AROR UNIVERSITY
OF ART, ARCHITECTURE,
DESIGN & HERITAGE,
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CSC-207: Database Systems

Lab # 03: To work with MySQL & learning SQL basics

Objectives

1. MySQL Installation
2. Connect to MYSQL database from command line
3. SQL introduction
4. SQL commands

1. MySQL Installation

If you want to install MySQL on Windows, you can use the MySQL Installer. The MySQL Installer provides you with an easy-to-use wizard that helps you to install MySQL with the following main products:

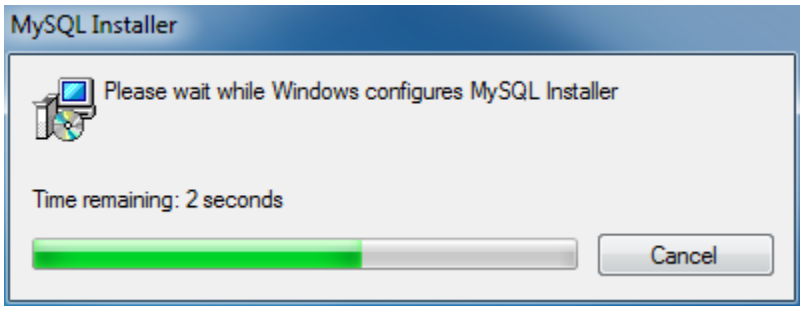
- MySQL Server
- MySQL Workbench
- MySQL Shell
- MySQL Documentation
- All Available Connectors

To download the MySQL installer, go to the following link http://dev.mysql.com/downloads/installer/.

We'll use the MySQL Installer 8.0.34 to install the MySQL Server and related products such as MySQL Workbench and MySQL Shell.

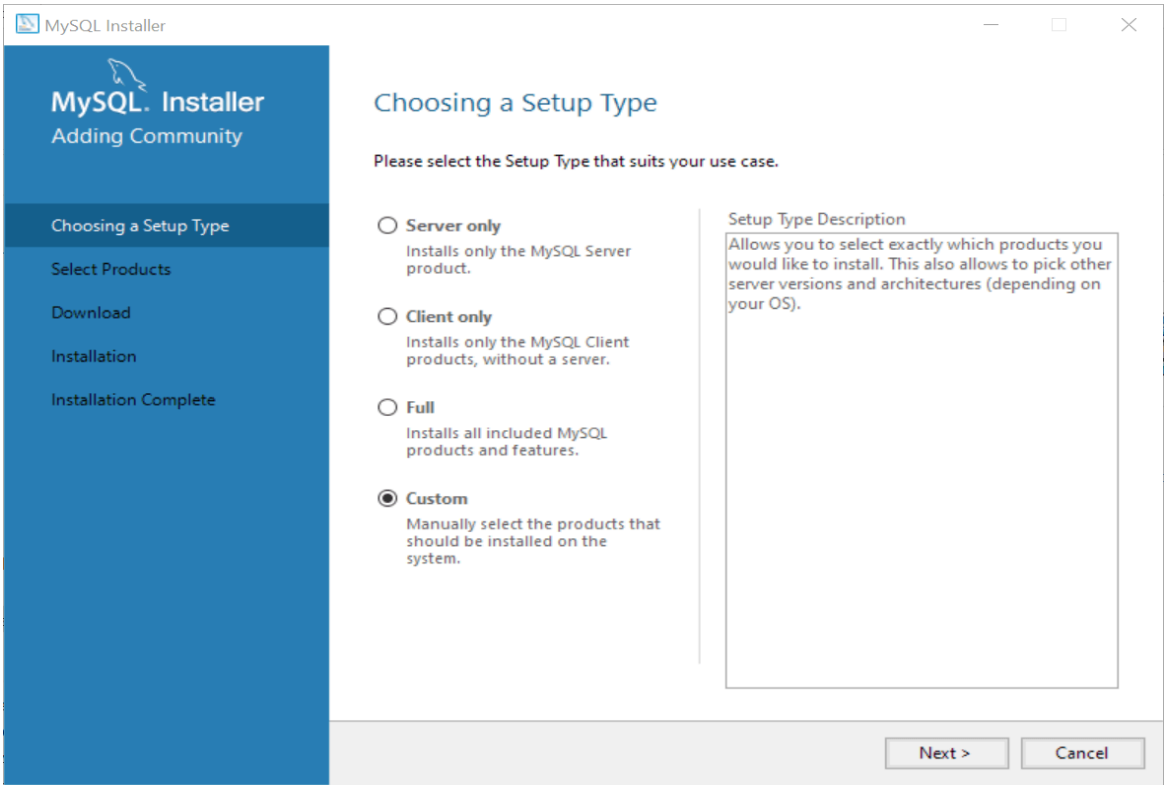
Install MySQL Server & related products using MySQL Installer

To install MySQL using the MySQL installer, double-click on the MySQL Installer file and follow the steps below:



Step 1: Choosing a setup type

In this step, you need to choose the setup type that suits your use case. For tutorial purposes, you can select the last option which is **Custom** setup type:



Step 2. Selecting products

Since we chose the **Custom** setup type, the MySQL Installer displays available products for us to select to install.

We'll install the following products:

- **MySQL Server** – This is the MySQL Database Server.

