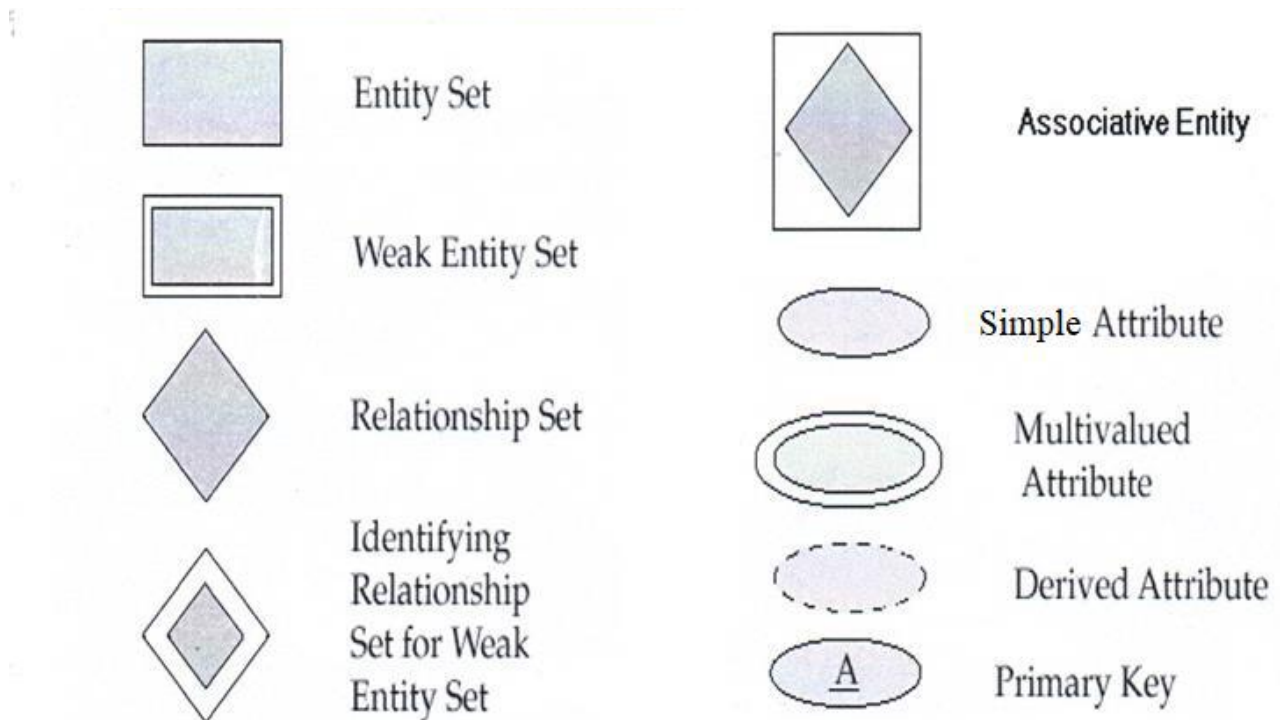


Third Lecture

Entity-Relationship ER Model

A logical (graphical) representation of the data for an organization or a business area (conceptual data model). A database can be modeled as Collection of Entities and Relationship among Entities.

Symbols Used in ER Notation



General Aspects of Database

1. **Entity:** The object can be recognized from other objects depending of specific set of attributes.
2. **Relationship:** it is the union between entities
3. **Attribute(Column):** the general and special properties of Entities or Relationships.
4. **Data Value:** it is the information included by Attributes.
5. **Data Domain:** the allowable domain used by the attributes to represent its data.
6. **Record/Tuple/Row(Instance):** the set of values for an entity.

<u>Name</u>	<u>Street</u>	<u>City</u>	
Mazen Sabah	Alnaser	19	Record1/ Tuple1/Row1
Azhar Khaled	Alhadbaa	21	Record2/Tuple2/Row2

7. **Primary Key:** It is one or more than attributes included within an entity , it has the a unique value for each instance of an entity , used for distinguishing between records .

e.g.: each bank customer has a fixed Account_No could not be changed, and can used to determine the customer's name and his account.

8. **Meta Data:** The data that describes the properties of another data.

e.g.: declaring data structures.

type customer = record

name: string; *street*: string; *city*: integer;

end;

Entity

Is an object that exists and is distinguishable from other objects depending on set of attributes. Example: PERSON, COMPANY, EVENT, PLANT.

- Entities have **attributes**. For example: people have *names* and *addresses*
- **An entity set (type)** is a set of entities of the same type that share the same properties. For example: set of all persons, companies, trees, holidays

Attributes

A property or characteristic of an entity type that is of interest to the organization.

