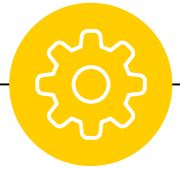
welcome back



SQL Essentials

Roadmap


RDBMS
ER Model
SQL Server
DDL
DML
Operator
Function
SQL Clause
Join data
Sub Query
Best
Practice

Previous lecture

- INNER JOIN
- OUTER JOIN
- EXCLUDING JOIN
- SELF JOIN
- CROSS JOIN
- UNION & UNION ALL

What we will explore today?

- Sub queries
- Advance operators
- Rules of sub query
- Practice

Sub query

- A sub-query, also called an inner query, is a SQL query nested inside a larger query.
- basicly it’s query inside query

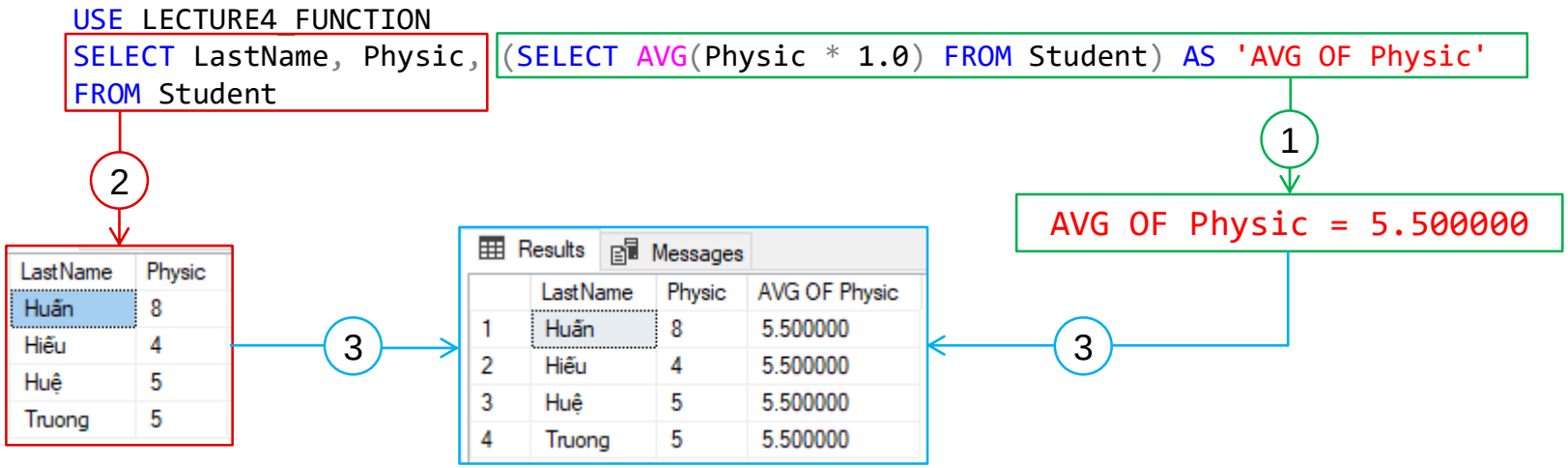
How it’s work

- Inner query is independent of outer query.
- Inner query is executed first and the results are stored.
- Outer query then runs on the stored results.
- Exception **Correlated subqueries**

Example 1

Results | Messages

	ID	FirstName	MiddleName	LastName	Math	Physic	Chemical	DateOfBirth
1	1	Nguyễn	Văn	Huấn	7	8	9	2000-10-15
2	2	Võ	Văn	Hiếu	3	4	5	2005-10-15
3	3	Nguyễn	Thị	Huệ	2	5	7	2008-10-15
4	4	Nguyễn	NULL	Truong	NULL	5	7	1999-10-15



Example 2

```
USE LECTURE5_JOIN_DEMO
SELECT CustomerID, FullName
FROM Customer
WHERE CustomerID IN (SELECT CustomerID FROM CustomerOrder)
```

2

Results | Messages | Live G

	CustomerID	FullName
1	1	Châu Tinh Trì
2	2	Châu Nhuận Phát
3	3	Lý Tiểu Long
4	4	Thành Long

