

The UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Comp 411 Computer Organization  
Spring 2011

**Labs #9 and #10: Your Own Mini-Project**

*Issued Fri. 3/25/11; See below for due dates*

This will be the last lab assignment. You are asked to propose your own mini-project, and complete it in three weeks. You will demonstrate your working program on Friday, April 8 (C version) and April 15 (MIPS version) during lab hours.

Here are a couple of examples to help you in proposing your own mini-project:

- *Example 1:* Design an RPN calculator. It must handle at the following operations: add, subtract, multiply and divide. It should also have 5-10 memory locations for storing and recalling intermediate results (e.g., 5 3 – STO 1 8 4 – RCL 1 / should give you 2).
- *Example 2:* Implement a program that performs alphabetic sort on a text file (say, max 20 lines of text).
- *Example 3:* Implement a program that solves the Towers of Hanoi problem.
- *Example 4:* Design a “malware” program (MIPS only, not C) which exploits buffer overflow vulnerability in your code and runs some “bad” code. You should sign up for this only if you are very comfortable with stack manipulation, and with machine coding (i.e., bit-level coding) of MIPS instructions.

The above are just four examples. Please feel free to propose any other interesting problem you would like to solve. You will likely have a lot more fun with the project if you come up with your own idea. But, be sure that it can be completed within two weeks!

As a general guide, in order to make your project be of adequate complexity/challenge, please try to incorporate at least one (or more) of the following:

- Recursion
- Data structures (e.g., stacks, queues, structures, multidimensional arrays, etc.)
- Fancy I/O (e.g., file I/O, or nicely formatted text output, ASCII art, etc.)
- Complex arithmetic (e.g., floating-point, matrix operations, etc.)

You must first implement your mini-project as a C program, and only then using MIPS assembly. (The malware project is an exception.)

**Timeline:**

- March 30: Submit a brief (1-2 paras only) proposal on what you intend to implement by beginning of class on Wednesday, March 30.
- April 8: Show your complete working C implementation of your project.
- April 15: Show your complete working MIPS implementation of your project.

**What to submit:** You will show a demo during lab hours. If we need, we will ask you to submit your code and screenshots and a short report. We will update the website with submission instructions.