CSPB 3753 - Fall 2024 - Knox - Operating Systems

Started on	Friday, 18 October 2024, 3:28 PM
State	Finished
Completed on	Friday, 18 October 2024, 5:02 PM
Time taken	1 hour 34 mins
Grade	**86.33** out of 100.00

Question **1**

Partially correct

Mark 7.00 out of 10.00

Term Definitions:

1. Set of all of tracks of equal diameter in a hard disk drive.
2. Component of a disk drive device that is used to transfer data to/from the platter.
3. Information about the data being stored in a file.
4. A block is used to hold the order and pointers to the blocks scattered across the disk.
5. A process that divides large data into data blocks and spreads them across multiple storage devices.
6. Kernel data structure associated with information contained within a directory.
7. The replication of disk data onto separate physical storage devices.
8. A second entry in the file system to the same data.
9. A circular magnetic plate that is used for storing data.
10. Each block of data for a file has the address of the next block of data.
11. The time necessary to move the disk arm to the desired cylinder.
12. Information in the file is processed in no particular order.
13. Information in the file is processed in order, one record after the other.
14. A unique identifier used to access file data.
15. A value used to verify the integrity of a data.
16. The location within the file structure where the file system is to be attached.
17. time necessary for the desired sector to reach the disk head.
18. Kernel data structure associated with information about a file.
19. Redundant data that allows recovery of original data even when a number of errors have occurred.
20. Component of a disk drive device that is used to position components over correct cylinders of the platter.

Place the number of the best definition next to each term:

cylinder	1 ✔	seek time	11 ✔
file handle	18 ✖	disk arm	20 ✔
dentry	6 ✔	striping	5 ✔
indexed allocation	10 ✖	error correction	15 ✖
direct access	12 ✔	symbolic link	8 ✔

Your answer is partially correct.

7 of your answers are correct.

Question **2**

Correct

Mark 2.00 out of 2.00

How do we get a message into the system log from a system call?

Select one:

- a. printk ✔
- b. /dev
- c. /var/log
- d. dmesg
- e. printf

Your answer is correct.

Question **3**

Correct

Mark 2.00 out of 2.00

A keyboard is a ___ while a USB drive is a ____.

Select one:

- a. character device, character device
- b. block device, block device
- c. block device, character device
- d. character device, block device ✔

Your answer is correct.

Question **4**

Correct

Mark 2.00 out of 2.00

When using a bit vector for free space management, what is represented by each individual bit?

Select one:

- a. storage for an array of bits
- b. a block that is available for allocation
- c. a block that is already allocated
- d. the state of the block corresponding to the bit's index ✔

Your answer is correct.

Question **5**

Correct

Mark 2.00 out of 2.00

What sacrifice is made with regards to space needed to store a file, when moving from contiguous to indexed methods?

Select one:

- a. file names are required
- b. extra blocks needed for boot blocks
- c. extra blocks allocated for pointers ✔
- d. path names are required

Your answer is correct.

Question **6**

Correct

Mark 2.00 out of 2.00

C-LOOK is _____ efficient than C-SCAN

Select one:

- a. less
- b. more ✔
- c. equivalently

Your answer is correct.

Question **7**

Correct

Mark 2.00 out of 2.00

ECC is used in RAID and FLASH for:

Select one:

- a. energy control
- b. extraction conditions
- c. error correction ✔
- d. elemental cache

Your answer is correct.

Question **8**

Correct

Mark 2.00 out of 2.00

What is the name of the location where a remote file system is added to a directory structure?

Select one:

- a. absolute path
- b. distribution point
- c. mount point ✔
- d. shared position

Your answer is correct.

Question **9**

Correct

Mark 2.00 out of 2.00

Unix\Linux systems use which of the following file allocation structure to accommodate small and large fiiles -

Select one:

- a. FAT
- b. Indexing
- c. Linked-list
- d. Multi-level indexing ✔

Your answer is correct.

Question **10**

Correct

Mark 2.00 out of 2.00

Which of the following is NOT an advantage of using LKMs?

Select one:

- a. at build time the OS does not need to know about every possible device driver
- b. When added to the OS, the kernel does not need to be rebuilt
- c. editing and building are performed in user space
- d. the device driver runs in user space ✔

Your answer is correct.

Question **11**

Correct

Mark 2.00 out of 2.00

Why do we implement RAID?

Select one:

- a. allow data to be outside of current hardware
- b. control the disk access from a process
- c. to increase speed of disk driver
- d. to address performance and reliability issues ✔

Your answer is correct.