- Each entity type has a set of attributes associated with it.
- In naming attributes, we use an initial capital letter followed by lower case letters, and if attributes consist of two words, we use underscore character '-' to connect the words and we start each word with capital letter.
- An attribute is associated with exactly one entity or relationship.

Example:

STUDENT (Student_Id, Student_Name, Address , Phone_Number)

Student_Id = 1209

Student_Name = Sufyan Salim Mahmood

Address = Mosul – WadiHajar

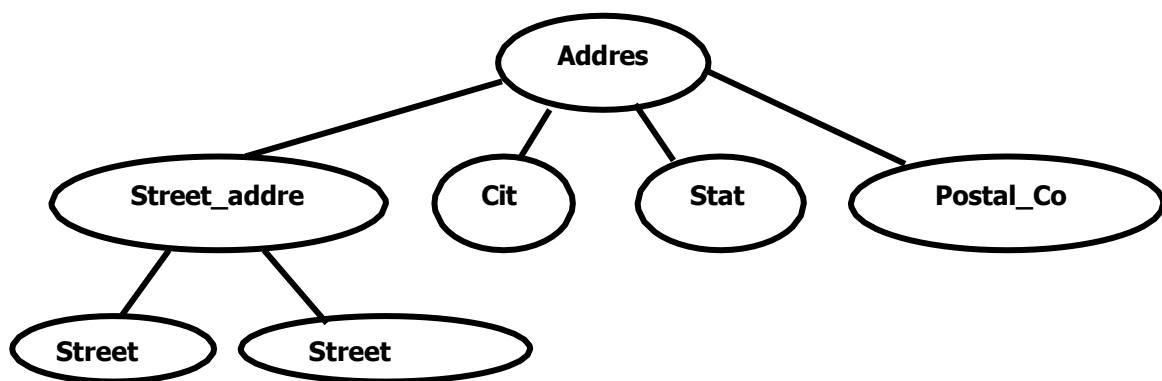
Phone_Number = +96460817543

Student_Id = 1190
 Student_Name = **Mohammad Zaki Hasan**
 Address = **Mosul – AlnabiSheet**
 Phone_Number = **+96460713241**

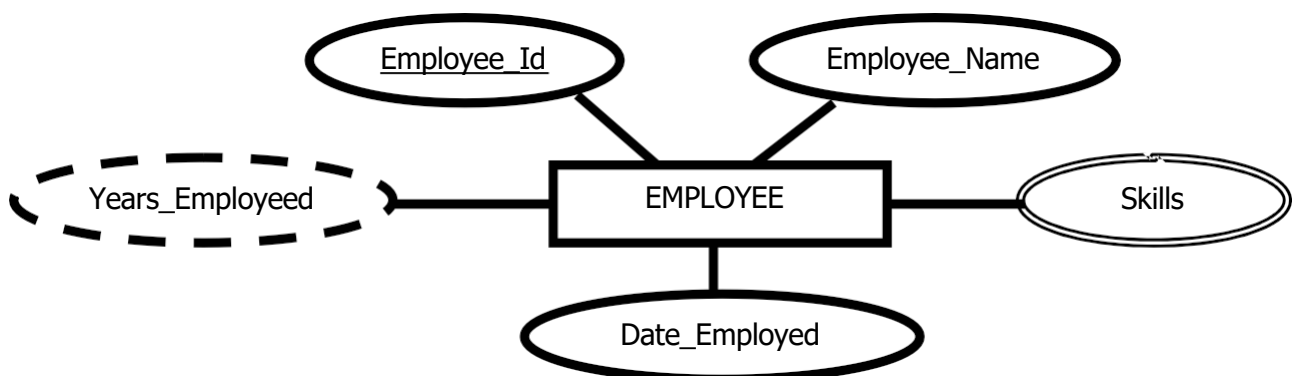
((Two entity instances with attribute values.))

Attributes Types

- 1- **Simple Attribute:** An attribute that cannot be broken down into smaller components like all attributes associated with STUDENT except Name and Address.
- 2- **Composed Attributes:** an attribute that can be broken down into components parts like address.

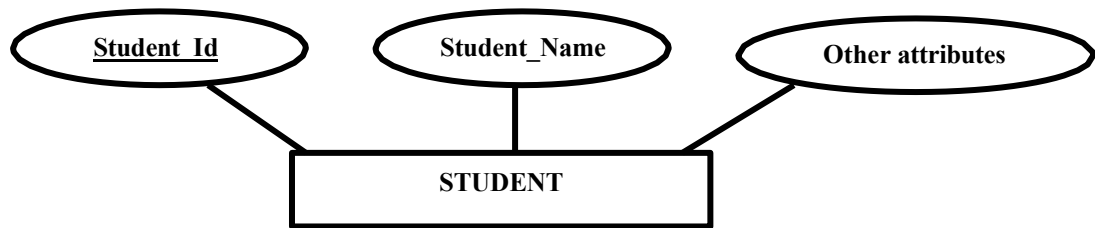


- 3- **Multi Valued attribute:** An attribute that may take more than one value for a given entity instance like: EMPLOYEE may have more than one Skill.
- 4- **Stored Attribute:** An attribute whose value is fixed and stored.
- 5- **Derived Attribute:** An attribute whose values can be calculated from related stored attribute values.