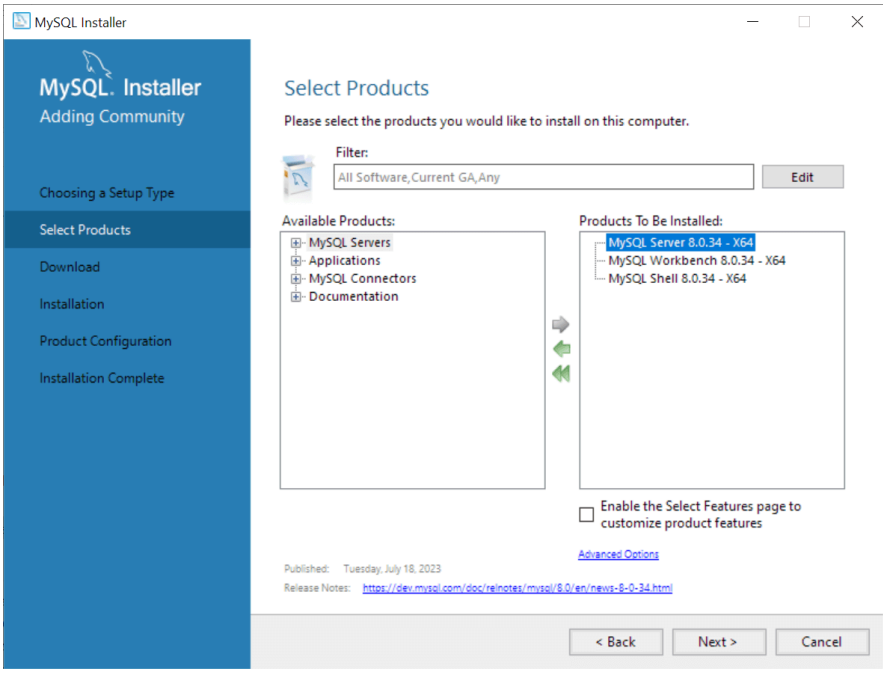
- **MySQL Workbench** – This is the client tool for interacting with the MySQL Database Server via GUI.
- **MySQL Shell** – This is an interactive Javascript, Python, or SQL interface supporting development and administration for the MySQL Server.

To select these products, you click the + icon on the left pane, select the product, and click the right arrow button.

Here are the paths to the selected products:

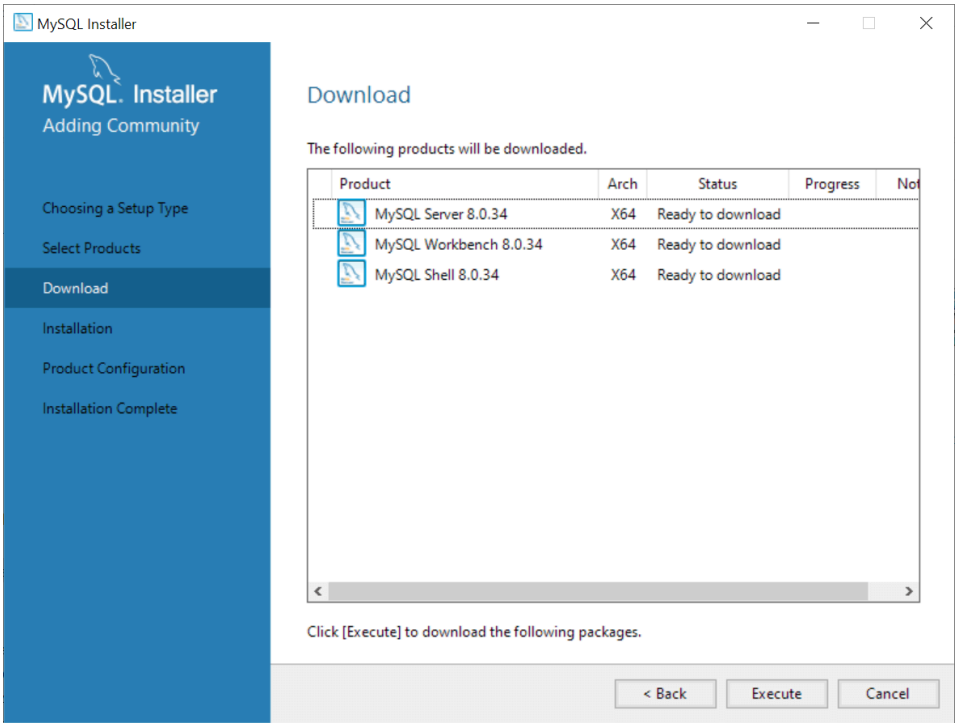
- MySQL Servers > MySQL Server > MySQL Server 8.0 > MySQL Server 8.0.34 – x64
- Applications > MySQL Workbench > MySQL Workbench 8.0 > MySQL Workbench 8.0.34 – X64
- Applications > MySQL Shell > MySQL Shell 8.0 > MySQL Shell 8.0.34 – X64

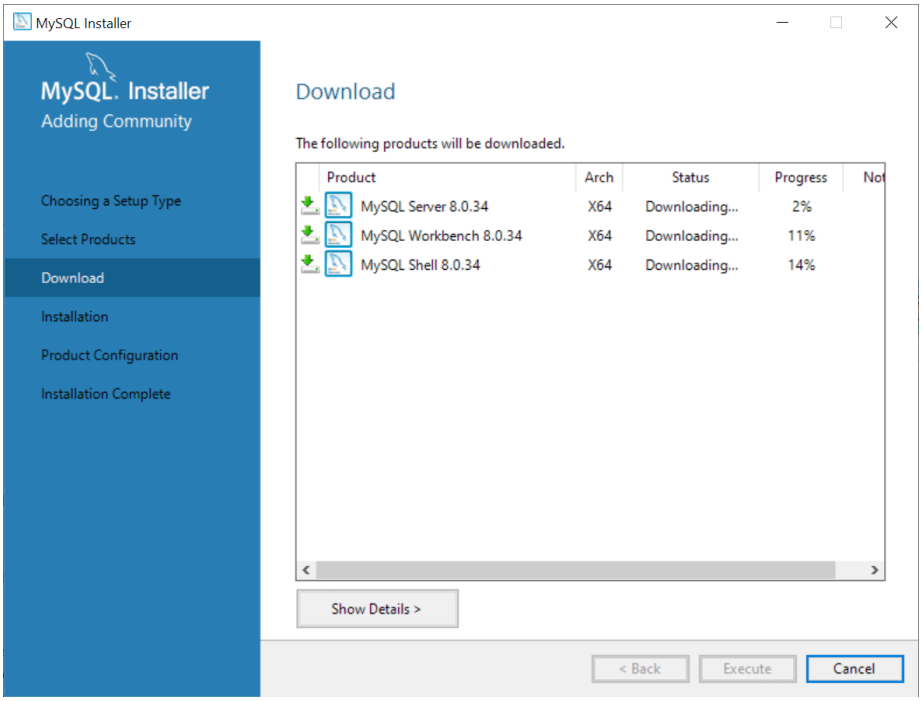
Once you select the products, you click the **Next** button to continue.



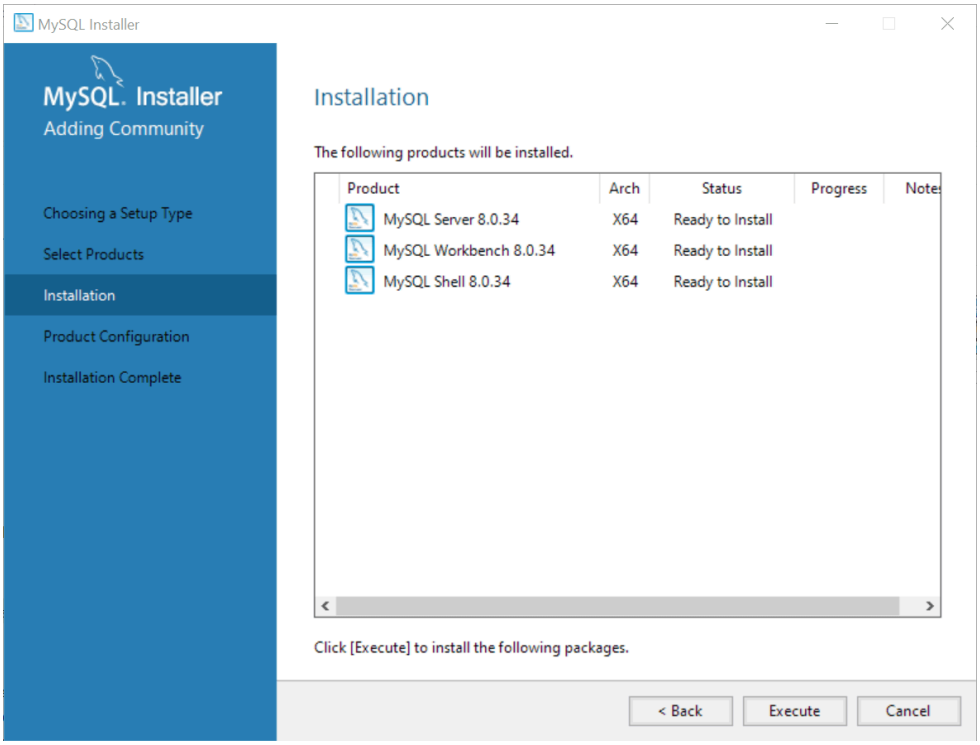
Step 3. Downloading the selected products

The MySQL Installer will download the selected products from the internet. Please ensure you have an active internet connection and wait for a few minutes for the download to complete.



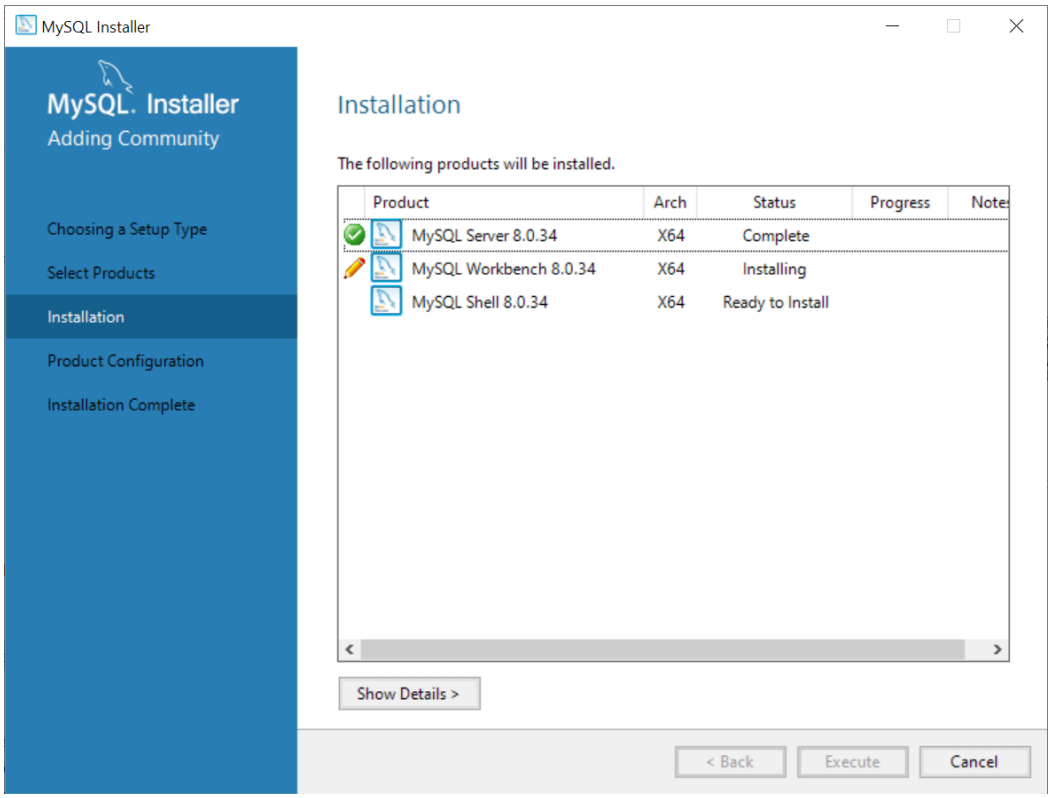


After the download is complete, click the **Execute** button to start the installation.

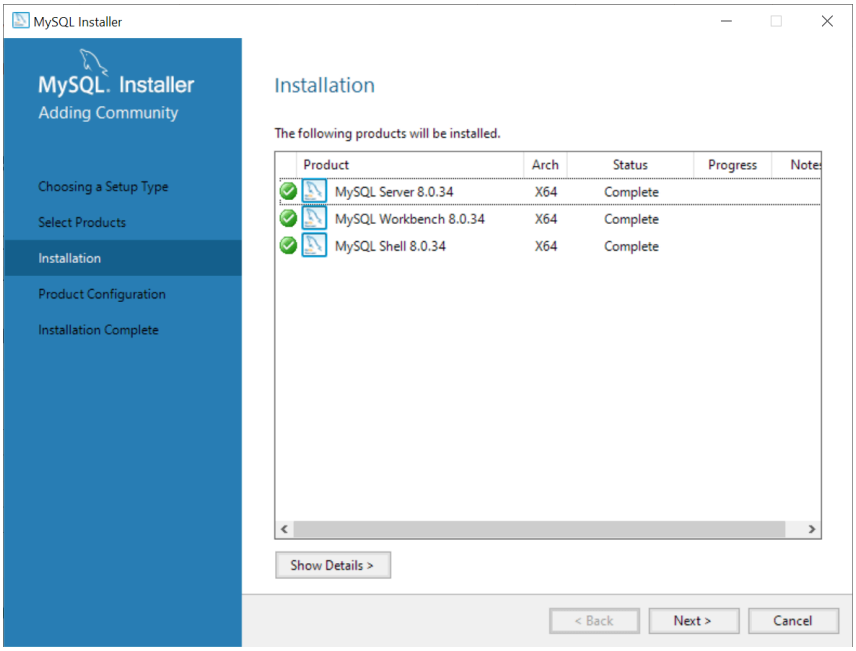


Step 4. Installing the selected products

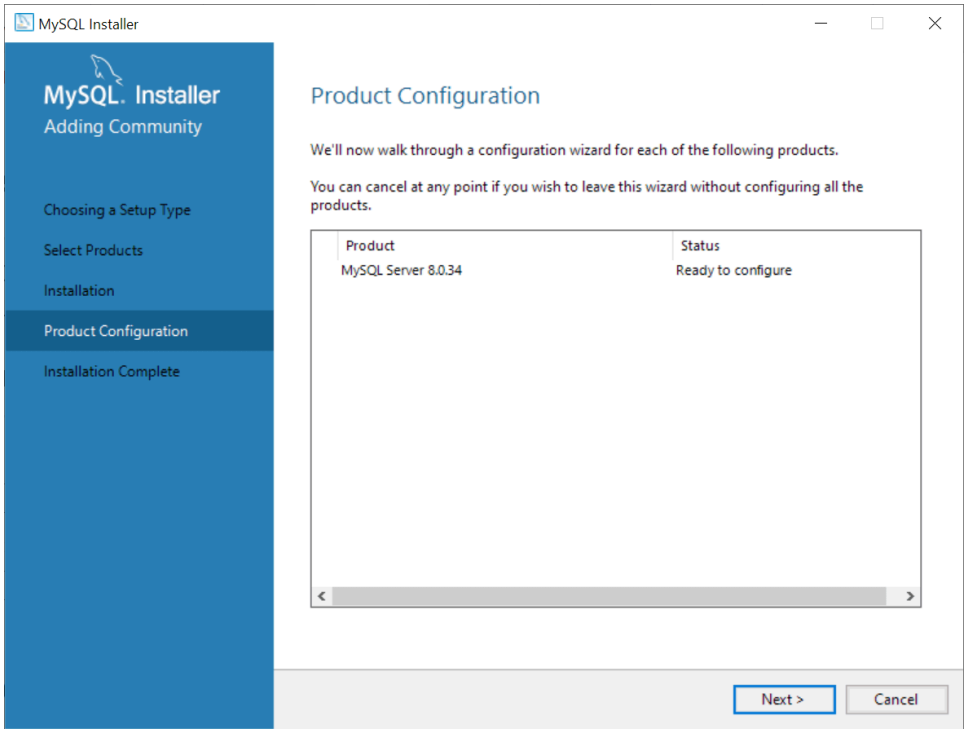
The MySQL Installer will install the selected products and this process may some time.



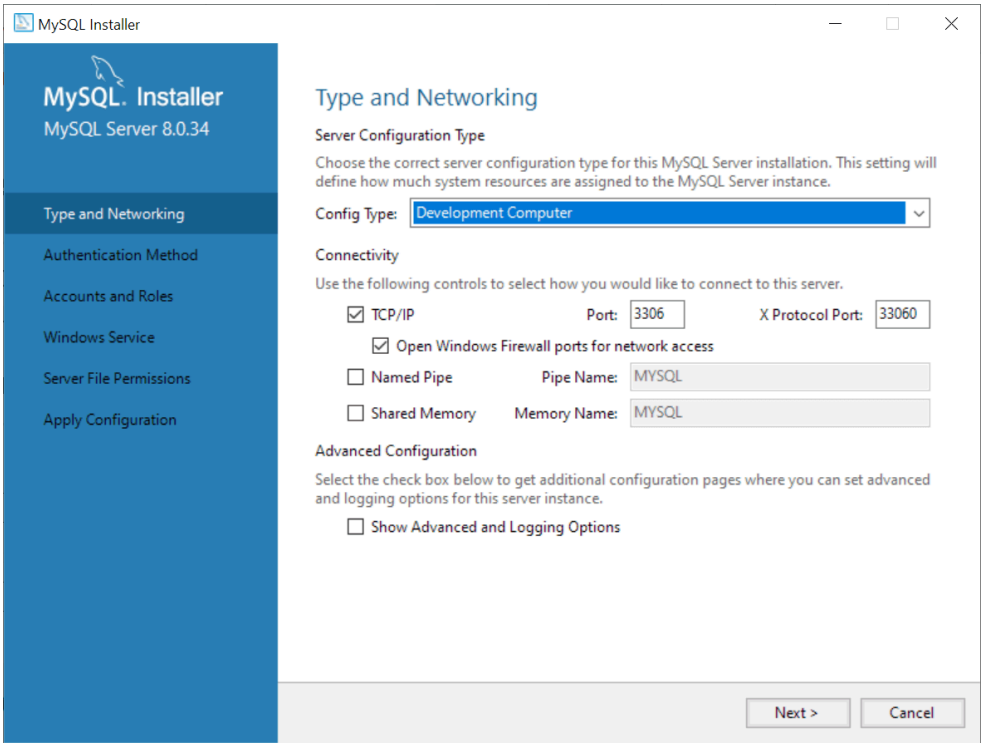
After the installation is complete, click the **Next** button to proceed to the Product Configuration.



