Practical 06

Program :-

Bully Algorithm :

```
import java.util.*;


public class Bully {
    int coordinator;
    int max_processes;
    boolean processes[];



    public Bully(int max) {
        max_processes = max;
        processes = new boolean[max_processes];
        coordinator = max;


        System.out.println("Creating processes..");
        for(int i = 0; i < max; i++) {
            processes[i] = true;
            System.out.println("P"+ (i+1) + " created");
        }
        System.out.println("Process P" + coordinator + " is the coordinator");

    }
    void displayProcesses() {
        for(int i = 0; i < max_processes; i++) {
            if(processes[i]) {
                System.out.println("P" + (i+1) + " is up");
            } else {
                System.out.println("P" + (i+1) + " is down");
            }
        }
        System.out.println("Process P" + coordinator + " is the coordinator");
    }

    void upProcess(int process_id) {
        if(!processes[process_id - 1]) {
            processes[process_id - 1] = true;
            System.out.println("Process " + process_id + " is now up.");
        } else {
            System.out.println("Process " + process_id + " is already up.");
        }
    }

    void downProcess(int process_id) {
        if(!processes[process_id - 1]) {
            System.out.println("Process " + process_id + " is already down.");
        } else {
            processes[process_id - 1] = false;
            System.out.println("Process " + process_id + " is down.");
        }
    }


    void runElection(int process_id) {

        coordinator = process_id;

        boolean keepGoing = true;


        for(int i = process_id; i < max_processes && keepGoing; i++) {

            System.out.println("Election message sent from process " + process_id + " to process
" + (i+1));


            if(processes[i]) {

                keepGoing = false;

                runElection(i + 1);

            }

        }

    }


    public static void main(String args[]) {

        Bully bully = null;

        int max_processes = 0, process_id = 0;

        int choice = 0;

        Scanner sc = new Scanner(System.in);


        while(true) {

            System.out.println("Bully Algorithm");

            System.out.println("1. Create processes");
System.out.println("2. Display processes");
System.out.println("3. Up a process");
System.out.println("4. Down a process");
System.out.println("5. Run election algorithm");
System.out.println("6. Exit Program");
System.out.print("Enter your choice:- ");
choice = sc.nextInt();

switch(choice) {
  case 1:
    System.out.print("Enter the number of processes:- ");
    max_processes = sc.nextInt();
    bully = new Bully(max_processes);
    break;
  case 2:
    bully.displayProcesses();
    break;
  case 3:
    System.out.print("Enter the process number to up:- ");
    process_id = sc.nextInt();
    bully.upProcess(process_id);
    break;
  case 4:
    System.out.print("Enter the process number to down:- ");
    process_id = sc.nextInt();
    bully.downProcess(process_id);
```

```
                break;
            case 5:
                System.out.print("Enter the process number which will perform election:- ");
                process_id = sc.nextInt();
                bully.runElection(process_id);
                bully.displayProcesses();
                break;
            case 6:
                System.exit(0);
                break;
            default:
                System.out.println("Error in choice. Please try again.");
                break;
          }
        }
    }
}
```

Ring Algorithm :

```
import java.util.*;

public class Ring {
    int max_processes;
    int coordinator;
    boolean processes[];
    ArrayList<Integer> pid;
```

