(T16)討論 LinqToSql 的 CRUD(Create、Read、Update、Delete)
CourseGUID: 5ba9a6fe-7475-4b0c-8b99-bbcf7f5e2e1c
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# 0. Summary

1.
1.1.
Language Integrated 整體 Query (LINQ) is a component between the LINQ query and the actual data source which includes SQL Server, XML documents, Objects in memory etc.
E.g. Linq to SQL provider can convert a Linq query to TSQL.
1.2.
LINQ query can be written by any .NET supported programming language, and it provides compile time error checking.

2.
Linq to Sql
Reference:
https://docs.microsoft.com/en-us/dotnet/framework/data/adonet/sql/linq/
LINQ to SQL is an ORM (Object Relational Mapping) framework in .NET Framework
that provides a run-time infrastructure
for managing relational data as strongly typed .Net objects.
The Linq to Sql provider can convert Linq query to TSql for Sql Server Database.
Linq to Sql supports Transactions, Views, and Stored Procedures.
Because Linq to Sql use strongly typed .Net objects,
it has intellisense support, compile time error checking and debugging support

3.
Linq to Sql

```
.Net Application
 |                          ↑
 |                          |
```

```
  ↓                                    |
from gamer in dbContext.Gamers              gamer objects
where gamer.Gender == "Female"               ↑
orderby gamer.Score descending               |
select gamer;                           |
  |                                  |
  |                                  |
  ↓
```

**Linq to Sql Provider**

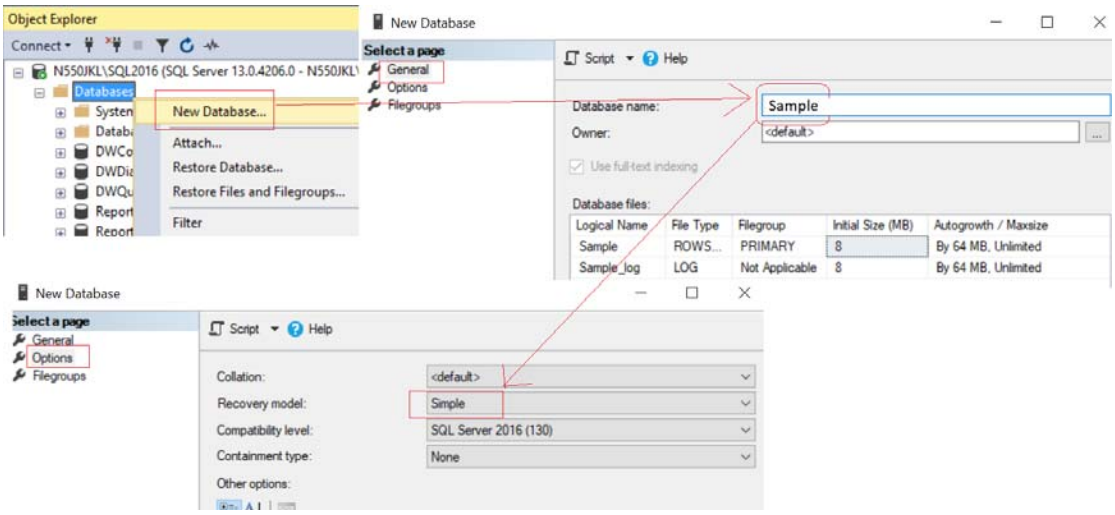
```
  |                                  ↑
  |                                  |
  ↓                                  |
exec sp_executesql N'SELECT [T0].[Id]        Matching data rows
[T0].[Name]                             are returned
[T0].[Gender]                                ↑
[T0].[Score]                            |
[T0].[Team]                             |
FROM [dbo].[Gamer]  AS [t0]                  |
WHERE [t0].[Gender]=@p0                      |
ORDER BY [t0].[Score DESC']',N'@p0=N'Male'   |
  |                                  |
  |                                  |
  ↓                                  |
```

