📘 Module 15: Fundamental SQL Statements

🧾 Reference Tables Used in This Module

We will use the following sample tables to demonstrate all SQL statements in this module:

- ✅ Professors
- ✅ Department
- ✅ Register

📸 Image Reference:

Register

DeptID	PID	Combine col(DeptID_PID)
D1	P2	D1_P2
D1	P3	D1_P3
D2	P1	D2_P1
D3	P4	D3_P4
D3	P6	D3_P6
D4	P5	D4_P5

Professors

PID	First name	Last name	DeptID
P1	Tom	Jones	D2
P2	Erica	Sharma	D1
P3	Cole	David	D1
P4	Yash	Sharma	D3
P5	Tarini	Mittal	D4
P6	Riya	Kapoor	D3

Department

DeptID	Department
D1	Computer Science
D2	English
D3	Statistics
D4	Geography

🔷 How to Create a Database

✅ Definition:

Creating a database means setting up a named space to store related tables and data objects.

✅ Syntax:

CREATE DATABASE database_name;

✅ Method 1: Using SSMS

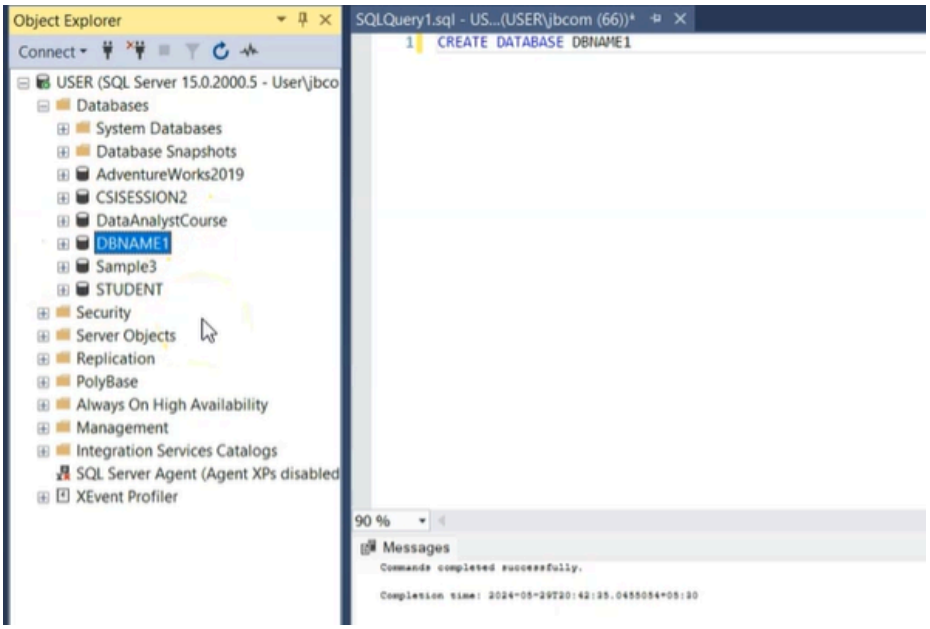
1. Open **SQL Server Management Studio**
2. In **Object Explorer**, right-click on **Databases** → **New Database**
3. Name your database (e.g., `CollegeDB`) → Click **OK**

✅ Method 2: Using Query

CREATE DATABASE database_name;

📌 Example:

CREATE DATABASE DBNAME1;



🧭 How to Select a Database

✅ Definition:

You must select the **active database** you want to work with.

✅ Method 1: Dropdown in SSMS

- Use the dropdown menu on the toolbar to select your database (e.g., `CollegeDB`)

✅ Method 2: Using Query

USE database_name;

📌 Example:
USE CollegeDB;

🔐 SQL Constraints

✅ Definition:

Constraints are **rules** applied to table columns to enforce **data integrity**.

Constraint	Purpose
`PRIMARY KEY`	Uniquely identifies each row in a table
`FOREIGN KEY`	Links a column to another table's primary key
`NOT NULL`	Prevents null (empty) values
`UNIQUE`	Ensures all values are different
`CHECK`	Ensures column value meets a condition
`DEFAULT`	Sets a default value

🔢 SQL Data Types

Data Type	Description
`INT`	Whole numbers
`NVARCHAR(n)`	Variable-length text (Unicode)
`DATE`	Stores date values

🔨 1. `CREATE` Statement

✅ Definition:

Used to **create new tables or databases** in SQL.

✅ Syntax:

```
CREATE TABLE table_name (
  column_name datatype constraints,
  ... );
```

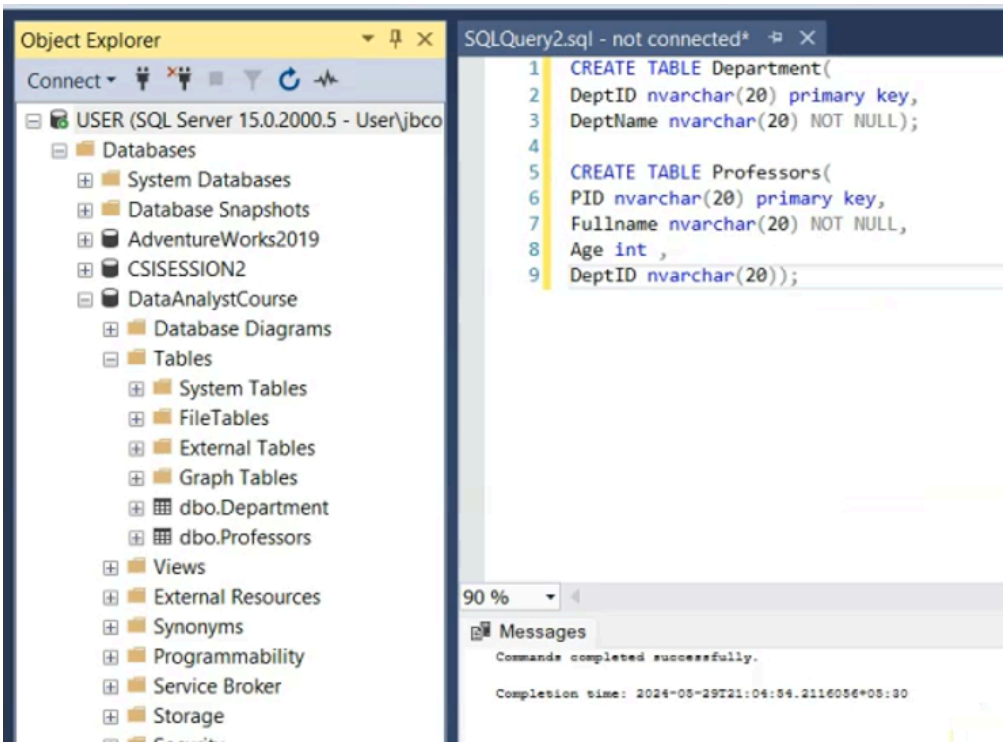
📌 Examples:

1.

```
CREATE TABLE Department (
  DeptID NVARCHAR(20) PRIMARY KEY,
  DeptName NVARCHAR(20) NOT NULL );
```

2.

```
CREATE TABLE Professors (
  PID NVARCHAR(20) PRIMARY KEY,
  Fullname NVARCHAR(50) NOT NULL,
  Age INT,
  DeptID NVARCHAR(20),
  FOREIGN KEY (DeptID) REFERENCES Department(DeptID) );
```



✍️ 2. INSERT Statement

✅ Definition:

Used to **insert data into a table**.

