# CSCI 460 Operating Systems

Practice Test 2

Instructions: Relax and attempt the problems below. This is NOT a quiz and you do NOT need to submit it. (Later, detailed solutions will be gone over and will be posted on the course webpage.)

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(1) This question is regarding disk scheduling. Suppose we have a disk with 200 tracks (numbered from 0 to 199) and the head is initially at track 100 and is moving toward track 0 (the center of the disk). The sequence of requests is: 27, 129, 110, 186, 147, 41, 10, 64, 120. Show the average number of tracks visited for each of these algorithms.
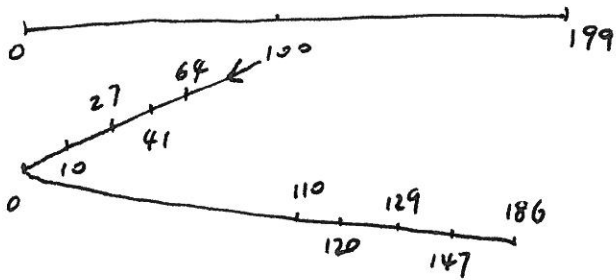
(1.1) FIFO
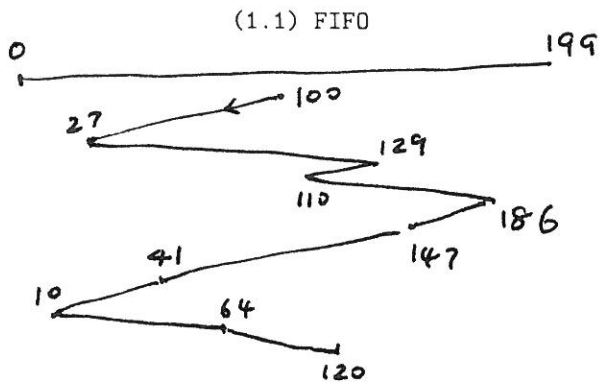
$$\frac{\# \text{ of tracks visited}}{9}$$

$$= \frac{73 + 102 + 19 + 76 + 39 + 106 + 31 + 54 + 56}{9}$$

$$\doteq 61.9$$

(1.2) SSTF
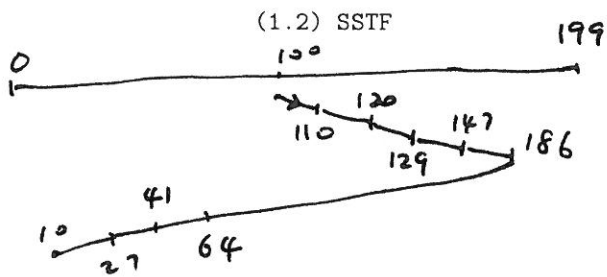
$$\frac{\# \text{ of tracks visited}}{9}$$

$$= \frac{10 + 10 + 9 + 18 + 39 + 122 + 23 + 14 + 17}{9}$$

$$\doteq 29.1$$

(1.3) SCAN

$$\frac{\text{\# of tracks visited}}{9}$$

$$= \frac{36 + 23 + 14 + 17 + 120 + 10 + 9 + 18 + 36}{9}$$

$$\doteq 31.8$$

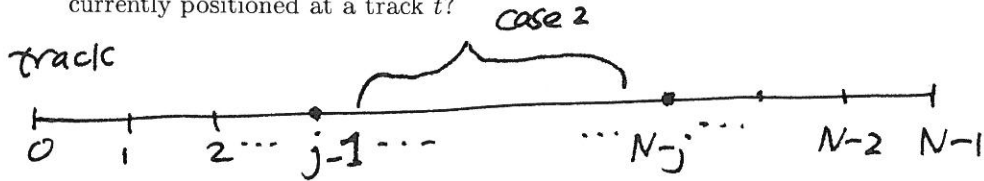(1.4) C-SCAN
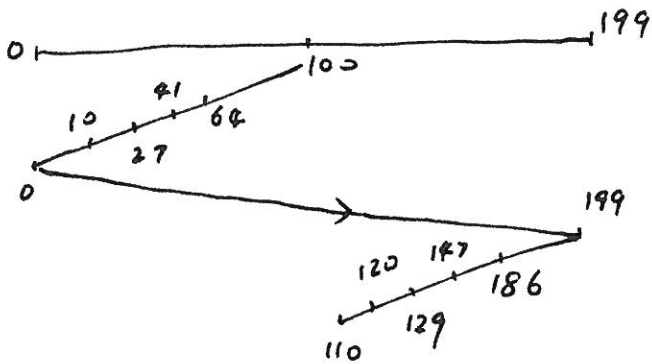
$$\frac{\text{\# of tracks visited}}{9}$$

$$= \frac{36 + 23 + 14 + 17 + 209 + 13 + 39 + 18 + 9 + 10}{9}$$

$$= \frac{388}{9}$$

$$\doteq 43.1$$

2

(2) Consider a disk with N tracks (numbered from 0 to $N-1$), and assume that the requested sectors are randomly distributed over the whole disk. What is the probability of a seek of length j (i.e., the read/write head will move by j tracks) when the head is currently positioned at a track t?

track

Case 2

$$
\begin{array}{c}
0 \quad 1 \quad 2 \cdots \quad j\text{-}1 \cdots\text{-} \quad \cdots N\text{-}j \cdots \quad N\text{-}2 \quad N\text{-}1
\end{array}
$$

Define $P[j/t] = P_r[\text{seek of length } j \text{ when the head is currently at track } t]$.

Each of the N tracks is equally likely to be requested. Unconditionally, the probability any particular track is requested is $1/N$.

$P[j/t] = \frac{1}{N}$, if $t \le j\text{-}1$ OR $t \ge N\text{-}j$, $j > 0$

$P[j/t] = \frac{2}{N}$, if $j\text{-}1 < t < N\text{-}j$, $j > 0$ // case 2

$P[j/t] = \frac{1}{N}$, if $j = 0$.

Note that here we ignore the case when j is out of bound (i.e., $N = 10$, $t = 5$, $j = 9$).