Assignment No.6

Problem Statement:

Implement Bully and Ring algorithm for leader election.

Code:

1. **Ring**

```
import java.util.Scanner;

public class Ring {

	public static void main(String[] args) {

		// TODO Auto-generated method stub
		int temp, i, j;
		char str[] = new char[10];
		Rr proc[] = new Rr[10];

// object initialisation
		for (i = 0; i < proc.length; i++)
			proc[i] = new Rr();

// scanner used for getting input from console
		Scanner in = new Scanner(System.in);
		System.out.println("Enter the number of process : ");
		int num = in.nextInt();

// getting input from users
		for (i = 0; i < num; i++) {
			proc[i].index = i;
			System.out.println("Enter the id of process : ");
			proc[i].id = in.nextInt();
			proc[i].state = "active";
			proc[i].f = 0;
		}

// sorting the processes from on the basis of id
		for (i = 0; i < num - 1; i++) {
			for (j = 0; j < num - 1; j++) {
				if (proc[j].id > proc[j + 1].id) {
					temp = proc[j].id;
					proc[j].id = proc[j + 1].id;
					proc[j + 1].id = temp;
				}
			}
		}

		for (i = 0; i < num; i++) {
			System.out.print("  [" + i + "]" + " " + proc[i].id);
		}


		int init;
```

```
		int ch;
		int temp1;
		int temp2;
		int ch1;
		int arr[] = new int[10];

		proc[num - 1].state = "inactive";

		System.out.println("\n process " + proc[num - 1].id + "select as co-
ordinator");

		while (true) {
			System.out.println("\n 1.election 2.quit ");
			ch = in.nextInt();

			for (i = 0; i < num; i++) {
				proc[i].f = 0;
			}

			switch (ch) {
			case 1:
				System.out.println("\n Enter the Process number who
initialsied election : ");
				init = in.nextInt();
				temp2 = init;
				temp1 = init + 1;

				i = 0;

				while (temp2 != temp1) {
					if ("active".equals(proc[temp1].state) &&
proc[temp1].f == 0) {

						System.out.println("\nProcess " +
proc[init].id + " send message to " + proc[temp1].id);
						proc[temp1].f = 1;
						init = temp1;
						arr[i] = proc[temp1].id;
						i++;
					}
					if (temp1 == num) {
						temp1 = 0;
					} else {
						temp1++;
					}
				}

				System.out.println("\nProcess " + proc[init].id + " send
message to " + proc[temp1].id);
				arr[i] = proc[temp1].id;
				i++;
				int max = -1;


// finding maximum for co-ordinator selection
				for (j = 0; j < i; j++) {
					if (max < arr[j]) {
						max = arr[j];
```

```
                                }
                            }

// co-ordinator is found then printing on console
                            System.out.println("\n process " + max + "select as co-
ordinator");


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

                                if (proc[i].id == max) {
                                    proc[i].state = "inactive";
                                }
                            }
                            break;
                    case 2:
            System.out.println("Program terminated ...");
            return ;
                    default:
                            System.out.println("\n invalid response \n");
                            break;
                    }


               }
        }

}

class Rr {

        public int index;   // to store the index of process
        public int id;      // to store id/name of process
        public int f;
        String state;       // indiactes whether active or inactive state of node

}
```

