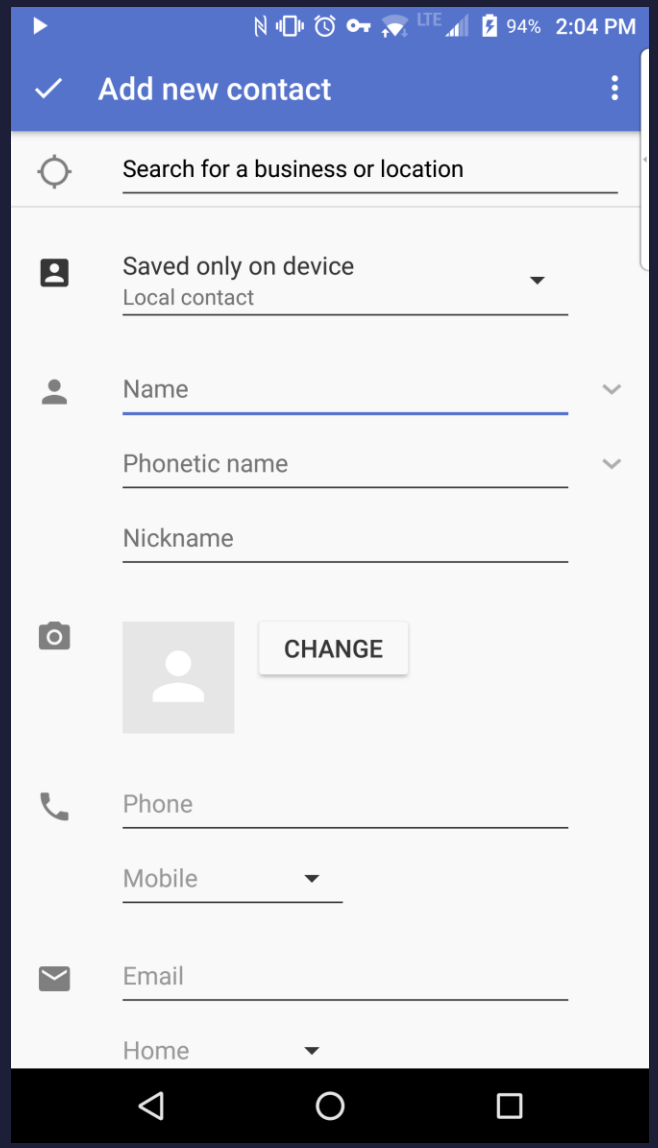
INTRODUCTION TO DBMS


94% 2:04 PM
Add new contact
Search for a business or location
Saved only on device
Local contact
Name
Phonetic name
Nickname
CHANGE
Phone
Mobile
Email
Home

CONTACT APP

- **Contact App includes data like**
- contact names
- number
- address
- birth date
- email add

- **Functions of Contact App**
- Insert
- update
- delete
- Search

- we can consider contact app as database management system as it contain
  - Database -collection of data about various contacts
  - Management system - set of programs to perform various operation on those data.

Data v/s Information

data and information are generally represented in form of collection of characters, digits and alphabets.

In computer world they can be in the form of images, sounds and videos..

Data	Information
•Data is known facts ,that can be recorded and have implicit meanings	•information means processed or organized data
•student no : 01 •student name : "XYZ" •city: Surat •college: GPG	•Percentage : 82.2% •Run rate : 6.0
•Data are raw material used to derive information •Ex: marks of subject	•Information is the product derived from data. •Ex: Percentage
•Data convey something less comparatively. •it is not convenient to represent result as a marks of 5 subjects.	•information convey something more comparatively. •it is convenient to represent result as a percentage.
•Data is comparatively less useful.	•information is comparatively more useful

Database

- A database is a collection of interrelated data.
- it represent some aspect of the real world.
- Ex: Bank
- Customer
  - customer id,name,address,contact no
- accounts
  - account no,account type,balance
- loans
  - loan no ,loan type,loan amount

- Employee
  - employee id,employee name,employee post,salary
- braches
  - branch code,branch name,city
  - All these data are interrelated in the context of banking system and it forms database for bank.
  - any arbitrary collection of data is not considered as a database.
  - Ex:
    - student
    - account
    - vehicle

Database Management System

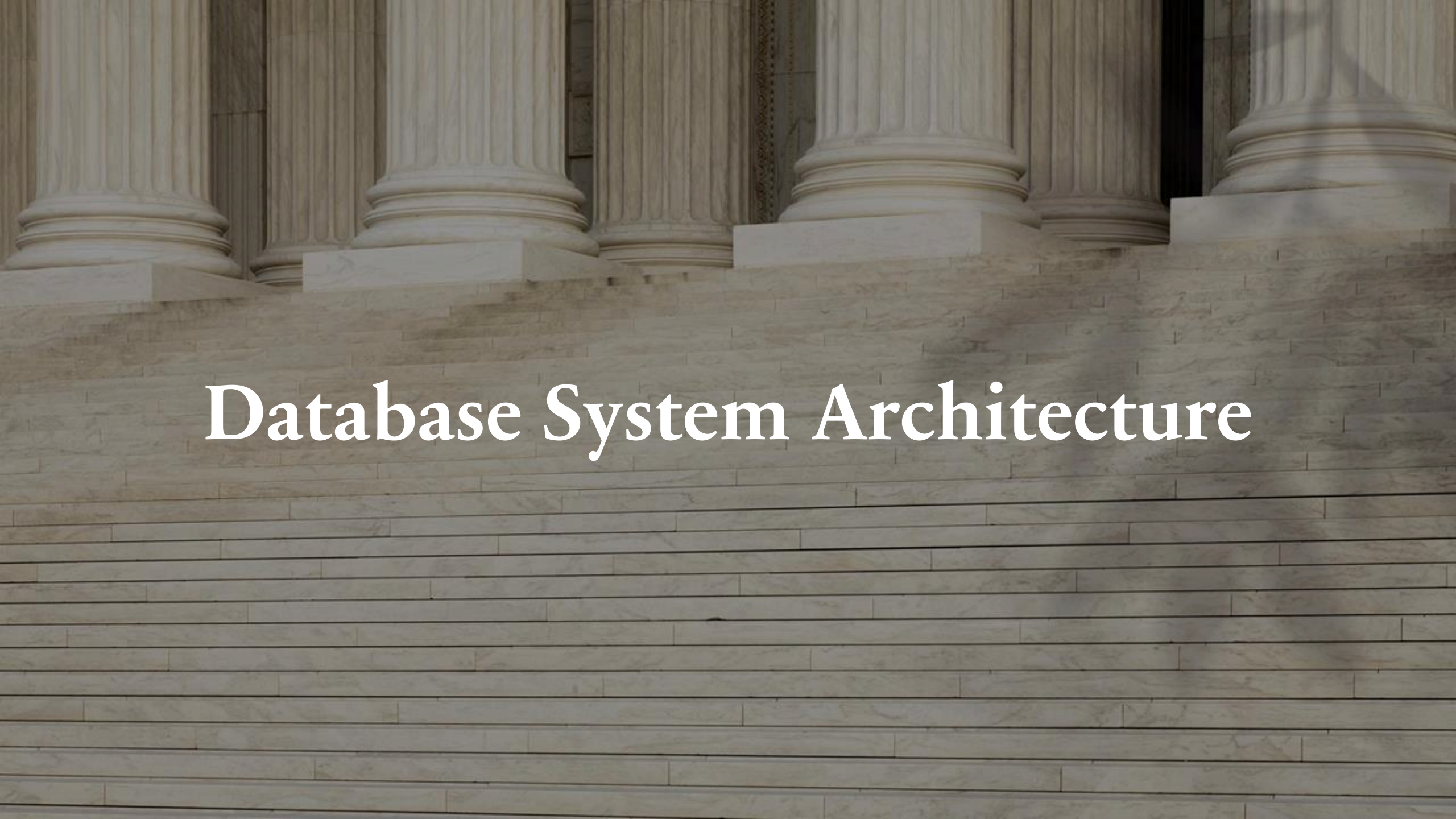
- A database management system is a collection of interrelated data and a set of program to manipulate those data.
- Data manipulation involves various operation such as
  - insert data
  - modify data
  - remove data
  - retrieve data
- DBMS = Database + A set of programs
- it is also called as database system only
- Primary goal of DBMS is to provide efficiency and convenience in storing and retrieving database information.
- DBMS also provide safety of information against
  - System crashes
  - unauthorized access

Database System Operation

- Various operation which can be performed on any kind of database system
  - Creating containers for database such as tables, files
  - insert data into existing database
  - modifying data in existing database
  - removing data from existing database
  - retrieving data from existing database
  - Destroying containers for database such as tables, files
- Other important operations which can be performed on database system
  - backup and recovery
  - performance monitoring
  - authorizing data access to provide safety to database

Application of DBMS

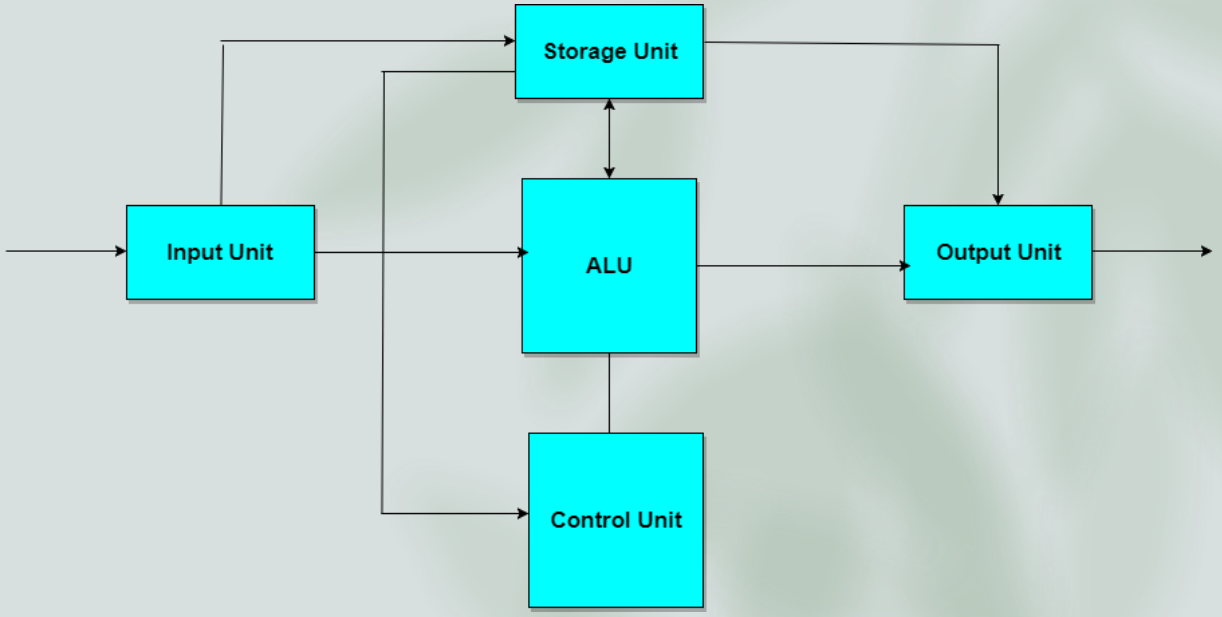
System	Data / Information to be managed
Banking System	Customers, Accounts, Loan, Employee, Transactions
Inventory System	Items, Bills, Orders, Customers, Vendors, Employees
Library System	Books, Magazines, Authors, Publications, Students, Faculty
Railway Reservation System	Trains ,Routes, Fairs, Schedules, Passengers ,Reservations
College/University	Students, Subjects, Faculty, Results, Department
Hospital Management System	Patients ,Doctors, Medicines, Wards, Employee
Cyber Cafe Management System	Customers, Computers, Plans, Bills..