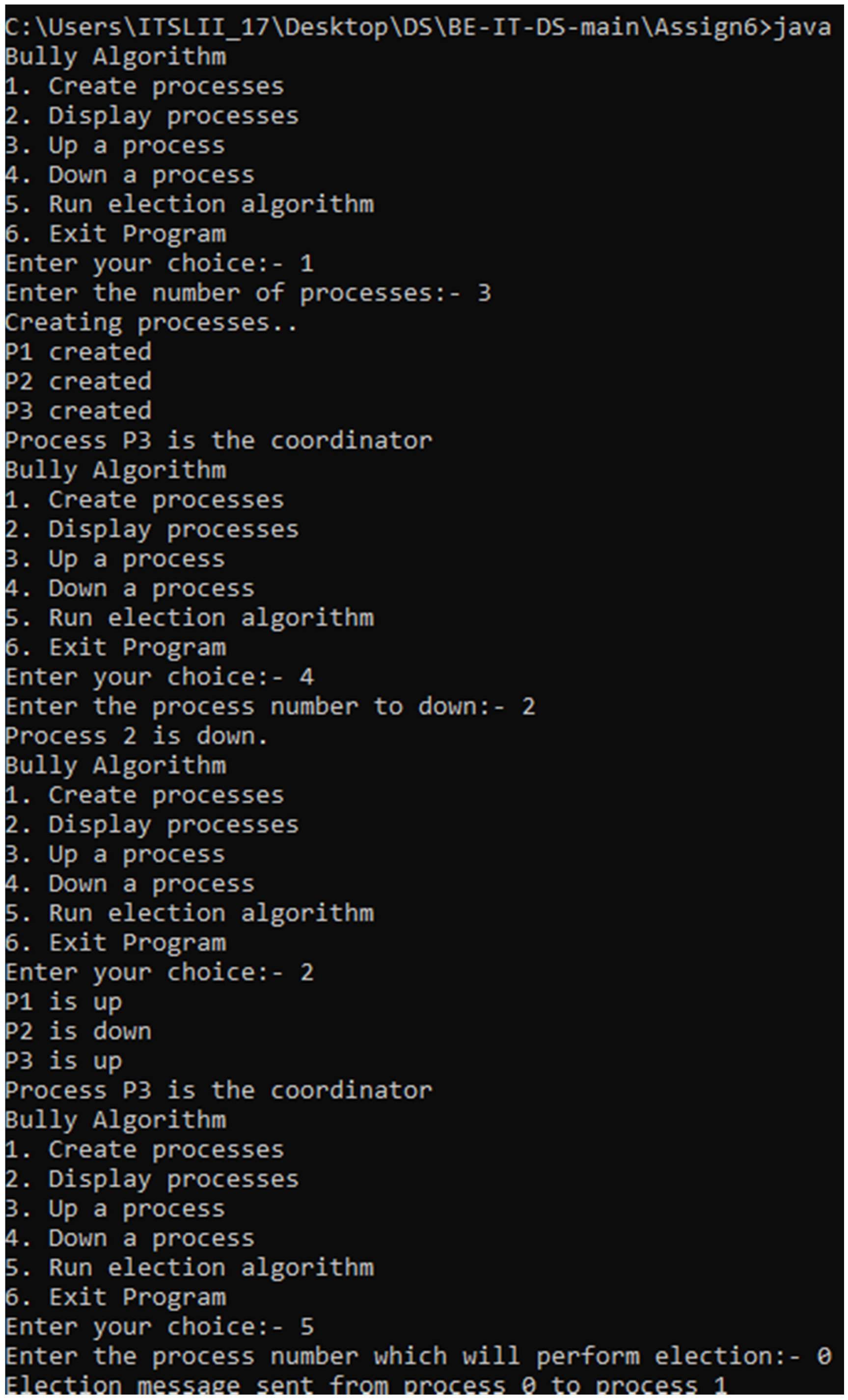
```
public Ring(int max) {
    coordinator = max;
    max_processes = max;
    pid = new ArrayList<Integer>();
    processes = new boolean[max];

    for(int i = 0; i < max; i++) {
        processes[i] = true;
        System.out.println("P" + (i+1) + " created.");
    }
    System.out.println("P" + (coordinator) + " is the coordinator");
}

void displayProcesses() {
    for(int i = 0; i < max_processes; i++) {
        if(processes[i])
            System.out.println("P" + (i+1) + " is up.");
        else
            System.out.println("P" + (i+1) + " is down.");
    }
    System.out.println("P" + (coordinator) + " is the coordinator");
}

void upProcess(int process_id) {
    if(!processes[process_id-1]) {
        processes[process_id-1] = true;
        System.out.println("Process P" + (process_id) + " is up.");
    } else {
        System.out.println("Process P" + (process_id) + " is already up.");
    }
}

void downProcess(int process_id) {
    if(!processes[process_id-1]) {
        System.out.println("Process P" + (process_id) + " is already down.");
    } else {
        processes[process_id-1] = false;
        System.out.println("Process P" + (process_id) + " is down.");
    }
}

void displayArrayList(ArrayList<Integer> pid) {
    System.out.print("[ ");
    for(Integer x : pid) {
        System.out.print(x + " ");
    }
    System.out.print(" ]\n");
}

void initElection(int process_id) {
    if(processes[process_id-1]) {
        pid.add(process_id);

        int temp = process_id;

        System.out.print("Process P" + process_id + " sending the following list:- ");
        displayArrayList(pid);

        while(temp != process_id - 1) {
            if(processes[temp]) {
                pid.add(temp+1);
                System.out.print("Process P" + (temp + 1) + " sending the following list:- ");
                displayArrayList(pid);
            }
