Sabancı University

Faculty of Engineering and Natural Sciences
CS204 Advanced Programming
Spring 2016

Homework 2 – Movie Rating System with Linked Lists

Due: 24/2/2016, Wednesday, 21:00

PLEASE NOTE:

Your program should be a robust one such that you have to consider all relevant programmer mistakes and extreme cases; you are expected to take actions accordingly!

You can NOT collaborate with your friends and discuss solutions. You have to write down the code on your own. Plagiarism will not be tolerated!

Introduction

In this homework, you are asked to implement a movie rating system. This system must use a *Linked List* structure to store the movies and their ratings in a sorted fashion. Movies and ratings can be entered manually or read from a text file. The system will be explained in more detail in subsequent sections of this homework specification.

The Data Structure to be Used

In this homework, you **must** represent movies and their ratings as a *linked list* (regular one-way linked list). As a result, you are going to implement one node type that stores a movie list item with their **names**, **total rating** and **number of ratings** they received. **You are not allowed to use arrays, vectors and similar containers in this homework.**

The Program Flow

There are different operations to be implemented in your program. These are as follows:

1. Load movie names and ratings from a file
2. Add a new rating manually
3. Remove an existing movie
4. Display the list of movies and rating information
5. Exit

At the very beginning, the program displays a menu and asks for an option from the user for the operation to be executed. In this menu, each operation has an index between 1 and 5. According to the index that the user enters, the system performs the associated operation.

Your program reads the operation index from the standard input (keyboard). These operations are explained in this section.

1. Load movie names and ratings from a file

When the user wants to load a movie list from a data file, this option is used. To do so, firstly the program asks for the name of the data file. After the user enters an existing file name, your program reads the movie list details from the file and adds movies and their ratings to a linked list.

The input file is composed of lines. Each line consists of two values: (i) one *string* and (ii) one *integer* separated by space(s). The first value represents the movie name; the second value represents the rating of the movie. In the movie name, you can assume that the name does not contain any spaces, i.e. it is a single string. The rating information must be an integer between and including 1 and 10. You can assume that in each line of the file, there is one string and one integer value, but you have to check if the integer value (i.e. the rating) is in correct range. If not, you should not process that line by giving an appropriate error message. Moreover, you also have to check the existence of the file.

A sample input file is as follows:

```
Fight_Club   5
The_Dark_Knight  8
Pulp_Fiction    8
Schindler's_List 8
Dunyayi_Kurtaran_Adam -10
Life_is_Beautiful 10
Fight_Club   8
The_Shawshank_Redemption  100
Devil's_Advocate  7
Schindler's_List 9
Matrix_Reloaded  6
```

If a movie does not exist in the linked list, a new node will be created and added to the list. Otherwise, the linked list will be traversed in order to find out the node of that movie, and this node's total rating information will be updated such that the new total rating will be the sum of the old total rating and the rating value in the file. In other words, if there is more than one occurrence of a movie in the file, then the total rating of this movie will be the **sum** of all individual ratings. Also, the number of ratings field of the movie should be incremented to reflect how many times the movie has been rated. Depending on the fact that the item is added to the list or the list is updated, you should display an appropriate message on the screen (please see the sample runs for examples). The movie name checks will be done in case-sensitive manner (i.e. regular comparison operators for strings work fine). In addition, the movies and their rating information should always be stored in the linked list in alphabetical order according to the movie names. Therefore, after a new movie is added, the alphabetical order of the list should be preserved.

2. Add a new rating manually

Another option is to add a rating manually. In this option, the program asks for the movie name and the rating to be added. The user enters these values from the keyboard. You have to perform an input check here; if the rating value is not an integer between and including 1 and 10, then no addition is done and an appropriate message is displayed. If the rating value is correct, then the rules of addition of this movie to the linked list are the same as above. That is, if this movie already exists in the list, then its total rating field will be the sum of previous value and this newly entered rating, and the number of ratings fields will be

incremented; otherwise, a new node must be added to the list. You are again required to keep the linked list in alphabetical order according to the movie names, in case a new movie is to be added to the list.