✅ Syntax (Recommended):

INSERT INTO table_name (col1, col2, ...)
VALUES (val1, val2, ...);

✅ Syntax (Less preferred):

INSERT INTO table_name
VALUES (val1, val2, ...);

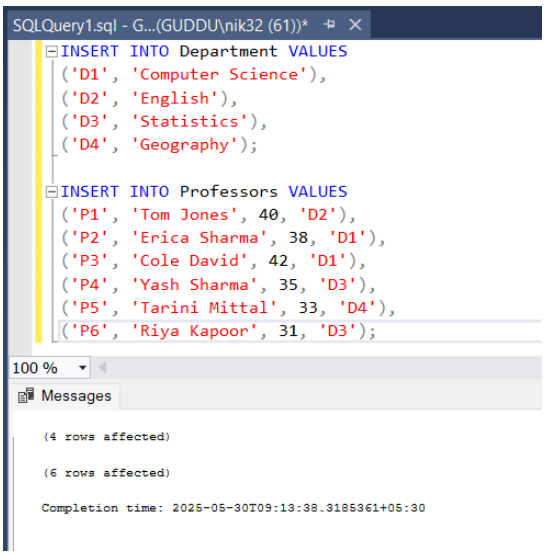
✅ Why use column names?

✔️ Safer, clearer, prevents column mismatch errors.

📌 Example (from your image):

INSERT INTO Department VALUES
('D1', 'Computer Science'),
('D2', 'English'),
('D3', 'Statistics'),
('D4', 'Geography');

```
INSERT INTO Professors VALUES
('P1', 'Tom Jones', 40, 'D2'),
('P2', 'Erica Sharma', 38, 'D1'),
('P3', 'Cole David', 42, 'D1'),
('P4', 'Yash Sharma', 35, 'D3'),
('P5', 'Tarini Mittal', 33, 'D4'),
('P6', 'Riya Kapoor', 31, 'D3');
```



🔗 3. Primary Key & Foreign Key

✅ Primary Key:

A column that **uniquely identifies** each row in a table.

✅ Foreign Key:

A column that **links** to another table's primary key.

✅ Syntax:

```
-- Inline with CREATE TABLE
PID NVARCHAR(20) PRIMARY KEY,

-- Foreign Key
FOREIGN KEY (DeptID) REFERENCES Department(DeptID)
```

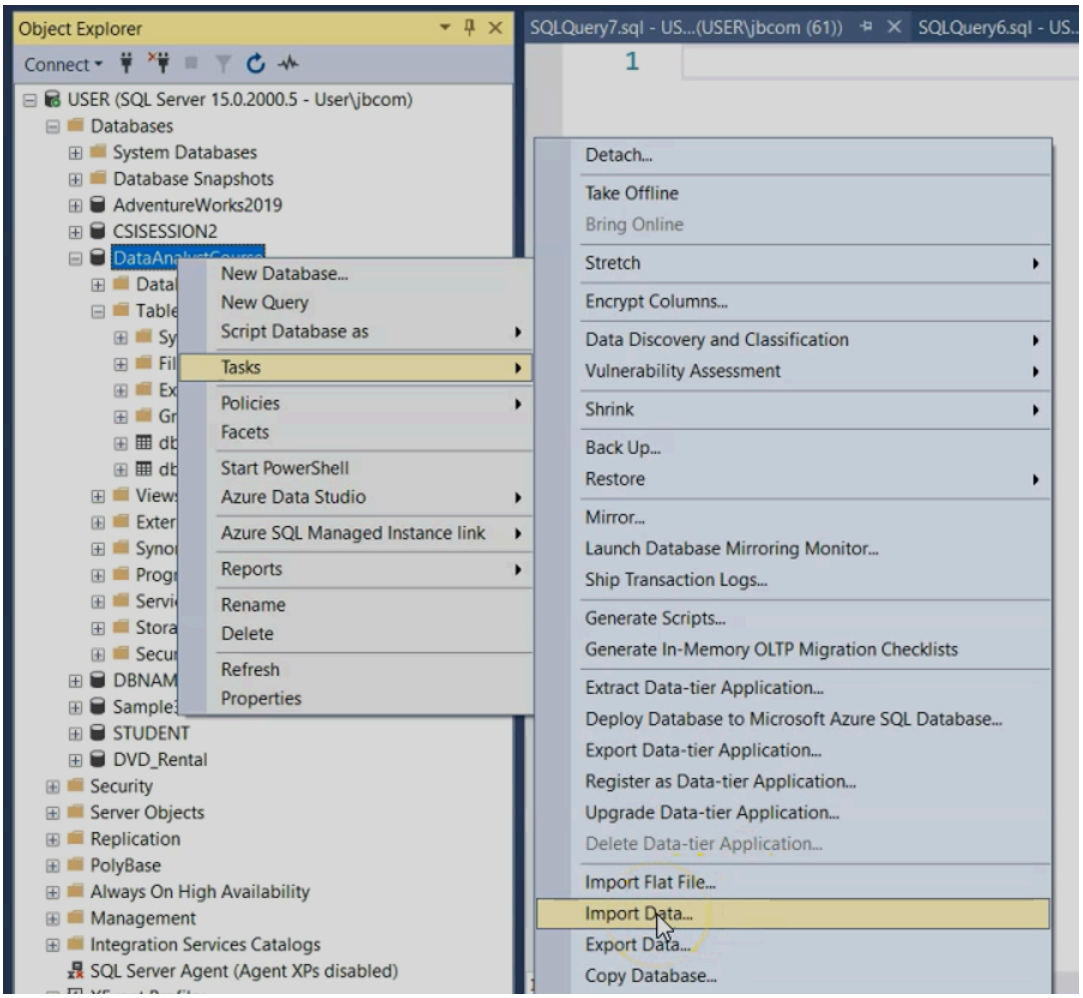
🧩 3 Relationships (from your image):

1. Each professor belongs to one department (via DeptID).
2. Each department may have multiple professors.
3. `Register` shows combinations of multiple professors in departments (many-to-many).