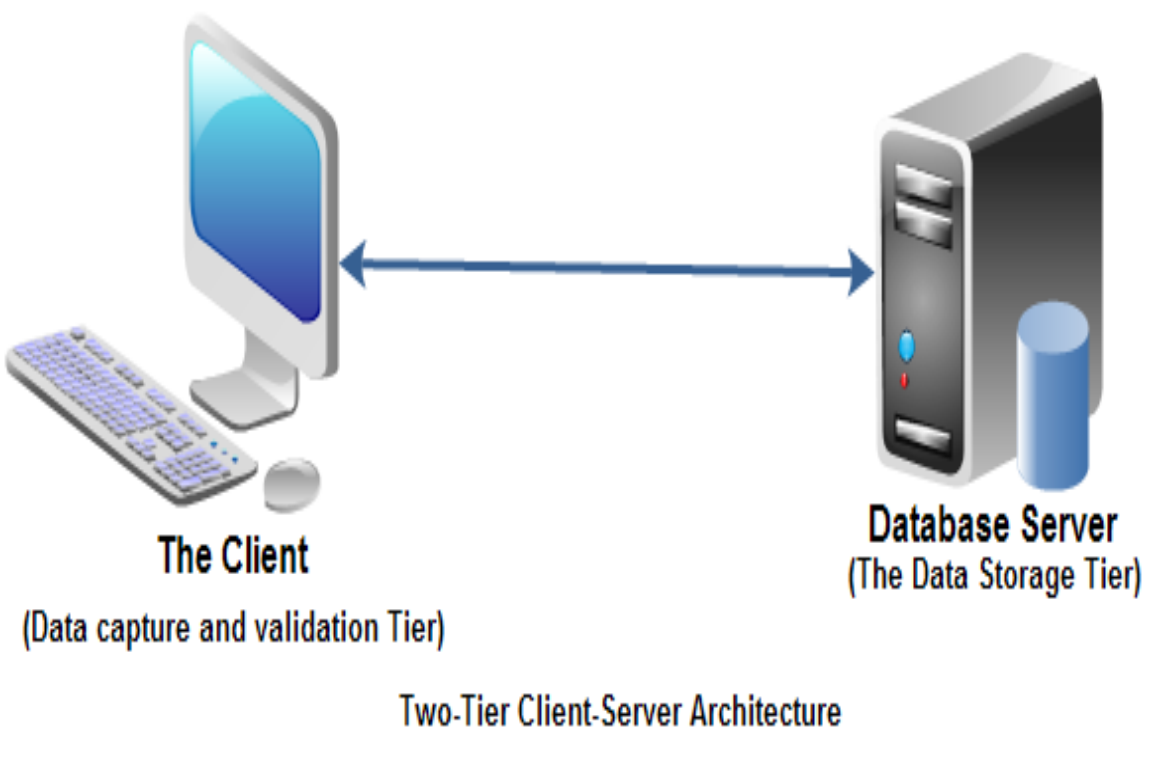
Database System Architecture

Introduction

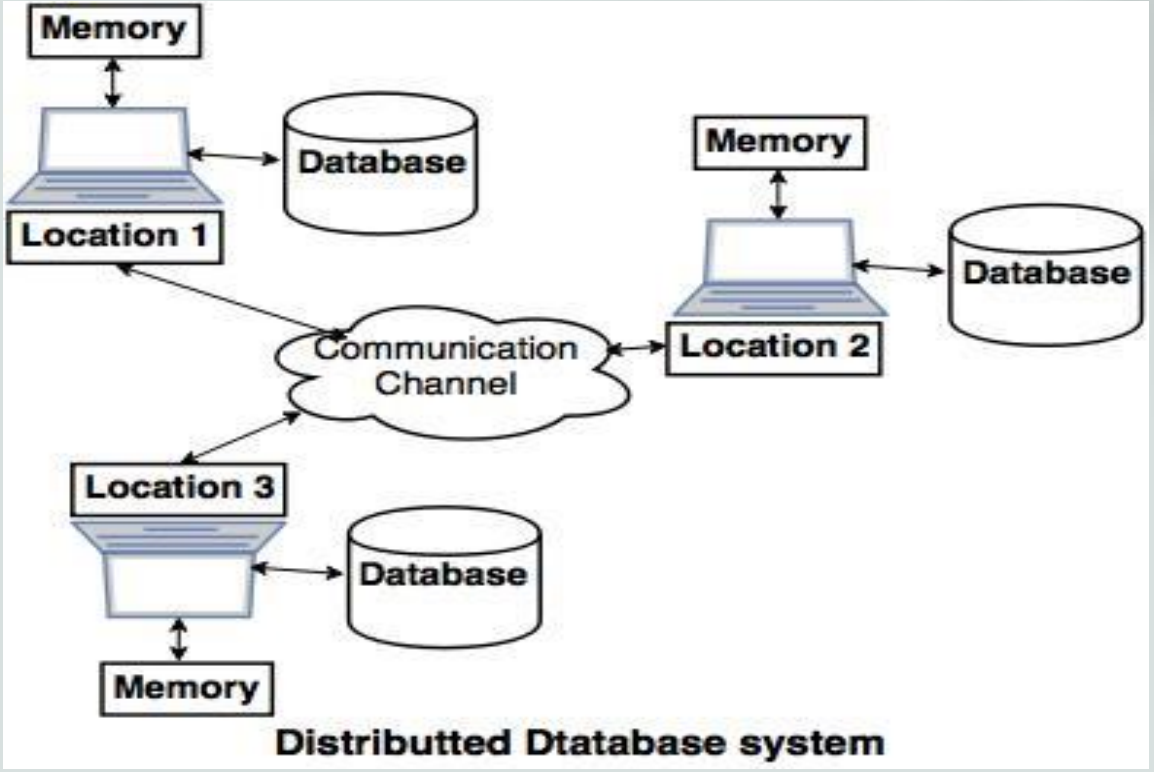
In computer engineering, computer architecture is a set of rules and methods that describe the functionality, organization, and implementation of computer systems.



- Database architecture focuses on database design and construction for large enterprise database systems that manage massive amounts of information for organizations.
- DBMS architecture has evolved from early centralized monolithic systems to modern distributed DBMS system with modular design.
- In early system the whole DBMS package was a single, tightly integrated system.
- whereas the modern DBMS is based on client-server system architecture.



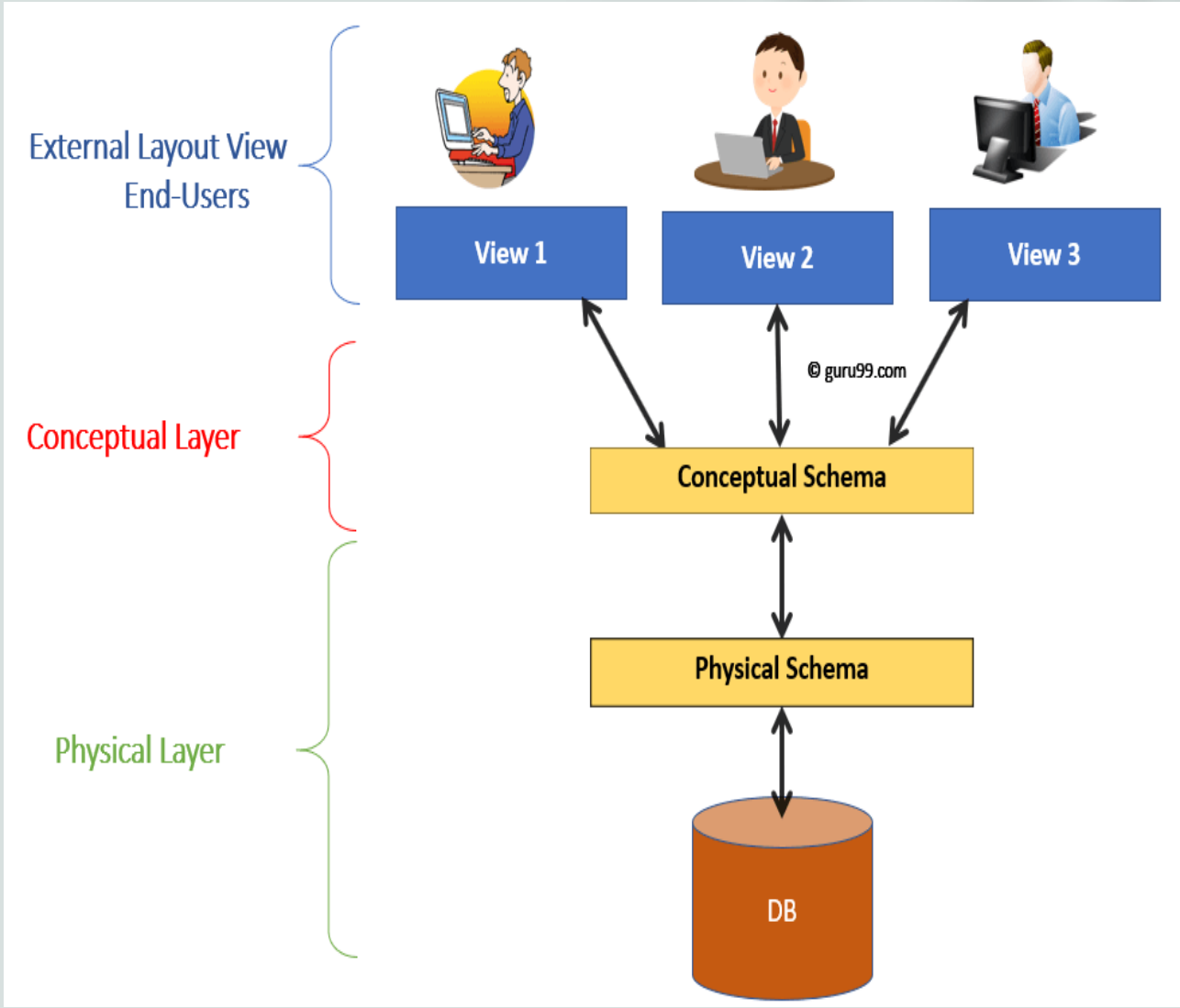
Two-Tier Client-Server Architecture



Distributted Dtatabase system

Three Level ANSI SPARC Database Architecture

- In 1975 ANSI SPARC(American National Standards Institute-Standard Planning and Requirements Committee) defined three tier architecture for database system.



- ANSI SPARC architecture is consisting of three levels
  - **Internal Level**
  - **Conceptual Level**
  - **External Level**
- These three levels provide **data abstraction**.
- It hides the low-level complexities from the end users.
- A database system should be efficient in performance and convenient in use.
- Both things are contradictory but, using three level architecture , it is possible to use complex structure at internal level for efficient operation and to provide simple and convenient interface at external level.

- **Internal Level**
  - this is the lowest level of data abstraction.
  - it describes how the data are stored on storage devices.
  - It is also known as a physical level because it provides internal view of the physical storage of data.
  - it deals with complex low level data structure - file structure and access methods in the detail.
  - it also deals with data compression and encryption techniques , if used.

- **Conceptual Level**
  - This is the next higher level of data abstraction
  - It describes what data are stored in database and what relationship exist among those data.
  - it is also known as a logical level
  - Data administrator and designer work at this level to determine what data to keep in database.
  - Application developer also work at this level as they must decide what data types and data structure should be used to develop an application based on the available data.
  - it hides the low-level complexity of physical storage.

- **External View**
  - This is the highest level of data abstraction
  - it describes only the part of the entire database that a particular end user concern.
  - It is also known as view level.
  - it provides end user simple and convenient interaction with system.
  - it hides details about data-types and data structure used to develop application at logical level.
  - End users need to access only the part of a database rather than entire database.
  - Different users need different views of database. Therefore, there can be many view level abstractions of the same database.

Advantages of Three -tier Architecture

- Same data can be accessed by different users with different customized view.
- The end user does not need to concern about the physical storage details.
- Physical storage structure can be changed without requiring changes in logical structure of the database.
- Conceptual structure of the database can be changed without affecting end users.
- Physical storage structure can be changed without requiring changes in user's view.

Characteristics of Three-tier Architecture

The Internal level deals with the complexity of the physical storage structure. DBMS software developer must deal with this.

The conceptual level deals with what data to keep in database.it also deals with relationship among these data.

Database administrator and designer is concern about these level

The external level provides simple interface to the end user. Application developer concern about this level to provide simple graphical user interface.

DATABASE SYSTEM ENVIRONMENT

Important Definitions

- The field is the basic unit of data in a database. A field stores a single piece of information o particular data type:

- Fields are combined to form records:

- A set of records with the same fields are collected together in a table:

Data-Item (Field)

- A data-item is a character or group of characters that has a specific meaning
- it is also called as Field .
- it is represented in the database by a value.
- Example :
  - customer id,name,society ,city --- **Customer**
  - ano,balance,brach ---**Account**

Record

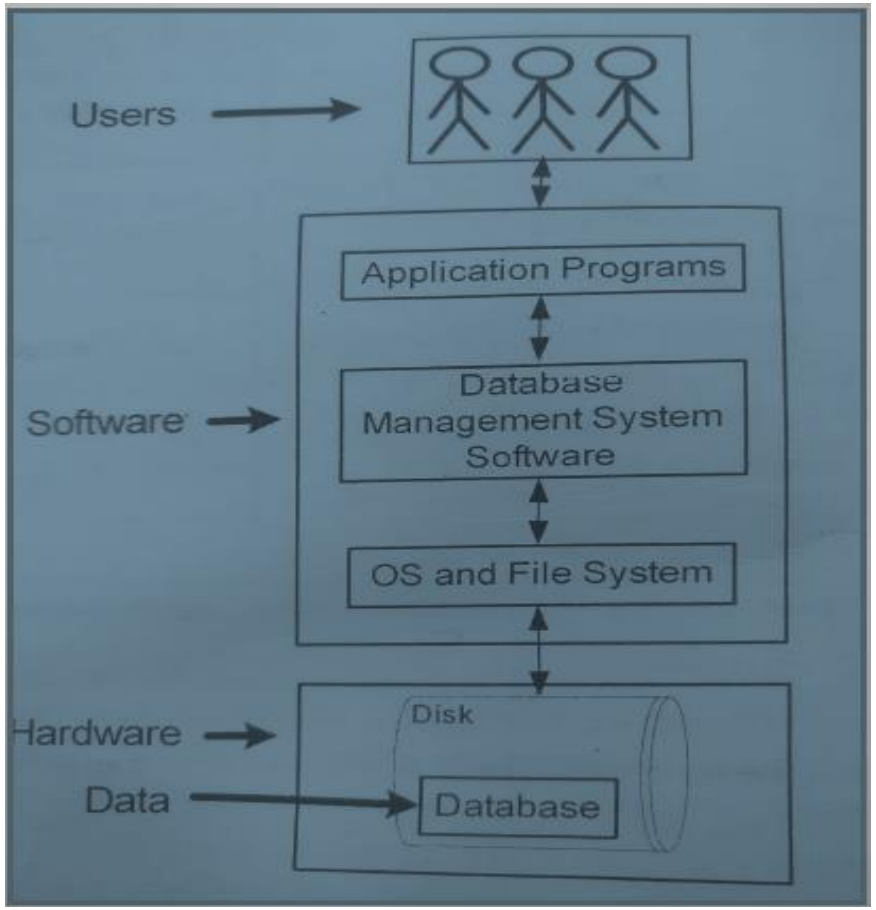
- A record is a collection of logically related fields
- Here, each field in a record contains a fixed size and fixed data type.
- A record consists of values for each field.
- So a record consisting of id,name, society and city represent a customer.

Files:

- A file is a collection of related records.
- these records are generally arranged in a specific sequence.
- Fixed length records -if all the records in the file have same size.
- Variable length records- if different records in file have different size

Database System Environment

- There are four major components of the database system which forms the database system environment.
  - Data
  - Hardware
  - Software
  - Users



Data

- Data is the most important component of the database system
- Data means known fact that can be recorded and have implicit meanings.
- Collection of interrelated data is referred as database.
- Database is a repository of related data.
  - Example : Banking System
- Data in Database are integrated and shared.
- Integrated data means they are correct and consistent.
- Correctness suggest that data satisfies the integrity rules.
  - balance should not be negative.
- Consistency suggest that all the data stored in a database should be consistent.
  - Account should not have a branch name which does not exist.
- Depending on the number of users interacting with the system Database can be classified into two category
  - Single user system
  - Multi user system
- in Single user system at most one user can access the database at a time.
- in Multi user system more than one user can access the database at the same time.

Hardware:

- All the physical devices of a computer system are referred as Hardware.
- Computer system can have different types of hardware
  - processor
  - memory
  - hard disk
  - monitor
  - keyboard
  - Mouse ,printer
- From database point of view hardware can be classified into two categories
  - The processor and Main memory
    - provides supports for the execution of database software
  - The Secondary storage devices
    - used to store data of a system permanently
    - it includes hard disk ,magnetic tapes, compact disk etc.
    - Hard disks are the most widely used secondary storage devices now a days.

Software

- Software provides the interface between users and database stored in physical devices.
  - Application programs
  - DBMS software
  - OS
- Application programs are developed using programming languages like C,C++,Java, Visual Basics
- These application program uses the functionalities of the DBMS software to perform various operations on the database.
  - Oracle
  - Ms Access
  - MySql
- Operating system manages all the hardware of computers.
- file system of the operating system provides the interaction between other software components and database.

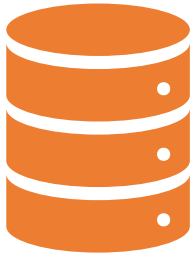
Users

- A person who interacts with a database in any form is considered as a database user
- Database Users can be divided into four categories
  - Database Administrator
    - has central control over the database system - including data & programs
    - he/she is responsible for the proper functioning of the database system.
  - Database Designer
    - Identify the data to be stored in database and design structure of the database for an organization.
  - Application programmers
    - Writes application program to develop database application using some programming languages.
  - End Users
    - Interact with the system by using pre-developed application program.
    - these users interact with the database in different manners depending upon their requirements.

Data Administrator vs Database Administrator

DATA ADMINISTRATOR	DATABASE ADMINISTRATOR
•The person in the organization who controls the data of the database.	•The person in the organization who control the design and use of the database.
•DA determines what data to be stored in database based on requirements of the organization.	•DBA provides necessary technical supports for implementing a database.
•DA is involved more in requirement gathering, analysis, design phase.	•DBA is involved in the design ,development , testing, and maintenance phases.
•DA is a manager or some senior level person in an organization who understands organizational requirements with respect to data.	•DBA is a technical person having knowledge of database technology.
•DA is a business focused person, but he should have basic knowledge about the database technology.	•DBA is a technically focused person , but he/she should have some business knowledge to administrate database effectively.

Functionalities and Responsibilities of DBAs



Schema definition

The DBA defines the schema of the database.

A schema refers to the overall logical structure of the database.

According to this schema ,database will be developed to store required data for an organization.

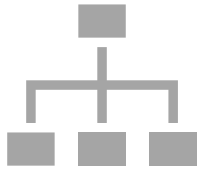
Storage Structure and Access Method Definition

The DBA decides how the data is to be stored/represented in stored database.

Based on the storage structure of the database access methods of data is defined.

Assisting Application Programmers

The DBA also provides assistance to application programmers to develop application program.



Physical Organization Modification

The DBA modifies the physical organization of the database to reflect the changing needs of the organization to improve the performance.

Approving Data Access

The DBA determines which user needs to access to which part of the database.

