Educate Elevate Enlighten

JSS Mahavidyapeetha

JSS Science And Technology University

(Established Under JSS Science and Technology University Act No. 43 of 2013)

(Formerly Known as SJCE)

JSS

SCIENCE AND TECHNOLOGY UNIVERSITY

MYSURU

IV SEMESTER B.E DEGREE - CIE-3/TEST-3 (Section - 'A', 'B','C')

Branch: Computer Science and Engineering

Name of the Paper Setter: Prof Sheela N & Prof. Vani Ashok

CS450 - OPERATING SYSTEMS

Duration: 01 Hr. (2:30am to 3:30 P.M)

Date: 16/06/2021

STUDENT NAME:

Max. Marks: 20

Day: Wednesday

USN/SR. No:

COURSE OUTCOMES

After **completing** this course, **students** should **be** able to:

CO1: Understand various activities of process, thread, memory, file and secondary storage components of an Operating System.

CO2: Apply various scheduling algorithm of process, memory and secondary storage components.

CO3:

CO4: Analyze the concepts of inter process communication, deadlocks, memory allocation strategies, page replacement algorithms of OS.

Evaluate various algorithms for handling processes, threads, memory allocation strategies and deadlocks.

NOTE: Answer any two questions:

Q No	CO	CD	Questions	
1.	CO2 Application	Consider the following set of processes, with the length of the CPU burst time and arrival time given in milliseconds.		10

Process ID	Arrival Time	Priority	Burst Time
P1	1		
P2	**4**		
P3	3		
P4	4		

3454

		3	8
		4	2
		5	4
		4	1
P5	10		

6

6

P6

6

1

5

Draw the Gantt Charts to illustrate the execution of these processes using the following scheduling algorithms:

i) Preemptive SJF

ii) Non preemptive Priority

iii) Preemptive Priority

iv) Round Robin with Time Quantum = 3 ms

Compute the average Turnaround time, average, Waiting time and average Response time of these scheduling algorithms.

Which algorithms results in minimum average waiting time.

What is the percentage utilization of CPU?

Marks

2.

CO3 Analy Consider the implementation of a lock using atomic hardware instructions. If the lock is defined using the following structure

```
typedef struct

    int available;

} lock;
```

available 0 indicates that the lock is available and available=1 indicates that the lock is unavailable. Using this structure, modiy the test_and_set() and swap() instructions to acquire and release lock along with the mutual exclusion implementation of critical

section problem.

Include any initialization that may be necessary.

3.

C02 Appli cation

Consider the following snapshot of a system:

Process Id	Allocation	Max
	A B C D	A B C D
PO	2001	4212
P1	3121	5252
P2	2103	2316
P3	1312	1 42 4
P4	4 3 2	3665

1

4

.

Using banker's algorithm, determine whether or not each of the following **states is** unsafe. If the state is safe, illustrate the order in which the processes **may complete**. Otherwise illustrate why the state is unsafe.

i)Available = **(3, 3**, 2, 1)

ii) Available = (0, 3, 0, 1)

For the above shown snapshot, determine whether the following requests with the Available=(3, **3**, 2, **1**) can be granted immediately. Is so, find the safe sequence, otherwise illustrate why request can't be granted.

i)Request from P1 arrives for (1, 1, 0, 0**)**

ii) Request from P4 arrives for (0, 0,2, 0)

10

10

AT

BT

TT

P

8

P2

3
M

2

7423

Pre-emptive

SJF

21-1=20

WT

20-8=12-

3-2=1

RT

0

10-3=7

ホーム=3

5-6=1

0

27-10-17 17-6 = 1}

5-4=1

3-3=0

4-4=0

27

Pa

Ps

16

10

6

21-10=11

5

15-6=9

9-5= 4

10-6=4

57

31

16

Pre-emptive

SSF

(6)

ابی

P1 (2) P2 ( ) | P4 (4) | P2 (2) P3 (2) P6 (5) P1 (6). Ps. (6)

3

5

7

10

15

21

Avg. 7T = 57/6=9.5

· Arg WT =

Avg RT

31/6=5016

1616

= 2066

Nox-preemptive priority

12 2

AT BT Priority TT

2

00

4

3

8

12

ЮТ

10

PT

1-1=0

14-4=10

21-3=18

14

17-3=14

5

17-4=13

12

16-4=12

10

6

2710=17

11

21-10=11

P2

6

5 @

14-6= 8

3

9-6=3

76

50

So

P1 (E) P6 (5) P2 (2) Pq

(1) P3 (4) P5 (6)

