**ELC 5313: Advanced Computer Architecture**

**Fall 2025**

**Lab 4: Tomasulo’s Method**

**Scope**

In this lab, you will combine the previous modules in a main top module to make a functioning Tomasulo’s machine.

You are given two new files, CDB\_controller.sv and oscillator.sv. You will combine those files with your instructionqueue.sv, registers.sv, and alu.sv files in the top module.

Note: In your register file, add a delay of #1 in the handle issues block.

In your instruction\_queue file, change the instructions to:

Instruction\_Memory[0] <= {alu\_add , alu\_add , 5'd5 , 5'd5, 5'd3, 11'b0};

Instruction\_Memory[1] <= {alu\_sub , alu\_sub , 5'd3 , 5'd13, 5'd20, 11'b0};

Instruction\_Memory[2] <= {alu\_and , alu\_and , 5'd15 , 5'd18, 5'd21, 11'b0};

Instruction\_Memory[3] <= {alu\_add , alu\_add , 5'd25 , 5'd30, 5'd22, 11'b0};

Instead of the for loop making all instructions the same ADD.

Also, comment out this line in your issue block: Instruction[i][EXEC\_UNIT\_HIGH:EXEC\_UNIT\_LOW]==ADDER)

**Schedule**

* **Week 1 (today):**
  + Work on Tomasulo top module
* **Week 2:**
  + If we finish the top module, we will try to implement our own instructions

You are welcome to work ahead.

**Provided Files**

* CDB\_controller.sv
* oscillator.sv

**Deliverables**

1. tomasulo.sv – completed module.
2. Screenshots of waveform simulation showing correct Tomasulo implementation
3. Lab Report: Your report should give details about the work distribution within the group (who did what), milestones in your work, and your implementation decisions (why did you choose the way you did it, and/or how did you do that).

**Grading Rubric**

* **Lab Report** (50 pts)
  + Complete report. Clear documentation about work distribution and process. Contains simulation waveforms that demonstrate proper behavior of both modules with clear waveform evidence; shows correct data flow, redirection, and instruction status update.
* **Tomasulo Module Functional** (40 pts)
  + Correct implementation of operand fetch, redirection logic, and register updates.
* **Code clarity & comments** (10 pts)
  + Descriptive names and comments explaining design choices.

A screenshot of a computer

AI-generated content may be incorrect.

**Due Date**

**11/05/2025** (Submit individually via Canvas). You can work in pairs for this lab; both partners must turn in code and a lab report.