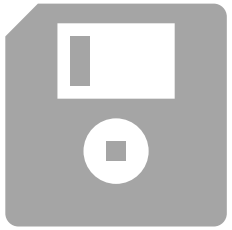
According to this ,various types of authorization are granted to different users.

this is required to prevent unauthorized access to a database.

Monitoring Performance

The DBA monitors performance of the system.

The DBA ensure that better performance is maintained by making changes in physical or logical schema if required.



Backup and Recovery

Database is an asset for any organization.

it should not be lost or damaged.

The DBA ensures this by periodically backing up the database on magnetic tapes or remote servers.

in the case of failure-system crash, virus attack database is recovered from this backup.

UNIT 2: Data Models

Notebook:	Database Management		
Created:	1/8/2020 8:56 PM	**Updated:**	12/22/2022 12:45 PM
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What is Data Model?

- A Data model is a collection of conceptual tool for describing-
  - Data
  - Data relationships
  - Data semantics
  - Data constraints
- In Simple word data model describes the structure of a database.

Types of Data Models

- Logical Data Model
- Physical Data Model

- Logical data model can be further classified into two category.
  - Object based logical data model
  - Record based logical data model

Object Based Logical Data Model

- Object based logical data models are used in describing data at the logical and view level
- well known object based logical data models are
  - The Entity Relationship model
  - The object Oriented Model
  - The Binary Model
  - The semantic Model
  - The Functional Model

The Entity Relationship Model

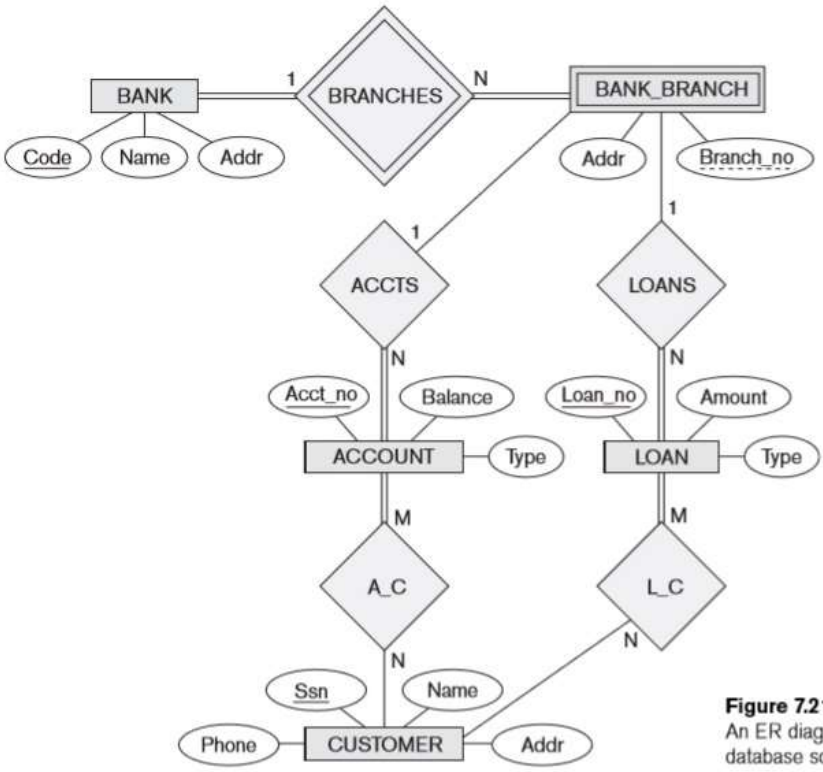
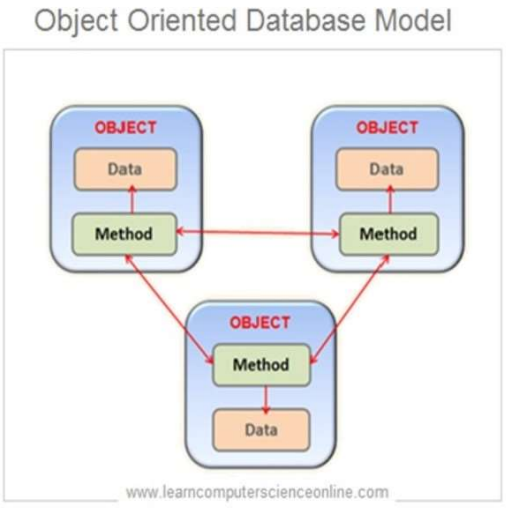
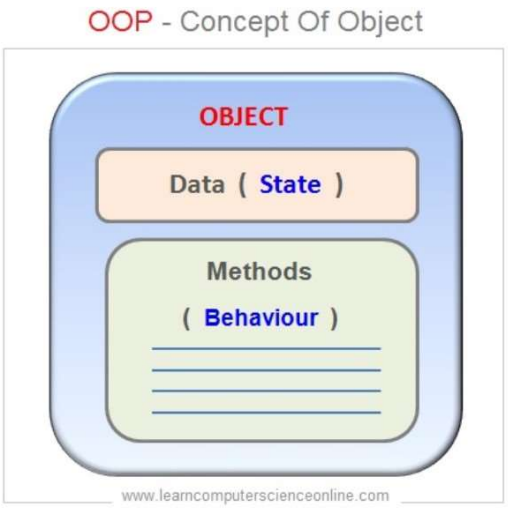


Figure 7.21
An ER diagram for a BANK database schema.

- The Entity Relationship Model is based on the perception of real world.
- The real world consist of collection of basic objects and relationship among these objects.
- It is also referred as E-R Model.
- These real world objects can be considered as **Entities.**
- These entities are distinguishable from each other.
    - Example: Customer , Account
- A set of attributes or properties is associated with each entity to describe it.
    - Example: account no,balance --Account
- A set of all the entities of the same type is called the **Entity Set.**
    - **Customer** is an entity set and each individual customers are called entities.
- An association among several entities is known as **relationship.**
- The set of all the relationships of the same type is called **relationship set.**
- Along with entities and relationship , the E-R model represent certain **constraints**.
- The content of a database must confirms to these constraints.
- One of the most important constraint in E-R model is **Mapping Cardinality.**
- **The E-R model is used to represent overall logical structure of database graphically.**

Object Oriented Model





- Object oriented model is also based a collection of **objects**.
- **An Object**
  - In Object Oriented model object is consist of
    - Data Member (Instance variable)
    - Body of code that operates on these instance variable (Methods)
  - Object = Values in instance variable + Methods
- **A Class**
  - It is a collection of objects of similar types.
  - it can be viewed as a type-definition/ prototype of objects.
- **Sending a Message:**
  - The only way in which one object can access the data of another object is by calling a method of that other object.
- **Two level of data abstraction**
  - The method names of an object defines that object's externally visible part.
  - The internal part of the object
    - instance variable
    - method code , are not visible externally.
  - Example:
    - Object -- Account
    - Instance variable --- acc_no , balance
    - Method : --- pay_interest()
  - **The external interface method name to the objects remains unchanged.**
- **Distinction among the Objects**
  - Each object has its own unique identity in this model.
  - This Identity is independent of the values it contains.
  - Two objects containing the same values are distinct.

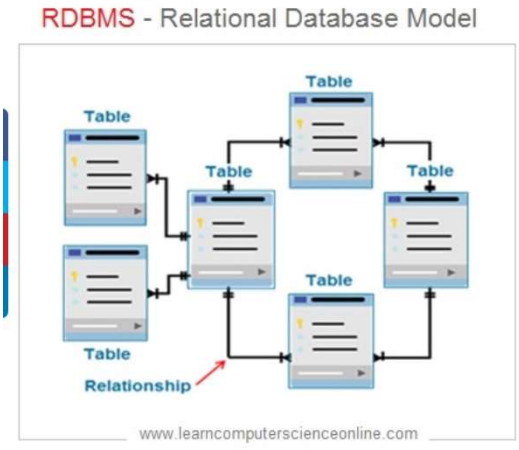
- This distinction is created and maintained in physical level by assigning distinct object identifier.

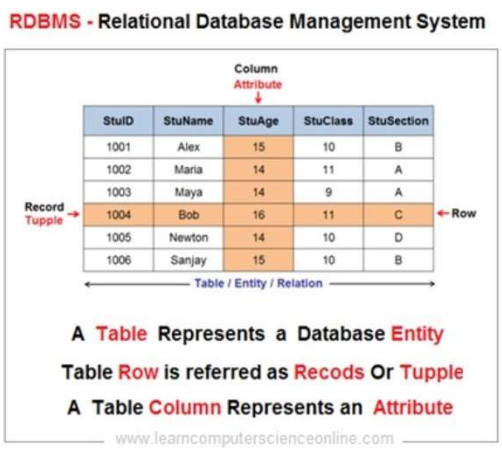
Record Based Logical Data Models

- Record based logical data models are also used in describing data at the logical and view level.
- They are used to specify overall logical structure of the database and provide a higher level description of the implementation
- In this model , database is structured in fixed format records of several types .
- Each record type defines a fixed no of fields.
- Each field is usually of a fixed length.
- This simplifies the physical level implementation of the database.
- Some of the well known record based logical data models are
  - The Relational Model
  - The Network Model
  - The Hierarchical Model

The Relational Model

- The relational model uses a collection of tables to represent both data and the relationship among those data.
- Each table has multiple columns.
- Each column has unique name and fixed length.

