

CS 314 Operating Systems
Spring 2024
Quiz #8 on March 19, 2024 (**SOLUTIONS**)

Your Last Three Digits: _____
(please do NOT write all of your student ID or your name)

Grade: _____

(1) What are the possible major performance metrics regarding file systems?

- How quickly access files in a (possibly a huge) storage device
- How efficiently (in terms of capacity) files are stored
- How securely store files (“reliability”)
- How easily users access files

(2) What are “sequential access files”?

Sequential access files are those files that require accessing (reading) the contents of a file always from the beginning to the end of a file (“no shortcut for jumping to a piece of data you would like to read within a file”).

(3) What is the primary advantage in using contiguous file space allocation (“the relative advantage compared to the non-contiguous allocation)? What is the primary disadvantage in using contiguous file space allocation (“the relative disadvantage compared to the non-contiguous allocation)?

The primary advantage in using contiguous files is (one of the followings):

- Reading contents in a file (especially when we read the contents in an entire file) is faster (than non-contiguous file allocations).
- Data recoveries will be easier.

Note: “implementation is easy (easier)” is not good enough if you do not explain what will be good if “implementation is easy” – as described above either “faster access” or “easy data recoveries”).

(4) Describe how “linked-list non-contiguous file space allocation” works.

The linked-list non-contiguous file space allocation” works in the following way:

- The contents of a file are split to multiple pieces (“blocks”).
- Blocks that are assigned to a file are stored in any locations in a storage device (at random locations).
- The first block of a file is pointed by the (file) directory. Then, each block assigned to a file in a storage device has a pointer to its next block.

(5) What are “special files”? Mention some devices (at least two) human users can manipulate using “special files”.

Special files are those files created/managed/used by operating systems.

Examples:

- (Printer) spooling files
- Device files – those that represent each I/O device
- Virtual-memory files
- Files that hold suspended processes (the long-term and the medium-term process schedulers)