**MS Sql Server**

# 1. Web Form Application - Linq Query

## 1.1. TSQL

Database --> Right Click --> New Database -->
Database Name : Sample
Options --> Recovery Model : Simple




--Create an Sample DataBase and Run the following TSQL

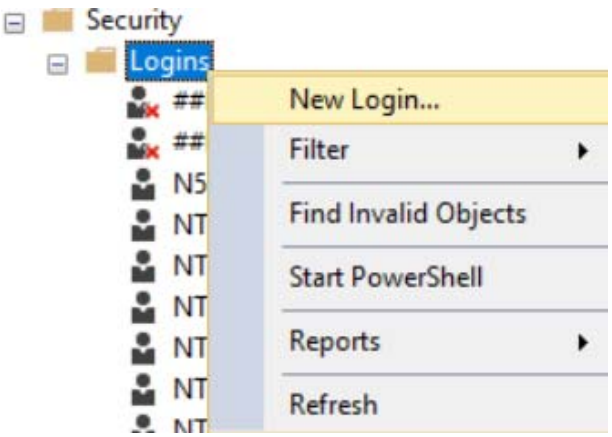
```
/*
1.
```

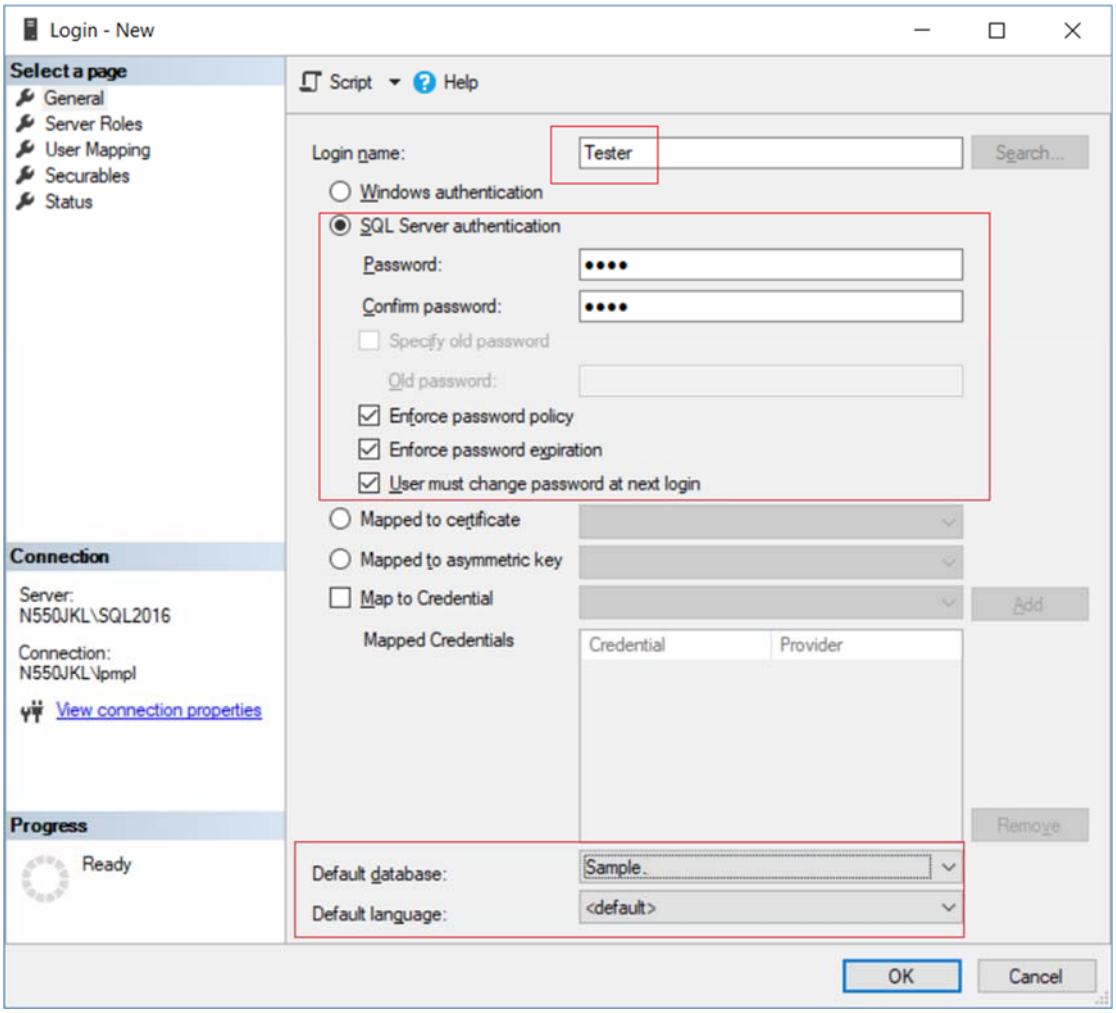
```
One Team can have many Gamers
One Gamer can have One Team.
This is One to Many Relationship.
2.
Team Id==4 has no Gamer.
Gamer Id==7 has no Team.
*/
--Drop Table if it exists.
--IF OBJECT_ID('Gamer') IS NOT NULL
IF ( EXISTS ( SELECT    *
              FROM      INFORMATION_SCHEMA.TABLES
              WHERE     TABLE_NAME = 'Gamer' ) )
    BEGIN
        TRUNCATE TABLE Gamer;
        DROP TABLE Gamer;
    END;
GO -- Run the previous command and begins new batch
--Drop Table if it exists.
--IF OBJECT_ID('Team') IS NOT NULL
IF ( EXISTS ( SELECT    *
              FROM      INFORMATION_SCHEMA.TABLES
              WHERE     TABLE_NAME = 'Team' ) )
    BEGIN
        TRUNCATE TABLE Team;
        DROP TABLE Team;
    END;
GO -- Run the previous command and begins new batch
--Create Tables
CREATE TABLE Team
    (
      Id INT PRIMARY KEY
             IDENTITY ,
      Name NVARCHAR(100) ,
      Type NVARCHAR(100)
    );
GO -- Run the previous command and begins new batch
CREATE TABLE Gamer
    (
      Id INT PRIMARY KEY
             IDENTITY ,
      Name NVARCHAR(50) ,
      Gender NVARCHAR(50) ,
      Score INT ,
      Type  NVARCHAR(50) ,
      TeamId INT FOREIGN KEY REFERENCES Team ( Id )
    );
GO -- Run the previous command and begins new batch
--Insert Data
INSERT  INTO Team
VALUES  ( 'Team1_Guardian', 'Guardian' );
INSERT  INTO Team
VALUES  ( 'Team2_Assassinator', 'Assassinator' );
INSERT  INTO Team
VALUES  ( 'Team3_Soldier', 'Soldier' );
INSERT  INTO Team
VALUES  ( 'Team4_Civilian', 'Civilian' );
```

