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Class: TY(CSE-AIML)

Experiment No. 1

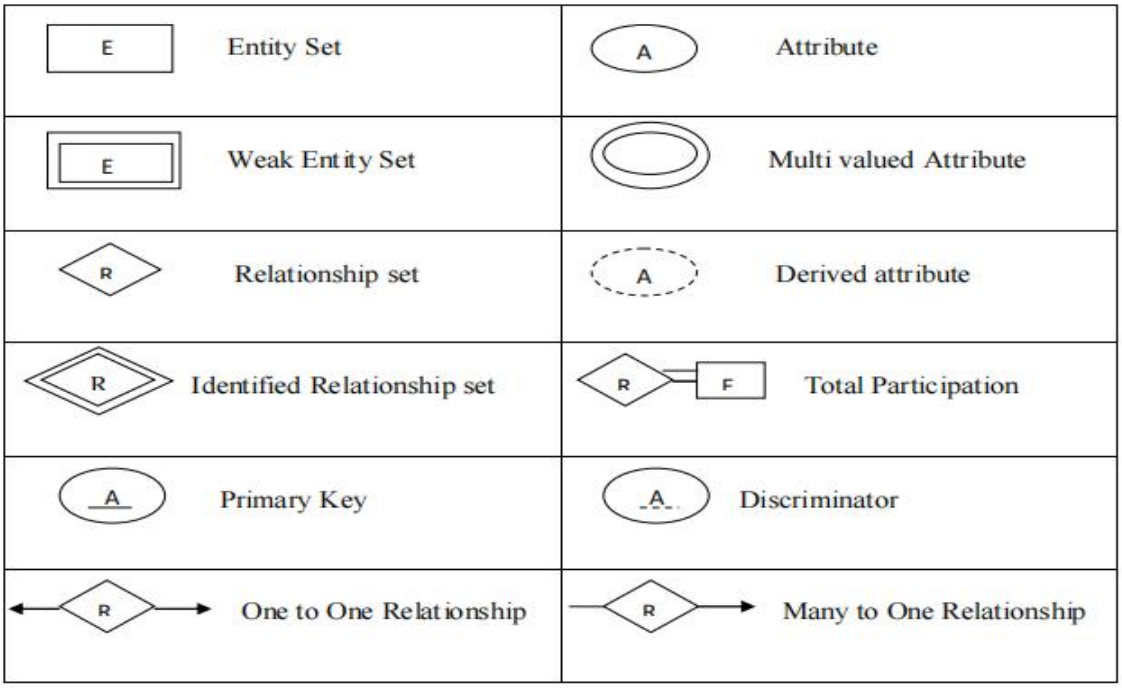
Title: ER Diagram of an Organization.

Objective: Draw an E-R Diagram for any organization like Insurance Company, Library systems, College Management systems, Hospital Management systems etc.
Use data modelling tools like Oracle SQL developer, Tode, ERDPlus etc. to draw ER diagram.

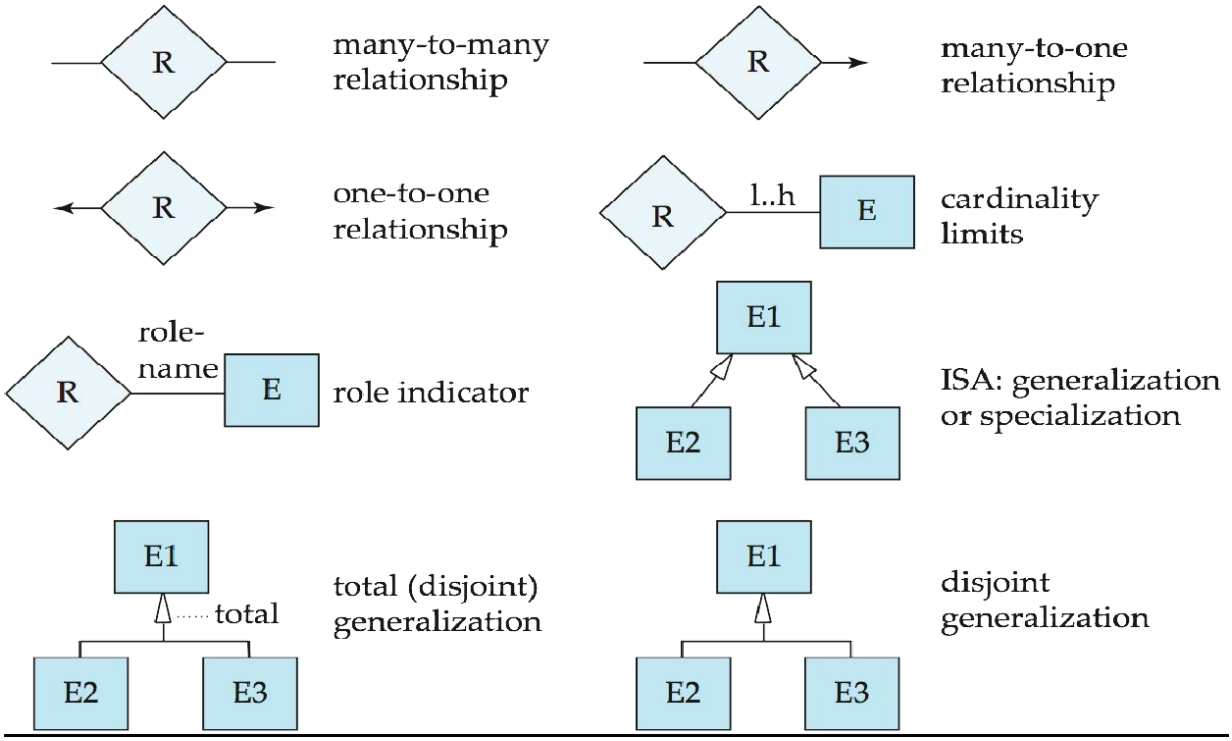
Theory:

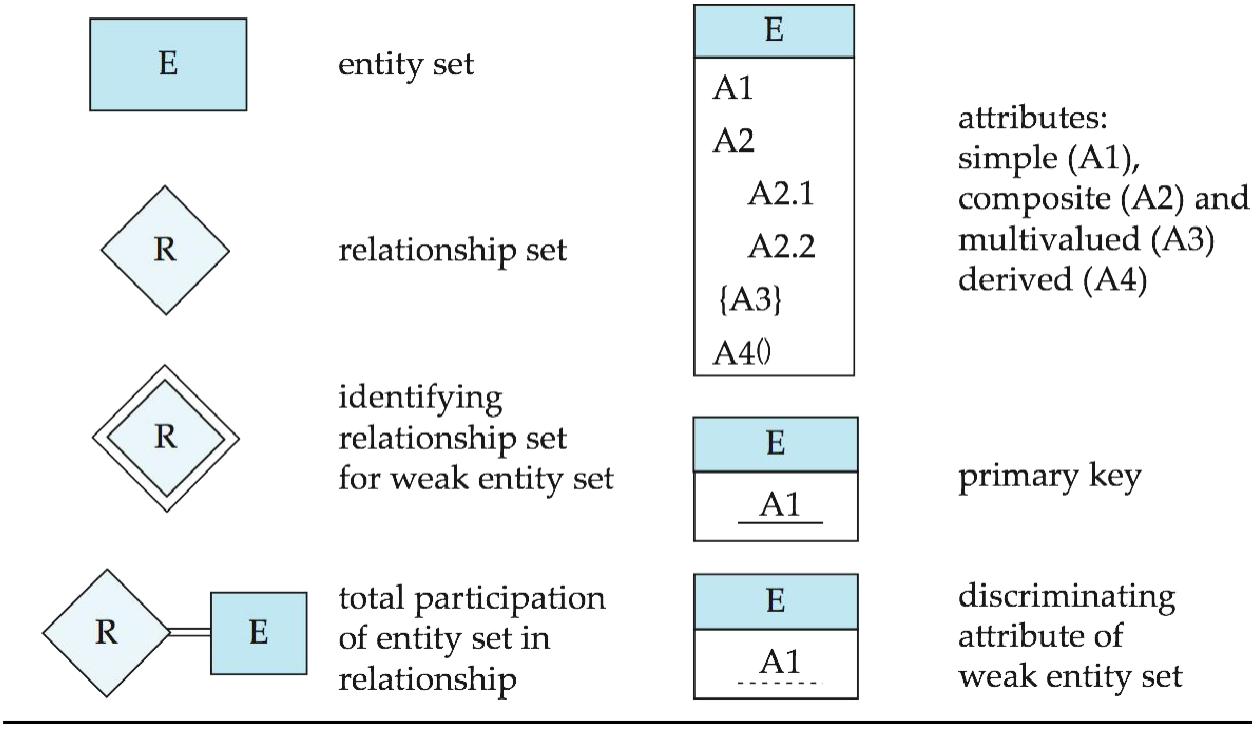
1. **Entity:** It is a "thing" or "object" in the real world that is distinguishable from all otherObjects.
2. **Relation:** A relation is an association among several entities.

3. Symbols used in E-R diagram:



Alternative ER Notations:





Peter Chen developed the ER diagram in 1976. The ER model was created to provide a simple and understandable model for representing the structure and logic of databases. It has since evolved into variations such as the Enhanced ER Model and the Object Relationship Model

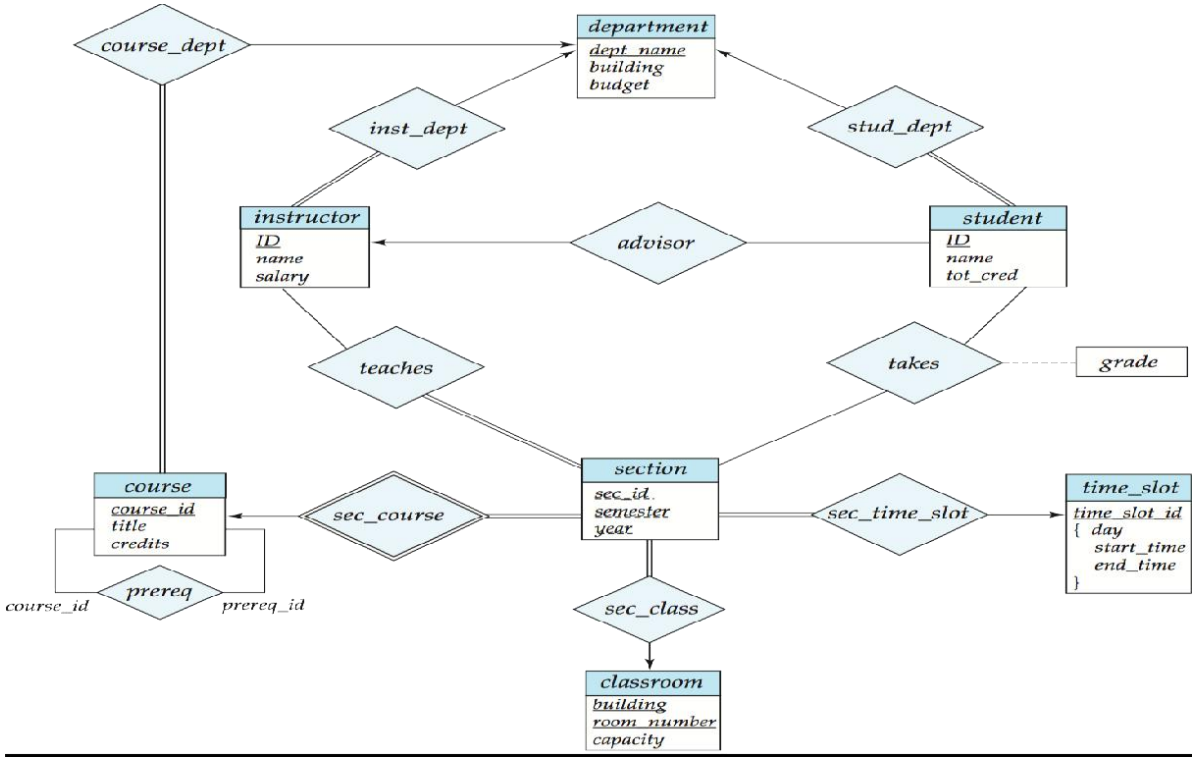
The Entity Relational Model is a model for identifying entities to be represented in the database and representation of how those entities are related. The ER data model specifies enterprise schema that represents the overall logical structure of a database graphically.

The Entity Relationship Diagram explains the relationship among the entities present in the database. ER models are used to model real-world objects like a person, a car, or a company and the relation between these real-world objects. In short, the ER Diagram is the structural format of the database.

Why Use ER Diagrams In DBMS?

- ER diagrams represent the E-R model in a database, making them easy to convert into relations(tables).
- ER diagrams provide the purpose of real-world modeling of objects which makes them intently useful.
- ER diagrams require no technical knowledge and no hardware support.
- These diagrams are very easy to understand and easy to create even for a naive user.
- It gives a standard solution for visualizing the data logically.

