

Introduction to MySQL

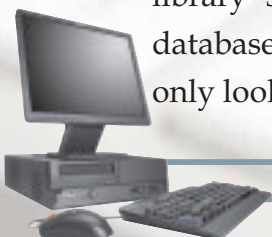
Learning Objectives

After studying this lesson the students will be able to

- ❖ State what a database is.
- ❖ Express the relationship between a database and table
- ❖ Recognize different parts of a table like Row and Column.
- ❖ Define DBMS related terms like Primary key, Candidate key, Alternate key etc.
- ❖ List the functions of a DBMS.
- ❖ Write examples of popular DBMS software.
- ❖ State what is MySQL.
- ❖ Install MySQL in a computer.

Most of us keep diaries to store details like names, addresses, birthdays of our friends. Teachers keep marks registers to keep track of marks secured by their students. A shopkeeper keeps details of customers who frequently visit his /her shop in a register. These all are examples of paper-based databases. A database is an organized collection of related data. However, generally, when we use the term 'database' we think of a computerized database. In this lesson, let us study more about such databases and numerous tasks that we can do on them.

These days computerized databases can be seen being used almost everywhere. The police force uses various computerized databases to help them track criminals and solve crimes. A library stores details of all their books, in a computerized database. When we want to know if a book is in stock, we cannot only look it up, but can also check when it is due to be returned.



The database also records details of all the borrowers, what books they currently have borrowed and when they are due back.

What is Database Management System(DBMS)?

To create and maintain a database on a computer, we need a database program, called a Database management system, or DBMS. Database Management System is a software that enables users to create and maintain databases. Examples of popular DBMSs are MySQL, PostgreSQL, Microsoft Access, Oracle, Microsoft SQL Server, DB2 and Sybase.

A DBMS gives us tools to:

- ❖ store data in a structured way.
- ❖ query the database (that is, ask questions about the data)
- ❖ sort and manipulate the data in the database
- ❖ validate the data entered and check for inconsistencies
- ❖ produce flexible reports, both on screen and on paper, that make it easy to comprehend the information stored in the database.

Tables in a Database

Relational Databases store data or information in tables. A table is similar to a spreadsheet where data is stored in rows and columns. A table refers to a two dimensional representation of data using rows and columns. For example, consider the following table named Customer with details about customers:

Table: Customer

Customer_ID	FirstName	LastName	Address	Telephone No
101	Prachi	Mehra	145, Mahatma Avenue, Delhi	9178908767
102	Vinay	Ahlurkar	76-A/32, Adarsh Nagar, Delhi	9278906351
103	Venu	Magalam	C-6, Kanthi Nagar, Delhi	9323764561
104	Neeza	Ali	B-6-B,Fateh Nagar, Meerut	9143347330



The horizontal subset of the Table is known as a Row/Tuple. Each row represents a record, which is a collection of data about a particular person, place or thing. The vertical subset of the Table is known as a Column/ Attribute. The term field is also often used for column. Each column has a unique name and the content within it must be of the same type.

Relational Database

In the database named Learner shown below, the data is organized into separate tables. Once the tables have been set up, a relationship can be created to link them together. Such a database that stores data in separate tables that are related through the use of a common column is called a Relational database.

Student table

StudentName	StudentID
K.S. Lakshmi	84
Ankita Matta	100
Himali Shah	92
Arushi Goel	106

Database : Learner

Participant table

StudentID	Activity
84	Swimming
84	Dancing
92	Tennis
100	Golf
100	Cricket
106	Squash

Activity table

Activity	Cost
Swimming	2000.00
Dancing	1500.00
Tennis	900.00
Golf	1500.00
Cricket	2000.00
Squash	2500.00



RDBMS Terminology:

Primary key

When you got admission in the school, you were given an Admission number. The Admission number assigned to you was not assigned to any other student of your school (it is unique). When patients go to a hospital, each patient is given a unique patient number. When you go to open an account in the bank, you are given a unique account number. Admission number, Patient number, Account number are all examples of Primary key. A primary key is a field in a table that is unique for each record. Every database table should have a column or a group of columns designated as the primary key. The value this key holds should be unique for each record in the table.

Some more examples of Primary key are: Accession Number of a Book in the Book table, Employee ID of an employee in the Employee Table, Item Code of an item in the Stock table, Flight Number of a flight in the Flight Master Table, etc.

The purpose of a primary key is to uniquely identify each record in a table.

Candidate key

In a table, there may be more than one field that uniquely identifies a record. All such fields are called candidate keys. A Candidate key is an attribute (or set of attributes) that uniquely identifies a row. A Primary Key is one of the candidate keys. A table may have more than one candidate keys but definitely has one and only one primary key.

Example: Consider the following Table, RollNo and Admission_no both may be used to uniquely identify each row in this Table, so both are candidate keys.

