

CLASS XII A

COMPUTER SCIENCE

TOPIC :- MYSQL REVISION TOUR

**Step 1: Learning Objectives:**

To enable students to

* Understand the basic terminology of Database system
* Create their own database and table.
* Apply various SQL commands for solving queries

**Step 2: Introduction:**

* MYSQL - A freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL).
* SQL (Structured Query Language) - A language that enables you to create and operate on relational databases, which are sets of related information stored in tables.
* DIFFERENT DATA MODELS
  + A **data model refers to a set of concepts to describe the structure of a database**, and certain constraints (restrictions) that the database should obey. The four data models that are used for database management are :
    1. **Hierarchical data model**
    2. **Relational data model**
    3. **Network data model**
    4. **Object Oriented data model**

RELATIONAL MODEL TERMINOLOGY

1. **Relation :** A table storing logically related data is called a Relation.
2. **Tuple :** A **row of a relation** is generally referred to as a tuple.
3. **Attribute :** A **column** of a relation is generally referred to as an attribute/Field.
4. **Degree :** This refers to the **number of attributes** in a relation.
5. **Cardinality :** This refers to the **number of tuples** in a relation.
6. **Primary Key :** This refers to a set of one or more attributes that can uniquely identify tuples within the relation.
7. **Candidate Key :** All attribute combinations inside a relation that can serve as primary key are candidate keys(as these are candidates for primary key position).
8. **Alternate Key :** A candidate key that is not primary key, is called an alternate key.
9. **Foreign Key :** A non-key attribute, whose values are derived from the primary key of some other table, is known as foreign key in its current table ie. Primary Key of one table when used in another table for reference.

REFERENTIAL INTEGRITY

- A referential integrity is a system of rules that a DBMS uses to ensure that relationships between records in related tables are valid, and that users don’t accidentally delete or change related data. This integrity is ensured by foreign key.

CLASSIFICATION OF SQL STATEMENTS

SQL commands can be mainly divided into following categories:

# Data Definition Language(DDL) Commands

Commands that allow you to perform task, related to data definition e.g;

* Creating, altering and dropping.
* Granting and revoking privileges and roles.
* Maintenance commands.

# Data Manipulation Language(DML) Commands

Commands that allow you to perform data manipulation e.g., retrieval, insertion, deletion and modification of data stored in a database.

# Transaction Control Language(TCL) Commands (Grant and Revoke)

Commands that allow you to manage and control the transactions e.g.,

* Making changes to database, permanent
* Undoing changes to database, permanent
* Creating save points
* Setting properties for current transactions.

DATA TYPES

# Numeric Data Type

1. int – used for number without decimal.
2. Decimal(m,d) – used for floating/real numbers. m denotes the total length of number and d is number of decimal digits.

# Date and Time Data Type

1. date – used to store date in YYYY-MM-DD format.
2. time – used to store time in HH:MM:SS format.

# String Data Types

* 1. char(m) – used to store a fixed length string. **m** denotes max. number of characters.
  2. varchar(m) – used to store a variable length string. **m** denotes max. no. of characters.

**DIFFERENCE BETWEEN CHAR AND VARCHAR DATA TYPE**

|  |  |  |
| --- | --- | --- |
| **S.NO** | **Char Datatype** | **Varchar Datatype** |
| 1. | It specifies a **fixed length**  character | It specifies a **variable length**  character string. |
| String. |
| 2. | When a column is given datatype as CHAR(**n**), then MySQL ensures that all values stored in that column have this length i.e. **n** bytes. If a value is shorter than this length **n** then blanks are added, but the size of value remains **n** bytes. | When a column is given datatype as VARCHAR(**n**), then the maximum size a value in this column can have is **n** bytes. Each value that is stored in this column store exactly as you specify it  i.e. no blanks are added if the length is shorter than maximum length **n**. |

**NULL VALUE**

If a column in a row has no value, then column is said to be **null** , or to contain a null. **You should use a null value** when the actual value is not known or when a value would not be meaningful.

