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|  | **CSC-252: Database Management System** |
| **Semester IV(CS, SE) Section(E, F) (Spring 2023)**  **Course Instructor(s): Muhammad Hussain & Faryal Shamsi** |

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| **Lab 02:**  **Perform Arithmetic Operations & Querying Database Tables** |

**Objective(s):**

1. Arithmetic operators
2. WHERE clause
3. Operators in the WHERE clause
4. SQL Operator Precedence

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| **1: Arithmetic operators** |

Arithmetic operators can perform arithmetical operations on numeric operands involved. Arithmetic operators are addition (+), subtraction (-), multiplication (\*) and division (/). The + and - operators can also be used in date arithmetic.

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| Operator | Description |
| + | Add |
| - | Subtract |
| \* | Multiply |
| / | Divide |
| % | Modulo |

**Syntax:**

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| SELECT *expression <*arithmetic operator> *expression*  FROM *table\_name*  WHERE *condition*; |

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| **2: WHERE clause** |

The next thing we want to do is to start limiting, or filtering, the data we fetch from the database.

By adding a WHERE clause to the SELECT statement, we add one (or more) conditions that must be met by the selected data. This will limit the number of rows that answer the query and are fetched. In many cases, this is where most of the "action" of a query takes place.

In other words:

The WHERE clause is used to filter records.

The WHERE clause is used to extract only those records that fulfill a specified condition.

**Syntax:**

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

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| **Note:** The WHERE clause is not only used in SELECT statement, it is also used in UPDATE, DELETE statement, etc.! (will learn in upcoming labs) |

The following SQL statement selects all the employees from the FIRST\_NAME "Ellen", in the "employees" table:

**Example:**

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| SELECT *\**  FROM employees  WHERE FIRST\_NAME = 'Ellen'; |

If you want to get the opposite, the employees other than Ellen then query will be:

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| SELECT *\**  FROM employees  WHERE FIRST\_NAME <> 'Ellen'; |

Also you can use “**!=**” at the place of “**<>**”.

**Text Field & Numeric Fields**

SQL requires single quotes around text values (most database systems will also allow double quotes).

However, numeric fields should not be enclosed in quotes.

**Syntax:**

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| SELECT *\**  FROM employees  WHERE EMPLOYEE\_ID = 103; |

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| **3: Operators in the WHERE clause** |

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| **Operator** | **Type** | **Description** |
| = | Comparison | Equal |
| > | Comparison | Greater than |
| < | Comparison | Less than |
| >= | Comparison | Greater than or equal |
| <= | Comparison | Less than or equal |
| <> | Comparison | Not equal. Note: In some versions of SQL this operator may be written as != |
| AND | Logical |  |
| OR | Logical |  |
| NOT | Logical |  |
| BETWEEN | Logical | Between a certain range |
| LIKE | Logical | Search for a pattern |
| IN | Logical | To specify multiple possible values for a column |

**AND, OR & NOT operator:**

The WHERE clause can be combined with AND, OR, and NOT operators.

The AND and OR operators are used to filter records based on more than one condition:

* The AND operator displays a record if all the conditions separated by AND are TRUE.
* The OR operator displays a record if any of the conditions separated by OR is TRUE.

The NOT operator displays a record if the condition(s) is NOT TRUE.

**AND Syntax:**

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

**OR Syntax:**

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

**NOT Syntax:**

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

**BETWEEN operator:**

The BETWEEN operator selects values within a given range. The values can be numbers, text, or dates.

The BETWEEN operator is inclusive: begin and end values are included.

**Syntax:**

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| SELECT *column1, column2, ...*  FROM *table\_name*  WHERE *column\_name* BETWEEN *value1 AND value2;* |

**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

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

**Syntax:**

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| SELECT *column1, column2, ...*  FROM *table\_name*  WHERE *column\_name* LIKE *pattern;* |

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

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| **LIKE Operator** | **Description** |
| WHERE CustomerName LIKE 'a%' | Finds any values that start with "a" |
| WHERE CustomerName LIKE '%a\_' | Finds any values that 2nd last char is "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" |

**Example:**

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| SELECT \*  FROM employees  WHERE FIRST\_NAMELIKE'El%'*;* |

**IN Operator:**

The IN operator allows you to specify multiple values in a WHERE clause.

The IN operator is a shorthand for multiple OR conditions.

**Syntax:**

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| SELECT *column1, column2, ...*  FROM *table\_name*  WHERE *column\_name* IN *(value1, value2, value3, ...);* |

OR

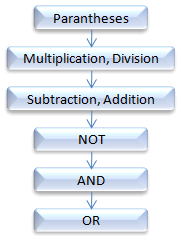
|  |
| --- |
| SELECT *column1, column2, ...*  FROM *table\_name*  WHERE *column\_name* IN *(*SELECT *STATEMENT);* |

|  |
| --- |
| **3: SQL Operator Precedence** |

Operator precedence describes the order in which operations are performed when an expression is evaluated.

Operations with a higher precedence are performed before those with a lower precedence.

**Parentheses** has the highest precedence and **OR** has the lowest.



Exercise

1. Write a query to display EMPLOYEE\_ID, FIRST\_NAME, and SALARY of employees whose SALARY is less than $3000.
2. Write a query to display FIRST\_NAME, LASTNAME of all employees whose first name starts with letter ‘A’.
3. Write a query to display FIRST\_NAME, JOB\_ID, DEPARTMENT\_ID of employees who are either PU\_CLERK or belongs to MANAGER\_ID = 114.
4. Write a query to display EMPLOYEE\_ID, FIRST\_NAME, and SALARY of employees whose salaries lies in the range of $1500 to $3000;
5. Write a query to display EMPLOYEE\_ID, FIRST\_NAME, and SALARY of employees whose commission is empty.
6. Write a query to display first names of all employees that end with alphabet ‘N’.
7. Write a query to display FIRST\_NAME, JOB\_ID, DEPARTMENT\_ID of employees who are not PU\_CLERK.
8. Write a query to display EMPLOYEE\_ID, FIRST\_NAME, and SALARY of those employees who do not have salaries of $3300, $3200, $2200.
9. Write a query to display names of those employees whose first name starts with ‘A’ and ends with ‘N’.
10. Write a query to display the list of employee names that have letters ‘LA’ in their names.
11. Write a query to display the EMPLOYEE\_ID, FIRST\_NAME, and SALARY of employees. In that, the highest paid employee should display first and lowest paid should display last.
12. Write a query to display FIRST\_NAME of employees that have "a" in the second position.
13. Write a query to display EMPLOYEE\_ID, FIRST\_NAME, and SALARY of employees whose salaries do not lies in the range of $1500 to $3000;
14. Write a query to display FIRST\_NAME, LAST\_NAME and DEPARTMENT\_ID of all employees in departments 30 or 100 in ascending order.
15. Write a query to display FIRST\_NAME, LAST\_NAME and SALARY for all employees whose salary is not in the range $10,000 through $15,000 and are in department 30 or 100.
16. Write a query to display FIRST\_NAME, LAST\_NAME and HIRE\_DATE for all employees who were hired in 1987.
17. Write a query to display the LAST\_NAME of employees whose LAST\_NAME have exactly 6 characters.
18. Write a query to display FIRST\_NAME, SALARY and PF (15% of salary) of all employees.
19. Write a query to display FIRST\_NAME, SALARY and commission amount (% of salary) of all employees.
20. Write a query to display FIRST\_NAME, SALARY and NET\_SALARY after 500 deduction from salary of all employees;