Database Design

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
- Construct a conceptual model based on a given business scenario

Objectives (cont.)

This lesson covers the following objectives:

- Apply the rules of entity-relationship diagramming to create an ERD that reflects the business rules
- Present and interpret the data model to an audience
- Compose written documentation to accompany the oral presentation and an ERD

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.

Purpose (cont.)

Can you think of an application for a pharmaceutical company, a commercial dairy or bakery, or a seafood-processing plant? What historical data would each want to keep and why?

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?

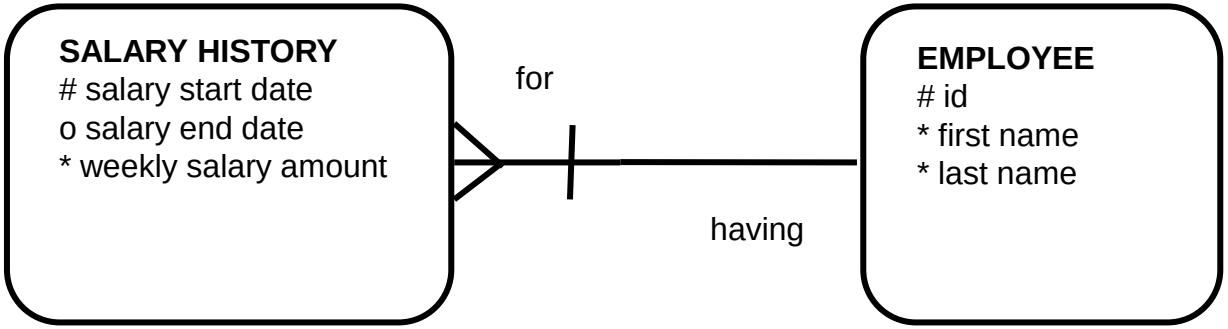
Data Over Time Example

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

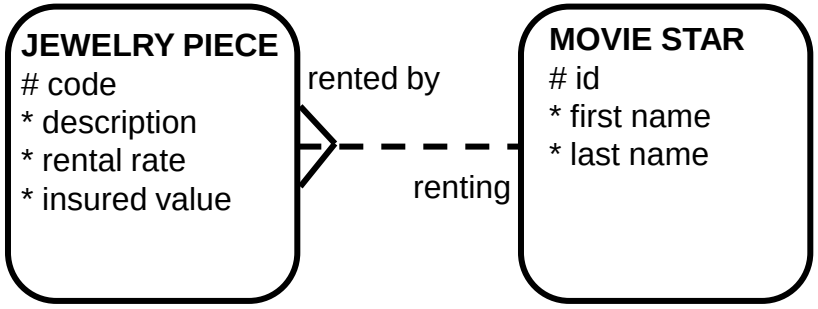
To model salary changes over time, add a SALARY HISTORY entity.



The UID of the SALARY HISTORY entity is the related EMPLOYEE id and the salary start date.

Model Rental Over Time

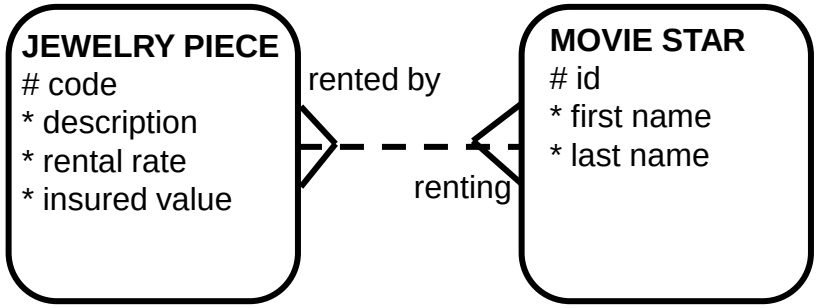
A jewelry store rents pieces (necklaces, bracelets and so on) to movie stars for special occasions, such as award ceremonies or movie premieres. They would like to track the rental history of a jewelry piece. The following ER model will only track the current renter of a piece of jewelry. How would you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



