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2016UCO1620
COE-2
SEM-4

OPERATING SYSTEMS

CE-C14

ASSIGNMENT-1

Ques 1 A system has 6 processes as follows:

PROCESS	ARRIVAL TIME (msec)	CPU BURST TIME (msec)
P_1	0	90
P_2	4	8
P_3	8	50
P_4	28	70
P_5	30	60
P_6	32	20

Calculate average waiting time for processes if round robin scheduling is used with time quantum of:

i) 80 msec

Ready queue: $P_1\ P_2\ P_3\ P_4\ P_5\ P_6\ P_1$

Gantt chart:

P1	P2	P3	P4	P5	P6	P1

0 80 88 138 208 268 288 298

Waiting time:
$P_1 \rightarrow (0-0)+(288-80) = 208$ msec
$P_2 \rightarrow (80-4) = 76$ msec
$P_3 \rightarrow (88-8) = 80$ msec
$P_4 \rightarrow (138-28) = 110$ msec
$P_5 \rightarrow (208-30) = 178$ msec
$P_6 \rightarrow (268-32) = 236$ msec

Avg waiting time $= 148$ msec $\dfrac{(208+76+80+110+178+236)}{6}$

ii) 20 msec

Ready queue: $P_1\ P_2\ P_3\ P_1\ P_4\ P_5\ P_6\ P_3\ P_1\ P_4\ P_5\ P_3\ P_1\ P_4\ P_5\ P_1\ P_4$

Gantt chart:

P1	P2	P3	P1	P4	P5	P6	P3	P1	P4	P5	P3	P1	P4	P5	P1	P4

0 20 28 48 68 88 108 128 148 168 188 208 218 238 258 278 288 298

Waiting time:
$P_1 \rightarrow (0-0)+(48-20)+(148-68)+(218-168)+(278-238) = 198$
$P_2 \rightarrow (20-4) = 16$
$P_3 \rightarrow (28-8)+(128-48)+(208-148) = 160$

$P_4 \rightarrow (68-28)+(168-88)+(258-208)=188$

$P_5 \rightarrow (88-30)+(188-108)$

$P_6 \rightarrow (108-32)=76$

Avg waiting time $\Rightarrow$ 139.66 msec $\left(\frac{76+188+200+16+160+\ldots}{6}\right)$

iii) 10 msec

Ready queue : $P_1 P_2 P_3 P_1 P_3 P_4 P_5 P_6 P_1 P_3 P_4 P_5 P_6 P_1 P_3 P_4 P_5 P_1 P_3 P_4 P_5 P_1 P_4 P_5 P_1 P_4 P_5 P_1 P_4 P_1$

Gantt chart :

P1	P2	P3	P1	P3	P4	P5	P6	P1	P3	P4	P5	P6	P1	P3	P4	P5	P1	P3	P4	P5	P1	P4	P5	P1	P4	P5	P1	P4	P1

0 10 18 28 38 48 58 68 78 88 98 108 118 128 138 148 158 168 178 188 198 208 218 228 238 248 258 268 278 288 298

Waiting time : $P_1 \rightarrow (0-0)+(28-10)+(78-38)+(128-88)+(168-138)+(208-178)+(238-218)+(268-248)+(288-278)=208$

$P_2 \rightarrow$ ~~[illegible]~~ $(10-4)=6$

$P_3 \rightarrow (18-8)+(38-28)+(88-48)+(138-98)+(178-148)=130$

$P_4 \rightarrow (48-28)+(98-58)+(148-108)+(188-158)+(218-198)+(248-228)+(278-258)=190$

$P_5 \rightarrow (58-30)+(108-68)+(158-118)+(198-168)+(228-208)+(258-238)=178$

$P_6 \rightarrow (68-32)+(118-78)=76$

Avg waiting time $\rightarrow$ 131.33 msec $\left(\frac{208+6+130+190+178+76}{6}\right)$

Ques 2 Use a suitable deadlock algorithm to check if there is a deadlock in the system where

