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COP4600

HW 1.2

17. What is a trap instruction? Explain its use in operating systems.

A trap instruction is a software interrupt generated by the user program or an OS error when needed to perform system calls. The use of a trap instruction in OS is to switch from user mode to kernel mode of the system. After the necessary service to the process is complete, the trap instruction returns the control to the currently running task.

22. Can the

count = write(fd, buffer, nbytes);

call return any value in count other than nbytes? If so, why?

The write system call writes data into a buffer from a file. The system call usually returns the number of bytes written in the count, referred to nbytes of data, but it can return any value other than the nbytes. This is because the number of bytes that were written could be different from the nbytes amount such as reaching the end-of-file before all nbytes are read from a file. This means that count was less than nbytes, therefore the write system call can return a value different than nbytes.

24. Suppose that a 10-MB file is stored on a disk on the same track (track 50) in consecutive sectors. The disk arm is currently situated over track number 100. How long will it take to retrieve this file from the disk? Assume that it takes about 1 ms to move the arm from one cylinder to the next and about 5 ms for the sector where the beginning of the file is stored to rotate under the head. Also, assume that reading occurs at a rate of 200 MB/s.

Size of the file = 10MB Reading rate = 200MB/s

Time to read = (x/10MB) = (1s/200MB) -> x = 0.05s = 50ms

Time to move the arm from one cylinder to the next = 1ms

Time to move to the sector = 5ms

Time to move to cylinder and track = 1ms\*50ms = 50ms

Total time = Time to move to cylinder and track + Time to read + Time to move to the sector

=50ms + 5ms +50ms = 105ms = 0.105s

25. What is the essential difference between a block special file and a character special file?

The essential difference between a block special file and a character special file is that the block special files transfer data in the form of blocks, allows the data to be stored in the cache and that the character special files transfer data in the form of one character at a time, used for stream communication. Different type of device is used where the block special files model devices contain randomly addressable block which characters special files model devices that transmit a character stream.