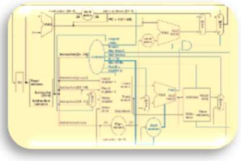

CSE 331-503 Project 2
MIPS ALU with MOD
Due Date: 07/12/2023 23:59 - Teams

In this Project you will implement the Arithmetic Logic Unit of MIPS. Your ALU will get two 32-bit numbers: **A** and **B**. It will get three bit **ALUop** as the third input. It will output a 32-bit **Result** signal. It will be able to perform addition, subtraction, mod, and, or, xor, nor, lessthan as shown in the table:

FUNCTION	ALUop
AND	000
OR	001
XOR	010
NOR	011
LESS THAN	100
ADD	101
SUB	110
MOD	111

MOD & ADDER

1. For getting mod of A according to B, you will subtract B from A until you get a number smaller than B.
2. Implementation of Mod is a MUST to get points from the assignment. **Otherwise you get 0.**
3. You will design mod operation as a sequential circuit explained next.
4. Your adder will be a **2-Level Carry Look Ahead Adder** as we studied in the lecture.
5. For all functions in the above table other than the mod operation you will use Structural Verilog only. Dataflow (assign) or Behavioral Verilog are not permitted.
6. Your design will include at least **alu.v**, **adder.v**, **mod.v** modules.
7. You have to write a test bench in Verilog to show the accuracy of your ALU design via simulation.

FSM for MOD

You will implement the MOD function on Verilog.

- Your design will have three Verilog files: **mod_cu.v** and **mod_dp.v**
- **mod_cu.v** is for the control unit and **mod_dp.v** is for the datapath.
- Your control unit FSM is shown in Fig. 1.
- Your datapath will include a subtractor and a comparator.
- You get 25 Bonus pts if you use your subtractor you designed for the ALU, instead of an additional subtractor allocation.
- Combine these two Verilog files in another Verilog file called **mod.v**
- **Your mod.v must be working accurately to get points from this project.**
- Please attend the next lecture that will clarify your assignment further and teach you to design sequential circuits in Verilog.

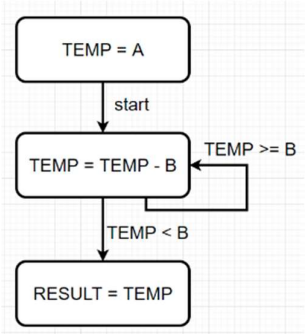

Figure 1 Control Unit FSM for MOD

This project is not hard if you start on time, yet procrastination will surely make you work harder.