

OOP Class

Documentation on assignment2

Computer Science
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1. Candidate class

```
1
2 public class Candidate implements Comparable<Candidate>{
3
4     private String name;
5     private Vote[] votes;
6     private int numVotes=0;
7
8     public Candidate(String name, int maxVotes){
9         this.name=name;
10        votes= new Vote[maxVotes];
11    };
12
13    public String toString(){
14        return "-----Candidate-----\r\n"+"Name: " + this.name + "\r\nVotes: "
15                + numVotes + "\r\n\r\n===== ";
16    }
17
18    public synchronized void addVote(int regionNum){
19        votes[numVotes++] = new Vote(regionNum);
20    }
21
22    public int compareTo(Candidate candi){
23        if(this.numVotes>candi.numVotes) return -1;
24        else if(this.numVotes==candi.numVotes) return 0;
25        else return 1;
26    }
27
28    private class Vote{
29
30        private int regionNum;
31
32        public Vote(int regionNum){
33            this.regionNum=regionNum;
34        }
35    }
36 }
```

Implement the Comparable interfaces and it can accept only candidate type object by using generics

Synchronize prevent simultaneous access from different Threads

This method is the method of Comparable interface.

To sort the descending order, when the parameter's numVotes is smaller it return the negative number, and when it is the same return zero and when it is bigger it return positive number.

it it the innerclass, which is delcare in outerclass names Candidate.

2. Region class

→ By the extending the Thread class, we can use threads.

```
1 public class Region extends Thread{
2
3
4     private String name;
5     private int regionNum;
6     private int population;
7     private Candidate[] candidates;
8
9     public Region(String name, int regionNum, int population, Candidate[] candidates){
10         this.name=name;
11         this.regionNum=regionNum;
12         this.population=population;
13         this.candidates=candidates;
14     }
15
16     public void generateVotes(){
17         int random = (int)Math.floor(Math.random()*candidates.length);
18         candidates[random].addVote(regionNum);
19         population--;
20     }
21
22     public void run(){
23         while(true){
24             if(population<=0) break;
25             generateVotes();
26         }
27     }
28 }
```

→ It makes the random integer value from 0 to candidates number

→ It increasing the numVotes instance variable of the Candidate object which index of array is value of random.

→ Run method acts like the main method of a traditional sequential program.

3. ElectionSim class (1/3)

```
1
2 import java.util.Scanner;
3 import java.io.FileInputStream;
4 import java.io.FileNotFoundException;
5 import java.util.Arrays;
6 import java.io.PrintWriter;
7 import java.io.FileOutputStream;
8
9
10 public class ElectionSim {
11
12     private String outputFile;
13     private int population;
14     private Candidate[] candidate;
15     private Region[] region;
16
17
18     public ElectionSim(String inputFile,String outputFile){
19
20         this.outputFile = outputFile;
21         Scanner inputStream=null;
22
23         try{
24             inputStream = new Scanner(new FileInputStream(inputFile));
25         }catch(FileNotFoundException e){
26             System.out.println(e.getMessage());
27         }
28
29         inputStream.next();
30         this.population=inputStream.nextInt();
31
32         inputStream.next();
33
34         candidate = new Candidate[inputStream.nextInt()];
35
36         inputStream.nextLine();
37     }
```

It is possible to reading to a file by using the Scanner class

There is no Scanner constructor which accept the file name as its argument, so we have to use FileInputStream class.

The catch block is performed if an FileNotFoundException is thrown in try block.

It read the from the textfile which is inputFile

It used to erase the buffer because nextInt store the Enter in buffer.

3. ElectionSim class (2/3)

```
38     for(int i=0;i<candidate.length;i++)
39         candidate[i]= new Candidate(inputStream.nextLine(),population);
40
41     inputStream.next();
42     this.region = new Region[inputStream.nextInt()];
43
44     for(int i=0;i<region.length;i++)
45         region[i]= new Region(inputStream.next(),inputStream.nextInt(),inputStream.nextInt(),candidate);
46
47     inputStream.close();
48 }
49
50 public void saveData(){
```

Have to use the close method when program is finished reading to a file, it prevents some of the error occurs.

