Database Design

8-1
Modeling Historical Data
Objectives

This lesson covers the following objectives:

• Identify the need to track data that changes over time

• Construct ERD models that incorporate elements of “data over time”

• Identify the UID of an entity that stores historical data; explain and justify the choice of UID
Purpose

• How tall were you at age 5? How tall were you at age 10? How tall are you right now?

• If your parents wrote this down when you were young, they were keeping track of historical data.

• Most businesses need to track some historical data.

• This helps them find trends and patterns that are the basis for business innovations or process improvements.

• For example, rental history of a movie is useful to a video store. It tells managers which movies are popular and which should be moved to the back shelf.
Model Data Over Time

• When is it necessary to model data over time?
• Ask your client:
  – Is an audit trail required?
  – Can attribute values change over time?
  – Can relationships change over time?
  – Do you need to produce reports on older data?
  – Do you need to keep previous versions of the data? If so, for how long?
Data Over Time Example

• An organization needs to keep data about employees’ salaries.
• All employees are paid weekly.
• Initially, the following EMPLOYEE entity was modeled.
• Additional requirements now specify that the organization needs to keep a historical record of how and when employees’ salaries have changed during their employment.
Model Salary Changes

• To model salary changes over time, add a SALARY HISTORY entity.

• The UID of the SALARY HISTORY entity is the related EMPLOYEE id and the salary start date.
Model Rental Over Time

• A jewelry store rents pieces (necklaces, bracelets and so on) to movie stars for special occasions, such as award ceremonies or movie premieres.
• They would like to track the rental history of a jewelry piece.
• The following ER model will only track the current renter of a piece of jewelry.
• How would you revise the relationship to track history?
Resolve M:M

• The relationship between JEWELRY PIECE and MOVIE STAR should be revised to a M:M, which is then resolved with an intersection entity RENTAL HISTORY.

• Next we need to determine the UID of RENTAL HISTORY.
Determine UID

- Option 1: Barred relationship.
- Drawing a Barred relationship is not a suitable UID here, as this would not allow a MOVIE STAR to rent the same JEWELRY PIECE on different dates.
Determine UID

• Option 2: Barred relationship and Rental Date.

• Adding rental date to the UID would allow a MOVIE STAR to rent the same JEWELRY PIECE on different dates, but would also permit different MOVIE STARS to rent the same JEWELRY PIECE on the same date!
Determine UID

- Option 3: Barred relationship between MOVIE STAR and RENTAL HISTORY with Rental Date.

- This model would not permit the same MOVIE STAR to rent more than one JEWELRY PIECE on a given day.
Determine UID

• Option 4: Barred relationship between JEWELRY PIECE and RENTAL HISTORY with Rental Date.

• This model says that a JEWELRY PIECE can be rented only once on the same date.
Terminology

Key terms used in this lesson included:

• Audit trail
• Historical data
Summary

In this lesson, you should have learned how to:

• Identify the need to track data that changes over time

• Construct ERD models that incorporate elements of “data over time”

• Identify the UID of an entity that stores historical data; explain and justify the choice of UID