1

Results | Messages

	OrderID	CustomerID	FoodName
1	1	1	Heo Quay
2	2	1	Gà Luộc
3	3	3	Bò Lá Lốt
4	4	100	Dê Nướng

3

Results | Messages | Li

	CustomerID	FullName
1	1	Châu Tinh Trì
2	3	Lý Tiểu Long

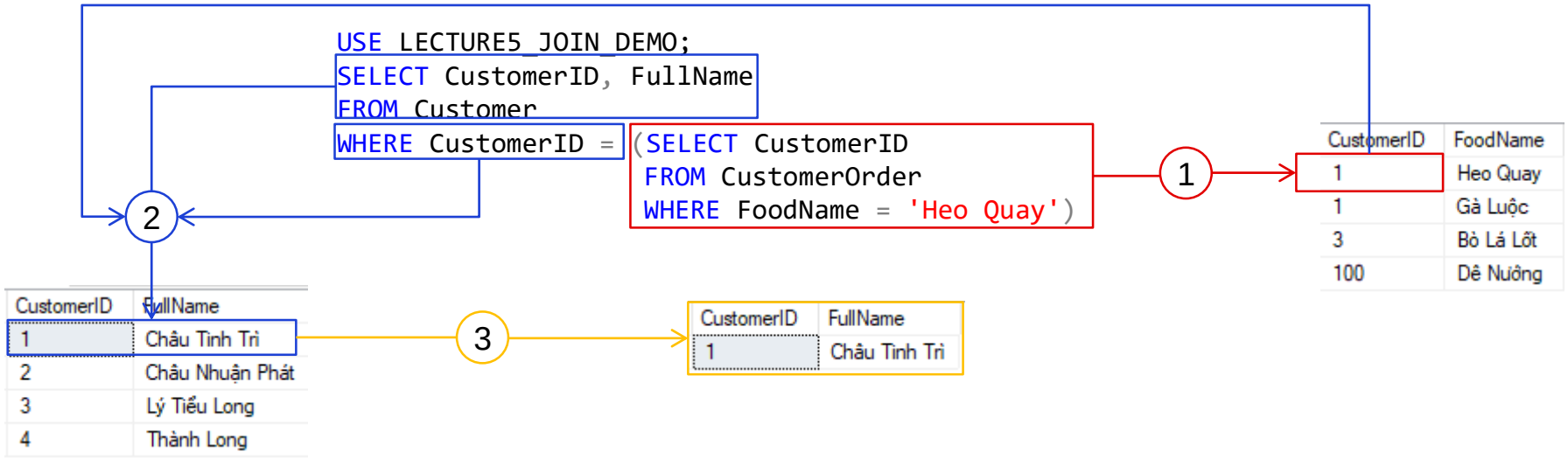
Type of Sub Query

- Single row sub query
- Multiple row sub query
- Multiple column sub query
- Corrolated sub query
- Nested sub query

Single row query

- A single row subquery returns zero or one row to the outer SQL statement.
- You can place a subquery in a WHERE, HAVING or FROM clause of a SELECT statement.

Single row query



Excercise

Customer

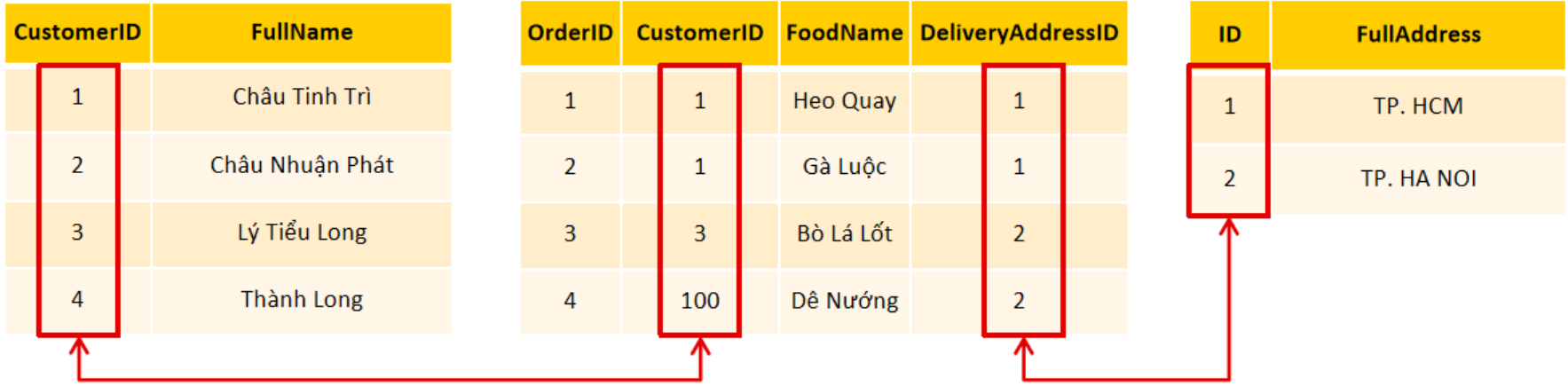
CustomerID	FullName
1	Châu Tinh Trì
2	Châu Nhuận Phát
3	Lý Tiểu Long
4	Thành Long

CustomerOrder

OrderID	CustomerID	FoodName	DeliveryAddressID
1	1	Heo Quay	1
2	1	Gà Luộc	1
3	3	Bò Lá Lốt	2
4	100	Dê Nướng	2

DeliveryAddress

ID	FullAddress
1	TP. HCM
2	TP. HA NOI



Query CustomerID, OrderID, FoodName from CustomerOrder with Delivery FullAddress = “TP. HCM” using single row subquery

Multiple row subquery

- Multiple row subquery returns one or more rows to the outer SQL statement. You may use the IN, ANY, or ALL operator in outer query to handle a subquery that returns multiple rows.

Multiple row subquery

```
USE LECTURE5_JOIN_DEMO
SELECT CustomerID, FullName
FROM Customer
WHERE CustomerID IN (SELECT CustomerID FROM CustomerOrder)
```

2

Results | Messages | Live G

	CustomerID	FullName
1	1	Châu Tinh Trì
2	2	Châu Nhuận Phát
3	3	Lý Tiểu Long
4	4	Thành Long

1

Results | Messages

	OrderID	CustomerID	FoodName
1	1	1	Heo Quay
2	2	1	Gà Luộc
3	3	3	Bò Lá Lốt
4	4	100	Dê Nướng

3

Results | Messages | Li

	CustomerID	FullName
1	1	Châu Tinh Trì
2	3	Lý Tiểu Long

Excercise

Customer

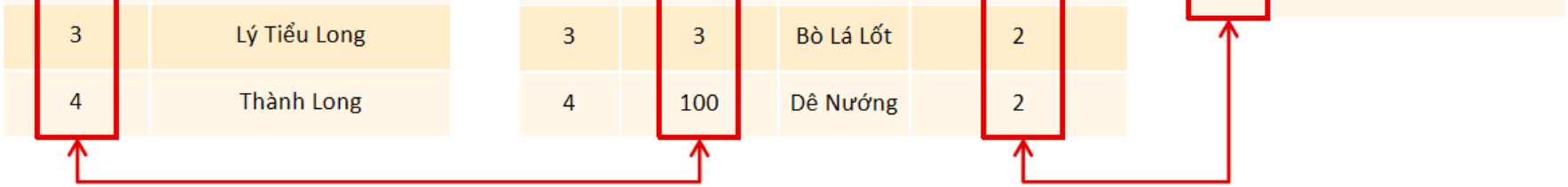
CustomerID	FullName
1	Châu Tinh Trì
2	Châu Nhuận Phát
3	Lý Tiểu Long
4	Thành Long

CustomerOrder

OrderID	CustomerID	FoodName	DeliveryAddressID
1	1	Heo Quay	1
2	1	Gà Luộc	1
3	3	Bò Lá Lốt	2
4	100	Dê Nướng	2

DeliveryAddress

ID	FullAddress
1	TP. HCM
2	TP. HA NOI



Query CustomerID, OrderID, FoodName from CustomerOrder with Delivery FullAddress = “TP. HCM” or “TP. HA NOI” using multiple row subquery

