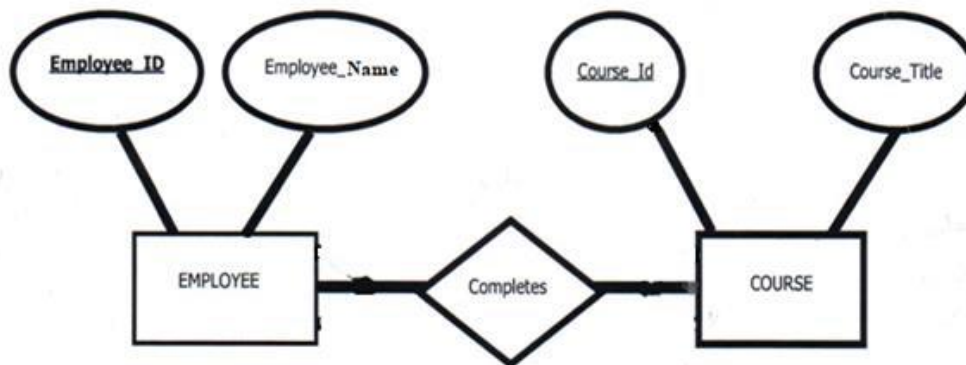


Fourth Lecture

Relationship

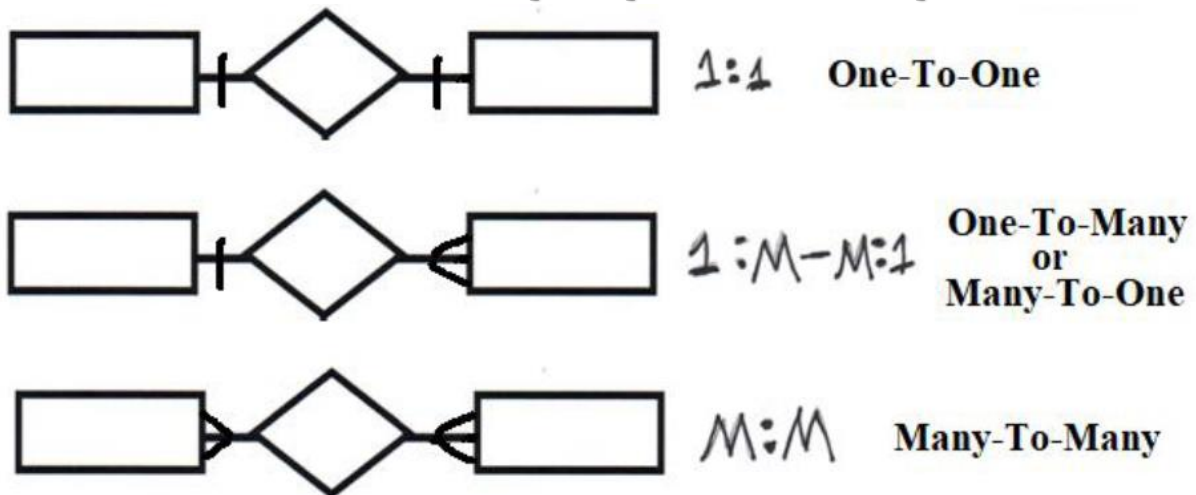
A meaningful association between (or among) entities. We suggest using a short descriptive verb phrase and should be in present tense, which is meaningful to the user in naming the relationship. Relationship has three important factors: Type, Degree, and Cardinality. The following is an example of relationship.