Step 5. Configuring the MySQL Server

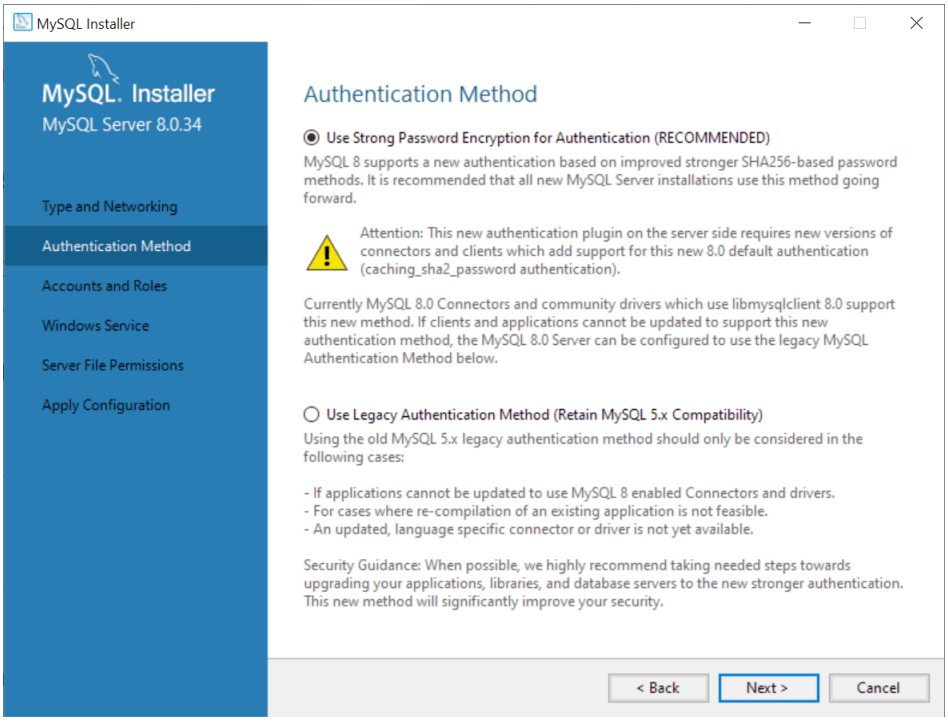


In this step, configure the MySQL Server. Choose the **Development Computer** for the server configuration type, leave the other options as they are, and click the **Next** button.



Step 6. Choosing an authentication method

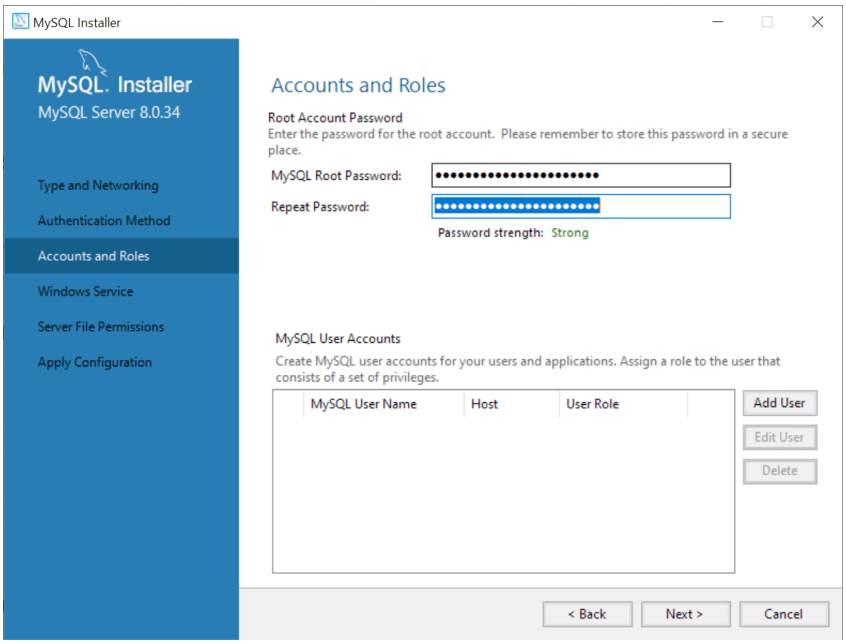
It's recommended to use strong password encryption for authentication, which is the first option.



Step 7. Entering a password for the root account

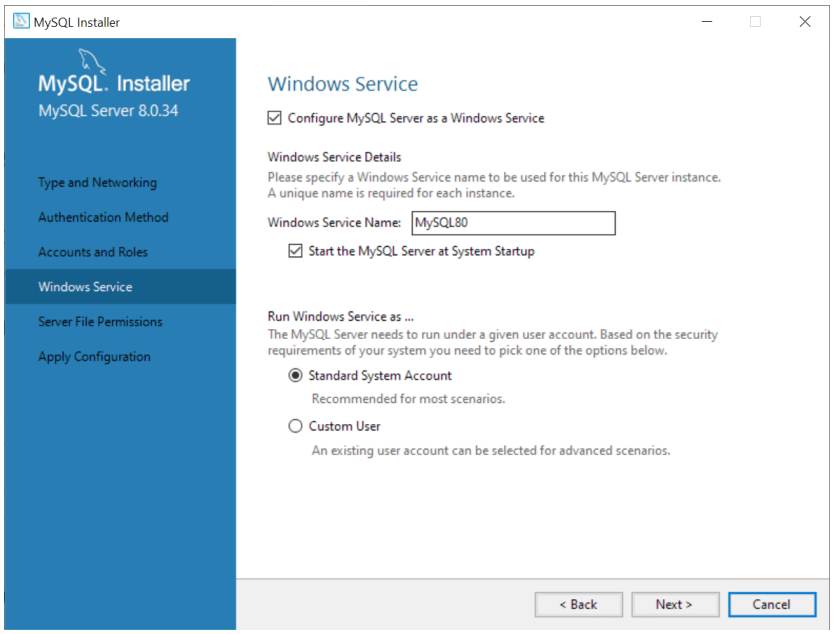
Enter a secure password for the root account, which has full administrative privileges.

