ECE GY 6913 Computing Systems Architecture

RISCV Simulator Project – Phase 1
Spring 2025

Goal of the Project

- Have a working model of a 32 bit RISC-V interpreter.
- Accurately maintain the values in all registers and memory locations.
- Project is to be done either in Python or C++. The boiler-plate code will been provided on brightspace.
- Project is to be done individually.

Grading Scheme and support

- Weightage of the RISCV project will be 10% of your total grade.
- Each phase will be out of 50 marks.
- Test cases – total 10 – 3 of which will be released a week before submission of each phase.
- Project report – contains questions and marking scheme which will be posted on Brightspace.
- Submission deadline for Phase 1 is March 21st 2025.

Input

imem.txt

contains binary input of all the instructions

dmem.txt

contains binary input of all the memory locations

Output

Performance Metrics

Register States after each cycle

DMem at the end of program execution

State Results

What needs to be done in IF

Read 4 lines of the IMEM file.

What needs to be done in ID

Convert the 32 bits into an instruction. (Big endian)

```
00000000
01010010
00000001
10110011
```

Instruction: `00000000010100100000000110110011`

Decoded instruction: `add x3, x4, x5`

What needs to be done in EX

Instruction: `add x3, x4, x5`

`lw x10, 20(x12)`

Be sure to perform the right execution at this stage.

R and I type instructions will perform the normal executions.

Load and Store instructions will perform calculations of offset.

What needs to be done in MEM

Make sure to access memory in this stage.

LOAD and STORE instructions

What needs to be done in WB

Update the values of registers in this stage.

Eg. loading a value into a register, arithmetic result to be written into register

Instructions to be implemented

Please refer Brightspace Project document which contains all instructions that need to be implemented.