UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA

Course Name : Database Management System

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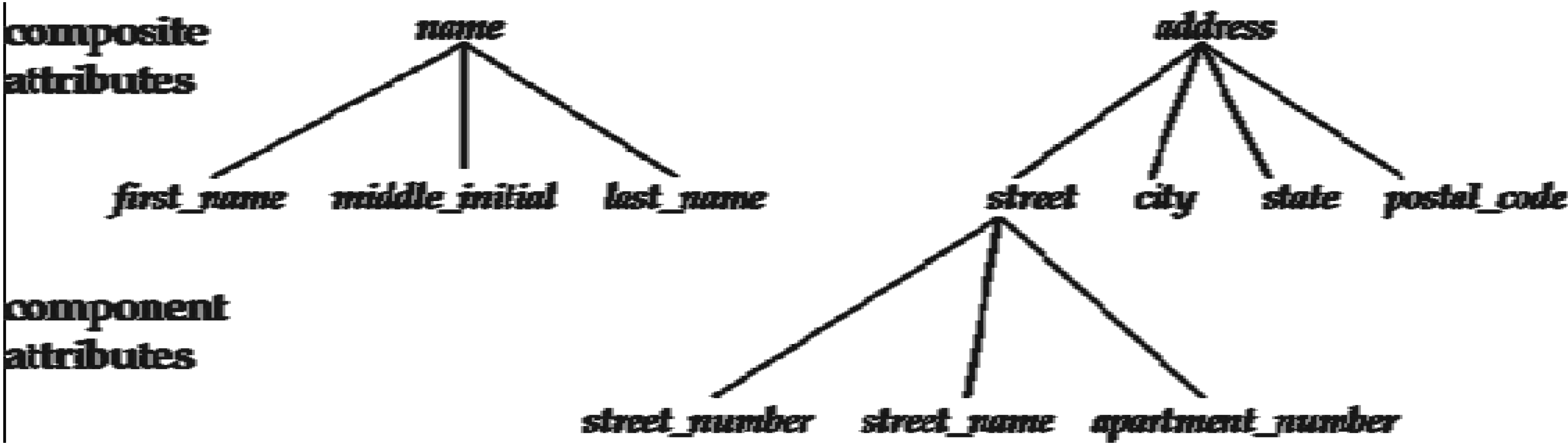
Module 2: Attributes Types

Attributes types

- Attribute types:
  - **Simple** and **composite** attributes.
    - Example: composite : name, address
  - **Single-valued** and **multivalued** attributes
    - Example: multivalued attribute: *phone_numbers*
  - **Derived** attributes
    - Can be computed from other attributes
    - Example: age, given date_of_birth
- **Domain** – the set of permitted values for each attribute / range of values

Composite Attributes



Redundant Attributes

- Suppose we have entity sets:
  - *instructor*, with attributes: *ID*, *name*, *dept_name, salary*
  - *department,* with attributes: *dept_name, building, budget*
- We model the fact that **each instructor has an associated department** using a relationship set *inst_dept*
- The attribute ***dept_name*** **appears in both entity sets**. Since it is the primary key for the entity set *department*, it replicates information present in the relationship and is **therefore redundant in the entity set *instructor* and needs to be removed.**
- BUT: when converting back to tables, in some cases the attribute gets reintroduced, as we will see later.

Weak Entity Sets

- Consider a *section* entity, which is uniquely identified by a *course_id*, *semester, year*, and *sec_id*.

- Clearly**, section entities are related to course entities**. Suppose we create a relationship set ***sec_course*** between entity sets *section* and *course*.

- Note that the information in *sec_course* is redundant, since *section* already has an attribute *course_id*, which identifies the course with which the section is related.

- One option to **deal with this redundancy is to get rid of the relationship s*ec_course***; however, by doing so the relationship between *section* and *course* becomes implicit in an attribute, which is not desirable.

Weak Entity Sets (Cont.)

- An alternative way to deal with this redundancy is to **not store the attribute *course_id* in the *section* entity and to only store the remaining attributes *section_id*, *year*, and *semester*.** However, the entity set *section* then **does not have enough attributes to identify a particular *section* entity uniquely**; although each *section* entity is distinct, sections for different courses may share the same *section_id*, *year*, and *semester*.

- To deal with this problem, we treat the relationship ***sec_course* as a special relationship that provides extra information, in this case, the *course_id*, required to identify *section* entities uniquely**.

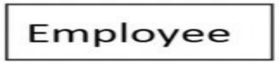
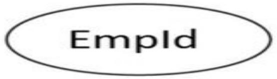
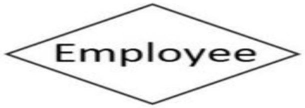
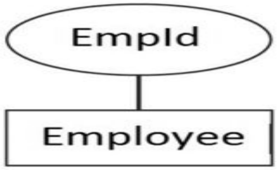
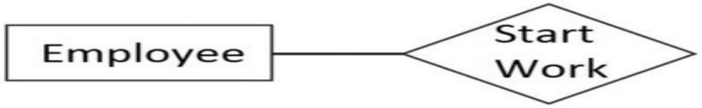
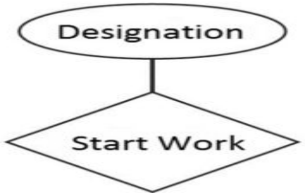
- **The notion of weak entity set formalizes the above intuition. A weak entity set is one whose existence is dependent on another entity, called its identifying entity; instead of associating a primary key with a weak entity, we use the identifying entity, along with extra attributes called discriminator to uniquely identify a weak entity. An entity set that is not a weak entity set is termed a strong entity set.**

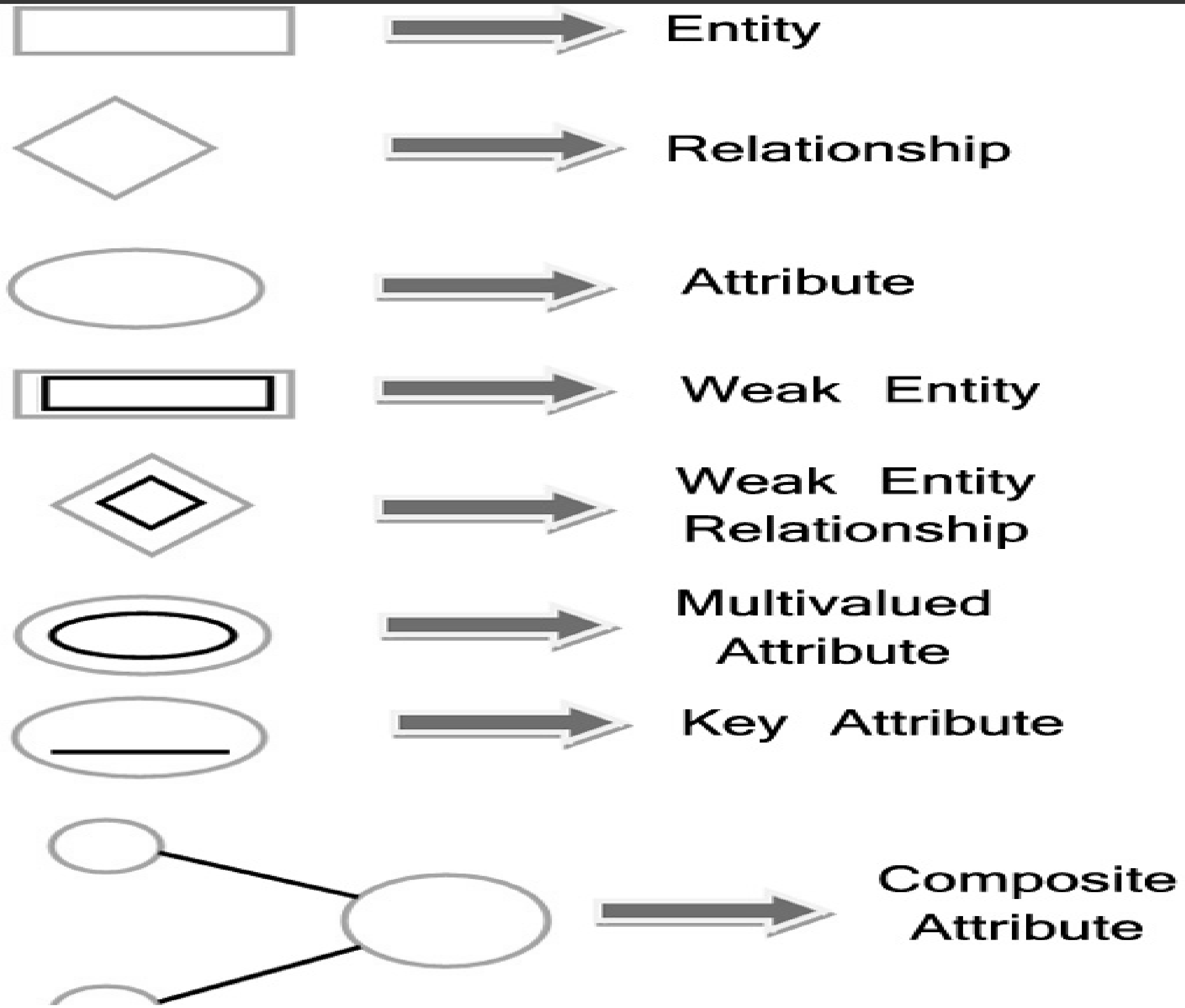
Weak Entity Sets (Cont.)

