CSCE 231/ 2303 Fall 2018
Assignment 3: MIPS Programming

Assigned: Sunday, September 30th in Class

Due: Sunday, October 7th at 17:00

Delayed submission with penalty until Tuesday, October 9th at mid-night.

Goals

This assignment is an individual assignment and you will work on it on your own. The goal of this assignment is to write code for small basic functionalities using the MIPS assembly language. In this assignment you will implement a number of MIPS simple functions as well as a main program to test these functions. Your code should run in the MARS simulator.

Details

You are required to write the following functions:

1. **Swap two memory locations.**
   You are required to write a function that receives in $a0 and $a1 the address of two memory locations which we will refer to as array1 and array2 respectively. The function should also expect an integer representing the size of the arrays in $a2, which we will refer to as the arrays_size. The function should swap every byte of the two arrays with in the size range of the arrays_size.

2. **Four functions to read from the user a number in the four number systems: binary, decimal, octal, and hexadecimal.**
   You are required to write four functions, one for each number system. Each function will read a string from the user and convert it to its corresponding number system. Each function should validate the input and makes sure that it is in the correct corresponding format. The function should convert the string to the corresponding number and store the result in $v0. $v1 should be set to 0 if the function was performed correctly and to be set to 1 if an error has occurred.

3. **Four functions to print on the screen a number in the four number systems: binary, decimal, octal, and hexadecimal.**
   You are required to write four functions, one for each number system. Each function should expect its integer value input in $a0, and it should convert the value stored in $a0 to its corresponding string representation and print it on the screen. Each number system will have a prefix that identify its representation: binary → 0b, Octal → 0O , Hexa → 0X, and the decimal number system will have no prefix.

Important: you are required to perform all needed validations, and generate/report errors whenever needed.

What to submit

1. Your full in-line documented source code; it should include a main program that has some test cases that shows how your functions work.
2. A PDF report that includes:
    a. Any assumptions you have made.
    b. Your design approach to implement these function and why do you think it is the most optimum approach.
3. Your code should run on the MARS simulator.

How to submit:

Compress all your work: source code, report, readme file, and any extra information into a zip archive. You should name your archive in the specific format <Student_ID>_<Name>_Assignment3.zip. Finally, upload your code to blackboard.

Grade

This assignment is worth 5% of the overall course grade. The assignment will be graded on a 100% grade scale, and then will be scaled down to the 5% its worth. The grading of the assignment will be broken down as follows:

1. 10 % for just submitting a meaningful assignment before or on the due date. This 10% does not account for the correctness of your assignment but submitting an empty assignment without code will definitely results in loosing this 10% and consequently the whole grade of this assignment.
2. 65 % for the correctness and the quality of your code.
3. 25 % for the quality of your inline documentation and the readme file.

Delays

You have up to 2 working days of delay, after which the assignment will not be accepted and your grade in that case will be ZERO. For every day (of the 2 allowed days), a penalty of 10% will be deducted from the grade. And of course you will lose the 10% mentioned in point 1 above under the “Grade” section.