

# Introduction to SQL

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## About DBMS(Data Base Management System):

- Database Management Systems (DBMS) are software systems used to store, retrieve, and run queries on data. A DBMS serves as an interface between an end-user and a database, allowing users to create, read, update, and delete data in the database.
- DBMS manage the data, the database engine, and the database schema, allowing for data to be manipulated or extracted by users and other programs. This helps provide data security, data integrity, concurrency, and uniform data administration procedures.
- DBMS optimizes the organization of data by following a database schema design technique called normalization, which splits a large table into smaller tables when any of its attributes have redundancy in values. DBMS offer many benefits over traditional file systems, including flexibility and a more complex backup system.
- Database management systems can be classified based on a variety of criteria such as the data model, the database distribution, or user numbers. The most widely used types of DBMS software are relational, distributed, hierarchical, object-oriented, and network.

## About RDBMS(Relational Data Base Management System):

- The software used to store, manage, query, and retrieve data stored in a relational database is called a relational database management system (RDBMS).
  - An RDBMS is a type of database management system (DBMS) that stores data in a row-based table structure which connects related data elements
  - Relational database management systems (RDBMS) are the most popular data model because of its user-friendly interface. It is based on normalizing data in the rows and columns of the tables.
  - This is a viable option when you need a data storage system that is scalable, flexible, and able to manage lots of information.
  - An RDBMS includes functions that maintain the security, accuracy, integrity and consistency of the data.
- RDBMS is the basis for SQL, and for all modern database systems such as MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.

The data in RDBMS is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows.

## About SQL:

- SQL stands for Structured Query Language
- SQL lets you access and manipulate databases
- SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987
- is a domain-specific language used in programming and designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS). It is particularly useful in handling structured data, i.e. data incorporating relations among entities and variables.

## SQL uses for:

- execute queries against a database
- retrieve data from a database
- insert records in a database
- update records in a database
- delete records from a database
- create new databases
- create new tables in a database
- create stored procedures in a database
- create views in a database
- set permissions on tables, procedures, and views

## Sub languages of SQL:

SQL Sub Languages-Learn about types of statements used in SQL and their classification with explanation.

SQL consists of many type of statements, which classified as sub languages.

There are 6 sublanguages in SQL.

DDL – Data Definition Language.

- Used to define Database objects like TABLE, VIEW,SEQUENCE,INDEX,SYNONYM creation or modification or removing.
- CREATE,ALTER,DROP,TRUNCATE,RENAME are the DDL commands

DML – Data Manipulation Language.

- Used to manipulate the data in Database objects like table, view, index ..etc,.
- INSERT, UPDATE, DELETE are the DML commands.

DRL/DQL – Data Retrieval Language/Data Query Language.

- used to retrieve information from the database objects. it is for read only purpose.
- SELECT is the DQL or DRL command.

TCL – Transaction Query Language.

- Transaction control statement are use to apply the changes permanently save into database.
- COMMIT, ROLLBACK, SAVEPOINT, ROLLBACK TO are the TCL commands.

DCL – Data Control Language.

- Data control statements are use to give privileges to access limited data or share the information between users.
- GRANT,REVOKE ,AUDIT,COMMENT, ANALYZE are the DCL commands

## SCL – Session Control Language.

- Session control statements manage properties dynamically of a user session.
- ALTER SESSION, SET ROLE are the SCL commands.

## **Index in SQL:**

An index is a schema object. It is used by the server to speed up the retrieval of rows by using a pointer. It can reduce disk I/O (input/output) by using a rapid path access method to locate data quickly. An index helps to speed up select queries and where clauses, but it slows down data input, with the update and the insert statements. Indexes can be created or dropped with no effect on the data. In this article, we will see how to create, delete, and use the INDEX in the database.

Syntax is given as

“CREATE INDEX index ON TABLE column;”

**Unique Indexes:** Unique indexes are used for the maintenance of the integrity of the data present in the table as well as for fast performance, it does not allow multiple values to enter into the table.

Syntax is given as

“CREATE UNIQUE INDEX index ON TABLE column;”

When should indexes be created:

- A column contains a wide range of values.
- A column does not contain a large number of null values.
- One or more columns are frequently used together in a where clause or a join condition

When should indexes be avoided:

- The table is small
- The columns are not often used as a condition in the query
- The column is updated frequently

Removing an Index: Remove an index from the data dictionary by using the DROP INDEX command.

Syntax given as

“ DROP INDEX index;”

## About MySQL:

- is an open-source relational database management system (RDBMS).
- name is a combination of "My", the name of co-founder Michael Widenius's daughter My,
- and "SQL", the acronym for Structured Query Language.
- A relational database organizes data into one or more data tables in which data may be
- related to each other; these relations help structure the data.
- SQL is a language programmers use to create, modify and extract data from the relational database,
- as well as control user access to the database.
- In addition to relational databases and SQL, an RDBMS like MySQL works with an operating system to Implement
- a relational database in a computer's storage system, manages users, allows for network access and
- facilitates testing database integrity and creation of backups.
- MySQL has stand-alone clients that allow users to interact directly with a MySQL database using SQL,
- but more often, MySQL is used with other programs to implement applications that need relational database capability.
- MySQL is a component of the LAMP web application software stack(and others), which is an acronym for *Linux, Apache, MySQL, Perl/PHP/Python*.
- MySQL is used by many database-driven web applications, including Drupal, Joomla, phpBB, and WordPress.
- MySQL is also used by many popular websites, including Facebook, Flickr, MediaWiki, Twitter, and YouTube.

## **Feature of MySQL:**

- Open source
  - MySQL is open-source, which means this software can be downloaded, used and modified by anyone. It is free-to-use and easy-to-understand.
- Quick and Reliable
  - MySQL stores data efficiently in the memory ensuring that data is consistent, and not redundant. Hence, data access and manipulation using MySQL is quick.
- Scalable
  - Scalability refers to the ability of systems to work easily with small amounts of data, large amounts of data, clusters of machines, and so on. MySQL server was developed to work with large databases.
- Data Types
  - It contains multiple data types such as unsigned integers, signed integers, float (FLOAT), double (DOUBLE), character (CHAR), variable character (VARCHAR), text, blob, date, time, datetime, timestamp, year, and so on.
- Secure
  - It provides a secure interface since it has a password system which is flexible, and ensures that it is verified based on the host before accessing the database.
- Support for large databases
  - It comes with support for large databases, which could contain about 40 to 50 million records, 150,000 to 200,000 tables and up to 5,000,000,000 rows.



## Advantages of MySQL:

- MySQL does not support a very large database size as efficiently.
- MySQL does not support ROLE, COMMIT, and Stored procedures in versions less than 5.0.
- Transactions are not handled very efficiently.
- There are a few stability issues.
- It suffers from poor performance scaling.
- The development is not community driven so it has lagged behind.
- The functionality tends to be heavily dependent on the addons.
- Developers may find some of its limitations very frustrating.

**Primary key:** The PRIMARY KEY constraint uniquely identifies each record in a table.

Primary keys must contain UNIQUE values, and cannot contain NULL values.

A table can have only ONE primary key; and in the table, this primary key can consist of single or multiple columns (fields).

**Foreign key:** The FOREIGN KEY constraint is used to prevent actions that would destroy links between tables. A FOREIGN KEY is a field (or collection of fields) in one table, that refers to the PRIMARY KEY in another table. The table with the foreign key is called the child table, and the table with the primary key is called the referenced or parent table

**Unique key:** A unique key in SQL is the set of fields or columns of a table that helps us uniquely identify records. The unique key guarantees the uniqueness of the columns in the database. It is similar to the primary key but can accept a null value, unlike it

## Difference between MySQL and SQL

SQL	VERSUS	MYSQL
<b>SQL</b>		<b>MYSQL</b>
Database language for storing, manipulating and retrieving data in a relational database		Open source Relational Database Management System (RDBMS) that allows managing relational databases
A database language		A software
Helps to manage the data in the relational databases		Helps to manage relational databases using SQL
Does not change as it is a language		Updates frequently as it is a software
		Visit <a href="http://www.PEDIAA.com">www.PEDIAA.com</a>

## Difference between TRUNCATE and DELETE

DELETE	TRUNCATE
DML Command	DDL Command ( autocommit )
Can use where condition with delete st	Cannot use where condition with truncate st
Delete specific rows "Where" condition	All rows will be removed from table
Slower, because it used undo segment	Faster
"Delete" triggers will get fired	No triggers will get invoked
Wont reclaim the space used by table	Reclaim the space used by table
Wont reset the high level watermark	Reset the high level watermark



# CHAR VERSUS VARCHAR

## CHAR

A data type available in SQL that helps to store characters

‘char’ denotes character

Stores values in fixed lengths

Holds maximum of 255 characters

Uses static memory allocation

Programmer can use char when the sizes of the column data entries are consistent

## VARCHAR

A data type available in SQL that helps to store variable characters

‘varchar’ denotes variable character

Stores values variable length long with 1 byte or 2 byte length prefix

Holds a maximum of 65535 characters

Uses dynamic memory allocation

Programmer can use varchar when the sizes of the column data entries change considerably