Advanced SQL Database final Lab Part 2

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SD - PD

1. Batch, Script, and Transaction:

Batch:

- A batch is a collection of one or more SQL statements that are executed as a single unit.
- Batches are often used to group related statements or to execute multiple statements together.

Script:

- A script is a set of SQL statements that are saved in a file and executed together.
- Scripts can contain one or more batches.

Transaction:

- A transaction is a sequence of one or more SQL statements that are executed as a single unit of work.
- Transactions ensure that either all the statements within the transaction are executed, or none of them are. They follow the ACID properties (Atomicity, Consistency, Isolation, Durability).

2. Trigger and Stored Procedure:

Trigger:

- A trigger is a special type of stored procedure that is automatically executed (or "triggered") in response to certain events, such as INSERT, UPDATE, or DELETE operations on a table.
- Triggers are used to enforce business rules, maintain data integrity, or perform additional actions based on changes to the data.

Stored Procedure:

- A stored procedure is a precompiled collection of one or more SQL statements that can be executed as a single unit.
- Stored procedures are explicitly called by the user or application and can accept parameters.

3. Stored Procedure and Functions:

Stored Procedure:

- A stored procedure is a set of SQL statements that can be executed as a single unit.
- Stored procedures may or may not return values, and they can contain input and output parameters.

Function:

- A function is a special type of stored procedure that returns a value.
- Functions are designed to be used in SQL statements, such as SELECT queries, and can be part of expressions.

4. Drop, Truncate, and Delete Statement:

DROP:

- The DROP statement is used to remove database objects, such as tables, views, or indexes.
- Once an object is dropped, it is permanently deleted from the database.

TRUNCATE:

- The TRUNCATE statement is used to remove all rows from a table but retains the table structure for future use.
- TRUNCATE is faster than DELETE, but it cannot be used if the table is referenced by a foreign key constraint.

DELETE:

- The DELETE statement is used to remove rows from a table based on a condition.
- DELETE is slower than TRUNCATE, but it offers more flexibility as it allows the use of WHERE clause to specify conditions for deletion.

5. Select and Select Into Statement:

SELECT:

- The SELECT statement is used to retrieve data from one or more tables in a database.
- It is often used in conjunction with other clauses like WHERE, ORDER BY, GROUP BY, etc., to filter, sort, and organize the retrieved data.

SELECT INTO:

- The SELECT INTO statement is used to create a new table and insert the result set of a SELECT query into that table in a single statement.
- It is often used to create a temporary or backup table based on the result of a query.

6. Local and Global Variables:

Local Variables:

- Local variables are declared and used within a specific scope, such as a stored procedure, function, or a batch of statements.
- They have limited visibility and are typically used for temporary storage of data within a specific block of code.

Global Variables:

- Global variables, in the context of databases, often refer to variables that can be accessed from anywhere within a program or session.
- SQL Server doesn't have truly global variables, but you can use session-level variables or system functions to achieve a similar effect.

7. Convert and Cast Statements:

CONVERT:

- The CONVERT function is used to explicitly convert an expression from one data type to another.
- It allows for more flexibility in specifying the target data type and the format of the result.

CAST:

- The CAST function is used for explicit conversion of an expression to a specified data type.
- It provides a simpler syntax compared to CONVERT but may have limitations in terms of format customization.

8. DDL, DML, DCL, DQL, and TCL:

DDL (Data Definition Language):

- DDL statements are used for defining, altering, and dropping database objects such as tables, indexes, and views.
- Examples include CREATE, ALTER, and DROP statements.

DML (Data Manipulation Language):

- DML statements are used for manipulating data stored in the database.
- Examples include SELECT, INSERT, UPDATE, and DELETE statements.

DCL (Data Control Language):

- DCL statements are used for controlling access to data within the database.
- Examples include GRANT and REVOKE statements.

DQL (Data Query Language):

- DQL refers to the subset of SQL that deals with queries, primarily the SELECT statement.
- It is used for retrieving data from the database.

TCL (Transaction Control Language):

- TCL statements are used to manage transactions within a database.
- Examples include COMMIT, ROLLBACK, and SAVEPOINT.

9. FOR XML RAW and FOR XML AUTO:

FOR XML RAW:

- FOR XML RAW is used in SQL Server to return query results as raw XML, with each row represented as an XML element.
- It provides a simple XML structure where each column is represented as an attribute.

FOR XML AUTO:

- FOR XML AUTO is used to return query results as XML, with a more hierarchical structure.
- It automatically generates XML elements and attributes based on the table structure and relationships.

10. Table-Valued and Multi-Statement Function:

Table-Valued Function:

- A Table-Valued Function (TVF) is a function that returns a table as its result.
- It can be used in the FROM clause of a SELECT statement, similar to a regular table.

Multi-Statement Function:

- A Multi-Statement Function is a function that contains multiple SQL statements in its body.
- It can perform complex operations and includes control-of-flow language (BEGIN...END), allowing for more advanced logic.

These comparisons provide an overview of the differences and use cases for each concept in SQL Server.

11. Varchar(50) and Varchar(max):

Varchar(50):

- Varchar(50) is a variable-length character data type that can store up to 50 characters.
- The number within the parentheses (50 in this case) represents the maximum number of characters allowed for a specific column.

Varchar(max):

- Varchar(max) is a variable-length character data type that can store up to 2^31-1 (2,147,483,647) characters.
- It is used when the length of the data is unknown or when the data can be very large.

Note: The use of **max** comes with some considerations, and it's important to be mindful of potential performance implications when dealing with very large data.

12. Datetime, Datetime2(7), and Datetimeoffset(7):

Datetime:

- Datetime is a data type that represents a date and time from January 1, 1753, to December 31, 9999, with an accuracy of 3.33 milliseconds.

Datetime2(7):

- Datetime2 is an extension of the Datetime data type with a larger date range and fractional seconds precision.
- Datetime2(7) indicates that it can store up to 7 digits of fractional seconds.

Datetimeoffset(7):

- Datetimeoffset is a data type that includes a time zone offset along with date and time information.
- Datetimeoffset(7) indicates that it can store up to 7 digits of fractional seconds.

13. Default Instance and Named Instance:

Default Instance:

- In SQL Server, the default instance refers to the installation of SQL Server that uses the default settings without specifying an instance name.
- The default instance is identified by the machine name or IP address.

Named Instance:

- A named instance is an installation of SQL Server that is assigned a specific instance name during setup.
- It allows for multiple instances of SQL Server to run on the same machine, each with its own configuration and databases.

14. SQL and Windows Authentication:

SQL Authentication:

- SQL Authentication is a method of authentication where users provide a username and password to connect to the SQL Server.
- User credentials are stored in the SQL Server database, and the authentication is independent of Windows user accounts.

Windows Authentication:

- Windows Authentication, also known as Integrated Security, relies on the Windows operating system to authenticate users.
- Users are authenticated based on their Windows login credentials, and SQL Server trusts the Windows security infrastructure for user authentication.

15. Clustered and Non-Clustered Index:

Clustered Index:

- Defines the physical order of data rows in a table.
- The leaf nodes of the clustered index contain the actual data pages.
- There can be only one clustered index per table.

Non-Clustered Index:

- Does not affect the physical order of data rows.
- The leaf nodes of the non-clustered index contain pointers to the actual data pages.
- Tables can have multiple non-clustered indexes.

Choosing between clustered and non-clustered indexes depends on factors such as the type of queries, data distribution, and the overall usage pattern of the database.

16. Group by ROLLUP and Group by CUBE:

ROLLUP:

- Used for creating subtotals and grand totals in result sets.
- Generates result sets that represent hierarchies of values in the columns listed in the GROUP BY clause.
- Provides a more limited form of grouping compared to CUBE.

CUBE:

- Similar to ROLLUP but more powerful.
- Generates result sets that represent all possible combinations of values in the columns listed in the GROUP BY clause.
- Useful for creating cross-tabular reports.

17. Sequence Object and Identity:

Sequence Object:

- Introduced in SQL Server 2012.
- A user-defined object that generates a sequence of numeric values.
- More flexible than the IDENTITY property, as it can be used independently of a specific table.

  Identity:

- A property that is used to automatically generate numeric values for a column.
- Typically associated with a specific table.
- Limited to a single column in a table.

18. Inline Function and View:

Inline Function:

- A user-defined function that returns a table data type.
- Accepts parameters and can be used in the FROM clause of a query.
- Allows for more dynamic behavior as it can take parameters.

  View:

- A virtual table based on the result set of a SELECT statement.
- Does not accept parameters and is essentially a saved query.
- Provides a static representation of data.

19. Table Variable and Temporary Table:

Table Variable:

- Created and stored in memory.
- Scope is limited to the batch, stored procedure, or function in which it is declared.
- Automatically cleared when the batch or session ends.

Temporary Table:

- Created in the tempdb database.
- Can be explicitly dropped or is dropped automatically when the session ends.
- Can have indexes and statistics.

20. ROW_NUMBER() and DENSE_RANK() Function:

ROW_NUMBER():

- Assigns a unique number to each row within a partition of a result set.
- The numbering is consecutive without gaps.

DENSE_RANK():

- Similar to ROW_NUMBER() but assigns ranks without any gaps, even if there are tied values.
- Provides a ranking without skipping rank values.

These comparisons should give you a good overview of the differences and use cases for each concept in SQL Server.