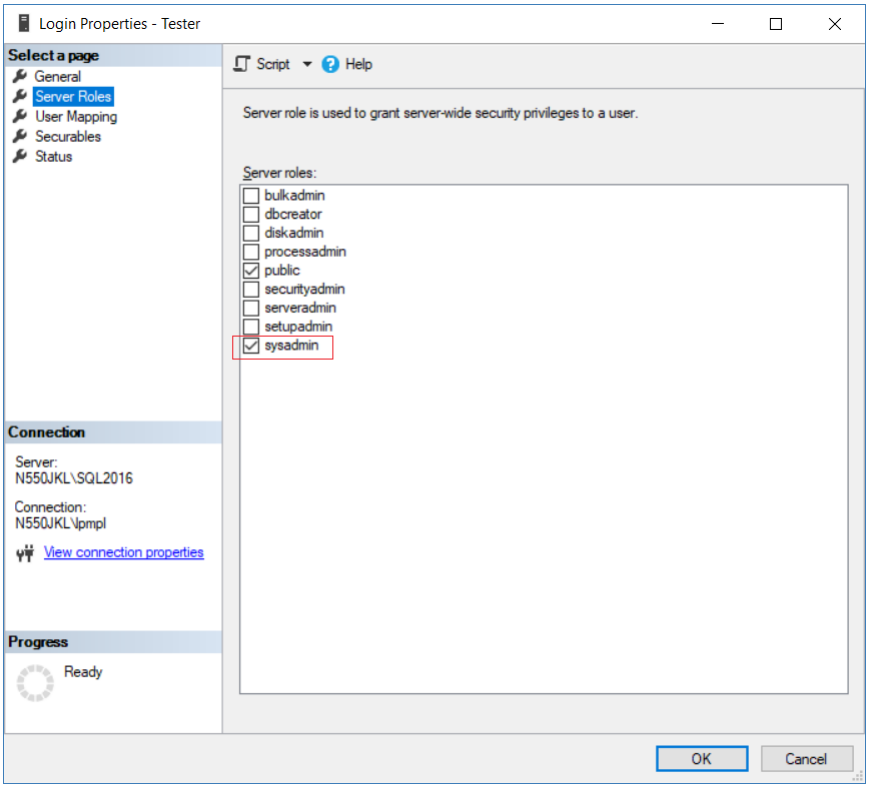
```
GO -- Run the previous command and begins new batch
INSERT  INTO Gamer
VALUES  ( 'Name1 ABC', 'Male', 5000, 'Water', 1 );
INSERT  INTO Gamer
VALUES  ( 'Name2 ABCDE', 'Female', 4500, 'Fire', 3 );
INSERT  INTO Gamer
VALUES  ( 'Name3 EFGH', 'Male', 6500, 'Fire', 2 );
INSERT  INTO Gamer
VALUES  ( 'Name4 HIJKLMN', 'Female', 45000, 'Water', 2 );
INSERT  INTO Gamer
VALUES  ( 'Name5 NOP', 'Male', 3000, 'Wood', 1 );
INSERT  INTO Gamer
VALUES  ( 'Name6 PQRSTUVW', 'Male', 4000, 'Earth',3 );
INSERT  INTO Gamer
VALUES  ( 'Name7 XYZ', 'Male', 4500, 'Metal', NULL );
GO -- Run the previous command and begins new batch
```

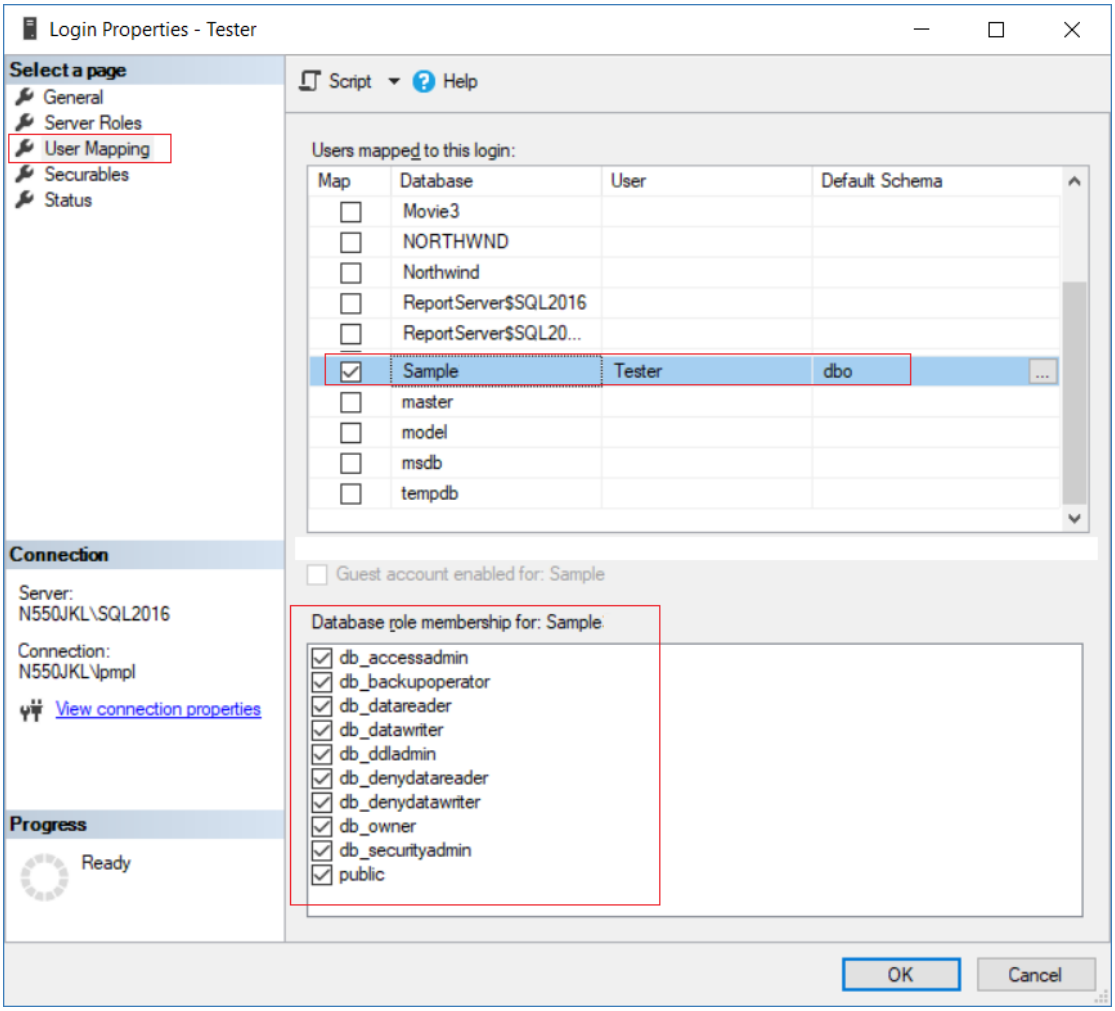
# 1.2. Set up SQL Authentication

In SQL server
Object Explorer --> Security --> Logins --> New Logins
-->
General Tab
Login Name :
**Tester**
Password:
**1234**
Default Database:
**Sample**
-->
Server Roles Tab
Select
**sysadmin**
-->
User Mapping Tab
Select **Sample**
Select every Roles.




Login - New
Select a page
General
Server Roles
User Mapping
Securables
Status
Script
Help
Login name:
Tester
Search...
Windows authentication
SQL Server authentication
Password:
Confirm password:
Specify old password
Old password:
Enforce password policy
Enforce password expiration
User must change password at next login
Mapped to certificate
Mapped to asymmetric key
Map to Credential
Add
Mapped Credentials
Credential
Provider
Remove
Default database:
Sample
Default language:
<default>
Connection
Server:
N550JKL\SQL2016
Connection:
N550JKL\lpmpl
View connection properties
Progress
Ready
OK
Cancel

