

YORK UNIVERSITY

LASSONDE SCHOOL OF ENGINEERING

EECS 2021 Computer Organization

Project 1: MIPS Simulator

In this project, you will write a simple simulator for a subset of MIPS instruction set as defined in ‘Computer Organization and Design: The hardware/Software Interface’ 5th Edition, Patterson and Hennessy.

This project is worth 2 labs.

You can use C or Java. The input to your simulator is the executable program binary.

Your simulator should read the instructions one by one and execute them. Execution of the instructions means changing the contents of registers and/or memory. Your simulator should run the program until the end of the file (executable binary), or until executing a `syscall` to exit.

Your simulator should be able to execute the following instructions:

sll	srl	addu	add	and	nor
slt	sltu	addiu	slti	lui	

Extra credit (25%) will be given if you simulate the following instructions

lb lw lbu sb sw

Keep in mind here that you need to think how to represent the “memory” in your simulator.

Your simulator should run in one of two different modes. The first line of the binary code is either 0 or 1. If 0, the simulator simulates the program until the end and then print the contents of the 32 register \$0 - \$31. If the first line is 1, the simulator prints the contents of the 32 registers after it executes any instruction.

Each time the simulator print the registers, it does that in the following format

\$0:0x??????. The “\$0” means register 0 followed by a colon, then 0x (for hex) then 8 hex digits , then the next instruction 4 registers per line with the last register value **NOT** followed by two spaces. After you write all the registers’ values, a new line consists of 40 “=”

```
$0:0x421ae210 $1:0x12345678 $2:0xffff1212 $3:0x1111ffff
$4:0x421af210 $5:0x12345678 $6:0xffff1212 $7:0x1111ffff
                ^
                |
            2 spaces

$28:0x421af210 $29:0x12345678 $30:0x12af1212 $31:0x1111ffff
=====
```

The input to the simulator is a file with the first line contains a 0 or 1 (to set the mode) then one hex number per line, for example

0

46540af2

1234abcd

This document will be modified/corrected/”made more clear” frequently. I will make the correction/modification in red, so please check this site often