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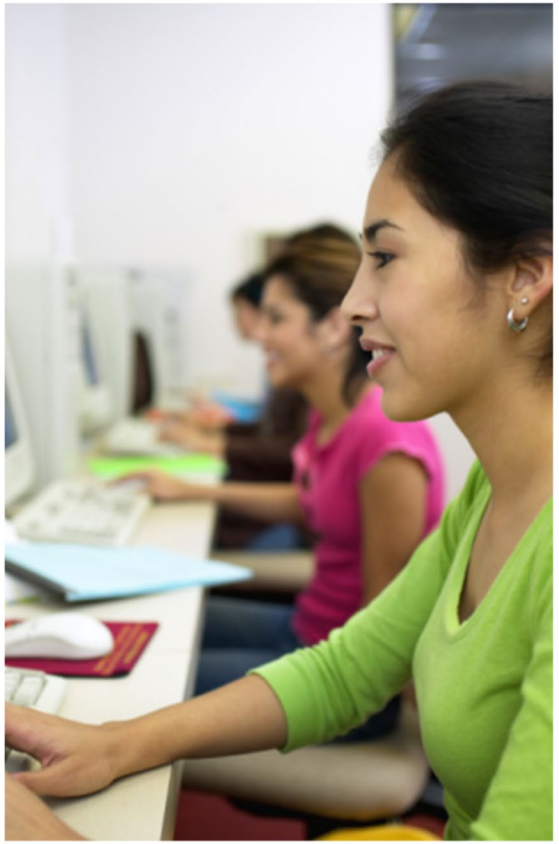
Academy

Database Design

3-1

Identifying Relationships



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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?

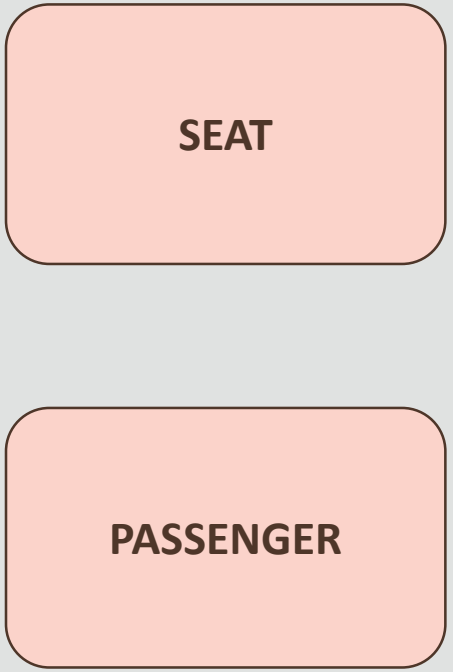
- Cardinality measures the quantity of something
- In a relationship, it determines the degree to which one entity is related to another by answering the question, “How many?”
- For example:
  - How many jobs can one employee hold? One job only? Or more than one job?
  - How many employees can hold one 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