Be sure to store it safely and use it for connecting to the MySQL Server in the future.



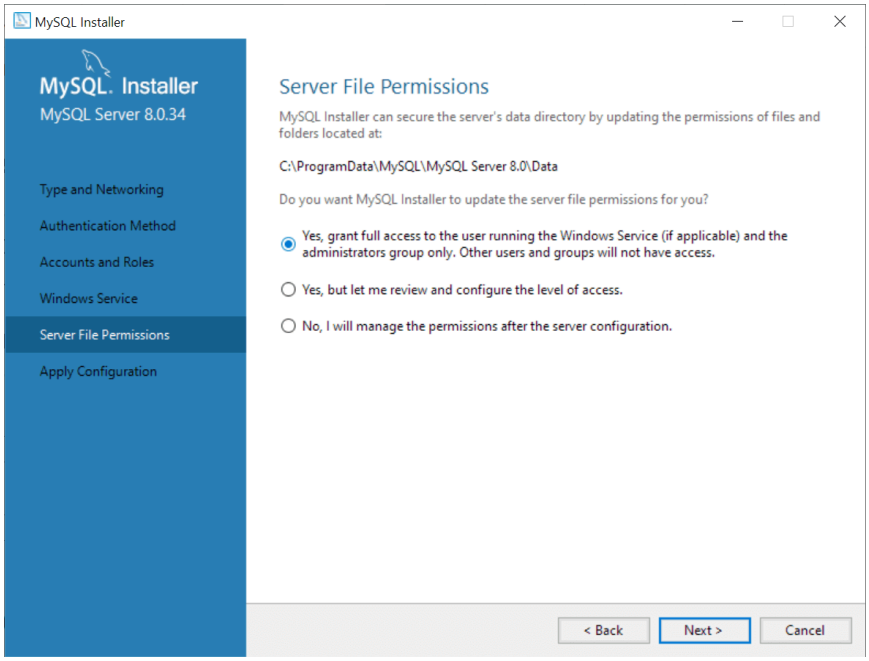
Step 8. Configuring MySQL Server as a Windows Service

In this step, you can configure the MySQL Server as a Windows service, specify a service name, and choose whether to start the MySQL Server during the operating system startup.



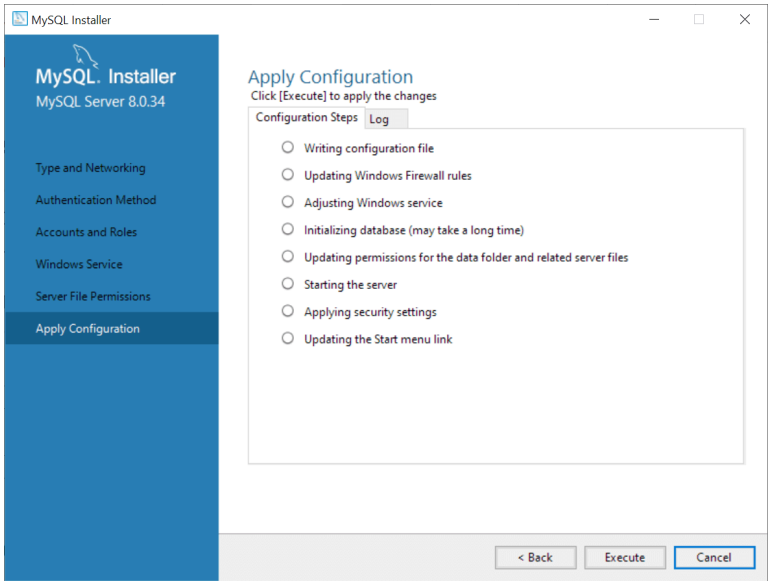
Step 9. Granting file permissions

In this step, you grant permission to MySQL to access the data directory.



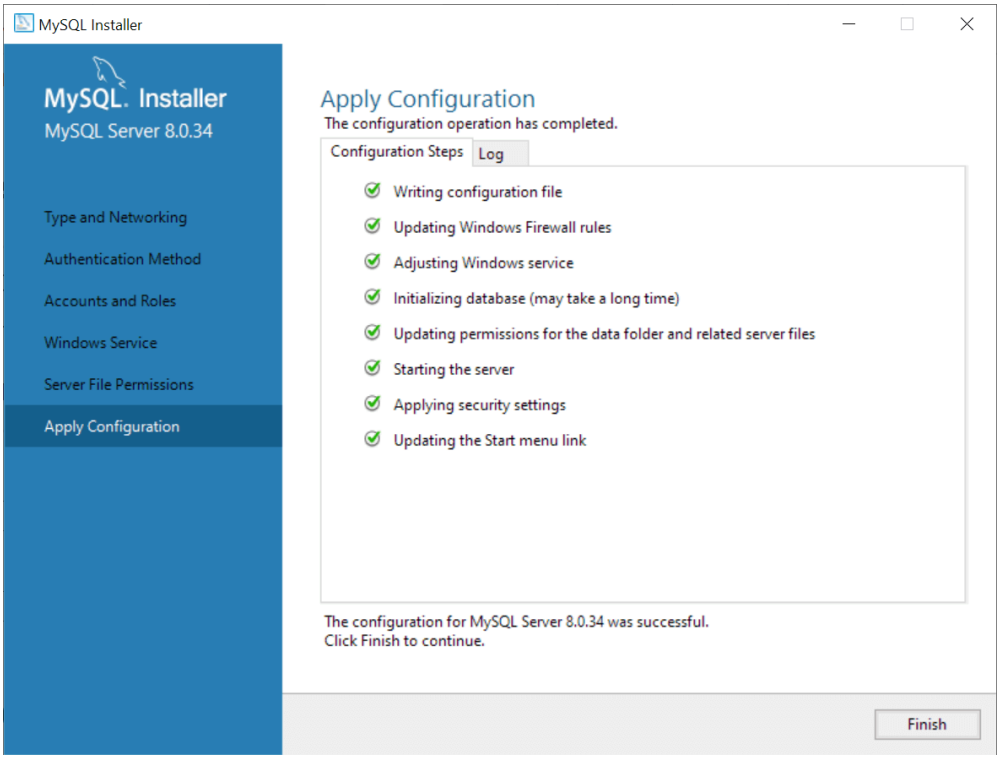
Step 10. Displaying the selected configuration

The MySQL Installer displays a window with the configuration steps. Click the **Execute** button to apply the configuration.

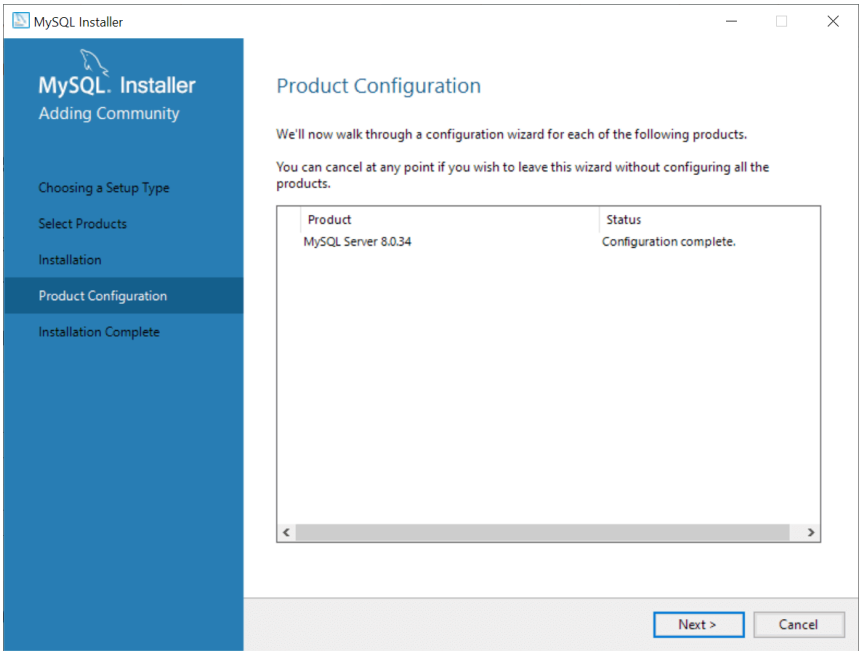


Step 11. Completing configuration

After applying the configuration, the MySQL Installer displays the following window to indicate whether the MySQL Server has been configured successfully.

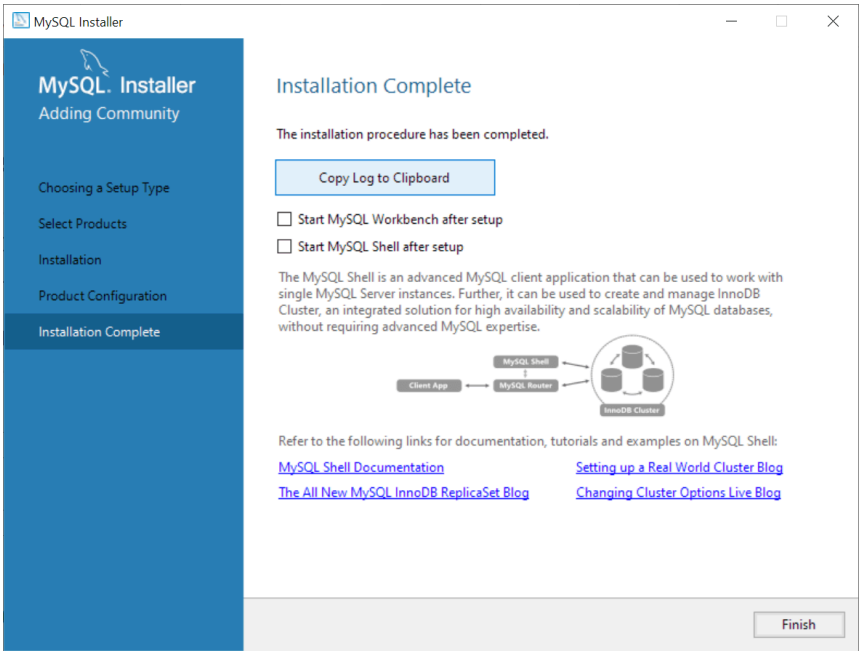


After completing the configuration, click the **Next** button to confirm and finish.



Step 12. Completing installation

The MySQL Installer displays a window to notify you that the installation is complete. Click the **Finish** button to close the installer.



2. 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.

