CMPS347 – Data Structures

Course Project

A PROGRAMMER'S PERSPECTIVE

Clinic Management
System Manager

Proposed to
Dr. Ali El-Zaart

Presented By
Mohammad Sidani (202100611)
Reem Mneimneh (202100775)

4/12/2021

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Abstract

Our project is about Medical Clinic Management System, developed using many kinds of data structures, such as Arrays, Linked List, Circular Linked List, Queue, Circular Queue and Nodes. This program or system is written using Java Programming Language in Eclipse IDE.

Introduction

General idea about the topic in the project.

A Clinic Management System is a program that allows an admin to add doctors and patients, remove doctors and patients from the list and reserve appointments for different patients. Also, in this program the admin can modify in the patients' data or delete reservations by entering the Id number.

Idea related to our project and what we did in this project.

The general idea about the project was accomplished successfully. A Clinic Management System is made in which it is a program that allows admin to simulate a clinic. It also helps visualize the doctors and patients present in the list, how it is distributed, and it also help the admin user to search for any data by the Id number. On the other hand, it helps manage a queue of reservations that contains the reservations plus the doctors and patients in a circular linked list.

Work & Report Division.

Everything in this project was prepared and finished by Mohammad Sidani of Id 202100611 and Reem Mneimneh of Id 202100775.

Related Work and Technologies

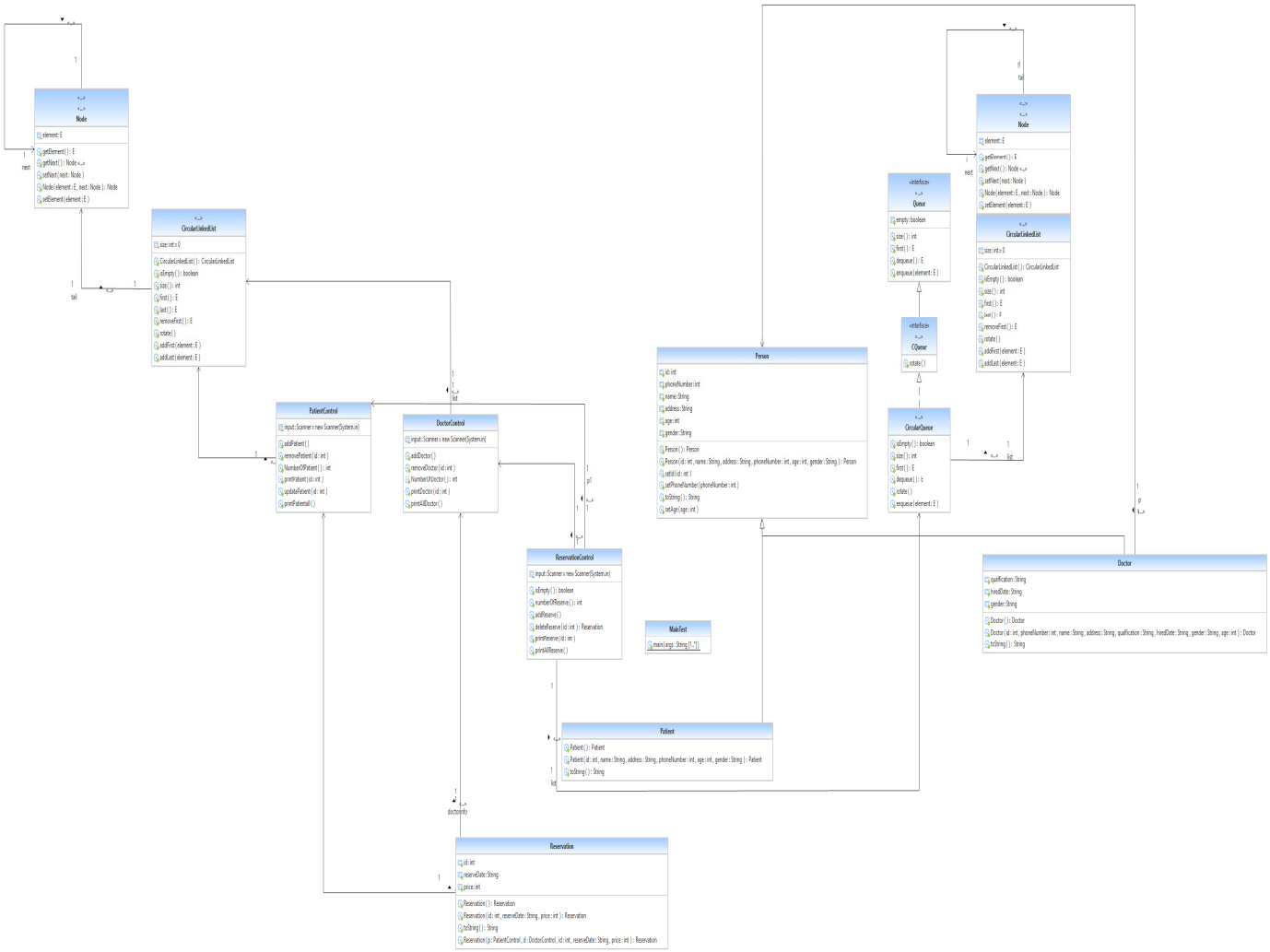
Program Used:

- Eclipse IDE for Java Developers – 2020-09
- UML Lab extension in Eclipse

How was it used?

Eclipse was used to edit the code and run it. Also, to draw the UML diagram by UML lab extension in Eclipse.

UML Diagram (You can found a .png file in the project folder)



Implementation

Implementation of the project

In the main class, basic OOP concept were used to initialize objects, the doctor, patient and reservation control were initialized.

```java
package Main;

import Doctors.DoctorControl;

public class MainTest {
    public static void main(String[] args) {
        PatientControl p = new PatientControl();
        DoctorControl d = new DoctorControl();
        ReservationControl r = new ReservationControl();

```

```java
public class Patient extends Person {

    public Patient() {
    }

    public Patient(int id, String name, String address, int phoneNumber, int age, String gender) {
        super(id, name, address, phoneNumber, age, gender);
    }

    public String toString() {
        System.out.println("The patient's Id:" + getId()+"\n");
        System.out.println("The patient's name:" + getName()+"\n");
        System.out.println("The patient's gender:" + getGender()+"\n");
        System.out.println("The patient's age:" + getAge()+"\n");
        System.out.println("The patient's phone number:" + getPhoneNumber()+"\n");
        System.out.println("The patient's address:" + getAddress()+"\n");
        System.out.println("*****************************NEW PATIENT*******************************\n");
        return null;
    }
}
```

```java
public class Person {

    private int id;
    private int phoneNumber;
    private String name;
    private String address;
    private int age;
    private String gender;

    public Person() {
    }

    public Person(int id, String name, String address, int phoneNumber, int age, String gender) {
        this.id = id;
        this.phoneNumber = phoneNumber;
        this.name = name;
        this.address = address;
        this.age = age;
        this.gender = gender;

```

Data Structure Used

This project required the use of many data structure kinds, and they are as the following

- Linked List
- Circular Linked List
- Node
- Queue
- Circular Queue

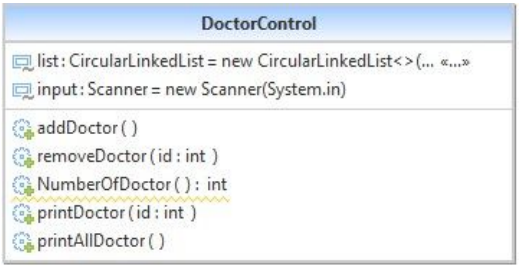
Explaining The Classes

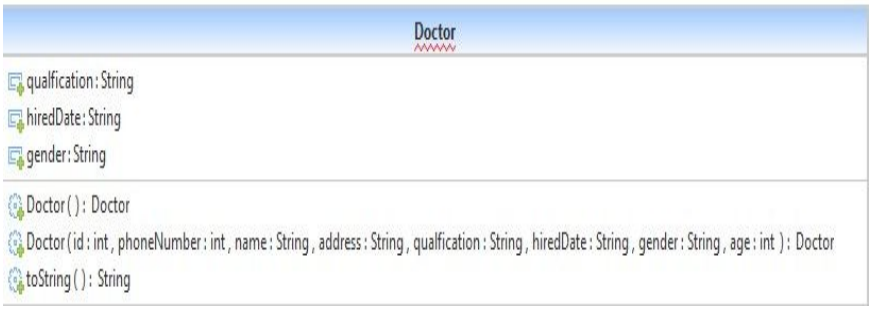
Doctor Class

It is a simple class to take the doctor's data.

DoctorControl Class

It is a simple class to implement a circular linked list of doctors.





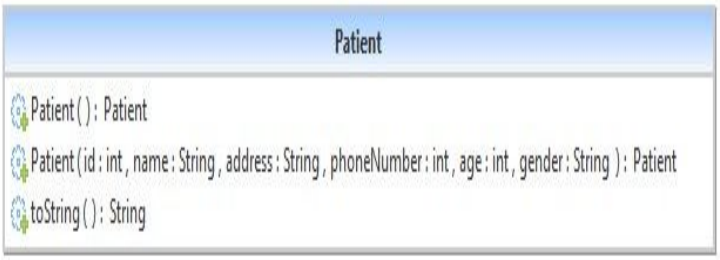
Patient Class

It is a simple class to take the doctor's data.

Attributes

Methods

- Patient()
- Patient(id:int, name:String…), it is public.
- toString()

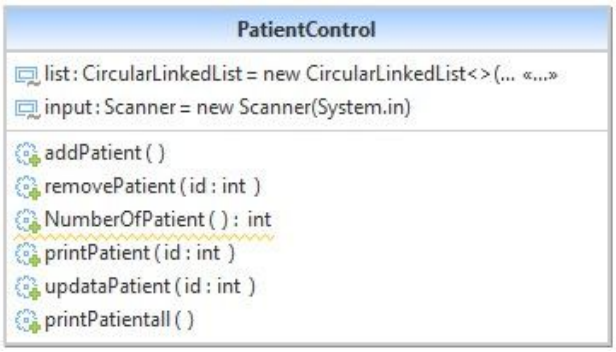


PatientControl Class

It is a simple class to implement a circular linked list of patients.

Attributes

- Circular Linked List.



Methods

- addPatient(), method to add patients to the list.
- removePatient(), to remove a patient from the list.
- NumberOfPatients(), it takes the numbers of patients in the list to check if it is empty or no.
- printPatient(), it prints the patient's data after taking and reading the Id number.
- updatePatient(), this method deletes the data of a patient and ask the admin to re-enter new modified data.
- printPatientall(), this method prints all the patients without entering the Id number.

CircularLinkedList Class

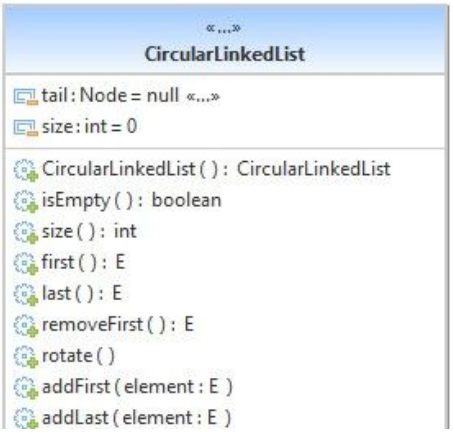
A class to implement a node in a Circular Linked List of reservations, but this will be used to store the data and modify it.

Attributes

- tail, a Node in Circular Linked List.
- size.

