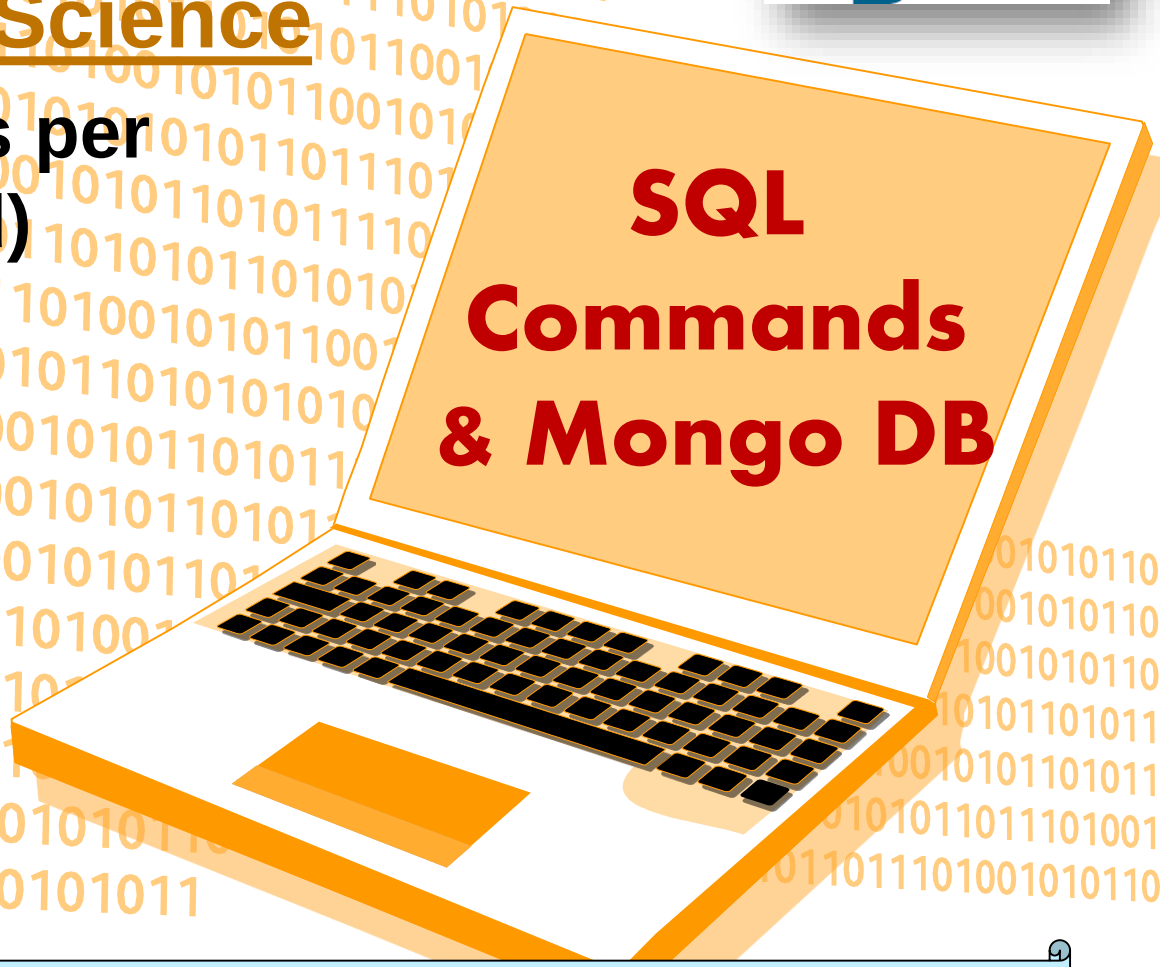
Chapter 15 :

Computer Science

Class XI (As per CBSE Board)



New Syllabus 2018-19

Visit : python.mykvs.in for regular updates

SQL

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

MYSQL

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

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.

