

Microprocessor_Design

Group 48

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Task :-

Design a 4-bit microprocessor capable of execute 8 hardcoded instructions. Design consisted of 4-bit-add/sub unit, Instruction decoder, program counter, Hardcoded ROM and Registry

Assembly code

101110000001 – Mov 1 to Reg 7

100010000010 – Mov 2 to Reg 1

100100000011 – Mov 3 to Reg 2

001110010000 – add Reg 7 and Reg 1

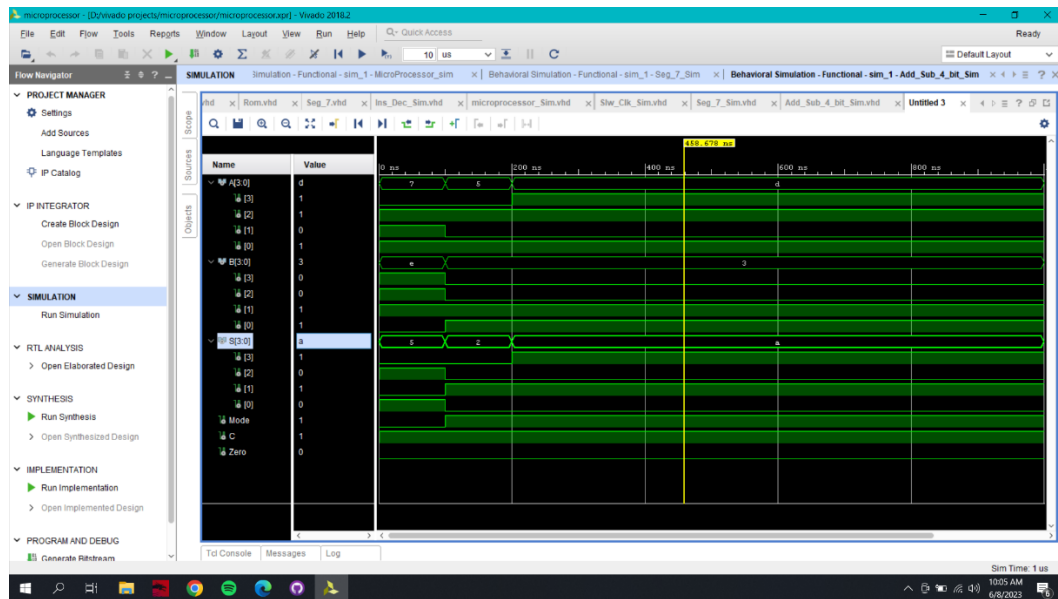
001110100000 – add Reg 7 and Reg 2

All VHDL codes :-

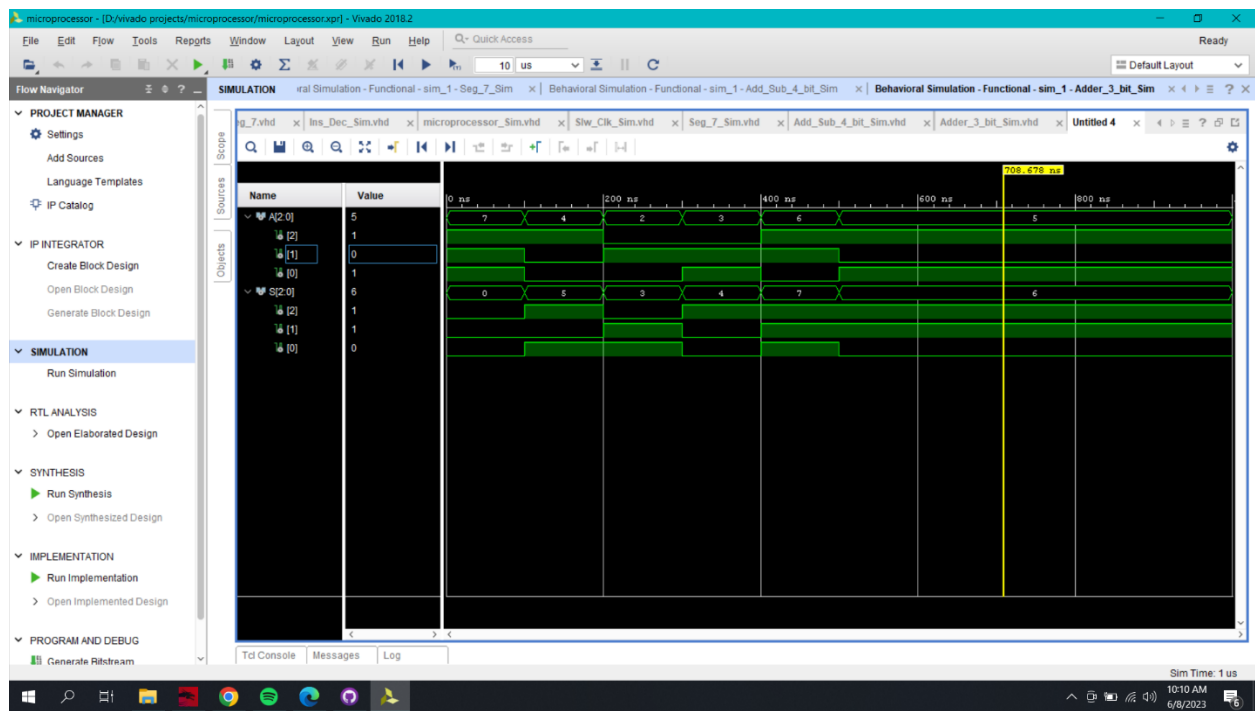
<https://github.com/lucky Lukezzz/Microprocessor/tree/master>

