COMP- 8115-M50 Database systems

Assignment – 1

1)

a) Setup/Install the MySQL database server on your local machine. Include the screenshot(s). (25 pts)

Answer:

Most of us use MySQL since it is one of the most popular relational database management software which is widely used in the IT sector to maintain the database systems. It provides access to multiple users and supports various storage engines.

Prerequisites:

We need to have this available in your system to use MySQL or make it workable.

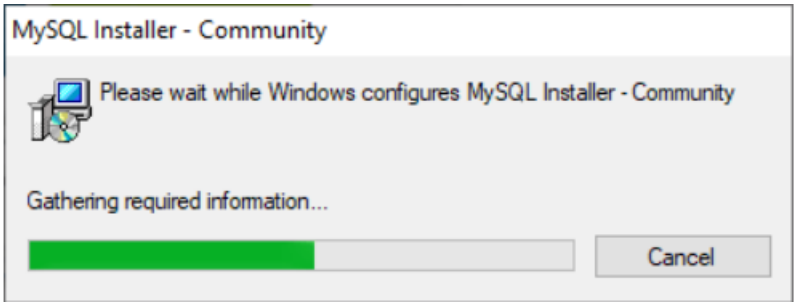
- MySQL Setup software
- Microsoft .NET Framework
- At least a 4 GB Ram system

Steps to install MYSQL

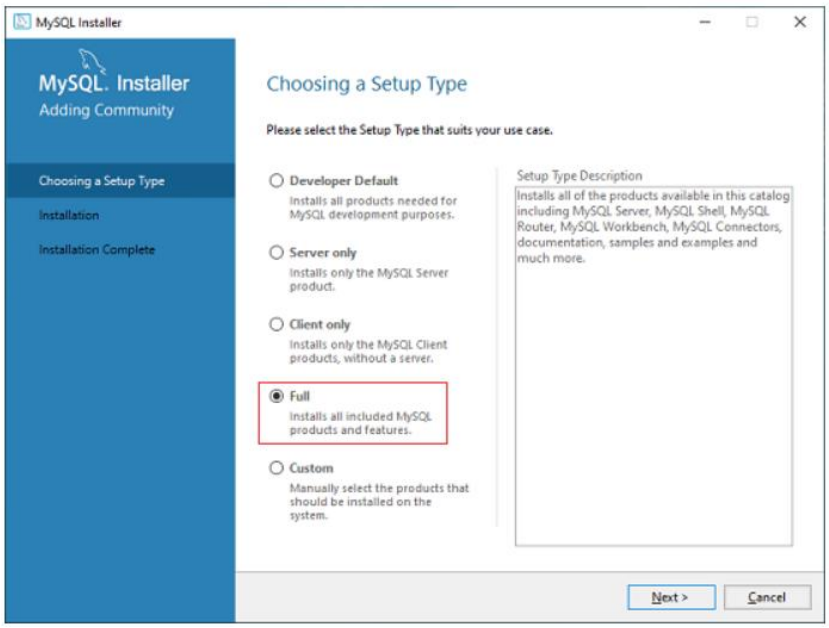
1) Go to the official website of MYSQL and download the community server edition software. There it would ask for the kind of operating system where you can select the windows operating system.
2) Next, there are two options available to download the setup. Choose the version number for the MySQL community server, which you want. If you have good internet connectivity, then choose the MySQL-installer-web-community. Otherwise, choose the other one.

Now installing the MYSQL on windows

Step 1: You can download the Zip file, or you can directly download the MSI installer .exe file. But if you are downloading the zip, make sure you click on .exe file.



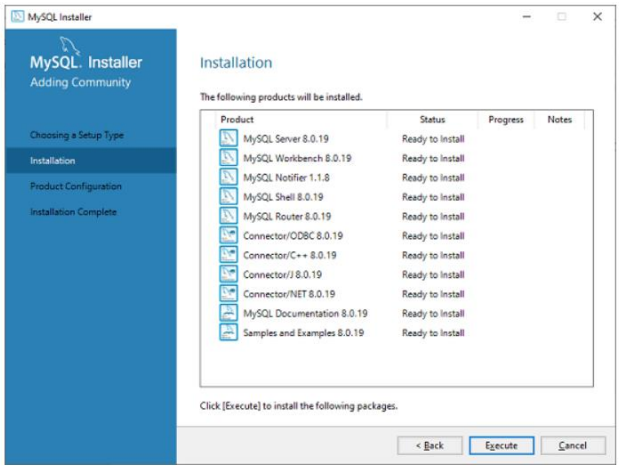
Step 2: Now in the choose Setup Type. There are several types available, and you need to choose the appropriate option to install MySQL products and features. Here, we are going to select the **Full** option and click on the Next button.



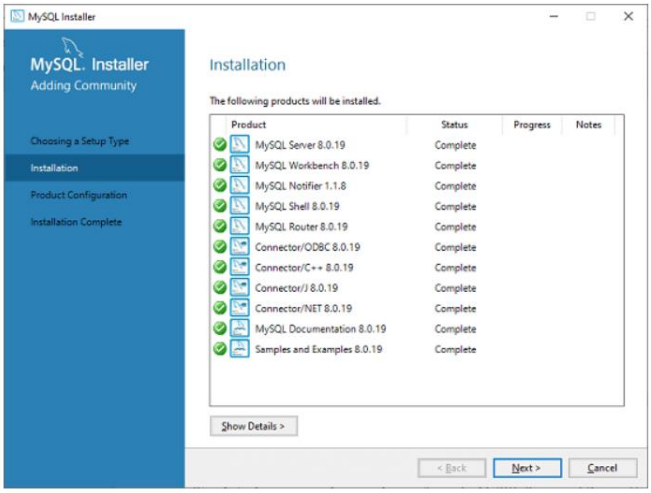
Step 3: Once we click on the Next button, it may give information about some features that may fail to install on your system due to a lack of requirements. We can resolve them by clicking on the Execute button that will install all requirements automatically or can skip them. Now, click on the Next button.

Step 4: In the next wizard, we will see a dialog box that asks for our confirmation of a few products not getting installed. Here, we must click on the **Yes** button.

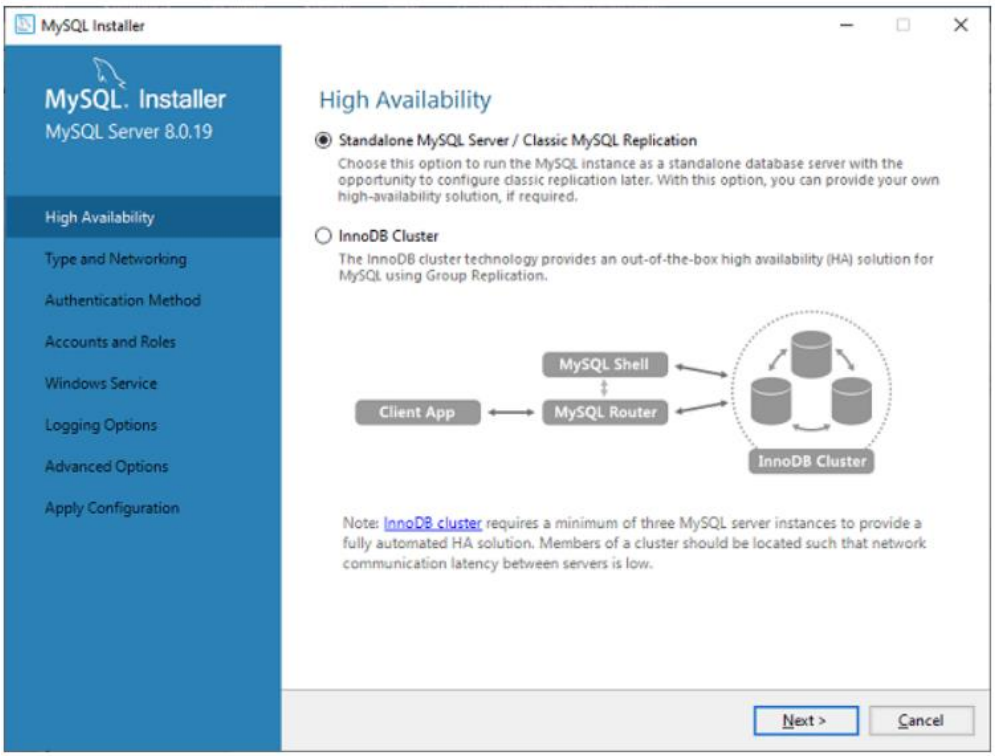
After clicking on the Yes button, we will see the list of the products which are going to be installed. So, if we need all products, click on the Execute button.



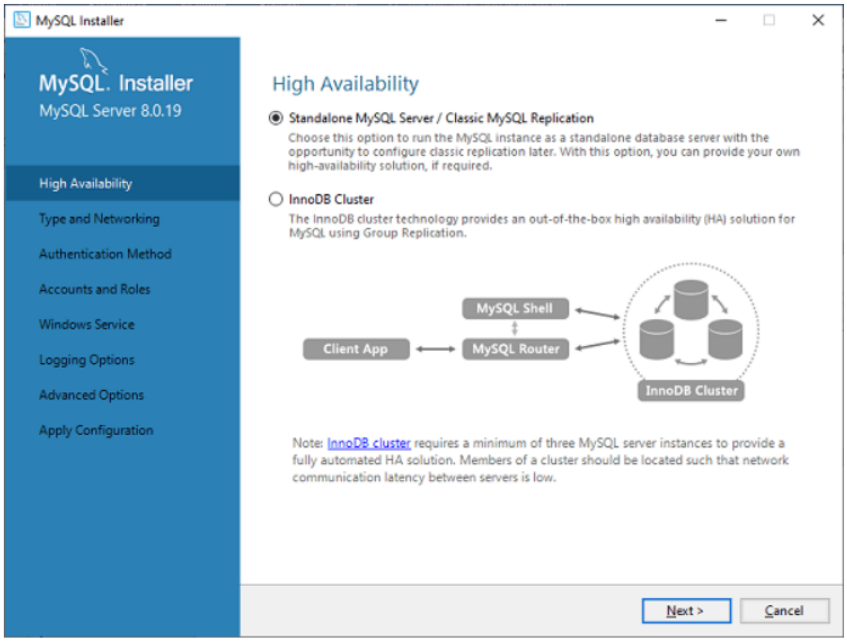
Step 5**:** Once we click on the Execute button, it will download and install all the products. After completing the installation, click on the Next button.



Step 6: In the next wizard, we need to configure the MySQL Server and Router. Here, I am not going to configure the Router because there is no need to use it with MySQL. We are going to show you how to configure the server only. Now, click on the Next button.



Step 7: As soon as you will click on the Next button, you can see the screen below. Here, we have to configure the MySQL Server. Now, choose the Standalone MySQL Server/Classic MySQL Replication option and click on Next. Here, you can also choose the InnoDB Cluster based on your needs.



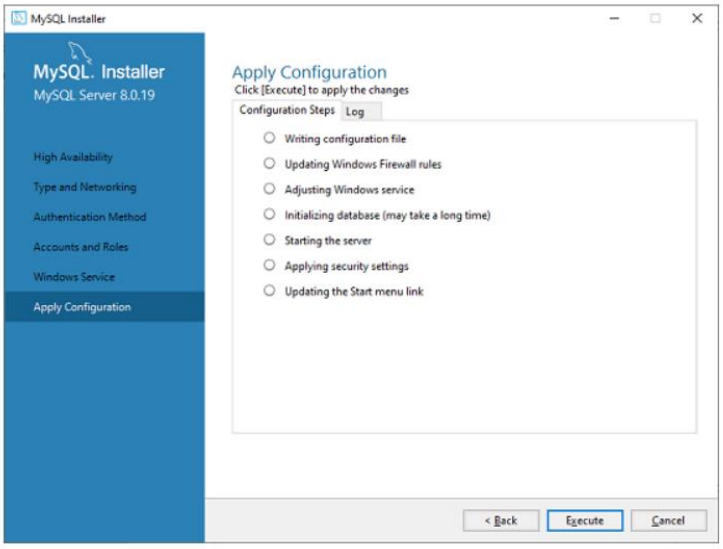
Step 8: In the next screen, the system will ask you to choose the Config Type and other connectivity options. Here, we are going to select the Config Type as 'Development Machine' and Connectivity as TCP/IP, and Port Number is 3306, then click on Next.

Step 9: Now, select the Authentication Method and click on Next. Here, I am going to select the first option

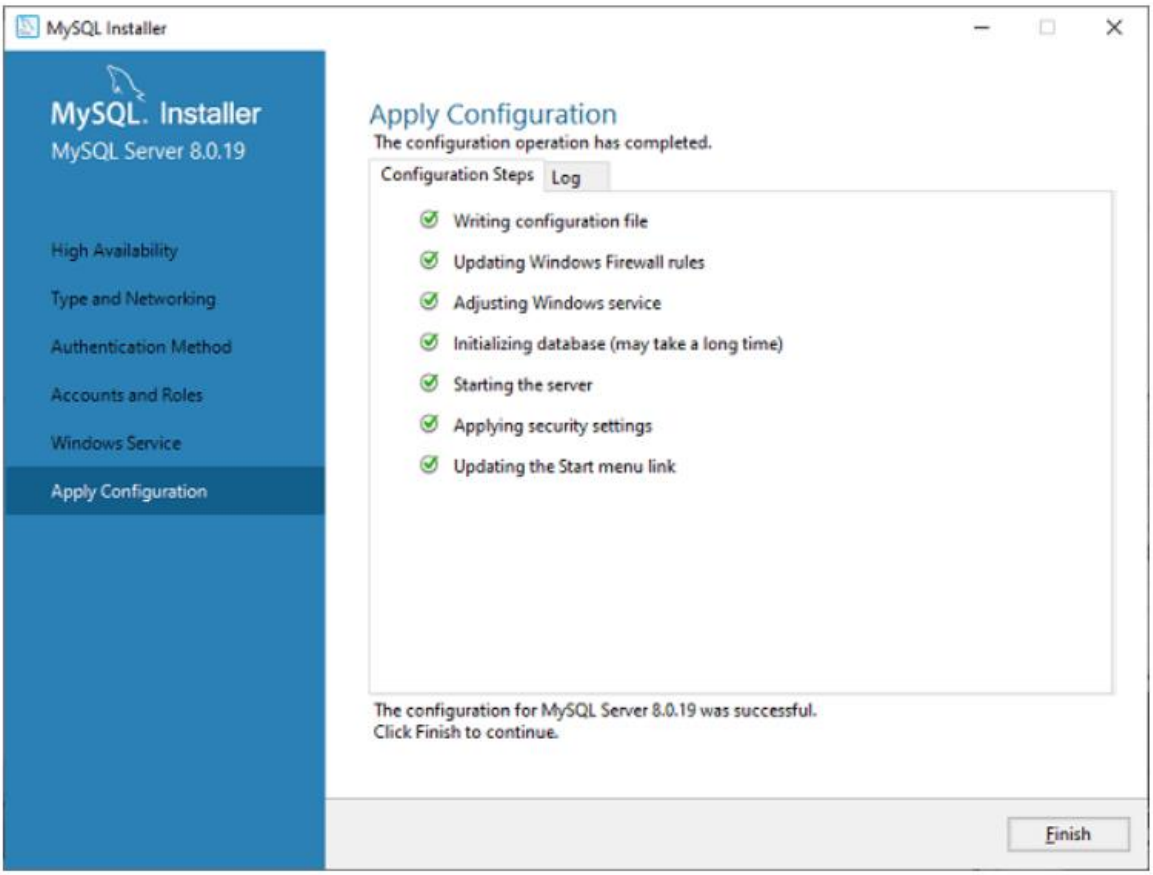
Step 10: The next screen will ask you to mention the MySQL Root Password. After filling the password details, click on the Next button.

Step 11: The next screen will ask you to configure the Windows Service to start the server. Keep the default setup and click on the Next button

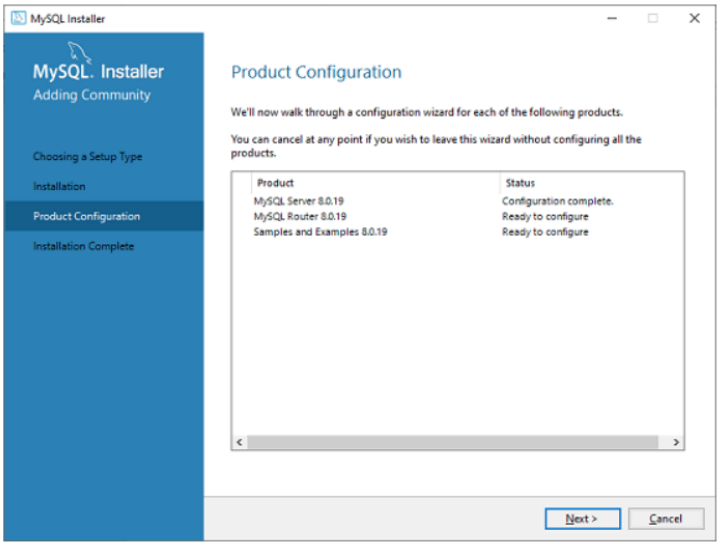
Step 12: In the next wizard, the system will ask you to apply the Server Configuration. If you agree with this configuration, click on the Execute button.



Step 13: Once the configuration has completed, you will get the screen below. Now, click on the Finish button to continue.



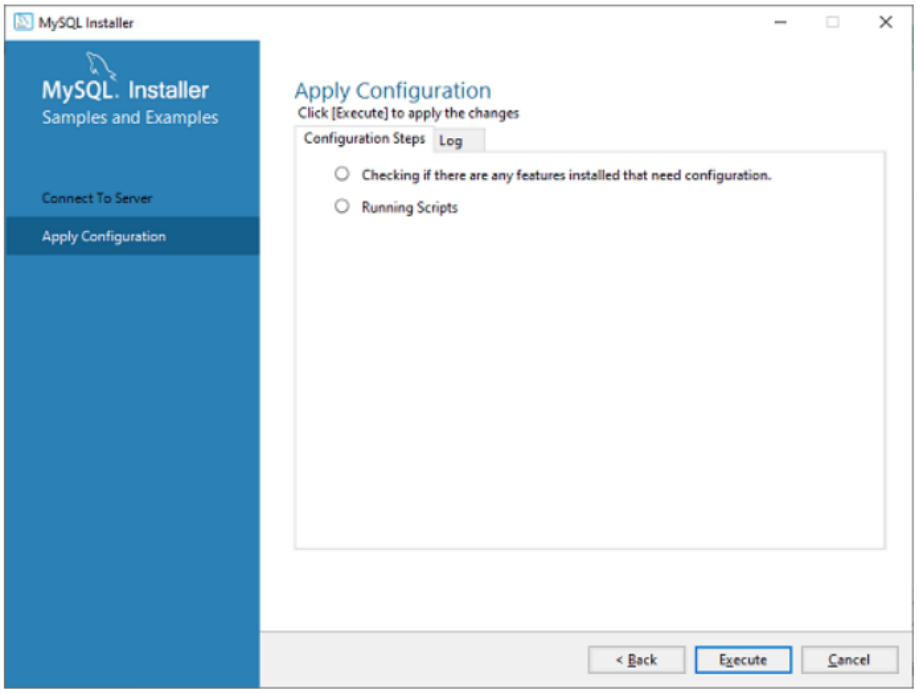
Step 14: In the next screen, you can see that the Product Configuration is completed. Keep the default setting and click on the Next-> Finish button to complete the MySQL package installation.



Step 15: In the next wizard, we can choose to configure the Router. So click on Next->Finish and then click the Next button.

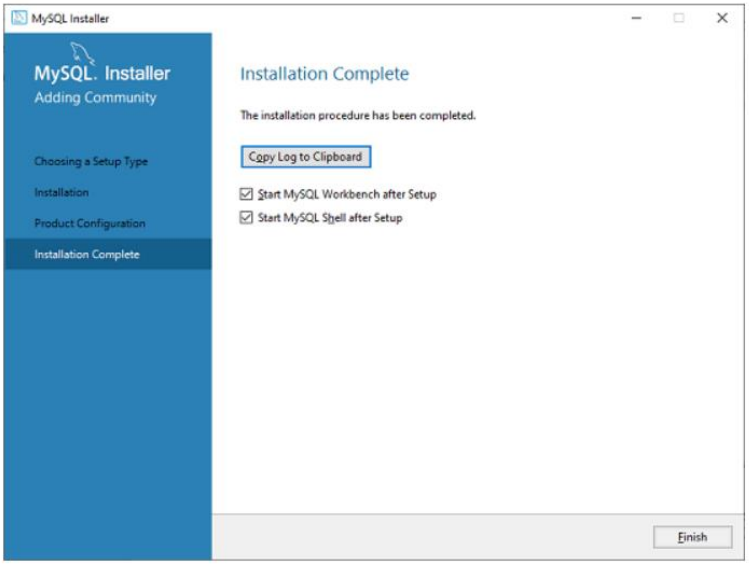
Step 16: In the next wizard, we will see the Connect to Server option. Here, we have to mention the root password, which we had set in the previous steps.

Step 17: In the next wizard, select the applied configurations and click on the Execute button.

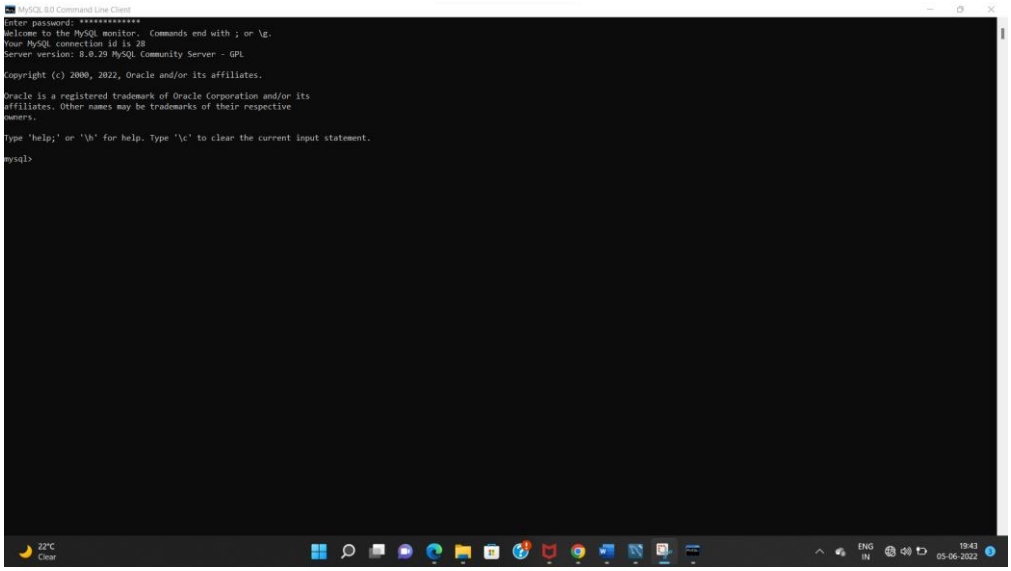


Step 18: After completing the above step, we will get the following screen. Here, click on the Finish button

Step 19: Now, the MySQL installation is complete. Click on the Finish button.



To confirm the installation of the MYSQL command-line client and it should be appeared with a mysql> prompt. If you have already set a password enter your password. Then you are connected with the MYSQL server, you are good to execute all the MYSQL Queries.

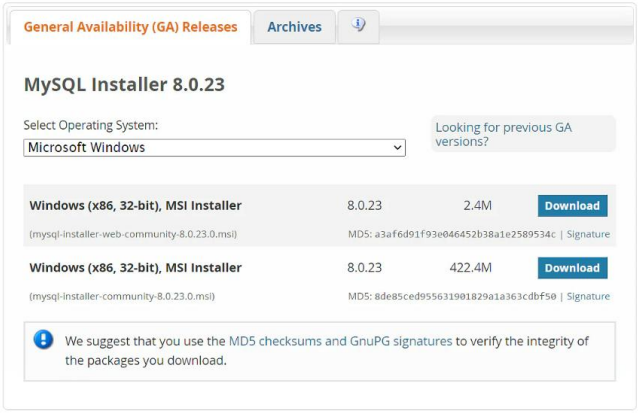


b) Setup/Install a MySQL client on your local machine. You can install MySQL Workbench (a desktop client application) or phpMyAdmin (a web-based client application). Include the screenshot(s). (25 pts)

MySQL is a workbench is a software used to add functionality and ease to SQL development work. It provides data modelling, SQL development, and various administration tools for configuration.

