Merit-Quality-Excellence

IBA Institute of Emerging Technologies Khairpur

DATABASE MANAGEMENT SYSTEM

LAB No: 01

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Objective of Lab No. 1:

After performing lab1, students will be able to:

- Introduction to Database and SQL
- MYSQL Installation
- Connect to MYSQL Database from Command Line
- Understand the basic terminology of SQL
- How to Load the Sample Database into MySQL Server
- show, use, source commands
- Use Select Statement

Introduction to database

Database is a structured collection of data. The data relating to each other by nature, e.g., a product belonged to a product category and associated with multiple tags. Therefore, we use the term relational database. Because we deal with a significant amount of data, we need a way to define the databases, tables, etc., and process data more efficiently. Besides, we want to turn the data into information.

And this is where SQL comes to play.

MySQL

My is the daughter's name of the MySQL's co-founder, Monty Widenius.

MySQL is a database management system that allows you to manage relational databases. It is open source software backed by Oracle. It means you can use MySQL without paying a dime. Also, if you want, you can change its source code to suit your needs.

Even though MySQL is open source software, you can buy a commercial license version from Oracle to get premium support services.

SQL

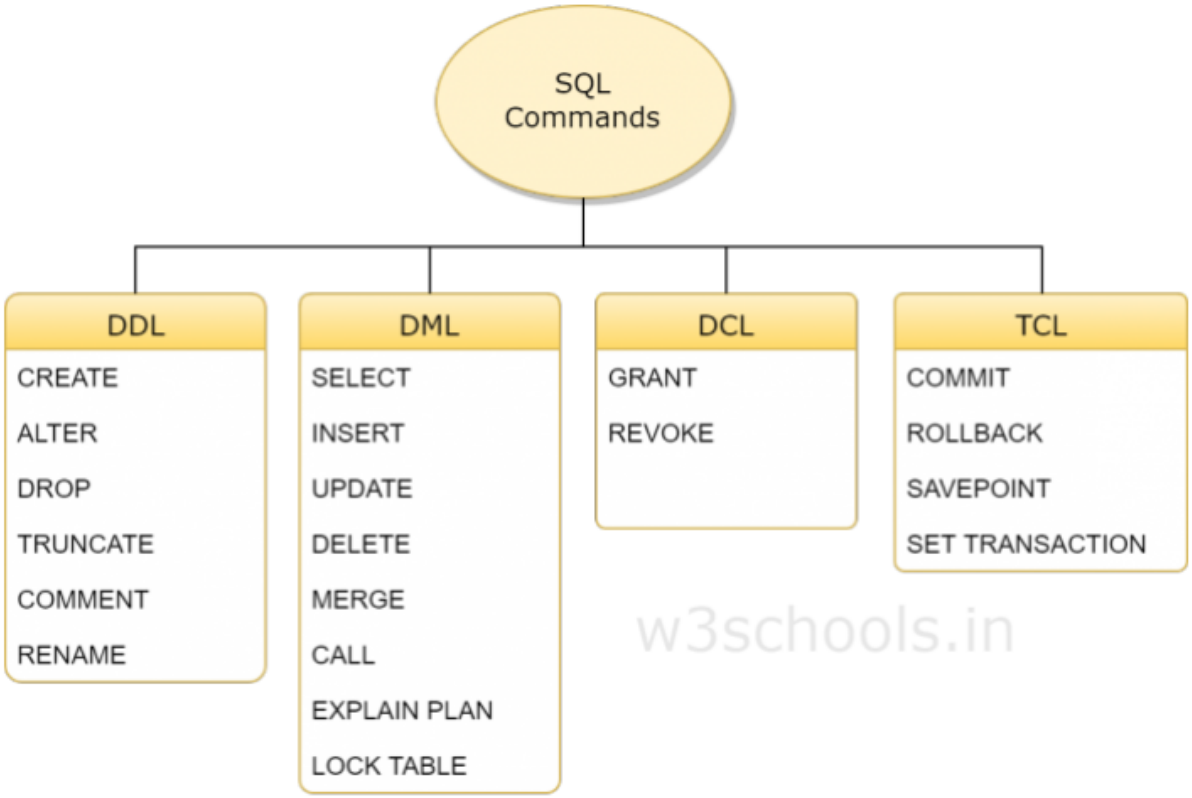
The language of the relational database. SQL stands for the structured query language. It is standardized language used to access the database. ANSI/SQL defines the SQL standard. The current version of SQL is SQL: 2016. Whenever we refer to the SQL standard, we mean the current SQL version.

There are five types of SQL statements, outlined in the following list:

1. Query statements retrieve rows stored in database tables. You write a query using the SQL **SELECT** statement.

2. Data Manipulation Language (DML) statements modify the contents of tables. There are three DML statements:
    a. **INSERT** adds rows to a table.
    b. **UPDATE** changes rows.
    c. **DELETE** removes rows.
3. Data Definition Language (DDL) statements define the data structures, such as tables, that make up a database. There are five basic types of DDL statements:
    a. **CREATE** creates a database structure. For example, CREATE TABLE is used to create a table; another example is CREATE USER, which is used to create a database user.
    b. **ALTER** modifies a database structure. For example, ALTER TABLE is used to modify a table.
    c. **DROP** removes a database structure. For example, DROP TABLE is used to remove a table.
    d. **RENAME** changes the name of a table.
    e. **TRUNCATE** deletes all the rows from a table.
4. Transaction Control (TC) statements either permanently record any changes made to rows, or undo those changes. There are three TC statements:
    a. **COMMIT** permanently records changes made to rows.
    b. **ROLLBACK** undoes changes made to rows.
    c. **SAVEPOINT** sets a “save point” to which you can roll back changes.
5. Data Control Language (DCL) statements change the permissions on database structures. There are two DCL statements:
    a. **GRANT** gives another user access to your database structures.
    b. **REVOKE** prevents another user from accessing your database structures.

Figure - SQL Commands:



MYSQL Installation

Step 01: Download MYSQL

https://dev.mysql.com/downloads/

- MySQL Yum Repository
- MySQL APT Repository
- MySQL SUSE Repository

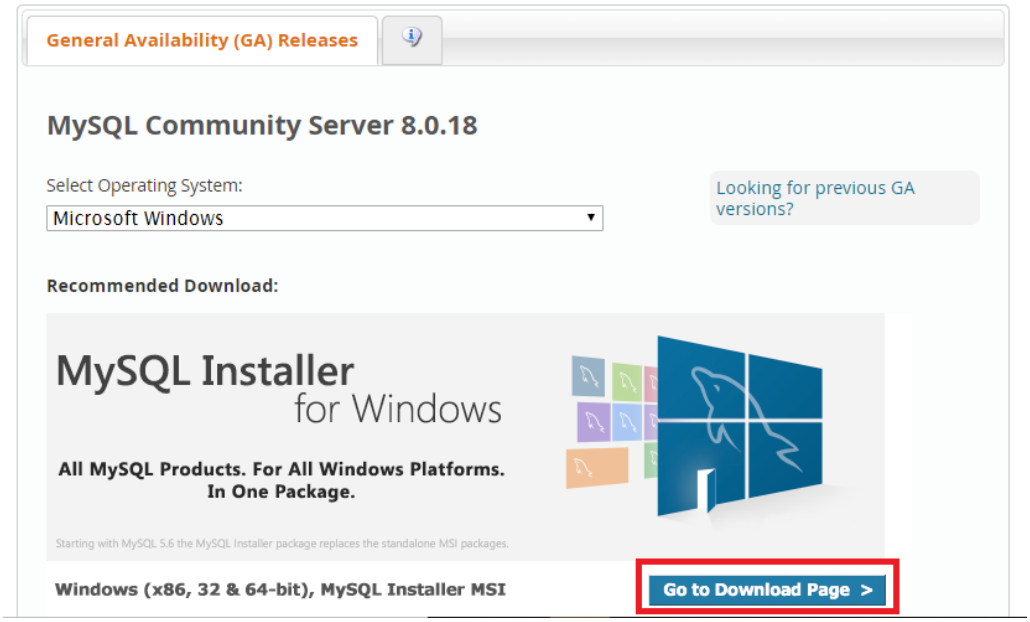
- MySQL Community Server
- MySQL Cluster
- MySQL Router
- MySQL Shell
- MySQL Workbench

- MySQL Installer for Windows
- MySQL for Excel
- MySQL for Visual Studio
- MySQL Notifier

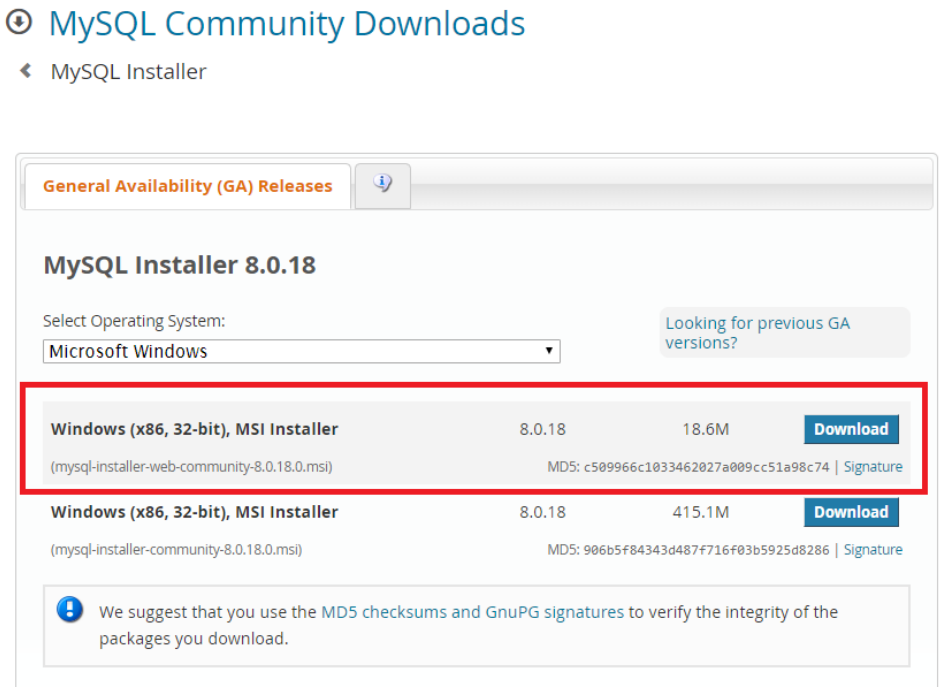
- C API (libmysqlclient)
- Connector/C++
- Connector/J
- Connector/NET
- Connector/Node.js
- Connector/ODBC
- Connector/Python
- MySQL Native Driver for PHP

- MySQL Benchmark Tool
- Time zone description tables
- Download Archives

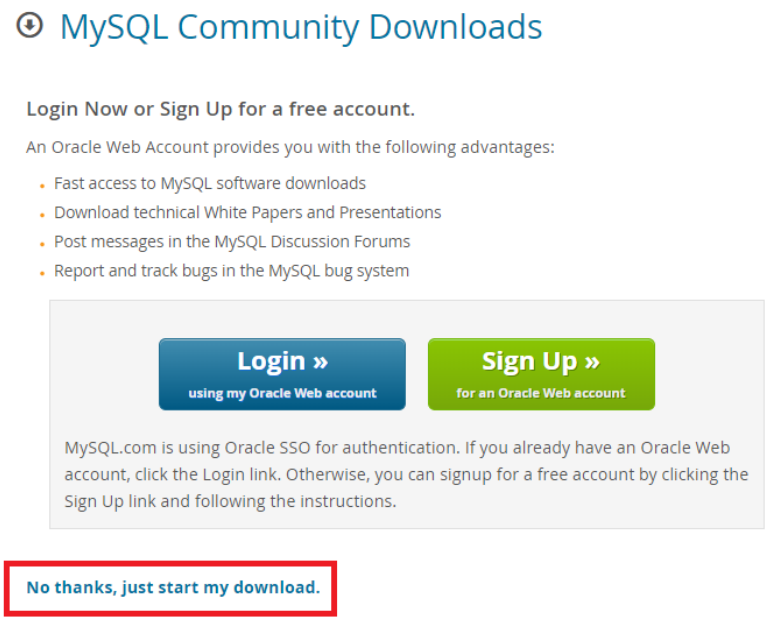
Step 02:



Step 03:



Step 04:



Step 05: Run downloaded file and follow steps in wizard.

