Gebze Technical University
Computer Engineering

CSE 331 - 2018 Fall

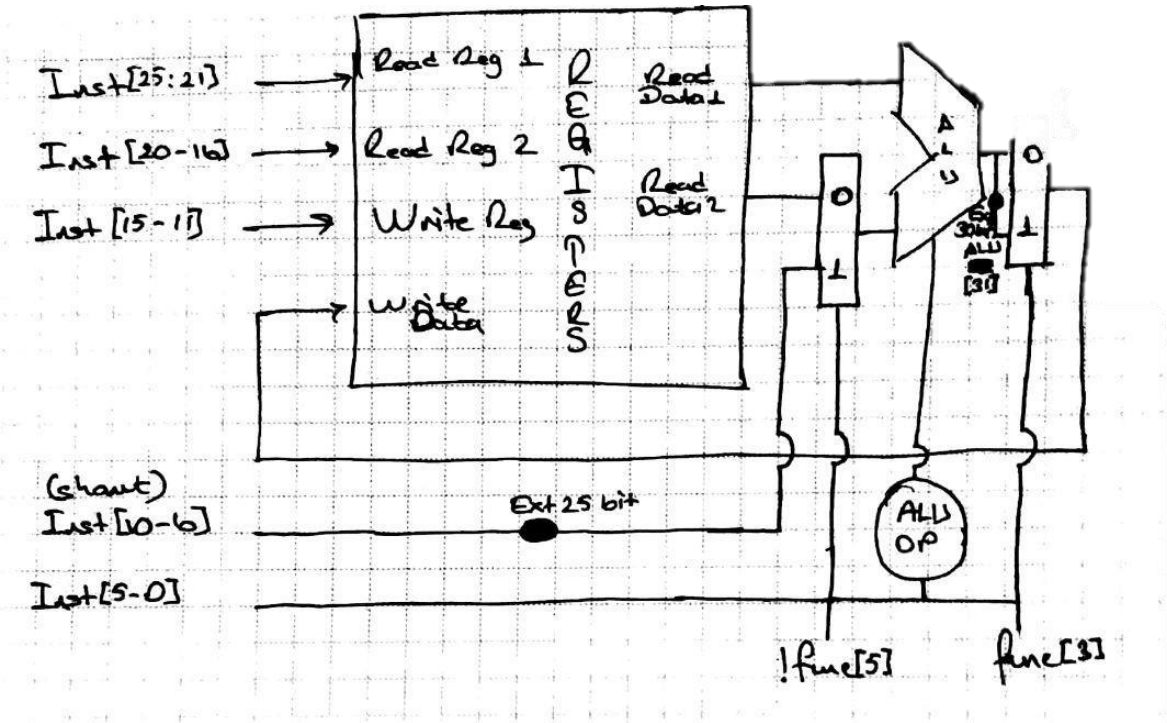
ASSIGNMENT 3 REPORT

HALİL ONUR ÇEÇEN

161044057

Making of Single Cycle Datapath of a mips processor

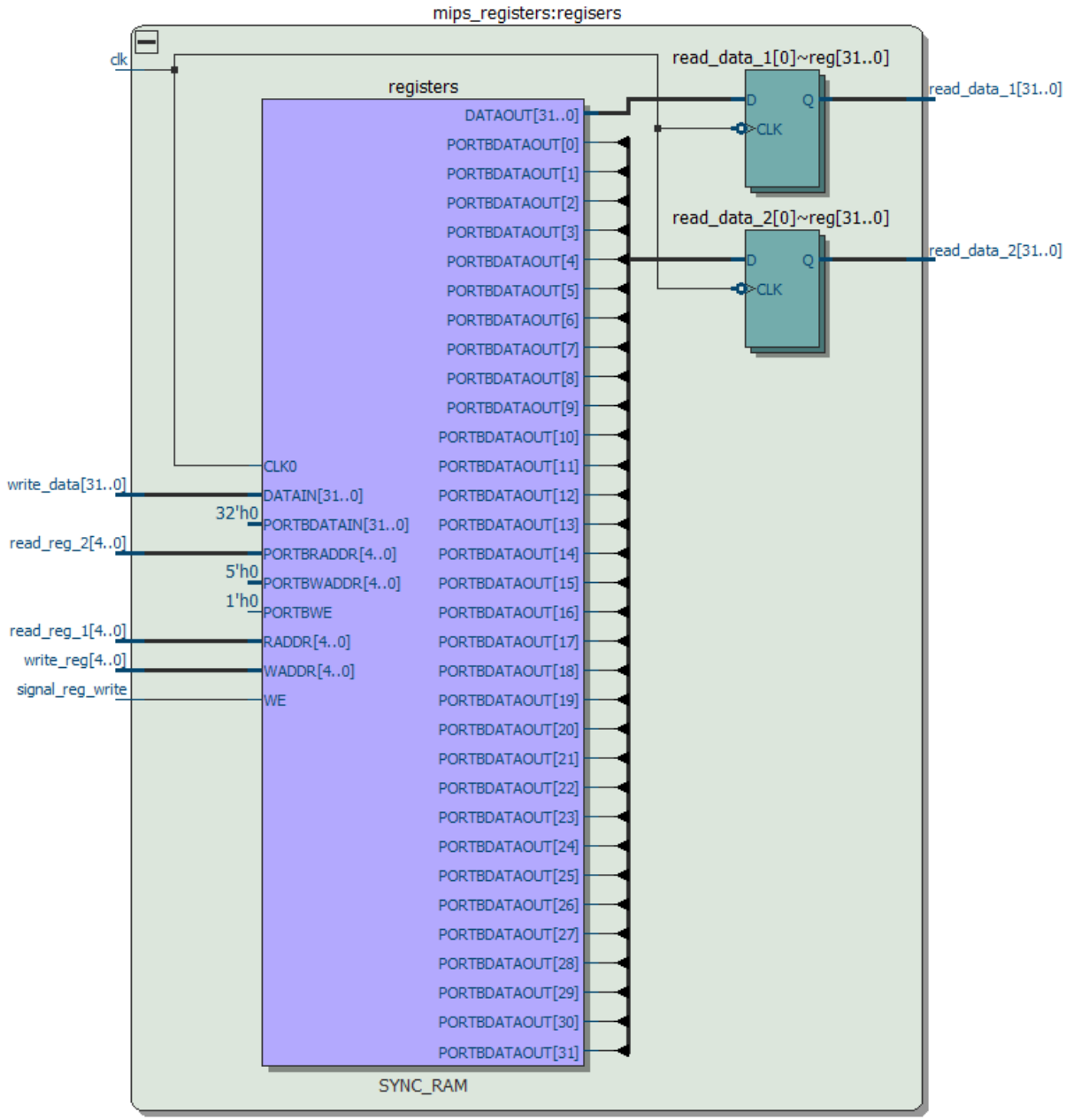
To make the required datapath I used following schema.



Main Mips32 Module(Explained)