Available = [2 1 2 3 1],

$$\text{allocation} = \begin{bmatrix} 2 & 3 & 1 & 3 & 3 \\ 1 & 2 & 2 & 1 & 1 \\ 2 & 3 & 2 & 2 & 2 \\ 1 & 2 & 1 & 2 & 2 \\ 1 & 2 & 3 & 1 & 1 \end{bmatrix} \quad \text{Request} = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 \end{bmatrix}$$

Work = [2 1 2 3 1]

Finish = [F F F F F]

	Work	Finish
		F F F F F
Initially	2 1 2 3 1	T F F F F
step ① select P1	4 4 3 6 4	T T F F F
step ② select P2	5 6 5 7 5	T T T F F
step ③ select P3	7 9 7 9 7	T T T T F
step ④ select P4	8 11 8 11 9	T T T T T
step ⑤ select P5	9 13 11 12 10	

Since Finish[i] = True for all processes, there is <u>no deadlock</u>

...YSTEMS

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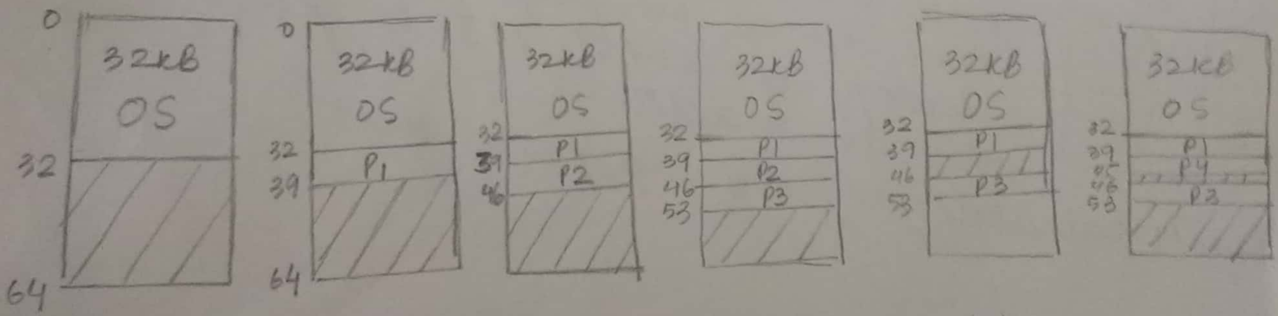
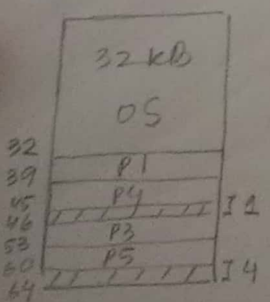
...o a system has 64KB RAM and uses contiguous
...emory allocation. The sizes of the OS and the
user processes are as follows:

Process	size (KB)
Operating system	32
P1	7
P2	7
P3	7
P4	6
P5	7
P6	5

The following sequence of events occur in the system, OS is loaded, then P_1, P_2, P_3 arrive, P2 terminates, P_4, P_5, P_6 arrives. Determine if all the processes can be allocated space in the memory following:

i) FIRST FIT

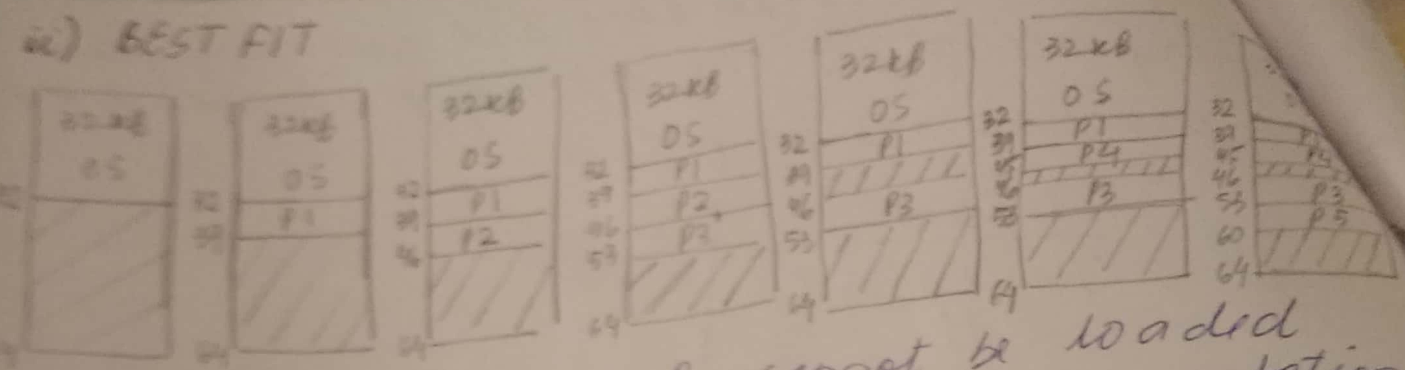




The total memory space still available = 1+4 = 5 KB and the next incoming process P_6 has size = 5 KB.
But since 5KB is available in different holes hence, we cannot load P_6 in memory even though the size of process is equal to the empty space available in the memory due to external fragmentation

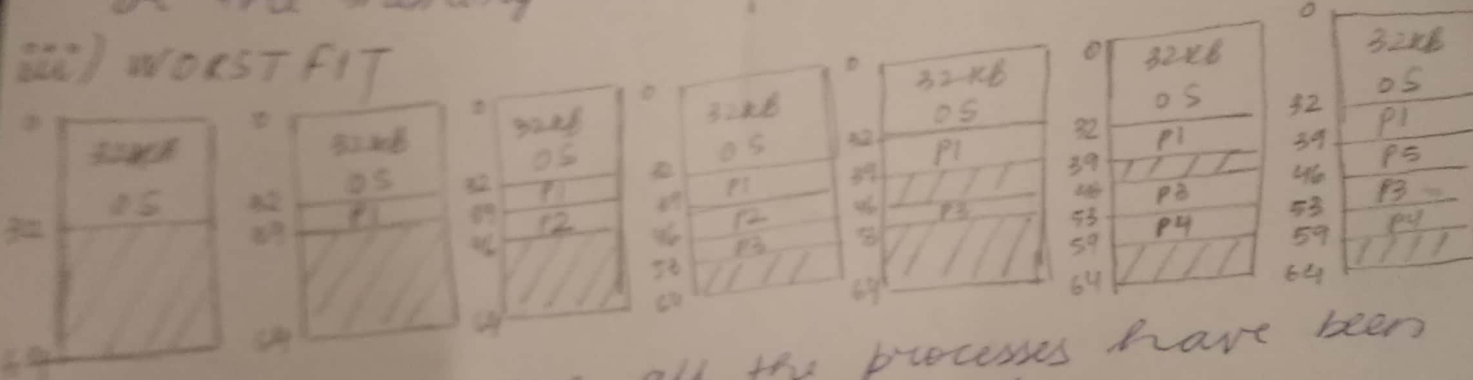
Ques 05 A hard disk has 1000 cylinders. The head is now at cylinder ... outwards. The disk ... and access cylinders ...
Calc...

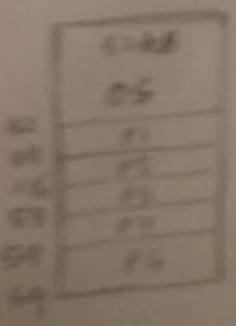
ii) BEST FIT



→ As in the above case, P_6 cannot be loaded in the memory due to external fragmentation.

iii) WORST FIT



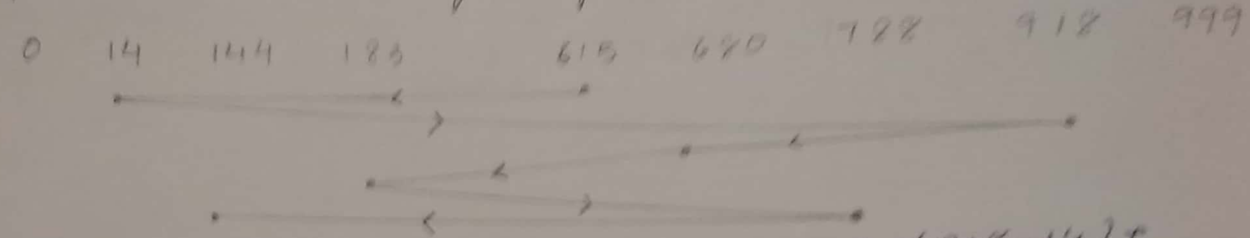


In this case, all the processes have been successfully loaded into the memory and there is no external fragmentation issue. Hence, we prefer to use this strategy of WORST FIT to get optimal results.