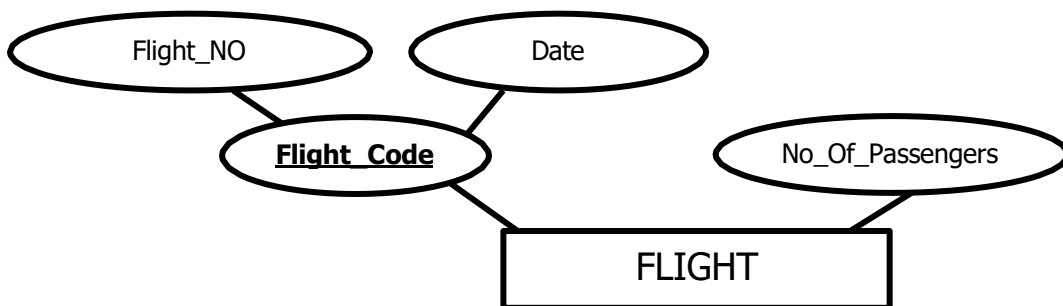


* **Identifier:** an attribute or combination of attributes that uniquely identifies individual instances of an entity type, we express it by underline its name.

a- Simple Key Attribute (Identifier):



b- Composite Key Attribute (Composed Identifier): An identifier that consists of composite attribute

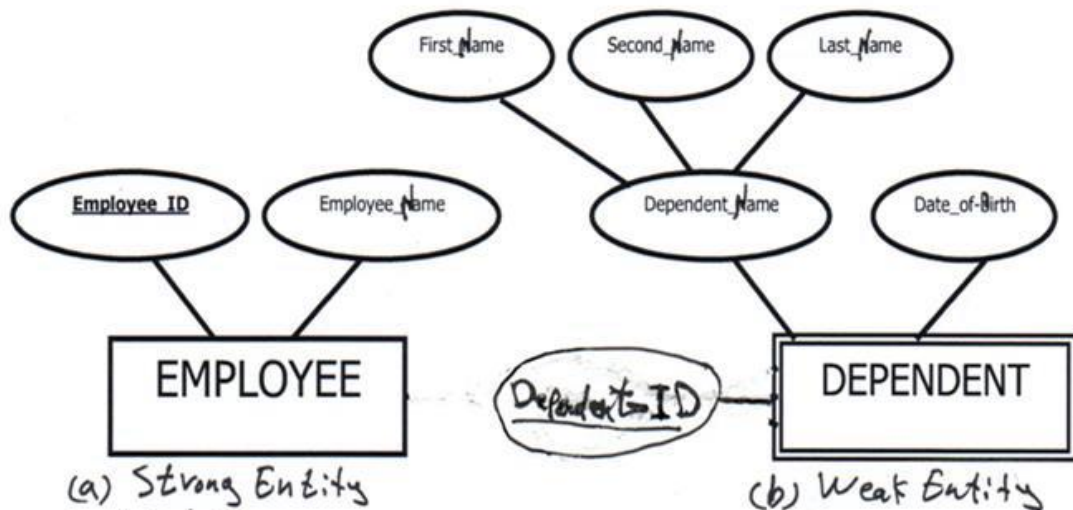


* **Note:** If the entity type has one attribute, and it is an identifier, this entity considered "illegal".

Entity Types

There are three types of entities:

1. **Strong (regular) entity:** an entity that exists independently of other entity types. It has identifier that is an attribute or combination of attributes that uniquely distinguish each occurrence of that entity (see fig (a)).
2. **Weak entity type:** an entity type whose existence depend on some other entity type. It does not have its own identifier. But have an attribute that serves as partial identifier (see fig (b)).
 - **Full identifier** for weak entity type = *partial identifier + identifier of its owner*
 - **Identifying Owner (owner):** the entity type on which the weak entity type depends.
 - **Identifying relationship:** the relationship between a weak entity type and its owner.



3. Associative Entity: To know it we must illustrate:

- Candidate identifier.
- Relationship type & degree.
- Relationship attributes.

Candidate Key

Sometimes more than one Candidate key (Candidate identifier) may appear, so it may test in some criterion:

1. The key never changed in whole life (Student Number).
2. Not to use the keys on specific classification or position (Street Name).
3. The value of the identifier must not be NULL.
4. As possible, it should not be composite.