Database Design

Second Normal Form

Objectives

This lesson covers the following objectives:

- Define the rule of Second Normal Form in the normalization process

- Examine a non-normalized entity and determine which rule, or rules of normalization are being violated

- Apply the rule of Second Normal Form to resolve a violation in the model

Purpose

Your goal as a database designer is to "store information in one place only and in the best possible place." Consistently applying the rules of normalization helps you achieve this goal.

When organizing information such as your friends' phone numbers and addresses, you want to make sure that you store that information in the appropriate place -- such as a personal address book. If you store a friend's address in your recipe box, for instance, you may not find it until the next time you look up that recipe.

Purpose (cont.)

Normalization is a process that helps eliminate these kinds of problems.

Second Normal Form Example

Examine the entity PRODUCT SUPPLIER. The UID is a composite UID consisting of the supplier number and the product number.

If one supplier supplies 5 different products, then 5 different instances are created. What happens if the supplier name changes?

PRODUCT SUPPLIER

supplier number
product number
* purchase price
* supplier name

Second Normal Form Example (cont.)

The supplier name would then need to be changed in 5 different instances. What if some of them were changed, but not others? How would users know which name is the correct name?

PRODUCT SUPPLIER

\# supplier number
\# product number
* purchase price
* supplier name

Second Normal Form Description

Second Normal Form (2NF) requires that any non-UID attribute be dependent on (be a property of, or a characteristic of) the entire UID.

Is purchase price a property of supplier number, product number, or both?

PRODUCT SUPPLIER

\# supplier number
\# product number
* purchase price
* supplier name

Second Normal Form Description (cont.)

Is supplier name a property of supplier number, product number, or both?
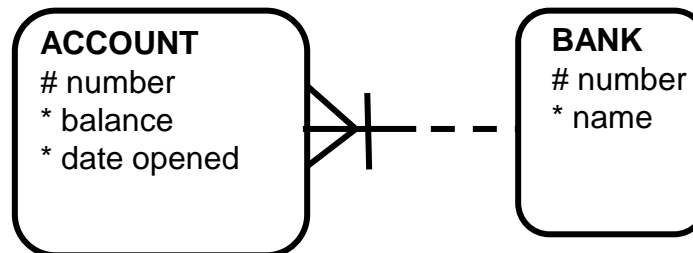
2NF requires a "both" answer to each question.

PRODUCT SUPPLIER

\# supplier number
\# product number
* purchase price
* supplier name

Second Normal Form Bar Relationship

The UID for ACCOUNT is a composite UID from a barred relationship consisting of ACCOUNT number and BANK number.

Is balance a property of ACCOUNT number, BANK number, or both? Is date opened a property of ACCOUNT number, BANK number, or both?

ACCOUNT
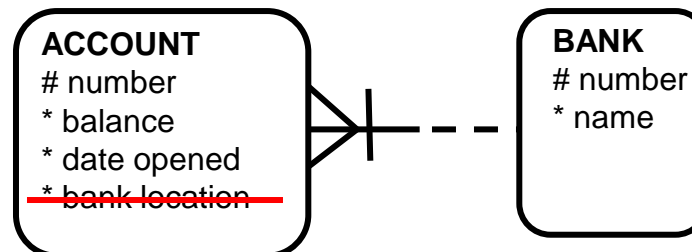# number
* balance
* date opened

BANK
number
* name

Second Normal Form Violation

In this ERD, the attribute bank location has been added. Is bank location a property of ACCOUNT number, BANK number, or both?

It is a property of BANK number only and is thus misplaced. This is a violation of Second Normal Form.

What would happen if a bank's location changed? Every account at that bank would need to be updated.

ACCOUNT
number
* balance
* date opened
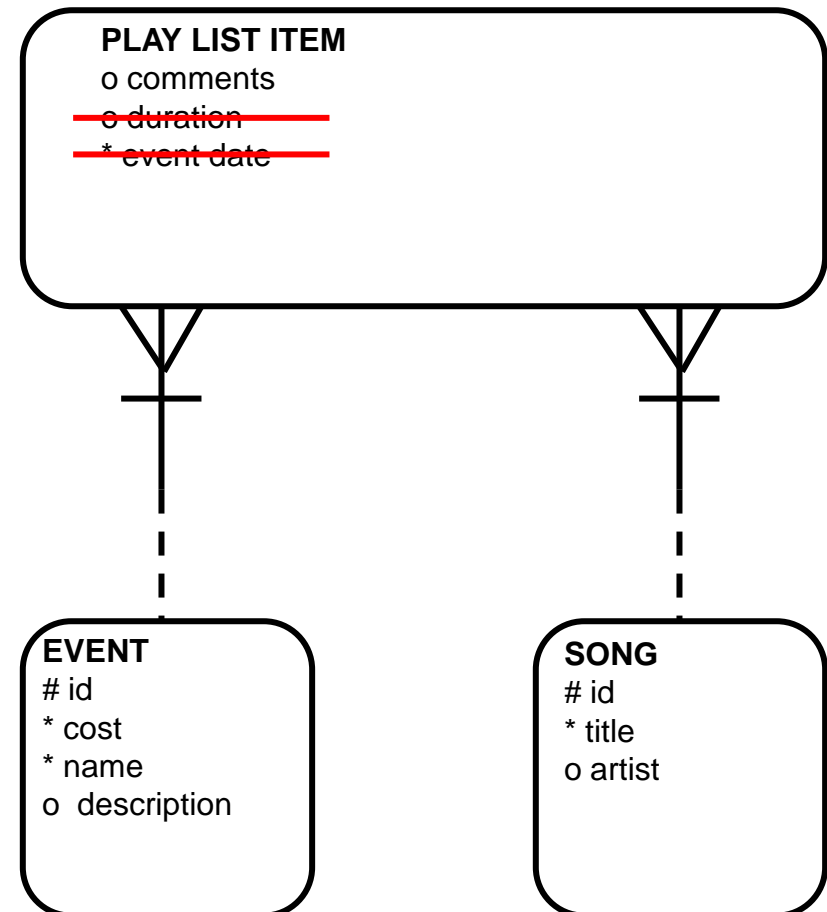* bank location

BANK
number
* name

Second Normal Form Song Example

The DJ is responsible for preparing the collection of songs to be played at each event. Each SONG can be played at more than one EVENT, and each EVENT will use more than one SONG. Let's look at how the DJ prepares the play list.

Modified DJ ERD

What is wrong with this diagram?

Answer: The attributes duration and event date are misplaced. Duration depends solely on SONG, and event date depends solely on EVENT. This is a violation of Second Normal Form.

PLAY LIST ITEM
o comments
~~o duration~~
~~* event date~~

EVENT
id
* cost
* name
o description

SONG
id
* title
o artist

Terminology

Key terms used in this lesson included:

- Second Normal Form (2NF)

Summary

In this lesson, you should have learned how to:

- Define the rule of Second Normal Form in the normalization process

- Examine a non-normalized entity and determine which rule, or rules of normalization are being violated

- Apply the rule of Second Normal Form to resolve a violation in the model