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Foundations of Databases & SQl Programming

SQL Functions

Introduction

In this paper I will be discussing SQL functions, when you would use a SQL User Defined Function (UDF) and the differences between Scalar, Inline, and Multi-Statement Functions.

When to use a SQL UDF

A SQL User-Defined Function (UDF) is a custom function that you can create and use in SQL queries. It allows you to extend the functionality of the database system by defining your own functions that can be used just like built-in SQL functions.

Scenarios where SQL UDF might be used:

Complex calculations: If you have a complex calculation or transformation that needs to be performed repeatedly in your SQL queries, you can encapsulate it in a UDF. This allows you to simplify your queries and improve readability by abstracting away the complexity into a reusable function.

Data validation and cleansing: When working with raw or unstructured data, you may need to perform data validation and cleansing operations. UDFs can be used to implement custom data validation rules, perform string manipulations, or apply specific formatting to data.

Custom aggregations: SQL provides built-in aggregate functions like SUM, AVG, COUNT, etc. However, there might be cases where you need to perform a custom aggregation that is not provided by the standard functions. In such cases, you can define a UDF to implement the desired aggregation logic.

Scalar, Inline, and Multi-Statement Functions

A scalar function returns a single value for each input parameter.It can be used in SQL expressions, just like any other scalar value or built-in function. Scalar functions take input parameters and perform a calculation or transformation to produce a single result.

An inline table-valued function returns a table as its result.It is similar to a view in that it defines a reusable query, but it can accept input parameters. An inline function is expanded by the query optimizer and treated as part of the calling query, allowing the result to be used directly in the query. Inline functions are commonly used to encapsulate complex queries and are particularly useful when you need to join the result of a function with other tables in a query. Inline functions are typically used in the FROM clause of a query, where they act as a table source.

A multi-statement table-valued function returns a table as its result, similar to an inline function. However, a multi-statement function is more flexible and allows for more complex logic compared to an inline function. It consists of multiple SQL statements enclosed within a BEGIN...END block. It can have local variables, temporary tables, and conditional logic, making it suitable for performing complex calculations or data transformations. The result of a multi-statement function is stored in a temporary table or table variable, and the final result is returned at the end of the function. Multi-statement functions are typically used in the FROM clause like inline functions, but they can also be used as a parameterized view or joined with other tables.

Summary

In summary, scalar functions return a single value, inline functions return a table and are expanded by the query optimizer, and multi-statement functions return a table but allow for more complex logic and operations. The choice between these types of functions depends on the specific requirements of your use case and the complexity of the operations you need to perform.