Terna Engineering College
Computer Engineering Department
Program: Sem VIII

Course: Distributed Computing Lab (CSL802)

Faculty: Rohini Patil

Experiment No. 5

A.1 Aim: To Implement a Bully Algorithm.

PART B
(PART B: TO BE COMPLETED BY STUDENTS)

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Date of Experiment: 10-02-2022	**Date of Submission:** 10-02-2022
Grade:	

B.1 Software Code written by student:

- **Bully.java**

```
import java.util.*;
import java.util.*;
class Bully
{
   public static void main(String args[])
   {
      Scanner sc=new Scanner(System.in);
      System.out.println("Enter the number of processes(starting with 0): ");
      int p;
      p=sc.nextInt();
      int a[]=new int[p+1];
      System.out.println("Enter the process number which fails:  ");
      int f;
      f=sc.nextInt();
      int i;
      for(i=0;i<=p;i++)
      {
```

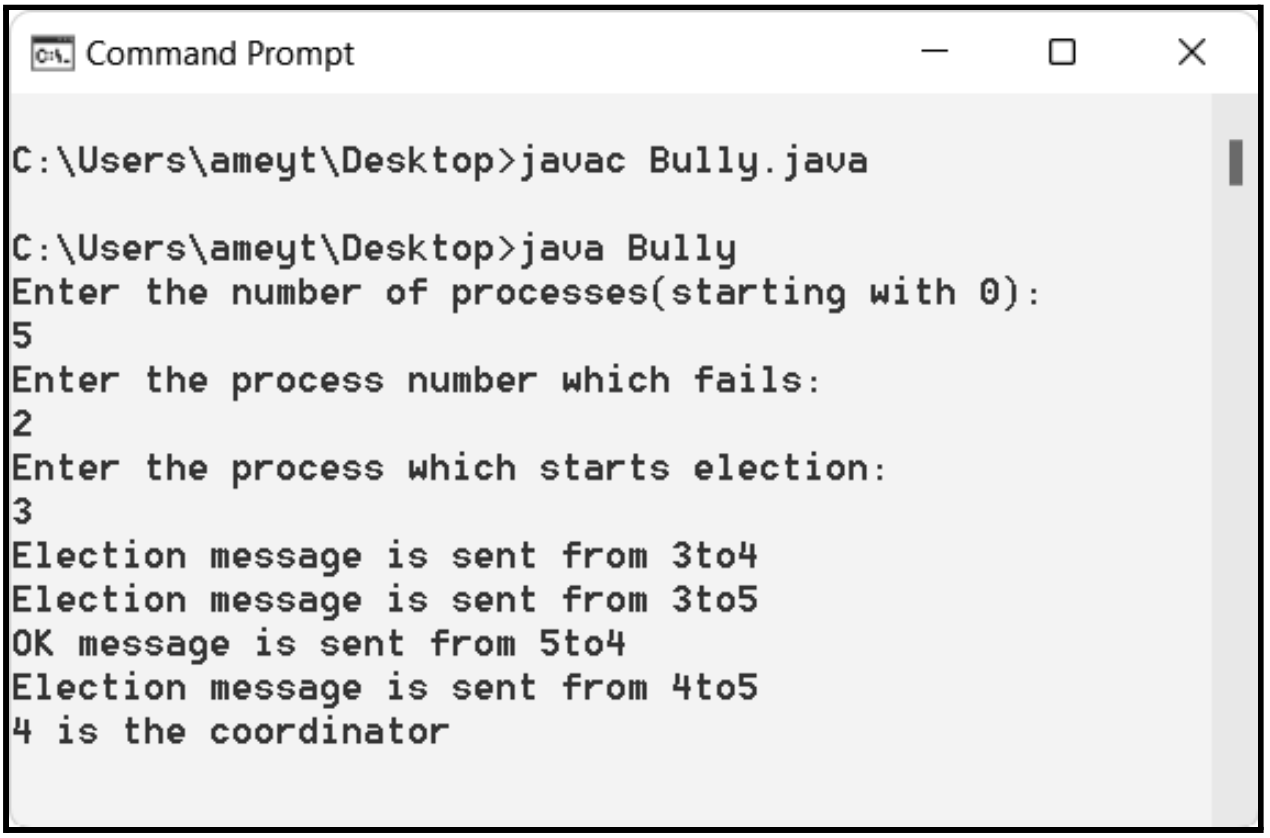
```
            if (i!=f)
            {
               a[i]=1;
            }
            else
            {
               a[i]=0;
            }
         }
         System.out.println("Enter the process which starts election: ");
         int e;
         e=sc.nextInt();

         while(e<=p)
         {
            if(e==f)
            {
               e=e+1;
               continue;
            }

            for(i=0;i<=p;i++)
            {

               if(e<i  && (e!=f || e>f))
               {
                  System.out.println("Election message is sent from "+e+ "to" +i);
               }
            }
            e=e+1;
            for(i=0;i<=p;i++)
            {
               if((e<i)&&(i!=f))
               {
                  System.out.println("OK message is sent from "+i+"to"+e);
               }
            }
         }
         System.out.println((e-2)+" is the coordinator");
      }
   }
```

B.2 Input and Output:



B.3 Observations and learning:

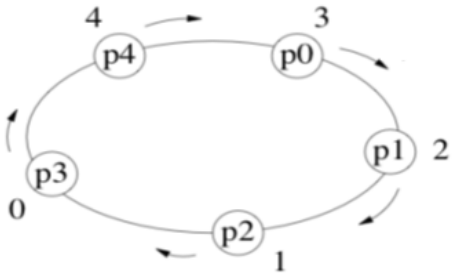
- The bully algorithm is a sort of Election algorithm that is used to select a point.
- In a distributed system, election algorithms like bully and ring are required to select a coordinator who performs duties required by other processes.
- Election algorithms choose a single process from among those that serve as coordinators.
- When the selected coordinator process fails for whatever reason, a new process is chosen.
- The election algorithms are used to identify where the new copy of the coordinator should be restarted.

B.4 Conclusion:

As a result, we've successfully constructed and understood the Bully Algorithm concept in Java.

B.5 Question of Curiosity:

Q1: Consider the following steps of the Leader Election algorithm as shown in the figure.



1. send value of own id to the left
2. when receive an id j (from the right):
3. if j > id then
4. forward j to the left (this processor has lost)
5. if j = id then
6. elect self (this processor has won)
7. if j < id then
8. do nothing

Calculate the total number of messages for such algorithm:

A. 10
B. 12
C. 15
D. 20

ANS: C. 15

Q2: Consider the O(nlogn) Messages Leader Election (LE) Algorithm and answer the following: k-neighbourhood of a processor includes exactly _____processors and the number of messages initiated by a processor in phase k is at most _____

A. $2k-1, 2^k$
B. 2k, 4k
C. $2k+1, 4*2^k$
D. $2^k, 2*4^k$

ANS: C. $2k+1, 4*2^k$

Q3. In distributed systems, election algorithms assumes that

A. a unique priority number is associated with each active process in system
B. there is no priority number associated with any process
C. priority of the processes is not required
D. none of the mentioned

ANS: A. a unique priority number is associated with each active process in system