CSCI-2500 Assignment #3: Matrix Swap and Multiplication in MIPS

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September 25, 2012

DUE DATE: Noon, Tuesday, October 2nd, 2012

1 Assignment Description

The purpose of this assignment is to help you:

- Transition from ANSI C to MIPS assembly language.
- Transition from GCC to using the SPIM “MIPS” interpreter.
- Develop skills for breaking a problem down into it’s MIPS code blocks.

Leveraging the C code solution from Assignment 1, you will write a 2-D Matrix Swap and Multiplication System in MIPS assembly language.

1.1 Using SPIM – The MIPS interpreter

SPIM command line version has already been install on kratos.cs.rpi.edu. You need to set your PATH environment variable by doing:

```bash
export PATH=/home/chrisc/spimsimulator/spim:$PATH
```

From there you can run spim from the command-line:

```bash
spim
```

There you will see an arrow prompt. There you can “load” you MIPS file by doing:
load “filename.s”
SPIM will tell which lines of the code have an error.
To set a breakpoint prior to running a program, do:

**breakpoint main**
To run, execute the **run**.
Then set another breakpoint:

**breakpoint GLOBALSYMBOL**
Where GLOBALSYMBOL is the name of a function or place you want to break but the label is global to the program.

Details on how to use SPIM can be found in the course textbook, Appendix B, Section 9, page B-40. In fact the whole Appendix B is useful for this assignment as it provides a number of MIPS examples.

## 2 Code Structure

You should have 4 functions.

1. **main** – main routine that starts the program. **Do not modify this routine.**

2. **matrix_swap** – computes the swap of the matrix like we did for assignment 1.

3. **matrix_multiply** – multiples the transpose with the original matrix. You can use the MIPS “multiple” **mul** instruction. See Appendix B, page 51 for the details of the R-type instruction.

4. **matrix_print** – outputs the solution to the screen.

You can use **mm-swap.s** found in `/home/chrisc/comp-org-templates` on **kratos.cs.rpi.edu** as a template that will help you. I will go over this example in class.

## 3 HAND-IN INSTRUCTIONS

Leave your code on **kratos.cs.rpi.edu** under the **assignment3** subdirectory from your home directory. I will grab your assignment from your home directory and give a copy to the TAs to grade. The version of your assignment that resides on **kratos.cs.rpi.edu** as of the deadline is the one that will be graded.