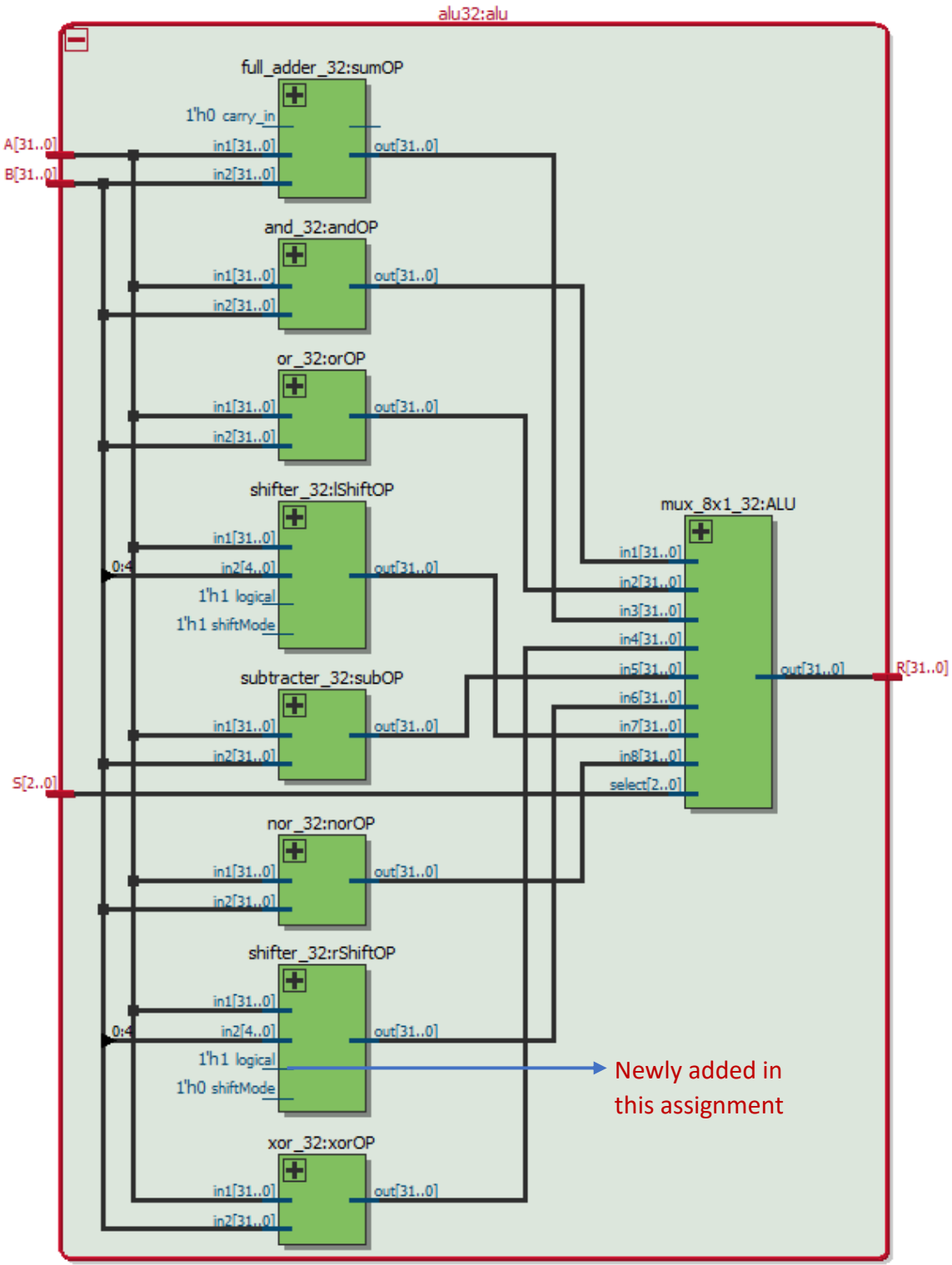
Registers (Mips_register module)

I used an external clock to determine to write or read in a single cycle. İn positive edge it always writes and in negative edge it always reads.



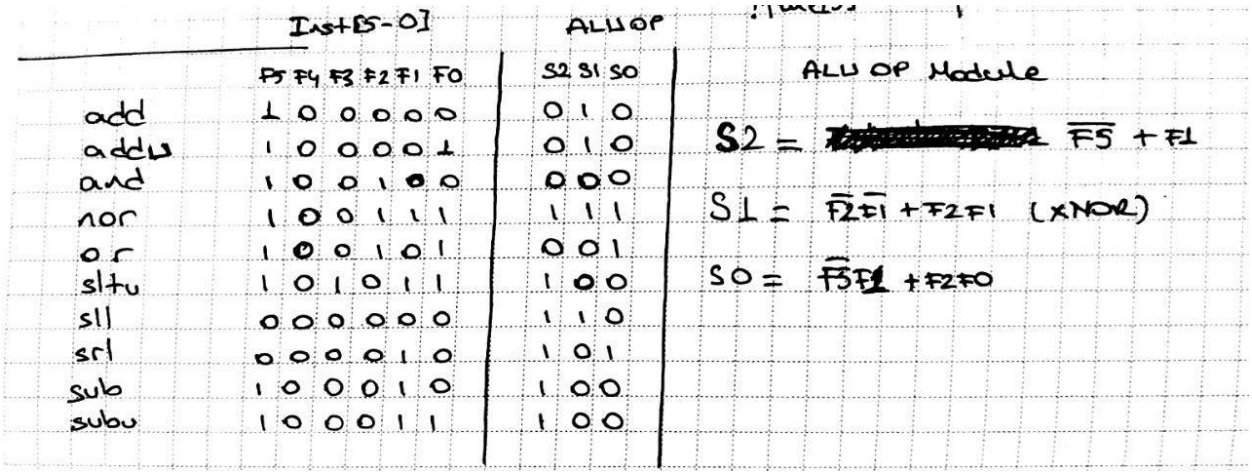
Alu (From previous assignment)

I used previous alu unit with slight modifications to shifter to work both in arithmetic and logical way. To do that I added another control input to shifter module in alu.

