第十二章 大容量存储管理

1. None of the disk-scheduling disciplines, except FCFS, is truly fair (starvation may occur).
   a. Explain why this assertion is true.
   b. Describe a way to modify algorithms such as SCAN to ensure fairness.
   c. Explain why fairness is an important goal in a time-sharing system.
   d. Give examples of circumstances in which it is important that the operating system be unfair in serving I/O requests.

2. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is

   86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

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?
   a. FCFS
   b. SSTF
   c. SCAN
   d. LOOK
   e. C-SCAN

1.

a. 除了FCFS其他调度算法都是抢占式的调度算法，当不断有新的靠近磁头的调度请求出现时，远离磁头的调度请求就会饥饿。

b. 设置一个定时器，所有超过固定时长的调度请求被安排到等待队列列首

c. 分时系统要求计算机能够快速响应所有用户的请求，所以要避免某些用户的进程因为不公布导致长时间等待

d. 内核的IO请求优先于用户的IO请求

高优先级进程的IO请求优先于低优先级的进程IO请求

分页和交换优先于用户IO请求

2.

a. FCFS (先来先服务)

路径 143→86→1470→913→1774→948→1509→1022→1750→130

dis = 57 + 1384 + 557 + 861 + 826 + 561 + 487 + 728 + 1620

= 7081

b. SSTF (最短寻道时间优先)

143 → 130 → 86 → 913 → 948 → 1022 → 1470 → 1509 → 1750 → 1774

dis = 13 + 44 + 827 + 35 + 74 + 448 + 39 + 241 + 24

= 1745

c. SCAN (假设向上，由于上一请求为125，直到4999，调头)

143 → 913 → 948 → 1022 → 1470 → 1509 → 1750 → 1774 → 4999 → 130 → 86

dis = 770 + 35 + 74 + 448 + 39 + 241 + 24 + 3225 + 4869 + 44

= 9769

d. LOOK (向上，直到最大请求，调头)

143 → 913 → 948 → 1022 → 1470 → 1509 → 1750 → 1774 → 130 → 86

dis = 770 + 35 + 74 + 448 + 39 + 241 + 24 + 1644 + 44

= 3319

e. C-SCAN (向上，直到最大请求后跳回0，继续向上)

143 → 913 → 948 → 1022 → 1470 → 1509 → 1750 → 1774 → 4999 → 0 → 86 → 130

dis = 770 + 35 + 74 + 448 + 39 + 241 + 24 + 3225 + 4999 + 86 + 44

= 9985