Import Settings:
Base Settings: Brownstone Default
Highest Answer Letter: D
Multiple Keywords in Same Paragraph: No

Chapter: Chapter 11

Multiple Choice

1. Transfers between memory and disk are performed a ____.
A) byte at a time
B) file at a time
C) block at a time
D) sector at a time

Ans: C
Feedback: 11.1
Difficulty: Medium

2. Order the following file system layers in order of lowest level to highest level.

[1] I/O control
[2] logical file system
[3] basic file system
[4] file-organization module
[5] devices
A) 1, 3, 5, 4, 2
B) 5, 1, 3, 2, 4
C) 1, 5, 3, 4, 2
D) 5, 1, 3, 4, 2

Ans: D
Feedback: 11.1
Difficulty: Difficult

3. A volume control block ____.

A) can contain information needed by the system to boot an operating system from that partition
B) is a directory structure used to organize the files
C) contains many of the file's details, including file permissions, ownership, size, and location of the data blocks
D) contains information such as the number of blocks in a partition, size of the blocks, and free-block and FCB count and pointers

Ans: D
Feedback: 11.2
Difficulty: Medium

4. Which of the following is the simplest method for implementing a directory?
A) tree data structure
B) linear list
C) hash table
D) nonlinear list

Ans: B
Feedback: 11.3.1
Difficulty: Medium

5. In the Linux VFS architecture, a(n) ____ object represents an individual file.
A) inode
B) file
C) superblock
D) dentry

Ans: A
Feedback: 11.2.3
Difficulty: Medium

6. Which of the following allocation methods ensures that only one access is needed to get a disk block using direct access?
A) linked allocation
B) indexed allocation
C) hashed allocation
D) contiguous allocation

Ans: D

Feedback: 11.4.1
Difficulty: Medium

7. The free-space list can be implemented using a bit vector approach. Which of the following is a drawback of this technique?
A) To traverse the list, each block must be read on the disk.
B) It is not feasible to keep the entire list in main memory for large disks.
C) The technique is more complicated than most other techniques.
D) This technique is not feasible for small disks.

Ans: B
Feedback: 11.5.1
Difficulty: Medium

8. Page caching ____.
A) uses virtual memory techniques to cache file data as system-oriented blocks as opposed to pages
B) uses virtual memory techniques to cache file data as pages as opposed to system-oriented blocks.
C) is used in Windows NT but not in Windows 2000.
D) cannot be used to cache both process pages and file data.

Ans: B
Feedback: 11.6.2
Difficulty: Medium

9. NFS views a set of interconnected workstations as a set of ____.
A) independent machines with independent file systems
B) dependent machines with independent file systems
C) dependent machines with dependent file systems
D) independent machines with dependent file systems

Ans: A
Feedback: 11.8
Difficulty: Medium

10. The NFS mount protocol ____.
A) does not allow a remote directory to be accessible in a transparent manner

B) exhibits a transitivity property in terms of client access to other file systems
C) establishes the initial logical connection between a server and a client
D) provides a set of RFCs for remote file operations

Ans: C
Feedback: 11.8.2
Difficulty: Medium

11. A disk with free blocks 0,1,5,9,15 would be represented with what bit map?
A) 0011101110111110
B) 1100010001000001
C) 0100010001000001
D) 1100010001000000

Ans: B
Feedback: 11.5.1
Difficulty: Medium

12. A _____ is a view of a file system before the last update took place.
A) transaction
B) backup
C) consistency checker
D) snapshot

Ans: D
Feedback: 11.7.3
Difficulty: Medium

13. _____ includes all of the file system structure, minus the actual contents of files.
A) Metadata
B) Logical file system
C) Basic file system
D) File-organization module

Ans: A
Feedback: 11.1
Difficulty: Medium

14. The file-allocation table (FAT) used in MS-DOS is an example of _____.
A) contiguous allocation
B) indexed allocation
C) linked allocation
D) multilevel index

Ans: C
Feedback: 11.4.2
Difficulty: Medium

15. How many disk accesses are necessary for direct access to byte 20680 using linked allocation and assuming each disk block is 4 KB in size?
A) 1
B) 6
C) 7
D) 5

Ans: B
Feedback: 11.4.2
Difficulty: Medium

16. A contiguous chunk of disk blocks is known as a(n) _____.
A) extent
B) disk block group
C) inode
D) file-allocation table (FAT)

Ans: A
Feedback: 11.4.1
Difficulty: Medium

17. On UNIX systems, the data structure for maintaining information about a file is a(n) _____.
A) superblock
B) inode
C) file-control block (FCB)
D) master file table

Ans: B
Feedback: 11.1
Difficulty: Medium

18. Which algorithm is considered reasonable for managing a buffer cache?
A) least-recently-used (LRU)
B) first-in-first-out (FIFO)
C) most-recently-used
D) least-frequently-used (LFU)

Ans: A
Feedback: 11.6.2
Difficulty: Easy

19. Which of the following statements regarding the WAFL file system is incorrect?
A) Clones are similar to snapshots.
B) WAFL is used exclusively on networked file servers.
C) Part of caching uses non-volatile RAM (NVRAM.)
D) It provides little replication.

Ans: D
Feedback: 11.9
Difficulty: Medium

20. Consider a system crash on a log-structured file system. Which one of the following events must occur?
A) Only aborted transactions must be completed.
B) All transactions in the log must be completed.
C) All transactions in the log must be marked as invalid.
D) File consistency checking must be performed.

