Entities and Attributes

Entities

- Entities are *anything* you want to store data about
  - people (students, customers, employees, etc.)
  - places (resorts, cities, countries, etc.)
  - things (restaurants, products, invoices, movies, paintings, books, buildings, contracts, etc.)
  - events (elections, presentations, earthquakes, hurricanes, etc.)

Entity Sets

- Entity sets are **collections** of related **entities**. Entities are related by their classification:
  - **student entities are related by the fact that they are all students**
  - **invoice entities are related by the fact that they are all invoices**
  - **car entities are related by the fact that they are all cars**

Entity Sets, cont.

- Entity sets are named after the entities that are stored in them.
- Entity set names are singular.
- Entity set names are capitalized.

Examples:

An entity set named STUDENT contains student entities.

An entity set named INVOICE contains invoice entities.

An entity set named PRODUCT contains product entities.

Entity Sets, cont.

- Entity sets can only contain *related* entities
  - a **STUDENT** entity set may not contain INVOICE entities
  - a **DEPARTMENT** entity set may not contain invoice entities
  - a **PRODUCT** entity set may not contain employee entities

…. And so on

Entity Sets and Entities

Entity sets are collections of **related entities**

- Unfortunately, database designers almost always use the two terms as synonyms.
- When database designers refer to *entities*, they really are referring to *entity sets*.
- Therefore, when you see a reference to an **EMPLOYEE** "entity" in a database design, remember that **EMPLOYEE** actually represents an entity set that contains a collection of employee entities.

Attributes

Attributes are the characteristics that describe entities.

Example:

- a **student** entity may be described by attributes that may include his or her ...
  - **social security number**
  - **name**
  - **address**
  - **date of birth**
  - **major**

Attributes, cont.

Remember: Attributes are the characteristics that describe entities

- An invoice entity may be described by attributes such as these:
  - **invoice number**
  - **invoice date**
  - **customer number**
  - **invoice total**

Attribute Names

- Attribute names are capitalized.
- For documentation reasons, attribute names are composed of two parts:
  - the first few characters reflect the entity they help describe.
  - subsequent characters are sufficiently descriptive to identify the attribute.

Attribute Names, cont.

Examples of attribute names:

EMP_LNAME = employee last name

STU_GPA = student grade point average

PROD_CODE = product code

CUST_LNAME = customer last name

INV_NUM = invoice number

Simple (Atomic) Attributes

A **simple** (**atomic**) attribute cannot be decomposed into meaningful components

Examples:

- The attribute **EMP_LNAME** cannot be decomposed, because you cannot subdivide **EMP_LNAME** into a set of new attributes.
- The attribute **PROD_PRICE** cannot be decomposed, because you cannot subdivide **PROD_PRICE** into a new set of attributes.

Simple (Atomic) Attributes, cont.

Simple attributes may be ….

- **single-valued**

  or

- **multi-valued**

Simple (Atomic) Attributes, cont.

- **Single-valued simple attributes**
  - Example: an employee can have only one gender, so EMP_GENDER is a single-valued attribute. The attribute EMP_GENDER cannot be decomposed, so it is a simple attribute.
- **Multi-valued simple attributes**
  - Example: an employee can have many degrees, so EMP_DEGREE is multi-valued. The attribute EMP_DEGREE cannot be decomposed, so it is a simple attribute.

Composite Attributes

A **composite attribute** can be decomposed into meaningful components

- **Example: an employee's address, shown as**
  123 East Main Street, Nashville, TN 32123

  may be decomposed into

  EMP_ADDRESS = 123 East Main Street
  EMP_CITY = Nashville
  EMP_STATE = TN
  EMP_ZIP = 32123

Composite Attributes, cont.

A composite attribute may be ….

- **single-valued**

  or

- **multi-valued**

Composite Attributes, cont.

- single-valued composite attributes
  - Example: an employee can have only one date of birth, so EMP_DOB is single-valued. But the attribute EMP_DOB can be decomposed into year, month, and day, so it is a composite attribute.
- multi-valued composite attributes
  - Example: an employee can have more than one address, so EMP_ADDRESS may be multi-valued. The attribute EMP_ADDRESS can be decomposed into street address, city, state, and ZIP code, so it is a composite attribute.

The End