CSCI 4500 / 8506
Sample Questions for Final Examination
From Module 11

1. With respect to memory in a computer system, the term *persistent* means

   a. the ability of a memory type to retain its contents even after its power source has been removed.
   b. the necessity of the interface between the memory and the system bus to maintain the data on the bus for a specified period of time if it is to be written reliably.
   c. None of the other answer choices is correct.

2. Assume a disk device can be read by a user application, and further assume that this disk contains files belonging to many users. What prevents the user application from reading files belonging to other users?

   a. The disk controller, which must be given the user ID of the owner of each block that is to be read.
   b. The file system, which verifies that each disk access is to a block containing information that can be legally read by the user owning the application process.
   c. Nothing, since the individual disk blocks containing files and other information can be read without any security checks.

3. Many storage devices used by filesystems in modern computer systems are removable, like floppy disks, CDs and DVDs, and flash RAM. Why is it usually necessary to inform the operating system before physically removing one of these devices from the system?

   a. Removable devices are continuously monitored by the system, and removing the device without informing the system will cause the monitoring process to fail.
   b. The operating system usually buffers data (in RAM) that is to be written to removable devices, so the writing is not necessarily complete as soon as a *write* or *close* system call is completed. Telling the system you want to remove the device tells it to write all modified data in buffers to the device before indicating it is safe to remove the device.
   c. None of the other answer choices is correct.

4. Suppose multiple distinct file systems are stored on a single physical disk. The storage region in which each of these file systems is located is usually called a _____ .

   a. partition
   b. segment
   c. cylinder set

5. In a file system, the unit of information to which protection is applied is called a _____ .

   a. file
   b. byte
   c. sector

6. The *extension* -- the part of a file name that usually appears at the end of a file name after a period -- usually indicates _____ .

   a. the type of information contained in the file.
   b. which version, or generation, of the information this particular file represents.
   c. the size of the file, in bytes.

7. Obviously applications depend on the content of files conforming to certain expectations. Is the structure of a file's content imposed by the operating system? And if so, why?

   a. Yes, because the size of each file must always be an exactly multiple of the size of a logical disk block (for example, a multiple of 4K bytes).
   b. It depends on the operating system and the file type whether any particular structure is imposed.
   c. No, arbitrary files may contain any structure desired by the user.

8. In UNIX systems, *regular* files contain _____ .

   a. user information (text files, source code, data and executable programs)
   b. information that is accessed on a scheduled basis
   c. data that is readable by processes belonging to any user

9. A *keyed* file is one which _____ .

   a. each record has a unique identifier that can be used in search operations
   b. each record is encrypted and the unencrypted version of the record can only be obtained by supplying the proper key to the decryption algorithm
   c. None of the other answer choices is correct.

10. In UNIX, a *character special file* is

    a. a file which, when accessed, results in input/output operations on a device which is accessed one byte at a time.
    b. a file that contains a single character such that any access triggers special security actions by the system.
    c. a file, similar to a regular file, but used only on systems where the size of a character is other than 8 bits (for example, 9 bits or 12 bits).

11. Suppose a UNIX file has multiple names (that is, multiple physical links). When is the file's content actually deleted?

    a. When any of the links to the file are deleted.
    b. When each of the links to the file has been deleted.
    c. When a majority of the links to the file have been deleted.

12. What are the principal purposes of the *open* system call?

    a. prepare the open data structures used during the file's access
    b. return a unique descriptor which is then used in other calls to access the open file
    c. All of the other answers are correct.

13. In most systems (certainly in UNIX), all files opened by a process are closed when the process terminates. Why, then, is there a separate system call that allows a user to explicitly close a file?

    a. A child process usually inherits open files from its parent, and the close system call is provided to allow child processes to close these inherited instances.
    b. Open files consume system resources, and there is a limit on the number of files a process may have open at the same time. Thus closing a file frees resources and allows additional files to be opened.
    c. If the process wants to open the same file a second (or later) time with different access permissions (perhaps to write the file, when the first open was for read only), then the first open instance of the file must be closed.

