Chapter 1

MySQL

"As you study computer science you develop this wonderful mental acumen, particularly with relational databases, systems analysis, and artificial intelligence" - Frederick Lenz

1.1. SQL (Structured Query Language)

SQL is a standard language for accessing and manipulating databases. SQL became a standard of the American National Standards Institute (ANSI) in 1986 and of the International Organization for Standardization (ISO) in 1987. All the RDBMS systems like MySQL, MS Access, Oracle, Sybase, Postgres, and SQL Server use SQL as their standard database language. SQL programming language uses various commands for different operations. There are three types of SQL queries, they are:

1) Data Definition Language (DDL), helps you to define the database structure or schema
2) Data Manipulation Language (DML), allows you to modify the database instance by inserting, modifying, and deleting its data
3) Data Query Language (DQL), used for performing queries on the data within schema objects
4) Data Control Language (DCL), allows you to control the accessing of databases as per their roles
5) Transaction Control Language (TCL), deal with the transaction within the database.

Some important reasons for using SQL:

1) It helps users to access data in the RDBMS system.
2) It helps you to describe the data.
3) It allows you to define the data in a database and manipulate that specific data.
4) With the help of SQL commands in DBMS, you can create and drop databases and tables.
5) SQL offers you to use the function in a database, create a view, and store procedure.
6) You can set permissions on tables, procedures, and views.

SQL is not case sensitive; you can use all lowercase or all uppercase. Different programmers have their own preferences. For readability purposes, many SQL programmers prefer to use uppercase for SQL commands and lowercase for everything else. The SQL syntax allows you to include line breaks at logical points without it breaking the statement. A semicolon should be placed at the end of each SQL statement.

1.2. MySQL

MySQL is a database server program that can receive and send data very quickly, is a multi-user program, and uses basic SQL (Structured Query Language) commands. MySQL has two licenses, namely Free Software and Shareware. The MySQL that we usually use is MySQL Free Software which is under the GNU/GPL (General Public License). MySQL was first pioneered by a database programmer named Michael Widenius. MySQL is a widely used relational database management system (RDBMS). MySQL is ideal for both small and large applications.

- MySQL is very fast, reliable, scalable, and easy to use
- MySQL is cross-platform
- MySQL is compliant with the ANSI SQL standard
- MySQL was first released in 1995
- MySQL is developed, distributed, and supported by Oracle Corporation
- MySQL is named after co-founder Monty Widenius's daughter: **My**

