

First Chapter

Database Management System

Data

- Data can be defined as any raw fact ,figure, observation or collection about any object or business transactions. It can be in the form of number , text ,video , image, .

Information

- Data when processed for any objectives then it becomes information . Data may not have any value but information gives value to that data .

Data :- Ram ,12,13

Information:-

Name is Ram

Class is 12

Roll no is 12

Database

- Database is a collection of meaningful data or information that is organized in useful manner so that it can easily be accessed ,managed and updated .
- Eg. Banking Record , School Record

DBMS (Database management System)

- A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a **database**. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.
- A DBMS is a set of programs that manages the database file .
- EG. MS-ACCESS ,MYSQL,ORACLE , MS-SQL

Objectives of DBMS

- To provide storage for mass data
- To provide data access easy to end user
- To Eliminate Data Redundancy
- To Avoided Data Inconsistency
- To allow multiple user to work on the same time

Problems with file processing

- Data Redundancy
- Inconsistency
- Security Problem
- Backup-Recovery

Advantages of Database Management System

- Reduced Redundancy
- Data can be shared
- Easy Maintenance
- Reduce Time
- Data Backup
- Data Integrity (eg . Mobile no should be number)
- Multi User Interface
- Easy Accessing and Retrieving

Disadvantages of Database Management System

- High Cost
- Huge Size
- Database failure
- Complexity
- Increase Staff Cost
- Requirement of Technical staff

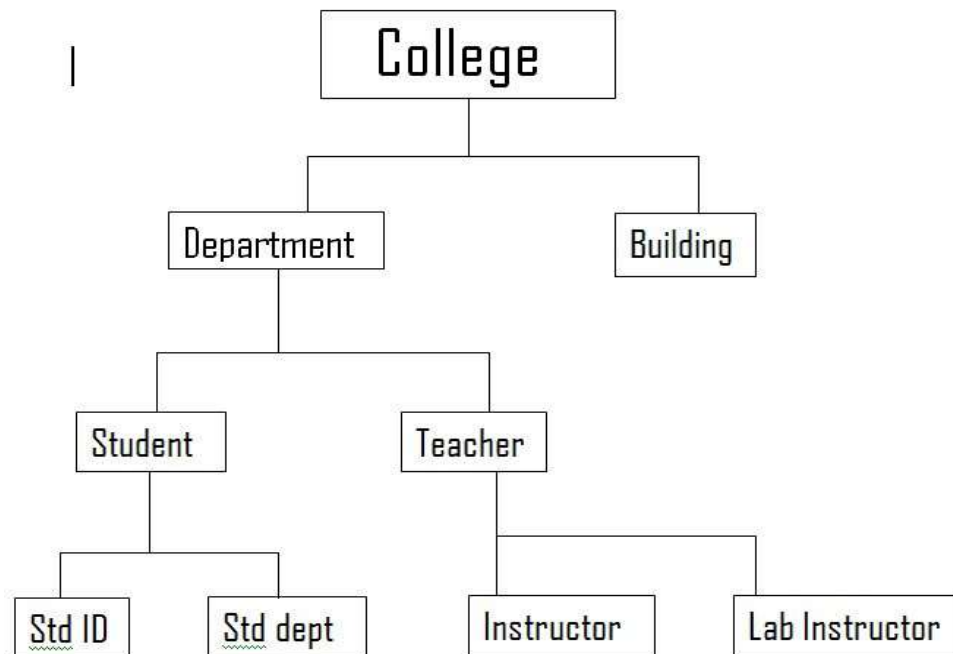
Database model

A database model is a type of data model that determines the logical structure of a database

- Hierarchical Model
- Network Model
- Relational Model
- Entity Relationship Model
- Object Oriented Model

Hierarchical Database Model

It is a data model in which the data are organized into a tree-like structure. In Hierarchical model data is organized into tree-like structure with one to many Relationship (one parent can have one or more child)