14. When a UNIX file is open, there is a unique position associated with the file that indicates where the next read or write operation will commence. A system call is provided that allows a process to arbitrarily change this position. That system call is named _____ .

    a. lseek
    b. goto
    c. seek

15. When a UNIX file is open, there is a unique position associated with the file that indicates where the next read or write operation will commence. After a read or write, how is that position altered?

    a. It is incremented by 1.
    b. It is incremented by the number of bytes read or written.
    c. None of the other answer choices is correct.

16. A directory (sometimes called a folder) contains information about a collection of files. In UNIX systems the entries in a directory contain a file's name and _____ .

    a. the access rights for the file.
    b. the number of an i-node.
    c. the file size.

17. The size of a file is an important file attribute. In the CP/M operating system, what was interesting about file size attribute?

    a. It was only updated after the file was closed.
    b. It was reported as the number of 128-byte sectors contained in the file.
    c. None of the other answer choices is correct.

18. Most users usually say things like "this directory contains that file." What's technically incorrect about such statements?

    a. Directories don't contain files, but only information *about* files.
    b. The directory only contains the first logical block of the file; the remainder is stored elsewhere.
    c. None of the other answer choices is correct.

19. A user process may be allowed to read a directory, but never to write it. Why?

    a. The format of directory entries must be carefully preserved, so writing a directory is only indirectly possible by using system calls like read, write, delete, and rename.
    b. Writing a directory is not permitted because it may cause the size of a file to be reduced, which is not allowed.
    c. None of the other answer choices is correct.

20. Which of the following facts are used to construct a hierarchical file system?

    a. The number of entries in a directory is variable.
    b. A directory is similar to a regular file, but is uniquely identified as a directory by the file system.
    c. all of the other choices are correct.

21. A *path* for a file system is _____ .

    a. a sequence of directory and file names separated by a unique separator character.
    b. a linked list of directory names.
    c. None of the other answer choices is correct.

22. A relative path does not begin with the root directory of a file system. Instead it begins with _____ .

    a. the home directory for the user who owns the process performing the access
    b. the current working directory
    c. None of the other answer choices is correct.

23. One of the advantages of using a relative path to a file instead of the corresponding complete (or absolute) path to the file is

    a. it is always shorter than the corresponding absolute path.
    b. it eliminates the need to search directories for filenames.
    c. it is often more convenient.

24. In UNIX file systems, the directory named '.' is

    a. a link to the youngest (newest) subdirectory of the current directory.
    b. a link to the current directory.
    c. None of the other answer choices is correct.

25. Suppose a disk has tracks that contain 30 blocks each, and there are 6 tracks per cylinder. If the first block on the first track of the first cylinder is given the block number 1, then where would block number 217 be located?

    a. 2nd cylinder, 2nd track, 7th block
    b. 3rd cylinder, 2nd track, 7th block
    c. None of the other answer choices is correct.

26. A contiguous region on a disk is

    a. a region that contains only tracks from the same cylinder.
    b. region that includes only blocks with consecutive block numbers.
    c. a region that resides entirely on a single cylinder.

27. In UNIX, a set of structures is used to record the disk block numbers for those blocks belonging to a file. Suppose the first of these structures, an array with say 20 entries, records the disk block numbers of the first 20 blocks of the file. What happens if the file requires more than 20 disk blocks?

    a. If there are only 20 entries for disk block numbers then the file cannot become larger than that.
    b. An additional structure, called an indirect block, is used to hold additional disk block numbers for the file.
    c. None of the other answer choices is correct.

28. Some file systems use a linked structure to record the numbers of disk blocks used for each file (like the FAT file systems, for example). Which of the following operations is likely to be much more time consuming with such a scheme as compared with an indexed block number scheme (like that used by UNIX)?

    a. reading the 100 bytes of a file following the last bytes read.
    b. reading the last 100 bytes of a file.
    c. reading the first 100 bytes of a file.

29. Suppose a file system allocates only complete disk blocks to files, and further each disk block holds 4096 bytes. Assuming random file sizes, what is the size and type of fragmentation present in the file system?

    a. There is insufficient information available to answer the question.
    b. There is external fragmentation of 2048 bytes average for each file.
    c. There is internal fragmentation of 2048 bytes average for each file.

