Stýrikerfi

Verkefni 25

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At a disk scheduler (being part of the operating system's disk driver), the following accesses to cylinders of a hard disk have queued up in the following order (entries to the left arrived earlier than those to the right):

$$2, 15, 20, 18, 13, 4, 30, 35, 26$$

Just before, the read/write head of the hard disk has moved from cylinder 8 to cylinder 18, i.e. it is currently located at cylinder 18 and the above queued up request for cylinder 18 is a new request that has not been processed, yet. The following head scheduling strategies are used:

- For each of the strategies, write down in which order the cylinder accesses are scheduled.

- What is the distance (in terms of cylinders) that the disk head has to move for each of the strategies?

- To move the head from one cylinder to a directly neighbored cylinder, 0.1 ms are required for each cylinder that the head is moved. Once the head has reached the target position, a further delay of 1 ms is introduced, because the head has to "settle" (i.e. a fine positioning is made and the controller has to wait until vibrations/oscillations (due to the movement and sudden stop) of the head settled).

  - How much time does head positioning consume for each of the strategies and the above accesses?

  - To get a feeling how slow I/O is in comparison to a CPU: How many instructions may a CPU with a clock rate of 1 GHz execute during each of these head positioning times? (For simplicity, assume that during one CPU clock cycle, exactly one instruction can be executed.)

First Come, First Served (FCFS)

Lausn:

- They are accessed in the same order they arrived in: 2, 15, 20, 18, 13, 4, 30, 35, 26.

- The distance is just the distance between the cylinders in the same order as they arrive: $16 + 13 + 5 + 2 + 5 + 9 + 26 + 5 + 9 = 90$ is the distance the head needs to travel.

- The time needed is

$$9 + 90 * 0.1 = 18ms$$

and in that time the CPU could perform

$$10^6 * 18 = 1.8e7$$

operations, so the I/O is slowing us down quite a bit.

Shortest Seek First (SSF)

<u>**Lausn:**</u>

- This time we will go where ever the shortest path is so our order will be: 18, 20, 15, 13, 4, 2, 26, 30, 35

- This will give us a distance of:

$$0 + 2 + 5 + 2 + 9 + 2 + 24 + 4 + 5 = 53 \text{ jumps}$$

- The time needed for this is:

$$8 + 53 * 0.1 = 13.3ms$$

and in that time the CPU could perform

$$10^6 * 13.3 = 1.33e7$$

operations which is a little better but still not great news for us.

Elevator/Scan

<u>**Lausn:**</u>

- This time we will be going from our starting point, 18, and going up to our highest numbered cylinder before return back down to the lowest one and visiting all the queued up cylinders so the order will be: 18, 20, 26, 30, 35, 15, 13, 4, 2

- This will give us a distance of:

$$0 + 2 + 6 + 4 + 5 + 20 + 2 + 9 + 2 = 50 \text{ jumps}$$

- The time needed for this is:

$$8 + 50 * 0.1 = 13ms$$

and in that time the CPU could perform

$$10^6 * 13 = 1.3e7$$

operations which is better still but not great either.