



操作系统

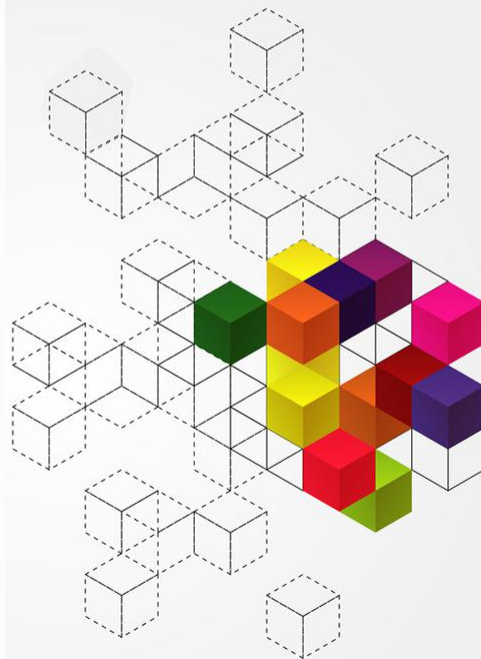
Operating system

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一、 磁盘调度背景

二、 磁盘调度算法

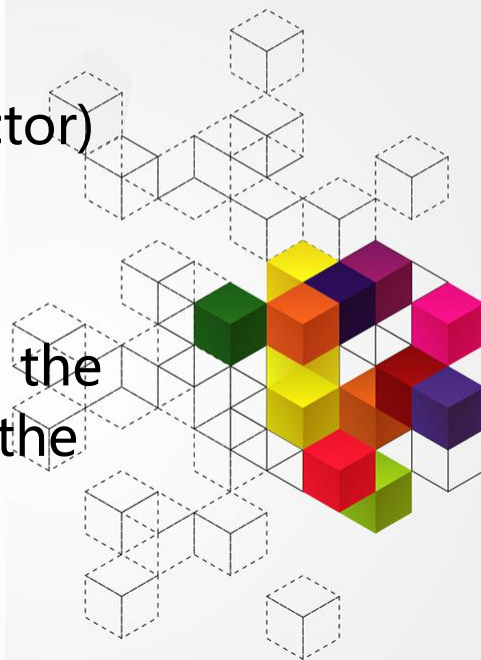


一、磁盘调度背景

为什么需要磁盘调度

- 根据磁盘特性进行高效数据访问
 - Minimize seek time (move arm to cylinder-sector)
- 充分利用磁盘数据传输带宽
 - Disk bandwidth is the total number of bytes transferred, divided by the total time between the 1st request for service and the completion of the last transfer

适用对象：机械磁盘

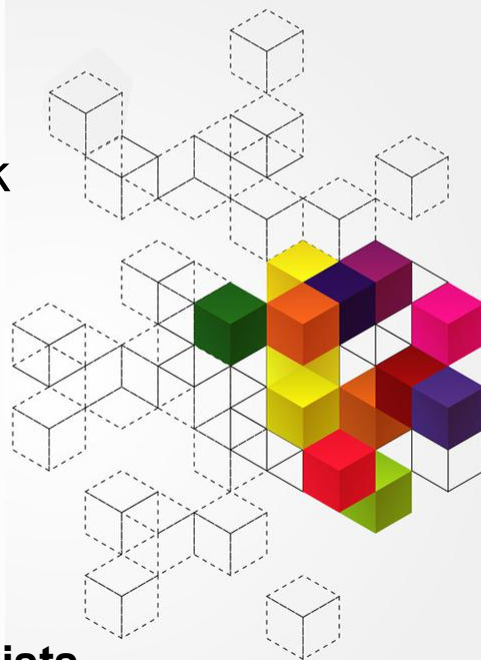


一、磁盘调度背景

磁盘调度的优化指标：寻道时间

- 可由操作系统控制
- 调度算法目标：最小化磁头寻道距离

- I/O request includes info about input or output mode, disk address, memory address, number of sectors to transfer
- OS maintains **queue of requests**, per disk or device
- Idle disk can immediately work on I/O request, busy disk means work must queue
 - **Optimization algorithms only make sense when a queue exists**