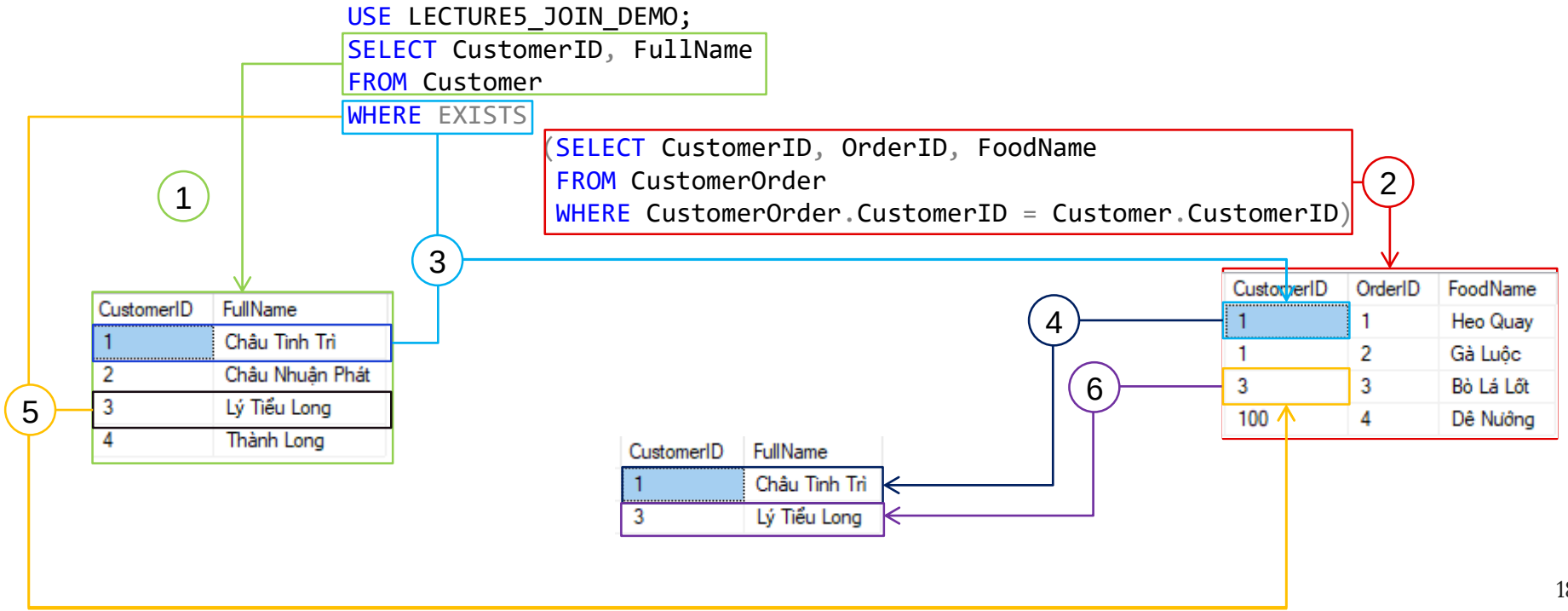
MULTIPLE COLUMN

- Multiple columns subquery returns more columns to outer SQL statement. You may use the EXISTS operator in outer query to handle a subquery that returns multiple columns.

CORROLATED SUBQUERY

- Normal subquery executes the subquery first and provides the value to the outer query, whereas **correlated subquery** references a column in the outer query and **executes the subquery once for each row in the outer query**..

How it work


USE LECTURE5_JOIN_DEMO;
SELECT CustomerID, FullName
FROM Customer
WHERE EXISTS
(SELECT CustomerID, OrderID, FoodName
FROM CustomerOrder
WHERE CustomerOrder.CustomerID = Customer.CustomerID)
1
2
3
4
5
6
CustomerID FullName
1 Châu Tinh Trì
2 Châu Nhuận Phát
3 Lý Tiểu Long
4 Thành Long
CustomerID OrderID FoodName
1 1 Heo Quay
1 2 Gà Luộc
3 3 Bò Lá Lốt
100 4 Dê Nướng
CustomerID FullName
1 Châu Tinh Trì
3 Lý Tiểu Long

