Database Foundations

3-1
Conceptual and Physical Data Models
Roadmap

You are here

Conceptual and Physical Data Models

Business Rules

Entities

Attributes

Unique Identifiers

Relationships

Validating Relationships

Tracking Data Changes over Time

Validating Data Using Normalization
Objectives

This lesson covers the following objectives:

• Describe a conceptual data model
• Describe a logical data model
• Describe a physical data model
• Analyze the similarities and differences between conceptual and physical data models
What Is a Conceptual Model?

• Captures the functional and informational needs of a business.

• Is based on current needs, but may reflect future needs.

• Addresses the needs of a business (what is conceptually ideal), but does not address its implementation (what is physically possible).

• Identifies important entities and relationships among them.

• Does not specify primary keys.
What Is a Logical Model?

• Includes all entities and relationships among them.
• Is called an entity relationship model (ERM).
• Is illustrated in an ERD.
• Specifies all attributes for each entity.
• Determines attribute optionality.
• Determines relationship optionality and cardinality.
What Is a Physical Model?

• Is an extension to a logical data model.
  – Defines table definitions, data types, and precision.
  – Identifies views, indexes, and other database objects.

• Describes how the objects should be implemented in specific database.

• Shows all table structures, including columns, primary keys, and foreign keys.
Steps to Create a Physical Data Model

- Model entities as tables
- Model relationships as foreign keys
- Model attributes as columns
- Modify the physical data model based on physical constraints and requirements
Conceptual and Physical Models

• The art of planning, developing, and communicating produces a desired outcome.

• Data modeling is the process of capturing the important concepts and rules that shape a business and depicting them visually in a diagram. This diagram becomes the blueprint for designing the physical thing.

• The client's dream (conceptual model) becomes a physical reality (physical model).
Faculty: Matt, I would like you to create a simplified library database to store the book details in our department.

Matt: Sure. I will start by identifying the entities and attributes and their relationships.
Case Scenario: Creating a Conceptual/Logical Model

A logical data model documents the information requirements of the business.
Physical Model: Case Scenario

Matt, I want to know the specifications for all tables and columns required in the simplified library database.

Faculty

Sure. I will convert the entities and their attributes into tables and columns.

Matt
Case Scenario: Creating a Physical Model
Summary

In this lesson, you should have learned how to:

• Describe a conceptual model
• Describe a logical model
• Describe a physical model
• Analyze the similarities and differences between conceptual and physical data models