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Comparison of Batch, Script, and Transaction in SQL server

Feature	Batch	Script	Transaction
Definition	Group of SQL statements run together.	Sequence of SQL commands run together, separated by delimiters.	A set of SQL statements that are executed as a single unit, with commit and rollback on failure.
Execution	Executed as a group, usually sequentially.	Executed as a whole script.	Executed as an atomic unit (all or nothing).
Rollback Support	Not necessarily; depends on implementation.	Not always; depends on use of transactions.	Yes; rollback occurs if any part fails.

Comparison of Trigger and Stored procedure in SQL server

Feature	Trigger	Stored Procedure
Definition	A special type of object that executes automatically in response to DML/DDL events.	A reusable block of SQL code that executes only when called explicitly .
When It Runs	Automatically, after (AFTER) or instead of (INSTEAD OF) operations like INSERT, UPDATE, DELETE.	Only when executed via EXEC or EXECUTE statement.
Accepts Parameters	✗ No	✓ Yes (can take input/output parameters)
Manual Execution	✗ No – cannot be called directly	✓ Yes – you decide when to run it
Common Use Cases	Enforcing rules, automatic logging, auditing changes to tables.	Encapsulating logic, complex queries, reports, or updates done on demand.

فواں اے trigger

① DML Queries security (ما يمنع استخدامه في الـ DML)

auditing مستخدمة في الـ ②

* مع كل trigger أو fire تكون لدى tables 2 واحد اسماً واحد inserted و واحد deleted ويكونوا سبباً لـ table الاختهلي الذي يعمل عليه او trigger

① لما يعدل update او adds او deletes او الجديدة inserteds تتسجل في الملف datafile

لما بعمل delete أو drop الفريدة بتحذف في
اللى أوى اسوي insert new يكون خافى

٣) لما يُدخل insert او insertAfter data الجديدة يتسجل في insertList والآيات
الآتية تكون فارغة deleted == false



* الـ Queries stored procedure بـ يتكتب فـ يـ كل اـنـوـاع اـرـ بـ يـسـ الفـروـقـ بـ يـسـها وـ يـسـ اـلـ views وـ يـاـلـ function وـ يـاـلـ gsp الـي صـنـ بـ يـخـلـيـنا نـلـغـيـهـ هـوـ اـنـ

۱۱-۱ View بی تعامل زی ار table باز نمایش و ممکن است دل فیه سانان

الـ **where** وارد أو **select** أو **from** و هكذا في أي مكان
لـ **flexibility function** لـ **الـ flexibility function** ممكن تستخدم في ②

* أفراد views مارك up أو أعمدة call PS اول ار function و queries ال يمكن بحثها في SF

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* لـ `functions` و `Views` من `SP` `Jas` امتحنوا على `APP` لـ `SP` `SP` من `SP`

بس لو حجٰو ار Δ کیبر وغى اجزا، مىكىن اعمالها Δ او view االأفضل ئىامل كدة زى لو فى «هــز» الأفضل ئىام Δ view Δ اما

* ففي الآخر اى DB كلها يتحوال ل SQL بس جوة f_n و $views$.

* ار ای بخصل من ال Queries بتوغع ار APP فلارم try و catch او if exists errors دی زی code دل جمل