Ans: B
Feedback: 11.7.2
Difficulty: Difficult

21. A _____ contains the same pages for memory-mapped IO as well as ordinary IO.
A) double cache
B) unified virtual memory
C) page cahce
D) unified buffer cache

Ans: D
Feedback: 11.6.2
Difficulty:

Essay

22. Briefly describe the in-memory structures that may be used to implement a file system.

Ans: An in-memory mount table contains information about each mounted volume. An in-memory directory-structure cache holds the directory information of recently accessed directories. The system-wide open-file table contains a copy of the FCB of each open file. The per-process open-file table contains a pointer to the appropriate entry in the system-wide open-file table.
Feedback: 11.2
Difficulty: Difficult

23. To create a new file, an application program calls the logical file system. Describe the steps the logical file system takes to create the file.

Ans: The logical file system allocates a new FCB. Alternatively, if the file-system implementation creates all FCBs at file-system creation time, an FCB is allocated from the set of free FCBs. The system then reads the appropriate directory into memory, updates it with the new file name and FCB, and writes it back to the disk.
Feedback: 11.2
Difficulty: Difficult

24. What do the terms "raw" and "cooked" mean when used to describe a partition?

Ans: A raw disk is used where no file system is appropriate. Raw partitions can be used for a UNIX swap space as it does not need a file system. On the other hand, a cooked disk is a disk that contains a file system.
Feedback: 11.2.2
Difficulty: Medium

25. What are the two most important functions of the Virtual File System (VFS) layer?

Ans: The VFS separates the file-system-generic operations from their implementation by defining a clean VFS interface. Several of these implementations may coexist on the same machine allowing transparent access to different types of locally mounted file systems. The other important feature of VFS is that it is based on a file-representation structure that contains a numerical designator for a network-wide unique file. This network-wide uniqueness is required for support of network file systems.
Feedback: 11.2.3
Difficulty: Medium

26. What is the main disadvantage to using a linear list to implement a directory structure? What steps can be taken to compensate for this problem?

Ans: Linear lists are slow to search. This slowness would be noticeable to users as directory information is used frequently in computer systems. Many operating systems implement a software cache to store the most recently used directory information. A sorted list may also be used to decrease the average search time due to a binary search.
Feedback: 11.3.1
Difficulty: Medium

27. How is a hash table superior to a simple linear list structure? What issue must be handled by a hash table implementation?

Ans: A hash table implementation uses a linear list to store directory entries. However, a hash data structure is also used in order to speed up the search process. The hash data structure allows the file name to be used to help compute the file's location within the linear list. Collisions, which occur when multiple files map to the same location, must be handled by this implementation.
Feedback: 11.3.2
Difficulty: Medium

28. What are the problems associated with linked allocation of disk space routines?

Ans: The major problem is that a linked allocation can be used effectively only for sequential-access files. Another disadvantage is the space required for the pointers. Yet another problem of linked allocation is the decreased reliability due to lost or damaged pointers.
Feedback: 11.4.2
Difficulty: Medium

29. Describe the counting approach to free space management.
Ans: The counting approach takes advantage of the fact that, generally, several contiguous blocks may be allocated or freed simultaneously. Thus, rather than keeping a list of *n* free disk addresses, we can keep the address of the first free block and the number *n* of free contiguous blocks that follow the first block. Each entry in the free-space list then consists of a disk address and a count.
Feedback: 11.5.4
Difficulty: Medium

30. Explain how a snapshot is taken in the WAFL file system.

Ans: To take a snapshot, WAFL creates a duplicate root inode. Any file or metadata updates after that go to new blocks rather than overwriting their existing blocks. The new root inode points to metadata and data changed as a result of these writes, while the old root inode still points to the old blocks, which have not been updated.
Feedback: 11.9
Difficulty: Medium

31. Explain the benefit if using a unified buffer cache.

Ans: Without a unified buffer cache, memory-mapped IO uses a page cache, and ordinary IO uses a buffer cache. The buffer cache will also cache the same contents as in the page cache. This is known as double caching of file system data twice. A unified buffer cache uses the same, single buffer cache for caching pages for both memory-mapped IO as well as ordinary IO.
Feedback: 11.6.2
Difficulty: Medium

True/False

32. Metadata includes all of the file-system structure, including the actual data (or contents of the file).

Ans: False
Feedback: 11.1
Difficulty: Medium

33. In NTFS, the volume control block (per volume) and the directory structure (per file system) is stored in the master file table.

Ans: True
Feedback: 11.2.1
Difficulty: Medium

34. Indexed allocation may require substantial overhead for its index block.

Ans: True
Feedback: 11.4.3
Difficulty: Medium

35. The NFS protocol provides concurrency-control mechanisms.

Ans: False
Feedback: 11.8
Difficulty: Medium

36. On log-structured file systems, all metadata and file data updates are written sequentially to a log.

Ans: False
Feedback: 11.7.2
Difficulty: Medium

37. VFS allows dissimilar file systems to be accessed similarly.

Ans: True
Feedback: 11.2.3
Difficult: Medium

38. Linked allocation suffers from external fragmentation.

Ans: False
Feedback: 11.4.2

Difficulty: Medium

39. The WAFL file system can be used in conjunction with NFS.

Ans: True
Feedback: 11.9
Difficulty: Easy

40. On log-structured file systems, a transaction is considered only when it is written to disk.

Ans: False
Feedback: 11.7.2
Difficulty: Medium

41. A unified buffer cache uses the same cache for ordinary disk I/O as well as memory-mapped I/O.

Ans: True
Feedback: 11.6.2
Difficulty: Medium

42. A consistency checker only checks for inconsistencies, it cannot fix any that it may find.

Ans: False
Feedback: 11.7.1
Difficulty: Easy

43. Asynchronous writes to a file system are generally more efficient than synchronous writes.

Ans: True
Feedback: 11.6.2
Difficulty: Medium