Database Systems Lab

Lab # 01

Introduction to Database Systems

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Course Code: CL2005

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Contents

Data:

Data is a collection of facts, such as numbers, words, measurements, observations.

OR

Data can be facts related to any object in consideration.

For example your name, age, height, weight, etc. are some data related toyou. A picture, image, file, pdf etc. can also be considered data.

Database

A database is simply a bunch of information (data) stored on a computer. This could be a list of all your clients, a list of the products you sell, the results of a chess tournament or everyone in your family tree.

Data could be random; database is a systematic collection of data. Since the data in database is organized it makes data management easy. Databases support storage and manipulation of data.

A database is a shared collection of logically related data, which is stored to meet the requirement of different users of an organization

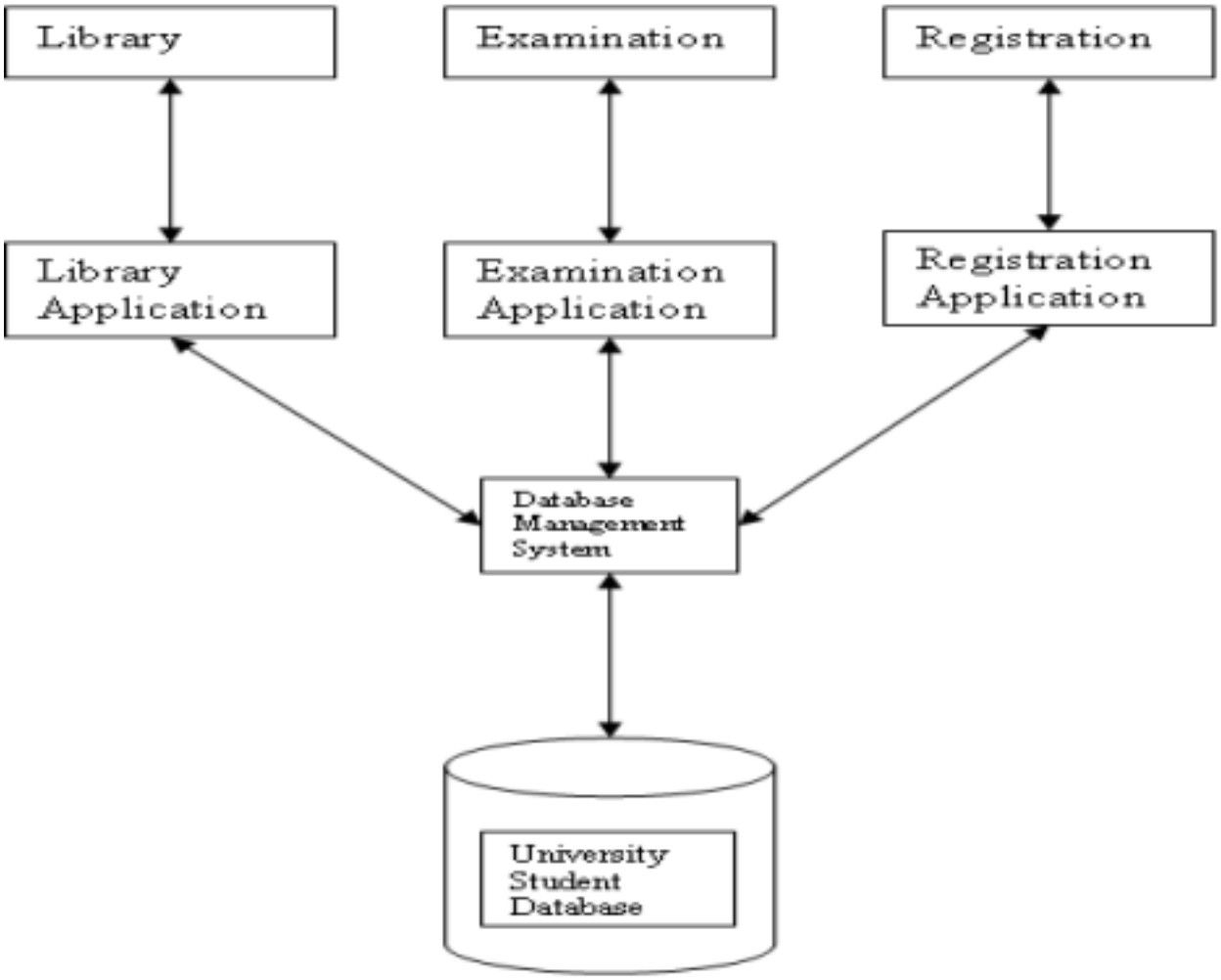
Logically related data: for example a man is working in a company and we want to get facts/data about such worker. We can gather many data like

- ➢ **Necessary Data**
  - ▪ Name
  - ▪ FName
  - ▪ Address
  - ▪ So many …
- ➢ **Unnecessary Data**
  - ▪ Size of shoe
  - ▪ Hair Color
  - ▪ Height
  - ▪ Weight
  - ▪ Eye Color

Why Database?

- ▪ Better Data Integrity

- ▪ Better data security
- ▪ Control of data redundancy
- ▪ Data & resource sharing eliminates or at least minimize duplication
- ▪ Multiple users access the data at the same time
- ▪ Better Backup and Recovery procedure



Database Management system (DBMS)

A database management system (DBMS) is a software application used to store, manage and administers the database. For example. MySQL, Oracle, Mongo.

In other words, Database Management System (DBMS) is a collection of programs which enables its users to access database, manipulate data, reporting / representation of data.

It also helps to control access to the database.

Let's discuss few examples.

Your electricity service provider is obviously using a database to manage billing, client related issues, to handle fault data, etc.

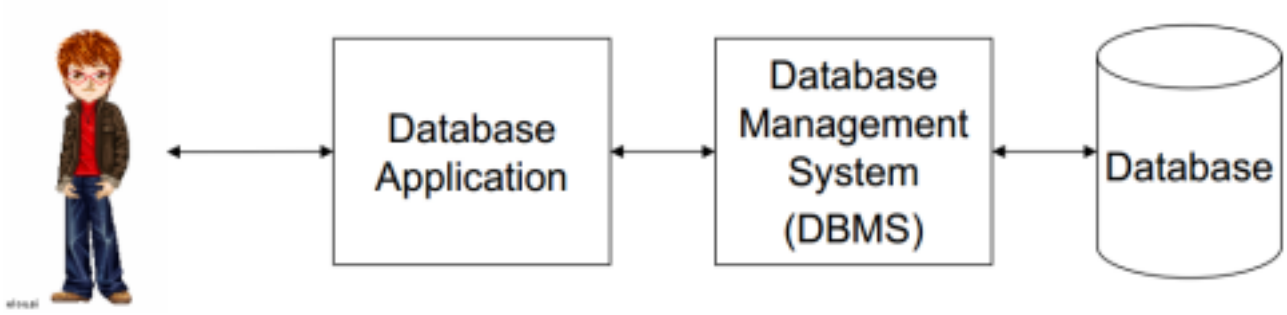
Let's also consider the facebook. It needs to store, manipulate and present data related to members, their friends, member activities, messages, advertisements and lot more.

Database Management Systems are not a new concept and as such had been first implemented in 1960s.

Charles Bachmen's Integrated Data Store (IDS) is said to be the first DBMS in history.

With time database technologies evolved a lot while usage and expected functionalities of databases have been increased immensely.

Database System:



Database Components (Sanjay Goal University at Albany)

Types of DBMS

There are 4 major types of DBMS.

i. Hierarchical

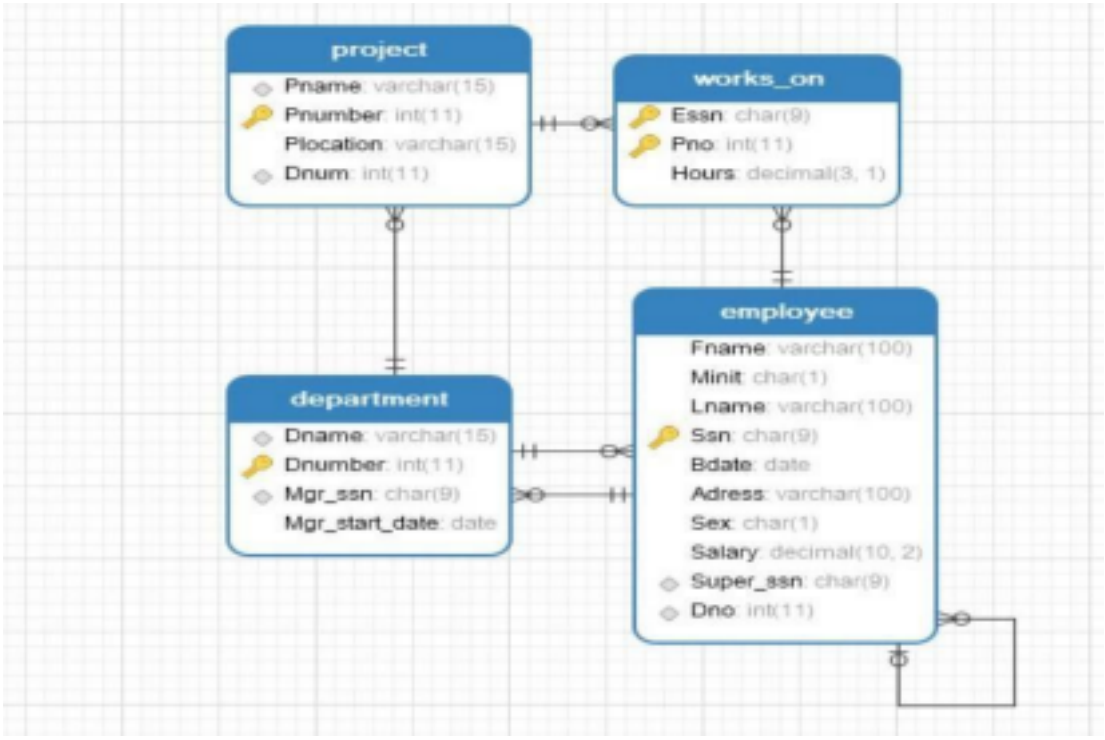
ii. Network DBMS

iii. Object Oriented Relation DBMS

iv. Relational DBMS

Relational DBMS

This type of DBMS defines database relationships in form of tables, also known as relations. Relational DBMS usually have pre- defined data types that they can support. This is the most popular DBMS type in the market. Examples of relational database management systems include MySQL, Oracle, and Microsoft SQL Server database.



NoSQL or Non-relational Databases:

A popular alternative to relational databases. NoSQL database does not have predefined schemas, which makes NoSQL databases a perfect candidate for rapidly changing development environments.

WAMP:

A Windows web development platform. WAMP stands for Windows, Apache, MySQL and PHP. It's a software stack. By installing WAMP means installing Apache, MySQL and PHP on your operating system.

XAMPP:

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends. 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.

Installation of XAMPP on Windows
https://www.wikihow.com/Install-XAMPP-for-Windows

SQL:

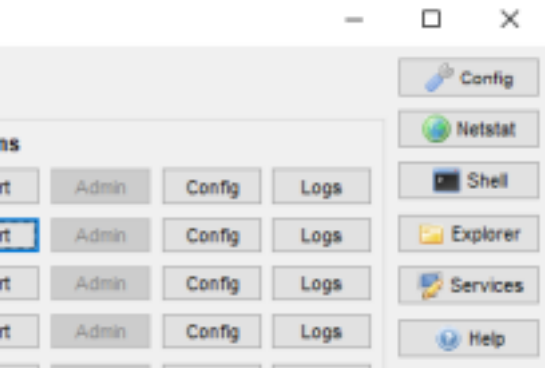
SQL stands for Structured Query Language. SQL is a language used to communicate with database. If you want to pull, edit, add or delete data to a database you can use the language SQL to do that.

SQL is the standard language for Relational Database System. All the Relational Database Management Systems (RDMS) like MySQL, MS Access and SQL Server use SQL as their standard database language.

MySQL:

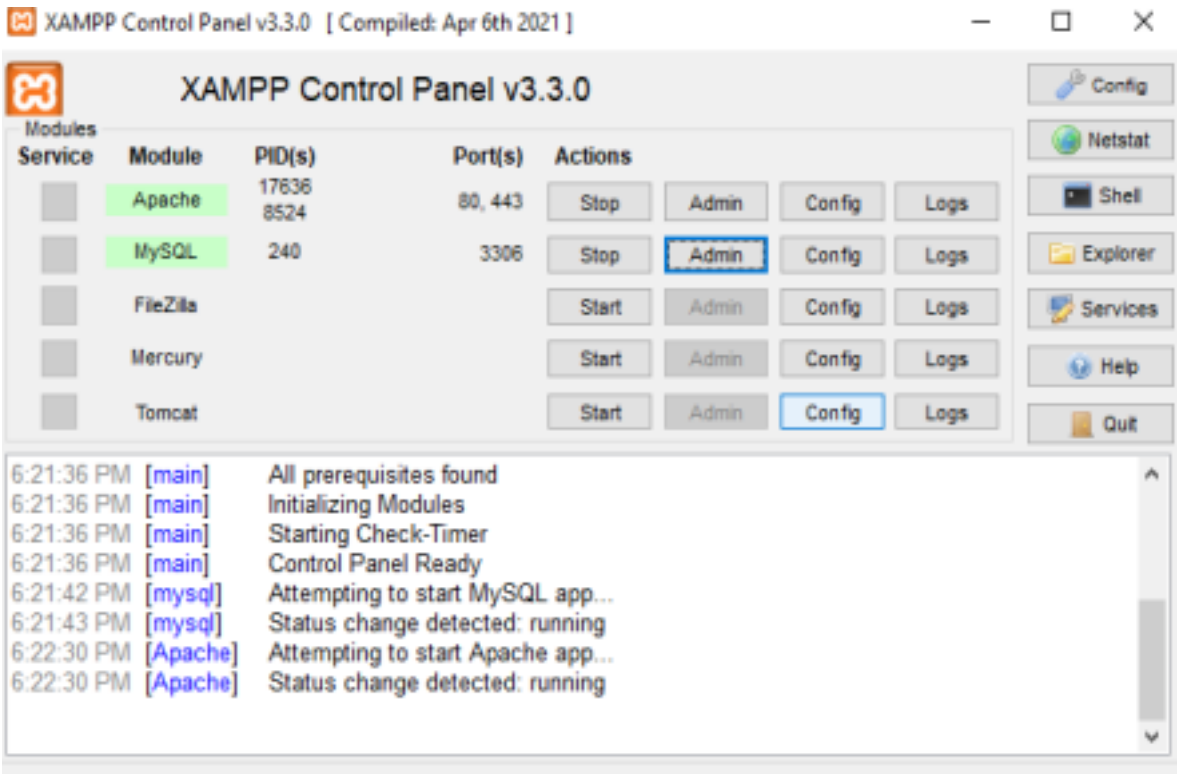
MySQL is one of the most popular Open-Source SQL database management systems.

To start MySQL firstly you must install WAMP / XAMPP. After installing XAMPP open the XAMPP control panel and click on start button in front of Apache and MySQL Module as shown below.