9

TT = 76/6

WT 2

14

16

17

21

=12·66 TT=75/6 50r

58.3 / OP) WT =

45/6 = 8-16

TT: 75/6=12.5

27=50/6=8.3

PT =

49/6=8-16

OT

27

E

Preamplive priority

AT & T Privity TT

WT RT

h

ع

3

14-1 = 13

5

o

业

16-4=12

10

14-4=10

21-3=18

14

17-3=14

4

17-4=13

12

16-4=12

27-10=17

11

21-10=1)

11-6=5

1

6

10

выб

3

Zale) P1 (5)

| P6 (5)

| P, (3) B2 (2 .) Pq (1)

P2 (4) Ps (6)

21

6-6=0

78

52

47

TT = 78/6=13 ms

WTE 57/6=8+67

PT =

27/6=7.83

RR (3ms)

BTiCTiTT

!)

14

16

17

77/6= 12.83

op

51/6 = 8.5

46/6=7.6

27

AT BT

WT RT

Pi

8

22

21

13

Pa

9

5

3

M

833

17

14

10

10

Py 4

BC

P6

6

15

5

10

6

551

6

TT = 81

6

NT=

55/6=9016

RT= 23/6 = 3.833

13.5

27

17

H

24

18

13

#

81

55

23

(1)

(2)

(27

P,

PzP2 P4

P

вь

Pz

P5

(3)

Pi Po Ps

b 19

10

13

16

2.0

22

24 27

Ready Q

B3 Pr Pu Pr PG P3 Ps Pi PG PG

int Test-and-set (lack of target)

و

int PV = Target-> available;

Talget available = '1'

return RV;

ME Implementation.

ملہ

< while (Fest-and-set (slock)); //

do nothing

c/s

lock → available = 0;

{ while (true)

int swap (lock Valive， int x6)

&

（ int temp = value available；

->

Value; available = *b；

+6 = temp；

柏

¿

do <

int key = 1；

while (key ==

1）

Swap （xlack, key）； // do nothing

4 / 5

lock -> available = 0；

RIS

} while

(true）;

Allocation Max

Available Need

ARC D

A B C D

A B C D

A B C D

I

2 0 01

3

2

P3|1

Pa

1 *4*

2

? 2-

9

69

M
M

12

4212

5252

2316

14

3665

3321

22

| |

5322

2131

213

2

4

6634

0

12

710 66

2

233

Allocated 49, 9, 6, 9

> = (1, 13, C, DS

Available <3 3 2 17

Total = [12, 12, 8, 10>=

(A,B,C,D)

(f) d= Po need &

work

Need = Mare -
Allocation

(2,2,1)) { (3,3,2,1) _ executes
releases,

Work = Available = (3,3, 2, 1) +
(2,0,0,1) = (5, 3, 2, 2)

£=

P),

PI

(2, 1, 3, 1)

$ (5, 3, 3, 2)

3,1)

(5,3,3

X

= P2 (0, 2, 1, 3) $ (5, 3, 2, 2) X

J =

P2

x = 14

z

3.

32 2

<0, 1, 1, 2>

<(5, 3,

Work:

5, 3, 2, 2

+

6, 6, 34

1, 3, 1, 2

(2, 4, 3, 3) ≤

(6, 6, 3, 4)~

2

4, 3,

2)

work = (6,6, 3, 4)+

(4., 3,

= 29, 10, 6,

67

B

j= P, (2, 1, 3,

1)) { (7, 10, 5,

6) ~

work = ($, 10, 6, 6) +

(3, 1, 2, 1)~

++ P+ (0, 1, 1,
3) ≤ (10, 11, 8,
7/

Sobe sequence
is
Po, Ps, lq,
P1, P2Y

work (10, 11, 8, 7) +
(2,1; 0, 3)
= (12, 12, 8,
10)

(ii)
(1) Amilable =
(0,3,0,1)

Pox
P
Po x ;; P, X,
P2 X,
Pyx, Pax

Need

of

Po

sse > Available

337

X

A B C D

C D

Po 20

01

4

21

2-

Request prom PI arrives for (1,1,0,0)

Allocation

pom

Мак Ав

Need

A B C D

221

Available A B C

D

12 221

P, 14 2 21

5252

03

P

2 1

03

2

316

0

2

1 3

3

12 1

4 24

112

كة

4 32

3

665

2233

work- available = <2,2,2,1)

Po) (2211) ≤

(2

work =12

ε

221

1) + (2001) = (4,

2, 2, 2}

2 2

1/

P1 (10,. 3, 1) =

(4, 2, 2, 2) X

B

ﾚ

3 <

P2 (0,4,17) ≤(4,322

/ X

ﾋ.

