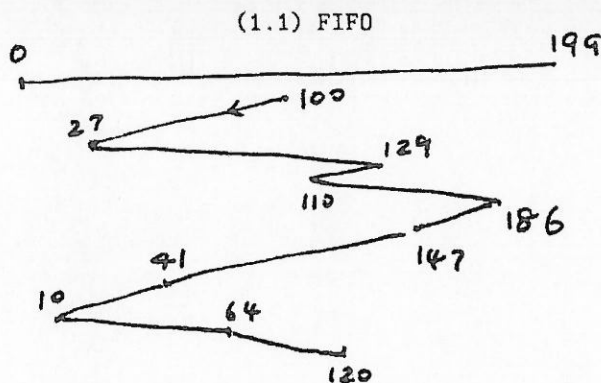


CSCI 460 Operating Systems

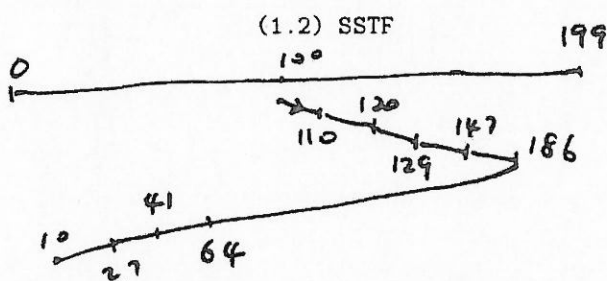
Exercise on Device Management

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.)

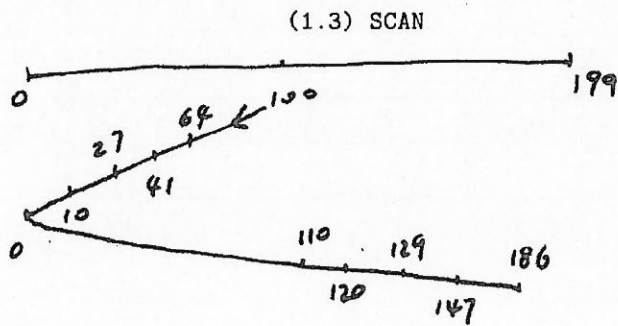
(1) This question is regarding disk scheduling. Suppose we have a disk with 200 tracks (numbered from 0 to 199) and the head is initially at track 100 and is moving toward track 0 (the center of the disk). The sequence of requests is: 27, 129, 110, 186, 147, 41, 10, 64, 120. Show the average number of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



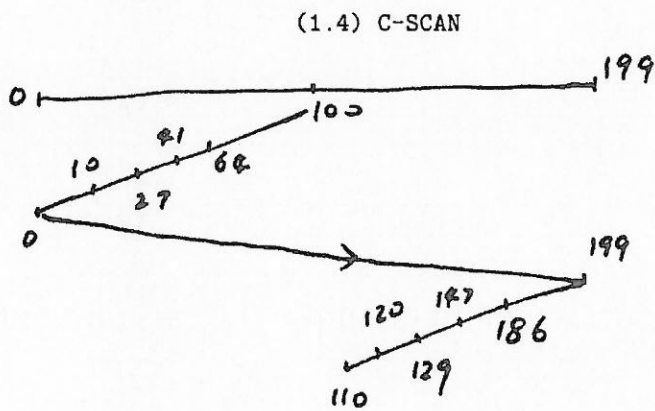
$$\begin{aligned} & \frac{\# \text{ of tracks visited}}{9} \\ &= \frac{73 + 102 + 19 + 76 + 39 + 106 + 31 + 54 + 56}{9} \\ &= 61.9 \end{aligned}$$



$$\begin{aligned} & \frac{\# \text{ of tracks visited}}{9} \\ &= \frac{10 + 10 + 9 + 18 + 39 + 122 + 23 + 14 + 17}{9} \\ &= 29.1 \end{aligned}$$

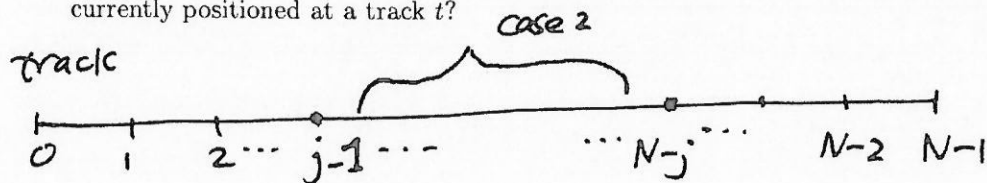


$$\frac{\text{\# of tracks visited}}{9} = \frac{36 + 23 + 14 + 17 + 120 + 10 + 9 + 18 + 36}{9} = 31.8$$



$$\frac{\text{\# of tracks visited}}{9} = \frac{36 + 23 + 14 + 17 + 209 + 13 + 39 + 18 + 9 + 10}{9} = \frac{388}{9} = 43.1$$

(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 ?



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 $1/N$.

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

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

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

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