

**CS 162, Fall 1991  
Final  
Professor A. Smith**

The exam is closed book. Any question for which you give no answer at all will receive 20% partial credit.

**Problem #1**

One thing that adds security to the Unix password system is "salt." Salt consists of two randomly generated characters, different for each user, which are stored in the /etc/passwd file for each file. The Salt is used to determine which of 4096 variations of the password encryption algorithm are used to encrypt a given password. What is the advantage of using "salt?". Explain. (15)

**Problem #2**

Explain what an "intentions list" is, and how and why it is used. (15)

**Problem #3**

When you log into Unix, it tells you when you last logged on. Why? (10)

**Problem #4**

Define and explain what a stack algorithm is. Why is it good? If two algorithms are compared and one is not a stack algorithm and the other is, will one always give better (fewer page faults) results? Why and why not? (17)

**Problem #5**

Explain the purpose of a token in a ring network. Why is there only one token? (13)

**Problem #6**

What are the functions that "open" and "close" perform? (16)

**Problem #7**

Describe and explain all of the problems that could occur if users could write directories directly. Be precise and specific.

**Problem #8**

What is a polyalphabetic cipher? How would you go about breaking it? (10)

**Problem #9**

Explain the only perfect method of encryption, and why it is perfect. What do we mean by perfect? (11)

**Problem #10**

True/False questions (27):

- a: The "chmod" command in Unix is used to alter capabilities. \_\_\_\_\_
- b: Files in Unix are contiguously allocated. \_\_\_\_\_
- c. Deleting a directory deletes all files within that directory. \_\_\_\_\_
- d. When a file is opened, its descriptor is kept in main memory. \_\_\_\_\_
- e. Internally the OS refers to files by name. \_\_\_\_\_
- f. Directories are stored on disk just like regular files. \_\_\_\_\_
- g. If A has a symbolic link to B's file, (these are the only two links to the file) and B removes its hard link from the file, the link count of the file is decremented and the file still exists, but B no longer has access to it. \_\_\_\_\_
- h. A Unix file descriptor must allocate at least 13 pointers, even if the file it points to has only 4 blocks. \_\_\_\_\_
- i. Unix password files are world-readable. \_\_\_\_\_

**Problem # 11**

We discussed two ways of comparing paging algorithms: A curve of space vs. faults, and space-time product. Define each, and explain which is better and why. (15)

**Problem # 12**

Explain (all of) the advantages and disadvantages of disk caching. (15)

**Problem # 13**

- (a) What is the approximate length of time required for a full rotation on most hard disks? (6)
- (b) Suppose that you have a new mythical disk called the dervish. The rotation time is as in part a. The seek time is 10 microseconds/cylinder, and there are 100 cylinders. I claim that disk scheduling algorithms such as SCAN and SSTF are no longer very good. Why? What would be a good scheduling algorithm for the dervish disk? (16)

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