National University of Computer and Emerging Sciences

Lab Manual 2

"Introduction to MS SQL Server, DML and DDL"

Database Systems Lab

Spring 2023

Department of Computer Science
FAST-NU, Lahore, Pakistan

Table of Contents

1. Objective

The purpose of this lab is to introduce students to Microsoft SQL server environment and getting started with Data definition queries and Data modification queries.

2. Prerequisites

You should know the concepts of Primary key, foreign key and how to identify these constraints from the given schema. You have to read the manual before coming to lab.

3. Task Distribution

Total Time	170 Minutes
Introduction to MSSQL	20 Minutes
DDL	30 Minutes
DML	30 Minutes
Exercise	90 Minutes
Evaluation	--

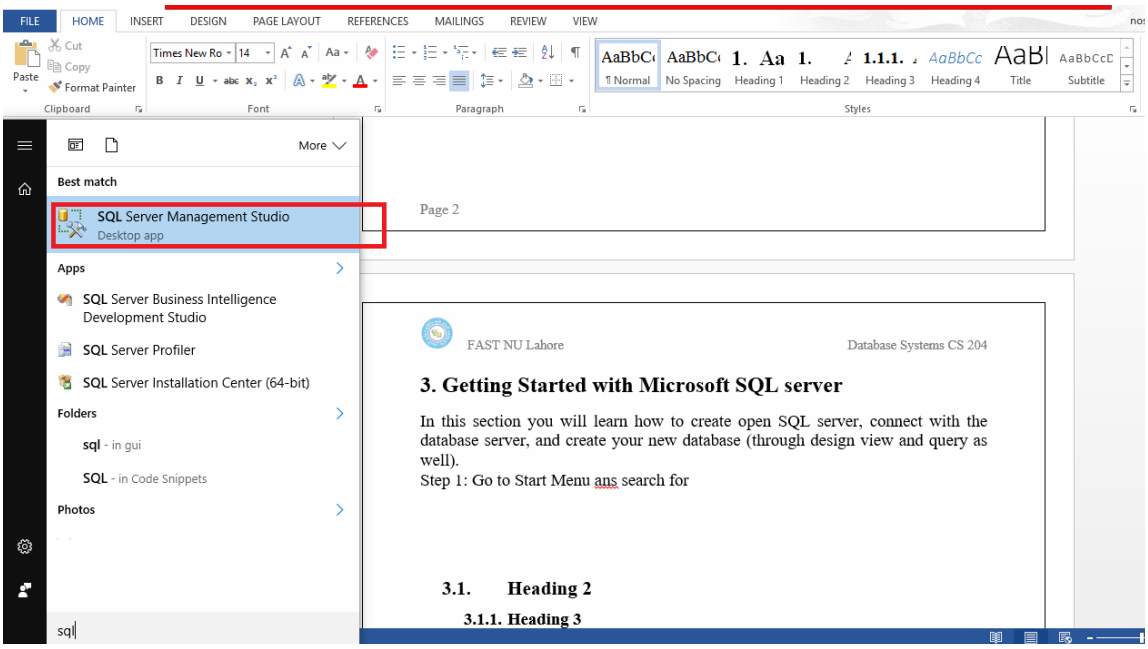
4.

Getting Started with Microsoft SQL server

In this section you will learn how to create open SQL server, connect with the database server, and create your new database (through design view and query as well).