30. Which of the following is an advantage of using a logical block size that is larger than a disk's physical block size?

    a. The physical blocks belonging to a file will be grouped more closely, possibly resulting in less disk head movement.
    b. Fewer entries are required in the structure that maps file locations to disk block numbers.
    c. All of the other answer choices are correct.

31. There are two common ways used to keep track of the unused (available for allocation) disk blocks in a file system. These are

    a. bit maps and linked lists.
    b. heaps and linked lists.
    c. linked lists and skip lists.

32. Which of the following actions might occur when a failing disk block is detected?

    a. An alternate good block is used instead of the failing disk block.
    b. The read or write of the disk block is repeated to deal with transient errors.
    c. All of the other answer choices are correct.

33. An *image* backup of a file system

    a. copies each block of the file system to the backup media without regard to the type of information it contains.
    b. copies all the image files (e.g. JPG files) to the backup media.
    c. None of the other answer choices is correct.

34. Which type of file system backup can be used to defragment a file system?

    a. a backup of all files and directories sorted by disk block address.
    b. an image backup.
    c. a file-by-file backup.

35. An *incremental* backup of a file system contains

    a. only those files that have been created or changed since the last backup.
    b. a backup that uses multiple backup volumes, such as multiple CDs, DVDs, or magnetic tapes.
    c. None of the other answer choices is correct.

36. When the contents of a disk block are needed by a user program, the system first

    a. looks for the block in a RAM disk.
    b. looks for the block in the file system cache.
    c. None of the other answer choices is correct.

37. One approach to improving the performance of UNIX file systems that has been used in the past is to

    a. place all the i-nodes for files close to the beginning of the disk, and place all the logical blocks containing file data as close as possible to the physical end of the disk.
    b. place the block containing the i-node close to the blocks containing the file's data.
    c. place each logical block of the file's data on separate cylinders.

38. Which of the following decisions are likely to be mechanisms as opposed to policies?

    a. how a process is represented
    b. what type of file system is available
    c. which users are allowed to access a particular file

39. In a microkernel-based operating system,

    a. only a small number of mechanisms are provided in the kernel.
    b. there is little or no reliance on message-passing mechanisms found in the kernel.
    c. None of the other answer choices is correct.

40. A *joe* password is one which is identical to a username. For example, if a username is xy123, then the *joe* password is also xy123. Requiring users to avoid the use of such passwords is

    a. not something that is enforced by the operating system.
    b. a policy.
    c. a mechanism.

41. Which of the following might be characterized as a *denial of service* attack on a system?

    a. flooding a system with requests.
    b. attempting to obtain a copy of the encrypted password file for a system.
    c. making an attempt to break the password encryption algorithm for a system.

42. *Countermeasures* are

    a. system features designed to identify or eliminate the possibility of a security attack.
    b. automatic logoff actions taken if a user does not utilize a system within a certain period of time.
    c. None of the other answer choices is correct.

43. An *access control list* (ACL) is

    a. a list of pairs, each pair containing identification of a domain and a user.
    b. a list of users that are allowed to use a system.
    c. None of the other answer choices is correct.

44. An access control list (ACL) is associated with

    a. an object to which the ACL is to be applied.
    b. each active process table entry.
    c. each file system.

45. A *capability* is

    a. a list of pairs, each pair containing identification of a protection domain and a user.
    b. a pair containing an object identification and a set of access rights.
    c. a password protected access control list.

46. In a computer system characterized as having a *tagged* architecture,

    a. each object in memory has a field identifying its data type.
    b. each object in memory has a tag that is essentially a password that must be matched by a password associated with the process attempting to access the object.
    c. None of the other answer choices is correct.

47. Libraries of functions for most operating systems include facilities to open a directory, scan the directory sequentially or locate files with names matching a pattern, and to close the directory. Why are such functions provided?

    a. Since the format of directory entries is usually complex and varies depending on the type of filesystem, it is convenient to be able to process all directories, regardless of the filesystem type, using one set of functions.
    b. Although a user can use the open, close, and read system calls on directory files, there is additional information associated with a directory that can only be accessed using these special library functions.
    c. None of the other answer choices is correct.

