

Introduction to Database Management System

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Hi Folks,

We'll be starting with DBMS today. It is considered as one of the most important topics without which professional knowledge paper can't be set, so we'll be learning about it holistically by touching upon relevant areas under it.



This article is a part of [PK Series \(IT\)](#)

What is Database?

A database is a **collection of information** that is organized so that it can easily be accessed, managed and updated.

What is Database Management System?

DBMS is a software package designed to define, manipulate, retrieve and manage data in a database. It defines rules for validating and manipulating that data. Fourth generation query languages like SQL are used along with DBMS package to interact with database.

Some of the real time applications using DBMS are Banking (transactions), Airlines (reservations and schedules), Universities (registration and grades), Manufacturing (production, inventory, orders, supply chain) etc.

Advantages of a DBMS

1. **Controls Data Redundancy:** All of the data is integrated into a single centralized file and no duplicates are created.
2. **Data Sharing:** Database administrator upon granting access allows for sharing of data across different platforms and different users.
3. **Data consistency:** As a data item appears only once, update has to be done once only and updated value is immediately available for use.
4. **Integration of Data:** In DBMS, data is stored in tabular form and various relationships can be created among tables. This makes it easy to retrieve and update data.
5. **Data Security:** The access to critical information can be restricted and access privileges are required for updating/manipulating important information. E.g.- access to financial data is restricted providing for security of data.
6. **Backup and Recovery:** It has subsystems which deal with back up and recovery in case of hardware/software failure or in case of a natural calamity which endangers the data in any way.
7. **Concurrent Access:** It provides for concurrent access to multiple users at one time making it more efficient for business applications.

Components of DBMS

A database system consists of 4 components usually:

- Data
- Hardware
- Software
- Users

1. Data: It is the most important component of a database which acts like a bridge between hardware and software. Different types of data are- User data (actual/workable data stored in tables), Metadata (data about data i.e no of tables, no of fields), application metadata (structure and format of queries)

2. Hardware: Storage devices on which data is stored with i/o operations (hard disks, optical disks, magnetic tapes etc)

3. Software: It acts a bridge between user and database. It interacts with both user and database and acts a medium for data exchange. For performing various operations on the data, we use query languages like SQL etc.

4. Users: They are the ones who need information from a database to carry out their primary business responsibilities. Various types of users are: Database administrators, Database designers, End users, Application Programmers.

Levels of Abstraction

1. Physical Level

It describes how a record (e.g. customer) is stored in the database.

2. Logical Level

It describes the data stored in database and the relationships among themselves. Lets look at the description of customer data below:

```
cust_id: int;  
cust_name: string;  
cust city: string;
```

3. View Level

At this level, application programs hide details of data types. Views can also hide information such as employee salary for security purposes.

