DATABASE DESIGN DOCUMENT

Hospital Management Database

Project Team 7

(Nithya Viswanathan, Shruthi Rudraraju, Deepak Bisht, Ramrakshith S B)

Database Specification :-

Purpose, Business Rules, Business Problems Addressed and Design Decisions.

Database Purpose:-

The purpose of this database is to maintain data related to diagnosis, treatment, and surgeries of patients of a particular hospital. It also maintains data of **COVID-19** infected patients separately for better objectivity.

Business Problems Addressed:-

- Allow hospital staff to generate descriptive reports about patients.
- Provide information about patients (medical condition, diseases, etc.) which can be used to ensure improved availability of resources.
- Provide information about COVID-19 recovered patients so that it can be helpful for the treatment of current and future COVID-19 patients.
- Supply insight about beds available in different wards to enhance the infrastructure of the hospital.
- To have insight about the success rates for different surgeries in this hospital.
- To have insight about the success rates of different surgeons in this hospital.
- To gain insight about success of plasma therapy as a possible treatment for COVID-19 and the details of the recovered patients.
- To keep track of a patient's recovery status after surgery to make sure the disease does not relapse.

Business Rules:-

1. A patient can be admitted many times but participation is optional.
2. Each patient can take multiple tests but participation is optional.
3. Every test can be taken by multiple patients but participation is optional.
4. A ward can have many beds and participation is mandatory.

5. Available beds in each Ward is monitored
6. A patient can have multiple diseases and participation is mandatory.
7. One patient disease can have multiple treatments and participation is mandatory.
8. A patient can undergo multiple surgeries and participation is optional.
9. A surgery can be performed by multiple doctors and participation is mandatory.
10. A surgery can be performed on multiple patients and participation is optional.
11. Success rate of Surgeries performed in Hospital is Calculated.
12. A patient, doctor or nurse can have only one address at a given point of time but multiple people can have the same address.
13. The shift time for doctors and nurses is stored. But, there can be shift times that do not belong to any doctor or nurse. The history of shifts of doctors and Nurses is maintained.
14. Every department will have at least one doctor and one nurse.
15. Since the designation entity contains designations of both doctors and nurses, it has optional participation.
16. Multiple COVID-19 recovered patients may be eligible for Plasma donation and participation is optional.
17. Only patients who have been treated and recovered from COVID-19 in this hospital will be considered for plasma donation.
18. Only the current recovery status of a patient after surgery is recorded.
19. Doctor in a PatientDisease entity who prescribes treatment for a patient need not be the same as the one in the Admission entity.

Design Requirements (Credit to Prof. Simon Wang):-

- Use Crow's Foot Notation.
- Specify the primary key fields in each table by specifying PK beside the fields.
- Draw a line between the fields of each table to show the relationships between each table. This line should be pointed directly to the fields in each table that are used to form the relationship.
- Specify which table is on one side of the relationship by placing one next to the field where the line starts.
- Specify which table is on the many sides of the relationship by placing a crow's feet symbol next to the field where the line ends.

Design Decisions:-

Entity Name	Functionality of the entity	Relationship with other entities
PatientDetails	This entity holds records of all the admitted patients' details, i.e. **PatientID,** Name, Address-ID, blood group, phone number, DOB, gender and emergency contact for the patient.	This entity has one, one to many non-identifying relationship with **PatientDisease** entity, two non identifying one to one relationships with **Covid** entity and **EligibleToDonatePlasma** entity, one non-identifying many to one relationship with **Address** entity and one identifying one to many relationship with **Result** entity.
Covid	This entity has a record of everybody diagnosed with Covid-19 in this hospital with **CovidID**, the treatment they received, their admission details and their recovery status.	This entity has three non-identifying one to one relationships with **PatientDetails** entity, **EligibleToDonatePlasma** entity and **Admission** entity and two many to one non-identifying relationships with **Status** entity and **Treatment** entity.
PatientDisease	This entity gives brief information about the patient's disease, **PatientDiseaseID,**date of diagnosis and treatment prescribed by the respective doctor.	This entity has one non identifying one to one relationship with the **Admission** entity, three non identifying many to one relationships with **Disease**, **Treatment, Doctor** and **PatientDetails** entities. And three identifying one to many relationships with**PatientDiseaseSurgery**,**Patient DiseaseSurgeryDoctor** and **PostOpStatus** entities**.**

Admision	This entity gives the details about the patients who is admitted to the hospital	This entity makes a non identifying one to many relationship with **CovidPatients** entity. A non identifying one to one relationship with **PatientDisease** and 3 non identifying many to one relationship with **Doctor**, **Ward** and **Bed** entities respectively.
Address	This entity holds the location detail about patients, working doctors and working nurses with **AddressID**	This entity makes three non-identifying one to many relationships with **PatientDetails**, **Doctor** and **Nurse** entities.
Result	This is an associative entity which holds information about every test taken by each patient with **PatientID**, the doctor who prescribed the test with **TestID**, the **Date** and the test result.	This entity makes two identifying many to one relationships with **PatientDetails** and **Test** entities and a non-identifying many to one relationship with **Doctor** entity.
Doctor	This entity has complete information of the doctors in the hospital. It consists of the Doctor's name, designation, department, which shift he/she is in, address, contact number, DOB and gender with **DoctorID**	This entity makes non identifying many to one relationships with **Address, Designation** and **Department** entities, one to many non identifying relationship with **Admission, Result** and **PatientDisease** entities and identifying one to many relationship with **PatientDiseaseSurgeryDoctor** and **DoctorShift** entities.

Nurse	This entity holds information regarding the nurses of the hospital. It consists of the nurse's name, designation, department, shift details, address, contact number, the ward they are assigned to currently, contact number, DOB and gender with **NurseID**.	This entity makes three non identifying many to one relationships with **Address, Designation, Department** entities and three identifying one to many relationship with **PatientDiseaseSurgeryDoctor, WardNurse** and **ShiftNurse** entities.
Treatment	This entity holds information about the treatment given to the patient and whether or not admission is required(decided by the Doctor) with **TreatmentID**.	This entity makes two non identifying one to many relationships with **Covid** and **PatientDisease** entities.

EligibletoDonate Plasma	This entity maintains data of recovered COVID-19 patients who are eligible to donate their plasma with **EligibilityID**. A healthy patient can donate his/her plasma to a patient who is currently suffering from COVID-19. By doing this, anti-bodies of recovered patients will help current patients fight COVID-19.The doctor determines the eligibility.	This entity makes two non identifying one to one relationships with the **Covid** and **PatientDetails** entities.
Ward	This entity holds information about wards. It has the name of the ward like general ward, special ward or ICU etc.. with **WardID**.	This entity has two non identifying one to many relationships with the **Admission** and **Bed** entities and a one to many identifying relationship with **WardNurse** entity.

Bed	This entity keeps track of every bed in the hospital, the ward it belongs to, and its occupancy with **BedID**.	This entity has two non identifying relationships. A Many to one with **Ward** entity and a one to one with **Admission** entity.
Disease	This entity contains information of all the diseases with **DiseaseID**.	This entity makes a one to many non-identifying relationship with the **PatientDisease** entity.
Test	This entity has information about the tests which are available in the hospital with **TestID**.	This entity makes a one to many identifying relationship with the **Result** entity.
Department	This entity has information about various departments in the hospital with **DepartmentID**.	This entity makes two one to many non identifying relationships with **Doctor** and **Nurse** entities.
Designation	Designation entity holds data about the post/designation of doctors and nurses in the hospital with **DesignationID**.	This entity makes two one to many non identifying relationships with **Doctor** and **Nurse** entities.

Status	This entity consists of the current recovery status of a patient with **StatusID**.	This entity has a one to many non identifying relationship with the **Covid** entity and a one to many identifying relationship with **PostOpStatus** entity.
PostOpStatus	This entity maintains post operation status of patients who have undergone any surgery with **PatientID**, **SurgeryID** and **StatusID**.	**PostOpStatus** entity has three many to one identifying relationships with **PatientDisease**, **Surgery** and **Status** entities.

PatientDiseaseSurgery	This entity consists of information about the patient, disease he/she is suffering from and also the surgery/operation undergone by the patient with **PatientDiseaseID** and **SurgeryID**.	**PatientDiseaseSurgery** entity has two many to one identifying relationships with **PatientDisease** and **Surgery** entities.
PatientDiseaseSurgeryDoctor	This entity keeps track of all the doctors and nurses who participated in a particular surgery and their role in the surgery with **PatientDiseaseID, SurgeryID**, **DoctorID** and **NurseID**.	**PatientDiseaseSurgeryDoctor** entity has four many to one identifying relationships with **PatientDisease, Surgery**, **Doctor** and **Nurse** entities.
Surgery	This entity has a list of all the surgeries that can be performed in this hospital with **SurgeryID**.	The **Surgery** entity has three one to many, identifying relationships with **PatientDiseaseSurgery**, **PatientDiseaseSurgeryDoctor** and **PostOpStatus** entities.
Shift	This entity holds information about shifts in which the hospital functions with **ShiftID**. Start time and end time is also maintained so that nurses and doctors can come to hospital according to their shifts.	**Shift** entity has two one to many, identifying relationships with **DoctorShift** and **NurseShift** Entity.
NurseShift	This entity holds information about the history of shifts of each Nurse with **ShiftID, NurseID** and **Date**.	**NurseShift** entity has two many to one identifying relationships with **Shift** entity and **Nurse** Entity.

DoctorShift	This entity holds information about the history of shifts of each Doctor with **ShiftID, DoctorID** and **Date**.	**DoctorShift** entity has two many to one, identifying relationships with **Shift** entity and **Doctor** Entity.
WardNurse	The entity holds information regarding the Nurses and the history of Wards they were assigned to with **NurseID**, **ShiftID** and **Date**	**WardNurse** entity has two many to one, identifying relationships with **Nurse** entity and **Ward** Entity.