CMPT-300: Assignment 4

1 The deadline

Due at 4:30pm, Friday, Nov. 28th.

2 Where to submit

Please drop your answers into the assignment drop-in box outside the general office.

3 Questions

In this assignment, you have **9** problems which count for **30** marks. You need to answer all of these questions. Please write your answers clearly.

3.1 (4 points)

What is the major difference(s) between block devices and character devices? What is the advantage(s) of symbolic link comparing to hard link?

3.2 (4 points)

Consider the algorithm for checking block consistency of a file system that we have discussed in class. We maintain two counters for each block: one counter keeps track of how many times the block is present in a file, and the other counter records how often the block is present in the free list. The question is: is it possible that for some particular block both counters have the value 1? Please justify your answers.

3.3 (2 points)

We discussed spooling technique for managing printers in a computer system. Why are output files for a printer normally spooled on disk before printed?

3.4 (3 points)

Suppose that a disk has 200 sectors on each track and each sector has 512 bytes. The speed of the disk is 7200rpm and the track-to-track seek time is 1 milli sec. How much cylinder skew is needed for this disk?

3.5 (2 points)

In Windows OS, sharing files can be achieved by creating a *shortcut* that points to the file to be shared. Is this shortcut a symbolic link or hard link? Why?

3.6 (4 points)

Explain the pros and cons of contiguous file allocation and linked file allocation.

3.7 (2 points)

Consider the i-node structure in UNIX. If it contains 10 direct addresses, one single, double and triple indirect blocks. The length of each address is 2 bytes and all disk blocks are 512 bytes. What is the largest possible size for a file in UNIX?

3.8 (3 points)

How many disk operations are needed to fetch the i-node for the file */usr/ast/courses/os/project.pdf*? Assume that the i-node for the root directory is in memory, but nothing else along the path is in memory. Also assume that all directory entries for the same directory fit in one disk block.

3.9 (6 points)

Disk requests come in to the disk driver for cylinders 12, 22, 20, 2, 40, 6, and 39, in that order. A seek takes 6 msec per cylinder moved. How much seek time is needed for
a)first-come, first served
b)Closest cylinder next
c)Elevator algorithm (initially moving upward)
In all cases, the arm is initially at cylinder 20.