**Week01**

**Three Types of Relationships in ERD Diagram**

There are three types of relationships that can exist between two entities.  
An entity-relationship (ER) diagram can be created based on these three types, which are listed below:

1. one-to-one relationship: In relational database design, a one-to-one (1:1) relationship exists when zero or one instance of entity A can be associated with zero or one instance of entity B, and zero or one instance of entity B can be associated with zero or one instance of entity A. (abbreviated 1:1)
2. one-to-many relationship: (abbreviated 1:N) In relational database design, a one-to-many (1:N) relationship exists when, for one instance of entity A, there exists zero, one, or many instances of entity B; but for one instance of entity B, there exists zero or one instance of entity A.
3. many-to-many relationship: In relational database design, a many-to-many (M:N) relationship exists when, for one instance of entity A, there exists zero, one, or many instances of entity B; and for one instance of entity B, there exists zero, one, or many instances of entity A. (abbreviated M:N)

Following are simple examples of each:

|  |  |
| --- | --- |
| 1:1 relationship | In a traditional American marriage, a man can be married to only one woman; a woman can be married to only one man. |
| 1:N relationship | A child has exactly one biological father; a father can have many biological children. |
| M:N relationship | A student can enroll in many classes; a class can have many enrolled students. |

In the business world, one-to-one relationships are few and far between. One-to-many and many-to-many relationships, on the other hand, are common. However, as will be explained later, many-to-many relationships are not permitted in a relational database and must be converted into one-to-many relationships. Relational databases are comprised almost entirely of tables in one-to-many relationships.

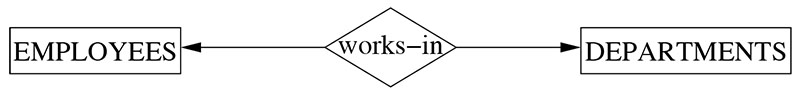
Types of Constraints

Limit the number of possible combinations of entities that may participate in a relationship set. There are two types of constraints:

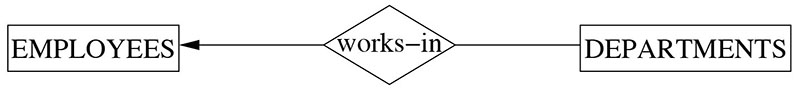
1. cardinality ratio and
2. participation constraints.

Very useful concept in describing binary relationship types. For binary relationships, the cardinality ratio must be one of the following types:

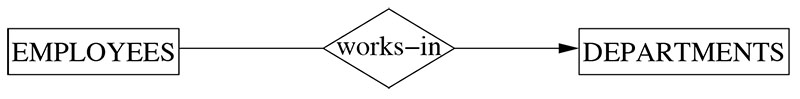
1) One To One

An employee can work in at most one department, and a department can have at most one employee.

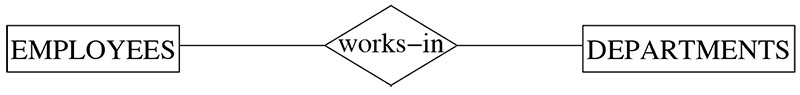
2) One To Many

An employee can work in many departments (>=0), but a department can have at most one employee.

3) Many To One

An employee can work in at most one department (<=1), and a department can have several employees.

4) Many To Many (default)



An employee can work in many departments (>=0), and a department can have several employees  
The following page contains three diagrams describing the 3 relationship types implemented in Microsoft Access.  
[Three Relationships in MS Access](https://www.relationaldbdesign.com/access-features/module2/different-types-accessRelationships.php).  
The next lesson defines one-to-one relationships.

Reference:

https://www.relationaldbdesign.com/database-design/module7/erdiagram-modelTypes-conclusion.php