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 using the below assumptions you should have the results for the objectives described below:

Description and Grading Rubric

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.

Dynamic Instruction Count and CPI: [35 points]

Dynamic Instruction Count will be evaluated by the **MARS4.4→Tools→Instruction Counter** for the file-provided string.

To calculate the Dynamic Instruction Count of Project 2 Part A_2.

- Dynamic Instruction Count is calculated from the first instruction execution until completion of a proper exit using syscall, as calculated in the "**Instructions so far:**" dialog box.
- Plot a graph of Dynamic Instructions for different sentences with different lengths. **(10 points for graph including at least 5 different sentences with different lengths)**
- Calculate the CPI of your program for the above inputs, assuming all R-type instructions require 4 clocks, all I-type instructions require 5 clocks and all J-type instructions require 3 clock. **(15 points for detailed solution and calculations of at least 5 different sentences with different lengths)**
- Plot a graph of CPI for different sentences with different lengths **(10 points for graph including at least 5 different sentences with different lengths)**

Energy Consumption: [25 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 Part A_2:

- Consider the following are the energy consumption per instruction:(**15 points** for detailed solution and calculations of at least 5 different sentences with different lengths)
  1) ALU: 4 fj
  2) Jump: 5 fj
  3) Branch: 8 fj
  4) Memory: 100 fj
  5) Other: 3 fj
- Plot a graph of Energy consumption for different sentences with different lengths before optimization of the code. **(10 points for graph including at least 5 different sentences with different lengths)**