CS3700 - INTRODUCTION TO DATABASE SYSTEMS

Assignment - **1** - Submission - Group - **12**

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Domian : **HEALTHCARE** (Hospital)

# Description & Purpose:

Healthcare databases are an important part of running the entire operations. Such systems include treatments, finances, patient identification, tracking, billing, payments, among others. The reality is that almost everything runs on a database system and we cannot underscore the importance of technology in healthcare.

With the rapid growth of technology use in the healthcare sector, there is the generation of a lot of data. It, therefore, becomes a requirement that they collate the information for ease-of-use. This will greatly assist healthcare professionals in the discharge of their duties.

We are trying to implementing a database application to support the basic functions of a hospital: Patients are admitted to the hospital and assigned beds, and discharged once their treatment is completed. Patients are treated by doctors and physicians. Doctors may recommend tests for each patient to be conducted in labs performed by other doctors who are specialists. Each test conducted would show results, which would be tracked. We are proposing reasonable extensions to this basic set of functions, such as tracking the medications prescribed, tracking outpatients, and departmental information for doctors and nurses indicating their respective specializations.

## ✧ Advantages:

- Efficiency :

  Every time a patient visits a medical institution, there is a lot of information that is collected. Where the patient requires seeing many different practitioners, the diagnosis, procedures, drug prescriptions, or any other intervention, needs to be record. This process will reuire the safe storage of data.

  A well-designed hospital databases are important for the collection of patient information. It will also assist in achieving efficiency due to the processing of data, Thus giving the healthcare provider relevent information with click of a button.

- Exchange of information :

  In the case that a patient needs the services of healthcare providers in different hospitals, a system needs to be in a place that helps in the exchange of information. Hospitals need to exchange healthcare data anytime there is a requirement.

  It is therefore important that there is function integration through things like patient identification, healthcare access control, and order management services, among others. Technology is essential because standards for the workflow are an important requirement.

- Monitoring and Improving the value of Healthcare :

  Health care database systems provide an important way of monitoring and improving the value of healthcare services. This will result in better well-being for the patients. Healthcare providers find a way of availing information on costs, appropriate and effective treatment, and access to care and the quality of service a patient gets.

  Any institution or external group of petitioners can get access to this information for various uses. The data can help in quality assurance and improvement programs for health planning purposes at a regional level. The information can provide important answers about policy issues surrounding reforms in the sector.

- Assessing the Quality of Healthcare :

  Data for hospitals come from very many sources, including other hospitals, state and regional organizations, Department of Health, central agencies, among others. The hospital administration discharge information provides valuable data for measuring quality. Such pertinent information includes diagnosis, procedures, length of stay, charges, among others.

  Quality experts use hospitals databases to assess healthcare quality. They will consider factors such as:- How accessible are the healthcare facilities to the people within the region?, Availability of pertinent information to clinicians and other institutions, Whether the services are appropriate for the identified Healthcare problems, Financing of healthcare facilities, among others.

- Tracking Healthcare Usage :

  Healthcare databases can give medical providers an important tool for tracking Healthcare use. Healthcare providers, for instance, need to know whether people are getting their vaccinations or not. By having information through the reports, they are better able to tell whether or not this is happening.

  By having the ability to track healthcare usage, providers can take care of diseases like influenza, polio, and measles, among others. Eradication of such diseases requires that the patients seek treatment and get the necessary vaccinations.

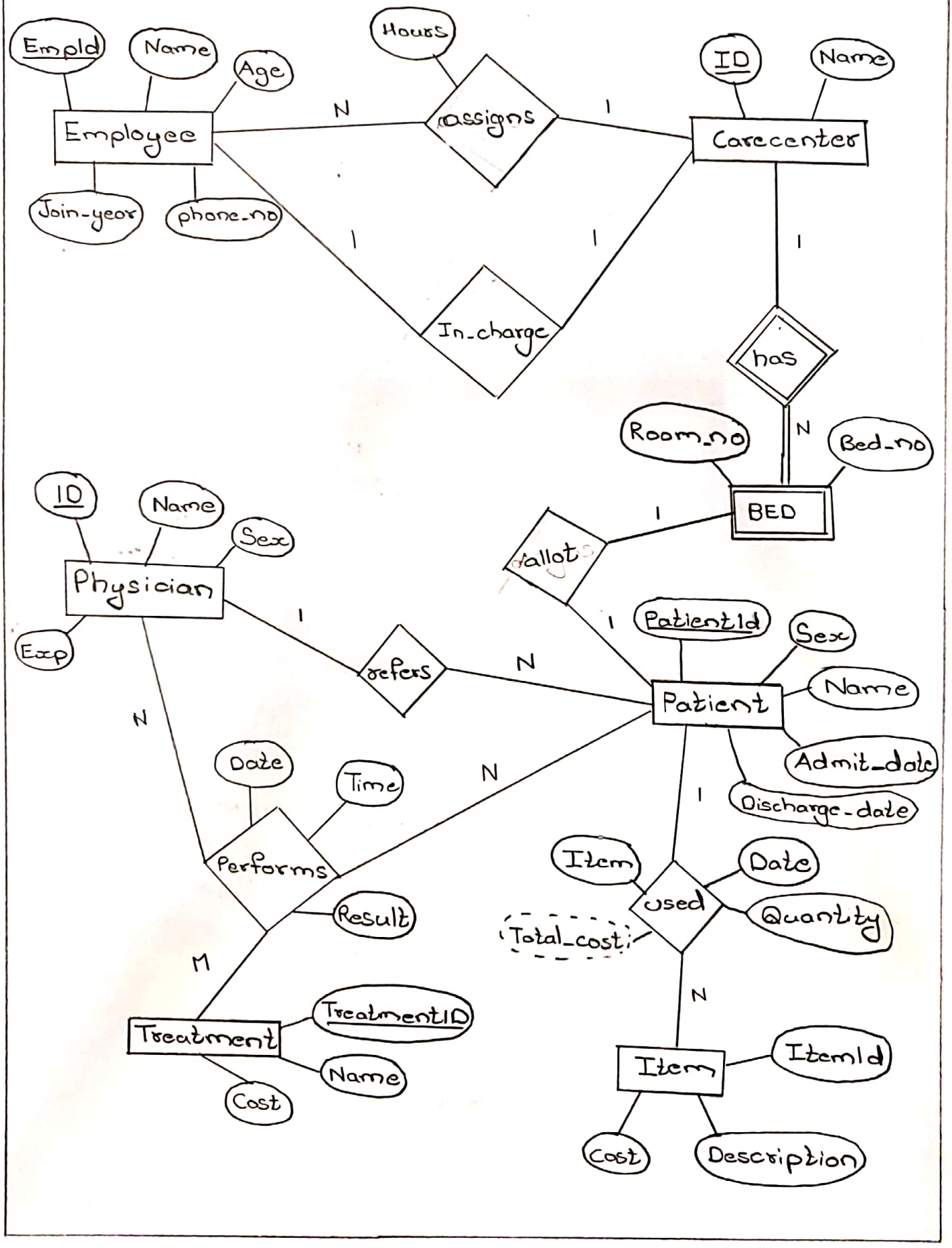
A well-designed Healthcare database system is important for the day-to-day running of the day Healthcare sector. The proper technology will make it possible for the health care providers to collect pertinent information that will improve the quality of care they provide.

Our **Current Hospital database design purpose** is to keep track of all the entities associated with it. A general hospital consists of carecenters where the patients are treated and assigned beds. Employees are assigned to carecenters for taking care of the patients and one of the employees is appointed in-charge of the carecenter. A hospital also consists of various physicians who treat the patients. Each patient is referred to a physician.

Under these conditions, we are going to design a database. Database design involves creating a Entity-Relationship diagram. We design our relation schema based on this E-R diagram. Relational schema consists of relations with their respective attributes.We also need to specify the domain constraints for the tuples.We also designate keys for our schema and stipulate the key constraints,RICs(Referential Integrity constraints) which are essential for having a meaningful database

# Entity Relationship Model

(Hospital Domain)



## ER Model description

In hospital, there are several departments called carecentres and every employee belongs to one of them. Each carecenter has a unique carecenter ID, a name and an employee in charge of it. Employees have a unique employee ID, a name, age, a phone number and the year they joined.

Each employee based on part-time/full time must work for specific hours in the respective carecenter. It is assumed that every employee is assigned to exactly one carecenter.

If there is a carecenter then they have rooms and beds allotted to them represented by *room_no* and *bed_no* respectively. A patient is assigned to a single bed during treatment. It is assumed that beds can be empty if not allotted, each carecenter has its own building or floor hence there maybe same room and bed numbers across different carecenters.

We would like to keep track of following details of patients, their unique patient ID, name, sex, admit date, discharge date and current location of patient i.e., bed and room number of the carecenter. It is assumed that if the patient isn't discharged the discharge date value corresponds to default value i.e., all zeros

Each patient is referred to by a single physician. Every physician has unique ID, name, sex and experience indicating number of years of work experience.

We also like to keep track of treatment details given by physician to the patient on a certain date and time and the result whether success or failure. Each physician can perform several treatments on multiple patients. It is assumed that patients may undergo multiple treatments from multiple physicians.

Each treatment has a unique treatment ID, name and the cost associated with the treatment. When the patient undergoes a treatment, he/she may use various services offered such as injections, medicines on particular day which amount to a certain quantity and has some cost. It is assumed that each item is separated tracked and noted in the database.

All the items used during treatment have a unique ID, description and associated unit cost.

# Relation Scheme

**Note: Date is integer of format YYYYMMDD**

**Employee**( EmpId : string,
Name : string,
Age : integer,
Join_year : integer,
Phone_no : integer,
CarecenterID : integer )

Here, each employee has a unique ID and join_year is the year when the employee is recruited. Phone_no is that of the employee, carecenterID is the IDof the carecenter he is assigned to

**Assigns**( EmpID : string,
CarecenterID : integer,
Assigned_time : integer )

Here assigned_time is the minimum number of hours the employee has to work before he/she leaves for the day

**Carecenter**( ID : integer,
Name : string,
Incharge_ID : string )

Here Name is that of the carecenter and Incharge_ID is the ID of the employee who has to look after the carecenter

**Bed** ( CarecenterID : integer,
Bed_no : integer,
Room_no : integer )

Each carecenter has designated beds and rooms for the department

**Patient**( PatientID : integer,
Name : string,
Sex : string,
Admit_date : integer,
Dis_data : integer
PhysicianID : integer,
CCID : integer,
Bed_no : integer,
Room_no : integer )

Here each patient has unique ID, admit_date is the date when the patient was admitted to the hospital, Dis_date is the date when patient was discharged from the hospital, physicianID is the ID of physician who referred the patient to the treatment, Bed_no and Room_no correspond to the patients bed and room location, in carecenter of id represented by CCID

**Physician**( PhysicianID : integer,
Name : string,
Sex : string,
Exp : integer )

Here each physician has a unique ID and Exp refers to the number of years the physician has in the particular field

**Performs**( PhysicianID : integer,
TreatmentID : integer,
PatientID : integer,
Time : integer,
Date : integer,
Result : string )

Here time & date corresponds to the treatment taken by the patient (of ID patientID) done by physician (whose ID is physicianID) and result correspond to the success of failure of the treatment

**Treatment**( TreatmentID : integer,
Name : string,
Cost : integer )

Here the cost is the amount a patient incurs if he takes the named treatment.

**used**( Date : integer,
PatientID : integer,
ItemID : string,
Quant : integer,
Total_cost : integer )

Here quant is the total quantity of the item specified by the itemID used by the patient, total_cost is the cost of the entire amount of items used by the patient

**Item**( ItemID : string,
Description : string,
Cost : integer )

Here description is about the item details (name, uses and chemical contains) and cost the cost per unit amount of the item.

**WITH KEYS**

Employee(EmpID, Name, Age, Join_year, Phone_no, CarecenterID)

Assigns(EmpID, CarecenterID, assigned_time)

Carecenter(ID, Name, Incharge_ID)

Bed(CarecenterID, Bed_no, Room_no)

Patient(PatientID, Name, Sex, Admit_date, Dis_date, PhysicianID, CCID, Bed_no, Room_no)

Physician(PhysicianID, Name, Sex, Exp)

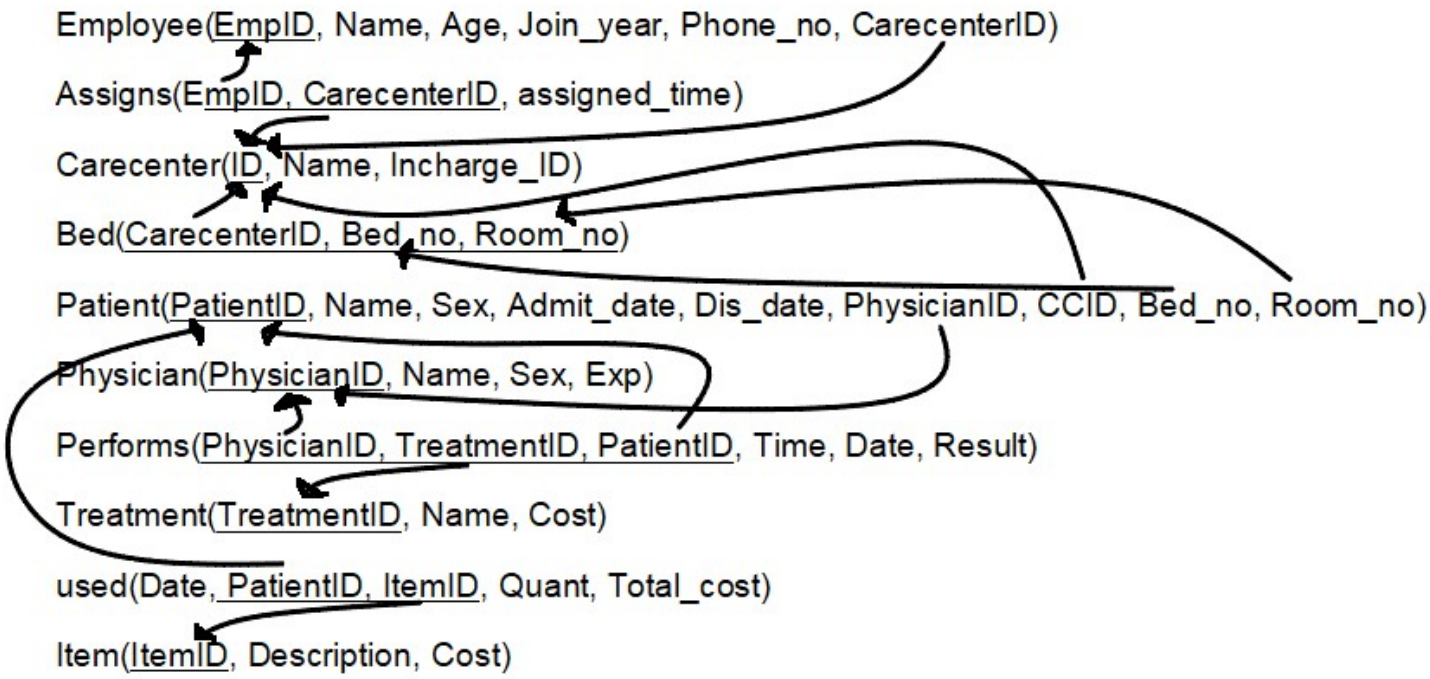
Performs(PhysicianID, TreatmentID, PatientID, Time, Date, Result)

Treatment(TreatmentID, Name, Cost)

used(Date, PatientID, ItemID, Quant, Total_cost)

Item(ItemID, Description, Cost)

**WITH RICS (Referential Integrity Constarints)**

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