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**INTRODUCTION**

The college data management contains data related to the college, i.e. various departments in the college, courses in a department, the instructors teaching that course and the students studying various courses. The E-R Diagram and the Relational Schema for the college data has also been made.

**ER DIAGRAM**

The E-R data model employs three basic concepts: entity sets, relationship sets, and attributes

1. ENTITY SETS

An entity is a “thing” or “object” in the real world that is distinguishable from all other objects. An entity has a set of properties, and the values for some set of properties may uniquely identify an entity. An entity set is a set of entities of the same type that share the same properties, or attributes. Each entity has a value for each of its attributes. A database thus includes a collection of entity sets, each of which contains any number of entities of the same type.

2. RELATIONSHIP SETS

A relationship is an association among several entities. A relationship set is a set of relationships of the same type. The association between entity sets is referred to as participation. A relationship instance in an E-R schema represents an association between the named entities in the real-world enterprise that is being modeled. The function that an entity plays in a relationship is called that entity’s role. A relationship may also have attributes called descriptive attributes. The number of entity sets that participate in a relationship set is the degree of the relationship set. A binary relationship set is of degree 2; a ternary relationship set is of degree 3.

3. ATTRIBUTES

An attribute of an entity set is a function that maps from the entity set into a domain. For each attribute, there is a set of permitted values, called the domain, or value set, of that attribute. The attribute values describing an entity constitute a significant portion of the data stored in the database. An attribute, as used in the E-R model, can be characterized by the following attribute types:

* Simple and composite attributes. Simple attributes cannot be divided into subparts. Composite attributes can be divided into subparts (that is, other attributes).
* Single-valued and multivalued attributes. Singled value attributes are attributes having a single value. Attributes that have more than one value are called multivalued attributes. Where appropriate, upper and lower bounds may be placed on the number of values in a multivalued attribute.
* Derived attribute. The value for this type of attribute can be derived from the values of other related attributes or entities. The value of a derived attribute is not stored but is computed when required.

E-R diagram can express the overall logical structure of a database graphically. E-R diagrams are simple and clear—qualities that may well account in large part for the widespread use of the E-R model.

An E-R diagram consists of the following major components:

* Rectangles divided into two parts represent entity sets.
* Diamonds represent relationship sets.
* Undivided rectangles represent the attributes of a relationship set. Attributes that are part of the PRIMARY KEY are underlined.
* Lines link entity sets to relationship sets.

**N**

**M**

**COURSES**

**ATTENDS**

**STUDENT**

**M**

**TEACHES**

**HAS**

**M**

**M**

**M**

**TEACHES**

**1**

**1**

**IN**

**1**

**N**

**INSTRUCTOR**

**DEPARTMENT**

**BELONGS**

**M**

**1**

Entities and their attributes used in this E-R diagram are:

* **STUDENT**
  + ROLL NUMBER
  + NAME
  + DATE OF BIRTH
  + MOBILE NUMBER
  + ADDRESS
* **INSTRUCTOR**
  + ID
  + NAME
  + DATE OF BIRTH
  + MOBILE NUMBER
  + ADDRESS
* **DEPARTMENT**
  + NAME
  + HOD
  + NUMBER OF STUDENTS
  + NUMBER OF COURSES
* **COURSES**
  + COURSE ID
  + COURSE NAME

Relationships used in this E-R diagram are:

* ATTENDS (Many to Many from STUDENT to COURSES)
* TEACHES (Many to Many from STUDENT to INSTRUCTOR)
* BELONGS (Many to One from INSTRUCTOR to DEPARTMENT)
* IN (Many to Many from COURSES to DEPARTMENT)
* TEACHES (Many to One from COURSES to INSTRUCTOR)
* HAS (Many to One from STUDENT to DEPARTMENT)

**RELATIONAL SCHEMA**

A relational schema is a set of relational tables and associated items that are related to one another. It is the basic information describing a table and its relation. It is the logical definition of a table. Relation schema defines what the name of the table is. This includes the attributes of the table, the PRIMARY KEY, the referenced Foreign Keys of the table and the relations of the table.

Tables used in Relational Schema:

* **STUDENT**(ROLLNO, NAME, DATE\_OF\_BIRTH, MOBILENO, ADDRESS, *DEPARTMENT)*
* **COURSES**(ID, NAME, *INSTRUCTOR*, *DEPARTMENT)*
* **ATTENDS**(*ROLLNO, COURSE\_ID*)
* **INSTRUCTOR**(ID, NAME, DATE\_OF\_BIRTH, MOBILENO, ADDRESS, *DEPARTMENT)*
* **TEACHES**(*ROLLNO, INSTRUCTOR\_ID*)
* **DEPARTMENT**(NAME, HOD, NUMBER\_OF\_STUDENTS, NUMBER\_OF\_COURSES)

**STUDENT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ROLLNO | NAME | DATE\_OF\_BIRTH | MOBILENO | ADDRESS | DEPARTMENT |

**COURSES**

|  |  |  |  |
| --- | --- | --- | --- |
| ID | NAME | INSTRUCTOR | DEPARTMENT |

**ATTENDS**

|  |  |
| --- | --- |
| ROLLNO | COURSE\_ID |

**INSTRUCTOR**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ID | NAME | DATE\_OF\_BIRTH | ADDRESS | MOBILENO | DEPARTMENT |

**TEACHES**

|  |  |
| --- | --- |
| ROLLNO | INSTRUCTOR\_ID |

**DEPARTMENT**

|  |  |  |  |
| --- | --- | --- | --- |
| NAME | HOD | NUMBER\_OF\_STUDENTS | NUMBER\_OF\_COURSES |