**Which TCP/IP port does SQL Server run on? How can it be changed?**

SQL Server runs on port 1433. It can be changed from the Network Utility TCP/IP properties.

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

1. **A clustered index** is a special type of index that reorders the way records in the table are physically stored. Therefore table can have only one clustered index. The leaf nodes of a clustered index contain the data pages.
2. **A non clustered index** is a special type of index in which the logical order of the index does not match the physical stored order of the rows on disk. The leaf node of a non clustered index does not consist of the data pages. Instead, the leaf nodes contain index rows.

**3. What are the different index configurations a table can have?**

A table can have one of the following index configurations:

1. No indexes
2. A clustered index
3. A clustered index and many nonclustered indexes
4. A nonclustered index
5. Many nonclustered indexes

**What is collation?**

A collation in SQL Server is a defined set of rules for sorting and comparing data. This includes rules for case-sensitivity and accent-sensitivity. When you select a collation (for your server, database, column, or expression), you assign specific characteristics to your data that affect the results of database operations.

**4. What are different types of Collation Sensitivity?**

1. **Case sensitivity** - A and a, B and b, etc.
2. **Accent sensitivity**
3. **Kana Sensitivity** - When Japanese kana characters Hiragana and Katakana are treated differently, it is called Kana sensitive.
4. **Width sensitivity** - A single-byte character (half-width) and the same character represented as a double-byte character (full-width) are treated differently than it is width sensitive.

**5. What is OLTP (Online Transaction Processing)?**

In OLTP - online transaction processing systems relational database design use the discipline of data modeling and generally follow the Codd rules of data normalization in order to ensure absolute data integrity. Using these rules complex information is broken down into its most simple structures (a table) where all of the individual atomic level elements relate to each other and satisfy the normalization rules.

**6. 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 nonclustered index by default. Another major difference is that, primary key doesn't allow NULLs, but unique key allows one NULL only.

**What is difference between DELETE and TRUNCATE commands?**

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.

1. **TRUNCATE**:
   1. TRUNCATE is faster and uses fewer system and transaction log resources than DELETE.
   2. TRUNCATE removes the data by deallocating the data pages used to store the table's data, and only the page deallocations are recorded in the transaction log.
   3. TRUNCATE removes all rows from a table, but the table structure, its columns, constraints, indexes and so on, remains. The counter used by an identity for new rows is reset to the seed for the column.
   4. You cannot use TRUNCATE TABLE on a table referenced by a FOREIGN KEY constraint. Because TRUNCATE TABLE is not logged, it cannot activate a trigger.
   5. TRUNCATE cannot be rolled back.
   6. TRUNCATE is DDL Command.
   7. TRUNCATE Resets identity of the table
2. **DELETE**:
   1. DELETE removes rows one at a time and records an entry in the transaction log for each deleted row.
   2. If you want to retain the identity counter, use DELETE instead. If you want to remove table definition and its data, use the DROP TABLE statement.
   3. DELETE Can be used with or without a WHERE clause
   4. DELETE Activates Triggers.
   5. DELETE can be rolled back.
   6. DELETE is DML Command.
   7. DELETE does not reset identity of the table.

Note: DELETE and TRUNCATE both can be rolled back when surrounded by TRANSACTION if the current session is not closed. If TRUNCATE is written in Query Editor surrounded by TRANSACTION and if session is closed, it can not be rolled back but DELETE can be rolled back.

**8. When is the use of UPDATE\_STATISTICS command?**

This command is basically used when a large processing of data has occurred. If a large amount of deletions any modification or Bulk Copy into the tables has occurred, it has to update the indexes to take these changes into account. UPDATE\_STATISTICS updates the indexes on these tables accordingly.

**9. What is the difference between a HAVING CLAUSE and a WHERE CLAUSE?**

They specify a search condition for a group or an aggregate. But the difference is that HAVING can be used only with the SELECT statement. HAVING is typically used in a GROUP BY clause. When GROUP BY is not used, HAVING behaves like a WHERE clause. Having Clause is basically used only with the GROUP BY function in a query whereas WHERE Clause is applied to each row before they are part of the GROUP BY function in a query.

**10. What are the properties and different Types of Sub-Queries?**

1. **Properties of Sub-Query**
   1. A sub-query must be enclosed in the parenthesis.
   2. A sub-query must be put in the right hand of the comparison operator, and
   3. A sub-query cannot contain an ORDER-BY clause.
   4. A query can contain more than one sub-query.
2. **Types of Sub-Query**
   1. Single-row sub-query, where the sub-query returns only one row.
   2. Multiple-row sub-query, where the sub-query returns multiple rows,. and
   3. Multiple column sub-query, where the sub-query returns multiple columns

**11. What is SQL Profiler?**

SQL Profiler is a graphical tool that allows system administrators to monitor events in an instance of Microsoft SQL Server. You can capture and save data about each event to a file or SQL Server table to analyze later. For example, you can monitor a production environment to see which stored procedures are hampering performances by executing too slowly.

Use SQL Profiler to monitor only the events in which you are interested. If traces are becoming too large, you can filter them based on the information you want, so that only a subset of the event data is collected. Monitoring too many events adds overhead to the server and the monitoring process and can cause the trace file or trace table to grow very large, especially when the monitoring process takes place over a long period of time.

**12. What are the authentication modes in SQL Server? How can it be changed?**

Windows mode and Mixed Mode - SQL and Windows. To change authentication mode in SQL Server click Start, Programs, Microsoft SQL Server and click SQL Enterprise Manager to run SQL Enterprise Manager from the Microsoft SQL Server program group. Select the server then from the Tools menu select SQL Server Configuration Properties, and choose the Security page.

**Which command using Query Analyzer will give you the version of SQL server and operating system?**

SELECT SERVERPROPERTY ('productversion'), SERVERPROPERTY ('productlevel'), SERVERPROPERTY ('edition').

**14. What is SQL Server Agent?**

SQL Server agent plays an important role in the day-to-day tasks of a database administrator (DBA). It is often overlooked as one of the main tools for SQL Server management. Its purpose is to ease the implementation of tasks for the DBA, with its full- function scheduling engine, which allows you to schedule your own jobs and scripts.

**15. Can a stored procedure call itself or recursive stored procedure? How much level SP nesting is possible?**

Yes. Because Transact-SQL supports recursion, you can write stored procedures that call themselves. Recursion can be defined as a method of problem solving wherein the solution is arrived at by repetitively applying it to subsets of the problem. A common application of recursive logic is to perform numeric computations that lend themselves to repetitive evaluation by the same processing steps. Stored procedures are nested when one stored procedure calls another or executes managed code by referencing a CLR routine, type, or aggregate. You can nest stored procedures and managed code references up to 32 levels.

**16. What is Log Shipping?**

Log shipping is the process of automating the backup of database and transaction log files on a production SQL server, and then restoring them onto a standby server. Enterprise Editions only supports log shipping. In log shipping the transactional log file from one server is automatically updated into the backup database on the other server. If one server fails, the other server will have the same db and can be used this as the Disaster Recovery plan. The key feature of log shipping is that it will automatically backup transaction logs throughout the day and automatically restore them on the standby server at defined interval.

**17. Name 3 ways to get an accurate count of the number of records in a table?**

SELECT \* FROM table1   
SELECT COUNT(\*) FROM table1   
SELECT rows FROM sysindexes WHERE id = OBJECT\_ID(table1) AND indid < 2

**18. What does it mean to have QUOTED\_IDENTIFIER ON? What are the implications of having it OFF?**

When SET QUOTED\_IDENTIFIER is ON, identifiers can be delimited by double quotation marks, and literals must be delimited by single quotation marks. When SET QUOTED\_IDENTIFIER is OFF, identifiers cannot be quoted and must follow all Transact-SQL rules for identifiers.

**What is the difference between a Local and a Global temporary table?**

1. **A local temporary** table exists only for the duration of a connection or, if defined inside a compound statement, for the duration of the compound statement.
2. **A global temporary** table remains in the database permanently, but the rows exist only within a given connection. When connection is closed, the data in the global temporary table disappears. However, the table definition remains with the database for access when database is opened next time.

**20. What is the STUFF function and how does it differ from the REPLACE function?**

STUFF function is used to overwrite existing characters. Using this syntax, STUFF (string\_expression, start, length, replacement\_characters), string\_expression is the string that will have characters substituted, start is the starting position, length is the number of characters in the string that are substituted, and replacement\_characters are the new characters interjected into the string. REPLACE function to replace existing characters of all occurrences. Using the syntax REPLACE (string\_expression, search\_string, replacement\_string), where every incidence of search\_string found in the string\_expression will be replaced with replacement\_string.

**21. What is PRIMARY KEY?**

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.

**22. What is UNIQUE KEY constraint?**

A UNIQUE constraint enforces the uniqueness of the values in a set of columns, so no duplicate values are entered. The unique key constraints are used to enforce entity integrity as the primary key constraints.

**23. 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.

**24. What is CHECK Constraint?**

A CHECK constraint is used to limit the values that can be placed in a column. The check constraints are used to enforce domain integrity.

**What is NOT NULL Constraint?**

A NOT NULL constraint enforces that the column will not accept null values. The not null constraints are used to enforce domain integrity, as the check constraints.

**26. How to get @@ERROR and @@ROWCOUNT at the same time?**

If @@Rowcount is checked after Error checking statement then it will have 0 as the value of @@Recordcount as it would have been reset. And if @@Recordcount is checked before the error-checking statement then @@Error would get reset. To get @@error and @@rowcount at the same time do both in same statement and store them in local variable.

SELECT @RC = @@ROWCOUNT, @ER = @@ERROR

**27. What is a Scheduled Jobs or What is a Scheduled Tasks?**

Scheduled tasks let user automate processes that run on regular or predictable cycles. User can schedule administrative tasks, such as cube processing, to run during times of slow business activity. User can also determine the order in which tasks run by creating job steps within a SQL Server Agent job. E.g. back up database, Update Stats of Tables. Job steps give user control over flow of execution. If one job fails, user can configure SQL Server Agent to continue to run the remaining tasks or to stop execution.

**28. What are the advantages of using Stored Procedures?**

1. Stored procedure can reduced network traffic and latency, boosting application performance.
2. Stored procedure execution plans can be reused, staying cached in SQL Server's memory, reducing server overhead.
3. Stored procedures help promote code reuse.
4. Stored procedures can encapsulate logic. You can change stored procedure code without affecting clients.
5. Stored procedures provide better security to your data.

**29. What is a table called, if it has neither Cluster nor Non-cluster Index? What is it used for?**

Unindexed table or Heap. Microsoft Press Books and Book on Line (BOL) refers it as Heap. A heap is a table that does not have a clustered index and, therefore, the pages are not linked by pointers. The IAM pages are the only structures that link the pages in a table together. Unindexed tables are good for fast storing of data. Many times it is better to drop all indexes from table and then do bulk of inserts and to restore those indexes after that.

**30. Can SQL Servers linked to other servers like Oracle?**

SQL Server can be linked to any server provided it has OLE-DB provider from Microsoft to allow a link. E.g. Oracle has an OLE-DB provider for oracle that Microsoft provides to add it as linked server to SQL Server group.

**What is BCP? When does it used?**

BulkCopy is a tool used to copy huge amount of data from tables and views. BCP does not copy the structures same as source to destination. BULK INSERT command helps to import a data file into a database table or view in a user-specified format.

**32. How to implement one-to-one, one-to-many and many-to-many relationships while designing tables?**

One-to-One relationship can be implemented as a single table and rarely as two tables with primary and foreign key relationships. One-to-Many relationships are implemented by splitting the data into two tables with primary key and foreign key relationships. Many-to-Many relationships are implemented using a junction table with the keys from both the tables forming the composite primary key of the junction table.

**33. What is an execution plan? When would you use it? How would you view the execution plan?**

An execution plan is basically a road map that graphically or textually shows the data retrieval methods chosen by the SQL Server query optimizer for a stored procedure or ad- hoc query and is a very useful tool for a developer to understand the performance characteristics of a query or stored procedure since the plan is the one that SQL Server will place in its cache and use to execute the stored procedure or query. From within Query Analyzer is an option called "Show Execution Plan" (located on the Query drop-down menu). If this option is turned on it will display query execution plan in separate window when query is ran again.

When is the UPDATE\_STATISTICS command used?

- When the processing of large data is done, this command is used.   
- Whenever large number of deletions, modification or copy takes place into the tables, the indexes need to be updated to take care of these changes. UPDATE\_STATISTICS performs this job.

2. Differentiate between a HAVING CLAUSE and a WHERE CLAUSE.

HAVING CLAUSE

- HAVING CLAUSE is used only with the SELECT statement.   
- It is generally used in a GROUP BY clause in a query.   
- If GROUP BY is not used, HAVING works like a WHERE clause.

WHERE Clause

- It is applied to each row before they become a part of the GROUP BY function in a query.

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3. What do you understand by a view? What does the WITH CHECK OPTION clause for a view do?

- A view is a virtual table that consists of fields from one or more real tables.  
- It is usually used to join multiple tables and get the data.   
- The WITH CHECK OPTION for a view prevents any modification to the data that does not confirm to the WHERE clause of the view definition.  
- This allows the data belonging to the view to be updated through the view.

4. Explain query execution plan?

- The optimizer available in SQL Server optimizes the code to be effectively executed.   
- A query execution plan shows how this optimizer would run the query.  
- Query execution plan can be viewed by :   
- Using the Show Execution Plan option available in Query Analyzer,  
- Displaying Estimated Execution Plan on the query dropdown menu,   
- Use the SET SHOWPLAN\_TEXT ON command before running a query and capturing the execution plan event in a SQL Server Profiler trace.

5. What is the function of SQL Server Agent Windows service?

- It is a Windows service which handles the tasks scheduled within the SQL Server environment. These tasks are also called as job and are stored with in SQL server. The jobs may run through a trigger, a predefined schedule or on demand.   
- This service is very useful in determining why a particular job did not run as intended.

6. Comment on Transactions.

- Using transactions we can group all SQL commands into a single unit.   
- The transaction begins with some task and finishes only when all tasks within it are over.  
- The transaction gets over successfully only when all commands in it are successfully over. Even if one command fails, the whole transaction 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.   
- In case of any problem, the rollback command is executed to abort the transaction.   
- If all the tasks run successfully, all commands are executed through commit statement.

7. Differentiate between a primary key and a unique key.

- By default, clustered index on the column are created by the primary key whereas nonclustered index are created by unique key.   
- Primary key doesn't allow NULLs, but unique key allows one NULL.

8. What is recursion? Is it possible for a stored procedure to call itself or recursive stored procedure?  How many levels of SP nesting is possible?

Recursion is method of problem solving where the solution is arrived at by repetitively applying the logic and solution to the subsets of the problem.

Transact-SQL supports recursion. So, yes it is possible for a stored procedure to call itself.

Stored procedures and managed code references can be nested up to 32 levels.

9. What are the advantages of using Stored Procedures?

- They help in reducing the network traffic and latency which in turn boosts application performance.   
- They help in promoting code reuse.   
- They provide better security to data.   
- It is possible to encapsulate the logic using stored procedures. This allows to change stored procedure code without affecting clients.   
- It is possible to reuse stored procedure execution plans, which are cached in SQL Server's memory. This reduces server overhead.

10. a.) What do you mean by an execution plan? Why is it used? How would you view it?

a.) An execution plan can be called as a road map that graphically or textually shows the data retrieval methods which have been chosen by the SQL   
Server query optimizer, for a stored procedure or ad- hoc query.   
  
b.) It is used because it is a very useful tool for a developer to understand the performance characteristics of a query or stored procedure.   
  
c.) There exists an option called "Show Execution Plan" in Query Analyzer. If this option is turned on, it will display query execution plan in separate window when the query is run again.

