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# Database Design

6-1

Artificial, Composite, and Secondary UIDs



# Objectives

This lesson covers the following objectives:

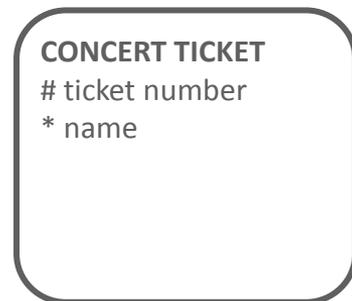
- Define the different types of unique identifiers (UIDs)
- Define a candidate UID and explain why an entity can sometimes have more than one candidate UID
- Analyze business rules and choose the most suitable primary UID from the candidates
- Recognize and discuss the issues of identification in the real world

# Purpose

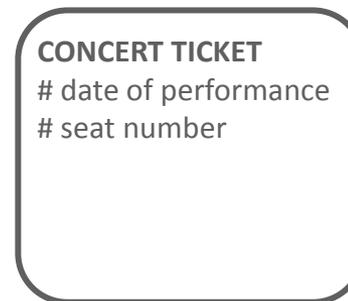
- The unique identifier (UID) is very important in relational databases.
- It is the value or combination of values that enables the user to find that one unique item among all the rest.
- Identifying just the right attribute, or combination of attributes and relationships, is a skill that any database designer must master.
- The unique identifier enables you to find your record in a file, a particular card in a deck of cards, your package in a warehouse, or a specific piece of data in a database.

# Simple UIDs vs. Composite UIDs

- A UID that is a single attribute is a simple UID.
- However, sometimes a single attribute is not enough to uniquely identify an instance of an entity.
- If the UID is a combination of attributes, it is called a composite UID.



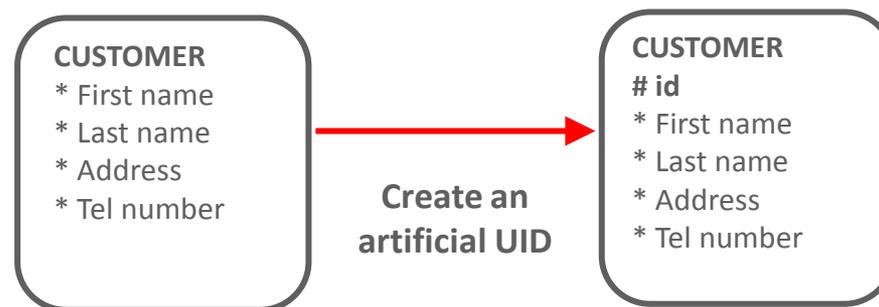
**Simple Unique Identifier**



**Composite Unique Identifier**

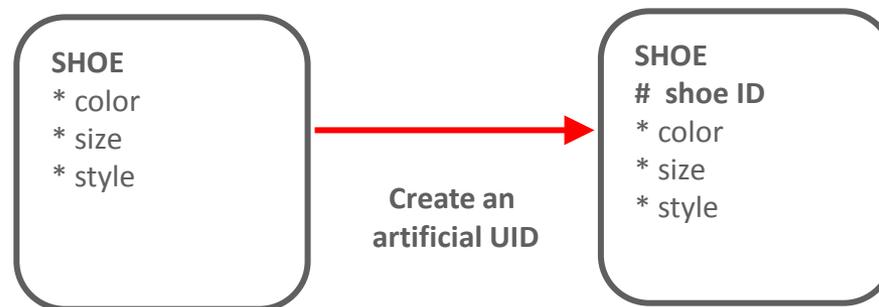
# Artificial UIDs

- Artificial UIDs are those that don't occur in the natural world but are created for purposes of identification in a system.
- People are not born with “numbers,” but a lot of systems assign unique numbers to identify people: student numbers, customer IDs, etc.



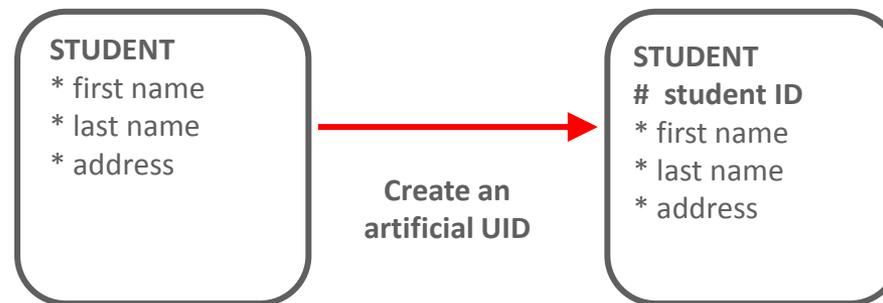
# Artificial UIDs

- A shoe has a color, a size, a style, but no truly descriptive “number.”
- However, a shoe store will assign unique numbers to each pair of shoes so they can be uniquely identified.



