CST 337: Computer Architecture

Homework 6

Homework must be done on paper and submitted to the corresponding submitting portal on iLearn! What to submit:

- The schematic of the single cycle CPU with your implementation. Overdrawing of the schematic page of this PDF is totally ok
- A textfile where you explain what's going on.

Exercise:

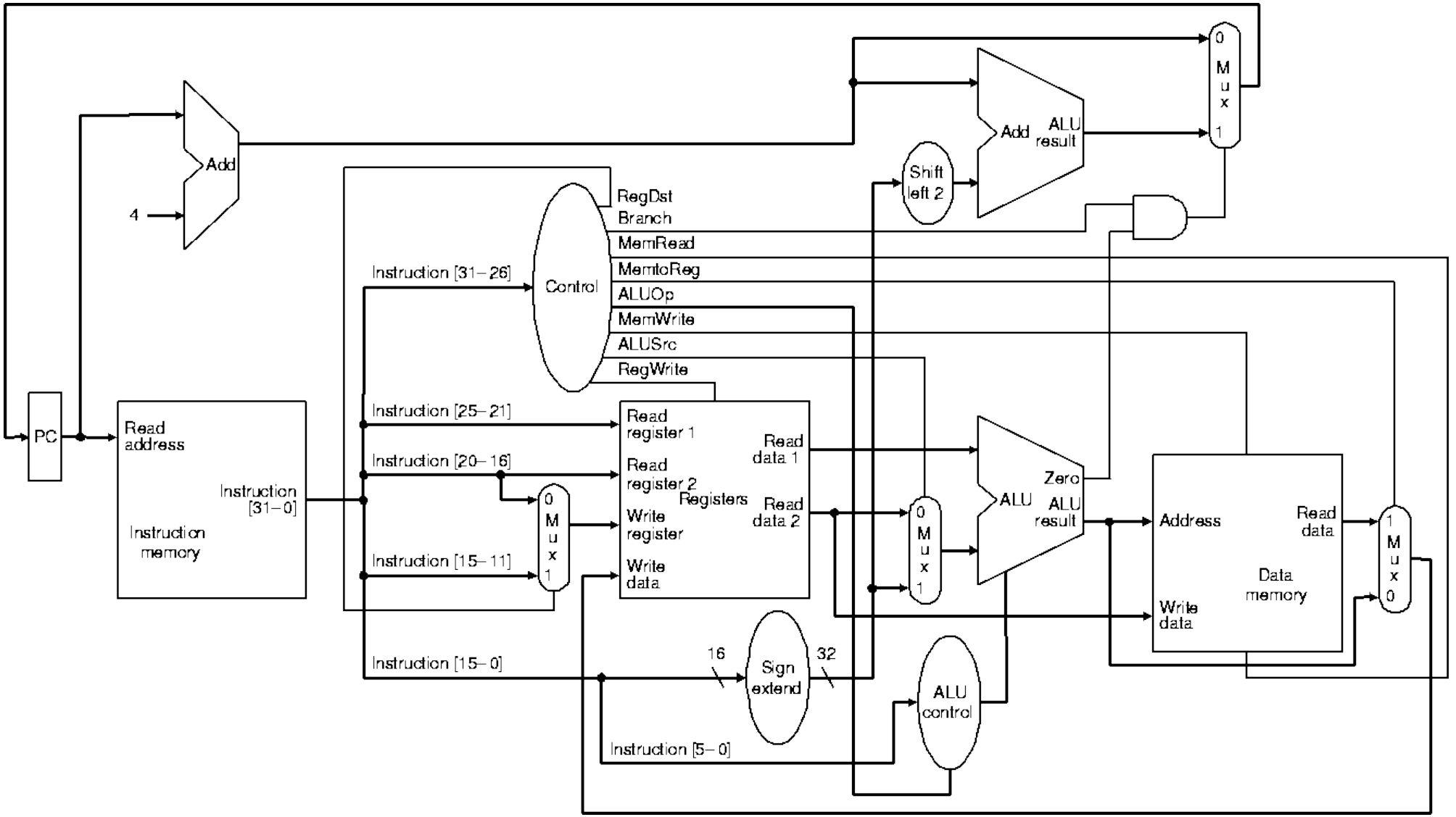
Take the schematic from the single cycle CPU and add a new instruction "MAX".
It should do following:
MAX $d, $s, $t

d = max (s,t);

So $d gets either the value of register $s or $t depending on which is bigger.
Implement new logic to the schematic to achieve that.
You can implement new lines, muxer and logic gates.

Hints:

- To decide which number is bigger, subtract them with the ALU and decide if the result is bigger than zero (first bit of the 32 bit ALU output is 0 or 1?).
- Set the register chips correct to read/write.
- The op-code has 6 digits. Choose a new one wisely.


Add
4
PC
Read address
Instruction [31–0]
Instruction memory
Instruction [31–26]
Control
RegDst
Branch
MemRead
MemtoReg
ALUOp
MemWrite
ALUSrc
RegWrite
Instruction [25–21]
Instruction [20–16]
Instruction [15–11]
Instruction [15–0]
Instruction [5–0]
0 M u x 1
Read register 1
Read register 2
Registers
Write register
Write data
Read data 1
Read data 2
16
Sign extend
32
Shift left 2
Add
ALU result
ALU
Zero
ALU result
ALU control
Address
Read data
Data memory
Write data
1 M u x 0