Advantages

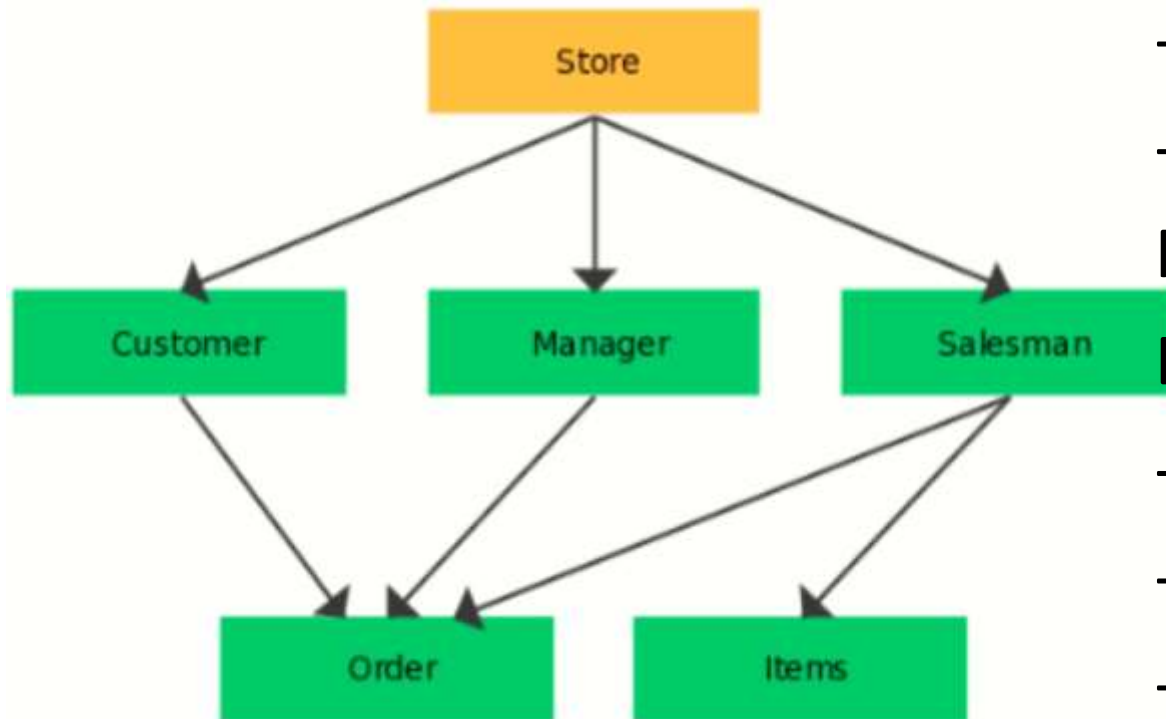
- Easy & Secure Model
- Handle one to many Relationship
- Built complex system from simple components

Disadvantages

- Cannot Handle Many to Many Relationship
- Create Data Redundancy
- Totally Based on Parent Node

Network Model

This is an extension of the hierarchical model. In this model data are organized more like a graph. In this model child node can have multiple parent. This Database model was used to map many to many data relationship



Advantages

- Flexible Model

- Accept Many to Many to Many Relationship

- Fast searching

Disadvantages

- Complex Model

- Need Large Program to handle relationship

- Less Secure Model

Entity Relationship Model (ER Model)

Entity:-

Any things or Object which has any physical extension That is known as Entity .

