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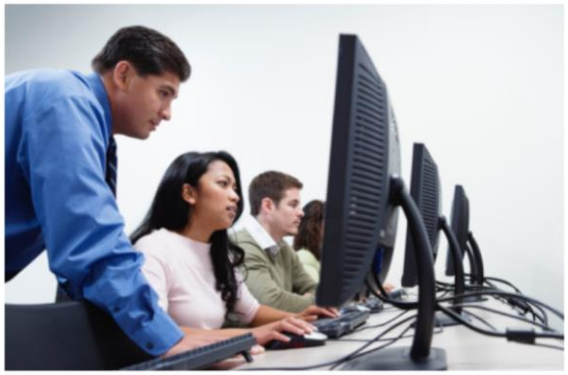
Academy

Database Design

2-1

Conceptual and Physical Models



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In this lesson, students will learn the concept of modeling and to recognize models – conceptual vs. physical. This lesson provides reasons for creating a data model in the first place, as opposed to just going ahead and building a database.

Have you ever had trouble finding a document in a filing cabinet or folder that someone else organized? The files may have been organized to meet that person's needs, but not your own.

Data modeling attempts to capture the needs of the business users so that the resulting database is one that everyone can use. The final product of this process is a data model, or more specifically a conceptual model known as an Entity Relationship Diagram.

Objectives

This lesson covers the following objectives:

- Explain the importance of clearly communicating and accurately capturing information requirements
- Distinguish between a conceptual model and its physical implementation
- List five reasons for building a conceptual data model
- Give examples of conceptual models and physical models

Purpose

- When you are able to recognize and analyze information, you can better understand how things work and potentially make them better
- For example:
  - How to make the line at the food counter go faster
  - How to successfully exchange an item at the store
  - How to organize and keep track of your growing CD collection
- Also, recognizing and analyzing information helps prevent mistakes and misunderstanding
- For a business, this is important because it saves time and money

If you were the manager of a fast-food restaurant, why would you want to collect information about how to make the customer lines at the food counter go faster?

Answers include:
The faster you can serve people, the greater the profits are for your store!
What would be the profits if it could only serve one customer per hour?
A business and its customers both suffer when inefficient processes are used. You would not return to a restaurant that could serve only one person per hour, would you?

What is a Conceptual Model?

A conceptual model:

- Captures the functional and informational needs of a business
- Is based on current needs but it may reflect future needs
- Addresses the needs of a business (what is conceptually ideal), but does not address its implementation (what is physically possible)
- Is the result of completing the Data Modeling process

What is a Conceptual Model?

- A conceptual model:
  - Identifies :
    - important entities (objects that become tables in database)
    - relationships among entities
  - Does not specify :
    - attributes (objects that become columns or fields in database)
    - unique identifiers (attribute that becomes primary key in database)

What is a Conceptual Model?

- A conceptual model is important to a business because it:
  - Describes exactly the information needs of the business
  - Facilitates discussion
  - Prevents mistakes and misunderstandings
  - Forms important “ideal system” documentation
  - Forms a sound basis for physical database design
  - Documents the processes (also known as the “business rules”) of the business
  - Takes into account regulations and laws governing this industry

What is a Logical Model?

- 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 and UIDs for each entity
  - Determines attribute optionality
  - Determines relationship optionality and cardinality

A logical data model describes the data in as much detail as possible, without regard to how it will be physically implemented in the database. It is normally derived from a conceptual data model.

What Is a Physical Model?

- 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

Physical modeling deals with the conversion of the logical data model to a relational database model. Each relational model can have one or more physical models, one for each RDBMS that you deploy to.

Conceptual and Physical Models

- It is the art of planning, developing, and communicating that allows a group of people to work together to achieve a desired outcome
- Data modeling is the process of capturing the important concepts and rules that shape a business and depicting them visually on a diagram
- This diagram becomes the blueprint for designing the physical thing
- The client's dream (conceptual model) will become a physical reality (physical model)

Terminology

- Key terms used in this lesson included:
  - Conceptual model
  - Data
  - Data modeling
  - Physical model

Summary

- In this lesson, you should have learned how to:
  - Explain the importance of clearly communicating and accurately capturing information requirements
  - Distinguish between a conceptual model and its physical implementation
  - List five reasons for building a conceptual data model
  - Give examples of conceptual models and physical models


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