

CSE321 - Operating Systems

Quiz 1

Section 23 (Set A)

Date:

Full name:

Roll:

Total Marks: 15

1. Theoretical questions:

- What is meant by bounded waiting?
- What is race condition?
- What are the advantages and disadvantages of many-to-many model in multithreading?
- What is the use of `thread_join()` function?
- Write the problems of Round Robin algorithm.

a) limited waiting time on critical section.

b) Multiple processes trying to change shared value.

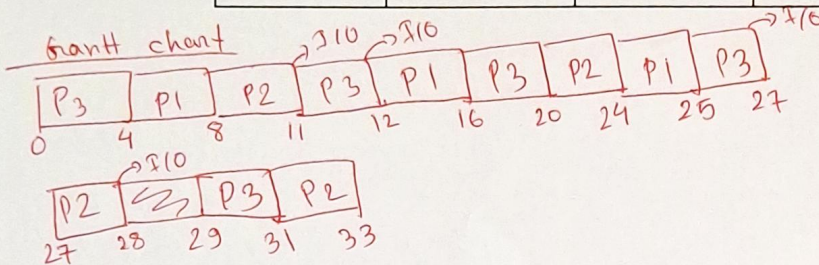
c) Adv: No blocking, no extra kernel thread
Disadv: Complex to implement

d) Suspends main thread, returns value.

e) q too small \rightarrow context switches
 q too big \rightarrow FCFS.

2. Simulate CPU scheduling of the following processes using Round Robin (time quantum = 4) on CPU and SRTF on I/O. Also find average turnaround time, average waiting time and average response time.

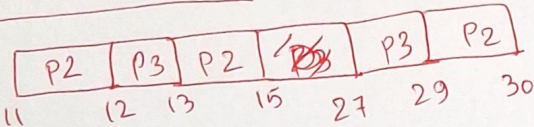
Process	CPU burst time	Arrival time	I/O
P1	9	1	N/A
P2	10	2	4 [3s after total 3s CPU and 1s after total 8s CPU]
P3	13	0	3 [1s after total 5s CPU and 2s after total 11s CPU]



Ready queue

- 0 P3(13)
- 1 P1(9)
- 2 P1(9), P2(10)
- 4 P1(5), P2(10), P3(9)
- 8 P2(10), P3(9), P1(5)
- 11 P3(9), P1(5)
- 12 P1(5)
- 13 P3(8), P2(7)
- 15 P3(8), P2(7)
- 16 P3(8), P2(7), P1(1)
- 20 P2(7), P1(1), P3(4)
- 24 P1(1), P3(4), P2(3)
- 25 P3(4), P2(3)
- 27 P2(3)
- 29 P3(2)
- 30 P2(2)
- 31 P2(2)

I/O Gantt chart



Turnaround: P1: $(25 - 1) = 24$, P2 = 31
P3: $(31 - 0) = 31$, Avg: 25.67

Waiting: P1: $(15 - 9 - 0) = 6$
P2: $(31 - 10 - 4 - 2) = 15$
P3: $(31 - 13 - 3) = 15$
Avg = 12

Response: P1: $(4 - 1) = 3$, P2: $(8 - 2) = 6$
P3: $(0 - 0) = 0$ Avg: 3

CSE321 - Operating Systems

Quiz 1

Section 23 (Set B)

Date:

Full name:

Roll:

Total Marks: 15

1. Theoretical questions:

- What is meant by mutual exclusion?
- What should be done to avoid race condition?
- What are the advantages and disadvantages of user threads?
- What is the use of `thread_join()` function?
- Write the problem and solution of Priority Scheduling algorithm.

a) Only one process in critical section.

b) Synchronization.

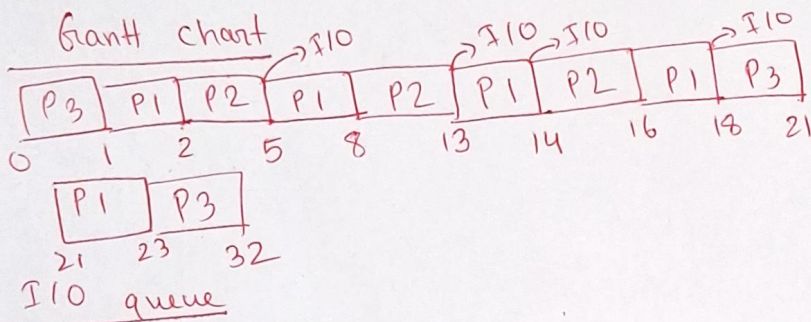
c) Adv: Easy to use and create
Disadv: No parallelism without kernel, blocking.

d) Suspends main thread, return value.

e) Starvation. Aging

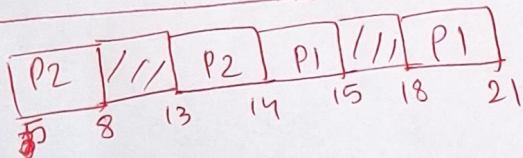
2. Simulate CPU scheduling of the following processes using Preemptive Priority Scheduling on CPU and FCFS on I/O. Also find average turnaround time, average waiting time and average response time.

