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Assignment: 2

Q1 Given memory partitions of size 150K, 500K, 200K, 300K, 350K in order. these partion need to be allocated to four processes of size 357KB, 210KB, 468KB, 491KB in that order. Perform the allocation using First fit, Best fit and worst fit algorithm, which algorithm makes most efficient use of memory?

Ans

First fit:
- 357 KB is put in 500K partition.
- 210 KB is put in 300K partition
- 468 KB is put in 550K partition
- 491 KB must wait.

Best Fit:
- 357 KB is put in 500K partition.
- 210 KB is put in 300K partition.
- 468 KB is put in 550K partion.
- 491 KB must wait.

worst Fit:
- 357 KB is put in 550K partion.
- 210 KB is put in 500K partition.
- 468 KB ~~is put in~~ must wait
- 491 KB must wait.

In this example, First fit and Best fit both are efficient:

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Q-2 Consider a main memory with 5 page frames and the following sequence of page.
3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3
comment on the number of page faults obtained when FIFO and LRU page replacement policies are used? Repeat the above problem considering page frame size as 3.

Ans Page Frame size = 5 : FIFO :-

Request	3	8	2	3	9	1	6	3	8	9	3	6	2	1	3
Frame 5						1	1	1	1	1	1	1	1	1	1
Frame 4					9	9	9	9	9	9	9	9	2	2	2
Frame 3			2	2	2	2	2	2	8	8	8	8	8	8	8
Frame 2		8	8	8	8	8	8	3	3	3	3	3	3	3	3
Frame 1	3	3	3	3	3	3	6	6	6	6	6	6	6	6	6
miss / Hit	miss	miss	miss	Hit	miss	miss	miss	miss	miss	Hit	Hit	Hit	miss	Hit	Hit

Number of Page fault = 9
Number of hits = 6

LRU :-

Request	3	8	2	3	9	1	6	3	8	9	3	6	2	1	3
Frame 5						1	1	1	1	1	1	1	2	2	2
Frame 4					9	9	9	9	9	9	9	9	9	9	9
Frame 3			2	2	2	2	2	2	8	8	8	8	8	1	1
Frame 2		8	8	8	8	8	6	6	6	6	6	6	6	6	6
Frame 1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
miss / Hit	M	M	M	H	M	M	H	H	M	H	M	M	M	M	H

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Number of Page Faults = 9
Number of Hits = 6

* Page Frame size = 3

FIFO :-

Request	3	8	2	3	9	1	6	3	8	9	3	6	2	1	3
Frame3			2	2	2	2	6	6	6	9	9	9	9	1	1
Frame2		8	8	8	8	1	1	1	8	8	8	8	2	2	2
Frame1	3	3	3	3	9	9	9	3	3	3	3	6	6	6	3
Miss/Hit	M	M	M	H	M	M	M	M	M	M	H	M	M	M	M

Number of Page Faults = 13
Number of Hits = 2

LRU:-

Request	3	8	2	3	9	1	6	3	8	9	3	6	2	1	3
Frame3			2	2	2	1	1	1	8	8	8	6	6	6	3
Frame2		8	8	8	9	9	9	3	3	3	3	3	3	1	1
Frame1	3	3	3	3	3	3	6	6	6	9	9	9	2	2	2
Miss/Hit	M	M	M	H	M	M	M	M	M	M	H	M	M	M	M.

Number of Page Faults = 13
Number of Hit = 2.

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Q-3 Explain file allocation mechanism and their advantages.

Ans The allocation methods define how the files are stored in the disk blocks. efficent disk space utilized and fast access to the file block is main idea behind file allocation methods.

1) Contiguous Allocation:- Each file occupies a contiguous set of block on the each disk. we can determine the blocks occupied by the files. The directory entry for a files with contiguous allocation contains address of starting block and length of allocated portion.

Advantages:-

(i) Both the sequential and direct access are supported. for direct access the address of k'th block of the file which started at block b can easily obtain as (b+k)

(ii) This is extremly fast since the number of seeks are minimal because of contiguous allocation of file blocks.

2) Linked List Allocation:- Each file is a linked list of disk blocks which used not be contiguous The disk blocks can be scattered anywhere on the disk The directory entry contains a pointed to the staring and ending file block. Each block contains a pointed to the next block occupied by the file.

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Advantages:

(i) This is very flexible in terms of file size.
(ii) File size can be increased easily since the system does not have to look for a contiguous chunk of memory
(iii) This method does not suffer from external fragmentation
(iv) Better memory utilization.

3) Indexed Allocation: A special block known as the index block contains the pointer to all the blocks occupied by a files. each file has its own index block. The i'th entry in index block contains the disk address of the i'th file block. The directory entry contains the address of the index block.