Relationship

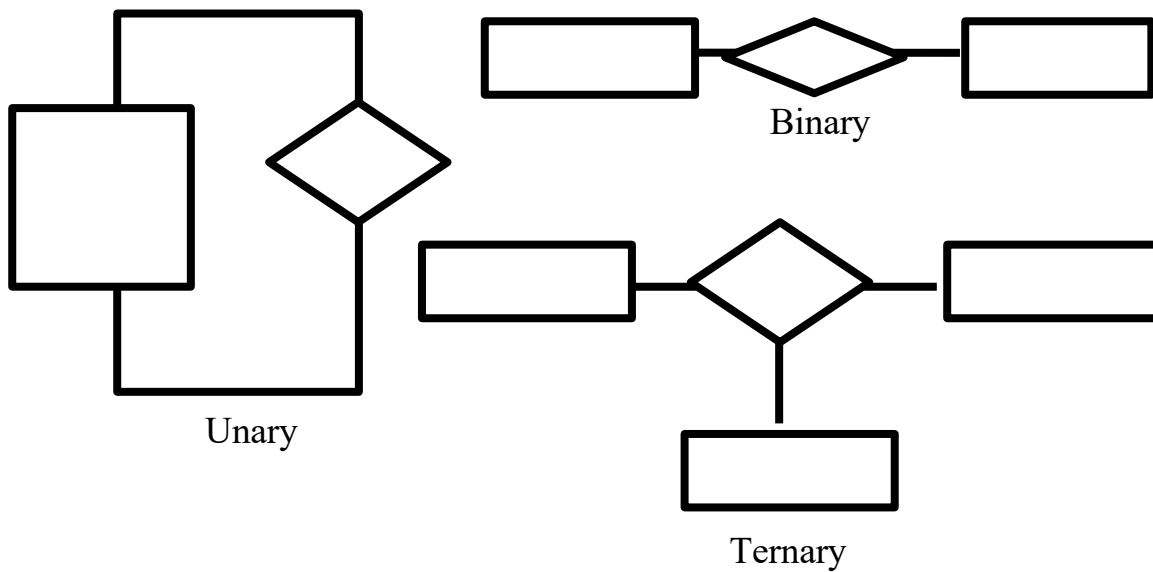
Relationship Type

Refers to the number of instances that participate in a relationship set.



Relationship Degree

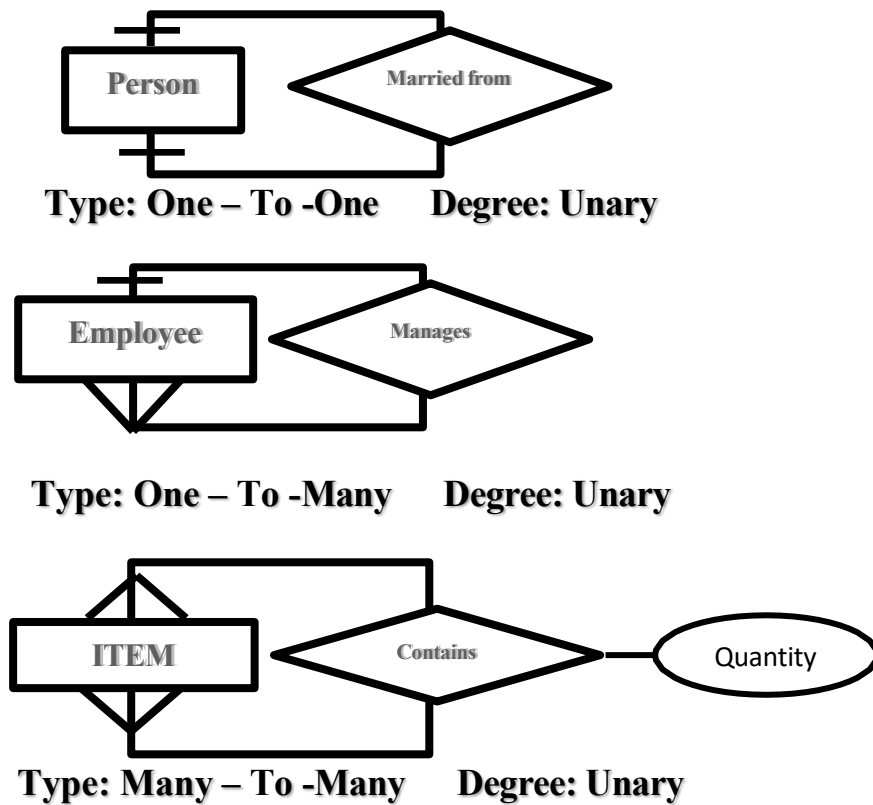
Refers to number of entity set that participate in a relationship set.



The following examples shows the **Relationship Type & Relationship Degree**.

1. Unary relationship:

The relationship between the instances of a single entity type (recursive relationships)



2. Binary relationship: the relationship involves two entities, i.e. the relationship between the instances of two entity type.

Examples:



Type: One-To-One, Degree: Binary

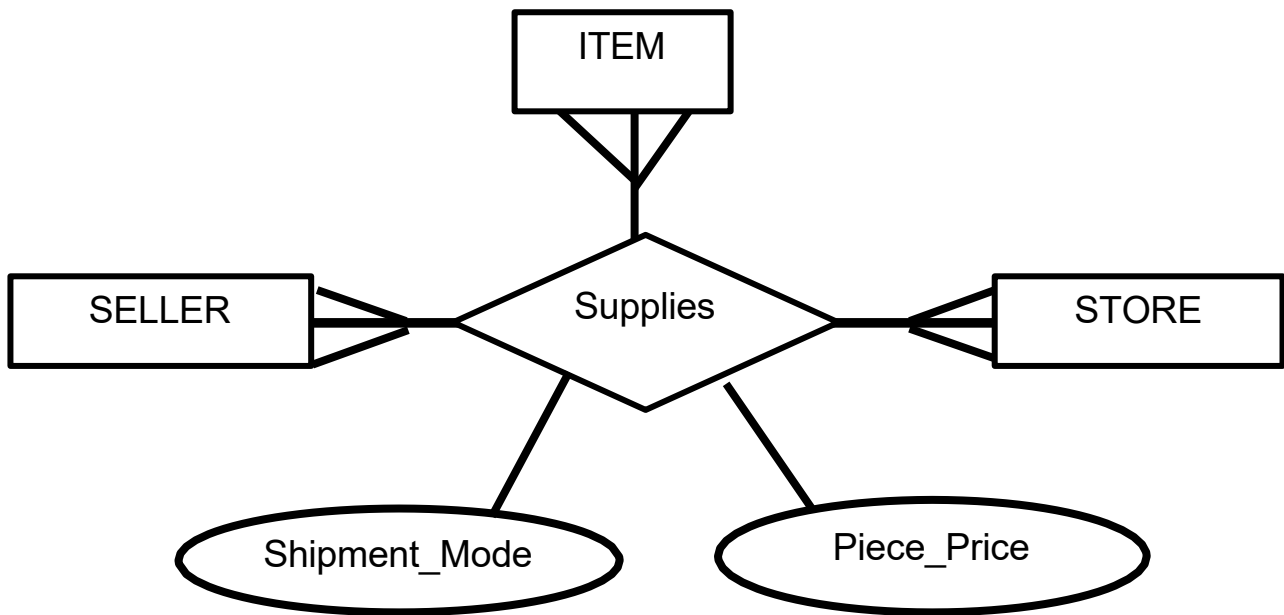


Type: One-To-Many, Degree: Binary



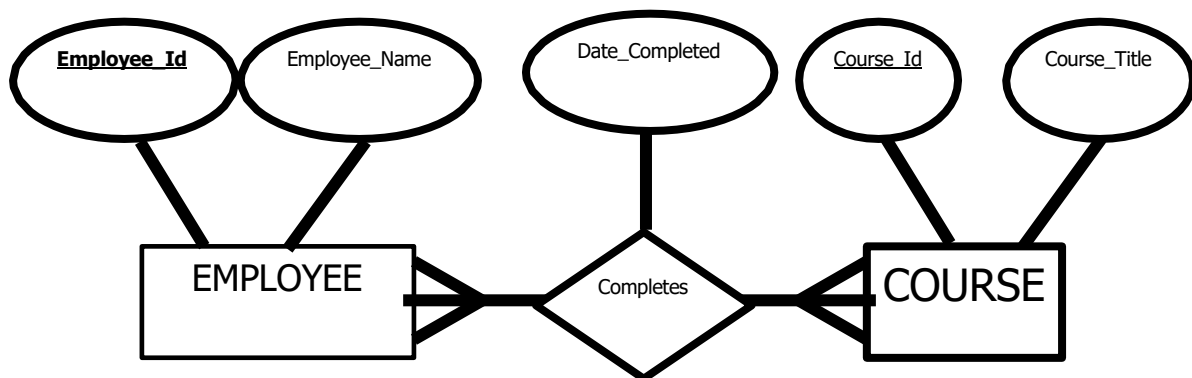
Type: Many-To-Many, Degree: Binary

3. Ternary relationship sets: involve more than two entity sets, i.e. simultaneous relationship among the instances of three entity types at least.



Relationship Attributes

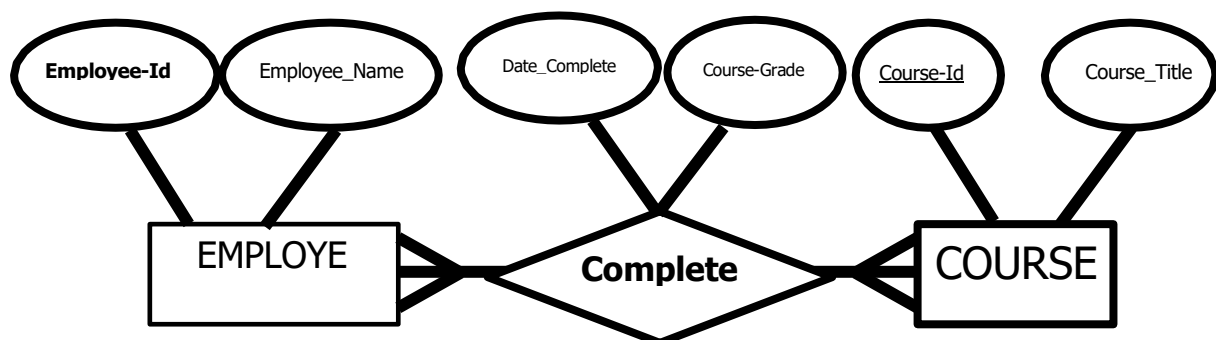
We can add an attribute to the relationship as shown in the following ER diagram:



From the previous figure we can consider a table, if we want to add an attribute (Date_Completed), it will be:

EMPLOYEE	COURSE	Date_Completed
Ali Mottar	C++	12/07/2006
Ali Mottar	SQL	01/21/2006
Mohammad Zaki	Visual Basic	9/30/2007
Sufyan Salim	C++	12/07/2006
Sufyan Salim	Visual Basic	9/30/2007
Ibraheem Ahmed	Visual FoxPro	10/31/2007

Also, we can add another attribute, like the grade of the course (Course_Grade) then the diagram will be:



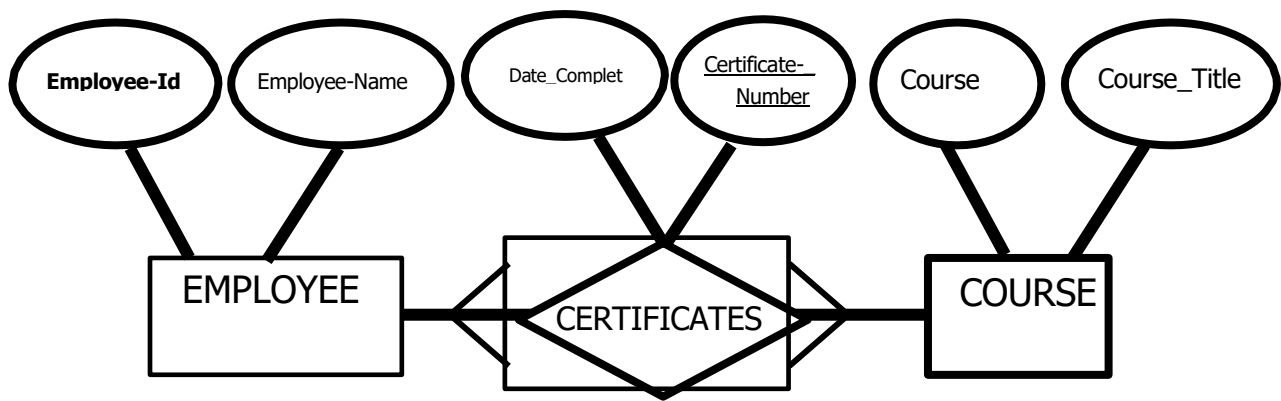
Associative Entities

An entity type that associates the instances of one or more entity types and contains attributes that are peculiar to the relationship between those entity instances. Associative entity sometimes referred to as [gerunds] since the relationship name [verb] is usually converted to an entity name that is noun (an -ing form of the verb).

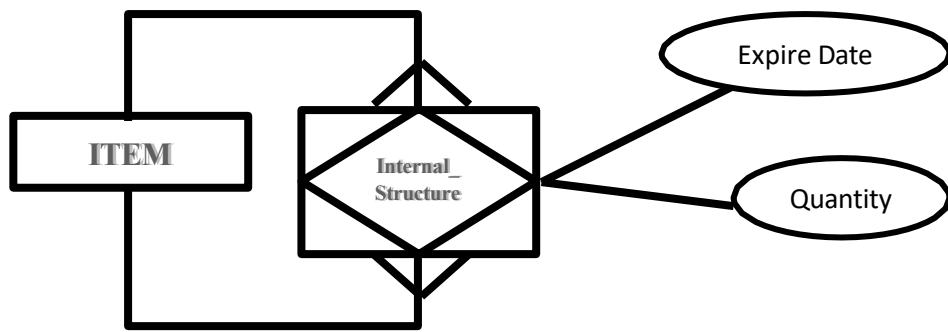
How do we know whether to convert a relationship to an associative entity type?

❖ Following are four conditions that should exist:

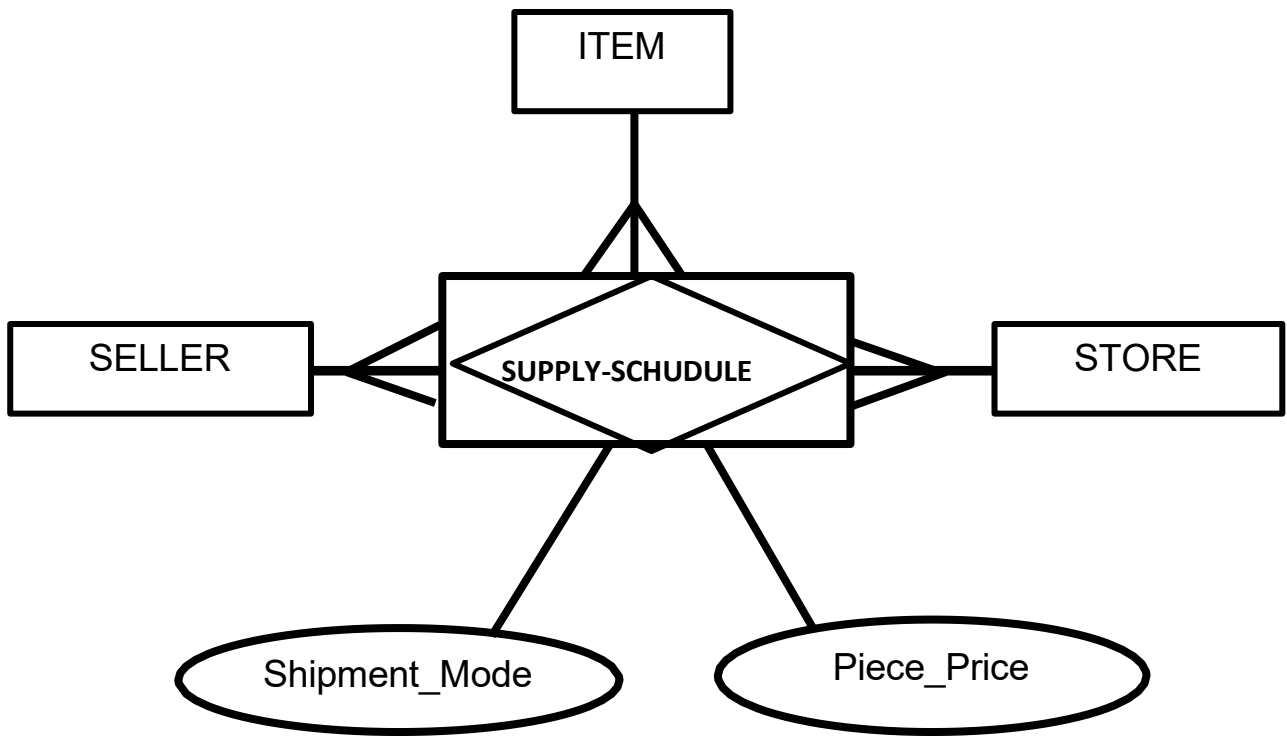
1. All the relationships for the participating entity type are (Many) relationship.
2. The resulting associative entity type has independent meaning to end user, and preferably can be identified with a single attribute identifier.
3. the associative entity has one or more attributes in addition to the identifier.
4. the associative entity participates in one or more relationships independent of the entities related in the associated relationship.



Contains



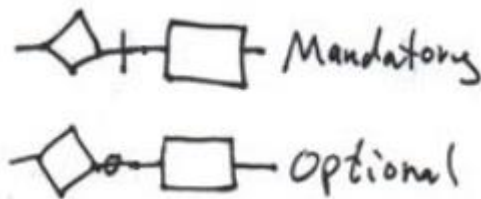
Used in reassembling



Associative Entity

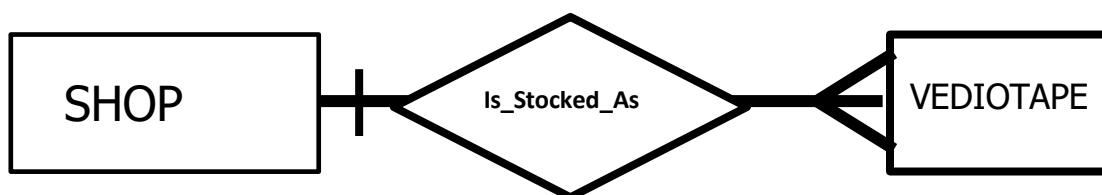
Relationship Cardinality

It is a constraint between entity and relationship. It has two types, Mandatory (1) and Optional (0).

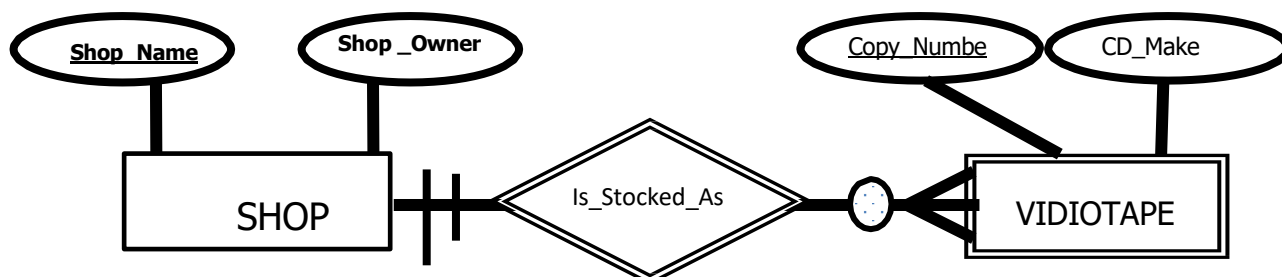


The cardinality constraints specify the number of instances of one entity that can (or must) be associated with each instance of another entity:

A. *Basic relationship:*



B. *Relationship with cardinality constraints:*



❖ *Minimum Cardinality*

The minimum number of instances of one entity that may be associated with each instance of another entity. When the minimum number of participants is zero, we say that the entity is an optional participant in the relationship.

❖ *Maximum Cardinality*

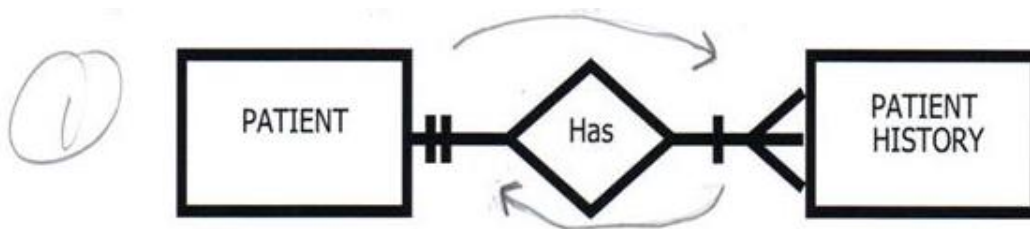
The maximum number of instances of one entity that may be associated with a single occurrence of another entity.

**** Note:**

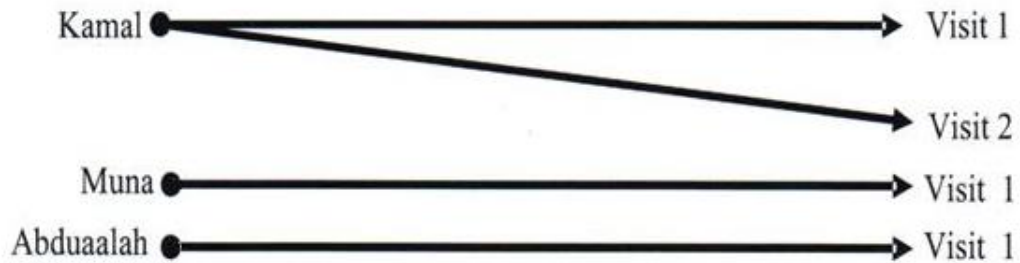
- If the maximum cardinality is zero, participation is optional, if the minimum cardinality is one, participation is mandatory.
- If the minimum and maximum are both one, this is called mandatory one.
- The name of **Entity** in **Capital** letters.
- If the Entity name contains two or more words, use underscore between them.
- The names of **Attributes** and **Relationship** the first letter is capital and others are small.
- If the Attributes or Relationships contain two or more words use underscore with the capital letter in every word.
- Each **Line** connects **Entity** and **Relationship** must include **Two Things** (**Type & cardinality**) in the diagram.

Some cardinality examples:

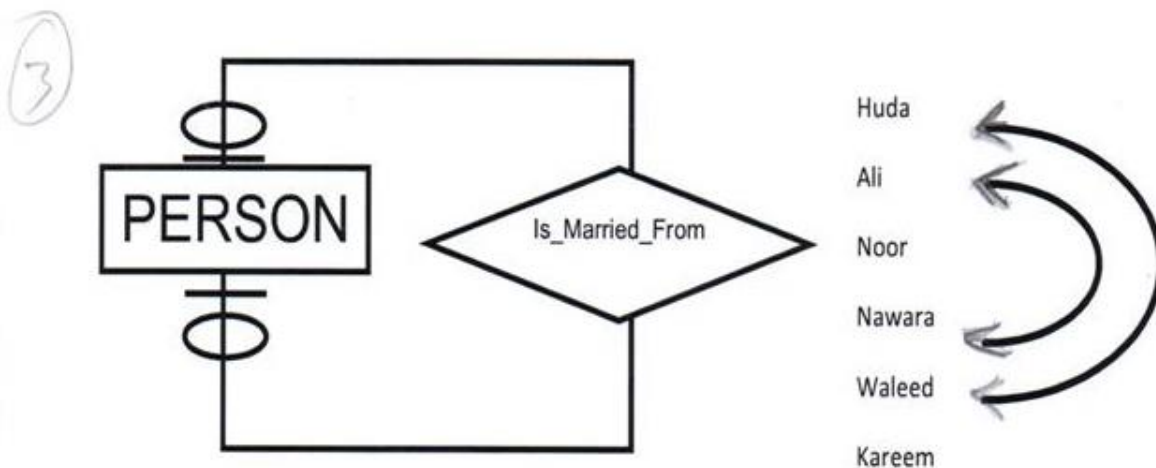
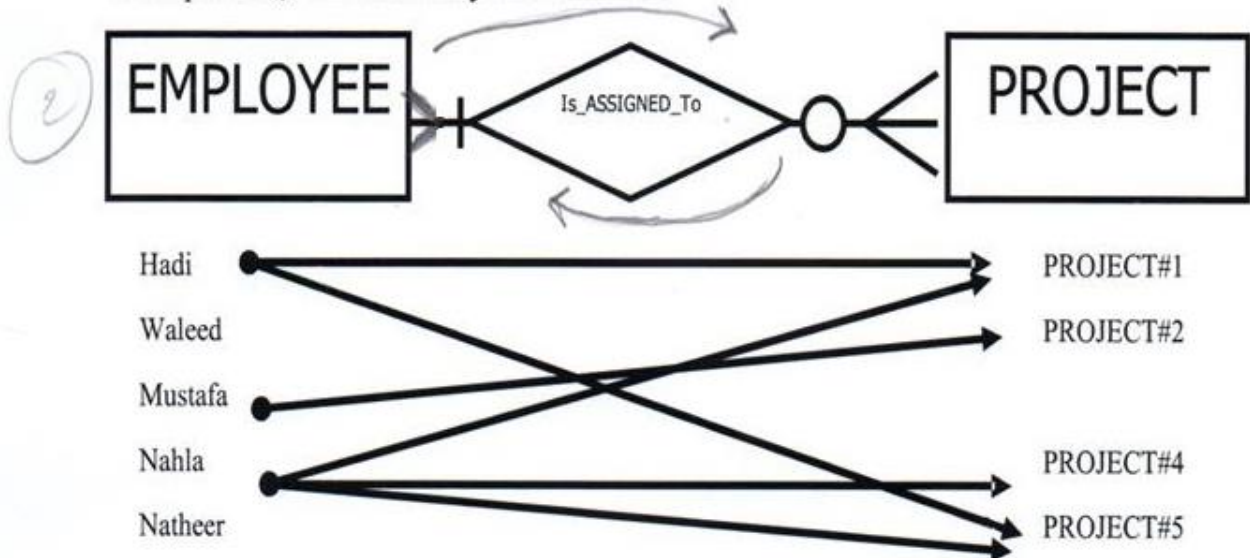
1. PATIENT has PATIENT-HISTORY, each patient has one or more patient history, each instance of PATIENT-HISTORY “belongs to” exactly one PATIENT.
2. EMPLOYEE is assigned to PROJECT each PROJECT has at least one EMPLOYEE assigned to it (some projects have more than one). Each EMPLOYEE may or may not be assigned to any existing PROJECT, or may assigned to one or more PROJECT.
3. PERSON Is_Married to PERSON. This is an optional zero or one cardinality in both directions. Since a person may or may not be married.



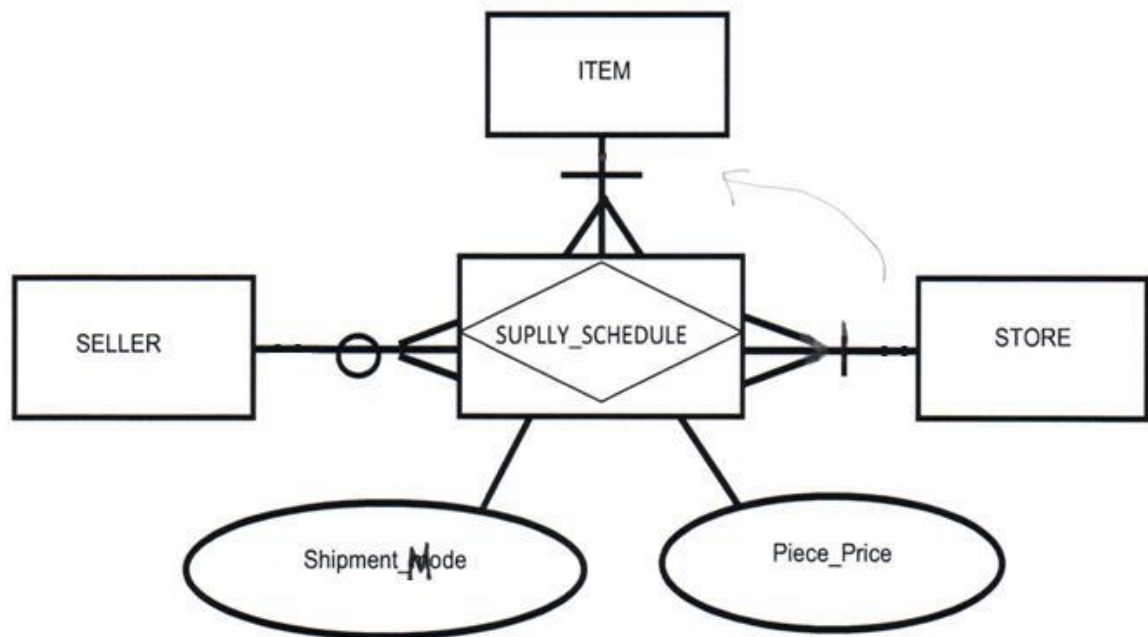
Mandatory Cardinalities:



One optional, one mandatory Cardinalities..

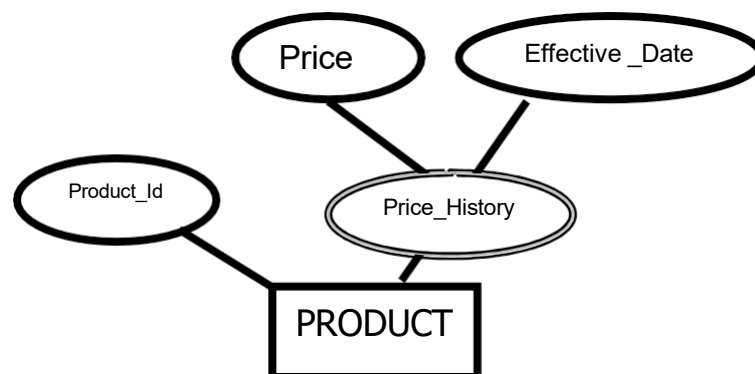


A ternary relationship with the cardinality constraints:



Time Stamp

A time value that associates with a data value. A time stamp may be associated with any data value that changes over time when we need to maintain a history of those data values.

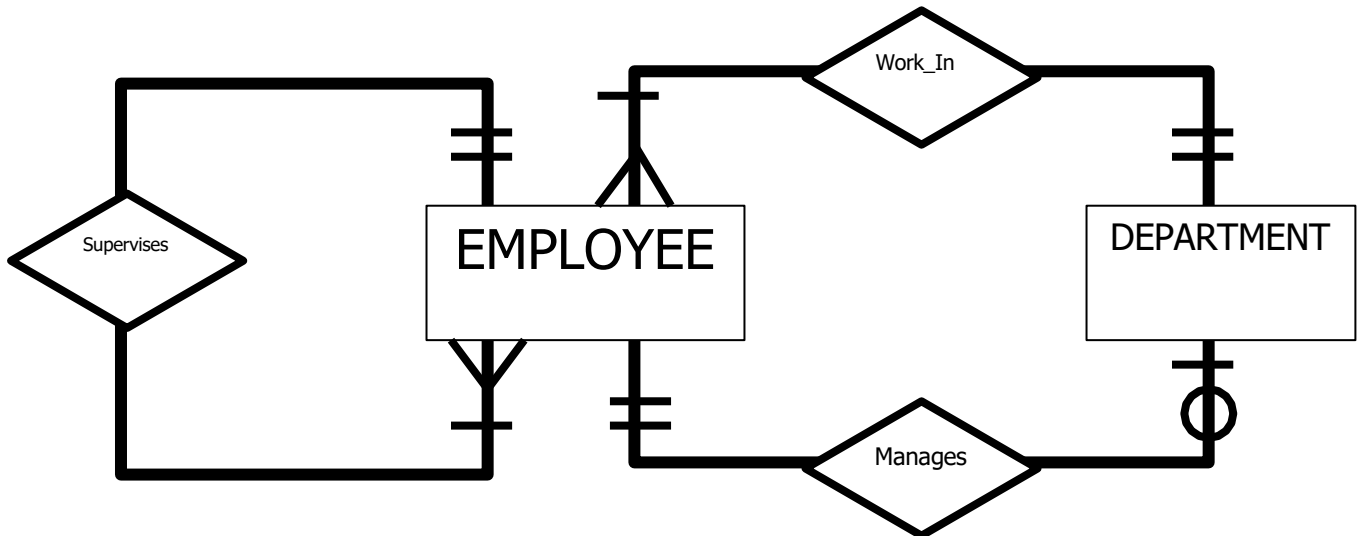


Multiple Relationships

An organization of more than one relationship between the same entity type.

Examples:

a. Employees and departments:



b. Professors and Courses:

