SQL
Session 1

Did you complete the pre-class activity?

Table of Contents

1 What is a database?

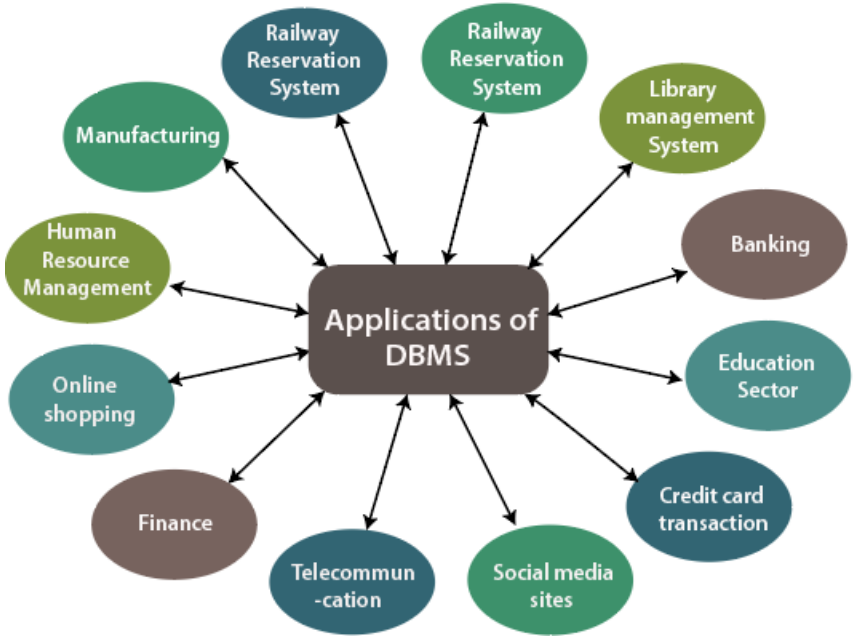
Could you define what the database is?

Students, write your response!

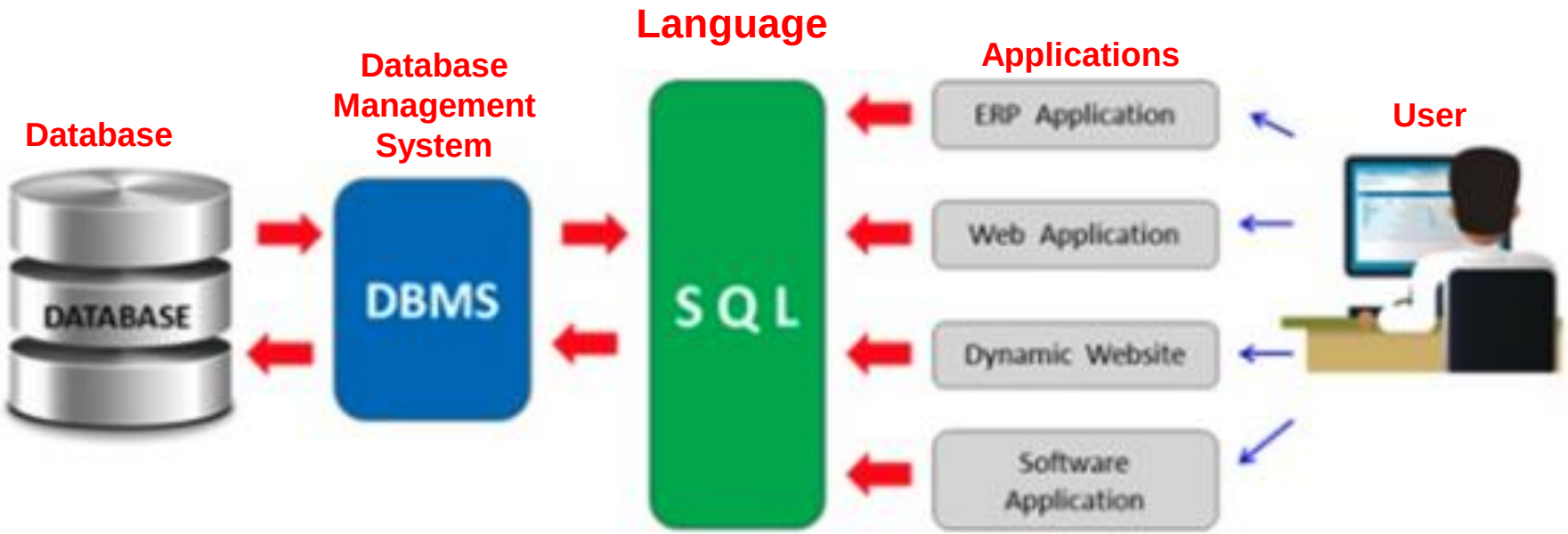
What is a database?

"A database is an organized collection of data stored in a computer system."

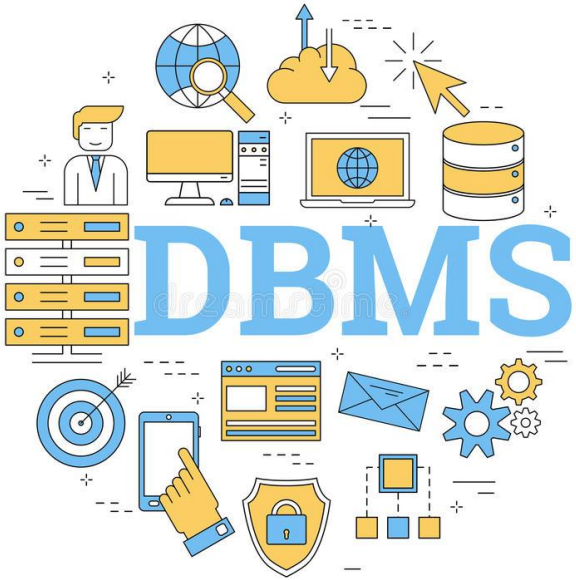
How are databases used in the real-world?



Database Management System

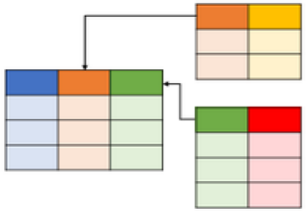


Database Management System



Types of Database Management System

SQL DATABASES



Relational

Primary Key

Foreign Key

Students

ID#	Name	Phone	DOB
500	Matt	555-4141	06/03/70
501	Jenny	867-5309	3/15/81
502	Sean	876-9123	10/31/82

ID#	ClassID	Sem
500	1001	Fall02
501	1002	Fall02
501	1002	Spr03
502	1003	S203

Takes_Course

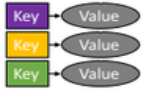
ClassID	Title	ClassNum
1001	Intro to Informatics	I101
1002	Data Mining	I400
1003	Internet and Society	I400

Courses

NoSQL DATABASES

Column

Graph



Key-Value

Document

```
Get customer.firstname,customer.lastname,cust
omer.productID.* where Last_Name='Whitelock'
```

Key	Value
746133	Firstname: George Lastname: Whitelock productID: 2012: 5
135225	Firstname: Luke Lastname: Whitelock productID: 1285: 1 1077: 5
884256	Firstname: Sam Lastname: Whitelock productID: 1442: 2

Types of Database Management System

Relational Database

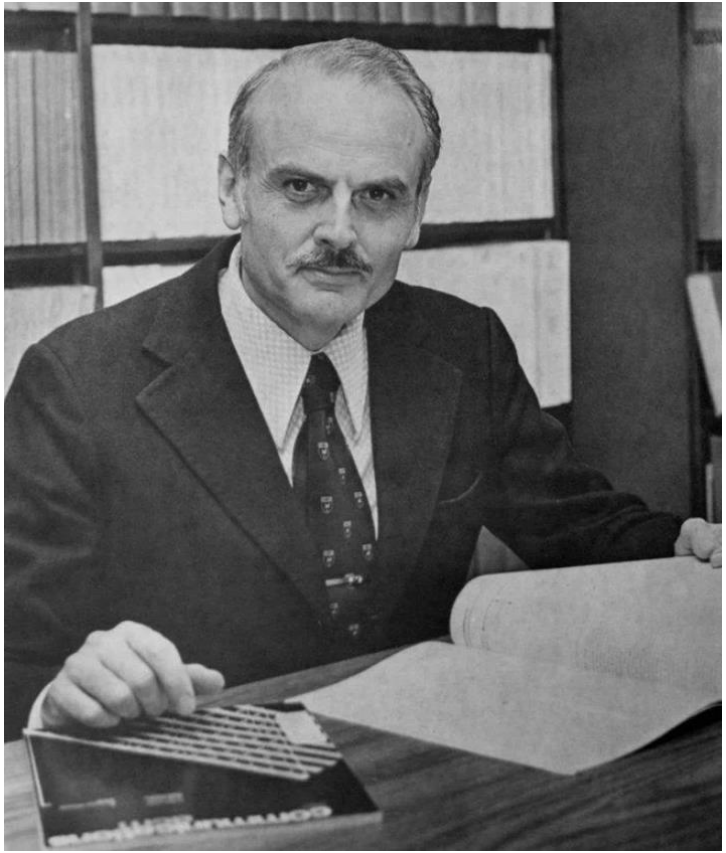
Non-Relational Database

Types of Database Management System

Edgar Frank "Ted" Codd
(19 August 1923 – 18 April 2003)

English computer scientist

While working for IBM, invented the relational model for database management.

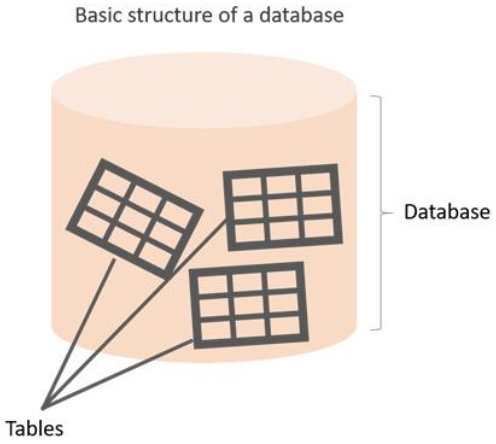


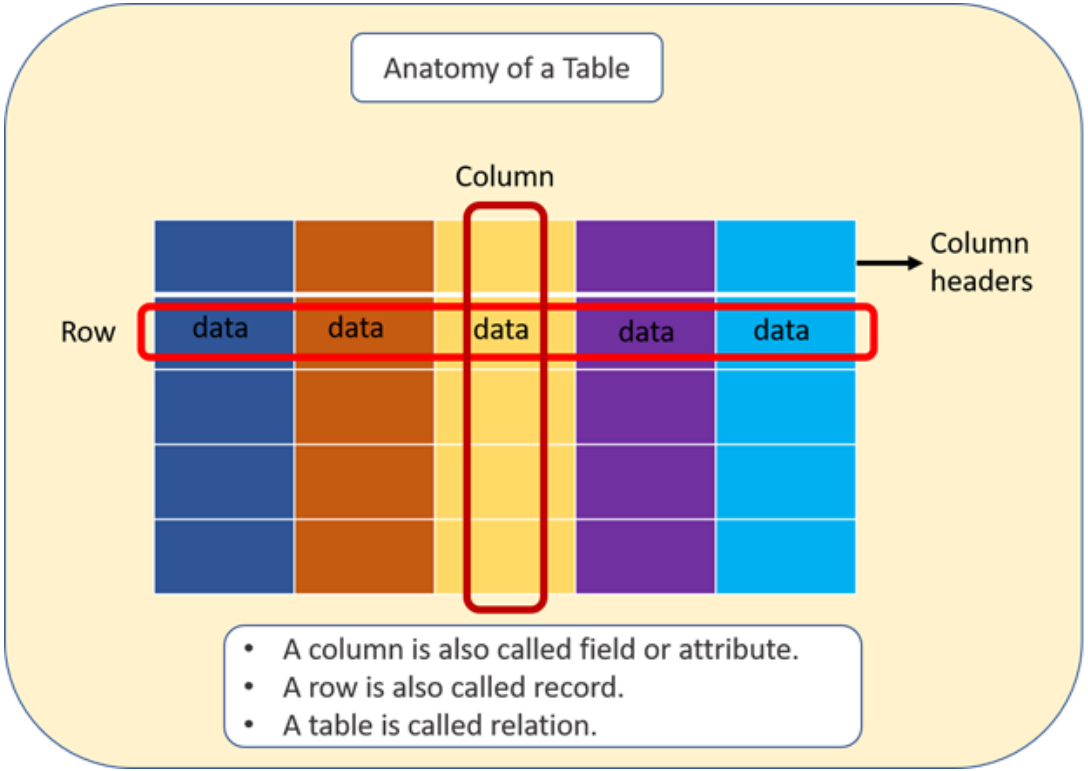
"SQLite is a C-language library that implements a small, fast, self-contained, serverless, high-reliability, full-featured, SQL database engine. SQLite is the **most used database engine** in the world. SQLite is built into **all mobile phones** and **most computers** and comes bundled inside countless other applications that people use every day."

What is in a database?

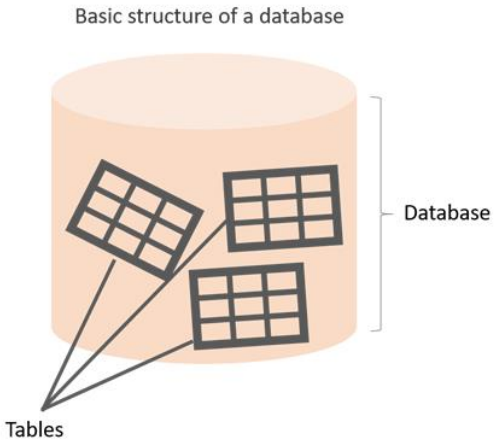
Students, write your response!

What is in a database?





What is in a database?



emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

employee table

3 Structured Query Language (SQL)

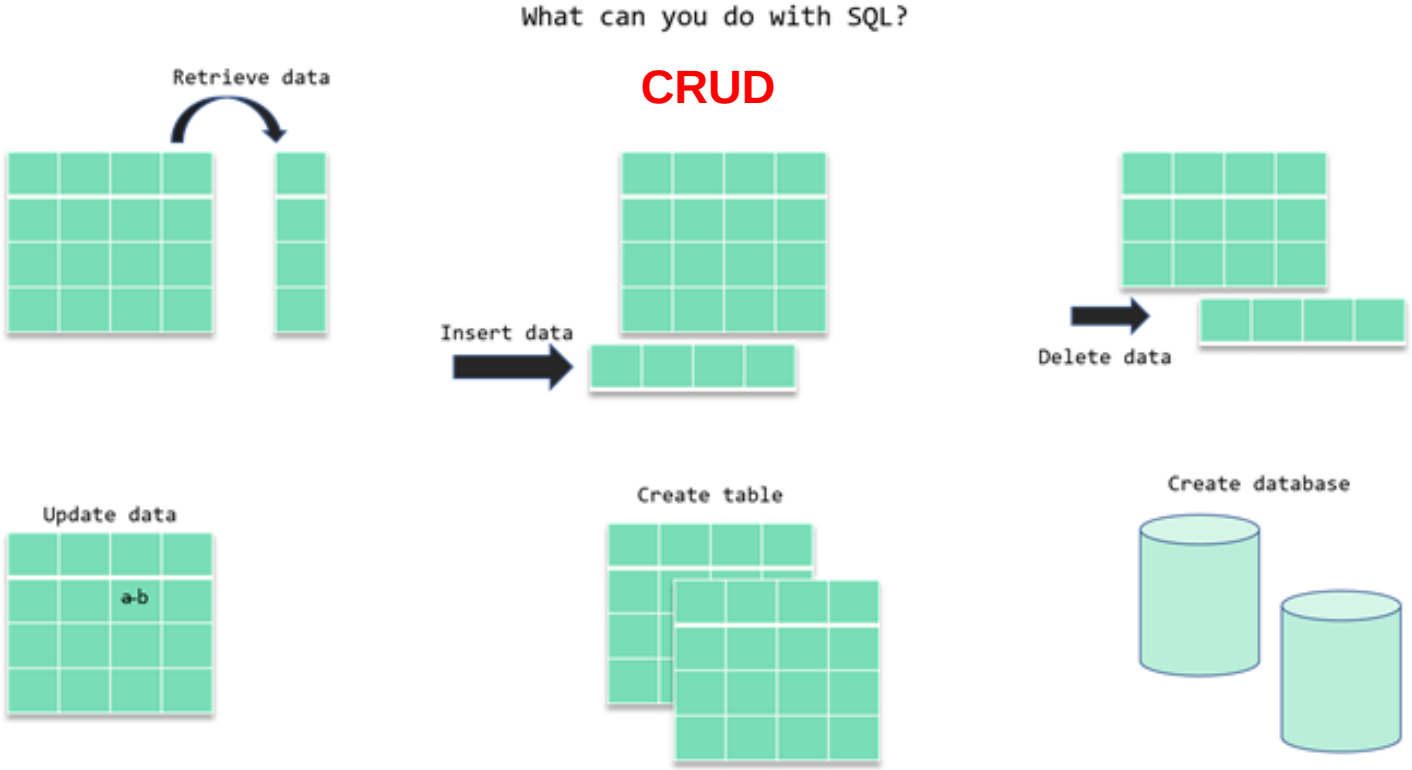
SQL

SQL stands for Structured Query Language

SQL lets you access and manipulate relational databases

SQL became a standard of the American National Standards Institute (ANSI) in 1986, and of the International Organization for Standardization (ISO) in 1987

Structured Query Language (SQL)



Drag your dot to how you are feeling:

Keep going, I understand

I’m a little confused

Stop, I need help!

Students, drag the icon!

4 SQL Language Elements

"The beginning of wisdom is the definition of terms."

Socrates (470 – 399 B.C.)

SQL Language Rules

1) SQL is **not** case-sensitive language (Except our Strings).

2) SQL syntax looks like English Grammar.

```
SELECT name, profit
FROM Companies
WHERE location == "USA"
ORDER BY number_of_employees;
```

3) A **semi-comma** (;) is placed at the end of completed commands.

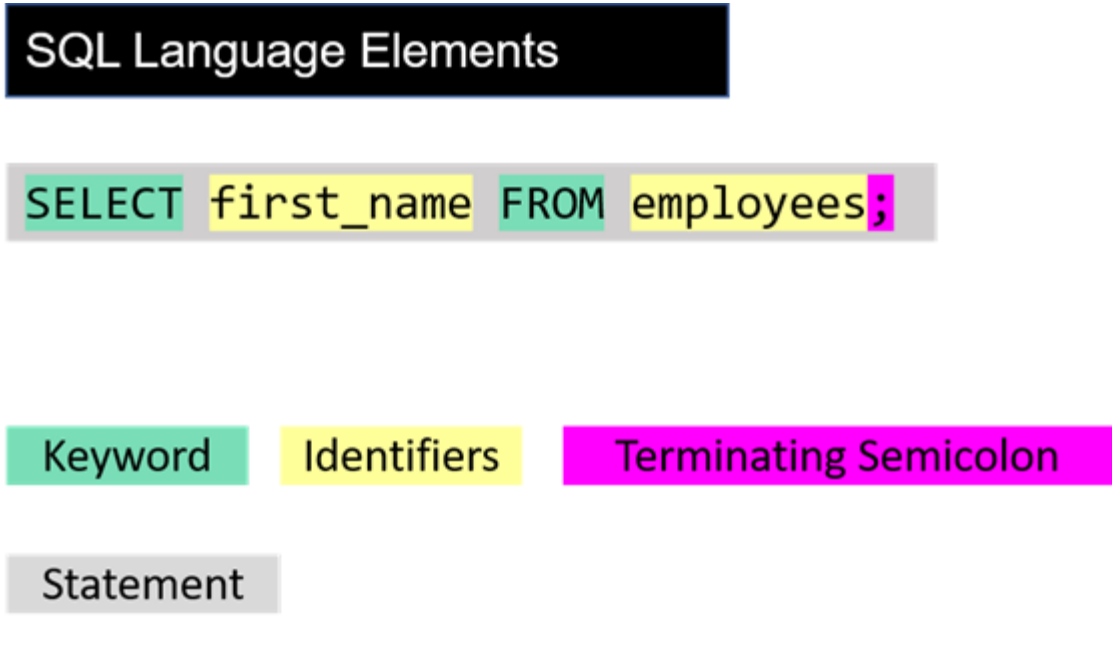
4) Generally, **BNF** notation is used

Keywords => UPPER CASE
identifiers => LOWER CASE
Example: DROP TABLE students;

5) Non-numeric expressions are enclosed in single quotes.

