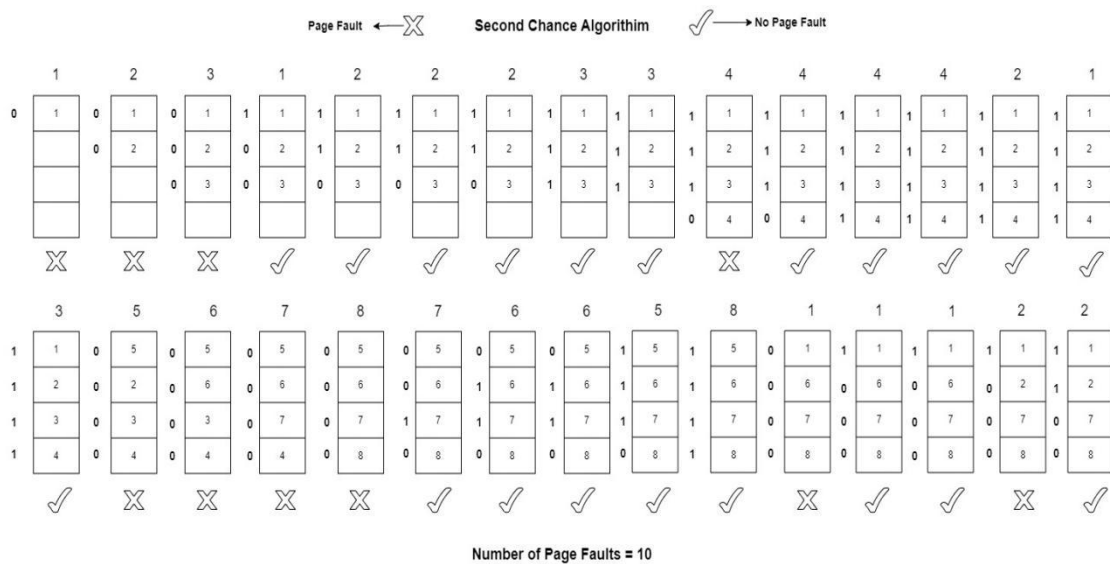# CNG 334

Assignment 3
Report

Name: Shayan
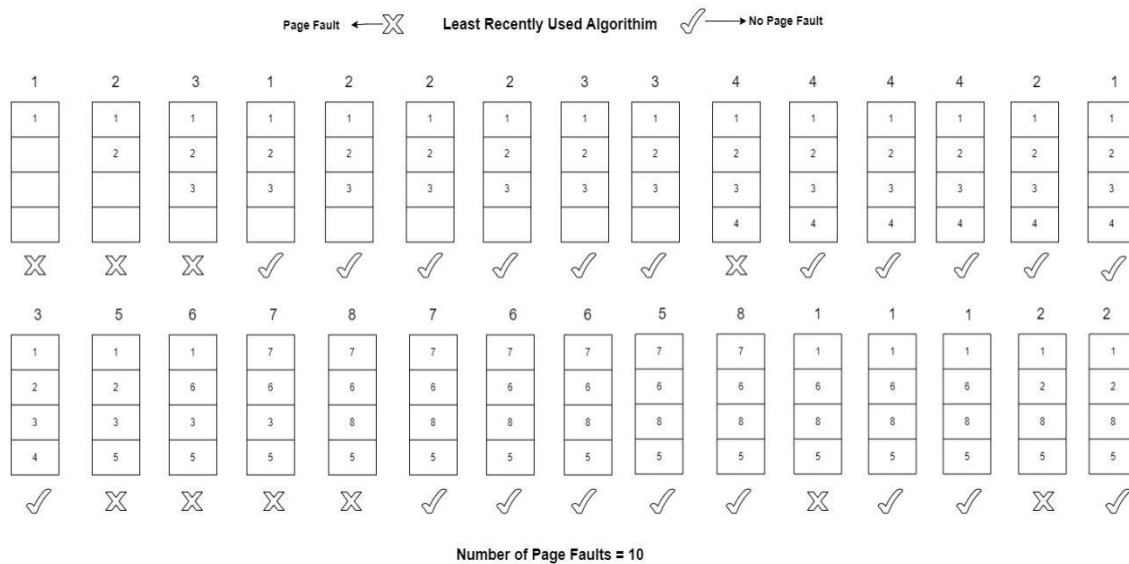
Nadeem

Student ID: 2542413

TASK 1:

1)

Second Chance Algorithm — Number of Page Faults = 10

2)

Least Recently Used Algorithm — Number of Page Faults = 10

3)

Page Fault ←── X   Optimal Replacement Algorithim   ✓ ──→ No Page Fault

Number of Page Faults = 10

TASK 2:

1)

First-Fit Algorithim

2)

Best-Fit Algorithim

	P4 (5K)	P5 (8K)	P6 (5K)
OS	OS	OS	OS
P1	P1	P1	P1
		P5	P5
15K	15K		P6
		7K	2K
P2	P2	P2	P2
5K	P4	P4	P4
P3	P3	P3	P3

3)

