Database Design

3-1
Identifying Relationships
Objectives

This lesson covers the following objectives:

• Interpret and describe relationship optionality
• Interpret and describe relationship cardinality
• Relate (connect or join) entities by applying the rules of cardinality and optionality
Purpose

• Being able to identify the relationships between entities makes it easier to understand the connections between different pieces of data.

• Relationships help you see how different parts of a system affect each other.

• For example, the entities STUDENT and COURSE are related to each other.

• To accurately model the business, the relationships between entities are as important as the entities themselves.
Relationships in Families

• A relationship is the way in which two or more people or things are connected.

• Family relationships categorize relationships between people, for example mother, father, aunt and cousin.

• The name of the relationship tells us how the family members are connected.
Relationships in Data Models

Relationships:

- Represent something of significance or importance to the business
- Show how entities are related to each other
- Exist only between entities (or one entity and itself)
- Are bi-directional
- Are named at both ends
- Have optionality
- Have cardinality
What is Optionality in a Relationship?

• Relationships are either mandatory or optional.
• Consider the two entities EMPLOYEE and JOB.
• Based on what you know about instances of the entities, you can determine optionality by answering two questions:
  • Must every employee have a job?
    – In other words, is this a mandatory or optional relationship for an employee?
  • Must every job be assigned to an employee?
    – In other words, is this a mandatory or optional relationship for a job?
What is Cardinality in a Relationship?

• Cardinality measures the quantity of something.
• In a relationship, it determines the degree to which one entity is related to another by answering the question, “How many?”
• For example:
  – How many jobs can one employee hold? One job only? Or more than one job?
  – How many employees can hold one specific job? One employee only? Or more than one employee?
  • Note: The cardinality of a relationship only answers whether the number is singular or plural; it does not answer with a specific plural number.
Optionality and Cardinality

Examples:

• Each EMPLOYEE must hold one and only one JOB
• Each JOB may be held by one or more EMPLOYEES
• Each PRODUCT must be classified by one and only one PRODUCT TYPE
• Each PRODUCT TYPE may classify one or more PRODUCTS
Relationships

• Each SEAT may be sold to one or more PASSENGERs
• Each PASSENGER may purchase one SEAT
• SEAT is sold to a PASSENGER (or PASSENGERs -- hence, overbooking)
• PASSENGER purchases or books a SEAT
Business Scenario 1

What are the relationships in the following business scenario?

• “In our restaurant, a customer walks up to the counter and places their order. A customer can order for him or herself only, or for him/herself and others. For example, a mother orders for herself and her children.

• We consider the mother to be the customer who owns the order and is responsible for payment. Over a period of time, a customer can place as many orders as he wants.”
Business Scenario 1

- CUSTOMER places ORDERs: optionality and cardinality
- Optionality = Must or may?
- Each ORDER must be placed by one (and only one) CUSTOMER.
- Each CUSTOMER must place one or more ORDERs.
Business Scenario 1

- Cardinality = How many?
- Each ORDER must be placed by one and only one CUSTOMER.
- Each CUSTOMER must place one or more ORDERs.
Business Scenario 2

• A relationship can join one entity to itself.

• Examine the following scenario:
  – “We need to keep track of our employees and their managers. Every employee has one manager, including the managing director who manages him/herself. Each manager can manage several employees.”
Business Scenario 2

• Since managers are also employees, both are listed in the same entity: EMPLOYEE.

RELATIONSHIP

Each EMPLOYEE may be managed by one and only one EMPLOYEE

Each EMPLOYEE may manage one or more EMPLOYEES
Terminology

Key terms used in this lesson included:

• Cardinality
• Optionality
• Relationship
Summary

In this lesson, you should have learned how to:

• Interpret and describe relationship optionality
• Interpret and describe relationship cardinality
• Relate (connect or join) entities by applying the rules of cardinality and optionality