

Introduction to DataBases

Checkpoint

MongoDB vs SQL

Presentations

MongoDB :

- MongoDB is an open-source, cross-platform, and distributed document-based database built for ease of application development and scaling.
- The term MongoDB is taken from the word "Humongous," which means "large, immense." The MongoDB database is designed to hold a large quantity of data while also performing quickly.
- MongoDB is not a Relational Database Management System (RDBMS). It's known as a "NoSQL" database. It differs from SQL-based databases because it does not normalize data under schemas and tables, and each table has a defined structure. It instead stores data in collections as JSON-based documents and does not impose schemas. It does not include the tables, rows, and columns seen in other SQL (RDBMS) databases.

SQL :

- **SQL** is an abbreviation for **Structured Query Language**. SQL is a database communication language. According to ANSI (American National Standards Institute), it is the standard language for relational database management systems.
- SQL commands are used to perform operations such as updating or retrieving data from a database. SQL is commonly used in relational database management systems such as Oracle, Sybase, Microsoft SQL Server, Microsoft Access, Ingres, etc.
- Although most database systems employ SQL, they also have their own proprietary extensions that are often exclusively used on their system. However, common SQL commands like "Select", "Insert", "Update", "Delete", "Create", and "Drop" can be used to accomplish almost everything that one needs to do with a database.

Uses

Why use MongoDB ?

- MongoDB is based on a scale-out architecture, which has gained popularity among developers of all types for constructing scalable systems with growing data schemas.
- MongoDB, being a document database, makes it simple for developers to store structured or unstructured data. It stores documents in a JSON-like manner. This format directly maps to native objects in most modern programming languages, making it a natural choice for developers because it eliminates the requirement for data normalization. MongoDB can also manage massive amounts of data and can scale data vertically or horizontally to accommodate large data loads.

MongoDB was designed for those who are creating internet and commercial apps that must evolve quickly and scale gracefully. MongoDB is used by businesses and development teams of various sizes for a wide range of purposes.

Why use SQL ?

- You can use SQL to query, update, and reorganize data, as well as create and alter a database system's schema (structure) and control access to its data.
- SQL can also be used to store data on every client your company has ever worked with, from critical contacts to sales details. For example, if you wanted to search for every client who spent at least \$5,000 with your company in the last decade, an SQL database could retrieve that information for you instantly.

Features

Features of MongoDB

The main features of MongoDB which make it unique are:

1) Document Oriented

MongoDB maintains all data in the form of documents rather than tables as in RDBMS. In these documents, data is kept in key-value pairs rather than rows and columns, making the data far more flexible than in RDBMS, where each document has a unique ID.

2) Schema-less database

MongoDB's schema-less database is a great feature that allows multiple types of documents to be stored in the same collection. A single collection in the MongoDB database can hold numerous documents, each with a distinct amount of fields, content, and size. It is not necessary for a document to be comparable to another document, as it is with relational databases. Due to this excellent feature, MongoDB gives databases a lot of flexibility.

3) Scalability

MongoDB provides horizontal scalability through a method known as sharding. Sharding is the process of spreading data across numerous servers; in this case, a huge amount of data is partitioned into data pieces using the shard key, and these data pieces are evenly distributed across shards that reside on many physical servers. It can also add new machines to an already active database.

4) Indexing

The MongoDB database indexes every document field with primary and secondary indices, making it easier and faster to retrieve or search data from the data pool. If the data is not indexed, then the database must search through each document with the specified query, which takes a long time and is inefficient.

5) Aggregation

MongoDB also enables operations on grouped data to yield a single or calculated result. It offers three types of aggregations: aggregation pipelines, map-reduce functions, and single-purpose aggregation methods.

6) High Performance

When compared to other databases, MongoDB's performance and data persistence are enhanced by capabilities such as scalability, indexing, and replication.

Features of SQL

The main features of SQL Server that make it highly usable are:

1) High Performance

SQL allows for high-performance programming in highly transactional, heavy-workload, and high-usage database systems. SQL programming provides numerous methods for more analytically describing data.

2) High Availability

SQL works with databases such as MS Access, Microsoft SQL Server, MySQL, SAP HANA, Oracle Database, SAP Adaptive Server, etc. All of these relational database management systems support SQL, and it is simple to construct an application extension for procedural programming and other SQL functions that are extra features, transforming SQL into a powerful tool.

3) Scalability and Flexibility

SQL allows for scalability and flexibility. It is very simple to create new tables in a database, and previously created, or inactive tables can be dropped or deleted in a database using SQL.

4) Robust Technical Support

SQL programming is capable of handling big records and managing several transactions.

5) High Security

SQL provides data security by making it simple to provide permissions to tables, procedures, and views.

6) Comprehensive Application Development

Many programmers use SQL to create apps that query databases. SQL works for all sizes of businesses, whether it is large or small.

7) Management Ease

SQL is a language that is used in practically every Relational Database Management System. The typical and popular SQL commands that let us manage large amounts of data from a database quickly and efficiently include *Select*, *Create*, *Insert*, *Drop*, *Update*, and *Delete*.