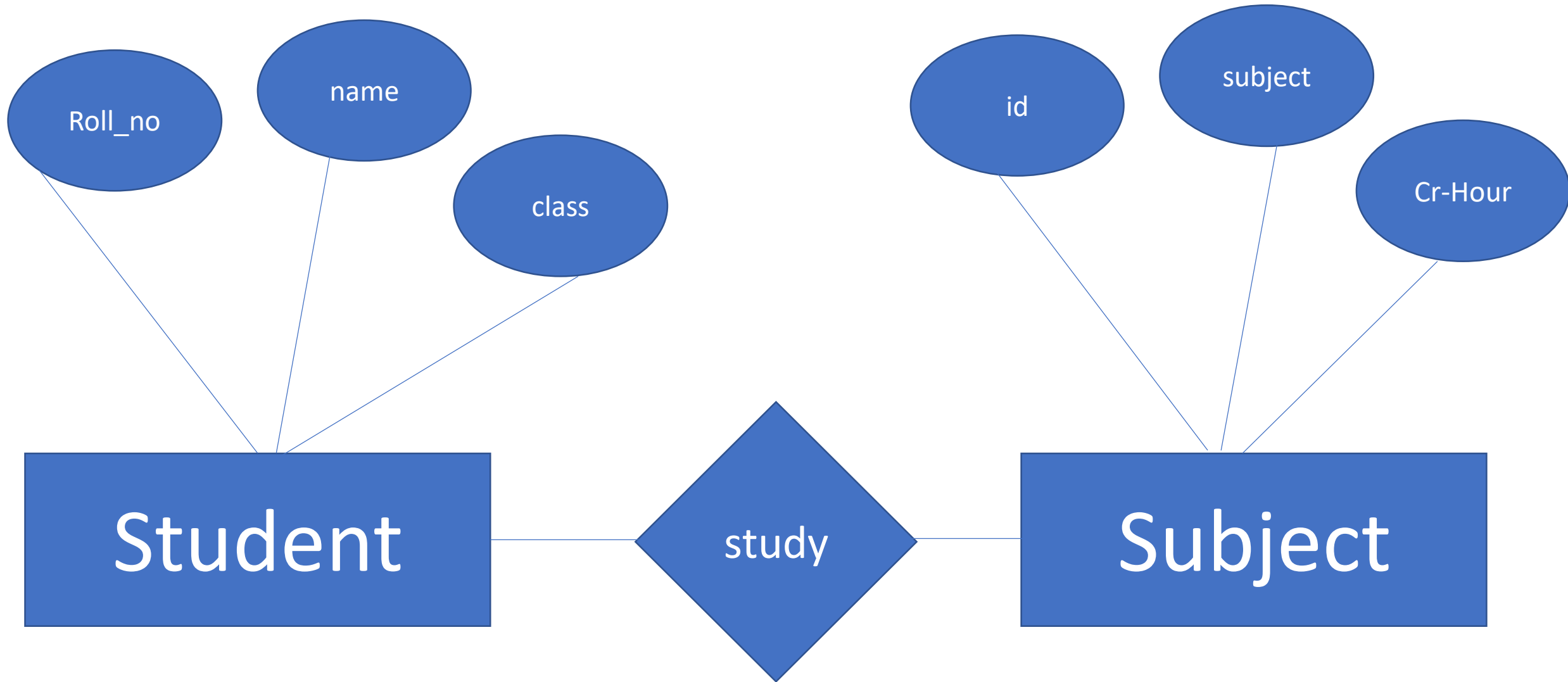
- Person : Teacher, Employee, students, parents etc.
- Place :zone , Region, country , branch etc
- Object : Tool, Machine , buildings, products etc.
- Event : Application, sales, award, Registration, renewal etc
- Concept : qualification, Account, work center etc.

Attributes :-

Attributes are properties That describe the entity .

Relationship

Any Relationship or association between two or more entities we called it Relationship



- Entity-Relation Models are normally represented in any entity relationship diagram (ERD) which use graphical representation to model database components .

