

LESSON 2

INTRODUCTION TO BASIC SQL

2.0 Preamble

An aspect of information Systems is Data Processing, with the prior knowledge of information systems and computer technology as a whole you will find it will be easy to introduce the basic concept of Structured Query Language which is a useful tool in accessing and manipulating databases. You will be introduced to the basic statement of the SQL programs that will enable you to write simple database programs.

2.1 INTRODUCTION TO DATABASE AND SQL

A database is an organized collection of data. There are many different strategies for organizing data to facilitate easy access and manipulation. A database management system (DBMS) provides mechanisms for storing, organizing, retrieving and modifying data for many users. Database management systems allow for the access and storage of data without concern for the internal representation of data. Today's most popular database systems are relational databases. A language called SQL is the international standard language used almost universally with relational databases to perform queries (i.e., to request information that satisfies given criteria) and to manipulate data.

- SQL is an acronym for Structured Query Language stands for Structured Query Language
- SQL is used to access and manipulate databases
- SQL is an ANSI (American National Standards Institute) standard. It is a database language that is used for querying and modifying relational databases. SQL is a programming language for querying and modifying data and managing databases. Using SQL, you can communicate with the database server.

Read Up Assignment:

1. Advantages of SQL :
2. Different versions of SQL
3. History of SQL

2.3 THE BASIC CATEGORIES OF SQL STATEMENTS

SQL statements are basically divided into four; viz;

- Data Manipulation Language (DML)
- Data Definition Language (DDL)
- Data Control Language (DCL)
- Transaction Control

2.3.1 DATA MANIPULATION LANGUAGE (DML): DML retrieves data from the database, enters new rows, changes existing rows, and removes unwanted rows from tables in the database, respectively. The basic Data Manipulation Language (DML) includes the following;

- Select statement
- Insert statement
- Update statement
- Delete statement
- Merge statement

2.3.2 DATA DEFINITION LANGUAGE (DDL) : DDL sets up, changes and removes data structures from tables. The basic DDL includes the following;

- Create statement
- Alter statement
- Drop statement
- Rename statement
- Truncate statement

- Comment statement

2.3.3 DATA CONTROL LANGUAGE (DCL): DCL gives or removes access rights to both a database and the structures within it. The basic Data Control Languages are;

- Grant Statement
- Revoke Statement

2.3.4 TRANSACTION CONTROL: manages the changes made by the DML statements. Changes to the data can be grouped together into logical transactions. The basic Transaction control languages are;

- Commit
- Rollback
- Savepoint

Using the following simple rules and guidelines, you can construct valid statements that are both easy to read and easy to edit

NOTE:

- SQL statements are not case sensitive, unless indicated
- SQL statements can be entered on one or many lines.
- Keywords cannot be split across lines or abbreviated
- Clauses are usually placed on separate lines for readability .
- Indents should be used to make code readable.
- Keywords typically are entered in uppercase; all other words, such as table names and columns are entered in lowercase

1.4 WRITING BASIC SQL SELECT STATEMENTS

To extract data from the database, you need to use the SQL SELECT statement. You may need to restrict the columns that are displayed. Using a SELECT statement, you can do the following; *Projection*: You can use the projection capability to choose the columns in a table that you want to return by your query. You can choose as few or as many columns of the table as you require. *Selection*: You can use the selection capability in SQL to choose the rows in a table that you want to return by a query. You can use various criteria to restrict the rows that you use.

Joining: You can use the join capability to bring together data that is stored in different tables by creating a link between them.

1.5 SUMMARY OF THE FUNCTIONS OF SQL

- 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
- SQL can allow the construction codes manipulating database

2.6 USING SQL FOR WEB SITE

To build a web site that shows some data from a database, you will need the following:

- An RDBMS database program (i.e. MS Access, SQL Server, MySQL)
- A server-side scripting language, like PHP or ASP

- HTML / CSS

2.7 RDBMS

RDBMS stands for Relational Database Management System. RDBMS is the basis for SQL, and for all modern database systems like MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access. The data in RDBMS is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows.

2.8 SQL SYNTAX

2.8.1 Database Tables

A database most often contains one or more tables. Each table is identified by a name (e.g. "Students" or "Department"). Tables contain records (rows) with data. Below is an example of a table called "Students":

Stud_matricNo LastName FirstName Address City

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

The table above contains two records (one for each student) and five columns (Stud_matricNo, LastName, FirstName, Address, and City).

2.8.2 Format of SQL Statements

Most of the actions you need to perform on a database are done with SQL statements. The following SQL statement will select all the records in the "Students" table:

```
SELECT * FROM Students
```

- Some database systems require a semicolon at the end of each SQL statement. Semicolon is the standard way to separate each SQL statement in database systems that allow more than one SQL statement to be executed in the same call to the server.

2.8.3 SQL, DML and DDL

SQL can be divided into two parts: The Data Manipulation Language (DML) and the Data Definition Language (DDL). The query and update commands form the DML part of SQL:

- 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.

The DDL part of SQL permits database tables to be created or deleted. It also define indexes (keys), specify links between tables, and impose constraints between tables. The most important DDL statements in SQL are:

- 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

2.9 SUMMARY

What you have learned so far..

- Structured Query Language (SQL) which is a standard language for accessing and manipulating databases.
- The different SQL statement

- What SQL statement can be used for
- Not all SQL statement accepts semicolon at the end of it depending on the platform or server that is used to execute the statement.

SELF ASSESSMENT QUESTIONS

1. What does SQL means?
2. List and state the functions of the component of the DDL parts of SQL program.

LESSON3

3.1 The CREATE TABLE Statement

The CREATE TABLE Statement :is used to create a table in a database.

