

Homework 1: SPIM

The objective of this homework is for you to use SPIM which is a simulator that runs MIPS R2000/R3000 assembly language programs. In this lab, you are going to use some of the basic features of SPIM. In order to work with SPIM, you need to read the two-page tutorial.

If you have access to a PC, please get a copy of the software. Below is a program that you will use for this lab. It is a very simple program but it will help you to get familiar with SPIM.

```

1      .data
2  str:      .asciiz "the sum is: "
3             .text
4
5
6      li $a0, 6
7      # initialize argument 0
8      li $a1, 5
9      # initialize argument 1
10     # Register convention see page 88
11 sum:      beq $a0, $zero, sum_exit # compare argument 0 = 0
12           add $a1, $a1, $a0       # add arguments
13           addi $a0, $a0, -1        # a0 - 1
14           j sum                   # unconditional jump to sum
15 sum_exit: li $v0, 4               # syscall code for print_string
16           la $a0, str              # argument for system call
17           syscall                 # Read system calls
18           move $a0, $a1            # argument for system call
19           li $v0, 1               # syscall code for print_integer
           syscall

```

Last two digits of your
WSU ID number: 10451156.



Please do the following:

- 1) Modify the program by changing the values of argument registers a0 and a1 (see lines 6 and 7). Replace these arguments with the last two digits of your WSU ID number (if one of them is zero use the following digit). a0 would have the last (non-zero) digit.
- 2) Run the program (use Go command)
- 3) Using *File* → *Save Log File...* (*Ctrl+S*) save the file. This file would have the status of all the registers and memory after the execution of the program. Please print this file; this will be part of your report for this lab.
- 4) Now replace the values for arguments a0 and a1 with 2 and 4, respectively. Remember you need to edit the program file again. Run the program using a step by step option (*F10*). Please notice when registers R4, R5, and R6 change and how PC changes every time.

- 5) Reload the program and insert a break point at line 11. Run the program (use *Go* command). Please take a look of what happened with the instructions in line 11 and report the values of the following registers R4, R5, and R6.
- 6) Using *File → Save Log File...* (*Ctrl+S*) save the file. Please print this file and include it in your lab report.

REPORT

Please include the following items in your report.

1. Explain how your program works. You may use a flow chart, pseudo C program, or other way to explain the program. To understand a bit better SPIM and MIPS assembler code please read/study Appendix A of your textbook.
2. Please determine what each instruction does. For example *li* is a load immediate instruction that put a value onto the register.
3. Conclusion section. Explain what you have learned here and what was difficult about this homework.
4. A print out of your program. # ***Include comments in your program.***

REPORT IS DUE: Wednesday, January 31 at 9:10AM (in class).