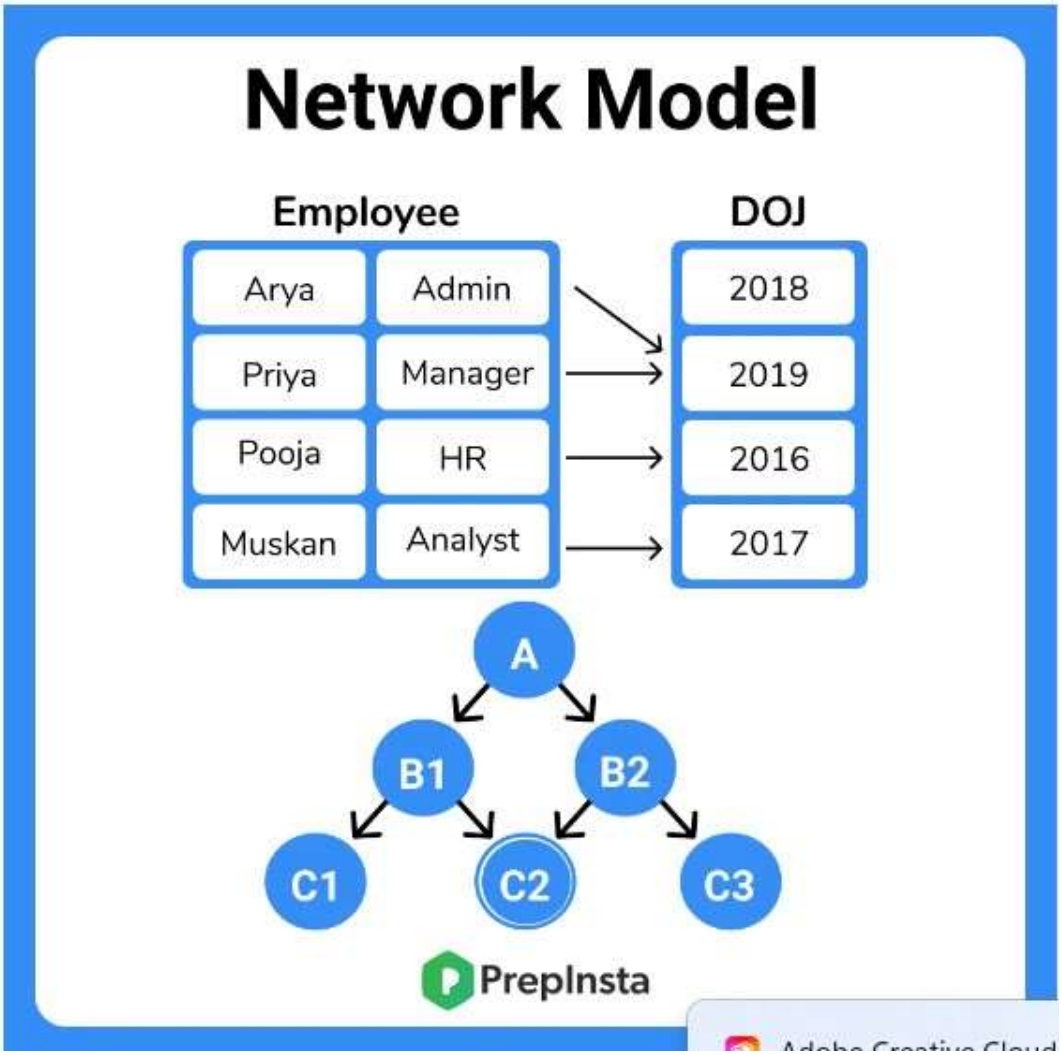




The Network Model

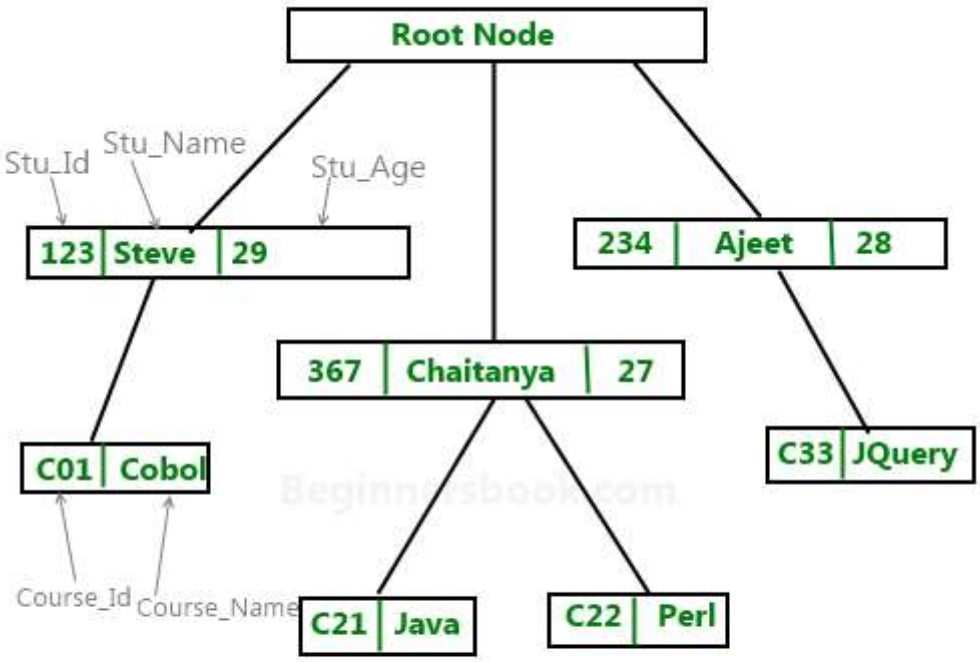
- In Network Model data are represented by collection of records.
- A record is defined as a collection of logically related data items.

- Relationship among data is represented by links.
- The records in a database are organized as collection of arbitrary graphs.



The Hierarchical Model

- The hierarchical model is simply a special case of the network model.
- Data are represented by collection of records as similar to network model.
- Relationship among data are represented by links or pointers.
- Records in database are organized as collection of trees rather than arbitrary graphs.



Physical Data Model

- Physical data models are used for a higher level description of storage structure and access mechanism.
- They describes how data are actually stored in database.
- Some of the well known physical data models
    - The Unifying Model
    - The Frame memory Model

UNIT 1: MetaData , System Catalog and Data Dictionary

Notebook:	Database Management		
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Metadata

- Metadata is data about data
- This means that data such as
  - table name,
  - column name,
  - data type,
  - size ,
  - constraints
  - authorized users,
  - access priviledges for any table is called meta data for that table.
- Meta data describes various objects in the database.
- it also makes it easier to access or manipulate those objects.
- Meta data provides program-data independance
- program-data Independence : data can be changed without requiring changes in application program.

Data Dictionary

- Data dictionary or data directory is a file that contains meta data.
- Data dictionary stores and manages following types of information
  - Description of the schema
  - Detailed information of physical database design - storage structure,access method ,record size
  - Description of database users, their responsibilities and access rights
  - Description of database transactions
  - Relationship among entities.
  - Usage statistics - frequencies of queries and transaction.

- Access counts of different part of the database.

Note :

- Every database stores each information about its objects.
- This information can be about its over all logical structure,which is called meta data.
- These metadata are also stored as rows and columns of a table.
- collection of metadata is stored in the data dictionary or system catalog.
- System catalog are accessed by the DBMS to perform various transactions
- Data dictionary has the user accessible view that are accessed by the developers /designers.
- Data dictionary is usually part of system catalog that is generated for each database.

Data Storage Techniques

Paper Based System

- Before the invention of computers databases were still there.
- At that time databases were stored on papers.
- Still now a days if size of database is small , paper-based system is most appropriate to manage it.

Advantages of Paper Based System

it is very simple to use.

it does not require any computer related skills.

They are cheap too.

they do not require any investment in preparing programs, database and installing computers.

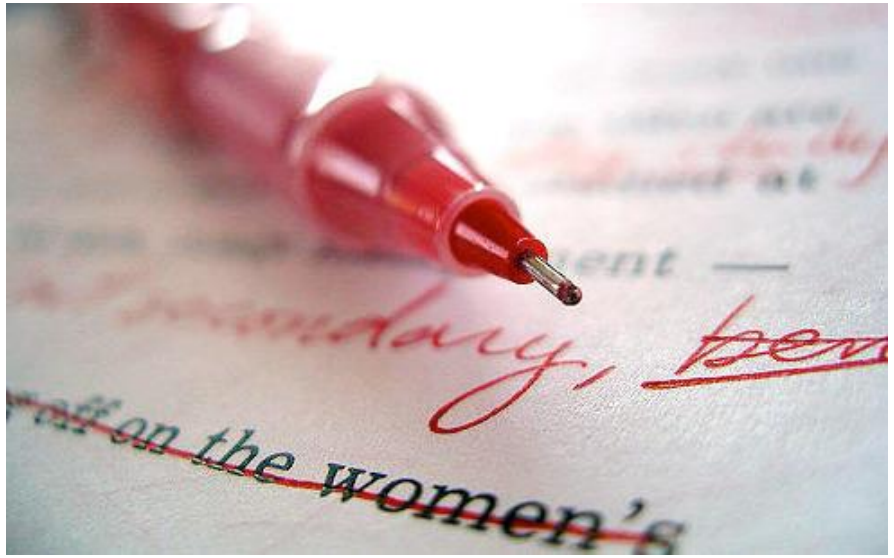
Disadvantages of Paper Based System

- **Backup**
  - it is not possible to take faster and automatic backup of database stored in hundreds or thousands of pages.
  - computer based system make this possible.

- **Compactness**
  - in paper-based system data cannot be store compactly.
  - ex: To store all the words of English dictionary hundreds of pages are required, but in computer-based system only few KB of memory is required for this purpose.

- **Data Retrieval**
  - It requires too much manual efforts.
  - But computer-based system provides enhanced data retrieval in easy and efficient way.

- **Editing**
  - it is almost impossible to edit data written on papers.
  - such of editing will result in chaos.
  - It is easy to edit any information stored in computers in form of files and tables.

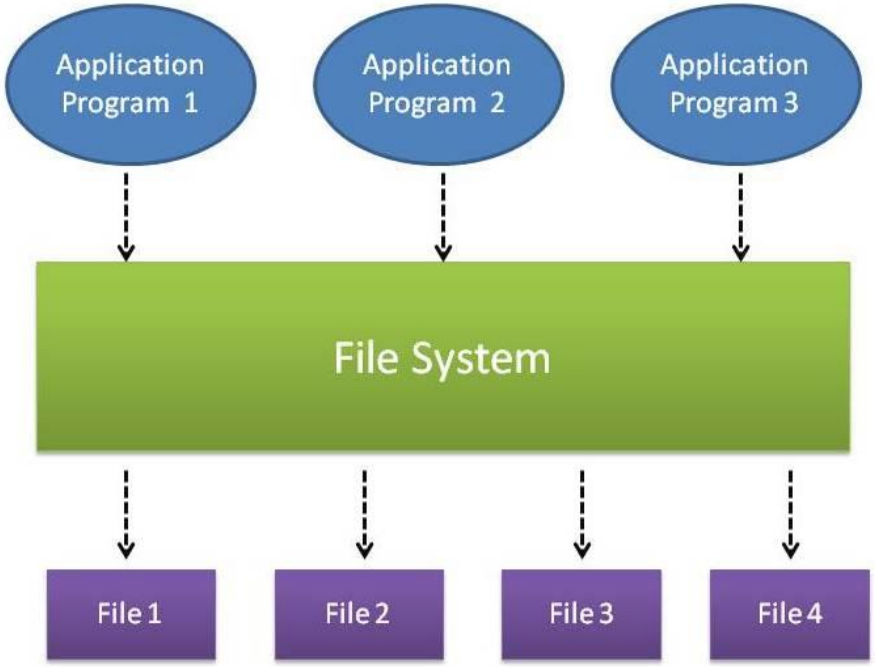


- **Remote Access**
  - it is not possible to access data stored on papers remotely.
  - To access the data available on paper user must be present at that geographical location.