Timing Diagrams :-

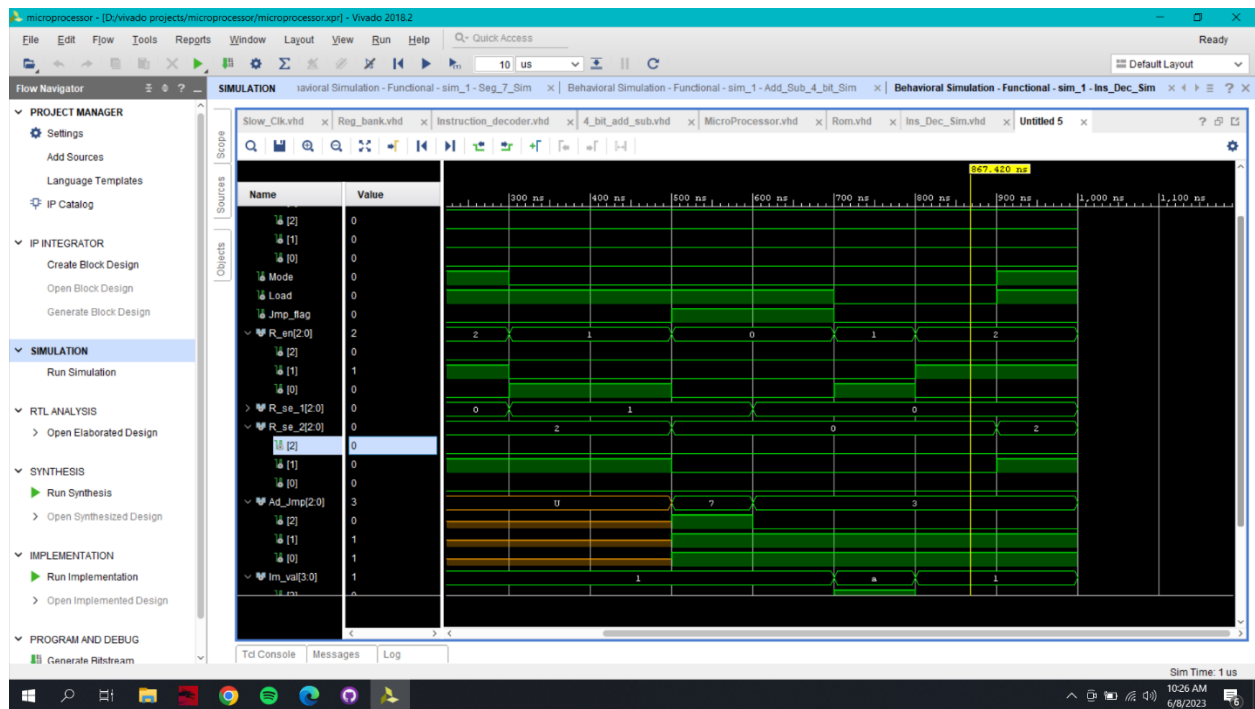
Add/Sub 4 bit



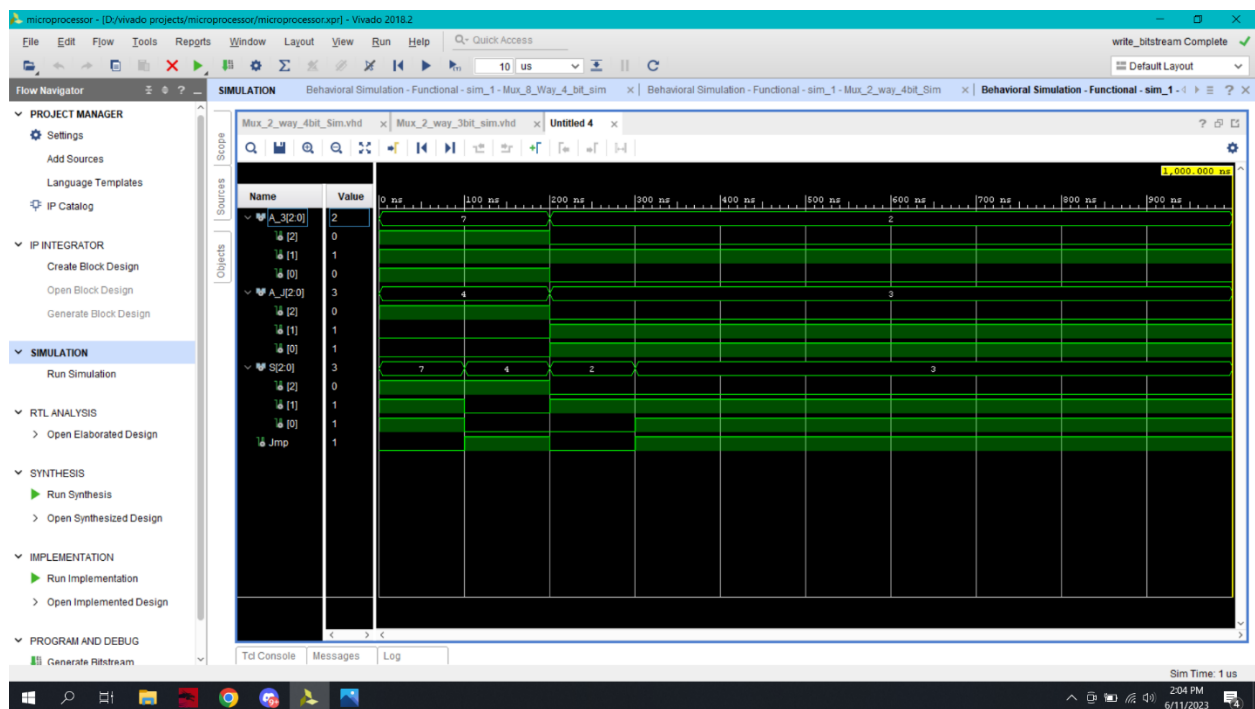
Adder 3 bit



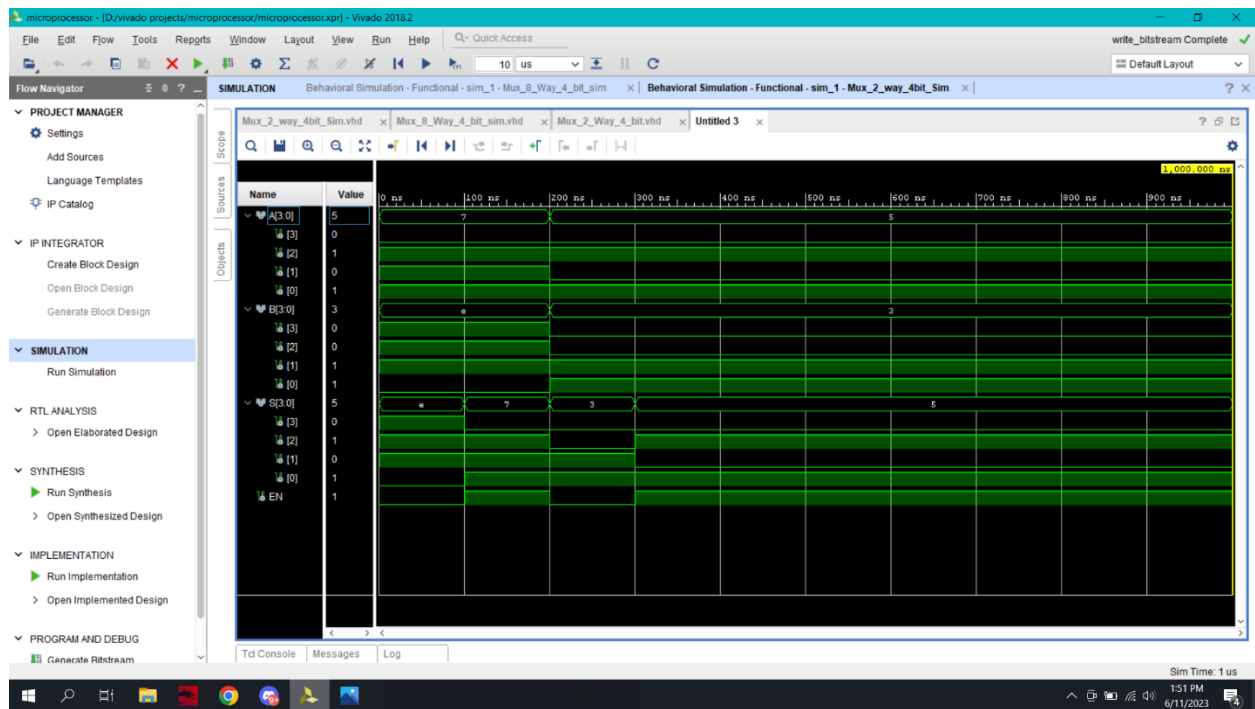
Instruction decoder



