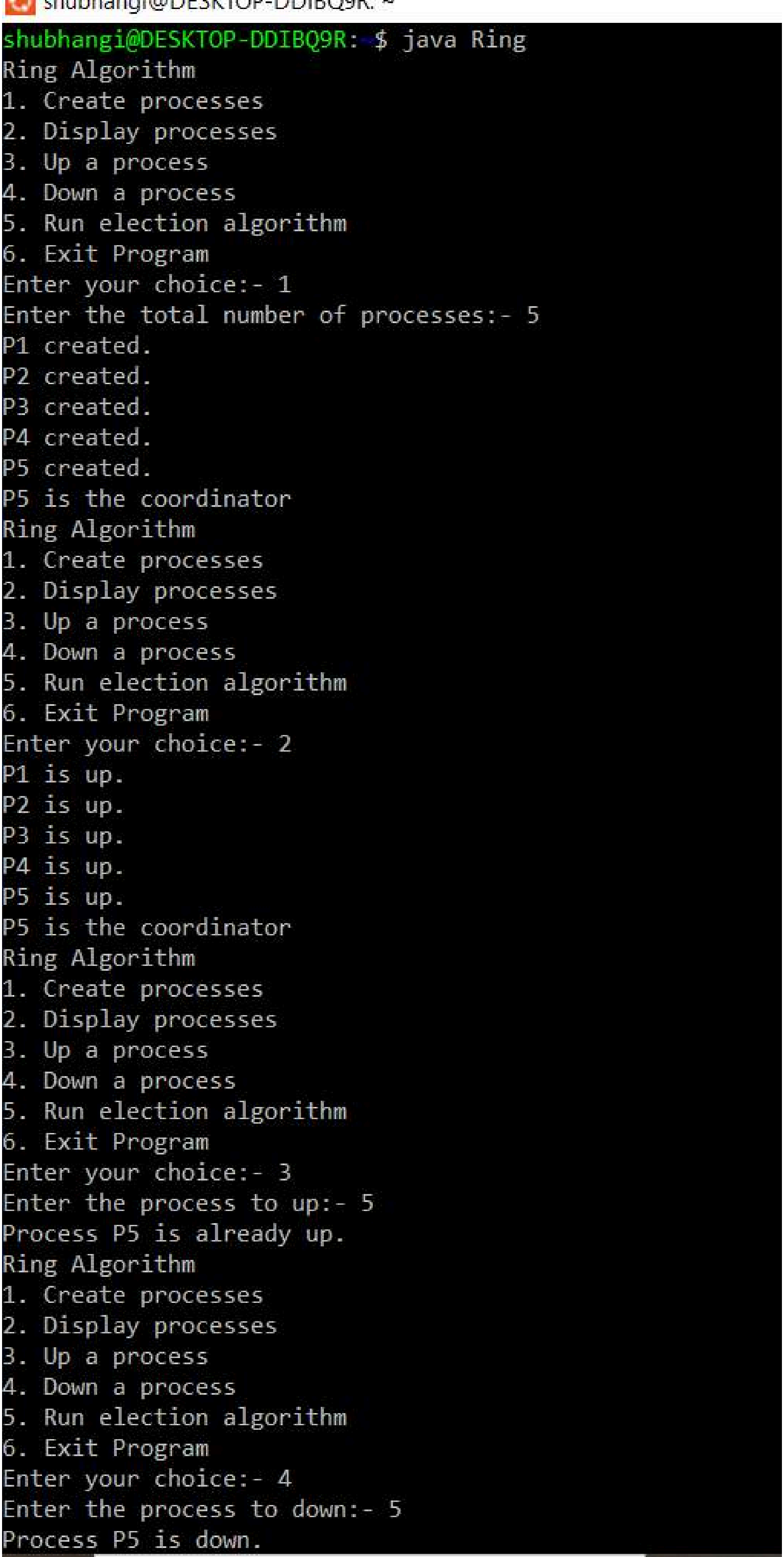
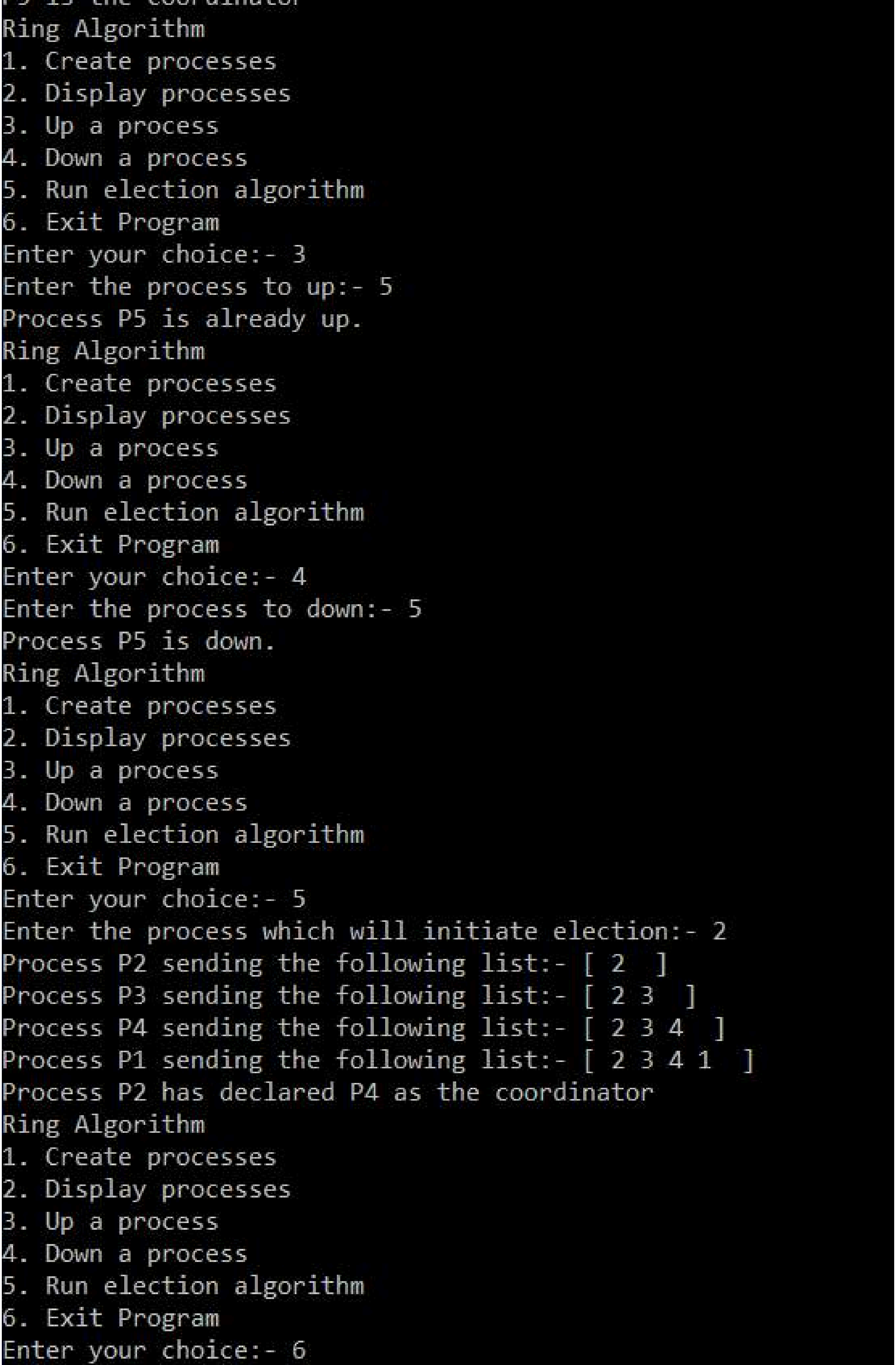
```java
import java.util.*;

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;
            }
        }
    }
}
```



```
shubhangi@DESKTOP-DDIBQ9R:~$ 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:- 5
P1 created.
P2 created.
P3 created.
P4 created.
P5 created.
P5 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:- 2
P1 is up.
P2 is up.
P3 is up.
P4 is up.
P5 is up.
P5 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:- 3
Enter the process to up:- 5
Process P5 is already up.
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:- 5
Process P5 is down.
```



```
P5 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:- 3
Enter the process to up:- 5
Process P5 is already up.
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:- 5
Process P5 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:- 2
Process P2 sending the following list:- [ 2  ]
Process P3 sending the following list:- [ 2 3  ]
Process P4 sending the following list:- [ 2 3 4  ]
Process P1 sending the following list:- [ 2 3 4 1  ]
Process P2 has declared P4 as 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:- 6
```