Click here to Start the Services

After clicking on Start button the text would change to Stop as shown. Notice that the services are running.



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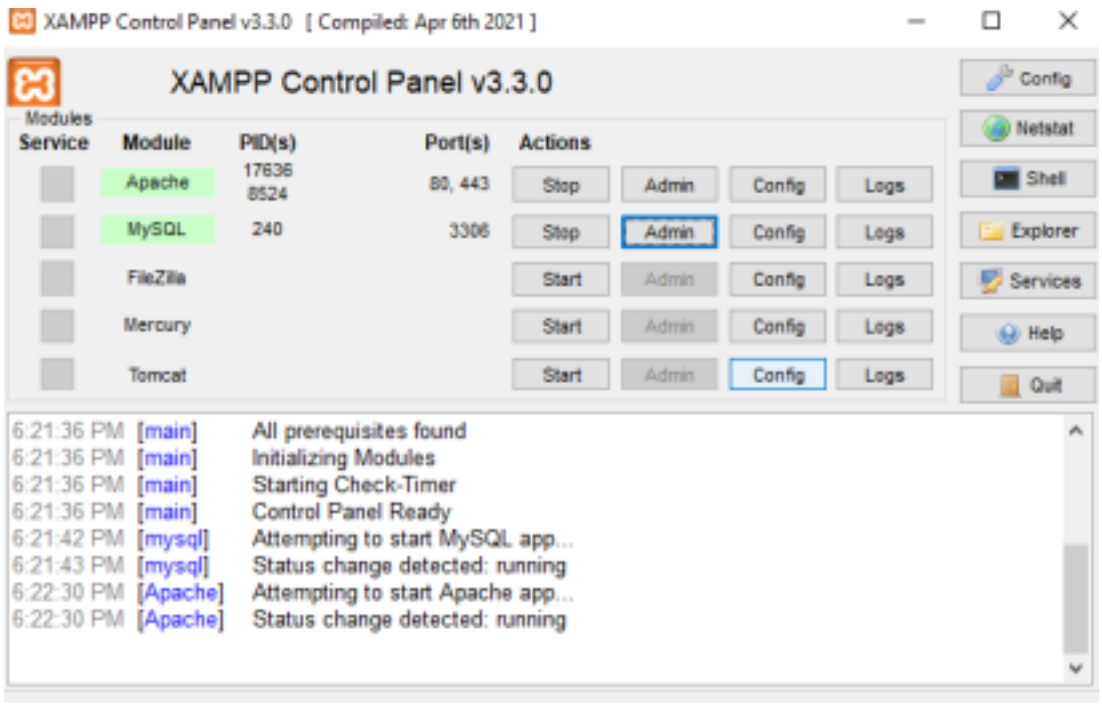
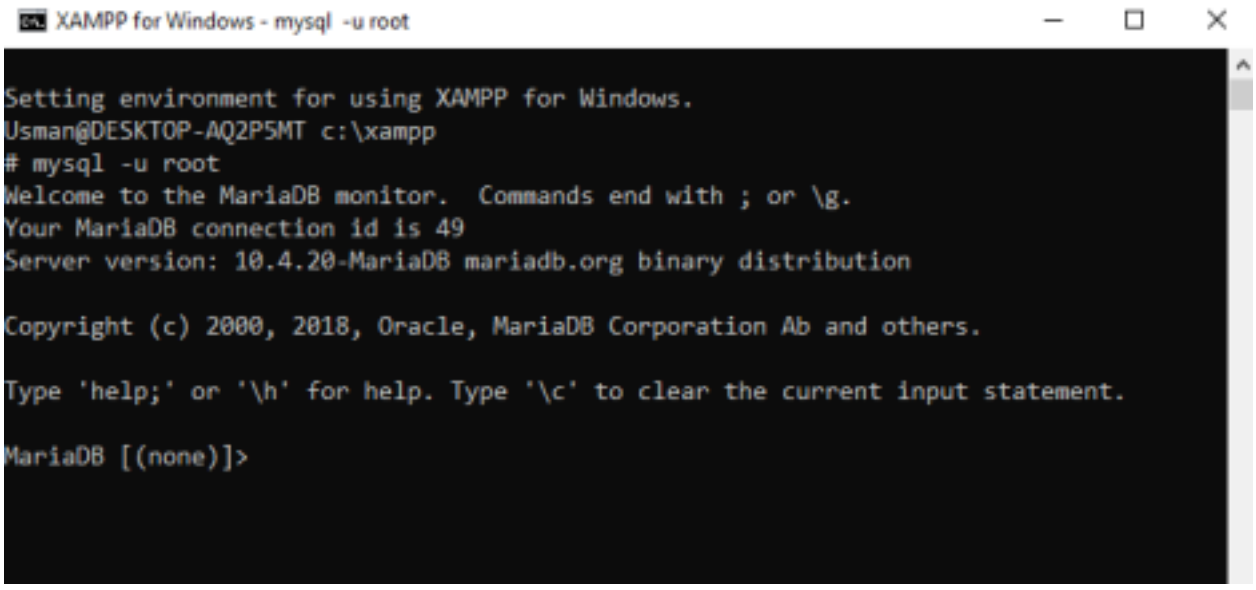
then you would open the MySQL command line client by clicking on shell as shown below.


XAMPP Control Panel v3.3.0 [Compiled: Apr 6th 2021]
XAMPP Control Panel v3.3.0
Modules
Service
Module
PID(s)
Port(s)
Actions
Apache
17636
8524
80, 443
Stop
Admin
Config
Logs
MySQL
240
3306
Stop
Admin
Config
Logs
FileZilla
Start
Admin
Config
Logs
Mercury
Start
Admin
Config
Logs
Tomcat
Start
Admin
Config
Logs
Config
Netstat
Shell
Explorer
Services
Help
Quit
6:21:36 PM [main] All prerequisites found
6:21:36 PM [main] Initializing Modules
6:21:36 PM [main] Starting Check-Timer
6:21:36 PM [main] Control Panel Ready
6:21:42 PM [mysql] Attempting to start MySQL app...
6:21:43 PM [mysql] Status change detected: running
6:22:30 PM [Apache] Attempting to start Apache app...
6:22:30 PM [Apache] Status change detected: running

Click here

After opening the shell write the command ***mysql -u root*** to enter into the shell as shown below



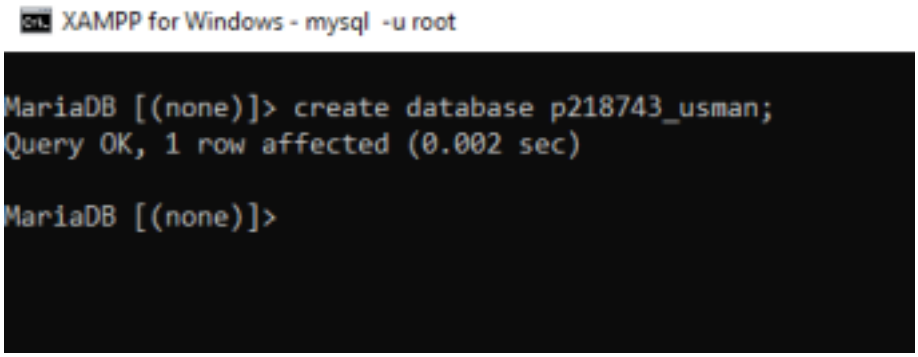
Exercises

To create a database, you would type the following:

Create database database_name;

Notice that you need a semi-colon to end the command.