To install the MYSQL workbench we need to do certain steps

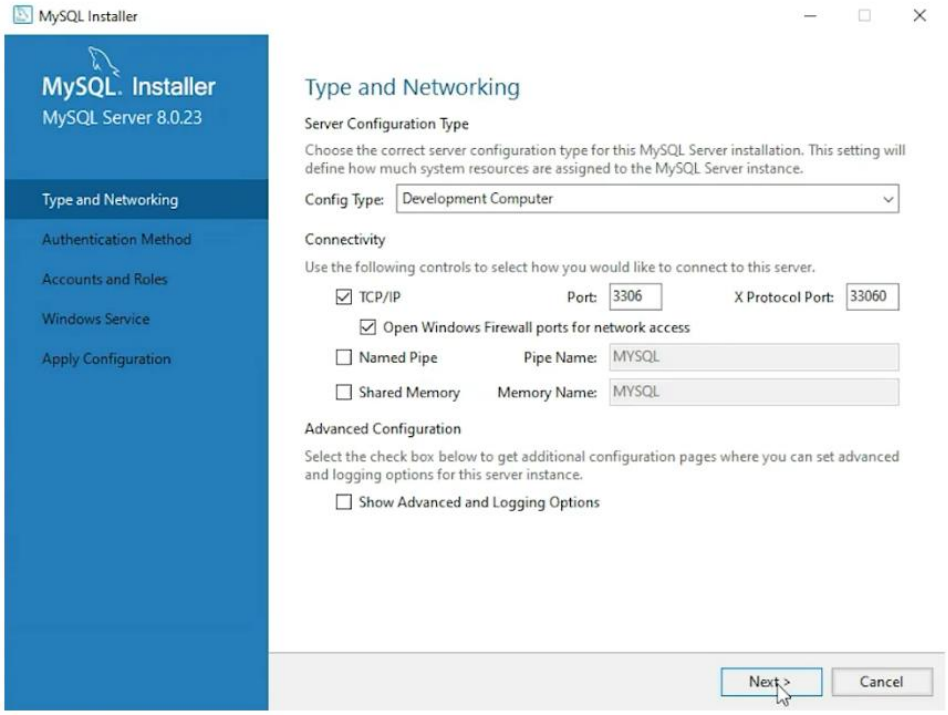
1. Open the MySQL website on a browser
2. Select the downloads option
3. Select MySQL installer for windows
4. Choose the desired installer and click on the download



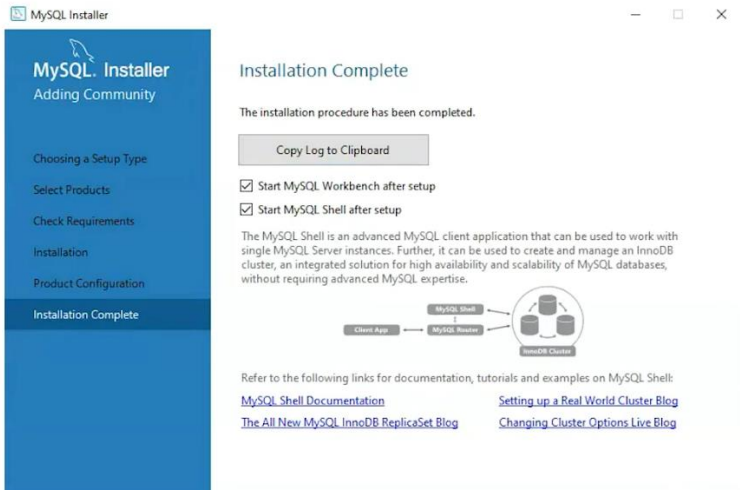
5. After successful completion of downloading, open the installer
6. It will ask for permission; when it does, click Yes. The installer will then open. Now, it will ask to choose the setup type. Here, select Custom.
7. Click on Next. With this, you will install MySQL server, MySQL Workbench, and MySQL shell.
8. Open MySQL Servers, select the server you want to install and move it to the Products/Features to be installed window section. Now, expand Applications,

choose MySQL Workbench and MySQL shell. Move both to Products/Features to be installed.

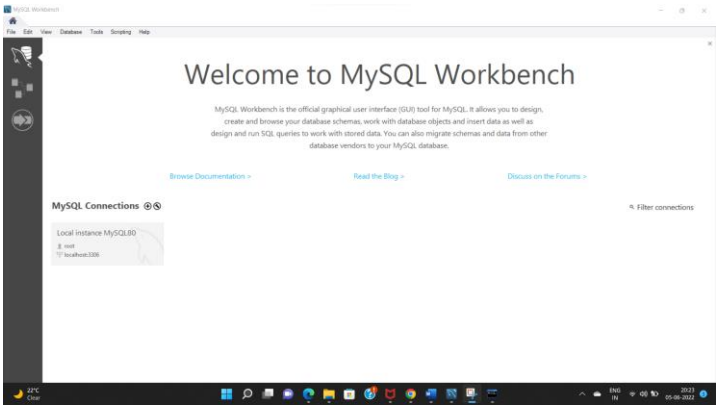
9. Click on the Next button. Now, click on the Execute button to download and install the MySQL server, MySQL Workbench, and the MySQL shell.
10. Once the product is ready to configure, click on Next. Under Type and Networking, go with the default settings and select Next.



