

COMPONENTS OF DBMS

DBMS have several components, each performing very significant tasks in the database management system environment. Below is a list of components within the database and its environment.

❖ **Software**

This is the set of programs used to control and manage the overall database.

❖ **Hardware**

Consists of a set of physical electronic devices such as computers, I/O devices, storage devices, etc.

❖ **Data**

DBMS exists to collect, store, process and access data, the most important component. The database contains both the actual or operational data and the metadata.

❖ **Procedures**

These are the instructions and rules that assist on how to use the DBMS, and in designing and running the database, using documented procedures, to guide the users that operate and manage it.

❖ ***Database Access Language***

This is used to access the data to and from the database, to enter new data, update existing data, or retrieve required data from databases

❖ ***Query Processor***

This transforms the user queries into a series of low level instructions.

❖ ***Run Time Database Manager***

Referred to as the database control system, this is the central software component of the DBMS that interfaces with user-submitted application programs and queries, and handles database access at run time. Its function is to convert operations in user's queries.

❖ ***Data Manager***

Also called the cache manger, this is responsible for handling of data in the database, providing a recovery to the system that allows it to recover the data after a failure.

❖ ***Database Engine***

The core service for storing, processing, and securing data, this provides controlled access and rapid transaction processing to address the requirements of the most demanding data consuming applications.

❖ ***Data Dictionary***

This is a reserved space within a database used to store information about the database itself.

❖ ***Report Writer***

Referred to as the report generator, it is a program that extracts information from one or more files and presents the information in a specified format.

RELATIONAL DATA MODEL

Relational data model is the primary data model, which is used widely around the world for data storage and processing.

Concepts

Tables – In relational data model, relations are saved in the format of Tables. This format stores the relation among entities. A table has rows and columns, where rows represents records and columns represent the attributes.

Student_Id	Student_Name	Student_Addr	Student_Age
101	Chaitanya	Dayal Bagh, Agra	27
102	Ajeet	Delhi	26
103	Rahul	Gurgaon	24
104	Shubham	Chennai	25

Tuple – A single row of a table, which contains a single record for that relation is called a tuple.

102	Ajeet	Delhi	26
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Relation schema – A relation schema describes the relation name (table name), attributes, and their names.

Relation key – Each row has one or more attributes, known as relation key, which can identify the row in the relation (table) uniquely.

ENTITY RELATIONSHIP MODEL

The ER model defines the conceptual view of a database

ENTITY

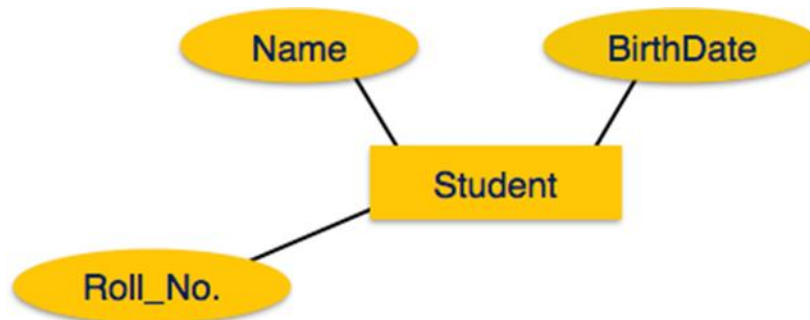
An entity can be a real-world object, either animate or inanimate, that can be easily identifiable.

An entity set is a collection of similar types of entities.

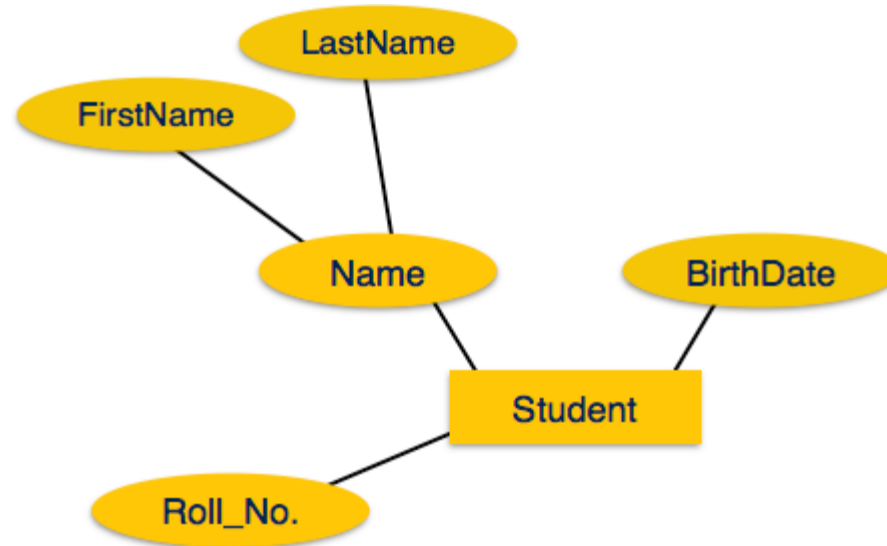


ATTRIBUTES

Attributes are the properties of entities. Attributes are represented by means of ellipses. Every ellipse represents one attribute and is directly connected to its entity (rectangle).



