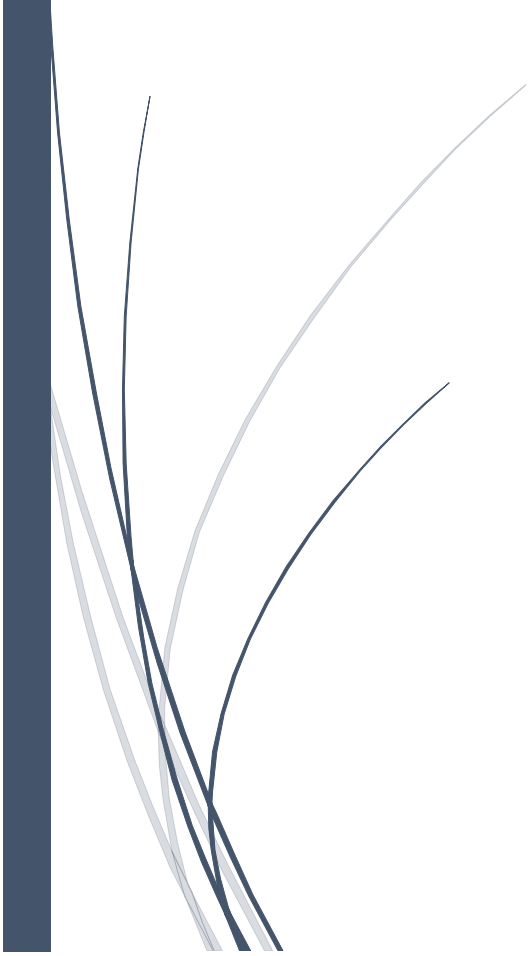
12/21/2023

System Analysis

Hospital-Management System



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Introduction

Data Flow Diagram Hospital Management System is used to create an overview of Hospital Management without going into too much detail. the problem we want to solve is the leak of information of patients and doctors and the access of the users. The overall Hospital Management System is represented and described using input, processing, and output in DFD. The DFD diagram for the Hospital Management System provides information about the inputs and outputs of each process and external entity of the hospital such as patient, staff, doctor, room, and medical treatment. At the end we will show the problem faced and some solutions for it.

Problems and some Solutions

1. Data Security and Privacy:
    - Problem: Patient data is sensitive and must be protected. Unauthorized access or data breaches can lead to serious consequences
    - Solution: Implement robust security measures, including encryption, access controls, and regular security audits. Ensure compliance with healthcare data protection regulations such as HIPAA.
2. Integration of Systems:
    - Problem: Hospital systems often comprise various modules (e.g., billing, patient records, pharmacy) that may not communicate seamlessly, leading to inefficiencies and data discrepancies.
    - Solution: Invest in an integrated hospital information system (HIS) that centralizes data and ensures smooth communication between different modules. This can streamline processes and reduce errors.
3. Appointment Scheduling Challenges:
    - Problem: Inefficient appointment scheduling can lead to long waiting times, patient dissatisfaction, and suboptimal resource utilization.
    - Solution: Implement an advanced appointment scheduling system that considers doctor availability, patient preferences, and prioritizes urgent cases. Provide online appointment booking options for patients.
4. Staff Workload and Burnout:
    - Problem: Uneven distribution of workload among staff can lead to burnout and impact the quality of patient care.
    - Solution: Use workload management tools to optimize staff schedules based on their expertise, availability, and workload. Provide training and support to reduce stress and burnout.

5. Patient Information Accessibility:
    - Problem: Lack of timely access to patient information can hinder quick decision-making and coordination among healthcare providers.
    - Solution: Implement a centralized electronic health record (EHR) system that allows authorized healthcare professionals to access patient information promptly. Ensure interoperability with other healthcare systems.
6. Technology Training and Adoption:
    - Problem: Resistance to new technologies and inadequate training can hinder the effective adoption of the hospital management system.
    - Solution: Invest in comprehensive training programs for staff to ensure they are proficient in using the hospital management system. Provide ongoing support and encourage a culture of continuous learning.
7. Communication Gaps:
    - Problem: Ineffective communication between different departments and healthcare providers can lead to misunderstandings and delays in patient care.
    - Solution: Implement a unified communication system that facilitates seamless communication among healthcare professionals. Use messaging platforms, alerts, and notifications to enhance collaboration.

ERD Diagram

The Entity-Relationship Diagram (ERD) of a Hospital Management System serves as a visual representation of the system's data structure. The ERD captures the relationships among key entities such as patients, doctors, appointments, pharmacies, and hospital staff. It outlines the attributes associated with each entity and illustrates the connections between them, facilitating a clear understanding of the data flow and dependencies within the system. The ERD emphasizes the relationships between entities, including the assignment of doctors to specific departments, the association of patients with their respective pharmacies, and the linkage between appointments and medical professionals. This visual model lays the foundation for designing a relational database that supports efficient data management, integrity, and retrieval, forming the backbone of a robust Hospital Management System.

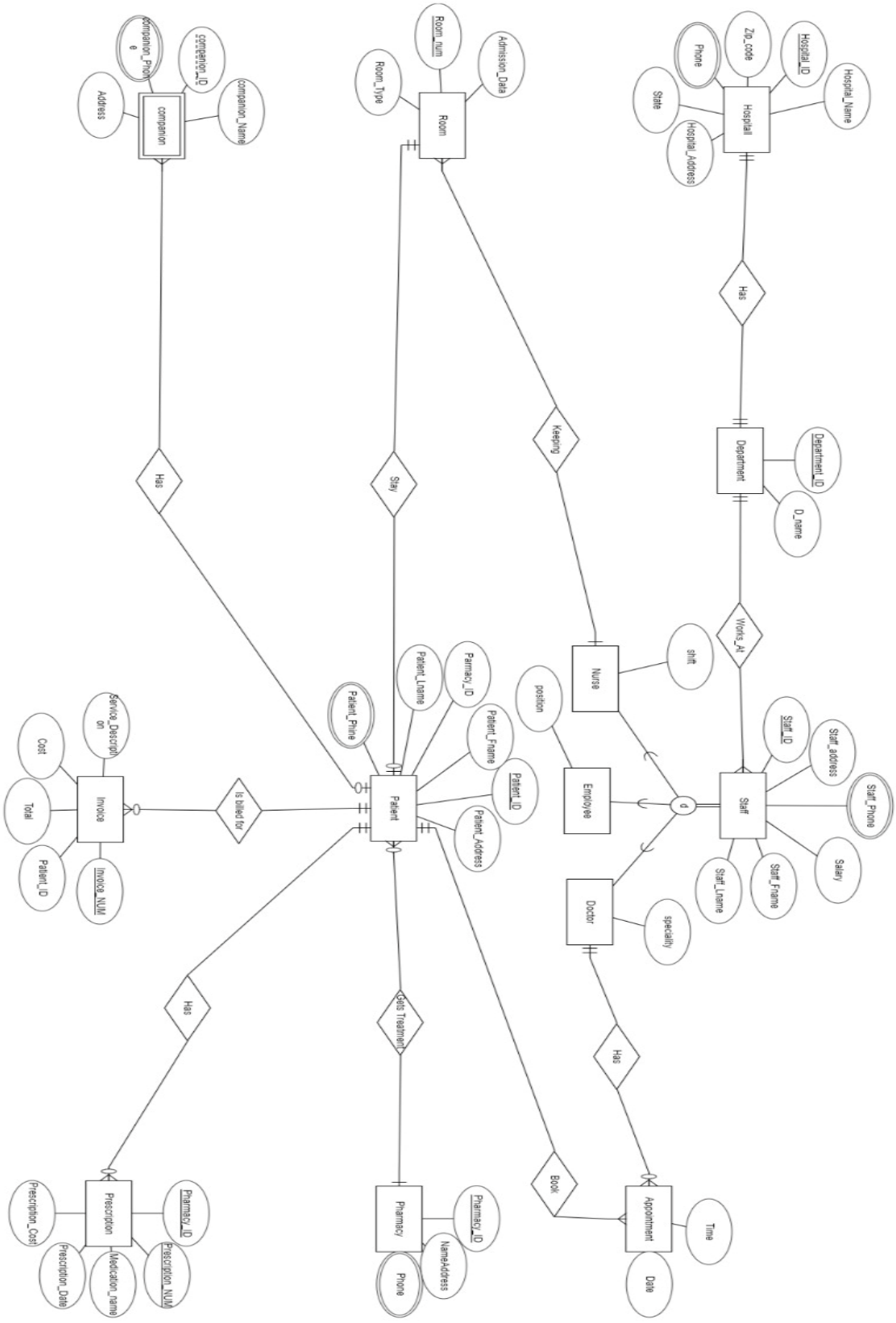
Room_num
Admission_Date
Room_Type
Room
Zip_code
Hospital_ID
Phone
Hospital_Name
State
Hospital_Address
Hospital
companion_Phone
companion_ID
Address
companion_Name
companion
Has
Keeping
Stay
Department
Department_ID
D_name
Has
Works_At
shift
position
Nurse
Patient_Phone
Patient_Lname
Pharmacy_ID
Patient_Fname
Patient_ID
Patient_Address
Patient
Staff_ID
Staff_address
Staff_Phone
Employee
Staff
Salary
Staff_Lname
Staff_Fname
Doctor
speciality
Service_Description
Cost
Total
Patient_ID
Invoice_NUM
Invoice
Is billed for
Has
Gets Treatment
Has
Book
Prescription_Cost
Prescription_Date
Medication_name
Prescription_NUM
Pharmacy_ID
Prescription
Pharmacy_ID
NameAddress
Phone
Pharmacy
Time
Date
Appointment

Figure 1 (ERD)

Data Flow Diagram (DFD)

DFD Context level (level 0):

The Zero Level DFD for the Hospital Management System depicts the overview of the whole hospital management system. It is supposed to be an abstract view of the overall system. This is also called a context diagram for a hospital management system in which the entire system is represented as a single process with its relationship with external entities such as Administrator, Staff, and Patient. This figure shows the view of the general process during the hospital management process (0-level diagram).