Methods

- isEmpty(), this method returns true if the List is Empty and vice versa.
- size(), to get the size of the node in the linked list.
- first()
- last()
- removeFirst()
- rotate()
- addFirst()
- addLast()



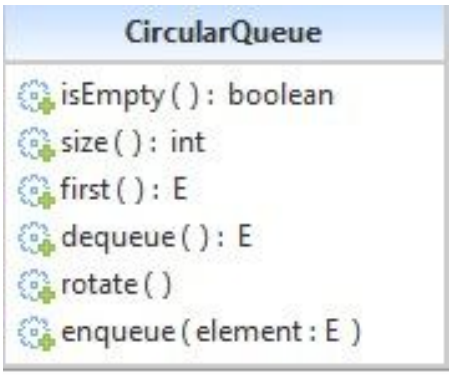
CircularQueue Class

A class to create Circular Queue by the Circular Linked List.

Attributes

Methods

- isEmpty(), this method returns true if the List is Empty and vice versa.
- size(), to get the size of the list.
- first()
- dequeue(), to remove first element in the queue.
- rotate()
- enqueue(), to add an element to the queue.



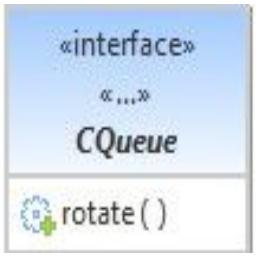
CQueue Class

An interface that inherit from the Queue class, and it is an abstract class to implement the rotate function in the Circular Queue class.

Attributes

Methods

- rotate()



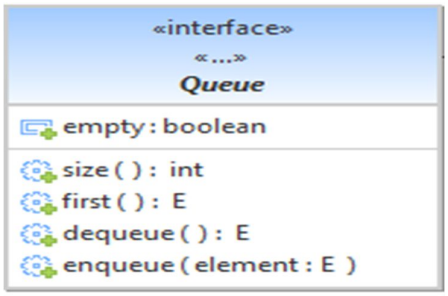
Queue Class

An abstract class of queue that implements the basic functions of Queue (enqueue and dequeue) in the list.

Attributes

Methods

- isEmpty, this method returns true if the List is Empty and vice versa.
- size()
- first()
- dequeue(), remove the first element from the queue.
- enqueue(), enqueue an element to the queue.

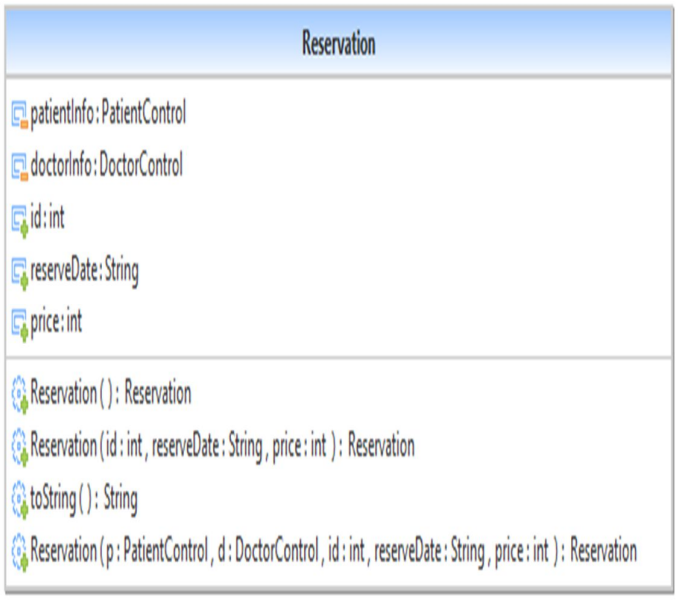


Reservation Class

This class is used to create a link between the patient and a doctor, to get the reservation data.

Attributes

- id, store the Id number of reservations as integer.
- reserveDate, string to store the reservation date.
- price, integer to store the price of the reservation.



