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Course: Foundations of Databases & SQL Programming

Assignment 07

<https://github.com/mitsuyojp/DBFoundations>

Assignment 07 – SQL Functions: When to use SQL UDF, Differences between Scalar, Inline and Multi-Statement Functions

Introduction

In this module, we learned about Functions.

SQL Server has many built-in functions. Also, we can create our own function for our needs which is called UDF (User Defined Functions).

I'd like to explain when we would like to use a SQL UDF. Then I'd like to explain the differences between Scalar, Inline, and Multi-Statement Functions.

1. Explain when you would use a SQL UDF.

There are a lot of built-in functions in SQL Server, but if none of them suits our needs, we can create our own custom function ourselves. These are often called User Defined Functions or just UDFs.

We can create the function once, store it in the database, and call it any number of times in our program. Similar as Views, we can execute complex codes with a simple Select statement.

2. Explain the differences between Scalar, Inline, and Multi-Statement Functions.

There are two basic types of functions: functions that return a table of values and functions that return a single value. Scalar Function returns a single value. Inline Function is used inside of the functions with RETURNS TABLE statement, which returns a table. In a Multi-Statement Function, we use a table variable as the return value inside the function.

Here I'd like to explain the details about Scalar, Inline and Multi-Statement Functions.

➤ What is Scalar Function?

Functions that return a single value are called Scalar Functions. Here is an example of a Scalar Function.

```
Create Function dbo.MultiplyValues(@Value1 Float, @Value2 Float)
Returns Float
As
Begin
    Return(Select @Value1 * @Value2);
End
go
-- Calling the function
Select Tempdb.dbo.MultiplyValues(4, 5);
go
```

Unlike parameters in table functions, parameters in scalar functions are very useful!

➤ What is Inline Function?

Example of Inline Function.

```
CREATE FUNCTION fnFilmsByDuration(
    @duration int
)
RETURNS TABLE
AS
-- function to return all films lasting
-- more than N minutes
RETURN
    SELECT
        FilmId,
        FilmName,
        FilmRunTimeMinutes
    FROM
        tblFilm
    WHERE
        FilmRunTimeMinutes >= @duration
```

In this code, we create a function with a simple table valued function (**RETURNS TABLE**). This is referred to as an in-line function or inline table valued function. We don't need to specify anything else; we don't need to define what columns the table will have or what types they will have. It is all implicit in the select statement we use to return a value. So **RETURNS TABLE** is all we need for this particular kind of functions.

➤ What is Multi-Statement Function?

A Multi-Statement Function (also called Multi-Statement Table-Valued Function, MSTVF) is a function which returns a table of data, but only after some additional processing.

Example of Multi-Statement Function.

```
CREATE FUNCTION fnName (  
    -- can have 0, 1, 2 or more parameters  
    @param1 datatype,  
    @param2 datatype, ...  
)  
  
    -- define table to return  
    RETURNS @TableName TABLE (  
        Column1 datatype,  
        Column2 datatype,  
        ...  
        Columnn datatype,  
    )  
AS  
BEGIN  
  
    -- typically insert rows into this table  
  
    -- eventually, return the results  
    RETURN  
  
END
```

As you can see, A Multi-Statement Function is a table-valued function that returns the result of multiple statements. The Multi-Statement Function is very useful because we can execute multiple queries within the function and aggregate the results into the returned table.

To define a Multi-Statement Function, we use a table variable as the return value. Inside the function, we execute one or more queries and insert data into this table variable.

Summary

Explain when you would use a SQL UDF.

- When built-in functions don't suit our needs, we can create our own custom functions ourselves.
- When we want to store complex code to save time for future uses, or for other people to run the code easily with a simple select statement. (Same as Views)

Explain the differences between Scalar, Inline, and Multi-Statement Functions.

- **Scalar Function** returns a single value.
- **Inline Function** is used inside of the functions with **RETURNS TABLE** statement, which returns a table.
- **Multi-Statement Function**, we use a table variable as the return value inside the function.