Instances
mux8_bit:mux1
mux8_bit:mux2
mux8_bit:mux3
mux8_bit:mux4
mux8_bit:mux5
mux8_bit:mux6
mux8_bit:mux7
mux8_bit:mux8
mux8_bit:mux9
mux8_bit:mux10
mux8_bit:mux11
mux8_bit:mux12
mux8_bit:mux13
mux8_bit:mux14
mux8_bit:mux15
mux8_bit:mux16
mux8_bit:mux17
mux8_bit:mux18
mux8_bit:mux19
mux8_bit:mux20
mux8_bit:mux21
mux8_bit:mux22
mux8_bit:mux23
mux8_bit:mux24
mux8_bit:mux25
mux8_bit:mux26
mux8_bit:mux27
mux8_bit:mux28
mux8_bit:mux29
mux8_bit:mux30
mux8_bit:mux31
mux8_bit:mux32
Ports
not32:my_not
not32:my_not2
or32:my_or
xor32:my_xor
100%
00:00:01
23:02
8.12.2022

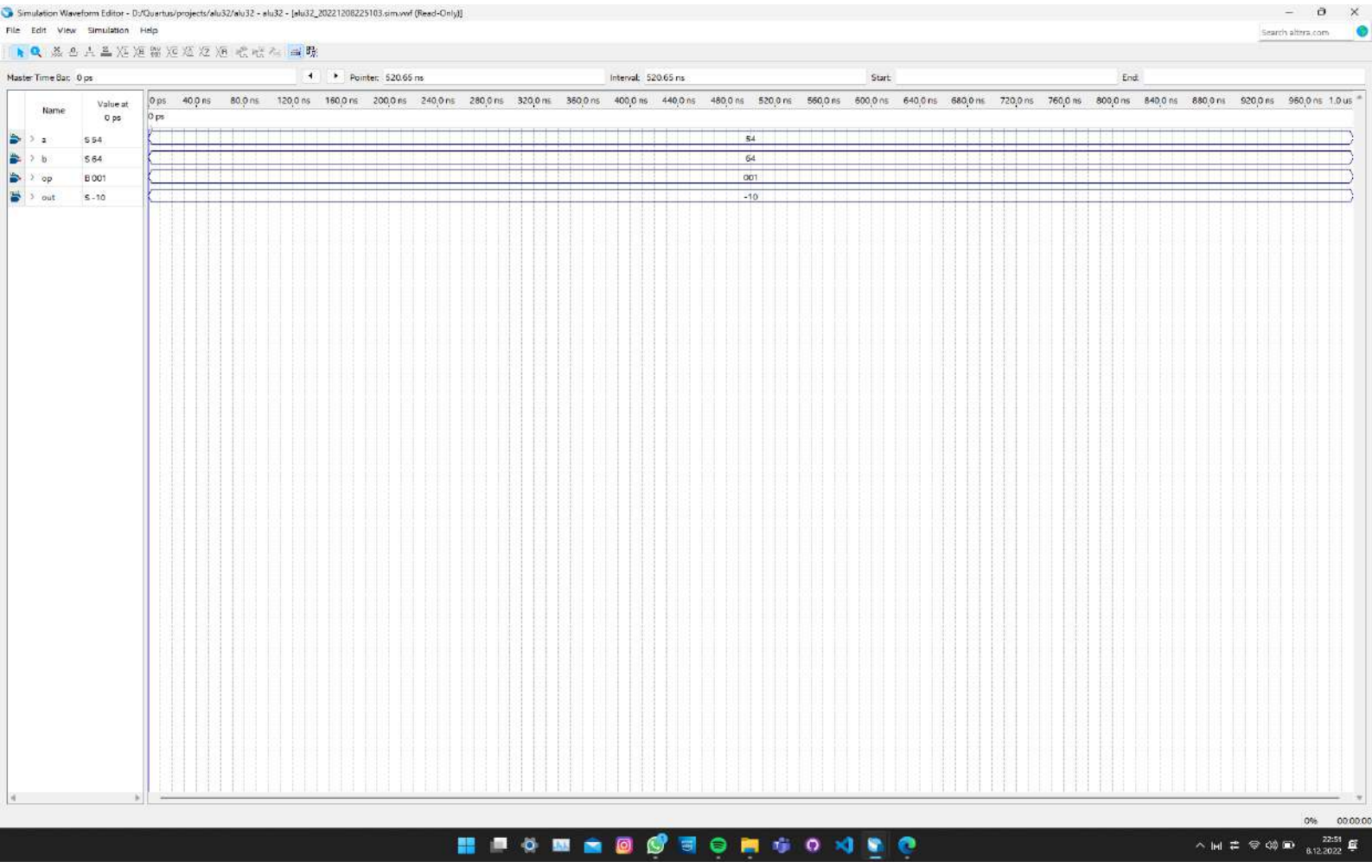
xor32_design

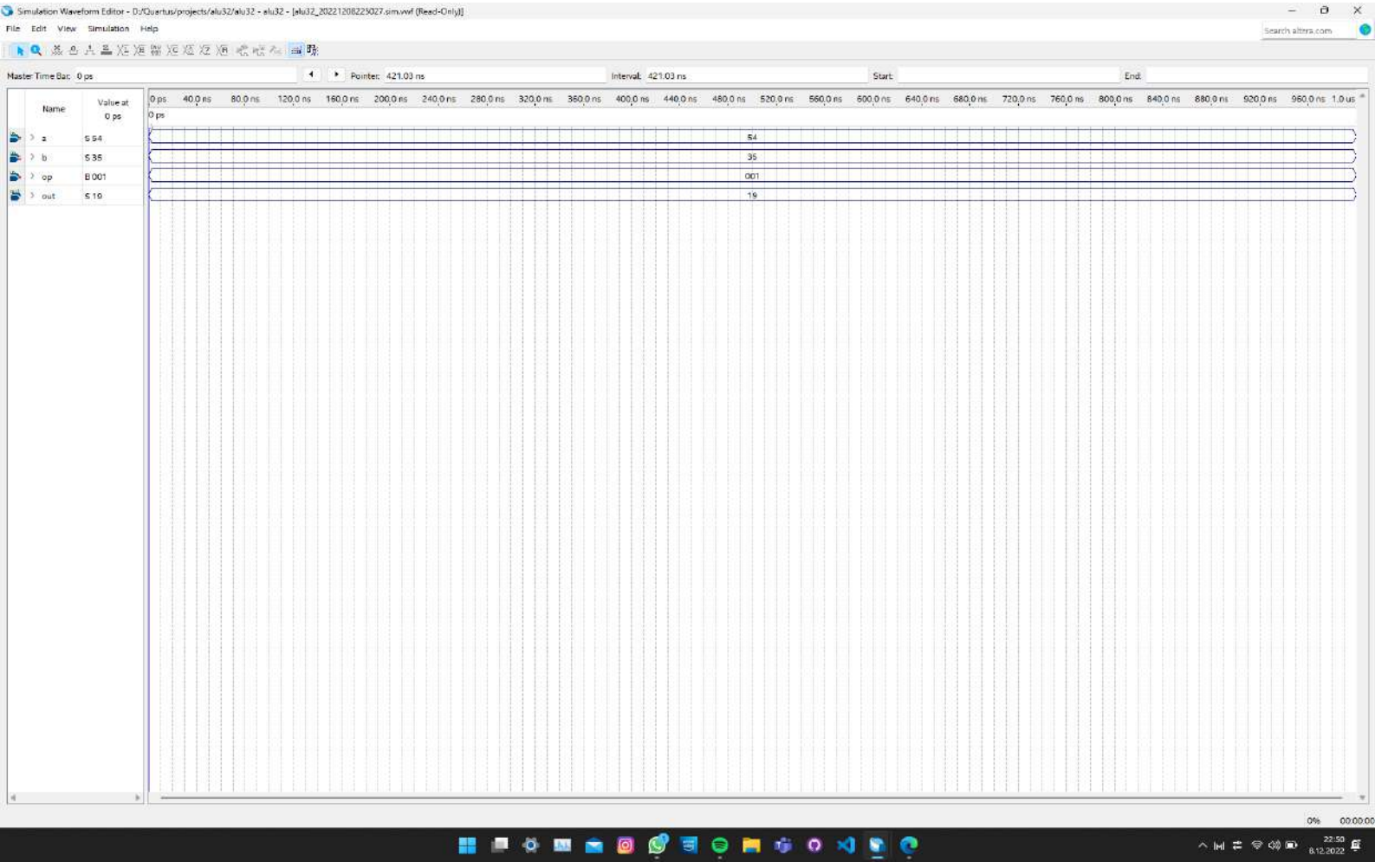


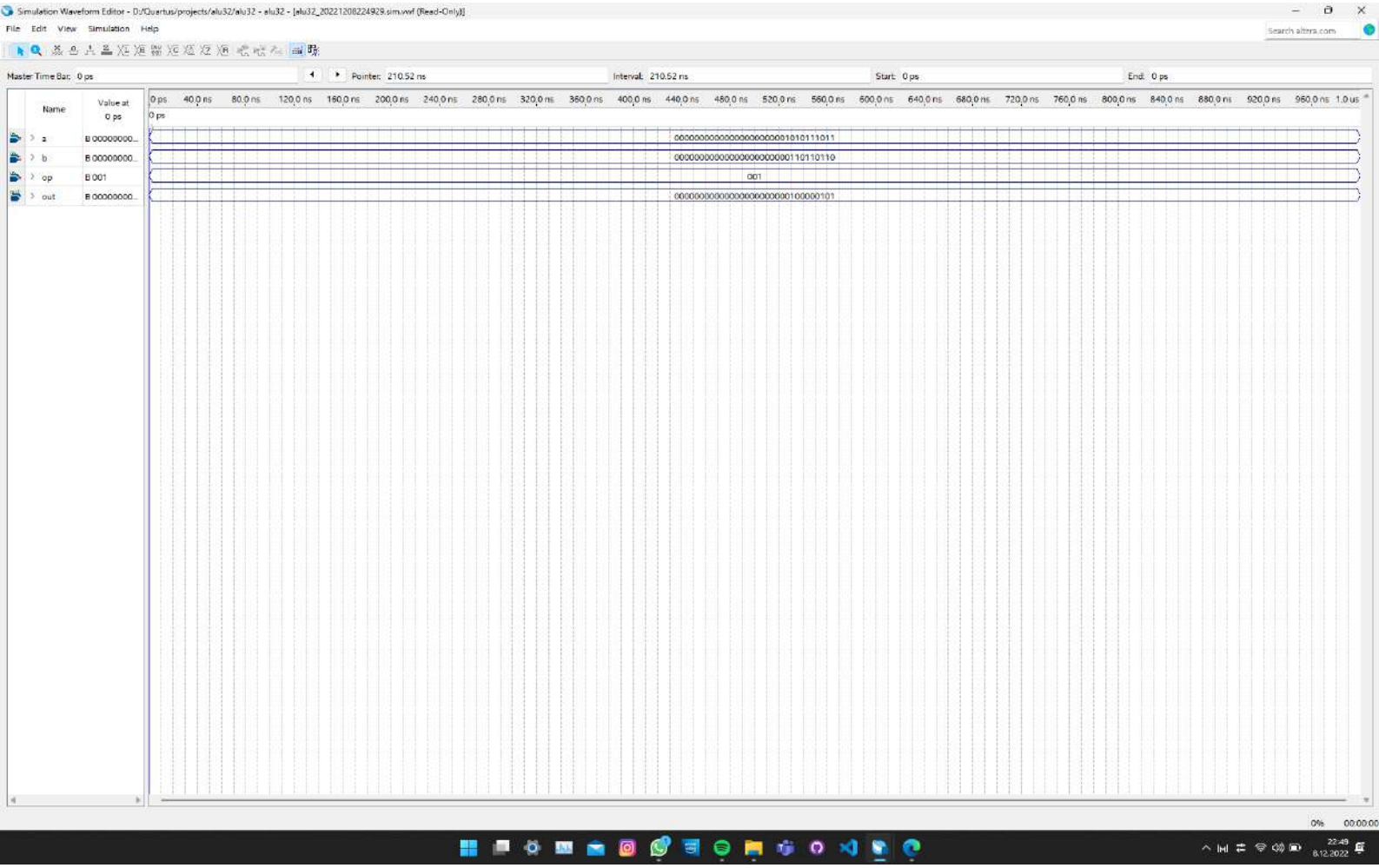

Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225340.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 409.17 ns
Interval: 409.17 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 101
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000000001000101001101
00000000000000000000101011111010
101
00000000000000000001010101111111


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225251.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 422.81 ns
Interval: 422.81 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 00000000...
B 100
B 00000000...
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000000011011010011101
00000000000000000011011110100l
100
00000000000000000010010100l001
0%
00:00:00
22:52
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225153.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 386.64 ns
Interval: 386.64 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 011
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000010101010101001001
00000000000000000000001011011011
011
00000000000000010101011110010010
0%
00:00:00
22:52
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225103.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 520.65 ns
Interval: 520.65 ns
Start:
End:
Name
Value at 0 ps
a S 54
b S 64
op B 001
out S -10
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns 520.0 ns 560.0 ns 600.0 ns 640.0 ns 680.0 ns 720.0 ns 760.0 ns 800.0 ns 840.0 ns 880.0 ns 920.0 ns 960.0 ns 1.0 us
54
64
001
-10
0%
00:00:00
22:51
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225027.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 421.03 ns
Interval: 421.03 ns
Start:
End:
Name
Value at 0 ps
a
S 54
b
S 35
op
B 001
out
S 19
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
54
35
001
19
0%
00:00:00
22:50
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208224929.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 210.52 ns
Interval: 210.52 ns
Start: 0 ps
End: 0 ps
Name
Value at 0 ps
a
b
op
out
001
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
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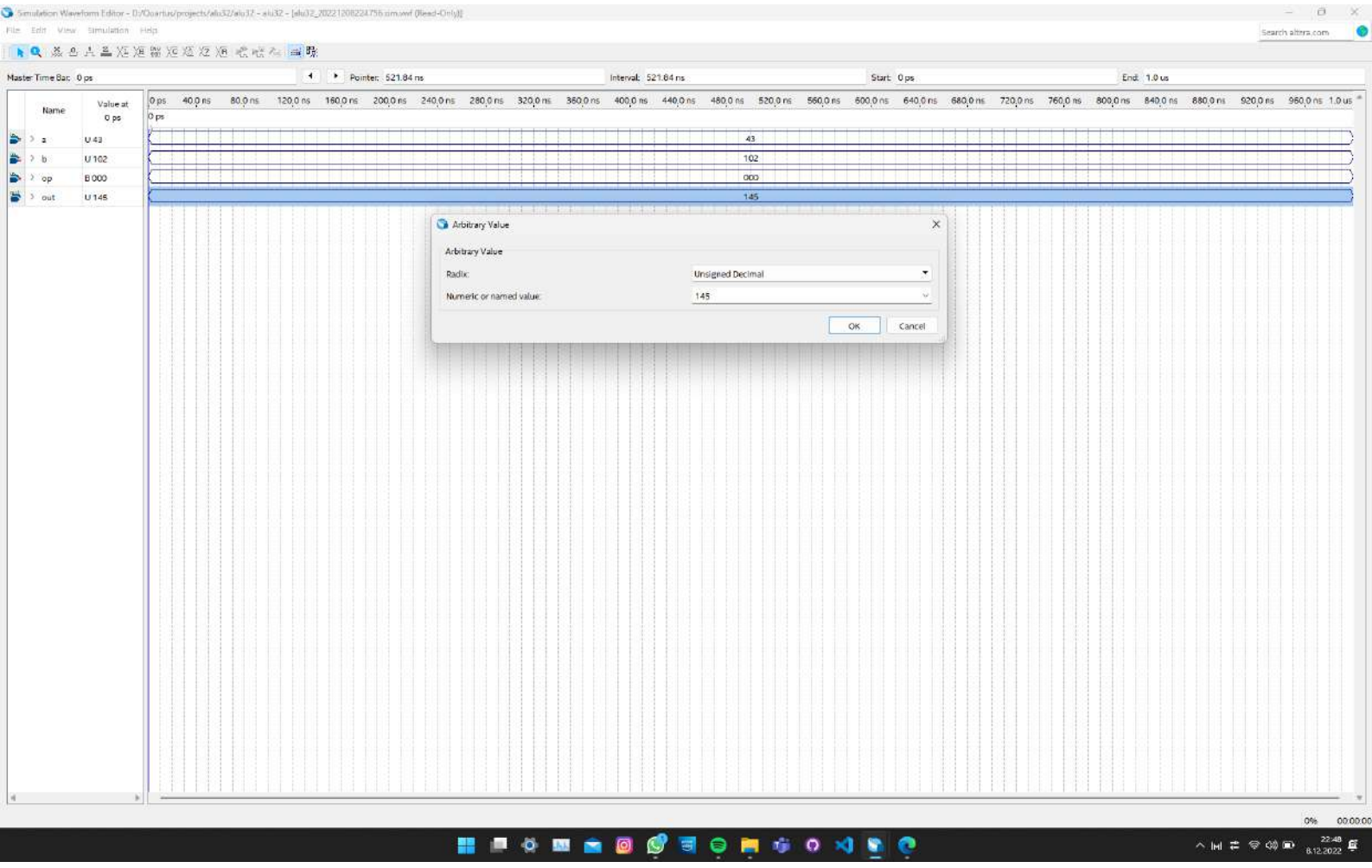
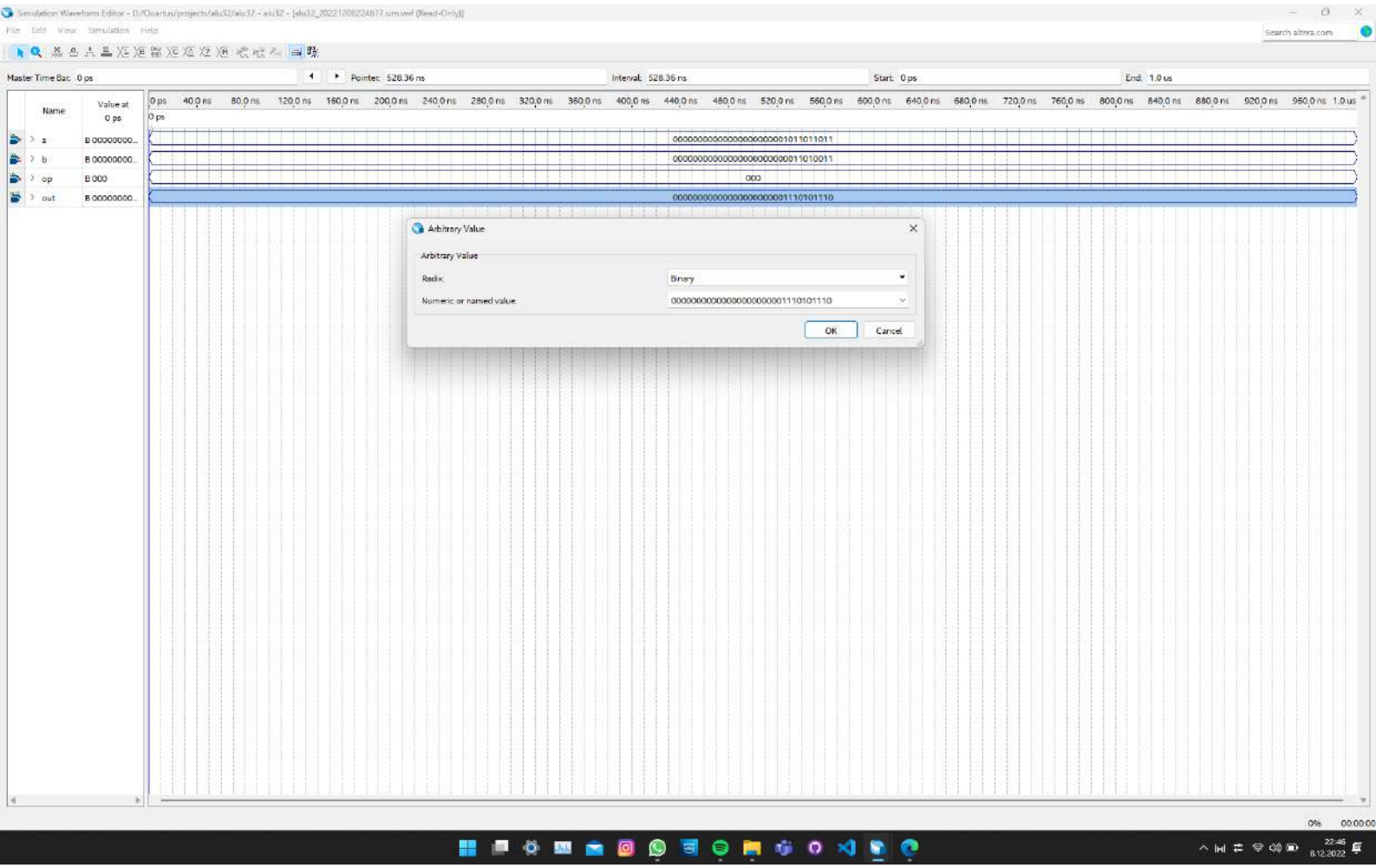
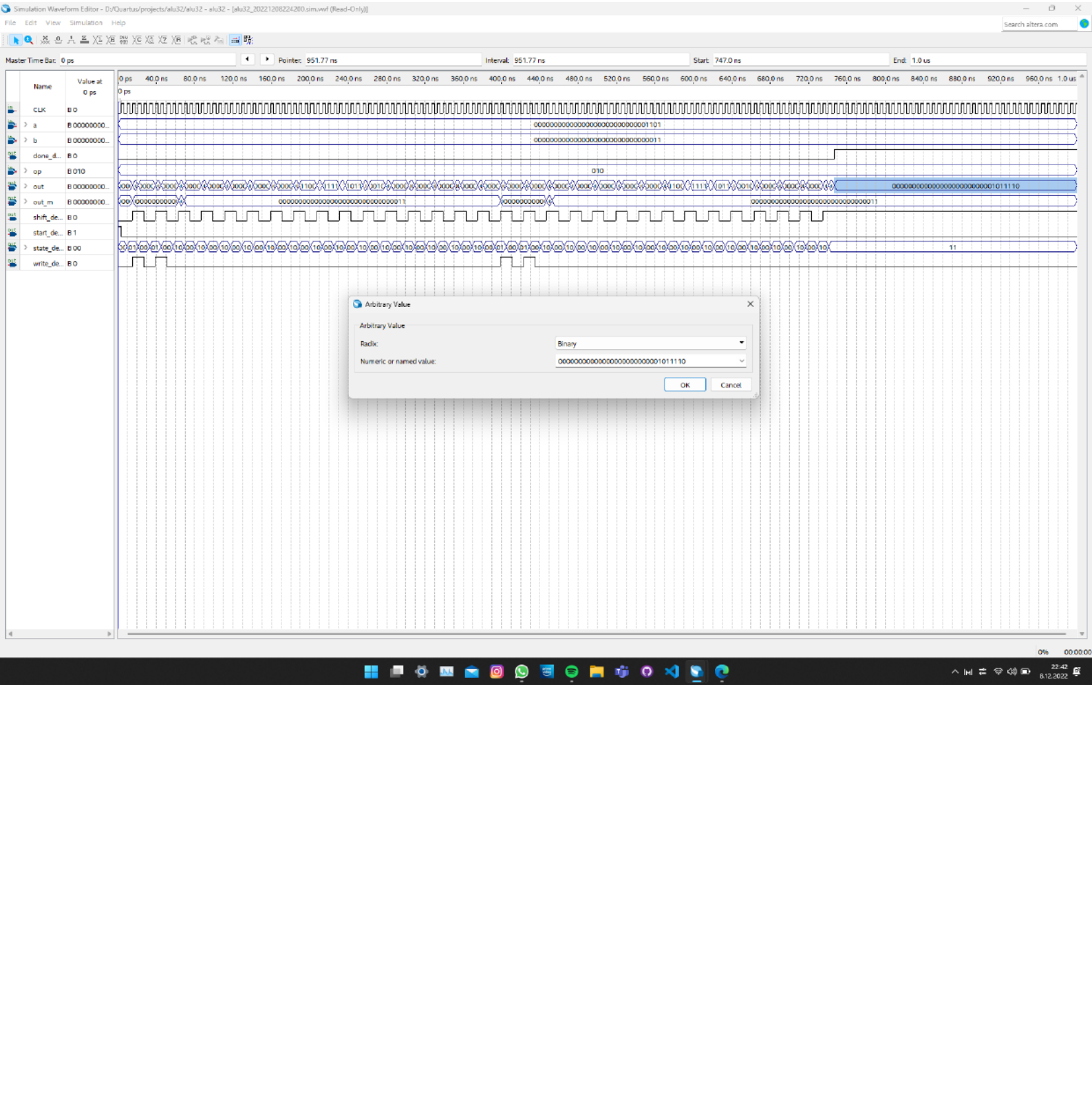