            temp = (temp + 1) % max_processes;
        }
        coordinator = Collections.max(pid);
        System.out.println("Process P" + process_id + " has declared P" + coordinator + " as
the coordinator");
        pid.clear();
    }
}

public static void main(String args[]) {
    Ring ring = null;
    int max_processes = 0, process_id = 0;
    int choice = 0;
```

```
Scanner sc = new Scanner(System.in);

while(true) {
    System.out.println("Ring Algorithm");
    System.out.println("1. Create processes");
    System.out.println("2. Display processes");
    System.out.println("3. Up a process");
    System.out.println("4. Down a process");
    System.out.println("5. Run election algorithm");
    System.out.println("6. Exit Program");
    System.out.print("Enter your choice:- ");
    choice = sc.nextInt();

    switch(choice) {
        case 1:
            System.out.print("Enter the total number of processes:- ");
            max_processes = sc.nextInt();
            ring = new Ring(max_processes);
            break;
        case 2:
            ring.displayProcesses();
            break;
        case 3:
            System.out.print("Enter the process to up:- ");
            process_id = sc.nextInt();
            ring.upProcess(process_id);
```

```
                break;
            case 4:
                System.out.print("Enter the process to down:- ");
                process_id = sc.nextInt();
                ring.downProcess(process_id);
                break;
            case 5:
                System.out.print("Enter the process which will initiate election:- ");
                process_id = sc.nextInt();
                ring.initElection(process_id);
                break;
            case 6:
                System.exit(0);
                break;
            default:
                System.out.println("Error in choice. Please try again.");
                break;
          }
        }
      }
    }
```

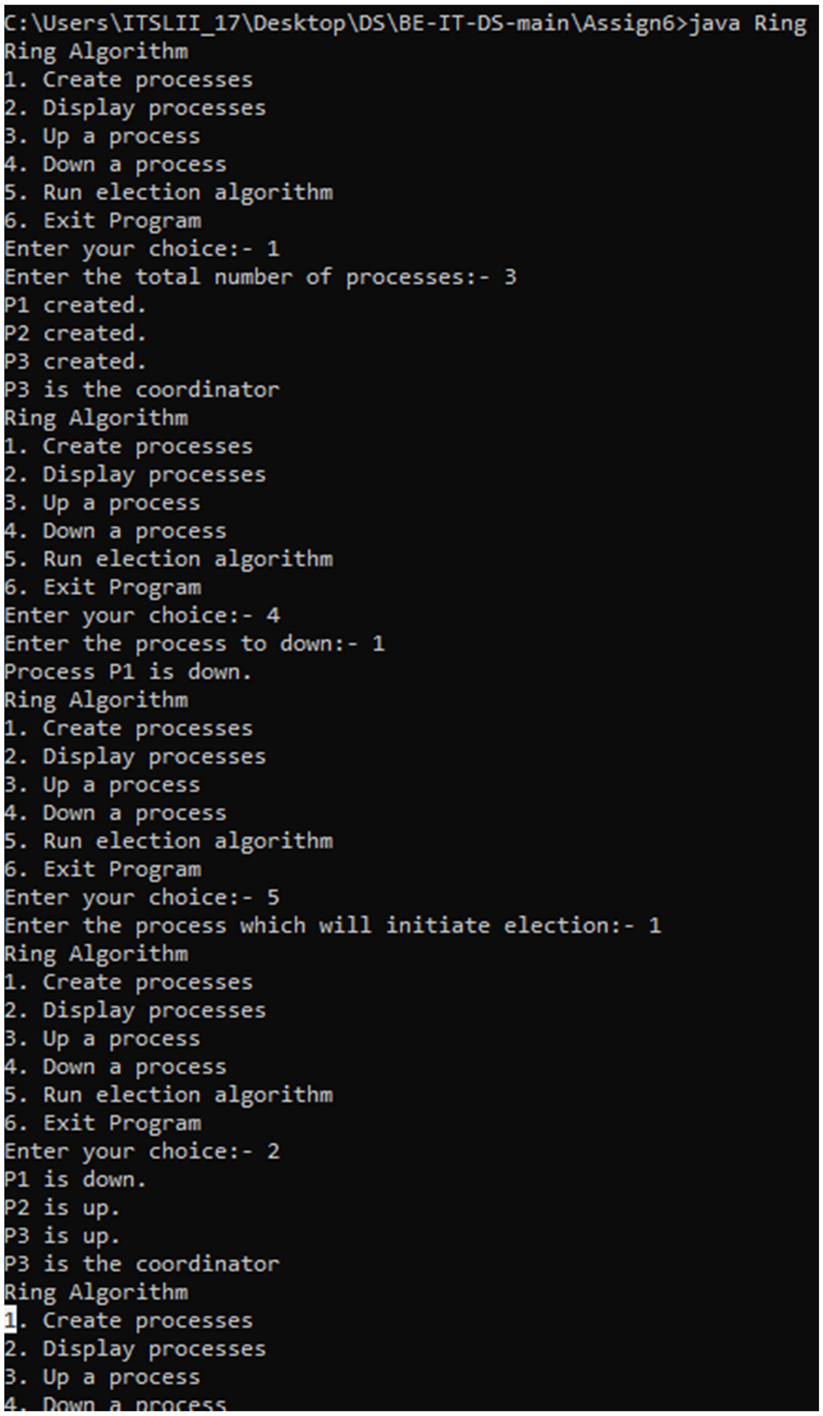
Output :-

Bully Algorithm :



```
C:\Users\ITSLII_17\Desktop\DS\BE-IT-DS-main\Assign6>java
Bully Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 1
Enter the number of processes:- 3
Creating processes..
P1 created
P2 created
P3 created
Process P3 is the coordinator
Bully Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 4
Enter the process number to down:- 2
Process 2 is down.
Bully Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 2
P1 is up
P2 is down
P3 is up
Process P3 is the coordinator
Bully Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 5
Enter the process number which will perform election:- 0
Election message sent from process 0 to process 1
```

Ring Algorithm :



```
C:\Users\ITSLII_17\Desktop\DS\BE-IT-DS-main\Assign6>java Ring
Ring Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 1
Enter the total number of processes:- 3
P1 created.
P2 created.
P3 created.
P3 is the coordinator
Ring Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 4
Enter the process to down:- 1
Process P1 is down.
Ring Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 5
Enter the process which will initiate election:- 1
Ring Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
5. Run election algorithm
6. Exit Program
Enter your choice:- 2
P1 is down.
P2 is up.
P3 is up.
P3 is the coordinator
Ring Algorithm
1. Create processes
2. Display processes
3. Up a process
4. Down a process
```