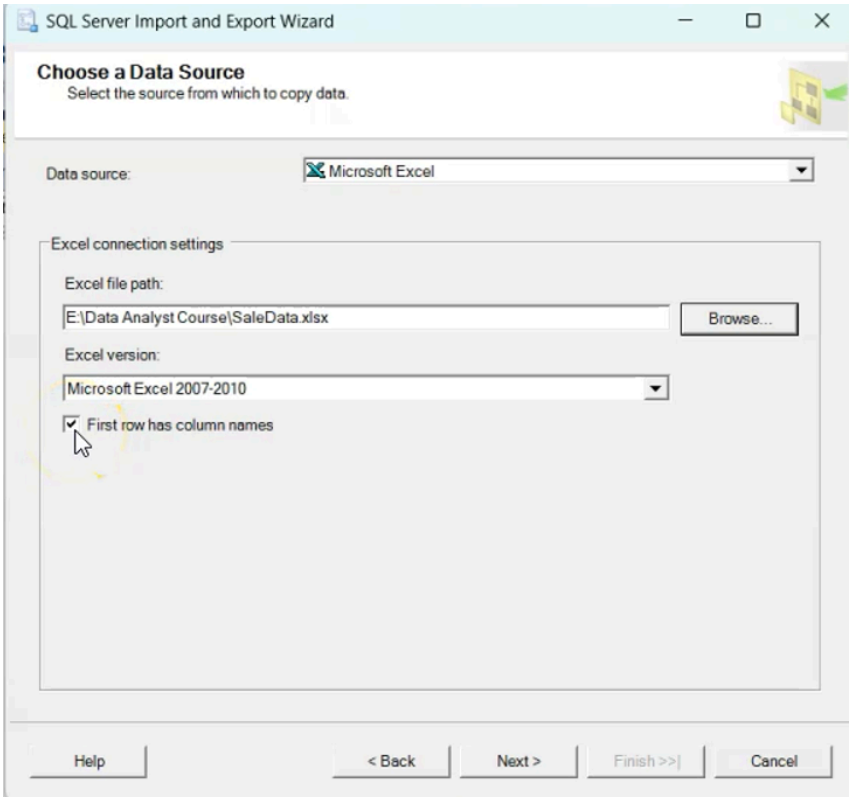
📥 4. Import Data from File (CSV)

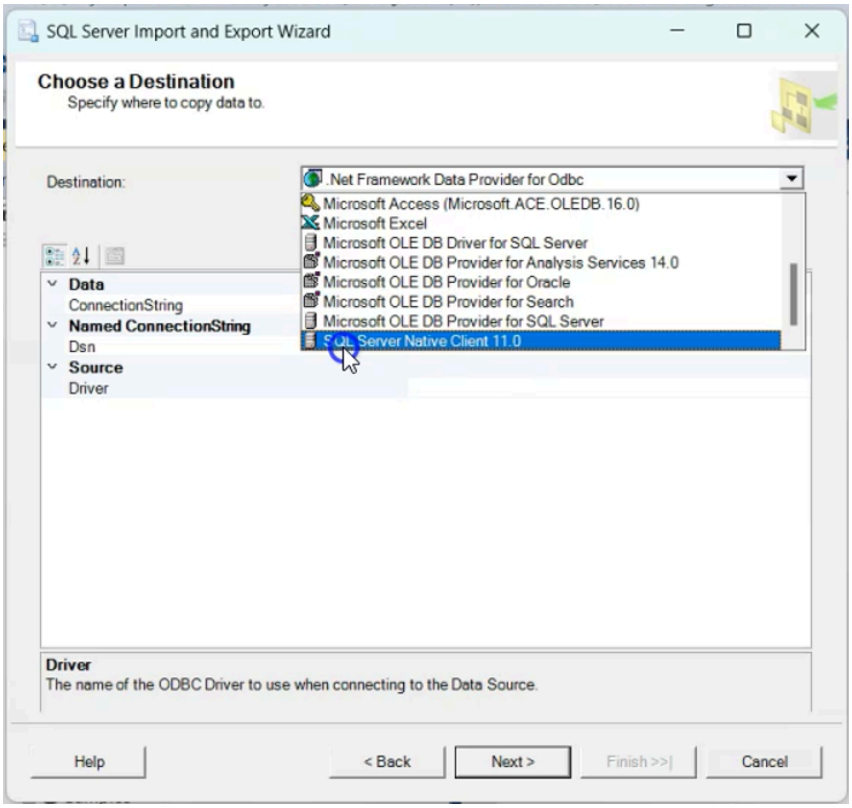
✅ Steps:

1. Right-click database → Tasks → Import Flat File

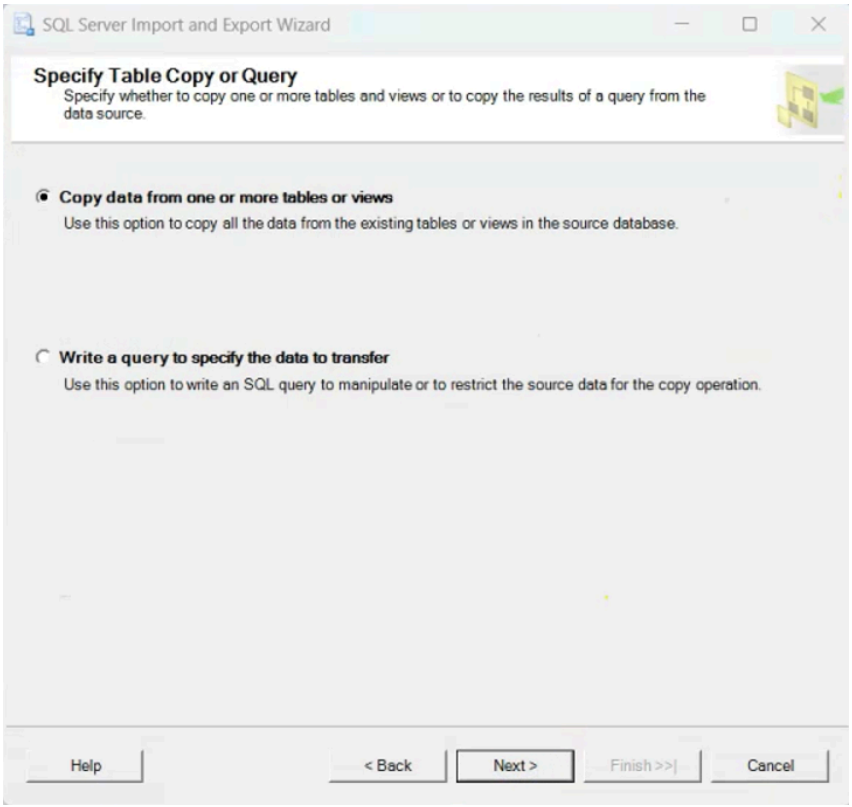


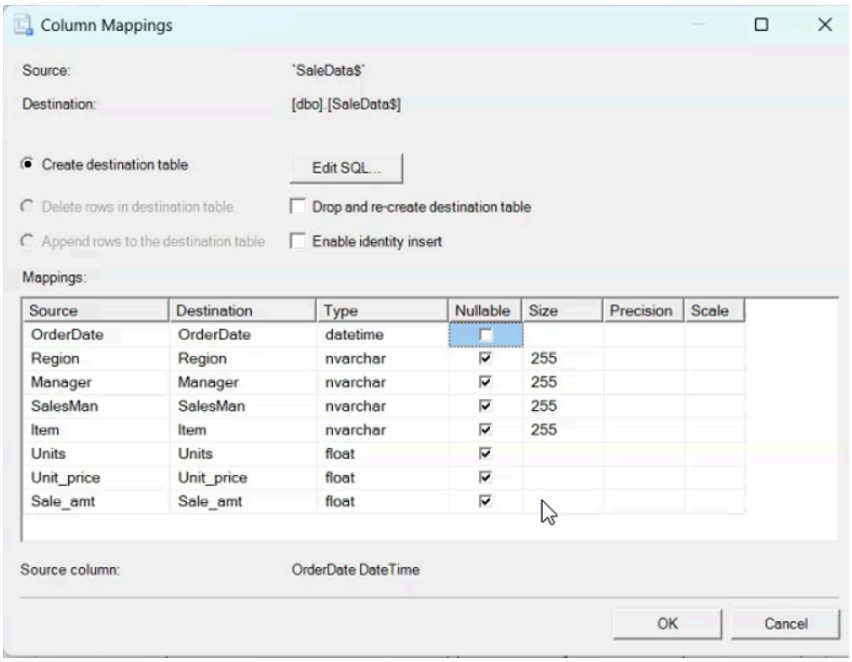
2. Select the CSV file → Click Next

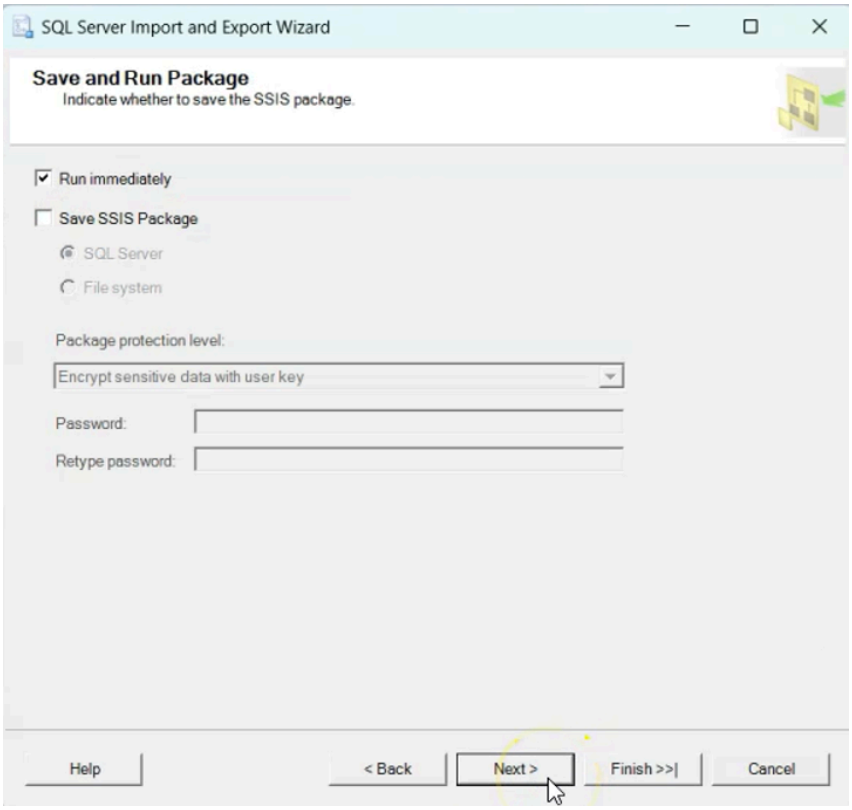


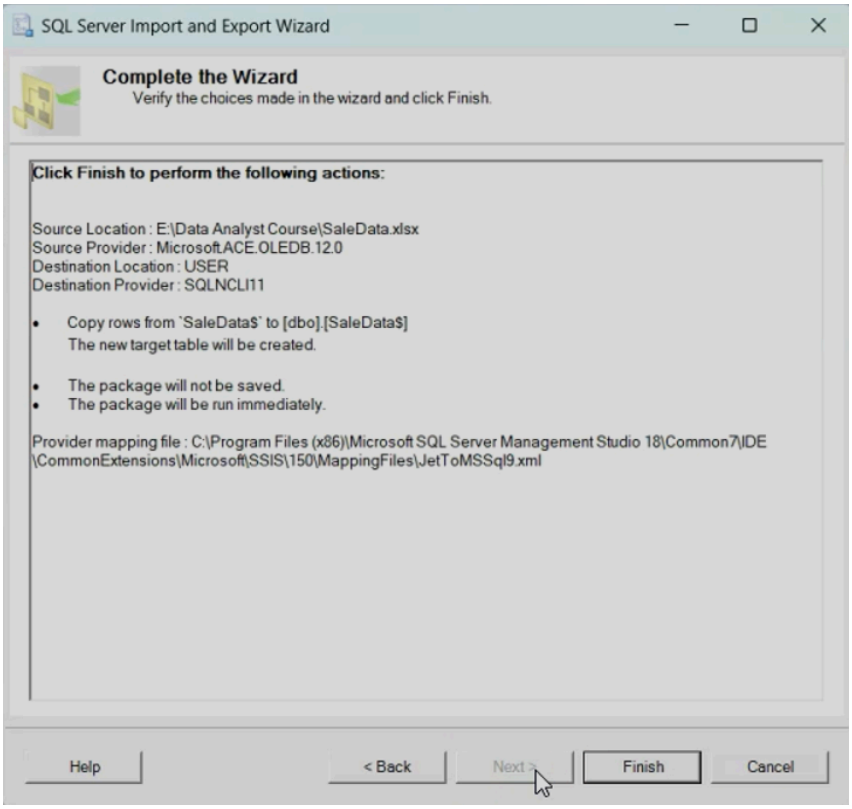


3. Define column names and types

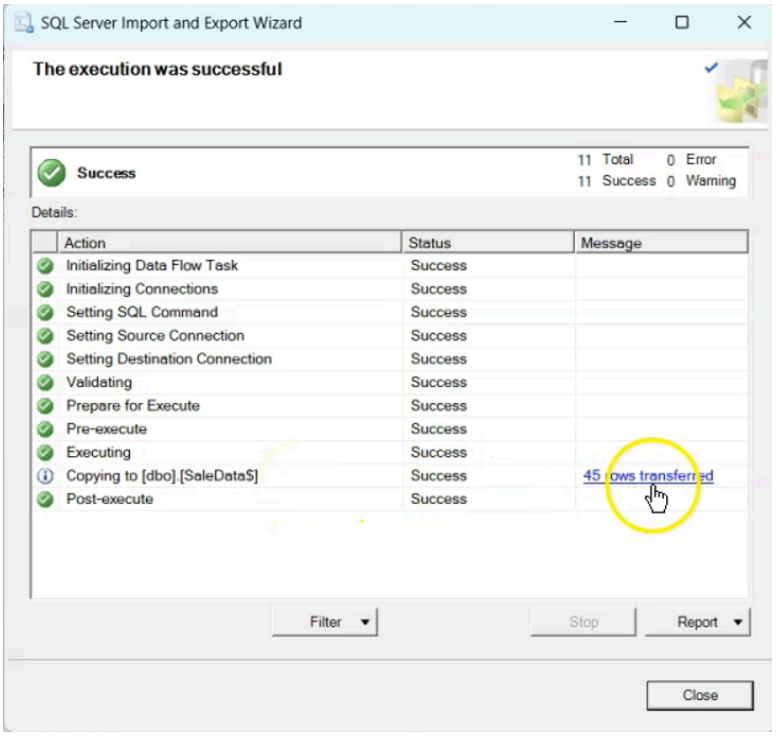




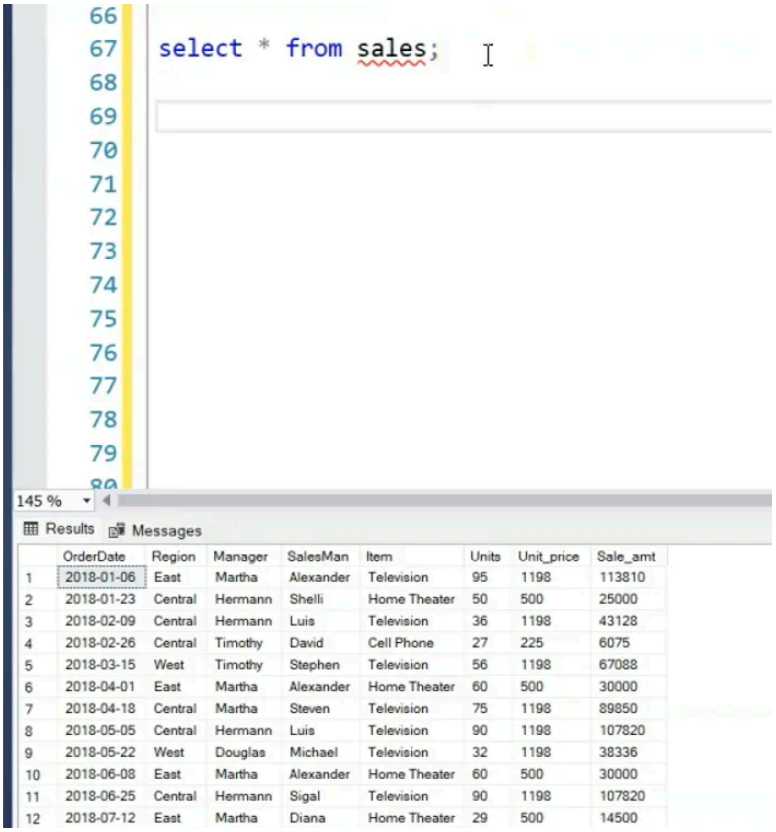

SQL Server Import and Export Wizard
Save and Run Package
Indicate whether to save the SSIS package.
Run immediately
Save SSIS Package
SQL Server
File system
Package protection level:
Encrypt sensitive data with user key
Password:
Retype password:
Help
< Back
Next >
Finish >>|
Cancel


SQL Server Import and Export Wizard
Complete the Wizard
Verify the choices made in the wizard and click Finish.
Click Finish to perform the following actions:
Source Location : E:\Data Analyst Course\SaleData.xlsx
Source Provider : Microsoft.ACE.OLEDB.12.0
Destination Location : USER
Destination Provider : SQLNCLI11
Copy rows from `SaleData$` to [dbo].[SaleData$]
The new target table will be created.
The package will not be saved.
The package will be run immediately.
Provider mapping file : C:\Program Files (x86)\Microsoft SQL Server Management Studio 18\Common7\IDE
\CommonExtensions\Microsoft\SSIS\150\MappingFiles\JetToMSSql9.xml
Help
< Back
Next >
Finish
Cancel

4. Preview and finish



✔ The table is created and data is imported automatically.



	OrderDate	Region	Manager	SalesMan	Item	Units	Unit_price	Sale_amt
1	2018-01-06	East	Martha	Alexander	Television	95	1198	113810
2	2018-01-23	Central	Hermann	Shelli	Home Theater	50	500	25000
3	2018-02-09	Central	Hermann	Luis	Television	36	1198	43128
4	2018-02-26	Central	Timothy	David	Cell Phone	27	225	6075
5	2018-03-15	West	Timothy	Stephen	Television	56	1198	67088
6	2018-04-01	East	Martha	Alexander	Home Theater	60	500	30000
7	2018-04-18	Central	Martha	Steven	Television	75	1198	89850
8	2018-05-05	Central	Hermann	Luis	Television	90	1198	107820
9	2018-05-22	West	Douglas	Michael	Television	32	1198	38336
10	2018-06-08	East	Martha	Alexander	Home Theater	60	500	30000
11	2018-06-25	Central	Hermann	Sigal	Television	90	1198	107820
12	2018-07-12	East	Martha	Diana	Home Theater	29	500	14500

📄 5. `SELECT` Statement

✅ Definition:

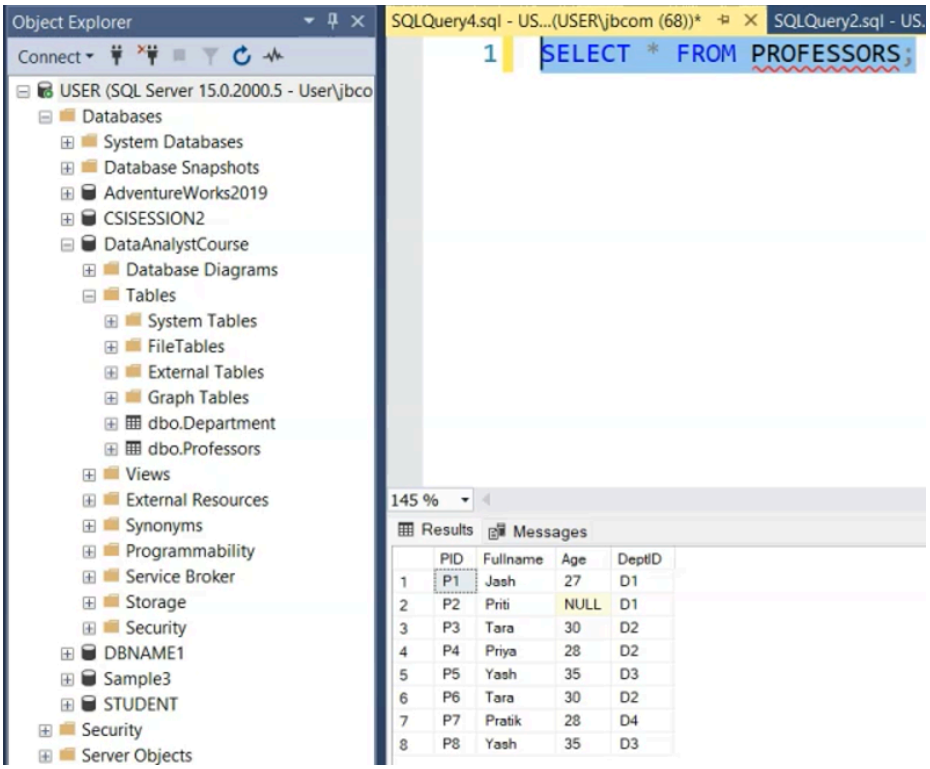
Used to **retrieve data** from a table.

✅ Syntax:

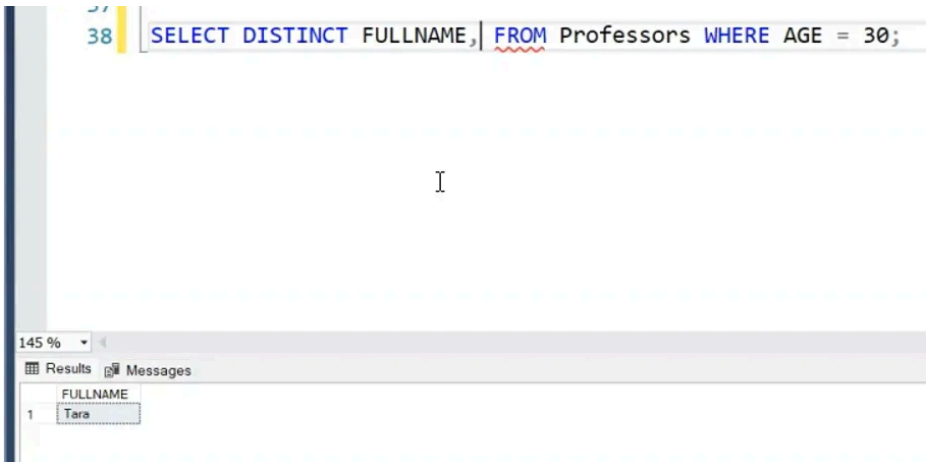
```
SELECT column1, column2 FROM table_name;
SELECT * FROM table_name; -- All columns
```

📌 Example:

1. SELECT * FROM Professors;



2. SELECT DISTINCT Fullname FROM Professors;



📊 6. SELECT DISTINCT

✅ Definition:

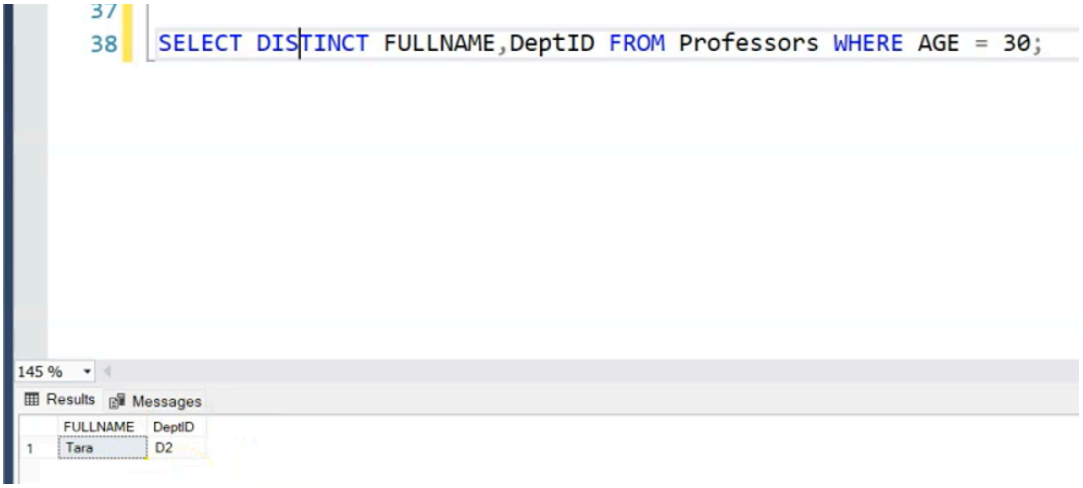
Returns only **unique values**, removing duplicates.

✅ Syntax:

SELECT DISTINCT column FROM table_name;

📌 Example:

1. SELECT DISTINCT Fullname, DeptID
   FROM Professors
   WHERE Age < 30;



🔍 7. WHERE Clause

✅ Definition:

Filters rows based on a given condition.

✅ Syntax:

SELECT column1 FROM table_name WHERE condition;

📌 Example:

1. SELECT DISTINCT Fullname
   FROM Professors
   WHERE Age < 30;

```
42  SELECT DISTINCT Fullname FROM Professors WHERE AGE < 30;
```

145 %

Results | Messages

	Fullname
1	Jash
2	Pratik
3	Priya

⚖️ 8. Logical Operators

✅ Definition:

Used in `WHERE` clause to combine conditions.

