Computer Architecture and Programming Languages
Jacobs University Bremen
Dr. Kinga Lipskoch

Course: CO20-320241
November 11th, 2019

Homework 9 - Datapath and Control

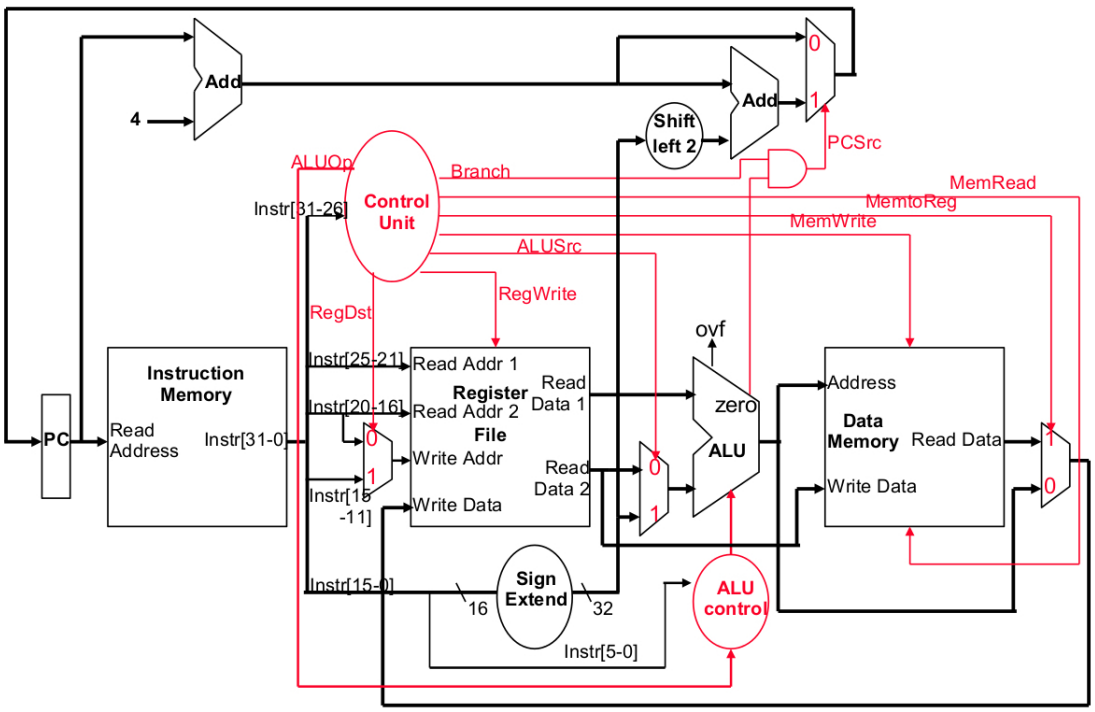
- Template file for submitting the solutions:
  https://grader.eecs.jacobs-university.de/courses/320241/2019_2/lectures/template_hw.tex
- The TAs are grading solutions to the problems according to the following criteria:
  https://grader.eecs.jacobs-university.de/courses/320241/2019_2/Grading_Criteria_CAPL.pdf

Problem 9.1 *Datapath and control* (1 point)

(a) Why does the PC not need an explicit write signal in a single-cycle datapath?

(b) Why is an explicit write control signal needed in a multicycle datapath?

Problem 9.2 *Single-cycle datapath* (6 points)



(a) By **marking (by e.g., a thicker line or another color) the active lines and circling the active selectors** in the figure above, show the single-cycle datapath for the add `$s0 $s1 $s2` and `lw $s3 16($s2)` instructions. Use two copies of the figure for the two instructions. Then with your findings write down the values of the control lines for the instructions into the table below.

Instruction	RegDst	ALUSrc	Memto Reg	Reg Write	Mem Read	Mem Write	Branch	ALUOp
`add`								
`lw`								

(b) When does the ALU need to add its inputs? Give and explain detailed examples from at least two different instruction classes.

How to submit your solutions

You can submit your solutions via *Grader* at **`https://grader.eecs.jacobs-university.de`** as a generated PDF file from the given template TEX file.
If there are problems with *Grader* (but only then), you can submit the file by sending mail to `k.lipskoch@jacobs-university.de` **with a subject line that starts with CO20-320241**.

Please note, that after the deadline it will not be possible to submit solutions. It is useless to send solutions by mail, because they will not be graded.

This homework is due by Monday, November 18th, 23:00.