Database Design and Final ERD
Team 14

Team Members:

Krishna Pal Singh - NUID - 002954173
Mohit Malani - NUID - 001568891
Nagashree Seshadri - NUID - 001050979
Rajiv Ranjan Sahu - NUID - 002101619
Sparsh Sinha - NUID - 001000390

The flow of Data within entities:

A patient visits the diagnostic center to get some tests done. On visiting the diagnostic center for the first time, a patient record is created in the diagnostic center. It is also accompanied by an account and insurance information is recorded. The diagnostic center is responsible for keeping track of patient data and also giving appointments based on the type of test required. A patient showing up for the appointment is directed to a lab room based on the test required. In a lab room that has a technician attending the patient along with a lab device, a test is conducted. The results are returned to the patient. The patient's results are showed to the referring doctor.

Business Problems addressed:

- Onboarding a patient into the system which helps maintain patient records.
- Performing lab tests of a patient (based on doctor's recommendation).
- Booking appointments for a patient at a diagnostic center.
- Managing labs, lab devices & lab technicians in a diagnostic center.
- Maintaining inventory of supply kits in a lab (via Suppliers).
- Maintaining relationship between a doctor and hospital.
- Generating a bill for the patient that can be covered by insurance, card, cash or cheque.
- Generating reports for entities including Patients with Covid, Supply kits supplied by the Suppliers, Insurance for Patients etc.
- Generating test reports for a patient after a test is performed.

Business Rules: (1..1 : 1 & only 1, 1..many : at least 1, 0…many : 0 or more)

1. Each patient has one and only one account in the diagnostic center.
2. A patient can have zero or more appointments with the diagnostic center.
3. A patient must have at least one address.
4. A patient can be seen by a doctor or multiple doctors.
5. A patient can request at least one test.
6. A patient account in a diagnostic center would be connected to insurance.
7. A diagnostic center can give zero or more appointments to a patient.
8. A diagnostic center has one and only one address associated with it.
9. A diagnostic center should have at least one lab.
10. A lab must be associated with one and only one diagnostic center.

11. A lab can perform one or more types of tests.
12. A lab can have zero or one lab technician.
13. A lab must have zero or one lab device.
14. A lab should have 1 or more supplies.
15. A supply kit can be supplied by one or more suppliers.
16. A lab technician can be associated with one lab.
17. A lab technician must have an address.
18. A patient needs to have one insurance.
19. A hospital should have one and only one address.
20. A hospital can have one or many doctors.
21. A doctor must be associated with at least one hospital.
22. A doctor can see one or many patients.
23. A doctor may recommend one or many tests for a patient.
24. A test can be recommended by one or many doctors.

Design Decisions:

Number	Entity	Purpose of the Entity	Defining IDs and Connections to other entities
1	Patient	An entity in the diagnostic center is responsible for the collection and maintenance of information of all the patients visiting the diagnostic center.	Identified by Primary Key Patient_id, connected to Account, Insurance, Address, Appointment, and Doctor.
2	Account	An entity that maintains details of financial transactions between the patient and diagnostic center. It involves maintaining financial transaction data along with reporting.	Identified by Primary Key Account_id mapped to each Patient and one Insurance entity.
3	Insurance	The entity which maintains Health Insurance information that a patient agrees to share with the diagnostic center which pays the Healthcare costs required. However, it is not compulsory for a patient to have health insurance.	Identified by Primary key Insurance_id and mapped to each Patient and a single account.
4	Appointment	Maintains and helps a	Primary key Appointment_id

		patient in scheduling appointments with the diagnostic center.	and is connected to the Diagnostic center and patient.
5	Diagnostic_center	An important entity of our database, it holds information for diagnostic centers.	The primary key is Diagnostic_center_id. Connected to Address, Appointment, Lab
6	Address	An entity that stores addresses of different entities which have an address associated with them such as patient, diagnostic center, etc.	An associative weak entity that gets all the information from Diagnostic Center, Patient, Hospital, and Lab Technician entities. The primary key is Address ID - which is a foreign key in the tables mentioned above.
7	Lab	A lab is associated with a diagnostic center, every lab provides one type of testing. A lab entity is responsible for storing and maintaining information pertaining to labs.	A lab is definitely connected to a Diagnostic center, a lab device, and a lab technician. It is also a place where testing happens. Primary key Lab_id is dependent on the Diagnostic_center_id
8	Lab_device	A lab device is essentially used for testing, the entity maintains data on its name, whether a lab device is in working status, and the lab it is associated with gives the type.	A lab device is associated with a lab alone. It is identified with a Lab_device_id as the primary key.
9	Test	A test is performed for a patient, it contains all the information related to the test and about the people involved in the testing.	The Test entity is connected to a Lab, a Patient, and a Referring doctor. It is an associative entity whose primary key depends on the tables it is connected to.
10	Lab_technician	A lab technician is responsible for conducting tests on a patient in a lab, this entity maintains all the lab technician-related data.	A lab_technician is connected to the Address and Lab entities by design. The primary key is Lab_technician_id.
11	Supply_kit	Entity which houses all the data on supply kits to labs.	A supply kit is connected to a Lab and a Supplier. It has a primary key called the Supply_kit_id.

12	Suppliers	Maintains the data on suppliers that supply specific supply kits to the labs.	Suppliers are connected to Supply kits and are identified by Supply_id.
13	Hospital	A hospital entity stores information about Hospitals such as their name, phone number, e-mail, and so on.	The hospital entity has the primary key of Hospital_id and is connected to Address and Doctor.
14	Doctor	This entity maintains information on doctors, their contact information, and the patients they are attending.	The Doctor_id is a primary key for this entity, it is a strong entity that is connected to Patient and Test respectively.

ERD of Lab Management System: