

CS 1550 Final Review Practice Questions

December 2002

As with the mid-term, these questions are intended to cover the *kind* of questions that may be asked about the material we covered. It is not intended as a comprehensive review, and is not representative of the final exam length.

I/O Questions

I can fill the trunk of my car with about 100 DLT tapes, each holding roughly 100GB of data. If I can drive from Sennott Square to the Cathedral of Learning in 10 minutes ... what is the bandwidth of the trunk of my car?

Why must disk sectors vary in physical length (not storage capacity) ... while CD sectors/blocks can have practically identical physical lengths?

What is sector interleaving? And why *was* it needed?

A disk has 200 cylinders. The head is currently over cylinder 20 heading outwards (towards higher numbered cylinders). A time $t=0$ we have a queue of requests for blocks on different cylinders: 25, 36, 28, 124, 56, 18, 178, 236. List the order in which the cylinders will be visited using:

- a) SCAN
- b) C-Look
- c) If we assume moving X cylinders required X units of time, then how long will it take to visit all cylinders using SSTF

How do Unix systems keep track of time?

File System Questions

An example disk has 512-byte sectors, and a total capacity of 100MB. All tracks have 100 sectors. It spins at 6000 rpm, and a complete track can be read in 2 revolutions.

- a) How many tracks are on this disk?
- b) How fast can data be read off the disk surface (give an upper limit)?
- c) If we use a file-system with 4-sectors per block, how many bits are needed for a sector pointer?
- d) Given your answer to part c), and assuming file names can be up to 200 characters long, then how many direct pointers can be held in a single i-node, if an i-node is exactly 1 file-system block in size?
- e) If file system blocks are 4-sectors, how big must a DOS-like allocation table be?

If we use a contiguous file allocation ... can we read the contents of a file faster/slower than if we use index-nodes.

If files are all exactly 10KB in size, and we use 4KB file system blocks, what is the percentage of disk space lost to internal fragmentation.

In a log-structured file system, when do you expect a file to be moved on disk (i.e. moved from one set of sectors to a new set of sectors)?

Security Questions

A virus that attempts to change its appearance is referred to as a _____ virus.
(Fill in the blank)

What is the difference between a virus and a worm?

Describe what is meant by the term: "stack overflow vulnerability."

Cryptography must be unbreakable to be useful.

Give an example of "security by obscurity."

Public-key cryptography can be used to confidentially exchange information between two parties. Describe how this would be done, being careful to describe which steps guarantee:

- a) Confidentiality
- b) Authenticity
- c) Integrity

What is a one-way hash? Name two well-known algorithms for producing one-way hashes ... and state the size of the resulting hash produced by each (is it a fixed size?).

Dynamic Libraries and Extensible Operating Systems

What is the difference between link-time and load-time? Which applies to UNIX .so files?

Give an example of a commonly used .so file. What is it used for?

Networking and Distributed Systems

Describe three different network topologies.

Give a specific description of three problems encountered when implementing or using a remote procedure call.

What is the difference between multi-processor and multi-computer systems?

Give two examples of “middleware.”