MYSQL

Types of SQL Commands

- **DDL (Data Definition Language)**
  To create database and table structure-commands like CREATE , ALTER , DROP etc.
- **DML (Data Manipulation Language)**
  Record/rows related operations.commands like SELECT...., INSERT..., DELETE..., UPDATE.... etc.
- **DCL (Data Control Language)**
  Used to control the transactions.commands like COMMIT, ROLLBACK, SAVEPOINT etc.
- **Transactional control Language.**
  used to manipulate permissions or access rights to the tables.commands like GRANT , REVOKE etc.

MYSQL

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;

database;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;

MYSQL

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 ;**

MYSQL

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%’ ;
```

MYSQL

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;
```

MYSQL

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

MYSQL

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)
);
```

MYSQL

Database Commands in MySql

MySQL - INDEXES

Indexes are used to retrieve data from the database very fast. The users cannot see the indexes, they are just used to speed up searches/queries.

The INSERT and UPDATE statements take more time on tables having indexes, whereas the SELECT statements become fast on those tables. The reason is that while doing insert or update, a database needs to insert or update the index values as well.

CREATE INDEX

Creates an index on a table. Duplicate values are allowed:

mysql> CREATE INDEX idx_lastname
ON Persons (LastName);

MYSQL

Database Commands in MySql

MySQL – INDEXES

CREATE UNIQUE INDEX

Creates a unique index on a table. Duplicate values are not allowed:

mysql> CREATE UNIQUE INDEX idx_lastname
ON Persons (LastName);

DROP INDEX Statement

The DROP INDEX statement is used to delete an index in a table.

mysql> ALTER TABLE *table_name*
DROP INDEX *index_name*;

MYSQL

Database Commands in MySql

MySQL JOINS

In MySQL JOINS are used with SELECT statement. It is used to retrieve data from multiple tables.

There are three types of MySQL joins:

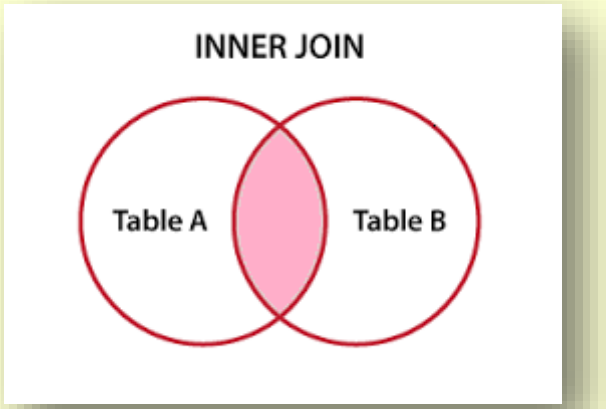
1. **MySQL INNER JOIN (or sometimes called simple join)**
2. **MySQL LEFT OUTER JOIN (or sometimes called LEFT JOIN)**
3. **MySQL RIGHT OUTER JOIN(or sometimes called RIGHT JOIN)**

MYSQL

Database Commands in MySql

1. MySQL Inner JOIN (Simple Join)

It return all rows from multiple tables where the join condition is satisfied.



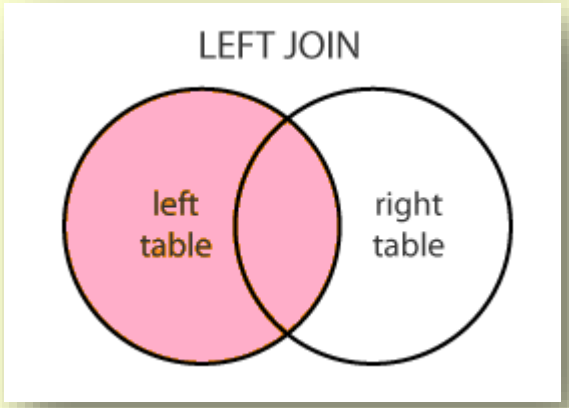

```
mysql> SELECT columns
FROM table1
INNER JOIN table2
ON table1.column = table2.column;
```

MYSQL

Database Commands in MySql

2. MySQL Left Outer Join

It returns all rows from the left hand table specified in the ON condition and only those rows from the other table where the join condition is fulfilled.



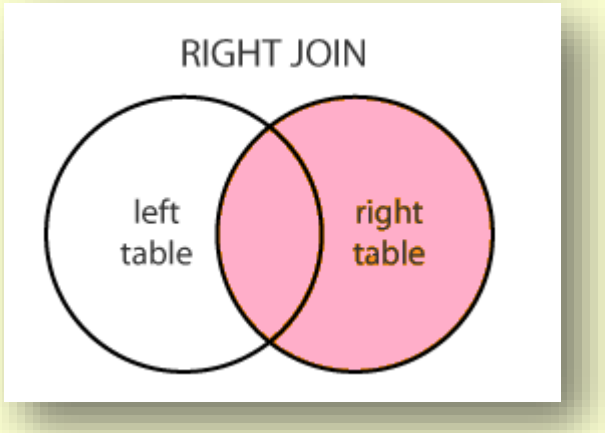

```
mysql> SELECT columns
FROM table1
LEFT  JOIN table2
ON table1.column = table2.column;
```

MYSQL

Database Commands in MySql

2. MySQL Right Outer Join

It returns all rows from the right hand table specified in the ON condition and only those rows from the other table where the join condition is fulfilled.



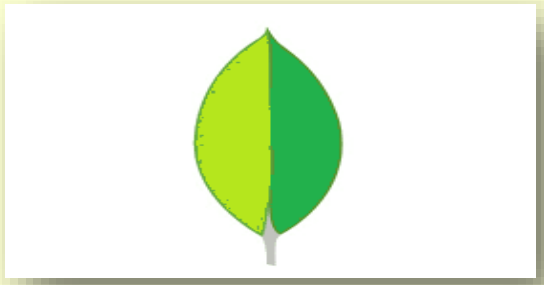

```
mysql> SELECT columns
FROM table1
RIGHT  JOIN table2
ON table1.column = table2.column;
```

Mongo DB

Mongodb is a document-oriented NoSQL database used for high volume data storage. It is an open source product, developed and supported by a company named 10gen. It was designed to work with commodity servers. Now it is used by company of all sizes, across all industry.

Main purpose to build MongoDB:

- Scaling from single server deployments to large
- Performance
- High Availability
- Scalability



Mongo DB

MongoDB Advantages

- MongoDB is schema less
- There may be difference between number of fields, content and size of the document from one to other.
- Structure of a object is clear in MongoDB.
- no complex joins in MongoDB.
- It is very easy to scale.
- It uses internal memory for storing working sets that's why its access data fast.
- It is easy to use
- It is Light Weight
- Much Faster than RDBMS

Mongo DB

Download & Install MongoDB on Windows

Step 1) Double click mongodb<version>.exe file , which can be downloaded from the MongoDB website or from https://www.mongodb.org/dl/win32/i386

Below are the steps for 64 bit version.

Step 2) click next->next->

Step 3) Click on the "complete" button to install all of the components.

Step 4) Click on the Install button to start the installation.

Step 5) Click on the Finish button to complete the installation.

Mongo DB

MongoDB Datatypes

Data Types	Description
Null	Used to store null values.
Boolean	Used to store boolean values.
Integer	Used to store the numeric value. It can be 32 bit or 64 bit depending on the server we are using.
Double	Used to store floating point values.
String	Used to store Text. It must be UTF 8.
Arrays	Used to store a list or multiple values.
Object	Used for embedded documents.
Symbol	Used for specific type symbol.
Date	Used to stores the current date or time.

Mongo DB

Open the the shell through command prompt.

Creating a database

C:\mongodb\bin\>use employee

Creating a collection using insert()

```
C:\mongodb\bin\> db.Employee.insert
        (
                {
                        "Employeeid" : 1,
                        "EmployeeName" : “freya"
                }
        )
```

MongoDB Query Document using find()

C:\mongodb\bin\> db.Employee.find({EmployeeName : “freya"}).forEach(printjson);