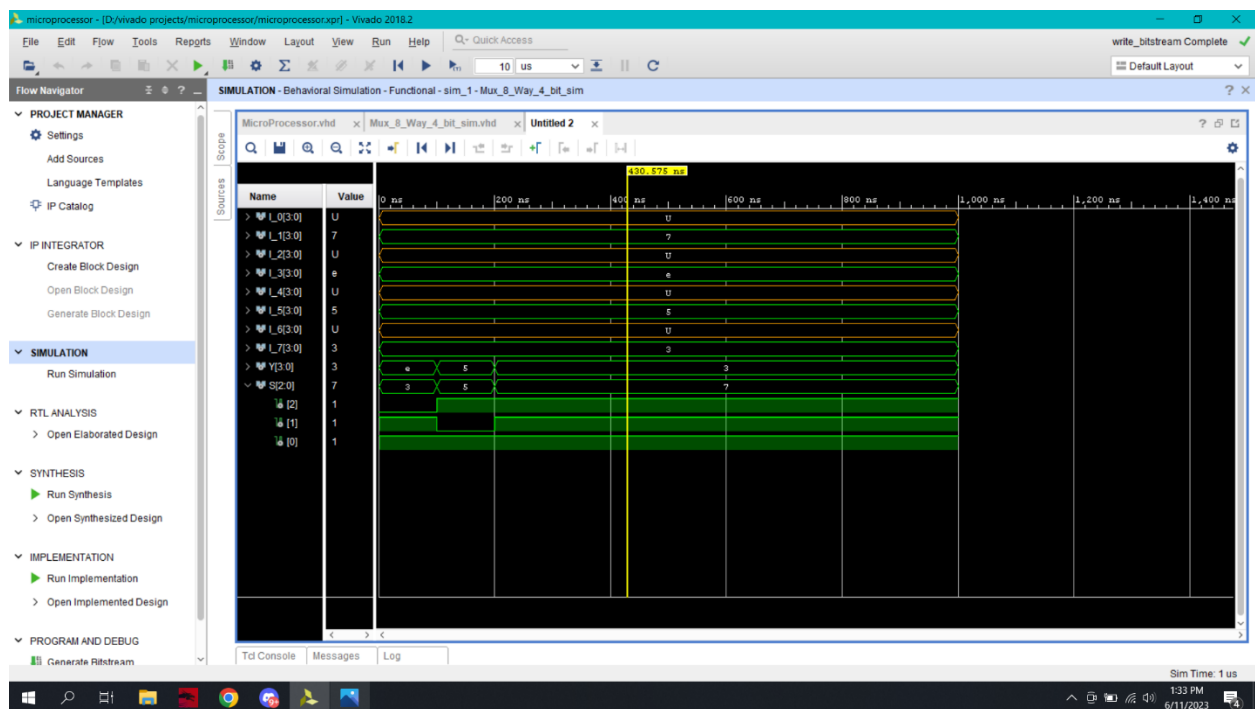
Mux 2 way 3 bit



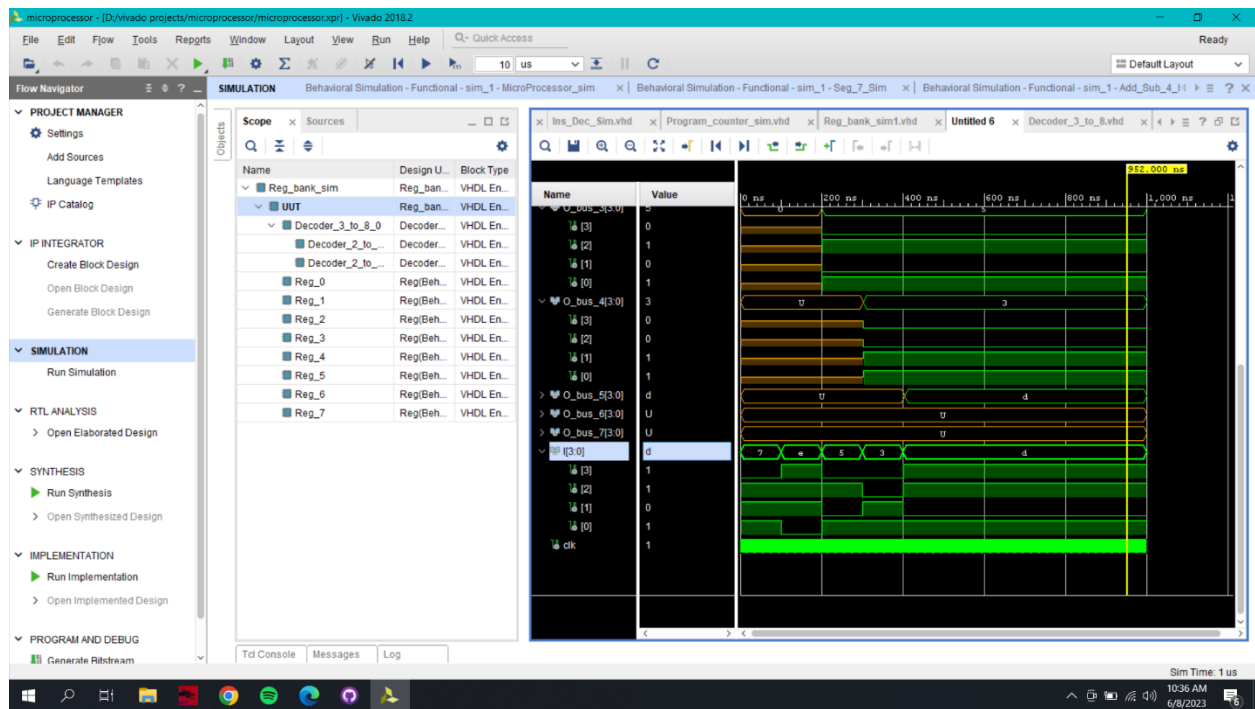
Mux 2 way 4 bit



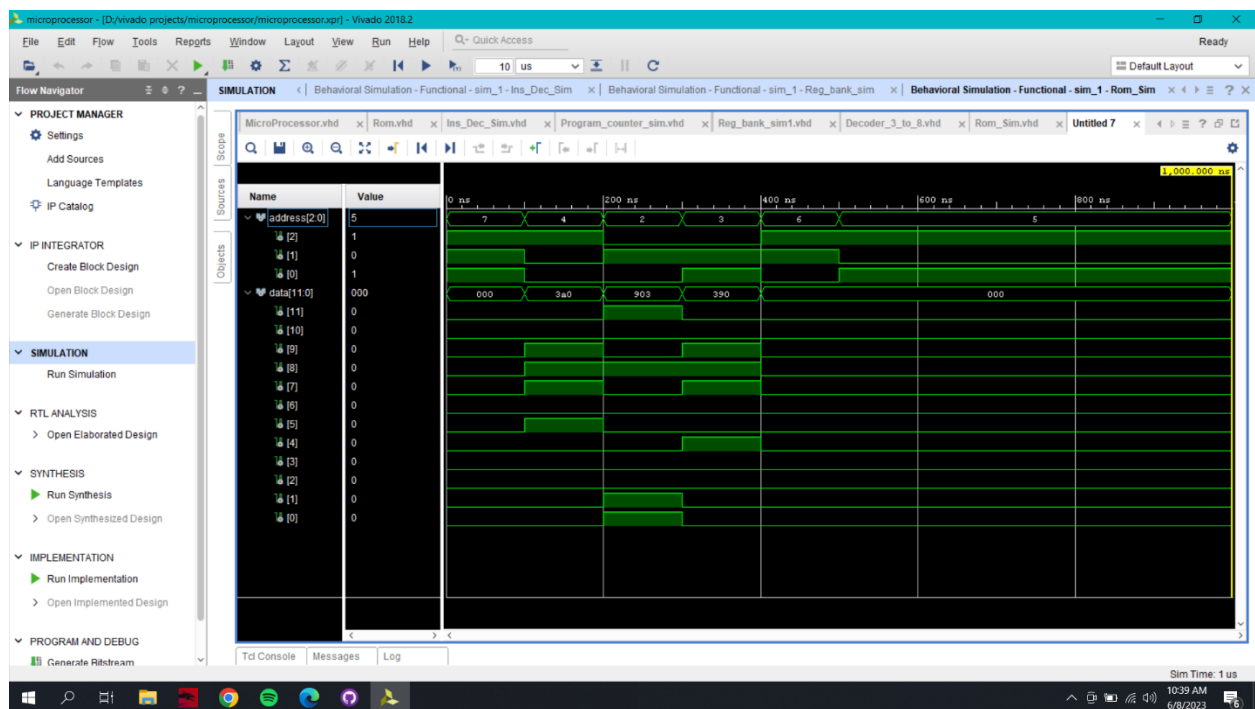
Mux 8 way 4 bit



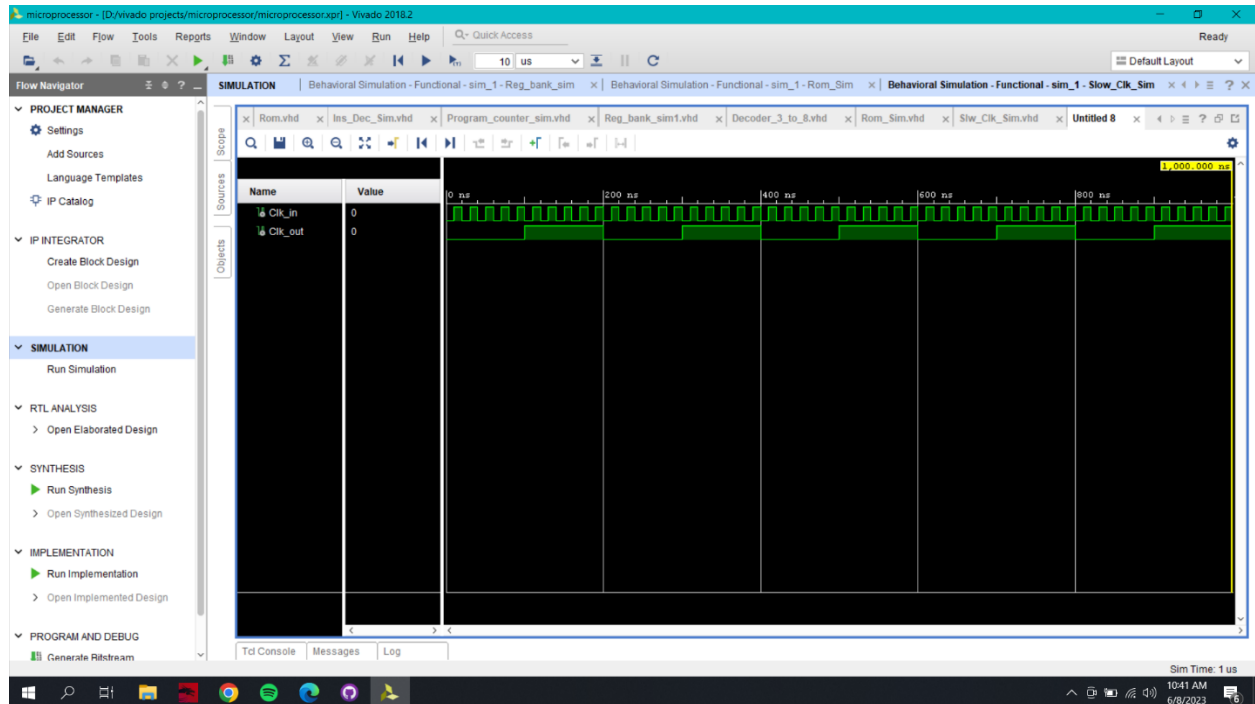
