FIle systems and Disk Scheduling

1) Consider a hard disk of capacity 1GB, and a block size of 1KB. If the free space list is maintained as a bitmap, then the size of the bitmap is
A) 1MB
B) 1Mb
C) 1Kb
D) 1KB

2) Consider an index-based file system with the inode containing 64 direct, 1 indirect index block, and a doubly indirect index block. Assume that each index takes 4 bytes. The maximum file size under this arrangement, _____ KB, if a disk block is 1024 bytes?
[NAT]

3) Consider a file system with 4096 byte blocks and 32-bit disk and file block pointers. Each file has 13 direct pointers, 4 singly-indirect pointers, a doubly-indirect pointer, and a triply-indirect pointer. In such a file system, the number of inodes that fit into a block is.....(NAT)
A. 53
B. 54
C. 51
D. 55

4) Disk requests come into the disk driver for cylinders: 10, 22, 20, 2, 40, 6, 38, in that order. The disk has 60 total cylinders and the disk head is currently positioned over cylinder 20. A seek takes 6 milliseconds per cylinder moved total seek time using LOOK disk scheduling algorithm is (initialing moving upwards):
A. 876
B. 348
C. 360
D. 640

5) A unix i-node has 10 disk addresses for data blocks, as well as addresses of single, double and triple indirect blocks. If each of these indirect blocks hold 256 disk addresses, what is the approximate size of the largest file? Assume each disk block is 1K bytes size.
A. 2GB
B. 4GB
C. 8GB
D. 16GB

6) A disk drive has 5000 cylinders, numbered 0 to 4999. The drive is serving a request at cylinder 143 currently and the previous request was at 125. The disk I/O queue, in FIFO order, is
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
Starting from the current head position, the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests was found to be 3319. Identify which scheduling method that was used?
A. FCFS
B. SSTF
C. SCAN
D. C-SCAN

7) The request queue for a disk contains the following requests in [track:sector] form: [10:5], [22:9], [20:21], [21:9], [2:10], [40:45], [6:7], [38:9] Assume that the disk head is currently positioned over cylinder 20. What is the sequence of reads under the Shortest Seek Time First head scheduling algorithm?

A. [20:21], [21:9], [22:9], [10:5], [6:7], [2:10], [38:9], [40:45]

B. [20:21], [21:9], [22:9], [38:9], [40:45], [10:5], [6:7], [2:10]

C. [40:45], [38:9], [2:10], [10:5], [6:7], [22:9], [21:9], [20:21]

D. None of these

8) Consider a file system with 2KB block size and 4 bytes block entry size. Each file can have 12 direct pointers, a singly indirect, a doubly indirect, and a triply indirect pointer. What is the maximum disk size supported by the system ?
A) 256GB
B) 512GB
C) 1TB
D) 8TB

9) The beginning of a free-space bitmap looks like this after the disk partition is first formatted: 1000 0000 0000 0000 (the first block is used by the root directory). The system always searches for free blocks starting at the lowest-numbered block, so after writing file A, which uses six blocks, the bitmap looks like this: 1111 1110 0000 0000. What the bitmap will look after each of the following additional actions:
(I) File B is written, using five blocks.
(II) File A is deleted.
(III) File C is written, using eight blocks.
(IV) File B is deleted.

A) 1111 1110 0000 1100

B) 1000 0001 1111 0000
C) 1111 0000 0000 1100
D) 1111 1110 0000 1000

10) In the indexed allocation, all the pointers of a file are brought together at one place in the_____.
A) data block
B) index block
C) indirect block
D) none

11) There is minimum disk head movement in _____ file allocation.
A) contiguous
B) indexed
C) linked
D) none

12) What is the maximum file size supported by a file system with 16 direct blocks, single, double, and triple indirection? The block size is 512 bytes. Disk block numbers can be stored in 4 bytes.

A) 1GB
B) 48GB
C) 32GB
D) 16GB

13) Suppose that the head of a moving-head disk with 192 tracks, numbered 0 to 191, is currently serving a request at track 80 and has just finished a request at track 62. The queue of requests is kept in the FIFO order: 119, 58, 114, 28, 111, 55, 103, 30, 75. What is the total number of tracks traversed by head movements needed to satisfy these requests for the SSTF disk-scheduling algorithm?

