Hospital Management Database

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Database Specification: Purpose, Business Problems Addressed and Business rules

Database Purpose:

The purpose of this database is to meet the diverse healthcare needs and to maintain a robust database to record and manage hospital related data. This database helps in recording and retrieval of patient information, appointments, medical records, insurance and pharmacy interactions. Further it also helps to maintain the hospital administrative functions by maintaining records on staff, rooms and equipment. This comprehensive system of maintaining the database will serve the needs of healthcare providers, administrative staff, and insurance handlers to maintain a good quality of patient care, streamlined hospital workflows which can improvise the overall healthcare services.

Business Problems Addressed:

- Managing the patient data and medical records to enhance the healthcare delivery.
- Hospital administration can be streamlined by keeping thorough records of all staff, departments, and payroll.
- Coordinating appointments, treatments, and medication in order to improve patient care and hospital operations.
- Monitoring the use of the equipment and rooms in order to increase operational effectiveness.
- Financing operations can be improved by knowing whether a patient claimed insurance or not to streamline with the enhanced billing procedure.
- Facilitating oversight of prescription distribution, the ordering of laboratory tests, and patient room assignments to enhance drug safety and minimize treatment discrepancies.

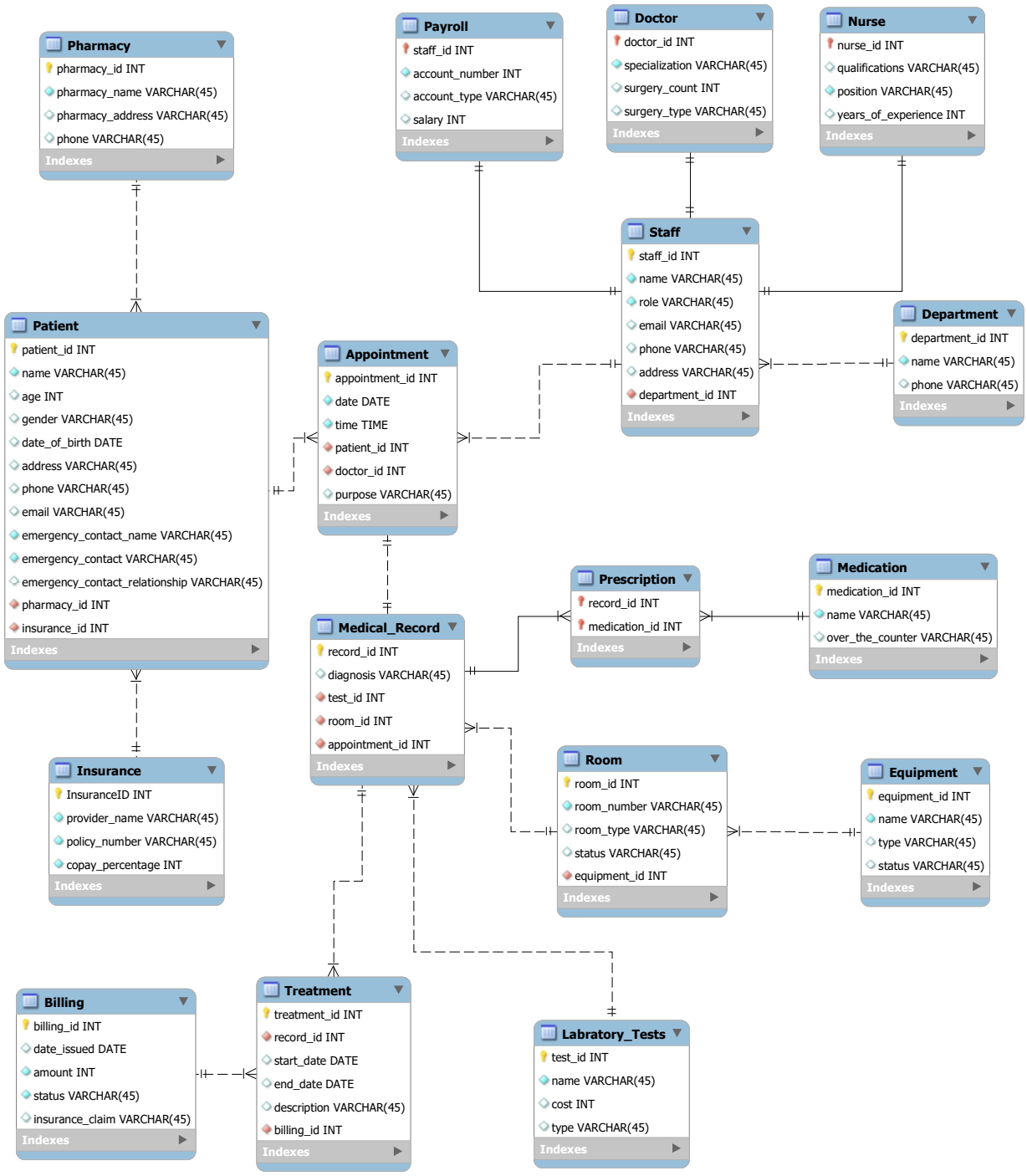
Business Rules:

- Each patient has only one emergency contact.
- Each patient has only one primary pharmacy.
- Each patient has only one primary insurance.
- There will be only one appointment id for the combination of patient id, doctor id, date and time.
- Each staff can only be associated with one department.
- Each staff can play only one role.
- Each doctor can only be associated with one specialisation.
- Each staff can only have one primary account number for their salary.
- Each nurse can take only one position at a time.
- There can be multiple medications associated with each medical record.
- Each medical record can only have one laboratory test ordered.
- Each medical record can only have one room allotted.
- Each room can have one equipment at a time

- Each record can only have one bill for all treatments.
- Each appointment can only have medical record.

Design Requirements:

- Crow’s foot notation has been used.
- Primary keys have been mentioned with a key feature right beside the attribute.
- Connected fields of related tables with lines to illustrate Identifying and Non-Identifying relationships between the tables using a thick line and a dashed line.
- Marked 'one' side of a relationship with the word 'one' near the starting point of the line.
- Indicated 'many' sides of a relationship with a crow's foot symbol at the end of the line.


Pharmacy
pharmacy_id INT
pharmacy_name VARCHAR(45)
pharmacy_address VARCHAR(45)
phone VARCHAR(45)
Indexes
Payroll
staff_id INT
account_number INT
account_type VARCHAR(45)
salary INT
Indexes
Doctor
doctor_id INT
specialization VARCHAR(45)
surgery_count INT
surgery_type VARCHAR(45)
Indexes
Nurse
nurse_id INT
qualifications VARCHAR(45)
position VARCHAR(45)
years_of_experience INT
Indexes
Staff
staff_id INT
name VARCHAR(45)
role VARCHAR(45)
email VARCHAR(45)
phone VARCHAR(45)
address VARCHAR(45)
department_id INT
Indexes
Department
department_id INT
name VARCHAR(45)
phone VARCHAR(45)
Indexes
Patient
patient_id INT
name VARCHAR(45)
age INT
gender VARCHAR(45)
date_of_birth DATE
address VARCHAR(45)
phone VARCHAR(45)
email VARCHAR(45)
emergency_contact_name VARCHAR(45)
emergency_contact VARCHAR(45)
emergency_contact_relationship VARCHAR(45)
pharmacy_id INT
insurance_id INT
Indexes
Appointment
appointment_id INT
date DATE
time TIME
patient_id INT
doctor_id INT
purpose VARCHAR(45)
Indexes
Prescription
record_id INT
medication_id INT
Indexes
Medication
medication_id INT
name VARCHAR(45)
over_the_counter VARCHAR(45)
Indexes
Medical_Record
record_id INT
diagnosis VARCHAR(45)
test_id INT
room_id INT
appointment_id INT
Indexes
Insurance
InsuranceID INT
provider_name VARCHAR(45)
policy_number VARCHAR(45)
copay_percentage INT
Indexes
Room
room_id INT
room_number VARCHAR(45)
room_type VARCHAR(45)
status VARCHAR(45)
equipment_id INT
Indexes
Equipment
equipment_id INT
name VARCHAR(45)
type VARCHAR(45)
status VARCHAR(45)
Indexes
Billing
billing_id INT
date_issued DATE
amount INT
status VARCHAR(45)
insurance_claim VARCHAR(45)
Indexes
Treatment
treatment_id INT
record_id INT
start_date DATE
end_date DATE
description VARCHAR(45)
billing_id INT
Indexes
Labratory_Tests
test_id INT
name VARCHAR(45)
cost INT
type VARCHAR(45)
Indexes

Design Decisions:

Entity Name	Why Entity Included	How Entity is Related to Other Entities
Patient	The core element that drives the entire system is the patient. This entity holds essential data concerning individuals seeking medical treatment at the hospital. Patients serve as the focal point in the hospital database, being the primary recipients of healthcare services. Incorporating patient information enables personalized care and streamlined management of medical records, appointments, billing, and other related processes. Such data plays a critical role in patient identification, treatment planning, billing accuracy, and maintaining the continuity of care.	Being the central entity within the database, the patient entity's primary key, patient_id, establishes a one-to-many relationship with Appointments, Medical Record, Insurance, and Prescriptions, facilitating comprehensive insights into these aspects. Given their connection to doctors, treatment, and billing, these entities exhibit many-to-many relationships. Therefore, multiple associative entities are created to accommodate these connections, as elaborated for each entity.
Doctor	Another key entity doctors are healthcare practitioners tasked with diagnosing and treating patients, and incorporating their information enables appointment scheduling, medical record management, and treatment planning, reflecting their role as medical experts delivering care to patients; their details are vital for appointment scheduling, treatment planning, and ensuring top-notch patient care.	Doctors are linked to appointments where they deliver medical services, associated with medical records they generate and update for treated patients, involved in crafting treatment outlining patient care, and prescribing medications recorded in prescriptions. In a many-to-many relationship, patients connect doctors to those they see through appointments and medical records, treatment plans facilitate collaboration among doctors on patient care plans, and prescriptions are issued for patients; while in a many-to-one relationship, appointments are linked to the individual appointment's doctors are involved in, and medical records are associated with the records they contribute to.
Appointment	The inclusion of appointments is essential for monitoring scheduled interactions between patients and doctors, guaranteeing effective time utilization, resource distribution, and communication among healthcare professionals engaged in patient care. Appointments serve as arranged sessions between patients and healthcare providers for medical consultations, treatments, or procedures. Documenting appointment specifics facilitates streamlined scheduling and monitoring of patient visits.	Relationships involve linking appointments to patients, ensuring accurate patient data and aiding in recordkeeping, to doctors, facilitating patient-doctor interaction and consultation management, and potentially to staff members like nurses or technicians, ensuring adequate resource allocation and smooth appointment flow; while appointments are connected to patients receiving medical services during the appointment, scheduled with specific doctors providing medical care, and may involve staff members in scheduling or assisting during appointments.
Medical_record	Medical records encompass detailed data concerning a patient's health history, diagnoses, treatments, and medications, emphasizing the necessity of maintaining precise and current records to deliver high-quality healthcare and ensure uninterrupted care. These records document a patient's medical history, diagnoses, treatments, allergies, and immunizations, offering a thorough overview of their health status to inform clinical decisions and ensure consistent care coordination among various providers and appointments.	Individual medical records are generated to document the healthcare information of patients, ensuring accurate record keeping tailored to everyone. Medical records are linked with the physicians responsible for providing care and making clinical decisions, providing valuable insights into treatment history and facilitating collaboration among healthcare professionals. Each patient is assigned to a specific medical record, guaranteeing meticulous recordkeeping and personalized healthcare and relevant doctors involved in a patient's care contribute to the medical record, offering insights into treatment history and fostering collaboration among healthcare providers making it many-to-many relationship.

Treatment	Provides tailored care strategies for each patient, directing medical interventions, monitoring progress, and facilitating cohesive efforts toward meeting patient objectives. Treatment plans delineate the steps for patient care, encompassing prescribed treatments, medications, and follow-up appointments. Documenting these plans aids in care coordination among healthcare providers and ensures compliance with treatment protocols.	Treatment plans are created for individual patients to guide their care. Treatment plans are developed and managed by doctors who oversee patient treatment. Staff members may assist in implementing treatment plans and providing patient care. In many-to-one relationships, patients set their own treatment plans for personalized care, doctors collaborate to ensure comprehensive treatment, staff support in plan implementation, with treatment plans created for patients, managed by doctors, and staff assisting in patient care.
Staff	Represents various non-doctor personnel crucial for hospital operations and patient welfare. Purpose: Staff members aid in administrative and clinical tasks, with their information enabling appointment scheduling, treatment coordination, and overall hospital operations efficiency.	Regarding appointments, staff members have potential involvement in both scheduling and managing appointments; in the context of treatment plans, they may aid in implementing these plans and providing patient care; and concerning billing, staff members may take charge of handling billing and payment processes for patient services.
Prescriptions	Prescriptions document medications prescribed to patients as part of their treatment. Recording prescription details helps track medication usage, monitor patient compliance, and prevent adverse drug interactions.	Prescriptions are issued to individual patients for their use and are written by doctors as part of patient treatment plans.
Billing	Billing records monitor the financial elements of patient treatment, such as fees for medical services, insurance particulars, and payment transactions, with precise billing records crucial for revenue oversight and financial reporting. They oversee financial transactions and payments associated with patient care.	Billing records are associated with individual patients for whom services were provided.It is also connected to doctors where billing records may include charges for medical services rendered by doctors.
Insurance	Insurance information includes details about patients' insurance coverage, such as provider, policy number, and policyholder name. Recording insurance information facilitates billing processes and ensures proper reimbursement for healthcare services.	It's connected to Patient as insurance information is linked to individual patients who have insurance coverage.
Department	The department of staff entity is included in the Hospital Management System database to represent the organizational structure of the hospital and facilitate staff management, appointment scheduling, and resource allocation. It is directly related to the staff entity and indirectly impacts patient interactions and experiences within the hospital.	The department of staff entity maintains a direct association with the staff entity. Each staff member, including doctors, nurses, and administrative staff, is affiliated with a particular department where they fulfill their duties. This connection aids in the organization and oversight of staff assignments within the hospital.Departments can have an indirect connection with appointments through the staff members assigned to them. Appointments often involve specific departments, such as the cardiology department for cardiology consultations, illustrating an indirect relationship between the department of staff entity and the appointment entity.
Medication	The primary purpose of the Medication entity is to store comprehensive information about medications used in patient treatments. This includes details such as medication names, dosages, administration routes, indications, contraindications, and potential side effects.	The Medication entity is directly related to the Prescription entity. Each prescription may include one or more medications prescribed to a patient as part of their treatment plan. This relationship ensures that medication information is accurately linked to individual prescriptions and patient treatments.
Payroll	The primary purpose of the payroll entity is to accurately calculate and disburse salaries, wages, and other forms of compensation to hospital	The payroll entity is directly related to the staff entity. Each staff member has a corresponding payroll record that includes details such as salary,

	staff members. This includes doctors, nurses, administrative staff, technicians, and other personnel employed by the hospital.	other compensation-related information. This relationship ensures that payroll data is accurately linked to individual staff members.
Laboratory_Tests	Laboratory Tests entity is to record and manage diagnostic tests performed on patients to aid in the diagnosis, monitoring, and treatment of medical conditions. This includes a wide range of tests such as blood tests, urine tests, imaging tests (e.g., X-rays, MRIs)	Laboratory test results are to be linked to patient medical records, documenting the tests performed, the results obtained, and any relevant clinical interpretations. This connection provides a comprehensive overview of patients' diagnostic histories and facilitates continuity of care.
Nurse	It contains vital data about every nurse, including their qualifications; their position, and their years of experience, which is crucial for administrative reasons and may have an impact on decisions about patient care, scheduling, and task assignments.	The Nurse entity is related to the Staff entity, where common details like name and contact information are stored. Furthermore, through the Staff entity, it connects to the Appointments entity, indicating which appointments they will be attending and which patients they will be taking care of. This relationship facilitates the scheduling of nurses for patient appointments, ensuring that qualified personnel are assigned to each patient's care. Also, Nurses work in specific departments, so there is a relationship indicating which department a nurse belongs to.
Pharmacy	The Pharmacy entity is included to manage the data of various pharmacy locations where patients can pick up their prescriptions. This entity makes it easier to manage pharmacy details, like address and phone number, which improves patient convenience and drug accessibility.	The Pharmacy table is directly connected to the Patient table, indicating which pharmacy a patient has chosen as their primary for medication pickup. This relationship ensures medications are available at the preferred location for each patient, streamlining the process of medication dispensing and pickup.
Room	The Room entity is included to manage information about the rooms within a facility, such as a hospital or clinic. It contains details about room numbers, types, and statuses, which are critical for patient accommodation, scheduling, and resource management.	It is directly related to the Equipment entity through an equipment_id, indicating that rooms can be equipped with specific equipment. This relationship is essential for tracking which equipment is located in the given room. Additionally, it interacts with entities like Medical_Record to store the information of the medical record being diagnosed in the given room.
Equipment	The Equipment entity is included to track the hospital's equipment, including its name, type, and status. This is crucial for asset management, maintenance scheduling, and ensuring that the right equipment is available and functional for medical procedures.	It is related to the Room entity via an equipment_id in the Room table, a one-to-many relationship where multiple rooms can have the same equipment. This setup is vital for managing the availability and allocation of equipment across various rooms.