Registry bank



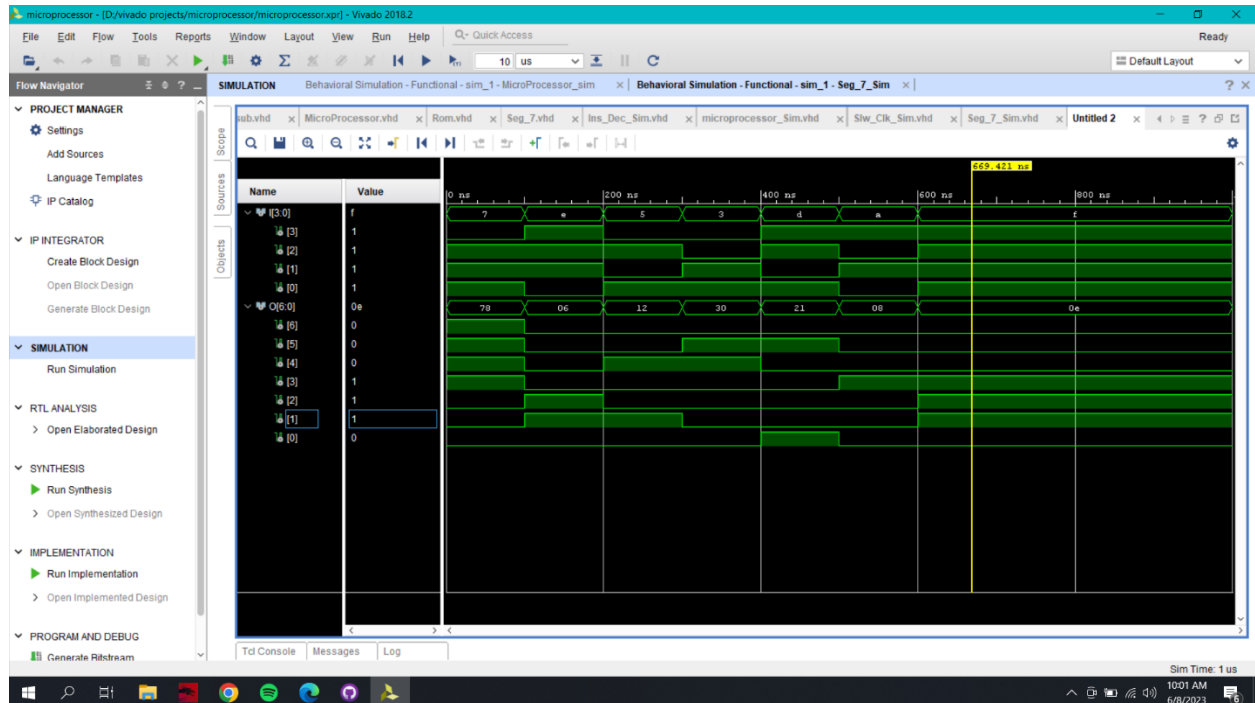
Rom



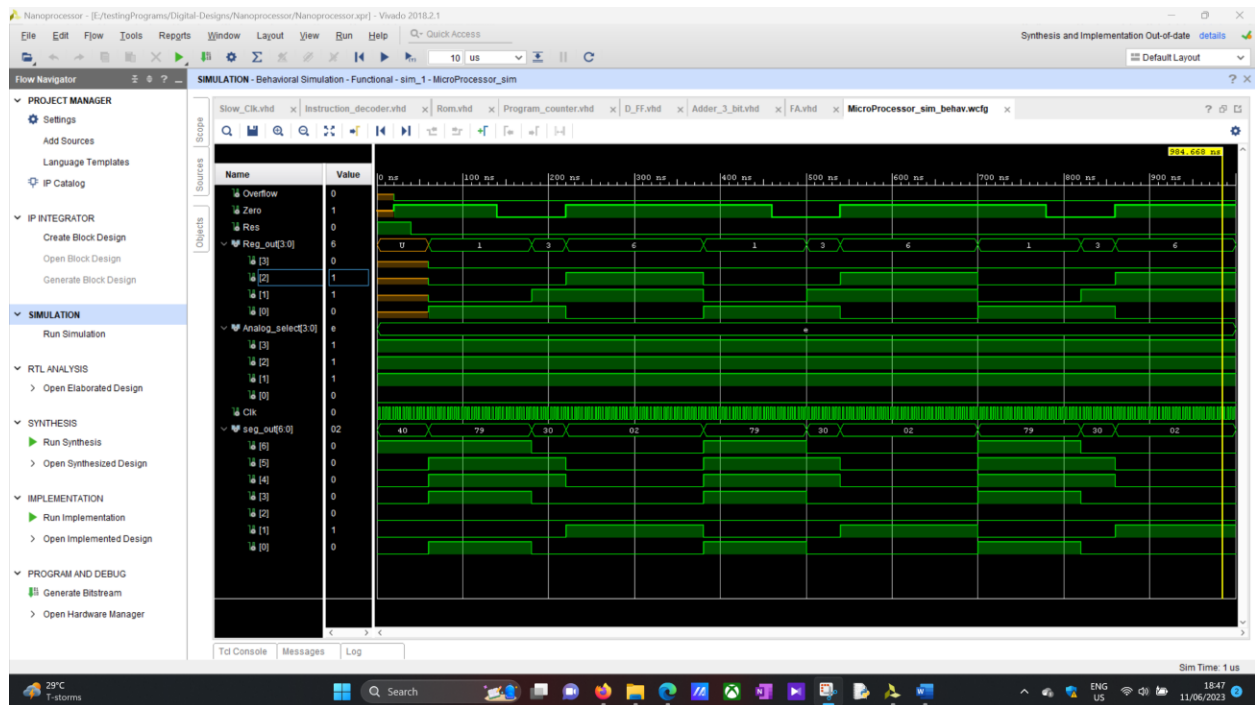
Slow clk



7 segment display



MicroProcessor



Contributions :-

210413G – Instruction decoder, program counter, registry bank, 7 segment display – 10hrs.

210407R – Add/Sub 4 bit, Adder 3 bit, MUXes, program ROM – 10hrs.

Conclusions :-

We designed a 4 bit microprocessor using components ,

4-bit arithmetic unit ,rom, program counter, instruction decoder, registers etc.

Through this lab we could understand the internal architecture of a processor and how it works.

We could practically use the concepts what we learned in previous labs.

We had to test every part with simulations to confirm all the components working correctly before running in the board.

We had to make changes to the code when uploading to the basys board than in the simulation.

We had to work coordinately with other teams to debug our code which improved our communication skills and make new friends.

This project helped us to improve our teamwork skills.