What is SQL Server

SQL Server is a relational database management system, or RDBMS, developed and marketed by Microsoft.
Similar to other RDBMS software, SQL Server is built on top of SQL, a standard programming language for interacting with relational databases. SQL Server is tied to Transact-SQL, or T-SQL, the Microsoft's implementation of SQL that adds a set of proprietary programming constructs.

1-Database Engine

SQL Server is the Database Engine. The Database Engine consists of a relational engine that processes queries and a storage engine that manages database files, pages, pages, index, etc. The database objects such as stored procedures, views, and triggers are also created and executed by the Database Engine.

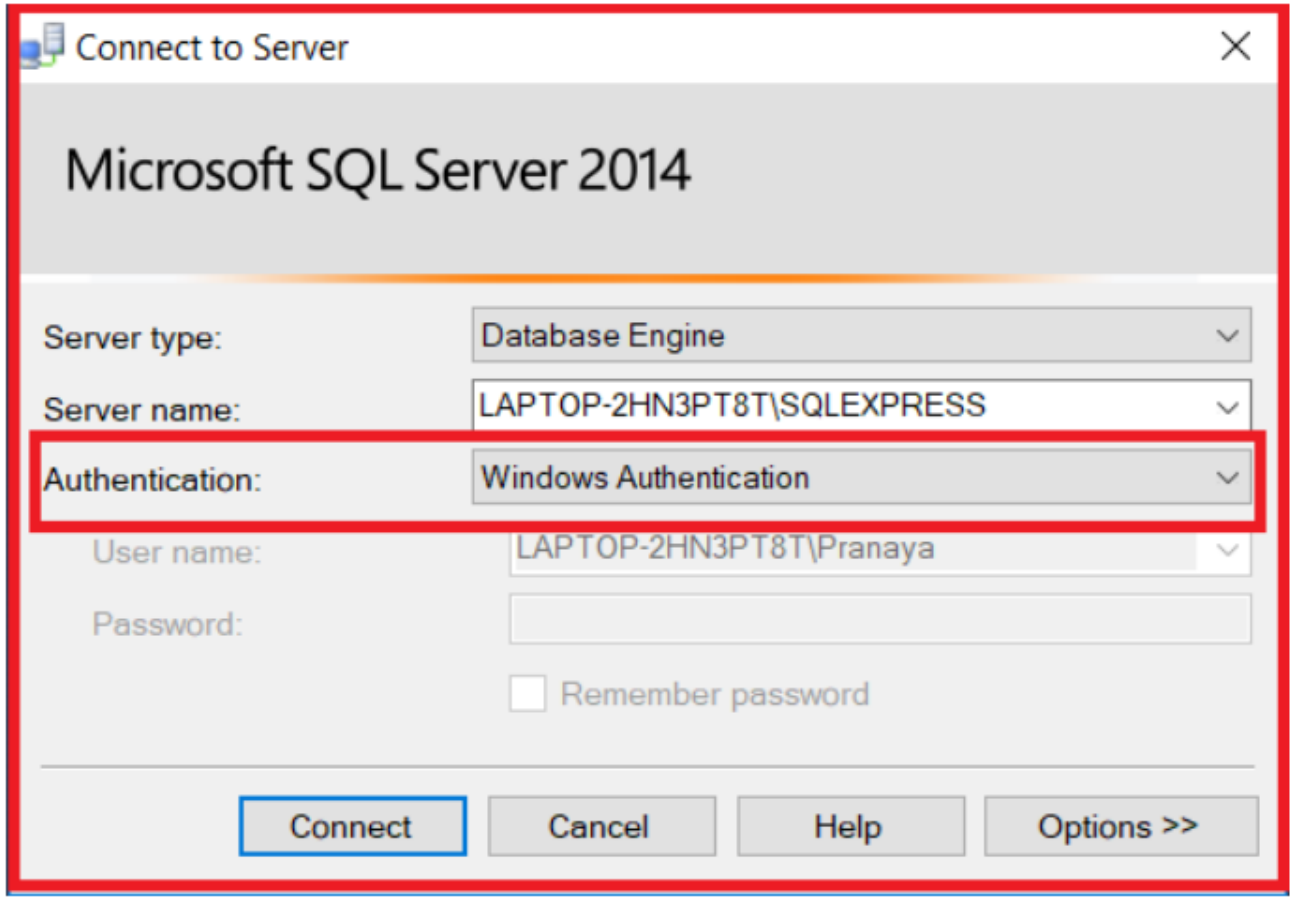
Relational Engine
The Relational Engine contains the components that determine the best way to execute a query. The relational engine is also known as the query processor.
The relational engine requests data from the storage engine based on the input query and processed the results.
Some tasks of the relational engine include querying processing, memory management, thread and task management, buffer management, and distributed query processing.

Storage Engine
The storage engine is in charge of storage and retrieval of data from the storage systems such as disks and SAN.

connect to the SQL Server using SQL Server Management Studio

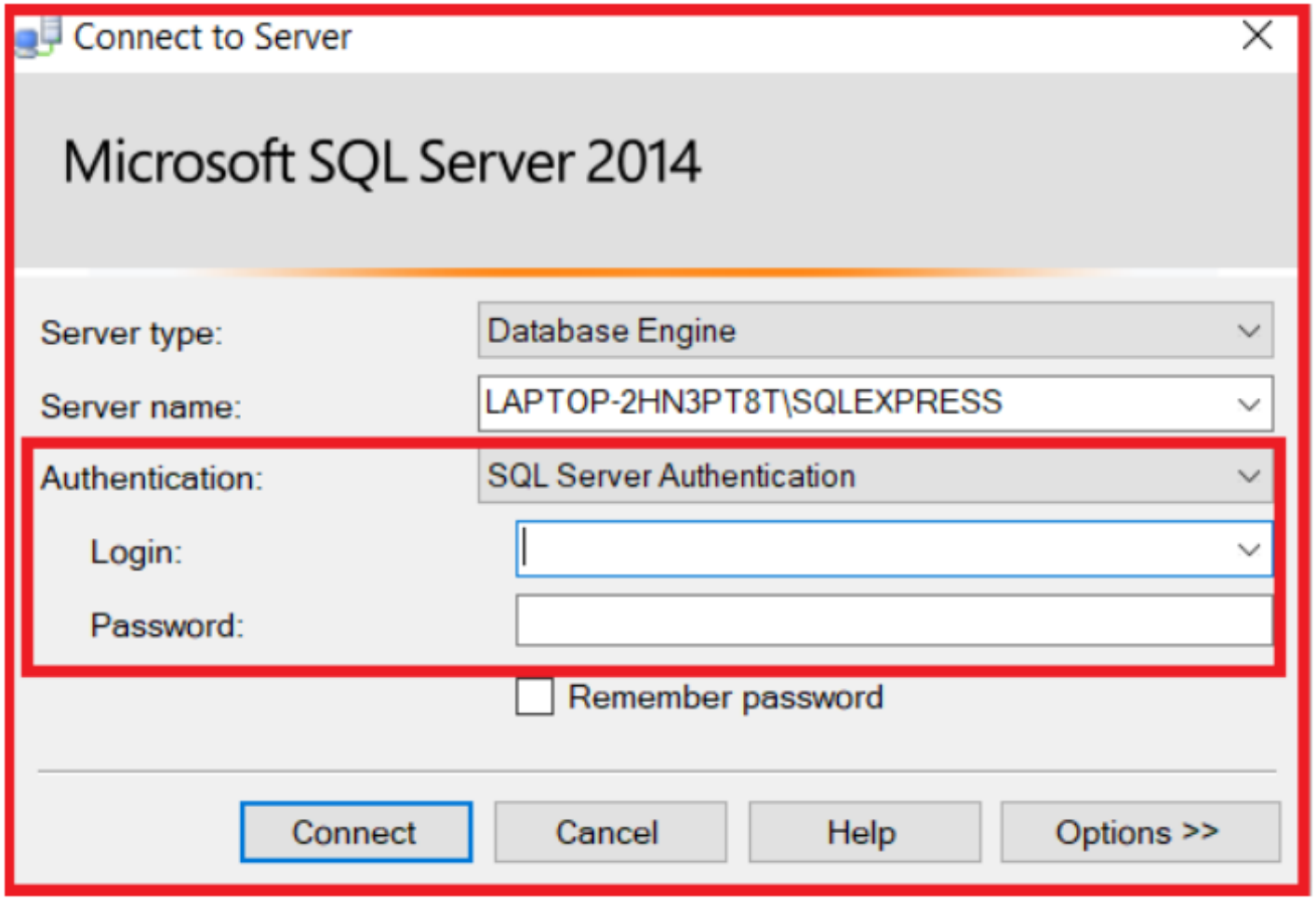
Windows Authentication:

1.It is the default authentication mode of SQL Server.
2.In Windows authentication, we will work on user admin.
3.With Windows authentication mode there is no need to enter the user credentials i.e. user Id and password because User Id and Password are generated by the Operating System by default,



SQL Server Authentication:

1.In SQL Server authentication we will work on the current user.
2.When we will work with SQL Server authentication we should enter user Id and Password (This user Id and password are created by the user at the time of SQL Server software installation).

