**Entity Relationship (ER) Modeling - Learn With a Complete Example**

Prerequisite: Basic knowledge about ER Modeling. It is recommended to read the [previous topic](http://www.careerbless.com/db/rdbms/c1/design.php)if you have not done so before proceeding further.

Here we are going to design an Entity Relationship (ER) model for a college database. Say we have the following statements.

1. A college contains many departments
2. Each department can offer any number of courses
3. Many instructors can work in a department
4. An instructor can work only in one department
5. For each department there is a Head
6. An instructor can be head of only one department
7. Each instructor can take any number of courses
8. A course can be taken by only one instructor
9. A student can enroll for any number of courses
10. Each course can have any number of students

Good to go. Let's start our design. (Remember our [previous topic](http://www.careerbless.com/db/rdbms/c1/design.php) and the notations we have used for entities, attributes, relations etc)

**Step 1: Identify the Entities**

What are the entities here?

From the statements given, the entities are

1. Department
2. Course
3. Instructor
4. Student

**Stem 2: Identify the relationships**

1. One department offers many courses. But one particular course can be offered by only one department. hence the cardinality between department and course is One to Many (1:N)
2. One department has multiple instructors. But instructor belongs to only one department. Hence the cardinality between department and instructor is One to Many (1:N)
3. One department has only one head and one head can be the head of only one department. Hence the cardinality is one to one. (1:1)
4. One course can be enrolled by many students and one student can enroll for many courses. Hence the cardinality between course and student is Many to Many (M:N)
5. One course is taught by only one instructor. But one instructor teaches many courses. Hence the cardinality between course and instructor is Many to One (N :1)

**Step 3: Identify the key attributes**

* "Department\_Name" can identify a department uniquely. Hence Department\_Name is the key attribute for the Entity "Department".
* Course\_ID is the key attribute for "Course" Entity.
* Student\_ID is the key attribute for "Student" Entity.
* Instructor\_ID is the key attribute for "Instructor" Entity.

**Step 4: Identify other relevant attributes**

* For the department entity, other attributes are location
* For course entity, other attributes are course\_name,duration
* For instructor entity, other attributes are first\_name, last\_name, phone
* For student entity, first\_name, last\_name, phone

**Step 4: Draw complete ER diagram**

By connecting all these details, we can now draw ER diagram as given below.