Examples: 'New York', 'John', '2021-02-01'

SQL Language Elements



(SQL Syntax)

SELECT Statement

Introduction

- You can retrieve rows from the columns of the table by using SELECT statement.
- SELECT statement is used with FROM keyword.
- The SELECT statement is used to select data from a database.

```
1  SELECT column_name(s) FROM table_name;
2
```

SELECT first_name FROM employees;

employees table

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
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49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

first_name
Elvis
Rodney
Billie
Lisa
Robert
Jason
Linda
Gayle
Hugo
David

Basic Syntax

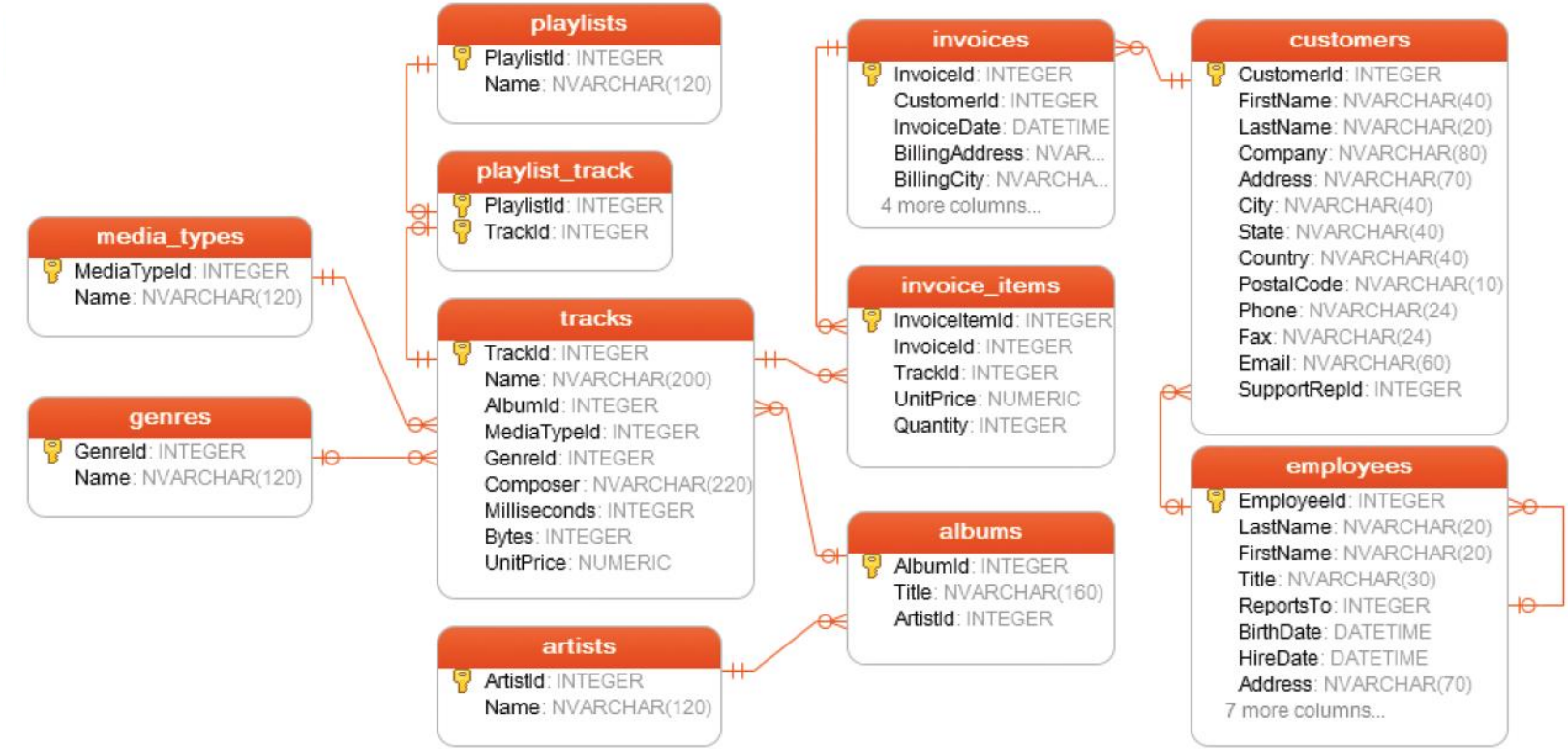
```sql
SELECT first_name FROM employees;
```

```sql
select column_name(s) from table_name;
SELECT COLUMN_NAME(s) FROM TABLE_NAME;
```

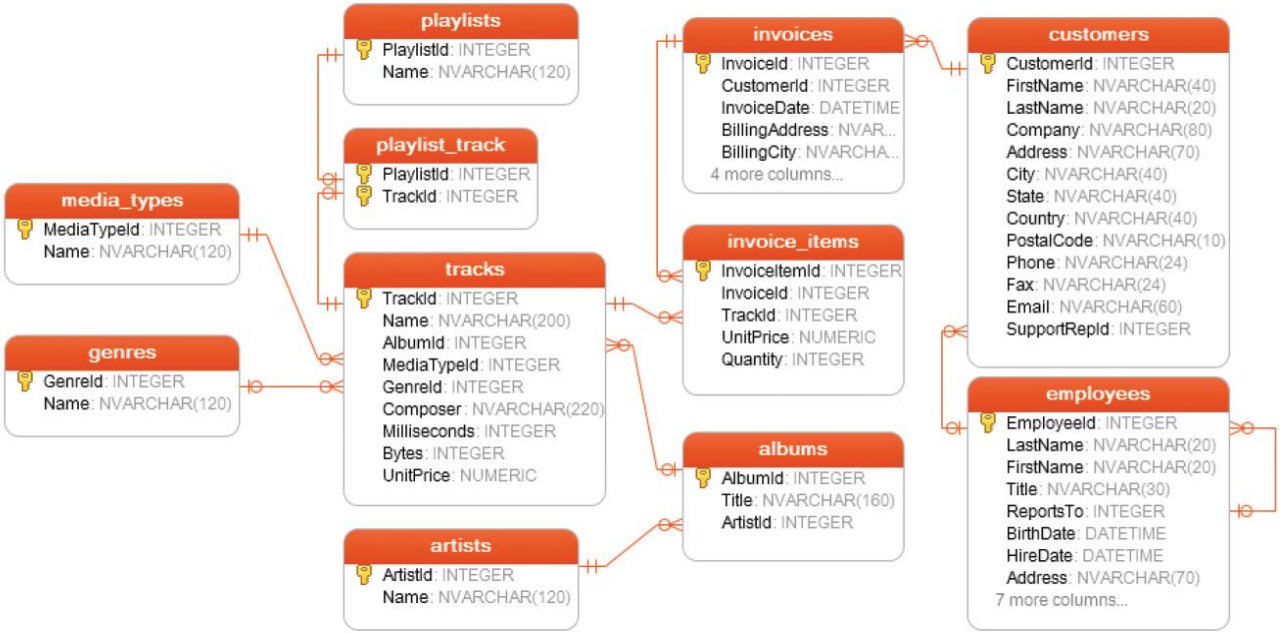
```sql
SELECT                                  column_name(s)

FROM                        table_name;
```

Query Time

Entity Relationship Diagram



Write a query that returns the track name using tracks table.



3 Selecting Multiple Columns

Selecting Multiple Columns

column1	column2	column3
column1_value1	column2_value1	column3_value1
column1_value2	column2_value2	column3_value2
column1_value3	column2_value3	column3_value3

query :

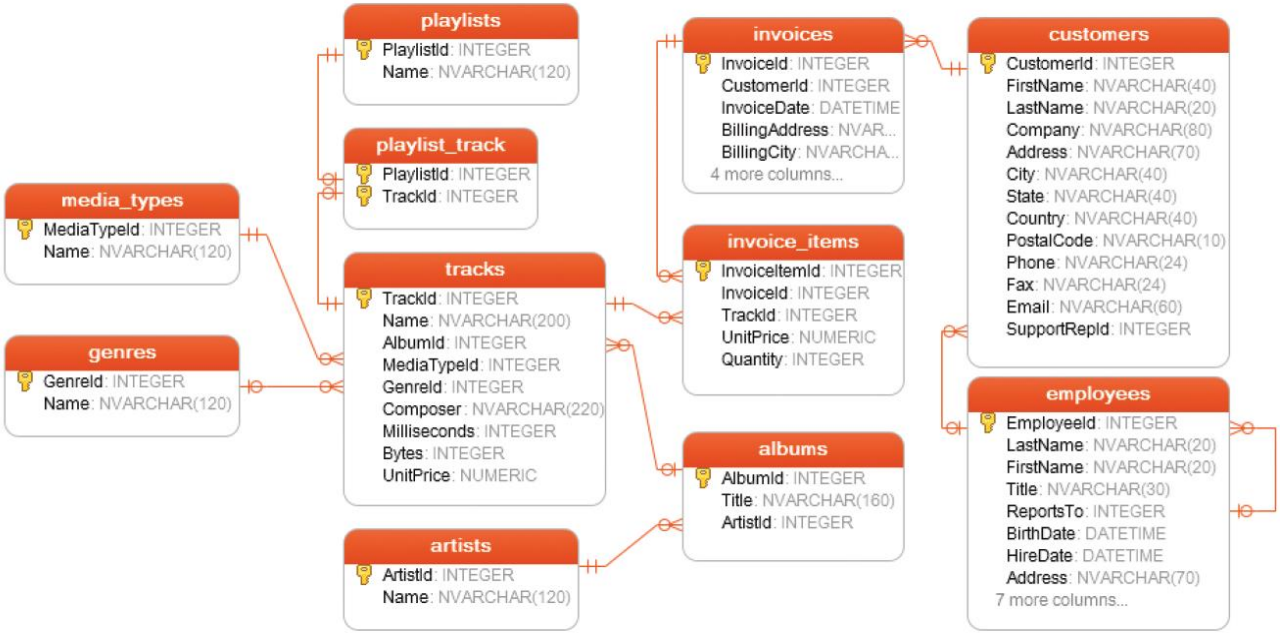
```
1  SELECT column1, column2 FROM table1;
2
```

output :

```
1  column1         column2
2  --------------  --------------
3  column1_value1  column2_value1
4  column1_value2  column2_value2
5  column1_value3  column2_value3
```

Query Time

Write a query that returns track name and its composer using tracks table.



Selecting All Columns

column1	column2	column3
column1_value1	column2_value1	column3_value1
column1_value2	column2_value2	column3_value2
column1_value3	column2_value3	column3_value3

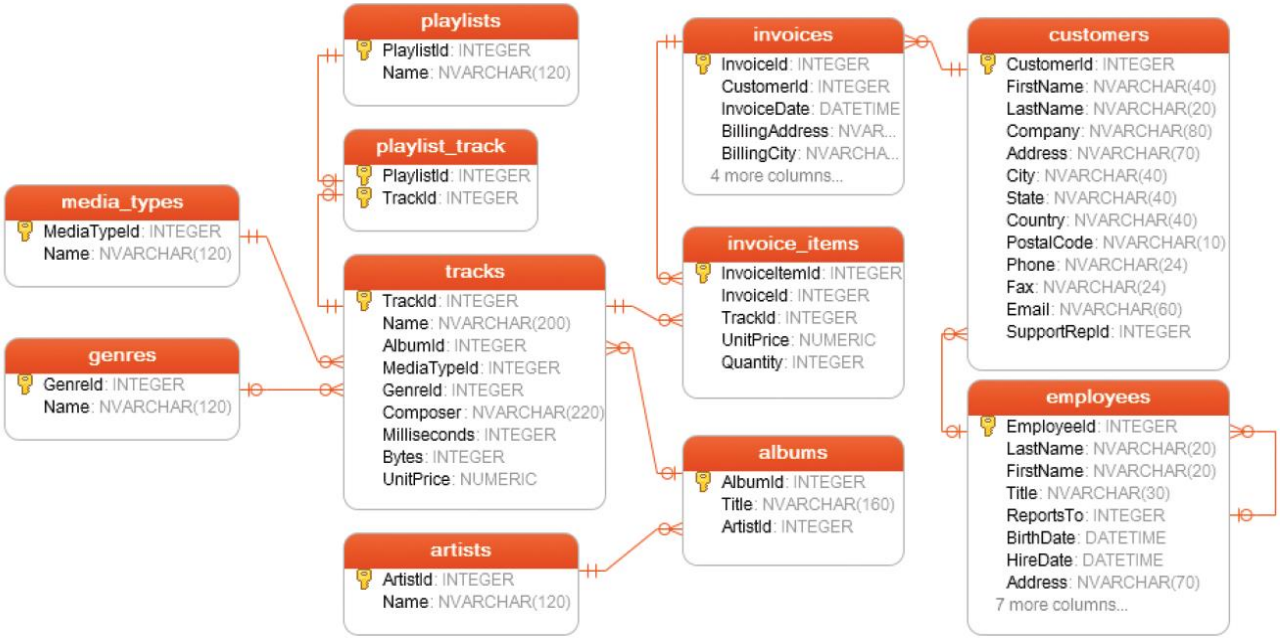
query :

```
1  SELECT column1, column2, column3 FROM table1;
2
```

output :

```
1  column1         column2         column3
2  --------------  --------------  --------------
3  column1_value1  column2_value1  column3_value1
4  column1_value2  column2_value2  column3_value2
5  column1_value3  column2_value3  column3_value3
6
```

Write a query that returns all columns of albums table.