- **Sharing**
  - Sharing of data among multiple users at a same time is not possible in paper-based system
  - Computer based system allows such kind of sharing.

Note:

- They are convenient only when database size is small, and data stored in database do not change.



File Oriented System

- File oriented system were the first attempt to computerize the data storage and various operation on data
- Before the advent of DBMS , organizations were using the file system supported by OS to store the data.
- To perform various types of operation like insert, update, delete, search - system has no of application programs developed using some programming language.
- this application program directly interact with the file system of OS, and OS in turn interact with the files on disk to perform various operations.

Example

- Let's say Bank allows two different types of accounts
  - saving account
  - current account
- So, to manage data about two types of account two different files are used
  - one file to store details about all customers having saving account
  - another file to store details about all customers having current account
- Banking system also contains a no of programs to perform various tasks on these data.
- These programs are developed by application programmer using some programming language ---C,C++,JAVA
- some of the Task
  - Debit or Credit an account
  - Check available balance
  - Search for customer and their details

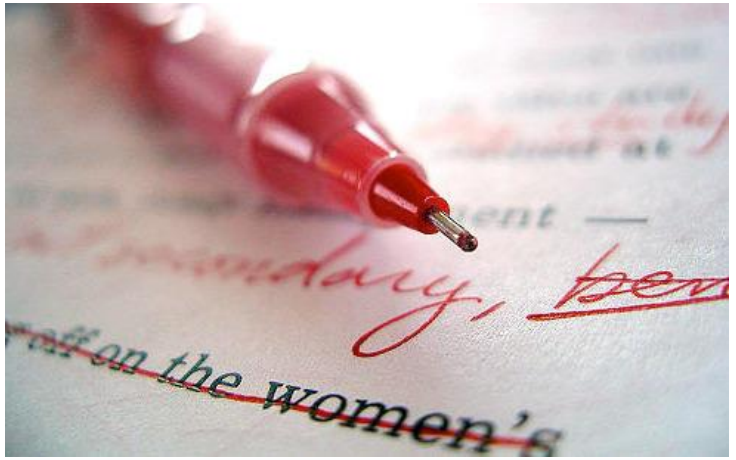
Advantages of File Oriented System

- **Backup**
  - it is possible to take faster and automatic backup of data stored in files of computer-based system
  - It is possible to develop specific application program for this purpose.

- **Compactness**
  - it is possible to store data compactly.
  - in computer based system only few KB of memory is required for storing words of English dictionary.

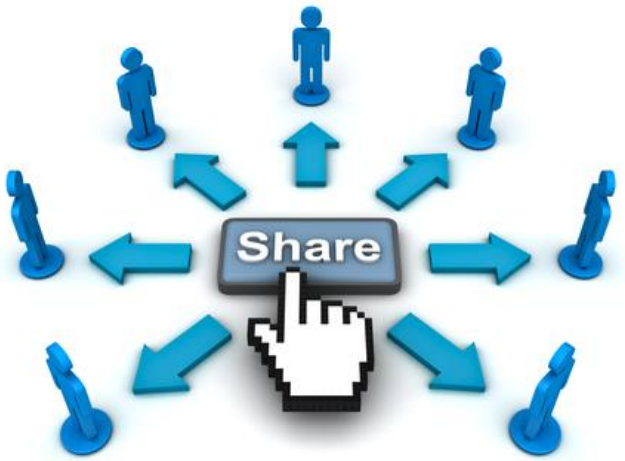
- **Data Retrieval**
  - computer based system provides enhanced data retrieval techniques to retrieve data stored in file in easy and efficient way.

- **Editing**
  - It is easy to edit any information stored in computers in form of files.
  - Specific application program or editing software can be used for this purpose.

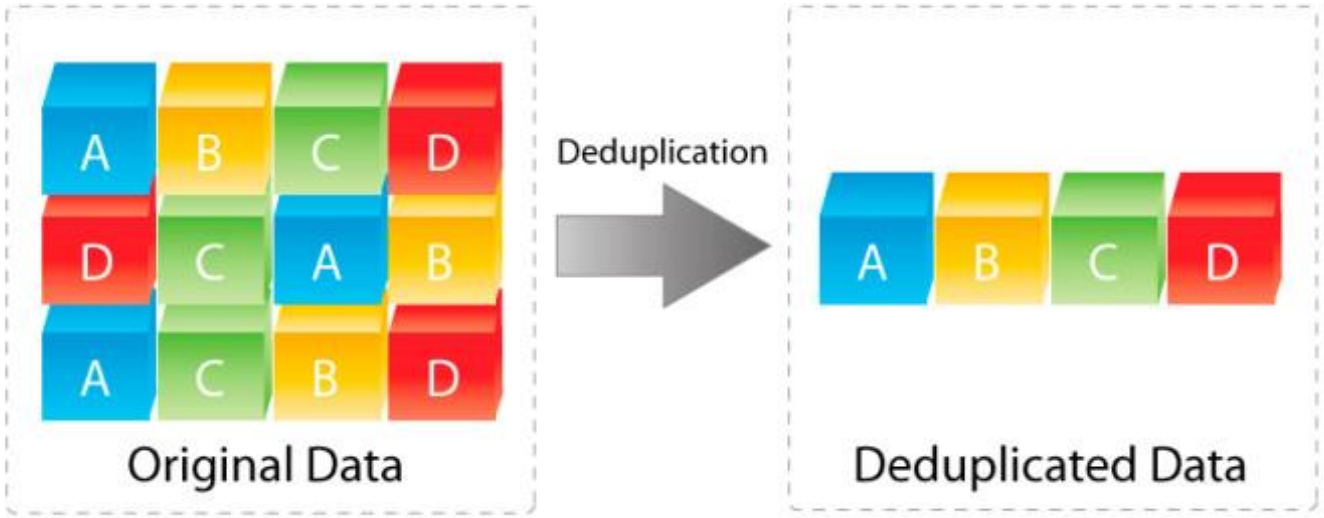


- **Remote Access**
  - In computer-based system, it is possible to access data remotely.
  - So, to access data it is not necessary for a user to remain present at location where these data are kept.

- **Sharing**
  - Data stored in files of computer-based system can be shared among multiple users at a same time.

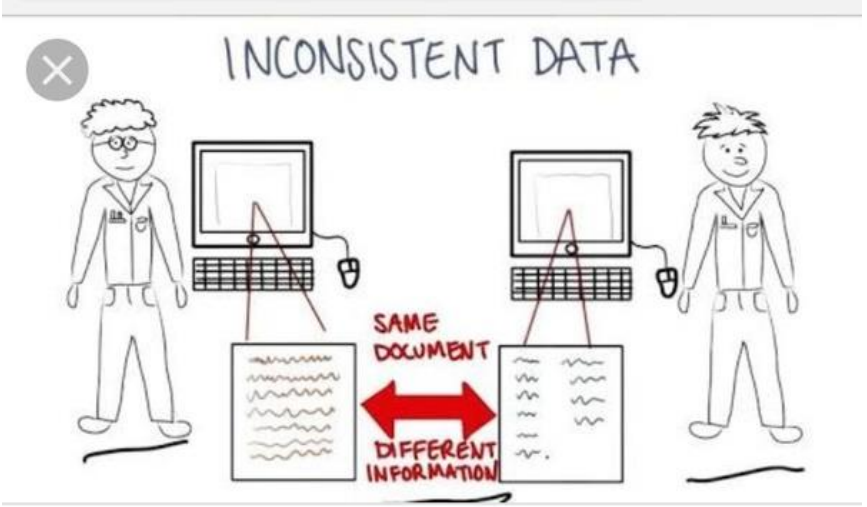


Disadvantages of File Oriented System



- **Data Redundancy**
  - it is possible that the same information may be duplicated in different files.
  - it leads to data redundancy.
  - data redundancy results in memory wastage.
  - Example:
    - Customers have both types of accounts- Savings ,Current

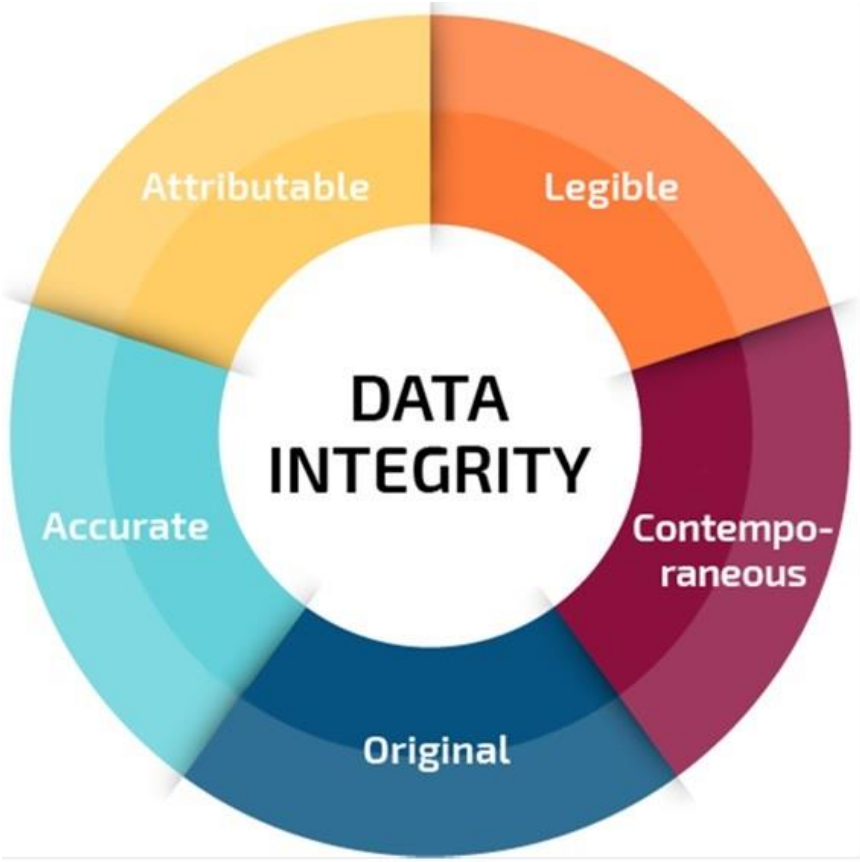
- **Data Inconsistency**
  - Due to data redundancy, it is possible data may not be in consistent state.
  - Example:
    - Let's say the customer address changes.
    - if that customer has both type of accounts.it is possible that this address changed in one file and living address in other file as it is.
    - As a result, same customer have two different address in two different files ,make data inconsistent.



