It is also pronounced as Sequel server. This is a client-server database management system developed by Microsoft for large scale databases. It comes into RDBMS (Relational Database Management System) category. It works based on SQL (System query language), a latest and advanced database language.

**Authentication**

A user need to login to this software system in-order to manage the database. SQL server allows us to logon in two ways.

1. Windows authentication
2. SQL Server authentication

In windows authentication, system recognizes the user through his/her windows login credentials. That means, if a user logs into a windows operating system, he/she becomes an authorized user to use all resources that accept windows authentication and available in the system. If the logged in computer is configured as a valid client under a DNS (domain name server), the user becomes eligible to access any resource of any computer that is working under the DNS with widows authentication. In front end (programming) the following connection string can be used to connect to the server.

Server=[server name] ; initial catalog=[database name]; trusted\_connection=true;

In SQL server authentication, user will be provided a user id and password. A user from any system in the network can use the user id and password to connect to the database server. In front end (programming) the following connection string can be used to connect to the server.

Server=[server name] ; initial catalog=[database name]; user id=[user id]; password=[password];

**Features of SQL Server**

* License cost is very lower than any RDBMS Systems
* Runs under Windows all windows servers (NT/2000/2003)
* Runs under client versions Windows 95/98/XP … (to install server service, we need to install MSDE – Microsoft SQL Desktop Engine)
* Scalable to meet Enterprise level databases
* Supports data replication
* Supports Data Marts and Data Warehouses
* Provide OLAP service
* English Query tool makes data move available to casual users
* Data transmission services enable easy exchange of data
* Supports distributed transaction
* Centralized management
* Availability of Visual administration tools and wizards
* Generation and transmission of data in XML format

**Advantages of relational databases**

* Redundancy can be reduced
* Inconsistency can avoided
* Irrelevant data can be avoided
* Data can be shared
* Standards can be enforced
* Security restrictions can be applied means access levels can be defined
* Integrity can be maintained
* Conflicting requirements can be balanced

**SQL Server Database objects**

In a SQL server the following database objects can be created and maintained.

* Database Users (user accounts)
* Databases
* Tables
* Views
* Constraints
* Indexes
* Triggers
* Stored procedures
* Stored functions

DATABASE USERS

A database user is an authenticated user and allowed to logon to the server to use a set of privileged (authorized) database objects. Administrator (user id: sa) or any user having administrator privileges can access all objects without any access restrictions. Any normal user will get limited access on some very important database objects. The following list shows the general access privileges on objects.

* SELECT
* CREATE
* INSERT
* UPDATE
* DELETE

A person who creates and maintains his/her database objects is called owner of those database objects. He can GRANT or REVOKE privileges on his/her objects to other users.

**DATABASES**

A database is a collection of database objects. It is a container to all tables, views, indexes, constraints, triggers, stored procedures and functions. All related objects of a database of an organization are maintained as a database. Every database is maintained by the server in the form of two files. One is a database file with **.mdf** and another is a log data file with extension **.ldf**. These files can not be accessed by any other user except administrator of the system.

**TABLES**

A table is an actual data storage object and used to store the raw data of an entity. A table collects data in the form of rows (records) and columns (fields). So, while creating a table a user has to declare the columns in terms of column name, column type and width. Column name is a identity name of the column, column type specifies the type of data to be allowed in to the column and column width specifies the maximum number of characters or range of data to be allowed in to the column. A table allows a maximum of 1024 columns and with an unlimited number of rows.

**VIEWS**

A view is a filter defined on a table. A view behaves like a table but with restricted columns and rows. A view can be used to insert, update and delete the contents of a table. But all actions work under the condition (filter) defined in the view. That means we can not delete, update records that are not coming under the filter definition of the view. So, views are very useful to restrict columns and rows from the users depend on their accessibility.

**CONSTRAINTS**

These are a set of logical conditions built on the business logics of an organization to allow and maintain data in tables. A data that is violating these rules can not be allowed into any table of the database. These are defined on columns and rows while creating the tables. They are listed below.

Column level constraints

* Not null : Column becomes Mandatory
* Unique: Column does not allow duplicate data
* Primary key: Column becomes default field with Unique and Not null natures

Row level constraint

* Check (logical expression)

Relational constraint (between two tables)

* Foreign key/Reference Key constraint

**INDEX**

An index is a database object that helps the database to speedup the data search in a table. It holds a data expression/data from one or more columns of a table in ascending order to find records quickly based on values of those columns. For a table an index will be created automatically on its primary key column data. It is called clustered index which is having data from the primary column in ascending order along with cluster IDs (physical locations on the disk) of all the rows. When a search condition is applied on a table through this column, system searches the corresponding index for the rows. So, indexes make the data searching faster.

**TRIGGERS**

A trigger a program that will implicitly (automatically) executed by the server when a transaction (INSERT/DELETE/UPDATE) occurs of a table. They are defined on tables. They are having the following advantages.

1. Deleted rows can be automatic backed-up from a table into its backup table.
2. Old values can be automatically backed-up when some rows are updates with new values.
3. Special business logics (constraints), that can not be implemented using standard constraints and need extra procedures, can be implemented using trigger procedures.

STORED PROCEDURES AND FUNCTIONS

These are the procedures created and stored in database separately. They are not attached to any table in the database. They take value through parameters. Some parameters are used to take data into the procedure or function, this type of parameters called in parameters. Some parameters returns values to calling programs, this type of parameters called out parameters. Stored functions can return a value or table. Stored procedures are used to add data to multiple tables with one transaction. Mainly these stored procedures and functions are used to perform tasks programmatically.