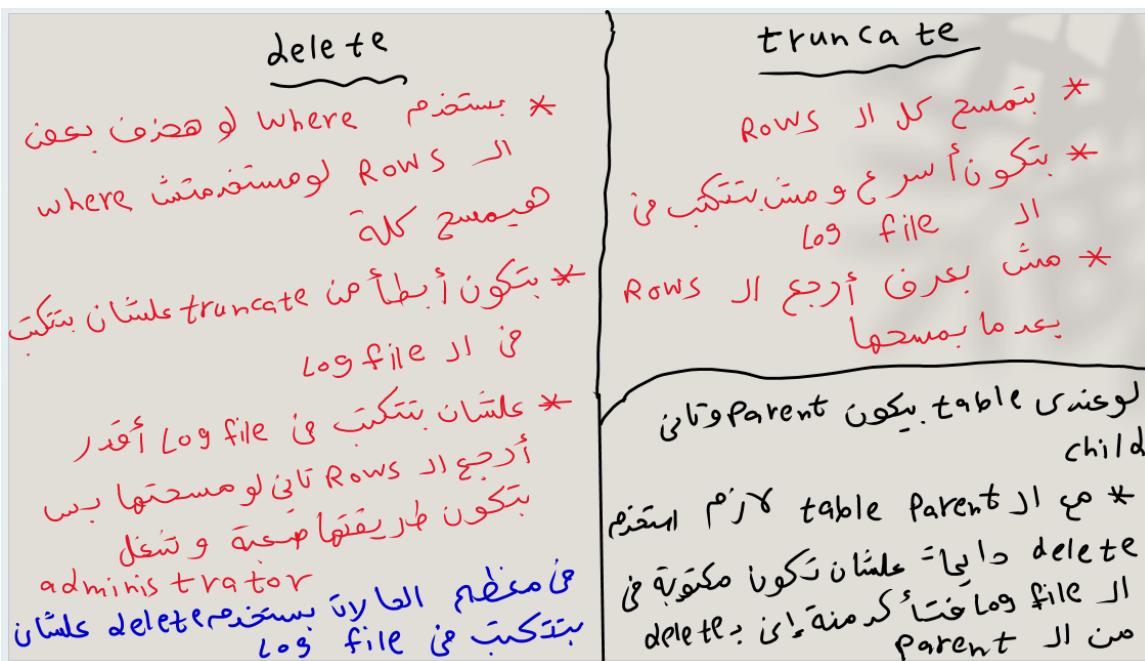
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Comparison of Function and Stored procedure in SQL server

Feature	Function	Stored Procedure
Definition	A routine that must return a value (scalar or table) and can be used in queries.	A block of SQL code that performs operations and is executed manually.
Return Value	Must return a value (RETURN or RETURNS TABLE).	May return integer only in one case to express the behavior of SP or use output parameters.
Call Method	Used in SQL expressions so has flexibility in calling with any a lot of SQL statements (SELECT, WHERE, etc.).	Can't called inside SQL statements , Called with EXEC or EXECUTE or with name.
Accepts Parameters?	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes
Allows DML (INSERT, UPDATE, DELETE)?	<input type="checkbox"/> No (only in multi-statement table-valued functions with restrictions)	<input checked="" type="checkbox"/> Yes
Transactions Allowed?	<input type="checkbox"/> Limited (no full transaction control)	<input checked="" type="checkbox"/> Full control with BEGIN, COMMIT, ROLLBACK
Error Handling	<input type="checkbox"/> Cannot use TRY...CATCH	<input checked="" type="checkbox"/> Can use TRY...CATCH

Comparison of Drop, Truncate and Delete in SQL server

Feature	DROP	TRUNCATE	DELETE
Purpose	Removes the entire table structure and data permanently.	Removes all rows , but keeps the table structure.	Removes some or all rows based on a condition.
Can Use WHERE Clause?	✗ No	✗ No	✓ Yes
Affects Table Structure?	✓ Yes – removes table and all constraints/indexes.	✗ No – data only; structure stays.	✗ No – data only.
Rolls Back with TRAN?	✗ No (DDL – auto-commit) can't be included inside a transaction	✓ Yes (can be rolled back if inside a transaction).	✓ Yes (if in a transaction).
Resets Identity Column?	✗ No (table is gone)	✓ Yes – resets identity to seed.	✗ No – identity remains unchanged.
Speed	⚡ Fastest – removes entire object.	⚡ Faster than DELETE for large data and not logs rows it removes. We Can't return the data	🐢 Slower – logs each row deleted. We Can return data
Triggers Fire?	✗ No	✗ No	✓ Yes – AFTER DELETE triggers will fire.
Use Case	Drop a table permanently.	Quickly clear all rows and reset identity.	Delete specific rows with conditions or fire triggers.



Comparison of Drop, Truncate and Delete in SQL server

Feature	SELECT	SELECT INTO
Purpose	Retrieves data from existing tables.	Creates a new table and inserts selected data into it.
Creates New Table?	<input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes
Modifies Data?	<input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes – inserts data into a new table
Used For	Viewing or analyzing data	Quick backup, exporting data, or creating temporary tables
Example	<code>SELECT * FROM Employees</code>	<code>SELECT * INTO NewTable FROM Employees</code>

Comparison of Local and Global Variables in SQL server

Aspect	Local Variable	Global Variable
Prefix	Starts with @	Starts with @@
Defined by	User-defined	System-defined (built-in)
Scope	Limited to current batch/procedure	Available throughout the session/server
Modifiable?	<input checked="" type="checkbox"/> Yes – can be assigned by user	<input type="checkbox"/> No – read-only
Usage	For temporary data storage	To get system-level information

