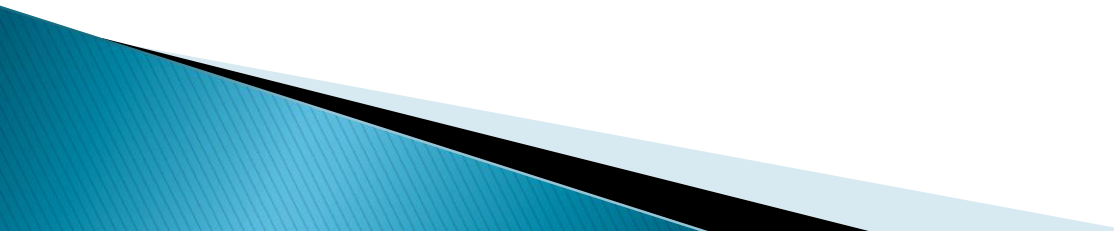


Entities and Attributes



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:

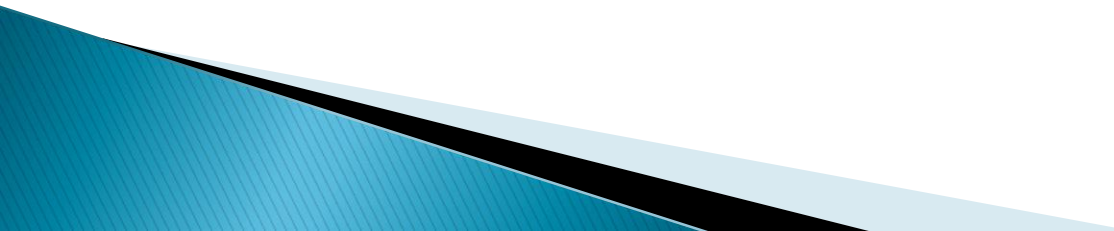
- a **student** entity may be described by attributes that may include his or her ...
 - social security number
 - name
 - address
 - date of birth
 - major

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

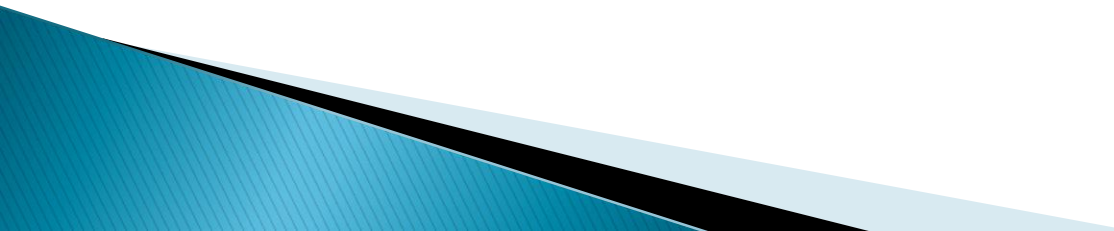
A simple (**atomic**) attribute cannot be decomposed into meaningful components

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

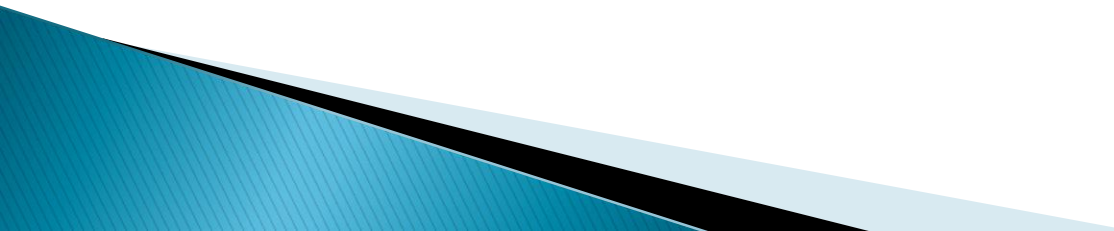
may be decomposed into

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