Question **12**

Correct

Mark 2.00 out of 2.00

File type is required to store data?

Select one:

- True
- False ✔

Question **13**

Correct

Mark 2.00 out of 2.00

The kernel keeps track of all files opened by ANY process?

Select one:

- True ✔
- False

Question **14**

Correct

Mark 2.00 out of 2.00

If each index block holds 64 (2^6) entries, how many blocks can double indexing access for each file's data?

Select one:

- a. 4096 (2^{12}) ✔
- b. 256 (2^8)
- c. 512 (2^9)
- d. 128 (2^7)

Your answer is correct.

Question **15**

Incorrect

Mark 0.00 out of 2.00

Log based transaction methods refer to:

Select one:

- a. writing log entries to record disk errors
- b. checkpoints and checksums before disk operations ✖
- c. creation of a log for uncommitted modifications
- d. disk operations that are performed synchronously

Your answer is incorrect.

Question **16**

Correct

Mark 2.00 out of 2.00

What is an advantage of storing blocks of a file near each other on the disk?

Select one:

- a. serialize data transfer
- b. minimize the seek time ✔
- c. parallelize data transfer
- d. maximize block usage

Your answer is correct.

Question **17**

Partially correct

Mark 2.67 out of 4.00

Which of the following are needed to access data on a disk?

Select one or more:

- [x] a. sector number ✔
- [x] b. seek time ✖
- [ ] c. platter number
- [ ] d. transfer rate
- [x] e. track number ✔

Your answer is partially correct.

You have correctly selected 2.

Question **18**

Partially correct

Mark 2.00 out of 4.00

Which of the following are methods for uniquely identifying a file within a directory tree?

Select one or more:

- [ ] a. shared path
- [x] b. absolute path ✔
- [ ] c. acyclic path
- [ ] d. mount path
- [ ] e. relative path

Your answer is partially correct.

You have correctly selected 1.

Question **19**

Partially correct

Mark 2.00 out of 4.00

What does a Virtual File System provide?

Select one or more:

- [x] a. direct access to the information on the disk device ✖
- [x] b. separation of operations from the implementation ✔
- [x] c. abstraction of different physical devices with common interface ✔
- [ ] d. network interface is used for all file access

Your answer is partially correct.

You have selected too many options.

Question **20**

Correct

Mark 4.00 out of 4.00

Which of the following are allocation methods for disk blocks?

Select one or more:

- [x] a. linked ✔
- [x] b. indexed ✔
- [ ] c. global
- [x] d. contiguous ✔
- [ ] e. proportional
- [ ] f. equal

Your answer is correct.

Question **21**

Correct

Mark 4.00 out of 4.00

Which of the following are downsides to using flash memory:

Select one or more:

- [x] a. Limited lifetime ✔
- [x] b. Rewrites require erasures ✔
- [ ] c. Higher power draw
- [ ] d. Data is randomly scattered over the entire flash device

Your answer is correct.

Question **22**

Partially correct

Mark 2.67 out of 4.00

Which of the following are advantages of flash memory over magnetic disks?

Select one or more:

- [x] a. lifetime of the media ✖
- [x] b. access latency time ✔
- [ ] c. storage capacity
- [ ] d. cost per bit of storage
- [x] e. power consumption ✔
- [x] f. resistance to kinetic shock ✔

Your answer is partially correct.

You have selected too many options.

Question **23**

Correct

Mark 4.00 out of 4.00

Suppose that `foo.ko` is a LKM in the current directory. Type the UNIX command that will insert this LKM.

Answer: sudo insmod foo.ko ✔

Question **24**

Complete

Mark 3.00 out of 5.00

What is the advantage of LOOK over SCAN disk head scheduling?

The short and sweet answer as to why LOOK is more advantageous over SCAN in disk head scheduling is that LOOK reduces the number of unncessary movements in comparison to SCAN. This is because of the nature in which the direction and length in which LOOK will take for a given request minimizes the seek time thus improving speed and reducing unneeded movements.

Comment: you need to provide more information about how the algorithms work as relates to the track at which the algorithm changes direction.

Question **25**

Complete

Mark 5.00 out of 5.00

How does linked list allocation work?

In linked list allocation, each file is represented as a linked list of disk blocks. The data element of the node in the list represents file's data is kept in the current disk block and the pointer points to the next disk block in the linked list.

Linked list allocation is a method used in file systems to manage the storage of files on disk. Basic concept: each file is stored as a linked list of disk blocks.