Worst-Fit Algorithim

	P4 (5K)	P5 (8K)	P6 (5K)
OS	OS	OS	OS
P1	P1	P1	P1
	P4	P4	P4
15K		P5	P5
	10K	2K	2K
P2	P2	P2	P2
5K	5K	5K	P6
P3	P3	P3	P3
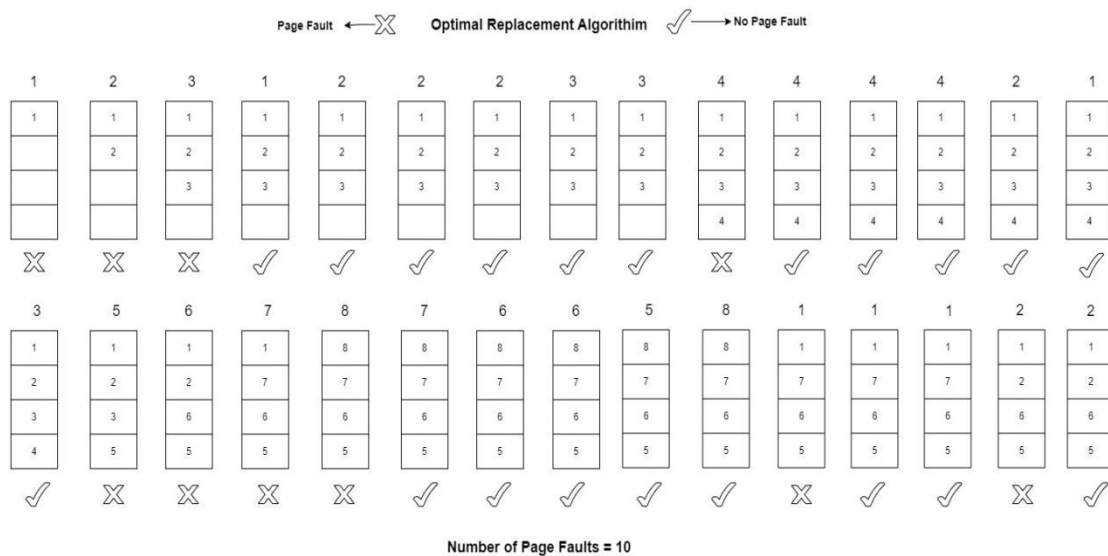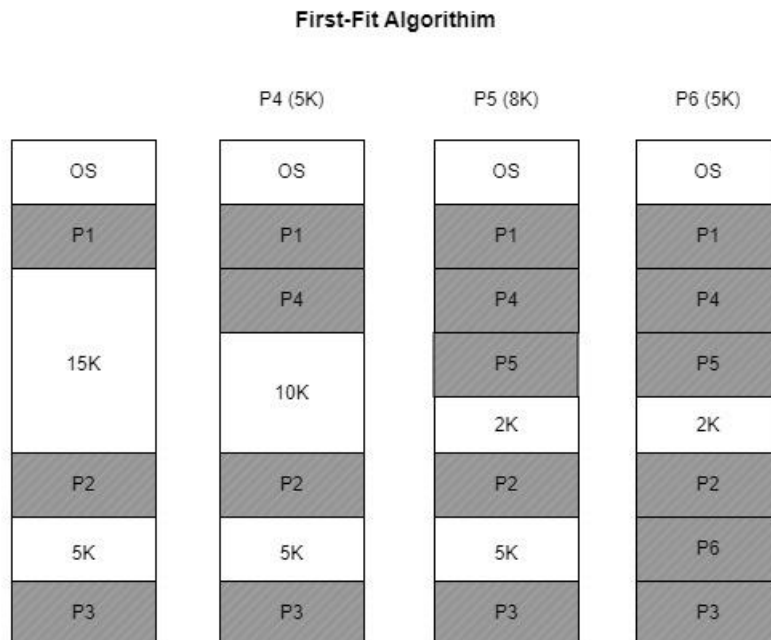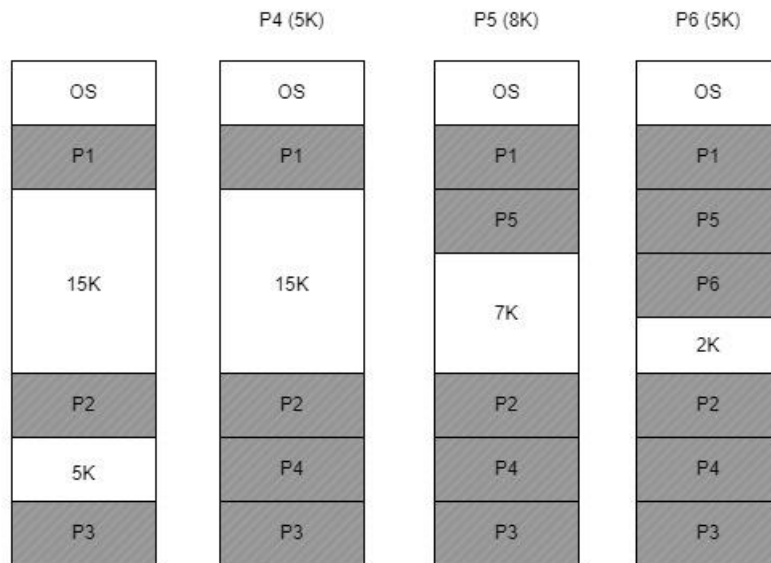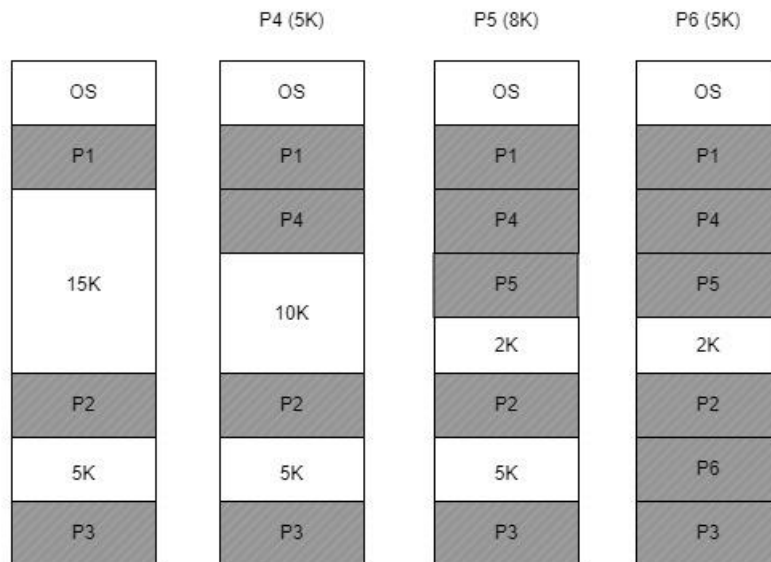
TASK 3:

Processes	Allocated	Maximum	Need/Work	Available	New Available
A	1 0 2 1 1	1 1 2 1 3	<1 1 2 1 3> - <1 0 2 1 1> = <0 1 0 0 2>	-	-
B	2 0 1 1 1	2 2 X 1 1	<2 2 X 1 1> - <2 0 1 1 1> = <0 2 X-1 0 0>	0 2 X-1 0 0 <= 2 2 3 3 1 = T	0 2 X-1 0 0 <= 2 2 3 3 1 = T
C	1 1 0 1 0	2 1 3 1 0	<2 1 3 1 0> - <1 1 0 1 0> = <1 0 3 0 0>	1 0 3 0 0 <= 1 1 3 2 1 = T	<1 1 3 2 1> + <1 1 0 1 0> = 2 2 3 3 1
D	1 1 1 1 0	1 1 2 2 1	<1 1 2 2 1> - <1 1 1 1 0> = <0 0 1 1 1>	0 0 1 1 1 <= 0 0 2 1 1 = T	<0 0 2 1 1> + <1 1 1 1 0> = 1 1 3 2 1

(circled markers ③ ② ① on right)

Safe Sequence: <D,C,B,A>

According to this safe sequence, the firstly, we'll go directly check D as the first three would be false if we follow this sequence, and then C, then B and then A to find X in this format:
Need <= Available = T/F if T, then New Available = Available + Allocated:

0 2 X-1 0 0 <= 2 2 3 3 1 = T

This statement should be true according to the safe sequence provided so the largest value of X where this statement would be True is 4, as 4-1 = 3 <= 3, Hence
[X = 4]
No need to do it for A, as we already found X

TASK 4:

1) Swap In/Out Time = (Size/Transfer Rate + Average Latency Time)
Swap Out Time (P1) = (150/60) * 1000 + 10 = 2510 ms
Swap Out Time (P2) = (200/60) * 1000 + 10 = 3343 ms (Rounded)
Swap In Time (P3) = (300/60) * 1000 + 10 = 5010 ms
Total Time = Swap In Time + Swap Out Time = 2510 + 3343 + 5010 = 10863 ms.
Total Time = 10863/1000 = 10.863 s.

2) **Logical Address + Base/Relocation Register = Physical Address**
If the Physical Address Value is less than Limit Register Value --> Valid, else Not Valid.

So following these steps:

1) 990 + 30010 = 31000 = 31000 --> **Valid**
2) 1020 + 30010 = 31030 > 31000 --> **Not Valid**

TASK 5:

In this solution, we need to use mutex locks to ensure the critical section is preserved for a single customer. Customers will be coming in the shop, and signaling the sleeping barber who will wake up to serve the customers, and when a customer is done with his/her haircut, he/she will signal the barber, this way we'll ensure that no customer leaves the barber shop without waiting infinitely. This will prevent the any race conditions that might prevail.

(Also it was not clear what sketching a solution means in this context)