Advantages:-

(i) Supports direct access to the blocks occupied by the file and therefore provides fast acess to the file. block.
(ii) It reduce the problem of external fragmentation

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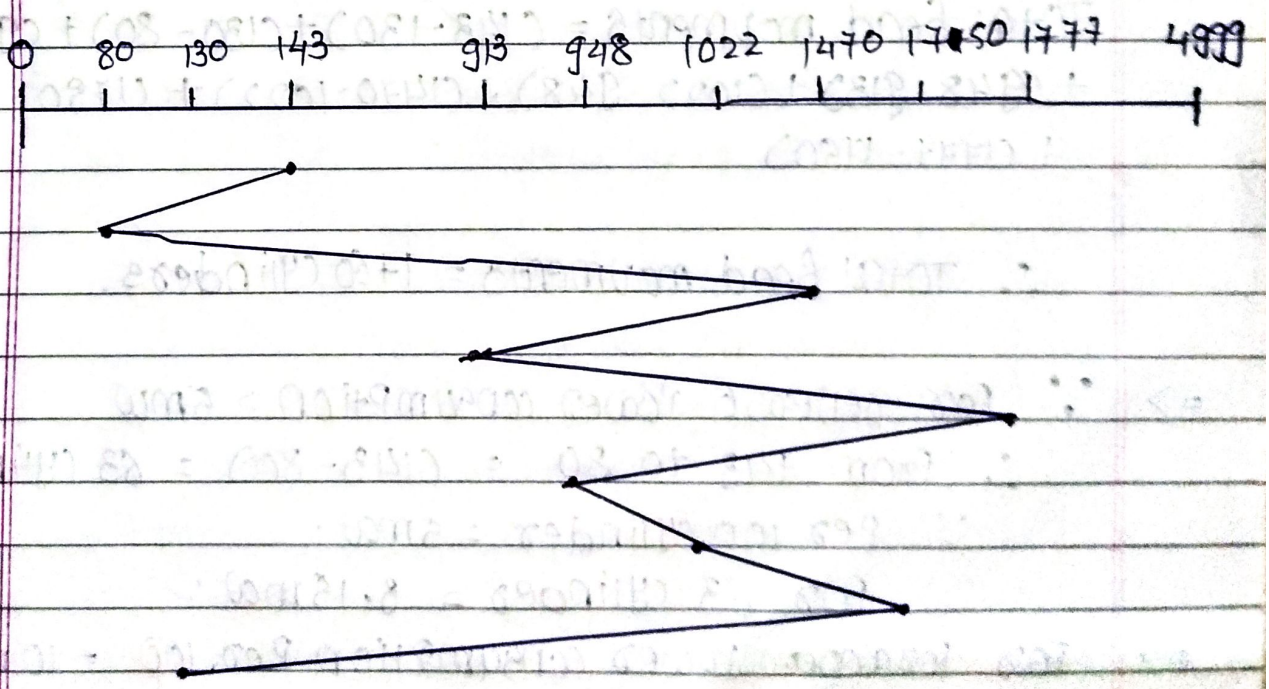
Q-4 consider the storage disk 5000cylinders (numbered as 0, 1, ..., 4999). The drive is currently serving at cylinder 143, and the previous was 125 cylinder. The Queue of Pending request in FIFO order as 80, 1470, 913, 1777, 948 1022, 1750, 130.
The average Power distribution in moving the head over 100 cylinder is 10 milliwatts and for reversing it is 5 milliwatts. The total Power consumption to satisfy all of the above requests using the shortest seek time first disk scheduling algorithm is ____. what is the total distance arm moves for following algorithm?
(i) FCFS (ii) SSTF (iii) LOOK (iv) SCAN.

ANS (i) FCFS:- 143, 80, 1470, 913, 1777, 948, 1022, 1750, 130



Total head movment: (143-80)+(1470-80)+(1470-913)+(1777-913)+(1777-948)+(1022-948)+(1750-1022)+(1750-130)