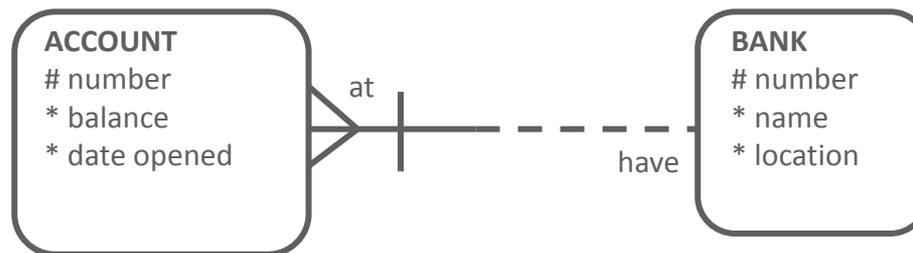
# Artificial UID Example

- How can we uniquely identify a STUDENT?
- Could we use a combination of first name and last name?
  - Only if we are sure that the combination is unique.
- Often, it is simpler and more straightforward to create an artificial attribute and make it the unique identifier.
- A UID can be both artificial and composite.



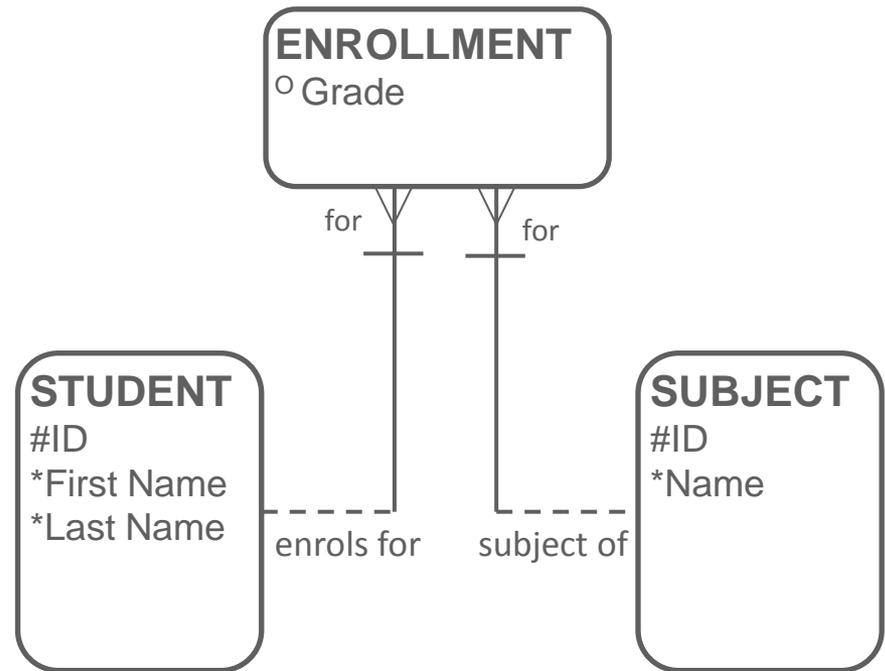
# UIDs from Barred Relationships

- Sometimes the UID is a combination of an attribute and a relationship.
- What is the UID of ACCOUNT? Is it artificial? Is it composite?
- Two people could have the same bank account number, but at different banks.
- Bank to bank transfers always need the bank routing number in addition to the bank account number.



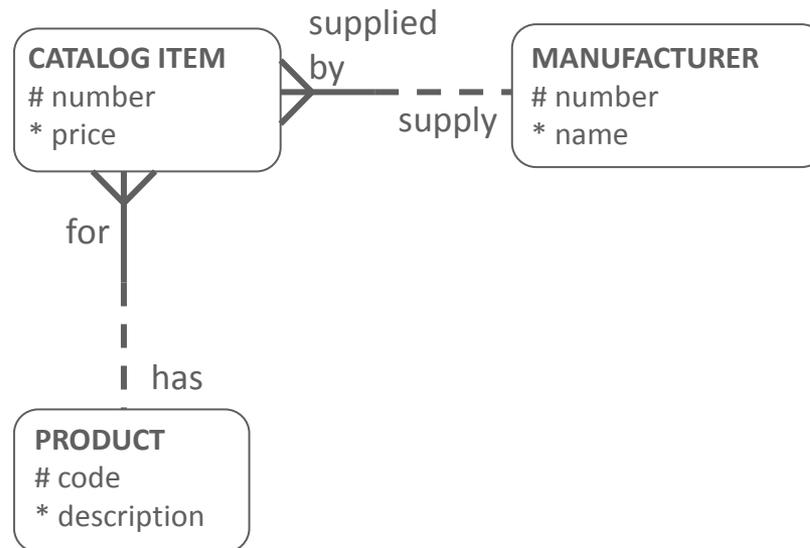
# UID from Barred Relationship Intersection Entity

- As we've seen before, the resolution of a M:M relationship often results in barred relationships from the intersection entity to the original ones.
- In this example, the UID of ENROLLMENT comes from STUDENT and SUBJECT.
- The bars on the relationships tell you this.



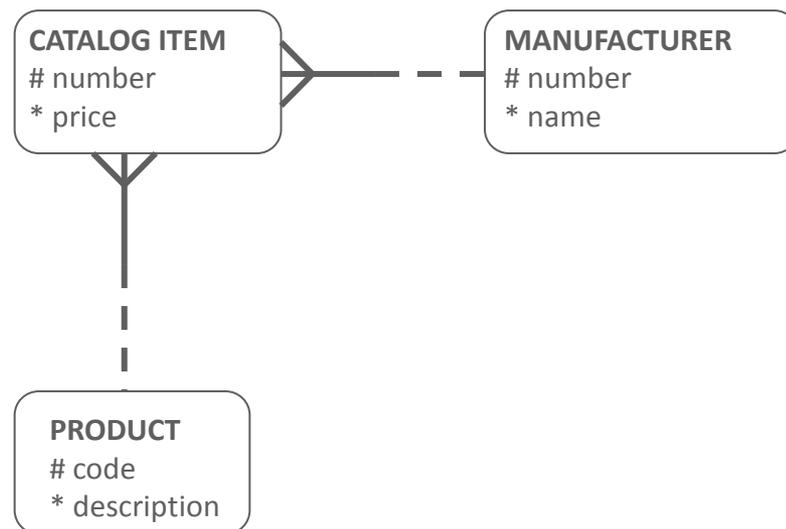
# Artificial UID Intersection Entity

- It is possible for an intersection entity to use an artificial attribute as the UID, instead of the barred relationships to the originating entities.



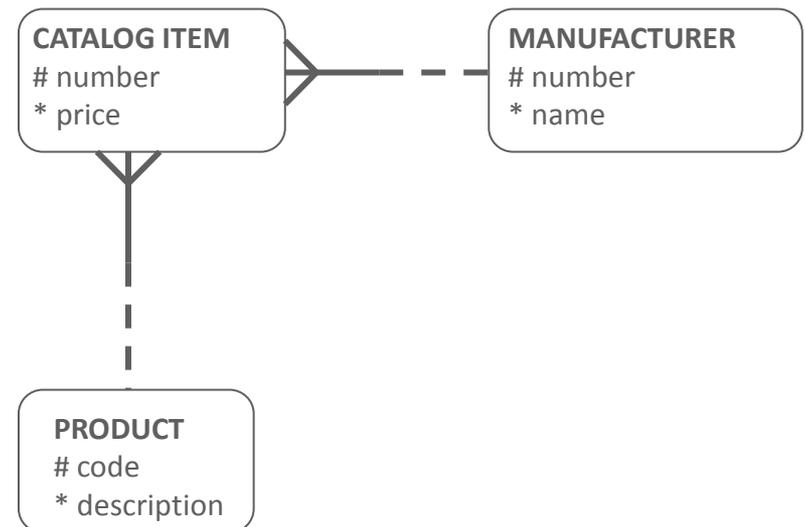
# Artificial UID Intersection Entity

- Each MANUFACTURER may produce one or more PRODUCTS (shoes, shirts, jeans, etc.).
- Each PRODUCT may be produced by one or more MANUFACTURERS (Nike shoes, Adidas shoes, Levi's jeans, etc.).



# Artificial UID Intersection Entity

- CATALOG ITEM resolves this many-to-many relationship.
- An item in a catalog can be uniquely identified by the manufacturer number and the product code.
- The relationships are not barred, because an artificial UID – catalog number – has been created instead.



# Candidate UIDs

- Sometimes two or more possible UIDs exist.
- For example, when you order a product from a commercial website, you will usually be assigned a unique customer code and asked to enter your e-mail address.
- Each of these uniquely identifies you, and each could be chosen as the UID. These are both candidate UIDs.
- Only one of the candidate UIDs is chosen as the actual UID. This is called the primary UID.
- The other candidates are called secondary UIDs.

# Candidate UIDs

- Student ID has been chosen as the primary UID in both of these STUDENT entities.
- The first entity has one secondary UID, while the second has two secondary UIDs (one of which is composite).

**STUDENT**  
# student ID  
(#) badge number  
\* first name  
\* last name  
\* address

**One Primary UID**  
**One Secondary UID**

**STUDENT**  
# student ID  
(#1) badge number  
(#2-1) first name  
(#2-2) last name  
\* address

**One Primary UID**  
**Two Secondary UIDs**

# Identification: Database vs. Real World

- Unique identifiers make it possible for us to distinguish one instance of an entity from another.
- As you will see later, these become primary keys in the database.
- A primary key allows you to access a specific record in a database.
- In the real world, however, it is sometimes not so easy to distinguish one thing from another.

# Terminology

Key terms used in this lesson included:

- Artificial UID
- Candidate UID
- Composite UID
- Primary UID
- Secondary UID
- Simple UID
- UID

# Summary

In this lesson, you should have learned how to:

- Define the different types of unique identifiers (UIDs)
- Define a candidate UID and explain why an entity can sometimes have more than one candidate UID
- Analyze business rules and choose the most suitable primary UID from the candidates
- Recognize and discuss the issues of identification in the real world

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