Relational Database Model

process of normalizing data in the rows and column of the tables is Relational Database Management System. Relational Model maintain the relation with multiple tables

In relational database model, the data are organized into tables which contains multiple row and columns. These tables are called relations

student_id	name	age
1	Akon	17
2	Bkon	18
3	Ckon	17
4	Dkon	18

subject_id	name	teacher
1	Java	Mr. J
2	C++	Miss C
3	C#	Mr. C Hash
4	Php	Mr. P H P

Advantages

- Data are Arranged in Rows and Column
- Less Data Redundancy.
- Normalization Is Possible

Disadvantages

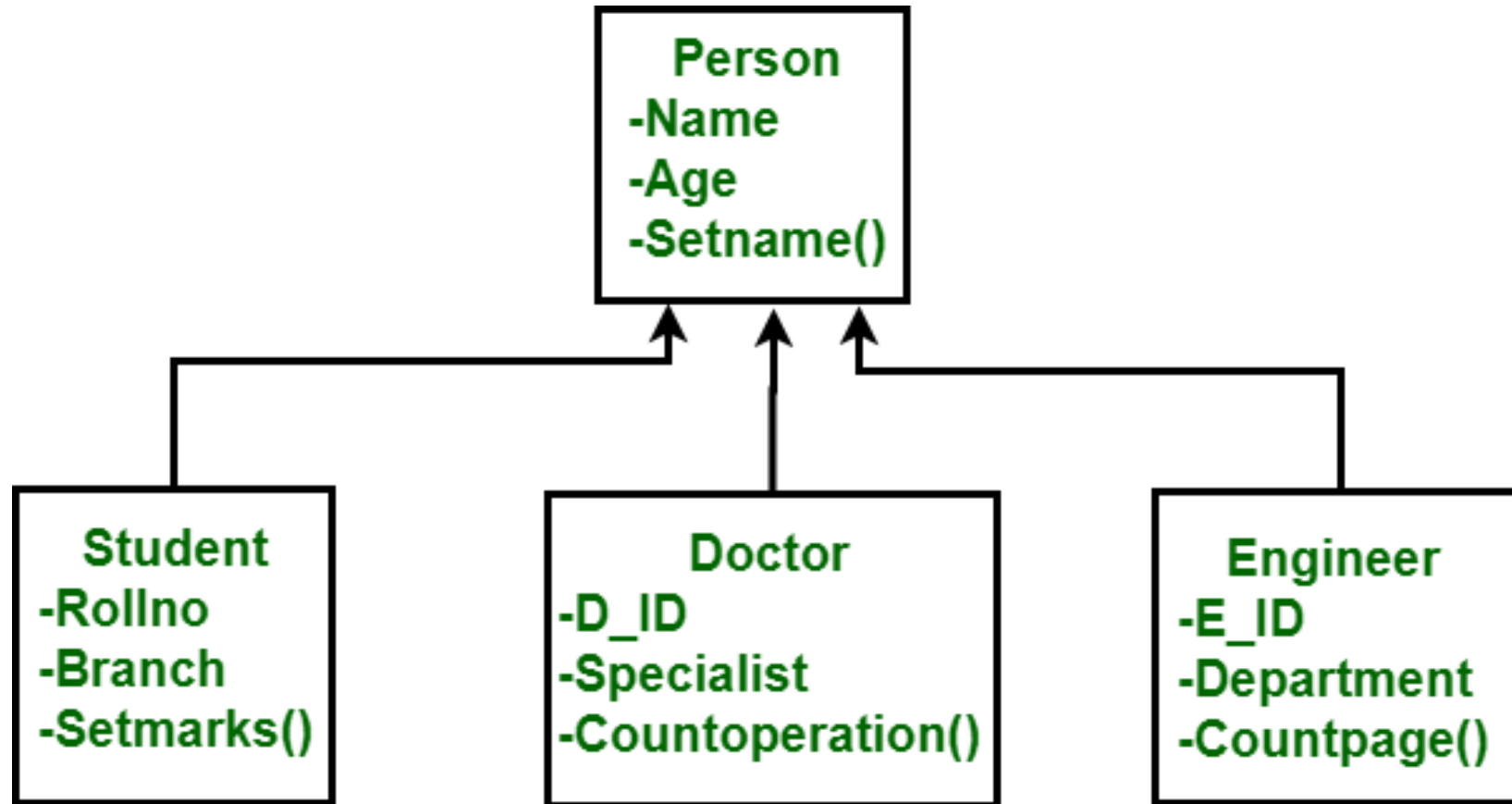
- More Complex then the other model
- Too Many Rules

