BITP 1323
DATABASE

Lab 3 Data Modelling (Part 1)

Learning Outcome

At the end of this lab session, students should be able to:

1. Understand main characteristics of entity relationship components
2. Design an Entity Relationship Diagram (ERD) based on information system requirements

Lab Details

Draw a Crow's Foot ERD to represent each of the following database:

1. The local city youth league needs a database system to help track children who sign up to play soccer. Data need to be kept on each team and the children who will be playing on each team and their parents. Also, data need to be kept on the coaches for each team.

   Draw the data model described below.
   Entities required: Team, Player, Coach, and Parent.
   Attributes required:
   Team: Team ID number, Team name, and Team colors.
   Player: Player ID number, Player first name, Player last name, and Player age.
   Coach: Coach ID number, Coach first name, Coach last name, and Coach phone number.

Parent: Parent ID number, Parent last name, Parent first name, Home phone number, and Home Address(Street, City, State, and Zip Code).

The following relationships must be defined:

- Team is related to Player.
- Team is related to Coach.
- Player is related to Parent.

Connectivities and participations are defined as follows:

- A Team may or may not have a player.

  A Player must have a Team.
- A Team may have many Players.

  A Player has only one Team.
- A Team may or may not have a Coach.

  A Coach must have a Team.
- A Team may have many Coaches.

  A Coach has only one Team.
- A Player may have many Parents.

  A Parent may have many Players.

2. Book Publication Database.

- A book is identified by its ISBN number, and it has a title, a price, and a date of publication. It is published by a publisher, which has its own ID number and a name. Each book has exactly one publisher, but one publisher typically publishes multiple books over time.
- A book is written by one or multiple authors. Each author is identified by an author number and has a name and date of birth. Each author has

either one or multiple books; in addition, occasionally data are needed regarding prospective authors who have not yet published any books

3. The Artist database conforms to the following conditions:

   A painter might paint many paintings. To be considered a painter in the Artist database, the painter must have painted at least one painting. Each painting is painted by one (and only one) painter. A painting might (or might not) be exhibited in a gallery.

   Entities required: Painter, Painting, Galery
   Attributes required:
   Painter : Painter Number, Painter Last Name, Painter First Name, Painter Area Code, Painter Phone Number
   Painting : Painting Number, Painting Title, Painting Price
   Gallery : Gallery Number, Gallery Owner, Gallery Area Code , Gallery Phone Number, Gallery Rate

4. A college maintains details of its lecturers' subject area skills. These details comprise:
   - Lecturer Number
   - Lecturer Name
   - Lecturer Grade
   - Department Code
   - Department Name
   - Subject Code
   - Subject Name
   - Subject Category

Assume that each lecturer may teach many subjects and a subject is taught by many lecturers. A lecturer may belong to one department and a department has many lecturers.

5. The Hudson Engineering Group (HEG) has contacted you to create a conceptual model whose application will meet the expected database requirements for its training program. The HEG administrator gives you the following description of the training group's operating environment:

   The HEG has 12 instructors and can handle up to 30 trainees per class. HEG offers five "advanced technology" courses, each of which may generate several classes. If a class has fewer than 10 trainees in it, it will be cancelled. It is, therefore, possible for a course not to generate any classes during a session. Each class is taught by one instructor. Each instructor may teach up to two classes or may be assigned to do research. Each trainee may take up to two classes per session.
   Given this information, do the following:

   a. Draw the E-R diagram for HEG.

   b. Describe the relationship between instructor and course in terms of connectivity, cardinality, and existence dependence.

6. Given the following brief summary of business rules for the ROBCOR catering service, and using the Crow's Foot E-R methodology, draw the fully-labeled ERD. Make sure to include all appropriate entities, attributes, relationships, connectivities, and cardinalities.

   Each dinner is based on a single entree, but each entree can be served at many dinners. A guest can attend many dinners, and each dinner can be attended by many guests. Each dinner invitation can be mailed to many guests, and each guest can receive many invitations.

7. Use the following business rules to create a Crow's Foot ERD. Write all appropriate attributes, connectivities and cardinalities in the ERD.

   a. A department employs many employees, but each employee is employed by one department.

   b. Some employees, known as "rovers," are not assigned to any department.

   c. An employee may or may not have one or more dependents, but each dependent belongs to one employee.

   d. An employee may or may not have an employment history, but an employment history is associated with a specific employee.

   e. A division operates many departments, but each department is operated by one division.

   f. An employee may be assigned to many projects, and a project may have many employees assigned to it.

   g. A project must have at least one employee assigned to it.

   h. One of the employees manages each department, and each department is managed by only one employee.

   i. One of the employees runs each division, and each division is run by one employee.

8. The video cd rental company has several branches throughout the country. The data held on each branch is the branch address made up of street, city, state, and zip code, and the telephone number. Each branch is given a branch number, which is unique throughout the company. Each branch is allocated staff. The data held on a member of staff is his or her name, position, and salary. Each member of staff is given a staff number, which is unique throughout the company. Each branch has at least one stock of videos. The data held on a video is the video number, title, category, daily rental, cost, status, and the names of the main actors, and the director. The video number uniquely identifies each video. However, in most cases, there are several copies of each video at a branch, and the individual copies are identified using the copy number. A video is given a category such as Action, Adult, Children, Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a video is available for rent. Before hiring a video from the company, a customer must first register as a member of a local branch. The data held on a member is the first and last name, address, and the date that the member registered at a branch. Each member is given a member number, which is unique throughout all branches of the company. Once registered, a member is free to rent videos, up to maximum of ten at any one time. The data held on each video rented is the rental number, the full name and number of the member, the video number, title, and daily rental, and the dates the video is rented out and date returned. Each rental agreement is managed by one and only one staff. A staff may manage one, zero or many rental agreements. The rental number is unique throughout the company.

   NOTE: You do NOT have to build the database. No data is required. **You need to provide an ERD and data dictionary that define the database.**