Operator	Meaning
`AND`	All conditions true
`OR`	At least one true
`NOT`	Negates a condition

✅ Syntax:

SELECT * FROM table_name WHERE condition1 LogicalOperator condition2;

📌 Examples:

1. SELECT * FROM Professors WHERE Age = 30 AND DeptID = 'D2';

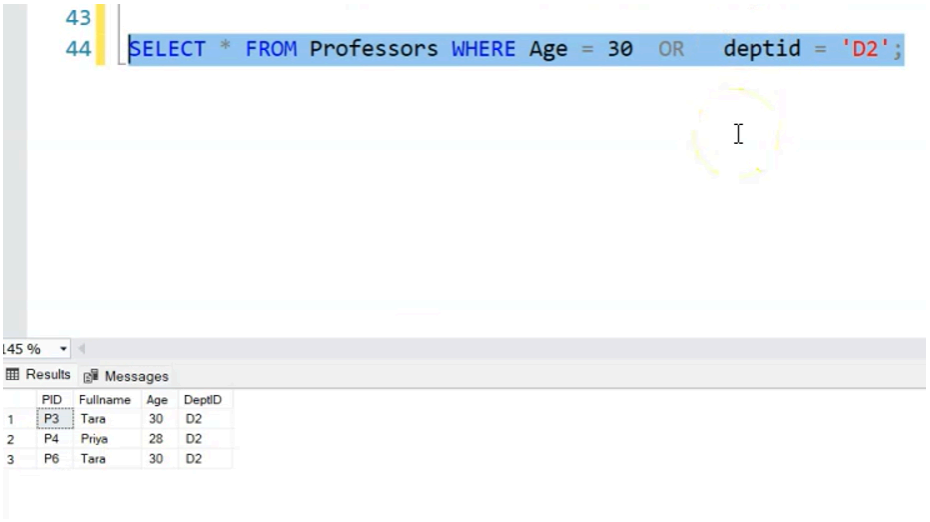
```
44  SELECT * FROM Professors WHERE Age = 30  AND   deptid = 'D2';
```

145 %

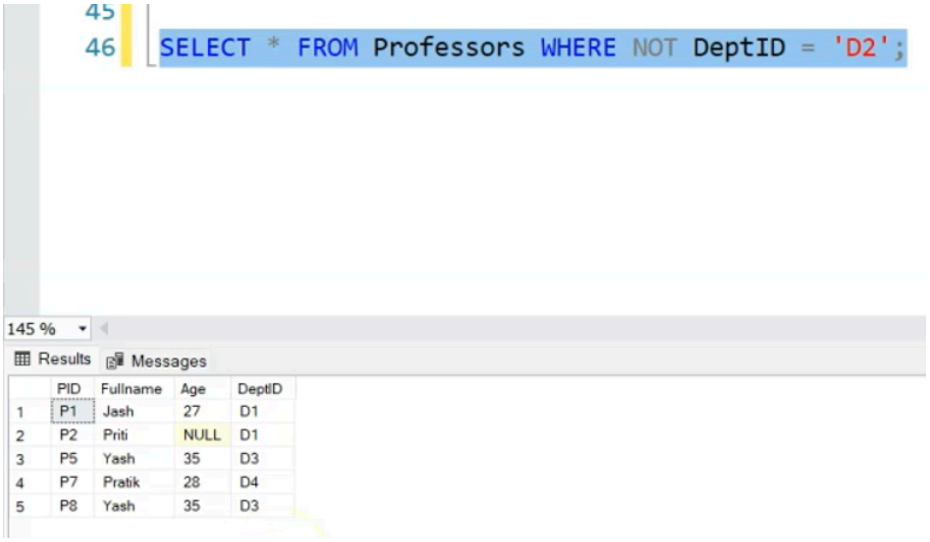
Results | Messages

	PID	Fullname	Age	DeptID
1	P3	Tara	30	D2
2	P6	Tara	30	D2

2. SELECT * FROM Professors WHERE Age = 30 OR DeptID = 'D2';



3. SELECT * FROM Professors WHERE NOT DeptID = 'D2';



✏️ 9. UPDATE Statement

✅ Definition:

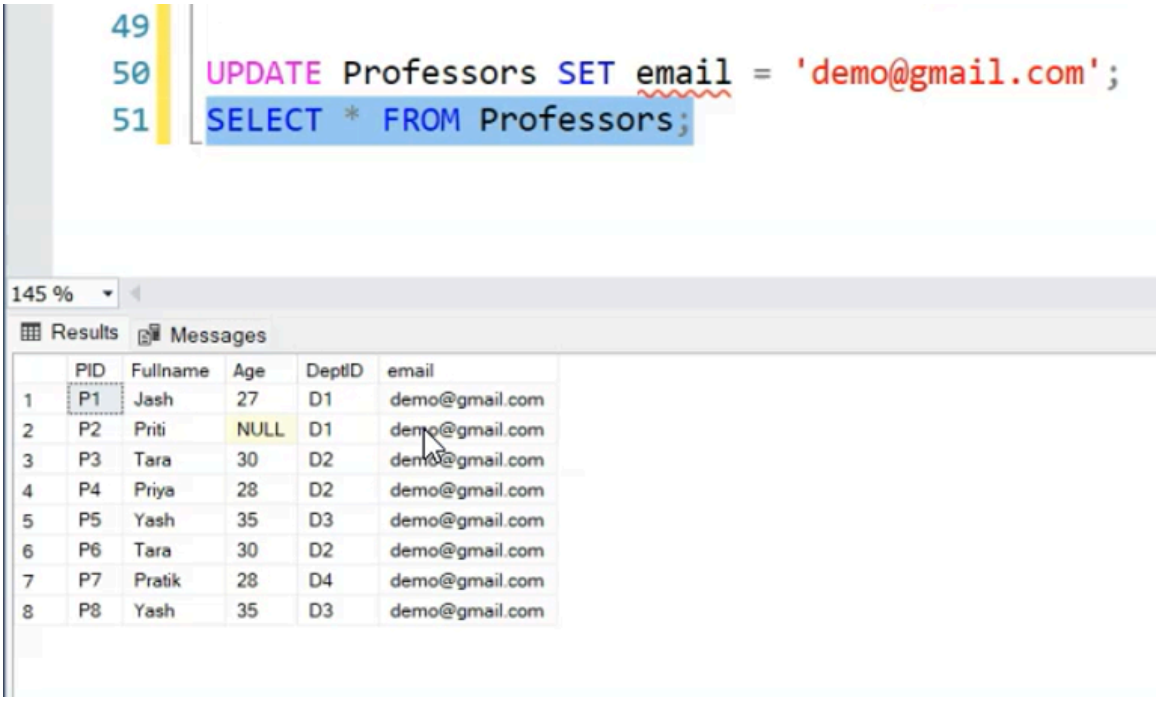
Used to **modify** existing records in a table.

✅ Syntax:

UPDATE table_name
SET column = value
WHERE condition;

📌 Example:

1. UPDATE Professors
   SET Email = 'demo@gmail.com';



🗑️ 10. `DELETE` Statement

✅ Definition:

Used to **remove** records from a table.

