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D17B101

EXPERIMENT 10

Aim: Write a program to demonstrate Chandy Misra Hass algorithm for deadlock management in distributed system

Theory

Chandy Hass algorithm is considered an edge-chasing probe-based algorithm. It is also considered one of the best deadlock detection algorithms for distributed system.

If a process makes a request for a resource which failes or times out, the process generates a probe message and sends it to each one of the process holding one or more of its required resources.

Each probe message contains the following information:

- The id of the process that is blocked (the one that includes the probe message)
- The id of the process is sending this particular version of the probe message, and the id of the process that should receive the probe message.

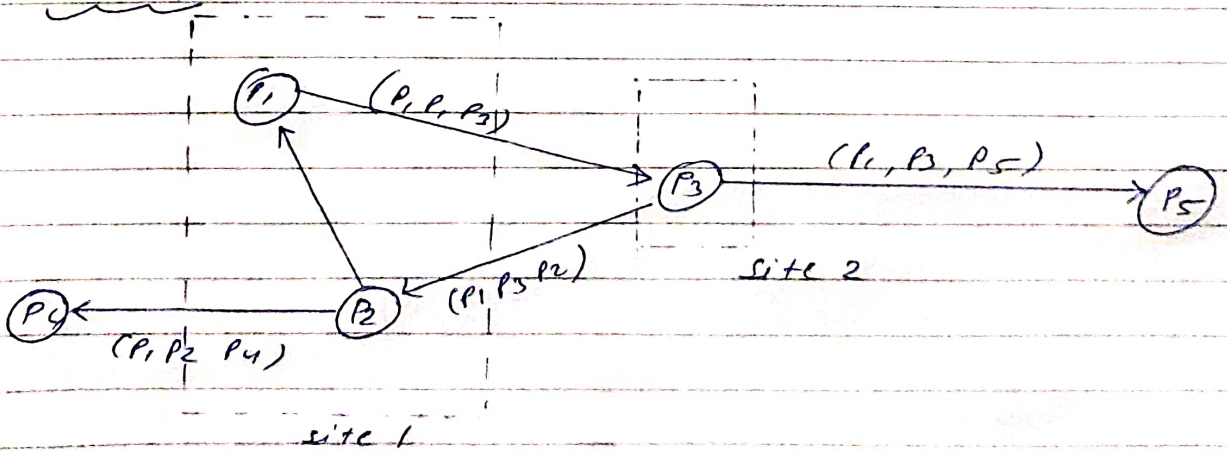
When a probe receives a message it checks to see if it is also waiting for resources. If not, it is currently using the needed resource, and will eventually finish and release the resources.

If it is waiting for resources it passes on the probe message to all processes it knows to be holding resource it has itself requested.

The process first modifies the probe message, changing the sender and receiver ids.

If a process receives a probe message that it recognizes as having initiated, it knows there is a cycle in the system and thus deadlock.

Example



In the above case, P_1 initiates the probe message, so that all the messages shown have P_1 as the initiator. When the probe message is received by process P_3, it modifies it and sends it two or more processes. Eventually, the probe message returns to process P_1. Hence, a deadlock detected.

Advantages:

- Easier to implement.
- Each process is of fixed length
- There is very little computation
- There is very little overhead
- There is no need to construct a graph nor to pass graph information to other sites.
- There is no need for special data structure.

Conclusion:

Chandy Misra Haas algorithm for deadlock management in distributed system has been implemented

```
import java.io.*;

public class ChandyMisraHaas
{
public static int flag=0;
public static void main(String args[])throws Exception
{
BufferedReader ob=new BufferedReader(new InputStreamReader(System.in));
int init,aa,bb,x=0,end=5;

File input=new File("Dependencies.txt");
BufferedReader in=new BufferedReader(new InputStreamReader(new FileInputStream(input)));
String line;int[][] a=new int[end][end];
line=in.readLine();line=in.readLine();
while((line=in.readLine())!=null)
        {aa=3;bb=4;
        for(int y=0 ; y<end ; y++)
                {
                a[x][y]=Integer.parseInt(line.substring(aa,bb));
                aa+=2;bb+=2;
                }
        x++;
        }

System.out.println("_____"
);System.out.println();
System.out.println(" CHANDY-MISRA-HAAS DISTRIBUTED DEADLOCK DETECTION
ALGORITHM");System.out.println();
System.out.println("\tS1\tS2\tS3\tS4\tS5");
for(int i=0 ; i<end ; i++)
        {
        System.out.print("S"+(i+1)+"\t");
        for(int j=0 ; j<end ; j++)
                {
                System.out.print(a[i][j]+"\t");
                }
        System.out.println();
        }

System.out.println();System.out.print("Enter Initiator Site No. : ");
init=Integer.parseInt(ob.readLine());
int j=init-1;

System.out.println();System.out.println();
```

```
System.out.println(" DIRECTION\tPROBE");System.out.println();

for (int k=0 ; k<end; k++)
        {
        if(a[j][k]==1)
                {
                System.out.println(" S"+(j+1)+" --> S"+(k+1)+"     ("+init+","+(j+1)+","+(k+1)+")");
                aman(a,j,k);
                }
        }
if(flag==0){System.out.println();System.out.println(" NO DEADLOCK DETECTED");}
System.out.println("_____________________________________________________________________"
);
ob.readLine();

}

public static void aman(int[][] a,int init,int k)
{int end=5;
for(int x=0 ; x<end ; x++)
        {
        if(a[k][x]==1)
                {
                if(init==x)
                        {
                        System.out.println(" S"+(k+1)+" --> S"+(x+1)+"
("+(init+1)+","+(k+1)+","+(x+1)+")"+" --------> DEADLOCK DETECTED");
                        flag=1;break;
                        }
                System.out.println(" S"+(k+1)+" --> S"+(x+1)+"
("+(init+1)+","+(k+1)+","+(x+1)+")");
                aman(a,init,x);
                }
        }
}

}
```

Deadlock Detected

```
Select C:\Windows\System32\cmd.exe - java  ChandyMisraHaas

C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>java ChandyMisraHaas
_____________________________________________________________

 CHANDY-MISRA-HAAS DISTRIBUTED DEADLOCK DETECTION ALGORITHM

       S1      S2      S3      S4      S5
S1     0       1       0       1       0
S2     0       0       1       0       0
S3     0       0       0       1       0
S4     0       0       1       1       0
S5     0       0       0       0       0

Enter Initiator Site No. : 3


 DIRECTION      PROBE

 S3 --> S4     (3,3,4)
 S4 --> S3     (3,4,3) --------> DEADLOCK DETECTED
_____________________________________________________________
```

```
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>java ChandyMisraHaas
_____________________________________________________________

 CHANDY-MISRA-HAAS DISTRIBUTED DEADLOCK DETECTION ALGORITHM

       S1      S2      S3      S4      S5
S1     0       1       0       1       0
S2     0       0       1       0       0
S3     0       0       0       0       1
S4     0       0       1       1       0
S5     0       0       0       0       0

Enter Initiator Site No. : 4


 DIRECTION      PROBE

 S4 --> S3     (4,4,3)
 S3 --> S5     (4,3,5)
 S4 --> S4     (4,4,4)
 S4 --> S3     (4,4,3)
 S3 --> S5     (4,3,5)
 S4 --> S4     (4,4,4) --------> DEADLOCK DETECTED
_____________________________________________________________
```

No Deadlock Detected

```
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>
C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>javac ChandyMisraHaas.java

C:\Users\User\Desktop\sem8-exps-anish\DC\exp10>java ChandyMisraHaas
_____________________________________________________________

 CHANDY-MISRA-HAAS DISTRIBUTED DEADLOCK DETECTION ALGORITHM

        S1      S2      S3      S4      S5
S1      0       1       0       1       0
S2      0       0       1       0       0
S3      0       0       0       0       1
S4      0       0       1       1       0
S5      0       0       0       0       0

Enter Initiator Site No. : 3


 DIRECTION      PROBE

 S3 --> S5     (3,3,5)

 NO DEADLOCK DETECTED
```