11. You want to implement the following relationships while designing tables. How would you do it?  
a.) One-to-one  
b.) One-to-many   
c.) Many-to-many

a.) One-to-One relationship - can be implemented as a single table and rarely as two tables with primary and foreign key relationships.   
  
b.) One-to-Many relationships - by splitting the data into two tables with primary key and foreign key relationships.   
  
c.) Many-to-Many - by using a junction table with the keys from both the tables forming the composite primary key of the junction table.

12. Differentiate between DELETE and TRUNCATE.

- Truncate can not be rolled back while Delete can be.   
- Truncate keeps the lock on table while Delete keeps the lock on each row.   
- Truncate resets the counter of the Identity column while Delete doesn't do so.   
- Trigger is not fired in Truncate while it happens in Delete.

13. What are the properties of the Relational tables?

Relational tables have six properties:  
1. Values are atomic.   
2. Column values are of the same kind.   
3. Each row is unique.   
4. The sequence of columns is insignificant.   
5. The sequence of rows is insignificant.   
6. Each column must have a unique name.

14. Explain the following.

a.) COLLATION.   
  
Collation is a type of sort order. There are mainly three types of sort orders, namely:   
i.) Dictionary case sensitive  
ii.)Dictionary - case insensitive   
iii.)Binary.  
  
b.) Stored Procedure  
  
- It is a set of T-SQL statements combined together to perform a single task formed by combining many small tasks.   
- When you actually run a Stored procedure, a set of statements is run.

15. What do you mean by ACID?

- ACID (Atomicity Consistency Isolation Durability) is a quality sought after in a reliable database. Here's the relevance of each quality:   
- Atomicity is an all-or-none proposition.   
- Consistency - it guarantees that your database is never left by a transaction in a half-finished state.   
- Isolation - it keeps transactions separated from each other until they’re finished.   
- Durability - it ensures that the database keeps a track of pending changes in a way that the server can recover from an abnormal termination.

16. Explain the following:

a.) Dirty pages.   
These are the buffer pages that contain modifications which have not been written to disk.  
  
b.) ETL - Extraction, Transformation, and Loading.   
- It is the process of copying and cleaning data from heterogeneous sources.   
- It is an important part of development projects for data warehousing and business intelligence.

17. Differentiate between a Local and a Global temporary table?

- A local temporary table exists only for the duration of a connection or, if defined inside a compound statement, for the duration of the compound statement.   
  
- Global temporary tables (created with a double “##”) are visible to all sessions.   
- Global temporary tables are dropped when the session that created it ends, and all other sessions have stopped referencing it.

18. Explain different types of Locks in SQL Server.

There are 3 kinds of locks in SQL Server  
  
i.) Shared locks - they are used for operations which do not allow any change or update of data. For e.g. SELECT.   
  
ii.) Update locks - they are used when SQL Server wants to modify a page. The update page lock is then promoted to an exclusive page lock before actually making the changes.   
  
iii.) Exclusive locks - they are used for the data modification operations. For e.g. UPDATE, INSERT, or DELETE.

##### Ca[n you explain about buffer cash and log Cache in sql server?](http://www.careerride.com/sql-server-buffer-cash-and-log-cache.aspx)

**Latest answer:**Buffer Cache: Buffer cache is a memory pool in which data pages are read. It performance of the buffer cache is indicated as follows:.............  
[**Read answer**](http://www.careerride.com/sql-server-buffer-cash-and-log-cache.aspx)

##### [What is a Trace frag? Where do we use it?](http://www.careerride.com/sql-server-trace-frag.aspx)

**Latest answer:**Temporary setting of specific server characteristics is done by trace tags. DBCC TRACEON is the command to set the trace flags. Once activated, trace flag will be in effect until the server is restarted...............  
[**Read answer**](http://www.careerride.com/sql-server-trace-frag.aspx)

##### [SSIS interview questions](http://www.careerride.com/ssis-interview-questions.aspx)

Difference between control flow and data flow?, If you want to send some data from Access database to SQL server database. What are different component of SSIS will you use?, Explain why variables called the most powerful component of SSIS?..................  
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##### [Describe how to use Linked Server.](http://www.careerride.com/sql-server-use-linked-server.aspx)

**Latest answer:**MS SQL Server supports the connection to different OLE DB on an ad hoc basis. This persistent connection is referred as Linked Server..............  
[**Read answer**](http://www.careerride.com/sql-server-use-linked-server.aspx)

##### [Explain how to send email from database.](http://www.careerride.com/sql-server-send-email-from-database.aspx)

**Latest answer:**SQL Server has a feature for sending mail. Stored procedures can also be used for sending mail on demand. With SQL Server 2005, MAPI client is not needed for sending mails................  
[**Read answer**](http://www.careerride.com/sql-server-send-email-from-database.aspx)

##### [Explain how to make remote connection in database](http://www.careerride.com/sql-server-remote-connection-in-database.aspx)

**Latest answer:**The following is the process to make a remote connection in database: - Use SQL Server Surface Area Configuration Tool for enabling the remote connection in database...................  
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##### [Difference between cross join and Full outer join.](http://www.careerride.com/sql-server-cross-join-vs-full-outer-join.aspx)

**Latest answer:**Cross Join : No join conditions are specified. Results in pairs of rows. Results in Cartesian product of two tables...............  
[**Read answer**](http://www.careerride.com/sql-server-cross-join-vs-full-outer-join.aspx)

##### [Explain the purposes of OPENXML clause sql server stored procedure.](http://www.careerride.com/sql-server-purposes-of-OPENXML-clause.aspx)

##### OPENXML parses the XML data in SQL Server in an efficient manner. It’s primary ability is to insert XML data to the RDB. It is also possible to query the data by using OpenXML. The path of the XML element needs to be specified by using ‘xpath’. [What is the order in which the SQL query is executed?](http://www.careerride.com/sql-server-order-in-which-query-is-executed.aspx)

**Latest answer:**The following is the order of executing SQL query: The query goes to the shared pool that has information like parse tree and execution plan for the corresponding statement...............  
[**Read answer**](http://www.careerride.com/sql-server-order-in-which-query-is-executed.aspx)

##### [Explain how to store pdf file in sql server.](http://www.careerride.com/sql-server-how-to-store-pdf-file.aspx)

##### Following are the steps of creating a pdf file in SQL server: 1. Create a column as type 'blob' in a table.  2. Read the content of the file.  3. Save in 'blob' type column in a table or store them in a folder and establish the pointer to link them in the database. - To retrieve the file from the database, SELECT query is executed and ID of the file is passed as an argument.

##### [Explain the concepts and capabilities of SQL Server.](http://www.careerride.com/SQL-Server-concepts-and-capabilities.aspx)

**Latest answer:**Microsoft SQL server is a relational database management system. It uses MS- SQL as the query language. SQL Server offers a high level of security, reliability and scalability depending on the business needs..............  
[**Read answer**](http://www.careerride.com/SQL-Server-concepts-and-capabilities.aspx)

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Explain inline variable assignment in sql server 2008 with an example.  
What is Compound Operators in sql server 2008? Explain with an example  
SQL Server 2008 introduces automatic auditing. Explain its benefits.............  
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##### [Explain the use of keyword WITH ENCRYPTION. Create a Store Procedure with Encryption.](http://www.careerride.com/SQL-Server-store-procedure-with-encryption.aspx)

##### It is a way to convert the original text of the stored procedure into encrypted form. The stored procedure gets obfuscated and the output of this is not visible to

##### [What is a linked server in SQL Server?](http://www.careerride.com/SQL-Server-what-is-a-linked-server.aspx)

**Latest answer:**A linked server allows remote access. Using this, we can issue distributed queries, update, commands, and transactions across different data sources................   
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-a-linked-server.aspx)

##### [Features and concepts of Analysis Services](http://www.careerride.com/SQL-Server-concepts-of-analysis-services.aspx)

**Latest answer:**Analysis service provides a combined view of the data used in OLAP or Data mining. Services here refer to OLAP, Data mining. Analysis services assists in creating, designing...........  
[**Read answer**](http://www.careerride.com/SQL-Server-concepts-of-analysis-services.aspx)

##### [What is Analysis service repository?](http://www.careerride.com/SQL-Server-what-is-analysis-service-repository.aspx)

**Latest answer:**Each server running analysis service has a repository to store objects of the computer running Analysis Services an Analysis service repository stores the information about the.............   
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##### 

##### [What is SQL service broker?](http://www.careerride.com/SQL-Server-what-is-SQL-service-broker.aspx)

**Latest answer:**SQL service broker provides asynchronous queuing functionality to SQL server. Once message is sent to the SQL server................  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-SQL-service-broker.aspx)

##### [What is user defined datatypes and when you should go for them?](http://www.careerride.com/SQL-Server-what-is-user-defined-datatypes.aspx)

**Latest answer:**User defined datatypes is created by using base SQL Server data type by providing a descriptive name.................  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-user-defined-datatypes.aspx)

##### [What is bit datatype?](http://www.careerride.com/SQL-Server-what-is-bit-datatype.aspx)

**Latest answer:**Bit datatype is used to store boolean information................  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-bit-datatype.aspx)

##### [What is lock escalation?](http://www.careerride.com/SQL-Server-what-is-lock-escalation.aspx)

**Latest answer:**Lock escalation from SQL Server 7.0 onwards, is dynamically managed by SQL Server. It is..........  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-lock-escalation.aspx)

##### [What is blocking?](http://www.careerride.com/SQL-Server-what-is-blocking.aspx)

**Latest answer:**Blocking happens when one connection from an application holds a lock and a second............  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-blocking.aspx)

##### [What is Public Role in SQL Server?](http://www.careerride.com/SQL-Server-what-is-public-role.aspx)

**Latest answer:**Every database has a public role which holds all the default permissions for the users in a database.................  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-public-role.aspx)

##### [Discuss about SQL Server Login.](http://www.careerride.com/SQL-Server-login.aspx)

**Latest answer:**SQL server login is used to connect to SQL server. This used when login in through the windows login credentials is not existent.............  
[**Read answer**](http://www.careerride.com/SQL-Server-login.aspx)

##### [Discuss about Builtin\Administrator.](http://www.careerride.com/SQL-builtin-administrator.aspx)

**Latest answer:**The built in Administrator Account is basically used during some setup to join some machine in the domain............  
[**Read answer**](http://www.careerride.com/SQL-builtin-administrator.aspx)

##### [Failover clustering overview](http://www.careerride.com/SQL-Server-failover-clustering.aspx)

**Latest answer:**Failover clustering is mainly used for data availability. Typically in a failover cluster, there are two machines. One machine provides the basic services and the second is available to run..................  
[**Read answer**](http://www.careerride.com/SQL-Server-failover-clustering.aspx)

##### [Describe the XML support SQL server extends.](http://www.careerride.com/SQL-server-XML-support.aspx)

**Latest answer:**SQL server can return XML document using FOR XML clause.................  
[**Read answer**](http://www.careerride.com/SQL-server-XML-support.aspx)

##### [Explain in brief how SQL server enhances scalability of the database system.](http://www.careerride.com/SQL-server-scalability.aspx)

**Latest answer:**SQL Server has efficient ways to enhance scalability of the database system...............  
[**Read answer**](http://www.careerride.com/SQL-server-scalability.aspx)

##### [What is SQL Server English Query?](http://www.careerride.com/SQL-server-English-Query.aspx)

**Latest answer:**SQL Server English Query helps to build applications that can accept query.............  
[**Read answer**](http://www.careerride.com/SQL-server-English-Query.aspx)

##### [What is the purpose of SQL Profiler in SQL server?](http://www.careerride.com/SQL-server-SQL-Profiler-purpose.aspx)

**Latest answer:**SQL Profiler captures SQL Server events from a server. The events are saved.................  
[**Read answer**](http://www.careerride.com/SQL-server-SQL-Profiler-purpose.aspx)

##### [What are the ways available in SQL Server to execute SQL statements?](http://www.careerride.com/SQL-server-execute-SQL-statements.aspx)

**Latest answer:**SQL Server uses different ways to execute SQL statements which are listed below................  
[**Read answer**](http://www.careerride.com/SQL-server-execute-SQL-statements.aspx)

##### [Explain Full-Text Query in SQL Server.](http://www.careerride.com/SQL-server-Full-Text.aspx)

**Latest answer:**SQL Server supports searches on character string columns using Full-Text Query...............  
[**Read answer**](http://www.careerride.com/SQL-server-Full-Text.aspx)

##### [Explain the phases a transaction has to undergo.](http://www.careerride.com/SQL-server-transaction-phases.aspx)

**Latest answer:**The several phases a transaction has to go through are listed here. Database..............  
[**Read answer**](http://www.careerride.com/SQL-server-transaction-phases.aspx)

##### [What is XPath?](http://www.careerride.com/SQL-server-XPath.aspx)

**Latest answer:**XPath is a language defined by the W3C, used to select nodes from XML documents..............  
[**Read answer**](http://www.careerride.com/SQL-server-XPath.aspx)

##### [Define the rules for designing Files and File groups in SQL Server.](http://www.careerride.com/SQL-server-Files-File-groups.aspx)

**Latest answer:**A file or file group can only be used by one database. For example, the files abc.mdf and abc.ndf contains.................  
[**Read answer**](http://www.careerride.com/SQL-server-Files-File-groups.aspx)

##### [What are the Authentication Modes in SQL Server?](http://www.careerride.com/SQL-server-Authentication-Modes.aspx)

**Latest answer:**SQL Server supports two security (authentication) modes................  
[**Read answer**](http://www.careerride.com/SQL-server-Authentication-Modes.aspx)

##### [Explain Data Definition Language, Data Control Language and Data Manipulation Language.](http://www.careerride.com/SQL-server-DDL-DCL-DML.aspx)

**Latest answer:**Data definition language is used to define and manage all attributes and properties of a database..............  
[**Read answer**](http://www.careerride.com/SQL-server-DDL-DCL-DML.aspx)

##### [What are the steps to process a single SELECT statement?](http://www.careerride.com/SQL-server-steps-process-SELECT.aspx)

**Latest answer:**SQL Server uses the following steps to process a single SELECT statement............  
[**Read answer**](http://www.careerride.com/SQL-server-steps-process-SELECT.aspx)

##### [What are the restrictions while creating batches in SQL Server?](http://www.careerride.com/SQL-server-restrictions-creating-batches.aspx)

**Latest answer:**CREATE DEFAULT, CREATE PROCEDURE, CREATE RULE, CREATE TRIGGER, and CREATE VIEW statements..............  
[**Read answer**](http://www.careerride.com/SQL-server-restrictions-creating-batches.aspx)

##### [Explain GO Command.](http://www.careerride.com/SQL-server-GO-Command.aspx)

**Latest answer:**GO Command is used to signal the end of a batch...............  
[**Read answer**](http://www.careerride.com/SQL-server-GO-Command.aspx)

##### [What is the significance of NULL value and why should we avoid permitting null values?](http://www.careerride.com/SQL-server-significance-NULL.aspx)

**Latest answer:**Null means no entry has been made. It implies that the value is either unknown or undefined............  
[**Read answer**](http://www.careerride.com/SQL-server-significance-NULL.aspx)

##### [What is the difference between UNION and UNION ALL?](http://www.careerride.com/SQL-Server-difference-between-UNION-and-UNION-ALL.aspx)

**Latest answer:**UNION command selects distinct and related information from two tables. On the other hand..............  
[**Read answer**](http://www.careerride.com/SQL-Server-difference-between-UNION-and-UNION-ALL.aspx)

##### [What is use of DBCC Commands?](http://www.careerride.com/SQL-Server-use-of-DBCC-commands.aspx)

**Latest answer:**Database Consistency Checker Commands give details in form of statistics about the SQL Server..............   
[**Read answer**](http://www.careerride.com/SQL-Server-use-of-DBCC-commands.aspx)

##### [What is Log Shipping?](http://www.careerride.com/SQL-Server-what-is-log-shipping.aspx)

**Latest answer:**UNION command selects distinct and related information from two tables. On the other hand.............  
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-log-shipping.aspx)

##### [What is the difference between a Local and a Global temporary table?](http://www.careerride.com/SQL-Server-local-vs-global-temporary-table.aspx)

**Latest answer:**A local temporary table lives until the connection is valid or until the duration of a compound statement.........   
[**Read answer**](http://www.careerride.com/SQL-Server-local-vs-global-temporary-table.aspx)

##### [What is the STUFF and how does it differ from the REPLACE function?](http://www.careerride.com/SQL-Server-what-is-the-STUFF-and-REPLACE.aspx)

**Latest answer:**STUFF function is used to insert a string into another string by deleting some characters specified.............   
[**Read answer**](http://www.careerride.com/SQL-Server-what-is-the-STUFF-and-REPLACE.aspx)

## Sql Server interview - May 7,  2011 by Swati Parakh

### Explain various data region available in SSRS with their use.

Data regions are report items used to display data from a single dataset. You can perform grouping, sorting and various aggregate functions on data in data region. In SSRS 2005, there were 4 data regions:-   
1. Table   
2. Matrix   
3. List   
4. Chart  
While in SSRS 2008, there are one additional data region namely Gauge.   
Let’s explain each one of them:

1. Table - Table Data region has fixed tabular structure i.e. fixed number of columns. It is useful for displaying data grouped by row. You can have maximum of 1 report item per cell. The size of table depends on number of rows dataset fetches i.e., if number of rows returned by dataset is more; it can expand to multiple pages.

2. Matrix – A matrix data region display data in pivot table format, hence also popularly known as pivot table or crosstab report. It has minimum of one row group and one column group. The size of matrix data region depends on columns and rows fetched.

3. List - A list data region is free layout. It is useful for complex reporting resign. The list can be used to display multiple table and matrix. Each getting data from different dataset.

4. Chart – This data region is for displays the data graphically i.e., in form of chart. A various chart types are available in SSRS 2008 namely line, pie chart, columns etc.

5. Gauge - This can be used in a table or matrix to show the relative value of a field in a range of values in the data region. You can also add a gauge to the design surface to show a single relative value.

### What are various ways to enhance the SSRS report? Explain.

There are various ways in which you can enhance your report:

1. Display your data in graphic format using Chart Region.   
2. Use sorting.   
3. If couple of reports are related, you can make them interactive using connect them using bookmark link, hyper link or drill through report link.   
4. Adding sub-report. Sub-report is a stand-alone report which can be link to another report based on its content using parameter.   
5. Add custom fields. Custom fields provide with same functionality as alias columns provide in SQL server query. It is the timing of the operation that differs from the alias columns. The calculation is performed on dataset by report server.   
6. Using expression.   
7. Using custom code. SSRS allows including custom code written in VB.Net. 8. Add document map (navigational links to report item once report is rendered) to report.

## Sql Server interview - July 7,  2011 by Swati Parakh

### What are various aggregate functions that are available?

The following are various aggregate functions available:-   
1. SUM   
2. AVG   
3. COUNT   
4. COUNTDISTINCT   
5. MAX   
6. MIN   
7. STDEV   
8. STDEVP   
9. VAR   
10. VARP

By default, SUM is the aggregate function used for numeric data type.

### How do you integrate the SSRS reports in your application?

There are 3 ways in which you can integrate reports into your application:-   
1. Navigating to URL i.e. https:\\servername\reportservername\reportname – This is simplest and most popular way. A separate login might be required since we are directly calling the report from report server. Address of report server gets expose to user.   
2. Using IFrame, Browser control or Report Viewer Control – In this approach, we embed the URL of report server in our application, hence address of reportserver is not exposed. No separate window opens. A user does not come to know that he has moved to different server.   
3. Programmatically sending a web request using SOAP to report server.

### Explain use of Expression builder.

Expressions provide us with flexibility to customize our report. It is written in Visual basic and is used throughout the report to to retrieve, calculate, display, group, sort, filter, parameterize, and format the data in a report. They start with equal sign (=).

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No.** | **Functionality** | **Property, Context and Dialog Box** | **Expression** |
| 1 | Format data in a text box depending on value | Colour for a placeholder inside of a text box in the details row for a Tablix | =IIF(Fields!TotalDue.Value < 10000,"Red","Black") |
| 2 | Dynamic page header or footer content. | Value for a placeholder inside of a text box that is placed in the page header or footer. | ="Page " & Globals!PageNumber & " of " & Globals!TotalPages |
| 3 | Specify page breaks for every 20 rows in a Tablix with no other groups. | Group expression for a group in a Tablix. | =Ceiling(RowNumber(Nothing)/20) |
| 4 | Shows the user ID of the person running the report | Value | =User!UserID |
| 5 | To get first day of the month | Value | =DateSerial(Year(Today()),Month(Today()),1) |
| 6 | To get the current date | Value | =Today() |
| 7 | To get last day of the month | Value | =DateAdd("d",-1,DateSerial(Year(Today()),Month(Today())+1,1)) |

## Sql Server interview - July 10,  2011 by Swati Parakh

### Difference between drill down and drill through report.

Both the drill down and drill through report provide interactive functionality to the SSRS report. The differences are as follows:-

|  |  |  |
| --- | --- | --- |
| **Trait** | **Drill Down** | **Drill Through** |
| Retrieves Data | Data retrieved at the same time as main report | Data retrieved one click on link of drill through report |
| Is processed and rendered when | With the main report | When link is clicked |
| Performance | Slower since retrieves all data with main report | Faster (but does not retrieve all data with main report) |
| Is displayed | Within main report | Separately either in separate window or tab |

### What’s the use of custom fields in report?

Custom fields can be defined as alias column of the report since the operation is performed on report server rather than on database server. The custom field is very useful for the data manipulation like adding some fields whose value can be calculated based on expression, text e.g. instead of CName fetched from database, I want the dataset to display Customer Name etc.

We can add custom fields as right click on dataset, select add in Dataset window. The New field dialog box will open, we can add name of custom field and also mention whether it is database field or calculated one. If it is calculated, then we can mention the computation in this window.

### Can we use custom code in SSRS? If so, explain how we can do.

Yes, we can. SSRS allows developer to add custom code in your report. You can write the code directly into embedded VB.Net and call it using property expression or you can write a custom class library and refer it in report server. The advantage of first method is that it is simple and easy to use but disadvantage is that it is available for that report only. While the second method has advantage of being available for multiple reports but it has much of configuration overhead.

To write custom code, right click on Report Designer outside report body and select Properties and go to Code tab and you can write custom code here.

To add custom class library, right click on Report Designer outside report body and select Properties and go to Reference tab and add the reference by browsing to the assembly of your class library. Note that you need to create class library and then compile it before referencing it in your SSRS report.

## Sql Server interview - July 16,  2011 by Swati Parakh

### Difference between report and query parameter. Why do we need different type of parameter?

|  |  |  |
| --- | --- | --- |
|  | **Query Parameter** | **Report Parameter** |
| Defined At | Database Level | Report Level |
| Created | Automatically if database query or stored procedure has a parameter | Automatically if report has some query parameter and is mapped to query parameter |
| processed | On Database Server | On Report Server |
| Use | Filtering of Data, Security of Data | Manipulate data, interconnect reports, filtering data |
| Processing Output | Number of records returned is based on query parameter | Number of records presented is based on query. Note- Records processed on report parameter would be same as records returned based on query parameter. |
| Filtering data based on them | Performance is good | Full set of records is retrieved then filtered. Hence, performance is low |

### How does your SSRS maintain security?

Reporting services maintain role based security. When a user logs into reporting services, a Report Manager (whose duty is to maintain security of Reporting Services) first checks the identity of user and then determine what rights he have to perform on report.

Report Manager manages the security at 2 levels –   
1. System-level – Administer the report server globally   
2. Item-level – Security at report and dataset level

System-level roles are:-  
1. System Administrator – can manage report server and report manager security  
2. Site User - view basic information like report properties and schedules.

Item-level roles – User can use any of predefined item-level roles or create their own roles by using combination of predefined item-level roles.   
Pre-defined Item-level roles are:-   
1. Browser – can navigate to report and run them.   
2. My Reports – these users’ rights is restricted to reports present in their MyReports folder. However, they can create, view and manage reports in their folder.   
3. Publisher – As name suggest, publisher user has rights to publish reports to Reporting Server database.   
4. Content Manager – has all permission at item-level.

## SQL Server interview questions and answers - submitted by Arpit Jain

### What is SQL Injection?

* SQL Injection is an attack in which attacker take the advantage of insecure application over internet by running the SQL command against the database and to steal information from it that too using GUI of the website.
* This attack can happen with the applications in which SQL queries are generated in the code.
* The attacker tries to inject their own SQL into the statement that the application will use to query the database.
* For example suppose the below query string is used for a search feature in a website and a user may have the inserted “Arpit” as the keyword to search. If in the code behind the keyword is directly used into the SQL statement, it will be like.

String sql = “Select EmpName, City from EmployeeMaster where EmpName like ‘%” + txtSearch.Text + “%’”;  
  
But the attacker might enter the keyword like  
‘ UNION SELECT name, type, id from sysobjects;--

This way attacker can get details of all the objects of the application database and using that attacker can steal further information.

### What is DBCC? Give few examples.

* DBCC stands for Database Consistency Checker.
* These commands are used to check the consistency of the database like validation tasks, maintenance and status checks.

For example –

1. DBCC CHECKALLOC – It is used to check that all pages are correctly allocated in database.  
2. DBCC CHECKDB – It is used to check that   
3. DBCC SQLPERF – It generates a report for the current usage of   
4. DBCC SQLFILEGROUP – It used to check all the tables file group for any design.

### What is difference between View and Materialized view?

* View result set doesn’t save anywhere on disk and executes the query definition whenever they are called, while materialized view are disk based and its result set table is updated periodically.
* Materialized view is similar to regular views but the output of select query has been saved to a table.
* View shows the latest data all the time while the materialized view only shows the fresh data after its result table is updated either by setting a schedule or based on the change in the underlying tables.
* The performance of the view depends on how good the selected statement the view has. If the select statement has too many joins then it the view will perform poorly.
* While in the case of materialized view, we are querying a table, which may also be indexed, that increase its performance.

### What is CTE (Common Table Expression)?

* When a complex SQL statement has number of joins then it can be made easier by using Common Table Expression.
* Consider the following SQL statement.

SELECT \* FROM (   
SELECT emp.EmpName,dept.Department,emp.Gender FROM Employee emp   
left join Department dept on emp.DeptID = dept.DeptID) E  
WHERE E.Gender = ‘Male’  
ORDER BY T.EmpName

The syntax of CTE is as follow  
  
- The CTE Name (followed by WITH keyword)  
- The Column List (Optional)  
- The Query (Appears within parentheses after the AS keyword)

If we write the above messy query using CTE it would be like  
  
With E(EmpName, Department, Gender)  
AS  
(  
SELECT emp.EmpName,dept.Department,emp.Gender FROM Employee emp   
left join Department dept on emp.DeptID = dept.DeptID  
)  
SELECT \* FROM E  
WHERE E.Gender = ‘Male’  
ORDER BY E.EmpName

This way the query can be made more readable and easy to understand.

### What is difference between clustered and non clustered index?

* A table can have only one Clustered Index at a time which is generally created on primary key and can have more than one non clustered indexes (maximum up to 999)
* The leaf level of clustered index is actual data pages of the table. Whereas in case of non-clustered index the leaf level is a pointer to the data.
* Non-clustered index is faster than clustered index because when we use DML statement on clustered index, performance issues may occurred since it has to update the index every time a DML statement is executed.
* Syntax of creative clustered / non clustered index is as follow  
  CREATE [CLUSTERED | NON CLUSTERED] INDEX index\_name  
  ON <object> (column [ASC | DESC] [,…n])

### What is use of EXCEPT clause? How it differs from NOT IN clause.

-When we combine two queries using EXCEPT clause, it will returns distinct rows from the first SELECT statement that are not returned by the second one.  
-EXCEPT clause works the same way as the UNION operator of SQL and MINUS clause in Oracle.  
-The syntax of EXCEPT clause is as follow  
SELECT column1 [, column2 ]  
FROM table1 [, table2 ]  
[WHERE condition]

EXCEPT  
  
SELECT column1 [, column2 ]  
FROM table1 [, table2 ]  
[WHERE condition]  
  
-The difference between EXCEPT and NOT IN clause is EXCEPT operator returns all distinct rows from the rows returned by first select statement which does not exist in the rows returned by second select statement. On the other hand “NOT IN” will return all rows from returned by first select statement which does not exist in the rows returned by second select statement.

### What is difference between Index Seek vs. Index Scan?

* Index Seek and Index Scan are operation for query tuning in execution plans.
* Table Scan scans every record of the table. So the cost of proportional is the number of rows of that table.
* The Index Scan is preferred only when the table is small.
* Index Seek only touches the rows which qualify and the pages that contain that qualifying rows, so the cost of proportional is the number of qualifying rows and pages instead of the number of rows in the table.
* Index seek is preferred for highly sensitive queries.

### What is ROW\_NUMBER function?

* RANK is one of the Ranking functions which are used to give rank to each row in the result set of a SELECT statement.
* For using this function first specify the function name, followed by the empty parentheses.
* Then specify the OVER function. For this function, you have to pass an ORDER BY clause as an argument. The clause specifies the column(s) that you are going to rank.
* For Example   
  SELECT ROW\_NUMBER() OVER(ORDER BY Salary DESC) AS [RowNumber], EmpName, Salary, [Month], [Year] FROM EmpSalary
* In the result you will see that the highest salary got the first rand and the lowest salary got the last rank. Here the rows with equal salaries will not get same ranks.

### What is Trigger?

-In SQL the Trigger is the procedural code that executed when you INSERT, DELETE or UPDATE data in the table.   
  
-Triggers are useful when you want to perform any automatic actions such as cascading changes through related tables, enforcing column restrictions, comparing the results of data modifications and maintaining the referential integrity of data across a database.  
  
-For example, to prevent the user to delete the any Employee from EmpDetails table, following trigger can be created.  
  
create trigger del\_emp  
on EmpDetails  
for delete  
as  
begin  
rollback transaction  
print "You cannot delete any Employee!"  
end  
  
-When someone will delete a row from the EmpDetails table, the del\_emp trigger cancels the deletion, rolls back the transaction, and prints a message "You cannot delete any Employee!"

### What is Scheduled job and how to create it?

-If we want to execute any procedural code automatically on specific time either once or repeatedly then we can create a Scheduled job for that code.  
-Following are the steps to create a Scheduled Job.  
  
1. Connect to your database of SQL server in SQL Server Management Studio.  
2. On the SQL Server Agent. There you will find a Jobs folder. Right click on jobs and choose Add New.  
3. A New Job window will appear. Give a related name for the job.  
4. Click next on the "Steps" in the left menu. A SQL job can have multiple steps either in the form of SQL statement or a stored procedure call.  
5. Click on the "Schedules" in the left menu. A SQL job can contain one or more schedules. A schedule is basically the time at which sql job will run itself. You can specify recurring schedules also.  
  
-Using scheduled job you can also create alert and notifications.

### What is OPENXML in SQL Server?

-OPENXML provides an easy way to use an XML document as a data-source for your procedures.   
  
-OPENXML data can be manipulated the same way we deal with database tables by treating xml tags in the form of columns and the value in the form of rows.  
  
-By using OPENXML Data can be inserted or updated very quickly without multiple trips to the database.  
  
-Example:  
  
DECLARE @count int  
DECLARE @xml varchar(5000)  
SET @xml ='<Employees>  
<Employee id="1">  
<Name>Arpit</Name>  
<Employee >1234</ Employee >  
</Employee >  
<Employee id="2">  
<Name>Rahul</Name>  
<PhoneNo>2211</PhoneNo>  
</Employee >  
</Employees>'  
  
EXEC sp\_xml\_preparedocument @count OUTPUT, @xml  
SELECT \*  
FROM OPENXML (@count, Employees/Employee')  
WITH (id Varchar(10), Name varchar(100) 'Name' , PhoneNo Varchar(50) 'PhoneNo')  
EXEC sp\_xml\_removedocument @index  
  
It will give following result.   
1 Arpit 1234  
2 Rahul 2211

### What are Sparse columns?

* Sparse column is a type of column which is used to optimize storage for null values.
* When a column there is big number of null then by defining that column as spars column we can save a large amount of disk space.
* The drawback of sparse column is that it requires more space for the non null values. When we define a column as sparse it requires additional 4 Byte for not null values.
* For example, a DATETIME column in a non-sparse column required 8 bytes of storage whereas if we define that column as a sparse column then it will require 12 bytes.
* It is not possible to set ROWGUIDCOL and IDENTITY properties in sparse column.

### What is RANK function?

-RANK is one of the Ranking functions which are used to give rank to each row in the result set of a SELECT statement.

-For using this function first specify the function name, followed by the empty parentheses.

-Then specify the OVER function. For this function, you have to pass an ORDER BY clause as an argument. The clause specifies the column(s) that you are going to rank.

For Example   
  
SELECT RANK() OVER(ORDER BY Salary DESC) AS [RowNumber], EmpName, Salary, [Month], [Year] FROM EmpSalary

-In the result you will see that the highest salary got the first rand and the lowest salary got the last rank.   
  
Here the rows with equal salaries will get same ranks.  
  
-Remember that the rank depends on the row's position in the result set, not on the sequential number of the row.

### What are cursors and when they are useful?

-When we execute any SQL operations, SQL Server opens a work area in memory which is called Cursor.   
  
-When it is required to perform the row by row operations which are not possible with the set-based operations then Cursor is used.  
  
-There are two of cursors

1. Implicate Cursor  
SQL Server automatically manages cursors for all data manipulation statements. These cursors are called implicit cursors.   
  
2. Explicit Cursor  
When the programmer wants to perform the row by row operations for the result set containing more than one row, then he explicitly declare a cursor with a name.  
They are managed by OPEN, FETCH and CLOSE.

%FOUND, %NOFOUND, %ROWCOUNT and %ISOPEN attributes are used in both types of cursors.

### What is log shipping?

-SQL has introduced Log Shipping feature to synchronize the Distributed Database Server. Synchronize the database by copying Transaction logs, Backing up, Restoring data. SQL Server Job Agents is used to make these processes automatic.  
  
-In the case of failure the Log Shipping will not transfer the server. That means it will not redirect your application to other server. This has to be done manually.  
  
-Log shipping synchronizes the database only. The main functions of Log Shipping are as follows:  
  
1. To Back up the transaction log of the primary database  
2. To Copy the transaction log backup to every secondary server  
3. To Restore the transaction log backup on the secondary database

### What is SQL Profiler?

-SQL Server provides a graphical tool which helps system administrators to monitor T-SQL statements of Database Engine.

-SQL Profiler can capture and store data related to every event to a file or a table.

-SQL Server Profiler can be used

1. To create a trace   
2. To store the trace results in a table.  
3. To watch the trace results when the trace runs   
4. To replay the trace results   
5. To start, stop, pause, and modify the trace results

### What is Similarity and Difference between Truncate and Delete in SQL?

Similarity

-These both command will only delete data of the specified table, they cannot remove the whole table data structure.

Difference

-TRUNCATE is a DDL (data definition language) command whereas DELETE is a DML (data manipulation language) command.   
  
-We can’t execute a trigger in case of TRUNCATE whereas with DELETE command, we can execute a trigger.  
  
-TRUNCATE is faster than DELETE, because when you use DELETE to delete the data, at that time it store the whole data in rollback space from where you can get the data back after deletion. In case of TRUNCATE, it will not store data in rollback space and will directly delete it. You can’t get the deleted data back when you use TRUNCATE.  
  
-We can use any condition in WHERE clause using DELETE but you can't do it with TRUNCATE.  
  
-If table is referenced by any foreign key constraints then TRUNCATE will not work.

### What is Normalization of database? What are its benefits?

-Normalization is set of rules that are to be applied while designing the database tables which are to be connected with each other by relationships. This set of rules is called Normalization.

-Benefits of normalizing the database are  
1. No need to restructure existing tables for new data.  
2. Reducing repetitive entries.  
3. Reducing required storage space   
4. Increased speed and flexibility of queries.

### What is Fill factor?

* The 'fill factor' option indicate how full SQL Server will create each index page.
* When the index page doesn’t have free space for inserting a new row, SQL Server will create new index page and transfer some rows from the previous index page to the new index page. This process is called page split.
* If we want to reduce the number of page splits then we can use Fill factor option. Using Fill factor SQL will reserve some space on each index page.
* The fill factor is a value from 1 through 100 that indicates the percentage of the index page to be left empty. The default value for fill factor is 0.
* If the table contains the data which is not changed frequently then we can set the fill factor option to 100. When the table's data is modified frequently, we can set the fill factor option to 80% or as we want.

### What are different types of replication in SQL Server?

There are three types of replication in SQL SERVER

1. Snapshot Replication.

* In Snapshot Replication snapshot of one database is transferred to another database.
* In this replication data can be refreshed periodically and all data will be copied to another database every time the table is refreshed.

2. Transactional Replication

* In transactional replication data will be same as in snapshot replication, but later only the transactions are synchronized instead of replicating the whole database.
* We can specify the refresh of database either continuously or on periodic basis.

3. Merge Replication

* Merge replication replicate data from multiple sources into a single central database.
* The initial load will be same as in snapshot replication but later it allows change of data both on subscriber and publisher, later when they come on-line it detects and combines them and updates accordingly.

### What is REPLACE and STUFF function in SQL Server?

STUFF: This function is used to replace the part of string with some another string.

Syntax:

STUFF (String1, Position, Length, String2)  
String1 - String to be overwritten  
Position - Starting Position for overwriting  
Length - Length of replacement string  
String2- String to overwrite

Example:  
SELECT STUFF(‘Arpit',2,2,'mi')  
Output: Amit

REPLACE: This function is used to replace all the occurrences of particular string by another string.

Syntax:  
REPLACE(String1, String2, String3)

Example:  
SELECT REPLACE(‘Arpit Jain’,’i’,’m’)  
Output: Arpmt Jamn

If you want to replace the first occurrence of “I”, Replace wouldn't work, because it always replaces ALL occurrences of the string.

### Give a example to search for a string in all stored procedure in SQL Server.

-Suppose we have a EmpDetails table in our database and there are certain number of stored procedures in database. We want to know in which stored procedure(s) table EmpDetails is used.  
  
-We can use following query

SELECT  
sys.objects.name, sys.objects.type, sys.objects.type\_desc,  
sys.objects.schema\_id, sys.syscomments.text  
FROM sys.objects  
INNER JOIN sys.syscomments ON sys.objects.object\_id = sys.syscomments.id  
where sys.syscomments.text like '%EmpDetails%'  
And type ='P'

### What are Magic tables in SQL Server?

-In SQL Server there are two system tables “Inserted” and “Deleted” called Magic tables.

-These are not the physical tables but the virtual tables generally used with the triggers to retrieve the inserted, deleted or updated rows.

-When a record is inserted in the table that record will be there on INSERTED Magic table.

-When a record is updated in the table that existing record will be there on DELETED Magic table and modified data will be there in INSERTED Magic table.

-When a record is deleted from that table that record will be there on DELETED Magic table.

### What is difference between stored procedure and user defined function?

* It is not possible to change the table data with the use of User defined functions but you can do it by using stored procedure.
* The execution of User defined function will be stopped if any error occurred in it. But in the case of Stored procedure when an error occurs the execution will ignore the error and jumps to the next statement.
* We can use User defined function in XML FOR clause but we can use stored procedure in XML FOR clause.
* It is not possible to make permanent changes to server environment whereas stored procedure can change some of the server environment.
* User defined functions do not return output parameters while stored procedure can return output parameters.

### What are ACID properties of Transaction?

Following are the ACID properties for Database.

Atomicity – Transactions may be set of SQL statements. If any of statement fails then the entire transaction fails. The transaction follows all or nothing rule.

Consistency – This property says that the transaction should be always in consistent state. If any transaction is going to effect the database’s consistent state then the transaction could be rolled back.

Isolation – This property says that one transaction can not retrive the data that has been modified by any other transaction until its completed.

Durability – When any transaction is committed then it must be persisted. In the case of failure only committed transaction will be recovered and uncommitted transaction will be rolled back.

### What are COMMIT and ROLLBACK in SQL?

COMMIT statement is used to end the current transaction and once the COMMIT statement is exceucted the transaction will be permanent and undone.

Syntax: COMMIT;

Example:   
BEGIN  
UPDATE EmpDetails SET EmpName = ‘Arpit’ where Dept = ‘Developer’  
COMMIT;  
END;  
  
ROLLBACK statement is used to end the current transaction and undone the changes which was made by that transaction.

Syntax: ROLLBACK [TO] Savepoint\_name;

Example  
BEGIN  
Statement1;  
SAVEPOINT mysavepoint;  
BEGIN  
Statement2;  
EXCEPTION  
WHEN OTHERS THEN  
ROLLBACK TO mysavepoint;  
Statement5;  
END;  
END;

### What is a Linked Server?

* When we want to query on remote database server along with the local database server then we can add the remote SQL server to local SQL server in a same group using the concept called Linked Server.
* We can query on both servers using T-SQL.
* We can use stored Procedure sp\_addlinkedserver, sp\_addlinkedsrvlogin to add new Linked Server.
* By using Linked Server we can SQL statement in clean and easy way to retrieve, join and combine remote data with local data.

### What is a WITH(NOLOCK)?

* WITH(NOLOCK) is used to unlock the data which is locked by the transaction that is not yet committed. This command is used before SELECT statement.
* When the transaction is committed or rolled back then there is no need to use NOLOCK function because the data is already released by the committed transaction.
* Syntax: WITH(NOLOCK)
* Example:   
  SELECT \* FROM EmpDetails WITH(NOLOCK)
* WITH(NOLCOK) is similar as READ UNCOMMITTED

### What are the basic functions for master, msdb, model, tempdb databases?

* The Master database contains catalog and data for all databases of the SQL Server instance and it holds the engine together. Because SQL Server cannot start if the master database is not working.
* The msdb database contains data of database backups, SQL Agent, DTS packages, SQL Server jobs, and log shipping.
* The tempdb contains temporary objects like global and local temporary tables and stored procedures.
* The model is a template database which is used for creating a new user database.

### List few advantages of Stored procedure.

* By using stored procedures we can reuse the code.
* Stored procedure helps in reducing network traffic and latency.
* Stored procedures provide better security to your data.
* Stored procedure is cached in SQL Server’s memory. So it helps to reduce the server overhead. It also enhances application performance.
* Stored procedures help us in the encapsulation of the code. The code of the stored procedure can be changed without affecting application.

#### Describe the XML support SQL server extends.

SQL Server (server-side) supports 3 major elements:

a. Creation of XML fragments: This is done from the relational data using FOR XML to the select query.   
b. Ability to shred xml data to be stored in the database.  
c. Finally, storing the xml data.   
Client-side XML support in SQL Server is in the form of SQLXML. It can be described in terms of

* XML Views: providing bidirectional mapping between XML schemas and relational tables.
* Creation of XML Templates: allows creation of dynamic sections in XML.

#### Describe the XML support SQL server extends.

**Answer**SQL server can return XML document using FOR XML clause. XML documents can be added to SQL Server database and you can use the OPENXML clause to display the data from the document as a relational result set. SQL Server 2000 supports XPath queries.

##### Sql server - What are the Authentication Modes in SQL Server? - Feb 08, 2010 at 17:10 PM by Shuchi Gauri

#### What are the Authentication Modes in SQL Server?

a. Windows Authentication Mode (Windows Authentication): uses user’s Windows account

b. Mixed Mode (Windows Authentication and SQL Server Authentication): uses either windows or SQL server

#### What are the Authentication Modes in SQL Server?

**Answer**SQL Server supports two security (authentication) modes:

Windows Authentication and Mixed mode

Windows Authentication mode connects to an instance of SQL Server through a Windows NT 4.0 or Windows 2000 user account.

Mixed mode (Windows Authentication and SQL Server Authentication) connect to an instance of SQL Server by using either Windows Authentication or SQL Server Authentication.

Users who connect through a Windows NT or 2000 user account can make use of trusted connections in either Windows Authentication mode or mixed mode.

##### SQL Server Authentication modes - March 06, 2009 at 22:00 PM by Rajmeet Ghai

#### Explain the Authentication modes of SQL Server - Windows Authentication and Mixed Mode Authentication

Windows authentication mode allows users to connect using Windows domain like NT/2000 account. The access to the SQL server is controlled by Windows NT/2000 account or group used when logged in. this means that Windows username and password are used to access the database server.

Mixed mode authentication: - Mixed mode allows use of Windows credentials and the local SQL server account.

##### Sql server - Describe in brief authentication modes in SQL server.  - Feb 11, 2010 at 11:55 AM by Shuchi Gauri

#### Describe in brief authentication modes in SQL server.

Authentication modes in SQL Server:

Windows: Allows user to authenticate based on the MS Windows account credentials.

Mixed Mode: Allows users to connect either through Windows authentication or an SQL Server authentication mode. Administrator might maintain user accounts in SQL Server.

##### [NEXT>>](http://www.careerride.com/SQL-server-DDL-DCL-DML.aspx)

**Also read**

##### [What are the guidelines to use bulk copy utility of SQL Server?](http://www.careerride.com/SQL-server-bulk-copy-utility.aspx)

**Answer -**While importing data, the destination table must already exist......

##### [What security features are available for stored procedures?](http://www.careerride.com/SQL-server-security-features-stored-procedures.aspx)

**Answer -**Database users can have permission to execute a stored procedure without being......

##### [Describe in brief system database.](http://www.careerride.com/SQL-Server-Master-MSDB-TEMPDB-Model.aspx)

**Answer -**Master database is system database. It contains information about server’s configuration. It is a very important database and important to backup Master.....

##### [What security features are available for stored procedures?](http://www.careerride.com/SQL-server-security-features-stored-procedures.aspx)

Database users can have permission to execute a stored procedure without being granted permissions to access the database objects...........

##### [Question: What is the significance of NULL value and why should we avoid permitting null values?](http://www.careerride.com/SQL-server-significance-NULL.aspx)

**Answer -**Null means no entry has been made. It implies that the value is either unknown or undefined.....

## Chapter 1: Database Concepts

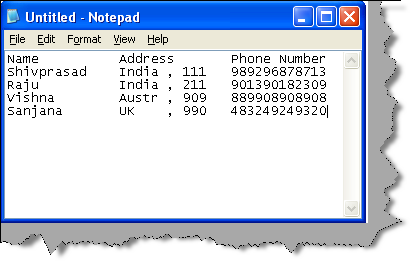
### (Q) What is a Database or Database Management System (DBMS)?

Twist: What is the difference between a file and a database? Can files qualify as a database?

**Note:**Probably these questions are too basic for experienced SQL SERVER guys. But from a fresher’s point of view, it can be a difference between getting a job and being jobless.

1. Database provides a systematic and organized way of storing, managing and retrieving from a collection of logically related information.
2. Secondly, the information has to be persistent, that means even after the application is closed the information should be persisted.
3. Finally, it should provide an independent way of accessing data and should not be dependent on the application to access the information.

Ok, let me spend a few more sentences on explaining the third aspect. Below is a simple figure of a text file that has personal detail information. The first column of the information is Name, second Address and finallyPhone Number. This is a simple text file, which was designed by a programmer for a specific application.