A) 547
B) 143
C) 130
D) 177

14) Suppose that the head of a moving-head disk with 192 tracks, numbered 0 to 191, is currently serving a request at track 80 and has just finished a request at track 62. The queue of requests is kept in the FIFO order: 119, 58, 114, 28, 111, 55, 103, 30, 75. What is the total

number of tracks traversed by head movements needed to satisfy these requests for the FCFS disk-scheduling algorithm?

A) 547
B) 143
C) 130
D) 177

15) Consider a file system with 4096 byte blocks and 32-bit disk and file block pointers. Each file has 13 direct pointers, 4 singly-indirect pointers, a doubly-indirect pointer, and a triply-indirect pointer. The number of i-nodes that can fit in a single block are.....

A) 54
B) 53
C) 127
D) 128

16) Consider the following six I/O operations and their respective cylinder locations on disk. Seek time is 0.1ms per cylinder traversed and the arm begins at cylinder 33.

(A:4), (B:10), (C:35), (D:62), (E:69), (F:95)

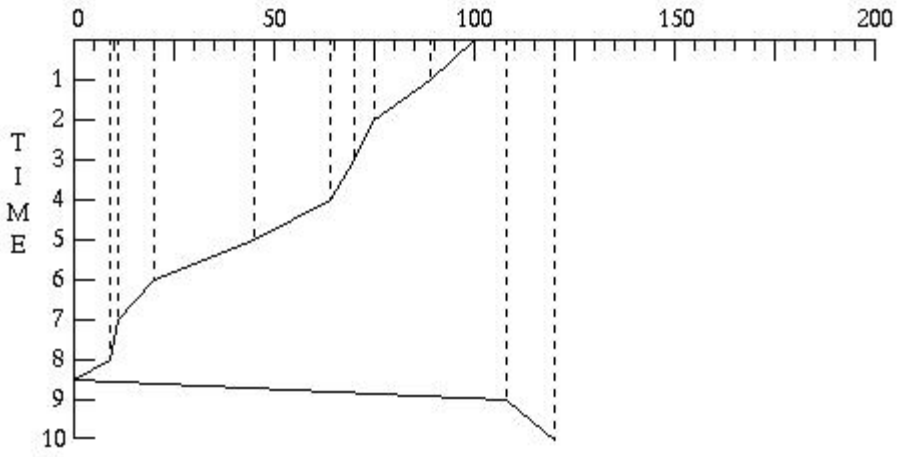
Using the Shortest Seek Time First disk scheduling algorithm to schedule these operations, find the total seek time (in ms).

A) 12
B) 12.4
C) 11.5
D) 15

17) Suppose a file system can have three disk allocation strategies, contiguous, linked, and indexed. We have just read the information for a file from its parent directory. For contiguous and linked allocation, this gives the address of the first block, and for indexed allocation this gives the address of the index block. Now we want to read the Nth data block into the memory. How many disk blocks do we have to read for each of the allocation strategies? (contiguous, linked, and indexed)

A. 0, 1, and N
B. 1, N, and 0
C. 2, 1, and N
D. 1, N, and 2

18) Consider the following requests for disk access: 64, 20, 75, 70, 11, 108, 120, 9, 45, 8. The tracks are numbered from 1-200, and the head is positioned at track 100. Identify the disk scheduling algorithm used, for which the below graph would have been obtained?



A) First Come First Serve
B) Shortest Seek Time First
C) SCAN (direction towards left)
D) C-SCAN (direction towards left)

19) Given the following queue for disk requests -- 95, 180, 34, 119, 11, 123, 62, 64 with the read-write head initially at the track 50 and the tracks are labeled form 0-199. The total number of disk seeks for FCFS scheduling algorithm is_____ **[NAT]**

20) Given the following queue for disk requests -- 95, 180, 34, 119, 11, 123, 62, 64 with the read-write head initially at the track 50 and the tracks are labelled form 0-199. The total number of disk seeks for SSTF scheduling algorithm is_____ **[NAT]**

