Healthcare Management System

Group Number 17

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Problem Statement:

This database aims to store detailed health records (EHR) of patients, consisting of medical history, encounters, billing information, and personal details. The database will also maintain data for various entities, namely departments, infrastructure units, labs, employees, and facilitate their interactions within the hospital. The consolidated data will help the administrator achieve a quick decision-making cycle resulting in efficient functioning of the system.

Problem Addressed:

1. The system enables patients to access detailed health records and provide their encounter details with a doctor, billing information, and personal information.
2. The detailed health records consist of the patient's vital signs, doctor's assessment, admission history, laboratory tests, and reports.
3. The system also helps provide the administrator with a bird's eye view, making it easier for him to visualize and manage the system, leading to a faster reaction time during emergencies.

Design Rules:

Each Staff can belong to one or more department.

Each Staff can have one and only one role.

Each Staff can have one or more address.

Each mapping of a Staff and Address will be a record in staff address relation.

Each Patient can have one or more encounters with Staff

Each Patient can have zero or more insurance.

Each Patient can have one or more address.

Each mapping of a Patient and Address will be a record in patient address relation.

Each Patient can have one or more billing records.

Each Patient encounter will have exactly one bill.

Each Patient encounter will have zero or more admission history records and laboratory tests.

Each Patient encounter will have exactly one vital sign record.

Each Lab test will have one or many Lab reports.

Each Patient admission record will have exactly one infrastructure unit occupied.

Each Infrastructure type will have one or more infrastructure unit.

Patient Accounts will calculate a consolidated bill for total treatment including admission fee.

Key Design Decisions:

Sr.No	Entity Name	Why is Entity included?	How is Entity related?
1.	Patient	• This entity holds the personal details of patients. • It also holds necessary information for the efficient functioning of the healthcare system.	• Every patient creates an encounter with the staff (role: doctor) which is stored in the PatientEncounter entity. • Every Patient will have one or more addresses which will be mapped in the PatientAddressRelation entity. • Every Patient will have zero or more insurances stored in PatientInsurance entity. These insurances can be used for billing purposes. • Every Patient will have a bill generated for every encounter stored in PatientAccounts entity.
2.	PatientInsurance	Patient Insurance holds the insurance details of that patient like insurance provider, start and expiry dates.	• PatientInsurance entity is related Patient and PatientAccounts entity. • The insurance can be used for claims during billing purposes.
3.	PatientAccounts	Patient Accounts stores the total billing details of a particular encounter. This includes admission fee and treatment charges.	• PatientAccounts is related to Patient, PatientInsurance, and PatientEncounter. • This entity stores billing information for each encounter.
4.	PatientEncounter	PatientEncounter stores details of an individual Patient interaction with Staff	• Every encounter uses the VitalSign entity to store observations for a patient. • One VitalSign entry is recorded for each encounter. • If a Patient is suggested hospitalization during an encounter an entry is added to the PatientAdmissionHistory entity. • Tests prescribed by the doctor are stored in LaboratoryTests entity.
5.	VitalSigns	VitalSigns holds the details of the vital signs (Temperature, Heart Rate, Respiratory Rate, Blood Pressure) at each encounter.	• During a Patient Encounter, VitalSigns are recorded. • It is linked to the Patient Encounter Entity.
6.	LaboratoryTests	This Entity contains all the lab tests available in the system.	• Laboratory Tests are connected to PatientEncounters and LaboratoryReport. • One lab test can have multiple lab reports

			• One patient encounter can have zero or many lab tests.
7.	LaboratoryReports	This Entity contains detailed reports of the lab test it is associated with.	• LaboratoryReports stores the results of LaboratoryTests suggested by a Staff (role: doctor) during an encounter.
8.	PatientAdmissionHistory	This entity has details of the infrastructure used within the hospital in case a Patient gets admitted after his encounter with the Staff (role: doctor).	• PatientAdmissionHistory is linked to Patient Encounter and Infrastructure entity. • An encounter can have zero or many admissions history. • Admission cannot exist without an encounter hence the participation is 1 • This is linked to PatientAccounts entity to get the billing amount of the Infrastructure used.
9.	Staff	This entity contains information about all the people in the system which includes doctors, nurses, admin, etc.	• Staff entity is related to PatientEncounter, Role, StaffAddressRelation and Department. • A Staff (role: doctor) is assigned to every Patient for every PatientEncounter. • Staff perform one role which he is assigned from Role entity.
10.	Department	This entity holds information about all the departments present in the system.	• Department entity stores the various Departments available in the system.
11.	Role	This entity contains information about all the roles present in the system, eg: Doctor, Nurses, etc.	• Role Entity is connected to Staff which helps us identify and distinguish Staff. • Eg. Staff can have role Doctor or Nurse or Wardboy.
12.	Infrastructure	This entity holds information about the infrastructure provided by our system. It contains information about the type, availability and cost for the infrastructure.	• It has a one-to-many relationship with Patient Admission History. • With participation mandatory on both sides.
13.	InfrastructureType	This entity holds data about the type of Infrastructure. Ex. ICU, ER, etc.	• Infrastructure Type is related to Infrastructure entity. • Many Infrastructures can have one Infrastructure type with mandatory participation on both sides.
14.	Address	This entity stores address details for both staff and patients. It also stores a Boolean field IsPrimary to check if the address is a primary address.	• This entity is related to both Patient and Staff entity. • Each patient can have one or many addresses.

			• Each staff can have one or more addressed.
15.	PatientAddressRelation	This entity stores the relation mapping between patient and address	• This entity is related to the Patient and Address entity. • It acts as a register to maintain all addresses for a particular patient. • Each patient can have one or many addresses.
16.	StaffAddressRelation	This entity stores the relation mapping between staff and address	• This entity is related to the Staff and Address entity. • It acts as a register to maintain all addresses for a particular staff. • Each staff can have one or many addresses.