CPE 102:Spring 2023

Homework 4

Due date: May 28, 2023.

You should submit your program by May 28 (any time up to midnight) through Teams. This time, please upload each file separately without zipping. Remember that your code should be fully documented. I once again remind you to read the academic honesty policy stated in the syllabus. If you submit code without comments or without proper indentation, you will lose 10 % of your grade.

In this assignment, you will rewrite your HW3 program such that a singly linked list is used to store the PopularNames instead of an ArrayList. You MUST write your linked list class yourself– you are NOT allowed to used Java's LinkedList class.

Recall that your HW3 program reads input from a file storing popular male and female baby names for a particular year in the US, and outputs statistics (rank, number and percentage) of a given name in that year.

1 Input File Format

The input file format is the same as in HW3. The file contain lines in the following format:

```
rank,male-name,male-number,female-name,female-number
```

where the comma-separated fields have the following meanings:

`rank`	the ranking of the names in this file
`male-name`	a male name of this rank
`male-number`	number of males with this name
`female-name`	a female name of this rank
`female-number`	number of females with this name

2 Requirements

1. You should reuse your a `PopularName` class that stores the name, rank in popularity and total number of babies with that name.

2. Write a SinglyLinkedList class where each node stores a PopularName as data, and link to the next node. You must have two instance variables head: storing the address of the first node and tail storing the address of the last node. The Node class MUST be an inner class of SinglyLinkedList.

3. Your driver program will first ask the user for a filename. The user enters a filename that contains the data in above format. You will then read the file and build two SinglyLinkedLists (containing PopularName objects) to store the information about the baby names found in the file, one Singly Linked List for the male names and one for the female names.

4. You must maintain the linked lists in increasing order of baby name, however to do that, write in SinglyLinkedList class a method called **insertInOrder(PopularName element)** that inserts the new PopularName in the correct place according to the name it stores. In other words, list must be in sorted order after each insertion. (In HW3 you sorted after all names were inserted—it is different in HW4.)

5. Your program then should display a small menu:

```
1 Name Statistics
2 Most Popular
3 List by Initial
4 Exit
```

The user the selects one of these options by entering 1, 2 or 3; or exits by entering 4.

Option 1: If 1 is selected the program asks the user to enter a gender and a name. After reading in the gender (male or female) and the name, it will look up the name in the appropriate SinglyLinkedList and report the following statistics: (This option does what you have done in HW3.)

(a) index in sorted list - just an integer indicating the position of the name in your sorted SinglyLinkedList (for that gender) so that we can verify your list is sorted

(b) rank in popularity (Note that this data is given in the file.)

(c) number - the number of babies given that name

(d) percentage - the percentage of babies given that name (for that gender)

For example, if user enters the gender "female" and the name "Emma' (female), the following statistics should be printed if we give the file for year 2002.

```
Emma:
index in sorted list: 326
rank in popularity: 4
number of babies: 16538
percentage of babies: 1.18%
```

Option 2: If 2 is selected the program asks the use to enter a gender and then displays the most popular name in that gender and the number of babies with that name. This should be done by searching the linked lists.

Option 3: If 3 is selected, the user asks for a gender and a letter, then lists ALL the names starting with the given letter and the number of babies with that name.

A sample run is as follows:

```
Enter a file name:
names2002.csv

File is uploaded.

1 Name Statistics
2 Most Popular
3 List by Initial
4 Exit

Choose an option:
1

Enter a gender:
female

Enter a name:
Emma

Emma:
index in sorted list: 326
rank in popularity: 4
number of babies: 16538
percentage of babies: 1.18\%

Choose an option:
2

Enter a gender:
female

Most popular female name is Emily: 24463

Choose an option:
3

Enter a gender:
female

Enter an initial:
V

Valentina 426
```

```
Valeria 1636
Valerie 2104
Vanesa 271
Vanessa 4453
Veronica 1908
Victoria 9782
Violet 418
Virginia 801
Vivian 1275
Viviana 647


Choose an option:
4
```