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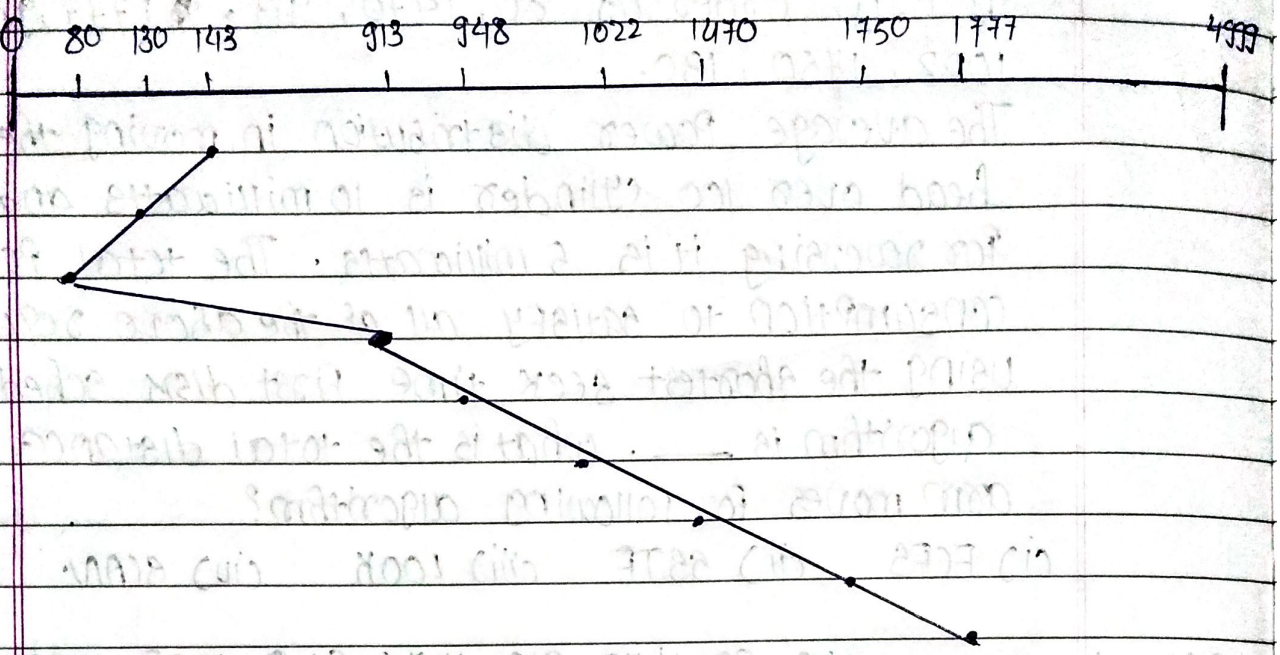
∴ Total head movments = 6125 cylinders.

(ii) SSTF:- 143, 130, 80, 913, 948, 1022, 1470, 1750, 1777.



Total head movments = (143-130) + (130-80) + (913-80) + (948-913) + (1022-948) + (1470-1022) + (1750-1470) + (1777-1750)

∴ Total head movments = 1760 cylinders.

⇒ ∵ For reverse Power consumption = 5mw
∴ From 143 to 80 = (143-80) = 63 cylinders
∵ Per 100 cylinder = 5mw.
For 63 cylinder = 3.15mw.

⇒ For forward Power consumption Per 100 = 10mw.
From (1777 to 80) = 1697 cylinders
∵ For 1697 cylinder Power = 169.7