Process	CPU burst time	Arrival time	Priority	I/O
P1	9	1	3	4 [1s after total 5s CPU and 3s after total 7s CPU]
P2	10	2	1	4 [3s after total 3s CPU and 1s after total 8s CPU]
P3	13	0	8	N/A



5 P2(3) 13 P2(1) 14 P1(1) 18 P1(3)

I/O gGantt chart



Turnaround: P1: $(23 - 1) = 22$

P2: $(16 - 2) = 14$, P3: $(32 - 0) = 32$

Avg: 22.67

Waiting: P1: $(22 - 9 - 4) = 9$

P2: $(14 - 10 - 4) = 0$, P3: $(32 - 13 - 0) = 19$

Avg: 9.33

Response: P1: $(1 - 1) = 0$, P2: $(2 - 2) = 0$

P3: $(0 - 0) = 0$. Avg = 0.

Ready queue

0 P3(13)

1 P1(9), P3(12)

2 P2(10), P3(12), P1(8)

5 P1(8), P3(12)

8 P3(12), P2(7), P1(5)

13 P1(5), P3(12)

14 P3(12), P2(2)

15 P3(12), P1(4)

16 P1(4), P3(12)

18 P3(12)

21 P1(2), P3(9)

23 P3(9)

CSE321 - Operating Systems

Quiz 1

Section 24 (Set A)

Date:

Full name:

Roll:

Total Marks: 15

1. Theoretical questions:

- How many PC, register and code will there be for four threads?
- What is task parallelism?
- What are the advantages and disadvantages of one-to-one model in multithreading?
- What is the use of `thread_join()` function?
- Write the problem of FCFS algorithm.

a) 4 PC, 4 register, 1 code

b) Same data, different task on different core

c) Adv: True parallelism, no blocking

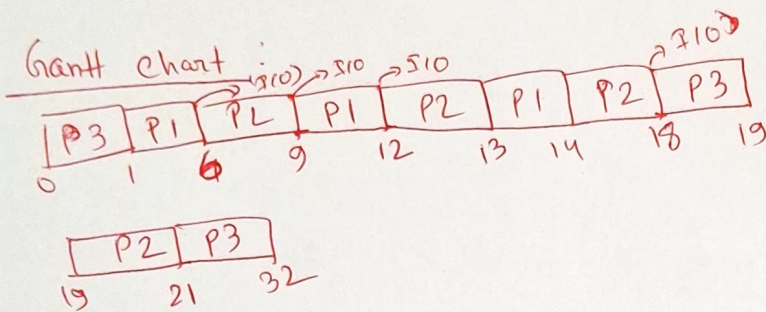
Disadv: Expensive kernel overhead

d) Suspends main thread, returns value

e) convoy effect

2. Simulate CPU scheduling of the following processes using SRTF on CPU burst time and Round Robin (time quantum = 2) on I/O. Also find average turnaround time, average waiting time and average response time.

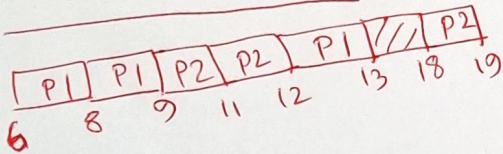
Process	CPU burst time	Arrival time	I/O
P1	9	1	4 [3s after total 5s CPU and 1s after total 8s CPU]
P2	10	2	4 [3s after total 3s CPU and 1s after total 8s CPU]
P3	13	0	N/A



I/O queue

4 P1(3) 8 P1(1) 9 P2(3) 11 P2(1)
12 P1(1) 18 P2(1)

I/O Gantt chart:



Turnaround time: $P_1: (14 - 1) = 13$

$P_2: (21 - 2) = 19$, $P_3: (32 - 0) = 32$

Avg: 21.33

Waiting: $P_1: (13 - 9 - 4) = 0$, $P_2: (19 - 10 - 4) = 5$

$P_3: (32 - 13 - 0) = 19$, Avg: 8

Response: $P_1: (1 - 1) = 0$, $P_2: (6 - 2) = 4$, $P_3: (0 - 0) = 0$

Avg: 1.33

Ready queue

0 ~~P3(13)~~

1 ~~P1(9)~~ P3(12)

2 P3(12), P2(10)

6 ~~P2(10)~~, P3(12)

9 P3(12), ~~P1(4)~~

12 P3(12), ~~P2(4)~~

13 P3(12), ~~P1(1)~~, P2(6)

14 ~~P2(6)~~, P3(12)

18 ~~P3(12)~~

19 ~~P2(2)~~, P3(11)

21 ~~P3(11)~~

CSE321 - Operating Systems

Quiz 1

Section 24 (Set B)

Date:

Full name:

Roll:

Total Marks: 15

1. Theoretical questions:

- How many PC, stack and code will there be for five threads?
- What is data parallelism?
- What are the advantages and disadvantages of many-to-one model in multithreading?
- What is the use of `thread_join()` function?
- Write the difference between SRTF and SJF algorithm.

a) 5 PC, 5 stack, 1 code

b) Same task, divided data.

c) Adv: User space thread management, fewer resource
Dadv: No true parallelism, blocking

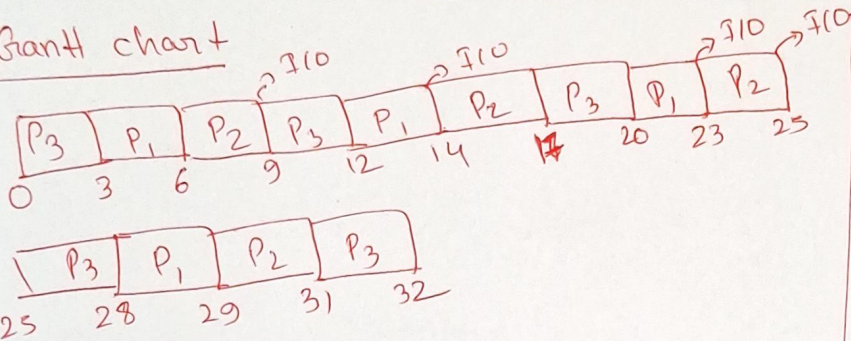
d) Suspends main thread, returns value

e) SRTF \rightarrow preemptive, SJF \rightarrow non preemptive

2. Simulate CPU scheduling of the following processes using Round Robin (time quantum = 3) on CPU and FCFS on I/O. Also find average turnaround time, average waiting time and average response time.

Process	CPU burst time	Arrival time	I/O
P1	9	1	3 [2s after total 5s CPU and 1s after total 8s CPU]
P2	10	2	4 [3s after total 3s CPU and 1s after total 8s CPU]
P3	13	0	N/A

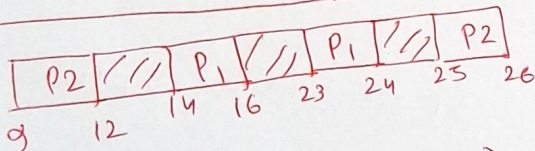
Gantt chart



I/O Queue

0 P₂(3) 14 P₁(2) 23 P₁(1) 25 P₂(1)

I/O Gantt chart



Turnaround time: P₁: (29-1) = 28, P₂ (31-2) = 29,

P₃: (32-0) = 32, Avg: 29.67

Waiting time: P₁: (28-9-3) = 16,

P₂: (29-10-4) = 15, P₃: (32-13-0) = 19

Avg: 16.67

Response time: P₁: (3-1) = 2, P₂: (6-2) = 4,

P₃ = (0-0) = 0, Avg: 2

* Either P₂ or P₃ can be chosen first.

Ready queue

0 P₃(13)

1 P₁(9)

2 P₁(9), P₂(10)

3 P₁(9), P₂(10), P₃(10)

6 P₂(10), P₃(10), P₁(6)

9 P₃(10), P₁(6)

12 P₁(6), P₂(7), P₃(7)*

14 P₂(7), P₃(7)

16 P₃(7), P₁(4)

17 P₃(7), P₁(4), P₂(4)

20 P₁(4), P₂(4), P₃(4)

23 P₂(4), P₃(4)

24 P₃(4), P₁(1)

25 P₃(4), P₁(1)

26 P₁(1), P₂(2)

28 P₁(1), P₂(2), P₃(1)

29 P₂(2), P₃(1) 31 P₃(1)