Solution (II midterm OS Soultion)

**Ans 1.**

X: Y: Z:

P(b) P(b) P(a)

P(a) P(c) P(c)

P(c) P(d) P(d)

**Ans 2.**

**monitor** ReadersWriters

**condition** OKtoWrite, OKtoRead;

**int** ReaderCount = 0;

**Boolean** busy = false;

**procedure** StartRead()

{

**if** (busy) // if database is not free, block

OKtoRead.wait;

ReaderCount++; // increment reader ReaderCount

OKtoRead.signal();

}

**procedure** EndRead()

{

ReaderCount-- ; // decrement reader ReaderCount

if ( ReaderCount == 0 )

OKtoWrite.signal();

}

**procedure** StartWrite()

{

if ( busy || ReaderCount != 0 )

OKtoWrite.wait();

busy = true;

}

**procedure** EndWrite()

{

busy = false;

If (OKtoRead.Queue)

OKtoRead.signal();

else

OKtoWrite.signal();

}

Reader()

{

**while** (TRUE) // loop forever

{

ReadersWriters.StartRead();

readDatabase(); // call readDatabase function in monitor

ReadersWriters.EndRead();

}

}

Writer()

{

**while** (TRUE) // loop forever

{

make\_data(&info); // create data to write

ReaderWriters.StartWrite();

writeDatabase(); // call writeDatabase function in monitor

ReadersWriters.EndWrite();

}

}

**Ans 3.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Process | Allocation | Max | Available | Need | Work | Available (R) | Need (R) | Work (R) |
|  | A B C D | A B C D | A B C D | A B C D | A B C D | A B C D | A B C D | A B C D |
| *P*0 | 4 1 0 0 | 6 5 6 0 | 4 13 18 2 | 2 4 6 0 | 8 14 18 2 (1) | 4 11 14 2 | 2 4 6 0 | 8 12 14 2 (1) |
| *P*1 | 2 3 6 0 | 2 5 6 0 |  | 0 2 0 0 | 10 17 24 2 (2) |  | 0 2 0 0 | 10 15 20 2 (2) |
| *P*2 | 4 5 3 1 | 6 5 3 2 |  | 2 0 0 1 | 14 22 27 3 (3) |  | 2 0 0 1 | 14 20 23 3 (3) |
| *P*3 | 2 1 0 0 | 2 1 0 0 |  | 0 0 0 0 | 16 23 27 3 (4) |  | 0 0 0 0 | 16 21 23 3 (4) |
| *P*4 | 0 0 0 1  0 2 4 1 | 0 5 7 1 |  | 0 5 7 0 | 16 23 27 4 (5) |  | 0 3 3 0 | 16 23 27 4 (5) |

Safe Sequence is < P0, P1, P2, P3, P4 >

After request from process P4 for (0,2,4,0) , safe sequence is <P0, P1, P2, P3, P4>

**Ans4**

**(a) 22 bits**

**(b) 4 KB**

**(c) 220 entries**

**(d) 10 bits**

**Ans5**

150 = h ( 10 + 100 ) + (1-h) (10 + 100 + 100)

100 h = 60

h= 0.6 (60 %)