Methods

- Reservation(), return the list of reservation to reserve an appointment for patients.
- Reservation(id, reserveDate, price), string that shows the details of the reservations.
- toString()
- Reservation(PatientControl p, DoctorControl d, id, reserveDate, price)

ReservationControl Class

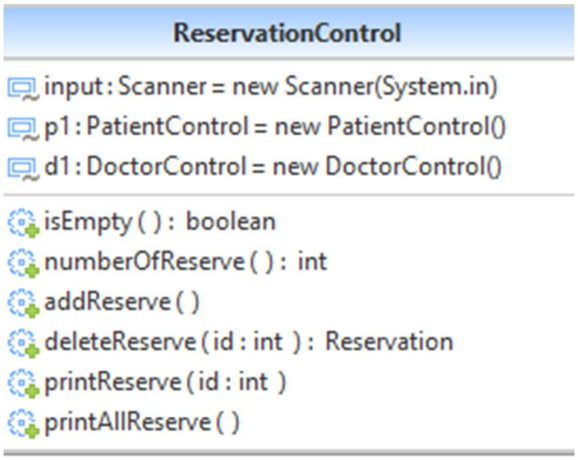
This class is used to make a reservation and implemented in the Circular Queue where data is stored.

Attributes

- p1, PatientControl.
- d1, DoctorControl.

Methods

- isEmpty(), return true if the reservations are Empty and vice versa.
- numberOfReserve(), return the number of reservations.
- addReserve(), to add reservation.
- deleteReserve(), to delete reserve by specific Id number.
- printReserve(), to print a reservation by specific Id.
- printAllReserve(), to print all reservations.



CircularLinkedList Class

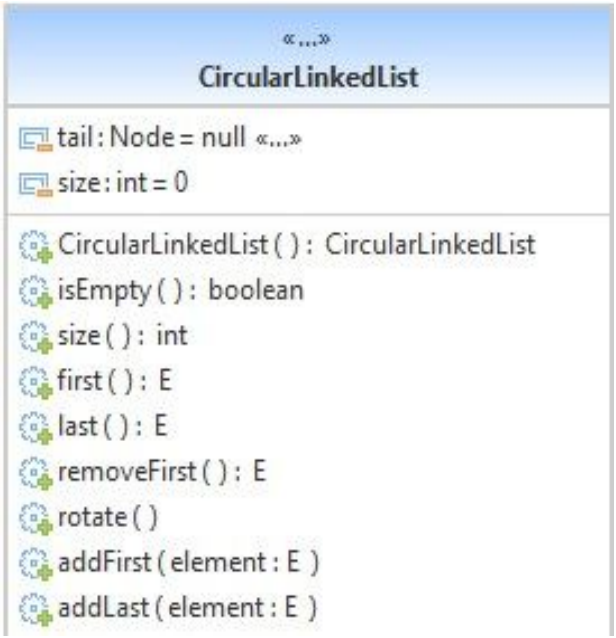
A class to implement a node in a Circular Linked List of reservations, but this will be used to store the data and modify it.

Attributes

- tail, a Node in Circular Linked List.
- size

Methods

- isEmpty(),return true if the reservations are Empty and vice versa.
- size()
- first()
- last()
- removeFirst()
- rotate()
- addFirstElement()
- addLastElement()