二、磁盘调度算法

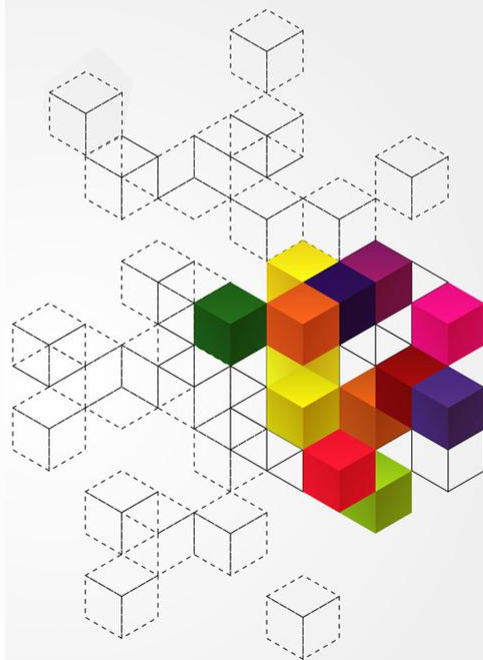
磁盘调度算法输入：IO请求队列

98, 183, 37, 122, 14, 124, 65, 67

每个数字表示一个具体的IO请求所访问磁盘块所处的磁道号

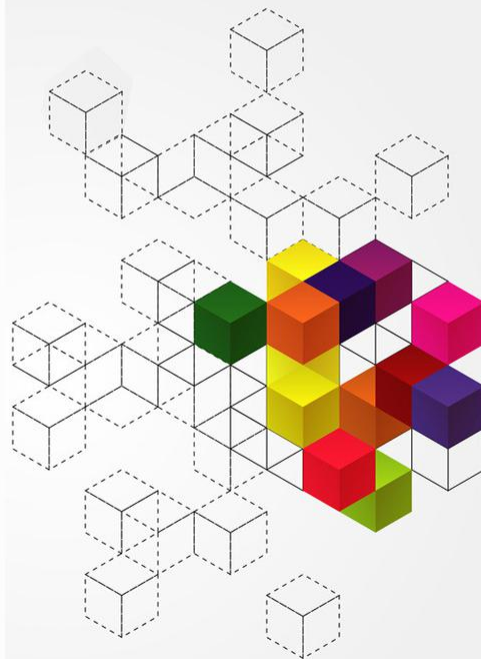
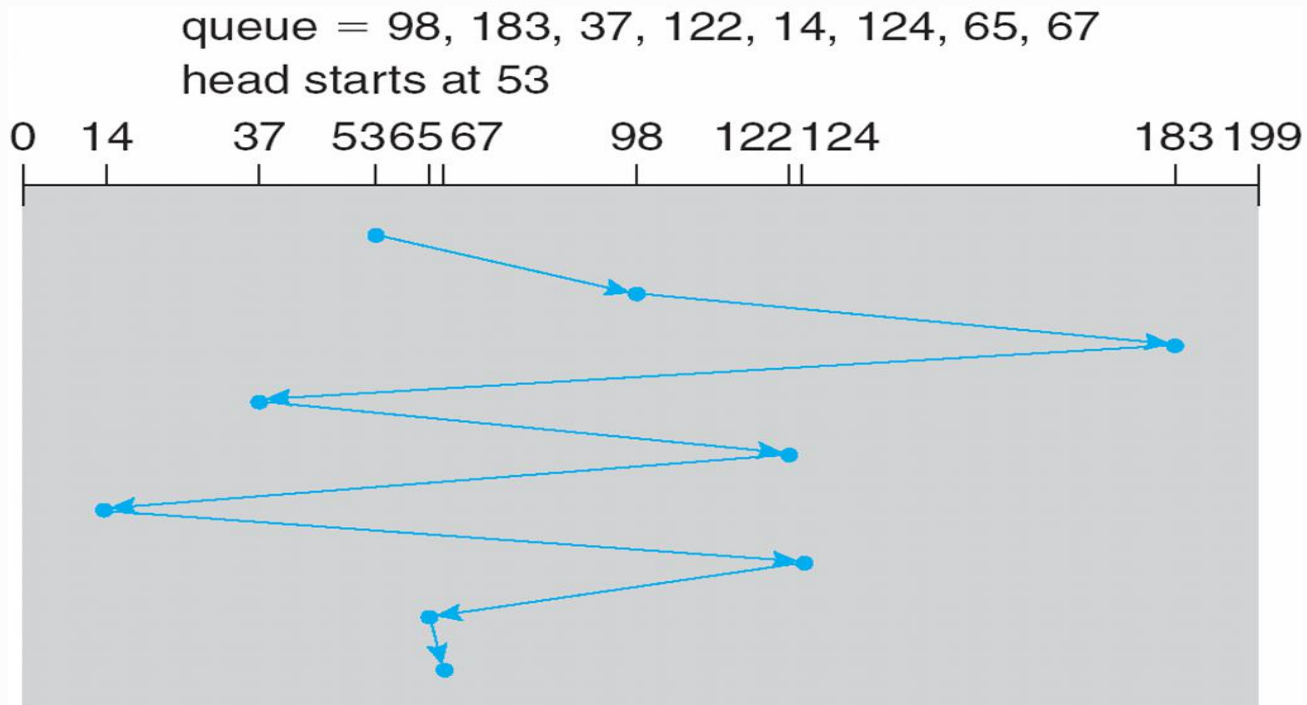
不同的磁盘调度算法，服务IO请求的顺序不同，算法效果也因此不同

