



DESIGN AND IMPLEMENTATIONDOCUMENT

Hospital Data Management System

[Abstract](#)

Database system is an important element of an enterprise system. The hospital data management system is a case study of a mid-sized hospital prototype.

Introduction:

Database is a data repository of different records collected from an Information System (Source). Database systems must follow proper structure, planning, designing, and implementation methodology to produce a reliable and effective system.

The database systems project work is a prototype database system for Hospital Information/Data Management System. Implementing an advanced database will require a modification of the project strategies and procedures.

Project Design:

Project Statement:

The key agenda of any project to identify the problem and provide a solution using structured project work

Problem Statement:

Manual record management system operations are both operationally and financially costly when it comes to managing client records:

- The manual record management system cannot give us a proper understanding of the healthcare service consumer base.
- Data and information are not adequately protected.
- There is a possibility that the patient data and information may be exposed for unauthorized modifications.
- Maintaining a manual record-keeping system might be too onerous.
- Data access is insufficiently controlled.

Implementation Objectives:

- We must guarantee that patient data is acquired correctly, processed effectively, securely kept, and retrievable by authorized users for operational purposes.
- The database will make client records available in real-time so that services may be provided to them.
- Structure of the database is simple and easy to filter the data
- System administrator will be given privileges to handle the accounts and permissions for the view
- Patient's data is stored in different levels and can be accessed by the "Patient_ID"

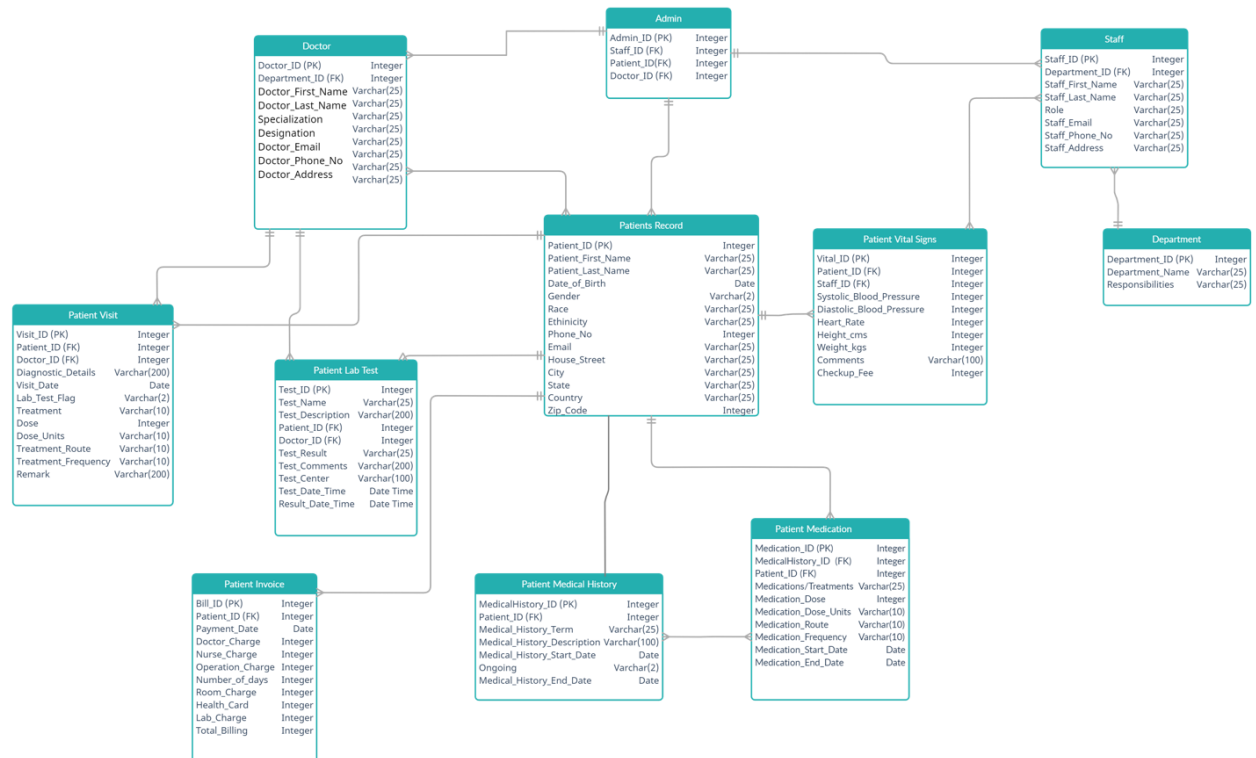
- The doctor will be able to access patient's medical records but not personal information.
- The patient information will be updated from time to time based on his visits
- There is a department which has different departments and different roles
- There is a doctor table which consists of doctors, department ID, managed by, specializations
- The other staff members are kept in Staff table which as similar layout to that of Doctor's tables
- Patient Invoice consists of all the billing activities of the patient during different visits

Proposed Solution:

To overcome the above problems, a model can be used. The issues are resolved as follows.

- To avoid cluttering we have divided the patient data into tables interlinked using the primary and foreign keys for integrity and uniqueness of data.
- Using the database design, the doctor can access the records of patients such as Patient Vital Signs, Patient Lab tests, Patient Medication and Patient Medical History without disclosing the patient personal information. This guarantees data security.
- All the patient billings records can be shown in one table that is 'Patient_Invoice' entity rather than creating separate tables for different entities.
- The database contains staff entity that includes the records of the other staff in the hospital excluding doctors for instance nurse, reception, department with respective 'Staff_Id' as primary and 'Department_Id' as foreign key.

Data Model E-R Diagram:



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Patients Record Entity

Attributes	Description	Data type	Relationship
Patient_ID	Patient Identification Number	Integer	Primary Key
Patient_First_Name	Patient First Name	Varchar(25)	Not Null
Patient_Last_Name	Patient Last Name	Varchar(25)	Not Null
Date_of_Birth	Patient Date of Birth	Date	Not Null
Gender	Patient Gender	Varchar(2)	Not Null
Race	Patient Race	Varchar(25)	Not Null
Ethnicity	Patient Ethnicity	Varchar(25)	Not Null
Phone_No	Patient Phone Number	Integer	Not Null
Email	Patient Email	Varchar(25)	Not Null
House_Street	Patient House Number and Street	Varchar(25)	Not Null
City	City where Patient resides	Varchar(25)	Not Null
State	State where Patient resides	Varchar(25)	Not Null
Country	Country where Patient resides	Varchar(25)	Not Null
Zip_Code	Zipcode where Patient resides	Integer	Not Null

Patient Vital Signs Entity

Attributes	Description	Data type	Relationship
Vital_ID	Vitals Identification Number	Integer	Primary Key
Patient_ID	Patient Identification Number	Integer	Foreign Key
Staff_ID	Nurse Identification Number	Integer	Foreign Key
Systolic_Blood_Pressure	Patient systolic Blood Pressure	Integer	Not Null
Diastolic_Blood_Pressure	Patient diastolic Blood Pressure	Integer	Not Null
Heart_Rate	Patient Heart Rate	Integer	Not Null
Height_cms	Patient Height	Integer	Not Null
Weight_kgs	Patient Weight	Integer	Not Null
Comments	Nurse Comments	Varchar(100)	Not Null
Checkup_Fee	Check up fees	Integer	Not Null

Patient Lab Test Entity

Attributes	Description	Data type	Relationship
Test_ID	Test Identification Number	Integer	Primary Key
Test_Name	Test Name	Varchar(25)	Not Null
Test_Description	Test Description	Varchar(200)	Not Null
Patient_ID	Patient Identification Number	Integer	Foreign Key
Doctor_ID	Doctor Identification Number	Integer	Foreign Key
Test_Result	Test Result	Varchar(25)	Not Null
Test_Comments	Test Comments	Varchar(200)	Not Null
Test_Center	Lab Diagnostic Center	Varchar(100)	Not Null
Test_Date_Time	Lab Test Date	Date Time	Not Null
Result_Date_Time	Lab Result Date	Date Time	Not Null

Patient Visit Entity

Attributes	Description	Data type	Relationship
Visit_ID	Visit Identifier	Integer	Primary Key
Patient_ID	Patient Identification Number	Integer	Foreign Key
Doctor_ID	Doctor Identification Number	Integer	Foreign Key
Diagnostic_Details	Patient Diagnosis Details	Varchar(200)	Not Null
Visit_Date	Patient Visit Date	Date	Not Null
Lab_Test_Flag	Lab Test Required	Varchar(2)	Not Null
Treatment	Treatments/Medication Prescribed	Varchar(10)	Null
Dose	Prescribed Medication Dose	Integer	Null
Dose_Units	Prescribed Medication Dose Units	Varchar(10)	Null
Treatment_Route	Prescribed Medication Dose Route	Varchar(10)	Null
Treatment_Frequency	Treatment Frequency	Varchar(10)	Null
Remarks	Doctor Remarks	Varchar(200)	Null

Patient Medical History Entity

Attributes	Description	Data type	Relationship
MedicalHistory_ID	Medical History Identification Number	Integer	Primary Key
Patient_ID	Patient Identification Number	Integer	Foreign Key
Medical_History_Term	Medical History Term	Varchar(25)	Not Null
Medical_History_Description	Medical History Description	Varchar(100)	Not Null
Medical_History_Start_Date	Medical History Start Date	Date	Not Null
Ongoing	Ongoing	Varchar(2)	Null
Medical_History_End_Date	Medical History End Date	Date	Null

Patient Medication Entity

Attributes	Description	Data type	Relationship
Medication_ID	Medication/Treatment Identification Number	Integer	Primary Key
MedicalHistory_ID	Medical History Identification Number	Integer	Foreign Key/Null
Patient_ID	Patient Identification Number	Integer	Foreign Key
Medications/Treatment	Treatments/Medication Patient is under going	Varchar(25)	Not Null
Medication_Dose	Dose of Medication	Integer	Null
Medication_Dose_Units	Units of Dose	Varchar(10)	Null
Medication_Route	Route taken for medication	Varchar(10)	Null
Medication_Frequency	Intervals of medication/treatment	Varchar(10)	Null
Medication_Start_Date	Medication Start Date	Date	Not Null
Medication_End_Date	Medication End Date	Date	Null

Doctor Entity

Attributes	Description	Data type	Relationship
Doctor_ID	Doctor Identification Number	Integer	Primary Key
Department_ID	Department Identification Number	Integer	Foreign Key
Doctor_First_Name	Doctor First Name	Varchar(25)	Not Null
Doctor_Last_Name	Doctor Last Name	Varchar(25)	Not Null
Specialization	Doctor Specialization	Varchar(25)	Not Null
Designation	Doctor Designation	Varchar(25)	Not Null
Doctor_Email	Doctor Email	Varchar(25)	Not Null
Doctor_Phone_No	Doctor Phone Number	Varchar(25)	Not Null
Doctor_Address	Doctor Address	Varchar(25)	Not Null

Department Entity

Attributes	Description	Data type	Relationship
Department_ID	Department Identification Number	Integer	Primary Key
Department_Name	Department Name	Varchar(25)	Not Null
Responsibilities	Department Responsibilities	Varchar(25)	Not Null

Staff Entity

Attributes	Description	Data type	Relationship
Staff_ID	Staff Identification Number	Integer	Primary Key
Department_ID	Department Identification Number	Integer	Foreign Key
Staff_First_Name	Staff First Name	Varchar(25)	Not Null
Staff_Last_Name	Staff Last Name	Varchar(25)	Not Null
Role	Role	Varchar(25)	Not Null
Staff_Email	Staff Email	Varchar(25)	Not Null
Staff_Phone_No	Doctor Phone Number	Varchar(25)	Not Null
Staff_Address	Doctor Address	Varchar(25)	Not Null

Patient Invoice Entity

Attributes	Description	Data type	Relationship
Bill_ID	Invoice Identification Number	Integer	Primary Key
Patient_ID	Patient Identification Number	Integer	Foreign Key
Payment_Date	Date of Payment	Data	Not null
Doctor_Charge	Doctor Charge	Integer	Not null
Nurse_Charge	Nurse Charge	Integer	Not null
Operation_Charge	Operation Charge	Integer	Null
Number_of_days	Number of Days	Integer	Null
Room_Charge	Room Charge	Integer	Null
Health_Card	Health Card	Integer	Null
Lab_Charge	Lab Charge	Integer	Null
Total_Billing	Total Billing	Integer	Not null

Admin Entity

Attributes	Description	Data type	Relationship
Admin_ID	Admin Identification Number	Integer	Primary Key
Staff_ID	Staff Identification Number	Integer	Foreign Key
Patient_ID	Patient Identification Number	Integer	Foreign Key
Doctor_ID	Doctor Identification Number	Integer	Foreign Key