***Figure 1.1: Non-Uniform Text File***

It works fine in the boundary of the application. Now, some years down the line a third party application has to be integrated with this file. In order for the third party application to be integrated properly, it has the following options:

* Use the interface of the original application.
* Understand the complete details of how the text file is organized, example the first column is Name, then Address and finally Phone Number. After analyzing, write a code which can read the file, parse it etc. Hmm, lot of work, right.

That’s what the main difference is between a simple file and a database; database has an independent way (SQL) of accessing information while simple files do not (That answers my twisted question defined above). File meets the storing, managing and retrieving part of a database, but not the independent way of accessing data.

**Note:** Many experienced programmers think that the main difference is that file cannot provide multi-user capabilities which a DBMS provides. But if you look at some old COBOL and C programs where files were the only means of storing data, you can see functionalities like locking, multi-user etc. provided very efficiently. So it’s a matter of debate. If some interviewers think of this as a main difference between files and database, accept it… going in to debate means probably losing a job.

(Just a note for fresher’s: Multi-user capabilities mean that at one moment of time more than one user should be able to add, update, view and delete data. All DBMS' provides this as in-built functionalities, but if you are storing information in files, it’s up to the application to write logic to achieve these functionalities).

### (Q) What is the Difference between DBMS and RDBMS?

As mentioned before, DBMS provides a systematic and organized way of storing, managing and retrieving from a collection of logically related information. RDBMS also provides what DBMS provides, but above that, it provides relationship integrity. So in short, we can say:

RDBMS = DBMS + REFERENTIAL INTEGRITY

For example, in the above Figure 1.1, every person should have an Address. This is a referential integrity between Name and Address. If we break this referential integrity in DBMS and files, it will not complain, but RDBMS will not allow you to save this data if you have defined the relation integrity between person and addresses. These relations are defined by using “Foreign Keys” in any RDBMS.

Many DBMS companies claimed that their DBMS product was RDBMS compliant, but according to industry rules and regulations, if the DBMS fulfills the twelve CODD rules, it’s truly a RDBMS. Almost all DBMS (SQL SERVER, ORACLE etc.) fulfill all the twelve CODD rules and are considered truly as RDBMS.

**Note:**One of the biggest debates is whether Microsoft Access is an RDBMS? We will be answering this question in later section.

### (DB)What are CODD Rules?

Twist: Does SQL SERVER support all the twelve CODD rules?

**Note:**This question can only be asked on two conditions when the interviewer is expecting you to be at a DBA job or you are complete fresher, yes and not to mention the last one he treats CODD rules as a religion. We will try to answer this question from the perspective of SQL SERVER.

In 1969, Dr. E. F. Codd laid down 12 rules, which a DBMS should adhere to in order to get the logo of a true RDBMS.

#### Rule 1: Information Rule

"All information in a relational database is represented explicitly at the logical level and in exactly one way - by values in tables."

In SQL SERVER, all data exists in tables and are accessed only by querying the tables.

#### Rule 2: Guaranteed Access Rule

"Each and every datum (atomic value) in a relational database is guaranteed to be logically accessible by resorting to a combination of table name, primary key value and column name."

In flat files, we have to parse and know the exact location of field values. But if a DBMS is truly an RDBMS, you can access the value by specifying the table name, field name, for instance Customers.Fields [‘Customer Name’].

SQL SERVER also satisfies this rule. In ADO.NET we can access field information using table name and field names.

#### Rule 3: Systematic Treatment of Null Values

"Null values (distinct from the empty character string or a string of blank characters and distinct from zero or any other number) are supported in fully relational DBMS for representing missing information and inapplicable information in a systematic way, independent of data type.”

In SQL SERVER, if there is no data existing, NULL values are assigned to it. Note NULL values in SQL SERVER do not represent spaces, blanks or a zero value; it is a distinct representation of missing information and thus satisfies rule 3 of CODD.

#### Rule 4: Dynamic On-line Catalog Based on the Relational Model

"The database description is represented at the logical level in the same way as ordinary data, so that authorized users can apply the same relational language to its interrogation as they apply to the regular data."

The Data Dictionary is held within the RDBMS. Thus, there is no need for off-line volumes to tell you the structure of the database.

#### Rule 5: Comprehensive Data Sub-language Rule

"A relational system may support several languages and various modes of terminal use (for example, the fill-in-the-blanks mode). However, there must be at least one language whose statements are expressible, per some well-defined syntax, as character strings and that is comprehensive in supporting all the following items:

* Data Definition
* View Definition
* Data Manipulation (Interactive and by program)
* Integrity Constraints
* Authorization
* Transaction boundaries ( Begin, commit and rollback)"

SQL SERVER uses SQL to query and manipulate data, which has a well-defined syntax and is being accepted as an international standard for RDBMS.

**Note:**According to this rule, CODD has only mentioned that some language should be present to support it, but not necessary that it should be SQL. Before the 80’s, different’s database vendors were providing their own flavor of syntax until in 1980, ANSI-SQL came in to standardize this variation between vendors. As ANSI-SQL is quite limited, every vendor including Microsoft introduced their additional SQL syntax in addition to the support of ANSI-SQL. You can see SQL syntax varying from vendor to vendor.

#### Rule 6: View-updating Rule

"All views that are theoretically updatable are also updatable by the system."

In SQL SERVER, not only views can be updated by the user, but also by SQL SERVER itself.

#### Rule 7: High-level Insert, Update and Delete

"The capability of handling a base relation or a derived relation as a single operand applies not only to the retrieval of data, but also to the insertion, update and deletion of data."

SQL SERVER allows you to update views that in turn affect the base tables.

#### Rule 8: Physical Data Independence

"Application programs and terminal activities remain logically unimpaired whenever any changes are made in either storage representations or access methods."

Any application program (C#, VB.NET, VB6, VC++ etc) does not need to be aware of where the SQL SERVER is physically stored or what type of protocol it is using, the database connection string encapsulates everything.

#### Rule 9: Logical Data Independence

"Application programs and terminal activities remain logically unimpaired when information-preserving changes of any kind that theoretically permit un-impairment are made to the base tables."

Application programs written in C# or VB.NET do not need to know about any structure changes in SQL SERVER database. Example: adding of new field etc.

#### Rule 10: Integrity Independence

"Integrity constraints specific to a particular relational database must be definable in the relational data sub-language and storable in the catalog, not in the application programs."

In SQL SERVER, you can specify data types (integer, nvarchar, Boolean etc.) which put in data type checks in SQL SERVER rather than through application programs.

#### Rule 11: Distribution Independence

"A relational DBMS has distribution independence."

SQL SERVER can spread across more than one physical computer and across several networks; but from application programs, it has not a big difference but just specifying the SQL SERVER name and the computer on which it is located.

#### Rule 12: Non-subversion Rule

"If a relational system has a low-level (single-record-at-a-time) language, that low level cannot be used to subvert or bypass the integrity Rules and constraints expressed in the higher level relational language (multiple-records-at-a-time)."

In SQL SERVER whatever integrity rules are applied on every record are also applicable when you process a group of records using application program in any other language (example: C#, VB.NET, J# etc.).

Readers can see from the above explanation that SQL SERVER satisfies all the CODD rules, some database gurus consider SQL SERVER as not truly being an RDBMS, but that’s a matter of debate.

### (Q) Is Access Database a RDBMS?

Access fulfills all rules of CODD, so from this point of view, yes it’s truly an RDBMS. However, many people can contradict it as a large community of Microsoft professionals think that Access is not an RDBMS.

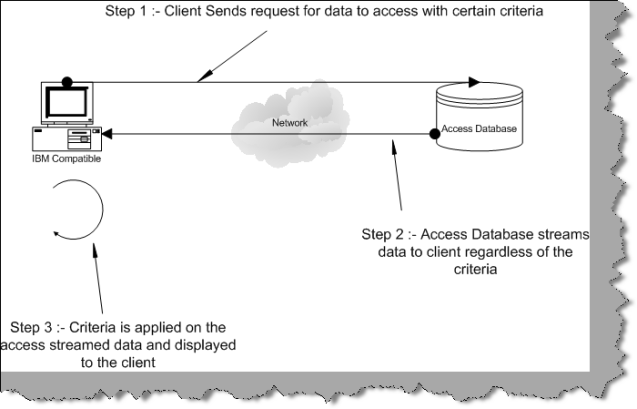
### (Q) What is the Main Difference between ACCESS and SQL SERVER?

As mentioned before, Access fulfills all the CODD rules and behaves as a true RDBMS. But there’s a huge difference from an architecture perspective, due to which many developers prefer to use SQL SERVER as the major database rather than Access. Following is the list of architecture differences between them:

* Access uses file server design and SQL SERVER uses the Client / Server model. This forms the major difference between SQL SERVER and ACCESS.  
  **Note:** Just to clarify what is client server and file server I will make a quick description of widely accepted architectures. There are three types of architectures:
  + Main frame architecture (This is not related to the above explanation but just mentioned as it can be useful during an interview and also for comparing with other architectures)
  + File sharing architecture (Followed by ACCESS)
  + Client Server architecture (Followed by SQL SERVER).

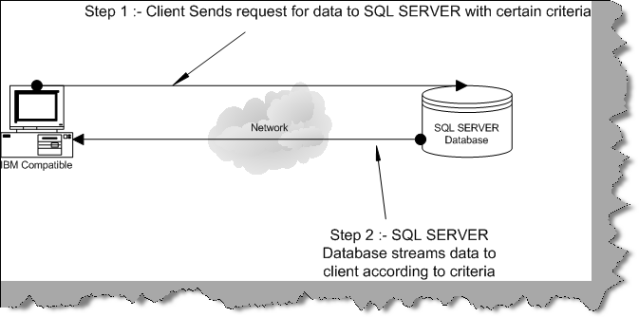
In Main Frame architecture, all the processing happens on central host server. User interacts through a dumb terminal that only sends keystrokes and information to the host. All the main processing happens on the central host server. So the advantage in such type of architecture is that you need least configuration clients. But the disadvantage is that you need a robust central host server like Main Frames.

In File sharing architecture, which is followed by Access database, all the data is sent to the client terminal and then processed. For instance, if you want to see customers who stay in India, in File Sharing architecture all customer records will be sent to the client PC regardless whether the customer belongs to India or not. On the client PC customer records from India are sorted/filtered out and displayed, in short all processing logic happens on the client PC. Therefore, in this architecture, the client PC should have heavy configuration and it increases network traffic as a lot of data is sent to the client PC. However, the advantage of this architecture is that your server can be of a low configuration.



***Figure 1.2: File Server Architecture of Access***

In client server architecture, the above limitation of the file server architecture is removed. In client server architecture, you have two entities, client and the database server. File server is now replaced by database server. Database server takes up the load of processing any database related activity and the client does any validation aspect of database. As the work is distributed between the entities it increases scalability and reliability. Second, the network traffic also comes down as compared to file server. For example if you are requesting customers from India, database server will sort/ filter and send only Indian customer details to the client, thus bringing down the network traffic tremendously. SQL SERVER follows the client-server architecture.



***Figure 1.3: Client Server Architecture of SQL SERVER***

* The second issue comes in terms of reliability. In Access, the client directly interacts with the Access file, in case there is some problem in the middle of a transaction, there are chances that an Access file can get corrupt. But in SQL SERVER, the engine sits in between the client and the database, so in case of any problems in the middle of a transaction, it can revert back to its original state.  
  **Note:**SQL SERVER maintains a transaction log by which you can revert back to your original state in case of any crash.
* When your application has to cater to a huge load demand, highly transactional environment and high concurrency, then its better to go for SQL SERVER or MSDE.
* But when it comes to cost and support, Access stands better than SQL SERVER. In case of SQL SERVER, you have to pay for per client license, but Access runtime is free.

**Summarizing:**SQL SERVER gains points in terms of network traffic, reliability and scalability whereas Access gains points in terms of cost factor.

### (Q) What is the Difference between MSDE and SQL SERVER 2000?

MSDE is a royalty free, redistributable and cut short version of the giant SQL SERVER database. It is primarily provided as a low cost option for developers who need a database server, which can easily be shipped and installed. It can serve as a good alternative for Microsoft Access database as it overcomes quite a few problems which Access has.

Below is a complete list, which can give you a good idea of the differences:

* **Size of database:**Microsoft Access and MSDE have a limitation of 2GB while SQL SERVER has 1,048,516 TB1.
* Performance degrades in MSDE 2000 when maximum number of concurrent operations goes above 8 or is equal to 8. It does not mean that you cannot have more than eight concurrent operations but the performance degrades. Eight-connection performance degradation is implemented by using SQL SERVER 2000 workload governor (we will be looking into more detail of how it works). As compared to SQL SERVER 2000, you can have 32,767 concurrent connections.
* MSDE does not provide OLAP and Data warehousing capabilities.
* MSDE does not have support facility for SQL mail.
* MSDE 2000 does not have GUI administrative tool such as enterprise manager, Query analyzer or Profiler. But there are roundabout ways by which you can manage MSDE 2000:
  + Old command line utility OSQL.EXE
  + VS.NET IDE Server Explorer: Inside VS.NET IDE, you have a functionality which can give you a nice GUI administrative tool to manage IDE.
  + SQL SERVER WEB Data administrator installs a web based GUI which you can use to manage your database.   
    For any details refer [here](http://www.microsoft.com/downloads/details.aspx?familyid=c039a798-c57a-%20419e-acbc-2a332cb7f959&displaylang=en).
* SQL-DMO objects can be used to build your custom UI
* There are many third party tools, which provide administrative capability GUI, which is out of scope of the book as it is only meant for interview questions.
* MSDE does not support Full text search.

**Summarizing:**There are two major differences: The first is the size limitation (2 GB) of the database and second is the concurrent connections (eight concurrent connections) which are limited by using the workload governor. During an interview, this answer will suffice if the interviewer is really testing your knowledge.

### (Q) What is SQL SERVER Express 2005 Edition?

Twist: What is the difference between SQL SERVER Express 2005 and MSDE 2000?

**Note:**Normally comparison is when the product is migrating from one version to other version. When SQL SERVER 7.0 was migrating to SQL 2000, asking differences was one of the favorite questions.

SQL SERVER Express edition is a scaled down version of SQL SERVER 2005 and the next evolution of MSDE.

Listed below are some major differences between them:

* MSDE maximum database size is 2GB while SQL SERVER Express has around 4GB.
* In terms of programming language support MSDE has only TSQL, but SQLSERVER Express has TSQL and .NET. In SQL SERVER Express 2005, you can write your stored procedures using .NET.
* SQL SERVER Express does not have connection limitation, which MSDE had and was controlled through the workload governor.
* There was no XCOPY support for MSDE, SQL SERVER Express has it.
* DTS is not present in SQL SERVER express while MSDE has it.
* SQL SERVER Express has reporting services while MSDE does not.
* SQL SERVER Express has native XML support and MSDE does not.

Note: Native XML support means now in SQL SERVER 2005:

* You can create a field with data type XML.
* You can provide SCHEMA to the SQL SERVER fields with XML data type.
* You can use new XML manipulation techniques like XQUERY also called as XML QUERY.

There is a complete chapter on SQL SERVER XML Support, so till then this will suffice.

**Summarizing:** The major difference is the database size (2 GB and 4 GB), support of .NET support in stored procedures and native support for XML. This much can convince the interviewer that you are clear about the differences.

### (DB) What is SQL Server 2000 Workload Governor?

Workload governor limits the performance of SQL SERVER Desktop engine (MSDE) if the SQL engine receives more load than what is meant for MSDE. MSDE was always meant for trial purpose and non-critical projects. Microsoft always wanted companies to buy their full blow version of SQL SERVER, so in order that they can put limitation on MSDE performance and number of connections, they introduced Workload governor.

Workload governor sits between the client and the database engine and counts the number of connections per database instance. If Workload governor finds that the number of connections exceeds eight connections, it starts stalling the connections and slowing down the database engine.