21) Suppose a file F of size 16KB is shared by 100 processes, each process read the entire F 10 times sequentially, disk uses linked allocation policy to store both Inode and data of the file with block size 512byte in FAT and Block Pointer takes 4bytes. The number of disk block access related to access the file F in executing all the 100 processes is :
A. 33
B. 34
C. 35
D. 36

22) A Unix filesystem has 'A' KB blocks and B byte disk addresses. Each i-node contains 10 direct entries, one single indirect entry and one doubly indirect entry. Suppose half of all files

are exactly 0.5A KB and other half of files are exactly 0.75A KB, what fraction of disk space would be wasted?
A. 62.5%
B. 25%
C. 37.5%
D. 50%

23) Given that the disk has 200 tracks, with track 200 on the outside of the disk. The set of requests is 98, 183, 37, 122, 14, 124, 65, 67and the disk head starts at cylinder 53. The average seek length using the SCAN disk scheduling algorithm (moving outwards) is_____ **[NAT]**

24) Given that the disk has 200 tracks, with track 200 on the outside of the disk. The set of requests is 98, 183, 37, 122, 14, 124, 65, 67and the disk head starts at cylinder 53. The average seek length using the LOOK disk scheduling algorithm (moving outwards) is_____ **[NAT]**

25) Consider a disk queue with requests for cylinders 98, 183, 41, 122, 14, 124, 65, 67. The FCFS scheduling algorithm is used. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 199. The total head movements or the seek operations (in number of cylinders) incurred while servicing these requests is _____.

26) Consider a disk queue with requests for cylinders 981, 183, 401, 122, 104, 324, 565, 267. The FCFS scheduling algorithm is used. The head is initially at cylinder number 553. The cylinders are numbered from 0 to 999. The total head movements or the seek operations (in number of cylinders) incurred while servicing these requests is _____.

27) Consider a disk queue with requests for cylinders 55, 58, 39, 18, 90, 160, 150, 38, 184. The C-SCAN scheduling algorithm is used. The head is initially at cylinder number 100, moving towards last cylinder. The cylinders are numbered from 0 to 199. The average seek length is _____.

28) Consider a disk queue with requests for cylinders 55, 58, 39, 18, 90, 160, 150, 38, 184. The SSTF scheduling algorithm is used. The head is initially at cylinder number 100, moving towards last cylinder. The cylinders are numbered from 0 to 199. The average seek length is

_____.

29) Consider a disk queue with requests for cylinders 55, 58, 39, 18, 90, 160, 150, 38, 184. The FCFS scheduling algorithm is used. The head is initially at cylinder number 100, moving towards last cylinder. The cylinders are numbered from 0 to 199. The average seek length is _____.

30) Consider a disk queue with requests for cylinders 82,170,43,140,24,16,190. The LOOK scheduling algorithm is used. The head is initially at cylinder number 50. The cylinders are numbered from 0 to 199. The total head movements or the seek operations (in number of cylinders) incurred while servicing these requests is _____.

31) Consider a disk queue with requests for cylinders 98, 183, 41, 122, 14, 124, 65, 67. The CLOOK scheduling algorithm is used. The head is initially at cylinder number 53. The cylinders are numbered from 0 to 199. The total head movements or the seek operations (in number of cylinders) incurred while servicing these requests is _____.

32) Suppose the following disk request sequence (track numbers) for a disk with 100 tracks is given: 45, 20, 90, 10, 50, 60, 80, 25, 70. Assume that the initial position of the R/W head is on track 50. The distance that will be traversed by the R/W head when the Shortest Seek Time First (SSTF) algorithm and the SCAN (Elevator) algorithm (assuming that SCAN algorithm moves towards 100 when it starts execution) is _____ and _____, respectively.

33) Consider a file system with 1MB block size. Assume an inode of a file holds pointers to D direct data blocks, and a pointer to a single indirect block. Further, assume that the single indirect block can hold pointers to I other data blocks. What is the maximum file size that can be supported by such an inode design?

34) Consider a FAT file system where disk is divided into B byte blocks, and every FAT entry can store an N bit block number. What is the maximum size of a disk partition that can be managed by such a FAT design?