Name: Sandesh Shrestha

Roll no: 2K21/CO/417

A6 Batch

OS assignment 2

CPU scheduling

January 13, 2023

assignment Jan 23

OS

Date .....

1) Consider 3 processes (P_0, P_1, P_2) with CPU burst time 4, 8, 6 & arrival time 0 for all processes. Consider Longest remaining time first (LRTF) scheduling algorithm. The average ~~time~~ Turn around time?

2) Consider 4 process P_1, P_2 P_3 P_4 arrival time zero for all. Consider SJF and RR (4 ms time quantum) then the absolute value of the difference between average turn around time of shortest job first and RR.??

BT for $P_1 = 7$, $P_2 = 5$, $P_3 = 2$, $P_4 = 4$

3) 4 processes P, Q, R, S scheduled as per RR (4 time quantum). Arrival time for all process is zero. There is exactly one context switch from R to Q, one context switch from S to Q exactly two context switches from Q to R. There is no context switch from S to P. Switching to a ready process after the termination of another process is also considered as context switch.

i) P=4, Q=10, R=6, S=2 iii) P=4, Q=12, R=5, S=4

ii) P=2, Q=9, R=5, S=1 iv) P=3, Q=7, R=7, S=3

Which one of the ~~above~~ following is not possible as CPU burst time.

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4) Consider 3 processes arrival time 0, execution time/BT 20, 30, 30. Each process spends first 20% of execution time doing input/output, 70% of time doing computation and last 10% time doing input/output again. Algorithm used is SRTF. It schedules a new process either the when the running process gets blocked on input/output or when running process finishes its compute burst assume that all input/output operations can be overlapped as much as possible. For what percentage of does the CPU remain idle??

5) Consider 4 processes (P_1, P_2, P_3, P_4) with arrival time (0, 0, 3, 4) and CPU burst time is 3, 2, 7, 1, I/O burst is (2, 4, 2, 2) and CPU burst is 2, 2, 2, 1. Consider SRTF and calculate average waiting time and average TAT.

6) Consider 4 processes (P_1, P_2, P_3, P_4) with AT as 1, 2, 3, 4 and CPU BT is 2, 4, 5, 2. Use LJF (pre-emptive) and calculate average wt and average TAT.

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Solutions:

Question no-1

Processes	Arrival time	BT
P_0	0	4
P_1	0	8
P_2	0	6

Gantt chart

P_1	P_2	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
0	3	4	5	6	7	8	9	10	11	12

P_0	P_1	P_2	P_0	P_1	P_2
13	14	15	16	17	18

TAT:

P_0	16
P_1	17
P_2	18

WT:

P_0	12
P_1	9
P_2	12

∴ average TAT = (16 + 17 + 18) / 3 = 17

average WT = (12 + 9 + 12) / 3 = 11

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Question no. 2

	AT	BT
P_1	0	7
P_2	0	6
P_3	0	2
P_4	0	4

Gantt chart for SJF scheduling

P_3	P_4	P_2	P_1

0 2 6 12 19

TAT:

P_1	19
P_2	12
P_3	2
P_4	6

WT:

P_1	12
P_2	6
P_3	0
P_4	2

average TAT = (19+12+2+6)/4 = 9.75

Gantt chart for RR scheduling

P_1	P_2	P_3	P_4	P_1	P_2

0 4 8 10 14 17 19

TAT:

P_1	17
P_2	19
P_3	10
P_4	14

averge TAT = (17+19+10+14)/4 = 15

Spiral

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∴ absolute value of difference in average TAT is
= |17.5 − 9.25|
= 8.25 #

Question no. 3

Solution,

option 1 : P = 4, Q = 10, R = 6, S = 2
Time quantum = 4 units
Gantt chart looks like

P	Q	R	S	Q	R	Q
0-4	4-8	8-12	12-16	16-20	20-21	21-25

~~opt~~ Here, exactly one context switch from S to Q, 1 from R to Q and 2 from Q to R so, might be true.

option 2 : P = 2, Q = 9, R = 5, S = 1

P	Q	R	S	Q	R	Q
0 2	6	10	11	15	16	17

might be true

option 3 : P = 3, Q = 7, R = 2, S = 3

P	Q	R	S	Q	R
0 3	7	11	14	17	20

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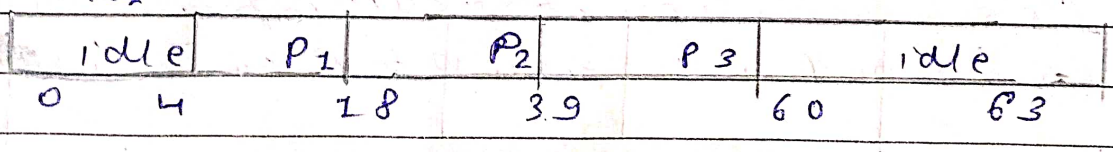
Since, there is no context switch from R to Q so, it is false.

Hence, P = 3, Q = 7, R = 7, S = 3 is not possible CPU burst time.

Question no. 4

SRTF algorithm for scheduling

PId	AT	BT	I/O (20%.)	BT (70%.)	IO (10%.)
P_1	0	20	4	~~21~~ 14	2
P_2	0	30	6	21	3
P_3	0	30	6	21	3



total idle time = 4 + 3 = 7 units

Total execution needed time = 63 units

∴ Percentage of idle time = $\frac{7}{63} \times 100\%$.

= 11.11%.

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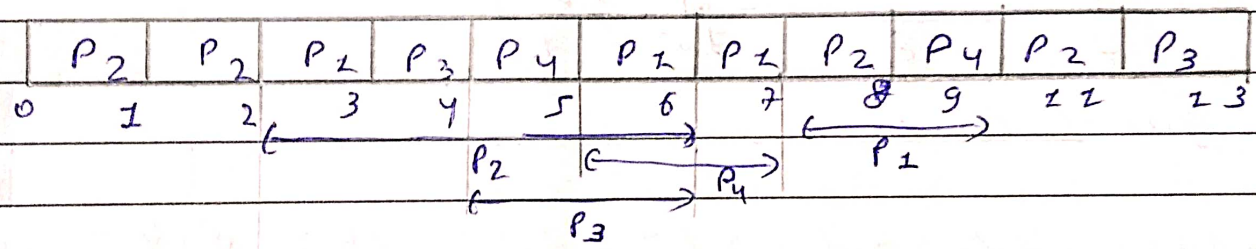
Question no: 5

Process id	AT	BT	I/O time	BT	CT	TAAT	WT
P_1	0	3	2	2	7	7	5
P_2	0	2	4	1	11	11	10
P_3	3	1	2	2	13	10	8
P_4	4	1	2	1	9	5	4

mode: preemptive

SRTF

Gantt chart looks like:



average TAT = (7 + 11 + 10 + 5) / 4 = 8.25 units

average WT = (5 + 10 + 8 + 4) / 4 = 6.75 units

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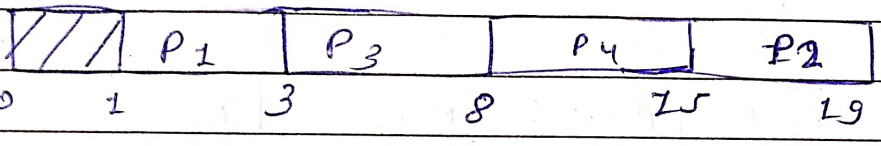
Question no-6

Process id	AT	BT	CT	TAT	WT
P1	1	2	3	2	0
P2	2	4	19	17	13
P3	3	5	8	5	0
P4	4	7	15	11	4

using LJF algorithm of scheduling
(non-~~no~~pre emptive)



gantt chart

average TAT = (2+17+5+11)/4 = 8.75 units
average WT = (0+13+0+4)/4 = 4.25 units

Spiral