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Database Design

6-1

Artificial, Composite, and Secondary UIDs

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Objectives

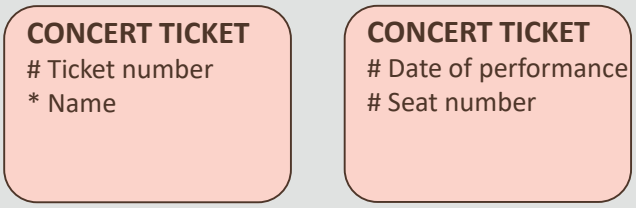
- This lesson covers the following objectives:
  - Define the different types of unique identifiers (UIDs)
  - Define a candidate UID and explain why an entity can sometimes have more than one candidate UID
  - Analyze business rules and choose the most suitable primary UID from the candidates
  - Recognize 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

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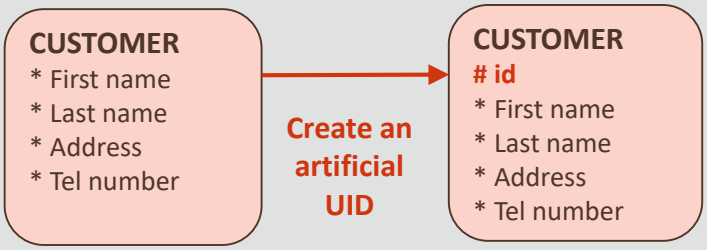
The date of performance or seat number alone does not identify a concert ticket. On any given date, there are many seats available. The same seat number is sold for many different dates.

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



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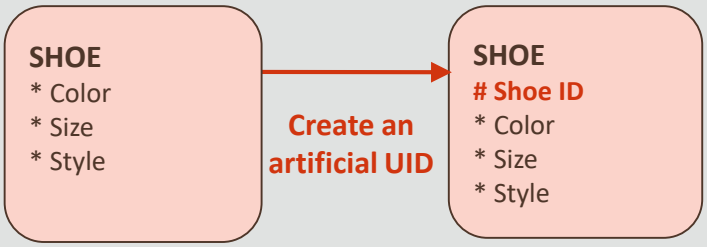
More examples: credit card numbers, social security numbers, passport numbers.

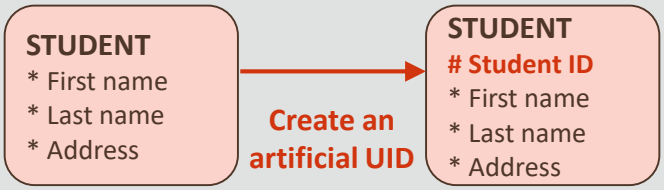
Artificial UIDs

- 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



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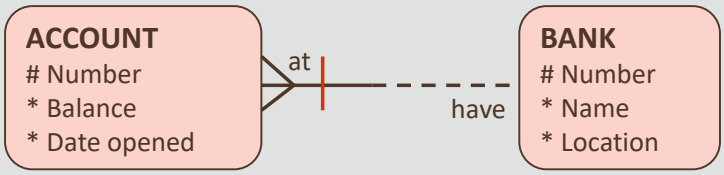
A combination of first name, last name, and address would possibly be unique. However, it is not as convenient as a single ID.
Think of the business requirements: if you went to the library, or checked out equipment at the gym, or asked for a copy of your grades – is it easier to just provide a student ID or to provide name and address each time?

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



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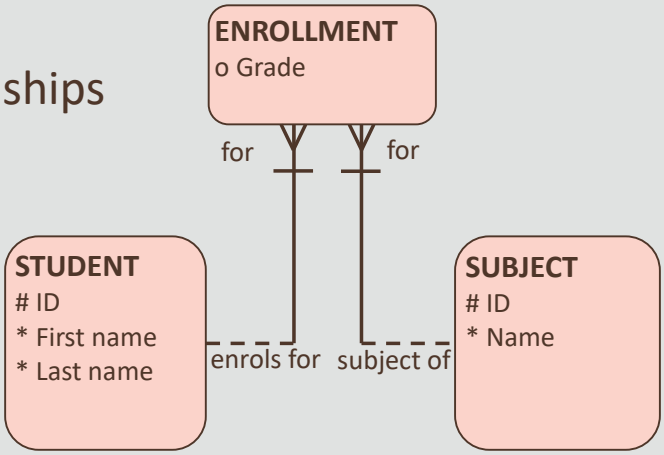
UID from Barred Relationship Intersection Entity

- 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



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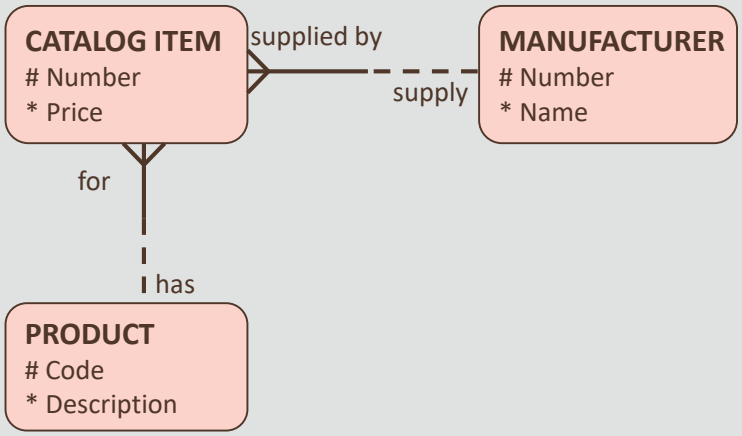
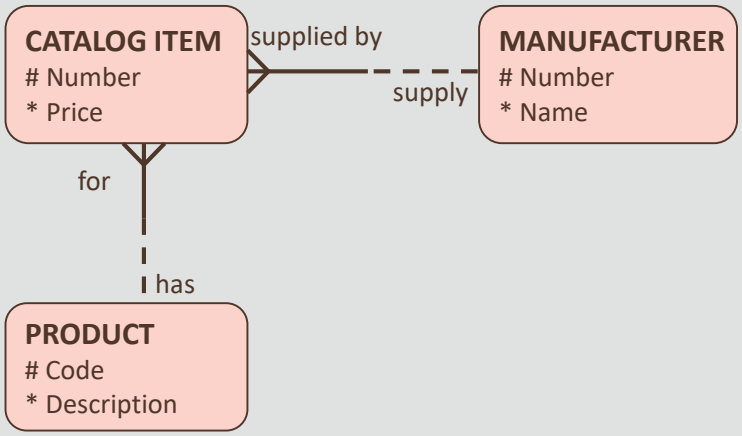
Artificial UID Intersection Entity

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



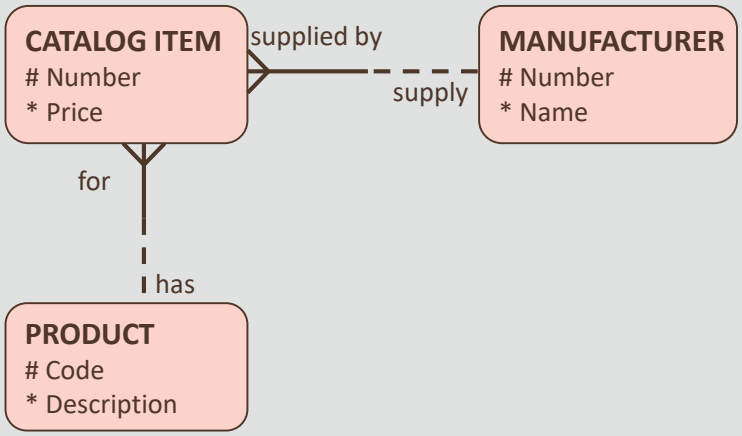
Artificial UID Intersection Entity

- 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, an artificial UID – catalog number – has been created instead



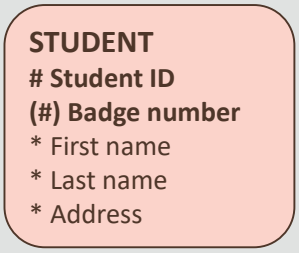
Candidate UIDs

- 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

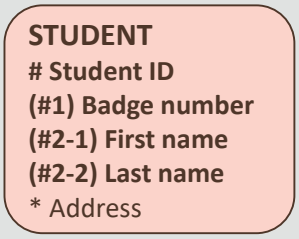
Candidate UID: One of several UIDs that could be used to identify something
Primary UID: A candidate UID that is the primary identifier of something
Secondary UID: A candidate UID that also identifies something, but is not the primary UID
Secondary UIDs can be useful as an alternative means of searching for data.
Examples:
You forgot your student ID, but you have your badge with you.
You have a frequent-shopper card at the supermarket but did not bring it with you. Some systems can find your information if you provide your telephone number.

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)



One Primary UID
One Secondary UID



One Primary UID
Two Secondary UIDs

The composite secondary UID (first name, last name) in the second entity may not be unique and therefore would not be chosen to be the primary UID.

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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