**Note:** It does not limit the number of connections but makes the connection request go slow. By default 32,767 connections are allowed both for SQL SERVER and MSDE. But it just makes the database engine go slow above eight connections.

### What is the Difference between SQL SERVER 2000 and 2005?

Twist: What is the difference between Yukon and SQL SERVER 2000?

**Note:**This question will be one of the favorites during SQL SERVER interviews. I have marked the points which should be mentioned by developers as PG and DBA for Database Administrator.

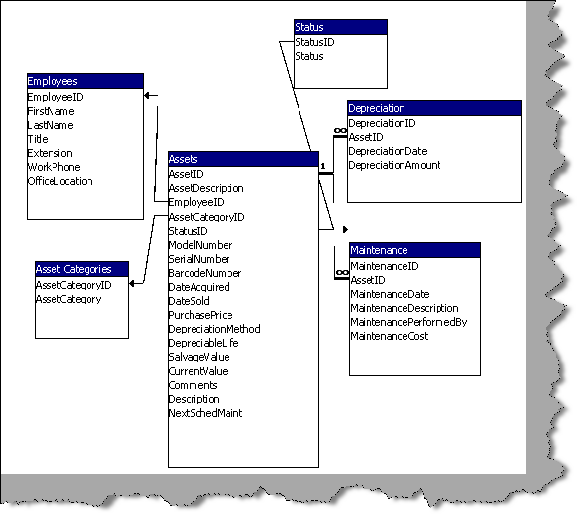
Following are some major differences between the two versions:

* (PG) The most significant change is the .NET integration with SQL SERVER 2005. Stored procedures, user-defined functions, triggers, aggregates, and user-defined types can now be written using your own favorite .NET language (VB.NET, C#, J# etc.). This support was not there in SQL SERVER 2000 where the only language was T-SQL. In SQL 2005, you have support for two languages T-SQL and .NET.
* (PG) SQL SERVER 2005 has reporting services for reports which is a newly added feature and does not exist for SQL SERVER 2000. It was a separate installation for SQL Server 2000.
* (PG) SQL SERVER 2005 has introduced two new data types varbinary (max) and XML. If you remember in SQL SERVER 2000, we had image and text data types. Problem with image and textdata types is that they assign the same amount of storage irrespective of what the actual data size is. This problem is solved using varbinary (max) which acts depending on amount of data. One more new data type is included XML which enables you to store XML documents and does schema verification. In SQL SERVER 2000, developers used varchar or text data type and all validation had to be done programmatically.
* (PG) SQL SERVER 2005 can now process direct incoming HTTP request without IIS Web server. In addition, stored procedure invocation is enabled using the SOAP protocol.
* (PG) Asynchronous mechanism is introduced using server events. In Server event model the server posts an event to the SQL Broker service, later the client can come and retrieve the status by querying the broker.
* For huge databases, SQLSERVER has provided a cool feature called “Data partitioning”. In data partitioning, you break a single database object such as a table or an index into multiple pieces. But for the client application accessing the single database object, “partitioning” is transparent.
* In SQL SERVER 2000, if you rebuilt clustered indexes even the non-clustered indexes where rebuilt. But in SQL SERVER 2005 building the clustered indexes does not build the non-clustered indexes.
* Bulk data uploading in SQL SERVER 2000 was done using BCP (Bulk copy program’s) format files. Now in SQL SERVER 2005 bulk, data uploading uses XML file format.
* In SQL SERVER 2000 there were maximum 16 instances, but in 2005 you can have up to 50 instances.
* SERVER 2005 has support of “Multiple Active Result Sets” also called as “MARS”. In previous versions of SQL SERVER 2000 in one connection, you could only have one result set. Now in one SQL connection, you can query and have multiple results set.
* In previous versions of SQL SERVER 2000, system catalog was stored in the master database. In SQL SERVER 2005, it’s stored in a resource database which is stored as sys object. You cannot access the sys object directly as in the older version we were accessing the master database.
* This is one of the hardware benefits which SQL SERVER 2005 has over SQSERVER 2000 – support of hyper threading. WINDOWS 2003 supports hyper threading; SQL SERVER 2005 can take advantage of the feature unlike SQL SERVER 2000 which did not support hyper threading.  
  **Note:**Hyper threading is a technology developed by INTEL which creates two logical processors on a single physical hardware processor.
* SMO will be used for SQL Server Management.
* AMO (Analysis Management Objects) to manage Analysis Services servers, data sources, cubes, dimensions, measures, and data mining models. You can mapm AMO in old SQL SERVER with DSO (Decision Support Objects).
* Replication is now managed by RMO (Replication Management Objects).  
  **Note:**SMO, AMO and RMO are all using .NET Framework.
* SQL SERVER 2005 uses current user execution context to check rights rather than ownership link chain, which was done in SQL SERVER 2000.  
  **Note:**There is a question on this later see for execution context questions.
* In previous versions of SQL SERVER the schema and the user name was same, but in current, the schema is separated from the user. Now the user owns schema.  
  **Note:** There are questions on this, refer “Schema” later.  
  **Note:**Ok below are some GUI changes.
* Query analyzer is now replaced by query editor.
* Business Intelligence development studio will be used to create Business intelligence solutions.
* OSQL and ISQL command line utility is replaced by SQLCMD utility.
* SQL SERVER Enterprise manager is now replaced by SQL SERVER Management studio.
* SERVER Manager which was running in system tray is now replaced by SQL Computer manager.
* Database mirror concept is supported in SQL SERVER 2005, which was not present in SQL SERVER 2000.
* In SQL SERVER 2005 Indexes can be rebuilt online when the database is in actual production. If you look back in SQL SERVER 2000, you cannot do insert, update, and delete operations when you are building indexes.
* (PG) Other than Serializable, Repeatable Read, Read Committed, and Read Uncommitted isolation levels, there is one more new isolation level “Snapshot Isolation level”.  
  **Note:**We will see “Snapshot Isolation level” in detail in the coming questions.

**Summarizing:**The major significant difference between SQL SERVER 2000 and SQL SERVER 2005 is in terms of support of .NET Integration, Snap shot isolation level, Native XML support, handling HTTP request, Web service support and Data partitioning. You do not have to really say all the above points during an interview. A sweet summary and you will rock.

### (Q) What are E-R diagrams?

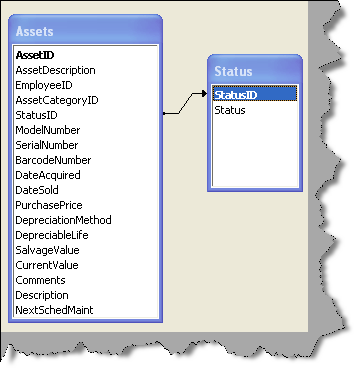
E-R diagram also termed as Entity-Relationship diagram shows the relationship between various tables in the database. Example: Tables Customer and Customer Addresses have a one to many relationship (i.e. one customer can have multiple addresses) this can be shown using the ER diagram. ER diagrams are drawn during the initial stages of a project to forecast how the database structure will shape up. Below is a screen shot of a sample ER diagram of “Asset Management” which ships free with Access.



***Figure 1.4: Asset management ER diagram.***

### (Q) How many Types of Relationship Exist in Database Designing?

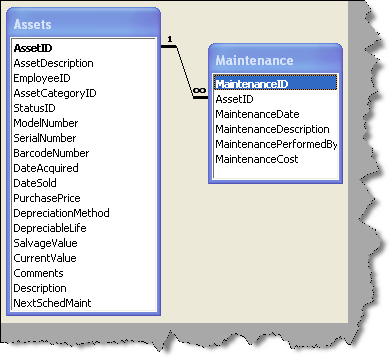
There are three major relationship models:

* One-to-one   
    
  

***Figure 1.5: One-to-One relationship ER diagram***

* One-to-many  
  In this many records in one table correspond to the one record in another table.   
  Example: Every one customer can have multiple sales. So there exist one-to-many relationships between customer and sales table.

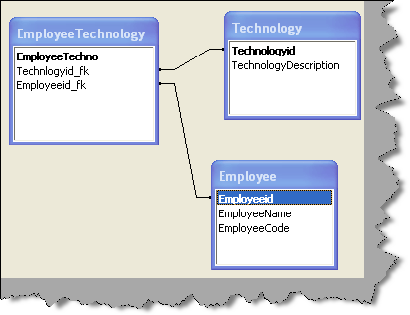
One Asset can have multiple Maintenance. So Asset entity has one-to-many relationship between them as the ER model shows below.



***Figure 1.6: One-to-Many Relationship ER diagram***

* Many-to-many  
  In this, one record in one table corresponds to many rows in another table and also vice-versa.   
  For instance: In a company, one employee can have many skills like Java , C# etc. and also one skill can belong to many employees.

Given below is a sample of many-to-many relationship. One employee can have knowledge of multipleTechnology. So in order to implement this, we have one more table Employee Technology which is linked to the primary key of Employee and Technology table.



***Figure 1.7: Many-to-Many Relationship ER diagram***

### (Q) What is Normalization? What are the Different Types of Normalization?

**Note:** A regular .NET programmer working on projects often stumbles on this question, which is but obvious. The bad part is sometimes the interviewer can take this as a very basic question to be answered and it can be a turning point for the interview. So let's cram it.

It is set of rules that have been established to aid in the design of tables that are meant to be connected through relationships. This set of rules is known as Normalization.

Benefits of Normalizing your database include:

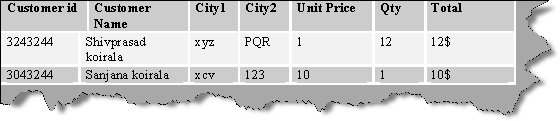
* Avoiding repetitive entries
* Reducing required storage space
* Preventing the need to restructure existing tables to accommodate new data
* Increased speed and flexibility of queries, sorts, and summaries

**Note**: During an interview, people expect to answer a maximum of three normal forms and that's what is expected practically. Actually you can normalize database to fifth normal form. But believe this book, answering three normal forms will put you in a decent shape during an interview.

The three normal forms as follows:

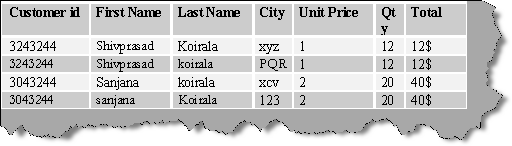
#### First Normal Form

For a table to be in first normal form, data must be broken up into the smallest units possible. In addition to breaking data up into the smallest meaningful values, tables in first normal form should not contain repetitions groups of fields.



***Figure 1.8: Repeating groups example***

In the above example, city1 and city2 are repeating. In order for these tables to be in First normal form, you have to modify the table structure as follows. Also note that the Customer Name is now broken down to first name and last name (First normal form data should be broken down to the smallest unit).

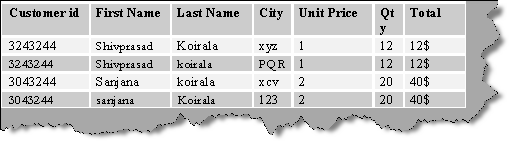


***Figure 1.9: Customer table normalized to first normal form***

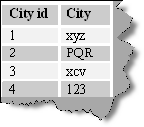
#### Second Normal Form

The second normal form states that each field in a multiple field primary key table must be directly related to the entire primary key. In other words, each non-key field should be a fact about all the fields in the primary key.

In the above table of customer, city is not linked to any primary field.



***Figure 1.10: Normalized customer table.***

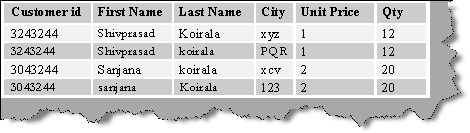


***Figure 1.11: City is now shifted to a different master table.***

That takes our database to a second normal form.

#### Third Normal Form

A non-key field should not depend on another Non-key field. The field Total is dependent on Unit priceand qty.



***Figure 1.12: Fill third normal form***

So now the Total field is removed and is the multiplication of Unit price \* Qty.

### (Q) What is Denormalization?

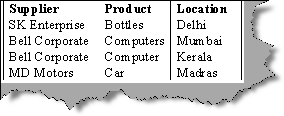
Denormalization is the process of putting one fact in numerous places (it is vice-versa of normalization). Only one valid reason exists for denormalizing a relational design - to enhance performance. The sacrifice to performance is that you increase redundancy in a database.

### (DB) Can you Explain Fourth Normal Form?

**Note:**Whenever the interviewer is trying to go above the third normal form, there can be two reasons, ego or to fail you. Three normal forms are really enough, practically anything more than that is an overdose.

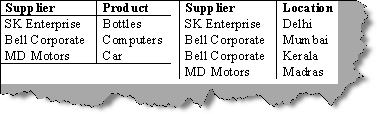
In fourth normal form, it should not contain two or more independent multi-valued facts about an entity and it should satisfy “Third Normal form”.

So let us try to see what multi-valued facts are. If there are two or more many-to-many relationship in one entity and they tend to come to one place, it is termed as “multi-valued facts”.



***Figure 1.13: Multi-valued facts***

In the above table, you can see that there are two many-to-many relationships between Supplier /Product and “Supplier / Location (or in short multi-valued facts). In order for the above example to satisfy the fourth normal form, both the many-to-many relationships should go in different tables.



***Figure 1.14: Normalized to Fourth Normal form.***

### (DB) Can you Explain Fifth Normal Form?

**Note:**UUUHHH if you get this question after joining the company, do ask him if he himself really uses it?

Fifth normal form deals with reconstructing information from smaller pieces of information. These smaller pieces of information can be maintained with less redundancy.

Example: Dealers sell Product which can be manufactured by various Companies. Dealers in order to sell the Product should be registered with the Company. So these three entities have a mutual relationship within them.

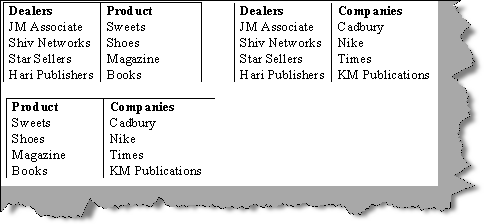


***Figure 1.15: Not in Fifth Normal Form.***

The above table shows some sample data. If you observe closely, a single record is created using lot of small information. For instance: JM Associate can sell sweets under the following two conditions:

* JM Associate should be an authorized dealer of Cadbury
* Sweets should be manufactured by Cadbury company

These two smaller bits of information form one record of the above given table. So in order for the above information to be “Fifth Normal Form” all the smaller information should be in three different places. Below is the complete fifth normal form of the database.



***Figure 1.16: Complete Fifth Normal Form***

### (DB) What is the Difference between Fourth and Fifth normal form?

**Note:** There is a huge similarity between Fourth and Fifth normal form, i.e. they address the problem of “Multi-Valued facts”.

“Fifth normal form” multi-valued facts are interlinked and “Fourth normal form” values are independent. For instance in the above two questions Supplier/Product and Supplier/Location are not linked. While in fifth form, the Dealer/Product/Companies are completely linked.

### (DB) Have you Heard about Sixth Normal Form?

**Note:**Arrrrggghhh yes there exists a sixth normal form also. But note guys you can skip this statement. Just in case you want to impress the interviewer...

If you want a relational system in conjunction with time, you use sixth normal form. At this moment SQL Server does not support it directly.

### (Q) What is Extent and Page?

Twist: What is the relationship between Extent and Page?

Extent is a basic unit of storage to provide space for tables. Every extent has a number of data pages. As new records are inserted new data, pages are allocated. There are eight data pages in an extent. So as soon as the eight pages are consumed, it allocates a new extent with data pages.

While extent is basic unit storage from a database point of view, page is a unit of allocation within extent.

