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

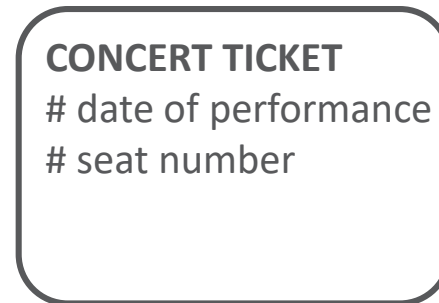- Recognize and discuss the issues of identification in the real world

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.

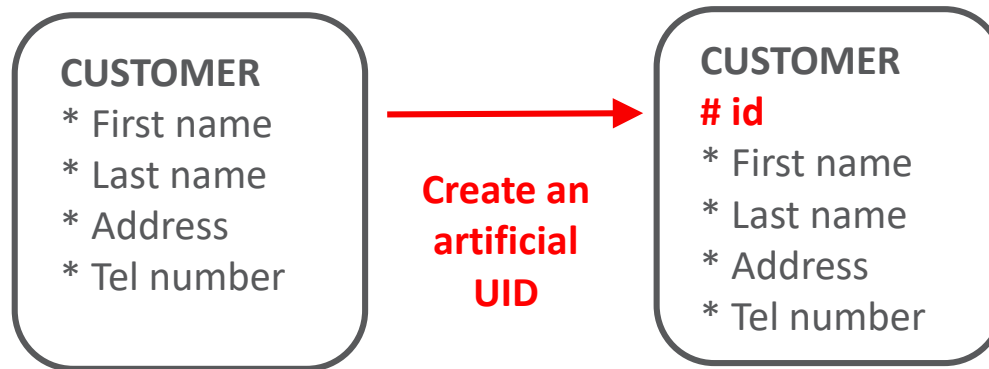- If the UID is a combination of attributes, it is called a composite UID.

CONCERT TICKET
\# ticket number
* name
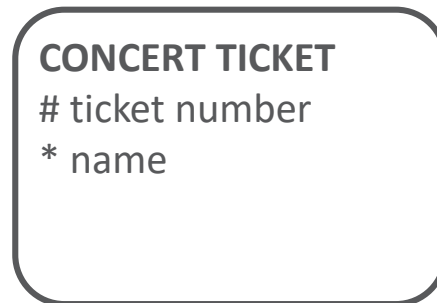
Simple Unique Identifier

CONCERT TICKET
\# date of performance
\# seat number

Composite Unique Identifier

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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.
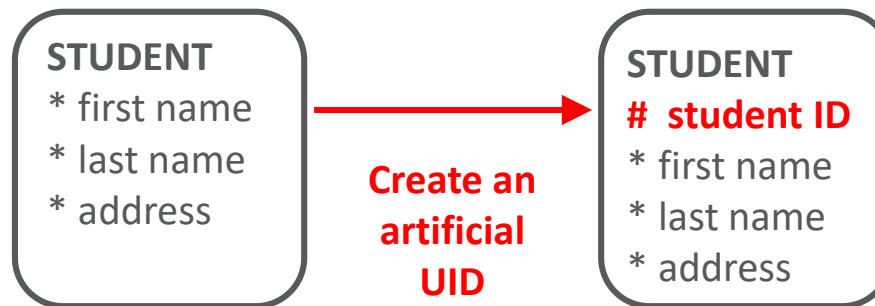
CUSTOMER
* First name
* Last name
* Address
* Tel number

Create an artificial UID

CUSTOMER
 # id
* First name
* Last name
* Address
* Tel number

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.

SHOE
* color
* size
* style

Create an artificial UID →

SHOE
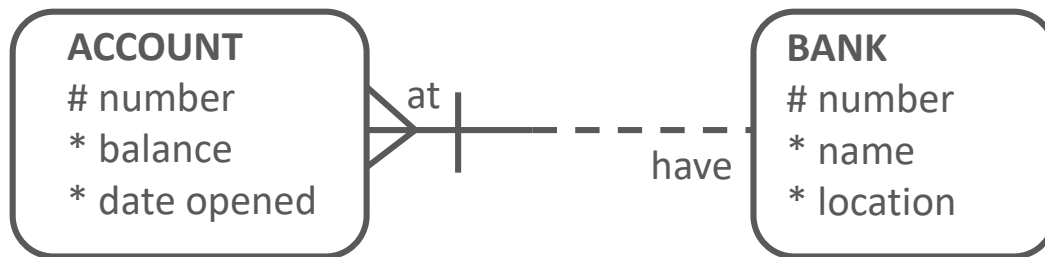**# shoe ID**
* color
* size
* style
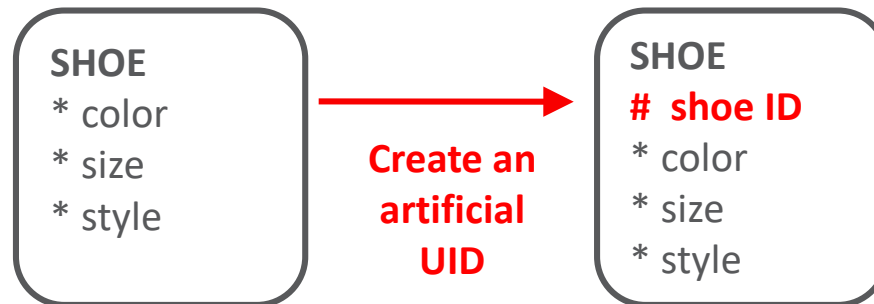
Artificial UID Example

- 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.

STUDENT
* first name
* last name
* address

Create an artificial UID →

STUDENT
 # student ID
* first name
* last name
* address

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.

```
ACCOUNT                          BANK
# number      at |               # number
* balance        |  ----------   * name
* date opened    |     have      * location
```
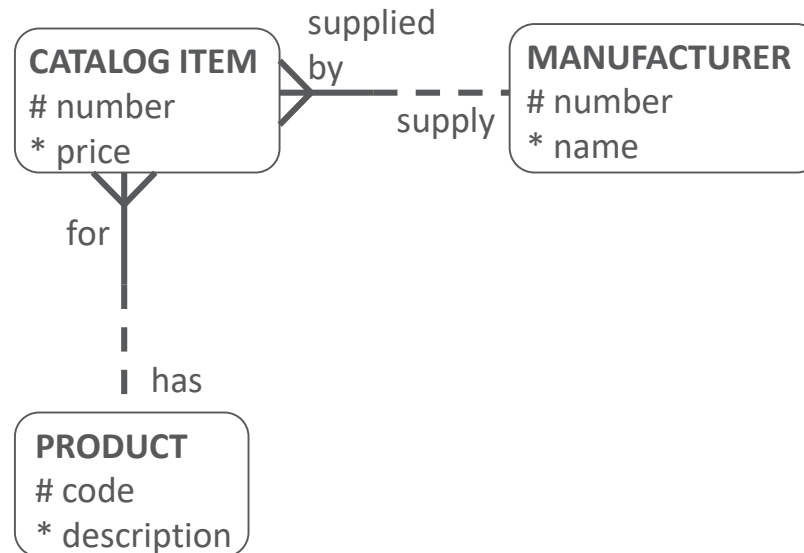
UID from Barred Relationship Intersection Entity

- 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.
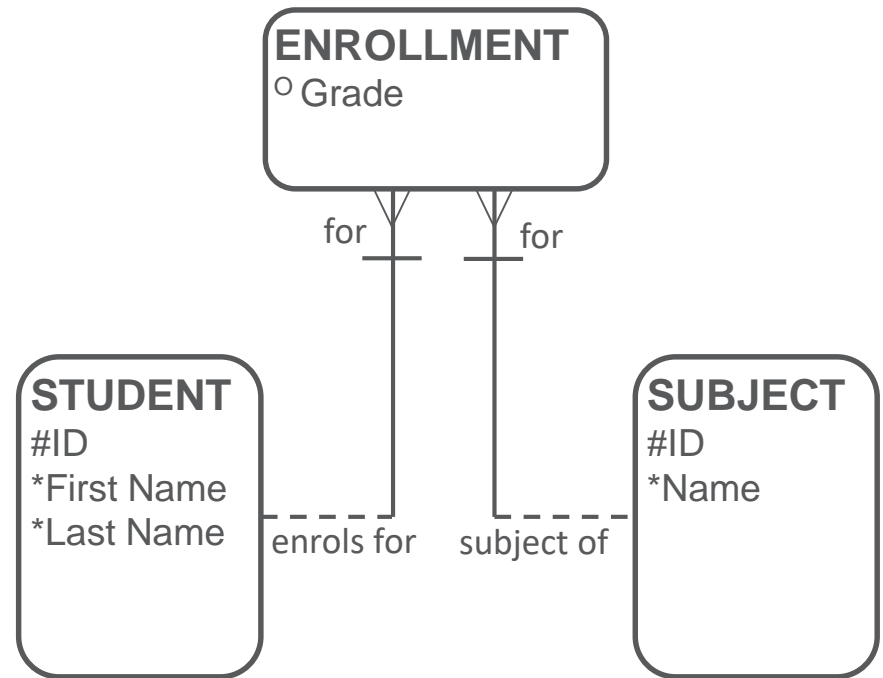
Artificial UID Intersection Entity

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

CATALOG ITEM
\# number
* price

supplied by

supply

MANUFACTURER
\# number
* name

for

has

PRODUCT
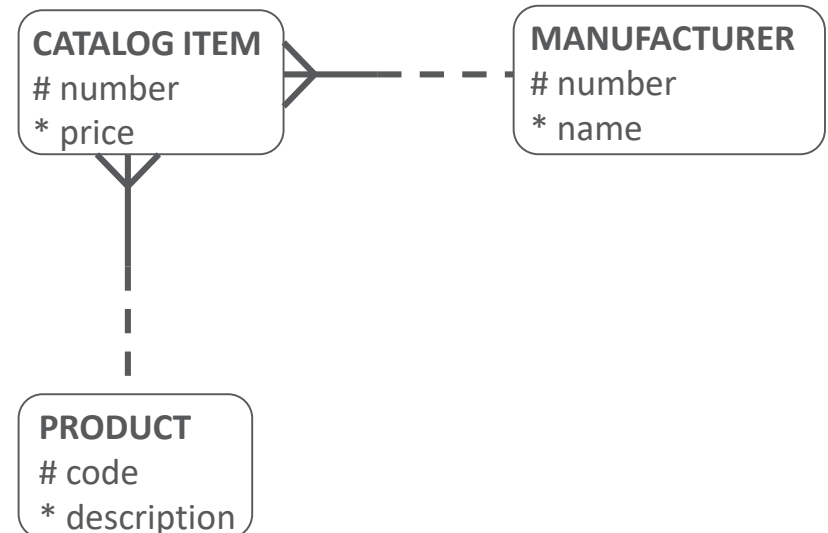\# code
* description

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.).

CATALOG ITEM
\# number
* price

MANUFACTURER
\# number
* name

PRODUCT
\# code
* description
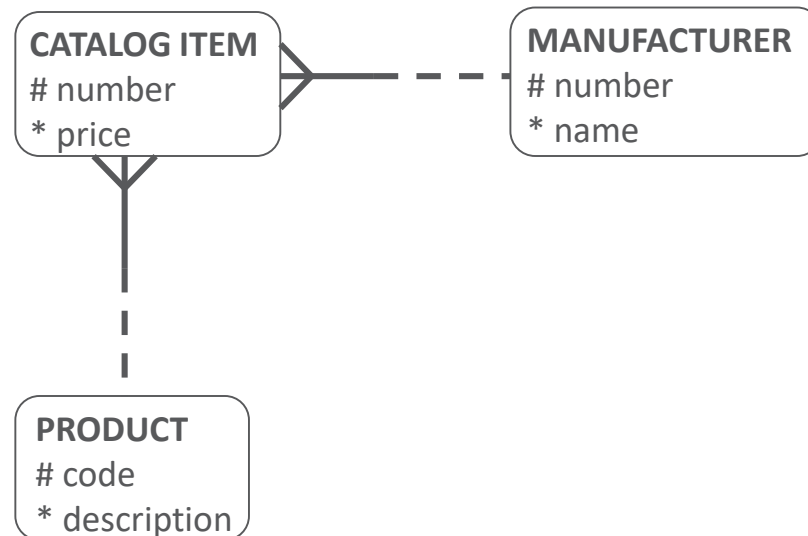
Artificial UID Intersection Entity

- 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.

CATALOG ITEM
number
* price

MANUFACTURER
number
* name

PRODUCT
code
* description

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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

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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