2. Bully

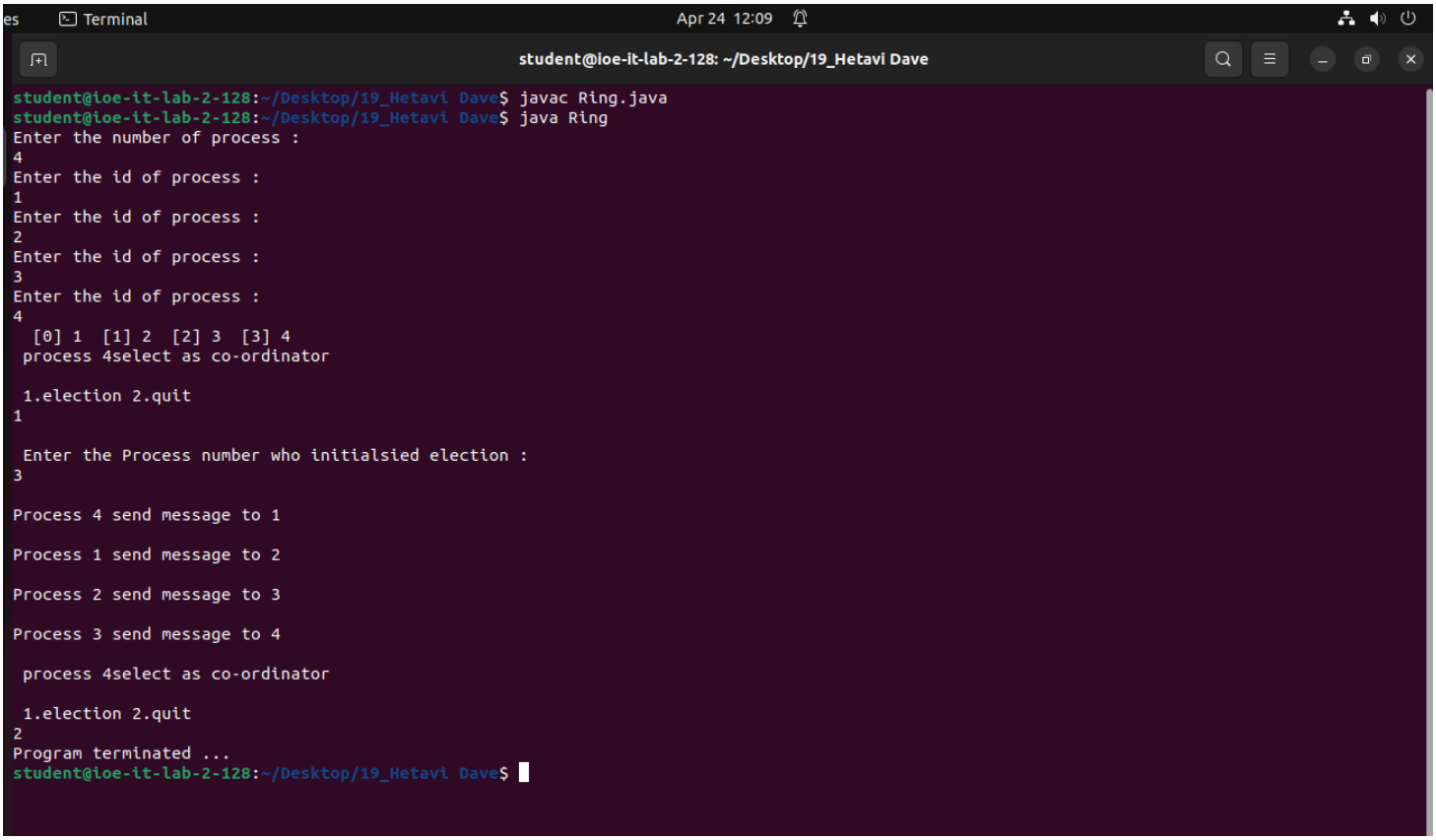
```
import java.io.InputStream;
import java.io.PrintStream;
import java.util.Scanner;

public class Bully {
    static boolean[] state = new boolean[5];
    int coordinator;

    public static void up(int up) {
        if (state[up - 1]) {
            System.out.println("process" + up + "is already up");
        } else {
            int i;
            Bully.state[up - 1] = true;
            System.out.println("process " + up + "held election");
            for (i = up; i < 5; ++i) {
                System.out.println("election message sent from process" + up + "to
process" + (i + 1));
```

```
            }
            for (i = up + 1; i <= 5; ++i) {
                if (!state[i - 1]) continue;
                System.out.println("alive message send from process" + i + "to
process" + up);
                break;
            }
        }
    }

    public static void down(int down) {
        if (!state[down - 1]) {
            System.out.println("process " + down + "is already dowm.");
        } else {
            Bully.state[down - 1] = false;
        }
    }

    public static void mess(int mess) {
        if (state[mess - 1]) {
            if (state[4]) {
                System.out.println("0K");
            } else if (!state[4]) {
                int i;
                System.out.println("process" + mess + "election");
                for (i = mess; i < 5; ++i) {
                    System.out.println("election send from process" + mess + "to
process " + (i + 1));
                }
                for (i = 5; i >= mess; --i) {
                    if (!state[i - 1]) continue;
                    System.out.println("Coordinator message send from process" + i +
"to all");
                    break;
                }
            }
        } else {
            System.out.println("Prccess" + mess + "is down");
        }
    }

    public static void main(String[] args) {
        int choice;
        Scanner sc = new Scanner(System.in);
        for (int i = 0; i < 5; ++i) {
            Bully.state[i] = true;
        }
        System.out.println("5 active process are:");
        System.out.println("Process up  = p1 p2 p3 p4 p5");
        System.out.println("Process 5 is coordinator");
        do {
            System.out.println(".........");
            System.out.println("1 up a process.");
            System.out.println("2.down a process");
            System.out.println("3 send a message");
            System.out.println("4.Exit");
            choice = sc.nextInt();
            switch (choice) {
```

