Hospital Management System

Course Code: CSCI305

Section: 1

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- ## Hospital Management System

Hospital management system enables hospitals to be able to manage the data and information to ensure the efficient and successful completion of operations and processes.

Generally, the hospital system helps to provide a better patient experience, to provide a several functions and to manage every department of the hospital.

- ## Objective for solving the problem

We created this system to help to improve the quality and to manage the data of every aspect. Also, we will create a hospital system that will have a friendly user interface to make sure that anyone can use it and make every process easily. Also, this system will record information related to diagnosis given to patients and keep information about different diseases that helps the doctor to treat the patients. The main components of our system are the hospital itself, doctors, patients, rooms, treatment, time, etc. Every component has a unique ID and details about every function and relation in the system that are shown in the ERD diagram. We will apply everything we have taken to create an efficient system using database processes.

- ## Entity Class

In this project there are 5 entity classes.

1. **DOCTOR**

   Doctor class stores the data of doctors who diagnose the patients.

2. **NURSE**

   The nurse class stores the data of nurses who treat the patients.

3. PATIENT

Patient class stores the data of patient who take appointment from reception.

4. RECEPTIONIST

Receptionist class stores the data of receptionist who interact with patient.

5. ROOM

Room class stores the record of which patients are admitted.

- ## Attributes

DOCTOR: Doctor class have 5 attributes

1. Doctor_ID.
2. Doctor_Name.
3. Doctor_Specialization.
4. Doctor_Gender.
5. Phone_Number

NURSE: Nurse class have 5 attributes

1. Nurse_Name
2. Nurse_ID
3. Nurse_Email
4. Nurse_Address
5. Phone_Number

PATIENT: Patient class have 8 attributes

1. Patient_ID

2. Patient_Name
3. Patient_Gender
4. Patient_Entry Date
5. Patient_Exit Date
6. NurseID
7. RoomID
8. Phone_Number

RECEPTIONIST: Receptionist class have 4 attributes

1. Receptionist_ID
2. Receptionist_Name
3. Receptionist_Gender
4. Receptionist_Address

ROOM: Room class have 4 attributes

1. Room_Number.
2. Room_Entry Date
3. Room_Exit Date
4. Room Type

Relations

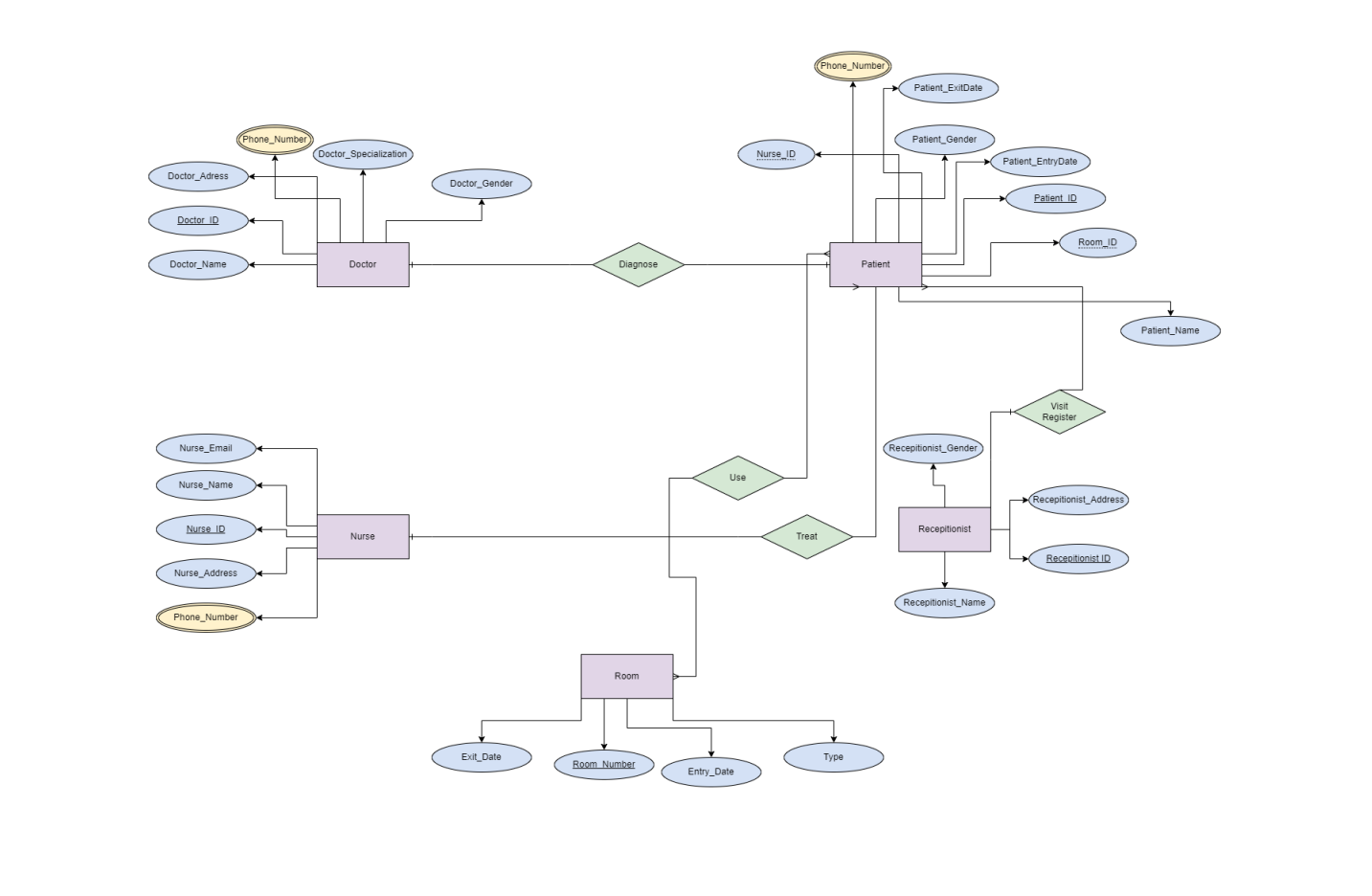
1. Treat
2. Diagnose
3. Visit-Register

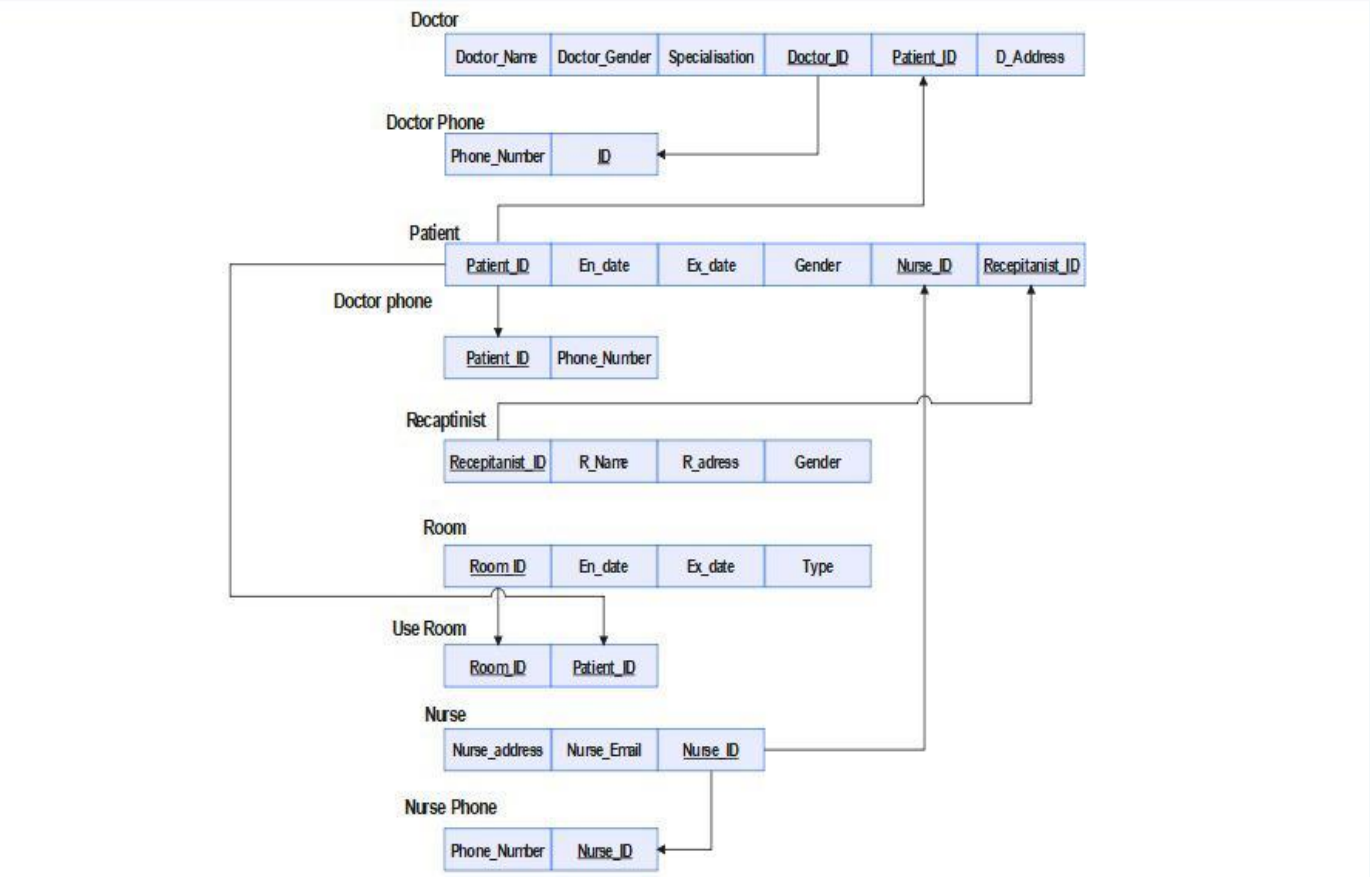
4. Use

- **Business role**

    1. One receptionist deals many patients, and one patient interacts with only one receptionist.
    2. One doctor diagnosis only one patient and one patient can only have one doctor checked up at a time.
    3. One can be admitted in many rooms and one room can have many patients.
    4. One nurse treats many patients and one patient treated by only one nurse.

- **ERD Diagram and schema**





Normalization:

- **In Doctor table:**
  a. **First Normal Form (1NF)** →There is no repeating group, so this table is in (1NF).
  b. **Second Normal Form** (2NF)→ There is no partial dependency as the table has no composite primary key, so this table is in (2NF).
  c. **Third Normal Form** (3NF)→ There is no transitive dependency, so this table is in (3NF).
- **In Nurse Table:**
  a. **First Normal Form (1NF)** →There is no repeating group, so this table is in (1NF).

b. **Second Normal Form (2NF)→**There is no partial dependency as the table has no composite primary key, so this table is in (2NF).

c. **Third Normal Form (3NF)→**There is no transitive dependency, so this table is in (3NF).

- **In Patient and the other tables:**

a. **First Normal Form (1NF) →**There are no repeating group, so these tables are in (1NF).

b. **Second Normal Form (2NF)→** There are no partial dependency as the tables have no composite primary key, so these tables are in (2NF).

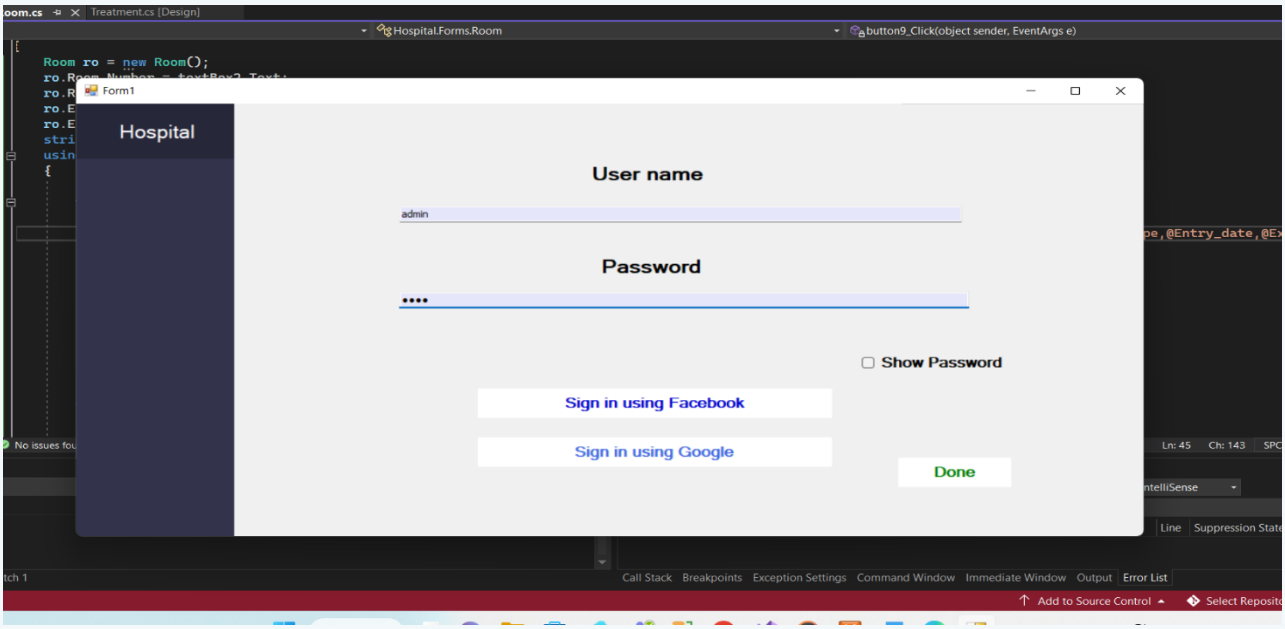
c. **Third Normal Form (3NF)→** There are no transitive dependency, so these tables are in (3NF).

In general, due to following all the normal forms in our project, there is no partial function dependency and transitive function dependency as all of them are fully, so all tables are normalized.

List of used tools:

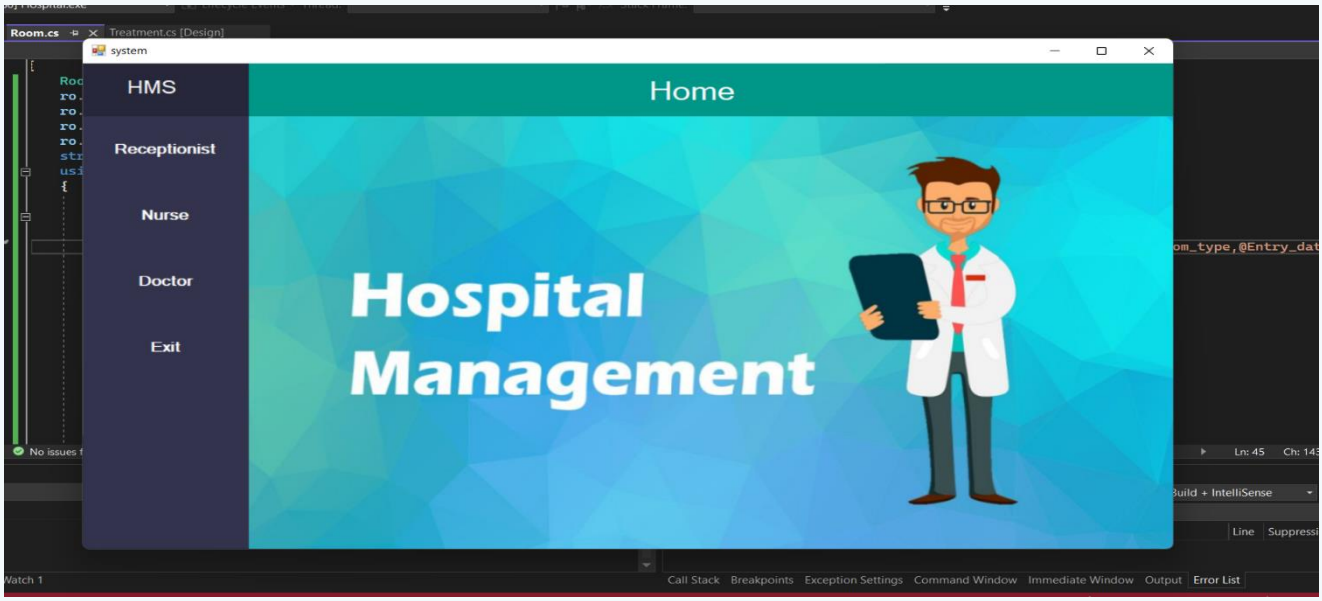
- An online website that is called (draw.io) for creating the Entity relationship diagram.
- Microsoft SQL for creating database (queries).
- Microsoft visual studio for creating all interfaces as a desktop application.

Demo and screenshots from the interfaces:



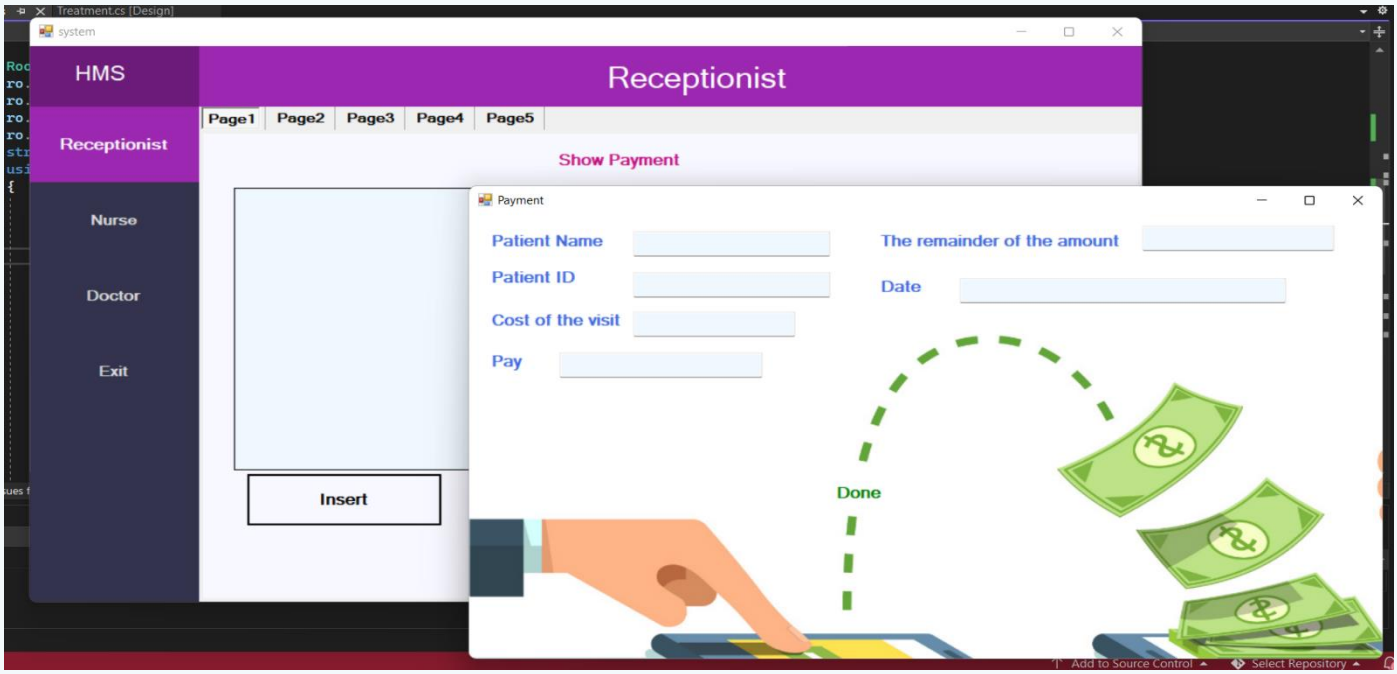
As the user should enter his username and password to be able to open the system

After Login page:

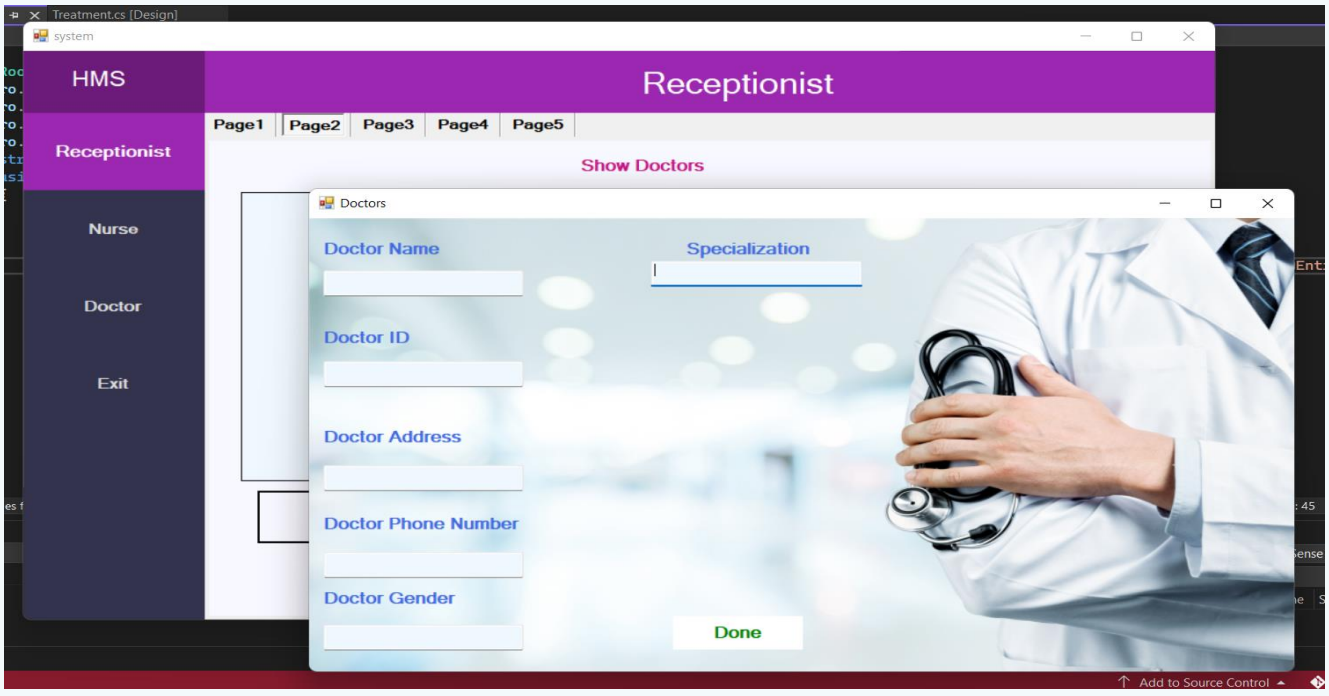


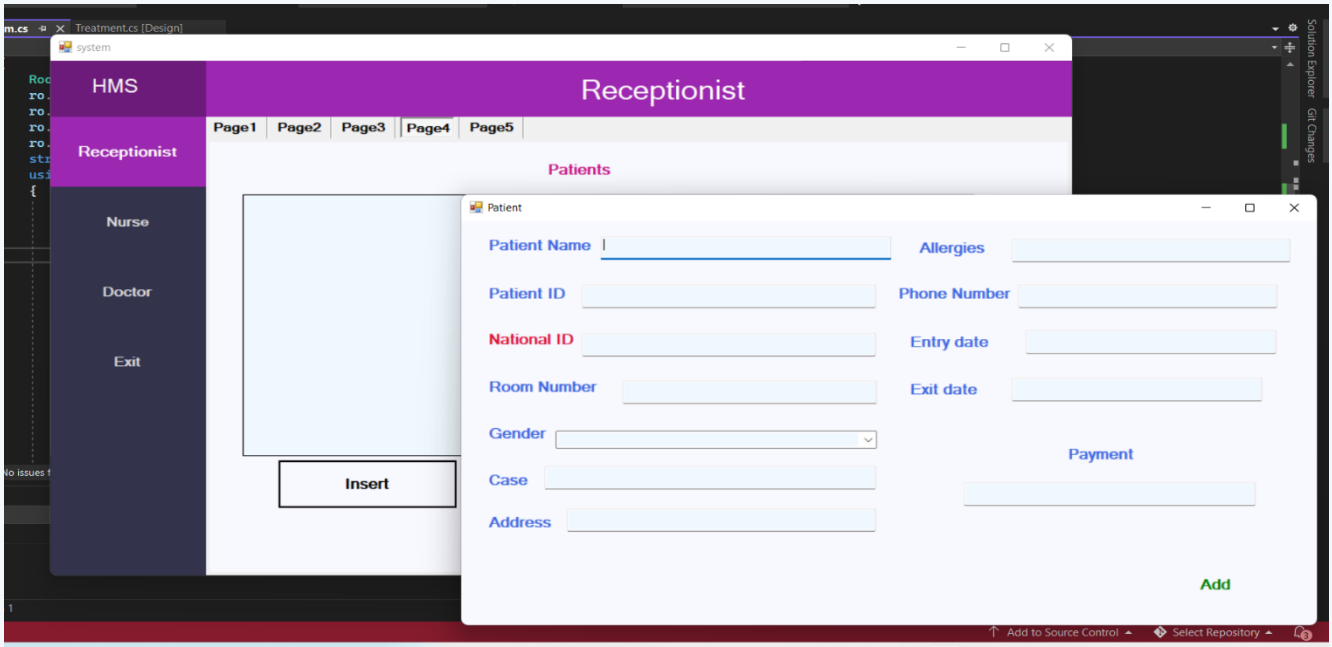
As after login page, the pages of Doctor, Nurse, and Receptionist.

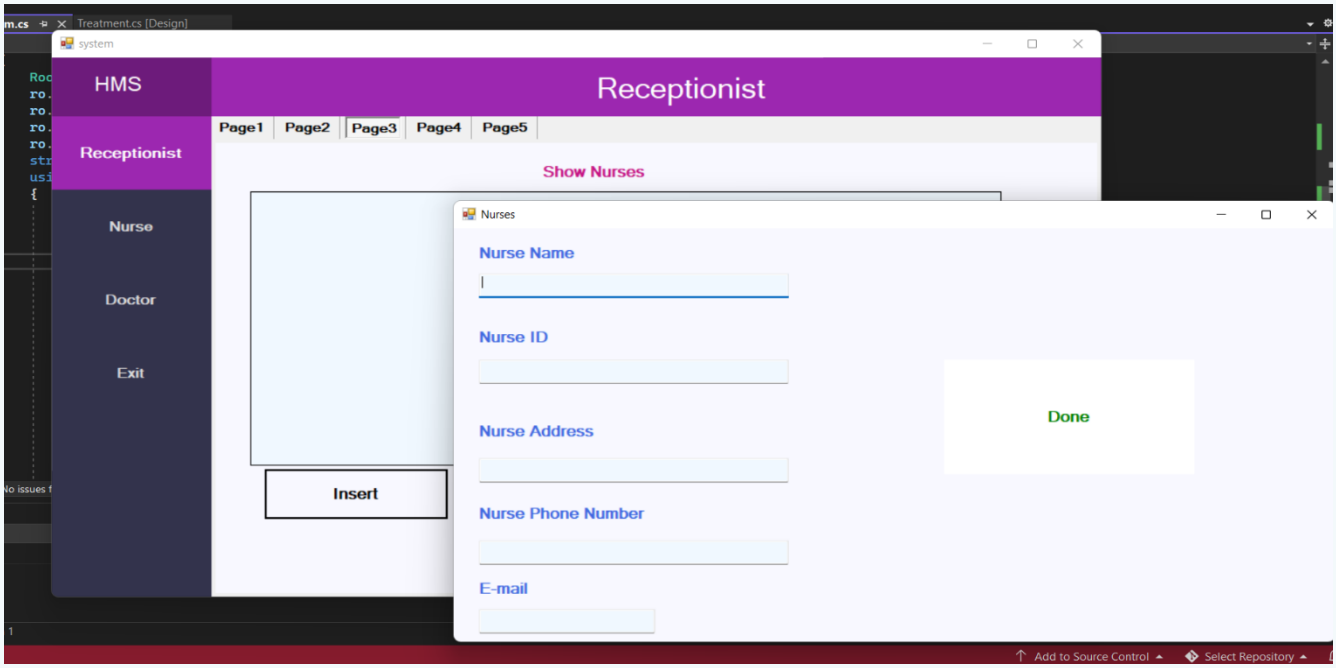
Variety of functionality in Receptionist page:

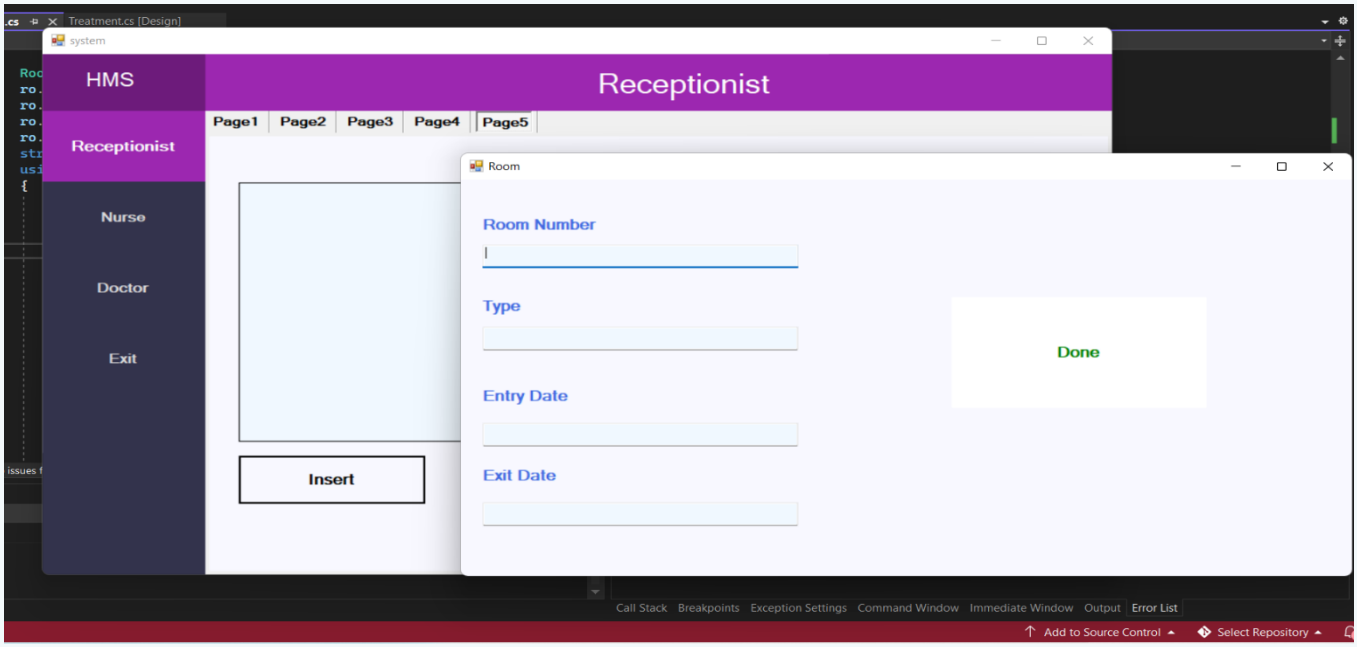


Once we click on add doctor, this page will appear

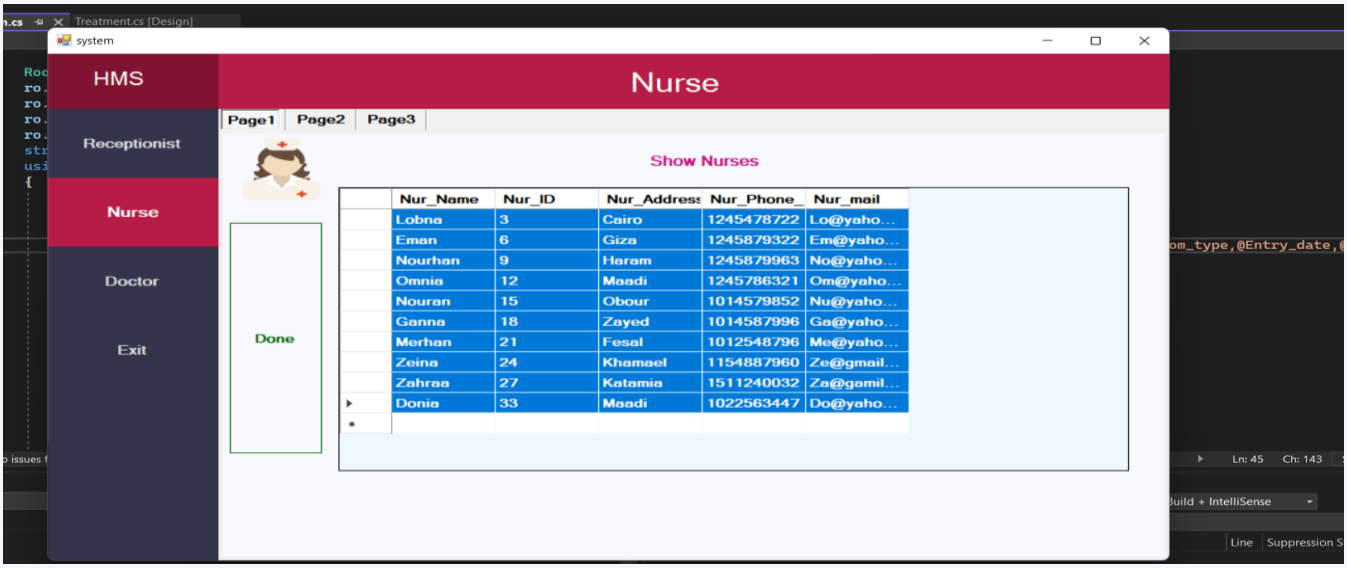


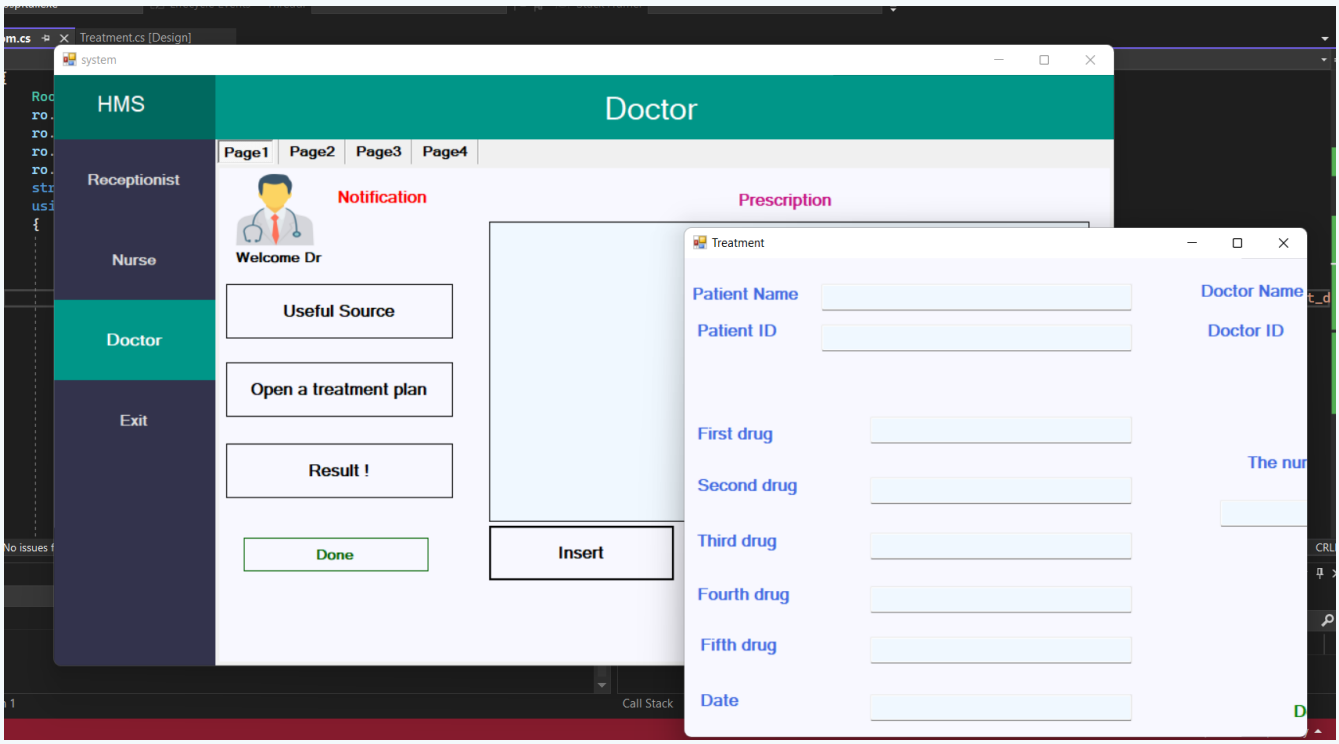

HMS
Receptionist
Page1
Page2
Page3
Page4
Page5
Receptionist
Nurse
Doctor
Exit
Patients
Insert
Patient
Patient Name
Allergies
Patient ID
Phone Number
National ID
Entry date
Room Number
Exit date
Gender
Payment
Case
Address
Add

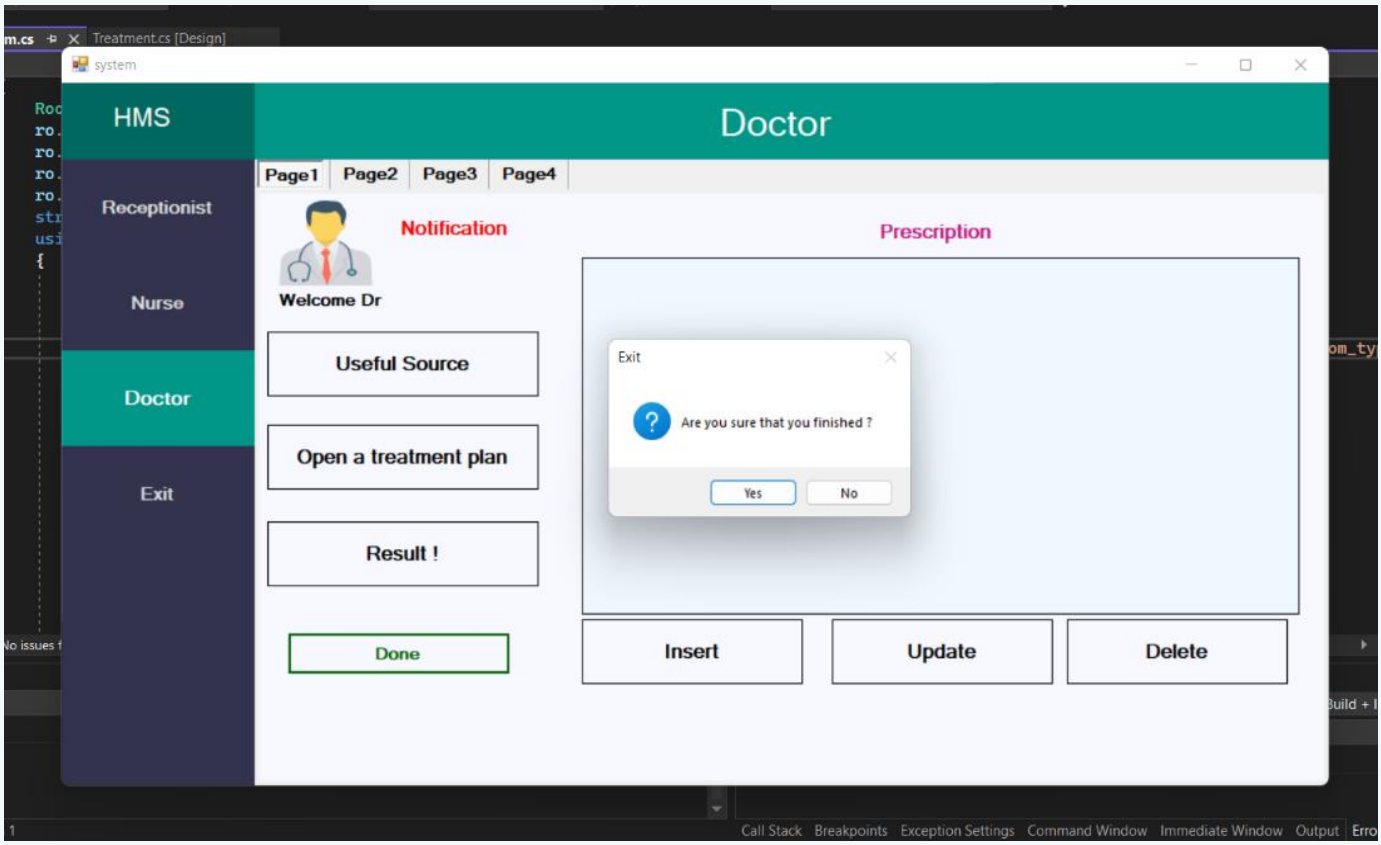

HMS
Receptionist
Page1
Page2
Page3
Page4
Page5
Receptionist
Nurse
Doctor
Exit
Show Nurses
Insert
Nurses
Nurse Name
Nurse ID
Nurse Address
Nurse Phone Number
E-mail
Done

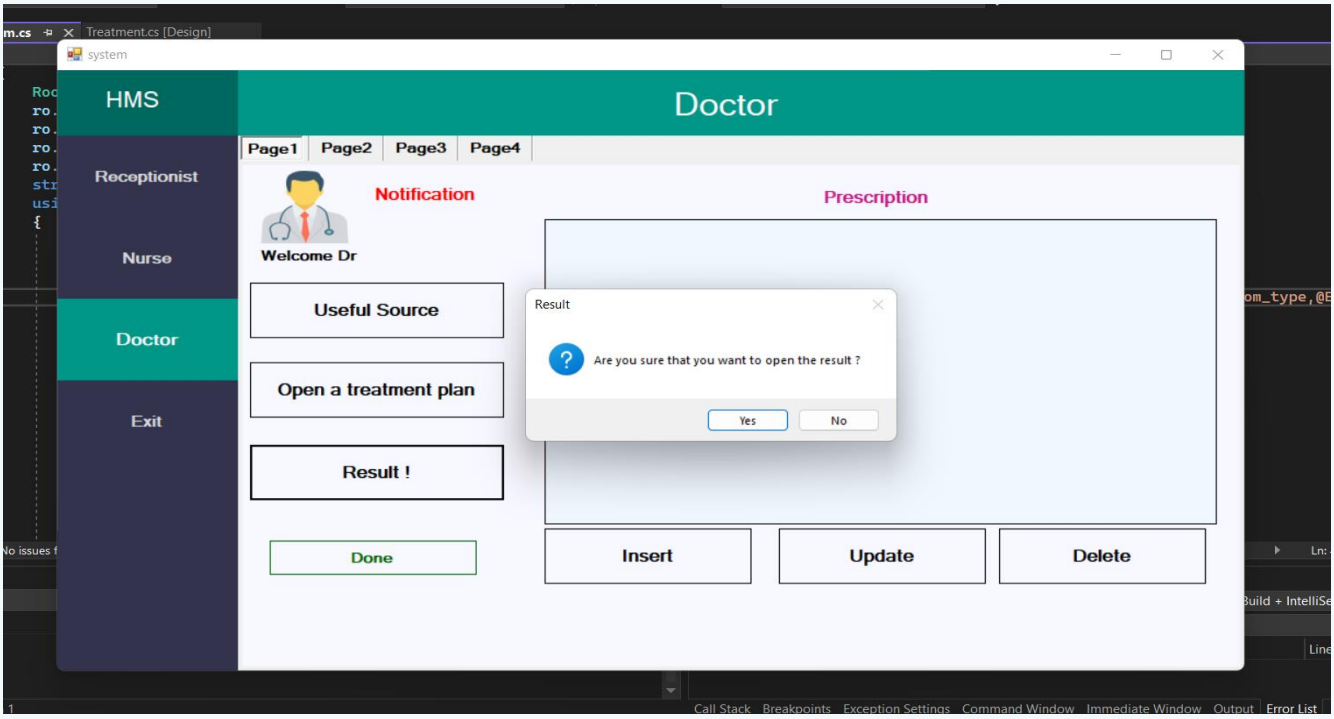

Treatment.cs [Design]
system
HMS
Receptionist
Nurse
Doctor
Exit
Receptionist
Page1
Page2
Page3
Page4
Page5
Insert
Room
Room Number
Type
Entry Date
Exit Date
Done
Call Stack
Breakpoints
Exception Settings
Command Window
Immediate Window
Output
Error List
Add to Source Control
Select Repository

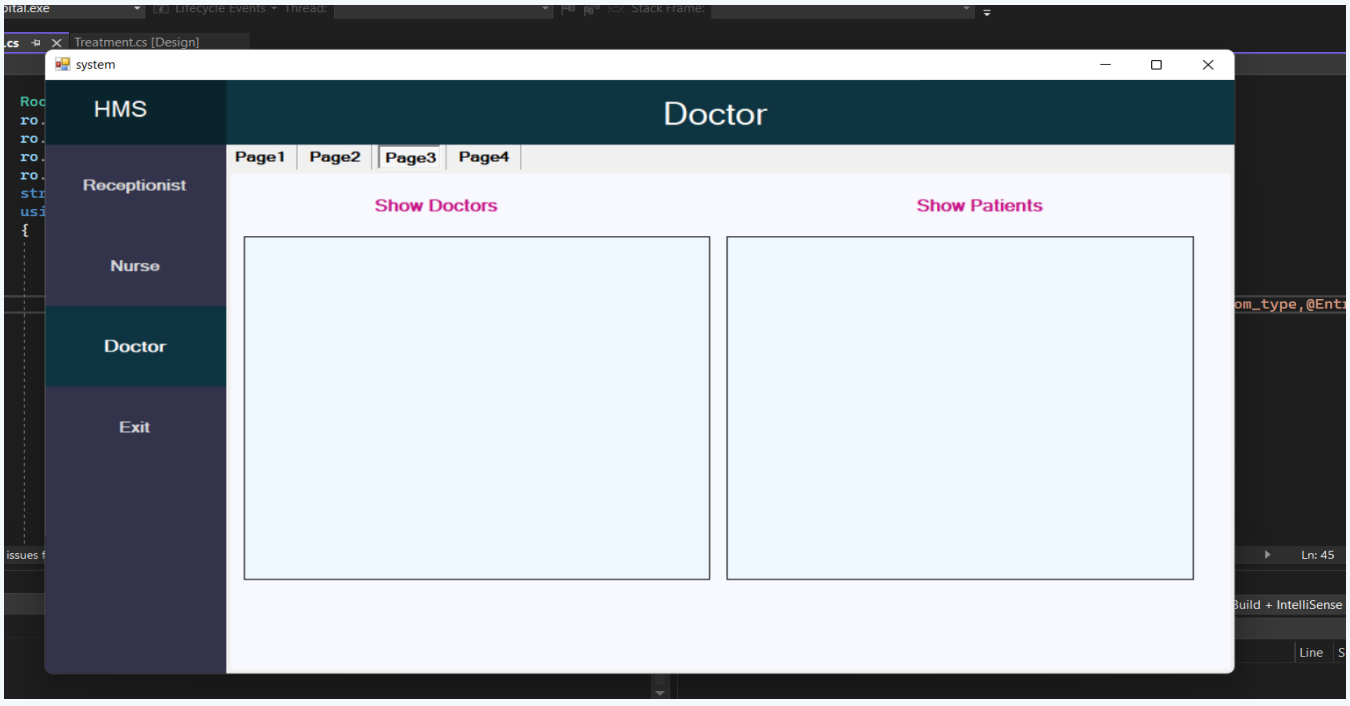
Nurse page


Treatment.cs [Design]
system
HMS
Receptionist
Nurse
Doctor
Exit
Nurse
Page1
Page2
Page3
Show Nurses
Done
Nur_Name
Nur_ID
Nur_Address
Nur_Phone_
Nur_mail
Lobna 3 Cairo 1245478722 Lo@yaho...
Eman 6 Giza 1245879322 Em@yaho...
Nourhan 9 Haram 1245879963 No@yaho...
Omnia 12 Maadi 1245786321 Om@yaho...
Nouran 15 Obour 1014579852 Nu@yaho...
Ganna 18 Zayed 1014587996 Ga@yaho...
Merhan 21 Fesal 1012548796 Me@yaho...
Zeina 24 Khamael 1154887960 Ze@gmail...
Zahraa 27 Katamia 1511240032 Za@gamil...
Donia 33 Maadi 1022563447 Do@yaho...
Ln: 45
Ch: 143
Build + IntelliSense
Line
Suppression S

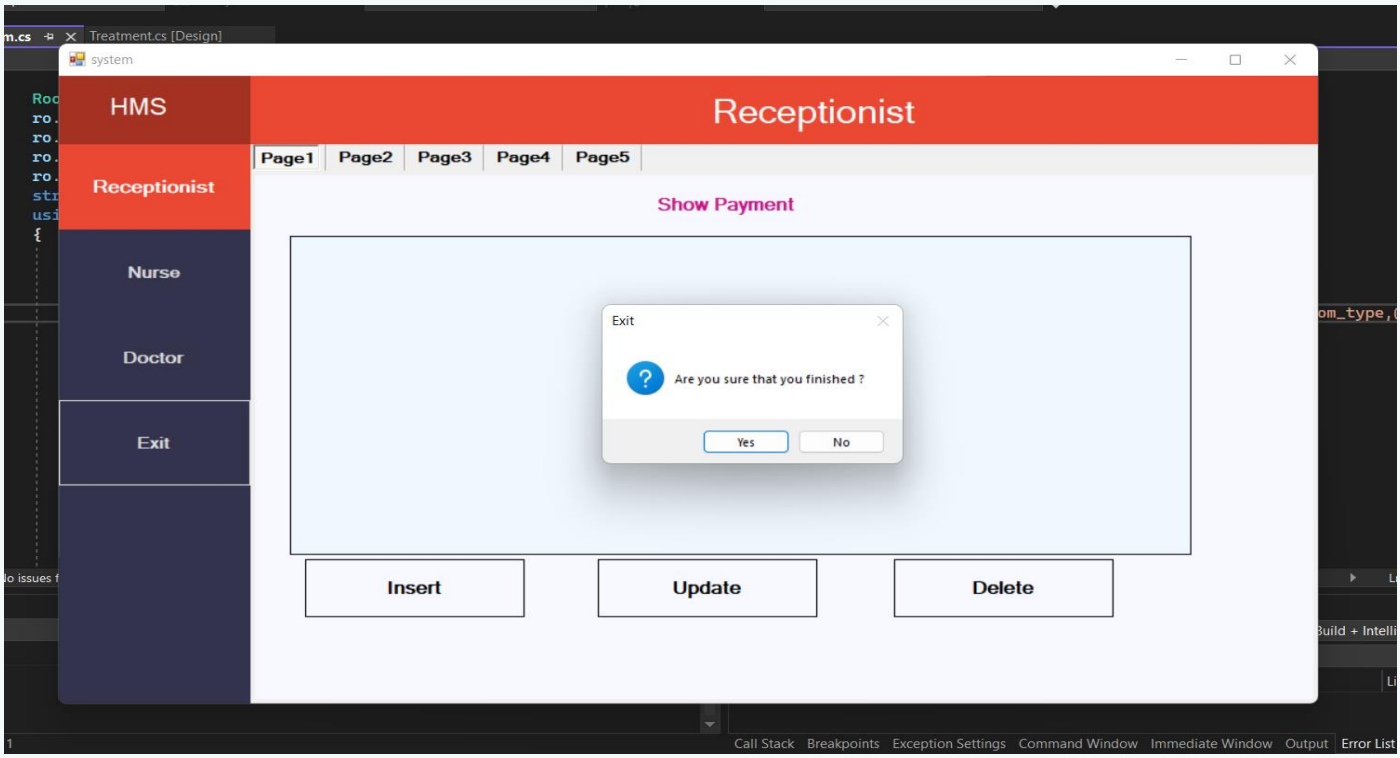

Treatment.cs [Design]
system
HMS
Doctor
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Notification
Welcome Dr
Prescription
Useful Source
Open a treatment plan
Result !
Done
Insert
Treatment
Patient Name
Patient ID
Doctor Name
Doctor ID
First drug
Second drug
Third drug
Fourth drug
Fifth drug
Date
Call Stack


Treatment.cs [Design]
system
HMS
Doctor
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Notification
Welcome Dr
Prescription
Useful Source
Open a treatment plan
Result !
Done
Exit
Are you sure that you finished ?
Yes
No
Insert
Update
Delete
Call Stack
Breakpoints
Exception Settings
Command Window
Immediate Window
Output


Treatment.cs [Design]
system
HMS
Doctor
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Notification
Welcome Dr
Prescription
Useful Source
Open a treatment plan
Result !
Done
Result
Are you sure that you want to open the result ?
Yes
No
Insert
Update
Delete
Call Stack
Breakpoints
Exception Settings
Command Window
Immediate Window
Output
Error List


Treatment.cs [Design]
system
HMS
Doctor
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Show Doctors
Show Patients


system
HMS
Doctor
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Patient with ID .... should take a rest for 3 weeks due to his broken leg.
Generate


system
HMS
Receptionist
Receptionist
Nurse
Doctor
Exit
Page1
Page2
Page3
Page4
Page5
Show Payment
Exit
Are you sure that you finished ?
Yes
No
Insert
Update
Delete

➔ As a summary: The receptionist has the ability to show the payment or booking of each patient per day to calculate the profit.

Also, he/she has the insert, update and delete records of doctors, patients, and other functions.

➔ Nurse has the ability to show her responsibility with each patient due (Room number)

Also, she can see the other nurses in the system.

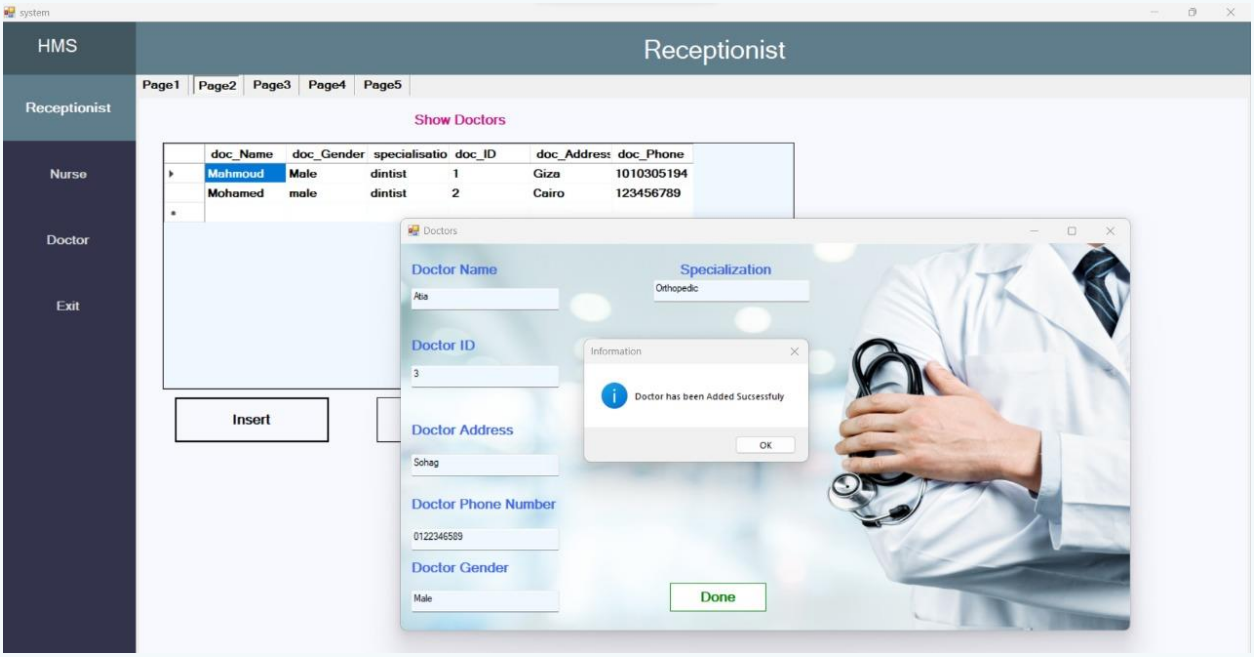
➔ Doctor has the ability to open a treatment plan as a diagnosis for every patient.

Also, he can update, delete, and insert a prescription by generating a QR code.

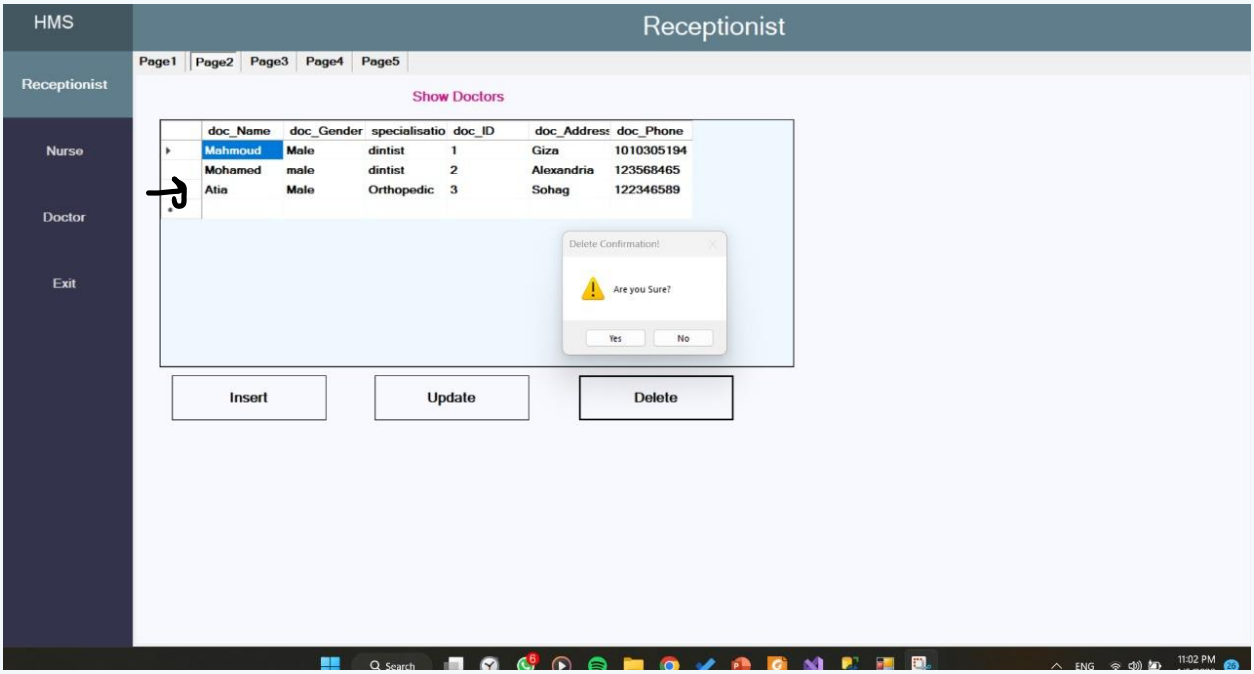
Now with a report from the system about some of update, insert, and delete functions by using this link:

https://drive.google.com/file/d/1tzhRopH9KmCr_bvpdM9u8tMxCJSyaGML/view?usp=share_link

1. **When adding a doctor as below:**

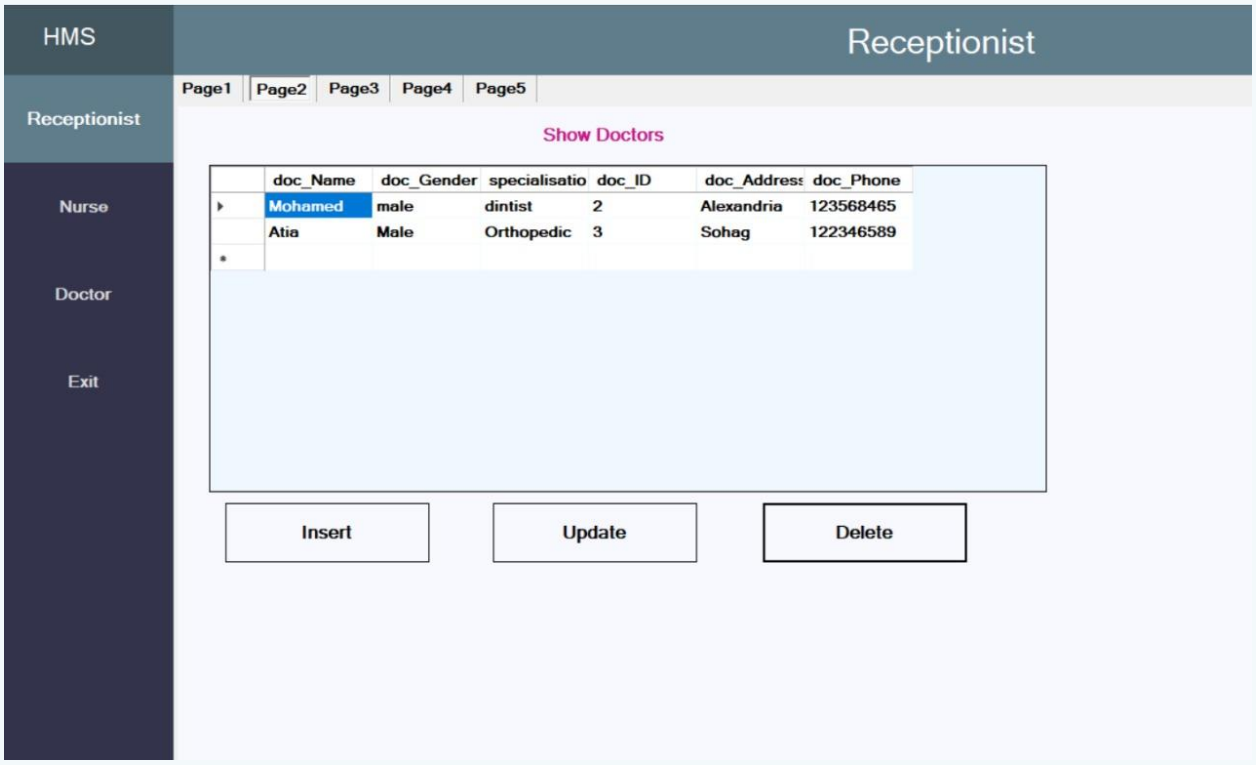


It will appear in the system:

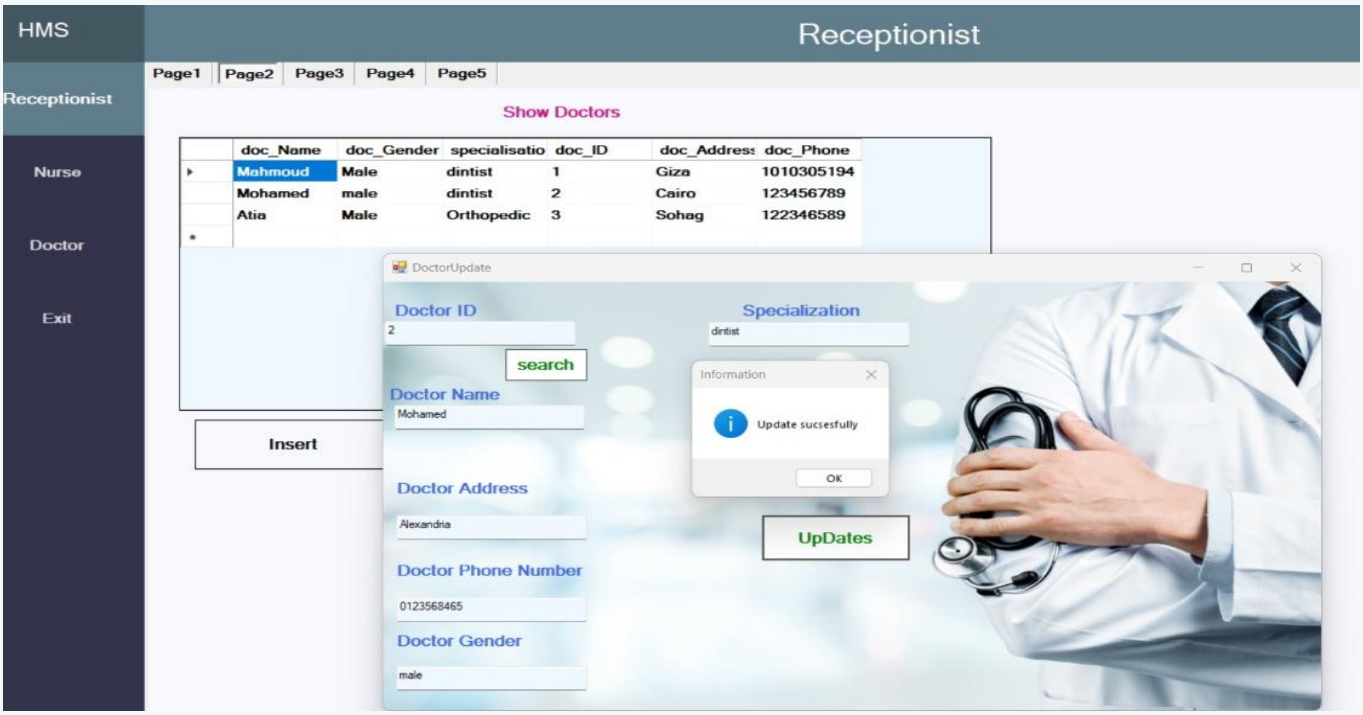


Also, if we want to delete a record as “Mahmoud”: as shown above.

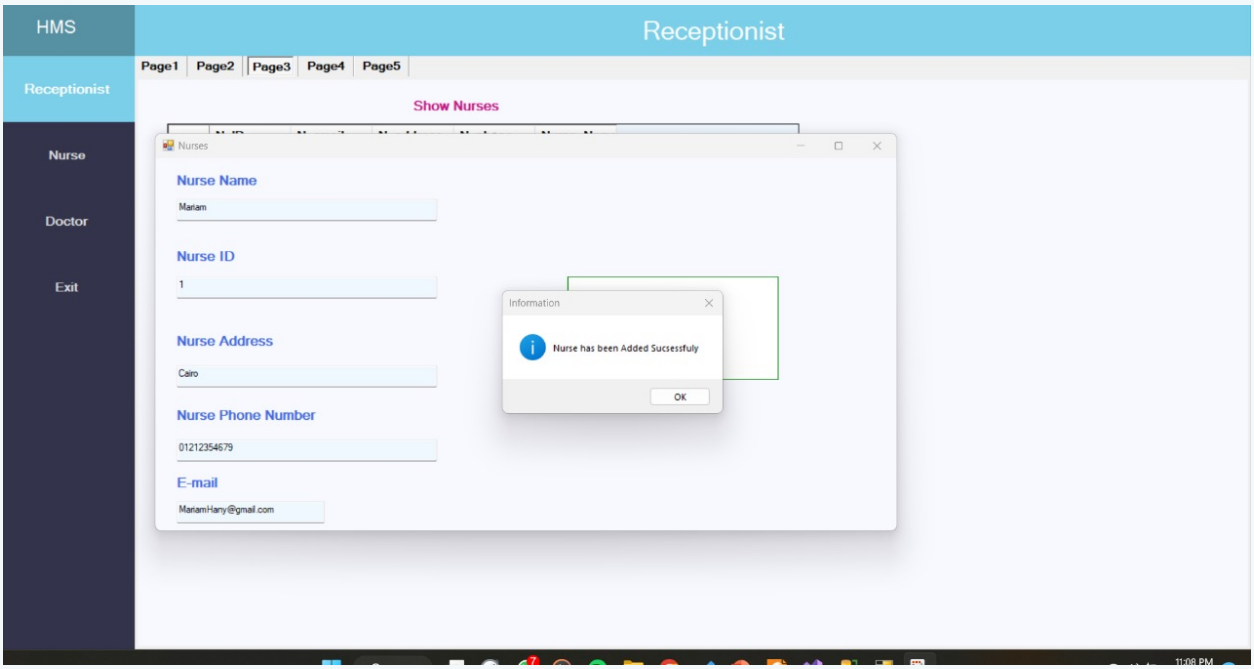
The record will be deleted as below:

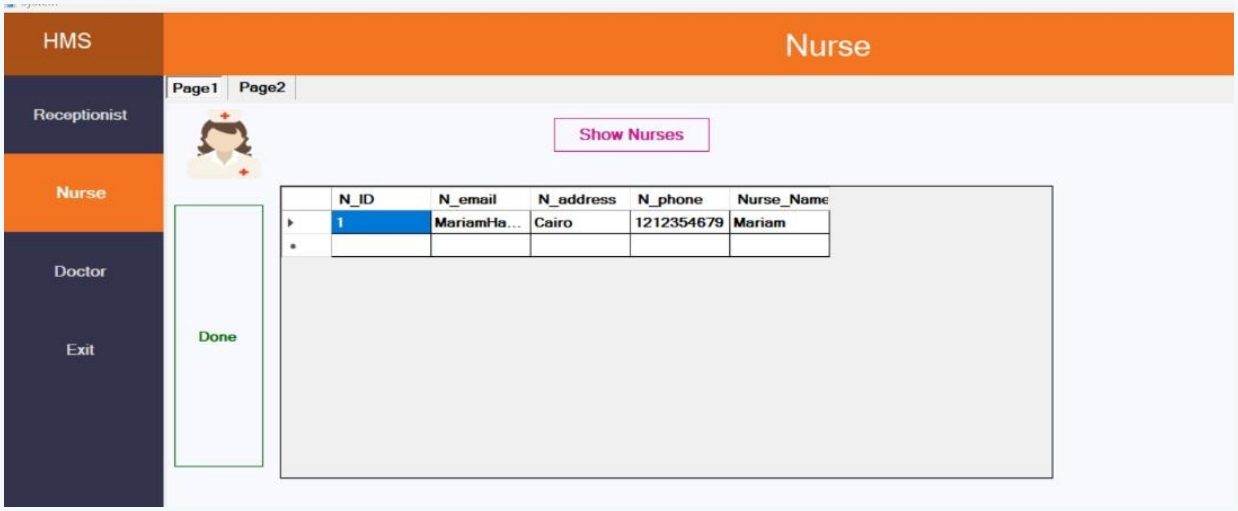


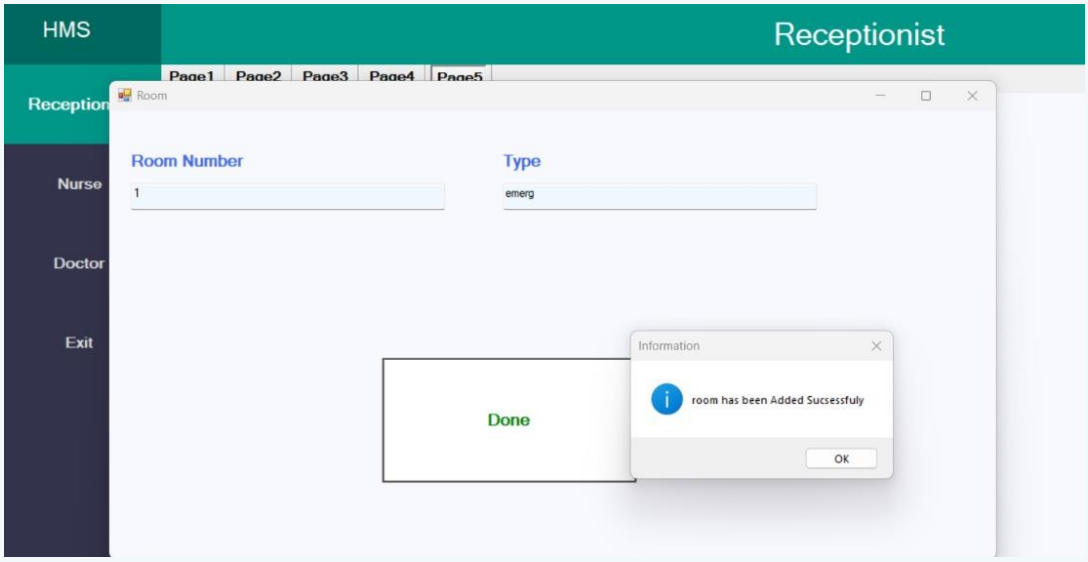
➔ Also, this example for updating info:



Another Example about adding nurse & room







➔ Generating QR code