✅ Syntax:

DELETE FROM table_name WHERE condition;

📌 Examples:

1. DELETE FROM Professors WHERE DeptID = 'D3';

```
60  DELETE FROM Professors WHERE DeptID = 'D3';
```

145 %

Results | Messages

	PID	Fullname	Age	DeptID	email
1	P1	Jash	27	D1	demo@gmail.com
2	P2	Priti	NULL	D1	demo@gmail.com
3	P3	Tara	30	D2	d2dept@gmail.com
4	P4	Priya	28	D2	d2dept@gmail.com
5	P6	Tara	30	D2	d2dept@gmail.com
6	P7	Pratik	28	D4	demo@gmail.com

2. DELETE FROM Professors WHERE Fullname = 'Tarini Mittal' AND DeptID = 'D4';

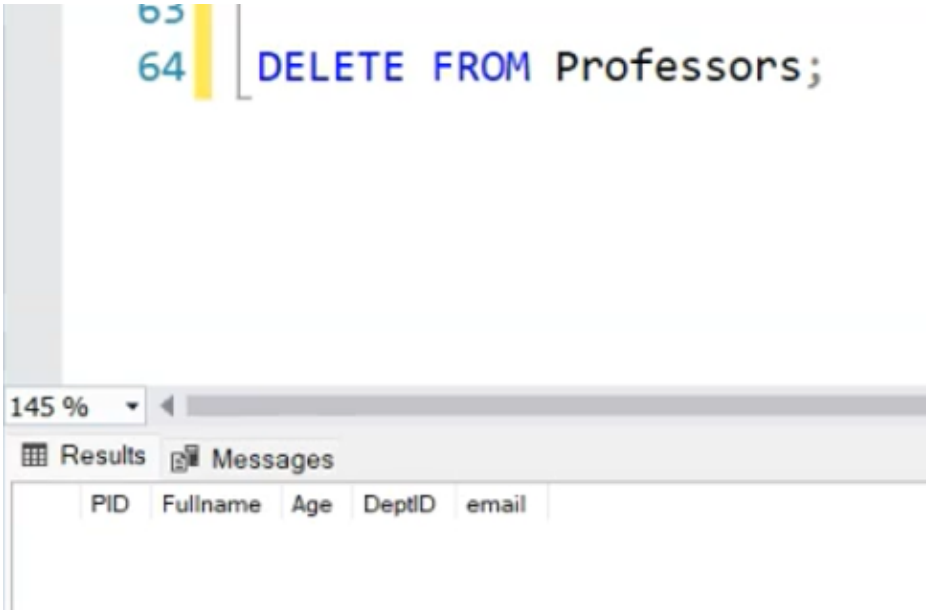
```
62  DELETE FROM Professors WHERE Fullname = 'Tara' AND  PID = 'P3';
```

145 %

Results | Messages

	PID	Fullname	Age	DeptID	email
1	P1	Jash	27	D1	demo@gmail.com
2	P4	Priya	28	D2	d2dept@gmail.com
3	P6	Tara	30	D2	d2dept@gmail.com
4	P7	Pratik	28	D4	demo@gmail.com

3. DELETE FROM Professors; -- Deletes all rows



🔄 11. ALTER Statement

✅ Definition:

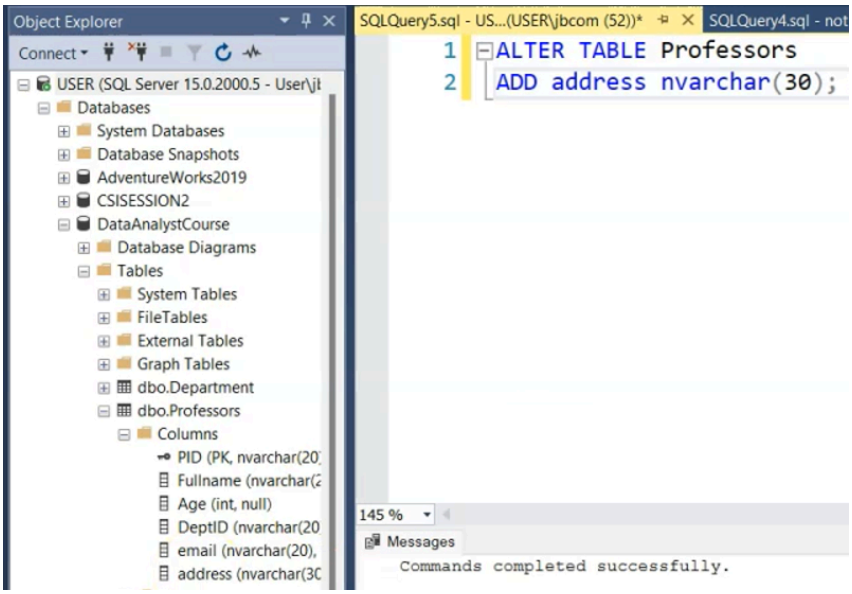
Used to **modify the structure** of an existing table.

✅ Syntax:

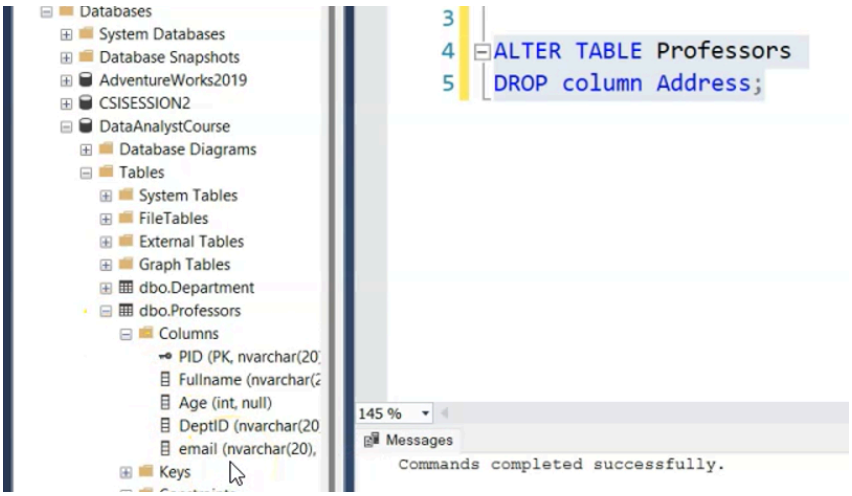
ALTER TABLE table_name ADD column_name datatype;
ALTER TABLE table_name DROP COLUMN column_name;

📌 Examples:

1. ALTER TABLE Professors ADD Address NVARCHAR(30);



2. ALTER TABLE Professors DROP COLUMN Address;



🔄 Difference: `DROP` vs `DELETE` vs `TRUNCATE`

Command	What It Does	Structure?	Reversible?
`DROP`	Deletes entire table	✅ Yes	❌ No
`DELETE`	Deletes rows (with condition)	❌ No	✅ Yes
`TRUNCATE`	Deletes all rows (fast)	❌ No	❌ No

✅ Final Notes for Students

- Use `CREATE`, `INSERT`, `SELECT`, `WHERE`, `UPDATE`, `DELETE` to manage data.
- Learn `PRIMARY` and `FOREIGN KEY` to **link tables properly**.
- Always use **column names** while inserting data.
- `WHERE` filters rows; `DISTINCT` removes duplicates.
- Use `ALTER` to adjust tables without deleting them.