DATABASE COMMANDS

* + 1. **VIEW EXISTING DATABASE**

To view existing database names, the command is: **SHOW DATABASES ;**

* + 1. **CREATING DATABASE IN MYSQL**

For creating the database in MySQL, we write the following command : **CREATE DATABASE**

<databasename> ;

e.g. In order to create a database Student, command is : **CREATE DATABASE** Student ;

* + 1. **ACCESSING DATABASE**

For accessing already existing database , we write :

**USE** <databasename> ;

e.g. to access a database named Student, we write command as : **USE** Student ;

* + 1. **DELETING DATABASE**

For deleting any existing database , the command is :

**DROP DATABASE** <databasename> ;

e.g. to delete a database , say student, we write command as : **DROP DATABASE** Student ;

* + 1. **VIEWING TABLE IN DATABASE**

In order to view tables present in currently accessed database , command is : **SHOW TABLES ;**

CREATING TABLES IN MYSQL

- Tables are created with the CREATE TABLE command. When a table is created, its columns are named, data types and sizes are supplied for each column.

**Syntax of CREATE TABLE command is :**

**CREATE TABLE <table-name>( <column name> <data type> ,<column name> <data type>**

**,……… ) ;**

**E.g.** in order to create table EMPLOYEE given below :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ECODE | ENAME | GENDER | GRADE | GROSS |
| Integer Primary Key | Varchar of length 20  Not NULL | Char of  length 1 | Char of  length 2 | Integer |

We write the following command:

CREATE TABLE employee (ECODE integer Primary Key , ENAME varchar(20) Not Null , GENDER char(1) , GRADE char(2) , GROSS integer) ;

INSERTING DATA INTO TABLE

The rows are added to relations(table) using INSERT command of SQL.

Syntax of INSERT is:

INSERT INTO <tablename> [<column list>] VALUES ( <value1> , <value2> , …..) ;

e.g. to enter a row into EMPLOYEE table (created above), we write command as : INSERT INTO employee VALUES(1001 , ‘Ravi’ , ‘M’ , ‘E4’ , 50000);

# OR

INSERT INTO employee (ECODE , ENAME , GENDER , GRADE , GROSS) VALUES(1001 , ‘Ravi’

, ‘M’ , ‘E4’ , 50000);

Output: The Data gets added in the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |

In order to insert another row in EMPLOYEE table, we write again INSERT command :

INSERT INTO employee VALUES(1002 , ‘Akash’ , ‘M’ , ‘A1’ , 35000);

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |
| 1002 | Akash | M | A1 | 35000 |

# INSERTING NULL VALUES

To insert value NULL in a specific column, we can type NULL without quotes and NULL will be inserted in that column.

E.g. in order to insert NULL value in GRADE column of above table, we write INSERT command as :

INSERT INTO EMPLOYEE VALUES (1004 , ‘Aman’ , ‘M’ , NULL , 38965 ) ;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |
| 1002 | Akash | M | A1 | 35000 |
| 1004 | Aman | M | NULL | 38965 |

SIMPLE QUERIES USING SELECT COMMAND

The SELECT command is used to extract and display information from a table.

Syntax of SELECT command is :

SELECT <column name>,<column name> FROM <tablename> WHERE <condition name> ;

**SELECTING ALL DATA**

In order to retrieve everything (all columns) from a table, SELECT command is used as :

**SELECT \* FROM** <tablename> ;

e.g. In order to retrieve everything from **Employee** table, we write SELECT command as :

**SELECT \* FROM** Employee ;

**EMPLOYEE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |
| 1002 | Akash | M | A1 | 35000 |
| 1004 | Aman | M | NULL | 38965 |

**SELECTING PARTICULAR COLUMNS**

A particular column from a table can be selected by specifying column-names with SELECT command.