Note: This installation required .Net Framework 4.5.2, you may install it using following link: https://www.microsoft.com/en-US/Download/confirmation.aspx?id=42642

Step 06: Connect to MYSQL Database from Command Line

At the command line, type the following command, replacing *USERNAME* with your username:

```
mysql -u USERNAME -p
```

At the **Enter Password** prompt, type your password. When you type the correct password, the **mysql>** prompt appears.

To display a list of databases, type the following command at the **mysql>** prompt:

```
show databases;
```

To access a specific database, type the following command at the **mysql>** prompt, replacing *DBNAME* with the database that you want to access:

```
use DBNAME;
```

After you access a database, you can run SQL queries, list tables, and so on.

SELECT Statement

The SELECT statement is used to select data from a database. The data returned is stored in a result table, called the result-set. A SELECT indicates that we are merely reading information, as opposed to modifying it. What we are selecting is identified by an expression or column list immediately following the SELECT. Thcmde FROM statement specifies the name of the table or tables from which we are getting our data.

When you want to select particular fields available in the table, use the following syntax:

```
SELECT column1, column2, ...
FROM table_name;
```

```
SELECT FirstName, LastName
FROM Employees;
```

Selects data of these two columns from the Employees table

When you want to select all the fields available in the table, use the following syntax:

```
SELECT *
FROM table_name;
```

```
SELECT *
FROM Employees;
```

Selects all the employees' records from the database and displays its columns.

Select DISTINCT Statement

The SELECT DISTINCT statement is used to return only distinct (different) values. Inside a table, a column often contains many duplicate values; and sometimes you only want to list the different (distinct) values. Syntax:

```
SELECT DISTINCT column1, column2, ...
FROM table_name;
```

SELECT Top Clause

The SELECT TOP clause is used to specify the number of records to return. The SELECT TOP clause is useful on large tables with thousands of records. Returning a large number of records can impact performance.

Note: Not all database systems support the SELECT TOP clause. MySQL supports the LIMIT clause to select a limited number of records while Oracle uses ROWNUM.

```
SELECT *
FROM table_name
LIMIT number;
```

The OFF SET value is also most often used together with the LIMIT keyword. The OFF SET value allows us to specify which row to start from retrieving data.

```
LIMIT with OFFSET Syntax:
SELECT *
FROM table_name
LIMIT OFFSET, number;
```

Functions with SELECT Statement

There are some functions that can be used in select statement. Syntax:

```
SELECT function_name()
FROM table_name;
```

Functions are:

- MIN
- MAX
- AVG
- SUM
- COUNT
- UPPER
- LOWER
- LENGTH
- etc

Aliases

SQL aliases are used to give a table, or a column in a table, a temporary name. Aliases are often used to make column names more readable.

An alias only exists for the duration of the query.

Alias Column Syntax:

```
SELECT column_name AS alias_name
```

```
FROM table_name;
```

Alias Table Syntax:

```
SELECT column_name(s)

FROM table_name AS alias_name;
```

ORDER BY Keyword

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

```
SELECT column_name(s)

FROM table_name

ORDER BY column1, column2, ... ASC|DESC
```

Exercise 1 (SELECT Statement)

1. Write a query to display the names (first_name, last_name) using alias name "First Name", "Last Name".
2. Write a query to get unique department ID from employee table.
3. Write a query to get all employee details from the employee table order by first name, descending.
4. Write a query to get the employee ID, names (first_name, last_name), salary in ascending order of salary.
5. Write a query to get the total salaries payable to employees.
6. Write a query to get the maximum and minimum salary from employees table.
7. Write a query to get the average salary and number of employees in the employees table.
8. Write a query to get the number of jobs available in the employees table.
9. Write a query get all first name from employees table in upper case.
10. Write a query to select first 10 records from a table.
11. Write a query to select 3rd & 4th record of employees table.
12. Write a query to select 2nd last record of employees table.