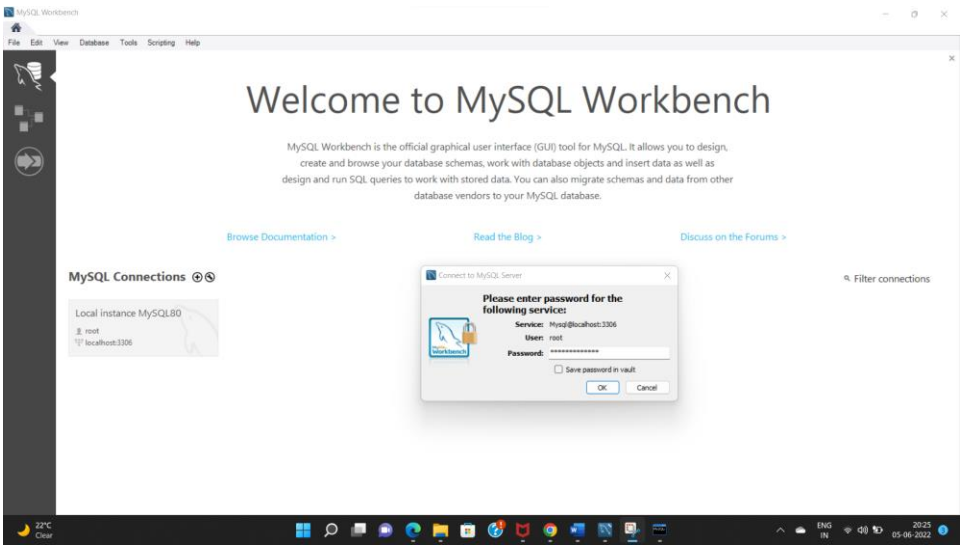
11. For authentication, use the recommended strong password encryption.
12. Set your MySQL Root password and click on next.
13. Go for the default windows service settings and under apply configuration, click on execute. Once the configuration is complete, click on finish.
14. Complete the installation. This will now launch the MySQL Workbench and the MySQL Shell



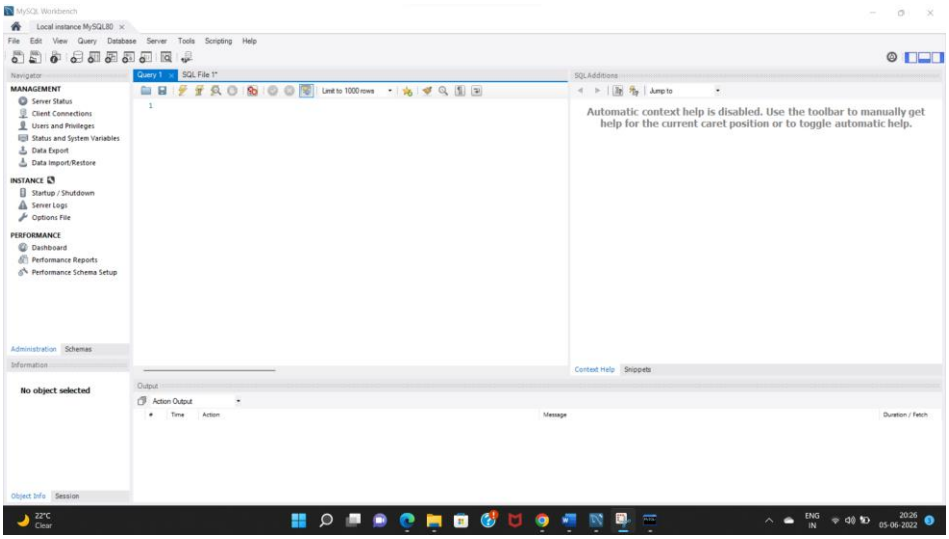
Once MySQL Workbench is installed, select the Local instance and enter the password.



Enter your password in the blank and store it in the vault for future purposes.



Now, you can use the MySQL query tab to write your SQL queries.



2) What four main types of actions involve databases? Briefly discuss each.

The Database Management system is a software system which explains mainly 4 types of actions, they are

1) Defining the database
2) Constructing the database
3) Manipulating the database
4) Sharing a database

1. **Defining a database:**

While defining a database we include data types, structures, and constraints of data which must be stored in the database. The information which is in the descriptive form is also stored in the DBMS in the dictionary form or catalogue form which is also called meta-data.

2. **Constructing the database:**
   Construct database is the process in which the data get stored in the database and can be maintained by the DBMS.
3. **Manipulating a database:**
   Manipulating the database by using a query to insert, update and delete the database.
4. **Sharing a database:**
   It is allowing multiple users to access the database at the same time and data can be shared among multiple people at a time.

3) Discuss the main characteristics of the database approach and how it differs from traditional file systems. (10 pts)

A database is a collection of data which is interrelated and stored in the database server, where the data is stored in the form of tables. The main goal of a database is to store the information in the most efficient and quick manner.

The main characteristics of the database approach are:

1. A database system's self-descriptive nature: The database system includes not only the database but also a detailed description of the database's structure and limitations. The DBMS catalog, which contains information such as the structure, type, and storage format of each data, stores this specification.
2. program and data isolation: In database systems, data is stored separately from the applications that use it. That is, you can alter data without having to update the programs; this quality is referred to as program operation independence.
3. Support for numerous data views: A database is shared across multiple users, and each user may require different information from the database depending on their needs. Each user's demand is a database view.
4. Data transaction processing sharing: Using concurrency control software, a multiuser DBMS allows several users to access the database at the same time.
5. Multiple views, for example, provide some level of security. When entering data into a database and retrieving it later, DBMS provides methods to improve security by applying constraints.
6. Query language: Query language makes retrieving and manipulating data more efficient. The user can use as many and as diverse filtering options as they want

I will try to explain the differences between the database approach and the traditional file approach are in traditional file processing each user defines and implements the files needed for a specific software application as a part of programming the application. For example, one user, the grade reporting office, may keep a file on students and their grades. Programs to print a student's transcript and enter new grades into the file are implemented as part of the application. A second user, the accounting office, may keep track of students' fees and their payments. Although both users are interested in data about students, each user maintains separate files-and programs to manipulate these files because each requires some data not available from the other user's files. This redundancy in defining and storing data results in wasted storage space and in redundant efforts to maintain common data up to date.