Comparison Between Convert and Cast Statements in SQL server

Aspect	CAST	CONVERT
Syntax Simplicity	Simpler, ANSI standard syntax	Slightly more complex, SQL Server-specific
Portability	<input checked="" type="checkbox"/> More portable across databases	<input type="checkbox"/> Less portable – SQL Server specific
Style Parameter	<input type="checkbox"/> Does not support formatting styles	<input checked="" type="checkbox"/> Supports style codes for date/time & money
Use Case Example	CAST(value AS datatype)	CONVERT(datatype, value, style)
Specific Example	CAST('2025-01-01' AS DATETIME)	CONVERT(DATETIME, '2025-01-01', 103)

Comparison Between DDL, DML, DCL, DQL and TCL in SQL server

Category	Full Form	Purpose	Affects	Examples
DDL	Data Definition Language	Defines and manages DB structure	Structure and Metadata	CREATE, ALTER, DROP
DML	Data Manipulation Language	Manages data inside tables	Data (rows)	INSERT, UPDATE, DELETE
DCL	Data Control Language	Controls access to data	Security and Permissions	GRANT, REVOKE and DENY
DQL	Data Query Language	Retrieves data from DB	Display Data (read-only)	SELECT +Agg fns , Grouping, Union, Joins, Subqueries
TCL	Transaction Control Language	Manages transactions in DB	Execution and Transactions	BEGIN TRANSACTION, COMMIT, ROLLBACK, SAVEPOINT

Comparison Between For XML Raw and For XML Auto in SQL server

Aspect	FOR XML RAW	FOR XML AUTO
Element Naming	Each row becomes a <row> element	Each table becomes an element with its name
Structure Control	Less automatic; flat, generic structure	Automatically reflects table and join structure
Customization	Easier to customize manually with aliases	More dependent on query structure and joins
Output Example	<row column1="..." column2="..." />	<TableName column1="..." column2="..." />

Comparison Between Table-Valued and Multi-Statement Function in SQL server

Aspect	Inline Table-Valued Function (TVF)	Multi-Statement Table-Valued Function (MSTVF)
Body Content	Contains a single SELECT statement	Can include multiple SQL statements
Returns Table	Returns the result of a single SELECT as a table	Returns a table variable explicitly. uses insert based on select
Performance	Better performance, optimized like a view	Slower; query optimizer can't estimate as well
Flexibility	Less flexible, limited to one query	More flexible with control flow, logic, temp data etc.
Definition Style	No BEGIN...END block	Uses BEGIN...END and requires explicit table structure

Comparison Between Varchar(50) and Varchar(Max) in SQL server

Aspect	VARCHAR(50)	VARCHAR(MAX)
Storage Limit	Stores up to 50 characters	Stores up to $2^{31}-1$ characters (~2 GB)
Performance	More efficient, better for short text	Slightly slower for operations, especially large data
Memory Usage	Uses less memory	Can use more memory, especially when large
Indexing	Fully supported	Limited indexing support
Use Case	Fixed-size short text (names, codes, etc.)	Large text (documents, logs, etc.)

Comparison Between Datetime, Datetime2(7) and Datetimeoffset(7) in SQL server

Aspect	datetime	datetime2(7)	datetimeoffset(7)
Precision	Up to 3 decimal places	Up to 7 decimal places	Same as datetime2(7) also 7 decimal places
Storage Size	8 bytes	6 to 8 bytes (depends on precision)	10 bytes
Date Range	1753-9999	0001-9999	0001-9999
Time Zone Support	✗ No	✗ No	✓ Yes (stores time zone offset)
Use Case	Legacy use	Preferred for higher precision	Needed when storing time zone aware datetime values

Comparison Between Default Instance and Default Instance in SQL server

Aspect	Default Instance	Named Instance
Instance Name	No custom name; referred to as MSSQLSERVER	Has a custom name specified during installation
Connection String	Server name only (e.g., DESKTOP-PC)	Server name + instance (e.g., DESKTOP-PC\SQL2022)
Number Per Machine	Only one default instance allowed	Can have multiple named instances
Usage Simplicity	Easier to connect (no need to specify name)	Needs full name in connection
Typical Use Case	Used when only one SQL Server instance is needed	Used when running multiple SQL Server versions or configurations on the same machine