- ***Importing HR Schema***

1. CREATE DATABASE hr_schema;
2. USE hr_schema ;
3. SOURCE C:\Program Files\MySQL\MySQL Server 8.0\bin
4. To run script file ***mysql -u root -p hr < hr_shcema.sql***
5. SHOW databases;

3. SQL introduction

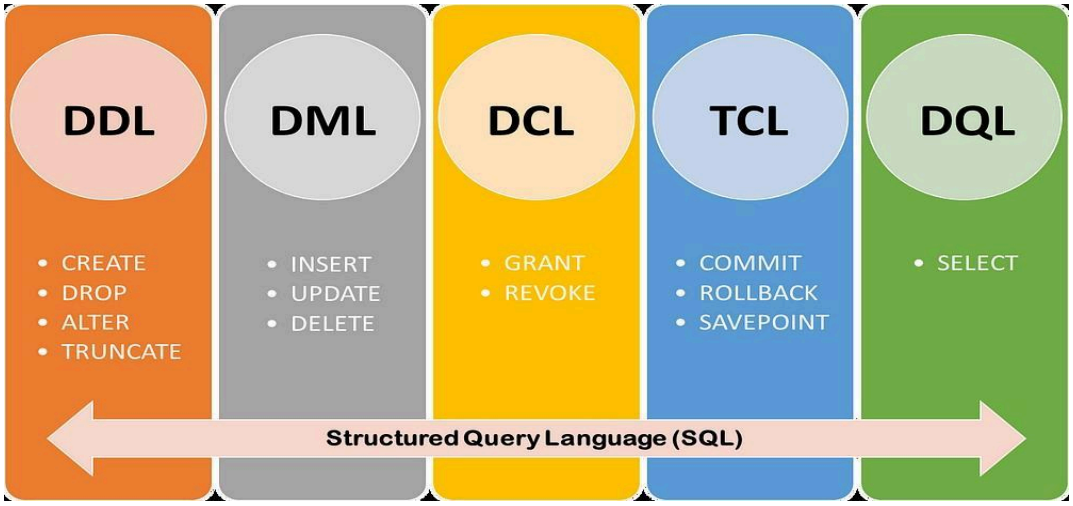
SQL is a standard database language used to access and manipulate data in databases. SQL stands for Structured Query Language. SQL was developed by IBM Computer Scientists in the 1970s. By executing queries SQL can create, update, delete, and retrieve data in databases like MySQL, Oracle, PostgreSQL, etc. Overall SQL is a query language that communicates with databases.

SQL can do…

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

4. SQL commands

Following are the basic commands used in SQL.



Data Definition Language(DDL)

- It helps you define the database structure or schema.
- DDL changes the format of the table, such as creating a table, deleting a table, and altering a table.
- All the command of DDL is auto-committed which means it permanently save all the changes in the database. Below are the DDL commands and their syntax.

1. CREATE TABLE

CREATE TABLE Creates a new table in the database. It allows you to specify the name of the table and the name of each column in the table.

CREATE TABLE table_name (column_1 datatype, column_2 datatype, column_3 datatype);

2. ALTER

ALTER TABLE Let's you alter the table as per your requirement.

For example, you can add, remove and rename the columns as shown below.

-- Add a column

ALTER TABLE table_name
ADD column_name datatype;

-- Remove a column

ALTER TABLE table_name
DROP COLUMN column_name;

-- Rename a column

ALTER TABLE table_name CHANGE COLUMN old_name new_name varchar/datatype;

Moreover, ALTER lets you change the table name itself with the below syntax.

ALTER TABLE old_table_name
RENAME TO new_table_name;

To change data type of column

ALTER TABLE table_name
MODIFY COLUMN dob year ;

To see the structure of table

DESC table_name

DESCRIBE table_name

3. DROP

It is used to delete both the structure and record stored in the table.

DROP TABLE table_name;

4. TRUNCATE

It is used to delete all the rows from the table and free the space containing the table.

TRUNCATE TABLE table_name;

Data Manipulation Language (DML)

- It allows you to modify the database instance by inserting, changing, and deleting its data.
- DML commands are used to Customize the database, and it is responsible for all forms of changes in the database.
- The command of DML is not auto-committed, which means it can't permanently save all the changes in the database. They can be rollback. Below are the DML commands and their syntax.

1. INSERT

INSERT Statements are used to add a new row to a table.

```
INSERT INTO table_name
(column_1, column_2, column_3)
VALUES
(value_1, value_2, value_3);
```

2. UPDATE

UPDATE statements allow you to edit rows in a table.

```
UPDATE table_name
SET column_name = value
WHERE condition;
```

3. DELETE

DELETE statements are used to remove rows from a table.

DELETE FROM table_name
WHERE some_column = some_value;

DCL (Data Control Language)

- It includes commands like GRANT and REVOKE, which help give "rights & permissions."
- DCL commands grants and takes back authority from any database user.

1. **GRANT**

GRANT command is for giving users access to a database.

GRANT SELECT, UPDATE ON My_TABLE TO FIRST_USER, SECOND_USER;

2. **REVOKE**

It is used to take back permissions from the user.

REVOKE SELECT, UPDATE ON My_TABLE TO FIRST_USER, SECOND_USER;

Exercises (Class)

Add here all the tasks performed in lab.

Exercises (Weekly)

1. **Create a Table for Students** – Create a table named *StudentsYourRollNo* with attributes: RollNo (Primary Key), Name, Age, and Department.
2. **Alter Table Structure** – Add a new column Email to the *StudentsYourRollNo* table.
3. **Modify Column Data Type** – Change the data type of the Age column in the *StudentsYourRollNo* table to SMALLINT.
4. **Drop a Column** – Remove the Email column from the *StudentsYourRollNo* table.
5. **Rename a Table** – Rename the Students table to University_Students.
6. **Truncate a Table** – Remove all records from the University_Students table while keeping the structure.
7. **Describe Table Structure** – Use the DESC command to display the structure of the University_Students table.

8. **Grant Privileges** – Grant SELECT and UPDATE privileges on the Students table to the user *YourName_RollNo*.
9. **Revoke Privileges** – Revoke UPDATE permission from the user *YourName_RollNo* on the Students table.
10. **Create Another Table for Courses** – Create a table Courses with CourseID (Primary Key), CourseName, and Credits.
11. **Grant All Privileges** – Grant all privileges on the Courses table to *RollNo_2501 user*.
12. **Drop a Table** – Drop the Courses table permanently from the database.
13. **Check Available Databases** – Use the SHOW DATABASES; command and verify if UniversityDB exists.
14. **Import HR Schema** – Execute the command to import the hr_schema.sql into the MySQL database.
15. **View All Tables** – List all tables in the UniversityDB database.