Need of a database

In the growing world of IT enabled applications, everyone is looking for the suitable and desired information at just a click. In the busy life, time and performance both are very very crucial along with accuracy of the information. The information may be just an extract from the voluminous raw data or it may be an information resulted on processing of that data. The requirement various case to case and application to application.

The raw data may be of a small amount or it may be really really huge. Like for a class, or our house hold member data consider to be a small amount of data but if we take all the classes and section of the school or all the household of our locality the volume of data will increase and if we say the data for the whole State or of country for house hold or all the classes, it will be huge huge data. Small amount of data can be managed easily in simple data files and when needed we may extract the desired information. But when the data volume of so huge it cannot be managed in simple data files and then some special software applications are required to manage this huge data and we call these software as databases.

Why databases?

➢ It will be very very difficult for any application to **store voluminous data** for lakhs of its users without a database.

➢ Apart from storing data, a database makes it quite easy to modify or update any specific data with newer data or delete any existing data.

➢ The data stored in a database is much more secure than if it's stored in any other form.

➢ A database helps us to easily identify any duplicate set of data present in it. It will be quite difficult to do this in any other data storage method.

➢ There is the possibility of users entering incomplete set of data, like missing mobile number which may add problems of any application. All such cases can be easily

identified by any database. These checks can be performed at entry time or at any later stage.

DBMS

- ➢ DBMS is an interface or intermediate system which helps the user to interact with data stored in databases which makes the database more secure.
- ➢ DBMS is basically an application software that interacts with the user or other applications, and even with the database itself, in order to capture and analyse the data.
- ➢ Any DBMS such as MySQL, MariaDB are designed in such a way that it allows the definition, querying, creation, updation and administration of the whole database. It is where we request the database to give us the required data in the query language.

Different types of databases available in the market

Personal Database

Data collected and stored on personal computers or other personal gadgets like mobile etc. These databases are small and easily manageable. This database is basically designed for a single user.

End user databases

The end user is usually not concerned about the transaction or operations done at various levels and is only aware of the product which may be a software or an application. There is a variety of data available at the nodes of the end users of an organization or enterprise. Each node acts like a small database in itself, which includes data in presentations, spreadsheets, Word files, downloaded files and Notepad files.

Centralized Database

The data is stored at a centralized database system and the users from different locations can access this data through several applications. This type of database contains application procedures that help the users to access the data even from a remote location. These applications contain the authentication process for the verification and validation of end users, to let users access data securely. Data consistency is maintained in Centralized

database as it manages data in a central repository. The size of the centralized database is large, which increases the response time for fetching the data and if any failure occurs, entire data will be lost, which could be a huge loss.

Distributed databases

In distributed database system, the data is not at one place and is distributed at various sites of an organization these may be regional offices, manufacturing plants, branch offices and a head office. These sites are connected to each other with the help of communication links which helps them to access the distributed data easily. The distributed database has contributions from the common database as well as the information captured by local computers also. Homogenous and heterogeneous are two kinds of distributed database. The databases having same underlying hardware, run over same operating systems and application procedures are known as homogeneous Distributed database. And if the operating systems, hardware as well as application procedures can be different at various sites, it is known as heterogeneous Distributed database.

Relational Database

Relational Database stores data in the form of rows(tuple) and columns(attributes), and together forms a table(relation). Each table has a unique key field, which is used to connect it to other tables. Therefore, all the tables are related to each other with the help of several key fields. A relational database uses SQL for storing, manipulating, as well as maintaining the data. These databases are used extensively in different industries and will be the type we are most likely to come across when working in IT. The RDBMS follows the ACID(**Atomicity, Consistency**, **Isolation**, **Durability**) properties of relational model. Examples of Relational databases are MySQL, Microsoft SQL Server, Oracle, etc.

Operational databases

An operational databases creates and updates the database in real-time. It is basically designed for executing and handling the daily data operations in several businesses. It includes the personal database, customer database and inventory database, all of which cover details of how much of any product the company has, as well as the information on the customers who buy the products. For example, An organization uses operational databases

for managing per day transactions. The data stored in different operational databases can be changed and manipulated based on what the company requires.

Enterprise Databases

Very large organizations and enterprises use this database for managing a massive amount of data. It helps organizations to increase and improve their efficiency. Such a database allows simultaneous access to users. Multi processes are supportable over the Enterprise database. It allows executing parallel queries on the system.

Data warehouses

It is required by many organizations and government bodies to store all relevant data for several years. These stored data be used for analyzing & retrieving various information's and comparing the present year data with past year to determine key trends. All such data, collected over years, is stored in a large data warehouse. It is presumed that these stored data has gone through different kinds of editing, screening and integration, it may not require any more editing or modification.

Cloud Databases

Cloud Databases are the databases which are stored over clouds (also known as virtual environment). Cloud databases can be stored on either in a hybrid cloud, public or private cloud. . It provides users with various cloud computing services (SaaS, PaaS, IaaS, etc.) for accessing the database. These are comparatively cheaper and not physical hardware & software are required to store and manage the data. There are various benefits of a cloud database, some of which are the ability to pay for storage capacity and bandwidth on a per-user basis, and they provide scalability on demand, along with high availability. There cloud platforms available are: Amazon Web Services(AWS), Google Cloud, Microsoft Azure etc.

Object-oriented Databases

The Object Oriented databasez uses the object-based data model approach for storing data in the database system. The data is represented and stored as objects which are similar to the objects used in the object-oriented programming language.

NoSQL Database

No-SQL(Not Only SQL) is a type of database presently used for storing a wide range of data sets mainly of distributed data.It is not exactly a relational database as it stores data not only in tabular form but in several different ways also. Performance issues handled by relational databases can be easily managed by NoSQL databases. There are very efficient in analyzing large size unstructured data that may be stored at multiple virtual servers of the cloud. It enables good productivity in the application development as it does not require to store data in a structured format and easily manage & handles large data sets with a provision of high scalability. Users can quickly access data from the database through key-value.

Graph Databases

Graph Databases are used for storing vast amounts of data in a graph-like structure. It is a type of NoSQL database that uses graph theory to store, map and query relationships. Graph databases are mainly used for analyzing interconnections. Most commonly, social networking websites use the graph database.

Assignment

1. Why database is required to store data?
2. Explain different databases present in the market.