CS 446 Homework 2

Chapter 3

1. [Linux Operating System] ***free*** is a command that displays used and available memory in your system. Read man page of ***free*** command. Run the command ***free –o*** several times, running other programs in between, and store the results in a file. Draw a graph as follows: X-axis: MB-used; for the Y-axis, use (i) Memory Used per unit time; (ii) (Memory Used – Memory Buffered – Memory Cached) per unit time; and (3) Swap Used per unit time. Explain the behavior of this graph with respect to memory utilization in the presence of running various applications.

2. [Any System] Plot a histogram and calculate the mean and median of the sizes of the executable binary files on a computer to which you have access. On a Windows system, look at all .exe and .dll files; on a UNIX system look at all executable files in */bin*, */usr/bin*, and */local/bin* that are not scripts (or use the file utility to find all executables). Determine the optimal page size for this computer just considering the code (not data). Consider internal fragmentation and page table size, making some reasonable assumption about the size of a page table entry. Assume that all programs are equally likely to be run and thus should be weighted equally.

Chapter 2

3. [Linux Operating System] ***df*** is a command that displays the amount of disk space available on the file system containing each file name argument. Read man page of ***df*** command. Run the command ***df*** to find out how many disk blocks are available and how many are in use. Does the sum of these equals the total number of disk blocks on the disk? If not, explain why there is a difference. Next run the command ***df –i*** to find out how many i-nodes are available and in use. Now create a new file with just a few characters in it, and again run ***df*** and ***df –i*** commands. Explain the effect of creating this new file. Now increase the size of this new file by entering a large number (> 5000) of characters, and again run ***df*** and ***df –i*** commands. Explain the effect of increasing the size of the new file.

4. [Programming Problem] Write a program that starts at a given directory and descends the file tree from that point, recording the sizes of all the files it finds. When the traversal is complete, the program should print a histogram of the file sizes using a bin width specified as a parameter into the program (e.g., with 1024, file sizes of 0 to 1023 to in one bin, 1024 to 2047 go in the next, etc.