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System Analysis

Hospital-Management System



Name	ID	Section
Abdulrahman Salah Anwar Abdo	20221458503	Eng.Hossam
Shahd Ahmed Karam	20221380283	Eng.Hossam
Mahmoud Reda Hassan Nour	20221469438	Eng.Hossam
Ragdan Ramadan Mohamed	20221449509	Eng.Dina
Mariem Salah Abdulrahman	20221311472	Eng.Dina
Mohamed Yousri Ibrahim Abdallah	20221509866	Eng.Hossam
Shahd Khalaf Ahmed Omar	20221462492	Eng.Hossam
Omar Mohamed Mostafa Mohamed	2022446471	Eng.Hossam
Mariem Osama Abdellatif Abdelfatah	20221462958	Eng.Dina
Shady Alaa Eldin Youssef	20201372720	Eng.Dina

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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.

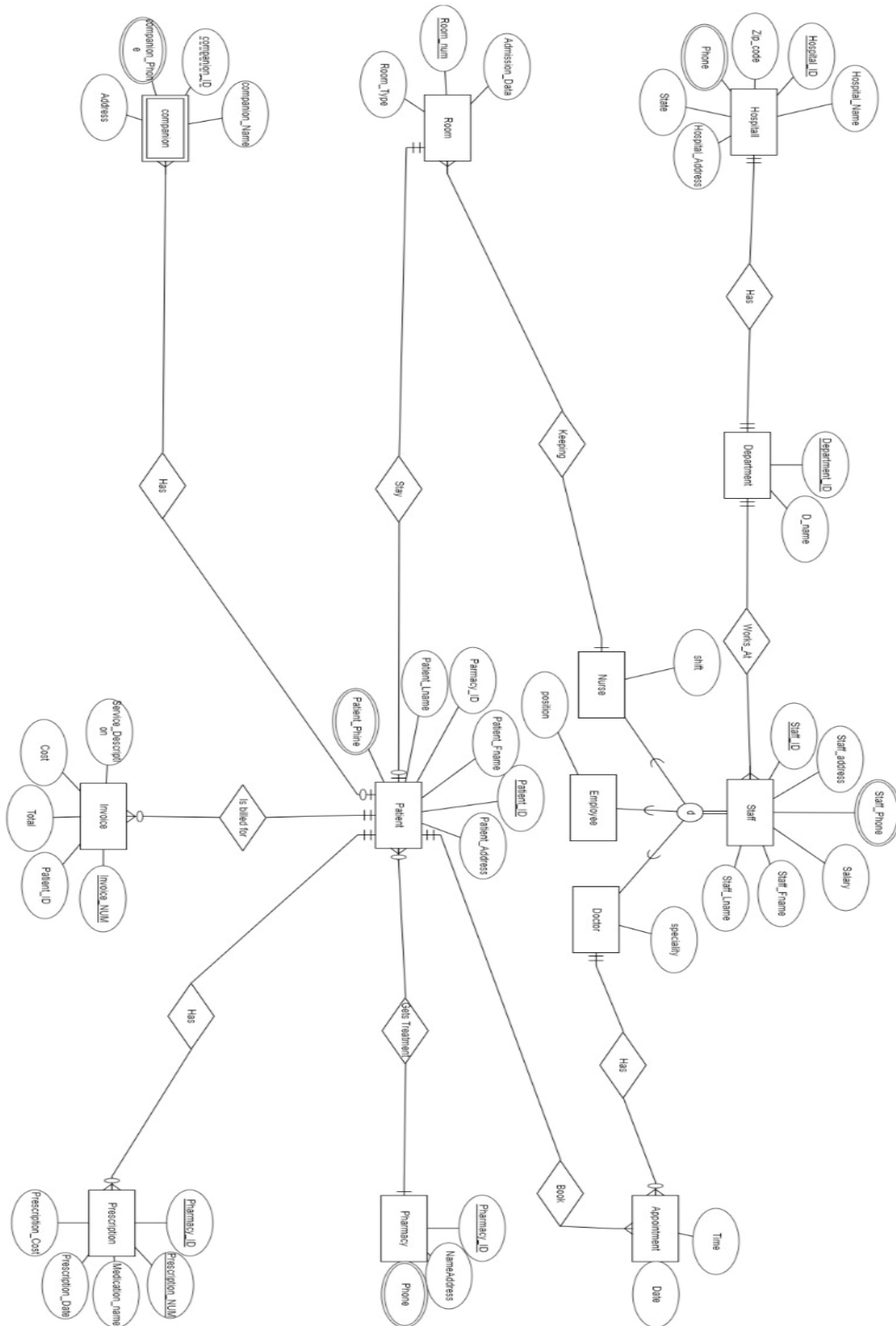


Figure 1 (ERD)

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).

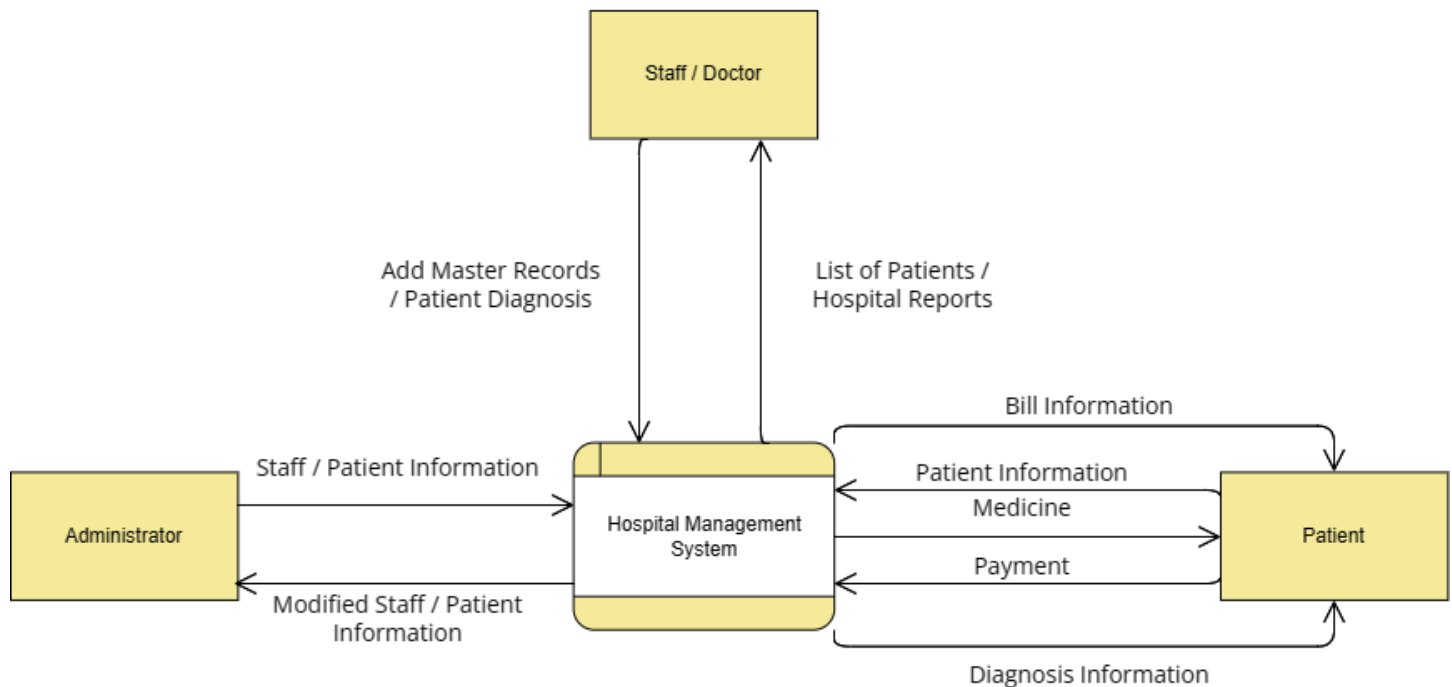


Figure 2 (Level 0)

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.

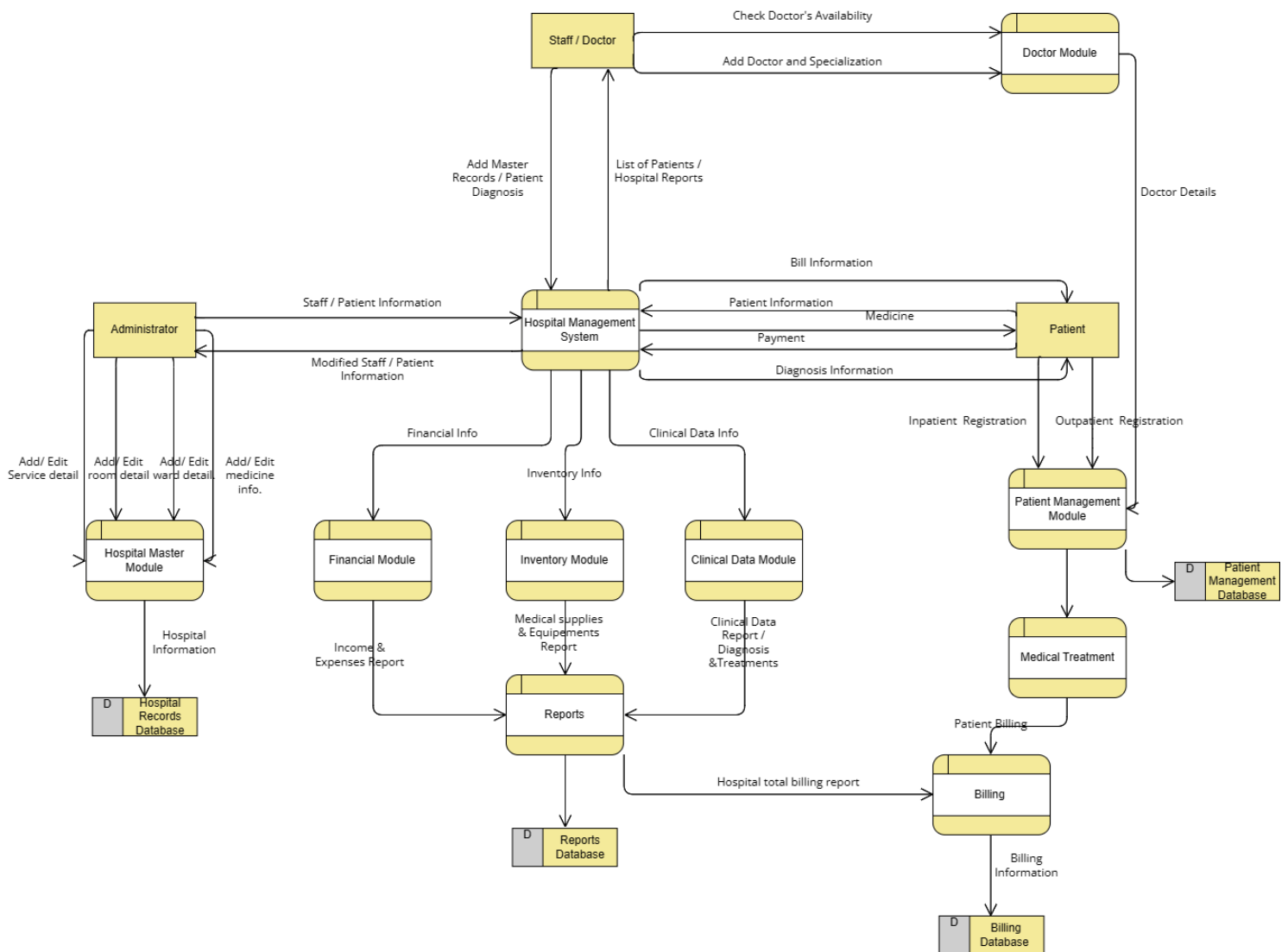


Figure 3 (Level 1)

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.

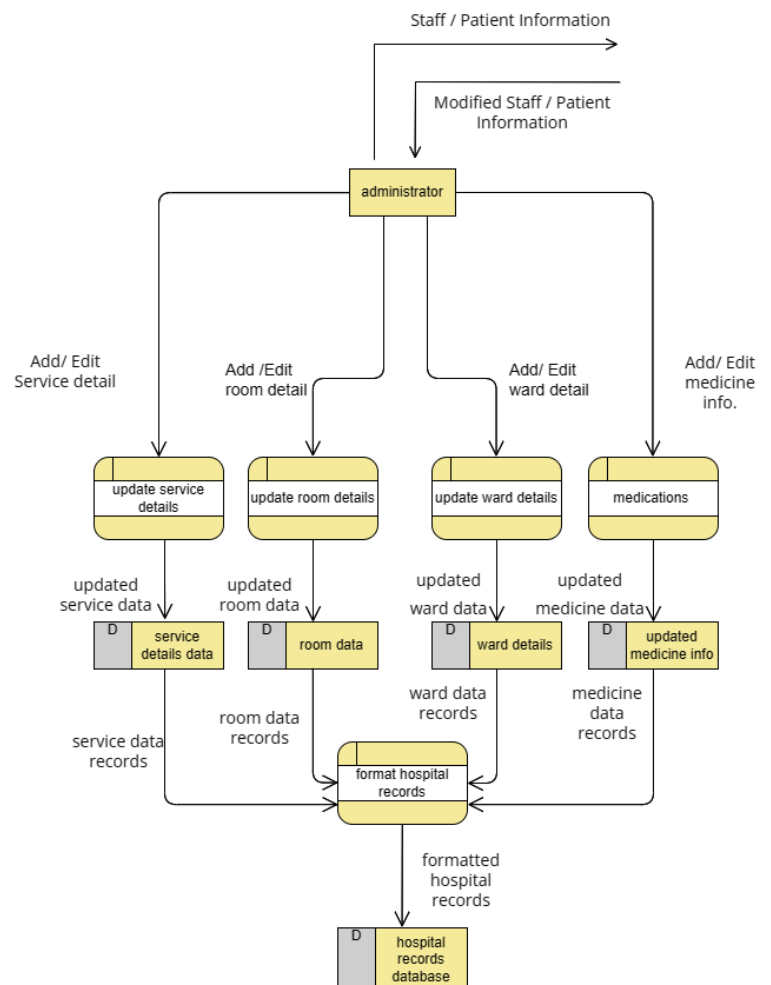


Figure 4 (Level2.1)

Hospital Management System - Level 2



9 | Page

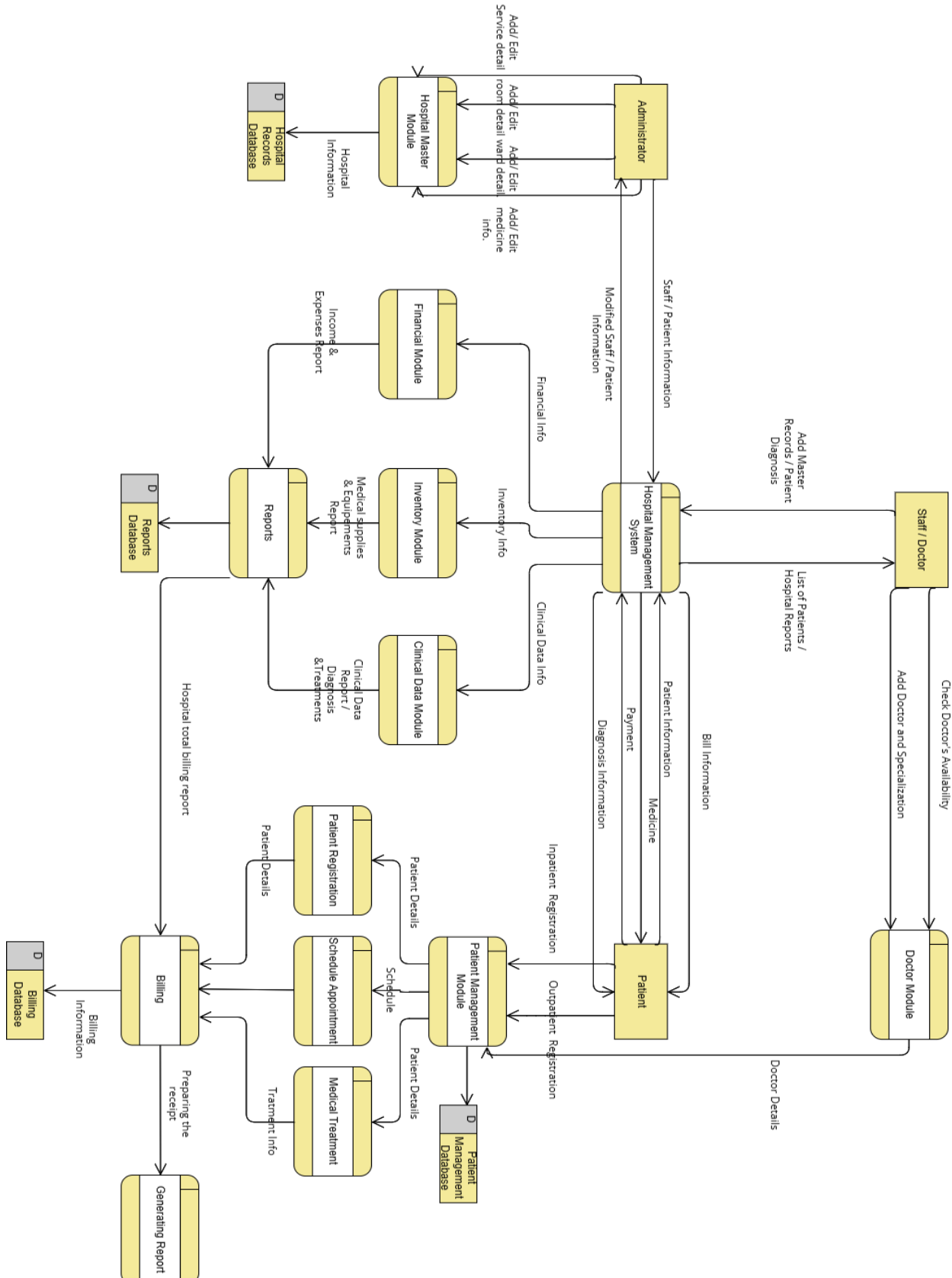


Figure 6(Level 2.3)

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

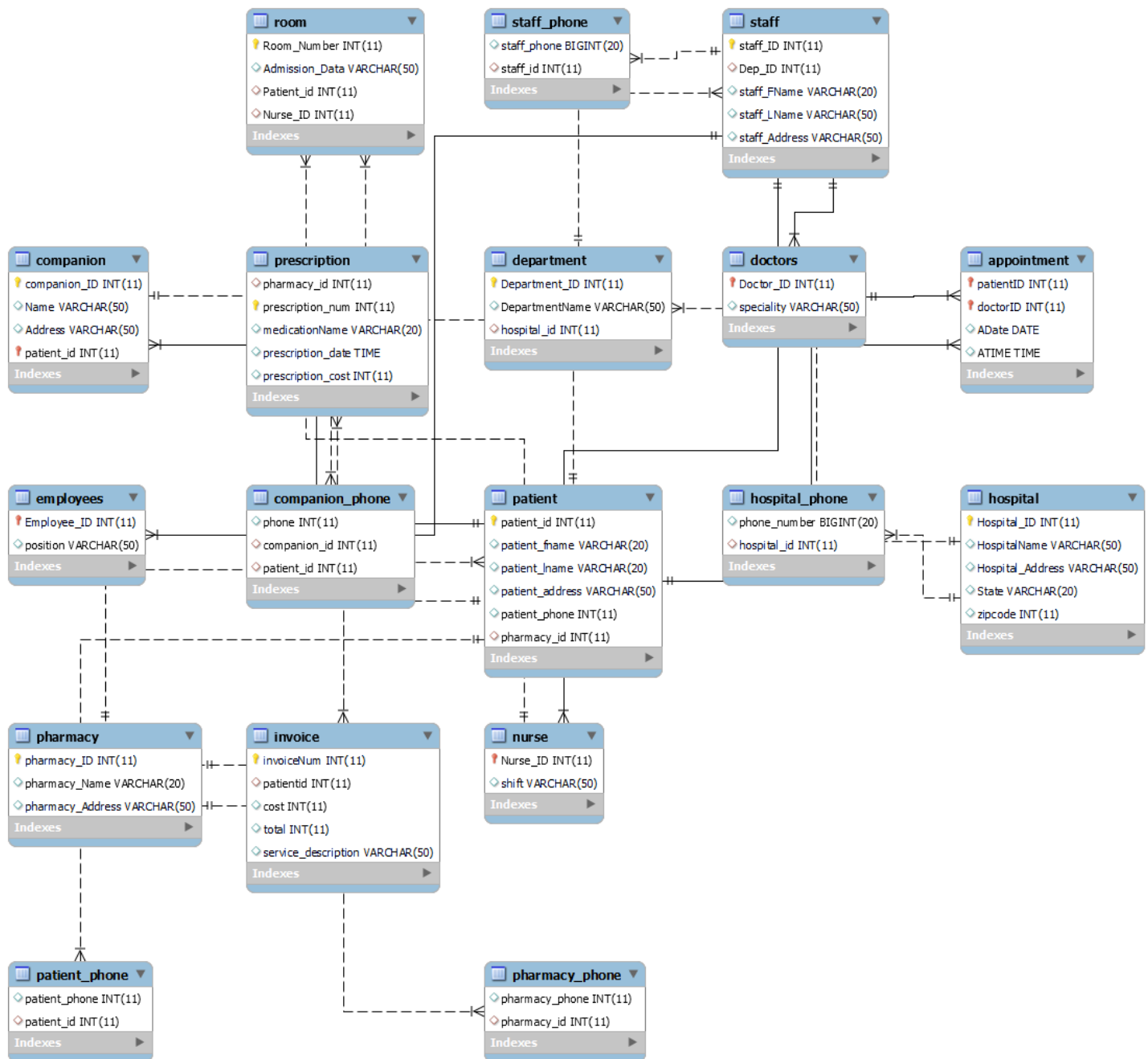


Figure 7 (Schema)

And this is another view of the data flows

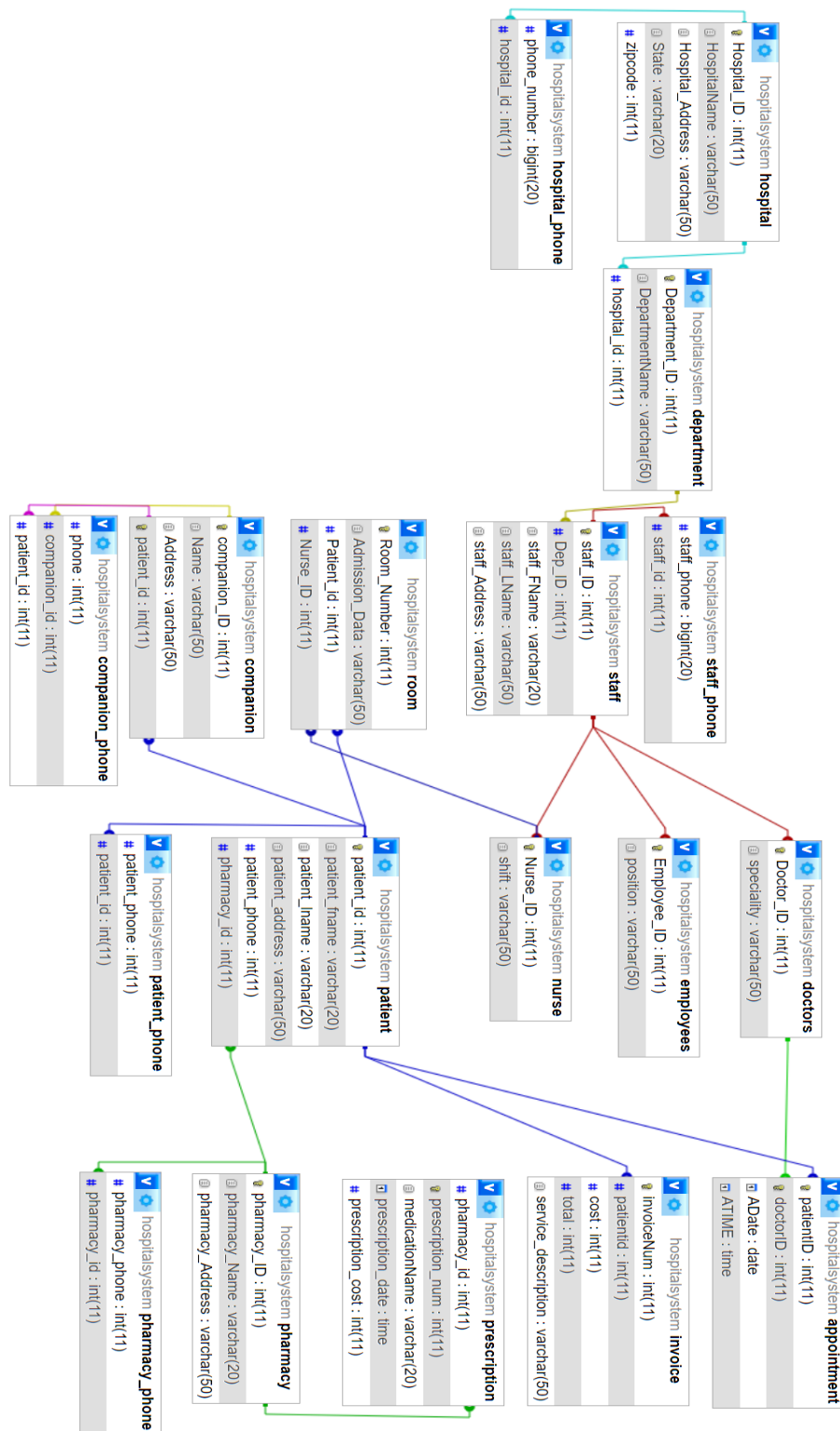


Figure 8(Another view of Schema)

Database view

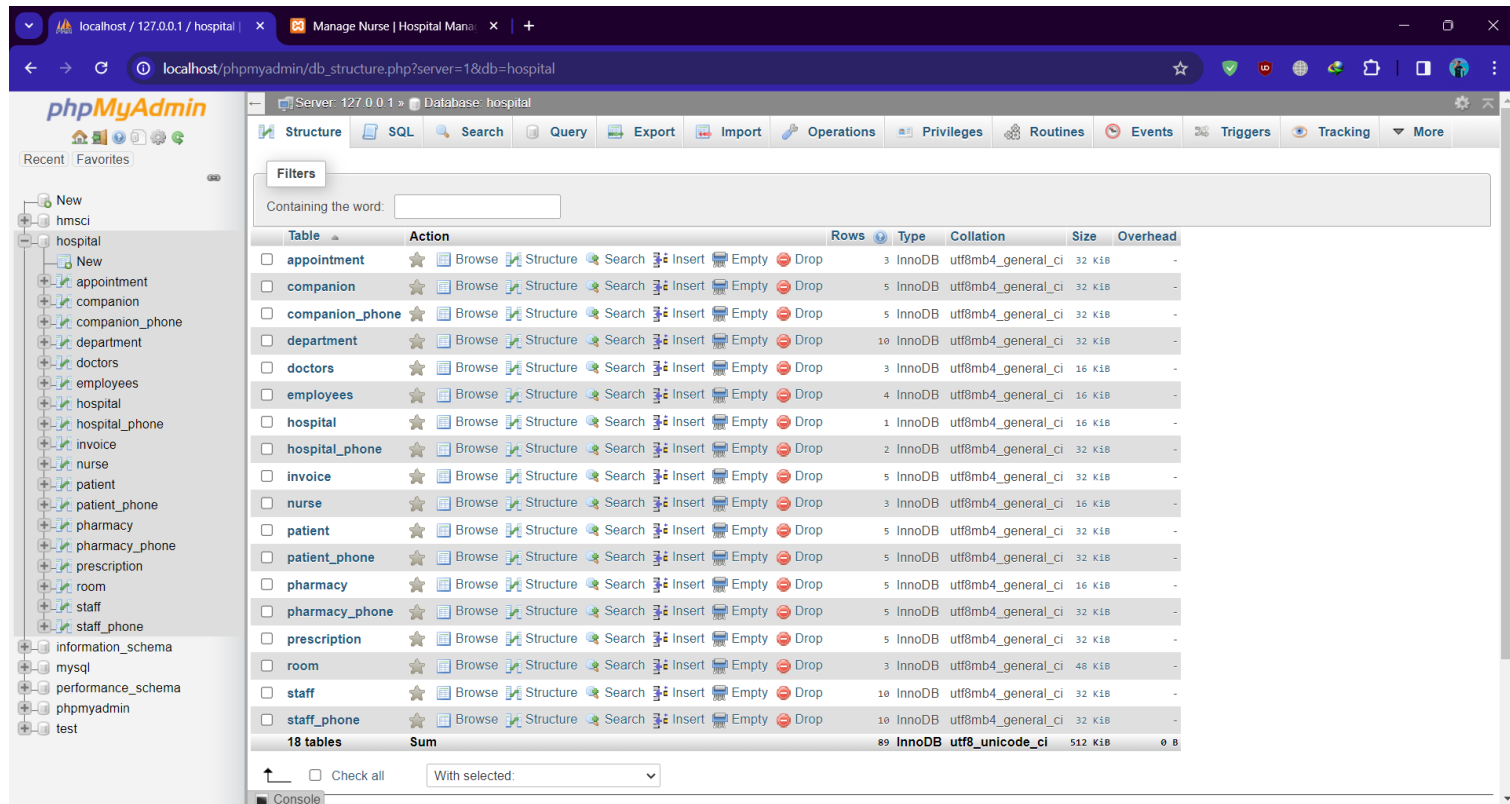


Figure 9 (Database View)

Hospital Interface

Login

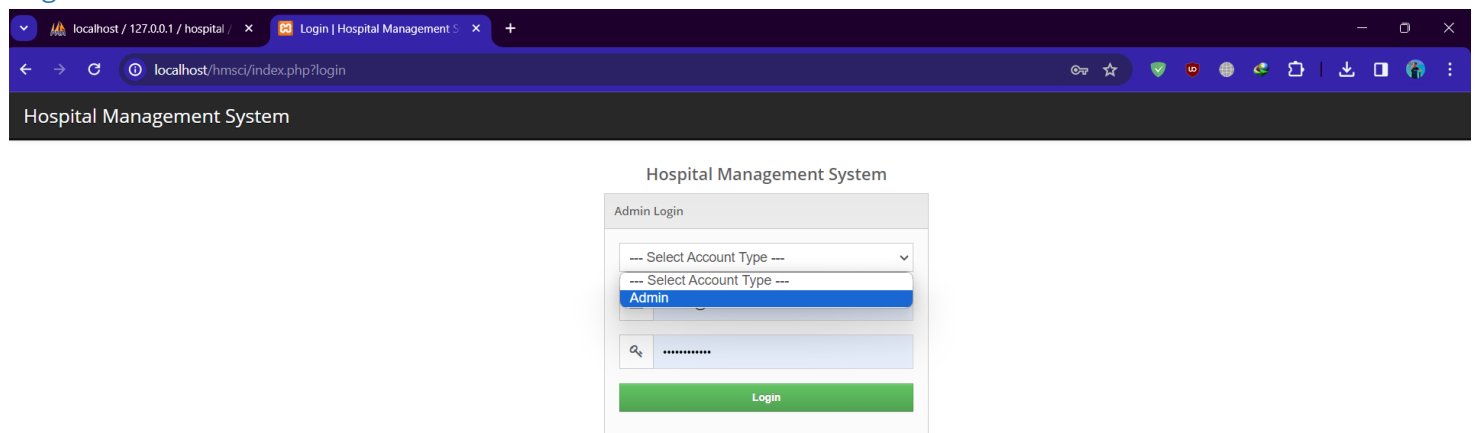


Figure 10(Localhost login)

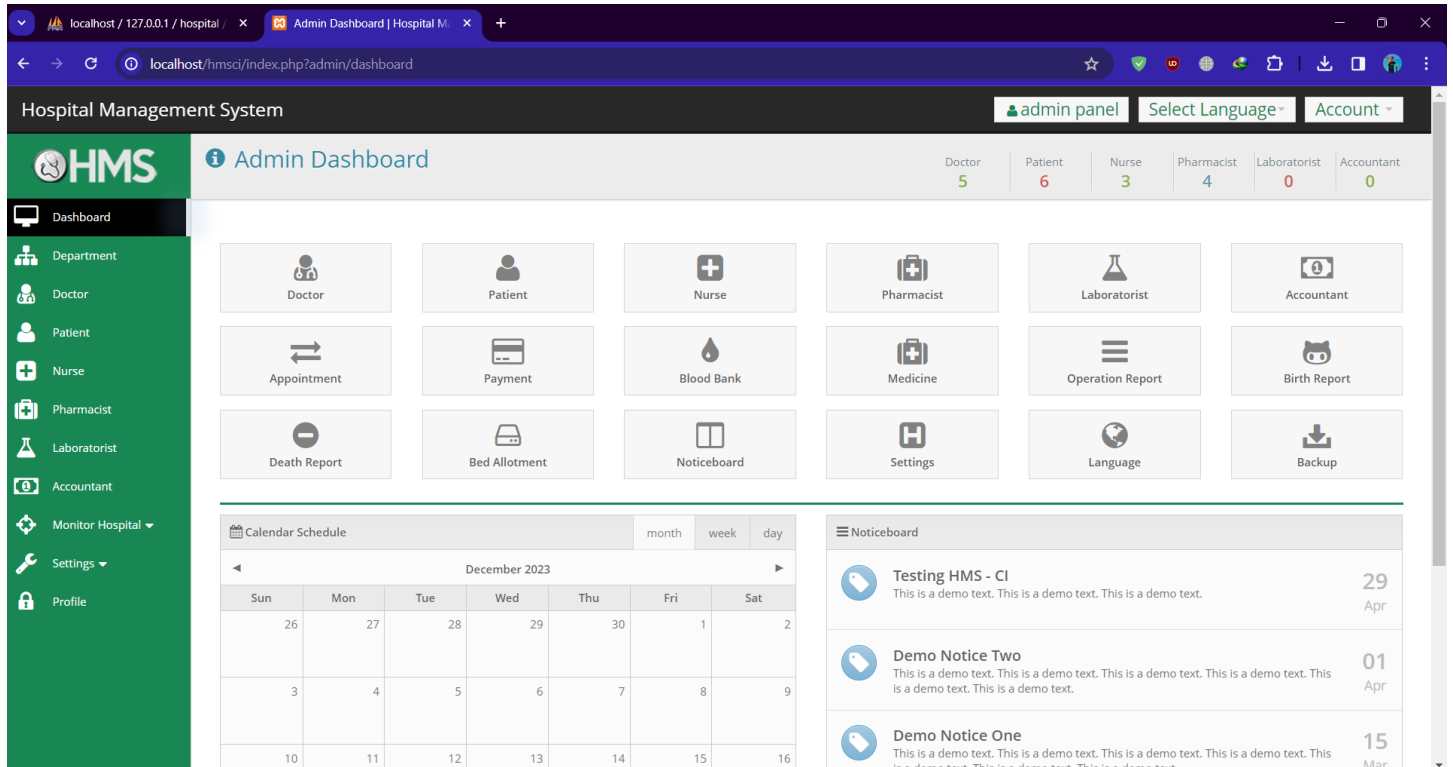


Figure 11 (Dashboard)

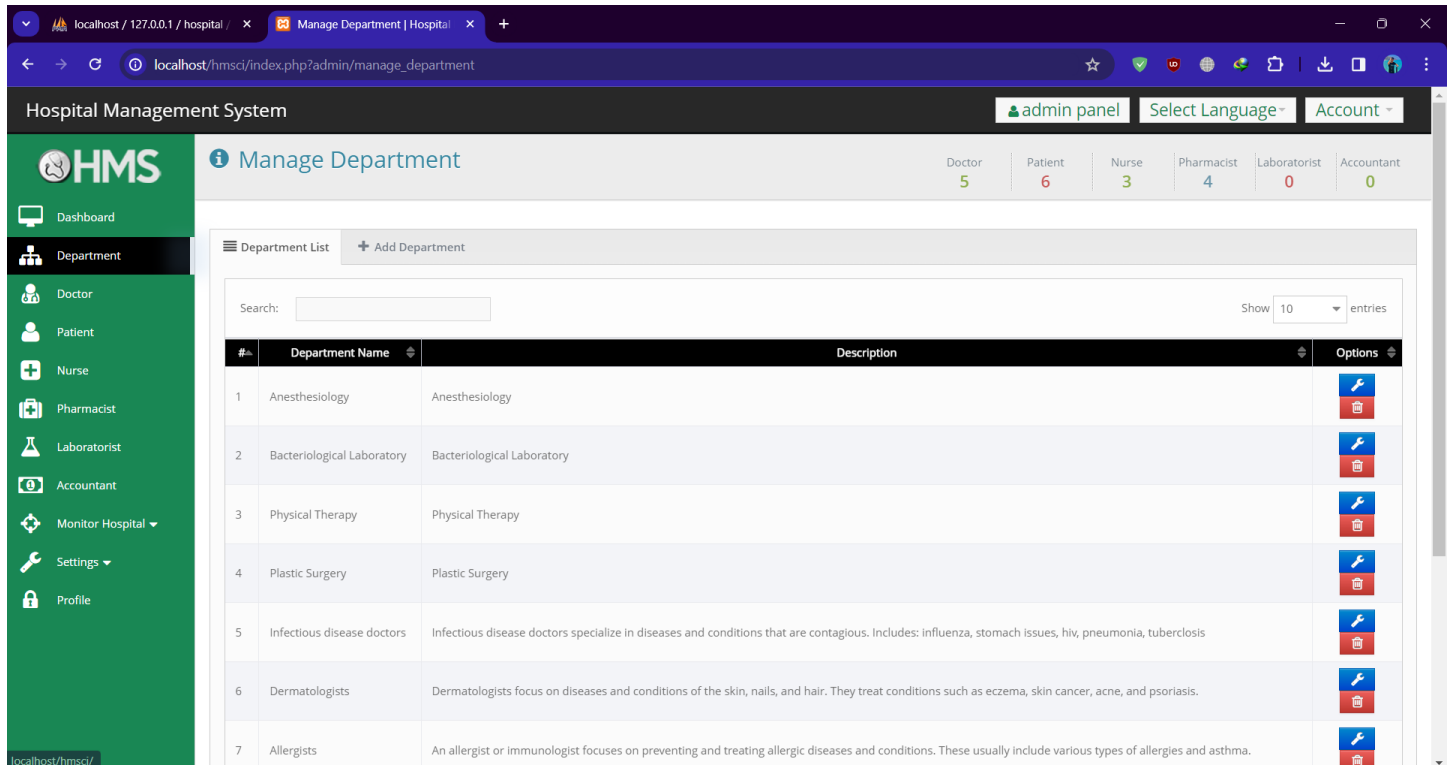


Figure 12 (Departments)

Hospital Management System

admin panel Select Language Account

HMS

Dashboard
Department
Doctor
Patient
Nurse
Pharmacist
Laboratorist
Accountant
Monitor Hospital
Settings
Profile

Manage Nurse

Doctor 5 Patient 6 Nurse 3 Pharmacist 4 Laboratorist 0 Accountant 0

Nurse List + Add Nurse

Search: Show 10 entries

#	Nurse Name	Email	Address	Phone	Options
1	shahd	admin@mail.com	alex,45 street	+20 120 045 0948	
2	shahd	admin@mail.com	alex	+20 121 195 1168	
3	mariam	admin@mail.com	alex	+20 127 877 9799	

Showing 1 to 3 of 3 entries

First Previous 1 Next Last

Figure 13(Nurse Table)

- Insert a new nurse into the data base

Hospital Management System

admin panel Select Language Account

HMS

Dashboard
Department
Doctor
Patient
Nurse
Pharmacist
Laboratorist
Accountant
Monitor Hospital
Settings
Profile

Manage Nurse

Doctor 5 Patient 6 Nurse 3 Pharmacist 4 Laboratorist 0 Accountant 0

Nurse List + Add Nurse

Name

Email

Password

Address

Phone

Add Nurse

Figure 14 (Insert new value)

Hospital Management System

admin panel Select Language Account

HMS

Dashboard
Department
Doctor
Patient
Nurse
Pharmacist
Laboratorist
Accountant
Monitor Hospital
Settings
Profile

Manage Nurse

Doctor 5 Patient 6 Nurse 4 Pharmacist 4 Laboratorist 0 Accountant 0

Nurse List + Add Nurse

Search: Show 10 entries

#	Nurse Name	Email	Address	Phone	Options
1	shahd	admin@mail.com	alex,45 street	+20 120 045 0948	
2	shahd	admin@mail.com	alex	+20 121 195 1168	
3	mariam	admin@mail.com	alex	+20 127 877 9799	
4	aya	admin@mail.com	alex,elagamy	01010101010	

Showing 1 to 4 of 4 entries

First Previous 1 Next Last

Figure 15(updated Nurse Table)

Patient table

Hospital Management System

admin panel Select Language Account

HMS

Dashboard
Department
Doctor
Patient
Nurse
Pharmacist
Laboratorist
Accountant
Monitor Hospital
Settings
Profile

Manage Patient

Doctor 5 Patient 6 Nurse 3 Pharmacist 4 Laboratorist 0 Accountant 0

Patient List + Add Patient

Search: Show 10 entries

#	Patient Name	Age	Sex	Blood Group	Birth Date	Options
1	abduurahman	20	male	O+	06/25/2003	
2	messi	36	male	B-	08/12/1982	
3	shady	21	male	B-	06/25/2003	
4	shahd	20	female	B+	06/25/2003	
5	nour	20	male	A+	04/08/2003	
6	yousril	21	male	AB+	06/20/2003	

Showing 1 to 6 of 6 entries

First Previous 1 Next Last

Figure 16 (Patient Table)

- Insert a new patient in the table

The screenshot shows the 'Add Patient' form in the Hospital Management System. The form is located at the URL `localhost/hmsci/index.php?admin/manage_patient`. The form fields are as follows:

- Name:
- Email:
- Password:
- Address:
- Phone:
- Sex:
- Birth Date:
- Age:
- Blood Group:

The 'Add Patient' button is located at the bottom of the form.

Figure 17(Insert new patient)

The screenshot shows the 'Manage Patient' page in the Hospital Management System. The page is located at the URL `localhost/hmsci/index.php?admin/manage_patient`. The page includes a sidebar with the HMS logo and a navigation menu. The main content area shows a table of patients with the following columns: #, Patient Name, Age, Sex, Blood Group, Birth Date, and Options. The 'Add Patient' button is located at the top left of the table.

#	Patient Name	Age	Sex	Blood Group	Birth Date	Options
1	mahmoud	20	male	A+	04/01/2003	
2	abduhrahman	20	male	O+	06/25/2003	
3	messi	36	male	B-	08/12/1982	
4	shady	21	male	B-	06/25/2003	
5	shahd	20	female	B+	06/25/2003	
6	nour	20	male	A+	04/08/2003	
7	yousril	21	male	AB+	06/20/2003	

The table shows 7 entries. The 'Options' column contains edit and delete icons for each patient. The 'Add Patient' button is located at the top left of the table.

Figure 18(Updated Patient Table)

Data Science Department
System Analysis
Doctor table

Hospital Management System

admin panel Select Language Account

HMS

Manage Doctor

Doctor 5 Patient 6 Nurse 3 Pharmacist 4 Laboratorist 0 Accountant 0

Doctor List + Add Doctor

Search: Show 10 entries

#	Doctor Name	Department	Options
1	mariam	Endocrinologists	
2	ronaldo	Psychiatrists	
3	mariam	Infectious disease doctors	
4	shahd	Anesthesiology	
5	abdulrahman	Plastic Surgery	

Showing 1 to 5 of 5 entries

First Previous 1 Next Last

Figure 19(Doctor Table)

- Insert a new doctor to the table

Hospital Management System

admin panel Select Language Account

HMS

Manage Doctor

Doctor 5 Patient 7 Nurse 4 Pharmacist 4 Laboratorist 0 Accountant 0

Doctor List + Add Doctor

Name Cristiano

Email admin@mail.com

Password *****

Address portagal,madera

Phone TTTTTTTT

Department Physical Therapy

Profile test

Add Doctor

Figure 20 (Insert a new Doctor)

Hospital Management System

admin panel Select Language Account

Manage Doctor

Doctor 6 Patient 7 Nurse 4 Pharmacist 4 Laboratorist 0 Accountant 0

Doctor List + Add Doctor

Search: Show 10 entries

#	Doctor Name	Department	Options
1	mariam	Endocrinologists	
2	Cristiano	Physical Therapy	
3	ronaldo	Psychiatrists	
4	mariam	Infectious disease doctors	
5	shahd	Anesthesiology	
6	abdulrahman	Plastic Surgery	

Showing 1 to 6 of 6 entries

First Previous 1 Next Last

Figure 21 (Updated Doctor Table)

Admin Dashboard | Hospital M

hpmyadmin/sql.php?server=1&db=hmsci&table=doctor&pos=0

Server: 127.0.0.1 » Database: hmsci » Table: doctor

Showing rows 0 - 5 (6 total, Query took 0.0024 seconds.)

SELECT * FROM `doctor`

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Options	doctor_id	name	email	password	address	phone	department_id	profile
	9	mariam	mariam@mail.com	password	15 Tator Patch Road	+20 127 877 9799	11	Test
	19	Cristiano	admin@mail.com	Password@123	portogal,madera	77777777	3	test
	18	ronaldo	admin@mail.com	Password@123	portogal,madera	77777777	18	test
	17	mariam	admin@mail.com	Password@123	alex	+20 128 961 6866	5	test
	15	shahd	admin@mail.com	Password@123	alex,45 street	+20 120 045 0948	1	test
	14	abdulrahman	admin@mail.com	Password@123	alex	+20 101 958 6466	4	abdo@gmail.com

Check all | With selected:

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

Query results operations

Print Copy to clipboard Export Display chart Create view

Figure 22 (updated Value in the Database Table)

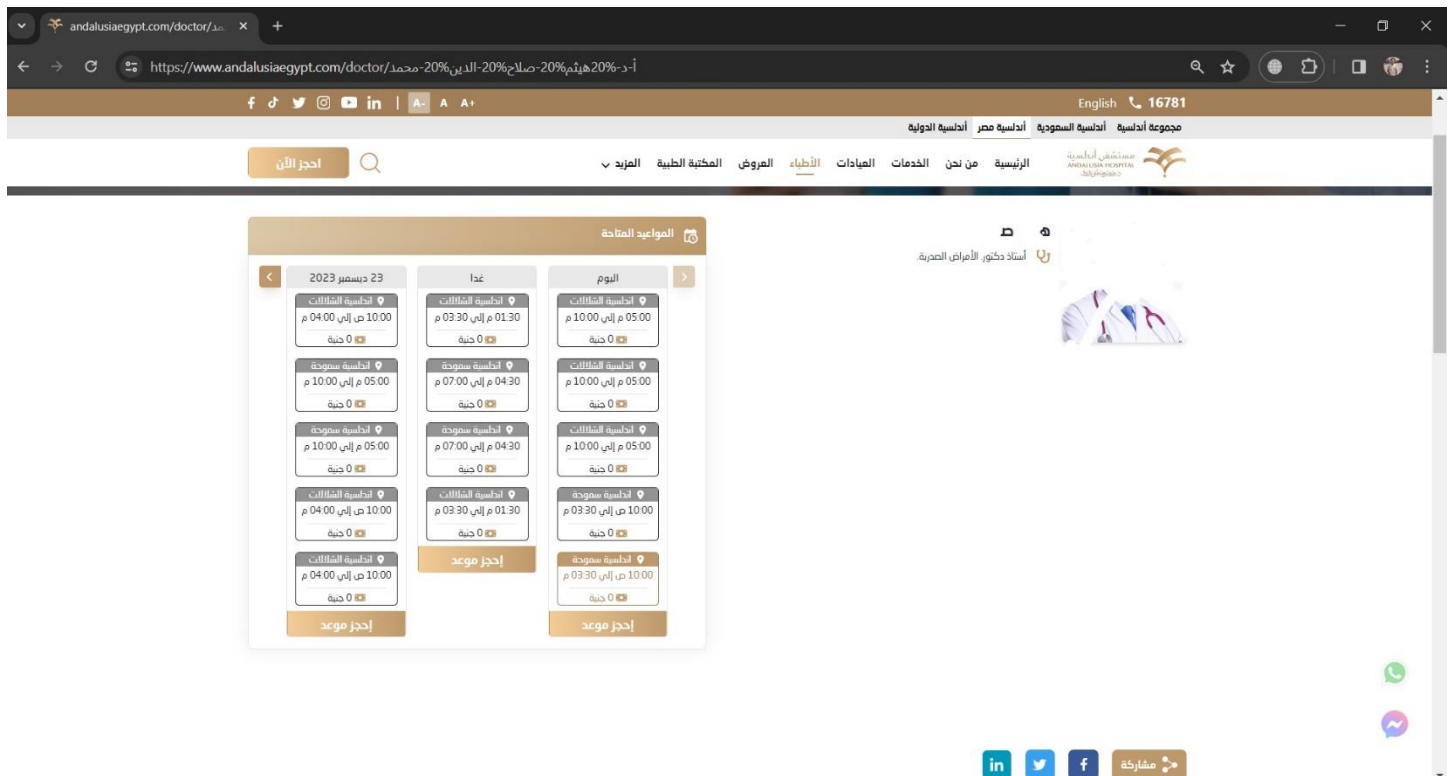


Figure 23 (Problems Example)

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