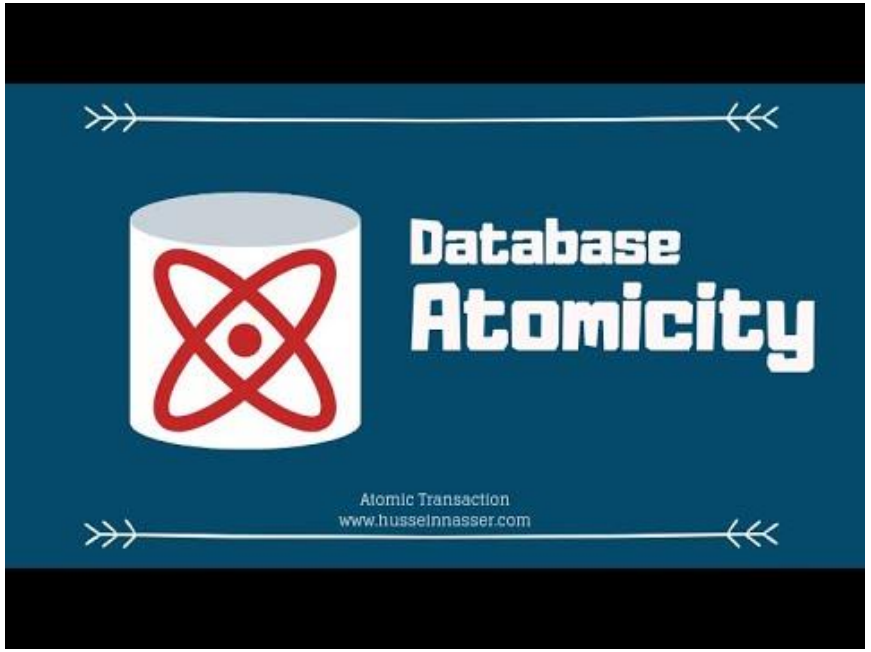
- **Difficulty in Accessing Data**
  - Accessing data is not convenient and efficient in file processing system.
  - For each different kind of data access , separate application programs are required which is neither convenient nor efficient.
  - Ex: There is an application program to find out all information about customers.
  - But what if there is need to find out all the customers from particular city.
    - find out all the customers using available program then extract the needed customers manually.
    - Develop new application program to get the required information.

- **Limited Data Sharing**
  - Data are scattered in various files.
  - These files may have different formats.
  - These files may be stored in different folders on different computers of different departments.
  - due to these data isolation -it is difficult to share data among different application.

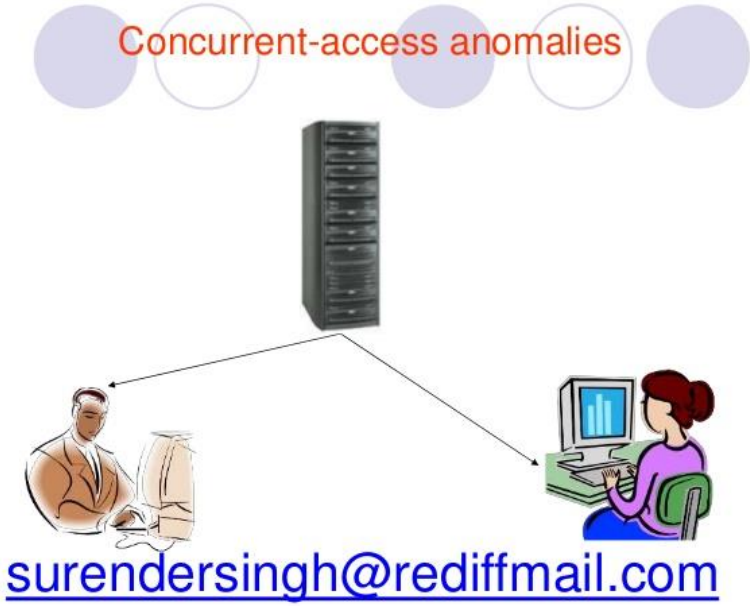
- **Data Integrity problems**
  - Data Integrity means that the data contained in database is both **correct** and **consistent**.
  - For these purpose, the data stored in database must satisfy certain types of constraints(rules)
  - Example
    - A balance of any account must not be less than zero.
    - such type of constraints can be enforced in the system by adding appropriate code in application program.
    - But it is difficult to add new constraints or change existing constraint whenever required.



- **Atomicity Problem**
  - Any operation on database must be atomic.
  - it must happen in its entirely or not at all.
  - it is difficult to ensure atomicity in file-oriented system
  - Example:
    - Transferring fund from one account to another must happen in its entirely.
    - As computer system are vulnerable to failure-system crash ,virus attack.
    - it may be possible that amount is debited from one account but does not credited into another account-which interns create data inconsistency.

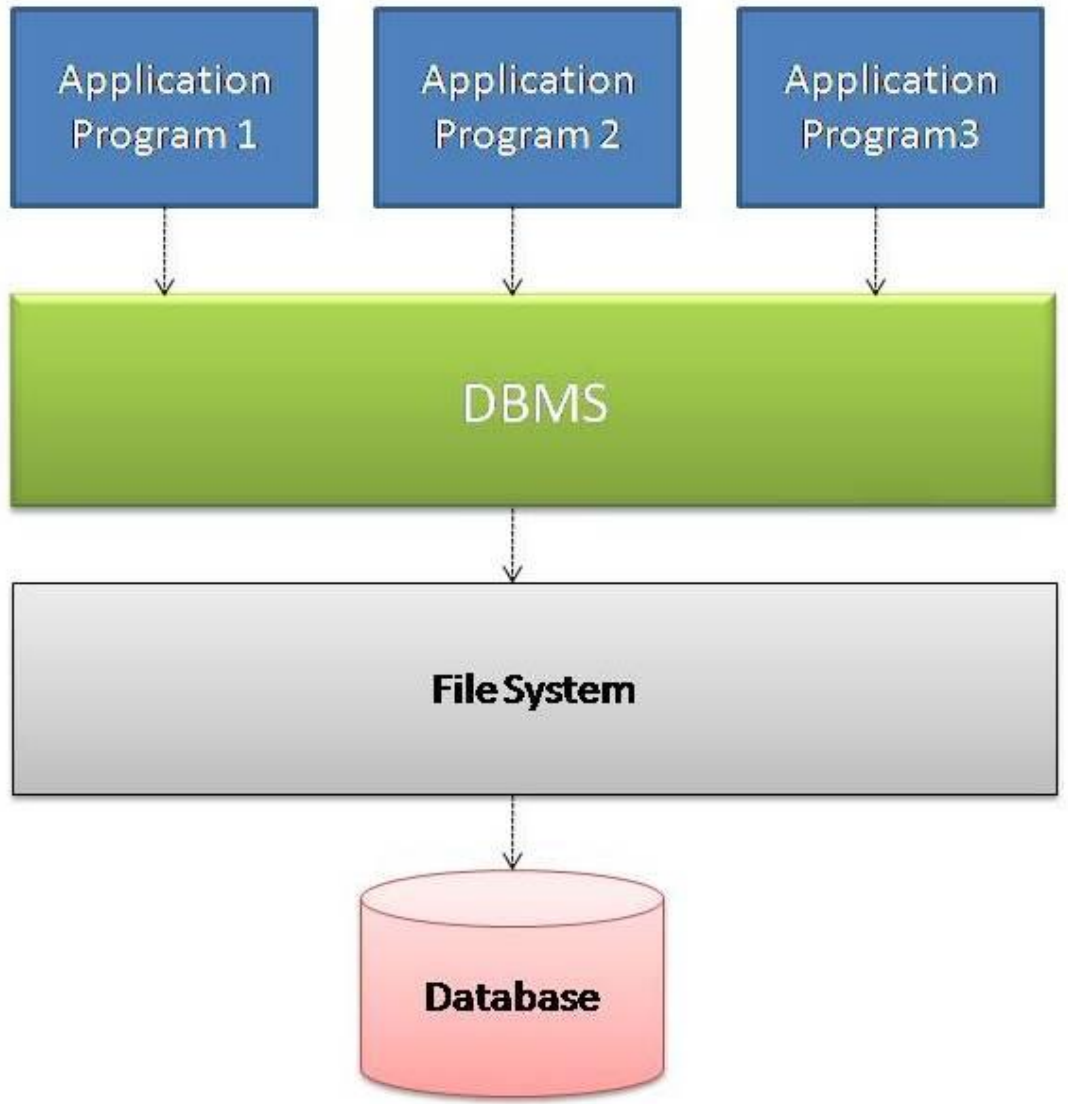


- **Concurrent Access Anomalies**
  - Multiple users can access data simultaneously
  - it is for sake of better performance and faster response.
  - Concurrent data access should be allowed under some supervision.
  - Concurrent access is not possible in file-oriented system because co coordinating different application program is difficult.
  - Example:
    - An operation to Withdraw amount from same account simultaneously.
    - Withdraw operation can be done in following manner
      - read old balance
      - calculate new balance
      - write new balance back to data base.



- **Security Problems**
  - Database should be accessible to users in limited way.
  - Each users should be allowed to access data concerning his/her requirements only.
  - Example:
    - customer can check balance only for his/her own account.
    - he should not have access to information about other accounts.
  - As in File oriented system , application program are added in ad hoc manner by different programmers.
  - it is difficult to enforce such kind of security constraints.

Database Management System

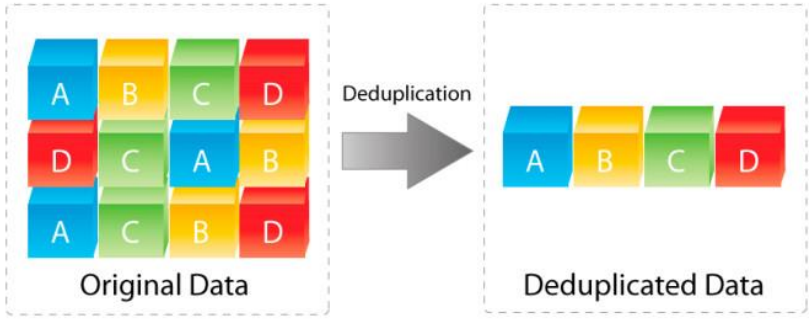


- In Database System, the data is managed by DBMS.
- All access to the data is through the DBMS software. DBMS provides effective data processing.
- While in file-oriented system application program can directly interact with the data via OS
- In File oriented system, there will be different files to store different kind of data .these files might have been stored at different location in different disks.
- In DBMS, all data are stored in single database and database is kept at single centralized location.
- This makes management more efficient and reduce redundancy.
- With centralized database , it is possible to provide centralized control over all the data.

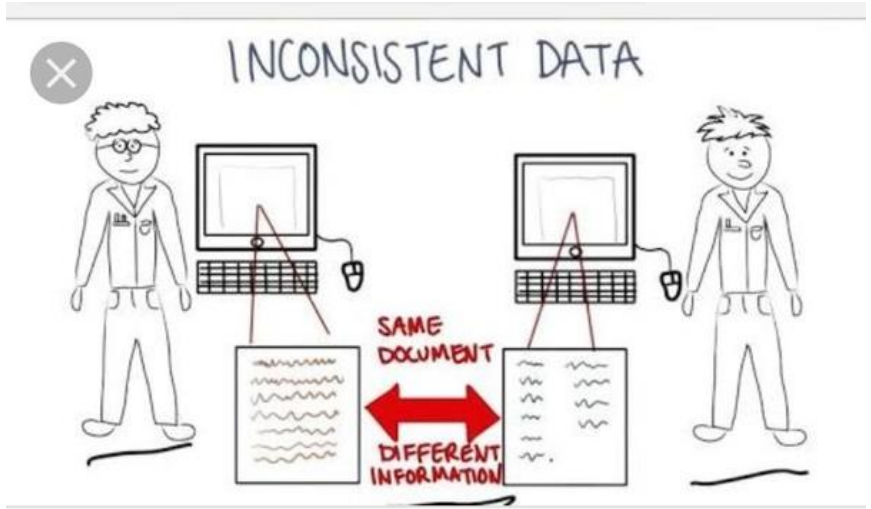
Advantaged of DBMS

- In Database System ,DBMS software is used to provide interaction between application program and database. Due to these it provides following advantages.

- **Minimal Data Redundancy**
  - Due to centralized database, unnecessary duplication of information can be avoided.
  - Which leads to reduced data redundancy and prevent memory wastage.
  - it also eliminates extra processing time to get required data in large database.
  - Less processing time improves the performance of the system.



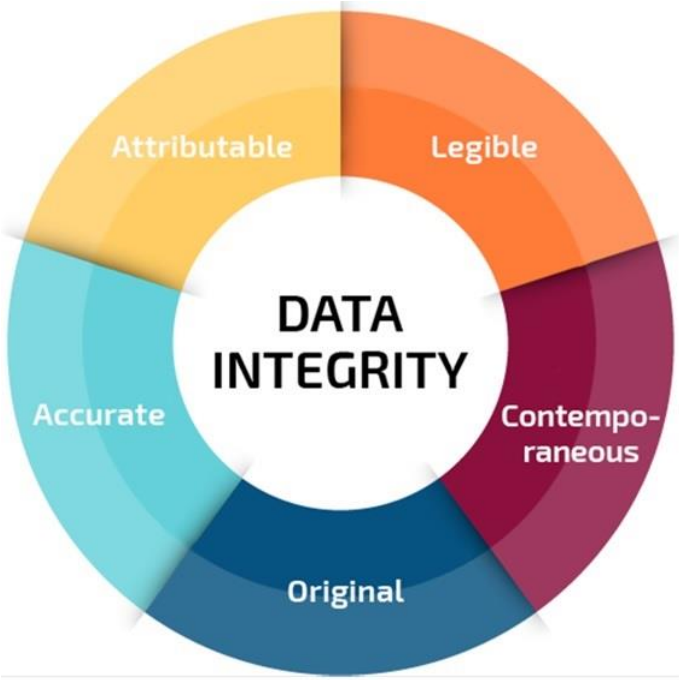
- **Improved Data Consistency**
  - Data inconsistency occur due to data redundancy.
  - With reduced data redundancy , such type of data inconsistency can be eliminated.
  - Example:
    - Maintaining Customer information separately for both saving and current accounts



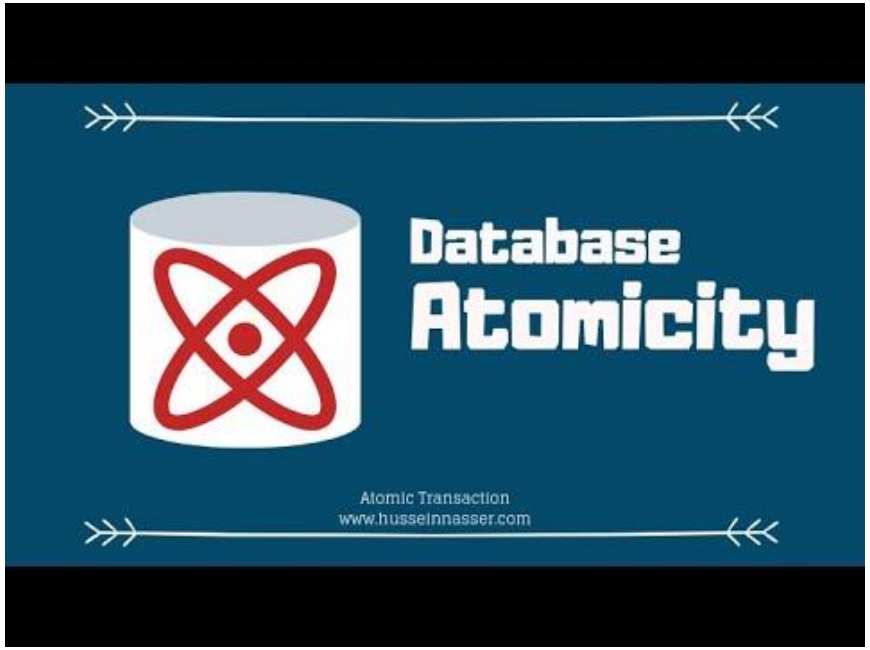
- **Efficient Data Access**
  - DBMS utilizes a variety of techniques to retrieve data.
  - Required data can be retrieved by providing appropriate query to the DBMS.
  - Example:
    - Information about all customers or from city can be retrieved easily by providing appropriate query statements.
  - Data can be accessed in convenient and efficient manner.

- **Improved Data Sharing**
  - As Database is maintained centrally, all authorized users and application program can share this database easily.

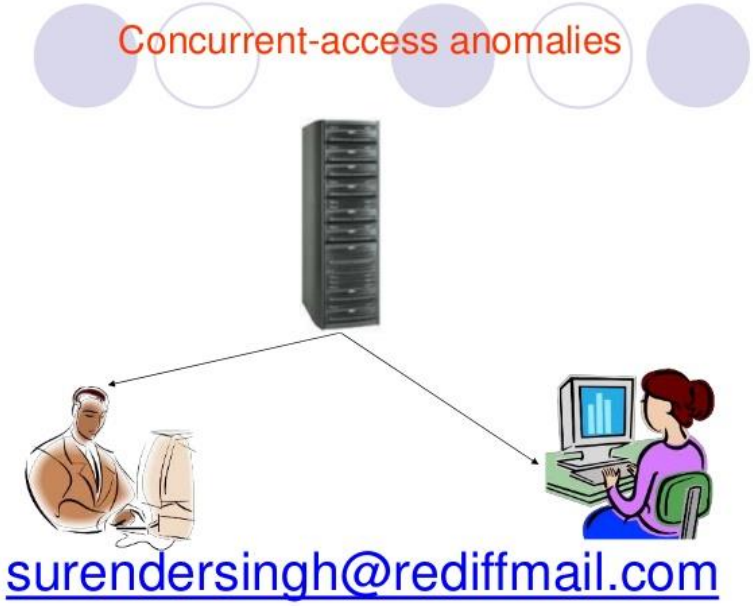
- **Improved Data Integrity**
  - Data integrity means that the data contained in the database is both correct and consistent.
  - For these purpose data stored in database must satisfy certain types of rules(constraints).
  - DBMS software provides different ways to implement such type of constraints.
  - it also ensure that the data stored in database follows such constraints on its own.
  - Application program does not need to worry about this.



- **Guaranteed Atomicity**
  - Any operation on database must be atomic.
  - it must happen its entirely or not at all.
  - Example:
    - fund transfer from one account to another must happens in its entirely.
  - it is the responsibility of the DBMS software to ensure such kind of atomicity.
  - if any operation failed due to some problems-system crash , then effect of partially executed operation can be undone.



- **Improved Concurrent access**
  - In Database system multiple users can access data simultaneously for the sake of better performance and faster response.
  - In Database system data is maintained centrally, data can be shared easily among multiple users, such kind of concurrent access can be allowed under some supervision of DBMS software.
  - Which result in better performance and faster response of the system.



- **Improved Security**
  - Database should be accessible to users in limited way.
  - each user should be allowed to access data concerning his/her requirements only.
  - In Database System , DBMS software provides way to control the access to data for different users according to their requirements.
  - It is also the responsibility of DBMS software to prevent unauthorized access to data.

Disadvantages of DBMS

- **High Cost**
  - Higher initial cost is required to implement database and application program.
  - It incurs high initial cost behind DBMS software. Also, hardware needs to be upgraded according to requirements of DBMS software.
  - Conversion from older file-oriented system to database system is also costly in terms of money as well as time

- **Specialized Manpower**
  - Database system requires specialized ,skilled manpower to design and develop database and to provide database administration services.
  - Due to rapid changes in database technology, manpower needs to be trained and retained on regular basis.

- **Security Risks**
  - Database is kept centrally and used by multiple users remotely at the same time.
  - This requires authorizing access to data among users to prevent misuse of the confidential and important data.

- **Increased Complexity**
  - it is necessary to understand the requirements of the organization and different kind of users to design and implement efficient database.
  - With increase in requirements and functionalities , complexity of the database increases.

- **Need of Explicit Backup and Recovery**
  - As entire database is maintained centrally, it is must to provide efficient backup and recovery facilities.
  - any kind of damage to this database can affect the operation of entire system

Note:

- it is desirable not to use database system if
  - database is simple & well defined
  - need not to change frequently
  - concurrent access among multiple users is not required.