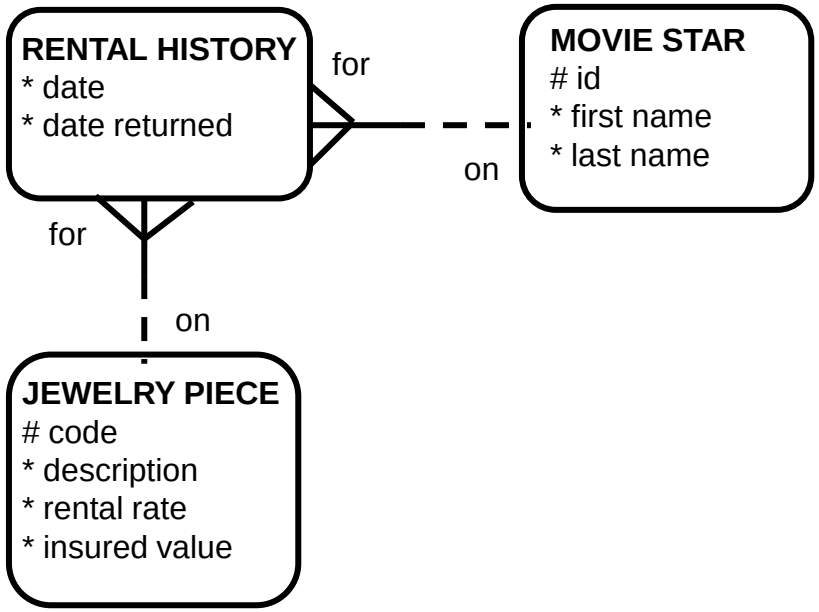
Resolve M:M

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.

What is the UID of RENTAL HISTORY?

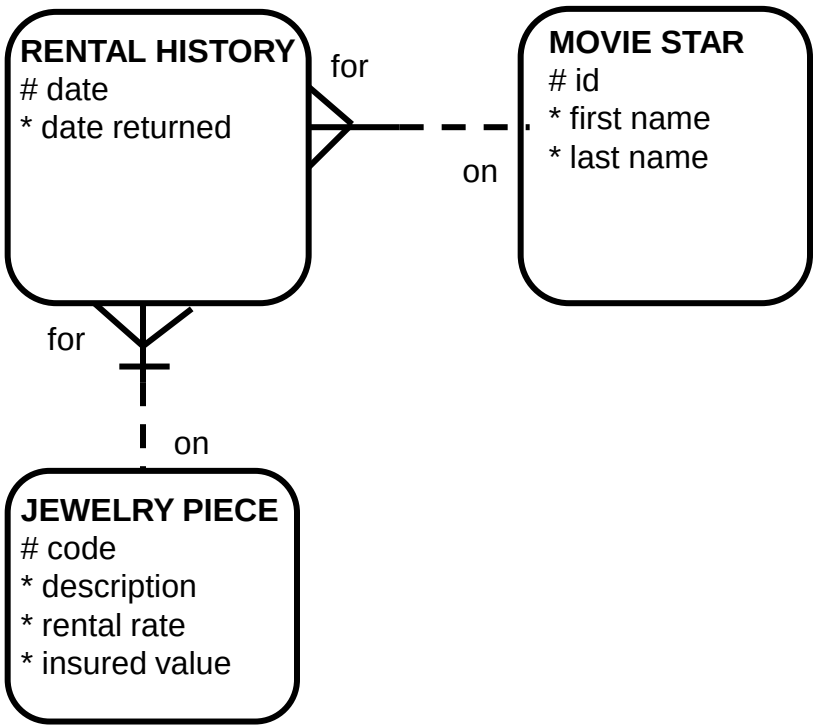


The M:M relationship is resolved with an intersection entity.



Barred Relationship

The UID of RENTAL HISTORY is date rented and the UID of JEWELRY PIECE (shown by the barred relationship).



Terminology

Key terms used in this lesson included:

- Audit trail
- Historical data

Summary

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