Person Class

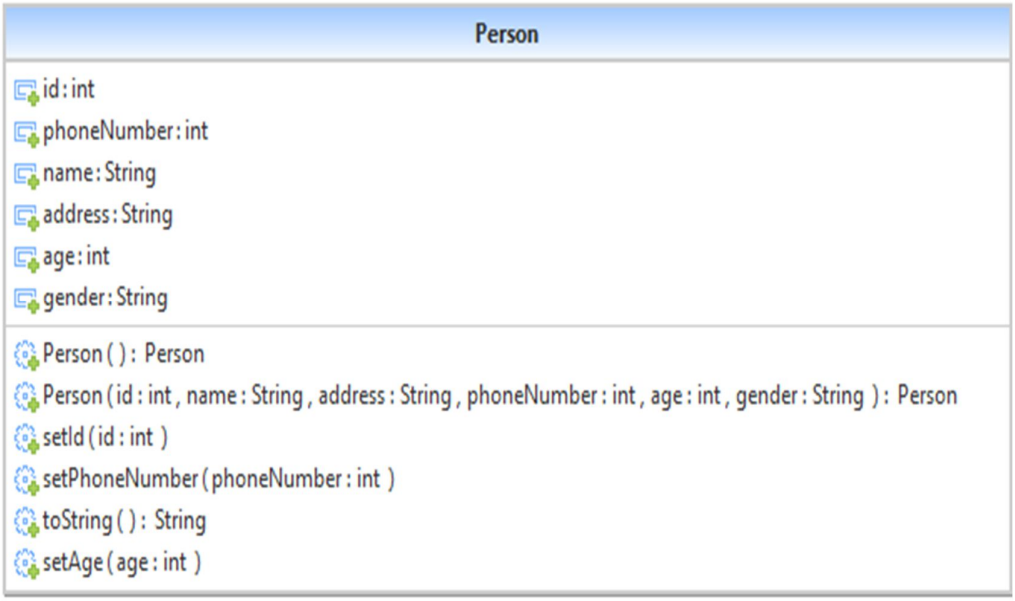
This class gives the description of both doctors and patients, it requires to enter the name, age and address of both in Doctors and Patients classes.

Attributes

- id
- phoneNumber
- name
- address
- age
- gender

Methods

- Person(id, name, address, phoneNumber, age, gender)
- setId
- setPhoneNumber
- toString()
- setAge()



MainTest Class

A test class was used during the development of this project to test every feature that was worked on.

```
package Main;

import Doctors.DoctorControl;
import Patients.PatientControl;
import Doctors.DoctorControl;
import Reservations.ReservationControl;
import java.util.Scanner;

public class MainTest {
	public static void main(String[] args) {
		PatientControl p = new PatientControl();
		DoctorControl d = new DoctorControl();
		ReservationControl r = new ReservationControl();

		Scanner sc = new Scanner(System.in);
		int choice;
		do {
			System.out.println("******************************");
			System.out.println("Welcome to Beirut Clinic.\nIn your service
24/7.\n");
			System.out.println("******************************");
			System.out.println("Choose your option:");
			System.out.println("1- Doctors");
			System.out.println("2- Add Doctor");
			System.out.println("3- Remove Doctor");
			System.out.println("4- Patients");
			System.out.println("5- Add Patient");
			System.out.println("6- Remove Patient");
			System.out.println("7- Update Patient");
			System.out.println("8- Reservations");
			System.out.println("9- Add Reservation");
			System.out.println("10- Remove Reservation");
			System.out.println("11- Exit");

			choice = sc.nextInt();
			if (choice != 1 && choice != 2 && choice != 3 && choice != 4
```

```
&& choice != 5 && choice != 6 && choice != 7
                                && choice != 8 && choice != 9 && choice != 10
&& choice != 11) {
                        System.out.println("Wrong choice");
                }
                switch (choice) {
                case 1:

                        d.printAllDoctor();
                        break;
                case 2:
                        d.addDoctor();

                        break;
                case 3:
                        d.printAllDoctor();
                        System.out.println("Please enter the Id of doctor you
want to remove:");
                        int id = sc.nextInt();

                        d.removeDoctor(id);

                        System.out.println("Doctor of Id " + id + " is removed.");

                        break;
                case 4:
                        p.printPatientall();

                        break;
                case 5:

                        p.addPatient();
                        break;
                case 6:
                        p.printPatientall();
                        System.out.println("Please enter the Id of patient you
want to remove:");
                        id = sc.nextInt();

                        System.out.println("Patient of Id " + id + " is removed.");
                        p.removePatient(id);
                        break;
                case 7:
```

```
                        p.printPatientall();
                        System.out.println("Please enter the Id of patient you
want to update:");
                        id = sc.nextInt();
                        p.updataPatient(id);
                        break;
                case 8:
                        r.printAllReserve();
                        break;
                case 9:
                        r.addReserve();
                        break;
                case 10:

                        r.printAllReserve();
                        System.out.println("Please enter the Id of reserve you
want to remove:");
                        id = sc.nextInt();
                        r.deleteReserve(id);
                        System.out.println("Reservation " + id + " is removed
successfully.");
                        break;
                }

        } while (choice != 11);
        System.out.println("Welcome to Beirut Clinic and thank you for the
visit!");
    }
}
```