48. It is clear that reading from a disk is different than reading from a keyboard or a serial port. Some early operating systems used different system calls to read different devices, but UNIX systems have always provided a single *read* system call. How is this possible?

    a. The filesystem identifies the device being accessed, and when necessary, invokes the appropriate entry point in the device driver for the device, making the *read* system call device independent.
    b. The *open* system call determines the device type to be processed, and there are then multiple *read* function implementations, one for each device type.
    c. None of the other answer choices is correct.

49. The acronym FAT stands for _____ .

    a. Fast Access Technique
    b. File Allocation Table
    c. Format And Test

50. The principal difference between FAT-12, FAT-16, and FAT-32 is _____ .

    a. the number of bits in the maximum file size supported
    b. the number of bits in each entry in the FAT
    c. None of the other answer choices is correct.

51. The term *metadata* refers to _____ .

    a. data which uses more than one byte to represent a single character (e.g. UNICODE)
    b. information *about* a file (e.g. the date and time a file was created)
    c. None of the other answer choices is correct.

52. The block cache holds

    a. at most one copy of each disk block that has been accessed.
    b. a copy of each directory block used in the absolute path to every open file.
    c. None of the other answer choices is correct.

53. When an additional block must be added to the block cache, and no unused block cache entries are available,

    a. additional storage for the block cache is dynamically allocated.
    b. the entire block cache is cleared (after writing any blocks with modified content to disk).
    c. the least recently used entry in the block cache is removed, writing it back to disk if it was modified, to provide an unused entry.

54. A drawback of using linked allocation of the blocks belonging to a file is that

    a. it causes significant internal fragmentation of the disk space.
    b. accessing an arbitrary block of the file requires accessing each of the preceding blocks.
    c. None of the other answer choices is correct.

55. A drawback of using static allocation of the blocks belonging to a file is that

    a. it introduces significant external fragmentation of the disk space.
    b. it causes significant internal fragmentation of the disk space.
    c. if the initial allocation is too small, then the entire file cannot be written.

56. A drawback of using static allocation of the blocks belonging to a file is that

    a. if the initial allocation is too small, then the entire file cannot be written.
    b. it introduces significant external fragmentation of the disk space.
    c. None of the other answer choices is correct.

57. A common filesystem type that uses linked allocation with the indices (links) stored in a separate structure is

    a. a FAT filesystem.
    b. a log-structured filesystem.
    c. None of the other answer choices is correct.

58. The CP/M operating system only recorded a file's size as the number of 128-byte physical sectors in the file. To identify the end of file in a text file, what did CP/M do?

    a. It padded the last sector of the file with blanks.
    b. It recorded the length of each line in a 16-bit (two byte) field before each line, and used a field containing zero to mark the end of file.
    c. It stored a special character (control-Z) after the last character in the file.

59. An i-node, as used in a UNIX system, does *not* contain which of the following items?

    a. the date and time when the file was created
    b. the disk block addresses of the first few blocks of data in the file
    c. None of the other answer choices is correct.

60. ECC is an acronym referring to _____ .

    a. a technique used to dynamically extend the size of directory entries
    b. an error correcting code used with disks
    c. None of the other answer choices is correct.

61. What does the UNIX *sync* program do?

    a. It periodically schedules the writing of all modified blocks in the cache to disk to limit the extent of damage caused by a system failure.
    b. It updates the last access time in a directory entry for all disk files to the time the file was last accessed.
    c. None of the other answer choices is correct.

62. A UNIX disk file F is opened by process A in a manner such that the first read from F will commence with the first byte of the file. Process A then creates a child process B. Process B then reads 100 bytes from file F, then process A reads 100 bytes from file F. What is the relationship between the 100 bytes read by B and the 100 bytes read by A?

    a. Both A and B obtain the first 100 bytes of the file.
    b. B's read obtains the first 100 bytes of the file, and A's read obtains the second 100 bytes of the file.
    c. Both A and B obtain the second 100 bytes of the file.