
ORACLE
Academy

Database Design

2-2
Entities, Instances, Attributes, and Identifiers

ORACLE Academy

Objectives

This lesson covers the following objectives:

- Define and give an example of an entity
- Distinguish between an entity and an instance of an entity
- Name and describe attributes for a given entity
- Distinguish between an attribute and its value
- Distinguish between mandatory and optional attributes, and between volatile and nonvolatile attributes
- Select and justify a unique identifier (UID) for an entity

Purpose of Entities

- Knowing how to organize and classify data makes it possible to draw useful conclusions about seemingly random facts.
- Our technology-rich world produces vast quantities of facts in need of structure and order.
- It is important to learn about entities because they are the things about which we store data.
- For example:
  - A school needs to store data about (as a minimum): STUDENTs, TEACHERs, COURSEs, ROOMs, GRADEs.

Purpose of Attributes

- It is important to learn about attributes because they provide more specific information about an entity.
- Attributes help you distinguish between one instance and another by providing greater detail for the entity.
- For example:
  - In a restaurant, you need to list the individual items on a customer's order so that you can calculate the bill.
  - When building several sales reports, you must be able to identify a specific report from the list of reports.

Purpose Unique Identifiers

- What about unique identifiers?
- It is important to learn about unique identifiers because they distinguish one instance of an entity from another.
- For example:
  - In a classroom, you need to distinguish between one student and another.
  - When classifying your CD collection, you need to distinguish between one CD and another.
  - When listing transactions on a financial statement, you need to distinguish between one transaction and another.

Identifying Purpose

- Look at the magazine advertisements and the Internet sites identified by the teacher.
- What is the “main thing” that each ad or website is about?

Entity Defined

An entity is:

- "Something" of significance to the business about which data must be known
- A name for a set of similar things that you can list
- Usually a noun
- Examples: objects, events, people
- Entities have instances.
- An instance is a single occurrence of an entity.

Entities and Instances

Entities	Instances
PERSON	Mahatma Gandhi, George Washington
PRODUCT	Nike Air Jordan, Gibson Les Paul Custom
PRODUCT TYPE	Shoe, Video Game
JOB	Electrician, IT Technician
SKILL LEVEL	Beginner, Expert
CONCERT	U2 at the Palladium, Beyoncé at the Greek Theatre L.A.
ANIMAL	Dog, Cat
CAR	Volkswagen Beetle, Toyota Corolla

Entities and Instances

- A Dalmatian, a Siamese cat, a cow and a pig are instances of ANIMAL
- A convertible, a sedan and a station wagon are instances of CAR
- Some entities have many instances and some have only a few
- Entities can be:
  - Tangible, like PERSON or PRODUCT
  - Intangible, like SKILL LEVEL
  - An event, like CONCERT

Entities and Instances

- Is DOG an instance or an entity?
- It depends:
  - If we consider many different kinds of animals, it makes sense to think of the entity ANIMAL to include instances DOG, CAT, HORSE and so on.
  - But what if we run a dog-breeding business? We will need to keep data on many different breeds of dog, but not on other species of animal.
  - For a dog-breeder, it is more natural to think of an entity DOG to include instances TERRIER, POODLE, LABRADOR and so on.

What is an Attribute?

- Like an entity, an attribute represents something of significance to the business.
- An attribute is a specific piece of information that helps:
  - Describe an entity
  - Quantify an entity
  - Qualify an entity
  - Classify an entity
  - Specify an entity
- An attribute has a single value.

Attributes

- Attributes have values. An attribute value can be a number, a character string, a date, an image, a sound, etc.
- These are called "data types" or "formats." Every attribute stores one piece of data of one specific data type.

Entities	Attributes
CUSTOMER	family name, date of birth, shoe size, town of residence, email
CAR	model, weight, catalog price
ORDER	order date, ship date
JOB	title, description
TRANSACTION	amount, transaction date
EMPLOYMENT CONTRACT	start date, salary

Attributes

- What is the data type of each attribute in CUSTOMER?
- For example: family name is a character string. Attributes are single-valued. Each attribute can have only one value (at any point in time) for each instance of the entity.

Entities	Attributes
CUSTOMER	family name, age, shoe size, town of residence, email
CAR	model, weight, catalog price
ORDER	order date, ship date
JOB	title, description
TRANSACTION	amount, transaction date
EMPLOYMENT CONTRACT	start date, salary

Attributes

- Some attributes (such as age) have values that constantly change.
- These are called volatile attributes.
- Other attributes (such as order date) will rarely change, if ever.
- These are nonvolatile attributes.
- If given a choice, select the nonvolatile attribute.
- For example, use birth date instead of age.

Attributes

- Some attributes must contain a value—these are mandatory attributes.
- For example: in most businesses that track personal information, name is required.
- Other attributes may either contain a value or be left null—these are optional attributes.
- For example: cell phone number is often optional except in mobile or wireless applications.

Attributes

- Example: Email address could be a mandatory attribute for EMPLOYEE in an email application, but an optional attribute for CUSTOMER in an online catalog.

Attributes

- If we were to model a Human Resource system, we would have an entity to store data for each worker called EMPLOYEE.
- What attributes does EMPLOYEE have?
- Give one or two examples of the values that each EMPLOYEE attribute might contain.

Identifiers

- An EMPLOYEE has a unique identifier (UID).
- A UID is either a single attribute or a combination of multiple attributes that distinguishes one employee from another.
- How do you find a specific employee that works for the company?
- What information uniquely identifies one EMPLOYEE?

Identifiers

- Think about all the students in the classroom.
- Each student is described by several traits or attributes.
- Which attribute or attributes allow you to pick a single student from the rest of the class?
- That is the student's UID.

Terminology

Key terms used in this lesson included:

- Attribute
- Data type
- Entity
- Instance
- Mandatory
- Intangible

Terminology

Key terms used in this lesson included:

- Null
- Optional
- Single valued
- Tangible
- Unique identifier (UID)
- Volatile

Summary

In this lesson, you should have learned how to:

- Define and give an example of an entity
- Distinguish between an entity and an instance of an entity
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