New syllabus 2022-23

Chapter 11
SQL

Informatics Practices

Class XI (As per CBSE Board)

SQL is an acronym of Structured Query Language. It is a standard language developed and used for accessing and modifying relational databases.

The SQL language was originally developed at the IBM research laboratory in San José, in connection with a project developing a prototype for a relational database management system called System R in the early 70s.

SQL is being used by many database management systems. Some of them are:

➤ **MySQL**

➤ **PostgreSQL**

➤ **Oracle**

➤ **SQLite**

➤ **Microsoft SQL Server**

Advantages of using SQL

- **High speed.**
- **No coding needed.**
- **Well defined standards.**
- **Portability.**
- **Interactive language.**
- **Multiple data view.**

MySQL is currently the most popular open source database software. It is a multi-user, multithreaded database management system. MySQL is especially popular on the web. It is one of the parts of the very popular LAMP platform. Linux, Apache, MySQL and PHP or WIMP platform Windows,Apache,MySQL and PHP. MySQL AB was founded by Michael Widenius (Monty), David Axmark and Allan Larsson in Sweden in year 1995.

MySQL Features

Open Source & Free of Cost:

It is Open Source and available at free of cost.

 Portability:

Small enough in size to instal and run it on any types of Hardware and OS like Linux,MS Windows or Mac etc.

 Security :

Its Databases are secured & protected with password.

 Connectivity

Various APIs are developed to connect it with many programming languages.

 Query Language

It supports SQL (Structured Query Language) for handling database.

Types of SQL Commands

❑ **DDL (Data Definition Language)**
   To create database and table structure-commands
   like **CREATE , ALTER , DROP** etc.

❑ **DQL (Data Query Language)**
   To retrieve the data from database
   SELECT

❑ **DML (Data Manipulation Language)**
   Record/rows related operations.commands like
   INSERT..., DELETE..., UPDATE.... etc.

❑ **DCL (Data Control Language)**
   used to manipulate permissions or access rights to the
tables.commands
   like **GRANT , REVOKE** etc.

❑ **Transactional control Language.**
Used to control the transactions.commands like
   COMMIT, ROLLBACK, SAVEPOINT etc.

MySql datatypes

numeric

decimal -decimal(<precision>, [<scale>]) [zerofill] For storing floating-point numbers where precision is critical.

Int - int(<size>) [auto_increment] [unsigned] [zerofill] A whole number, 4 bytes, with a maximum range of -2,147,483,648 to 2,147,483,647 (unsigned: 0 to 4,294,967, 295)

string

char-char(<size>) [binary]
Fixed length – for storing strings that won't vary much in size.
Range of 0 to 255, stores that amount in bytes

Varchar-varchar(<size>) [binary]
Variable length – for storing strings that will vary in size.
Range of 0 to 255, stores that amount in bytes, plus 1 byte

date

Date-Format: YYYY-MM-DD ,Example: 2006-09-23,Range of years 1000 to 9999

MYSQL

Database Commands in MySql

Getting listings of database and tables

mysql> SHOW DATABASES;

mysql> SHOW TABLES;

Creating a database-

mysql> CREATE database myschool;

Deleting a database mysql> DROP database abc;

to remove table mysql> drop table abctable;

After we have created the database we use the USE statement to change the current

mysql> USE myschool;

Creating a table in the database is achieved with CREATE table statement.

mysql> CREATE TABLE student (lastname varchar(15),firstname varchar(15), city varchar(20), class char(2));

The command DESCRIBE is used to view the structure of a table.

mysql> DESCRIBE student;

Database Commands in MySql

To insert new rows into an existing table use the INSERT command:

mysql>INSERT INTO student values('dwivedi','freya','Udaipur','4');

Similarly we can insert multiple records.With the SELECT command we can retrieve previously inserted rows:

mysql> SELECT * FROM student;

Selecting rows by using the WHERE clause in the SELECT command

mysql> SELECT * FROM student WHERE class="4";

Selecting specific columns(Projection) by listing their names

mysql> SELECT first_name, class FROM student;

To modify or update entries in the table use the UPDATE command

mysql> UPDATE student SET class="V" WHERE firstname="freya";

MYSQL

Database Commands in MySql

Deleting selected rows from a table using the DELETE command

mysql> DELETE FROM student WHERE firstname="amar";

A general form of SELECT is:

SELECT *what to select(field name)* FROM *table(s)* WHERE *condition that the data must satisfy*;

Comparison operators are: < ; <= ; = ; != or <> ; >= ; >

Logical operators are: AND ; OR ; NOT

Comparison operator for special value NULL: IS

mysql> SELECT * FROM Student WHERE City IS NULL ;

BETWEEN- to access data in specified range

mysql> SELECT * FROM Student WHERE class between 4 and 6;

IN- operator allows us to easily test if the expression in the list of values.

mysql> SELECT * FROM Student WHERE class in (4,5,6);

Database Commands in MySql

 Pattern Matching – LIKE Operator

A string pattern can be used in SQL using the following wild card

 % Represents a substring in any length

 _ Represents a single character

Example:

'A%' represents any string starting with 'A' character.

'_ _A' represents any 3 character string ending with 'A'.

'_B%' represents any string having second character 'B'

'_ _ _' represents any 3 letter string.

A pattern is case sensitive and can be used with LIKE operator.

mysql> SELECT * FROM Student WHERE Name LIKE 'A%';

mysql> SELECT * FROM Student WHERE Name LIKE%Singh%';

mysql> SELECT Name, City FROM Student WHERE Class>=8 AND

Name LIKE '%Kumar%' ;

Database Commands in MySql

Ordering Query Result – ORDER BY Clause

A query result can be orders in ascending (A-Z) or descending (Z-A) order as per any column. Default is Ascending order.

mysql> **SELECT * FROM Student ORDER BY class;**

To get descending order use DESC key word.

mysql> **SELECT * FROM Student ORDER BY class DESC;**

Database Commands in MySql

Creating Table with Constraints

The following constraints are commonly used in SQL:

NOT NULL -It Ensures that a column cannot have a NULL value

UNIQUE - It Ensures that all values in a column are different

PRIMARY KEY - A combination of a NOT NULL and **UNIQUE**. Uniquely identifies each row in a table

FOREIGN KEY - It Uniquely identifies a row/record in another table

CHECK - It Ensures that all values in a column satisfies a specific condition

DEFAULT - It Sets a default value for a column when no value is specified

INDEX - It is Used to create and retrieve data from the database very quickly

Database Commands in MySql

Creating Table with Constraints

mysql> CREATE TABLE Persons (
    ID int NOT NULL PRIMARY KEY,
    LastName varchar(255) NOT NULL,
    FirstName varchar(255),
    Age int,
    City varchar(255) DEFAULT 'Jaipur',
    CONSTRAINT CHK_Person CHECK (Age>=18)
);

mysql> CREATE TABLE Orders (
    OrderID int NOT NULL,
    OrderNumber int NOT NULL,
    PersonID int,
    PRIMARY KEY (OrderID),
    FOREIGN KEY (PersonID) REFERENCES Persons(ID)
);