3. Remove an existing movie

If the user wants to remove a movie and its rating information, the program asks for the movie name. Then, the user enters it using the keyboard. If the movie name does not exist in the list, then no remove operation will be performed and a message is displayed to explain this input problem (please see the sample run for examples). Otherwise, the node containing the movie name should be deleted from the linked list. Since you need to keep the list sorted at all times, delete operation should not disrupt the alphabetical order.

4. Display the list of movies and rating information

If the user selects this option, the program displays the movie list in ascending alphabetical order according to the movie names. For each movie in the list, one line should be displayed. Each line should consist of the ***movie name***, its ***number of ratings*** value and the ***average rating*** of this movie. Display this list as tidy as possible.

5. Exit

When this option is selected, your program is terminated. In order to make sure that you make no memory leak, your program **must** return all the dynamically allocated memory to the heap before the termination.

After each menu option is selected and the required processing is performed, the menu should be displayed and a new option is selected continuously until the user enters "5" to Exit.

Sample Runs

Sample run is given below, but this is not comprehensive, therefore you have to consider **all possible cases** to get full mark.

Sample Run 1

movies1.txt:

```
Rain_Man  10
The_Dark_Knight  8
Pulp_Fiction       8
Man_on_the_Moon   8
Apocalypse_Now 10
The_Dark_Knight 9
Chinatown 12
Scarface 9
The_Usual_Suspects -1
Man_on_the_Moon 7
Se7en  27
Mr._Brooks 6
Chinatown 9
Inception 0
Forrest_Gump 23
The_Big_Lebowski 10
```

```
Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 1

Please enter the name of the file: mov.txt
File cannot be opened.
Please enter the name of the file again: movies.txt
File cannot be opened.
Please enter the name of the file again: movies1.txt

The_Dark_Knight has been added to the list.
Pulp_Fiction has been added to the list.
Man_on_the_Moon has been added to the list.
Apocalypse_Now has been added to the list.
The_Dark_Knight has been updated.
Movie Chinatown does not have a valid rating.
Scarface has been added to the list.
Movie The_Usual_Suspects does not have a valid rating.
Man_on_the_Moon has been updated.
Movie Se7en does not have a valid rating.
Mr._Brooks has been added to the list.
Chinatown has been added to the list.
Movie Inception does not have a valid rating.
Movie Forrest_Gump does not have a valid rating.
The_Big_Lebowski has been added to the list.

Movies from file movies1.txt has been loaded.


Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 2

Please enter the name of the movie you wish to rate: A_Beautiful_Mind
Please enter the rating you wish to submit (1..10): 8
A_Beautiful_Mind has been added to the list.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 4
```

```
Movie Name               Ratings Received      Avg. Rating
A_Beautiful_Mind              1                    8
Apocalypse_Now                1                    10
Chinatown                     1                    9
Man_on_the_Moon               2                    7.5
Mr._Brooks                    1                    6
Pulp_Fiction                  1                    8
Rain_Man                      1                    10
Scarface                      1                    9
The_Big_Lebowski              1                    10
The_Dark_Knight               2                    8.5

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 2

Please enter the name of the movie you wish to rate: Year_One
Please enter the rating you wish to submit (1..10): -10

You have entered an invalid rating.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 2

Please enter the name of the movie you wish to rate: Year_One
Please enter the rating you wish to submit (1..10): 10
Year_One has been added to the list.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 2

Please enter the name of the movie you wish to rate: Oblivion
Please enter the rating you wish to submit (1..10): 8

Oblivion has been added to the list.
```

```
Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 2

Please enter the name of the movie you wish to rate: Oblivion
Please enter the rating you wish to submit (1..10): 9

Oblivion has been updated.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 2

Please enter the name of the movie you wish to rate: Oblivion
Please enter the rating you wish to submit (1..10): 12

You have entered an invalid rating.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 4

Movie Name               Ratings Received      Avg. Rating
A_Beautiful_Mind              1                    8
Apocalypse_Now                1                    10
Chinatown                     1                    9
Man_on_the_Moon               2                    7.5
Mr._Brooks                    1                    6
Oblivion                      2                    8.5
Pulp_Fiction                  1                    8
Rain_Man                      1                    10
Scarface                      1                    9
The_Big_Lebowski              1                    10
The_Dark_Knight               2                    8.5
Year_One                      1                    10
```

```
Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 3

Please enter the name of the movie you wish to remove: Oblivious
movie Oblivious does not exist.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 3

Please enter the name of the movie you wish to remove: A_Beautiful_Mind

The movie A_Beautiful_Mind has been removed from the list.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 3

Please enter the name of the movie you wish to remove: Year_One

The movie Year_One has been removed from the list.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 4

Movie Name               Ratings Received      Avg. Rating
Apocalypse_Now                1                  10
Chinatown                     1                  9
Man_on_the_Moon               2                  7.5
Mr._Brooks                    1                  6
```

```
Oblivion                    2                   8.5
Pulp_Fiction                1                   8
Rain_Man                    1                   10
Scarface                    1                   9
The_Big_Lebowski            1                   10
The_Dark_Knight             2                   8.5

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.


Your choice: 3

Please enter the name of the movie you wish to remove: Rain_Man

The movie Rain_Man has been removed from the list.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 5

Press any key to continue . . .
```

