**Department of Data Science, Bishop Heber College Tiruchirappalli**

**Modern Database Systems Lab**

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Lab1. Data Modeling using ER Diagrams

Objectives

In this lab, you will create Entity-Relationship diagramsfor the given business scenarios and understand

the terminologies.

Question1: For the ER diagram shown below, answer the following questions

1. How many entities are here in the Employee database? Ans: 4

2. How many relationships are there? Ans: 6

3. What is the primary key for the entity EMPLOYEE? Ans: ssn

4. Is there any unary relationship in this ERD?. What is it? Ans : YES, SUPERVISION

5. Which one is the weak entity here? Ans : DEPENDENT

6. Which one is the multivalued attribute? Ans: locations

7. Is there any derived attribute? Ans: yes

8. Which one is the weak entity?. Why? Ans :DEPENDENT, enclosed with double rectangle

9. How many departments can an employee work for? Ans: many to 1

10. How many employees can work for a Department? Ans: 1 to many

11. What are the total participations here? Ans:

**Question2: Create schema for all entities and relationships from ER diagram of Employee Database**

**CREATE TABLE EMPLOYEE(**

**SSN INT(10) PRIMARY KEY,**

**BDATE DATE,**

**NAME VARCHAR2 (15),**

**FNAME VARCHAR2 (15),**

**MINIT VARCHAR2 (15),**

**LNAME VARCHAR2(15),**

**ADDRESS VARCHAR2(30),**

**SALARY FLOAT(7,2),**

**SEX VARCHAR2(2));**

**CREATE TABLE DEPENDENT(**

**NAME VARCHAR2(10) FOREIGN KEY,**

**SEX VARCHAR2(2),**

**BIRTH\_DATE DATE,**

**RELATIONSHIP VARCHAR2(10));**

**CREATE TABLE DEPARTMENT(**

**NAME VARCHAR2(10) ALTERNATE KEY,**

**NUMBER INT(12) PRIMARY KEY,**

**ADDRESS\_LINE1 VARCHAR2(10),**

**ADDRESS\_LINE2 VARCHAR2(10),**

**STATE VARCHAR2(10),**

**COUNTRY VARCHAR2(10));**

**CREATE TABLE PROJECT(**

**NAME VARCHAR2(10) ALTERNATE KEY,**

**NUMBER VARCHAR(10) PRIMARY KEY,**

**LOCATION VARCHAR(30));**

**Question3: Create ER diagram for the following University application**

**The university database stores details about university students, courses, the semester a student**

**took a particular course (and his mark and grade if he completed it), and what degree program each**

**student is enrolled in. The database is a long way from one that’d be suitable for a large tertiary institution,**

**but it does illustrate relationships that are interesting to query, and it’s easy to relate to when you’re**

**learning SQL. We explain the requirements next and discuss their shortcomings at the end of this section.**

**Consider the following requirements list:**

** The university offers one or more programs.**

** A program is made up of one or more courses.**

** A student must enroll in a program.**

** A student takes the courses that are part of her program.**

** A program has a name, a program identifier, the total credit points required to graduate, and the**

**year it commenced.**

** A course has a name, a course identifier, a credit point value, and the year it commenced.**

** Students have one or more given names, a surname, a student identifier, a date of birth, and the**

**year they first enrolled. We can treat all given names as a single object—for example, “John Paul.”**

** When a student takes a course, the year and semester he attempted it are recorded. When he**

**finishes the course, a grade (such as A or B) and a mark (such as 60 percent) are recorded.**

** Each course in a program is sequenced into a year (for example, year 1) and a semester (for**

**example, semester 1).**

COURSEID

COMMENCEMENTYEAR

CREDITPOINTS

COURSE NAME

SEMESTER

GRADE

MARK

YEAR

COURSEID

STUDENTID

SURNAME

ENROLLMENT YEAR

DATE OF BIRTH

STUDENTID

NAME

ENROLLMENT YEAR

PROGRAMID

STUDENTID

COMMENCEMENTYEAR

PROGRAMID

TOTAL CREDIT POINT

PROGRAM NAME

**has**

PROGRAM

**OFFER**

ENROLLMENT

**has**

STUDENT

**has**

COURSE ENROLLMENT TABLE

COURSE

**has**

N 1

1. N

1. N

1 1

N

N

Question 3B: Create schema for all entities and relationships from the university ER diagram