The analysis is true for one or many platters



二、磁盘调度算法

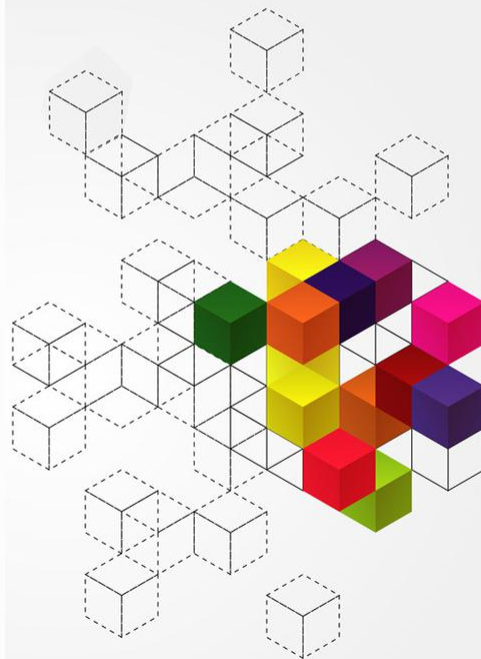
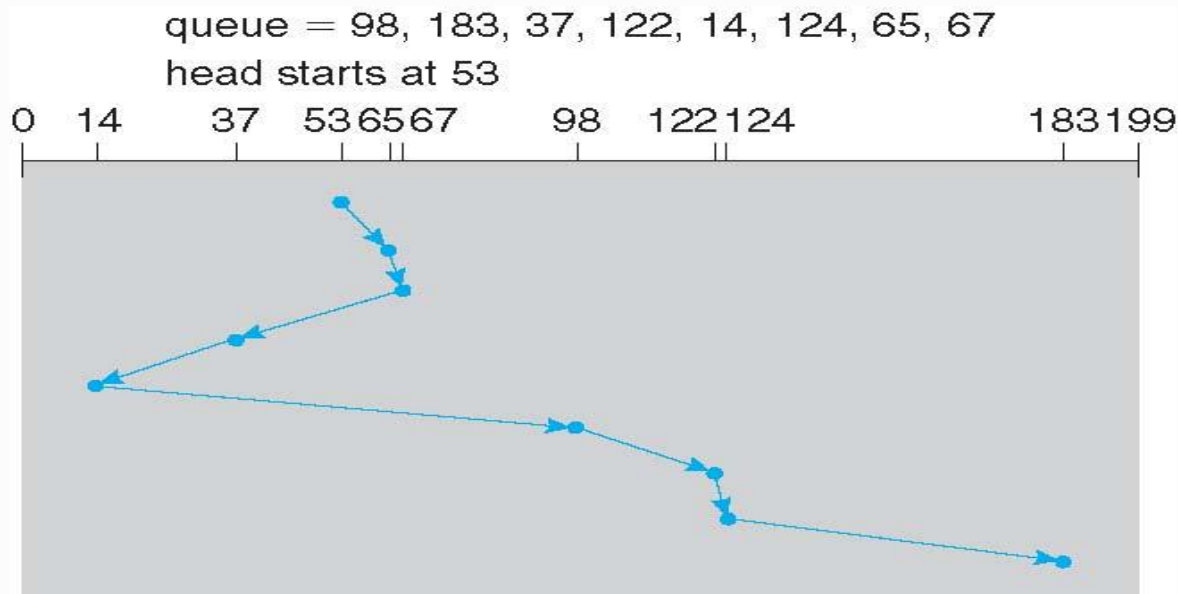
磁盘调度算法1: FCFS (640 movement)



二、磁盘调度算法

磁盘调度算法2: SSTF (Shortest Seek Time First, 236 movement)

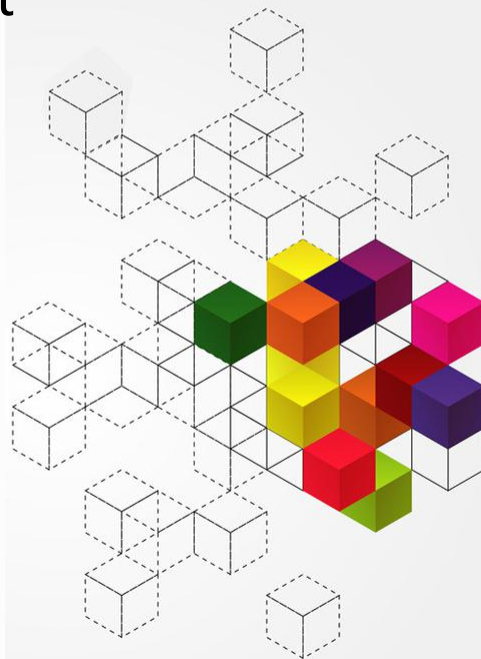
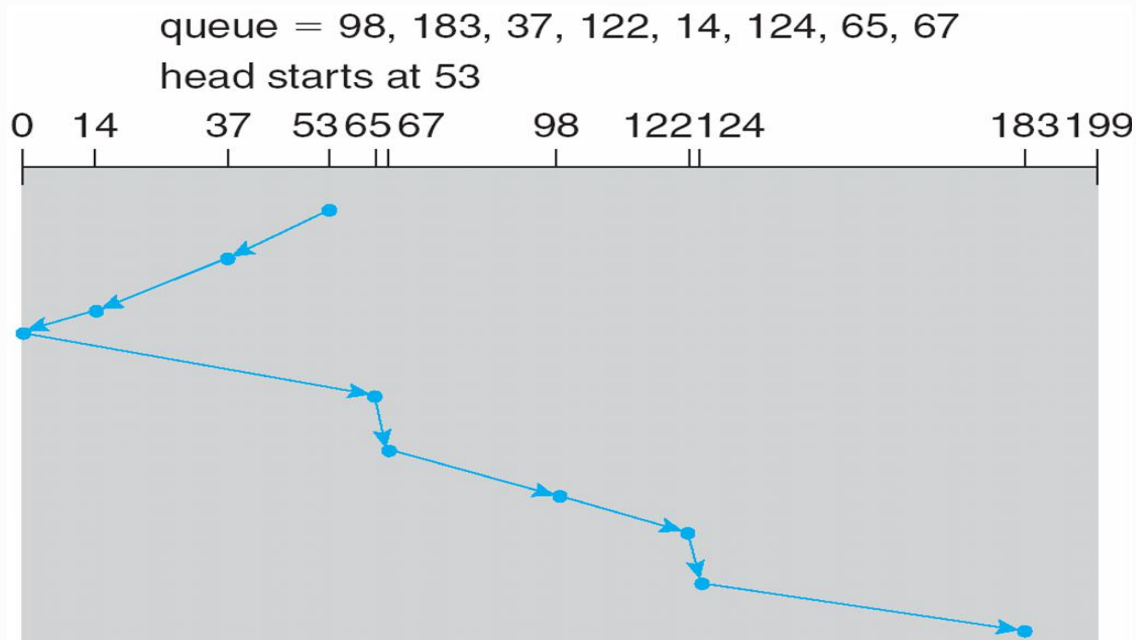
May cause starvation, not the best algorithm



二、磁盘调度算法

磁盘调度算法3: SCAN (236 movements)

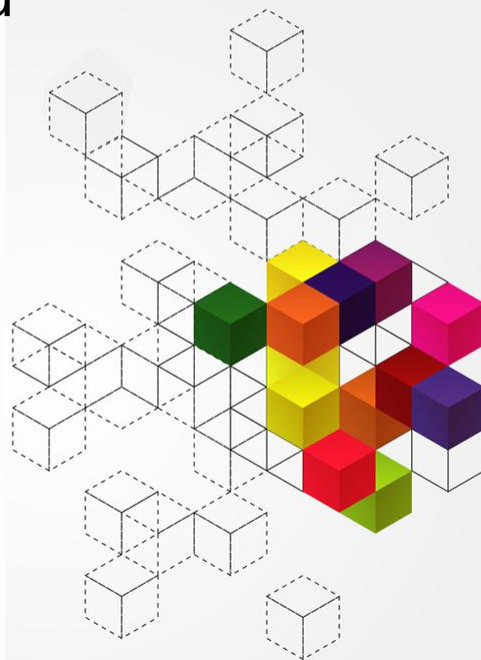
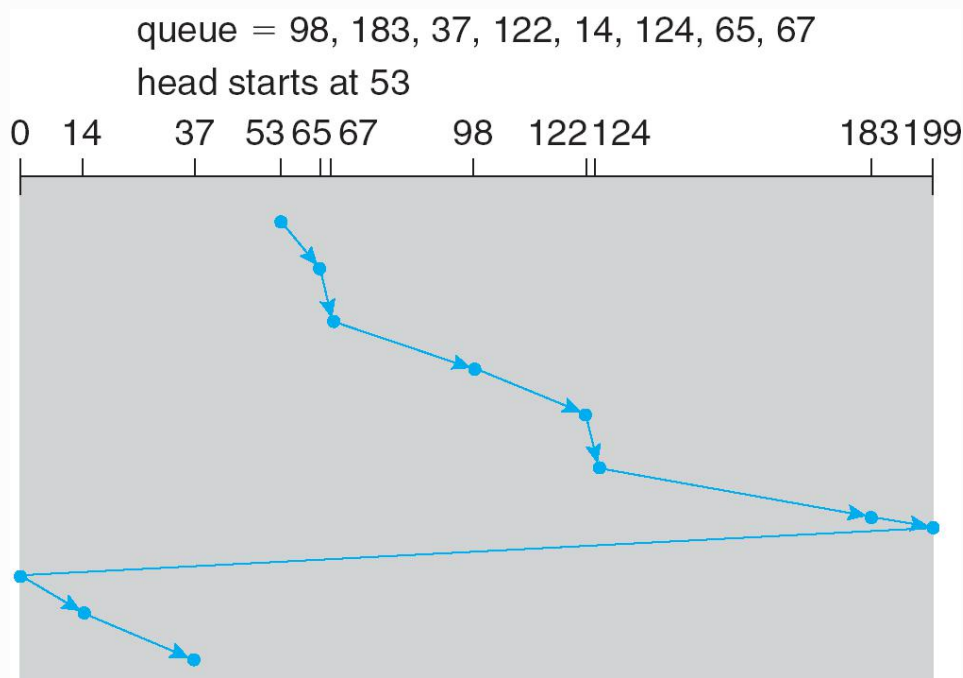
Largest density at other end of disk wait the longest



