CS 429, Fall 2012, Laboratory 3
Memory Mountain

Assigned: Wednesday, November 19, 2012
Due: Friday, December 7, 2012, by noon

1 Introduction

In this lab, you will learn about the memory throughput of an X86-compatible microprocessor. When you have completed the lab, you will have a better appreciation for bandwidth between the main memory, the caches, and the microprocessor. Late labs will not be accepted.

2 Logistics

You will work on this lab alone.

Any clarifications and revisions to the assignment will be posted on the course Web page.

3 Handout Instructions

You will find the file `memory-mountain.tar` referenced on the homework page of the class Website. You will need to download this file so you can us its contents. Please be sure to download the latest version.

4 Evaluation

The lab is graded parts: the graph of the memory mountain, and your description of the memory system on which you ran your experiment. We will not accept this laboratory late.

5 Memory Mountain

Your task is to compile and run the memory mountain code. For the code provided, you will need to use a Linux system running on top of a machine with a X86 architecture; any of the CS Department machines are suitable. The files are contained in the `memory-mountain.tar` file. This program is contained in the files `clock.c`, `fcyc.c`, and `mountain.c`, along with the two associated header files `clock.h`, `fcyc.h`. The laboratory can be compiled by issuing the command:

```
gcc -m32 -O2 -o mountain *.c
```

Then, the program can be run by just typing:

```
./mountain
```

The output of this program will be a matrix of values that present the memory bandwidth of the computer for different sized working sets and different stride sizes.

To complete your laboratory, you need to graph your results. In addition, you need to write down the model and speed of the microprocessor that you use to get the bandwidth results. You can find some of the information by typing the commands:

```
cat /proc/cpuinfo
cat /proc/meminfo
```

With that information, you can then lookup on Intel's Website the configuration of the internal caches. Your writeup should include this information and an explanation of why the graph of the memory mountain looks as it does. This writeup should not exceed two pages – be concise and clear.

Hand In Instructions

Please follow the instructions below for turning in your work.

- Make sure you have included your identifying information in your files.
- Remove any extraneous statements.
- To handin your memory mountain laboratory, make a PDF file of your report. Please name the file with your report `<YourCSUserName>.pdf`, and then type:

  ```
  turnin --submit beltagy lab3 <YourCSUserName>.pdf
  ```

  where `<YourCSUserName>.pdf` is the file containing your report.
- After turning something in, if you discover a mistake and want to submit a revised copy, type

  ```
  turnin --submit beltagy lab3 <YourCSUserName>.pdf
  ```

  which will replace your original report with a new one.