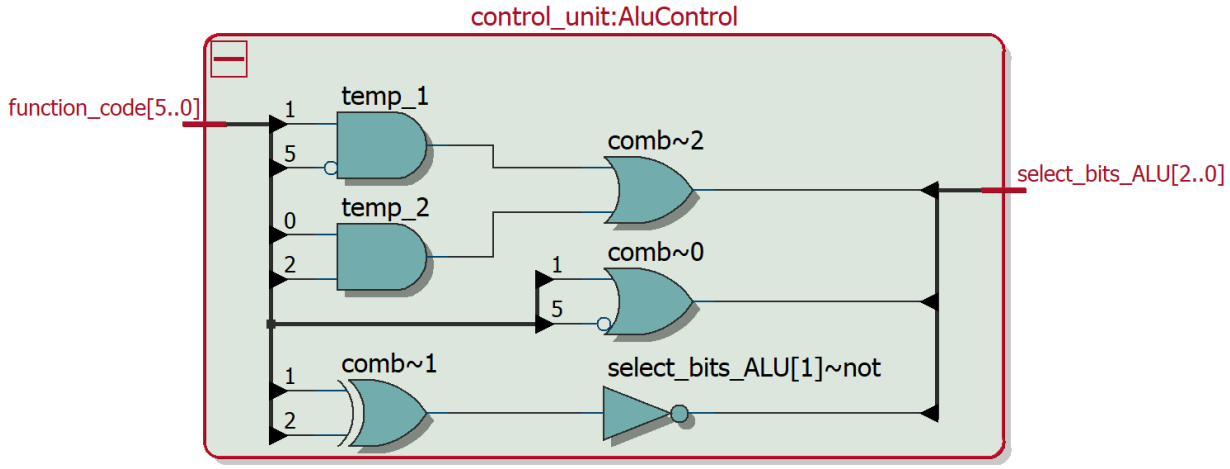


Alu Control Unit

I created a truth table for given function what to expect from Alu select bits. And after that used simplification and Karnaugh map methods to create simplest logic out of it.

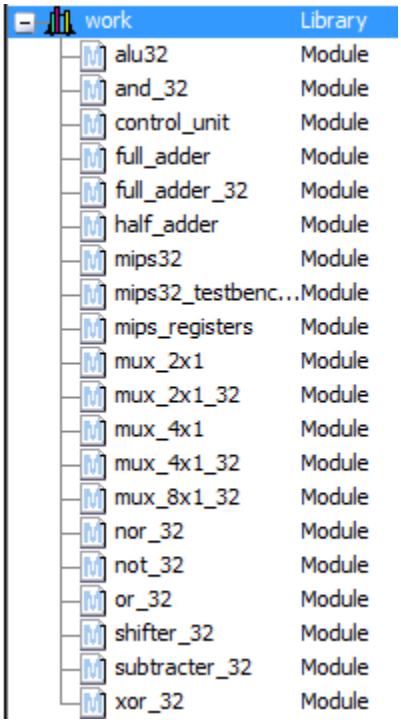


Note: I used an online Karnaugh map solver for given input and outputs to take the most efficient logic.



ModelSim Results

All modules



Simulation Results

```
# rs = 10000, rt = 10001, rd = 10010, func = 100000, shamt =  00000, result = 00000000000000000000000000100001
# rs = 10010, rt = 10001, rd = 10011, func = 000000, shamt =  00001, result = 00000000000000000000000001000010
# rs = 10010, rt = 10001, rd = 10100, func = 000010, shamt =  00001, result = 00000000000000000000000000010000
# rs = 10000, rt = 10001, rd = 10101, func = 100001, shamt =  00000, result = 00000000000000000000000000100001
# rs = 10000, rt = 10001, rd = 00000, func = 100100, shamt =  00000, result = 00000000000000000000000000010000
# rs = 10000, rt = 10001, rd = 00001, func = 100111, shamt =  00000, result = 11111111111111111111111111101110
# rs = 10000, rt = 10001, rd = 00010, func = 100101, shamt =  00000, result = 00000000000000000000000000010001
# rs = 10000, rt = 10001, rd = 00011, func = 101011, shamt =  00000, result = 00000000000000000000000000000001
# rs = 10001, rt = 10000, rd = 10100, func = 100010, shamt =  00000, result = 00000000000000000000000000000001
# rs = 10001, rt = 10000, rd = 10101, func = 100011, shamt =  00000, result = 00000000000000000000000000000001
```