Admission_No	RollNo	Name	Class	Sec	Dues
2301	1	Simran Chadha	11	A	23
1501	2	Ajay Kartik	11	B	15
1678	3	Vanshay Chawla	11	A	20
7003	4	Vibhor Madan	11	C	15

Alternate Key:

Only one of the Candidate keys is selected as the primary key of a table. All other



candidate keys are called Alternate keys. In the above example, if we use one of the candidate keys, say, Admission_No as the Primary Key, the other Candidate Key RollNo is the Alternate Key and vice-versa.

Introduction to MySQL:

The software required to manipulate relational databases is known as Relational Database Management System (RDBMS). Popular RDBMSs include MySQL, Oracle, Sybase, DB2, MSSQL Server.

MySQL is a relational database management system (RDBMS). It is pronounced as "My Sequel". MySQL was originally founded and developed in Sweden by David Axmark, Allan Larsson and Michael Widenius, who had worked together since the 1980s.

Characteristics of MySQL:

- ❖ MySQL is released under an open-source license so it is customizable. It requires no cost or payment for its usage.
- ❖ MySQL has superior speed, is easy to use and is reliable.
- ❖ MySQL uses a standard form of the well-known ANSI-SQL standards.
- ❖ MySQL is a platform independent application which works on many operating systems like Windows, UNIX, LINUX etc. and has compatibility with many languages including JAVA, C++, PHP, PERL, etc.
- ❖ MySQL is an easy to install RDBMS and is capable of handling large data sets.

Since MySQL is released under an open-source license, it does not require any cost or payment for its usage. Any one can download this software from specific location on Internet. If you want to download, follow the following steps. The step for two most popular OS platform, Windows and Linux are discussed here.

DOWNLOADING MySQL [Windows Environment]:

Installation file for MySQL may be downloaded from the link:

<http://dev.mysql.com/downloads/mysql/5.1.html#downloads>

(Choose appropriate download link as per the operating system)





Click on the "Download" button for the Community Server and choose from the list of supported platforms (i.e., operating systems that it will run on), which include 32-bit and 64-bit Windows, several different Linux, Solaris, Mac OS X, and a few others.

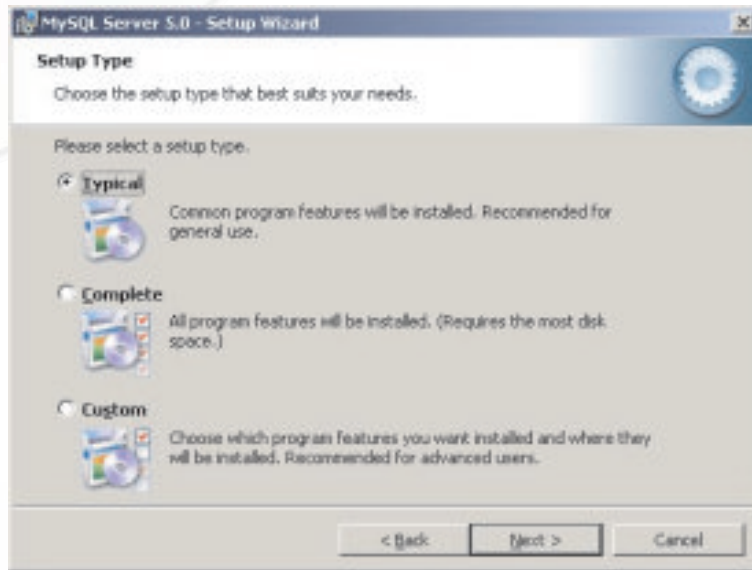
INSTALLING MySQL:

After the installation file has finished downloading, double-click it, which begins the MySQL Setup Wizard.



At the welcome dialog box, click the "Next" button.





The MySQL Setup Wizard allows us to choose the installation directory on the computer, and whether or not to have optional components installed. In the "Setup Type" dialog box, choose "Typical" from the three options. MySQL will be installed in the default directory, "C:\Program Files\MySQL\MySQL Server". Click the "Next" button.

Now it is ready to install MySQL's files. Click the "Install" button.

After the Setup is complete, we should configure the new server.

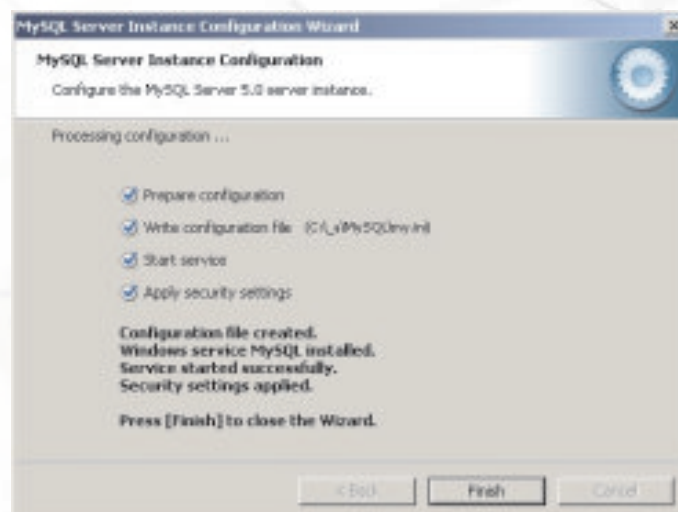


CONFIGURING MySQL:



At the initial Server Instance Configuration Wizard dialog box, click the "Next" button. Keep selecting the default options provided in subsequent windows. If the configuration does not encounter any errors, then information will be prompted that the configuration file was created, MySQL server was installed and started, and the security settings applied.