Tuple>

student_id	subject_id	marks
1	1	98
1	2	78
2	1	76
3	2	88

Object Oriented Database Model

An Object Oriented database is a collection of object-oriented programming and relational database



Keys

- Key is used to Uniquely identify any record or row of data from table . And it is also used to establish and identify relationship between tables .

Primary Key

- A key that can be used to uniquely identify a row in a table is called primary key
 - The value of primary key can never be NULL
 - The values of primary keys must always unique(not duplicate)
 - The value of Primary key never be changed

Teacher id-> pk

Teacher_id	Name	subject
1	Suman oli	C
2	Madhab Ghimire	C#
3	suman oli	DBMS

Foreign Key

- Foreign key is the column of the table that points the primary keys of another table . It is used to link two table together

Department id	Department name
1	Sales
2	Marketing
3	HR

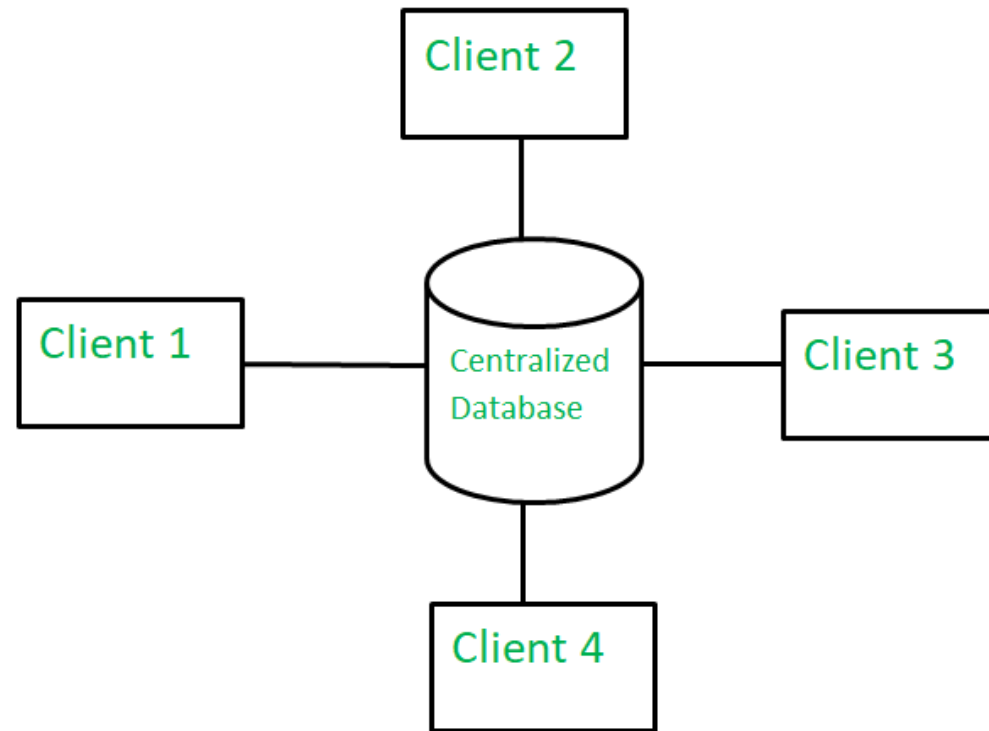
Foreign key

Emp_id	Emp_name	Address	Department_id
1	Suman	Btm	1
2	Sarita	Btm	2
3	Manoj	Ilam	1
4	Punit	Ktm	3
5	Shreya	ktm	2