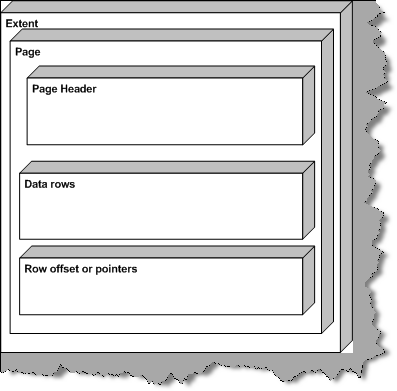
### (DB) What are the Different Sections in Page?

Page has three important sections:

* Page header
* Actual data i.e. Data row
* Row pointers or Row offset

Page header has information like timestamp, next page number, previous page number etc.

Data rows are where your actual row data is stored. For every data row, there is a row offset which points to that data row.



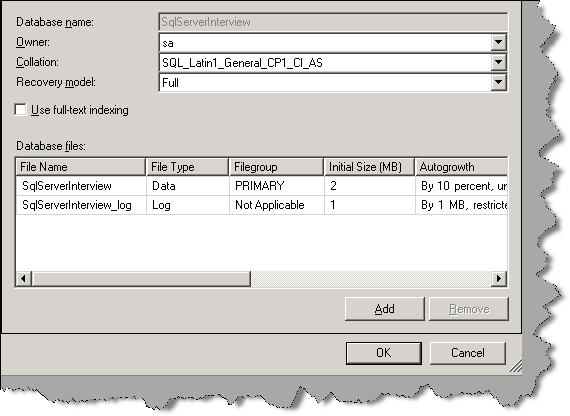
***Figure 1.17: General view of a Extent***

### (Q) What are Page Splits?

Pages are contained in extent. Every extent will have around eight data pages. But all the eight data pages are not created at once; they are created depending on data demand. So when a page becomes full it creates a new page, this process is called as “Page Split”.

### (Q) In which Files does SQL Server Actually Store Data?

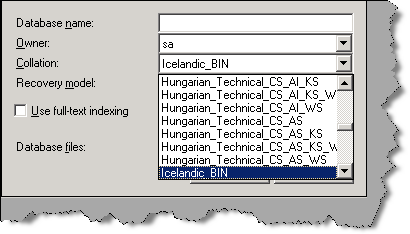
Any SQL Server database is associated with two kinds of files: \*.mdf and \*.ldf. \*.mdf files are actual physical database files where your data is stored finally.\*.ldf (LOG) files are actually data, which is recorded from the last time data was committed in the database.



***Figure 1.18: MDF and LDF files.***

### (Q) What is Collation in SQL Server?

Collation refers to a set of rules that determine how data is sorted and compared. Character data is sorted using rules that define the correct character sequence, with options for specifying case-sensitivity, accent marks, kana character types, and character width.



***Figure 1.19: Collation according to language***

**Note:** Different languages will have different sort orders.

#### Case Sensitivity

If A and a, B and b, etc. are treated in the same way, then it is case-insensitive. A computer treats A and adifferently because it uses ASCII code to differentiate the input. The ASCII value of A is 65, while a is 97. The ASCII value of B is 66 and b is 98.

#### Accent Sensitivity

If a and A, o and O are treated in the same way, then it is accent-insensitive. A computer treats a and Adifferently because it uses ASCII code for differentiating the input. The ASCII value of a is 97 and A 225. The ASCII value of o is 111 and O is 243.

#### Kana Sensitivity

When Japanese kana characters Hiragana and Katakana are treated differently, it is called Kana sensitive.

#### Width Sensitivity

When a single-byte character (half-width) and the same character when represented as a double-byte character (full-width) are treated differently then it is width sensitive.

### (DB) Can We Have a Different Collation for Database and Table?

Yes, you can specify different collation sequence for both the entities differently.

**What is RDBMS?**  
Relational Data Base Management Systems (RDBMS) are database management systems that maintain data records and indices in tables. Relationships may be created and maintained across and among the data and tables. In a relational database, relationships between data items are expressed by means of tables. Interdependencies among these tables are expressed by data values rather than by pointers. This allows a high degree of data independence. An RDBMS has the capability to recombine the data items from different files, providing powerful tools for data usage.

**What is normalization?**  
Database normalization is a data design and organization process applied to data structures based on rules that help build relational databases. In relational database design, the process of organizing data to minimize redundancy. Normalization usually involves dividing a database into two or more tables and defining relationships between the tables. The objective is to isolate data so that additions, deletions, and modifications of a field can be made in just one table and then propagated through the rest of the database via the defined relationships.  
  
**What are different normalization forms?**

***1NF: Eliminate Repeating Groups***  
Make a separate table for each set of related attributes, and give each table a primary key. Each field contains at most one value from its attribute domain.  
***2NF: Eliminate Redundant Data***  
If an attribute depends on only part of a multi-valued key, remove it to a separate table.  
***3NF: Eliminate Columns Not Dependent On Key***  
If attributes do not contribute to a description of the key, remove them to a separate table.All attributes must be directly dependent on the primary key  
***BCNF: Boyce-Codd Normal Form***  
If there are non-trivial dependencies between candidate key attributes, separate them out into distinct tables.  
***4NF: Isolate Independent Multiple Relationships***  
No table may contain two or more 1:n or n:m relationships that are not directly related.  
***5NF: Isolate Semantically Related Multiple Relationships***  
There may be practical constrains on information that justify separating logically related many-to-many relationships.  
***ONF: Optimal Normal Form***  
A model limited to only simple (elemental) facts, as expressed in Object Role Model notation.  
***DKNF: Domain-Key Normal Form***  
A model free from all modification anomalies.

Remember, these normalization guidelines are cumulative. For a database to be in 3NF, it must first fulfill all the criteria of a 2NF and 1NF database.

**What is Stored Procedure?**A stored procedure is a named group of SQL statements that have been previously created and stored in the server database. Stored procedures accept input parameters so that a single procedure can be used over the network by several clients using different input data. And when the procedure is modified, all clients automatically get the new version. Stored procedures reduce network traffic and improve performance. Stored procedures can be used to help ensure the integrity of the database.  
e.g. sp\_helpdb, sp\_renamedb, sp\_depends etc.

**What is Trigger?**  
A trigger is a SQL procedure that initiates an action when an event (INSERT, DELETE or UPDATE) occurs. Triggers are stored in and managed by the DBMS.Triggers are used to maintain the referential integrity of data by changing the data in a systematic fashion. A trigger cannot be called or executed; the DBMS automatically fires the trigger as a result of a data modification to the associated table. Triggers can be viewed as similar to stored procedures in that both consist of procedural logic that is stored at the database level. Stored procedures, however, are not event-drive and are not attached to a specific table as triggers are. Stored procedures are explicitly executed by invoking a CALL to the procedure while triggers are implicitly executed. In addition, triggers can also execute stored procedures.  
*Nested Trigger:*A trigger can also contain INSERT, UPDATE and DELETE logic within itself, so when the trigger is fired because of data modification it can also cause another data modification, thereby firing another trigger. A trigger that contains data modification logic within itself is called a nested trigger.

**What is View?**  
A simple view can be thought of as a subset of a table. It can be used for retrieving data, as well as updating or deleting rows. Rows updated or deleted in the view are updated or deleted in the table the view was created with. It should also be noted that as data in the original table changes, so does data in the view, as views are the way to look at part of the original table. The results of using a view are not permanently stored in the database. The data accessed through a view is actually constructed using standard T-SQL select command and can come from one to many different base tables or even other views.

**What is Index?**  
An index is a physical structure containing pointers to the data. Indices are created in an existing table to locate rows more quickly and efficiently. It is possible to create an index on one or more columns of a table, and each index is given a name. The users cannot see the indexes, they are just used to speed up queries. Effective indexes are one of the best ways to improve performance in a database application. A table scan happens when there is no index available to help a query. In a table scan SQL Server examines every row in the table to satisfy the query results. Table scans are sometimes unavoidable, but on large tables, scans have a terrific impact on performance.

*Clustered indexes* define the physical sorting of a database table’s rows in the storage media. For this reason, each database table may have only one clustered index.  
*Non-clustered indexes* are created outside of the database table and contain a sorted list of references to the table itself.

**What is a NOLOCK?**  
Using the NOLOCK query optimiser hint is generally considered good practice in order to improve concurrency on a busy system. When the NOLOCK hint is included in a SELECT statement, no locks are taken when data is read. The result is a Dirty Read, which means that another process could be updating the data at the exact time you are reading it. There are no guarantees that your query will retrieve the most recent data. The advantage to performance is that your reading of data will not block updates from taking place, and updates will not block your reading of data. SELECT statements take Shared (Read) locks. This means that multiple SELECT statements are allowed simultaneous access, but other processes are blocked from modifying the data. The updates will queue until all the reads have completed, and reads requested after the update will wait for the updates to complete. The result to your system is delay(blocking).

**What is difference between DELETE & TRUNCATE commands?**  
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 faster and uses fewer system and transaction log resources than DELETE.  
TRUNCATE removes the data by deallocating the data pages used to store the table’s data, and only the page deallocations are recorded in the transaction log.  
TRUNCATE removes all rows from a table, but the table structure and its columns, constraints, indexes and so on remain. The counter used by an identity for new rows is reset to the seed for the column.  
You cannot use TRUNCATE TABLE on a table referenced by a FOREIGN KEY constraint.  
Because TRUNCATE TABLE is not logged, it cannot activate a trigger.  
TRUNCATE can not be Rolled back using logs.  
TRUNCATE is DDL Command.  
TRUNCATE Resets identity of the table.

***DELETE***  
DELETE removes rows one at a time and records an entry in the transaction log for each deleted row.  
If you want to retain the identity counter, use DELETE instead. If you want to remove table definition and its data, use the DROP TABLE statement.  
DELETE Can be used with or without a WHERE clause  
DELETE Activates Triggers.  
DELETE Can be Rolled back using logs.  
DELETE is DML Command.  
DELETE does not reset identity of the table.

**Difference between Function and Stored Procedure?**  
UDF can be used in the SQL statements anywhere in the WHERE/HAVING/SELECT section where as Stored procedures cannot be.  
UDFs that return tables can be treated as another rowset. This can be used in JOINs with other tables.  
Inline UDF’s can be though of as views that take parameters and can be used in JOINs and other Rowset operations.

**When is the use of UPDATE\_STATISTICS command?**  
This command is basically used when a large processing of data has occurred. If a large amount of deletions any modification or Bulk Copy into the tables has occurred, it has to update the indexes to take these changes into account. UPDATE\_STATISTICS updates the indexes on these tables accordingly.

**What types of Joins are possible with Sql Server?**  
Joins are used in queries to explain how different tables are related. Joins also let you select data from a table depending upon data from another table.  
Types of joins: INNER JOINs, OUTER JOINs, CROSS JOINs. OUTER JOINs are further classified as LEFT OUTER JOINS, RIGHT OUTER JOINS and FULL OUTER JOINS.

**What is the difference between a HAVING CLAUSE and a WHERE CLAUSE?**  
Specifies a search condition for a group or an aggregate. HAVING can be used only with the SELECT statement. HAVING is typically used in a GROUP BY clause. When GROUP BY is not used, HAVING behaves like a WHERE clause. Having Clause is basically used only with the GROUP BY function in a query. WHERE Clause is applied to each row before they are part of the GROUP BY function in a query. HAVING criteria is applied after the the grouping of rows has occurred.

**What is sub-query? Explain properties of sub-query.**  
Sub-queries are often referred to as sub-selects, as they allow a SELECT statement to be executed arbitrarily within the body of another SQL statement. A sub-query is executed by enclosing it in a set of parentheses. Sub-queries are generally used to return a single row as an atomic value, though they may be used to compare values against multiple rows with the IN keyword.

A subquery is a SELECT statement that is nested within another T-SQL statement. A subquery SELECT statement if executed independently of the T-SQL statement, in which it is nested, will return a result set. Meaning a subquery SELECT statement can standalone and is not depended on the statement in which it is nested. A subquery SELECT statement can return any number of values, and can be found in, the column list of a SELECT statement, a FROM, GROUP BY, HAVING, and/or ORDER BY clauses of a T-SQL statement. A Subquery can also be used as a parameter to a function call. Basically a subquery can be used anywhere an expression can be used.

***Properties of Sub-Query***  
A subquery must be enclosed in the parenthesis.  
A subquery must be put in the right hand of the comparison operator, and  
A subquery cannot contain a ORDER-BY clause.  
A query can contain more than one sub-queries.

**What are types of sub-queries?**  
Single-row subquery, where the subquery returns only one row.  
Multiple-row subquery, where the subquery returns multiple rows,.and  
Multiple column subquery, where the subquery returns multiple columns.

**What command do we use to rename a db?**  
sp\_renamedb ‘oldname’ , ‘newname’  
If someone is using db it will not accept sp\_renmaedb. In that case first bring db to single user using sp\_dboptions. Use sp\_renamedb to rename database. Use sp\_dboptions to bring database to multi user mode.

**What is sp\_configure commands and set commands?**  
Use sp\_configure to display or change server-level settings. To change database-level settings, use ALTER DATABASE. To change settings that affect only the current user session, use the SET statement.

**What are the different types of replication? Explain.**  
The SQL Server 2000-supported replication types are as follows:

* Transactional
* Snapshot
* Merge

***Snapshot replication*** distributes data exactly as it appears at a specific moment in time and does not monitor for updates to the data. Snapshot replication is best used as a method for replicating data that changes infrequently or where the most up-to-date values (low latency) are not a requirement. When synchronization occurs, the entire snapshot is generated and sent to Subscribers.

***Transactional replication***, an initial snapshot of data is applied at Subscribers, and then when data modifications are made at the Publisher, the individual transactions are captured and propagated to Subscribers.

***Merge replication*** is the process of distributing data from Publisher to Subscribers, allowing the Publisher and Subscribers to make updates while connected or disconnected, and then merging the updates between sites when they are connected.

**What are the OS services that the SQL Server installation adds?**  
MS SQL SERVER SERVICE, SQL AGENT SERVICE, DTC (Distribution transac co-ordinator)

**What are three SQL keywords used to change or set someone’s permissions?**GRANT, DENY, and REVOKE.

**What does it mean to have quoted\_identifier on? What are the implications of having it off?**  
When SET QUOTED\_IDENTIFIER is ON, identifiers can be delimited by double quotation marks, and literals must be delimited by single quotation marks. When SET QUOTED\_IDENTIFIER is OFF, identifiers cannot be quoted and must follow all Transact-SQL rules for identifiers.

**What is the STUFF function and how does it differ from the REPLACE function?**  
**STUFF** function to overwrite existing characters. Using this syntax, STUFF(string\_expression, start, length, replacement\_characters), string\_expression is the string that will have characters substituted, start is the starting position, length is the number of characters in the string that are substituted, and replacement\_characters are the new characters interjected into the string.  
**REPLACE** function to replace existing characters of all occurance. Using this syntax REPLACE(string\_expression, search\_string, replacement\_string), where every incidence of search\_string found in the string\_expression will be replaced with replacement\_string.

**Using query analyzer, name 3 ways to get an accurate count of the number of records in a table?**  
**SELECT \*  
FROM table1  
SELECT COUNT(\*)  
FROM table1  
SELECT rows  
FROM sysindexes  
WHERE id = OBJECT\_ID(table1)  
AND indid < 2**  
**How to rebuild Master Database?**  
Shutdown Microsoft SQL Server 2000, and then run Rebuildm.exe. This is located in the Program Files\Microsoft SQL Server\80\Tools\Binn directory.  
In the Rebuild Master dialog box, click Browse.  
In the Browse for Folder dialog box, select the \Data folder on the SQL Server 2000 compact disc or in the shared network directory from which SQL Server 2000 was installed, and then click OK.  
Click Settings. In the Collation Settings dialog box, verify or change settings used for the master database and all other databases.  
Initially, the default collation settings are shown, but these may not match the collation selected during setup. You can select the same settings used during setup or select new collation settings. When done, click OK.  
In the Rebuild Master dialog box, click Rebuild to start the process.  
The Rebuild Master utility reinstalls the master database.  
To continue, you may need to stop a server that is running.  
Source: [**http://msdn2.microsoft.com/en-us/library/aa197950(SQL.80)**](http://msdn2.microsoft.com/en-us/library/aa197950(SQL.80)).aspx

**What is the basic functions for master, msdb, model, tempdb databases?**  
The ***Master*** database holds information for all databases located on the SQL Server instance and is the glue that holds the engine together. Because SQL Server cannot start without a functioning master database, you must administer this database with care.  
The ***msdb***database stores information regarding database backups, SQL Agent information, DTS packages, SQL Server jobs, and some replication information such as for log shipping.  
The ***tempdb*** holds temporary objects such as global and local temporary tables and stored procedures.  
The ***model*** is essentially a template database used in the creation of any new user database created in the instance.

