NAME: SHASHWAT SHAH SAP ID: 60004220126 DIV/BATCH: C22

## DISTRIBUTED COMPUTING (DC) EXPERIMENT 07

AIM: To implement Bully Election Algorithm in JAVA.

```
CODE:
```

```
Bully.java
import java.util.*;
public class Bully {
  static int n; // Number of processes
  static int pro[] = new int[100]; // Process IDs
  static int sta[] = new int[100]; // Status of processes (1 = active, 0 = crashed)
  static int co; // Coordinator process
  public static void main(String[] args) {
    Scanner sc = new Scanner(System.in);
    System.out.print("Enter the number of processes: ");
    n = sc.nextInt();
    // Initialize processes and their statuses
    for (int i = 0; i < n; i++) {
      sta[i] = 1; // All processes are initially active
      pro[i] = i; // Process IDs from 0 to n-1
    }
    boolean choice = true;
    int ch;
    int cl = 1; // Control flag
    // Menu-driven program
    do {
       System.out.println("\nEnter Your Choice");
       System.out.println("1. Crash Process");
       System.out.println("2. Recover Process");
       System.out.println("3. Exit");
       System.out.print(">");
       ch = sc.nextInt();
       switch (ch) {
         case 1: // Crash a process
           System.out.print("Enter the process number to crash: ");
           int c = sc.nextInt();
           if (c \le n \&\& c > 0) {
              sta[c - 1] = 0; // Mark process as crashed
              System.out.println("Process " + c + " has crashed.");
              cl = 1;
           } else {
```

```
}
           break;
         case 2: // Recover a process
           System.out.print("Enter the process number to recover: ");
           c = sc.nextInt();
           if (c \le n \&\& c > 0) {
              sta[c - 1] = 1; // Mark process as active
              System.out.println("Process " + c + " has recovered.");
              cl = 1;
           } else {
              System.out.println("Invalid process number.");
           break;
         case 3: // Exit the program
           choice = false;
           cl = 0;
           break;
         default:
           System.out.println("Invalid choice. Please try again.");
      }
       // If a process crashed or recovered, initiate election
       if (cl == 1) {
         System.out.print("Which process will initiate election?");
         int ele = sc.nextInt();
         if (ele <= n && ele > 0 && sta[ele - 1] == 1) {
           elect(ele);
           System.out.println("Final coordinator is Process" + co);
           System.out.println("Invalid or inactive process cannot initiate an election.");
         }
    } while (choice);
    sc.close();
  }
  // Election method based on Bully Algorithm
  static void elect(int ele) {
    ele = ele - 1; // Adjust for zero-based indexing
    co = ele + 1; // Assume initiator as coordinator
    // Send election messages to higher-numbered processes
    for (int i = 0; i < n; i++) {
       if (pro[ele] < pro[i]) {</pre>
         System.out.println("Election message is sent from Process" + (ele + 1) + " to Process" + (i +
1));
```

System.out.println("Invalid process number.");

## **OUTPUT:**

```
PROBLEMS (10) OUTPUT TERMINAL DEBUG CONSOLE PORTS
PS C:\Users\savla\Documents\SEM 7 PRACS\DC> cd "c:\Users\savla\Documents\SEM 7 PRACS\DC\"; if ($?) { javac Bully.java }; if ($?) { java Bully }
Enter the number of process:
Enter Your Choice

    Crash Process

2. Recover Process
3. Exit
Enter the process number: 1
Which process will initiate election? = 2
Election message is sent from 2 to 3 Ok message is sent from 3 to 2
Election message is sent from 3 to 4
Ok message is sent from 4 to 3
Election message is sent from 4 to 5
Ok message is sent from 5 to 4
Election message is sent from 3 to 5
Ok message is sent from 5 to 3
Election message is sent from 2 to 4
Ok message is sent from 4 to 2
Election message is sent from 4 to 5
Ok message is sent from 5 to 4
Election message is sent from 2 to 5
Ok message is sent from 5 to 2
Final coordinator is 5
Enter Your Choice

    Crash Process

2. Recover Process
3. Exit
Enter the process number: 5
Which process will initiate election? = 3
Election message is sent from 3 to 4
Ok message is sent from 4 to 3
Election message is sent from 4 to 5
Election message is sent from 3 to 5
Final coordinator is 4
Enter Your Choice
1. Crash Process
2. Recover Process
Enter the process number: 1
 Which process will initiate election? = 3
Election message is sent from 3 to 4
 Ok message is sent from 4 to 3
Election message is sent from 4 to 5 Election message is sent from 3 to 5
 Final coordinator is 4
Enter Your Choice
1. Crash Process
 2. Recover Process
3. Exit
```