What is SQL?

* SQL stands for Structured Query Language
* SQL lets you access and manipulate databases
* SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987

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

### **Example**

SELECT \* FROM Customers;

SELECT CustomerName, City FROM Customers;

## The SQL SELECT DISTINCT Statement

The SELECT DISTINCT statement is used to return only distinct (different) values.

Inside a table, a column often contains many duplicate values; and sometimes you only want to list the different (distinct) values.

## The 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 condition.

### **WHERE Syntax**

SELECT column1, column2, ...  
FROM table\_name  
WHERE condition;

The SQL AND, OR and NOT Operators

SELECT column1, column2, ...  
FROM table\_name  
WHERE condition1 AND condition2 AND condition3 ...;

### **OR Syntax**

SELECT column1, column2, ...  
FROM table\_name  
WHERE condition1 OR condition2 OR condition3 ...;

### **NOT Syntax**

SELECT column1, column2, ...  
FROM table\_name  
WHERE NOT condition;

## The SQL ORDER BY Keyword

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

### **ORDER BY Syntax**

SELECT column1, column2, ...  
FROM table\_name  
ORDER BY column1, column2, ... ASC|DESC;

## The SQL INSERT INTO Statement

The INSERT INTO statement is used to insert new records in a table.

### **INSERT INTO Syntax**

It is possible to write the INSERT INTO statement in two ways.

The first way specifies both the column names and the values to be inserted:

INSERT INTO table\_name (column1, column2, column3, ...)  
VALUES (value1, value2, value3, ...);

## What is a NULL Value?

A field with a NULL value is a field with no value.

If a field in a table is optional, it is possible to insert a new record or update a record without adding a value to this field. Then, the field will be saved with a NULL value.

**Note:** A NULL value is different from a zero value or a field that contains spaces. A field with a NULL value is one that has been left blank during record creation!

## How to Test for NULL Values?

It is not possible to test for NULL values with comparison operators, such as =, <, or <>.

We will have to use the IS NULL and IS NOT NULL operators instead.

### **IS NULL Syntax**

SELECT column\_namesFROM table\_name  
WHERE column\_name IS NULL;

### **IS NOT NULL Syntax**

SELECT column\_namesFROM table\_name  
WHERE column\_name IS NOT NULL;

## The SQL UPDATE Statement

The UPDATE statement is used to modify the existing records in a table.

### **UPDATE Syntax**

UPDATE table\_name  
SET column1 = value1, column2 = value2, ...  
WHERE condition;

# **SQL DELETE Statement**

## The SQL DELETE Statement

The DELETE statement is used to delete existing records in a table.

### **DELETE Syntax**

DELETE FROM table\_name WHERE condition;

# **SQL MIN() and MAX() Functions**

## The SQL MIN() and MAX() Functions

The MIN() function returns the smallest value of the selected column.

The MAX() function returns the largest value of the selected column.

### **MIN() Syntax**

SELECT MIN(column\_name)  
FROM table\_name  
WHERE condition;

# **SQL COUNT(), AVG() and SUM() Functions**

## The SQL COUNT(), AVG() and SUM() Functions

The COUNT() function returns the number of rows that matches a specified criteria.

The AVG() function returns the average value of a numeric column.

The SUM() function returns the total sum of a numeric column.

### **COUNT() Syntax**

SELECT COUNT(column\_name)  
FROM table\_name  
WHERE condition;

### **AVG() Syntax**

SELECT AVG(column\_name)  
FROM table\_name  
WHERE condition;

### **SUM() Syntax**

SELECT SUM(column\_name)  
FROM table\_name  
WHERE condition;

# **SQL LIKE Operator**

The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

There are two wildcards often used in conjunction with the LIKE operator:

* % - The percent sign represents zero, one, or multiple characters
* \_ - The underscore represents a single character

**Note:** MS Access uses an asterisk (\*) instead of the percent sign (%), and a question mark (?) instead of the underscore (\_).

The percent sign and the underscore can also be used in combinations!

### **LIKE Syntax**

SELECT column1, column2, ...  
FROM table\_name  
WHERE columnN LIKE pattern;

**Tip:** You can also combine any number of conditions using AND or OR operators.

Here are some examples showing different LIKE operators with '%' and '\_' wildcards:

|  |  |
| --- | --- |
| **LIKE Operator** | **Description** |
| WHERE CustomerName LIKE 'a%' | Finds any values that start with "a" |
| WHERE CustomerName LIKE '%a' | Finds any values that end with "a" |
| WHERE CustomerName LIKE '%or%' | Finds any values that have "or" in any position |
| WHERE CustomerName LIKE '\_r%' | Finds any values that have "r" in the second position |
| WHERE CustomerName LIKE 'a\_\_%' | Finds any values that start with "a" and are at least 3 characters in length |
| WHERE ContactName LIKE 'a%o' | Finds any values that start with "a" and ends with "o" |