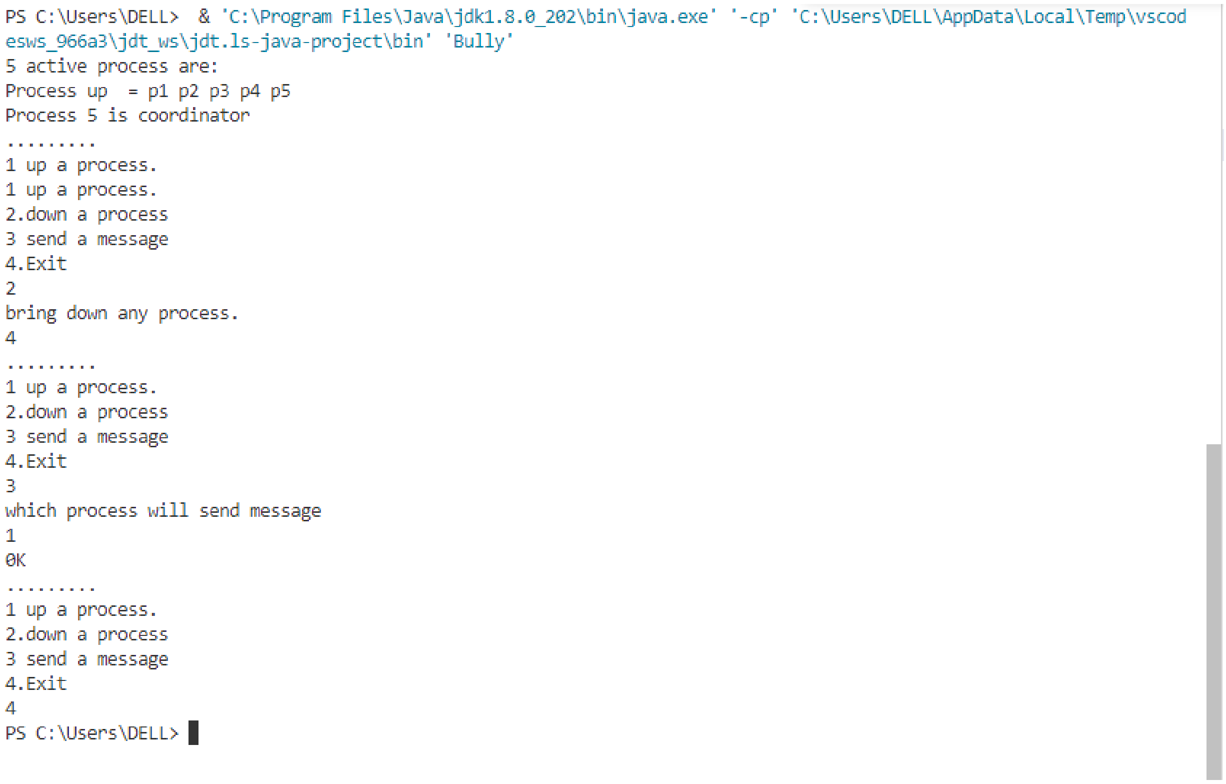
CODE:

Bully.java

```
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: -

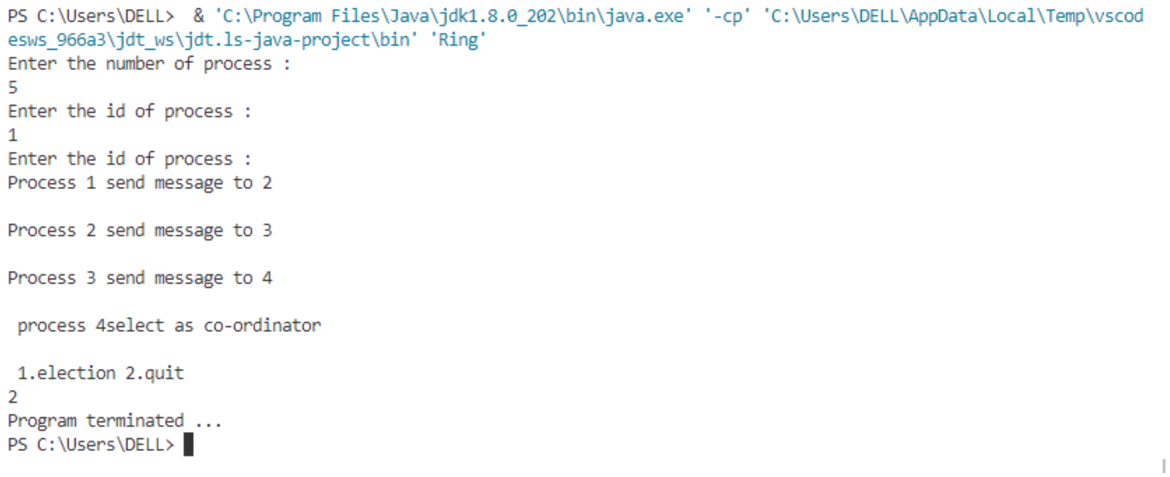


```
PS C:\Users\DELL>  & 'C:\Program Files\Java\jdk1.8.0_202\bin\java.exe' '-cp' 'C:\Users\DELL\AppData\Local\Temp\vscod
esws_966a3\jdt_ws\jdt.ls-java-project\bin' 'Bully'
5 active process are:
Process up  = p1 p2 p3 p4 p5
Process 5 is coordinator
.........
1 up a process.
1 up a process.
2.down a process
3 send a message
4.Exit
2
bring down any process.
4
.........
1 up a process.
2.down a process
3 send a message
4.Exit
3
which process will send message
1
0K
.........
1 up a process.
2.down a process
3 send a message
4.Exit
4
PS C:\Users\DELL> █
```

Ring.java

```
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
}
```

OUTPUT:



```
PS C:\Users\DELL>  & 'C:\Program Files\Java\jdk1.8.0_202\bin\java.exe' '-cp' 'C:\Users\DELL\AppData\Local\Temp\vscod
esws_966a3\jdt_ws\jdt.ls-java-project\bin' 'Ring'
Enter the number of process :
5
Enter the id of process :
1
Enter the id of process :
Process 1 send message to 2

Process 2 send message to 3

Process 3 send message to 4

 process 4select as co-ordinator

 1.election 2.quit
2
Program terminated ...
PS C:\Users\DELL> █
```