Introduction of Database Management System

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ABSTRACT: Database management system (DBMS) is computer software designed to manage the database in efficiently and conveniently. The main purpose of DBMS is to store and retrieve the data in the convenient and efficient way. This paper presents the overview of the database management system such as its components, data model which describing how data is to be arranged for a specific purpose. Major aim of database is to supply users with an abstract view of data. In database development process normalization play an important role. By using DBMS developers can eliminate duplication data and develop standards by which all data can be measured. It allows organizations to conveniently develop and use databases for various applications by database administrators (DBAs). Currently database management systems (DBMS) are not capable of supporting such flexibility. With the increase of data to be indexed and retrieved and the increasing heavy workloads, modern search engines suffer from Scalability, reliability, distribution and performance problems. This paper presents a new and simple way for integration and compares the performance of our system to the current implementations based on storing the full text index directly on the file system.

KEYWORDS: DBMS, components, operations, entities, redundancy, normalization.

INTRODUCTION

A Database Management System (DBMS) is a collection of program that enables a user to perform various operations like insert, modify, update, delete, maintain and access the database. DBMS relieves the user from knowing how the data is stored physically and complex algorithms used for performing operations on the database. Only focus on how the operations are to be performed to retrieve the data from the database. DBMS is also charge of access, security, storage and host of other functions for the database system. It does through a selection of computer programs [1].

What is Database?

Database (DB) is a collection of inter-related data which are used to retrieve, insert and delete the data efficiently. Data can be used to organise in the various format such as table, schema, views, and reports, etc. For example: The college Database organizes the data about the admin, staff, students and faculty etc. This can be can easily retrieve, insert, and delete the information using database.

Database Management System (DBMS): Database management system is software which is used to manage the database. These are the most commonly used database example of DBMS MySQL, Oracle etc. It is used in various applications. Various operation are performed by DBMS such as database creation, storing data in it, updating data, creating a table in the database and a lot more. Database is secure and protected software. It also maintains data consistency in the database [2].

Application of DBMS

- In Railway Reservation System database is required to keep the record of ticket booking, train's departure and arrival status. It also required in the case of trains get late then people get to know it through database they get the update [3].
- It is also useful in Library Management System as thousands books present in the library so it is very difficult to keep record of all the books in a copy or register. So DBMS used to maintain all the records relate to book issue dates, name of the book, author and availability of the book etc.
- In banking also DBMS play an important role. Thousands of transactions are placed daily through banks. So how banking has become so easy that by sitting at home we can send or get money through banks. It can all possible just because of DBMS that manages all the bank transactions [4].

- In Universities and colleges Examinations are done online basis and universities as well as colleges maintain all these records through DBMS such as Student's registrations details, results, courses and grades all the information are stored in database [5].
- In Social Media Sites to share views and connect with friends and family. Daily millions of users signed up for these social media accounts such as Facebook, twitter, LinkedIn and Google plus. How all the information of users are stored and how we become able to connect to other people, yes this all because of DBMS.
- *In* Military to keeps the records of millions of soldiers and it has millions of files that should be keeping secured and safe. As DBMS provides a big security assurance to the military information so it is widely used in militaries. Someone can easily search for all the information about anyone within seconds with the help of DBMS.
- Products are made and sales by the Manufacturing companies. To keep records of all the details about the products such as quantity, bills, purchase, and supply chain management DBMS is required [6].

Fig. 1: Types of database
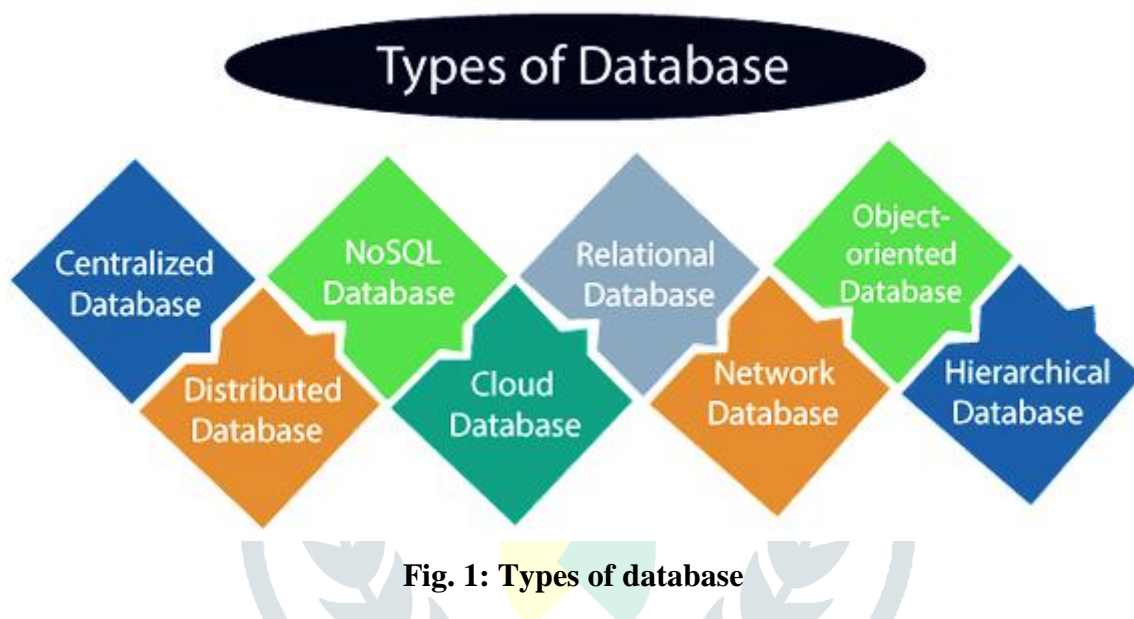
Components of DBMS

It has several components each performing very significant tasks in the database management system environment.

Software: It is the set of programs used to control and manage the overall database. It includes the DBMS software itself, an Operating System, network software being used to share the data among users, and the application programs used to access data in the DBMS.

Hardware: It consists of a set of physical electronic devices like computers, I/O devices, storage devices, etc. It provides the interface between computers and the real world systems.

Data: To collect, store, process and access data DBMS exists. The database contains both the actual as well as operational data and the metadata.

Users: Database is managed by users and performs different operations on the databases in the database system.

Types of Databases

There are various types of databases are used for storing different varieties of data. Centralized Database is the database type that stores the data in a centralized database system. It comforts the users through several applications to access the stored data from different locations. Such applications include the process of

authentication to allow users safe access to the data. A Centralized database example may be the Central Library, which carries a central database of each library in a college / university.

Advantages of Centralized Database

- It decreased the risk of data management.

- Consistency is maintained.

- Data quality is better which enhances the data standards of the organisation.

- Cost is less.

Disadvantages of Centralized Database

- The response time for fetching the data is increases because size of the centralized database is large.

- Not easy to update.

- Whenever the any server failure occurs entire data will be lost which would be a huge loss.

- *Distributed Database:* Unlike a centralized database system. Through distributed systems, data is distributed among an organization multiple database. The database systems are connected with communication links. Such links help the end-users to access the data easily. Some examples of the Distributed database are Apache Cassandra, Ignite, etc.

Advantages of Distributed Database

- In a distributed database modular development is possible.

- Entire data set will not get affected on the failure of one server.

- *Relational Database:* It is based on relational data model, which stores data in the forms of rows (tuple) and columns (attributes) or tuple and attributes. For storing, manipulating, as well as maintaining the data relation database is used.

- *NoSQL Database:* This is used for storing wide range of data sets. It stores the data in the various formats so it is not come under relational database.
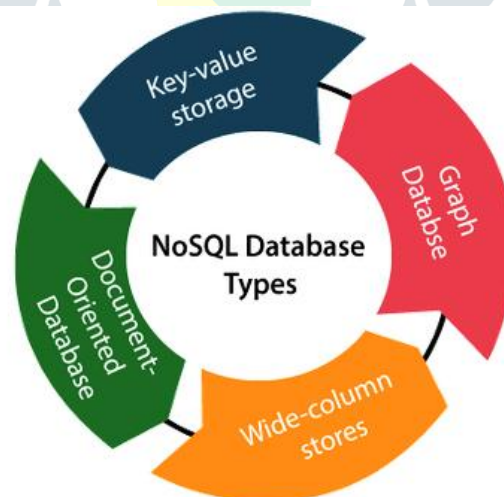

Fig.2: NoSQL Database Types

Data Abstraction

When the data retrieved efficiently system will be usable. Database comprise of complex data-structures. To make the system efficient in retrieval of data and developers use abstraction to reduce complexity in terms of usability of users [7].

Mainly three levels of data abstraction are possible in DBMS.

- *Physical Abstraction*: It is the lowest level of abstraction and it tells about how the data is actually stored in memory [8]. Access methods such as sequential or random access and file organisation methods like B+ trees etc. Size of memory, usability, and the number of times the records are entered which we need to know while designing the database.
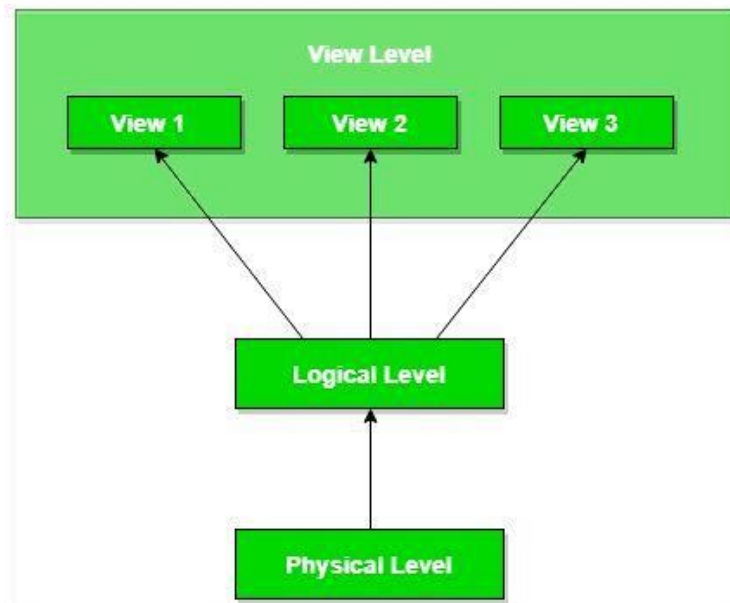

Fig. 3: Level of data abstraction

- *Logical Abstraction:* In logical level of abstraction data is stored in the form of tables in database. Relationship among data entities are also in relatively simple structures. At the view level information available to the user is unknown [9].
- *View Abstraction:* This is the highest level of abstraction. Users can view only the actual part of the database. In the forms of rows and columns data can be view. To stores the data tables and relations are used. Multiple view of the same database same make exists [10]. Implementation details are hidden from the users. Users can only view the data, interact with the database and storage.

Database Management System Language

DBMS has appropriate language and interfaces through with user can express queries and updates. To read, store, insert the data in the database DBMS languages are used.
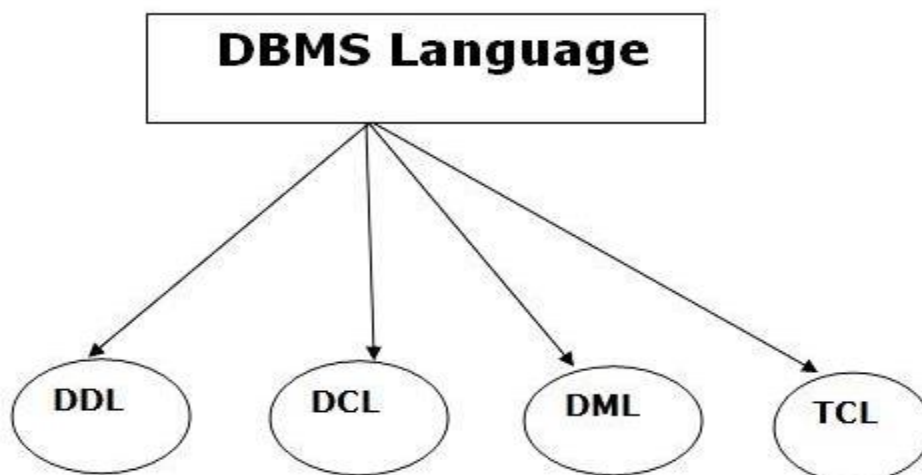
Fig. 4: DBMS Language

1. Data Definition Language (DDL)

DDL is used to store the information of metadata like the number of tables and schemas, their names, indexes, columns in each table, constraints, etc. DDL is used to define database structure or pattern. It also used to create schema, tables, indexes, constraints, etc. in the database. To create the skeleton of the database DDL is used.

2. Data Manipulation Language (DML)

DML is used for accessing and manipulating data in a database. It also handles user requests.

3. Data Control Language (DCL)

DCL is used to retrieve the stored or saved data. DCL execution is transactional. Rollback parameters are also involved in it.

4. Transaction Control Language (TCL)

TCL is used to run the changes made by the DML statement. TCL can be grouped into a logical transaction.

CONCLUSION

Like other software database management system also have some advantages and disadvantages. DBMS is a computer application designed for efficient and effective storage, retrieve and update large volume of data. Users take help of DBMS on managing the database. Data is stored in the form of record and every record consists of a group of related data values. For inserting, deleting, modifying records data manipulation language (DML) is used. Every organisation has its own database to manage the records. Many applications and projects are working on DBMS example attendance is biometric, data is automatically stored in the database. DBMS remove data redundancy, duplication and manage the data consistency. Either programmer or the one who implemented the database will have much more work to do without using DBMS. Operations such as to arrange data or inserting data into the database and also retrieving data out from the database it will become difficult.

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