Sample Run 2

movies2.txt:

```
Chinatown 9
Inception 0
The_Silence_of_the_Lambs 6
Forrest_Gump 23
The_Big_Lebowski 10
```

movies3.txt:

```
Pulp_Fiction       8
Man_on_the_Moon   8
Apocalypse_Now      -1
The_Dark_Knight 9
The_Silence_of_the_Lambs 7
Inception 10
The_Dark_Knight 10
The_Shawshank_Redemption 100
```

```
Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 4

The movie list is empty.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 3

Please enter the name of the movie you wish to remove:
The_Shawshank_Redemption

movie The_Shawshank_Redemption does not exist.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 2

Please enter the name of the movie you wish to rate:
The_Shawshank_Redemption
Please enter the rating you wish to submit (1..10): 10


Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 4

Movie Name               Ratings Received      Avg. Rating
The_Shawshank_Redemption      1                   10
```

```
Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 1

Please enter the name of the file: movies2.txt


Chinatown has been added to the list.
Movie Inception does not have a valid rating.
The_Silence_of_the_Lambs has been added to the list.
Movie Forrest_Gump does not have a valid rating.
The_Big_Lebowski has been added to the list.

Movies from file movies2.txt has been loaded.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 1

Please enter the name of the file: movies3.txt


Pulp_Fiction has been added to the list.
Man_on_the_Moon has been added to the list.
Movie Apocalypse_Now does not have a valid rating.
The_Dark_Knight has been added to the list.
The_Silence_of_the_Lambs has been updated.
Inception has been added to the list.
The_Dark_Knight has been updated.
Movie The_Shawshank_Redemption does not have a valid rating.

Movies from file movies3.txt has been loaded.

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 4

Movie Name               Ratings Received      Avg. Rating
Chinatown                      1                   9
Inception                      1                   10
```

```
Man_on_the_Moon              1                   8
Pulp_Fiction                 1                   8
The_Big_Lebowski             1                   10
The_Dark_Knight              2                   9.5
The_Shawshank_Redemption     1                   10
The_Silence_of_the_Lambs     2                   6.5

Movie Rating System
-----------------------------------
Please select one option:
1. Load movie ratings from a file.
2. Add a new rating manually.
3. Remove an existing movie.
4. Display the list of movies and rating information.
5. Exit.

Your choice: 5

Press any key to continue . . .
```

Some Important Rules

In order to get a full credit, your programs must be efficient and well presented, presence of any redundant computation or bad indentation, or missing, irrelevant comments are going to decrease your grades. You also have to use understandable identifier names, informative introduction and prompts. Modularity is also important; you have to use functions wherever needed and appropriate.

Since you will use dynamic memory allocation in this homework, it is very crucial to properly manage the allocated area and return the deleted parts to the heap whenever appropriate. Inefficient use of memory may reduce your grade.

When we grade your homework we pay attention to these issues. Moreover, in order to observe the real performance of your codes, we may run your programs in *Release* mode and **we may test your programs with very large test cases**. Of course, your program should work in *Debug* mode as well.

What and where to submit (PLEASE READ, IMPORTANT)

You should prepare (or at least test) your program using MS Visual Studio 2012 C++. We will use the standard C++ compiler and libraries of the abovementioned platform while testing your homework. It'd be a good idea to write your name and last name in the program (as a comment line of course).

Submissions guidelines are below. Some parts of the grading process are automatic. Students are expected to strictly follow these guidelines in order to have a smooth grading process. If you do not follow these guidelines, depending on the severity of the problem created during the grading process, 5 or more penalty points are to be deducted from the grade. Name your solution, project, cpp file that contains your main program using the following convention (the necessary file extensions such as .sln, .cpp, etc, are to be added to it):

“SUCourseUserName_YourLastname_YourName_HWnumber”

Your SUCourse user name is actually your SUNet user name which is used for checking sabanciuniv e-mails. Do NOT use any spaces, non-ASCII and Turkish characters in the file

name. For example, if your SUCourse user name is cago, name is Çağlayan, and last name is Özbugsızkodyazaroğlu, then the file name must be:

Cago_Ozbugsizkodyazaroglu_Caglayan_hw2

In some homework assignments, you may need to have more than one .cpp or .h files to submit. In this case add informative phrases after the hw number. However, do not add any other character or phrase to the file names.

Now let us explain which files will be included in the submitted package. Visual Studio 2012 will create two *debug* folders, one for the solution and the other one for the project. You should delete these two *debug* folders. Moreover, if you have run your program in release mode, Visual Studio may create *release* folders; you should delete these as well. Apart from these, Visual Studio 2012 creates a file extension of *.sdf* ; you will also delete this file. The remaining content of your solution folder is to be submitted after compression. Compress your solution and project folders using WINZIP or WINRAR programs. Please use "zip" compression. "rar" or another compression mechanism is NOT allowed. Our homework processing system works only with zip files. Therefore, make sure that the resulting compressed file has a zip extension. Check that your compressed file opens up correctly and it contains all of the solution, project and source code files that belong to the latest version of your homework. Especially double-check that the zip file contains your cpp and (if any) header files that you wrote for the homework.

Moreover, we strongly recommend you to check whether your zip file will open up and run correctly. To do so, unzip your zip file to another location. Then, open your solution by clicking the file that has a file extension of .sln. Clean, build and run the solution; if there is no problem, you could submit your zip file. Please note that the deleted files/folders may be regenerated after you build and run your program; this is normal, but do not include them in the submitted zip file.

You will receive no credits if your compressed zip file does not expand or it does not contain the correct files. The naming convention of the zip file is the same. The name of the zip file should be as follows:

SUCourseUserName_YourLastname_YourName_HWnumber.zip

For example zubzipler_Zipleroglu_Zubeyir_hw2.zip is a valid name, but

Hw2_hoz_HasanOz.zip, HasanOzHoz.zip

are **NOT** valid names.

Submit via SUCourse ONLY! You will receive no credits if you submit by other means (e-mail, paper, etc.).

Successful submission is one of the requirements of the homework. If, for some reason, you cannot successfully submit your homework and we cannot grade it, your grade will be 0.

Good Luck!
Albert Levi, Ömer Mert Candan