Storage Systems (2)

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CSE325 Principles of Operating Systems

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Selecting a Disk-Scheduling Algorithm

- SSTF is common and has a natural appeal
- SCAN and C-SCAN perform better for systems that place a heavy load on the disk
- Performance depends on the number and types of requests
- Requests for disk service can be influenced by the file-allocation method
- The disk-scheduling algorithm should be written as a separate module of the operating system, allowing it to be replaced with a different algorithm if necessary
- Either SSTF or LOOK is a reasonable choice for the default algorithm

In-class Work 9

Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 100. The queue of pending requests, in FIFO order, is:

55, 58, 18, 90, 160, 38

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? For SCAN and LOOK, assume the head moves towards cylinder 199 first.

FCFS, SSTF, SCAN, LOOK, C-SCAN, C-LOOK

Answer

FCFS: 352

SSTF: 224

SCAN: 280

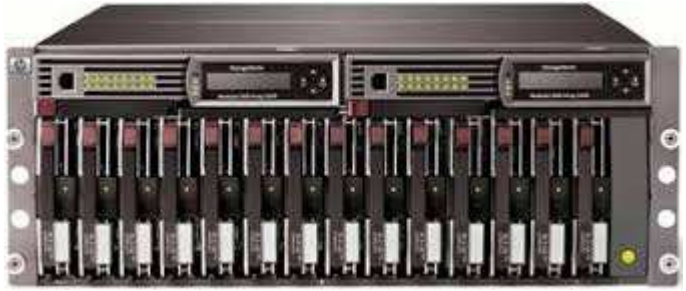
LOOK: 202

C-SCAN: 388

C-LOOK: 274

Disk Arrays

- Have many disk drives and therefore many disk arms (rather than a single disk arm):
  - Increase potential throughput



Dependability

- How to decide when a system is operating properly?
- Infrastructure providers now offer Service Level Agreements (SLA) to guarantee that their networking or power service would be dependable
- Systems alternate between 2 states of service with respect to an SLA:
  1. Service accomplishment, where the service is delivered as specified in SLA
  2. Service interruption, where the delivered service is different from the SLA
     - Failure = transition from state 1 to state 2
     - Restoration = transition from state 2 to state 1

Dependability

- *Module reliability* = measure of continuous service accomplishment (or time to failure).
  2 metrics
  1. *Mean Time To Failure* (*MTTF*) measures Reliability
  2. *Failures In Time* (*FIT*) = 1/MTTF, the rate of failures
     - Traditionally reported as failures per billion hours of operation
- If modules have *exponentially distributed lifetimes* (age of module does not affect probability of failure), overall failure rate is the sum of failure rates of the modules