import java.util.\*;

// Bully Algorithm Implementation

class BullyElection {

private int id;

private int[] processes;

private int coordinator;

public BullyElection(int id, int[] processes) {

this.id = id;

this.processes = processes;

this.coordinator = -1;

}

public void startElection() {

System.out.println("Process " + id + " started an election.");

for (int process : processes) {

if (process > id) {

System.out.println("Process " + id + " sent election message to " + process);

}

}

}

public void declareCoordinator(int newCoordinator) {

this.coordinator = newCoordinator;

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

System.out.println("Process " + newCoordinator + " is the new coordinator.");

}

}

// Ring Algorithm Implementation

class RingElection {

private int id;

private List<Integer> ring;

public RingElection(int id, List<Integer> ring) {

this.id = id;

this.ring = new ArrayList<>(ring);

}

public void startElection() {

System.out.println("Process " + id + " started an election.");

List<Integer> electionMessages = new ArrayList<>();

electionMessages.add(id);

int index = ring.indexOf(id);

for (int i = 1; i < ring.size(); i++) {

int nextProcess = ring.get((index + i) % ring.size());

electionMessages.add(nextProcess);

}

int newCoordinator = Collections.max(electionMessages);

System.out.println("Ring Election Result:");

System.out.println("Process " + newCoordinator + " is the new coordinator.");

}

}

public class LeaderElectionDemo {

public static void main(String[] args) {

// Bully Algorithm

int[] processes = {1, 2, 3, 4, 5};

BullyElection bullyElection = new BullyElection(3, processes);

bullyElection.startElection();

bullyElection.declareCoordinator(5);

// Ring Algorithm

List<Integer> ringProcesses = Arrays.asList(1, 2, 3, 4, 5);

RingElection ringElection = new RingElection(3, ringProcesses);

ringElection.startElection();

}

}

Output:

javac LeaderElectionDemo.java

java LeaderElectionDemo

Process 3 started an election.

Process 3 sent election message to 4

Process 3 sent election message to 5

Bully Algorithm Result:

Process 5 is the new coordinator.

Process 3 started an election.

Ring Election Result:

Process 5 is the new coordinator.