Selecting All Columns (Special Character)

To retrieve all of the information from your table, an asterisk (*) character can be used after the SELECT

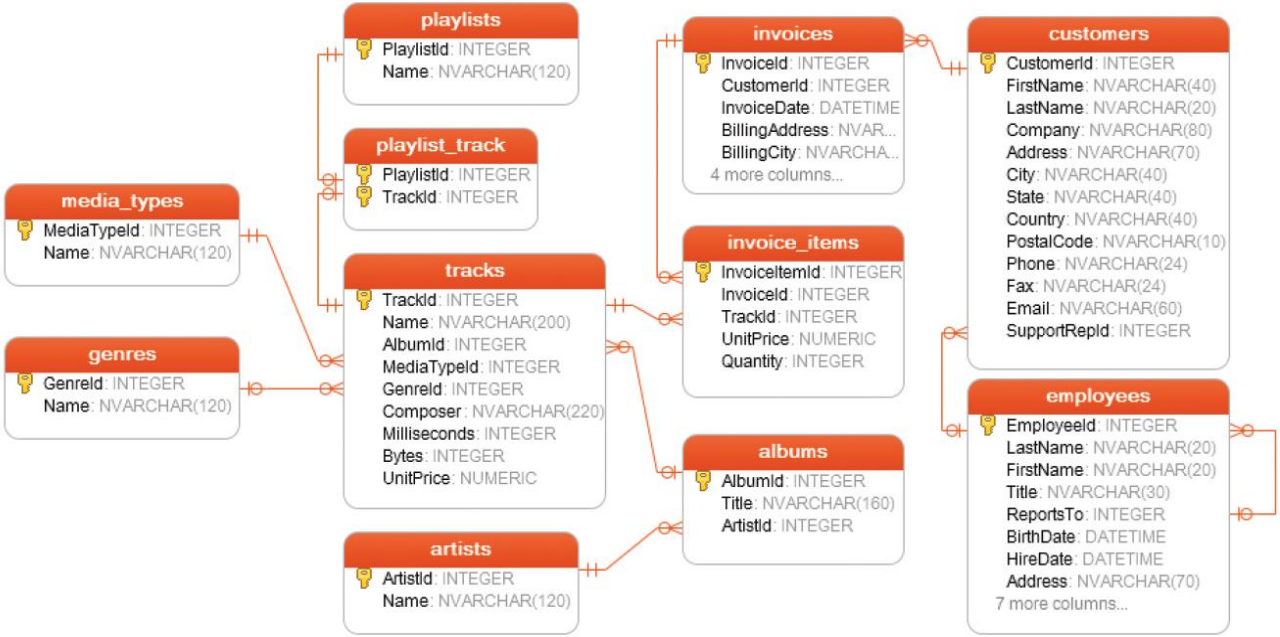
query :

```
1  SELECT * FROM table1;
2
```

output :

```
1  column1         column2         column3
2  --------------  --------------  --------------
3  column1_value1  column2_value1  column3_value1
4  column1_value2  column2_value2  column3_value2
5  column1_value3  column2_value3  column3_value3
6
```

Write a query that returns columns of tracks table.



DISTINCT Clause

Introduction

Columns in the tables may often contain some duplicate values, but you may only need the distinct values as a result. In such cases, we use the SELECT statement with the DISTINCT clause.

Introduction

The SELECT DISTINCT is used to return only distinct (different/unique) values to eliminate duplicate rows in a result set. Here is the syntax of the DISTINCT clause:

```
1  SELECT DISTINCT column_name(s) FROM table_name;
2
```

No Duplicated Rows

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

query :

```
1  SELECT DISTINCT student FROM student_table;
2
```

output :

```
1  student
2  ----------
3  Student1
4  Student2
5  Student3
6  Student4
7  Student5
8  Student6
9  Student7
10
```

Duplicated Rows

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

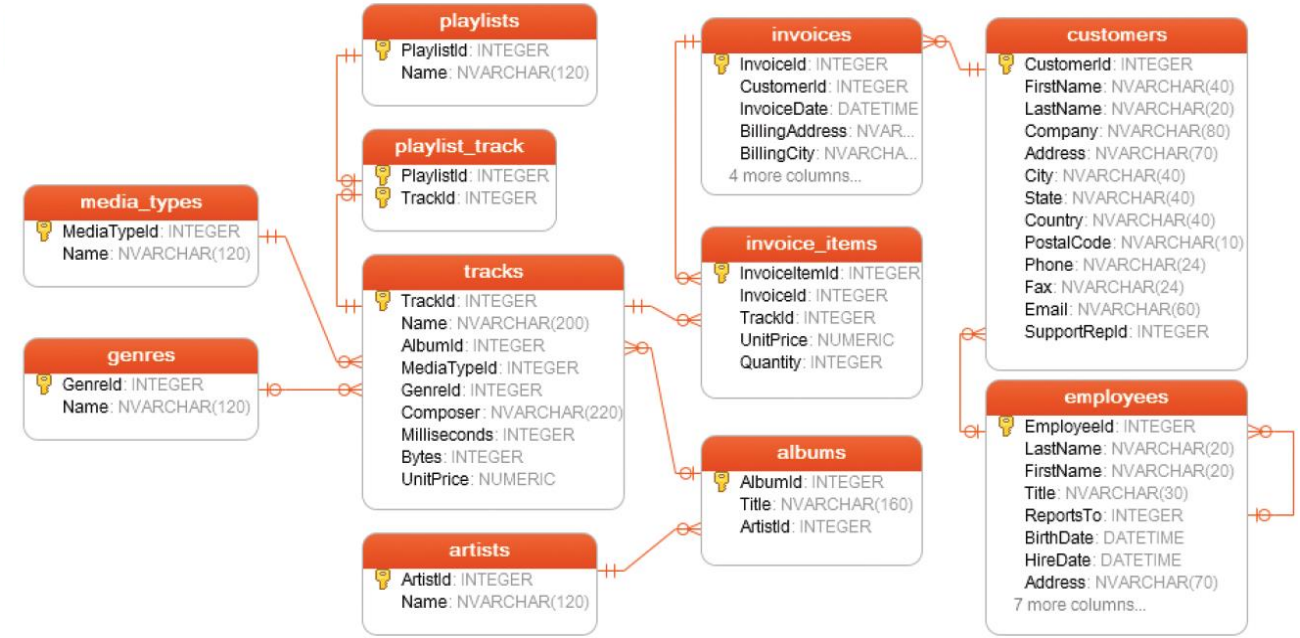
query :

```
1  SELECT DISTINCT lesson FROM student_table;
2
```

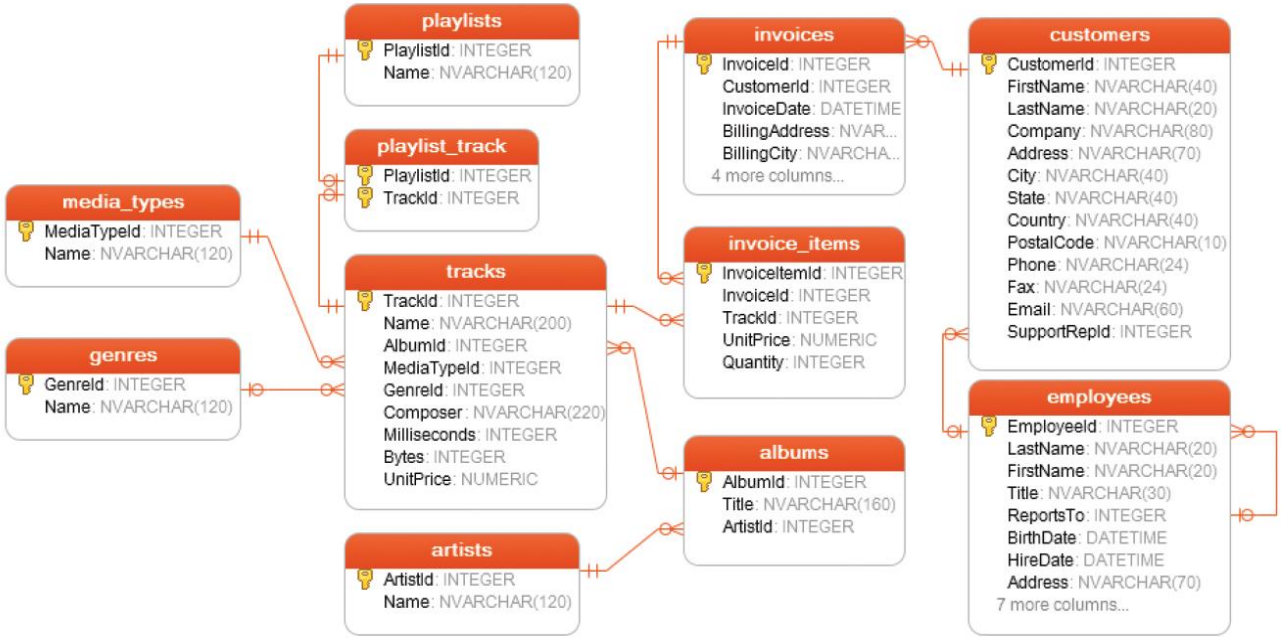
output:

```
1  lesson
2  -----------
3  Mathematics
4  Literature
5  Chemistry
6  Physics
7
```

Find the name of composers of each track using tracks table.



Write a query that return distinct AlbumId, MediaTypeId pair.



WHERE & LIMIT Clauses

Introduction

The WHERE clause is used to filter records.
It allows you to define a specific search condition for the result set returned by a query.

