EEL3801: Computer Organization
Project #2: UCF Knights

Project Functionality Overview:

Purpose of this project is to increase your understanding of data, address, memory contents, and strings. You will be expected to apply selected MIPS assembly language instructions, assembler directives and system calls sufficient enough to handle string manipulation tasks. Your task is to use your code for Project 2 Part A_2 and optimize it using the below assumptions you should have the results for the objectives described below:

Submit your optimized code .asm file with name as : <First Name>-<Last Name>-Optimized.asm & the word document with the below requirements as per rubric (added to previous week's word doc):

- **Description and Grading Rubric (Total: 40 points)**

The MIPS P5600 CPU is based on the MIPS32 ISA architecture, supporting up to six cores achieving the industry's leading CoreMark/MHz score per core. It supports high performance data parallel operations such as DSP, imaging and media.

Energy Consumption: [**30 points**]

Using the dynamic instruction count **MARS4.4→Tools→Instruction Statistics** you should be able to calculate the energy consumed by your code using below assumptions:

To calculate the Energy Consumption of Optimized Code:
- Consider the following are the energy consumption per instruction:
    1) ALU: 4 fj
    2) Jump: 5 fj
    3) Branch: 8 fj
    4) Memory: 100 fj
    5) Other: 3fj
- Optimize your code to consume appreciably less energy (>=5% energy savings of the unoptimized version for each sentence) based on the assumptions above. (**15 points for detailed solution and calculations of the 5 different sentences previously chosen with different lengths**)
- Explain about what was your strategy in terms of changes made in the MIPS code , instructions, algorithm etc. that you applied to reduce the energy consumption? And mention what was the reasoning behind choosing that strategy.(**10 points for details and clarity of the explanation**)
- Plot a graph of Energy consumption for different sentences with different lengths after optimization of the code. (**5 points for graph including at least 5 different sentences previously chosen with different lengths**)

MIPS/mW: [**10 points**]

Use the information of the two previous sections to determine MIPS/mW for the optimized code as illustrated in Module 8 (Device Technology)-Slide 30 (assume Clock Cycle is 400ps). (**20 points for detailed solution and calculations of at least 5 different sentences with different lengths**)