- Every weak entity must be associated with an identifying entity; that is, the weak entity set is said to be **existence dependent** on the identifying entity set. The identifying entity set is said to **own** the weak entity set that it identifies. The relationship associating the weak entity set with the identifying entity set is called the **identifying relationship**.

- Note that the relational schema we eventually create from the entity set *section* does have the attribute *course_id*, for reasons that will become clear later, even though we have dropped the attribute *course_id* from the entity set *section.*

E-R Diagrams

SYMBOL	NAME	MEANING	EXAMPLE
▭	Rectangle	Entity Set	
⬭	Oval	Attribute	
◇	Diamond	Relationship	
—	Line	Links: Attribute to Entity	
		Entity Set to Relationship	
		Attribute to Relationship	



Entity

Relationship

Attribute

Weak Entity

Weak Entity Relationship

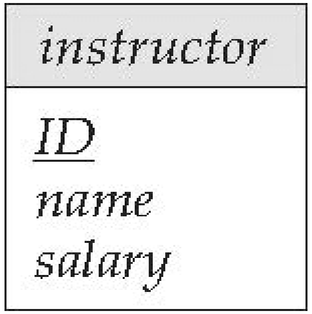
Multivalued Attribute

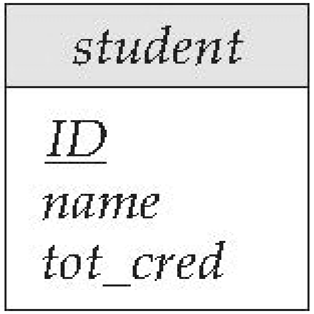
Key Attribute

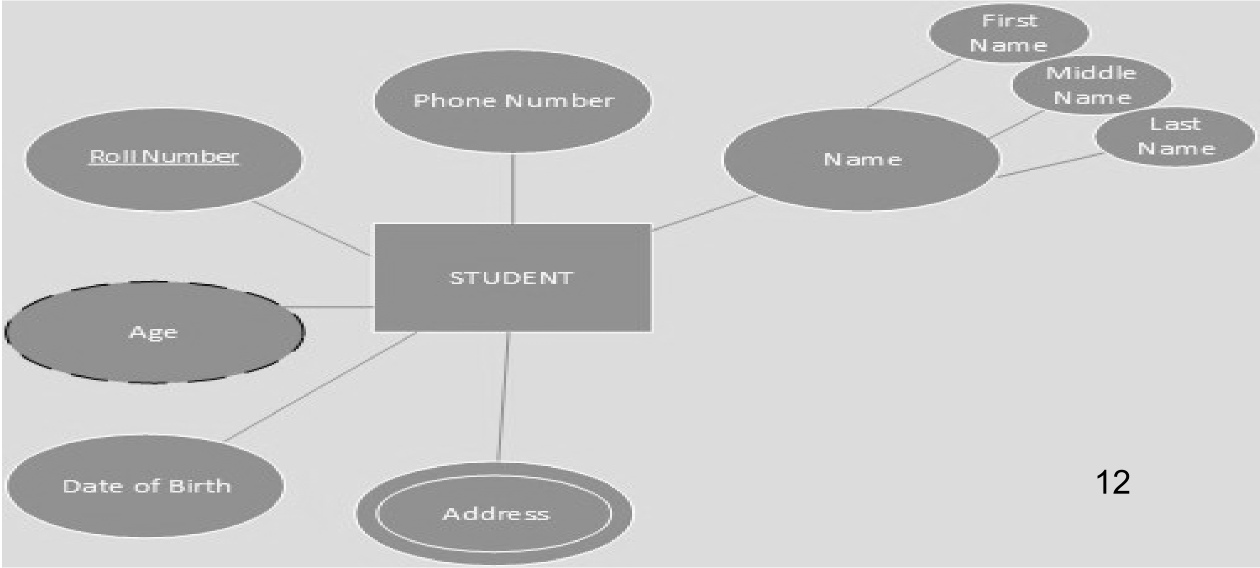
Composite Attribute

Entity Sets

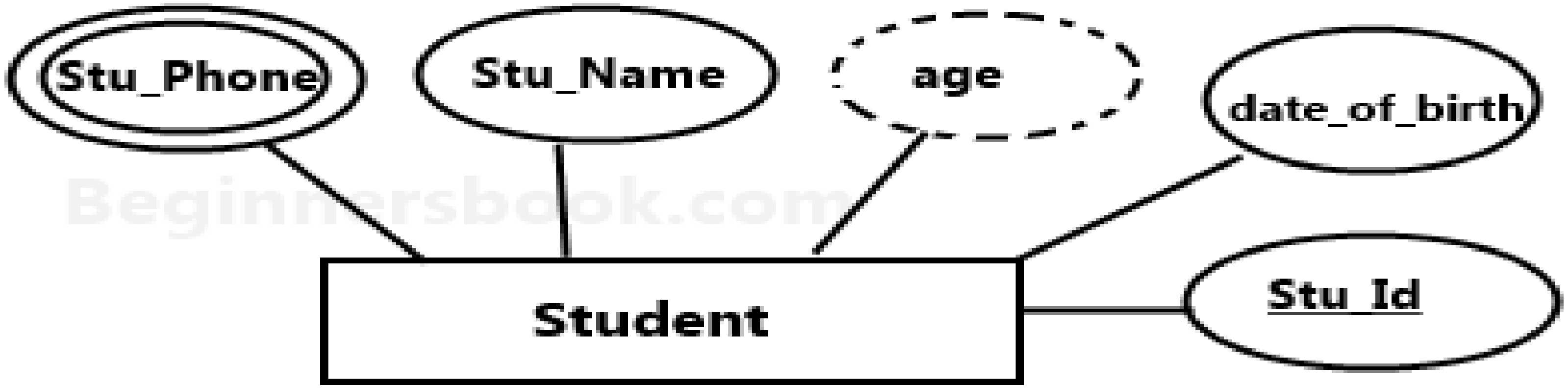
- Entities can be represented graphically as follows:
  - **Rectangles** represent entity sets.
  - **Attributes** listed inside entity rectangle / by oval shapes connected to entity
  - Underline indicates **primary key** attributes







Entity with attributes representation
Types of Attributes



Thank You