If the attributes are **composite**, they are further divided in a tree like structure. Every node is then connected to its attribute. That is, composite attributes are represented by ellipses that are connected with an ellipse.



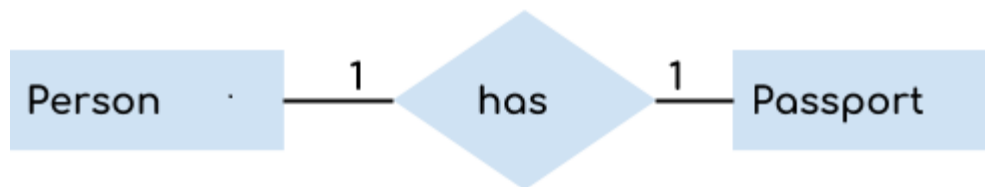
RELATIONSHIP:

A relationship is represented by diamond shape in ER diagram, it shows the relationship among entities. There are four types of relationships:

1. One to One
2. One to Many
3. Many to One
4. Many to Many

1. One to One Relationship

When a single instance of an entity is associated with a single instance of another entity then it is called one to one relationship. For example, a person has only one passport and a passport is given to one person.



2. One to Many Relationship

When a single instance of an entity is associated with more than one instances of another entity then it is called one to many relationship. For example – a customer can place many orders but a order cannot be placed by many customers.



3. Many to One Relationship

When more than one instances of an entity is associated with a single instance of another entity then it is called many to one relationship. For example – many students can study in a single college but a student cannot study in many colleges at the same time.



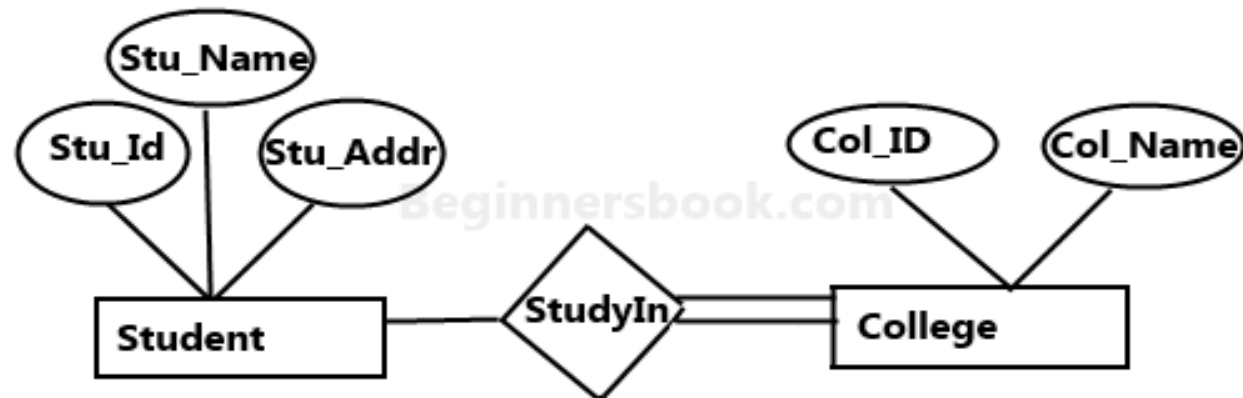
4. Many to Many Relationship

When more than one instances of an entity is associated with more than one instances of another entity then it is called many to many relationship. For example, a can be assigned to many projects and a project can be assigned to many students.



TOTAL PARTICIPATION OF AN ENTITY SET:

A Total participation of an entity set represents that each entity in entity set must have at least one relationship in a relationship set. For example: In the below diagram each college must have at-least one associated Student.



E-R Diagram with total participation of College entity set in StudyIn relationship Set - This indicates that each college must have atleast one associated Student.

PRIMARY KEY IN DBMS:

Definition: A primary key is a minimal set of attributes (columns) in a table that uniquely identifies tuples (rows) in that table.

Primary Key Example in DBMS:

Lets take an example to understand the concept of primary key. In the following table, there are three attributes: Stu_ID, Stu_Name & Stu_Age. Out of these three attributes, one attribute or a set of more than one attributes can be a primary key.

Attribute Stu_Name alone cannot be a primary key as more than one students can have same name.

Attribute Stu_Age alone cannot be a primary key as more than one students can have same age.

Attribute Stu_Id alone is a primary key as each student has a unique id that can identify the student record in the table.