二、磁盘调度算法

磁盘调度算法4: C-SCAN

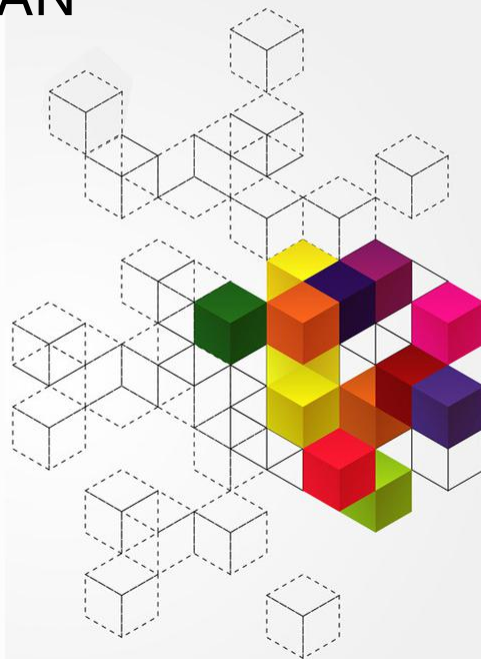
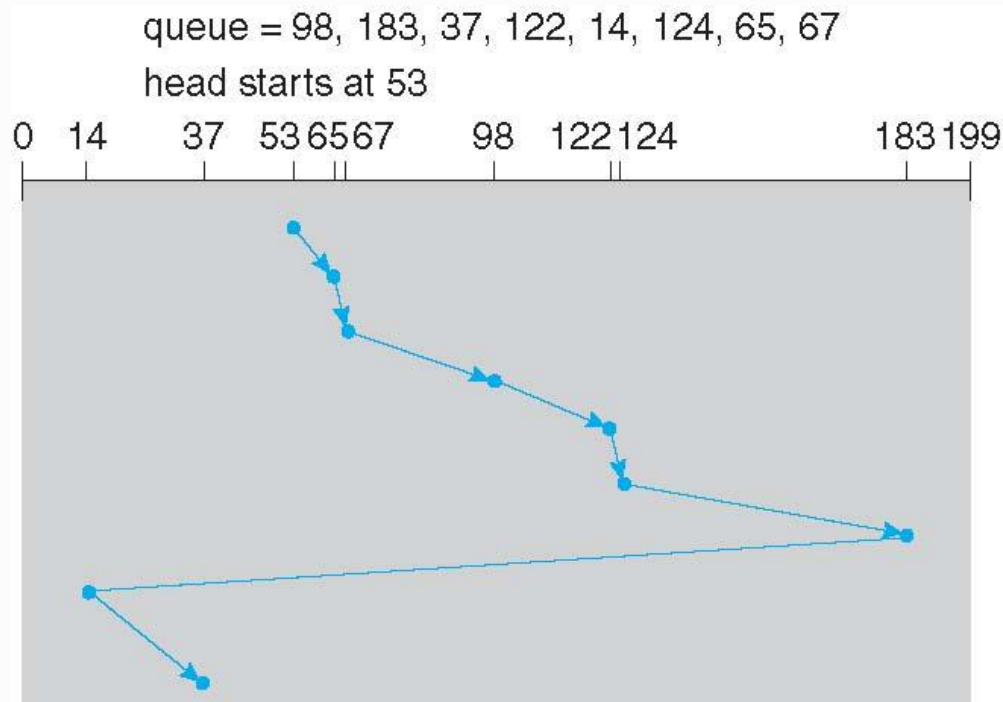
Treat the cylinder as a circular list that wraps around



二、磁盘调度算法

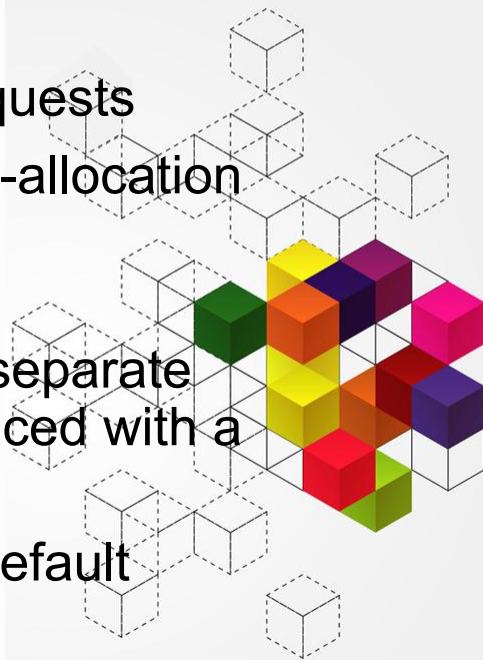
磁盘调度算法5: C-LOOK

LOOK a version of SCAN, C-LOOK a version of C-SCAN



二、磁盘调度算法—算法的选择

- SSTF is common and has a natural appeal
- SCAN and C-SCAN perform better for systems that place a heavy load on the disk (Less starvation)
- Performance depends on the number and types of requests
- Requests for disk service can be influenced by the file-allocation method (contiguous, linked, indexed)
 - **And metadata layout (directory)**
- 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
- What about rotational latency? (Difficult for OS to calculate)



本讲小结

- 磁盘调度背景
- 磁盘调度算法
 - FCFS
 - SSTF
 - SCAN

