EEM 480 Algorithms and Complexity HW 4

In this Homework, you are required to design a Spotify-like environment and program using hash structure. Your program will work on a command line where the commands are given in one line as:

I <Name> - Creates a person with the name given in the line. If <Name> has been created before, print "<Name> can not be created".

L <Name> <Song> - Sets the <Name> likes the <Song>. If <Name> is not created before print "<Name> is not created so Song cannot be liked".

E <Name> <Song> - Erases the assignment (<Name> doesn't like the song anymore). Print <Name> doesn't like the <Song>. If <Name> <Song> is not set before print "<Name> <Song> can not be erased".

D <Name> - Deletes the record of <Name> from the structure and all the songs liked related to <Name>. If the <Name> is not found, it prints "<Name> is not in the list".

P<Name> - Lists the songs of the person <Name> likes. If <Name> has no liked song, print "<Name> has no song". If the <Name> is not found it prints "<Name> is not in the list".

M <Name> - This is a matchmaking option. It checks the other people who like the same songs in the list of <Name>. This command prints the list of other people according to the number of identical songs they like using matching criteria.

Example <Name> has 3 identical songs in the list with <Name1> and 2 identical songs in the list of <Name2> and 1 song match with <Name3>

M<Name> will print

Possible friend of <Name> :

Name1 50% match (3 songs out of 6)

Name2 33% match (2 songs out of 6)

Name3 17% match (1 song out of 6)

R<Name> - Recommends 5 different music that <Name> can like but not found in his list. Propose a method and explain it in your report.

O </DIR/Filename.txt> - Opens a file with the given name. In this file, it is supposed that each line contains a command of the program as given in Figure 1:

X – Exit the program.

In the Program :

- The commands “I”, “L”, “D”, “P”and “E” will be executed in O(1) complexity which is independent of the total number of people in the system.
- You cannot use Java’s libraries. You have to implement every detail of the data structure you use.
- The command “M” and “R” have to be executed in the number of songs complexity = O(n)

Data Structure:

1. Define a Person class as given below

```
public class Person {
    String PersonName;
    Person next;
}
Public class Song {
    String SongName
    Song next;
}
```

2. The songs will be stored in the linked list using the Song class.
3. The persons who like the same song will be stored in the linked list using the Person class.
4. You have to store songs and persons in different hash tables. To resolve the collusion, propose and implement your collusion-resolving method. Clearly explain those methods in your report.

```
I Ali
I Veli
I Lutfullah
I Cevziye
L Ali Show must go on
L Ali Another brick in the wall
L Veli Fragile
L Veli Show must go on
L Veli Hello
L Ali Mambo italiano
P Veli
E Ali Another brick in the wall
```

```
P Ali
L Veli Maybe I like
L Cevziye Hope
L Cevziye Fragile
L Cevziye Hello
M Veli
L Lutfullah Fragile
L Lutfullah Eller yukari
L Lutfullah Hoppidi hoppidi
L Cevziye Amanin yandim
L Veli Maybe its too late
R Veli
X
```

Figure 1. Input.txt file

The Output :

```
Veli likes
Fragile
Show must go on
Hello
Ali likes
Show must go on
Mambo italiano
Possible friends of Veli
Cevziye 67%
Ali 33 %
For Veli :
Song 1
Song 2
Song 3
Song 4
Song 5
```

Find yourself

Rules for HW Submission

. You have to write your HW in the NetBeans environment.
. **Report will be 20% of your project**.
. You have to write a report with the name "Report_HW4.pdf" explaining your HW (purpose, how did you solve it, what complexity you have, etc.) and what environment you used (NetBeans, for example). The person who reads your report can easily use the class you have written.
. Submission should be in the form of a zip. When extracted, the result should be a single folder with the name "HW4".
. Don't forget to put your report into the zip file.
. The name of your project will be "**Name_Surame_HW4**. e.g. *Lutfullah_Arici_HW4*. If you do not obey the rule I will not grade your homework.
. You have to bundle your whole project folder into your HW4.zip file.
. If I extract your project file, then import it to my environment and if it doesn't work, you will be graded on 30, not 80. (Double check. It saves life)
. Do HW by yourself. Be honest.