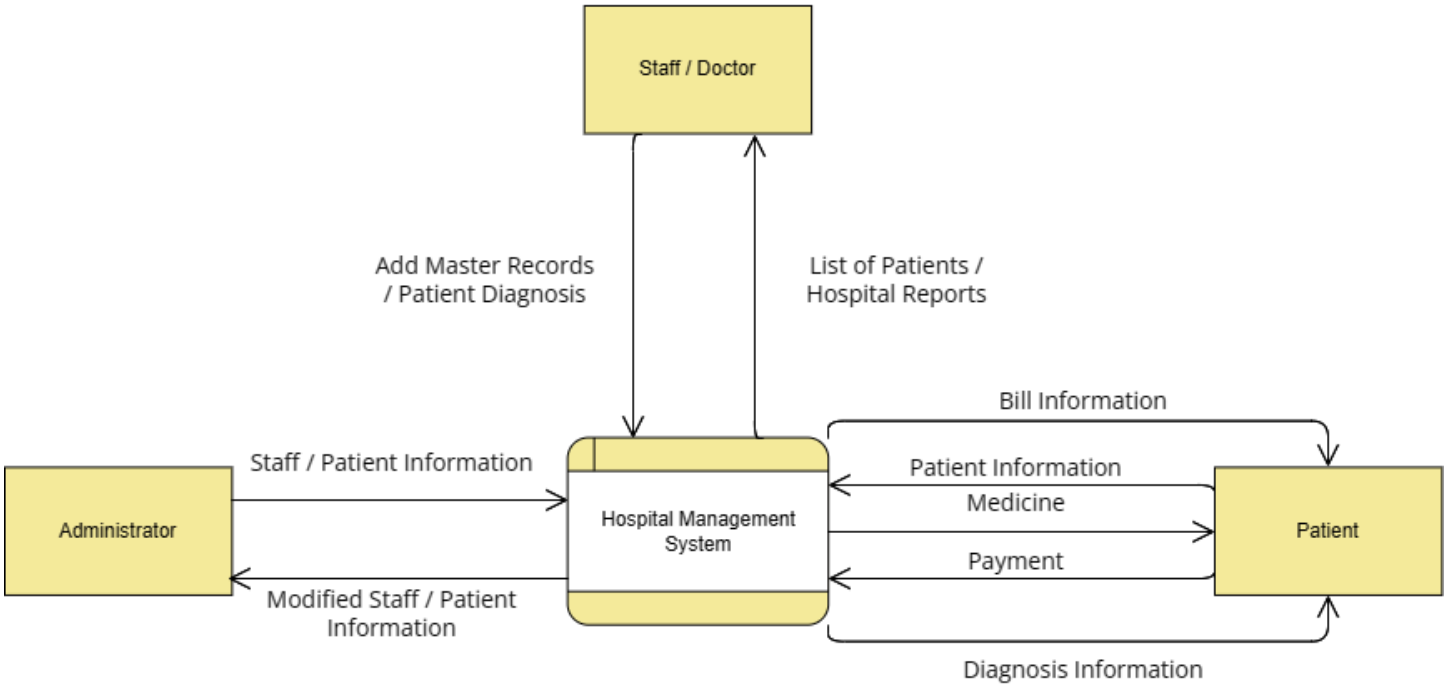

Figure 2 (Level 0)

DFD (Level 1):

The first level DFD of the hospital management system shows more details of processing. Level 1 DFD lists all the major sub processes that make up the entire system such as the hospital master module that contains all records of patients, doctors, staff, rooms, treatment, etc., that will be used during different other processes like patient registration and patient discharge, and also the other modules in the hospital management system as the Financial, Inventory, Clinical, and Patient Modules. It also identifies the data store of hospital master data, patient data, financial, inventory, and clinical data reports and the important processes to be carried out. The Level 1 DFD for hospital management system provides a broad overview but goes into greater depth than the context level diagram.

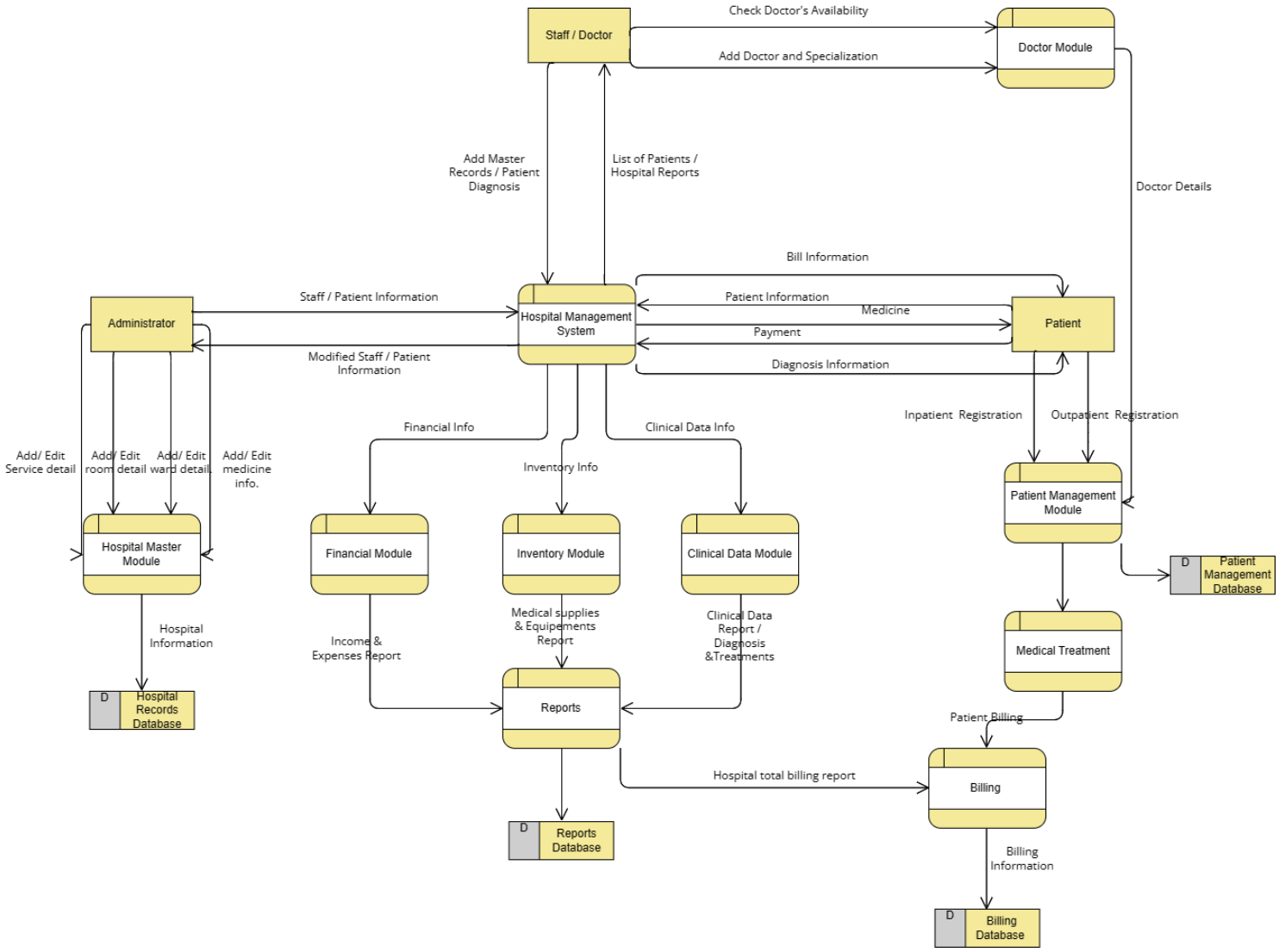

Figure 3 (Level 1)

DFD (Level 2):

The second level DFD of the hospital management system delves even deeper into the concept of level 1 DFD. The first level of DFD of the hospital management system represents how the system is divided into subsystems and the second level provides more details about patient registration, diagnosis, medical treatment, patient service record, and billing process.

The following are some functionalities of the hospital management system:

- Administrator can add, edit, and delete hospital master records such as service details, ward details, room details, medicine information details, various treatment details, patient details, staff and doctor records.
- Room allocation can be edited and changed.
- Preparing of the reports for every module in each process.
- Checking inventory for the checking of medicine availability.
- preparing discharge bills.

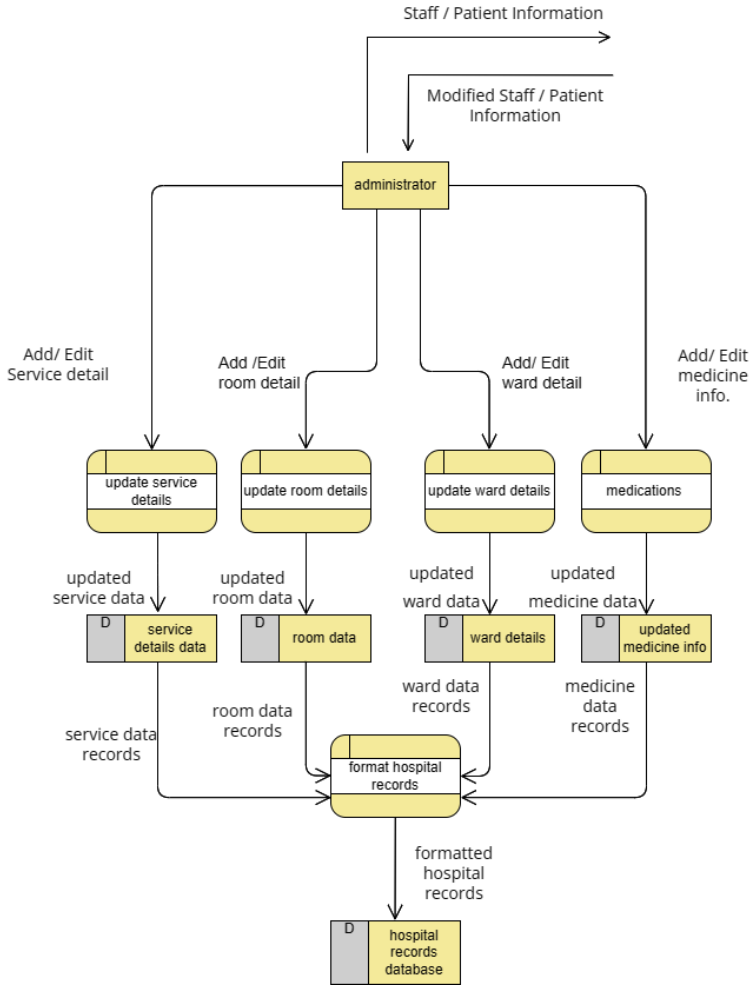

Figure 4 (Level2.1)

Here are another details for the level 2 diagram.

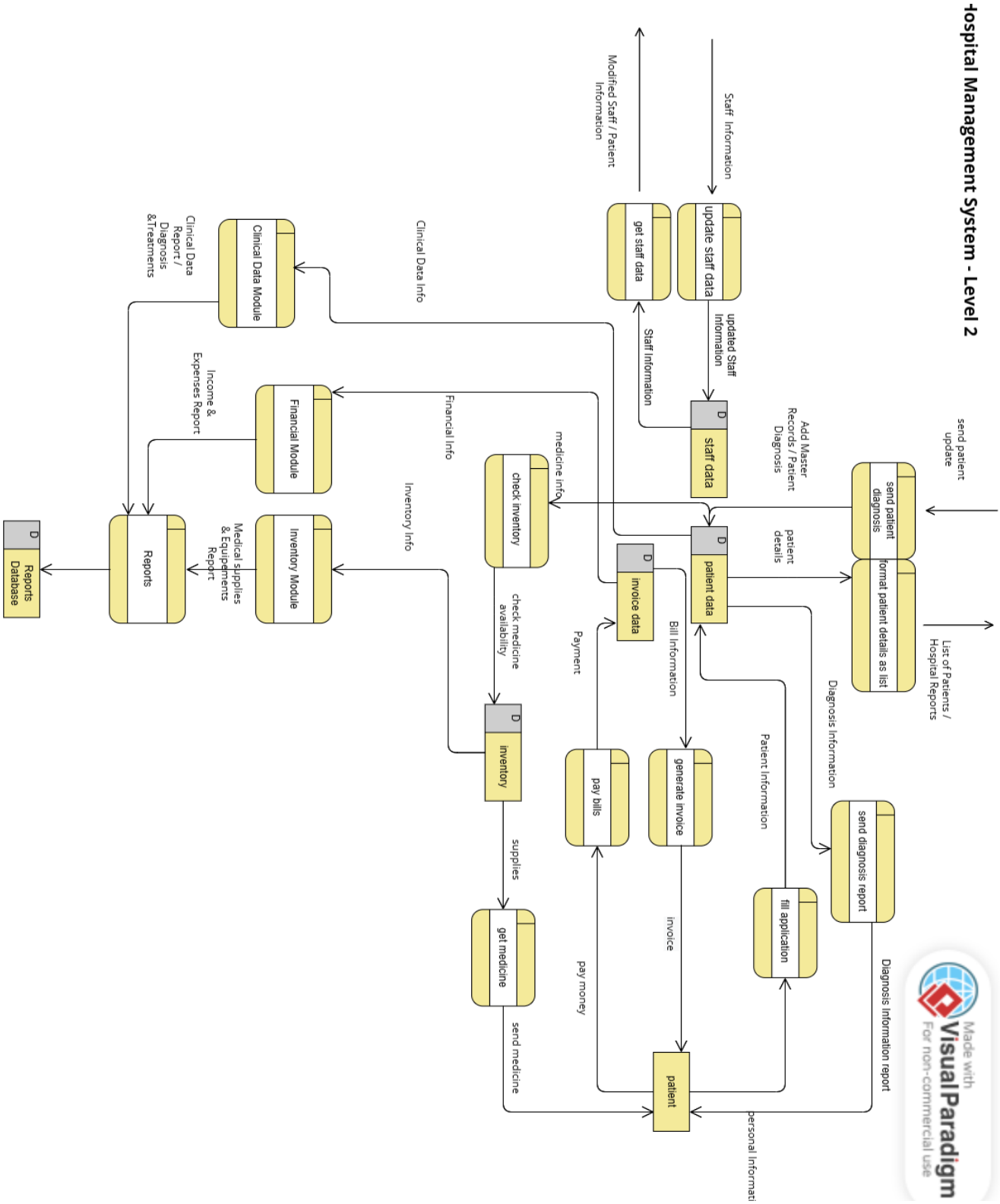

Figure 5(level 2.2)

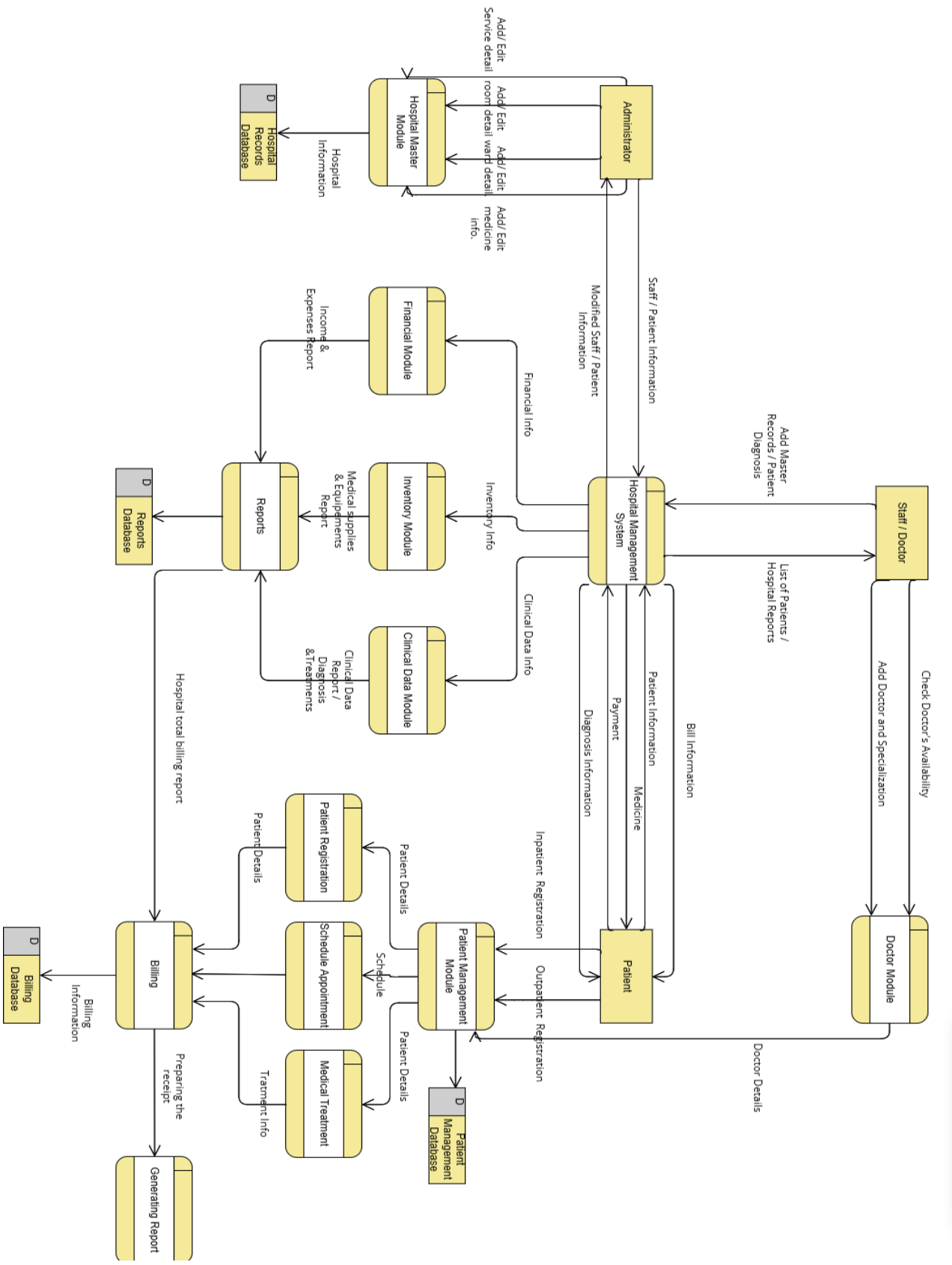

Figure 6(Level 2.3)

Database Schema

after modeling the ERD and DFD, it's time to define detailed database, tables, primary keys and so on so from the previous the suitable schema will be as the following

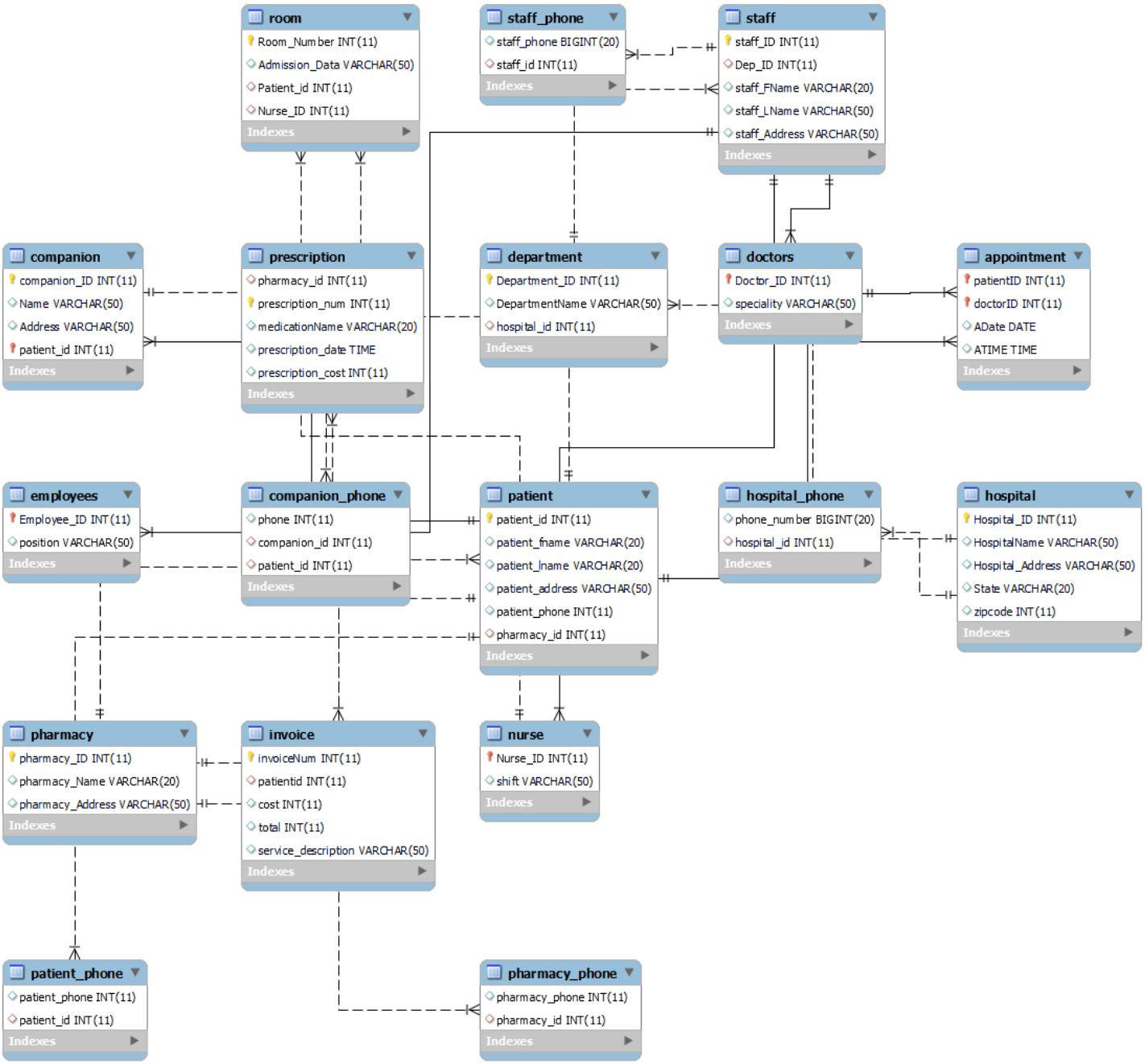

Figure 7 (Schema)

And this is another view of the data flows

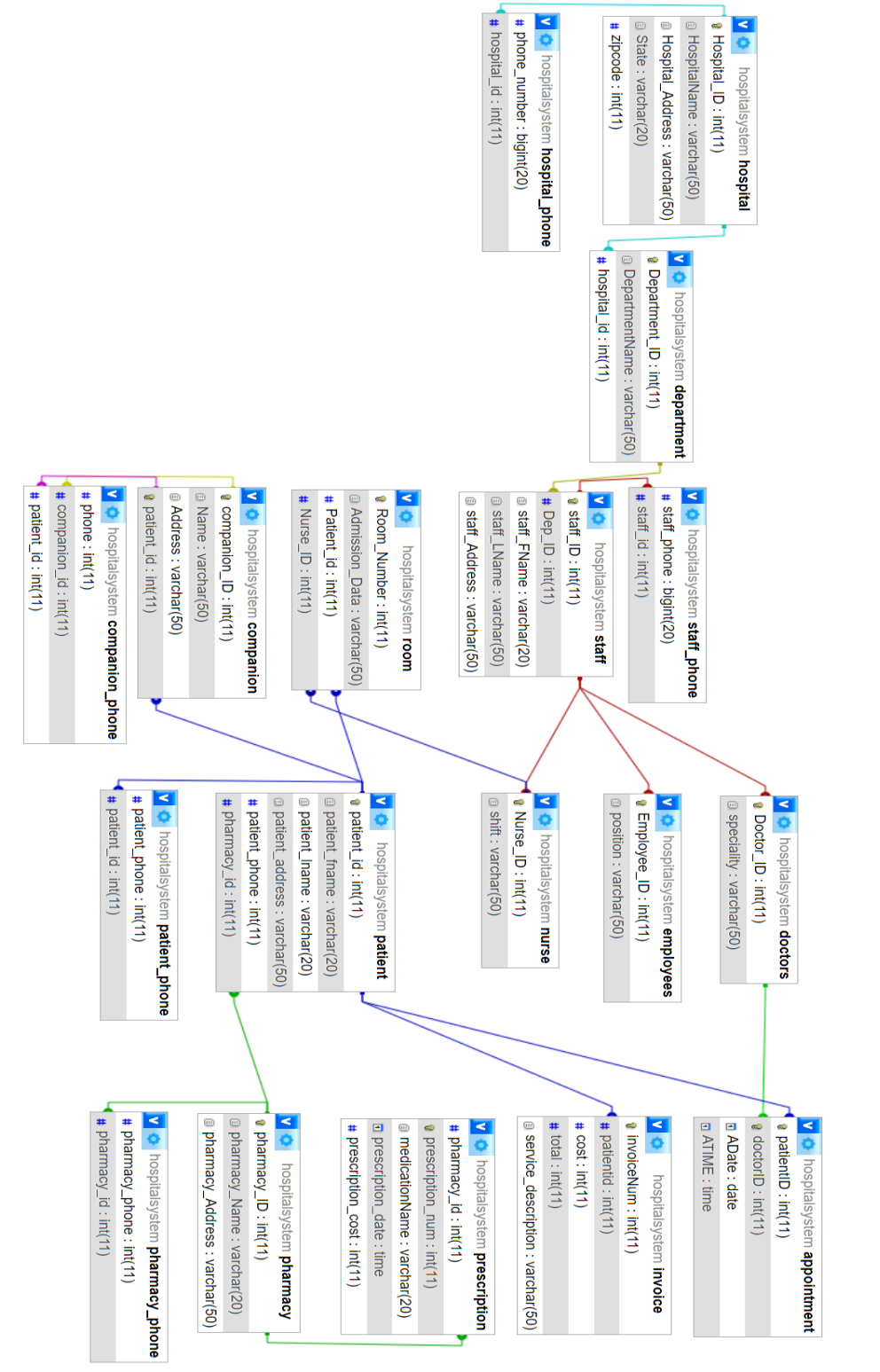

Figure 8(Another view of Schema)

Database view

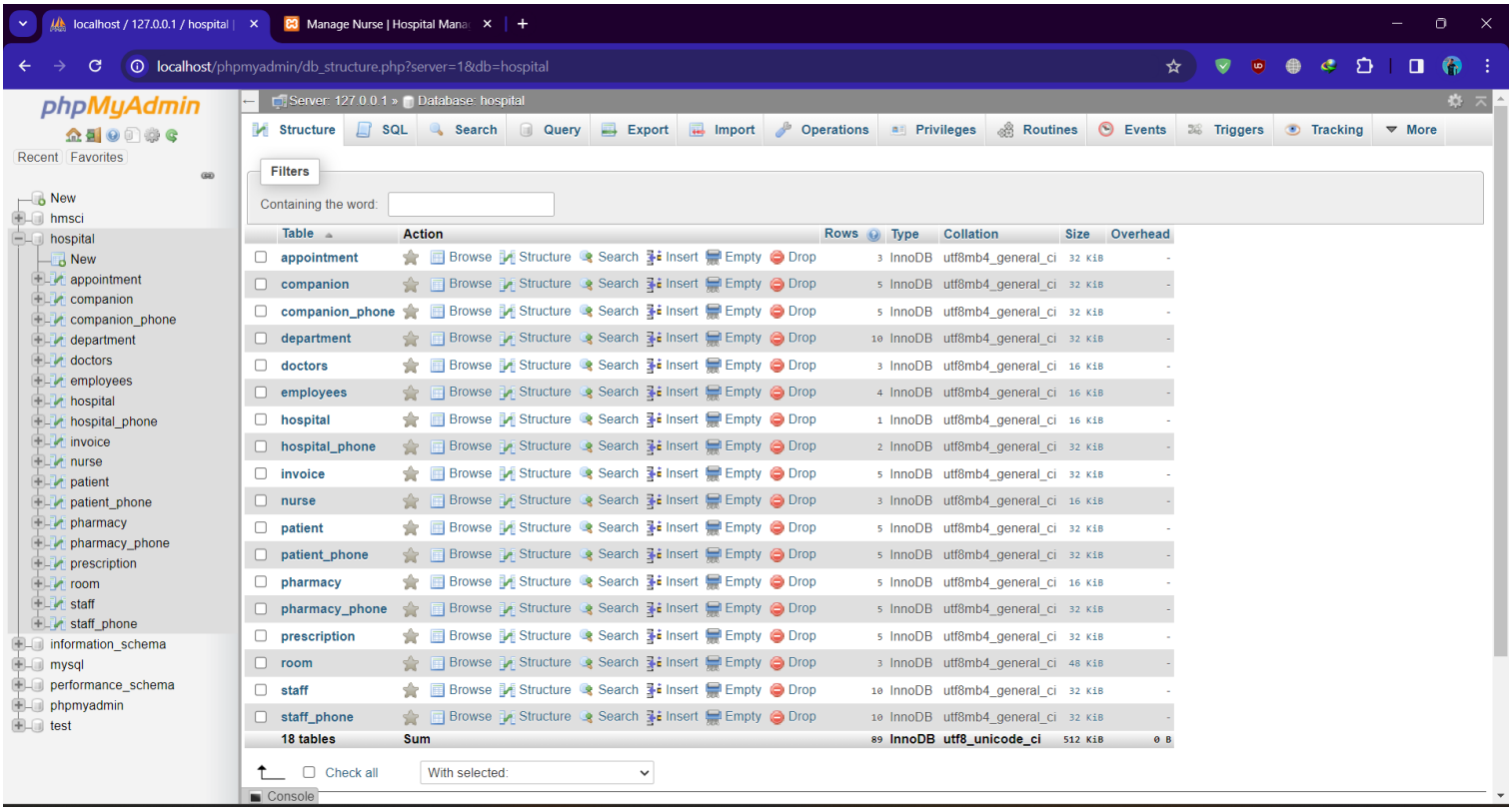

Figure 9 (Database View)

Hospital Interface

Login

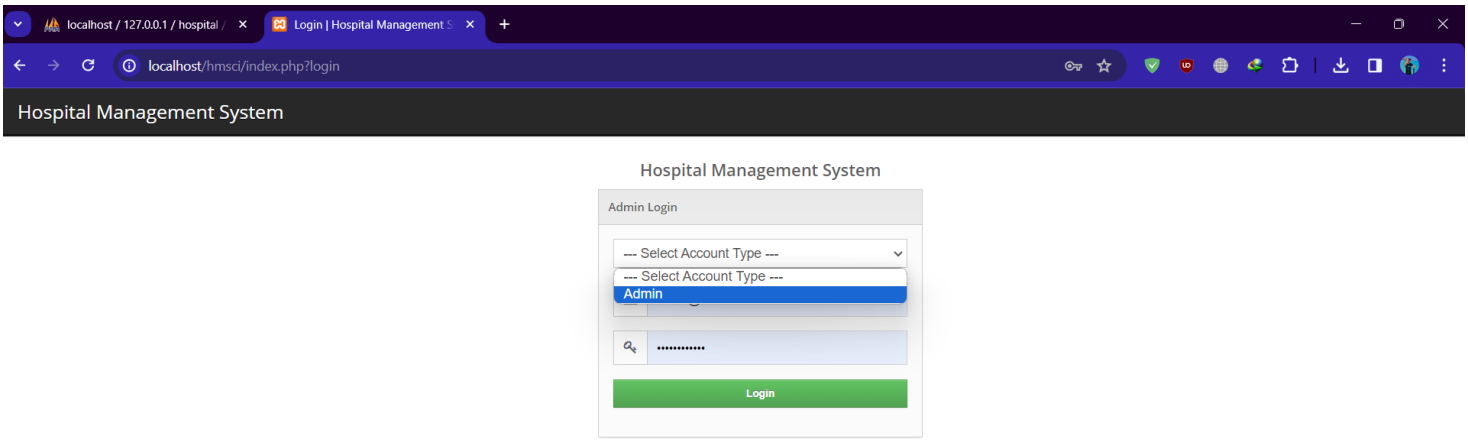

Figure 10(Localhost login)

Home Page

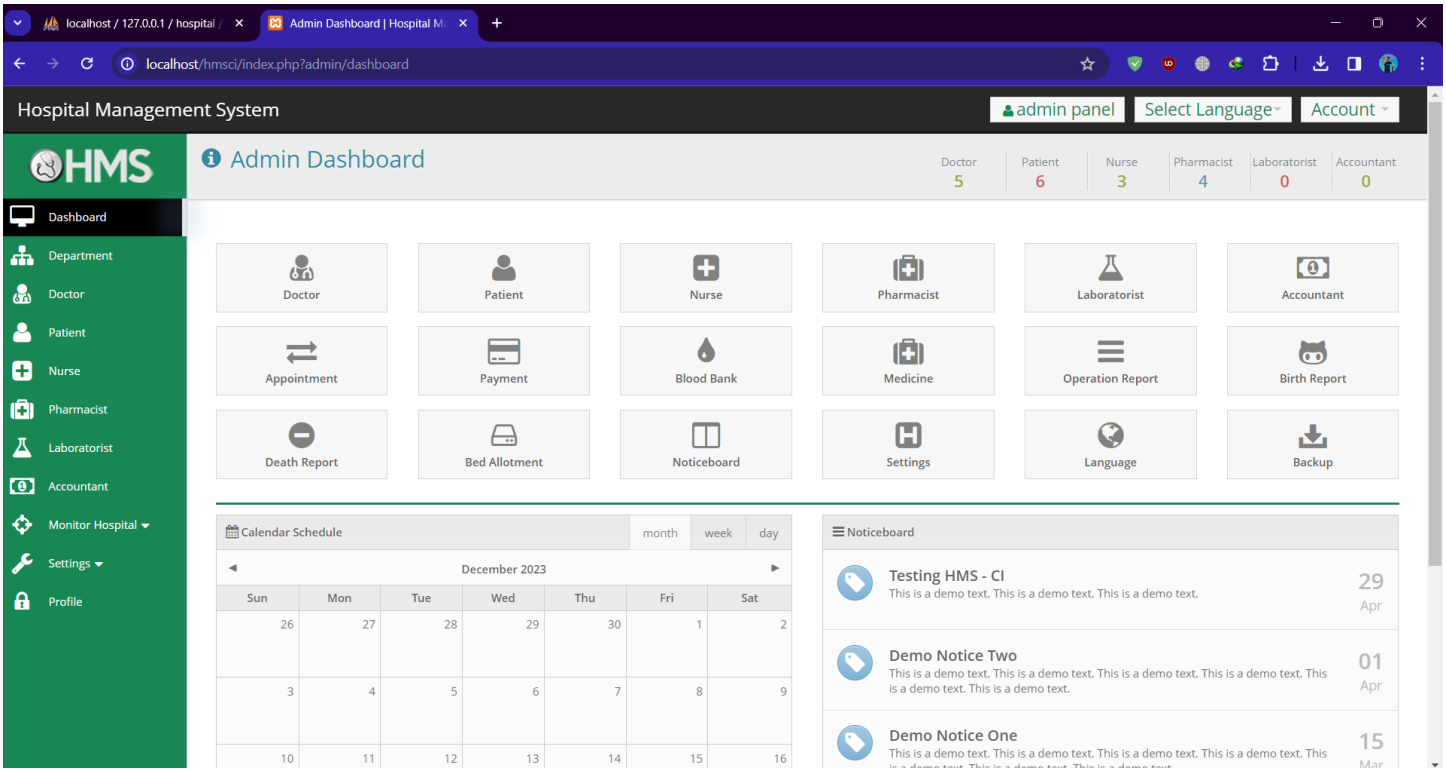

Figure 11 (Dashboard)

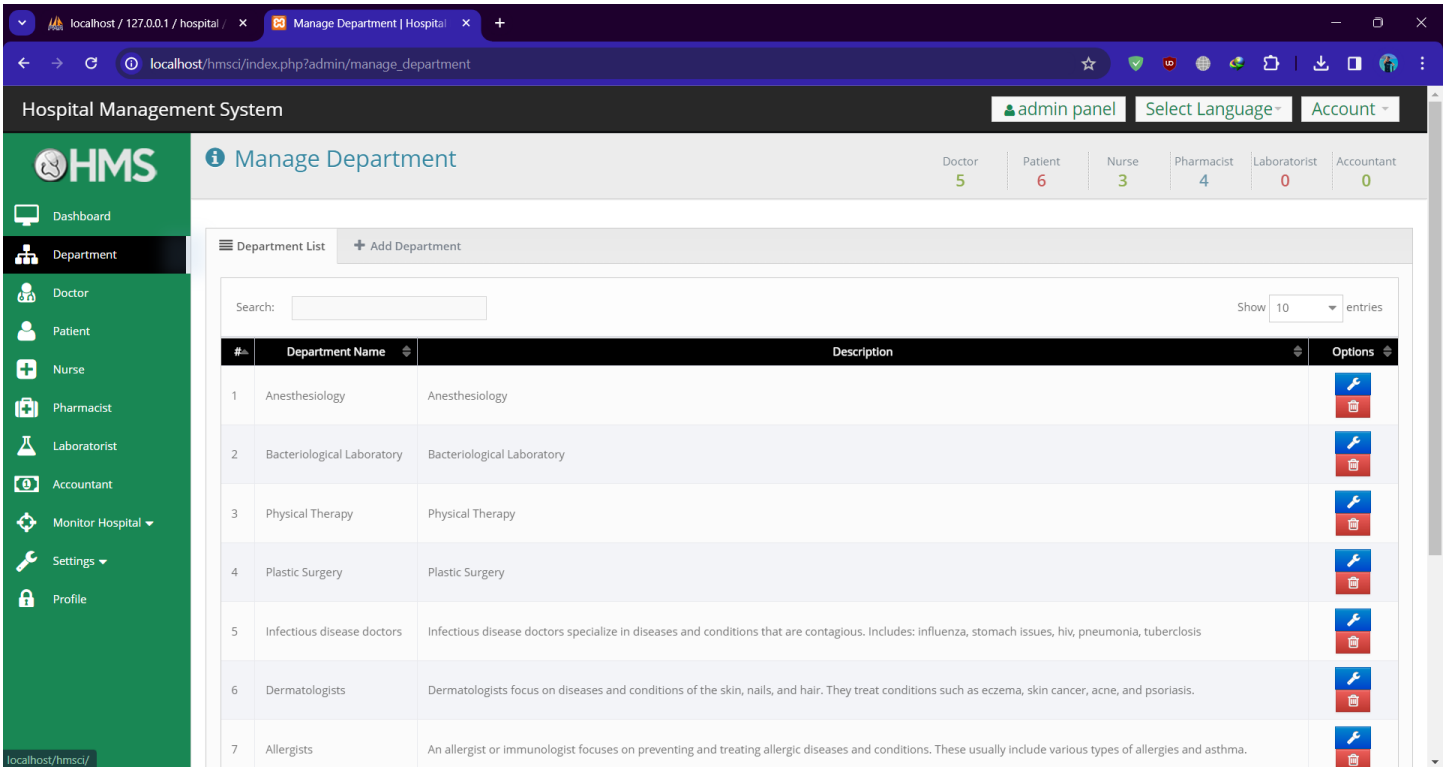

Figure 12 (Departments)

Nurse Table

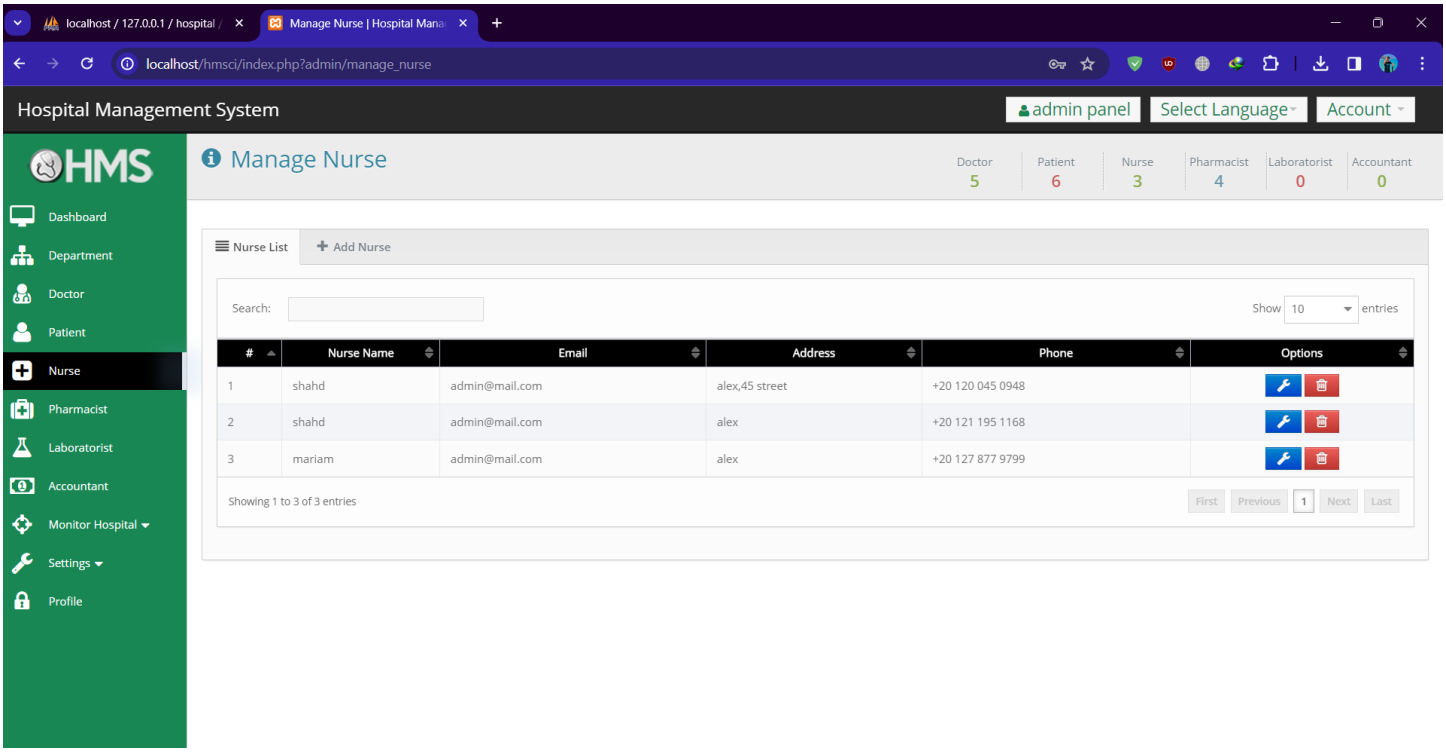

Figure 13(Nurse Table)

- Insert a new nurse into the data base

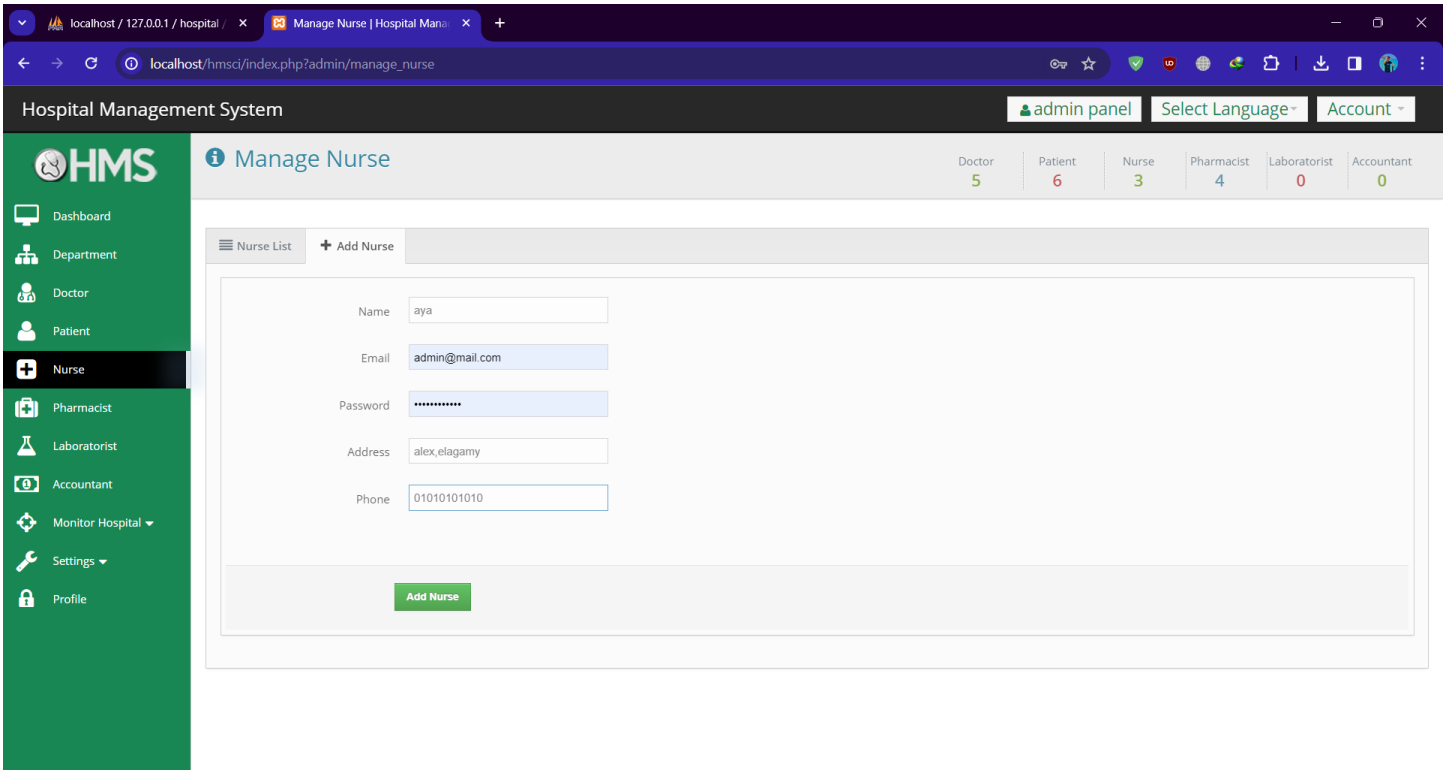

Figure 14 (Insert new value)

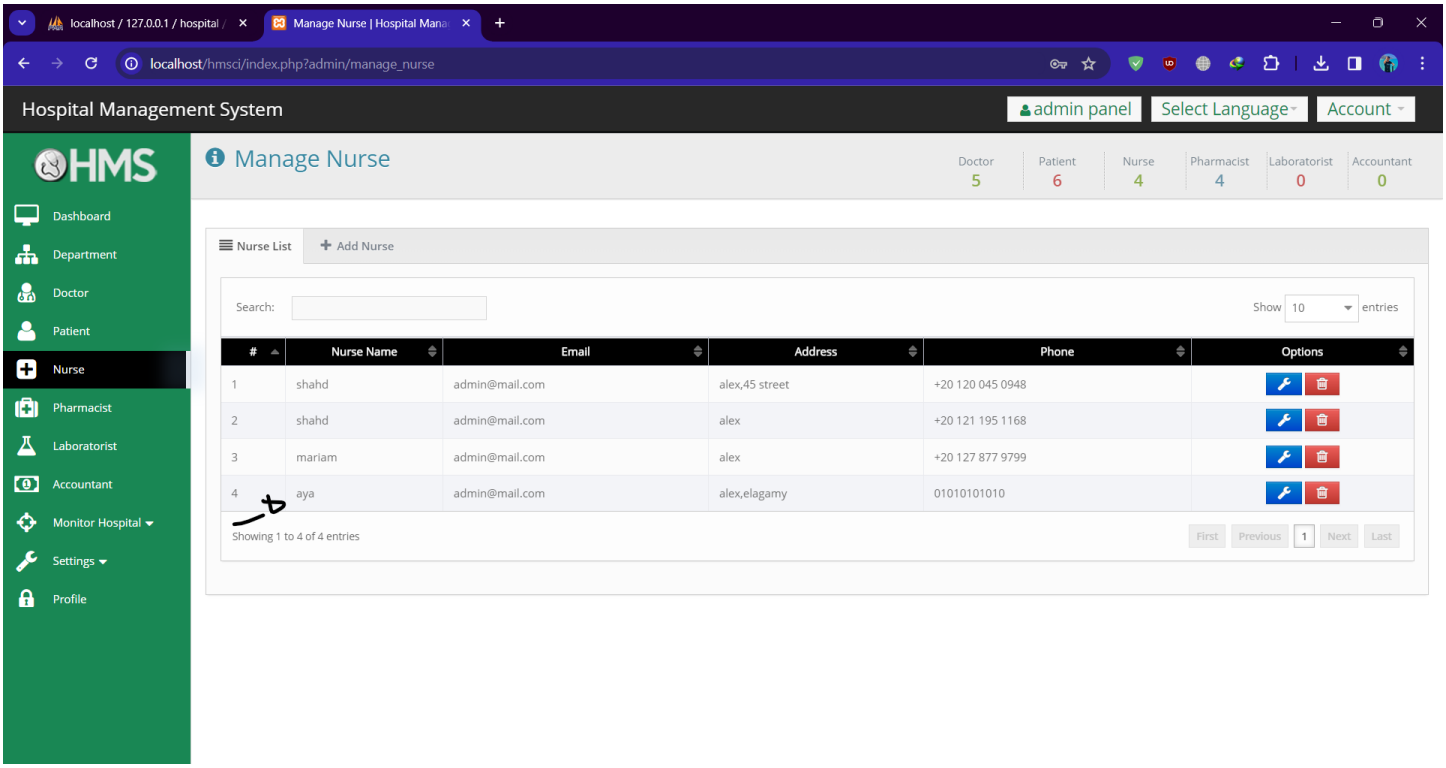

Figure 15(updated Nurse Table)

Patient table

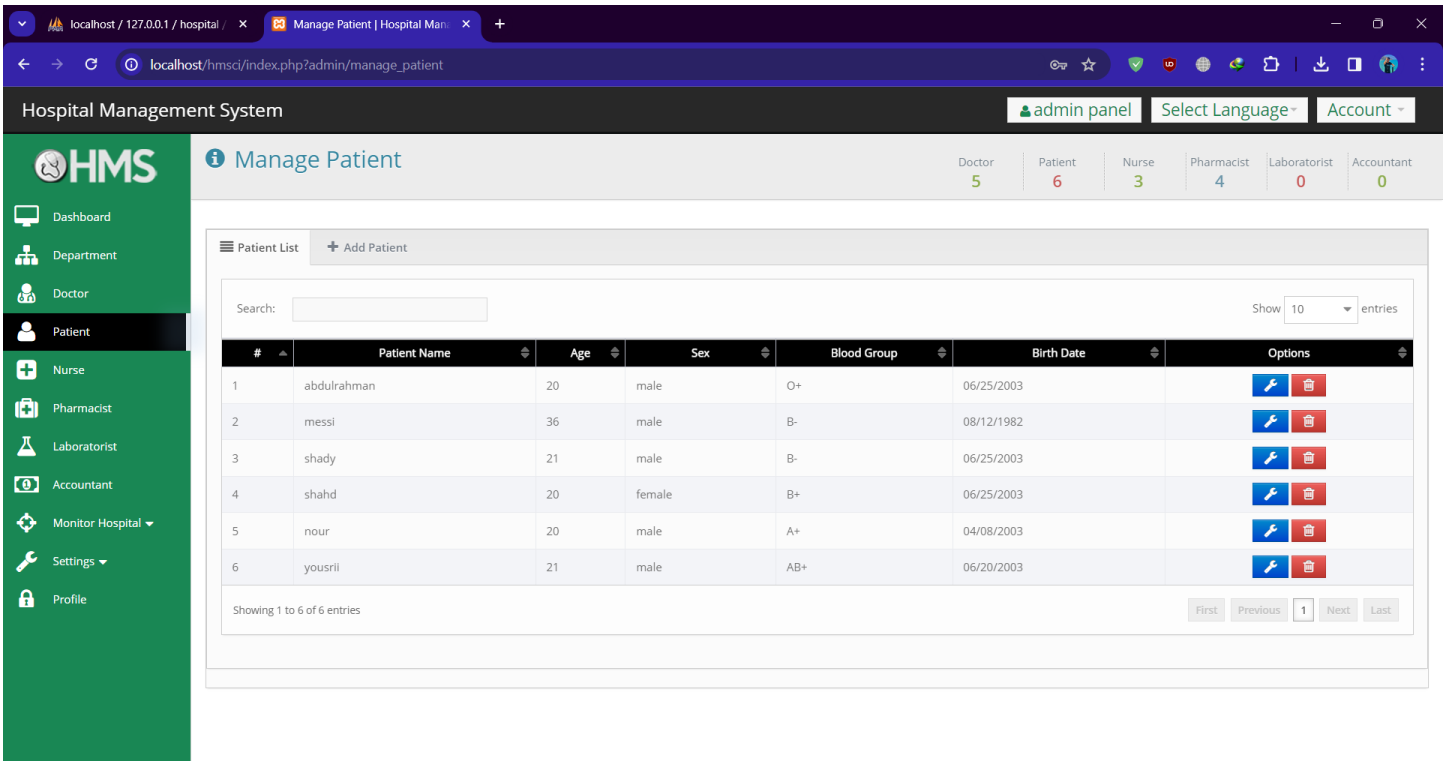

Figure 16 (Patient Table)

- Insert a new patient in the table

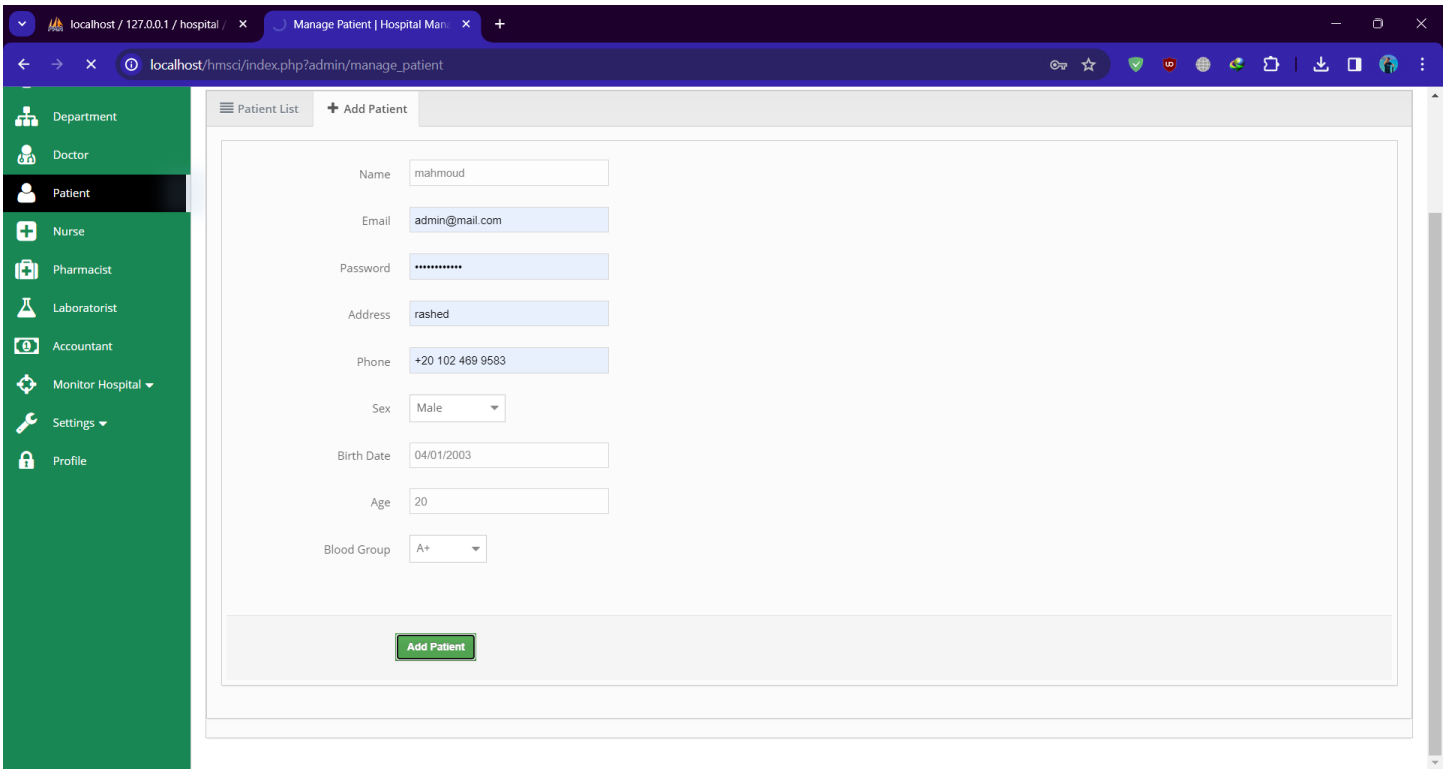

Figure 17(Insert new patient)

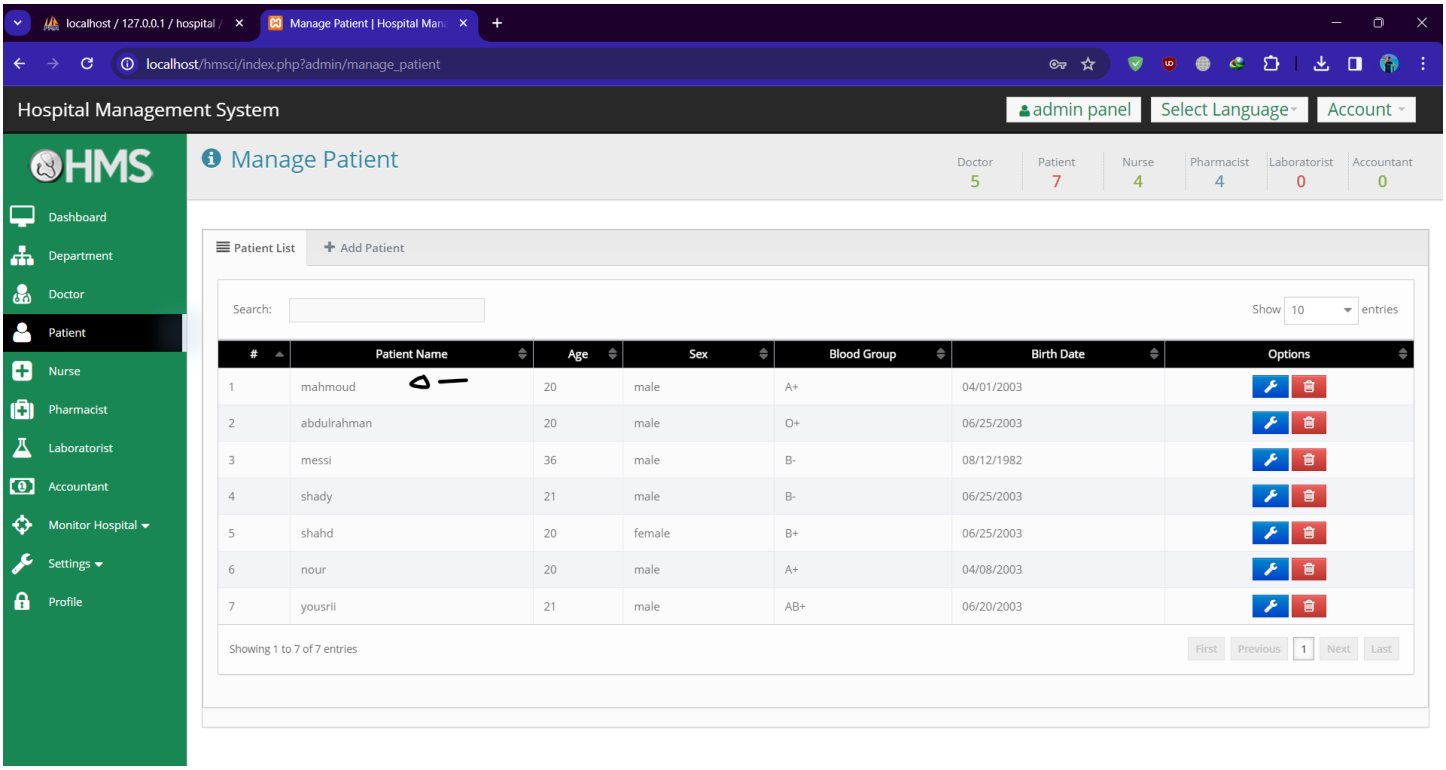

Figure 18(Updated Patient Table)

Doctor table

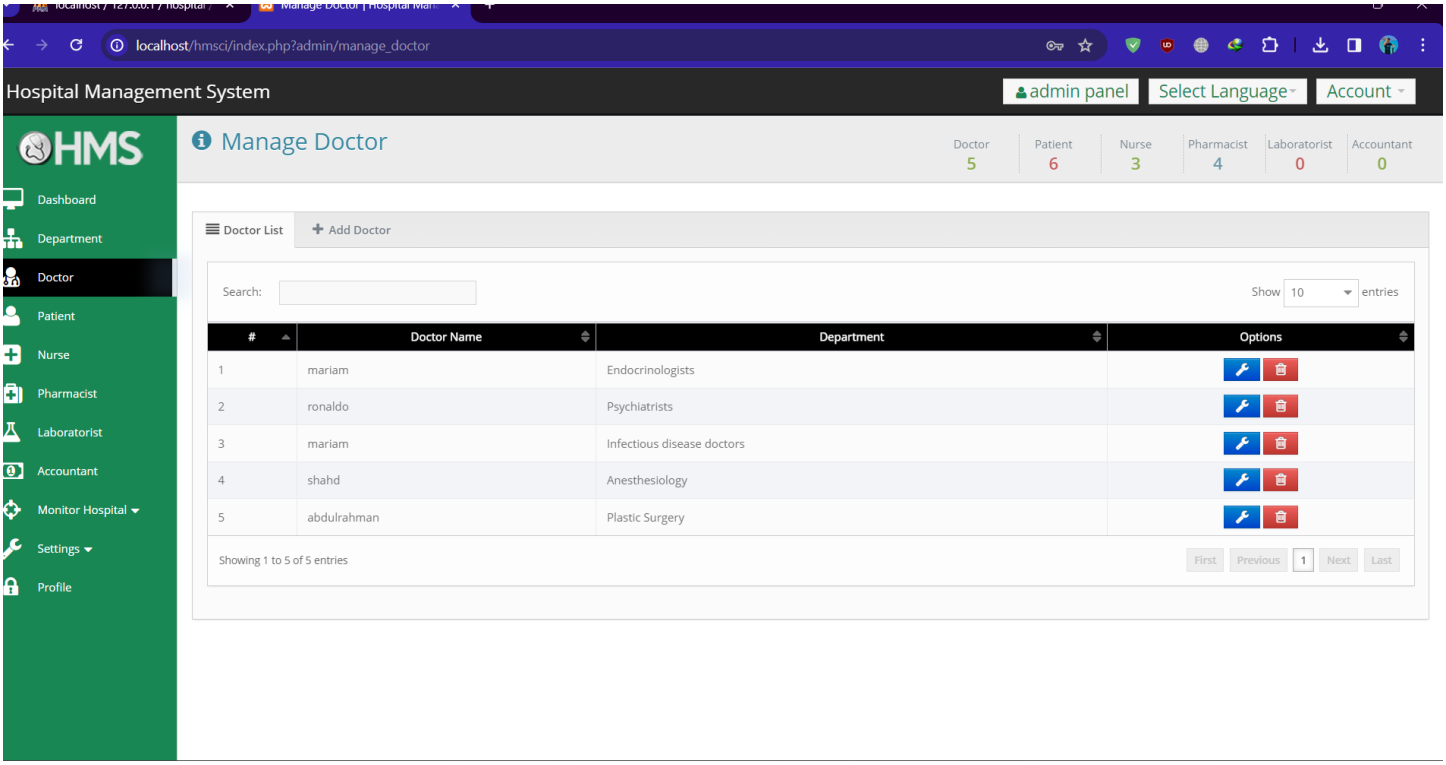

Figure 19(Doctor Table)

- Insert a new doctor to the table

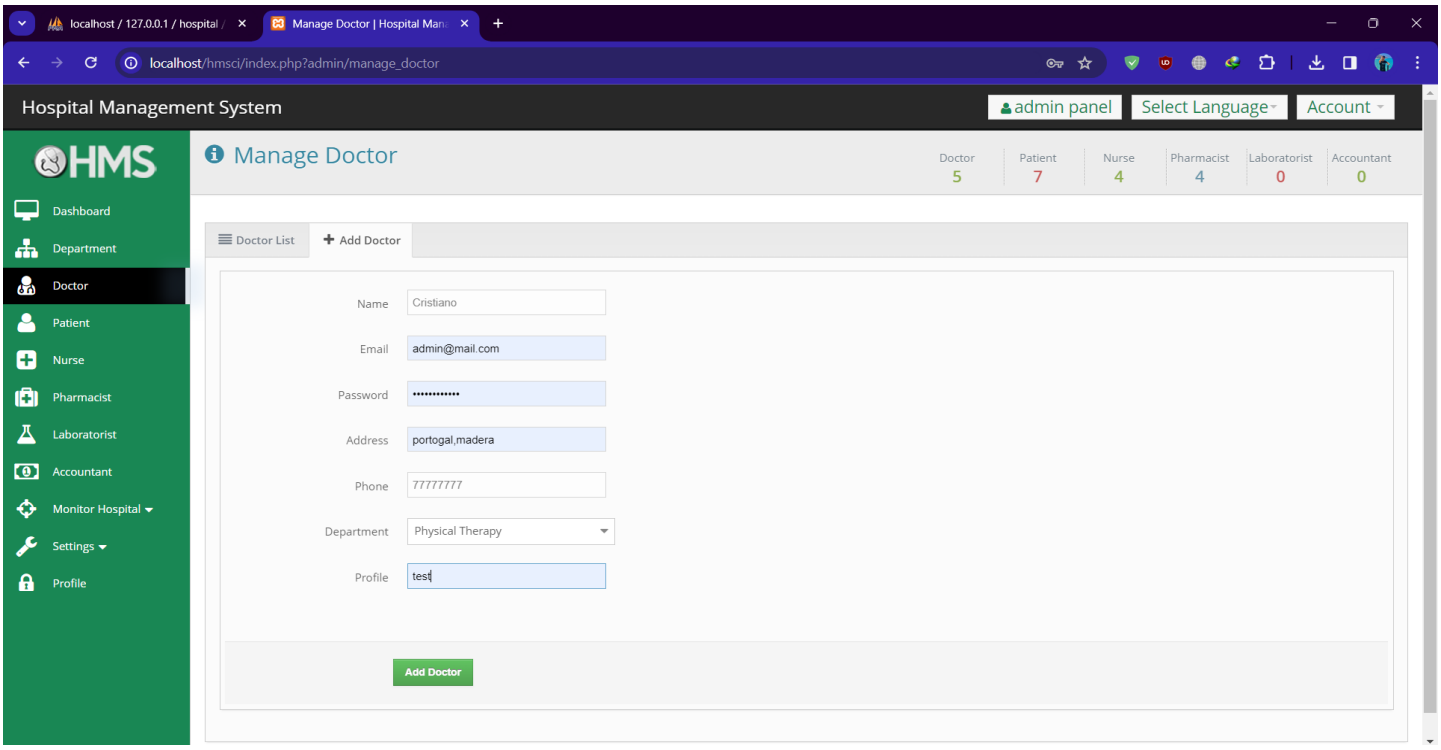

Figure 20 (Insert a new Doctor)

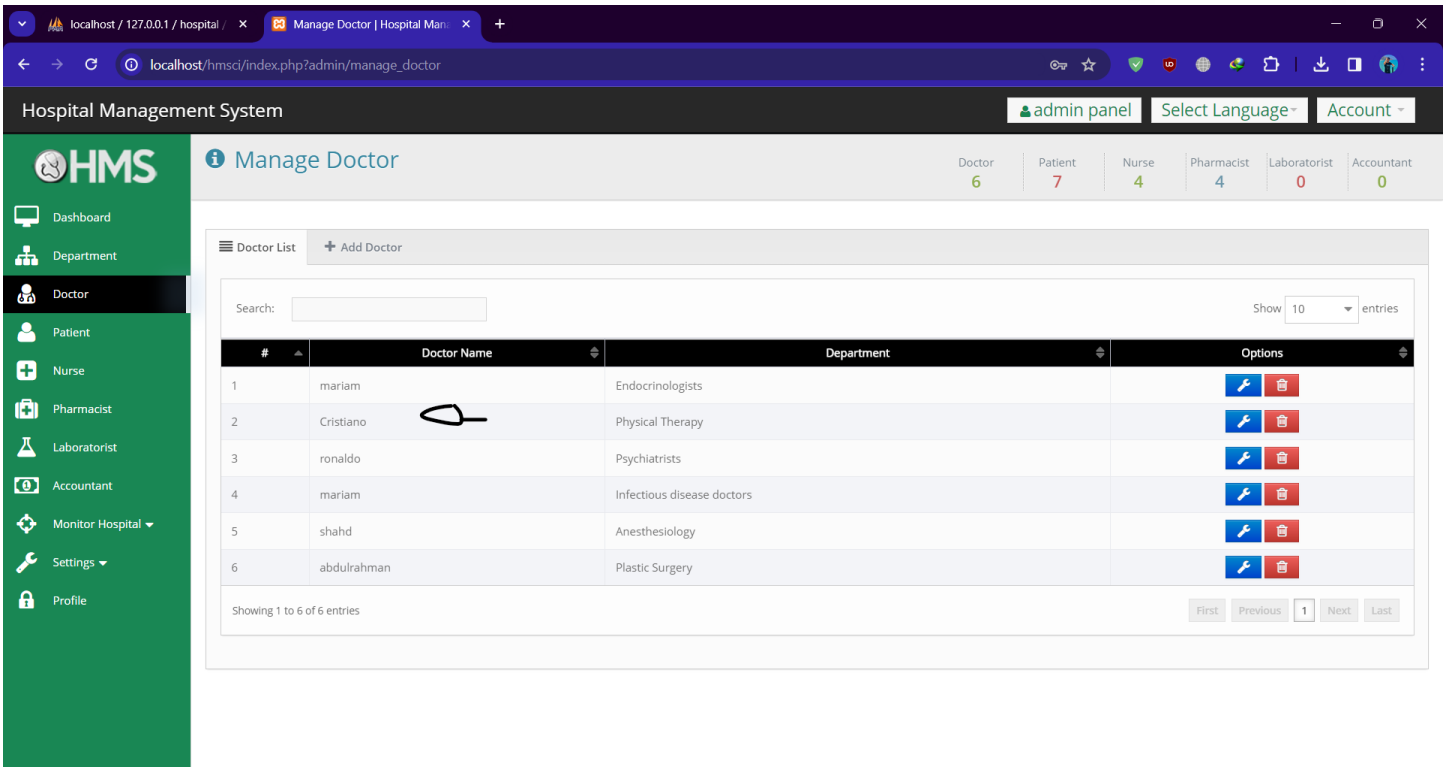

Figure 21 (Updated Doctor Table)

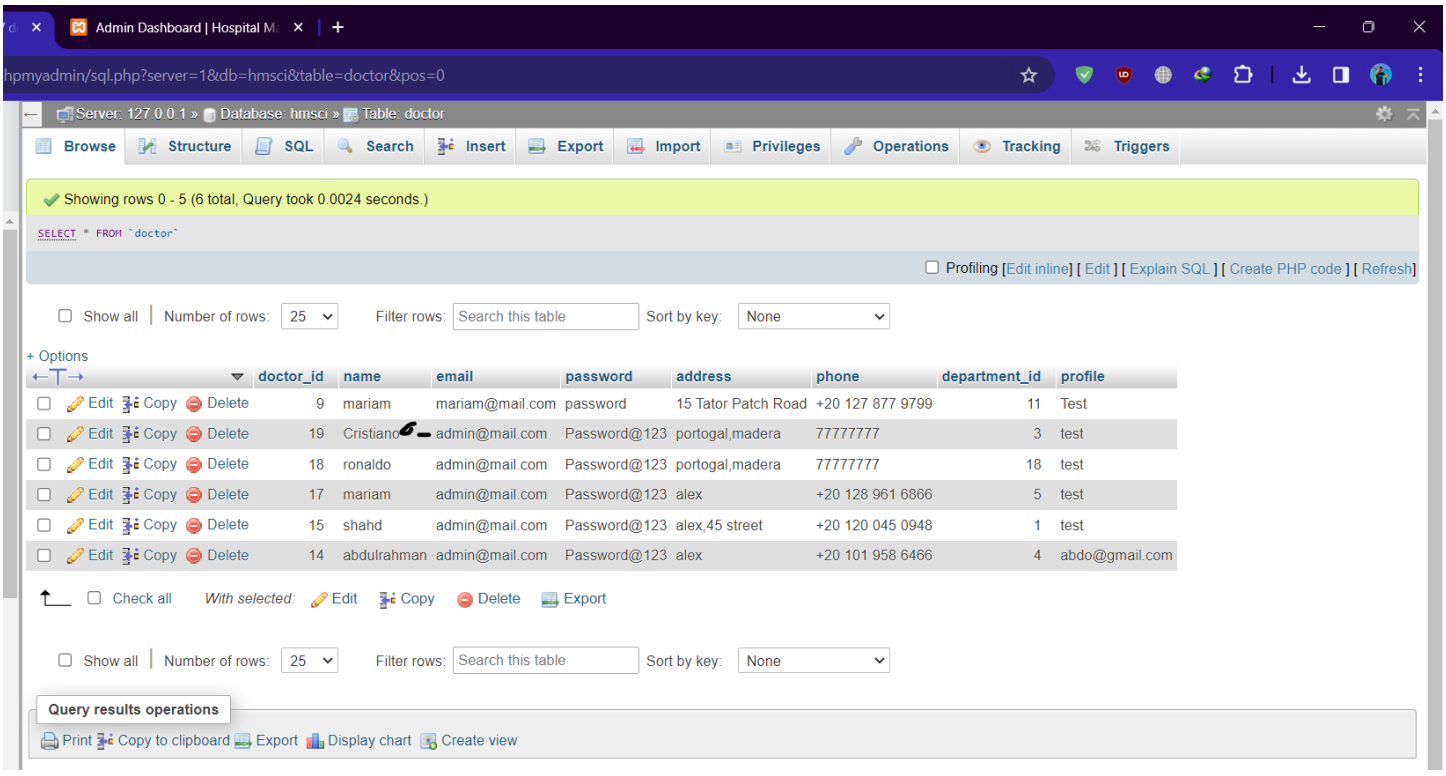

Figure 22 (updated Value in the Database Table)

Problems on real

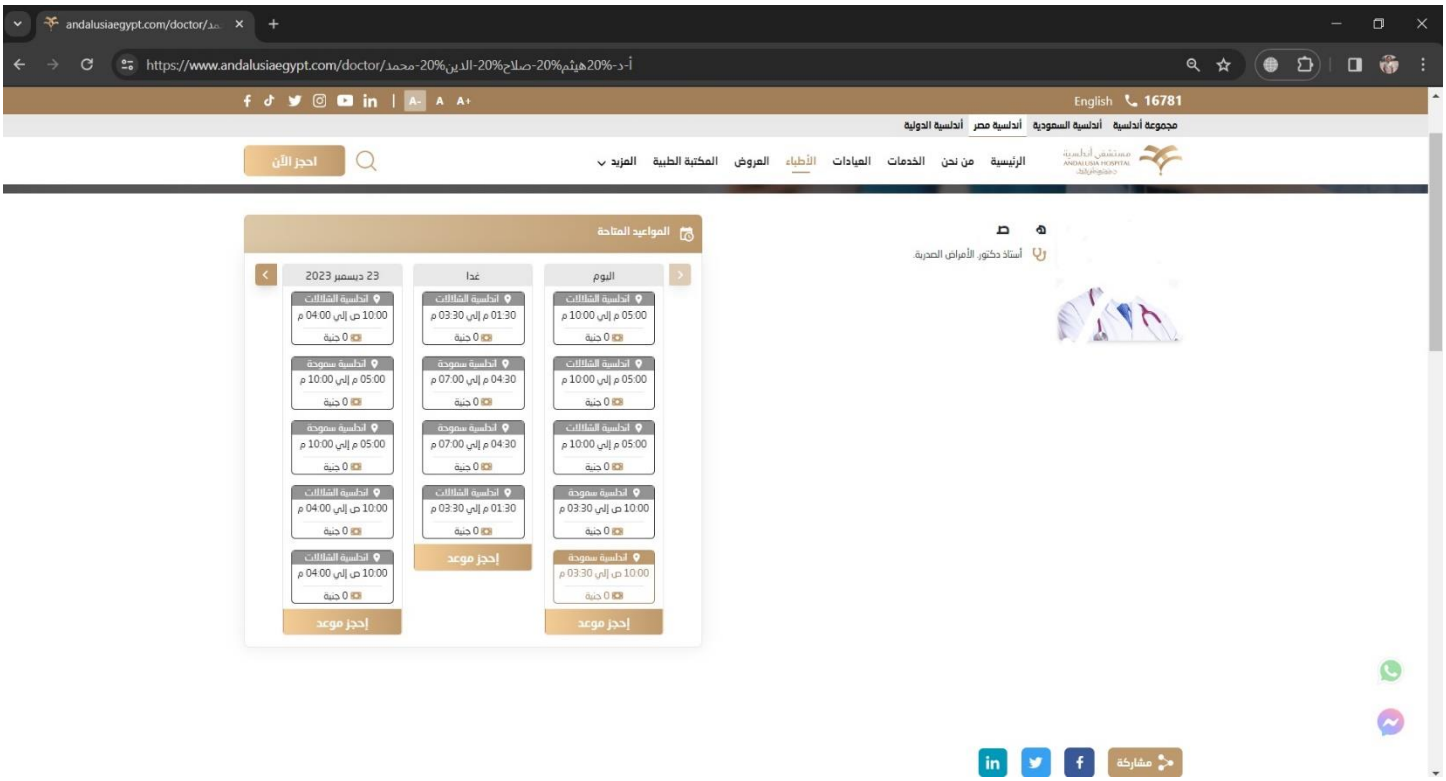

Figure 23 (Problems Example)

For example, In the system of this hospital there are some missing features and problems.

First, the price of the detect or consult is not defined at first and the prices of the laboratory services too. Second, we don't know if the schedule will be right and trusted or not. Third, who can access on patient data? And finally the layout of the page is not dynamic as the font becomes bigger from the buttons above some data and buttons disappear.

Ideas for more features

1. We can add more security on who can access the data and add password for specified or the user who will use this data as patient, schedule, finance and pharmacy.
2. We can use and connect some features that ease the scheduling process as google calendar in order to avoid problems for both patients and doctors.
3. Add a private chat between the patient and the doctor for any consults for free
4. Add an online video call too between them with a small paid fees
5. Add a machine learning model that you can talk to him in case there is no doctors online (the model will be built under the supervision of doctors in order to avoid any mistakes and wrong diagnose