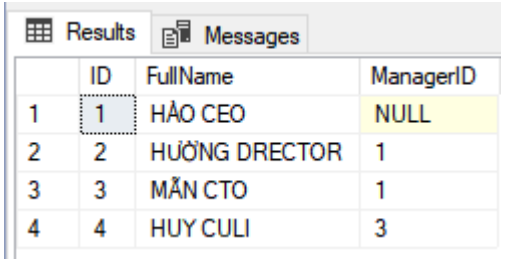
Excercise

```
USE MASTER;
DROP DATABASE IF EXISTS LECTURE5_SELFT_JOIN;
CREATE DATABASE LECTURE5_SELFT_JOIN;
USE LECTURE5_SELFT_JOIN;

CREATE TABLE Employee(
          ID int PRIMARY KEY IDENTITY(1, 1),
          FullName nvarchar(20) NOT NULL,
          ManagerID int,
);

INSERT INTO Employee (FullName, ManagerID)
VALUES(N'HÀO CEO', NULL),(N'HƯỜNG DRECTOR', 1),(N'MẪN CTO', 1),(N'HUY CULI', 3)
```

Excercise 1



	ID	FullName	ManagerID
1	1	HẢO CEO	NULL
2	2	HƯỜNG DRECTOR	1
3	3	MĂN CTO	1
4	4	HUY CULI	3

Query the manager who has at least 1 employee

Excercise 2

Results | Messages

	ID	FullName	ManagerID
1	1	HẢO CEO	NULL
2	2	HƯỜNG DRECTOR	1
3	3	MẪN CTO	1
4	4	HUY CULI	3

Results | Messages

	ID	FullName	ManagerID
1	1	HẢO CEO	NULL
2	2	HƯỜNG DRECTOR	1
3	3	MẪN CTO	1
4	4	HUY CULI	3

Query the manager infomation (ID, FullName) who has at least 2 employee

NESTED SUB QUERY

```
USE LECTURE5_JOIN_DEMO;
SELECT CustomerID, FullName
FROM Customer
WHERE CustomerID IN (SELECT CustomerID
                     FROM CustomerOrder
                     WHERE DeliveryAddressID = (SELECT ID
                                                FROM DeliveryAddress
                                                WHERE FullAddress = 'TP. HA NOI')
                     )
```

1

Results | Message

	ID	FullAddress
1	1	TP. HCM
2	2	TP. HA NOI

2

Results | Messages

	OrderID	CustomerID	FoodName	DeliveryAddressID
1	1	1	Heo Quay	1
2	2	1	Gà Luộc	1
3	3	3	Bò Lá Lốt	2
4	4	100	Dê Nướng	2

3

Results | Messages

	CustomerID	FullName
1	1	Châu Tinh Trì
2	2	Châu Nhuận Phát
3	3	Lý Tiểu Long
4	4	Thành Long

SOME RULE OF SUB QUERY

- You must enclose a subquery in parenthesis.
- A subquery must include a SELECT clause and a FROM clause.
- Subqueries that return more than one row can only be used with multiple value operators, such as the IN, ALL, ANY operator.
- A subquery can include WHERE, GROUP BY, and HAVING clauses.
- You can include an ORDER BY clause only when a TOP clause is included.
- You can nest subqueries up to 32 levels.

Advance Operator

- EXISTS
- ALL
- IN
- ANY

EXISTS Operator

- Used to test for the existence of any record in a subquery.
- The EXISTS operator returns TRUE if the subquery returns one or more records.

ALL Operator

- returns a boolean value as a result
- returns TRUE if ALL of the subquery values meet the condition
- is used with SELECT, WHERE and HAVING statements

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.

ANY Operator

- allow you to perform a comparison between a single column value and a range of other values.
- ANY means that the condition will be true if the operation is true for any of the values in the range.

IN vs ANY

- You must place an =, <>, <, >, <=, or >= operator before ANY

Pratice time

- open file “LECTURE6_PRATICE_SubQuery GUIDE-LINE.docx” & read the guide line

Pratice time (sub query)

- Get the cusomer list that never order
- Get the cusomer list that have at least 2 order
- Get the cusomer list that have at least 2 order in 2022 & at least 1 order in the March

Extra Resources

Name	Link
became SQL god?	https://www.w3schools.com/sql/default.asp