Universidade de Aveiro

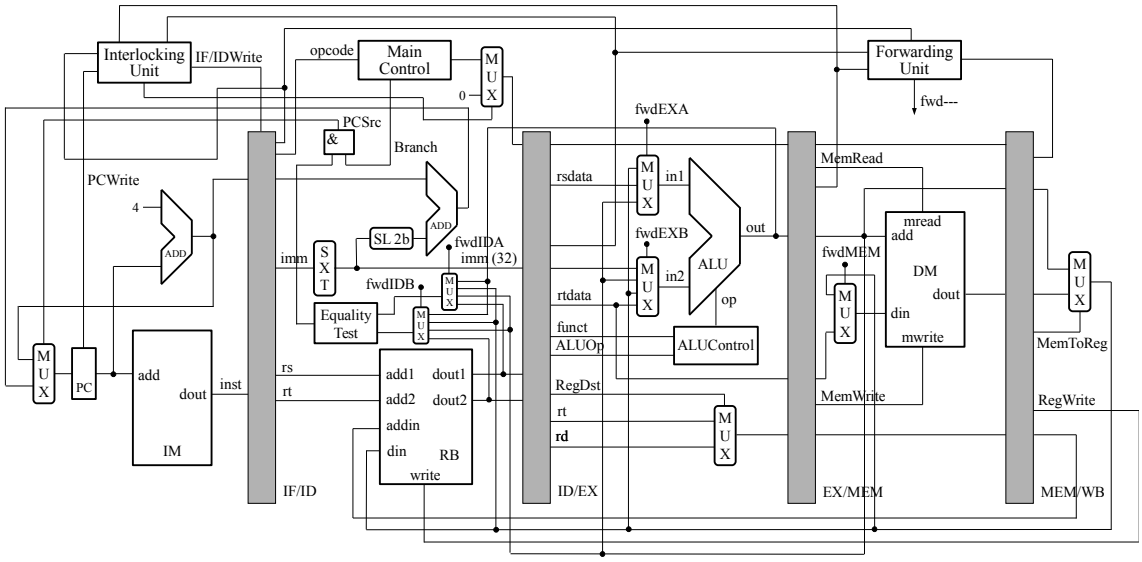
Mestrado Integrado em Engenharia de Computadores e Telemática

Arquitectura de Computadores Avançada

Assignment 1

Academic year 2016/2017

The `MIPS_SystemC_v1.zip` archive (available at the course elearning site) contains a behavior simulator of MIPS static pipeline as discussed in the lectures and whose diagram is shown bellow.



You are required to introduce into the simulator two new arithmetic / logic instructions

- a *logic rotate left*, which rotates left the contents of a register of the register bank by an arbitrary, but fixed, number of bits (`lrl rd, rt, nbits`, where *nbits* is the number of bits the contents of register *rt* is to be rotated and *rd* is the register used to store the result of the operation)
- a *population counter*, which counts the number of bits of the contents of a register of the register bank that have the value one (`pct rd, rt`, where *rt* is the register whose ones' content is to be counted and *rd* is the register used to store the result of the operation).

The instructions format is the following.

logic rotate left

0	0	rt	rd	nbits	48

population counter

0	0	rt	rd	0	49

The main goal is to present a solution that is cost effective, which means, that the instructions implementation should trade a balance between hardware complexity and execution time.

Therefore, the assignment entails that some investigation should be made on finding the best possible algorithms to implement the operations.

GRADING

- introduction of the instructions into the behavior simulator and proof that they work as specified – 14 valores
- modification of the instructions execution time, at the EX stage, to a more realistic value consonant with the solution which is presented – 17 valores.

DELIVARABLES

- an archive, named `MIPS_SystemC_v1_T$G#.zip` (where $, equal to 1, … ,4, means the lab number and #, equal to 1, …, 10, means the group number), of the modified version of MIPS behavior simulator with your solution
- a pdf file, up to 4 power point like pages, where the main ideas of your solution are described.

DEADLINE

- December, 4, at midnight.