P3 (0, 1, 1, 2) { (4,

3, 2, 4) ▶

B3

work = (4, 2, 2, 2) + (1, 3,

1, 2) - (5,5,3,4) P4 (3, 2, 3,

3) ≤ (5, 5, 341-

2

work = (5, 5, 3, 4). + (1,

4, 3, 2)= (6, 9, 6, 6)

P1 = (1, 0, 3, 1) = (6, 9, 6,

6) ▶

work = (6, 9, 6, 6) + (4, 2, 2, 1)

= 19, 11, 8, 7 P2 = (0, 2, 1,

3) { (10, 11, 8, 7) ▶

(۵)

p

Wirk =12, 12, 8, 10 (Po, P3,

P4, P1, P2>

=>

2

from Pu arrives

10,0,2,0)

3

Request from

Mlocation

Mak

10

Available

3 3 3 2

Need

A, B, C, DABCD X, B,
C, D

1,4,5,2 36,6,5 3 3 01

A B C D

2213

Since resource
type

I is zero, none of the processes
can execute as they all need II c
type resource

ie., Need; > Available

1.5/m is unlafl

SLN	NAME	1 (10M)	2 (10M)	3 (10M)	Total (20M)
1	Manoj kumar	5	5		10

2	Suraj G S				
3	Tanmai M G	10	u		14
4	Abhilash M Hadli	10			18
5	Adithi Mallesh	10	5	7	17
6	Alaap Surendran	10	q		19
7	Ananya K	10	5		15
9	Apoorva KC	10	5		15.
10	Ashutosh A Dodamani	119	5		
11	CHANDAN HY		Q		18
12	CHANDAN V	10	5		15

13 Chandana Raju

5

10

16

14 Chatush S

10

S

15 Chethan S

10

5

Q

6007

717

19

16 Chinmay jd

10

5

15

17 Chittesh Khachroo

10

5

15

18 D anushruta

10

6

16

19 Darshan M

10

516

16

20 Devothama GN

09

5

10

19

21 Dheemanth R

10

5

15

22 Dixith SR

10

5

15

23 Jayesh Jain

10

5

15

24 Kashyap S

10

5

6

16

25 Kishan MM

10

5

9

19

10

5

6

16

26 Mahith R

27 Mahmadarshad

10

5

다

17

28 Mohammed Ezhan

10

5

6

16

29 Nikhil m Raj

10

5

15

30 Nireksha Kothwal

31
Niteesh Bhat

east

32 Prajwall

33
Raksha BR

34
ROHAN.D

35
Rohith HN

36 Sachin BR

|||||

1

37
Sahana

39
Samarth Prasad

10
S

10
S

18

17
は

6

76

10 5

19

b

10

5

15

5
3

18

5

7

13

15

10

5

15

9

10

19

10

5

16

40 Shailendra kumar

41 Shaman B H

8

6

14

42 Shanmukhappa SD

15

5

$

18

43 Shashidhar **S** Joshi

10

5

15

10

5

15

44 Shobhith k

45 Shreyas Suri

10

5

15

10

5

15

46 Sinchana M P

5

9

14

47 Sinchana RG

5

10

10

15

48 SMITHA BHAT M

(rom) (10M)
(10M)

1
2
Tot

49
Sneha John
10
?
18

50
Soundarya Rd
10
5

51
Sreelal Raj mk
10
5

52 Srinivas Reddy

54
Sriram N
10

55
Srushti C
0

ज ज ज ज

7
17

平

17

P

19

15

15

56

Srushti Krishnagiri

9

10

57

Stuti Srinath

10

5

15

58

Subrahmanya Ramachandra naik 10

5

8

18

59

Sudeep H S

8

5

14

60

Sujith D

10

5

19

61

Supriya L

5

7

62

Surabhi A

10

5

15

5

63

Surabhi Seenivasan

12

5

64 Tejaswini M

8

17

65 Thanmay Jain S P

10.

If

6

66

Varun.M

6

12-

67 Vivek.E

10

5

68

Yashwanth prasad BL

10

5

69 Deepak S

4

3

5

70

Mohamaadjuber

71 Mamatha H L

10

5

55145

2

6

6

12-

72 Niranjan S

6

10

16

73

Nishitha S

5

12-

74

Sinchana C

75 Thejaswini K R

10

14