

Summary – Day 1

SQL

Data:

In simple words, data can be facts related to any object in consideration. For example, your name, age, height, weight, etc. are some data related to you. A picture, image, file, pdf, etc. can also be considered data.

Database:

A database is a systematic collection of data. They support electronic storage and manipulation of data. Databases make data management easy.

Let us discuss a database example: An online telephone directory uses a database to store data of people, phone numbers, and other contact details. Your electricity service provider uses a database to manage billing, client-related issues, handle fault data, etc.

Let us also consider Facebook. It needs to store, manipulate, and present data related to members, their friends, member activities, messages, advertisements, and a lot more. We can provide a countless number of examples for the usage of databases.

Types of Databases:

- Distributed databases:

A distributed database is a type of database that has contributions from the common database and information captured by local computers. In this type of database system, the data is not in one place and is distributed at various organizations.

- Relational databases:

This type of database defines database relationships in the form of tables. It is also called Relational DBMS, which is the most popular DBMS type in the market. Database example of the RDBMS system include MySQL, Oracle, and Microsoft SQL Server database.

- Object-oriented databases:

This type of computers database supports the storage of all data types. The data is stored in the form of objects. The objects to be held in the database have attributes and methods that define what to do with the data. PostgreSQL is an example of an object-oriented relational DBMS.

- Centralized database:

It is a centralized location, and users from different backgrounds can access this data. This type of computers databases store application procedures that help users access the data even from a remote location.

- Open-source databases:

This kind of database stored information related to operations. It is mainly used in the field of marketing, employee relations, customer service, of databases.

- Cloud databases:

A cloud database is a database which is optimized or built for such a virtualized environment. There are so many advantages of a cloud database, some of which can pay for storage capacity and bandwidth. It also offers scalability on-demand, along with high availability.

- Data warehouses:

Data Warehouse is to facilitate a single version of truth for a company for decision making and forecasting. A Data warehouse is an information system that contains historical and commutative data from single or multiple sources. Data Warehouse concept simplifies the reporting and analysis process of the organization.

- NoSQL databases:

NoSQL database is used for large sets of distributed data. There are a few big data performance problems that are effectively handled by relational databases. This type of computers database is very efficient in analysing large-size unstructured data.

Database Normalization:

Normalization is a database design technique that reduces data redundancy and eliminates undesirable characteristics like Insertion, Update and Deletion Anomalies. Normalization rules divide larger tables into smaller tables and link them using relationships. The purpose of Normalisation in SQL is to eliminate redundant (repetitive) data and ensure data is stored logically.

Database Normal Forms:

- 1NF (First Normal Form)
 - Each table cell should contain a single value.
 - Each record needs to be unique.
- 2NF (Second Normal Form)
 - Rule 1- Be in 1NF
 - Rule 2- Single Column Primary Key that does not functionally depend on any subset of candidate key relation
- 3NF (Third Normal Form)
 - Rule 1- Be in 2NF
 - Rule 2- Has no transitive functional dependencies
- BCNF (Boyce-Codd Normal Form)
- 4NF (Fourth Normal Form)
- 5NF (Fifth Normal Form)
- 6NF (Sixth Normal Form)

RDBMS Terminology:

Nowadays, we use relational database management systems (RDBMS) to store and manage huge volume of data. This is called relational database because all the data is stored into different tables and relations are established using primary keys or other keys known as Foreign Keys.

- A Relational Database Management System (RDBMS) is a software that –
- Enables you to implement a database with tables, columns and indexes.
- Guarantees the Referential Integrity between rows of various tables
- Updates the indexes automatically.
- Interprets an SQL query and combines information from various tables.

RDBMS Terminologies:

- Database – A database is a collection of tables, with related data.
- Table – A table is a matrix with data. A table in a database looks like a simple spreadsheet.

- Column – One column (data element) contains data of one and the same kind, for example the column postcode.
- Row – A row (= tuple, entry or record) is a group of related data, for example the data of one subscription.
- Redundancy – Storing data twice, redundantly to make the system faster.
- Primary Key – A primary key is unique. A key value can not occur twice in one table. With a key, you can only find one row.
- Foreign Key – A foreign key is the linking pin between two tables.
- Compound Key – A compound key (composite key) is a key that consists of multiple columns, because one column is not sufficiently unique.
- Index – An index in a database resembles an index at the back of a book.
- Referential Integrity – Referential Integrity makes sure that a foreign key value always points to an existing row

What is MySQL ?

MySQL is an open-source relational database management system. As with other relational databases, MySQL stores data in tables made up of rows and columns. Users can define, manipulate, control, and query data using Structured Query Language, more commonly known as SQL.

Benefits:

- Ease of use
- Reliability
- Scalability
- Performance
- High availability
- Security
- Flexibility