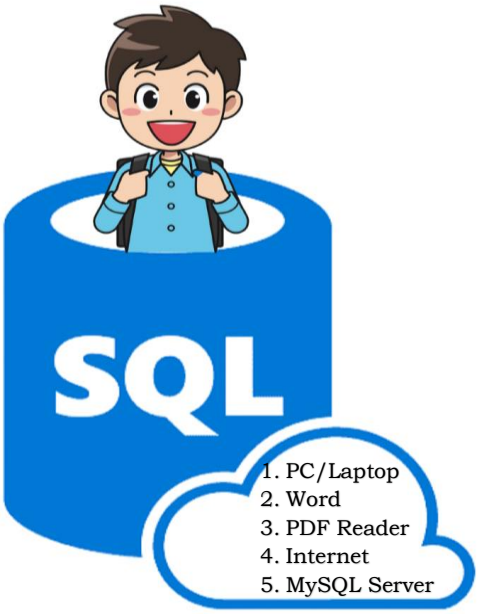
[Laboratory No. 2: Data Models]

Objectives

1. To identify the relationship between data models
2. To describe the similarities and differences between relationships

Materials



Background

A data model is an abstraction of a complex real-world data environment. Database designers use data models to communicate with application programmers and end-users. The essential data-modeling components are entities, attributes, relationships, and constraints. Business rules are used to identify and define the basic modeling components within a specific real-world environment.

The hierarchical and network data models were early ones that are no longer used, but some of the concepts are found in current data models. The hierarchical model depicts a set of one-to-many (1:M) relationships between a parent and its children segments. The network model uses sets to represent 1:M relationships between record types. The relational model is the current database implementation standard. In the relational model, the end-user perceives the data as stored in tables. Tables are related to each other through common values in common attributes. The entity-relationship (ER) model is a popular graphical tool for data modeling that complements the relational model.

The object-oriented data model (OODM) uses objects as the basic modeling structure. An object resembles an entity in that it includes the facts that define it. But unlike an entity, the object also has information about relationships between the facts as well as relationships with other objects, thus giving its data more meaning.

The relational model has adopted many object-oriented (OO) extensions to become the extended relational data model (ERDM). The OODM is largely used in specialized engineering and scientific applications, while the ERDM is primarily geared to business applications. Although the most likely future

scenario is an increasing merger of OODM and ERDM technologies, both are overshadowed by the need to develop Internet access strategies for databases. Usually, OO data models are depicted using Unified Modelling Language (UML) class diagrams.

Data-modeling requirements are a function of different data views (global vs. local) and the level of data abstraction. The American National Standards Institute Standards Planning and Requirements Committee (ANSI/SPARC) describes three levels of data abstraction: external, conceptual, and internal. There is also a fourth level of data abstraction (the physical level). This lowest level of data abstraction is concerned exclusively with physical storage methods.

Procedure

Answer the following questions:

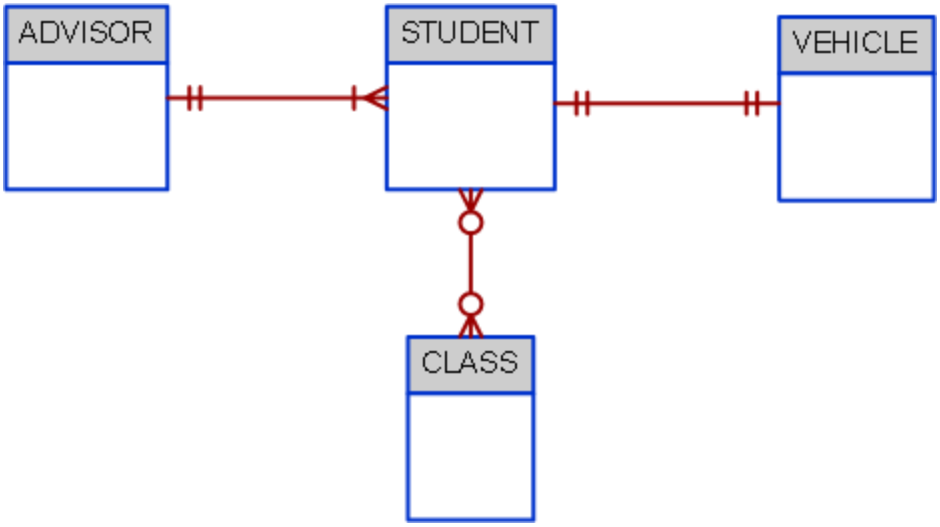
1. In the context of database application development (aka database engineering), what are the aims of data modeling?

2. Describe the What is a business rule, and what is its purpose in data modeling?

3. Create a data model based on the business rules that are as follows:

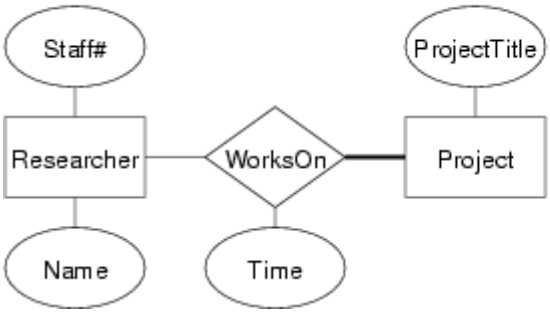
    a. Each sales representative writes many invoices.
    b. Each invoice is written by one sales representative.
    c. Each sales representative is assigned to one department.
    d. Each department has many sales representatives.
    e. Each customer can generate many invoices.
    f. Each invoice is generated by one customer.

4. Write a business rule based on the data model below, as shown.

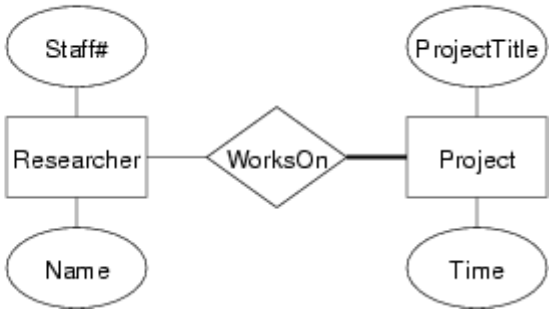


5. Researchers work on different research projects, and the connection between them can be modeled by a **WorksOn** relationship. Consider the following two different ER diagrams to represent this situation. Which do you think is the most appropriate model for this scenario?

(a)



(b)



Answer (Draw):

Explanation:

Insights

Write your takeaways in the blank provided.

Scoring System

Task	Total Points	Score
Task 1	**10**	
Task 2	**10**	
Task 3	**20**	
Task 4	**20**	
Task 5	**20**	
Insights	**20**	