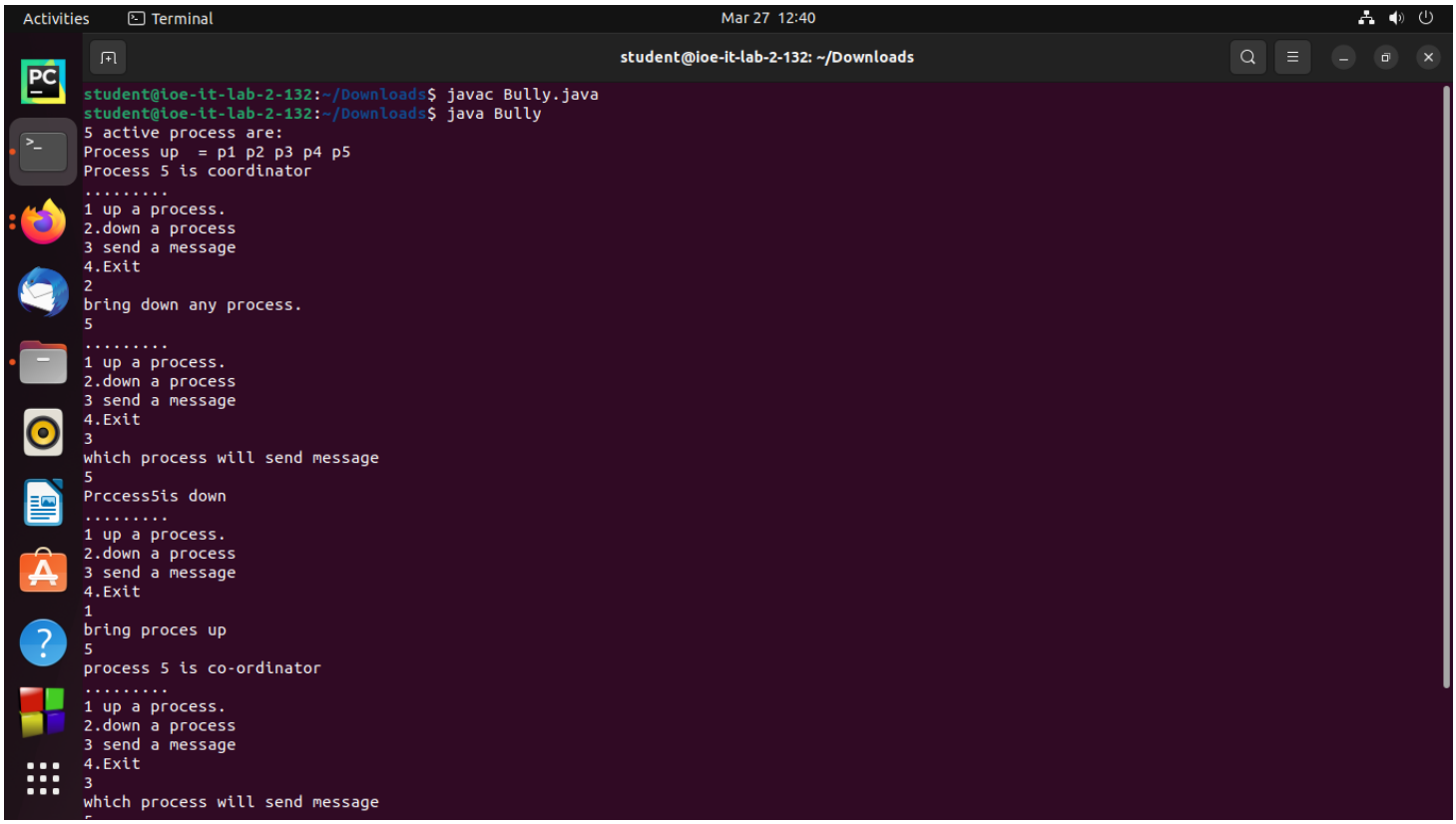
```
                case 1: {
                    System.out.println("bring proces up");
                    int up = sc.nextInt();
                    if (up == 5) {
                        System.out.println("process 5 is co-ordinator");
                        Bully.state[4] = true;
                        break;
                    }
                    Bully.up(up);
                    break;
                }
                case 2: {
                    System.out.println("bring down any process.");
                    int down = sc.nextInt();
                    Bully.down(down);
                    break;
                }
                case 3: {
                    System.out.println("which process will send message");
                    int mess = sc.nextInt();
                    Bully.mess(mess);
                }
            }
        } while (choice != 4);
    }
}
```

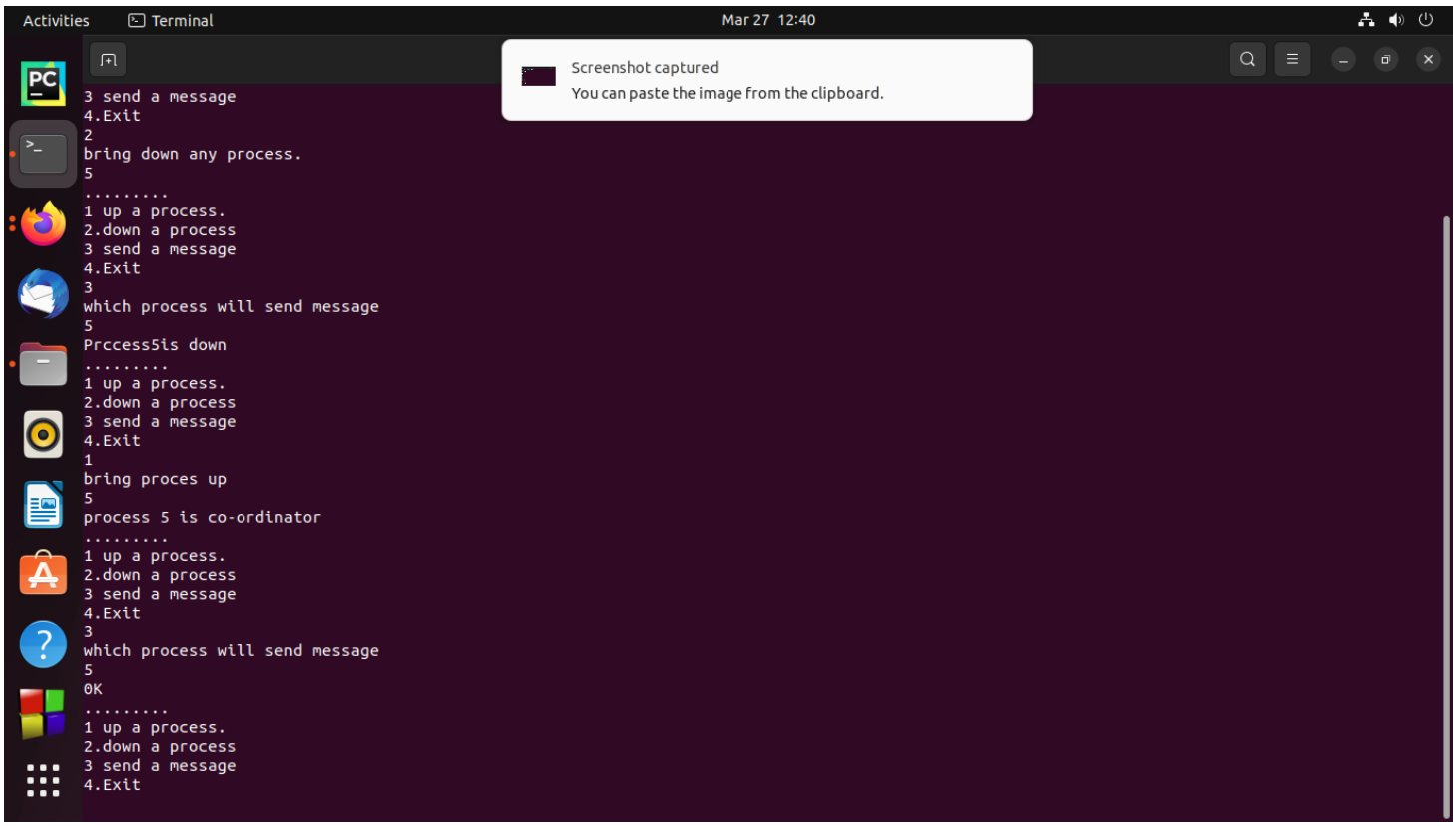
OUTPUT:

1. **Ring**



2. Bully


Activities
Terminal
Mar 27 12:40
student@ioe-it-lab-2-132: ~/Downloads
student@ioe-it-lab-2-132:~/Downloads$ javac Bully.java
student@ioe-it-lab-2-132:~/Downloads$ java Bully
5 active process are:
Process up = p1 p2 p3 p4 p5
Process 5 is coordinator
.....
1 up a process.
2.down a process
3 send a message
4.Exit
2
bring down any process.
5
.....
1 up a process.
2.down a process
3 send a message
4.Exit
3
which process will send message
5
Prccess5is down
.....
1 up a process.
2.down a process
3 send a message
4.Exit
1
bring proces up
5
process 5 is co-ordinator
.....
1 up a process.
2.down a process
3 send a message
4.Exit
3
which process will send message


Activities
Terminal
Mar 27 12:40
Screenshot captured
You can paste the image from the clipboard.
3 send a message
4.Exit
2
bring down any process.
5
.....
1 up a process.
2.down a process
3 send a message
4.Exit
3
which process will send message
5
Prccess5is down
.....
1 up a process.
2.down a process
3 send a message
4.Exit
1
bring proces up
5
process 5 is co-ordinator
.....
1 up a process.
2.down a process
3 send a message
4.Exit
3
which process will send message
5
0K
.....
1 up a process.
2.down a process
3 send a message
4.Exit