Basic Concepts and Advantages of DBMS:--

* A DBMS is system software for creating and managing databases.
* The DBMS provides users and programmers with a systematic way to create, retrieve, update and manage data.

A DBMS manages data and has many benefits. These are:

1. DATA INDEPENDENCE:

Application programs should be as free or independent as possible from details of data representation and storage.

DBMS can supply an abstract view of the data for insulating application code from such facts.

Two types are:

A) Physical data independence

B) Logical data independence

1. EFFICENT DATA ACCESS:

DBMS utilizes a mixture of sophisticated concepts and techniques for storing and retrieving data competently.

This feature becomes important in cases where the data is stored on external storage devices

1. DATA INTEGRITY AND SECURITY:

The data integrity provides protection for the existence of the database and maintaining the quality of the database.

If data is accessed through the DBMS, the DBMS can enforce integrity constraints on the data.

1. DATA ADMINISTRATION:

When several users share the data, integrating the administration of data can offer significant improvements.

1. DATA AVAILABILITY:

The data availability is responsible for the cost performance and the query update.

Availability functions make the database and available to users helps in defining and creating a database and getting the data in and out of a database.

The DBMS is used in the following:

1. Airlines : reservations, schedules, etc
2. Telecom : calls made, customer details, etc
3. Universities : registration, results, grades, etc
4. Sales : products, purchases, customers details, etc
5. Banking : all transactions etc

COMPONENTS OF DBMS:

* Users

Users may be of any kind such as DB administrator, system developer, or database users.

* Database application

Database application may be personal, organization’s, departmental.

* DBMS

Software that allows users to create and manipulate database access.

* Database

Collection of logical data as a single unit.

Relational Database Management System (RDBMS)

A RDBMS is a collection programs and capabilities that enable IT teams and others to create, update, administer and otherwise interact with a relational database.

* RDBMS store data in the form of tables, with most commercial rdbms using SQL to access the database.
* The RDBMS is the most popular database system among organizations across the world.
* It provides a dependable method of storing and retrieving large amounts of data while offering a combination of system performance and ease of implementation.
* An RDBMS is a type of DBMS that stores data in a row-based table structure which connects related data elements.

|  |  |  |
| --- | --- | --- |
|  | DBMS | RDBMS |
| Number of allowed users | It can only accept one user at a time | It can operate with multiple users |
| Hardware and Software requirements | It needs less software and hardware than RDBMS | It needs more software and hardware than DBMS |
| Database structure | Data is kept in a hierarchical form | It utilizes a table where the headers are used as column and rows contain the corresponding values. |
| Distributed database | It will not support | It will support |
| Database Normalization | It cannot be normalized | It will be normalized |
| Amount of data | It can only manage small amounts | It can handle any amount of data, from small to large. |
| ACID implementation | It do not use the ACID model for storing data | It base the structure of their data on the ACID model to ensure consistency |

And in the above table the ACID is equal to:

A—Atomicity

C—Consistency

I –Isolation

D—Durability

Features of RDBMS:

* The most basic RDBMS functions are related to create, read, update and delete operations.
* These form the foundation of a well-organized system that promotes consistent treatment of data.
* It is typically provides data dictionaries and metadata collection that are useful in data handling.
* These programmatically support well-defined data structures and relationships.
* The most common means of data access for the RDBMS is SQL
* Its main language components comprise data manipulation language and data definition language statements.
* It uses complex algorithms that support multiple concurrent user access to the database while maintaining data integrity
* It supports the work of database administrators who must manage and monitor database activity.
* Utilities help automate data loading and database backup.
* It manages log files that track system performance based on selected operational parameters.
* It provides graphical interfaces that help DBAs visualize database activity.
* ACID will particularly suited RDBMSes for handling business transactions.
* It is an intrinsic to operations of a variety of enterprise applications and are at the center of most master data management systems.

Uses of RDBMS:

* It is frequently used in disciplines such as manufacturing, human resources and banking.
* The system is also used for

Airlines, university, etc…

* Examples :

Oracle, MySQL, Microsoft SQL Server and PostgreSQL

Advantages of RDBMS:

* The use of an RDBMS can be beneficial to most organizations.
* The systematic view of raw data helps companies better understand and execute the information while enhancing the decision-making process.
* The use of tables to store data also improves the security of information stored in the databases.
* Users are able to customize access and set barriers to limit the content that is made available.
* It make it easy to add new data to the system or alter existing tables while ensuring consistency with the previously available content.

Other advantages

* Flexibility

Upload data is more efficient since the changes only need to be made in one place.

* Maintenance

Database administrators can easily maintain, control and update data in the database.

* Data structure

The table format used in RDBMSes is easy to understand and provides an organized and structural manner through which entries are matched by firing queries.

Drawback:

* The character limit placed on certain fields in the tables and the inability to fully understand new forms data such as complex numbers, designs and images.

Works:

* Each system will have varying numbers of tables with each table possessing its own unique primary key.
* The primary key is then used to identify each table.
* The rows are known as records or horizontal entities
* The columns are known as vertical entities and possess information about the specific field.

Assuring the integrity of data includes several specific tests, including entity, domain, referential and user-defined integrity.

* Entity integrity confirms that the rows are not duplicated in the table.
* Domain integrity makes sure that data is entered into the table based on the conditions.
* Referential integrity ensures that any row that is re-linked to different table cannot be deleted.
* User-defined integrity confirms that the table will satisfy all user-defined conditions.

Before creating these tables, the RDBMS must check the following Constraints:

1. Primary key

This identifies each row in the table.

One table can only contain one primary key.

The key must be unique and without null values.

1. Foreign key

This is used to link two tables.

The foreign key is kept in one table and refers to the primary key associated with another table.

1. Not null

This ensures that every column does not have null value, such as an empty cell.

1. Check

This confirms that each entry in a column or row satisfies a precise condition and that every column holds unique key.

1. Data integrity

This integrity of the data must be confirmed before the data is created.

Different Constraints:

1. Super key

Super key is a set of one or more than one keys that can be used to identify a record uniquely in a table.

1. Candidate key

Candidate key is a set of one or more columns that can identify a record uniquely in a table.

There can be multiple candidate keys in one table.

1. Alternate key

Alternate key is a key that can work as a primary key.

Basically, it is a candidate key that currently is not a primary key.

1. Composite/compound key

It is combination of more than one columns of a table.

It can be candidate key, primary key.

1. Unique key

It is a set of one or more columns of a table that uniquely identify a record in a database table.

It is like primary key but it can accept only one null value and it cannot have duplicate values.

1. Surrogate key

An artificial key which aims to uniquely identify each record.

1. Primary key
2. Foreign key
3. Not null key

To ensure a column not to accept null

1. Check key

The process of adding logic for checking data before storing them in tables.