Database Design

6-3

Second Normal Form

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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

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Second Normal Form

Purpose

- 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

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

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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

- 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
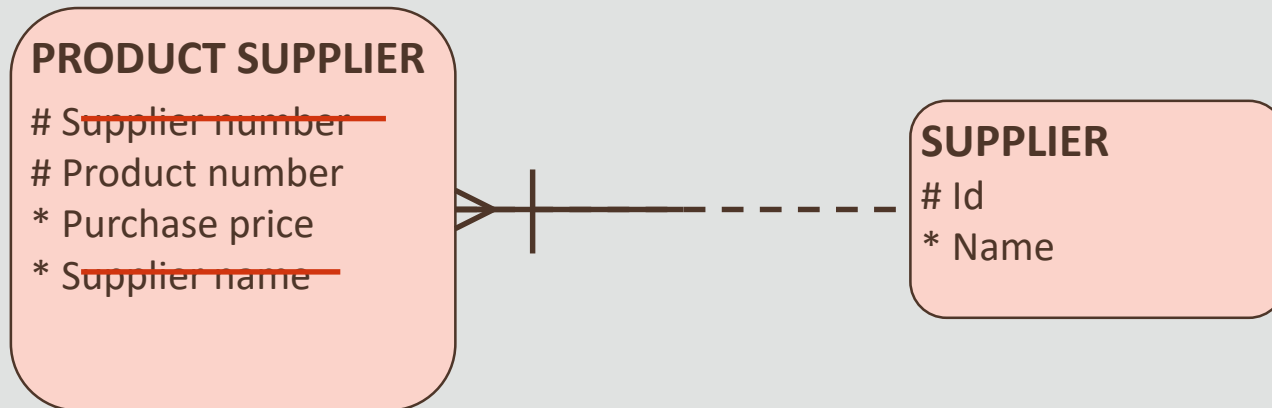* Supplier name

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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
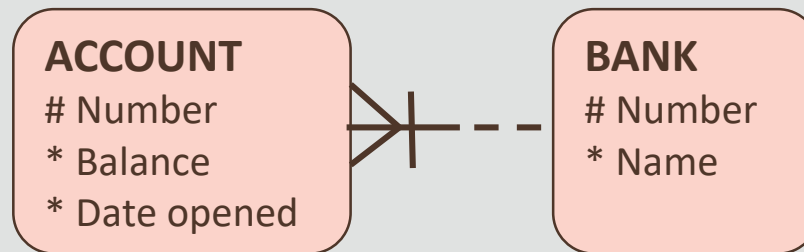* Supplier name

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Second Normal Form Description