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208224756.sim.vwf (Read-Only)]
File Edit View Simulation Help
Search altera.com
Master Time Bar: 0 ps
Pointer: 521.84 ns
Interval: 521.84 ns
Start: 0 ps
End: 1.0 us
Name
Value at 0 ps
a
U 43
b
U 102
op
B 000
out
U 145
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns 520.0 ns 560.0 ns 600.0 ns 640.0 ns 680.0 ns 720.0 ns 760.0 ns 800.0 ns 840.0 ns 880.0 ns 920.0 ns 960.0 ns 1.0 us
43
102
000
145
Arbitrary Value
Arbitrary Value
Radix:
Unsigned Decimal
Numeric or named value:
145
OK
Cancel
0%
00:00:00
22:48
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208224617.um.vwf (Read-Only)]
File Edit View Simulation Help
Search altera.com
Master Time Bar: 0 ps
Pointer: 528.36 ns
Interval: 528.36 ns
Start: 0 ps
End: 1.0 us
Name
Value at 0 ps
a
b
op
out
000
Arbitrary Value
Arbitrary Value
Radix:
Binary
Numeric or named value:
OK
Cancel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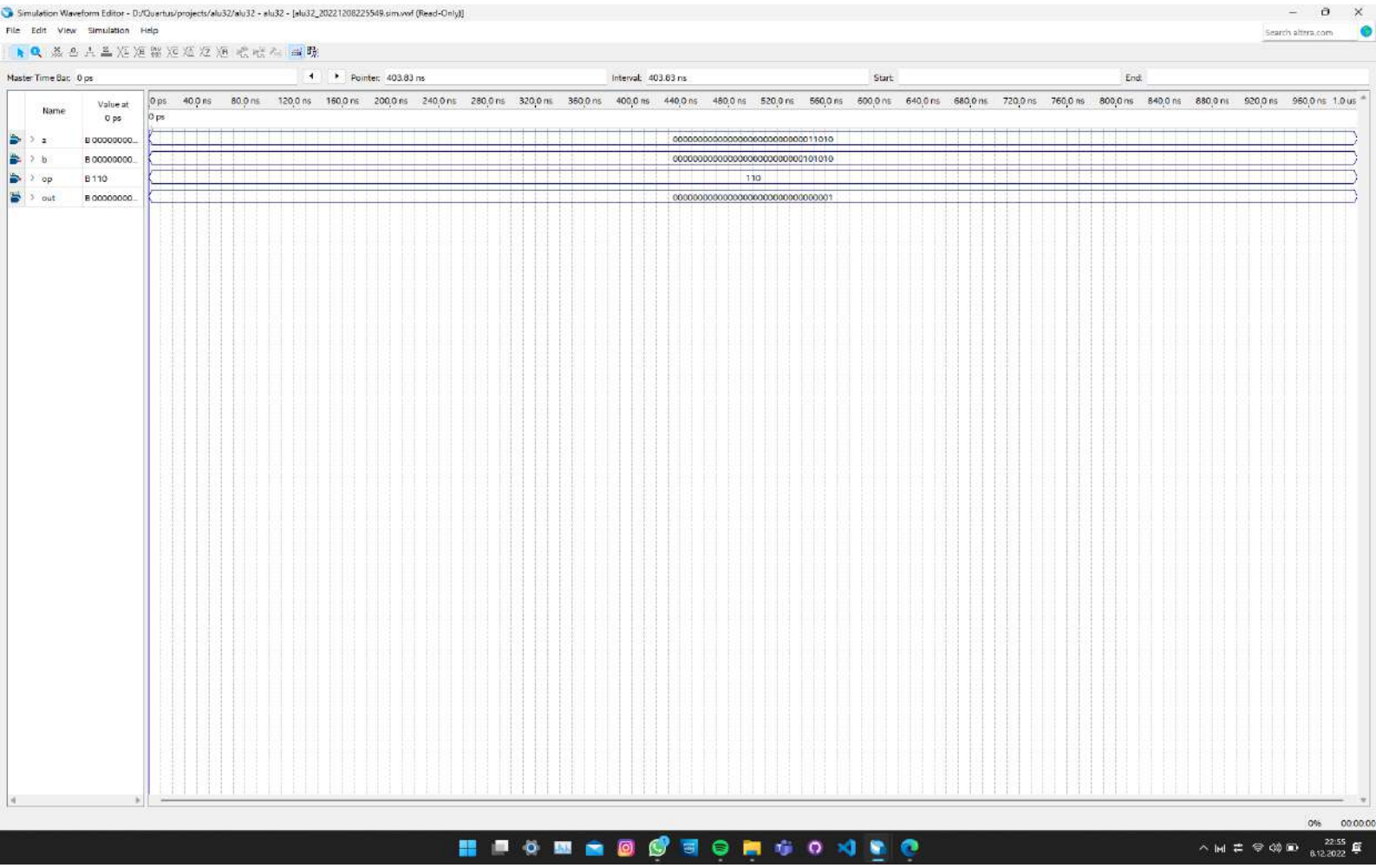
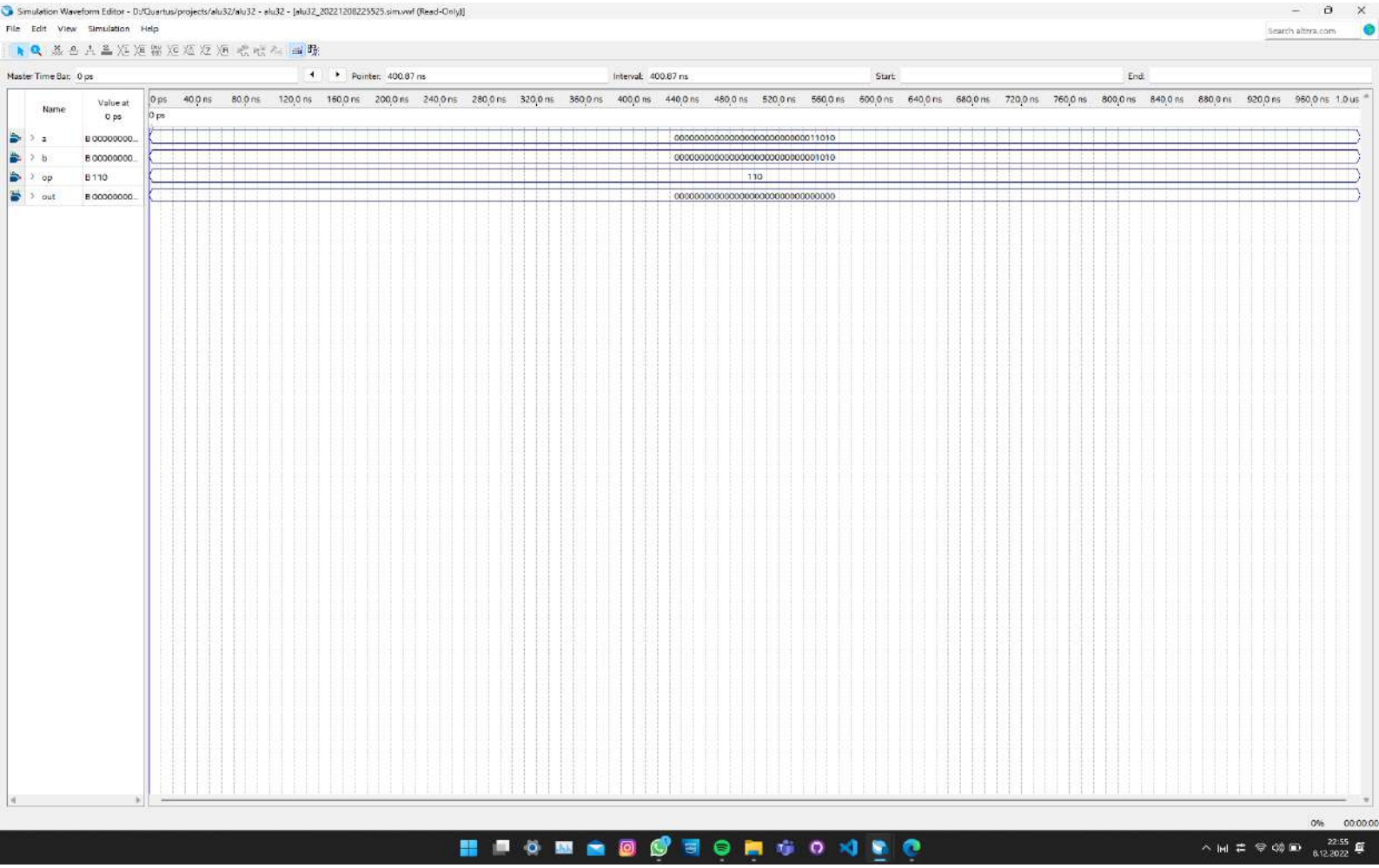
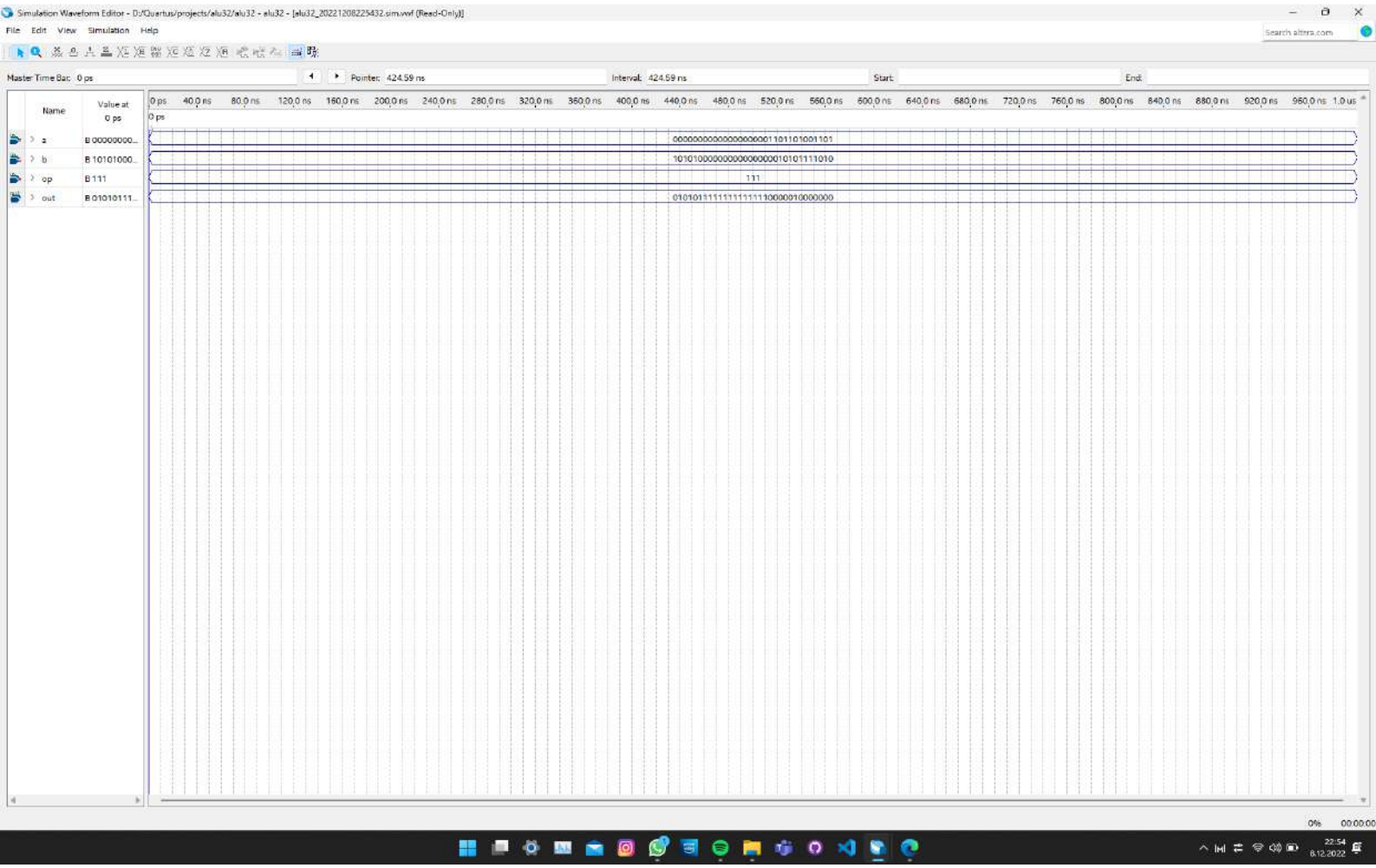
File Edit View Simulation Help
Search altera.com
Master Time Bar: 0 ps
Pointer: 951.77 ns
Interval: 951.77 ns
Start: 747.0 ns
End: 1.0 us
Name
Value at 0 ps
CLK
a
b
done_d...
op
out
out_m
shift_de...
start_de...
state_de...
write_de...
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000000000000001101
00000000000000000000000000011
010
00000000000000000000000001011110
11
Arbitrary Value
Arbitrary Value
Radix:
Binary
Numeric or named value:
00000000000000000000000001011110
OK
Cancel
0%
00:00:00
22:42
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225549.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 403.83 ns
Interval: 403.83 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 00000000...
B 110
B 00000000...
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns 520.0 ns 560.0 ns 600.0 ns 640.0 ns 680.0 ns 720.0 ns 760.0 ns 800.0 ns 840.0 ns 880.0 ns 920.0 ns 960.0 ns 1.0 us
00000000000000000000000011010
00000000000000000000000101010
110
00000000000000000000000000001
0%
00:00:00
22:55
8.12.2022


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225525.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 400.87 ns
Interval: 400.87 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 110
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000000000000011010
00000000000000000000000001010
110
00000000000000000000000000000


Simulation Waveform Editor - D:/Quartus/projects/alu32/alu32 - alu32 - [alu32_20221208225432.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 424.59 ns
Interval: 424.59 ns
Start:
End:
Name
Value at 0 ps
a
b
op
out
B 00000000...
B 10101000...
B 111
B 01010111...
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns
640.0 ns
680.0 ns
720.0 ns
760.0 ns
800.0 ns
840.0 ns
880.0 ns
920.0 ns
960.0 ns
1.0 us
00000000000000000011011010011101
10101000000000000000010101111010
111
01010111111111111110000010000000
0%
00:00:00
22:54
8.12.2022