Syntax

```
1  SELECT column_name(s) FROM table_name WHERE condition(s);
2
```

WHERE Clause - Operators

Operators in the WHERE Clause

Operator	Description
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal
<=	Less than or equal
<>	Not equal. This operator may be written as != in some versions of SQL
BETWEEN	Test if a value is between a certain range of values
LIKE	Determine if a character string matches a predefined pattern
IN	Test whether or a value matches any value in a list

WHERE Clause - Operators

student_table

student	lesson	grade
Student1	Mathematics	95
Student2	Literature	60
Student3	Mathematics	45
Student4	Chemistry	85
Student5	Physics	70
Student6	Physics	75
Student7	Mathematics	75

query :

```
1  SELECT * FROM student_table WHERE grade > 70
2
```

output:

```
1  student     lesson       grade
2  ----------  -----------  ----------
3  Student1    Mathematics  95
4  Student4    Chemistry    85
5  Student6    Physics      75
6  Student7    Mathematics  75
7
```

Example-1

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

query :

```
1  SELECT * FROM student_table WHERE lesson = "Mathematics";
2
```

output :

```
1  student     lesson       grade
2  ----------  -----------  ----------
3  Student1    Mathematics  95
4  Student3    Mathematics  45
5  Student7    Mathematics  75
6
```

Example-2

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

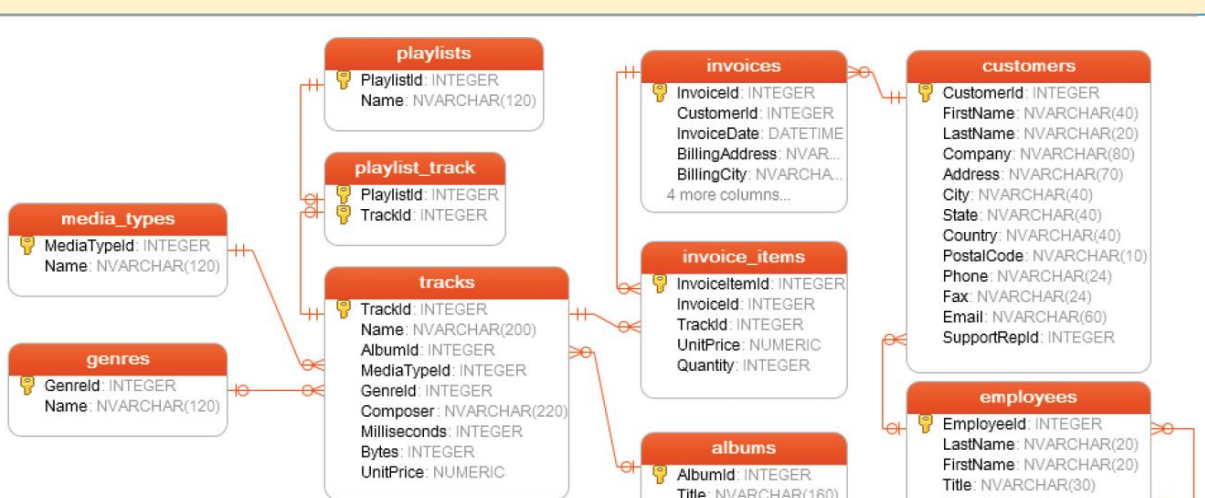
query :

```
1  SELECT * FROM student_table WHERE grade < 70
2
```

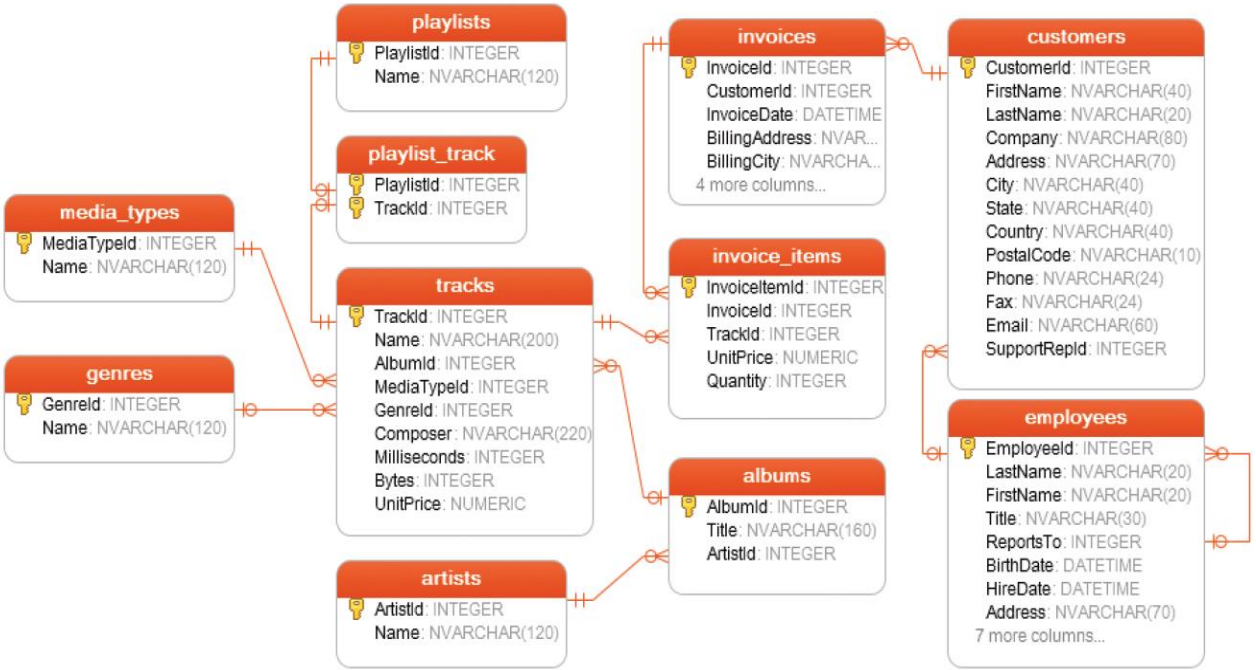
output:

```
1  student     lesson      grade
2  ----------  ----------  ----------
3  Student2    Literature  65
4  Student3    Mathematic  45
5
```

Find the track names of Jimi Hendrix.



Find all the info of the invoices of which total amount is greater than $10.



5 LIMIT Clause

LIMIT Clause

- The LIMIT clause is used to filter records.
- It constrains the number of rows returned by a query.

Here is the syntax of the `LIMIT` clause.

```
1  SELECT column_name(s) FROM table_name LIMIT number_rows;
2
```

LIMIT Clause

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

query:

```
1  SELECT * FROM student_table LIMIT 3;
2
```

output:

```
1  student     lesson       grade
2  ----------  -----------  ----------
3  Student1    Mathematics  95
4  Student2    Literature   65
5  Student3    Mathematics  45
6
```

LIMIT Clause

We can also combine LIMIT with WHERE. In that case, LIMIT clause is placed after the WHERE clause.

LIMIT Clause

student_table

	student	lesson	grade
1	Student1	Mathematics	95
2	Student2	Literature	65
3	Student3	Mathematics	45
4	Student4	Chemistry	85
5	Student5	Physics	70
6	Student6	Physics	75
7	Student7	Mathematics	75

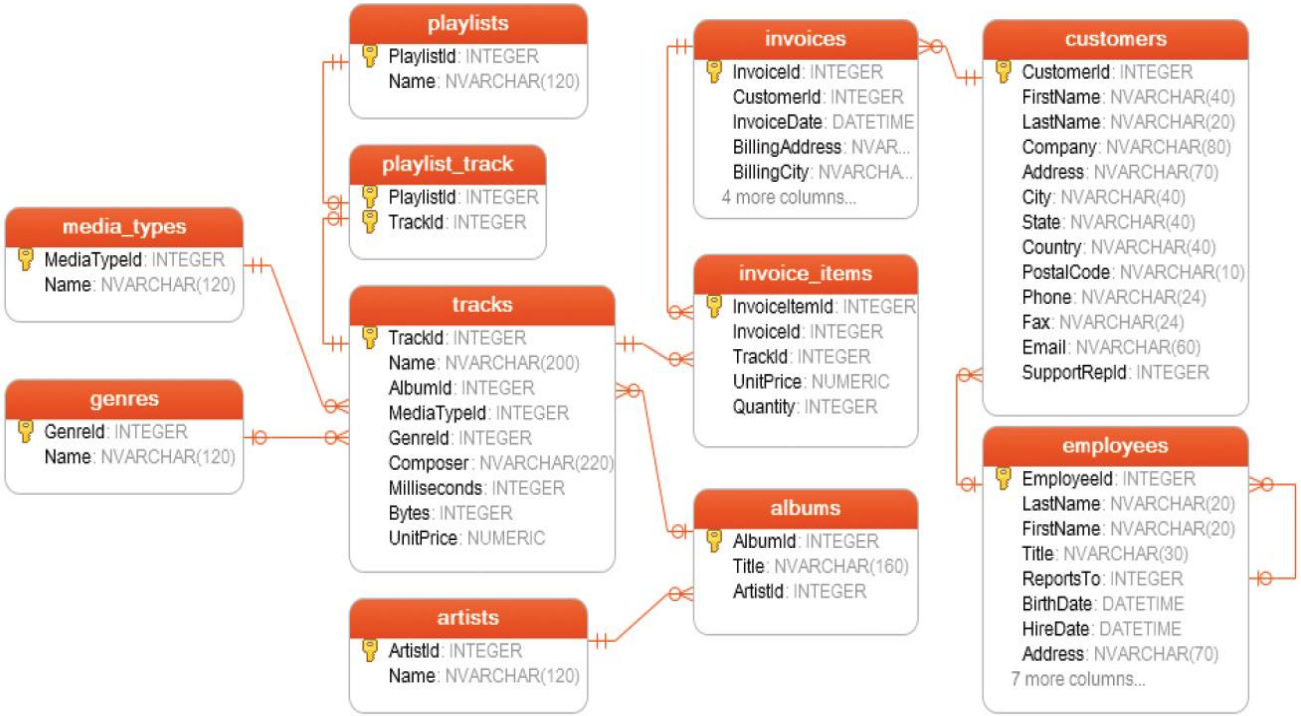
query:

```
1  SELECT * FROM student_table WHERE grade > 70 LIMIT 2;
2
```

output:

```
1  student     lesson       grade
2  ----------  -----------  ----------
3  Student1    Mathematics  95
4  Student4    Chemistry    85
5
```

Find all the info of the invoices of which total amount is greater than $10. Just return the first 4



ORDER BY Clause

Order By Clause

- In case you want to retrieve data in alphabetical or numeric order, we use ORDER BY keyword.
- By default ORDER BY keyword sorts the records in ascending order.
- Use the keyword DESC to sort the records in descending order. You can also use ASC explicitly to sort the data in ascending order.