Syntax:

```
CREATE TABLE table_name
(
  column_name1 data_type,
  column_name2 data_type,
  column_name3 data_type,
  ....
)
```

The data type specifies what type of data the column can hold. For a complete reference of all the data types available in MS Access, MySQL, and SQL Server, visit www.datatype.com

Example: Now we want to create a table called "Students" that contains five columns: Stud_matNo, LastName, FirstName, Address, and City. We use the following CREATE TABLE statement:

```
CREATE TABLE Students
(
  Stud_matNo int,
  LastName varchar(255),
  FirstName varchar(255),
  Address varchar(255),
  City varchar(255)
)
```

The Stud_matNo column is of type int and will hold a number. The LastName, FirstName, Address, and City columns are of type varchar with a maximum length of 255 characters. The empty "Students" table will now look like this:

Stud_matNo	LastName	FirstName	Address	City
------------	----------	-----------	---------	------

The empty table can be filled with data with the INSERT INTO statement.

3.2 The SQL SELECT Statement

The SELECT statement is used to select data from a database. The result is stored in a result table, called the result-set.

3.2.1 SQL SELECT Syntax SELECT column_name(s)

FROM table_name

and `SELECT * FROM table_name`

Note: SQL is not case sensitive. `SELECT` is the same as `select`.

3.2.2 An SQL `SELECT`

Example: The "Students" table

Stud_matNo	LastName	FirstName	Address	City
------------	----------	-----------	---------	------

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

Now we want to select the content of the columns named "LastName" and "FirstName" from the table above. We use the following `SELECT` statement: `SELECT LastName,FirstName FROM Students`

The result-set will look like this:

LastName	FirstName
----------	-----------

Salako	Hafeez
Yusuf	Fatimah

`SELECT *`

Example Now we want to select all the columns from the "Students" table. We use the following `SELECT` statement: `SELECT * FROM Students`

Tip: The asterisk (*) is a quick way of selecting all columns! The result-set will look like this:

Stud_matNo	LastName	FirstName	Address	City
------------	----------	-----------	---------	------

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

3.3 The SQL `SELECT DISTINCT` Statement

In a table, some of the columns may contain duplicate values. This is not a problem; however, sometimes you will want to list only the different (distinct) values in a table. The `DISTINCT` keyword can be used to return only distinct (different) values.

Syntax:

```
SELECT DISTINCT column_name(s) FROM table_name
```

Example: To select only the distinct values from the column named "City" from the table above. We use the following `SELECT` statement: `SELECT DISTINCT City FROM Students`

The result-set will look like this:

City

Niger
Ibadan

3.4 SQL `WHERE` Clause:

The `WHERE` clause is used to filter records. The `WHERE` clause is used to extract only those records that fulfill a specified criterion.

Syntax:

```
SELECT column_name(s)
FROM table_name
WHERE column_name operator value
```

Example : "Students" table:

Stud_matNo	LastName	FirstName	Address	City
------------	----------	-----------	---------	------

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

Now we want to select only the Students living in the city "Ibadan" from the table above. We use the following SELECT statement:

```
SELECT * FROM Students
WHERE City='Ibadan'
```

The result-set will look like this: Stud_matNo LastName FirstName Address City

1 14048 Yusuf Fatimah 24, Olodo Road Ibadan

Note: Quotes Around Text Fields SQL uses single quotes around text values (most database systems will also accept double quotes). Although, numeric values should not be enclosed in quotes. For text values: This is correct:

```
SELECT * FROM Students WHERE FirstName='Salako'
```

This is wrong:

```
SELECT * FROM Students WHERE FirstName=Salako
```

For numeric values: This is correct:

```
SELECT * FROM Students WHERE Year=1965
```

This is wrong:

```
SELECT * FROM Students WHERE Year='1965'
```

3.4.1 Operators Allowed in the WHERE Clause

With the WHERE clause, the following operators can be used: Operator Description

=, <>, <, >, >=, <=,

Note: In some versions of SQL the <> operator may be written as !=

3.5. SQL AND & OR Operators

The AND & OR operators are used to filter records based on more than one condition. The AND operator displays a record if both the first condition and the second condition is true while the OR operator displays a record if either the first condition or the second condition is true.

3.5.1 AND Operator

Example: From the "Students" table, we want to select only the Students with the first name equal to "Yusuf" AND the last name equal to "Fatimah": We use the following SELECT statement:

```
SELECT * FROM Students
WHERE FirstName='Yusuf'
AND LastName='Fatimah'
```

The result-set will look like this:

1. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

3.5.2 OR Operator

Example : Now we want to select only the Students with the first name equal to "Yusuf" OR the first name equal to "Salako": We use the following SELECT statement:

```
SELECT * FROM Students
WHERE FirstName='Yusuf'
OR FirstName='Salako'
```

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

3.5.3 Combining AND & OR

You can also combine AND and OR (use parenthesis to form complex expressions). Now we want to select only the Students with the last name equal to "Hafeez" AND the first name equal to "Salako" OR to "Yusuf": We use the following SELECT statement:

```
SELECT * FROM Students
WHERE LastName='Hafeez' OR LastName='Fatimah'
```

The result-set will look like this: Stud_matNo LastName FirstName Address City

1. 10072 Salako Hafeez Oy 10, Kakawa Str. Niger
2. 14048 Yusuf Fatimah 24, Olodo Road Ibadan

EXERCISES

1. Create a table called student which will contain the following: student_id, studentname, dept, level and grade
2. Write the syntax to insert into the table created in question1 .