∴ Total Power = 172.85

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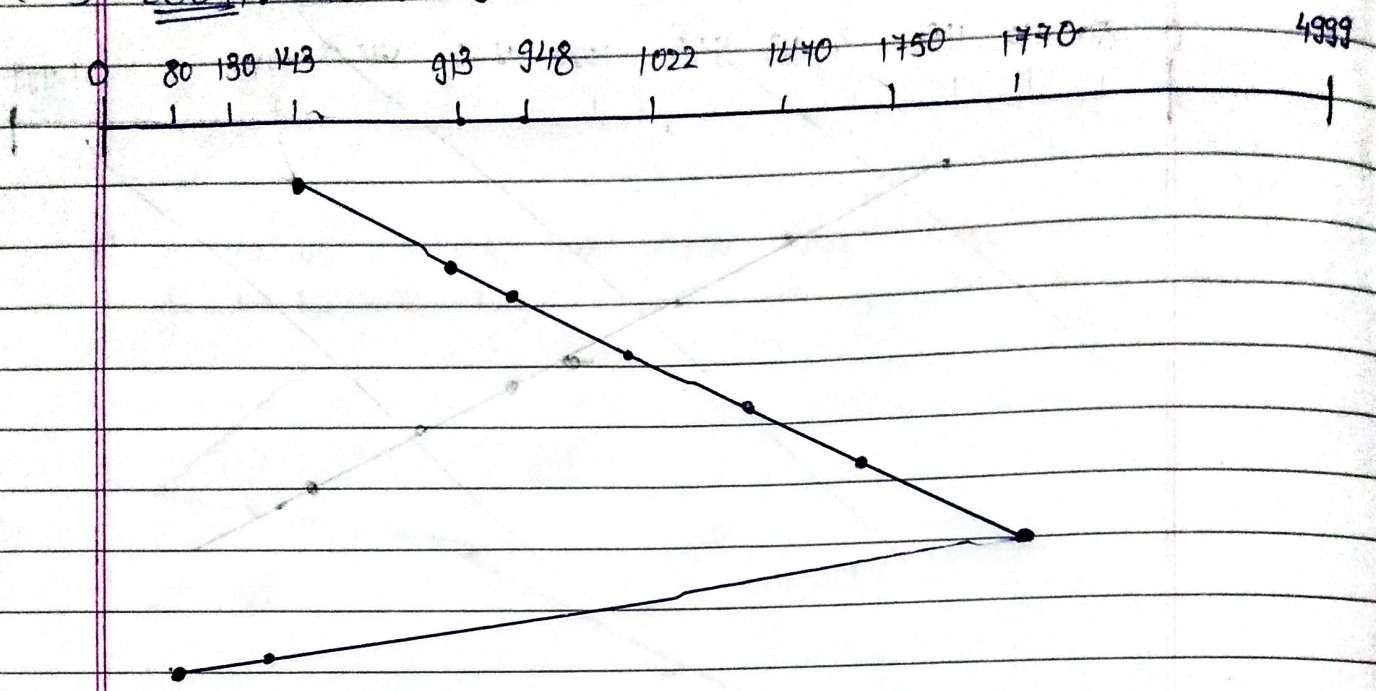
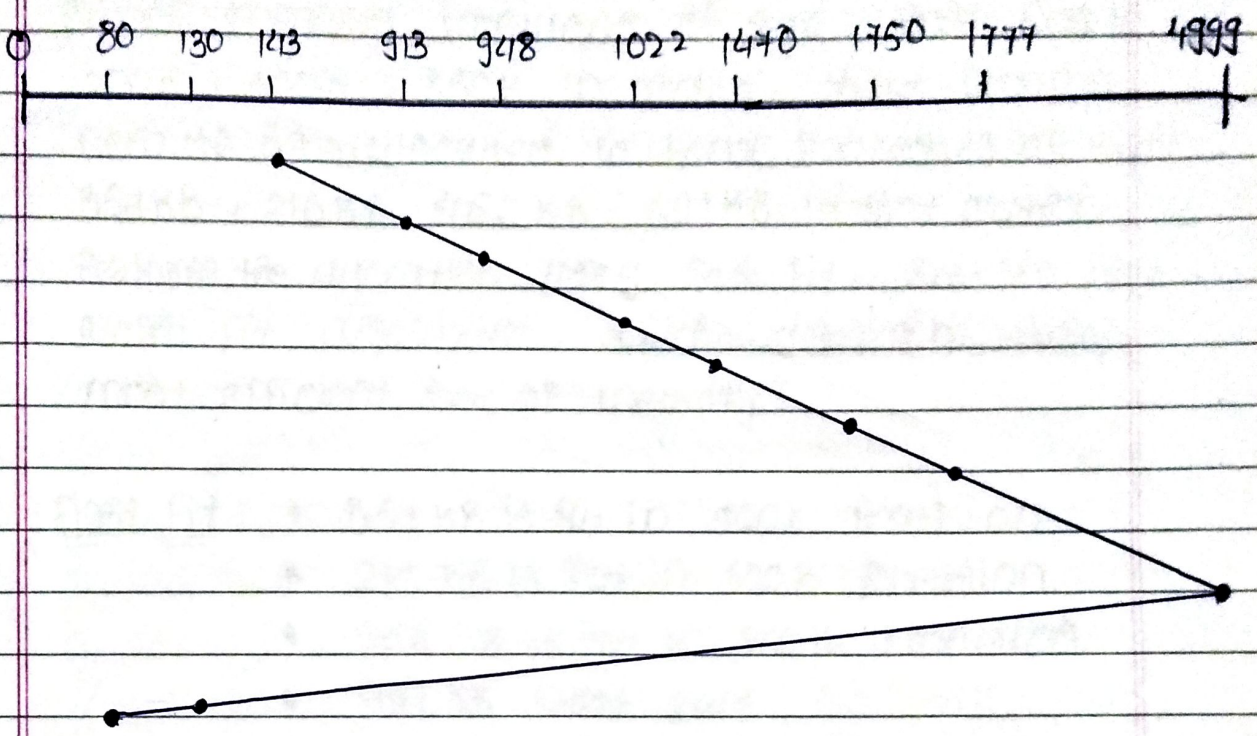
(iii) LOOK: 143, 913, 948, 1022, 1470, 1750, 1770, 130, 80



Total head movment =
(913 - 143) + (948 - 913) + (1022 - 948) + (1470 - 1022)
+ (1750 - 1470) + (1777 - 1750) + (1777 - 130) + (130 - 80).

∴ Total head movment = 3331 cylinders.

(iv) SCAN:-



Total head movment =
(913 - 143) + (948 - 913) + (1022 - 948) + (1470 - 1022)
+ (1750 - 1470) + (1777 - 1750) + (4999 - 1777)
+ (4999 - 130) + (130 - 80)

∴ Total head movment = 9775 cylinders.