Results

Results and Techniques

First, a main class was developed with numerous test methods that tested every single feature that was implemented in the project, and everything passed properly after fixing couple of bugs.

After that, the main method was developed, linked everything up, and ran the program for the first time, which worked flawlessly.

Visual Results

Main Menu

```
****************************
Welcome to Beirut Clinic.
In your service 24/7.

****************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
```

Add Doctor //Id number should be 9 digits.

```
2
Enter the doctor's Id please:
123456789
Enter the doctor's name please:
Mohammad Sidani
Enter the doctor's gender please:
Male
Enter the doctor's age please:
31
Valid age !!!
Enter the doctor's address please:
Beirut
Enter the doctor's qualfication please:
Nutrition
Enter the doctor's hired date please(dd/mm/yy):
12/4/2002
****************************
Welcome to Beirut Clinic.
In your service 24/7.

****************************
```

Display Doctors

```
1
The doctor's Id:123456789

The doctor's name:Mohammad Sidani

The doctor's gender:Male

The doctor's age:31

The doctor's address:Beirut

The doctor's qualfication:Nutrition

The doctor's hired date:12/4/2002

**********************************************************************
```

If it doesn't find doctors:

```
**********
Welcome to Beirut Clinic.
In your service 24/7.

**********
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
1
There is no data.
**********
```

Remove doctor

```
3
The doctor's Id:123456789

The doctor's name:Mohammad Sidani

The doctor's gender:Male

The doctor's age:31

The doctor's address:Beirut

The doctor's qualfication:Nutrition

The doctor's hired date:12/4/2002

********************************************************************************
Please enter the Id of doctor you want to remove:
123456789
The data is deleted successfully.
Doctor of Id 123456789 is removed.
**************************
Welcome to Beirut Clinic.
In your service 24/7.

**************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
1
There is no data.
**************************
```

If the Doctors List is empty:

```
******************************
Welcome to Beirut Clinic.
In your service 24/7.

******************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
3
There is no data.
```

Add Patient // Id number should be 9 digits & Phone number should be 8 digits.

```
5
Enter the patient's Id please:
100100100
Enter the patient's name please:
Ali El Zaart
Enter the patient's gender please:
Male
Enter the patient's age please:
24
Valid age !!!
Enter the patient's phone number please:
70707070
Enter the patient address please:
Barja
**************************
Welcome to Beirut Clinic.
In your service 24/7.

**************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
5
Enter the patient's Id please:
100200300
Enter the patient's name please:
Nadia Salame
Enter the patient's gender please:
Female
Enter the patient's age please:
39
Valid age !!!
Enter the patient's phone number please:
03030303
Enter the patient address please:
Beirut
```

Display Patients

```
4
The patient's Id:100100100

The patient's name:Ali El Zaart

The patient's gender:Male

The patient's age:24

The patient's phone number:70707070

The patient's address:Barja

******************************NEW PATIENT*******************************

The patient's Id:100200300

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:3030303

The patient's address:Beirut

******************************NEW PATIENT*******************************
```

Remove Patient

```
6
The patient's Id:100100100

The patient's name:Ali El Zaart

The patient's gender:Male

The patient's age:24

The patient's phone number:70707070

The patient's address:Barja

******************************NEW PATIENT*******************************

The patient's Id:100200300

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:3030303

The patient's address:Beirut

******************************NEW PATIENT*******************************

Please enter the Id of patient you want to remove:
100100100
Patient of Id 100100100 is removed.
The data is deleted successfully.
**************************
```