Structure: * Each block contains a pointer to the next block in the sequence. * The last block has a null pointer, indicating the end of the file. * File table entry contains a pointer to the first and last blocks of the file.

Advantages: * Supports sequential access efficiently. * No external fragmentation. * File size can grow dynamically.

Disadvantages: * Random access is slow, as the system must traverse the list. * Pointers take up extra space in each block. * Reliability issues if a pointer is corrupted.

Comment:

Question **26**

Partially correct

Mark 5.00 out of 5.00

Given that there are 400 cylinders (0-399) and the R/W head is on cylinder 201 moving towards lower numbered cylinders, calculate the distance (# of cylinders) traveled for each step by the R/W head using each of the given disk scheduling methods.

The following requests have been received in the following order:

232, 112, 199, 322, 0, 42, 86

what does the sequence of tracks look like when using each of the algorithm below.

Notes:

- Please input an integer value of page in memory for each place in table.
- You may not need to use all the columns, place -1 in those columns.
- Cylinder # and distance traveled between each step are graded.

SSTF	step 1	step 2	step 3	step 4	step 5	step 6	step 7	step 8	step 9	step 10
Cylinder# (required)	201	199 ✔	232 ✔	322 ✔	112 ✔	86 ✔	42 ✔	0 ✔	-1 ✔	-1 ✔
Distance traveled (required)		2 ✔	33 ✔	90 ✔	210 ✔	26 ✖	44 ✖	42 ✔	-1 ✔	-1 ✔

Your answer is partially correct.

16 of your answers are correct.

Question **27**

Correct

Mark 5.00 out of 5.00

Given that there are 400 cylinders (0-399) and the R/W head is on cylinder 201 moving towards higher numbered cylinders, calculate the distance (# of cylinders) traveled for each step by the R/W head using each of the given disk scheduling methods.

The following requests have been received in the following order:

232, 112, 199, 322, 0, 42, 399, 86

what does the sequence of tracks look like when using each of the algorithm below.

Notes:

- Please input an integer value of page in memory for each place in table.
- You may not need to use all the columns, place -1 in those columns.
- Cylinder # and distance traveled between each step are graded.

SCAN	step 1	step 2	step 3	step 4	step 5	step 6	step 7	step 8	step 9	step 10
Cylinder# (required)	201	232 ✔	322 ✔	399 ✔	199 ✔	112 ✔	86 ✔	42 ✔	0 ✔	-1 ✔
Distance traveled (required)		31 ✔	90 ✔	77 ✔	200 ✔	87 ✔	26 ✔	44 ✔	42 ✔	-1 ✔

Your answer is correct.

Question **28**

Complete

Mark 5.00 out of 5.00

What does the proc File System provide to an OS user?

The proc file system essentially provides a virtual file system to an OS user. This file system allows access to kernel and system level information for users. This 'file system' does not actually exist as it is indeed virtual. Some examples of what the information that can be accessed from this virtual file system is:

- CPU Info - How many cores, clock speed, etc
- Memory Info - Free memory, available memory, used memory, etc
- System Specific Info - Kernel version and other specific information about the system
- Other Information - This can be hardware info, uptime, etc.

Like we did in the Random I/O lab, we can access information about certain processes as well. And similar information for each process can be accessed through this virtual file system by an OS user.

Comment:

Question **29**

Complete

Mark 5.00 out of 5.00

What in an LKM? (include its advantages and why those are important)

An LKM (Loadable Kernel Module) is some code that is dynamically loaded into the kernel at runtime. Some advantages to LKMs are:

- Can be loaded and unloaded while the system is running (does not require system to be rebooted).
- Can be easily maintained (updated) as the system does not need to be shut down when edits are being made to the module.
- Allows for modification of the kernel in a piece by piece format. Additional code can be added to the kernel as needed as the entirety of the kernel does not need to be fully developed at once.
- LKMs allow users to access kernel information through interfaces such as the /proc File System and others.

LKMs allow for easy and accessible development at the kernel level. The nature in which LKMs are developed allows developers to make modifications to their modules in the future without needing to shutdown a system. The ease at which LKMs can be developed and then implemented is also a huge proponent in the open source development of the Linux kernel.

Comment:

Question **30**

Complete

Mark 2.00 out of 2.00

Write some comments about the exam or write the justification on your answers to some difficult questions (may allow for partial credit).
You should NOT write comments for every question, just a few that you felt were the **most** difficult for you.
You should **write "no comments"** in the answer if you have none.

-- no comments --

Comment: