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Hospital Management System

Database Design Project

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INTRODUCTION

The project Hospital Management system includes registration of patients, storing their details into the system, and also computerized billing in the pharmacy, and labs. The software has the facility to give a unique id for every patient and stores the details of every patient and the staff automatically. It includes a search facility to know the current status of each room. User can search availability of a doctor and the details of a patient using the id. The Hospital Management System can be entered using a username and password. It is accessible either by an administrator or receptionist. Only they can add data into the database. The data can be retrieved easily. The interface is very user-friendly. The data are well protected for personal use and makes the data processing very fast. Hospital Management System is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals. Hospital Management System is designed for multi speciality hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to- end Hospital Management System that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow. Hospital Management System is a software product suite designed to improve the quality and management of hospital management in the areas of clinical process analysis and activity-based costing. Hospital Management System enables you to develop your organization and improve its effectiveness and quality of work. Managing the key processes efficiently is critical to the success of the hospital helps you manage your processes

REQUIREMENT ANALYSIS

PURPOSE

This database system   will help the company to be more efficient in registration of their patients and manage appointments, records of patients. It enables doctors and admin to view and modify appointments schedules if required. The purpose of this project is to computerize all details regarding patient details and hospital details.

SCOPE

The system will be used as the application that serves hospitals, clinic, dispensaries or other health institutions. The intention of the system is to increase the number of patients that can be treated and managed properly. If the hospital management system is file based, management of the hospital has to put much effort on securing the files. They can be easily damaged by fire, insects and natural disasters. Also could be misplaced by losing data and information.

the main Scope of the Project:-

1) Information about Patients is done by just writing the Patients name, age and

gender. Whenever the Patient comes up his information is stored freshly.

2) Bills are generated by recording price for each facility provided to Patient on a

separate sheet and at last they all are summed up.

3) Diagnosis information to patients is generally recorded on the document, which

contains Patient information. It is destroyed after some time period to decrease

the paper load in the office.

4) Immunization records of children are maintained in pre-formatted sheets, which

are kept in a file.

5) Information about various diseases is not kept as any document. Doctors

themselves do this job by remembering various medicines.

All this work is done manually by the receptionist and other operational staff and lot of papers are needed to be handled and taken care of. Doctors have to remember various medicines available for diagnosis and sometimes miss better alternatives as they cant remember them at that time.

SYSTEM ANALAYSIS

EXISTING SYSTEM

Overview

The existing hospital management system in many healthcare facilities is often manual or semi-automated, relying on physical records or outdated software. These systems face significant limitations in managing complex hospital operations, leading to inefficiencies, errors, and delays in service delivery.

Many hospitals rely on manual record-keeping or outdated software that leads to inefficiencies in managing hospital operations. Common practices include paper-based files for patients, fragmented staff schedules, and manual billing processes.

Features of the Existing System

1. Patient Management

Patient records are maintained in paper files or standalone spreadsheets.

Difficulty in retrieving and updating medical history during emergencies.

Increased risk of data loss or misplacement of physical records.

2. Appointment Scheduling

Appointments are often managed manually through phone calls or on-site bookings.

Lack of a centralized system causes double-bookings or scheduling conflicts.

Patients face delays due to the unavailability of real-time doctor schedules.

3. Billing and Payment Management

Bills are calculated manually or using basic software with limited features.

Errors in billing are common due to manual calculations and data entry.

Difficulty in tracking payments and generating financial reports.

4. Staff Management

Employee schedules, roles, and attendance are tracked on paper or spreadsheets.

Lack of centralized data leads to inefficiencies in managing staff shifts and payrolls.

5. Inventory Management

Stock records for medications and equipment are often manual, leading to inaccurate tracking.

Delays in identifying low stock levels result in shortages of critical supplies.

No automated system for procurement and inventory monitoring.

Challenges in the Existing System

1. Data Redundancy and Inconsistency:

Patient and operational data are stored in multiple locations, leading to duplication and errors.

2. Limited Accessibility:

Staff and doctors cannot easily access patient records or schedules remotely or in real time.

3. Error-Prone Processes:

Manual data entry and calculations increase the likelihood of errors in billing, appointments, and record updates.

4. Time-Consuming Operations:

Searching for patient records, managing appointments, and handling billing manually are slow and inefficient.

5. Lack of Security:

Physical records are vulnerable to loss, damage, or unauthorized access.

Minimal data protection measures in digital systems lead to privacy concerns.

6. Inadequate Reporting:

Generating detailed reports on hospital performance, patient trends, or financial metrics is challenging and time-intensive.

PROPOSED SYSTEM

Overview:

The proposed system is a comprehensive Hospital Management Database designed to automate and streamline the clinic's operations. It will provide a centralized digital platform for managing patient information, appointments, billing, and inventory.

Key Features:

Patient Management: Digital registration forms that allow patients to fill out their information online or at kiosks within the clinic. This information is stored in a secure database.

Appointment Scheduling: An online appointment booking system that allows patients to schedule, reschedule, or cancel appointments. Automated reminders can be sent via SMS or email to reduce no-shows.

Electronic Medical Records (EMR): A digital repository for storing patient medical histories, treatment plans, and prescriptions that can be accessed by authorized personnel quickly and securely.

Billing System: Automated billing processes that generate invoices based on treatments provided, with options for online payments and insurance claim processing.

Inventory Management: A real-time inventory tracking system that alerts staff when supplies are low and automates reordering processes.

Reporting and Analytics: Dashboards that provide insights into clinic performance, patient demographics, and financial metrics.

Benefits:

- Improved efficiency and reduced wait times for patients.

- Enhanced data security and reduced risk of data loss.

- Better tracking of patient histories and treatment outcomes.

- Streamlined billing processes leading to faster payments.

- Improved inventory management reducing waste and ensuring availability of supplies.

CONSRAINTS SYSTEM

Technical Constraints:

Infrastructure Requirements: The proposed system will require reliable internet access and sufficient hardware (servers, workstations) to support the database and application software.

Integration with Existing Systems : If there are any existing digital systems (e.g., accounting software), integration may pose challenges.

Operational Constraints:

User Training: Staff will need training to effectively use the new system, which may require time away from their regular duties.

Change Management: Resistance to change from staff accustomed to manual processes could impede the adoption of the new system.

Regulatory Constraints:

Data Privacy Regulations: The system must comply with healthcare regulations such as HIPAA (Health Insurance Portability and Accountability Act) to ensure patient data privacy and security.

Clinical Standards: The system must adhere to clinical standards for record-keeping and reporting as required by local health authorities.

Financial Constraints:

Budget Limitations: The cost of developing, implementing, and maintaining the new system must fit within the clinic's budget constraints.

Return on Investment (ROI): The clinic must evaluate whether the expected improvements in efficiency and patient satisfaction will justify the initial investment in the new system.

CONCEPTUAL   DESIGH

Entities and Their Definitions

1. Patient

> Definition: Represents individuals receiving medical care at the hospital.

> **Attributes:**

• Patient ID (PK): Unique identifier for each patient.

• Name: Patient's name.

• Date Of Birth: Patient's date of birth.

• Gender: Patient's gender.

• Phone: Contact number of the patient.

• Email: Email address of the patient.

• Address: Residential address of the patient.

• blood group : blood type of patient

2. Doctor
> Definition: Represents medical professionals providing care to patients.
> Attributes:
• Doctor ID (PK): Unique identifier for each doctor.
• Name: Doctor's name.

- Gender : doctors sex .

- Specialty: Medical specialty of the doctor (e.g., cardiology, pediatrics).

- Phone: Contact number of the doctor.

- Email: Email address of the doctor.

- Experience: The number of years of experience of the doctor. This is an integer value.

- schedule : doctor's time schedule in hospital .

- .language: The languages spoken by the doctor.

3. Appointment (APPT)

- ➢ Definition: Represents scheduled meetings between patients and doctors for consultations or treatments.

- ➢ Attributes:

- Appointment ID (PK): Unique identifier for each appointment.

- Doctor name (FK): Reference to the doctor for the appointment.

- Appointment Date: Date of the appointment.

- Appointment Time: Time of the appointment.

- Consultant Fee: The consultation fee for the appointment.

- Specialization: The specialization of the doctor for the appointment.

4. Prescription

- ➢ Definition: Represents medication prescribed to patients by doctors.

- ➢ Attributes:

- Medicine: The name of the medicine prescribed.

- Advice: Any advice or instructions given to the patient regarding the medicine. .

- Remark: Any additional remarks or notes about the prescription.

5. Bill

- ➢ Definition: Represents financial charges incurred by patients for services rendered by the hospital.

- ➢ Attributes:

- Bill No (Bill Number): A unique identifier for each bill generated for a patient. This is the primary key for the BILL table. It's typically an integer value.

- P_ID (Patient ID): A foreign key referencing the P_ID in the PATIENT table. It indicates which patient the bill is for.

- Date: The date on which the bill was generated. This is a date value.

- Time: The time at which the bill was generated. This is a time value.

- Amount: The total amount of the bill. This is a decimal value (DECIMAL) to handle currency.

    6. Admin

    ➢ Definition: Represents administrative staff responsible for managing hospital operations and patient records.

    ➢ Attributes:

- Admin ID (PK): Unique identifier for each admin user.

- Name: Admin's last name.

- date of birth : identifier of age

- gender: identify sex of admin

- address : address of admin

- Phone: Contact number of the admin.

- Email: Email address of the admin.

Relationships Between Entities

1. Patient to Appointment

   • A patient can have multiple appointments with different doctors, but each appointment is associated with one specific patient.

   • Relationship Type: One-to-Many

   • Notation: 1 Patient → 0..* Appointments

2. Doctor to Appointment

   • A doctor can have multiple appointments with different patients, but each appointment is associated with one specific doctor.

   • Relationship Type: One-to-Many

   • Notation: 1 Doctor → 0..* Appointments

3. Patient to Prescription

• A patient can receive multiple prescriptions from different doctors, but each prescription is linked to one specific patient.

   • Relationship Type: One-to-Many

   • Notation: 1 Patient → 0..* Prescriptions

4. Doctor to Prescription

   • A doctor can issue multiple prescriptions to various patients, but each prescription is linked to one specific doctor.

   • Relationship Type: One-to-Many

• Notation: 1 Doctor → 0..* Prescriptions

5. Patient to Bill

   • A patient can have multiple bills corresponding to different treatments or services received, but each bill is linked to one specific patient.

   • Relationship Type: One-to-Many

   • Notation: 1 Patient → 0..* Bills
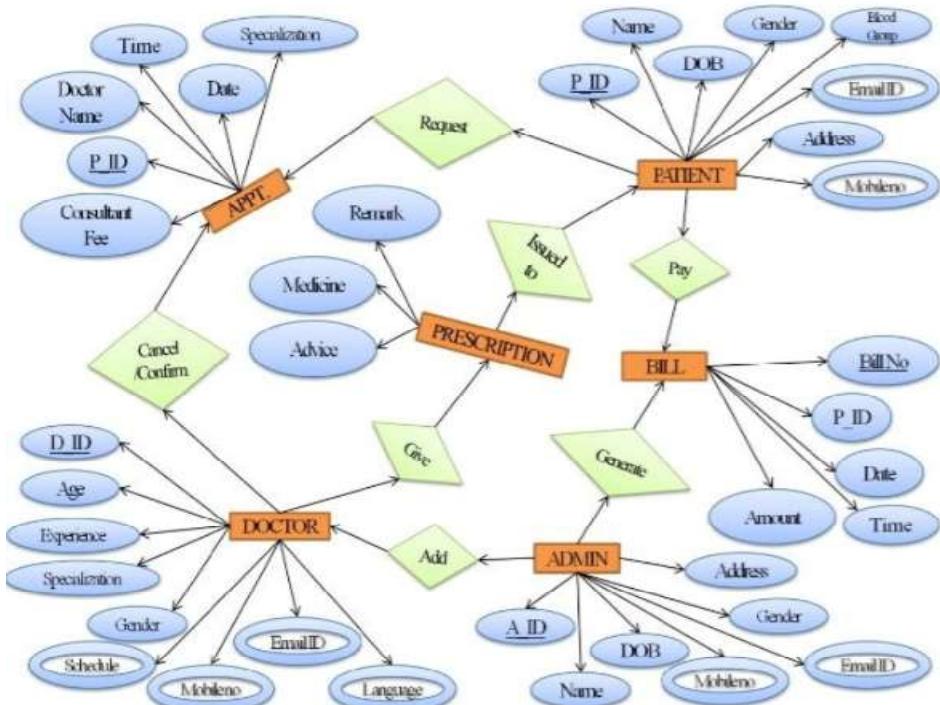
6. Admin to Patient

   • An admin can manage multiple patients, but each patient is typically managed by one admin (optional relationship).

   • Relationship Type: One-to-Many

   • Notation: 1 Admin → 0..* Patients

ER diagram

Data design

S no	Column name	Data type	constraints	describtion
1	P id	Varchar	Primery key	Contain unique id
2	Name	Varchar	-	Contain name
3	DOOB	Varchar	-	Contain date of birth
4	Gender	Varchar	-	Contain gender
5	Blood group	Varchar	-	Contain blood group
6	Email id	Varchar	-	Contain email id
7	Address	Varchar	-	Contain address
8	Mobile no	integer	-	Contain mobile no

Table 1:patient

S no	Column name	Data type	constraints	Description
1	P id	Varchar	Primary key	Contain unqiue id patient
2	Specialaization	Varchar	-	Contains name of the department in which peitent wants to visit
3	Doctor's name	Varchar	-	Contain doctor name patient wants to visit
4	Consultant fee	Varchar	-	Contain consultant fee of doctor
5	Date	Date	-	Contains date for the appointment
6	Time	Time	-	Contains time for the appointment

Table 2:appointment

S no	Column name	Data type	Constraints	Description
1	D id	Varchar	Primary key	Contains unique id
2	Age	Integer	-	Contains age
3	Gender	Varchar	-	Contains gender
4	Specialization	Varchar Varchar	-	Contain specialization
5	Experience	Varchar	-	Contain experience of the doctor (in months)
6	Language	Varchar	-	Contain in how many languages doctor can speak
7	Mobile no	Integer	-	Contains mobile number
8	Email id	Varchar	-	Contains email id
9	schedule	varchar	-	Contains day and time for which the doctor is available

Table 3:doctor

S no	Column name	Data type	Constraints	Description
1	D id	Varchar	-	Contains unique id
2	P id	Varchar	Primary key	Contain unique id
3	Medicine	Varchar	-	Contains name
4	Remark	Varchar	-	Contains remark given by the doctor for the patent
5	Advice	varchar	-	Contains any advice for the patient

Table 4:perception

S no	Column name	Data type	Constraints	Description
1	A id	Varchar	Primary key	Contains unique id
2	Name	Varchar	-	Contains name
3	DOB	Varchar	-	Contains date of birth
4	Gender	Varchar	-	Contains gender
5	Email id	Varchar	-	Contain email id
6	Mobile no	Integer	-	Contains mobile no
7	Address	varchar	-	Contains address

Table 5: admin

S no	Column name	Data type	Constraints	Description
1	P id	Varchar	-	Contains unique id
2	Bill no	Varchar	Primary key	Contains number of the bill
3	Data	Varchar	-	Contains date of the bill
4	Time	Varchar	-	Contains time of the bill generated
5	Amount	integer	-	Contains amount of the bill

Table 6: bill

Logical design phase

Mapping

- ✓ Patient

p id	Name	DOB	gender	blood group	address

Email

p id	Email

Mobile no

p id	mob no

- ✓ Doctor

D id	Age	experience	specialization	Gender

Language

D id	Language

Schedule

D id	schedule

Mobile no

D id	mob no

Email

D id	email id

- ✓ appointment

p id	docter name	Time	date	specialaization	consultant fee

- ✓ prescription

Remark	medicine	advice

- ✓ bill

bill no	p id	date	time	amount

- ✓ admin

A id	Name	DOB	gender	address

Mobile no

A id	mobile no
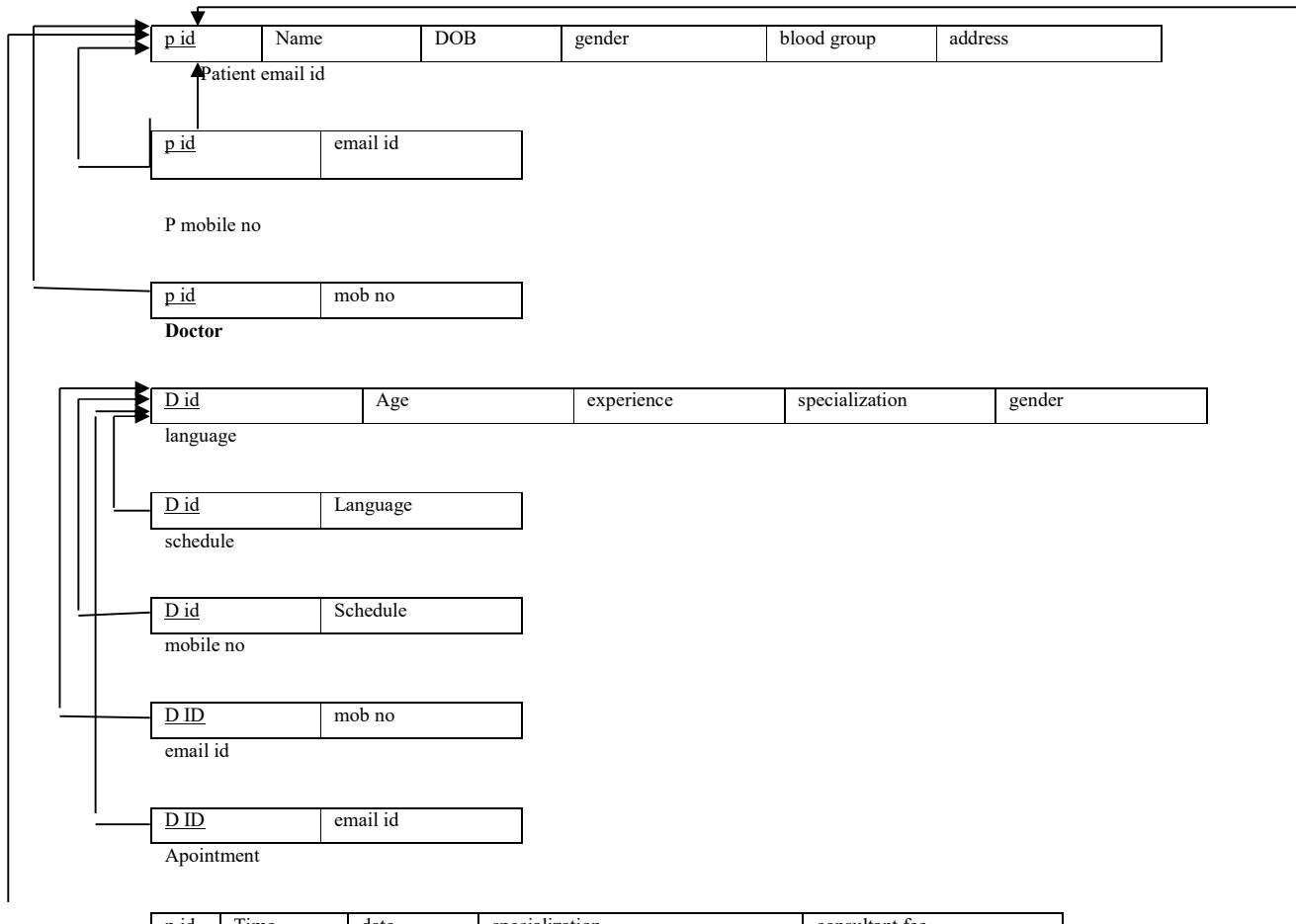
Email

A id	email id
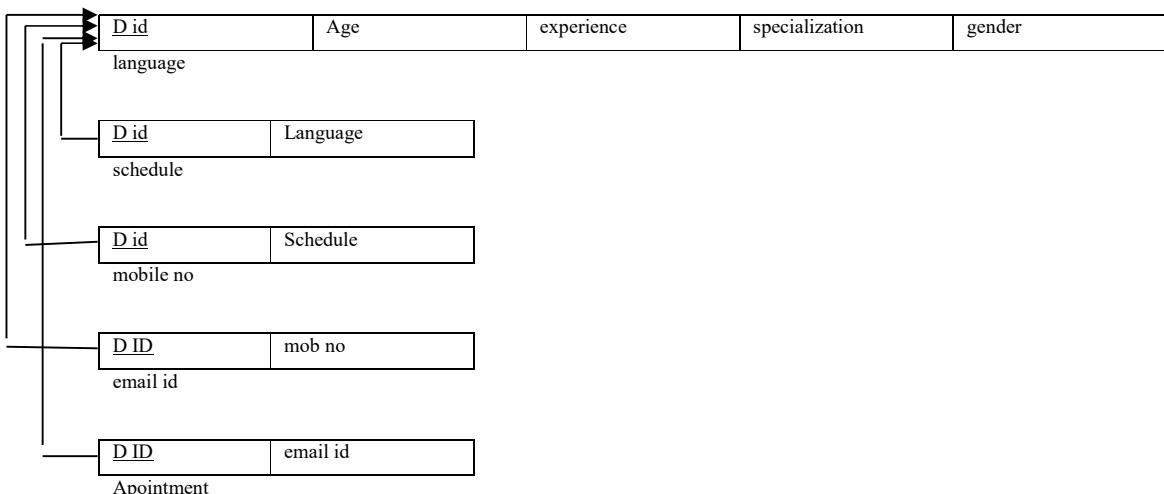
Logical Diagram

Patietent
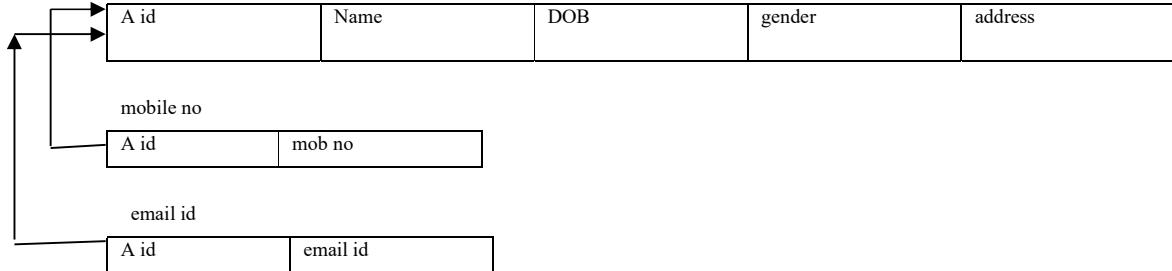
p id	Name	DOB	gender	blood group	address

Patient email id

p id	email id

P mobile no

p id	mob no

Doctor

D id	Age	experience	specialization	gender

language

D id	Language

schedule

D id	Schedule

mobile no

D ID	mob no

email id

D ID	email id

Apointment

p id	Time	date	specialization	consultant fee

prescription

Remark	medicine	advice

bill

bill no	p id	date	time	Amount

admin

A id	Name	DOB	gender	address

mobile no

A id	mob no

email id

A id	email id

Summary

The Hospital Management Database System (HMDBS) has been designed to overcome the inefficiencies of existing fragmented systems that often lead to data redundancy and hinder timely access to patient information, ultimately affecting care quality. By centralizing operations into a single, user-friendly database encompassing modules for patient management, staff coordination, appointment scheduling, billing, and inventory control, the HMDBS aims to streamline workflows and enhance interdepartmental communication. While developing this system, constraints such as budget limitations, regulatory compliance, potential staff resistance to change, and the need for robust data security were identified as critical factors for successful implementation. The conceptual design outlines key entities and their relationships, while the logical design details the database structure, ensuring efficiency and scalability. By addressing these challenges and employing a comprehensive design framework, the HMDBS is set to significantly improve hospital operations and patient care outcomes in an evolving healthcare landscape.