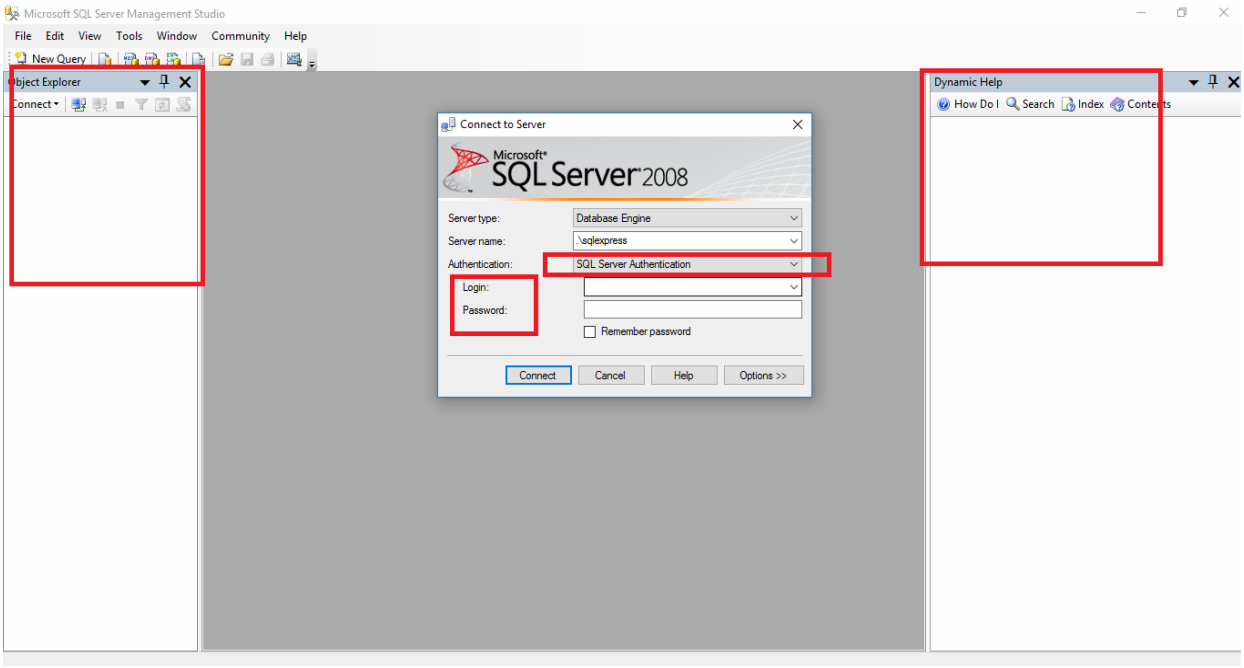
Step 1: Open SQL server management Studio

Go to Start Menu and search for SQL Server Management Studio, open it



Step 2: Connect to Server

One the left side you have object Explorer which you will use to explore all your databases and any object you create such as tables, on right there is Dynamic Help.
In the middle you can see Connect to server dialogue box.
Select SQL Server Authentication from Authentication Drop down
Ask for login and password from your lab instructor and press Connect
(refer to following figure)

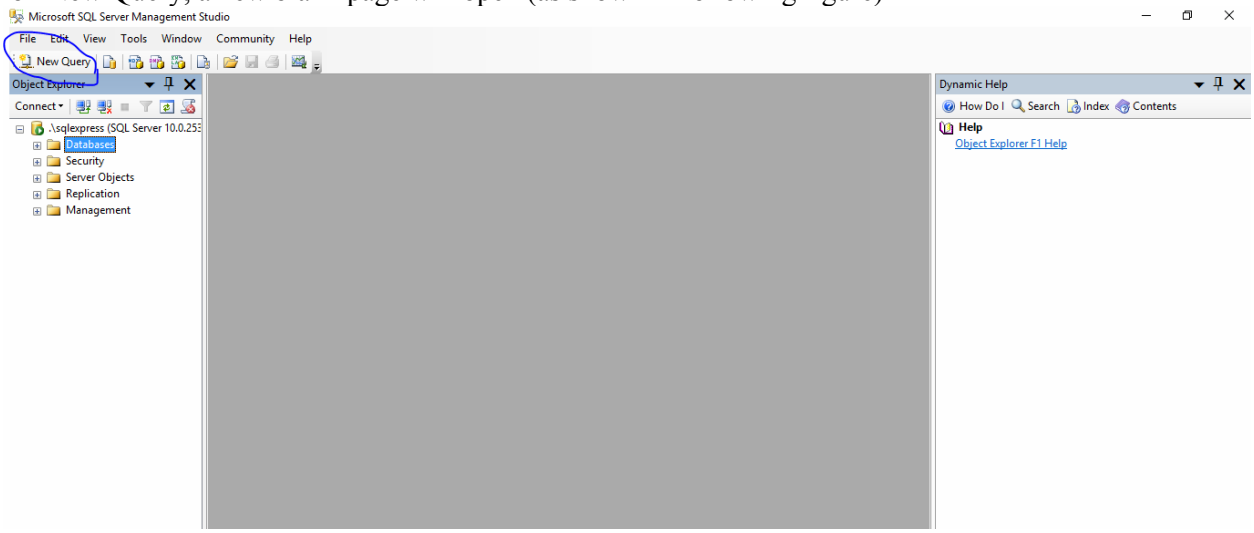


Step 3: Create your own Database

There are two ways to create a new data base

- Through Query

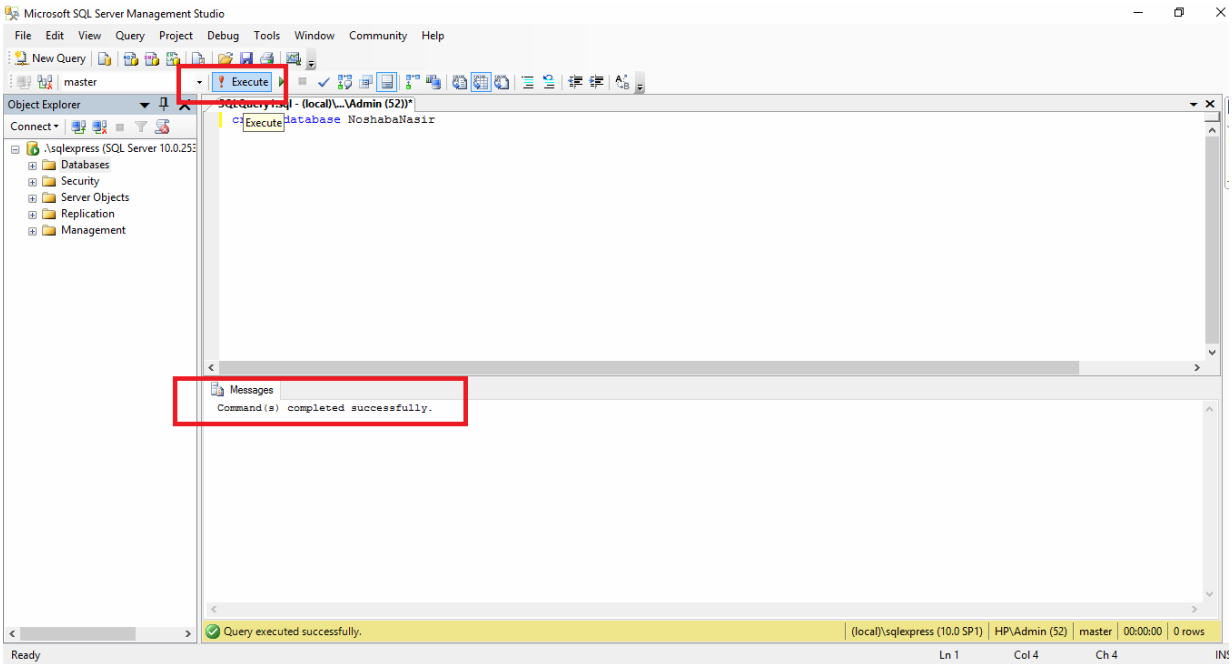
>>Click on New Query, a new blank page will open (as shown in following figure)



>>Write the following query on this page

```
create database <nameofyouDatabase>
```

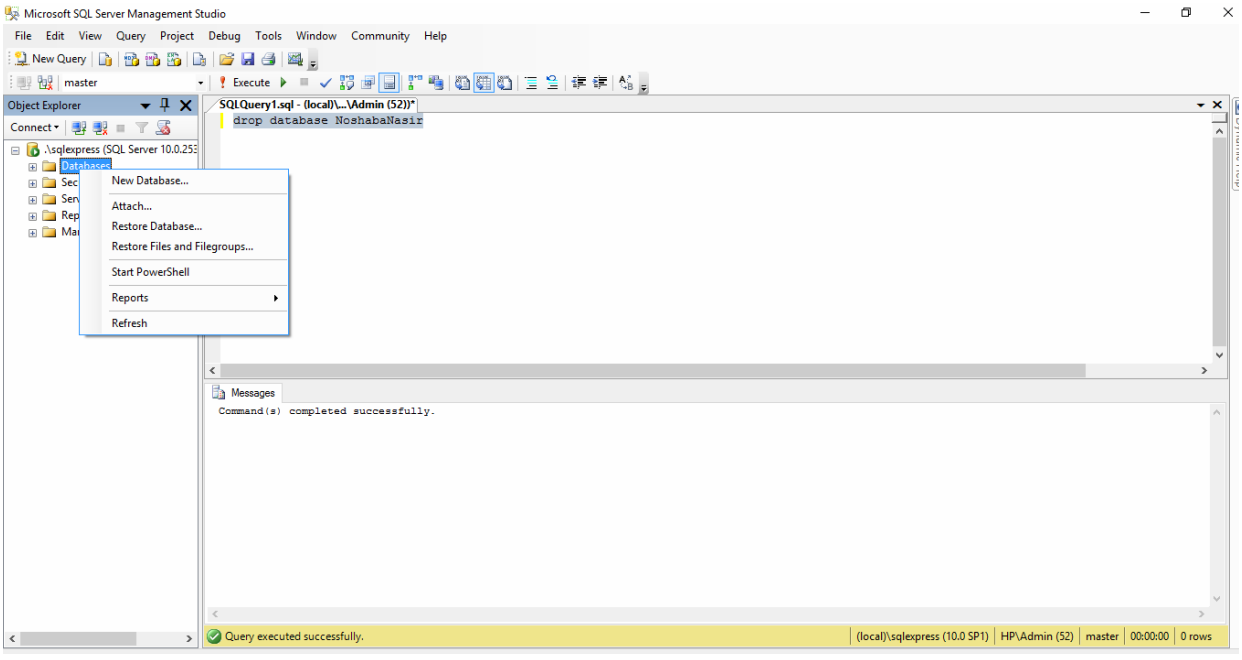
>>Hit Execute button shown on top, Command completed successfully shows that you database has been created. (As shown in following figure)

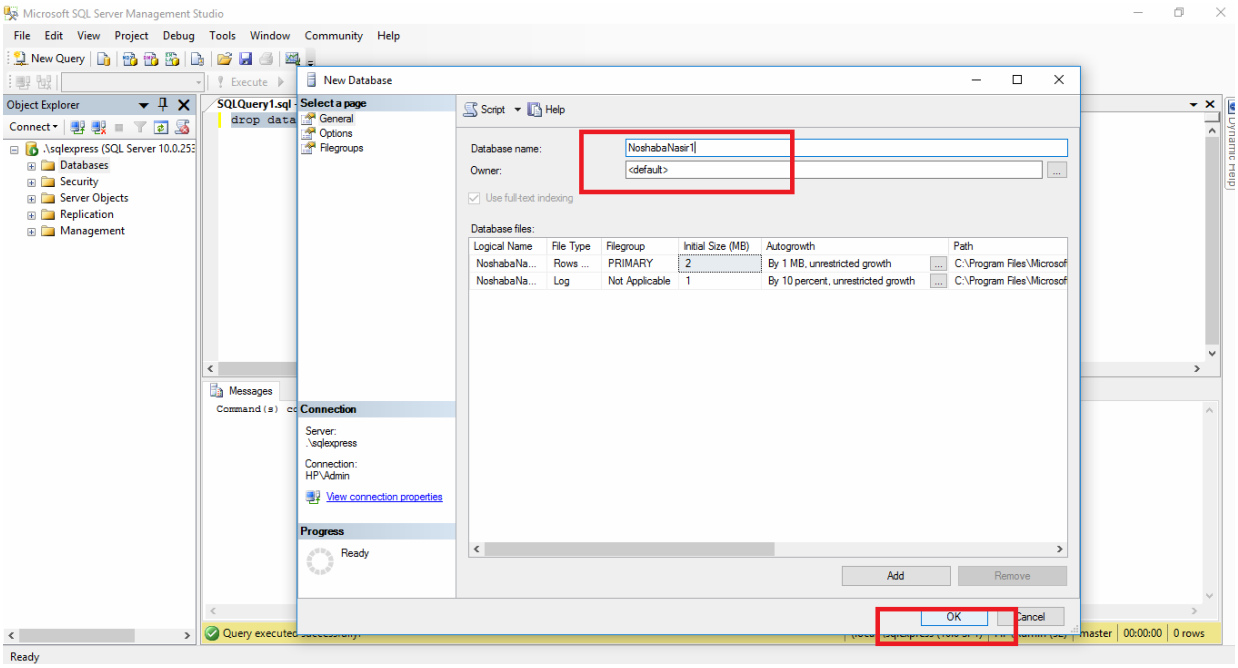


>>If you want to delete your database write the following query and Execute, make sure that the command is executed successfully.

```
drop database <DatabaseName>
```

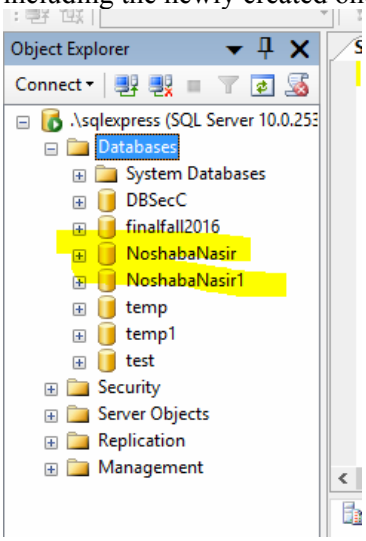
You can also create new database by Left click on Database from object Explorer and select new Database, give it a name and press ok (as shown in following figures).