E-R Diagram for a University Enterprise



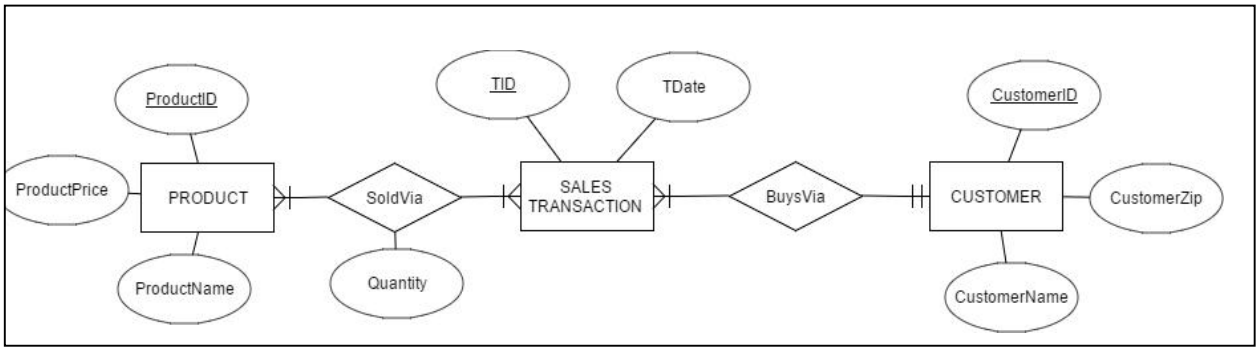
ERDPlus is a web-based database modeling tool that lets you quickly and easily create

- Entity Relationship Diagrams (ERDs)
- Relational Schemas (Relational Diagrams)
- Star Schemas (Dimensional Models)

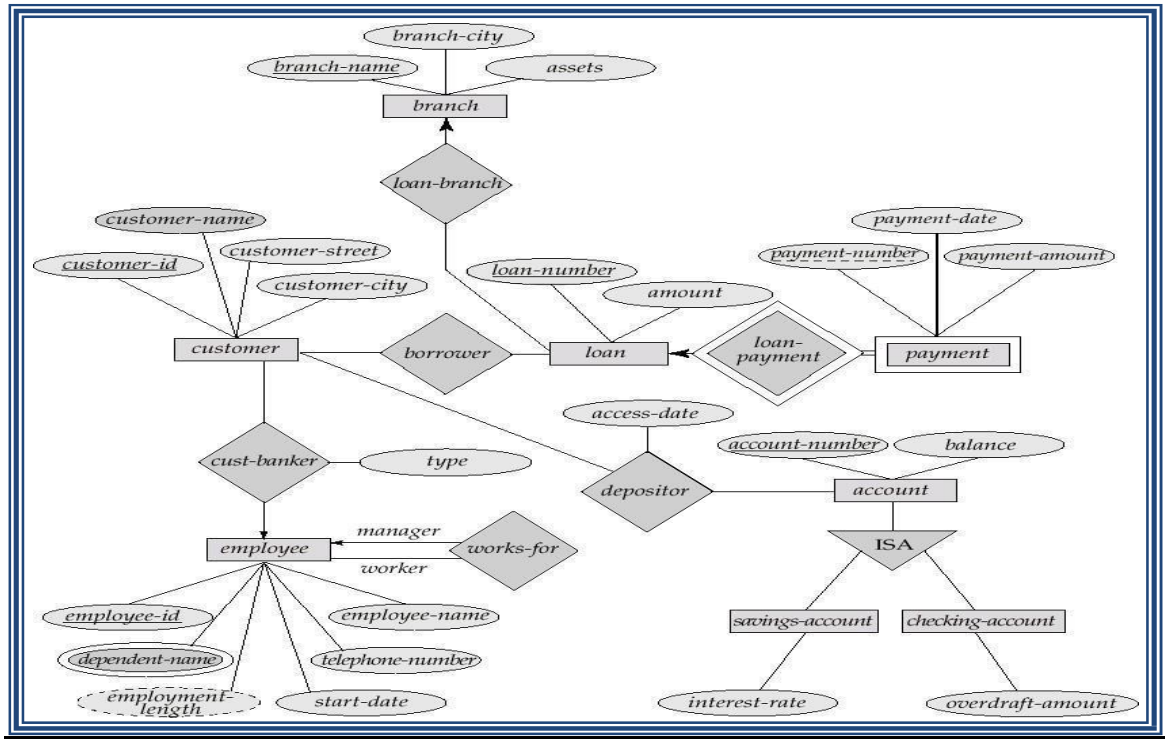
ERDPlus enables drawing standard ERD components.

- Entities, Attributes, Relationships

The notation supports drawing regular and weak entities, various types of attributes (regular, unique, multi-valued, derived, composite, and optional), and all possible cardinality constraints of relationships (mandatory-many, optional-many, mandatory-one and optional-one).



ER Diagram for Banking Enterprise:



Procedure:

1) Consider an enterprise of your choice.
2) Identify the entities and their attributes.
3) Identify the primary key of each entity.
4) Find the relationship between the entities. Name the relationship.
5) Find the cardinality of the relations & specify in ER Diagram

Examples to solve:

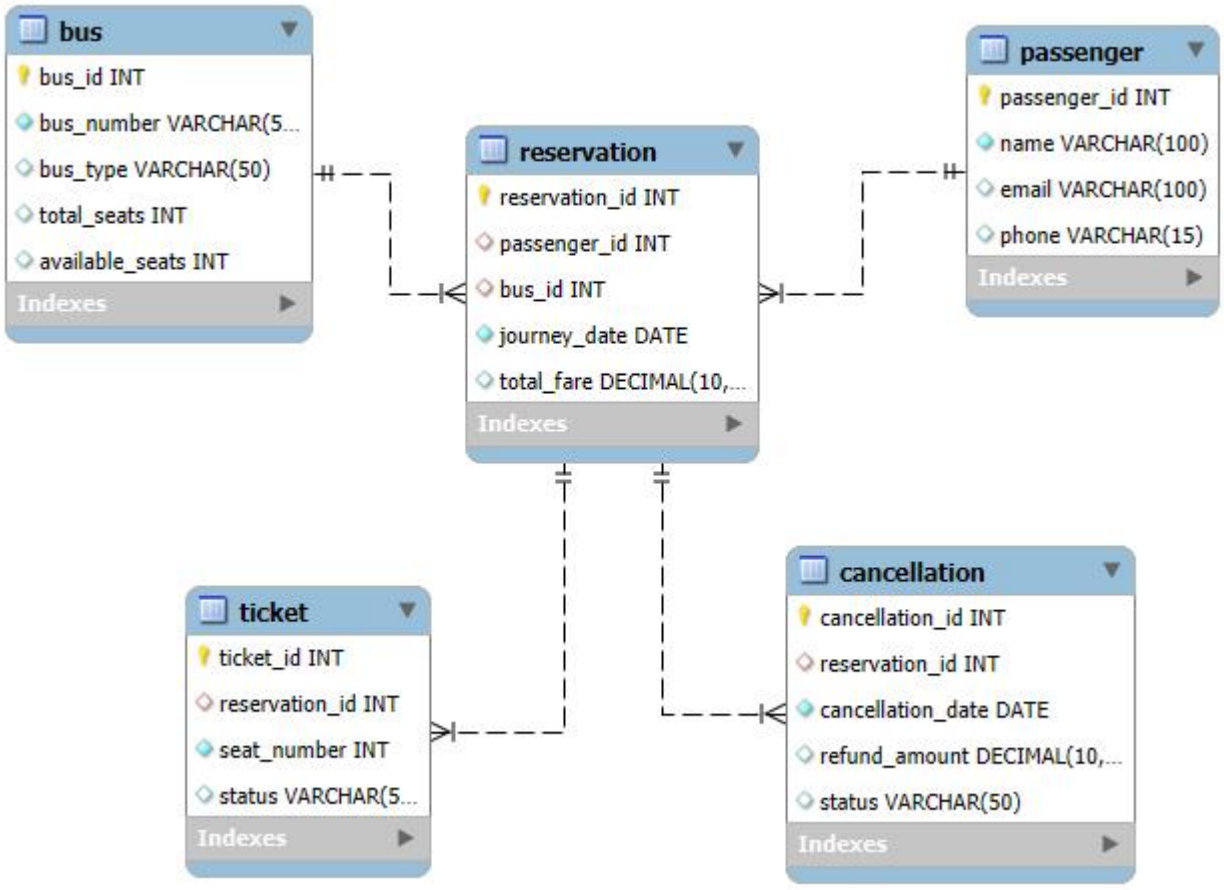
1. Construct an ER diagram for Online Bus ticket reservation.

Query:

```
-- Table for Bus
CREATE DATABASE bus;
USE bus;
CREATE TABLE Bus (
    bus_id INT PRIMARY KEY AUTO_INCREMENT,
    bus_number VARCHAR(50) NOT NULL UNIQUE,
    bus_type VARCHAR(50),
    total_seats INT,
    available_seats INT
);

-- Table for Passenger
CREATE TABLE Passenger (
    passenger_id INT PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    email VARCHAR(100) UNIQUE,
    phone VARCHAR(15)
);

-- Table for Reservation
CREATE TABLE Reservation (
    reservation_id INT PRIMARY KEY AUTO_INCREMENT,
    passenger_id INT,
    bus_id INT,
    journey_date DATE NOT NULL,
    total_fare DECIMAL(10, 2),
    FOREIGN KEY (passenger_id) REFERENCES Passenger(passenger_id),
    FOREIGN KEY (bus_id) REFERENCES Bus(bus_id)
);

-- Table for Ticket
CREATE TABLE Ticket (
    ticket_id INT PRIMARY KEY AUTO_INCREMENT,
    reservation_id INT,
```

```
    seat_number INT NOT NULL,
    status VARCHAR(50) DEFAULT 'Confirmed',
    FOREIGN KEY (reservation_id) REFERENCES Reservation(reservation_id)
);

-- Table for Cancellation
CREATE TABLE Cancellation (
    cancellation_id INT PRIMARY KEY AUTO_INCREMENT,
    reservation_id INT,
    cancellation_date DATE NOT NULL,
    refund_amount DECIMAL(10, 2),
    status VARCHAR(50) DEFAULT 'Pending',
    FOREIGN KEY (reservation_id) REFERENCES Reservation(reservation_id)
);
```

ER Diagram:

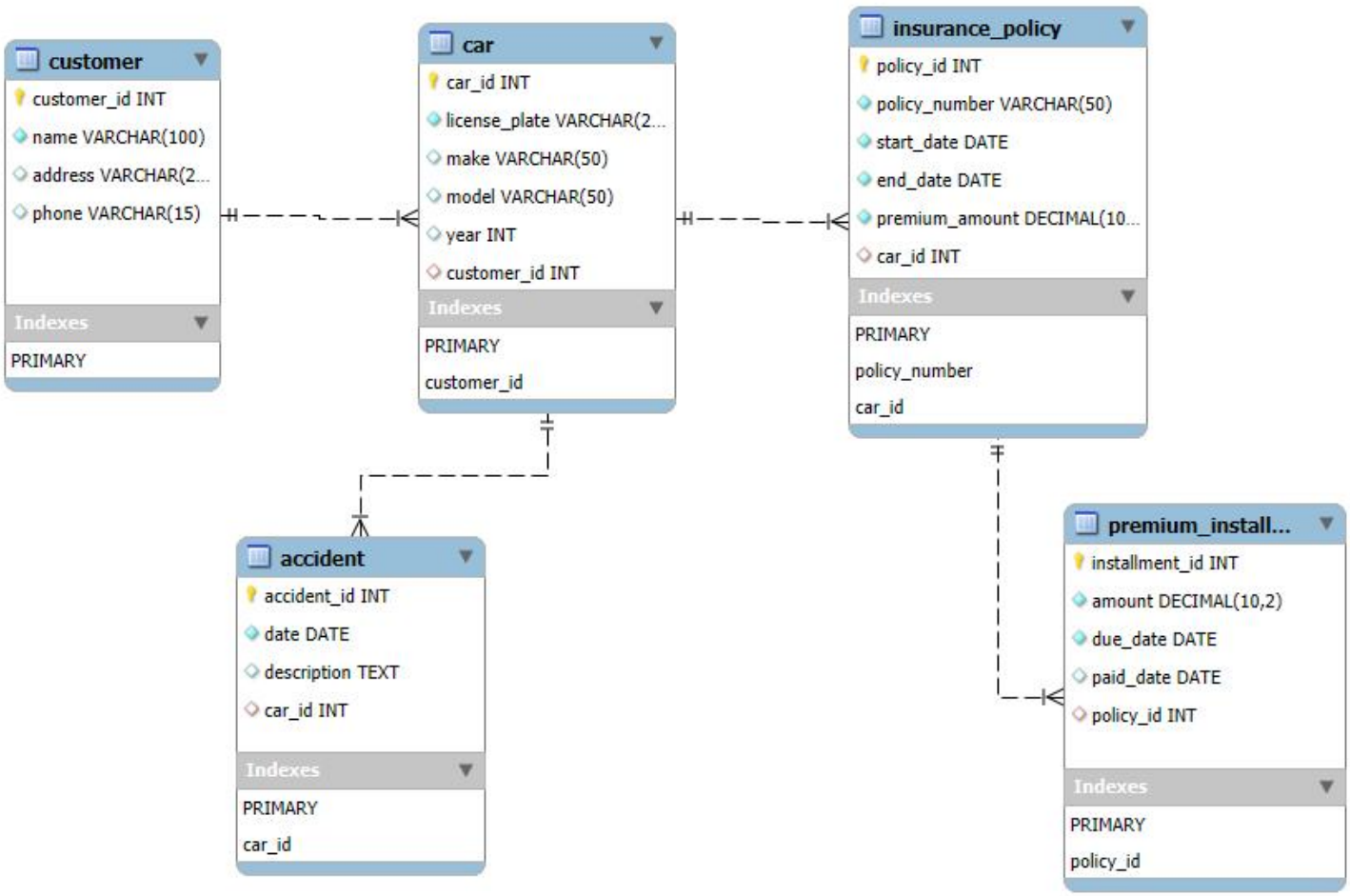


2. Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

```
CREATE DATABASE car;
USE car;
--Table For Customer
CREATE TABLE Customer (
    customer_id INT PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    address VARCHAR(255),
    phone VARCHAR(15)
);

-- Table for Car
CREATE TABLE Car (
    car_id INT PRIMARY KEY AUTO_INCREMENT,
    license_plate VARCHAR(20) UNIQUE NOT NULL,
    make VARCHAR(50),
    model VARCHAR(50),
    year INT,
    customer_id INT,
    FOREIGN KEY (customer_id) REFERENCES Customer(customer_id)
);

-- Table for Accident
CREATE TABLE Accident (
    accident_id INT PRIMARY KEY AUTO_INCREMENT,
    date DATE NOT NULL,
    description TEXT,
    car_id INT,
    FOREIGN KEY (car_id) REFERENCES Car(car_id)
);

-- Table for Insurance Policy
-- First, create the Insurance_Policy table
CREATE TABLE Insurance_Policy(
    policy_id INT PRIMARY KEY AUTO_INCREMENT,
    policy_number VARCHAR(50) UNIQUE NOT NULL,
    start_date DATE NOT NULL,
    end_date DATE NOT NULL,
    premium_amount DECIMAL(10, 2) NOT NULL,
    car_id INT,
    FOREIGN KEY (car_id) REFERENCES Car(car_id)
);

-- Now, create the Premium_Installment table
CREATE TABLE Premium_Installment (
    installment_id INT PRIMARY KEY AUTO_INCREMENT,
    amount DECIMAL(10, 2) NOT NULL,
    due_date DATE NOT NULL,
```

```
    paid_date DATE,
    policy_id INT,
    FOREIGN KEY (policy_id) REFERENCES Insurance_Policy(policy_id)
);
```

ER Diagram:

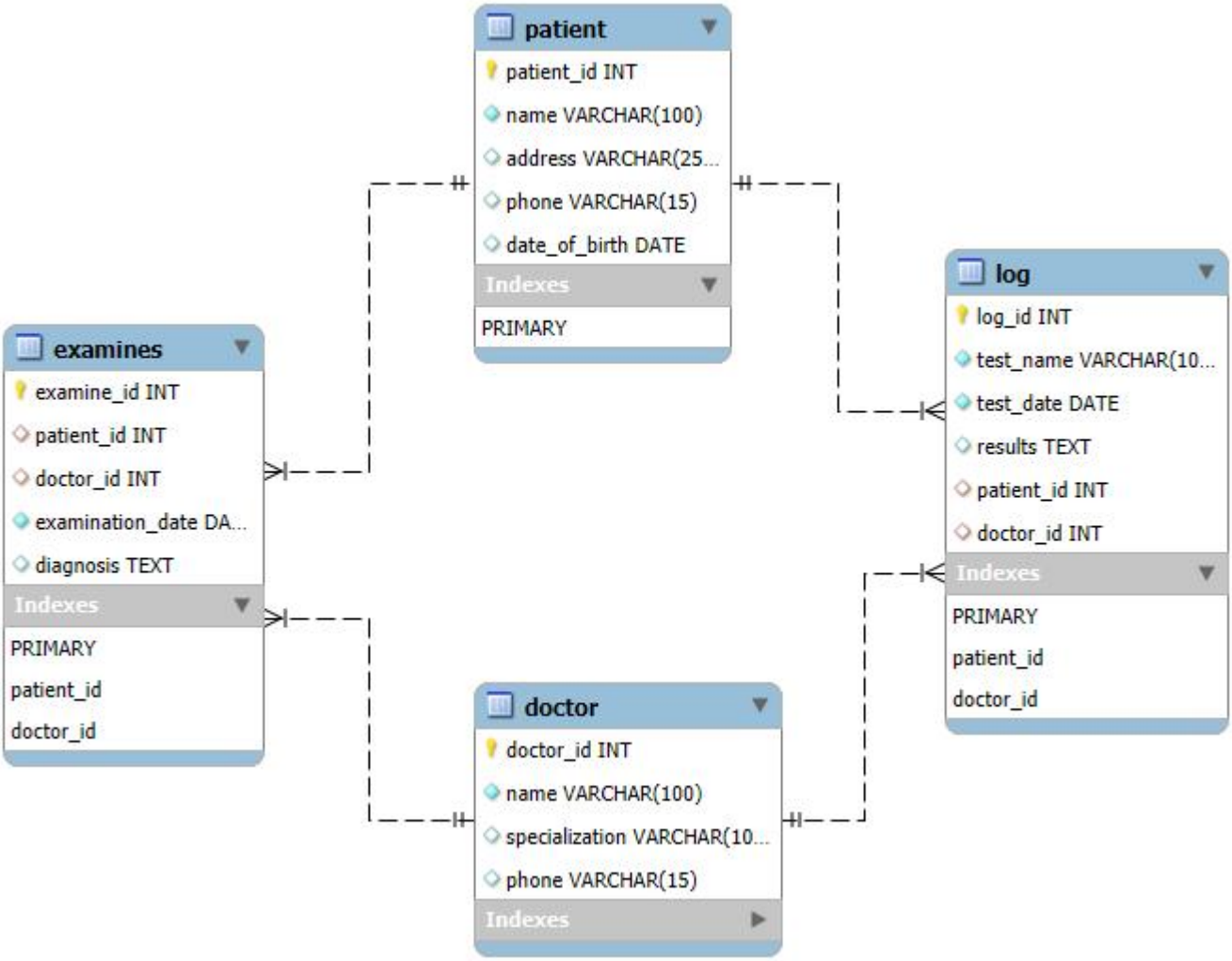


3. Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

Query:

```
-- Table for Patient
CREATE DATABASE Hospital;
Use Hospital;
CREATE TABLE Patient (
    patient_id INT PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    address VARCHAR(255),
    phone VARCHAR(15),
    date_of_birth DATE
);

-- Table for Doctor
CREATE TABLE Doctor (
    doctor_id INT PRIMARY KEY AUTO_INCREMENT,
    name VARCHAR(100) NOT NULL,
    specialization VARCHAR(100),
    phone VARCHAR(15)
);

-- Table for Log (Tests and Examinations)
CREATE TABLE Log (
    log_id INT PRIMARY KEY AUTO_INCREMENT,
    test_name VARCHAR(100) NOT NULL,
    test_date DATE NOT NULL,
    results TEXT,
    patient_id INT,
    doctor_id INT,
    FOREIGN KEY (patient_id) REFERENCES Patient(patient_id),
    FOREIGN KEY (doctor_id) REFERENCES Doctor(doctor_id)
);
CREATE TABLE Examines (
    examine_id INT PRIMARY KEY AUTO_INCREMENT,
    patient_id INT,
    doctor_id INT,
    examination_date DATE NOT NULL,
    diagnosis TEXT,
    FOREIGN KEY (patient_id) REFERENCES Patient(patient_id),
    FOREIGN KEY (doctor_id) REFERENCES Doctor(doctor_id)
);
```

ER Diagram:


patient
patient_id INT
name VARCHAR(100)
address VARCHAR(25...
phone VARCHAR(15)
date_of_birth DATE
Indexes
PRIMARY
log
log_id INT
test_name VARCHAR(10...
test_date DATE
results TEXT
patient_id INT
doctor_id INT
Indexes
PRIMARY
patient_id
doctor_id
examines
examine_id INT
patient_id INT
doctor_id INT
examination_date DA...
diagnosis TEXT
Indexes
PRIMARY
patient_id
doctor_id
doctor
doctor_id INT
name VARCHAR(100)
specialization VARCHAR(10...
phone VARCHAR(15)
Indexes