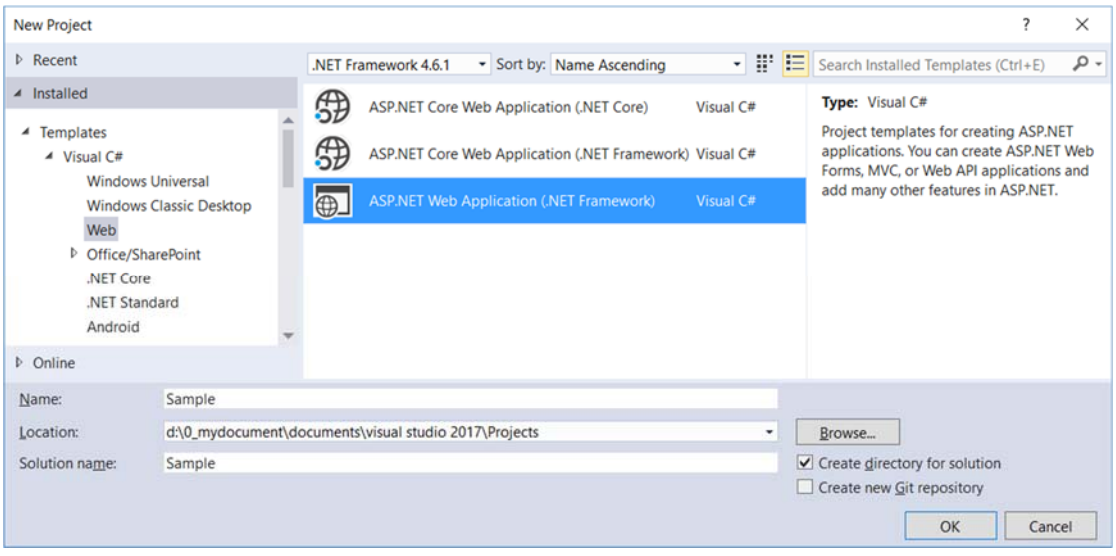

Login Properties - Tester
Select a page
General
Server Roles
User Mapping
Securables
Status
Script
Help
Server role is used to grant server-wide security privileges to a user.
Server roles:
bulkadmin
dbcreator
diskadmin
processadmin
public
securityadmin
serveradmin
setupadmin
sysadmin
Connection
Server:
N550JKL\SQL2016
Connection:
N550JKL\lpmpl
View connection properties
Progress
Ready
OK
Cancel