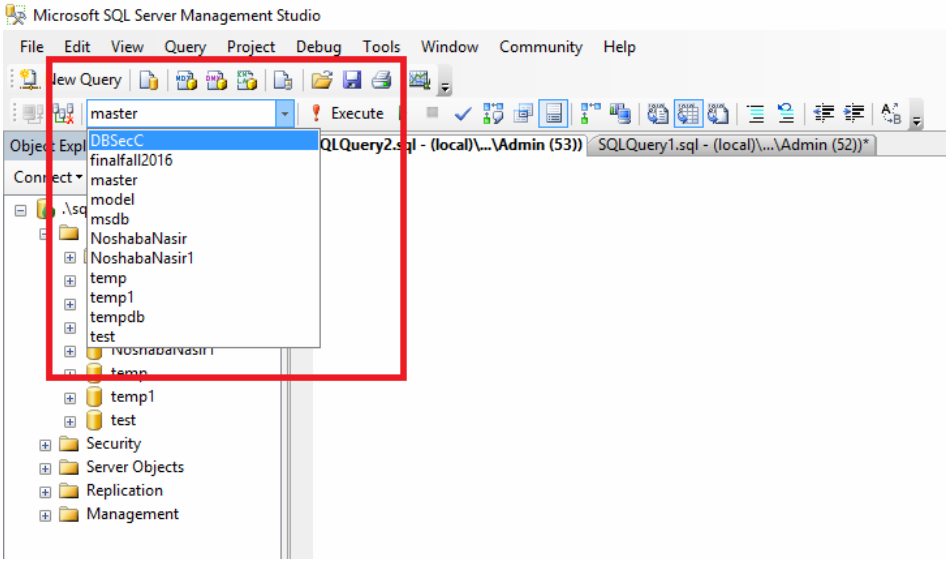

Microsoft SQL Server Management Studio
File Edit View Project Debug Tools Window Community Help
New Query
Execute
Object Explorer
Connect
.\sqlexpress (SQL Server 10.0.253
Databases
Security
Server Objects
Replication
Management
SQLQuery1.sql
drop data
Messages
Command(s) co
New Database
Select a page
General
Options
Filegroups
Script
Help
Database name:
NoshabaNasir1
Owner:
<default>
Use full-text indexing
Database files:
Logical Name
File Type
Filegroup
Initial Size (MB)
Autogrowth
Path
NoshabaNa...
Rows ...
PRIMARY
2
By 1 MB, unrestricted growth
C:\Program Files\Microsof
NoshabaNa...
Log
Not Applicable
1
By 10 percent, unrestricted growth
C:\Program Files\Microsof
Connection
Server:
.\sqlexpress
Connection:
HP\Admin
View connection properties
Progress
Ready
Add
Remove
OK
Cancel
Query executed
master
00:00:00
0 rows
Ready

Step 4: View and use your database

If you expand the Database from object explorer, you can see all of the databases that exist of the server, including the newly created ones (as shown in following figure).



To use your database, make sure to select your database from drop down menu (as shown in following figure).



Or you can use the following query to use your database.

Use <databaseName>

5. Data Definition Language:

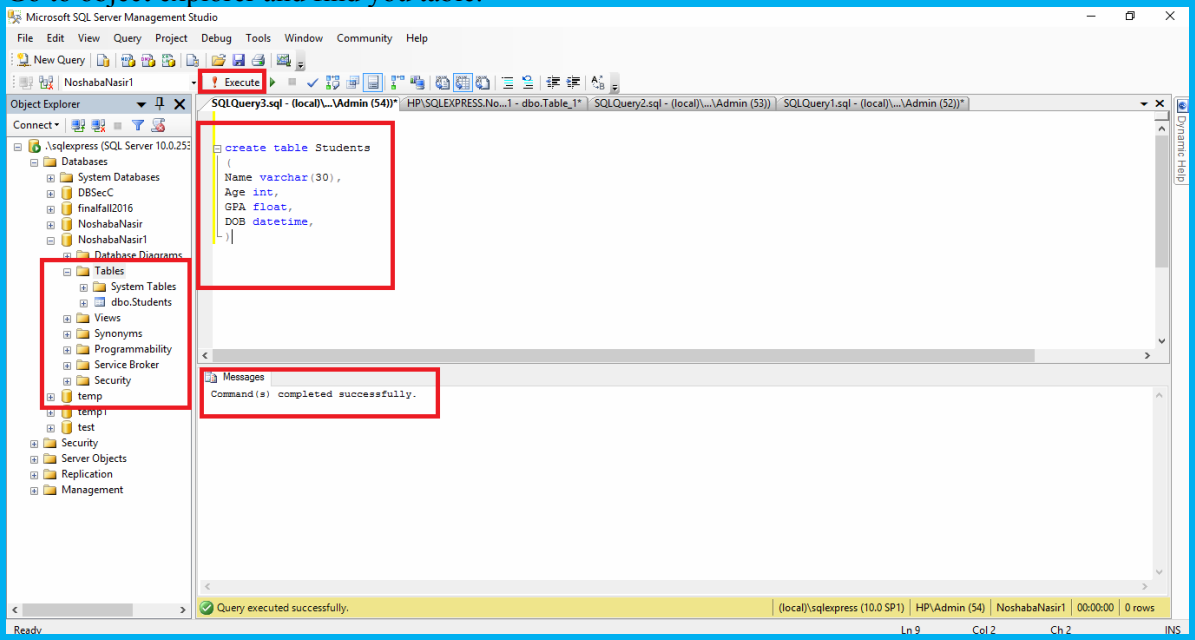
Also called DDL includes creating objects such as tables, adding constraints of tables, such as FK PK unique constraints, in this section you will learn how to create tables and add PK, FK constraints using Queries.

Step 1: Create table:

Following is the syntax of table creating query

```
create table [tablename]
(
[Column1Name] datatype null/Not null,
[Column2Name] datatype null/not null,
[Column2Name] datatype null/not null
)
*null is default
```

Create the table Students using the query as shown in following figure, Execute, make sure the message shows that the command is successful.
Go to object explorer and find you table.



Step 2: Altering table Schema

Adding new column to existing table

```
alter table <TableName> add <NewColumn> <Datatype>
```

Try this query

```
alter table Students add Address varchar(50)
```

Drop existing Column from existing table

```
alter table <TableName> drop column <ColumnName>
```

Try this query

```
alter table Students drop column [Address]
```

Step 3: Add Primary key Constraint.

One way to create Primary key is to add it whilst creating table using the following syntax

```
create table [tablename]
(
[Column1Name] datatype primary key,
[Column2Name] datatype,
[Column2Name] datatype
)
```

OR if there is composite key

```
create table [tablename]
(
[Column1Name] datatype,
[Column2Name] datatype,
[Column2Name] datatype,
Primary key ([Column1Name], [Column2Name])
)
```

Try the following query, see in object explorer

```
create table Students1
(
RollNo int not null primary key,
Name varchar(30),
Age int,
GPA float,
DOB datetime,
)
```

Primary key should be not null

Try the following query, see in object explorer

```
create table Students2
(
batchNo int,
serialNo int,
Name varchar(30),
Age int,
GPA float,
DOB datetime,
Primary key (batchNo, serialNo)
)
```

Other way is to add Primary key constraint after creating the table, by using ALTER query,

```
alter table [tableName] add constraint [keyContraintName] Primary key
(Column1, column2, column3)
```

Try the following, PK columns should be not null

```
create table Students3
(
RollNo int not null primary key,
Name varchar(30),
Age int,
GPA float,
DOB datetime,
)

alter table Students3 add constraint Primarykey Primary key (RollNo)
```

How to see the schema of your table

Try this to see the schema of your table

```
sp_help <tableName>
```

This will give you information about colums, their datatype and all the constraints on the table.