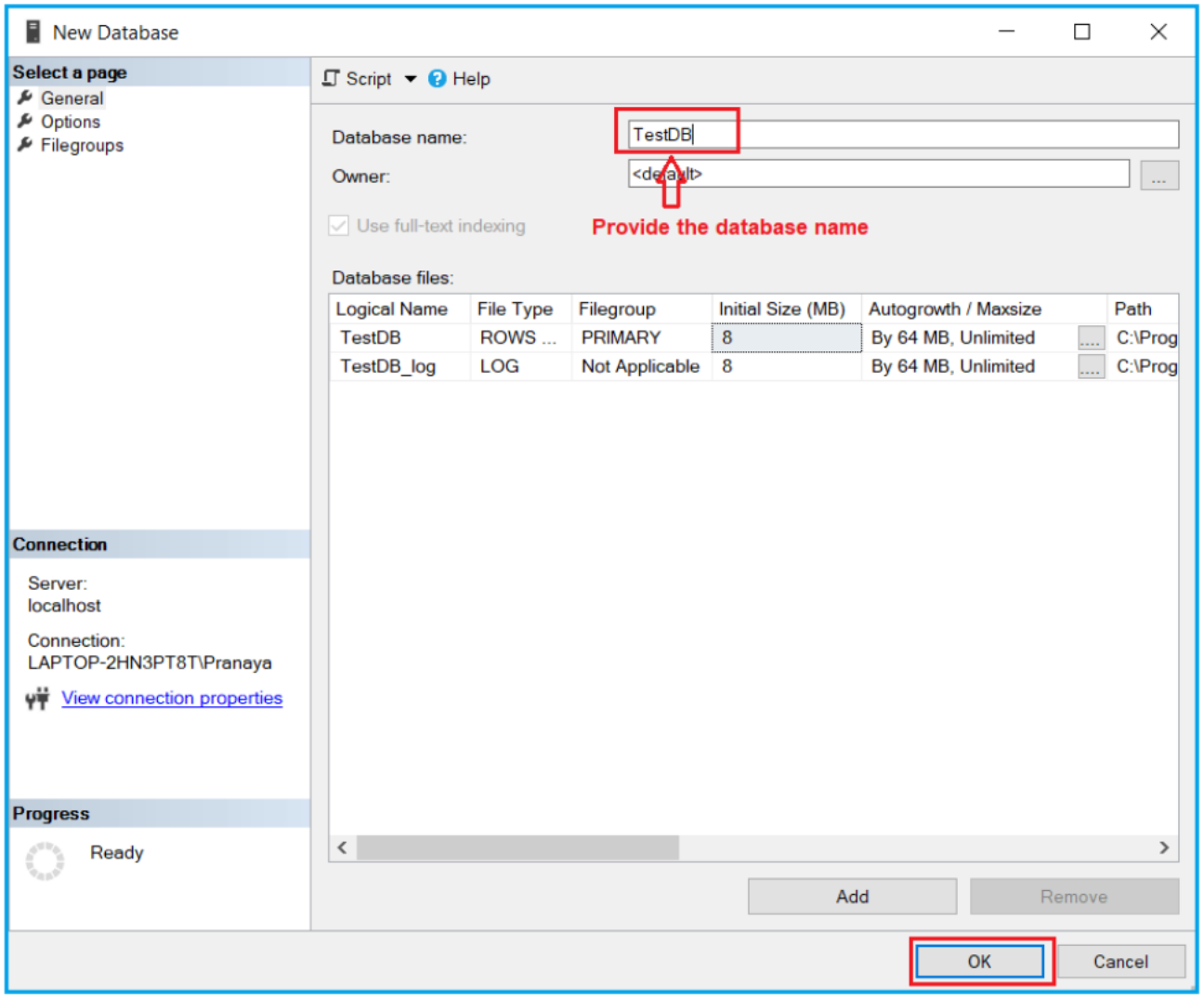


Creating SQL Server Database Graphically:

1.Right Click on the Databases folder in the Object Explorer

2.Select New Database

3.In the New Database dialog box, enter the Database name and click the OK button as shown in the below image.



How to create SQL Server Database using Query?
The syntax for creating a database in SQL Server: **Create database <Database Name>**
Example: **Create database TestDB**

Select the above query and Click on either Execute option or F5 key for execution. Whether we create a database graphically using the designer window or using a query, the following 2 files get generated.
.MDF file: Master Data File (Contains actual data). This file will store all Tables data and will be saved with an extension of .mdf (master data file)

.LDF file: Transaction Log file (Used to recover the database). This file will store transaction Query information (insert, update, delete. Create, etc) and saved with an extension of .ldf (log data file)

Note: The above two files are used for transferring the required database from one system to another system or from one location to another location. The Root Location of .mdf and .ldf files: **C:\Program Files\Microsoft SQL Server\MSSQL10.SQLEXPRESS\MSSQL\DATA**

How to Rename a database in SQL Server?

Once you create a database, then you can modify the name of the database using the Alter command as shown below.

Alter database DatabaseName Modify Name = NewDatabaseName

Alternatively, you can also use the following system-defined stored procedure to change the name.

Execute sp_renameDB 'OldDatabaseName','NewDatabaseName'

How to Delete or Drop a database in SQL Server?

in order to delete or drop a database in SQL Server, you need to use the following DROP command.

Drop Database DatabaseThatYouWantToDrop

Whenever you drop a database in SQL Server, internally it deletes the **LDF** and **MDF** files. You cannot drop a database if it is currently in use and at that time you will get an error stating – **Cannot drop database "DatabaseName" because it is currently in use**. So, if other users are connected to your database, then first you need to put the database in **single-user mode** and then drop the database. In order to put the database in single-user mode, you need to use the following command.

Alter Database DatabaseName Set SINGLE_USER With Rollback Immediate

With Rollback Immediate option, it will rollback all incomplete transactions and closes the connection to the database.

SQL Sub Languages:

SQL contains the following sublanguages

1.DDL (5 commands- create, alter, sp_rename, drop, truncate)

2.DML (3 commands- Insert, Update, Delete).

3.DQL/ DRL (1 command- select).

4.TCL (3 commands- commit, rollback, savepoint)

5.DCL (2 commands- Grant, Revoke).

Data Definition Language (DDL):

1.Data Definition Language (DDL) is used to define database objects such as tables, synonyms, views, procedures, functions, triggers, etc. that means DDL statements are used to alter/modify a database or table structure and schema

2.DDL commands are working on the structure of a table, not on the data of a table.

3.This language contains five commands. Those are (CREATE, ALTER, SP_RENAME, TRUNCATE, DROP)

Create Command in SQL Server:

The **CREATE** command is used to create a new database object in a database such as tables, views, functions, etc. In SQL Server, all database objects (tables, views, etc) are saved with an extension of "**dbo.<object name>**". The syntax to create a database is shown below.

```
CREATE TABLE student
(
studid INT,
sname VARCHAR(max),
salary DECIMAL(6, 2)
)
```

Rules for creating a table in SQL Server:

While creating a database in SQL Server, you need to follow the below rules.

1.The table name should be unique under a database.

2.The column name should be unique within the table definition.

3.A Table name should not start with numeric and special characters except the (-) underscore symbol.

4.Don’t provide space in the table name. If you want to provide space in a table name then you can use the underscore symbol.

5.A table name should contain a minimum of 1 character and a maximum of 128 characters.

6.A table should contain a minimum of 1 column and a maximum of 1024 columns.

Alter Command in SQL Server:

This command is used to change or modify the structure of a table. In SQL Server, using the ALTER command we can perform the following operations on an existing table.

1.Increase/decrease the width of a column.

2.Change the data type of a column.

3.Change the NOT NULL to NULL or NULL to NOT NULL.

4.Used to add a new column to an existing table.

5.Used to drop an existing column.

6.We can add a new constraint.

7.It can drop an existing constraint on a table.

8.Disable or re-enable check constraint of a table.

9.Changing a column name in the table.

ALTER-ALTER COLUMN:

Syntax: ALTER TABLE <TABLENAME> ALTER COLUMN <COLUMNNAME> <NEW DATA TYPE>[NEW SIZE]

Change the width of a column

```
ALTER TABLE Student ALTER COLUMN Name VARCHAR(100)
```

Changing the data type of an existing column.

```
ALTER TABLE Student ALTER COLUMN Name NVARCHAR(100)
```

Changing the column NULL to NOT NULL

```
ALTER TABLE Student ALTER COLUMN No INT NOT NULL
```

Changing NOT NULL to NULL.

```
ALTER TABLE Student ALTER COLUMN No INT NULL
```

Adding a new column to an existing table in SQL Server:

```
ALTER TABLE <TABLENAME> ADD <NEWCOLUMNNAME> <DATA TYPE>[NEW SIZE]
ALTER TABLE Student ADD Branch VARCHAR(20)
```

Deleting Column in SQL Server:

```
ALTER TABLE <TABLENAME> DROP COLUMN <COLUMNNAME>
ALTER TABLE Student DROP COLUMN Branch
```

Truncate Command and Drop Command in SQL Server:

```
TRUNCATE TABLE <TABLENAME>
DROP TABLE <OBJECT NAME>
```

What are the differences between Delete and Truncate Command in SQL Server?

Delete	Truncate
It is a DML command.	It is a DDL command
By using the delete command we can delete a specific record from the table.	But it is not possible with truncate command.
Delete supports WHERE clause.	Truncate does not support the WHERE clause
It is a temporary deletion	It is a permanent deletion
Delete supports rollback transactions for restoring the deleted data.	Truncate doesn’t support rollback transaction so that we cannot restore the deleted information
Delete command will not reset identity property.	But it will reset the identity property

What is SQL Server Data Type?

The SQL Server Data Types are the attribute that specifies what types of data entered by the user such as integer, character, decimal, date time, etc. In SQL Server Database, each column of a table, all the local variables, and parameters must have a data type. The SQL Server supports the following data types

1.Integer data types
2.Decimal data types
3.Money / currency data types
4.Date and Time data types
5.Character data types
6.Binary data types
7.Special data types

SQL Server Date and Time data types:

Date and Time data types are used to store a particular date and time information. These are applying on the date of joining, date of birth, hire date, order date columns, etc. Date and time data types again classified into 3 types, such as

1.Date: This data type will accept date format information only. The default format of the date data type is '**YYYY/MM/DD**'

2.Time: It allows time format information only. The default format of the time data type is '**hh:mm:ss.ms**'

3.DateTime: It allows date and time format information. The default format of DateTime data type is '**YYYY/MM/DD hh:mm: ss.ms**'.

What is Primary Key in SQL Server?

The **Primary Key in SQL Server** is the combination of **Unique** and **Not Null** Constraint**.** That means it will not allow either **NULL** or **Duplicate** values into a column or columns on which the primary key constraint is applied. Using the primary key we can enforce entity integrity i.e. using the primary key value we should uniquely identify a record.

A table should contain only 1 Primary Key which can be either on a single or multiple columns i.e. the composite primary key. A table should have a primary key to uniquely identify each record. The Primary Key constraint can be applied to any data type like integer, character, decimal, money, etc.

```
CREATE TABLE Branches
(
Bcode INT PRIMARY KEY,
Bname VARCHAR(40),
Bloc CHAR(40) PRIMARY KEY
)
```

When do we need to choose Primary Key?

When we need the following features on a column, then we need to make that column as the Primary Key

1.NULLs should not be allowed.

2.It should be unique

3.It can not be modified.

What are the differences between the primary key and unique key in SQL Server?

As we already discussed both unique key and Primary Key handles the uniqueness of a column on which they are applied. But the difference is that by default in SQL Server the primary key creates a unique clustered index whereas the unique key creates a unique non-clustered index on the column. Another difference between them is that the primary key column doesn't allow NULL values whereas the unique key column allows only one NULL value.

What is a Foreign Key Constraint in SQL Server?

One of the most important concepts in a database is, creating the relationship between the database tables. This relationship provides a mechanism for linking the data stores in multiple tables and retrieving them in an efficient manner.

In order to create a link between two tables, we must specify a Foreign Key in one table that references a column in another table. That means Foreign Key constraint is used for binding two tables with each other and then verify the existence of one table data in other tables.

A foreign key in one TABLE points to a primary key or unique key in another table. The foreign key constraints are used to enforce referential integrity.

How to Create Foreign Key Constraint in SQL Server?

To Create a Foreign Key Constraint in SQL Server we require the following things

1.We require two tables for binding with each other and those two tables must have a common column for linking the tables.

2.The common column that is present in both the tables need not have the same name but their data type must be the same.

3.The common column that is present under the parent table or master table is known as the reference key column and moreover, the reference key column should not contain any duplicate values. So we need to impose either UNIQUE or PRIMARY key constraint on that column.

4.If we impose the primary key constraint on the reference key column that column will also be the identity column of the table.

5.The common column which is present in the child or detailed table is known as the Foreign key column and we need to impose a Foreign key constraint on the column which refers to the reference key column of the master table.

The general formula is

Alter table ForeignKeyTable add constraint ForeignKeyTable_ForiegnKeyColumn_FK FOREIGN KEY (ForiegnKeyColumn) references PrimaryKeyTable (PrimaryKeyColumn)

Primary Key and Foreign key relationship between Multiple Tables in SQL Server

Creating the Customer Table

```
CREATE TABLE Customer
(
Cid INT PRIMARY KEY,
Cname VARCHAR(40),
Cmobno CHAR(10)
)

INSERT INTO Customer VALUES (1, 'AA', '9853977973')
INSERT INTO Customer VALUES (2, 'BB', '8895558077')
INSERT INTO Customer VALUES (3, 'CC', '7021801173’)
```

Creating the Products table

```
CREATE TABLE Products
(
Pcode INT PRIMARY KEY,
Pname VARCHAR(20),
Price MONEY
)

INSERT INTO Products VALUES (10,'C',500)
INSERT INTO Products VALUES (20,'C++',1000)
INSERT INTO Products VALUES (30,'.NET',3500)
INSERT INTO Products VALUES (40,'SQL',1800)
```

Creating The Orders Table

```
CREATE TABLE Orders
(
Odid INT PRIMARY KEY,
Ordate DATE,
Quantity INT,
Cid INT FOREIGN KEY REFERENCES Customer(Cid),
Pcode INT FOREIGN KEY REFERENCES Products(Pcode)
)

INSERT INTO Orders VALUES (101,'2017/12/20',9,1,10)
INSERT INTO Orders VALUES (102,'2017/12/20',10,2,10)
INSERT INTO Orders VALUES (103,'2017/12/21',6,3,20)
INSERT INTO Orders VALUES (104,'2017/12/22',11,1,40)
INSERT INTO Orders VALUES (105,'2017/12/23',8,1,30)
```

How to add Constraint to an existing table?

ALTER TABLE<TABLE NAME>ADD CONSTRAINT<KEY VARIABLE NAME><CONSTRAINT KEY> (COLUM NAME)

ALTER TABLE EMP ADD CONSTRAINT X PRIMARY KEY (EMPID)

ALTER TABLE EMP ADD CONSTRAINT Y UNIQUE (ENAME)

Now we can make the EID column of the DEP table ass FOREIGN KEY because the EID column is the primary key in the EMP column.

ALTER TABLE DEP ADD CONSTRAINT Q FOREIGN KEY (EID) REFERENCES EMP(EMPID)

How to remove constraints from an existing table?

ALTER TABLE<TABLENAME> DROP CONSTRAINT<KEY VARIABLE NAME>

ALTER TABLE EMP DROP CONSTRAINT Y
ALTER TABLE EMP DROP CONSTRAINT Z

What are clauses and their need in SQL Server?

If you want to provide the SQL Query with some additional functionalities such as filtering the records, sorting the records, fetching the records, and grouping the records then you need to use the SQL Server Clauses along with the SQL Query. So, in simple words, we can say that SQL Server clauses are used to provide some additional functionalities.

1. Where (Filtering the records in a table)
2. Order by clause (sorting the records in ascending or descending order)
3. Top n clause (Fetching top n records)
4. Group by clause (Grouping a set of rows)
5. Having Clause (Filtering the data like where clause)

```
SELECT * FROM Employee WHERE CITY = ‘MUMBAI’;

SELECT * FROM Employee WHERE GenderID = 1 AND Salary >= 27000;
SELECT * FROM Employee WHERE GenderID = 1 AND Salary >= 27000;
SELECT * FROM Employee WHERE (CITY = ‘MUMBAI’ AND GenderID = 1) OR (DepartmentID = 3);
```