Ques 4 Calculate the no. of page faults that

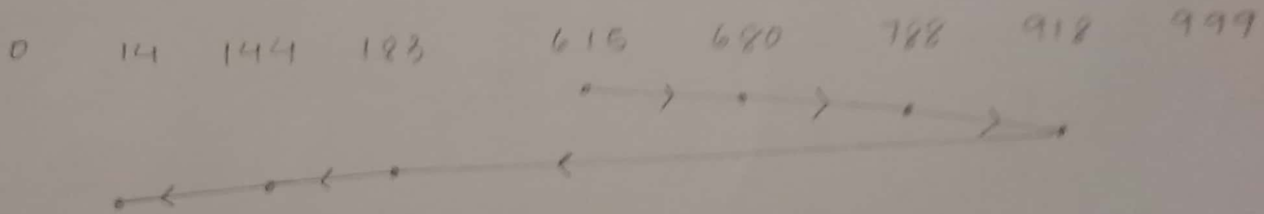
Ques5 A hard disk has 1000 cylinders. The read/write head is now at cylinder 615 and moving outwards. The disk queue has requests to access cylinders 14, 918, 680, 183, 788 and 144. Calculate the number of cylinders that the read/write head will have to traverse to serve these requests if i) FCFS ii) SSTF iii) SCAN and iv) LOOK scheduling algorithm are used.

i)



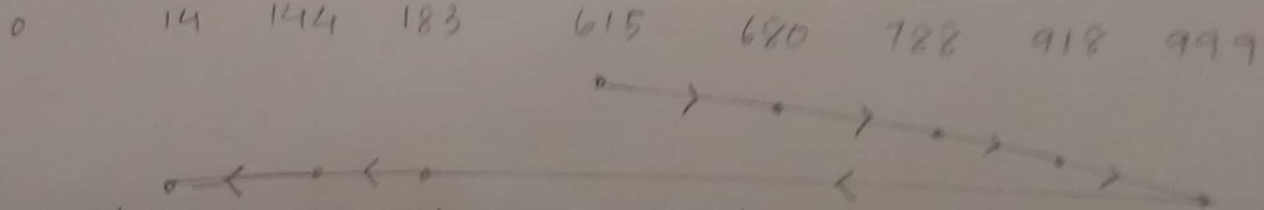
Number of cylinder traversed = (615 - 14) + (918 - 14) + (918 - 680) + (680 - 183) + (788 - 183) + (788 - 144) = 3489

ii)



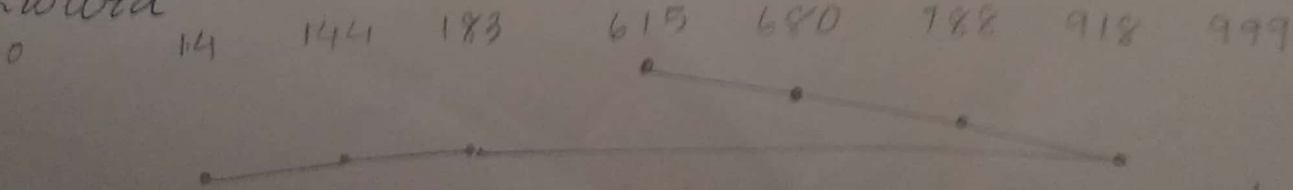
Number of cylinder traversed = (680 - 615) + (788 - 680) + (918 - 788) + (918 - 183) + (183 - 144) + (144 - 14) = 1207

iii) inward



Number of cylinder traversed = (680 - 615) + (788 - 680) + (918 - 788) + (999 - 918) + (999 - 183) + (183 - 144) + (144 - 14) = 1369

iv) inward



Number of cylinder traversed = (680 - 615) + (788 - 680) + (918 - 788) + (918 - 183) + (183 - 144) + (144 - 14) = 1207