It is possible to writing to a file by using the PrintWriter class

```
52     Arrays.sort(candidate);
53     PrintWriter outputStream = null;
54
55     try{
56         outputStream = new PrintWriter(new FileOutputStream(outputFile));
57     }catch(FileNotFoundException e){
58         System.out.println(e.getMessage());
59     }
60
61     for(int i=0;i<candidate.length;i++)
62         outputStream.println(candidate[i]);
63
64     outputStream.close();
65 }
66
```

The sort method on Arrays class sorting the candidate array using the compareTo method.

Also we have to use FileOutputStream class, same reason of the FileInputStream.

It writing to a output file not screen of computer.

Also, have to use the close method when program is finished writing to a file as the same reason.

3. ElectionSim class (3/3)

```
67     public void runSimulation(){
68
69         for(int i=0;i<region.length;i++)
70             region[i].start(); → Invoking the start method is execute the
71                                     run method of Thread
72     try{
73         for(int i=0;i<region.length;i++)
74             region[i].join(); → The join method stop the methods'
75     }catch(InterruptedException e){ → running until the all Threads are dead.
76         System.out.println(e.getMessage());
77     } → The catch block is performed if an
78                                     InterruptedException is thrown in try block.
79     this.saveData();
80 }
81 }
```

Screenshot of Outputs(1)

Input

POPULATION 2500
CANDIDATES 8
Mickey
Mia
Anthony
Katy
Lewis
Ashley
Danny
Karen
REGIONS 3
Seoul 1 1500
Daegu 2 700
Daejon 3 300

Output1

-----Candidate-----
Name: Danny
Votes: 327

=====

-----Candidate-----
Name: Lewis
Votes: 326

=====

-----Candidate-----
Name: Ashley
Votes: 318

=====

-----Candidate-----
Name: Mia
Votes: 317

=====

-----Candidate-----
Name: Mickey
Votes: 313

=====

-----Candidate-----
Name: Katy
Votes: 309

=====

-----Candidate-----
Name: Karen
Votes: 303

=====

-----Candidate-----
Name: Anthony
Votes: 287

=====

Output2

-----Candidate-----
Name: Lewis
Votes: 339

=====

-----Candidate-----
Name: Katy
Votes: 325

=====

-----Candidate-----
Name: Ashley
Votes: 325

=====

-----Candidate-----
Name: Anthony
Votes: 317

=====

-----Candidate-----
Name: Mia
Votes: 308

=====

-----Candidate-----
Name: Karen
Votes: 300

=====

-----Candidate-----
Name: Danny
Votes: 299

=====

-----Candidate-----
Name: Mickey
Votes: 287

=====

Screenshot of Outputs(2)

Input

POPULATION 3000
CANDIDATES 10
Jack
Peter
John
James
Obama
Trump
Putin
Hillary
Jackson
Biden
REGIONS 5
L.A 1 700
Washington 2 500
NewYork 3 1100
Seattle 4 400
Texas 5 300

Output1

-----Candidate-----
Name: Hillary
Votes: 322
=====

-----Candidate-----
Name: James
Votes: 316
=====

-----Candidate-----
Name: Putin
Votes: 315
=====

-----Candidate-----
Name: Obama
Votes: 308
=====

-----Candidate-----
Name: John
Votes: 297
=====

-----Candidate-----
Name: Peter
Votes: 296
=====

-----Candidate-----
Name: Trump
Votes: 295
=====

-----Candidate-----
Name: Biden
Votes: 291
=====

-----Candidate-----
Name: Jackson
Votes: 290
=====

-----Candidate-----
Name: Jack
Votes: 270
=====

Output2

-----Candidate-----
Name: Peter
Votes: 340
=====

-----Candidate-----
Name: Trump
Votes: 340
=====

-----Candidate-----
Name: Putin
Votes: 315
=====

-----Candidate-----
Name: James
Votes: 309
=====

-----Candidate-----
Name: Obama
Votes: 293
=====

-----Candidate-----
Name: Hillary
Votes: 292
=====

-----Candidate-----
Name: Biden
Votes: 292
=====

-----Candidate-----
Name: John
Votes: 285
=====

-----Candidate-----
Name: Jack
Votes: 282
=====

-----Candidate-----
Name: Jackson
Votes: 252
=====