E.g. From the table given below, if we want to select ECODE and ENAME column, then command is :

**EMPLOYEE**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |
| 1002 | Akash | M | A1 | 35000 |
| 1004 | Neela | F | B2 | 38965 |
| 1005 | Sunny | M | A2 | 30000 |
| 1006 | Ruby | F | A1 | 45000 |
| 1009 | Neema | F | A2 | 52000 |

**SELECT** ECODE , ENAME **FROM** EMPLOYEE ;

**E.g.2 To d**isplay only ENAME, GRADE and GROSS column, the command is :

**SELECT** ENAME , GRADE , GROSS **FROM** EMPLOYEE ;

**SELECTING PARTICULAR ROWS**

We can select particular rows from a table by specifying a condition through

**WHERE clause** along with SELECT statement.

**E.g.** To display the records of the female employees, then command is : SELECT \* FROM **EMPLOYEE** WHERE **GENDER = ‘F’ ;**

E.g.2. To display the records from Employee where salary is greater than 48000, then command is :

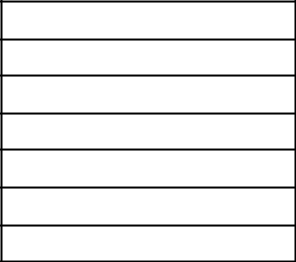
SELECT \* FROM **EMPLOYEE** WHERE **GROSS > 48000 ;**

ELIMINATING REDUNDANT DATA

The **DISTINCT** keyword eliminates duplicate rows from the results of a SELECT statement.

For example, Statement 1 given below will display all the data in the Gender column where as Statement 2 will display the unique values in the Gender column.

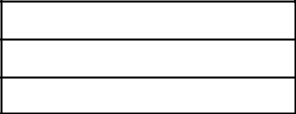
**Statement 1: SELECT** GENDER **FROM** EMPLOYEE;



**GENDER**

M M F M F F

**Statement 2: SELECT DISTINCT**(GENDER) **FROM** EMPLOYEE;



**DISTINCT**(GENDER) M

F

VIEWING STRUCTURE OF A TABLE

If we want to know the structure of a table, we can use DESCRIBE or DESC command, as per following syntax :

**DESCRIBE** | **DESC** <tablename> ;

**e.g.** to view the structure of table **EMPLOYEE**, command is :

**DESCRIBE** EMPLOYEE ; **OR DESC** EMPLOYEE ;

USING COLUMN ALIASES

The columns that we select in a query can be given a different name, i.e. column alias name for output purpose with the help of the keyword AS..

# Syntax :

SELECT <columnname> **AS** column alias , <columnname> **AS** column

alias ….. FROM <tablename> ;

**e.g.** In output, suppose we want to display ECODE column as EMPLOYEE\_CODE in output , then command is :

SELECT **ECODE AS “EMPLOYEE\_CODE”** FROM **EMPLOYEE ;**

CONDITION BASED ON A RANGE

The **BETWEEN** operator defines a range of values that the column values must fall in to make the condition true. The range include both lower value and upper value.

e.g. To display ECODE, ENAME and GRADE of those employees whose salary is between 40000 and 50000, the command is:

SELECT ECODE , ENAME ,GRADE FROM **EMPLOYEE** WHERE GROSS **BETWEEN** 40000 AND 50000 ;

# Output will be :

|  |  |  |
| --- | --- | --- |
| ECODE | ENAME | GRADE |
| 1001 | Ravi | E4 |
| 1006 | Ruby | A1 |

CONDITION BASED ON A LIST

To specify a list of values, IN operator is used. The IN operator selects value that match any value in a given list of values. E.g.

Eg. To display the details of the employees who have grade either as A1or A2. Ans:

SELECT \* FROM EMPLOYEE WHERE GRADE **IN** (‘A1’ , ‘A2’);

# Output will be :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1002 | Akash | M | A1 | 35000 |
| 1006 | Ruby | F | A1 | 45000 |
| 1005 | Sunny | M | A2 | 30000 |
| 1009 | Neema | F | A2 | 52000 |

The **NOT IN** operator finds rows that do not match in the list. E.g.

SELECT \* FROM EMPLOYEE

WHERE GRADE **NOT IN** (‘A1’ , ‘A2’);

# Output will be :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1001 | Ravi | M | E4 | 50000 |
| 1004 | Neela | F | B2 | 38965 |

CONDITION BASED ON PATTERN MATCHES

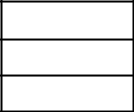
LIKE operator is used for pattern matching in SQL. Patterns are described using two special wildcard characters:

1. percent(%) – The % character matches any substring.
2. underscore(\_) – The \_ character matches any character.

**e.g.** to display names of employee whose name starts with R in EMPLOYEE table, the command is :

SELECT ENAME FROM **EMPLOYEE** WHERE ENAME **LIKE ‘R%’ ;**

# Output will be:



ENAME

Ravi Ruby

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**e.g.** to display details of employee whose second character in name is ‘e’.

SELECT \* FROM **EMPLOYEE** WHERE **ENAME LIKE ‘\_e%’ ;**

**Output will be :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1004 | Neela | F | B2 | 38965 |
| 1009 | Neema | F | A2 | 52000 |

**e.g.** to display details of employee whose name ends with ‘y’.

SELECT \* FROM **EMPLOYEE** WHERE **ENAME LIKE ‘%y’ ;**

**Output will be :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ECODE** | **ENAME** | **GENDER** | **GRADE** | **GROSS** |
| 1005 | Sunny | M | A2 | 30000 |
| 1006 | Ruby | F | A1 | 45000 |

SEARCHING FOR NULL

The NULL value in a column can be searched for in a table using IS NULL in the WHERE clause.

E.g. to list employee details whose salary contain NULL, we use the command : SELECT **\*** FROM **EMPLOYEE** WHERE GROSS **IS NULL ;**

# Output:

|  |  |  |
| --- | --- | --- |
| **Roll\_No** | **Name** | **Marks** |
| 1 | ARUN | NULL |
| 2 | RAVI | 56 |
| 4 | SANJAY | NULL |

E.g. to display the names of those students whose marks is NULL, we use the command: SELECT **Name** FROM **EMPLOYEE** WHERE Marks **IS NULL ;**

# Output will be :

|  |
| --- |
| **Name** |
| ARUN |
| SANJAY |
|  |

**SQL Assignment**

# Instruction: The Assignment should be done in the registers.

**Q1. Define the terms:**

1. Database Abstraction
2. Data inconsistency
3. Conceptual level of database implementation/abstraction
4. Primary Key
5. Candidate Key
6. Relational Algebra
7. Domain

# Q2. Answer the following questions :

1. Differentiate between DDL and DML?
2. What is a constraint?
3. What are single row functions?
4. Compare CHAR and VARCHAR data types.
5. What are the differences between DELETE and DROP commands of SQL?
6. A table "Animals" in a database has 3 columns and 10 records. What is the degree and cardinality of this table?
7. What is the difference between commit and rollback command?
8. Which keyword is used to remove redundant data from a relation?
9. Observe the following table and answer the parts(i) and(ii) accordingly Table:Product

|  |  |  |  |
| --- | --- | --- | --- |
| Pno | Name | Qty | PurchaseDate |
| 101 | Pen | 102 | 12-12-2011 |
| 102 | Pencil | 201 | 21-02-2013 |
| 103 | Eraser | 90 | 09-08-2010 |
| 109 | Sharpener | 90 | 31-08-2012 |
|  |  |  |  |
| 113 | Clips | 900 | 12-12-2011 |

1. Write the names of most appropriate columns, which can be considered as candidate keys.
2. What is the degree and cardinality of the above table?
3. What is a Primary Key?
4. What is a Foreign Key? What is its use?
5. What are the various Integrity Constraints used in SQL?