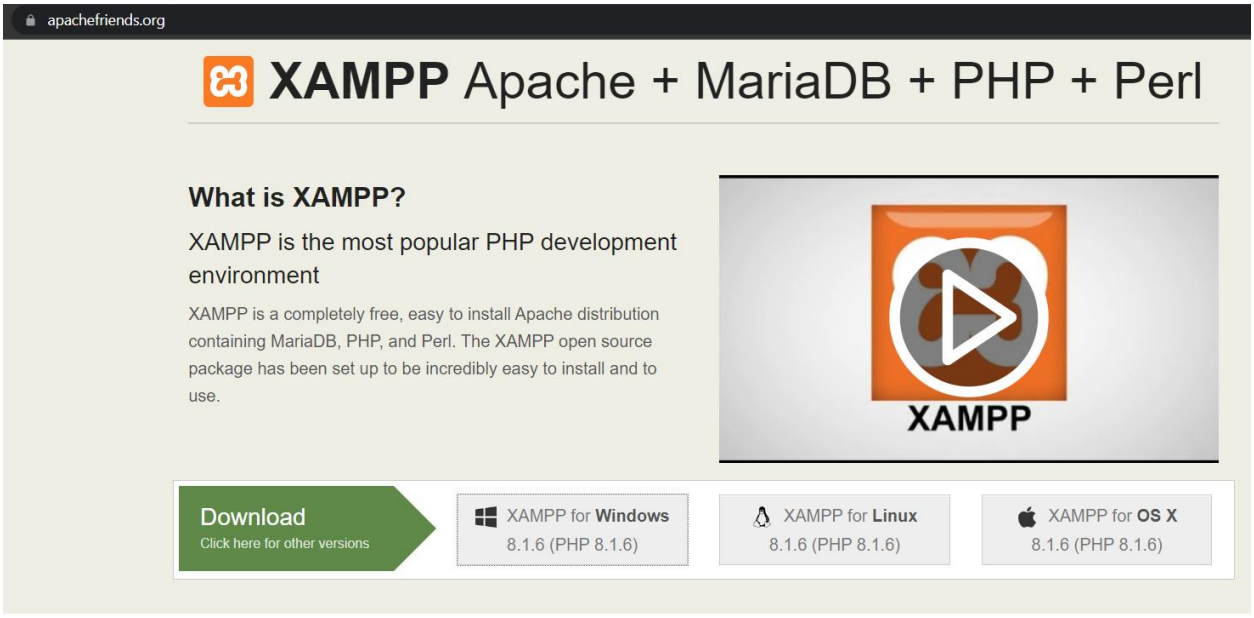
1.3. XAMPP

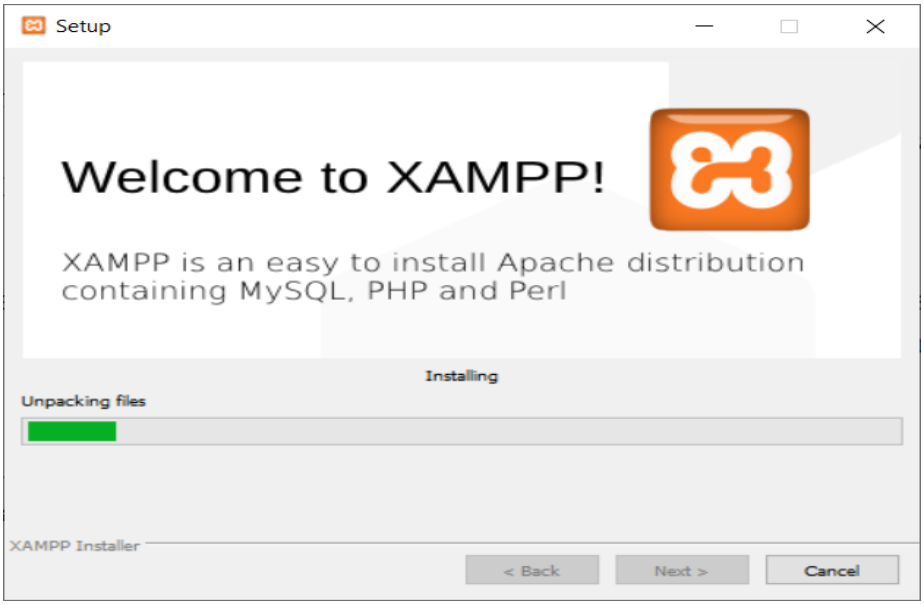
XAMPP is the title used for a compilation of free software. The name is an acronym, with each letter representing one of the five key components. The software packet contains the web server Apache, the relational database management system MySQL (or MariaDB), and the scripting languages Perl and PHP. The initial X stands for the operating systems that it works with: Linux, Windows, and Mac OS X.

a. **Apache**: the open-source web server Apache is the most widely used server worldwide for delivery of web content. The server application is made available as a free software by the Apache Software Foundation.
b. **MySQL/MariaDB**: in MySQL, XAMPP contains one of the most popular relational database management systems in the world. In combination with the web server Apache and the scripting language PHP, MySQL offers data storage for web services. Current XAMPP versions have replaced MySQL with MariaDB (a community-developed fork of the MySQL project, made by the original developers).
c. **PHP**: the server-side programming language PHP enables users to create dynamic websites or applications. PHP can be installed on all platforms and supports several diverse database systems.
d. **Perl**: the scripting language Perl is used in system administration, web development, and network programming. Like PHP, Perl also enables users to program dynamic web applications.

1.4. Installation

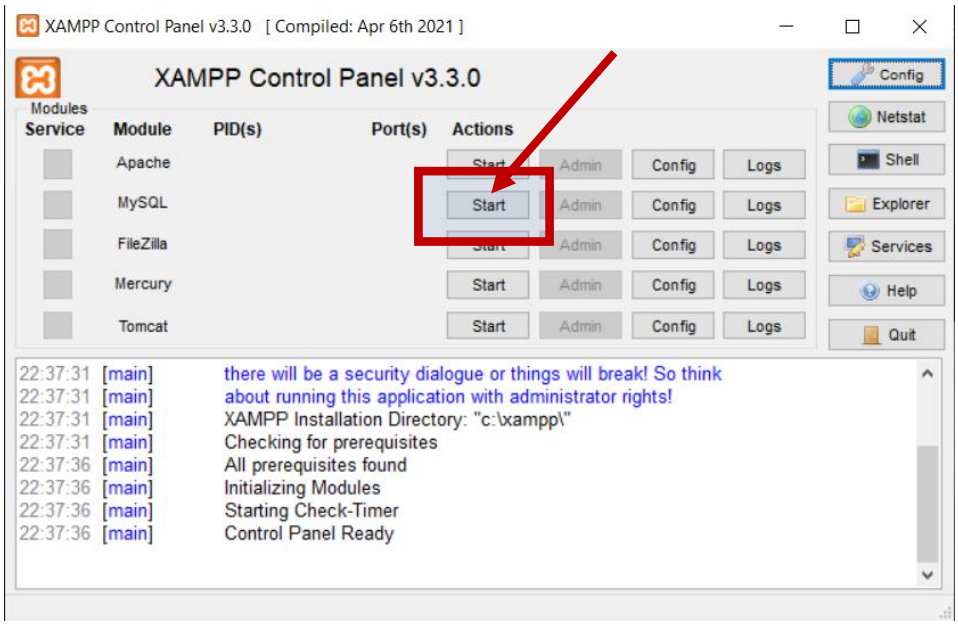
To download the file installation, go to https://www.apachefriends.org. Choose the versions and follow the instructions.


apachefriends.org
XAMPP Apache + MariaDB + PHP + Perl
What is XAMPP?
XAMPP is the most popular PHP development environment
XAMPP is a completely free, easy to install Apache distribution containing MariaDB, PHP, and Perl. The XAMPP open source package has been set up to be incredibly easy to install and to use.
XAMPP
Download
Click here for other versions
XAMPP for Windows
8.1.6 (PHP 8.1.6)
XAMPP for Linux
8.1.6 (PHP 8.1.6)
XAMPP for OS X
8.1.6 (PHP 8.1.6)

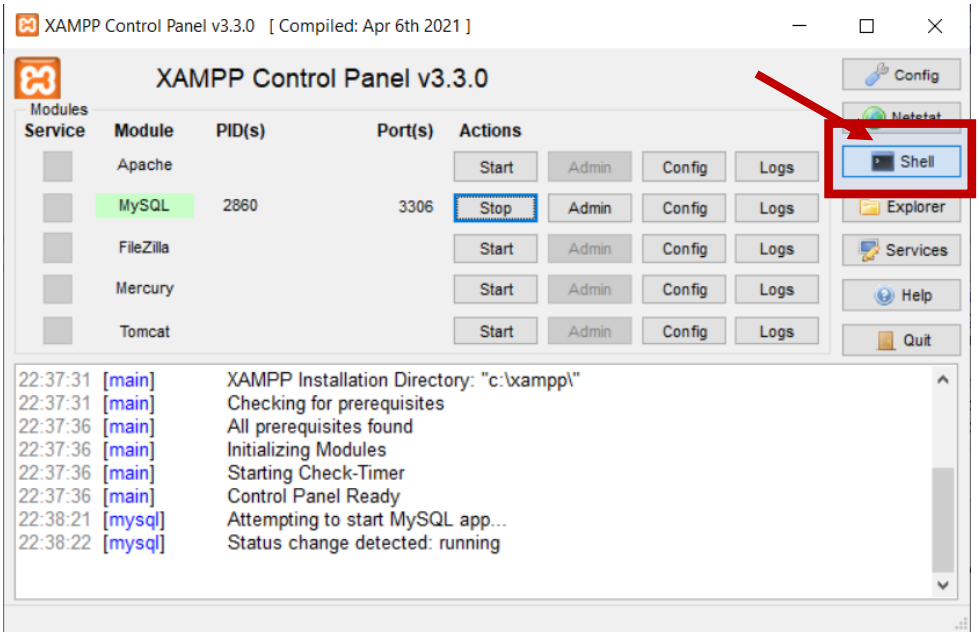

Setup
Welcome to XAMPP!
XAMPP is an easy to install Apache distribution containing MySQL, PHP and Perl
Installing
Unpacking files
XAMPP Installer
< Back
Next >
Cancel

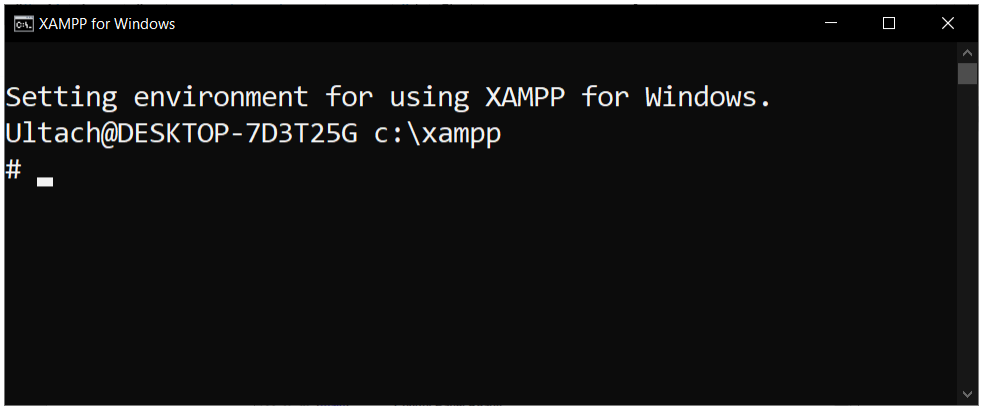
1.5. MySQL Activation

To be able to use MySQL, first activate the MySQL module. By clicking the start button for MySQL.



The next step after we activate our MySQL module, we need to go to the MySQL shell by clicking the Shell button.





The XAMPP Control Panel

Controls for the individual components of your test server can be reached through the XAMPP Control Panel. The clear user interface logs all actions and allows you to start or stop individual modules with a single. The XAMPP Control Panel also offers you various other buttons, including:

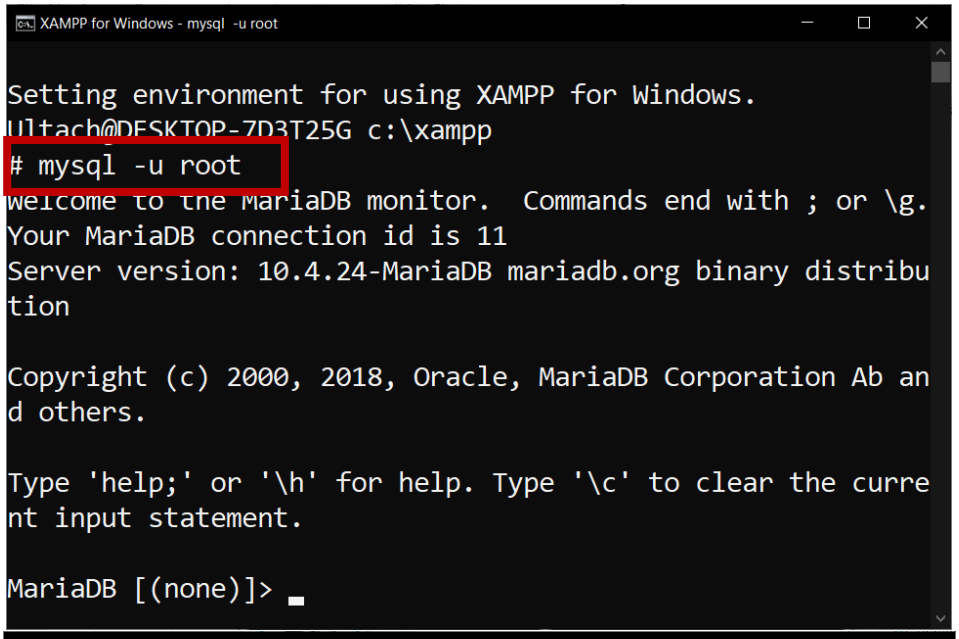
1. Config: allows you to configure the XAMPP as well as the individual components
2. Netstat: shows all running processes on the local computer
3. Shell: opens a UNIX shell
4. Explorer: opens the XAMPP folder in Windows Explorer
5. Services: shows all services currently running in the background
6. Help: offers links to user forums
7. Quit: closes the XAMPP Control Panel

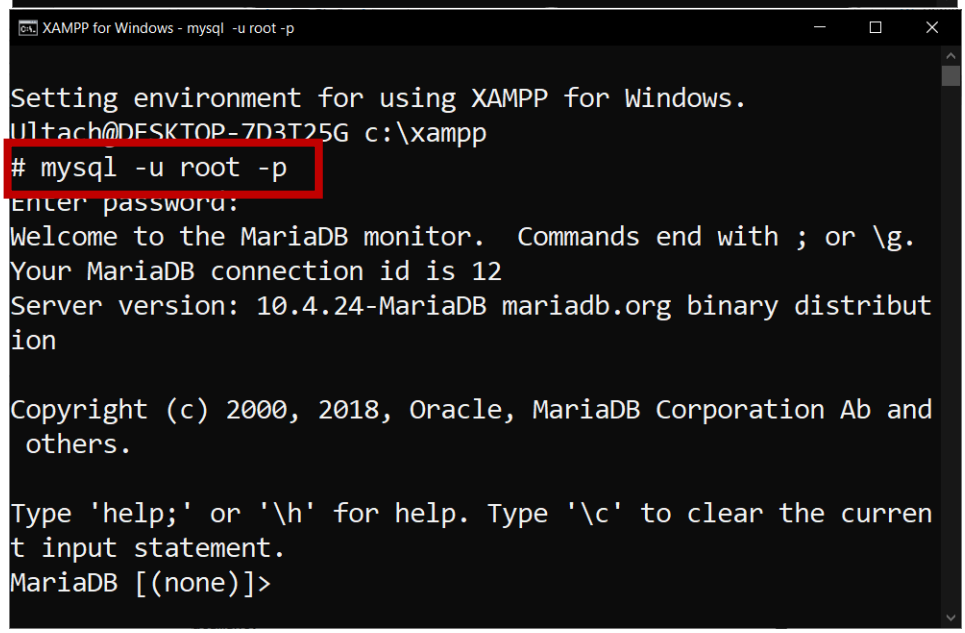
1.6. Start and Stop of MySQL

MySQL is a very secure database server. MySQL can manage user access. So, not just any user can access a database created by MySQL. So, before you have a user to access MySQL you can also access the MySQL database using the root user.

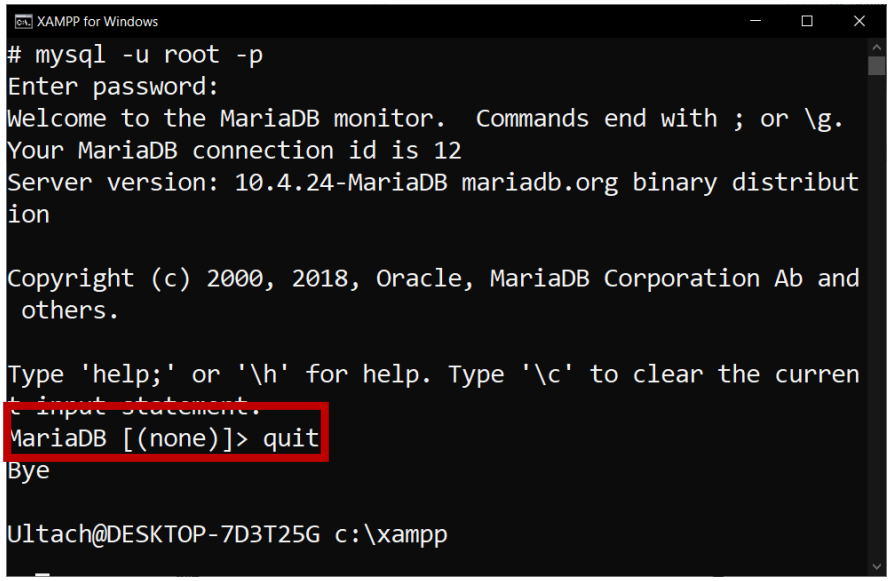
Command to start MySQL: **Shell > mysql –u root** or **Shell > mysql –u root -p**

Note: *The –u sign indicates that we will log in using a Username named root. -p indicates the database password. Without a semicolon (;) at the end of the line.*


XAMPP for Windows - mysql -u root
Setting environment for using XAMPP for Windows.
Ultach@DESKTOP-7D3T25G c:\xampp
mysql -u root
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 11
Server version: 10.4.24-MariaDB mariadb.org binary distribu
tion
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab an
d others.
Type 'help;' or '\h' for help. Type '\c' to clear the curre
nt input statement.
MariaDB [(none)]>


XAMPP for Windows - mysql -u root -p
Setting environment for using XAMPP for Windows.
Ultach@DESKTOP-7D3T25G c:\xampp
mysql -u root -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MariaDB connection id is 12
Server version: 10.4.24-MariaDB mariadb.org binary distribut
ion
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and
others.
Type 'help;' or '\h' for help. Type '\c' to clear the curren
t input statement.
MariaDB [(none)]>

For exiting the MySQL, we can type **Quit** or **\q** Instructions: **Mysql> quit**



1.6. Functions On MySQL

String Function

- CONCAT (String 1, String 2, ... , String n)
  This function is used to concatenate two or more strings (columns).

```
MariaDB [(none)]> select concat('Learning','Database');
+-------------------------------+
| concat('Learning','Database') |
+-------------------------------+
| LearningDatabase              |
+-------------------------------+
1 row in set (0.001 sec)
```

- CONCAT_WS (separator, String 1, String 2, ..., String n)
  This function is used to concatenate two or more strings (columns) with a separator (space).

```
MariaDB [(none)]> select concat_ws(' ','Learning','Database');
+--------------------------------------+
| concat_ws(' ','Learning','Database') |
+--------------------------------------+
| Learning Database                    |
+--------------------------------------+
1 row in set (0.000 sec)
```

- LENGTH (String)
  This function is used to calculate the length of a string.

```
MariaDB [(none)]> select length ('Universitas Singaperbangsa Karawang');
+-----------------------------------------------+
| length ('Universitas Singaperbangsa Karawang') |
+-----------------------------------------------+
|                                            35 |
+-----------------------------------------------+
1 row in set (0.00 sec)
```

- LEFT (String, length)
  This function is used to truncate the string from the left as much as the length of the character.

```
MariaDB [(none)]> select left('Universitas Singaperbangsa Karawang', 5);
+-----------------------------------------------+
| left('Universitas Singaperbangsa Karawang', 5) |
+-----------------------------------------------+
| Unive                                         |
+-----------------------------------------------+
1 row in set (0.00 sec)
```

