

Database Management System – 10 (Entities and Attributes)

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Outline

- Entities
- Attributes
- Type of Attributes

Entities and Attributes

- **Entity**

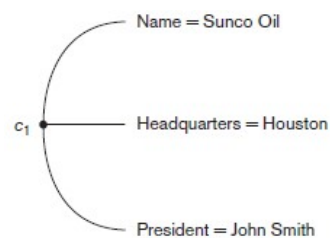
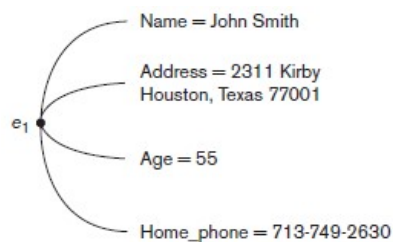
- A thing or object in the real world with an independent existence
- May be an object with a physical existence (a person, car, house, or employee)
- May be an object with a conceptual existence (a company, a job, or a university)

- **Attributes**

- Particular properties that describe an entity
- EMPLOYEE entity
 - name, age, address, salary, and job

Entities and Attributes

- A specific entity will have a **value** for each of its attributes
- Each attribute has a **value set** (or data type) associated with it – e.g. integer, string, subrange, enumerated type, ...



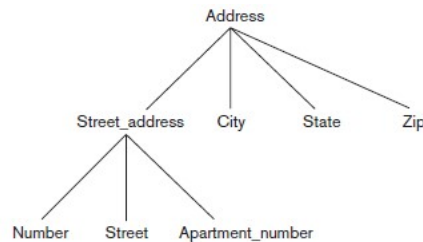
Types of Attributes (Simple vs Composite)

- **Simple or atomic attributes**

- Attributes that are not divisible
- *SSN, SEX*

- **Composite Attributes**

- can be divided into smaller subparts
- can form a hierarchy
- Value of a composite attribute is the concatenation of the values of its component simple attributes



Types of Attributes (Single-valued vs Multi-valued)

- **Single-Valued**

- Attributes have a single value for a particular entity
- *Age, Sex of a person*

- **Multi-valued**

- Attributes have set of values for the same entity
- *Colors* attribute for a car
- *College_degrees* attribute for a person
- may have lower and upper bounds to constrain the number of values allowed for each individual entity

Types of Attributes (Stored versus Derived)

- Two (or more) attribute values are related
 - *Age* and *Birth_date* attributes of a person
 - *Age* attribute is called a **derived** attribute
 - *Birth_date* attribute is called a **stored** attribute
- Attribute values can be derived from ***related entities***
 - *Number_of_employees* of a DEPARTMENT entity can be derived by counting the number of employees working for that department

NULL Values

- Entity may ***not*** have an ***applicable*** value for an attribute
 - *Apartment_number* attribute of an address
 - *College_degrees* attribute of a person
- Special value called **NULL** is created
- NULL can also be used if we ***do not know*** the value of an attribute for a particular entity
 - if we do not know the *home phone number* of 'John Smith'
- NULL is used when it is known that the attribute **value exists but is missing**
 - *Height* attribute of a person is listed as NULL

Complex Attributes

- Composite and multivalued attributes can be nested arbitrarily
- Representation
 - components of a composite attribute between parentheses () and separating the components with commas
 - Multi-valued attributes between braces { }
- Such attributes are called **complex attributes**

```
{Address_phone( (Phone(Area_code,Phone_number)),Address(Street_address
(Number,Street,Apartment_number),City,State,Zip) )}
```

Reference

- Elmasri R. and S. Navathe, Database Systems: Models, Languages, Design and Application Programming, Pearson Education 6th edition and 7th edition

Thank you

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