Part 1

Assignment 1

Aim: Study of Open Source Databases : MySQL

What is SQL?

- SQL stands for Structured Query Language
- SQL lets you access and manipulate databases
- SQL is an ANSI (American National Standards Institute) standard

What Can SQL 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

Features:

- Because of its unique storage engine architecture MySQL performance is very high.
- Supports large number of embedded applications which makes MySql very flexible.
- Use of Triggers, Stored procedures and views which allows the developer to give a higher productivity.
- Allows transactions to be rolled back, commit and crash recovery.
- Triggers & cursor.

Basic Termonoligies

RDBMS - Relational Database Management System

Attribute - A kind of information that describes one aspect of a data object. For example, "age" is an attribute of a person, and "salary" is an attribute of an employee. "Attribute" is also called "column".

Relation - A data object defined by a set of attributes. For example, "employee" is a relation with various attributes that define the employee data object. "Relation" is also called "table".

Tuple - An instance of a data object with specific values for all attributes of the relation. For example, one tuple of the "course" relation is the operating system course with "operating system" as the value of the "course name" attribute, and other values for other attributes. "Tuple" is also called "row" or "record".

DDL (Data Definition Language) - A set of SQL statements that manage data structures in the database. Examples of DDL are CREATE, ALTER, DROP, etc.

DML (Data Manipulation Language) - A set of SQL statements that manages data instances in the database. Examples of DML are INSERT, UPDATE, DELETE, etc.

SQL
Structured Query Language - a programming language designed for managing data in relational database management systems.

Table
a table is a set of data elements (values) that is organized using a model of vertical columns (which are identified by their name) and horizontal rows.

Record
are composed of fields.

Field
a space allocated for a particular item of information.

Timestamp
is a data type that exposes automatically generated binary numbers, which are guaranteed to be unique within a database. timestamp is used typically as a mechanism for version-stamping table rows. The storage size is 8 bytes.

Query
SQL coins the term query as the name for its commands. Basically, all SQL code is written in the form of a query statement and then executed against a database.

mysql_connect
opens or reuses a connection to a MySQL server.
mysql_select_db
sets the current active database on the server that's associated with the specified link identifier. Every subsequent call to mysql_query() will be made on the active databases.

mysql_query
sends a unique query (multiple queries are not supported) to the currently active database on the server that's associated with the specified link_identifier.\

SELECT
Selects data from one or more database tables and/or views.

WHERE
works in conjunction with other SQL clauses like SELECT, INSERT and UPDATE to specify a search condition for these statements.

ORDER BY
defines in what order to return a data set retrieved with a SQL SELECT statement.

INSERT
facilitates the process of inserting data into a SQL table.

JOIN
selects data from two or more tables tied together by matching table columns.

UPDATE
serves to update data in database table.

DELETE
is used to delete data from a database table.

Relationship
A relationship exists between two database tables when one table has a foreign key that references the primary key of another table.

Primary key
The primary key of a relational table uniquely identifies each record in the table.

Structural Terminology
Within the database world, MySQL is classified as a relational database management system (RDBMS). That phrase breaks down as follows:

- The database (the "DB" in RDBMS) is the repository for the information you want to store, structured in a simple, regular fashion:
    - The collection of data in a database is organized into tables.
    - Each table is organized into rows and columns.
    - Each row in a table is a record.
    - Records can contain several pieces of information; each column in a table corresponds to one of those pieces.
- The management system (the "MS") is the software that lets you use your data by allowing you to insert, retrieve, modify, or delete records.

- The word "relational" (the "R") indicates a particular kind of DBMS, one that is very good at relating (that is, matching up) information stored in one table to information stored in another by looking for elements common to each of them. The power of a relational DBMS lies in its capability to pull data from those tables conveniently and to join information from related tables to produce answers to questions that can't be answered from individual tables alone.

Query Language Terminology

To communicate with MySQL, you use a language called SQL (Structured Query Language). SQL is today's standard database language, and all major database systems understand it. SQL supports many different kinds of statements, all designed to make it possible to interact with your database in interesting and useful ways.

:

```
CREATE TABLE company
(  company_name CHAR(30),
  company_num INT,
  address   CHAR(30),
  phone    CHAR(12)
);
```

Statements like that can be somewhat imposing when you're new to SQL, but you need not be a programmer to learn how to use SQL effectively

MySQL Architectural Terminology

When you use MySQL, you're actually using at least two programs, because MySQL operates using a client/server architecture:

- The first program is the MySQL server, mysqld. The server runs on the machine where your databases are stored. It listens for client requests coming in over the network and accesses database contents according to those requests to provide clients with the information they ask for.
- The other programs are client programs; they connect to the database server and issue queries to tell it what information they want.