The patients list after removing patient:

```
4
The patient's Id:100200300

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:3030303

The patient's address:Beirut

******************************NEW PATIENT*******************************
```

Update Patients

```
7
The patient's Id:100200300

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:3030303

The patient's address:Beirut

****************************NEW PATIENT*******************************

Please enter the Id of patient you want to update:
100200300
The data is deleted successfully.
Enter the patient's Id please:
123123123
Enter the patient's name please:
Nadia Salame
Enter the patient's gender please:
Female
Enter the patient's age please:
39
Valid age !!!
Enter the patient's phone number please:
70123321
Enter the patient's address please:
Beirut
```

If there is no data for a patient:

```
*******************************
Welcome to Beirut Clinic.
In your service 24/7.

*******************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
7
There is no data.
```

Add Reservation

```
9
Enter the patient's Id please:
123123123
Enter the patient's name please:
Nadia Salame
Enter the patient's gender please:
Female
Enter the patient's age please:
39
Valid age !!!
Enter the patient's phone number please:
70123321
Enter the patient address please:
Beirut
Enter the doctor's Id please:
100100100
Enter the doctor's name please:
Mohammad Sidani
Enter the doctor's gender please:
Male
Enter the doctor's age please:
49
Valid age !!!
Enter the doctor's address please:
Beiruy
Enter the doctor's qualfication please:
Nutrition
Enter the doctor's hired date please(dd/mm/yy):
12/4/2002
Enter the reservation Id please:
1
Enter the reservation date please:
4/12/2021
Enter the reserve price please:
100
```

Display Reservations

```
8
The patient's Id:123123123

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:70123321

The patient's address:Beirut

*****************************NEW PATIENT*******************************

The doctor's Id:100100100

The doctor's name:Mohammad Sidani

The doctor's gender:Male

The doctor's age:49

The doctor's address:Beiruy

The doctor's qualfication:Nutrition

The doctor's hired date:12/4/2002

*********************************************************************
The reserve Id:1                    The reserve date:4/12/2021          The reserve price:100$

*****************************NEW RESERVATION*****************************
```

If there is no data for a reservation:

```
8
There is no data.
There is no data.
There is no data to show.
****************************
Welcome to Beirut Clinic.
In your service 24/7.

****************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
```

Remove Reservation

```
10
The patient's Id:123123123

The patient's name:Nadia Salame

The patient's gender:Female

The patient's age:39

The patient's phone number:70123321

The patient's address:Beirut

*****************************NEW PATIENT*********************************

The doctor's Id:100100100

The doctor's name:Mohammad Sidani

The doctor's gender:Male

The doctor's age:49

The doctor's address:Beirut

The doctor's qualfication:Nutrition

The doctor's hired date:12/4/2002

*************************************************************************
The reserve Id:1                        The reserve date:4/12/2021              The reserve price:100$

*****************************NEW RESERVATION*********************************

Please enter the Id of reserve you want to remove:
1
```

If there is no data for a reservation to remove:

```
*****************************
Welcome to Beirut Clinic.
In your service 24/7.

*****************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
10
There is no data.
There is no data.
There is no data to show.
```

Exit

```
*****************************
Welcome to Beirut Clinic.
In your service 24/7.

*****************************
Choose your option:
1- Doctors
2- Add Doctor
3- Remove Doctor
4- Patients
5- Add Patient
6- Remove Patient
7- Update Patient
8- Reservations
9- Add Reservation
10- Remove Reservation
11- Exit
11
Welcome to Beirut Clinic and thank you for the visit!
```

Conclusion

In the end of the project, we can say that the project was a success, and that it helped us develop the skills that we learned from this course. It taught how to use data structures by developing a program to serve a certain purpose.

Reference

- **Dr. Ali El-Zaart** CMPS347 course.