**What are primary keys and foreign keys?**  
***Primary keys*** are the unique identifiers for each row. They must contain unique values and cannot be null. Due to their importance in relational databases, Primary keys are the most fundamental of all keys and constraints. A table can have only one Primary key.  
***Foreign keys*** are both a method of ensuring data integrity and a manifestation of the relationship between tables.

**What is data integrity? Explain constraints?**  
Data integrity is an important feature in SQL Server. When used properly, it ensures that data is accurate, correct, and valid. It also acts as a trap for otherwise undetectable bugs within applications.

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.

A **UNIQUE** constraint enforces the uniqueness of the values in a set of columns, so no duplicate values are entered. The unique key constraints are used to enforce entity integrity as the primary key constraints.

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.

A **CHECK** constraint is used to limit the values that can be placed in a column. The check constraints are used to enforce domain integrity.

A **NOT NULL** constraint enforces that the column will not accept null values. The not null constraints are used to enforce domain integrity, as the check constraints.

**What is the difference between clustered and a non-clustered index?**  
A *clustered index* is a special type of index that reorders the way records in the table are physically stored. Therefore table can have only one clustered index. The leaf nodes of a clustered index contain the data pages.

A *nonclustered index* is a special type of index in which the logical order of the index does not match the physical stored order of the rows on disk. The leaf node of a nonclustered index does not consist of the data pages. Instead, the leaf nodes contain index rows.

**What are the different index configurations a table can have?**  
A table can have one of the following index configurations:

No indexes  
A clustered index  
A clustered index and many nonclustered indexes  
A nonclustered index  
Many nonclustered indexes

**What is cursors?**  
Cursor is a database object used by applications to manipulate data in a set on a row-by-row basis, instead of the typical SQL commands that operate on all the rows in the set at one time.

In order to work with a cursor we need to perform some steps in the following order:

Declare cursor  
Open cursor  
Fetch row from the cursor  
Process fetched row  
Close cursor  
Deallocate cursor

**What is the use of DBCC commands?**  
DBCC stands for database consistency checker. We use these commands to check the consistency of the databases, i.e., maintenance, validation task and status checks.  
E.g. DBCC CHECKDB – Ensures that tables in the db and the indexes are correctly linked.  
DBCC CHECKALLOC – To check that all pages in a db are correctly allocated.  
DBCC CHECKFILEGROUP – Checks all tables file group for any damage.

**What is a Linked Server?**  
Linked Servers is a concept in SQL Server by which we can add other SQL Server to a Group and query both the SQL Server dbs using T-SQL Statements. With a linked server, you can create very clean, easy to follow, SQL statements that allow remote data to be retrieved, joined and combined with local data.  
Storped Procedure sp\_addlinkedserver, sp\_addlinkedsrvlogin will be used add new Linked Server.

**What is Collation?**Collation refers to a set of rules that determine how data is sorted and compared. Character data is sorted using rules that define the correct character sequence, with options for specifying case-sensitivity, accent marks, kana character types and character width.

**What are different type of Collation Sensitivity?**  
*Case sensitivity*  
A and a, B and b, etc.

*Accent sensitivity*  
a and á, o and ó, etc.

*Kana Sensitivity*  
When Japanese kana characters Hiragana and Katakana are treated differently, it is called Kana sensitive.

*Width sensitivity*  
When a single-byte character (half-width) and the same character when represented as a double-byte character (full-width) are treated differently then it is width sensitive.

**What’s the difference between a primary key and a unique key?**  
Both primary key and unique enforce 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 nonclustered index by default. Another major difference is that, primary key doesn’t allow NULLs, but unique key allows one NULL only.

**How to implement one-to-one, one-to-many and many-to-many relationships while designing tables?**  
One-to-One relationship can be implemented as a single table and rarely as two tables with primary and foreign key relationships.  
One-to-Many relationships are implemented by splitting the data into two tables with primary key and foreign key relationships.  
Many-to-Many relationships are implemented using a junction table with the keys from both the tables forming the composite primary key of the junction table.

**What is SQL Profiler?**  
SQL Profiler is a graphical tool that allows system administrators to monitor events in an instance of Microsoft SQL Server. You can capture and save data about each event to a file or SQL Server table to analyze later. For example, you can monitor a production environment to see which stored procedures are hampering performance by executing too slowly.

Use SQL Profiler to monitor only the events in which you are interested. If traces are becoming too large, you can filter them based on the information you want, so that only a subset of the event data is collected. Monitoring too many events adds overhead to the server and the monitoring process and can cause the trace file or trace table to grow very large, especially when the monitoring process takes place over a long period of time.

**What is User Defined Functions?**  
User-Defined Functions allow to define its own T-SQL functions that can accept 0 or more parameters and return a single scalar data value or a table data type.

**What kind of User-Defined Functions can be created?**  
There are three types of User-Defined functions in SQL Server 2000 and they are Scalar, Inline Table-Valued and Multi-statement Table-valued.

**Scalar User-Defined Function**  
A Scalar user-defined function returns one of the scalar data types. Text, ntext, image and timestamp data types are not supported. These are the type of user-defined functions that most developers are used to in other programming languages. You pass in 0 to many parameters and you get a return value.

**Inline Table-Value User-Defined Function**  
An Inline Table-Value user-defined function returns a table data type and is an exceptional alternative to a view as the user-defined function can pass parameters into a T-SQL select command and in essence provide us with a parameterized, non-updateable view of the underlying tables.

**Multi-statement Table-Value User-Defined Function**  
A Multi-Statement Table-Value user-defined function returns a table and is also an exceptional alternative to a view as the function can support multiple T-SQL statements to build the final result where the view is limited to a single SELECT statement. Also, the ability to pass parameters into a T-SQL select command or a group of them gives us the capability to in essence create a parameterized, non-updateable view of the data in the underlying tables. Within the create function command you must define the table structure that is being returned. After creating this type of user-defined function, It can be used in the FROM clause of a T-SQL command unlike the behavior found when using a stored procedure which can also return record sets.

**Which TCP/IP port does SQL Server run on? How can it be changed?**  
SQL Server runs on port 1433. It can be changed from the Network Utility TCP/IP properties –> Port number.both on client and the server.

**What are the authentication modes in SQL Server? How can it be changed?**  
Windows mode and mixed mode (SQL & Windows).

To change authentication mode in SQL Server click Start, Programs, Microsoft SQL Server and click SQL Enterprise Manager to run SQL Enterprise Manager from the Microsoft SQL Server program group. Select the server then from the Tools menu select SQL Server Configuration Properties, and choose the Security page.

**Where are SQL server users names and passwords are stored in sql server?**  
They get stored in master db in the sysxlogins table.

**Which command using Query Analyzer will give you the version of SQL server and operating system?**  
**SELECT SERVERPROPERTY('productversion'), SERVERPROPERTY('productlevel'),**  
**What is SQL server agent?**SQL Server agent plays an important role in the day-to-day tasks of a database administrator (DBA). It is often overlooked as one of the main tools for SQL Server management. Its purpose is to ease the implementation of tasks for the DBA, with its full-function scheduling engine, which allows you to schedule your own jobs and scripts.

**Can a stored procedure call itself or recursive stored procedure? How many level SP nesting possible?**  
Yes. Because Transact-SQL supports recursion, you can write stored procedures that call themselves. Recursion can be defined as a method of problem solving wherein the solution is arrived at by repetitively applying it to subsets of the problem. A common application of recursive logic is to perform numeric computations that lend themselves to repetitive evaluation by the same processing steps. Stored procedures are nested when one stored procedure calls another or executes managed code by referencing a CLR routine, type, or aggregate. You can nest stored procedures and managed code references up to 32 levels.

**What is @@ERROR?**  
The @@ERROR automatic variable returns the error code of the last Transact-SQL statement. If there was no error, @@ERROR returns zero. Because @@ERROR is reset after each Transact-SQL statement, it must be saved to a variable if it is needed to process it further after checking it.

**What is Raiseerror?**  
Stored procedures report errors to client applications via the RAISERROR command. RAISERROR doesn’t change the flow of a procedure; it merely displays an error message, sets the @@ERROR automatic variable, and optionally writes the message to the SQL Server error log and the NT application event log.

**What is log shipping?**  
Log shipping is the process of automating the backup of database and transaction log files on a production SQL server, and then restoring them onto a standby server. Enterprise Editions only supports log shipping. In log shipping the transactional log file from one server is automatically updated into the backup database on the other server. If one server fails, the other server will have the same db can be used this as the Disaster Recovery plan. The key feature of log shipping is that is will automatically backup transaction logs throughout the day and automatically restore them on the standby server at defined interval.

**What is the difference between a local and a global variable?**  
A *local temporary*table exists only for the duration of a connection or, if defined inside a compound statement, for the duration of the compound statement.

A *global temporary* table remains in the database permanently, but the rows exist only within a given connection. When connection are closed, the data in the global temporary table disappears. However, the table definition remains with the database for access when database is opened next time.

**What are the properties of the Relational tables?**  
Relational tables have six properties:

* Values are atomic.
* Column values are of the same kind.
* Each row is unique.
* The sequence of columns is insignificant.
* The sequence of rows is insignificant.
* Each column must have a unique name.

**What is De-normalization?**  
De-normalization is the process of attempting to optimize the performance of a database by adding redundant data. It is sometimes necessary because current DBMSs implement the relational model poorly. A true relational DBMS would allow for a fully normalized database at the logical level, while providing physical storage of data that is tuned for high performance. De-normalization is a technique to move from higher to lower normal forms of database modeling in order to speed up database access.

**How to get @@error and @@rowcount at the same time?**If @@Rowcount is checked after Error checking statement then it will have 0 as the value of @@Recordcount as it would have been reset.  
And if @@Recordcount is checked before the error-checking statement then @@Error would get reset. To get @@error and @@rowcount at the same time do both in same statement and store them in local variable. SELECT @RC = @@ROWCOUNT, @ER = @@ERROR

**What is Identity?**  
Identity (or AutoNumber) is a column that automatically generates numeric values. A start and increment value can be set, but most DBA leave these at 1. A GUID column also generates numbers, the value of this cannot be controled. Identity/GUID columns do not need to be indexed.

**What is a Scheduled Jobs or What is a Scheduled Tasks?**  
Scheduled tasks let user automate processes that run on regular or predictable cycles. User can schedule administrative tasks, such as cube processing, to run during times of slow business activity. User can also determine the order in which tasks run by creating job steps within a SQL Server Agent job. E.g. Back up database, Update Stats of Tables. Job steps give user control over flow of execution.  If one job fails, user can configure SQL Server Agent to continue to run the remaining tasks or to stop execution.

**What is a table called, if it does not have neither Cluster nor Non-cluster Index? What is it used for?**Unindexed table or ***Heap***. Microsoft Press Books and Book On Line (BOL) refers it as Heap.  
A heap is a table that does not have a clustered index and, therefore, the pages are not linked by pointers. The IAM pages are the only structures that link the pages in a table together.  
Unindexed tables are good for fast storing of data. Many times it is better to drop all indexes from table and than do bulk of inserts and to restore those indexes after that.

**What is BCP? When does it used?**  
BulkCopy is a tool used to copy huge amount of data from tables and views. BCP does not copy the structures same as source to destination.

**How do you load large data to the SQL server database?**BulkCopy is a tool used to copy huge amount of data from tables. BULK INSERT command helps to Imports a data file into a database table or view in a user-specified format.

**Can we rewrite subqueries into simple select statements or with joins?**  
Subqueries can often be re-written to use a standard outer join, resulting in faster performance. As we may know, an outer join uses the plus sign (+) operator to tell the database to return all non-matching rows with NULL values. Hence we combine the outer join with a NULL test in the WHERE clause to reproduce the result set without using a sub-query.

**Can SQL Servers linked to other servers like Oracle?**  
SQL Server can be lined to any server provided it has OLE-DB provider from Microsoft to allow a link. E.g. Oracle has a OLE-DB provider for oracle that Microsoft provides to add it as linked server to SQL Server group.

**How to know which index a table is using?**  
SELECT table\_name,index\_name FROM user\_constraints

EXEC sp\_helpconstraint tablename

**How to copy the tables, schema and views from one SQL server to another?**  
Microsoft SQL Server 2000 Data Transformation Services (DTS) is a set of graphical tools and programmable objects that lets user extract, transform, and consolidate data from disparate sources into single or multiple destinations.

**What is Self Join?**  
This is a particular case when one table joins to itself, with one or two aliases to avoid confusion. A self join can be of any type, as long as the joined tables are the same. A self join is rather unique in that it involves a relationship with only one table. The common example is when company have a hierarchal reporting structure whereby one member of staff reports to another.

**What is Cross Join?**  
A cross join that does not have a WHERE clause produces the Cartesian product of the tables involved in the join. The size of a Cartesian product result set is the number of rows in the first table multiplied by the number of rows in the second table. The common example is when company wants to combine each product with a pricing table to analyze each product at each price.

**Which virtual table does a trigger use?**  
Inserted and Deleted.

**List few advantages of Stored Procedure.**

* 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.

**What is DataWarehousing?**

* **Subject-oriented**, meaning that the data in the database is organized so that all the data elements relating to the same real-world event or object are linked together;
* **Time-variant**, meaning that the changes to the data in the database are tracked and recorded so that reports can be produced showing changes over time;
* **Non-volatile**, meaning that data in the database is never over-written or deleted, once committed, the data is static, read-only, but retained for future reporting;
* **Integrated**, meaning that the database contains data from most or all of an organization’s operational applications, and that this data is made consistent.

**What is OLTP(OnLine Transaction Processing)?**  
In OLTP – online transaction processing systems relational database design use the discipline of data modeling and generally follow the Codd rules of data normalization in order to ensure absolute data integrity. Using these rules complex information is broken down into its most simple structures (a table) where all of the individual atomic level elements relate to each other and satisfy the normalization rules.

**How do SQL server 2000 and XML linked? Can XML be used to access data?**  
***FOR XML (ROW, AUTO, EXPLICIT)***  
You can execute SQL queries against existing relational databases to return results as XML rather than standard rowsets. These queries can be executed directly or from within stored procedures. To retrieve XML results, use the FOR XML clause of the SELECT statement and specify an XML mode of RAW, AUTO, or EXPLICIT.

***OPENXML***  
OPENXML is a Transact-SQL keyword that provides a relational/rowset view over an in-memory XML document. OPENXML is a rowset provider similar to a table or a view. OPENXML provides a way to access XML data within the Transact-SQL context by transferring data from an XML document into the relational tables. Thus, OPENXML allows you to manage an XML document and its interaction with the relational environment.

**What is an execution plan? When would you use it? How would you view the execution plan?**  
An execution plan is basically a road map that graphically or textually shows the data retrieval methods chosen by the SQL Server query optimizer for a stored procedure or ad-hoc query and is a very useful tool for a developer to understand the performance characteristics of a query or stored procedure since the plan is the one that SQL Server will place in its cache and use to execute the stored procedure or query. From within Query Analyzer is an option called “Show Execution Plan” (located on the Query drop-down menu). If this option is turned on it will display query execution plan in separate window when query is ran again.