Some of The Most Important SQL Commands

- **SELECT** - extracts data from a database
- **UPDATE -** updates data in a database

- **DELETE** - deletes data from a database
- **INSERT INTO** - inserts new data into a database
- **CREATE DATABASE** - creates a new database
- **ALTER DATABASE** - modifies a database
- **CREATE TABLE** - creates a new table
- **ALTER TABLE** - modifies a table
- **DROP TABLE** - deletes a table
- **CREATE INDEX** - creates an index (search key)
- **DROP INDEX** - deletes an index

TEXT TYPES

VARCHAR( )	A variable section from 0 to 255 characters long.
TINYTEXT	A string with a maximum length of 255 characters.
CHAR( )	A fixed section from 0 to 255 characters long.
TEXT	A string with a maximum length of 65535 characters.
BLOB	A string with a maximum length of 65535 characters.
MEDIUMTEXT	A string with a maximum length of 16777215 characters.
MEDIUMBLOB	A string with a maximum length of 16777215 characters.
LONGTEXT	A string with a maximum length of 4294967295 characters.
LONGBLOB	A string with a maximum length of 4294967295 characters.

NUMBER TYPES

TINYINT( )	-128 0 to 255 UNSIGNED.
SMALLINT( )	-32768 0 to 65535 UNSIGNED.
MEDIUMINT( )	-8388608 0 to 16777215 UNSIGNED.
INT( )	-2147483648 0 to 4294967295 UNSIGNED.
BIGINT( )	-9223372036854775808 0 to 18446744073709551615 UNSIGNED.
FLOAT	A small number with a floating decimal point.
DOUBLE(,)	A large number with a floating decimal point.
DECIMAL(,)	A DOUBLE stored as a string , allowing for a fixed decimal point.

DATE TYPES

DATE	YYYY-MM-DD.
DATETIME	YYYY-MM-DD HH:MM:SS.
TIMESTAMP	YYYYMMDDHHMMSS.
TIME	HH:MM:SS.

MISC TYPES

ENUM ( )	Short for ENUMERATION which means that each column may have one of a specified possible values.
SET	Similar to ENUM except each column may have more than one of the specified possible values.

Pattern	What the pattern matches
^	Beginning of string
$	End of string
.	Any single character
[...]	Any character listed between the square brackets
[^...]	Any character not listed between the square brackets
p1|p2|p3	Alternation; matches any of the patterns p1, p2, or p3
*	Zero or more instances of preceding element
+	One or more instances of preceding element
{n}	n instances of preceding element
{m,n}	m through n instances of preceding element

Indexes

A database index is a data structure that improves the speed of operations in a table. Indexes can be created using one or more columns, providing the basis for both rapid random lookups and efficient ordering of access to records.

Simple and Unique Index:

You can create a unique index on a table. A unique index means that two rows cannot have the same index value. Here is the syntax to create an Index on a table

```
CREATE UNIQUE INDEX index_name
```

```
ON table_name ( column1, column2,...);
```

You can use one or more columns to create an index. For example, we can create an index on tutorials_tbl using tutorial_author.

```
CREATE UNIQUE INDEX AUTHOR_INDEX
ON tutorials_tbl (tutorial_author)
```

You can create a simple index on a table. Just omit UNIQUE keyword from the query to create simple index. Simple index allows duplicate values in a table.

If you want to index the values in a column in descending order, you can add the reserved word DESC after the column name.

```
mysql> CREATE UNIQUE INDEX AUTHOR_INDEX
ON tutorials_tbl (tutorial_author DESC)
```

my sql Advantages:

MySQL is characterised as a free, fast, reliable open source relational database. It does lack some sophistication and facilities, but it has an active development team and, as it goes from release to release, more capabilities are added. At certain times there will be a trade-off between speed and capabilities, and the MySQL team intend to keep their database engine fast and reliable
MySQL Advantage is a suite of four open-source software packages–proven, popular, and well-supported ones–that work together to run interactive, dynamic Internet sites.
MySQL Advantage is comprised of Enhanced MySQL, Apache, PHP, and Perl, to create an integrated Web development environment. This technology suite delivers a complete, stable environment for building and deploying database-driven applications for the Internet. Available for Linux, Unix, and Windows, Advantage allows users to develop and deploy on their choice of platforms. This flexible, multiple-platform environment brings unity and scalability to development and Web applications.
MYSQL is widely used for web applications. This acts as a database component for many languages such as BAMP, WAMP, LAMP and MAMP. PHP.

Disadvantages

- MySQL does not support a very large database size as efficiently
- MySQL does not support ROLE, COMMIT, and Stored procedures in versions less than 5.0
- Transactions are not handled

Conclusion: Thus we have studied Mysql Database.