

Computer Organization 105-2

Lab 4: Pipelined CPU I

Due: 2016/5/23 23:59:59

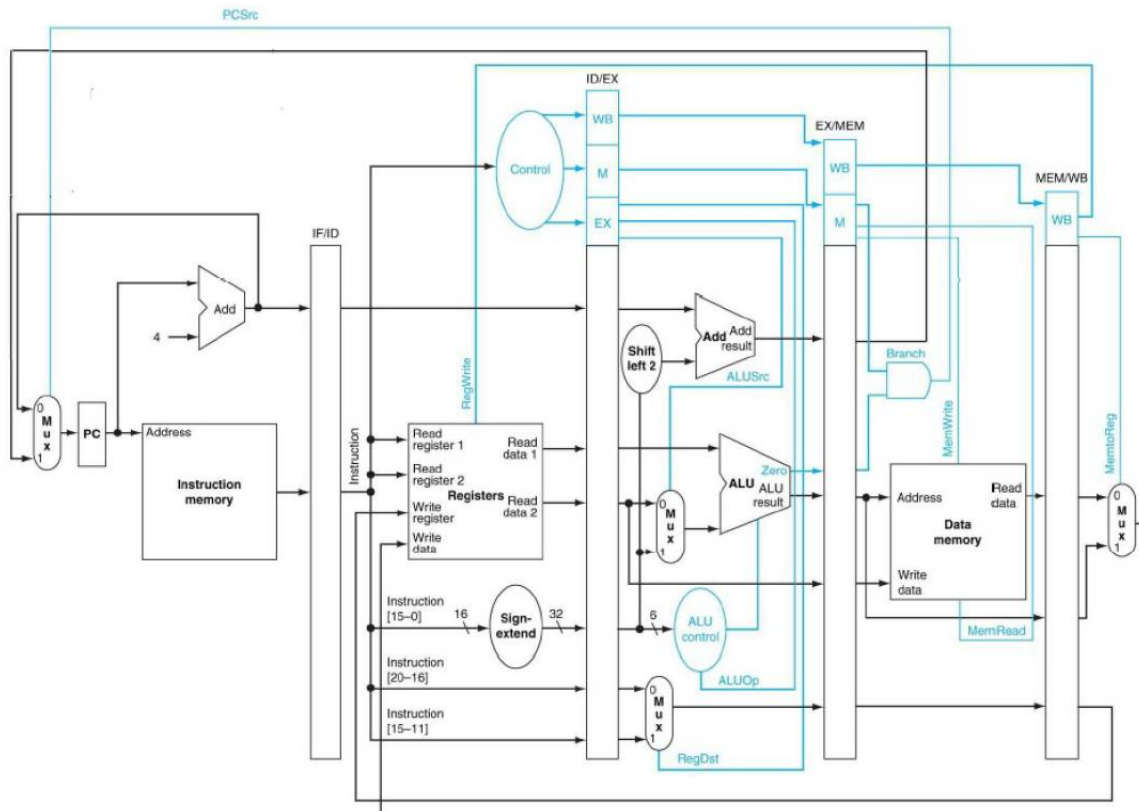
1. Goal

- Based on lab3, implement a simple pipeline CPU that can run R-type and I-type instructions.

2. Requirement

- Please use Modelsim or Xilinx as your simulation platform
- It's a team assignment (max: 2 people). Please attach your names and student IDs as comments in the top of each file. The assignment you upload on e3 must have the form of "studentID_Name_studentID_Name_LAB3.zip".
- Reg_File[29] represents stack point. Please give an initial value to Reg_File[29] as 128, others 0.
- You must **use the Reg_File.v provided for this LAB.**
- You need to implement the following basic instructions: ADD, SUB, AND, OR, SLT, ADDI, LW, SW
- "CO_P4_TEST1.txt" is a simple testing file and you can verify your design by running the file.
- Some of the Instructions in "CO_P4_TEST2.txt" have data dependency, you need to modify the content of the file to get the right answer. Hint: adding NOP instruction between instructions or you can rearrange the ordering of the instruction but without changing the result. You need to **hand in your CO_P4_TEST2.txt** as well.
- This LAB needs demo. During the demo, TA will ask each of you some question about this LAB or the design. Get prepared!
- Also, you need to hand in your Report for this LAB.
- You need to upload your file to E3 before deadline or 10 % off each day

3. Architecture Diagram



4. Test

CO P4 TEST1.txt

```
addi $1, $0, 3;    //a = 3
addi $2, $0, 4;    //b = 4
addi $3, $0, 1;    //c = 1
sw    $1, 4($0);   //A[1] = 3
add   $4, $1, $1;   //S4 = 2a
or    $6, $1, $2;   //e = a|b
and   $7, $1, $3;   //f = a & c
sub   $5, $4, $2;   //d = 2a - b
slt   $8, $1, $2;   //g = a < b
lw    $10, 4($0);  //i = A[1]
```

CO P4 TEST2.txt

```
addi  $1, $0, 16
addi  $2, $1, 4
addi  $3, $0, 8
sw    $1, 4($0)
lw    $4, 4($0)
sub   $5, $4, $3
add   $6, $3, $1
addi  $7, $1, 10
and   $8, $7, $3
addi  $9, $0, 100
```

5. Grading Policy

- Total source: 100pts
 - TEST1 score: 50 pts, TEST2 score: 20 pts, Q&A: 20 pts, Report: 10 pts.
 - ※ **Any Plagiarism will be punished with a null score!**
- **Delay: 10% off/day**

6. Hand in your assignment

Please upload the assignment to the E3.

Put all of .v source files and report into same compressed file.