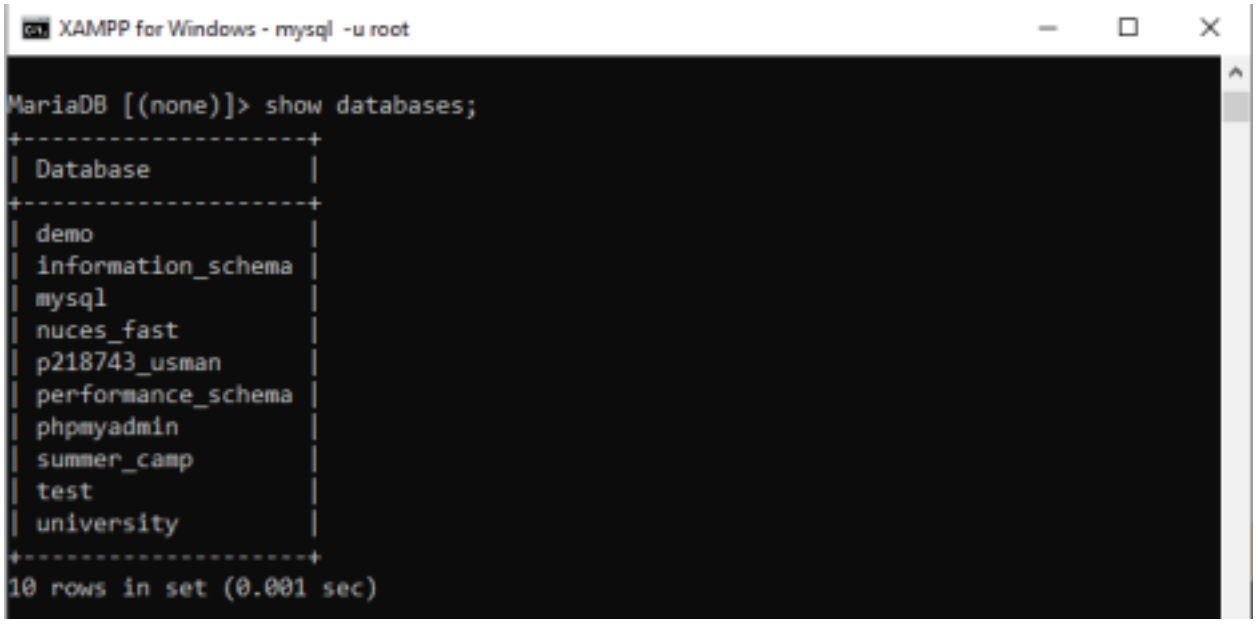
The following figure shows the creation of database.



Task 1 Create the database named your rollno_name (i.e p21432_usman) as shown in

above Figure.

To check to see if your database has been created you need to use the SHOW DATABASES command which lists the databases on the MySQL server host. **Task 2 Execute the following MySQL command to show the databases that you just created.**

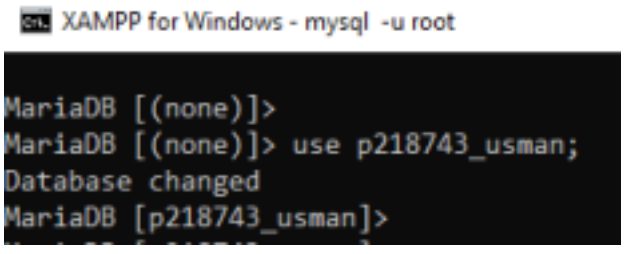


To work with any specific database you first have to select it, so you need to execute the USE command followed by the name of the database that you want to use.

Task 3 Execute the following MySQL command to begin using the p218743_usman database.

mysql> USE p218743_usman;

MySQL will then inform you that the database has changed.



Task 4 Execute the following MySQL command to create the table structures for the above created database.

Enter each one separately to ensure that you have no errors. Successful table creation will prompt MySQL to say “Query OK” as shown.

```
CREATE TABLE STUDENT(

 ROLL_NO VARCHAR(50) PRIMARY KEY,

 NAME VARCHAR(50),

 DOB DATE

);
```