Syntax

```
1  SELECT column_name(s) FROM table_name ORDER BY column_name(s) ASC|DESC;
2
```

Order By Clause

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT * FROM employees ORDER BY first_name ASC;
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
97927       Billie      Lanning     67000       Web Developer   Female      2018-06-25
30840       David       Barrow      85000       Data Scientis   Male        2019-12-02
26650       Elvis       Ritter      86000       Sales Manager   Male        2017-11-24
71329       Gayle       Meyer       77000       HR Manager      Female      2019-06-28
49714       Hugo        Forester    55000       IT Support Sp   Male        2019-11-22
76589       Jason       Christian   99000       Project Manag   Male        2019-01-21
51821       Linda       Foster      95000       Data Scientis   Female      2019-04-29
67323       Lisa        Wiener      75000       Business Anal   Female      2018-08-09
17679       Robert      Gilmore     110000      Operations Di   Male        2018-09-04
70950       Rodney      Weaver      87000       Project Manag   Male        2018-12-20
```

Sorting in Descending Order

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT * FROM employees ORDER BY first_name DESC;
```

output:

```
emp_id      first_name  last_name   salary      job_title          gender      hire_date
----------  ----------  ----------  ----------  ---------------  ----------  ----------
70950       Rodney      Weaver      87000       Project Manager    Male        2018-12-20
17679       Robert      Gilmore     110000      Operations Dire    Male        2018-09-04
67323       Lisa        Wiener      75000       Business Analys    Female      2018-08-09
51821       Linda       Foster      95000       Data Scientist     Female      2019-04-29
76589       Jason       Christian   99000       Project Manager    Male        2019-01-21
49714       Hugo        Forester    55000       IT Support Spec    Male        2019-11-22
71329       Gayle       Meyer       77000       HR Manager         Female      2019-06-28
26650       Elvis       Ritter      86000       Sales Manager      Male        2017-11-24
30840       David       Barrow      85000       Data Scientist     Male        2019-12-02
97927       Billie      Lanning     67000       Web Developer      Female      2018-06-25
```

Sorting in Descending Order

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT first_name, last_name, salary FROM employees ORDER BY salary DESC;
```

output :

```
1  first_name  last_name   salary
2  ----------  ----------  ----------
3  Robert      Gilmore     110000
4  Jason       Christian   99000
5  Linda       Foster      95000
6  Rodney      Weaver      87000
7  Elvis       Ritter      86000
8  David       Barrow      85000
9  Gayle       Meyer       77000
10 Lisa        Wiener      75000
11 Billie      Lanning     67000
12 Hugo        Forester    55000
```

Sorting By Multiple Columns

```
1  SELECT column_name(s) FROM table_name ORDER BY column1 ASC|DESC, column2
       ASC|DESC, columnN ASC|DESC;
2
```

Sorting By Multiple Columns

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT * FROM employees ORDER BY gender DESC, first_name ASC;
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
30840       David       Barrow      85000       Data Scientist  Male        2019-12-02
26650       Elvis       Ritter      86000       Sales Manager   Male        2017-11-24
49714       Hugo        Forester    55000       IT Support Spe  Male        2019-11-22
76589       Jason       Christian   99000       Project Manage  Male        2019-01-21
17679       Robert      Gilmore     110000      Operations Dir  Male        2018-09-04
70950       Rodney      Weaver      87000       Project Manage  Male        2018-12-20
97927       Billie      Lanning     67000       Web Developer   Female      2018-06-25
71329       Gayle       Meyer       77000       HR Manager      Female      2019-06-28
51821       Linda       Foster      95000       Data Scientist  Female      2019-04-29
67323       Lisa        Wiener      75000       Business Analy  Female      2018-08-09
```

ORDER BY Clause with WHERE Clause

```
1  SELECT column_name(s) FROM table_name WHERE condition ORDER BY column_name(s)s
       ASC|DESC;
2
```

Beautifying

```
1  SELECT column_name(s)
2  FROM table_name
3  WHERE condition
4  ORDER BY column_name(s)s ASC|DESC;
5
```

ORDER BY Clause with WHERE Clause

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

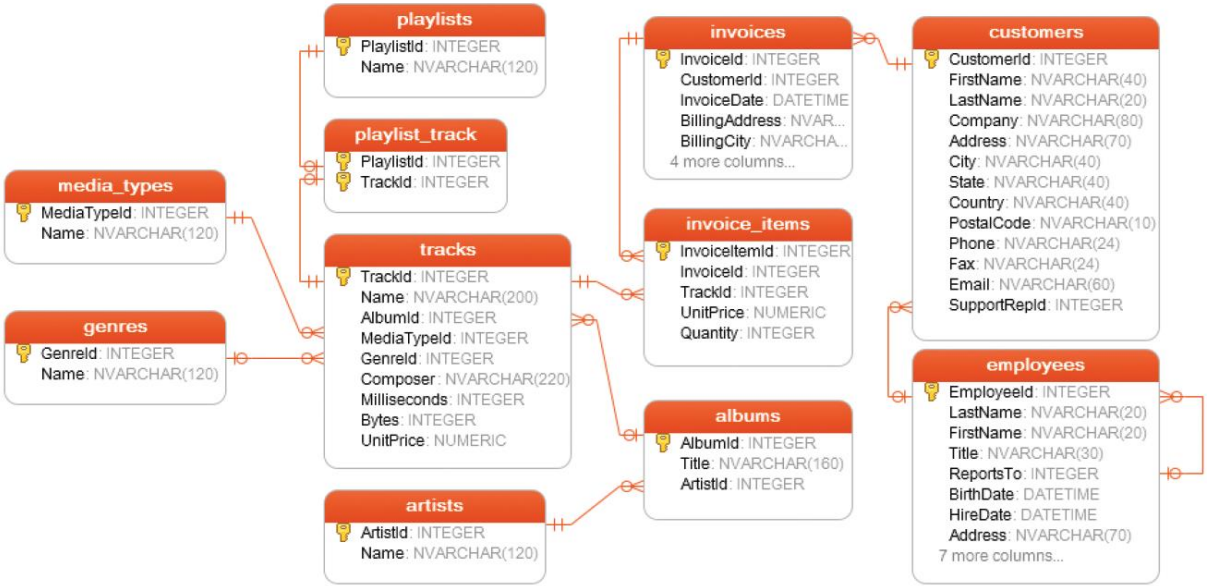
query :

```
1  SELECT *
2  FROM employees
3  WHERE salary > 80000
4  ORDER BY first_name DESC;
```

output:

```
emp_id      first_name  last_name   salary      job_title          gender      hire_date
----------  ----------  ----------  ----------  ---------------  ----------  ----------
70950       Rodney      Weaver      87000       Project Manager  Male        2018-12-20
17679       Robert      Gilmore     110000      Operations Dire  Male        2018-09-04
51821       Linda       Foster      95000       Data Scientist   Female      2019-04-29
76589       Jason       Christian   99000       Project Manager  Male        2019-01-21
26650       Elvis       Ritter      86000       Sales Manager    Male        2017-11-24
30840       David       Barrow      85000       Data Scientist   Male        2019-12-02
```

Find all the info of the invoices of which total amount is greater than $10. Then sort them by the total amount in descending order.

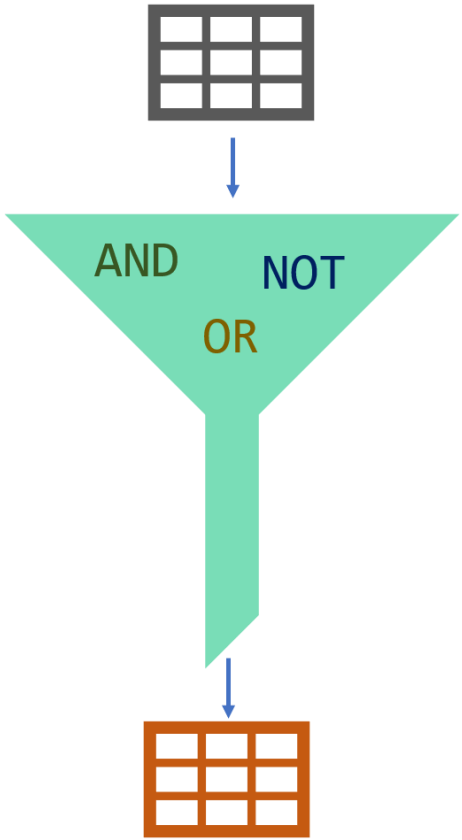


AND, OR & NOT Operators

1 Introduction

Introduction

In SQL, **AND, OR & NOT** keywords are called logical operators. Their purposes are filtering the data based on conditions.



AND Operator

The AND operator is used with the WHERE clause and combines multiple expressions. It returns only those records where both conditions (in WHERE clause) evaluate to True.

Syntax

```
1  WHERE left_conditon AND right_condition
2
```

AND Operator

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT *
2  FROM employees
3  WHERE job_title = 'Data Scientist' AND gender = 'Male';
4
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
30840       David       Barrow      85000       Data Scientist  Male        2019-12-02
```

OR Operator

The OR operator is used with the WHERE clause and combines multiple expressions. It displays the record where either one of conditions (in WHERE clause) evaluates to True.

Syntax

```
1  WHERE first_condition OR second_condition
2
```

OR Operator

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT *
2  FROM employees
3  WHERE job_title = 'Data Scientist' OR gender = 'Male';
4
```

output:

```
emp_id      first_name  last_name   salary      job_title           gender      hire_date
----------  ----------  ----------  ----------  ------------------  ----------  ----------
17679       Robert      Gilmore     110000      Operations Director  Male        2018-09-04
26650       Elvis       Ritter      86000       Sales Manager       Male        2017-11-24
30840       David       Barrow      85000       Data Scientist      Male        2019-12-02
49714       Hugo        Forester    55000       IT Support Speciali  Male        2019-11-22
51821       Linda       Foster      95000       Data Scientist      Female      2019-04-29
70950       Rodney      Weaver      87000       Project Manager     Male        2018-12-20
76589       Jason       Christian   99000       Project Manager     Male        2019-01-21
```

NOT Operator

The NOT operator is used to negate a condition in the WHERE clause. NOT is placed right after WHERE keyword. You can use it with AND & OR operators.

Syntax

```
1  WHERE NOT first_condition
2
```

NOT Operator

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

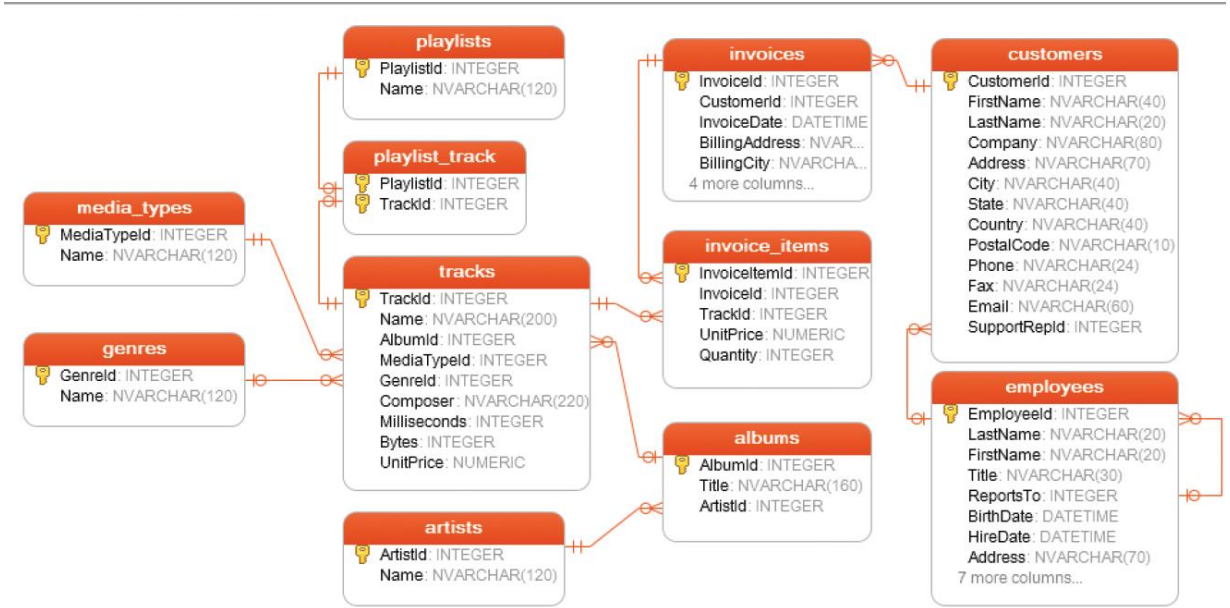
query :

```
1  SELECT *
2  FROM employees
3  WHERE NOT gender = 'Female';
```

output:

```
emp_id      first_name  last_name   salary      job_title           gender      hire_date
----------  ----------  ----------  ----------  ------------------  ----------  ----------
17679       Robert      Gilmore     110000      Operations Director  Male        2018-09-04
26650       Elvis       Ritter      86000       Sales Manager       Male        2017-11-24
30840       David       Barrow      85000       Data Scientist      Male        2019-12-02
49714       Hugo        Forester    55000       IT Support Speciali  Male        2019-11-22
70950       Rodney      Weaver      87000       Project Manager     Male        2018-12-20
76589       Jason       Christian   99000       Project Manager     Male        2019-01-21
```

Find all the info of the invoices of which billing country is not USA. Then sort them by the total amount in ascending order.



BETWEEN OPERATOR

Introduction

The BETWEEN operator is used for comparison in WHERE clauses. It's a comparison operator. You can use it to test if a value is in a range of values. If the value is in the specified range, the query returns all records fallen within that range.

```
1  WHERE test_expression BETWEEN low_expression AND high_expression
2
```

=

```
1  WHERE test_expression >= low_expression AND test_expression <= high_expression
```

Introduction

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT *
2  FROM employees
3  WHERE salary BETWEEN 80000 AND 90000;
4
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
26650       Elvis       Ritter      86000       Sales Manager   Male        2017-11-24
30840       David       Barrow      85000       Data Scientis   Male        2019-12-02
70950       Rodney      Weaver      87000       Project Manag   Male        2018-12-20
```

NOT BETWEEN Operator

We can use NOT BETWEEN to negate the result of the BETWEEN operator. The following is the syntax:

Syntax

```
1  WHERE test_expression NOT BETWEEN low_expression AND high_expression
2
```

BETWEEN with Date Example

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

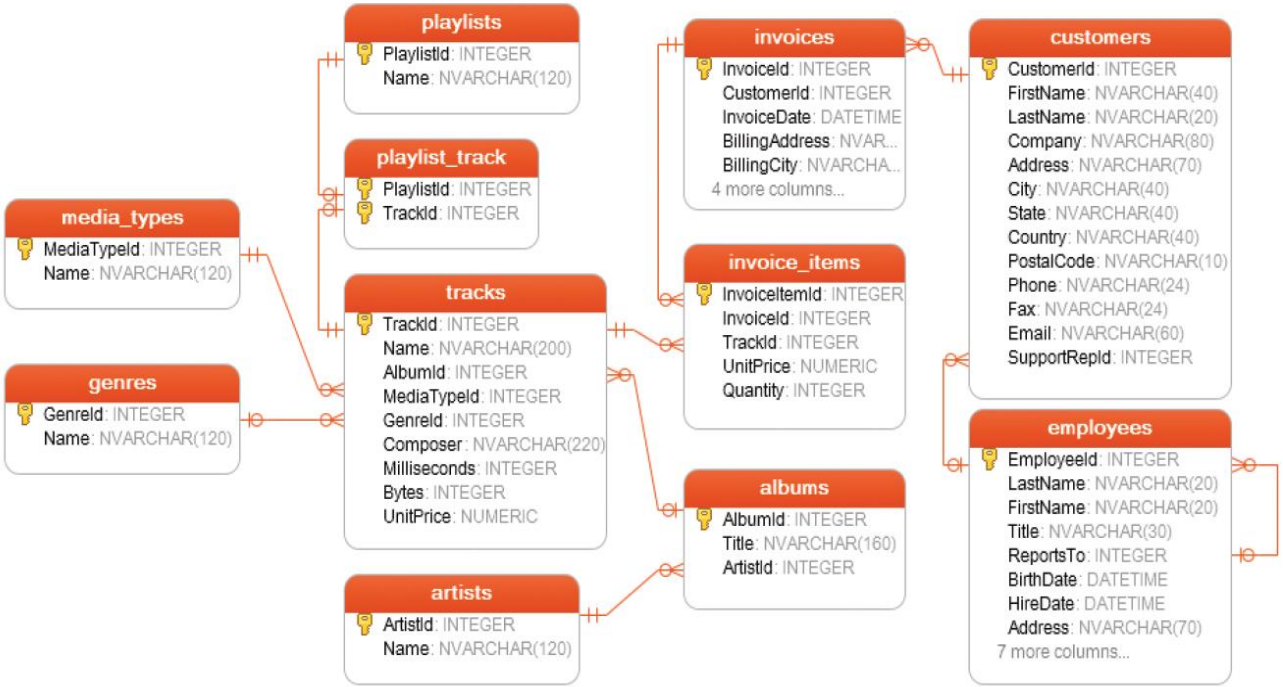
query :

```
1  SELECT *
2  FROM employees
3  WHERE hire_date BETWEEN '2018-06-01' AND '2019-03-31'
4  ORDER BY hire_date;
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
97927       Billie      Lanning     67000       Web Developer   Female      2018-06-25
67323       Lisa        Wiener      75000       Business Anal   Female      2018-08-09
17679       Robert      Gilmore     110000      Operations Di   Male        2018-09-04
70950       Rodney      Weaver      87000       Project Manag   Male        2018-12-20
76589       Jason       Christian   99000       Project Manag   Male        2019-01-21
```

Find the newest invoice date among the invoice dates between 2009 and 2011.



Using **BETWEEN** is tricky for datetime! While **BETWEEN** is generally inclusive of endpoints, it assumes the time is at 00:00:00 (i.e. midnight) for **datetime**. So, the end point is exclusive. But, if you have just **date**, then **BETWEEN** behaves as expected.

IN OPERATOR

1 Introduction

Introduction

The IN operator is used to determine whether a value matches any value in a list. We use IN operator with WHERE clause.

Syntax

```
1  WHERE column_name IN (value_list)
2
```

Introduction

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query:

```
1  SELECT *
2  FROM employees
3  WHERE job_title IN ('Data Scientist', 'Business Analyst');
4
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
30840       David       Barrow      85000       Data Scientist  Male        2019-12-02
51821       Linda       Foster      95000       Data Scientist  Female      2019-04-29
67323       Lisa        Wiener      75000       Business Analy  Female      2018-08-09
```

If you have a query in which you use many OR operators, consider using the IN operator instead. This will make your query more readable.

NOT IN Operator

We are going to add the keyword NOT to our IN operator.

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

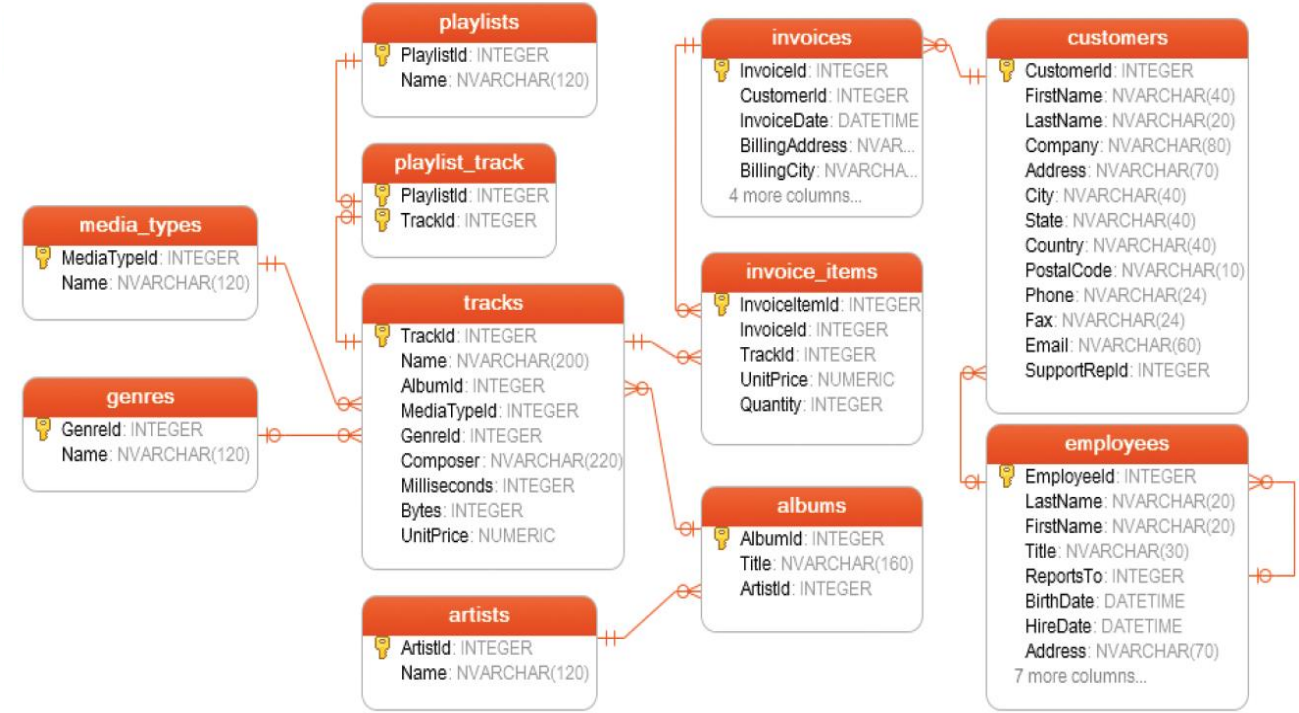
query :