But in the database approach, a single repository of data is maintained that is defined once and later can be accessed by the various users.

Another major feature of the database is that it allows multiple users to access the database at the same time and data can be shared. It includes parallel processing control, but multiple users to ensure the same data and update them at the same time, it must maintain proper control, whereas in the file system approach top many programmers and files will be created over a long period in various files formats are different from the language used in applications.

It is a potential for duplication of information to get the redundancy of the same data more than once, leading to higher costs and waste storage space. As a result, the data may be inconsistent in the application, it is a complete update of some files, not only all the files. In the database approach, several Views can be. View the presentation of information together, one or more included in the table. And called a "virtual table" or views.

In the traditional file system, if any changes are made to the structure of the files, programs that affect all the files change to the structure of all the changes that are required to file program Access. However, the database approach is the case, the structure of the database is stored separately in the system catalogue to access the application program. This property is called the data independence program.

In simple words:

Redundancy is controlled when the DBMS ensures that multiple copies of the same data are consistent and if the DBMS has no control over this, we have uncontrolled Redundancy

4)What is the difference between controlled and uncontrolled redundancy? (10 pts)

The state of not being needed or beneficial is known as redundancy. Uncontrolled redundancy in storing the same data/information numerous times in the database causes several issues in the traditional approach. This results in duplication of work, storage space waste, and data that is inconsistent.

The usage of redundant fields in a database necessitates the use of managed redundancy. This improves query performance while simultaneously speeding up database access. The data in the records is usually allocated by the database management system (DBMS). It should be able to control this redundancy to prevent file discrepancies.

When the same data is stored in various locations in a database, it is referred to as redundancy. Many issues can arise because of unmanaged redundancy, including inconsistent data, multiple

methods of data organization, such as the order of birth date information, waste of storage space, and duplication of data entry effort.

Controlled redundancy differs from uncontrolled redundancy in that with controlled redundancy, procedures can be utilized to combine data that is automatically input.

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Controlled redundancy differs from uncontrolled redundancy in that with controlled redundancy, procedures can be utilized to combine data that is automatically input.

DBMS controls the redundancy to prohibit inconsistencies among files. A controlled redundancy is a method to use redundant files in a database. Let me give an example where we can control the redundancy if suppose you put in a document and ask to enter the name and input could be numbers, symbols, letters, and multiple letters with a maximum of 12 letters or something. But we can have a controlled redundancy by making a rule to allow only 12 letters no symbols or numbers are allowed.

5)Specify all the relationships among the records of the database shown in Figure 1.2. (10 pts)

There are different tables shown in figure 1.2 the tables of the database are

1. Student
2. Course
3. Section
4. Grade_Report
5. Prerequisite

Now, we have relationships between each table like

Every student will be enrolled in one or more courses and Every student will have one section but each section student might take one or more courses. But each student will be having only one grading report. Some students might have a prerequisite, and some may not have it. There might be students with different sections and same student number in the grading report.

1. Each SECTION record is related to a COURSE record.

2. Each GRADE REPORT _REPORT record is related to one STUDENT record and one SECTION record.

3. Each PREREQUISITE record relates to two COURSE records: one in the role of a course and the other in the role of a prerequisite to that course.

6)Give examples of systems in which it may make sense to use traditional file processing instead of a database approach

It is obvious that the database approach will be better than traditional file processing, but it is important to know when you use a traditional file processing and database approach. Traditional file system

But first, know when it is better to use a traditional file system instead of a database approach.

1. The traditional file system is useful when the protection of data is not so important because in the Traditional file system if data is lost, we cannot access that data again because there is no data backup.
2. It is less complex than the Database approach so when we need to handle large data in a simple manner without any complexity, we use a traditional file system.
3. It is less expensive means when the budget is low, we can use the traditional file system approach.
4. If we talk about processing any query in the traditional file system, it is less efficient in comparison to the Database approach.

There are so many examples where the traditional file processing approach will be better rather than the Database approach.

They are:

- ✓ Small internal utility to locate files.
- ✓ Real-time navigation system (with heavy computation and very little data).
- ✓ Small single-user application that does not require security (such as a customized calculator or a personal address and phone book)
- ✓ Embedded system or Mobile system with limited storage, when we have limited storage, it is always better to use a traditional file system.
- ✓ Real-time system like a navigation system, in this type of system there is very less data and high computation, Traditional file system approach handle these types of real-time data very well.
- ✓ System for one person that does not require protection of data. These types of systems don't require protection.
  Example: Calculator.

In simple words:

Those types of systems, where the complexity to store data should be less and less expensive.