Comparison Between SQL and Windows Authentifications in SQL server

Aspect	SQL Authentication	Windows Authentication
Login Credentials	SQL Server-specific username & password	Uses Windows user account (domain/local)
Credential Management	Stored and managed inside SQL Server	Managed by Windows OS
Security	Generally less secure (passwords stored)	More secure (uses Kerberos/NTLM)
User Convenience	Requires entering credentials each time	Allows Single Sign-On (SSO)
Use Case	Used for cross-platform or non-domain users	Ideal in domain-based enterprise environments

Comparison Between Clustered and Non-Clustered Indexes in SQL server

Aspect	Clustered Index	Non-Clustered Index
Data Storage	Sorts and stores the actual table data	Stores separate structure with pointers to data rows
Number Allowed	Only one per table	Multiple (up to 999) per table
Physical Order	Changes the physical order of data in the table	Does not affect the physical order of data
Performance	Faster for range queries or ordered results	Better for specific lookups or non-key columns
Storage Space	Takes no extra space (data is the index)	Requires additional storage space

Comparison Between Group by Rollup and Group by Cube in SQL server

Aspect	GROUP BY ROLLUP	GROUP BY CUBE
Summary Direction	Adds hierarchical (vertical) subtotals	Adds all combinations of subtotals
Total Levels	Produces subtotal + grand total	Produces subtotal + cross totals + grand total
Use Case	Best for nested/grouped hierarchy (e.g. Year > Qtr)	Best for multi-dimensional analysis (pivot-style)
Output Rows	Fewer summary rows	More summary rows due to all combinations

Comparison Between Sequence Object and Identity in SQL server

Aspect	Sequence Object	Identity
Definition	A separate object used to generate sequential numbers	A property of a column in a table
Control	Fully customizable with options like increment , start value , and cycle	Limited customization (only increment and seed)
Scope	Can be used across multiple tables	Tied to a specific table and column
Value Generation	Manually invoked with NEXT VALUE FOR	Automatically generated when a new row is inserted
Resetting Values	Can be reset manually	Cannot be reset without truncate/recreating column But we can enable it and disable it to enter it manually
Concurrency	Supports independent sequence values for multiple tables	Each table's identity values are generated within the table

Comparison Between Inline Function and View in SQL server

Aspect	Inline Function	View
Definition	A user-defined function that returns a table result	A virtual table that stores a SELECT statement
Return Type	Always returns a single table result (can be used in queries)	Returns a set of rows based on the query
Use Case	Can be used in joins, SELECT, and WHERE clauses	Used to simplify complex queries
Performance	May provide better performance (especially inline)	Performance can vary depending on the query complexity
Modification	Cannot be modified directly once defined. Can't use any DML Queries inside it	Can be modified directly (if not based on multiple tables). Can we use DML Queries to it but under specific conditions
Parameterization	Accepts parameters that can be used to filter data	Does not accept parameters
Execution Context	Always executed like a function	Executes like a query

Comparison Between Table Variable and Temporary Table in SQL server

Aspect	Table Variable	Temporary Table
Scope	Limited to the batch, procedure, or function	Exists for the session or until explicitly dropped
Declaration	Declared using <code>DECLARE @Table...)</code>	Created using <code>CREATE TABLE #TempTable(...)</code>
Transaction Participation	Does not fully participate in transactions	Fully participates in transactions
Indexing	Limited support (no non-clustered indexes)	Full indexing support (clustered & non-clustered)
Statistics	No statistics maintained	Statistics are maintained, aiding performance
Performance	Better for small datasets	Better for large datasets and complex queries
Persistence	In-memory	Stored in tempdb (physically persisted)

Comparison Between Row_number() and Dense_Rank() functions in SQL server

Feature	ROW_NUMBER()	DENSE_RANK()
Handling of Ties	Assigns a unique number to each row, even if values are the same (no ties)	Assigns the same rank to tied values
Numbering Sequence	Always increases by 1 per row	Increases by 1 per distinct rank only
Example (Tied Values)	Tied values will get different row numbers (e.g., 1, 2, 3)	Tied values will get the same rank (e.g., 1, 1, 2)
Structure	ROW_NUMBER() OVER (PARTITION BY ... ORDER BY ...)	DENSE_RANK() OVER (PARTITION BY ... ORDER BY ...)
Example	SELECT ROW_NUMBER() OVER (ORDER BY Sales DESC) AS Rank FROM Sales	SELECT DENSE_RANK() OVER (ORDER BY Sales DESC) AS Rank FROM Sales