Centralized Database VS Distributed Database

Centralized Database

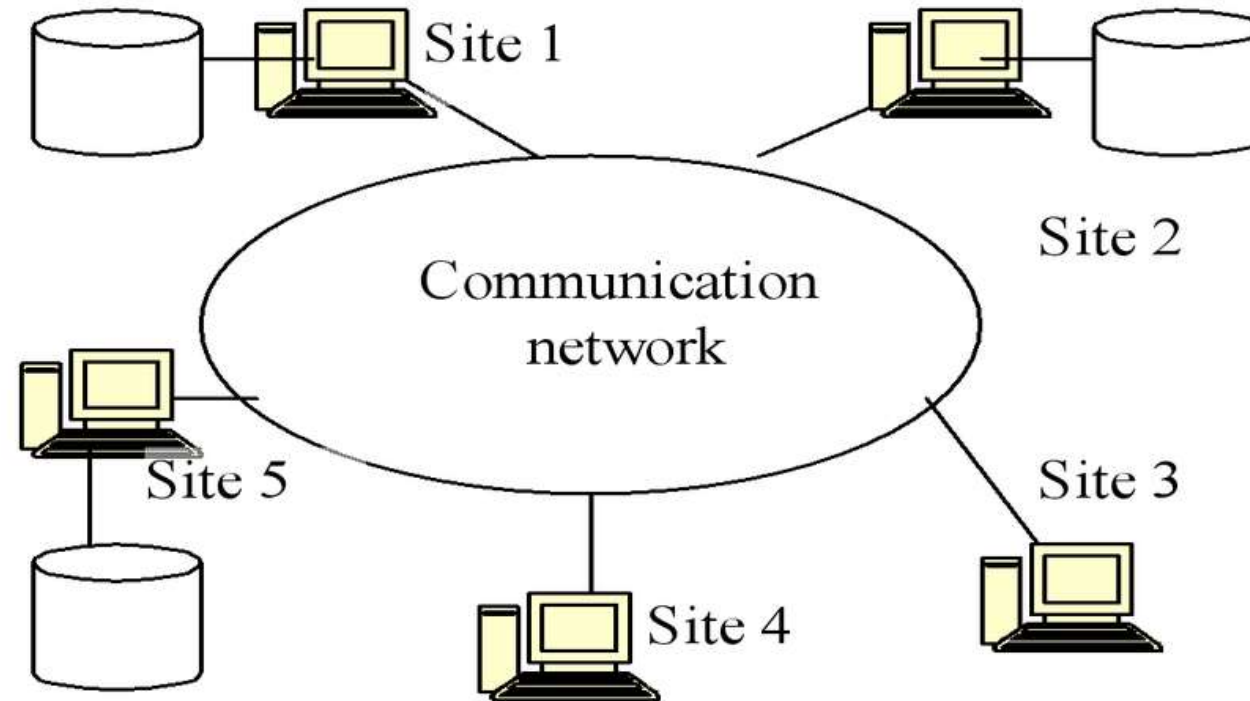
A centralized database is basically a type of database that is stored , located as well as maintained at a single location only. In this type of database clients or user are directly connected to the central Computer Called Server . And only the central computer is responsible for processing the data .



Distributed Database

It is database which consists of multiple database which are connected with each other and are spread across different physical location.

This type of database system are complex in structure, instead of storing and retrieving data from centrally located server, it uses several numbers of database and server randomly located at different place



Centralized Database	Distributed Database
Simple Type	Complex Type
Located on Single Location	Located on Multiple Geographical Location
Only One Server	Multiple Server on Many Locations
Suitable for small scale industry	Suitable for large scale industry
Maintenance is easy	Maintenance is difficult
Security is high	Security is low
Low speed	High speed
Cheap	Expensive
Failure of server affect whole network	It doesn't affect whole network
High chance of data loss	Low chance of data loss