**Tutorial 6: Device Management**

Q1. List and explain **TWO (2)** operations of a device manager.

Q2. Give **ONE (1)** example of sequential access media and **TWO (2)** categories of direct access media. For each of the media given, briefly describe their access operation.

Q3. Discuss all the factors that affect the access time of direct access storage devices that use moveable read/write heads.

Q4. Differentiate between the I/O channel and I/O control unit.

Q5. In a large direct sales company, analysis on sales transaction data stored in a database table is performed on weekly basis.

1. Polling and interrupt are the two commons I/O operation techniques to perform the test of the flag (the status of device). Briefly explain these **TWO (2)** I/O operation techniques.
2. Discuss TWO (2) drawbacks if interrupt-driven I/O technique is used in reading the sales transaction data.
3. Discuss clearly how Direct Memory Access (DMA) can be used to overcome each of the drawbacks in Q5 (ii). Support your answer by including the information that must be passed from the CPU to the DMA controller prior to the DMA transfer.

Q6. Consider a multimedia system that contains both audio and video components. Would you use polled I/O, interrupt driven I/O or Direct Memory Access (DMA)? Give reasons for your choice.

Q7. Suppose that a disk drive has 220 cylinders, numbered 0 to 219. The driver is currently serving a request at cylinder 65 and the head was previously serving a request at cylinder 70. The queue of pending requests is, in the order received as below:

58, 188, 69, 200, 30, 158, 48, 74, 105

Calculate the total head movements using the following seek strategies.

1. SSTF scheduling
2. SCAN scheduling
3. LOOK scheduling

Q8. Consider a disk with head pointer currently at 43 and the following processes reside in a request queue numbered from 0 to 300:

32, 80, 160, 208, 109, 289, 10, 50

Illustrate the head movement if **C-SCAN** disk scheduling algorithm is used, given that the last head movement is towards higher numbered tracks. Compute the total head movement based on your illustration.

Q9. Explain why Shortest-Seek-Time-First (SSTF) disk-scheduling algorithm tends to cause starvation problem. You may provide scenario to support your answer.

**Self-Review**

Q1. A disk drive has 1000 cylinders, numbered 0-999. The driver is currently serving a request at cylinder **540** and the head previously serving a request at cylinder **610**. The queue of pending requests are shown in **Table 5** below:

**Table 5:** Queue of pending requests

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Time (ms) | 13 | 20 | 32 | 40 | 44 | 52 | 60 |
| Cylinder | 600 | 350 | 320 | 800 | 830 | 770 | 630 |

By referring to **Table 5**, calculate the total head movements using the following disk seek strategies:

1. SCAN scheduling

1. Shortest Seek Time First (SSTF) scheduling