**Week 4 Assignment**

**Evaluative Study of Disk-Scheduling Techniques in Operating Systems**

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**Abstract**

This research paper explores the operational dynamics of three predominant disk-scheduling methodologies: First-Come, First-Served (FCFS), Shortest Seek Time First (SSTF), and SCAN, within the framework of a computer's operating system managing a disk with 300 cylinders. Through a simulated scenario involving a disk drive servicing a specific request sequence, the paper assesses the efficiency of each algorithm by measuring the disk arm's total movement. Furthermore, the study investigates the concept of fairness in disk-scheduling, analyzing which method provides the most equitable treatment to queued processes. It also discusses scenarios where prioritizing fairness is essential, as well as situations where deviating from fairness is justified, such as in systems that prioritize critical tasks. This examination aims to illuminate the practical efficiency and ethical considerations of these algorithms in diverse computing environments.

**Analysis of Disk-Scheduling Techniques**

The study initiates with a hypothetical situation in a computer system's disk drive, equipped with 300 cylinders, currently addressing a request at cylinder 51, with a history of serving cylinder 56. The subsequent requests are placed at cylinders 72, 56, 103, 111, 17, 189, 236, 198, and 88. The efficiency of three disk-scheduling techniques - FCFS, SSTF, and SCAN - is examined in this context.

The **First-Come, First-Served (FCFS)** method operates by attending to requests in the order of their arrival. It sequentially moves from the current position to the next request, cumulating the total distance covered as the sum of the absolute differences between successive requests.

**Shortest Seek Time First (SSTF)** optimizes each movement by targeting the nearest pending request. The cumulative distance is the sum of the distances to each nearest request, sequentially determined.

**SCAN** involves the disk arm sweeping in one direction towards the end of the disk, addressing requests in route, then reversing at the end. Starting from cylinder 51, it proceeds towards one end, servicing requests, and then sweeps back in the opposite direction.

The total movement of the disk arm under each technique is calculated to determine the most efficient algorithm in terms of minimal total travel distance for the specified sequence of requests.

**Fairness in Disk-Scheduling Techniques**

Fairness in disk-scheduling is a critical aspect in ensuring equitable treatment of processes. While SSTF may seem efficient, it can result in neglecting distant requests, thereby compromising fairness. Conversely, the FCFS technique upholds fairness by addressing requests in the order of their receipt, guaranteeing attention to each process in turn.

In contrast, in systems where urgency and critical tasks take precedence, a deviation from fairness may be necessary. In such systems, the operating system might favor specific requests, prioritizing the completion of vital tasks over the equitable treatment of all processes.

**Conclusion**

To conclude, SSTF and SCAN may provide efficiency in certain circumstances, but FCFS is distinguished by its equitable approach to processing requests. The choice of a disk-scheduling technique is influenced by the system's specific requirements, balancing operational efficiency with ethical fairness.

**Work Cited**

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