CREATE TABLE Program (

ProgramID INT PRIMARY KEY,

ProgramName VARCHAR(100),

TotalCreditPoints INT,

CommencementYear INT

);

CREATE TABLE Course (

CourseID INT PRIMARY KEY,

CourseName VARCHAR(100),

CreditPoints INT,

CommencementYear INT,

ProgramID INT,

FOREIGN KEY (ProgramID) REFERENCES Program(ProgramID)

);

CREATE TABLE Student (

StudentID INT PRIMARY KEY,

Names VARCHAR(100),

Surname VARCHAR(100),

DateOfBirth DATE,

EnrollmentYear INT

);

CREATE TABLE CourseEnrollment (

EnrollmentID INT PRIMARY KEY,

StudentID INT,

CourseID INT,

Year INT,

Semester INT,

Grade VARCHAR(2),

Mark DECIMAL(5,2),

FOREIGN KEY (StudentID) REFERENCES Student(StudentID),

FOREIGN KEY (CourseID) REFERENCES Course(CourseID)

);

CREATE TABLE Enrollment (

EnrollmentID INT PRIMARY KEY,

StudentID INT,

ProgramID INT,

EnrollmentYear INT,

FOREIGN KEY (StudentID) REFERENCES Student(StudentID),

FOREIGN KEY (ProgramID) REFERENCES Program(ProgramID)

);

Question4: Create ER diagram for the Flight database application

The flight database stores details about an airline’s fleet, flights, and seat bookings. Again, it’s a hugely

simplified version of what a real airline would use, but the principles are the same.

Consider the following requirements list:

 The airline has one or more airplanes.

 An airplane has a model number, a unique registration number, and the capacity to take one or

more passengers.

 An airplane flight has a unique flight number, a departure airport, a destination airport, a

departure date and time, and an arrival date and time.

 Each flight is carried out by a single airplane.

 A passenger has given names, a surname, and a unique email address.

 A passenger can book a seat on a flight.

DEPATURE DATE AND TIME

DESTINATION AIRPORT

ARRIVAL DATE AND TIME

N N 1 N N 1 N N

**has**

SURNAME

EMAIL

NAME

PASSENGERID

**CARRED BY**

**BOOKS**

FIGHTNUMBER

AIRPLAINID

FLIGHTNUMBER

DEPARTURE AIRPORT

CAPACITY

REGESTION NUMBER

MODEL NUMBER

PASSENGER

BOOKINGID

PASSENGERID

BOOKING

**has**

AIRPLAINID

AIRPLANE

FLIGHT

Question 4B: Create schema for all entities and relationships from the flight ER diagram

CREATE TABLE Airplane (

AirplaneID INT PRIMARY KEY,

ModelNumber VARCHAR(100),

RegistrationNumber VARCHAR(100) UNIQUE,

Capacity INT

);

CREATE TABLE Flight (

FlightNumber INT PRIMARY KEY,

DepartureAirport VARCHAR(100),

DestinationAirport VARCHAR(100),

DepartureDateTime TIMESTAMP,

ArrivalDateTime TIMESTAMP,

AirplaneID INT,

FOREIGN KEY (AirplaneID) REFERENCES Airplane(AirplaneID)

);

CREATE TABLE Passenger (

PassengerID INT PRIMARY KEY,

Name VARCHAR(100),

Surname VARCHAR(100),

Email VARCHAR(100) UNIQUE

);

CREATE TABLE Booking (

BookingID INT PRIMARY KEY,

PassengerID INT,

FlightNumber INT,

FOREIGN KEY (PassengerID) REFERENCES Passenger(PassengerID),

FOREIGN KEY (FlightNumber) REFERENCES Flight(FlightNumber)

);