Step 4: Add foreign key constraint to tables

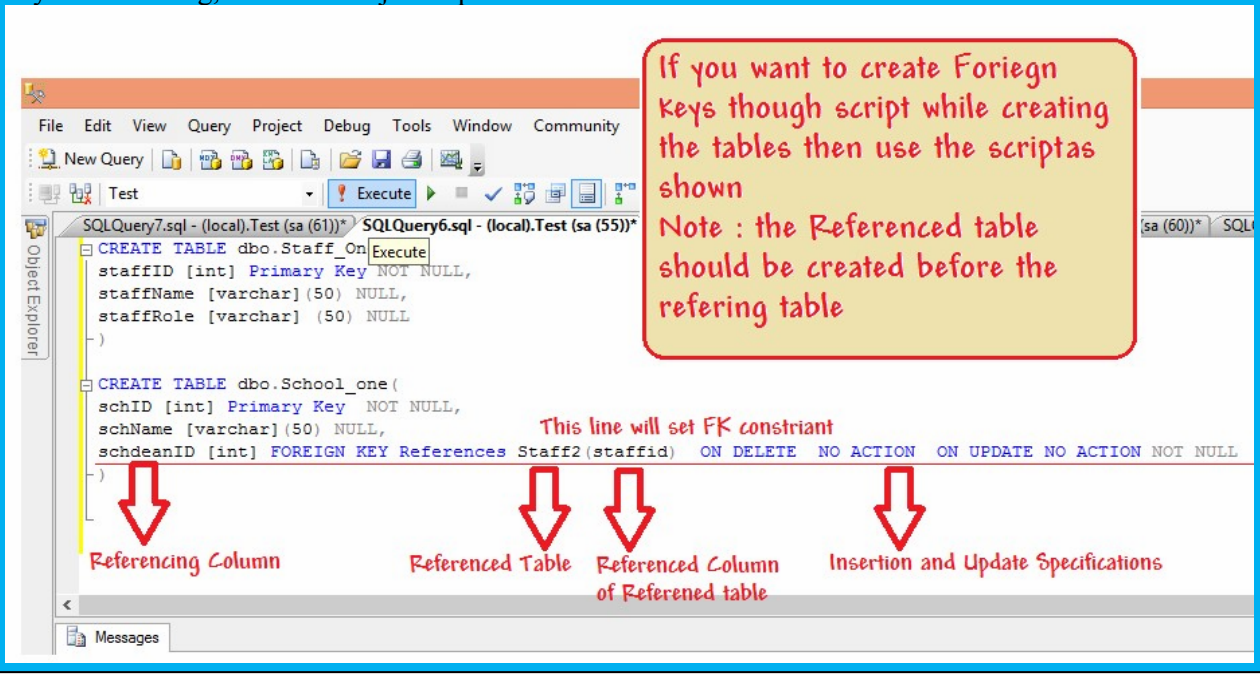
Before creating FK constraint Make sure that the referred table and its referred columns are created.

Add FK whilst creating table.

Use the following syntax as given.

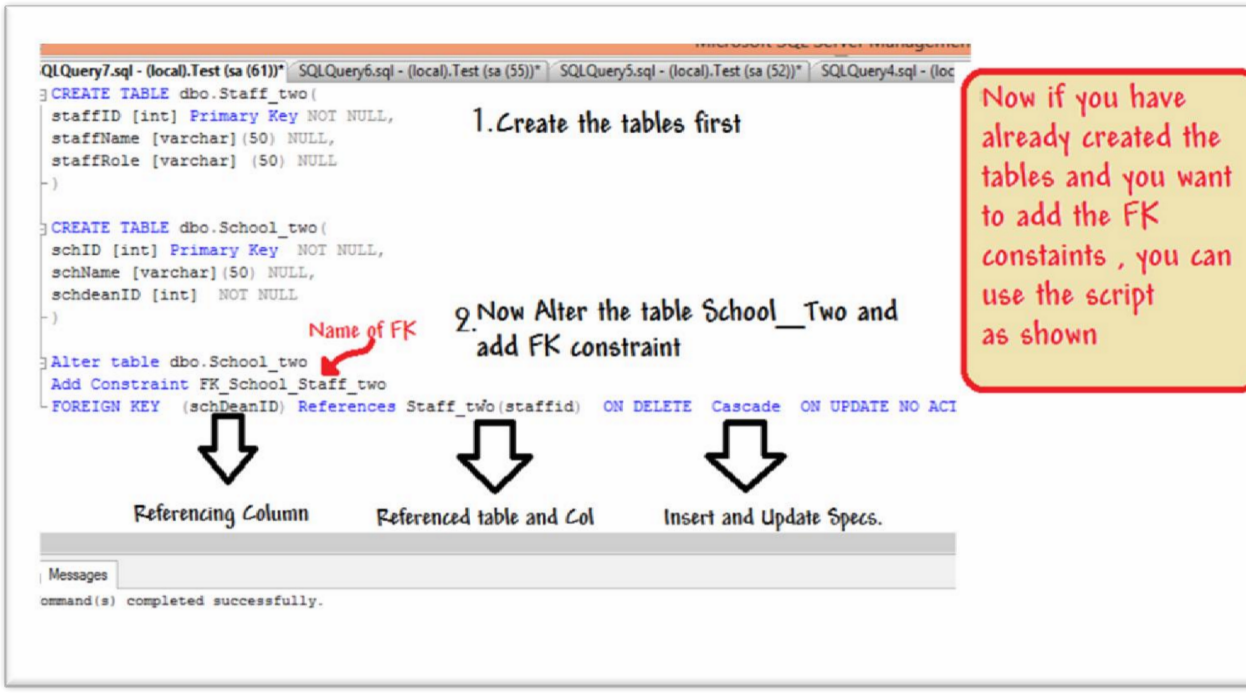
```
create table [tablename]
(
[Column1Name] datatype Null/Not Null,
[Column2Name] datatype Null/Not Null,
[ReferencingColumn] datatype Null/Not Null
FOREIGN KEY REFERNCES referedtable(referedColum)
ON DELETE NO ACTION/CASCADE/SET NULL/SET DEFAULT
ON UPDATE NO ACTION/CASCADE/SET NULL/SET DEFAULT
)
*no action is default
```

Try the following, and see in object explorer.



FK can also be added after the referencing and referred tables have been created.

Try the following and see in object explorer



6. Data Modification Language

Step 1: Insert rows into table

Syntax

```
-- let there be N columns in a table
INSERT INTO <tableName>
values
(Column1Value,Column2Value, Column3Value,….,ColumnNValue), --row 1
(Column1Value,Column2Value, Column3Value,….,ColumnNValue), --row2
(Column1Value,Column2Value, Column3Value,….,ColumnNValue) -row 3
```

Or

```
INSERT INTO <tableName> (ColumnX,ColumnY) -- List of Columns
values
(ColumnXValue,ColumnYValue), --Row 1 list of Corrrespong column values
(ColumnXValue,ColumnYValue), --Row 2
(ColumnXValue,ColumnYValue) -Row 3
```

Try the following

```
INSERT INTO [Students1] ([RollNo],[Name],[Age],[GPA],[DOB])
VALUES      (13,'Ahmed','20',2.4,'1/1/1990')
GO
```

Try the following

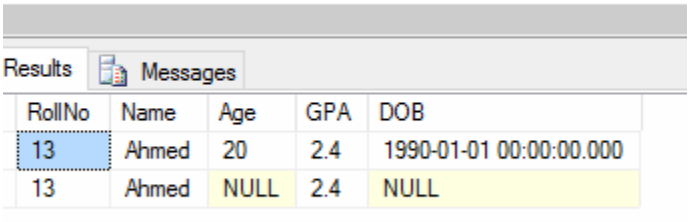
```
INSERT INTO [Students1] ([RollNo],[Name],[GPA])
VALUES      (13,'Ahmed',2.4)
GO
```

Step 2: To see the data from you table use the following table

```
Select * from tableName
```

Try the following and see the results

```
Select * from Students1
```



Results | Messages

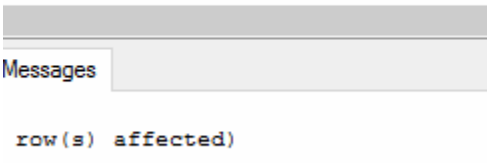
RollNo	Name	Age	GPA	DOB
13	Ahmed	20	2.4	1990-01-01 00:00:00.000
13	Ahmed	NULL	2.4	NULL

Step 3: Delete rows from the table

```
Delete from <tableName>
Where <conditions>
```

Try the following and see the message and data in table using select query

```
Delete from Students1
Where Age=20
```



Messages

```
row(s) affected)
```

Step 4: Delete all the data from the table

```
Delete from <tableName>  --as there is no
where condition all rows will be deleted
```

Or

```
Truncate table <tableName>
```

Try these two commands after adding some rows to the table and see the results.

Step 5: Updating the rows

```
Update tableName
set ColumnA=<NewValue>,
ColumnB=<NewValue>,
where <Conditions>
```

See the data in table before and after trying the following query

```
Update Students1
set Name='Ali Ahmed'
where Name='Ahmed'
```

Appendix

Comments in SQL

Comments in SQL server start with two dashes as shown below, in green color

```
--This query create student table
CREATE TABLE students
(
id INT,
fullName varchar(40)
)
```

Data Types

Exact Numerics

bigint	numeric
bit	smallint
decimal	smallmoney
int	tinyint
money	

Approximate Numerics

float	real

Date and Time

date	datetimeoffset
datetime2	smalldatetime
datetime	time

Character Strings

char	varchar
text	

Unicode Character Strings

nchar	nvarchar
ntext	

Binary Strings

binary	varbinary
image	

Where Conditions

Or
And
Not
In

Sub queries

In
All
Any
Some
Exists

How to see all the tables in your database:

```
SELECT * FROM INFORMATION_SCHEMA.TABLES;
```

Or

```
select * from sys.tables;
```

or

```
SELECT * FROM sysobjects WHERE xtype='U';
```

How to see details of certain table

```
sp_help tableName
```