**Tables – Creation / Design**

* What are the difference between clustered and a non-clustered index?

A **clustered** **index** alters the way that the rows are stored. When you create a clustered index on a column (or a number of columns), SQL server sorts the table’s rows by that column(s). It is like a **dictionary**, where all words are sorted in alphabetical order in the entire book.

A **non-clustered index**, on the other hand, does not alter the way the rows are stored in the table. It creates a completely different object within the table that contains the column(s) selected for indexing and a pointer back to the table’s rows containing the data. It is like an index in the last pages of a book, where keywords are sorted and contain the page number to the material of the book for faster reference.

* What are difference between primary key and clustered index?

A table without a **clustered index** is called a heap. A **primary key** is a unique **index** that is **clustered** by default. By default means that when you create a **primary key**, if the table is not **clustered** yet, the **primary key** will be created as a **clustered** unique **index**. Unless you explicitly specify the non-clustered option.

A PRIMARY KEY constraint is a unique identifier for a row within a database table. Every table should have a primary key constraint to uniquely identify each row and only one primary key constraint can be created for each table. The primary key constraints are used to enforce entity integrity.

* What's the difference between a primary key and a unique key?

Both primary key and unique key enforces **uniqueness** of the column on which they are defined.

But by default primary key creates a **clustered** index on the column, where are **unique** creates a **non-clustered index** by default.

Another major difference is that, primary key doesn't allow NULLs, but unique key allows one NULL only.

* What is FOREIGN KEY?

A FOREIGN KEY constraint prevents any actions that would destroy links between tables with the corresponding data values. A foreign key in one table points to a primary key in another table. Foreign keys prevent actions that would leave rows with foreign key values when there are no primary keys with that value. The foreign key constraints are used to enforce referential integrity.

* [How do you partition the table](https://msdn.microsoft.com/en-us/library/ms188730.aspx)?

You can create a partitioned table or index in SQL Server 2016 by using SQL Server Management Studio or Transact-SQL. The data in partitioned tables and indexes is horizontally divided into units that can be spread across more than one filegroup in a database. Partitioning can make large tables and indexes more manageable and scalable.

Creating a partitioned table or index typically happens in four parts:

1. Create a filegroup or filegroups and corresponding files that will hold the partitions specified by the partition scheme.
2. Create a partition function that maps the rows of a table or index into partitions based on the values of a specified column.
3. Create a partition scheme that maps the partitions of a partitioned table or index to the new filegroups.
4. Create or modify a table or index and specify the partition scheme as the storage location.

* Define a temp table.

In a nutshell, a temp table is a temporary storage structure. What does that mean? Basically, you can use a temp table to store data temporarily so you can manipulate and change it before it reaches its destination format.

* What’s the difference between a local temp table and a global temp table?

Local tables are accessible to a current user connected to the server. These tables disappear once the user has disconnected from the server.

Global temp tables, on the other hand, are available to all users regardless of the connection. These tables stay active until all the global connections are closed.

**Table – Query**

* What is the difference between WHERE clause and HAVING clause?

- WHERE clause can only be applied on a static non-aggregated column

- We will need to use HAVING for **aggregated** columns.

* What is a CTE?

A common table expression (CTE) is a temporary named result set that can be used within other statements like SELECT, INSERT, UPDATE, and DELETE. It is not stored as an object and its lifetime is limited to the query. It is defined using the WITH statement as the following example shows:

WITH ExampleCTE (id, fname, lname)

AS

(

SELECT id, firstname, lastname FROM table

)

SELECT \* FROM ExampleCTE

A CTE can be used in place of a view in some instances.

**Table - Joining**

* What is the difference between inner and outer join? Explain with example.

- Inner join returns rows when there is at least one match in both tables

- Outer join will return matching rows from both tables as well as any unmatched rows from one or both the tables

* What is the difference between JOIN and UNION?

- SQL JOIN allows us to “lookup” records on other table based on the given conditions between two tables.

- UNION operation allows us to add 2 similar data sets to create resulting data set that contains all the data from the source data sets. Union does not require any condition for joining.

* What is the difference between UNION and UNION ALL?

- UNION operation returns only the **unique** records from the resulting data set

- UNION ALL will return all the rows, even if one or more rows are duplicated to each other.

* What is the difference among UNION, MINUS and INTERSECT?

- UNION combines the results from 2 tables and eliminates duplicate records from the result set.

- MINUS operator when used between 2 tables, gives us all the rows from the first table except the rows which are present in the second

table.

- INTERSECT operator returns us only the matching or common rows between 2 result sets.

**Table – Command**

* Describe the difference between truncate and delete.

Delete command removes the rows from a table based on the condition that we provide with a WHERE clause.

Truncate will actually remove all the rows from a table and there will be no data in the table after we run the truncate command.

**TRUNCATE**

* TRUNCATE is a DDL command
* TRUNCATE is executed using a table lock and whole table is locked for remove all records.
* We cannot use Where clause with TRUNCATE.
* TRUNCATE removes all rows from a table.
* Minimal logging in transaction log, so it is performance wise faster.
* TRUNCATE TABLE removes the data by deallocating the data pages used to store the table data and records only the page deallocations in the transaction log.
* Identify column is reset to its seed value if table contains any identity column.
* To use Truncate on a table you need at least ALTER permission on the table.
* Truncate uses the less transaction space than Delete statement.
* Truncate cannot be used with indexed views.

**DELETE**

* DELETE is a DML command.
* DELETE is executed using a row lock, each row in the table is locked for deletion.
* We can use where clause with DELETE to filter & delete specific records.
* The DELETE command is used to remove rows from a table based on WHERE condition.
* It maintain the log, so it slower than TRUNCATE.
* The DELETE statement removes rows one at a time and records an entry in the transaction log for each deleted row.
* Identity of column keep DELETE retain the identity.
* To use Delete you need DELETE permission on the table.
* Delete uses the more transaction space than Truncate statement.
* Delete can be used with indexed views.

**DROP**

* The DROP command removes a table from the database.
* All the tables' rows, indexes and privileges will also be removed.
* No DML triggers will be fired.
* The operation cannot be rolled back.
* DROP and TRUNCATE are DDL commands, whereas DELETE is a DML command.
* DELETE operations can be rolled back (undone), while DROP and TRUNCATE operations cannot be rolled back.

**View**

* What is a view?

A view is simply a virtual table that is made up of elements of multiple physical or “real” tables. Views are most commonly used to join multiple tables together, or control access to any tables existing in background server processes.

* What is a view? What is the WITH CHECK OPTION clause for a view?

A view is a virtual table that consists of fields from one or more real tables. Views are often used to join multiple tables or to control access to the underlying tables.

The WITH CHECK OPTION for a view prevents data modifications (to the data) that do not confirm to the WHERE clause of the view definition. This allows data to be updated via the view, but only if it belongs in the view.

**Stored Procedure**

* What are the advantages of using Stored Procedures?

Stored procedure can reduced network traffic and latency, boosting application **performance**.

Stored procedure execution plans can be **reused**, staying cached in SQL Server's memory, reducing server overhead.

Stored procedures help promote code **reuse**.

Stored procedures can **encapsulate** logic. You can change stored procedure code without affecting clients.

Stored procedures provide better **security** to your data.

## **How are transactions used?**

Transactions allow you to group SQL commands into a single unit. The transaction begins with a certain task and ends when all tasks within it are complete. The transaction completes successfully only if all commands within it complete successfully. The whole thing fails if one command fails. The BEGIN TRANSACTION, ROLLBACK TRANSACTION, and COMMIT TRANSACTION statements are used to work with transactions. A group of tasks starts with the begin statement. If any problems occur, the rollback command is executed to abort. If everything goes well, all commands are permanently executed via the commit statement.

Query Execution Plan

* What is a query execution plan?

SQL Server has an optimizer that usually does a great job of optimizing code for the most effective execution. A query execution plan is the breakdown of how the optimizer will run (or ran) a query. There are several ways to view a query execution plan. This includes using the Show Execution Plan option within Query Analyzer; Display Estimated Execution Plan on the query dropdown menu; or use the SET SHOWPLAN\_TEXT ON command before running a query and capturing the execution plan event in a SQL Server Profiler trace.

SQL Server Agent Windows service

* What does the SQL Server Agent Windows service do?

SQL Server Agent is a Windows service that handles scheduled tasks within the SQL Server environment (aka jobs). The jobs are stored/defined within SQL Server, and they contain one or more steps that define what happens when the job runs. These jobs may run on demand, as well as via a trigger or predefined schedule. This service is very important when determining why a certain job did not run as planned — often it is as simple as the SQL Server Agent service not running.

**Misc.**

* What is the default port number for SQL Server? -

Basically, when SQL Server is enabled the server instant listens to the TCP port 1433. It can be changed from the Network Utility TCP/IP properties.