

# CSCE 231/2303: Computer Organization and Assembly Language Programming Summer 2020

## Project 2: ARM THUMB Simulator (20%)

The objective of this project is to develop a simulator for ARM THUMB ISA. The input to the simulator is a binary file that contains the machine code resulted from assembling an ARM THUMB assembly program. In this file every 16 bits (2 bytes) represent the instruction word of one ARM THUMB instruction. For this project, assume that the first 32-bit word is the initial value of the stack pointer and the second 32-bit word is the address of the program entry point (PC initial Value). Your simulator should print out the disassembly of the instruction being executed. Also, it should produce an output every time a register is modified. The simulator should terminate when it reads the special instruction word: 0xDEAD.

You are given a skeleton that can disassemble and execute few instructions. You need to complete it to disassembler and execute a subset of THUMB instructions. The supported subset includes the following instruction formats: 1, 2, 3, 4, 6, 7, 9, 13, 14, 16, 17, 18 and 19. The SWI (format 17) instruction is similar to the RISC-V ECALL instruction. The execution of SWI would print the content of register r0 on the screen.

Few THUMB assembly programs to be used as test cases. The “.bin” files are the ones that should be read by your simulator.

**Bonus (20%):** Extend SWI services to support: reading an integer, reading a string, printing a string, reading a character, printing a character and program termination.

### Guidelines

- Work in a group of 3 students
- The C++ skeleton is for your reference. You may use other programming language for your implementation. If you are planning to do so, please contact Dr. Shalan first to get his approval (you must have a strong reason for that).
- Interviews will take place on **Sunday July 12<sup>th</sup>**. You have to submit your report and the source code through BB before your interview. You must use GH for development. GH Repo URL (public repo) must be submitted as well.
- The report should outline the design and implementation of your simulator. This includes the functions and the data structures. If you developed an algorithm to solve a problem then it has to be included in the report.