Note: In the process of configuration of MySQL, a prompt for password will be displayed - Here you should enter a password and remember this password, as it will be required each time to start MySQL



Testing MySQL:

Follow the steps to start MySQL

```
Start> Programs>MySQL>...>MySQL Command Line Client
```

OR

Goto the folder

```
C:\Program Files\MySQL\MySQL Server 5.1\bin [Assuming C:\ drive  
as the drive having MySQL]
```

And Click on the file

```
MySQL.EXE
```

MySQL will prompt a message to provide password (it requires the same password which was entered during the installation)

```
Enter Password:****  
  
Welcome to the MySQL monitor.  Commands end with ; or \g.  
Your MySQL connection id is 4  
Server version:  5.0.51a-community-nt MySQL Community Edition  
(GPL)  
Type 'help;' or '\h' for help.  Type '\c' to clear the buffer.  
Mysql>
```

To exit from MySQL, type QUIT or EXIT

```
Mysql>QUIT
```

The above steps ensure successful installation and configuration of MySQL database server. Next time in the MySQL prompt, one can create and use databases, create tables and execute SQL queries.

Downloading MySQL [Linux Environment]:

Installation of the binary version of MySQL, release 4.0.20, to run on Linux is as follows:

Installation file for MySQL may be downloaded from the link:



<http://dev.mysql.com/downloads/mysql/5.1.html#downloads>

(Choose appropriate download link as per the desired operating system)

Create MySQL User Account:

```
# cd /usr/local
# groupadd mysql
# useradd -c "MySQL Software Owner" -g mysql mysql
# passwd mysql
Changing password for user mysql.
password: all authentication tokens updated successfully.
```

Installing Binary Version:

Unzip the files and change the directory to mysql

```
# cd mysql
# scripts/mysql_install_db --user=mysql
```

```
Preparing db table
Preparing host table
Preparing user table
Preparing func table
. . .
. . .
. . .
```

The latest information about MySQL is available on the web at

<http://www.mysql.com>

Support MySQL by buying support/licenses at
<https://order.mysql.com>



Start and Stop The Database Software:

Starting the MySQL Database

```
# su -  
# cd /usr/local/mysql  
# bin/mysqld_safe --user=mysql &
```

Starting mysqld daemon with databases from /usr/local/mysql/data

Stopping the MySQL Database

```
# su -  
# cd /usr/local/mysql  
# bin/mysqladmin -u root shutdown  
040803 23:36:27 mysqld ended  
[1]+  Done          bin/mysqld_safe --user=mysql
```

Know more

Visit the following website to find a vast list of free and open source softwares available:

http://en.wikipedia.org/wiki/List_of_free_and_open_source_software_packages

Summary

- ❖ A database is an organised collection of data.
- ❖ Data is stored in a relational database in one or more tables.
- ❖ A group of rows and columns forms a Table.
- ❖ The horizontal subset of a Table is known as a Row/Tuple.
- ❖ The vertical subset of a Table is known as a Column/Attribute.
- ❖ A Candidate key is an attribute (or a set of attributes) that uniquely identifies a row. A Primary Key is one of the candidate keys.
- ❖ Only one of the Candidate keys is selected as the primary key of a table. All other candidate keys are called Alternate keys.



Multiple Choice Questions

1. A relation can have only one _____ key and may have more than one _____ keys.
 - a) Primary, Candidate
 - b) Candidate, Alternate
 - c) Candidate, Primary
 - d) Alternate, Candidate
2. The vertical subset of a table is known as:
 - a) Tuple
 - b) Row
 - c) Attribute
 - d) Relation
3. If software is released under open source, it means:
 - a) It is expensive.
 - b) Its source code is available to the user.
 - c) It belongs to a company.
 - d) It is a DBMS.
4. Which of the following columns in a Student table can be used as the primary key?
 - a) Class
 - b) Section
 - c) First Name
 - d) Admission No
5. A tuple is also known as a _____ .
 - a) table
 - b) relation
 - c) row
 - d) field



6. An attribute is also known as a _____.
- a) table
 - b) relation
 - c) row
 - d) column
7. A field or a combination of fields in a table that has a unique value for each row is called:
- a) Candidate key.
 - b) Foreign key.
 - c) Main key.
 - d) Alternate key.

Exercises

1. Answer the following questions:

- a) Define the following terms:
 - i) Database
 - ii) Table
 - iii) Primary key
 - iv) Candidate key
 - v) Alternate key
- b) What is the relationship between a Database and a Table?
- c) What is DBMS? Write names of any two DBMSs.
- d) How is data organized in a table?
- e) What is a Primary key? What is its purpose in a table?
- f) What is MySQL?

2. Distinguish between the following pairs

- a) Row and Column
- b) Primary key and Candidate key.

