



UNIT I – INTRODUCTION TO DBMS – 3 HRS

DBMS Overview

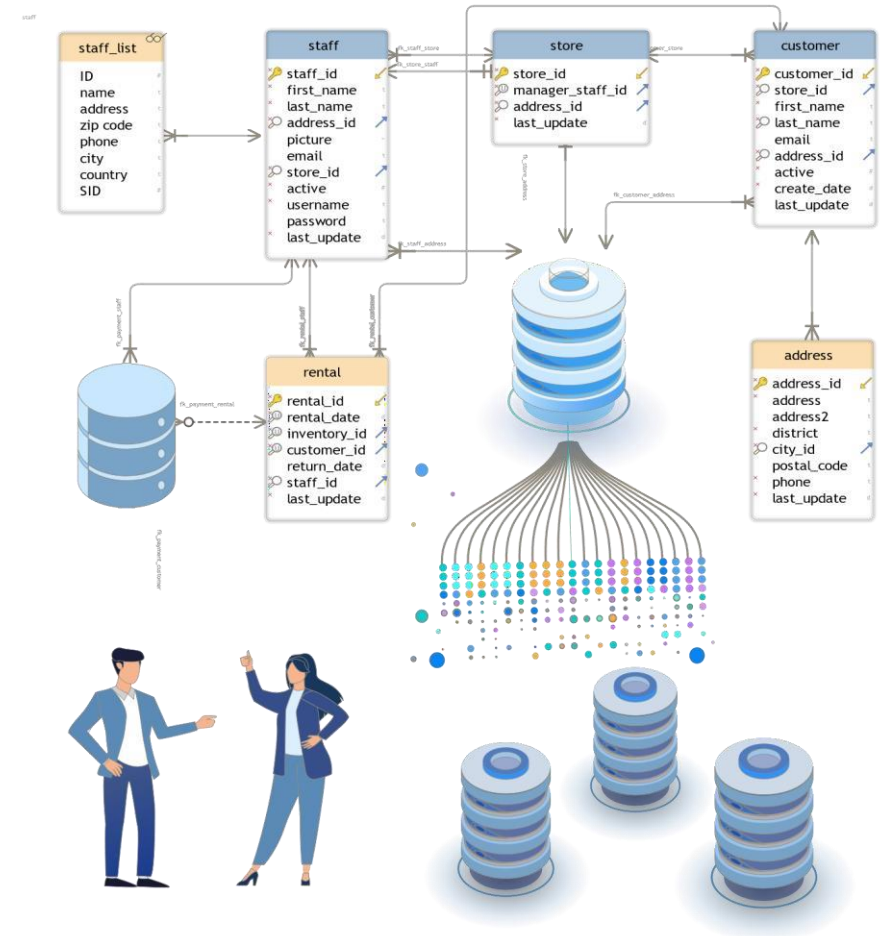
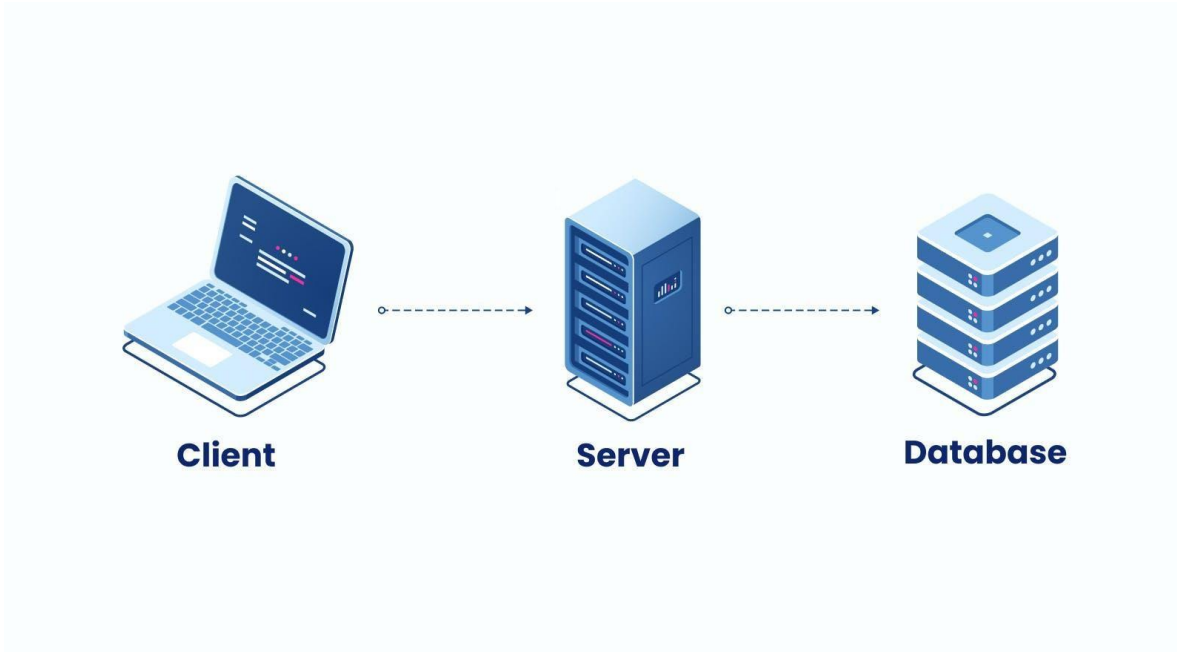
- A **database management system (DBMS)** is a software package designed to define, manipulate, retrieve and manage data in a database.
- A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.
- A DBMS relieves users of framing programs for data maintenance. Fourth-generation query languages, such as SQL, are used along with the DBMS package to interact with a database.

Example of Relational Database

	Microsoft SQL Server Developer: Microsoft Initial Release: 1989
	MySQL Developer: Oracle Corporation Initial Release: 23 May 1995
	PostgreSQL Developer: PostgreSQL Global Development Group Initial Release: 8 July 1996
	SQLite Developer: D. Richard Hipp Initial Release: 17 Aug. 2000
	Oracle Database Developer: Oracle Corporation Initial Release: 1979
	MariaDB Developer: MariaDB Corporation Ab Initial Release: 29 Oct. 2009
	Informix Developer: IBM Initial Release: 17 Nov. 2020
	Apache Derby Developer: Apache Software Foundation Initial Release: 19 May 2022
	Amazon RDS Developer: Amazon.com Initial Release: 26 Oct. 2009
	H2 Database Engine Developer: Thomas Mueller Initial Release: Dec. 2005
	Sybase ASE Developer: Sybase - A SAP Company Initial Release: 1987
	DB2 Developer: IBM Initial Release: 1993
	Microsoft Access Developer: Microsoft Initial Release: 13 Nov. 1992

Database

- A database is a collection of information that is organized so that it can be easily accessed, managed and updated. Data is organized into rows, columns and tables, and it is indexed to make it easier to find relevant information.



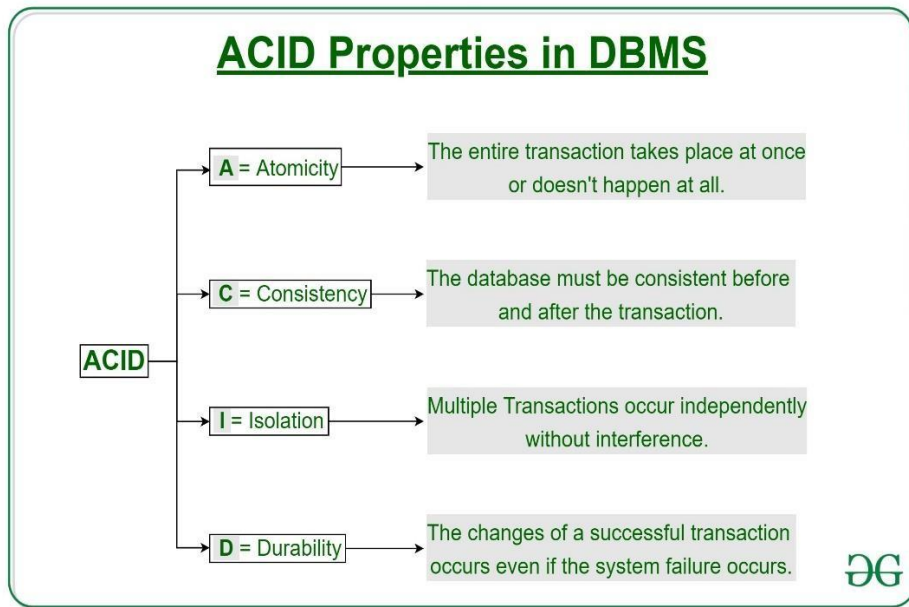
Characteristics of DBMS

- Provides security and removes redundancy (duplication)
- Insulation between programs and data abstraction
- Support of multiple views of the data
- Sharing of data and multiuser transaction processing
- DBMS allows entities and relations among them to form tables.
- It follows the ACID concept (Atomicity, Consistency, Isolation, and Durability).
- DBMS supports multi-user environment that allows users to access and manipulate data in parallel.

ACID CONCEPT

A transaction is a single logical unit of work that accesses and possibly modifies the contents of a database. Transactions access data using read and write operations.

In order to maintain consistency in a database, before and after the transaction, certain properties are followed. These are called ACID properties.



DBMS vs. Flat File

DBMS	Flat File Management System
Multi-user access	It does not support multi-user access
Design to fulfill the need for small and large businesses	It is only limited to smaller DBMS system.
Remove redundancy and Integrity	Redundancy and Integrity issues
Expensive. But in the long term Total Cost of Ownership is cheap	It's cheaper
Easy to implement complicated transactions	No support for complicated transactions

Objective of DBMS

1. Eliminate redundant data.
2. Make access to the data easy for the user.
3. Provide for mass storage of relevant data.
4. Protect the data from physical harm and un-authorized systems.
5. Allow for growth in the data base system.
6. Make the latest modifications to the data base available immediately.
7. Allow for multiple users to be active at one time.
8. Provide prompt response to user requests for data.

Importance of DBMS

- A database management system is important because it manages data efficiently and allows users to perform multiple tasks with ease.
- A database management system stores, organizes and manages a large amount of information within a single software application. Use of this system increases efficiency of business operations and reduces overall costs.
- Database management systems are important to businesses and organizations because they provide a highly efficient method for handling multiple types of data.
- Some of the data that are easily managed with this type of system include: employee records, student information, payroll, accounting, project management, inventory and library books. These systems are built to be extremely versatile.
- Without database management, tasks have to be done manually and take more time. Data can be categorized and structured to suit the needs of the company or organization.
- Data is entered into the system and accessed on a routine basis by assigned users. Each user may have an assigned password to gain access to their part of the system. Multiple users can use the system at the same time in different ways.

Advantages of DBMS

- DBMS offers a variety of techniques to store & retrieve data
- DBMS serves as an efficient handler to balance the needs of multiple applications using the same data
- Application programmers never exposed to details of data representation and storage.
- A DBMS uses various powerful functions to store and retrieve data efficiently.
- Offers Data Integrity and Security
- The DBMS implies integrity constraints to get a high level of protection against prohibited access to data.
- A DBMS schedules concurrent access to the data in such a manner that only one user can access the same data at a time
- Reduced Application Development Time

Disadvantages of DBMS

- Cost of Hardware and Software of a DBMS is quite high which increases the budget of your organization.
- Most database management systems are often complex systems, so the training for users to use the DBMS is required.
- In some organizations, all data is integrated into a single database which can be damaged because of electric failure or database is corrupted on the storage media
- Use of the same program at a time by many users sometimes lead to the loss of some data.
- DBMS can't perform sophisticated calculations

Application of DBMS

Sector	Use of DBMS
Banking	For customer information, account activities, payments, deposits, loans, etc.
Airlines	For reservations and schedule information.
Universities	For student information, course registrations, colleges and grades.
Telecommunication	It helps to keep call records, monthly bills, maintaining balances, etc.
Finance	For storing information about stock, sales, and purchases of financial instruments like stocks and bonds.
Sales	Use for storing customer, product & sales information.
Manufacturing	It is used for the management of supply chain and for tracking production of items. Inventories status in warehouses.
HR Management	For information about employees, salaries, payroll, deduction, generation of paychecks, etc.