- 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~~

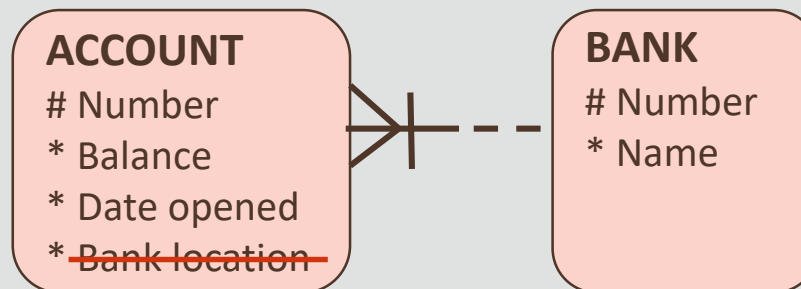**SUPPLIER**

Id
* Name

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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
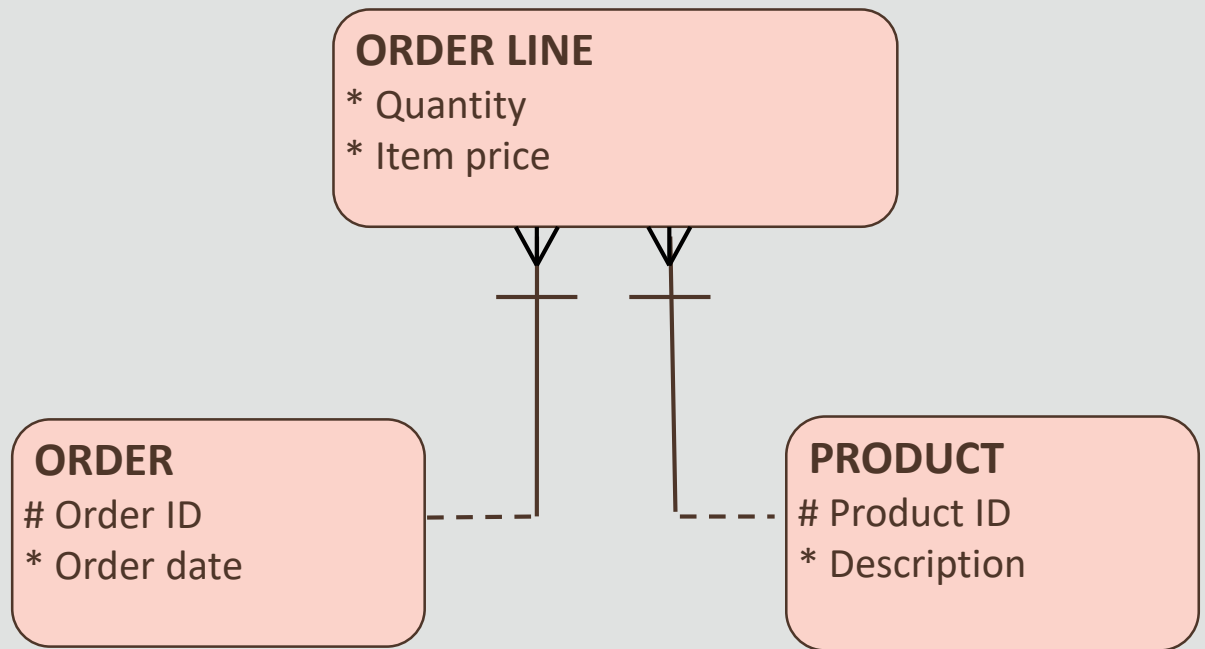* Date opened

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?

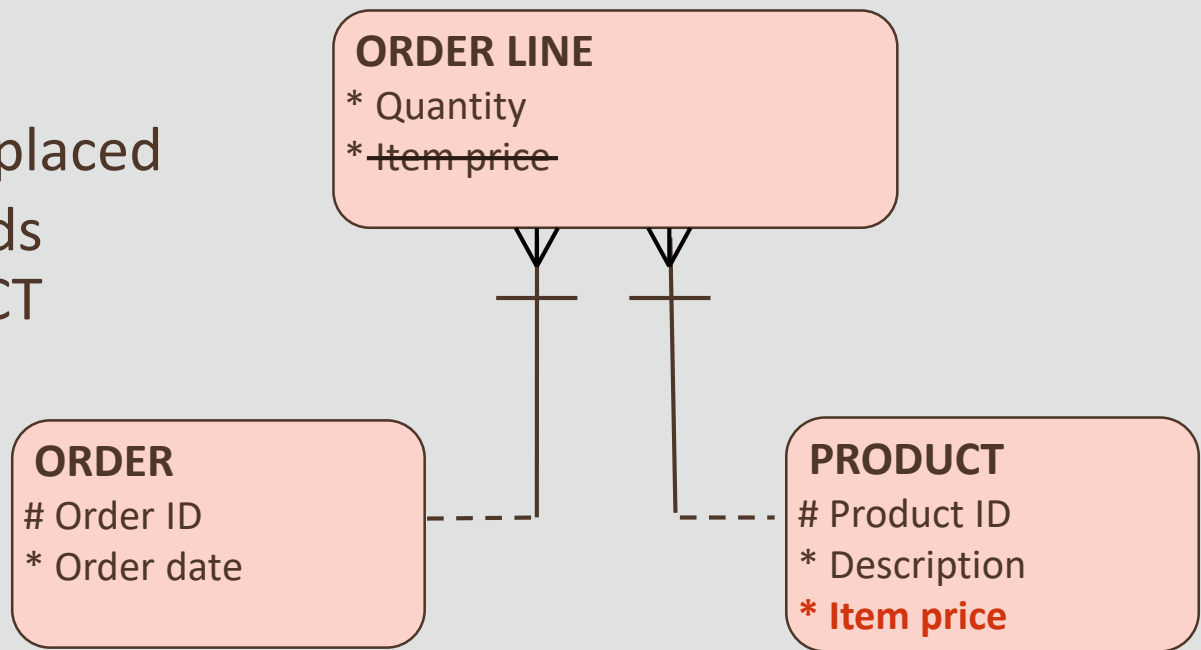- Every account at that bank would need to be updated

Order ERD

- What is wrong with this diagram?

ORDER LINE
* Quantity
* Item price

ORDER
Order ID
* Order date

PRODUCT
Product ID
* Description

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Order ERD

- The ERD is now in 2NF

- Answer:
  - The price attribute was misplaced
  - Item Price depends solely on PRODUCT
  - This is a violation of Second Normal Form

ORDER LINE
* Quantity
* ~~Item price~~

ORDER
Order ID
* Order date

PRODUCT
Product ID
* Description
* **Item price**

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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