- RIGHT (String, Length)
  This function is used to truncate the string from the right as much as the length of the character.

```
MariaDB [(none)]> select right('Universitas Singaperbangsa Karawang', 5);
+-----------------------------------------------+
| right('Universitas Singaperbangsa Karawang', 5) |
+-----------------------------------------------+
| awang                                         |
+-----------------------------------------------+
1 row in set (0.00 sec)
```

- REPLACE (String, initials, replacement letters)
  This function is used to replace a string with another string.

```
MariaDB [(none)]> select replace ('www.unsika.ac.id','w','x');
+--------------------------------------+
| replace ('www.unsika.ac.id','w','x') |
+--------------------------------------+
| xxx.unsika.ac.id                     |
+--------------------------------------+
1 row in set (0.00 sec)
```

- REPEAT (String, numbers)
  This function is used to duplicate a specified number of strings.

```
MariaDB [(none)]> select repeat ('Unsika',5);
+-----------------------------------+
| repeat ('Unsika',5)               |
+-----------------------------------+
| UnsikaUnsikaUnsikaUnsikaUnsika    |
+-----------------------------------+
1 row in set (0.00 sec)
```

Time Function

- NOW ()

  This function is used to get the current time and date from the system.

```
MariaDB [(none)]> select now();
+---------------------+
| now()               |
+---------------------+
| 2022-10-03 19:13:15 |
+---------------------+
1 row in set (0.105 sec)
```

- YEAR (now ())

  This function is used to get the current year from the system.

```
MariaDB [(none)]> select year (now());
+--------------+
| year (now()) |
+--------------+
|         2022 |
+--------------+
1 row in set (0.132 sec)
```

1.7. MySQL Administration

MySQL as a database server that can run on a network, of course, MySQL must have special capabilities that are useful for user management or supporting client/server database systems.

a. Create a new User

To be able to create a new user in the MySQL database contained in the user table. Can be done by using a SQL statement named CREATE.

The syntax is as follows: **CREATE USER username;**

Note: *username is the name of the user to be created, a maximum of 16 characters.*

```
MariaDB [(none)]> create user basisdata_admin1;
Query OK, 0 rows affected (0.10 sec)
```

b. View User List

MySQL users can see other users that have been created previously. It is used to see who the users of the database are.

The syntax is as follows: **SELECT user FROM mysql.user;**

```
MariaDB [(none)]> select user from mysql.user;
+------------------+
| User             |
+------------------+
| basisdata_admin1 |
| lecturer         |
| students         |
| root             |
| root             |
| pma              |
| root             |
+------------------+
7 rows in set (0.002 sec)
```

c. Delete User

The syntax is as follows: **DROP user username;**

Note: *username is the name of the user to be deleted.*

```
MariaDB [(none)]> drop user basisdata_admin1;
Query OK, 0 rows affected (0.135 sec)

MariaDB [(none)]> select user from mysql.user;
+----------+
| User     |
+----------+
| lecturer |
| students |
| root     |
| root     |
| pma      |
| root     |
+----------+
6 rows in set (0.002 sec)
```

TASK

1. Make the text as follows:
   "MySQL is the world's most popular open-source database. With its proven performance, reliability, and ease of use, MySQL has become the leading database choice for web-based applications, used by high-profile web properties including Facebook, Twitter, YouTube, Yahoo!, and many more. Oracle drives MySQL innovation, delivering new capabilities to power next generation web, cloud, mobile, and embedded applications.''
2. Count the length of the text in number 1.
3. Cut 113 characters from the left.

4. Cut 155 characters from the right.
5. Change the character **'.' (period)** to **'\\' (double slash)**.
6. Create users as follows:
    - lecturer@localhost
    - students@localhost
    - librarian@localhost
    - admin@localhost
    - security@localhost
7. View all the users.
8. delete user security@localhost and view the rest of the users