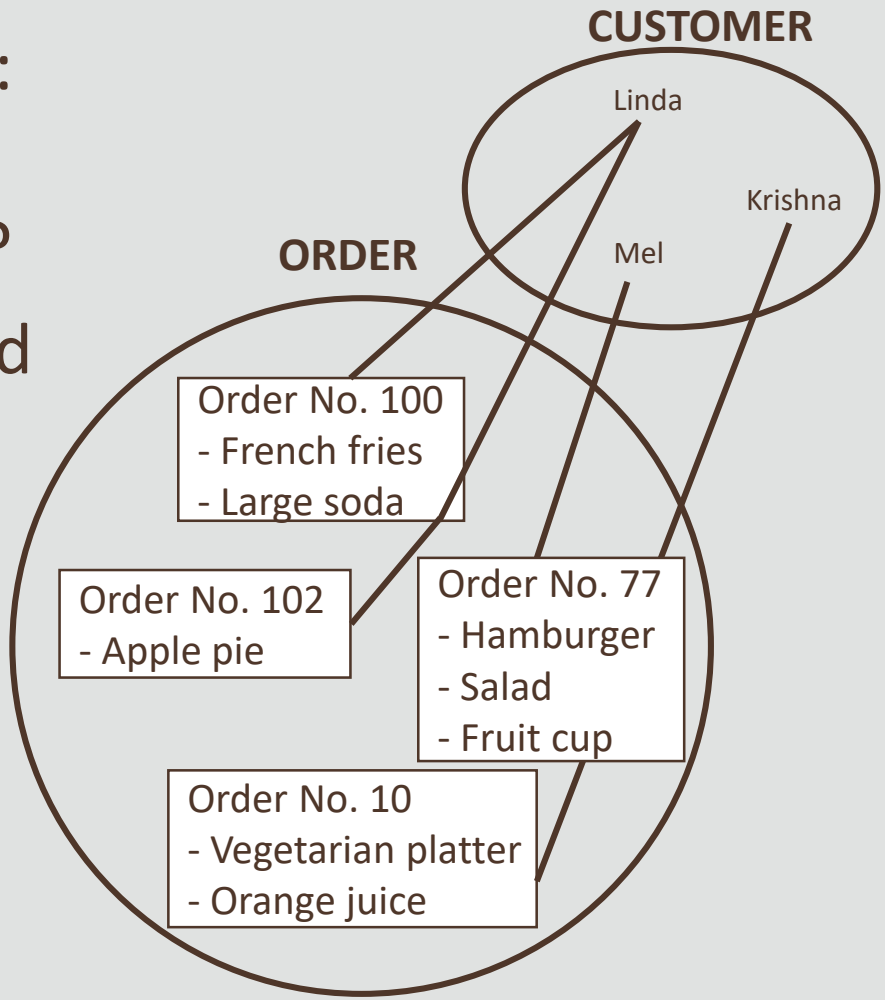


Business Scenario 1

- 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"

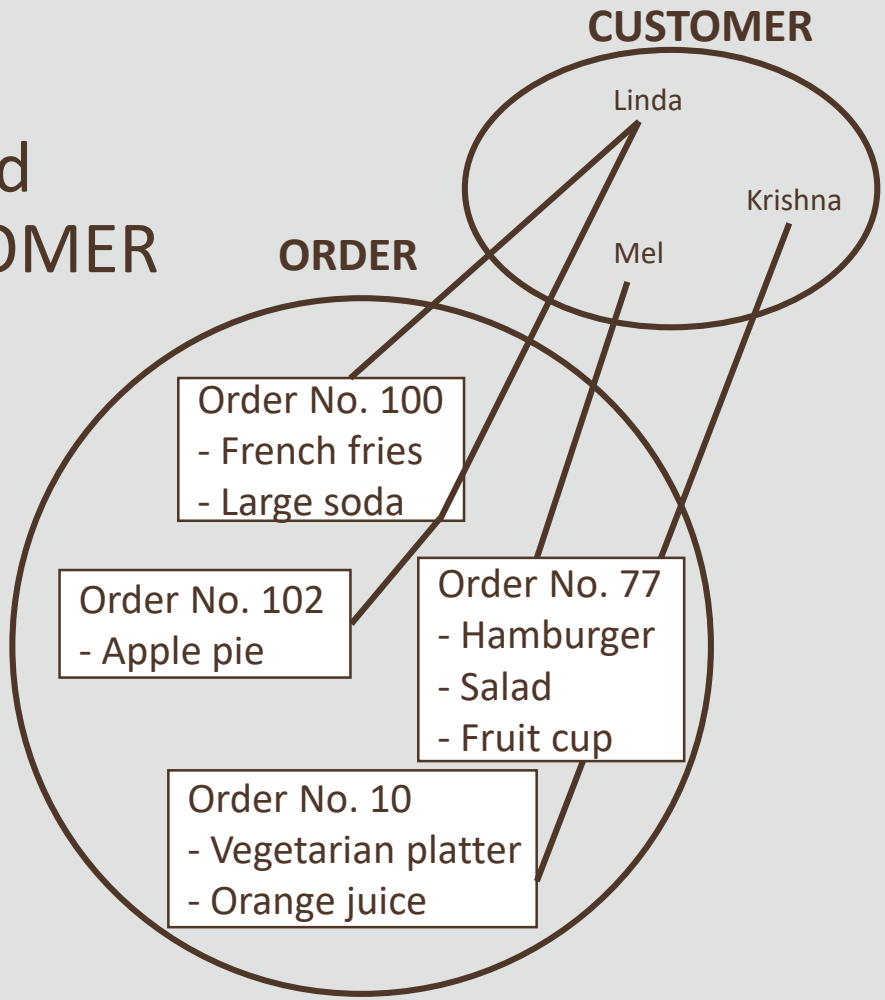
Business Scenario 1

- 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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