



Date handed out: 15 November 2021, Monday

Date submission due: 28 November 2021, Sunday 23:00

InstructorBook

This assignment aims to help you practice linked list data structure and basic linked list operations. Your main task in this assignment is to write a C program to create a simple application that will allow you manage information about your instructors in METU NCC. Your InstructorBook will include the list of instructors with their details (first name, last name, title, email, phone number and room number) and will help you manage your list of instructors, where you can add an instructor, find the details of an instructor, and delete an instructor from your instructor list.

When you run the C program, your InstructorBook will first create a linked list of your instructors which is initialised by reading the details of your instructors from an external text file and then some operations will be provided for you to manage your InstructorBook. Therefore, your program needs to support the following operations.

- **Reading your instructors from an external file and initialising your instructor list:** The program needs to be invoked with a command line argument which is the name of the file that includes your instructor details. If this command line argument is not provided then your program needs to ask the user to enter the name of the text file. The file should include the first name, last name, title, email, phone number and room number of your instructors, separated by a semicolon (;). We assume that there are no duplicates in the first names and surnames. An example file is shown below that contains three instructors:

```
Meryem;Erbilek;Asst. Prof. Dr.;merbilek@metu.edu.tr;2953;SZ43  
Dizem;Arifler; Assoc. Prof. Dr.;darifler@metu.edu.tr;2960;S132  
Enver;Ever;Assoc. Prof. Dr.;eever@metu.edu.tr;2961;S133
```

The program will read your instructors from the file and use a linked-list to store your instructors' details. Please note that you cannot make any assumptions about the number of your instructors and there is no upper limit for the number of instructors. In your internal representation, you will need to decide about the structure of your linked list based on the txt file given.

Your instructors may not be sorted in an external file, however your InstructorBook which will be created by the program should be sorted by the first names in alphabetical order. Therefore, when you insert a new instructor to the list, you need find its position and then insert it. The program should not add a new instructor at the end of the list and then sort the list.

- **Inserting a new instructor:** After the initialisation of your InstructorBook with an external file, you may want to insert a new instructor to your instructor list. Therefore, the program should ask you the required details (first name, last name, title, email, phone number and room number) for your new instructor and add it in the appropriate position in your instructor list. Please note that your instructor list should be sorted by the first names in alphabetical order.

- **Printing your instructor list:** The program should traverse the list of your instructors and print your instructors on the screen with their details.
- **Searching for an instructor in your instructor list:** The program should allow you to search for an instructor with his/her first name. Please note your search algorithm should have the $O(\log n)$ complexity.
- **Current semester Instructors:** The program should allow you to create a separate instructor list for your current semester instructors. First of all, you need to enter the first name of your instructor to move him/her, then the program will find the instructor, then delete it from the list of your instructors, and then add your current semester instructor to the list of your current instructors. Therefore, you need to have another linked list to keep the list of your current instructors.
- **Printing your Current semester Instructors:** The program should traverse the list of your current semester instructors and print them on the screen with their details.

Programming Requirements

When you write this program, you need to consider the data structure that will be necessary. Clearly, two linked-lists will be required: one for the list of your instructors and another one for the list of your CNG instructors. Therefore, it is recommended that you implement your basic linked list operations first (add/delete/search, etc). By using these basic operations on linked lists, you can implement other required operations. In order to achieve the steps, you need to have the following functions. Please strictly follow the requirements of the functions given below! In addition to these functions, you can write some helper/auxiliary functions.

| Function | Explanation | Take | Return |
|----------------------------|---|---|--|
| initialiseInstructorBook | To create and initialise a list of instructors by reading the instructors from an external file | File name | A list of instructors |
| InsertInstructor | To insert a new instructor in an appropriate position in the list of instructors by asking the required details | A list of instructors | - |
| PrintInstructors | To display the list of the instructors with their details | A list of instructors | - |
| SearchInstructor | To search for a specific instructor with given first name, and then print his/her details – $O(\log n)$ | A list of instructors and the first name of the instructor | - |
| CurrentSemesterInstructors | Add the instructor to the current semester instructors list | A list of instructors and A list of current semester instructors | A list of current semester instructors |

| | | | |
|--------------------------------|--|--|---|
| printCurrentSemsterInstructors | To display the list of current semester instructors with their details | A list of current semester instructors | - |
|--------------------------------|--|--|---|

Grading

Your program will be graded as follows:

| Grading Point | Mark (out of 100) |
|---|-------------------|
| Structures to represent a list of instructors and CNG instructors | 5 |
| Main function to control and coordinate the commands | 15 |
| initialiseInstructorBook | 20 |
| InsertInstructor | 15 |
| PrintInstructors | 5 |
| SearchInstructor | 15 |
| CurrentSemsterInstructors | 20 |
| printCurrentSemsterInstructors | 5 |

Important Notes

- Remember to have good programming style (Appropriate comments, variable names, formulation of selection statements and loops, reusability, extensibility etc.). Each of the items above will include 10% for good programming style.
- Read rules regarding to assignments from the Syllabus carefully.
- If your code does not compile due to syntax errors, you will automatically get zero.
- If your code includes a variable declaration inside a for loop such as for(int i=0; i<5;i++), you will automatically get zero.
- If your code includes global variables, you will automatically get zero.

Sample Run

The instructors.txt file has been loaded successfully

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 1

Enter instructor name: Yeliz
Enter instructor surname: Yesilada
Enter instructor title: Assoc. Prof. Dr
Enter instructor email: yyeliz@metu.edu.tr
Enter instructor phone number: 1234
Enter instructor room number: S223

The instructor has been added!!

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 2

Instructor in your database:

Instructor name: Dizem
Instructor surname: Arifler
Instructor title: Assoc. Prof. Dr.
Instructor email: darifler@metu.edu.tr
Instructor phone number: 2960
Instructor room number: S132

Instructor name: Enver
Instructor surname: Ever
Instructor title: Assoc. Prof. Dr.
Instructor email: eever@metu.edu.tr
Instructor phone number: 2961
Instructor room number: S133

Instructor name: Meryem
Instructor surname: Erbilek
Instructor title: Asst. Prof. Dr.
Instructor email: merbilek@metu.edu.tr
Instructor phone number: 2953
Instructor room number: SZ43

Instructor name: Yeliz
Instructor surname: Yesilada
Instructor title: Assoc. Prof. Dr
Instructor email: yyeliz@metu.edu.tr
Instructor phone number:1234
Instructor room number: S223

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 3

Enter the name of the instructor you want to search: Yeliz

Results

Instructor name: Yeliz
Instructor surname: Yesilada

Instructor title: Assoc. Prof. Dr
Instructor email: yyeliz@metu.edu.tr
Instructor phone number:1234
Instructor room number: S223

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 3

Enter the name of the instructor you want to search: Sara
Instructor not found!!!

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 4

Enter instructor name you want to add to your current semester list: Yeliz
Yeliz has been moved to current semester list

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 4

Enter instructor name you want to add to your current semester list: Sara
Instructor not found!!!

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 5

Results

Instructor name: Yeliz

Instructor surname: Yesilada
Instructor title: Assoc. Prof. Dr
Instructor email: yyeliz@metu.edu.tr
Instructor phone number:1234
Instructor room number: S223

----- MENU-----

1. Add Instructor
2. Print Instructor
3. Search Instructor
4. Create Current Semester Instructors List
5. Print Current Semester Instructors List
6. Exit

Enter your option: 6