```
1  SELECT *
2  FROM employees
3  WHERE job_title
4  NOT IN ('Operations Director', 'HR Manager', 'Sales Manager');
5
```

output:

```
emp_id      first_name  last_name   salary      job_title       gender      hire_date
----------  ----------  ----------  ----------  --------------  ----------  ----------
30840       David       Barrow      85000       Data Scientist  Male        2019-12-02
49714       Hugo        Forester    55000       IT Support Spe  Male        2019-11-22
51821       Linda       Foster      95000       Data Scientist  Female      2019-04-29
67323       Lisa        Wiener      75000       Business Analy  Female      2018-08-09
70950       Rodney      Weaver      87000       Project Manage  Male        2018-12-20
76589       Jason       Christian   99000       Project Manage  Male        2019-01-21
97927       Billie      Lanning     67000       Web Developer   Female      2018-06-25
```

Find the first and last name of the customers who gave an order from Belgium, Norway, Canada and USA.



LIKE OPERATOR

Introduction

Syntax

```
1  SELECT column_name(s)
2  FROM table_name
3  WHERE column_1 LIKE pattern;
4
```

Introduction

After LIKE keyword, we construct a pattern. SQL provides two special characters for constructing patterns. These are also called wildcards.

- Percent (%): The % character matches any sequence of zero or more characters.
- Underscore (_): The _ character matches any single character

Introduction

student_info table

	student_id	first_name	last_name	gender	state	county	field	start_date
1	110028	Michael	Crawford	M	Virginia	Albemarle	DevOps	2019-07-19
2	110078	Olivia	Smith	F	West Virginia	Tucker	Back-End Developer	2019-03-11
3	110080	Amelia	Anderson	F	West Virginia	Webster	Data Analysis	2019-04-25
4	110081	Megan	King	F	West Virginia	Kanawha	Back-End Developer	2019-06-07
5	110091	Richard	Morgan	M	Virginia	Prince William	DevOps	2019-06-28
6	110095	Hugo	Wallace	M	Virginia	Accomack	Data Analysis	2019-06-16
7	120001	Eleanor	Johnson	F	West Virginia	Wyoming	Front-End Developer	2019-03-22
8	120011	Oliver	Taylor	M	West Virginia	Hancock	Data Analysis	2019-04-14
9	120033	Lucas	Parker	M	West Virginia	Wayne	Data Science	2019-05-19
10	120048	Robert	Cox	M	Virginia	Accomack	Back-End Developer	2019-06-07
11	120087	Bill	Tucker	M	Virginia	Halifax	Data Analysis	2019-06-16
12	130558	Olivia	Brown	F	West Virginia	Kanawha	Quality Assurance (QA)	2019-04-02
13	130560	Joseph	Lee	M	West Virginia	Mingo	Quality Assurance (QA)	2019-05-08
14	130646	Jack	Rogers	M	Virginia	Prince William	Data Science	2019-05-19
15	120058	[illegible]	[illegible]	M	[illegible]	[illegible]	[illegible]	2019-[illegible]-21

query :

```
1  SELECT *
2  FROM student_info
3  WHERE county LIKE 'Wo%';
4
```

output:

```
1  SELECT *
2  FROM student_info
3  WHERE county LIKE 'Wo%';
4
```

% = 'od'

	student_id	first_name	last_name	gender	state	county	field	start_date
1	170555	Megan	Walker	F	West Virginia	Wood	Front-End Developer	2019-06-21

Percent Character Example

student_info table

	student_id	first_name	last_name	gender	state	county	field	start_date
1	110028	Michael	Crawford	M	Virginia	Albemarle	DevOps	2019-07-19
2	110078	Olivia	Smith	F	West Virginia	Tucker	Back-End Developer	2019-03-11
3	110080	Amelia	Anderson	F	West Virginia	Webster	Data Analysis	2019-04-25
4	110081	Megan	King	F	West Virginia	Kanawha	Back-End Developer	2019-06-07
5	110091	Richard	Morgan	M	Virginia	Prince William	DevOps	2019-06-28
6	110095	Hugo	Wallace	M	Virginia	Accomack	Data Analysis	2019-06-16
7	120001	Eleanor	Johnson	F	West Virginia	Wyoming	Front-End Developer	2019-03-22
8	120011	Oliver	Taylor	M	West Virginia	Hancock	Data Analysis	2019-04-14
9	120033	Lucas	Parker	M	West Virginia	Wayne	Data Science	2019-05-19
10	120048	Robert	Cox	M	Virginia	Accomack	Back-End Developer	2019-06-07
11	120087	Bill	Tucker	M	Virginia	Halifax	Data Analysis	2019-06-16
12	130558	Olivia	Brown	F	West Virginia	Kanawha	Quality Assurance (QA)	2019-04-02
13	130560	Joseph	Lee	M	West Virginia	Mingo	Quality Assurance (QA)	2019-05-08
14	130646	Jack	Rogers	M	Virginia	Prince William	Data Science	2019-05-19
15	130758	Elon	Powell	M	Virginia	Accomack	Back-End Developer	2019-06-21

query :

```
1  SELECT *
2  FROM student_info
3  WHERE field LIKE '%Developer';
4
```

output:

student_id	first_name	last_name	gender	state	county	field	start_date
110078	Olivia	Smith	F	West Virginia	Tucker	Back-End Developer	2019-03-11
110081	Megan	King	F	West Virginia	Kanawha	Back-End Developer	2019-06-07
120001	Eleanor	Johnson	F	West Virginia	Wyoming	Front-End Developer	2019-03-22
120048	Robert	Cox	M	Virginia	Accomack	Back-End Developer	2019-06-07
130758	Elon	Powell	M	Virginia	Accomack	Back-End Developer	2019-06-21
140799	Isla	Rivera	F	Virginia	Henrico	Front-End Developer	2019-06-21
150227	Chloe	Fisher	F	Virginia	Fairfax	Back-End Developer	2019-07-18
150234	George	Martinez	M	West Virginia	Pocahontas	Front-End Developer	2019-05-07
150246	Arthur	Wright	M	West Virginia	Monongalia	Back-End Developer	2019-06-07
160021	Olivia	Cooper	F	Virginia	Bedford	Front-End Developer	2019-06-21
170555	Megan	Walker	F	West Virginia	Wood	Front-End Developer	2019-06-21
170566	Jack	Morris	M	West Virginia	Wetzel	Front-End Developer	2019-06-28

Underscore Character Example

emp_id	first_name	last_name	salary	job_title	gender	hire_date
26650	Elvis	Ritter	86000	Sales Manager	Male	11/24/2017
70950	Rodney	Weaver	87000	Project Manager	Male	12/20/2018
97927	Billie	Lanning	67000	Web Developer	Female	6/25/2018
67323	Lisa	Wiener	75000	Business Analyst	Female	8/9/2018
17679	Robert	Gilmore	110000	Operations Director	Male	9/4/2018
76589	Jason	Christian	99000	Project Manager	Male	1/21/2019
51821	Linda	Foster	95000	Data Scientist	Female	4/29/2019
71329	Gayle	Meyer	77000	HR Manager	Female	6/28/2019
49714	Hugo	Forester	55000	IT Support Specialist	Male	11/22/2019
30840	David	Barrow	85000	Data Scientist	Male	12/2/2019

query :

```
1  SELECT first_name
2  FROM employees
3  WHERE first_name LIKE 'El_is';
4
```

output :

```
1  first_name
2  ----------
3  Elvis
```

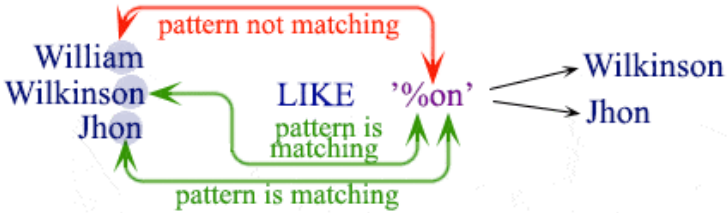
SQL LIKE Operator

Syntax : LIKE pattern

Example :

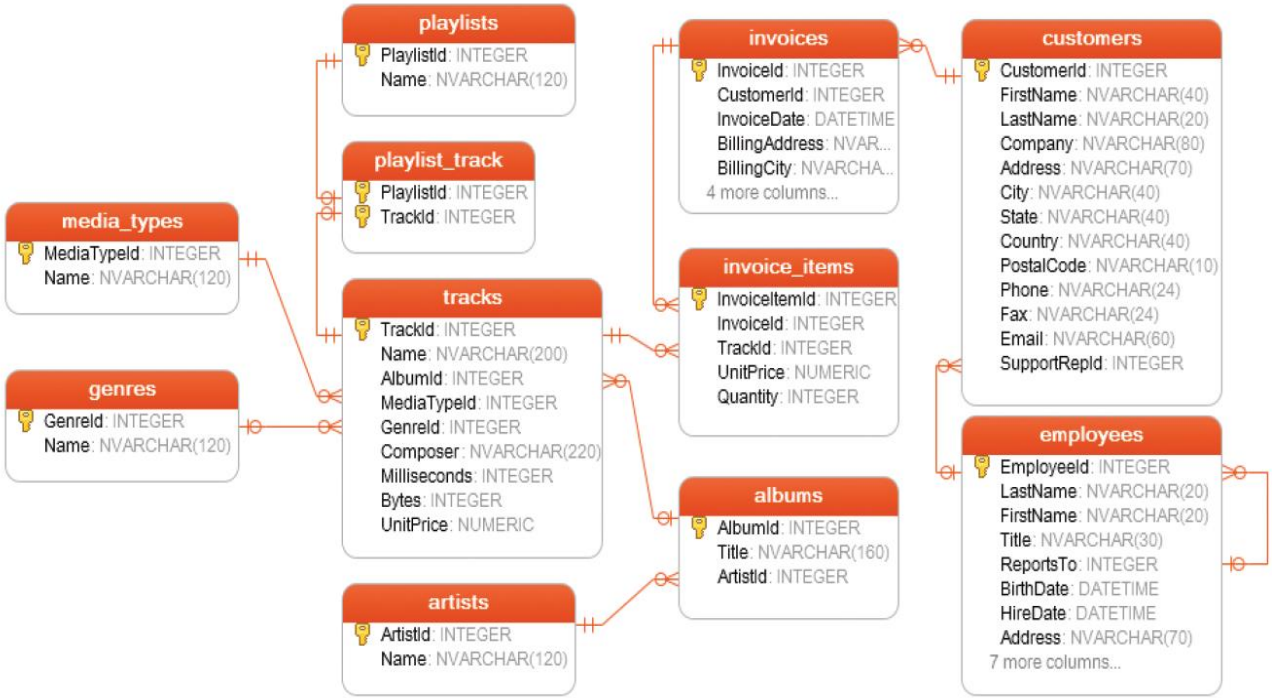
Output : William
Wilkinson

Example :



Output : Wilkinson
Jhon

Find the track names of Bach.



THANKS!

Any questions?