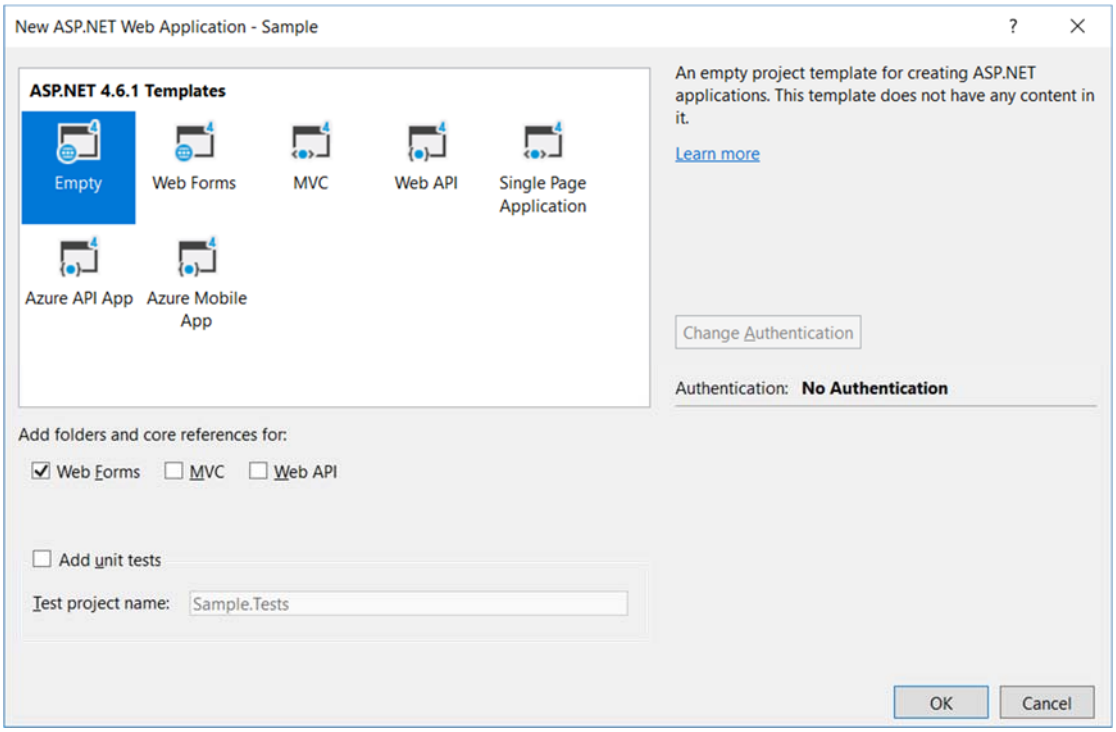



# 1.3. Create Web Application

Open Visual Studio, I am currently using VS2017
If you don't have it, you may following the instruction here to download.
http://ithandyguytutorial.blogspot.com/2017/10/ch00install-visual-studio-2017-offline.html

New Project --> Web -->ASP.NET**Web Application (.Net Framework)**
-->
Name:
**Sample**
--> **Empty** --> Select "**Web Forms**" --> OK



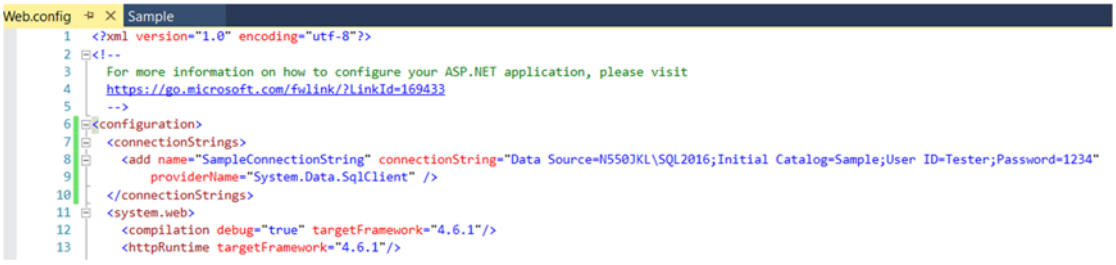



## 1.4.Web.config

Add connection String

If you use Linq to Sql, you don't have to set this connection string.
I personally already get used to set it by my own.

```
<configuration>
  <connectionStrings>
    <add name="SampleConnectionString" connectionString="Data Source=N550JKL\SQL2016;Initial
Catalog=Sample;User ID=Tester;Password=1234"
         providerName="System.Data.SqlClient" />
  </connectionStrings>
```

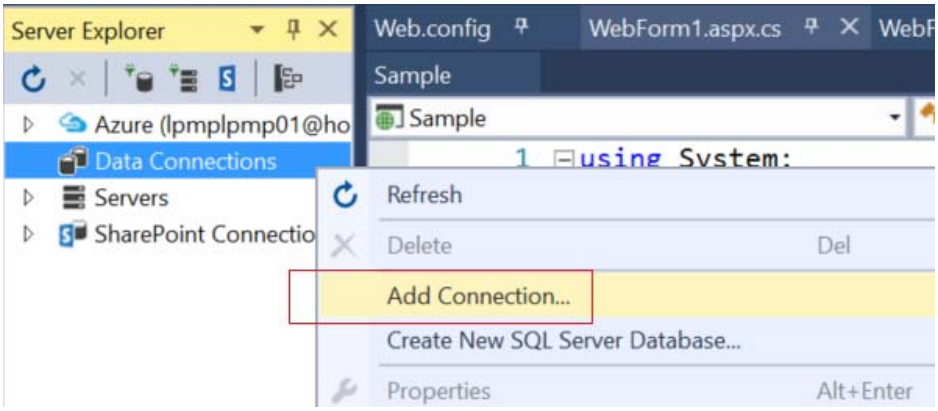


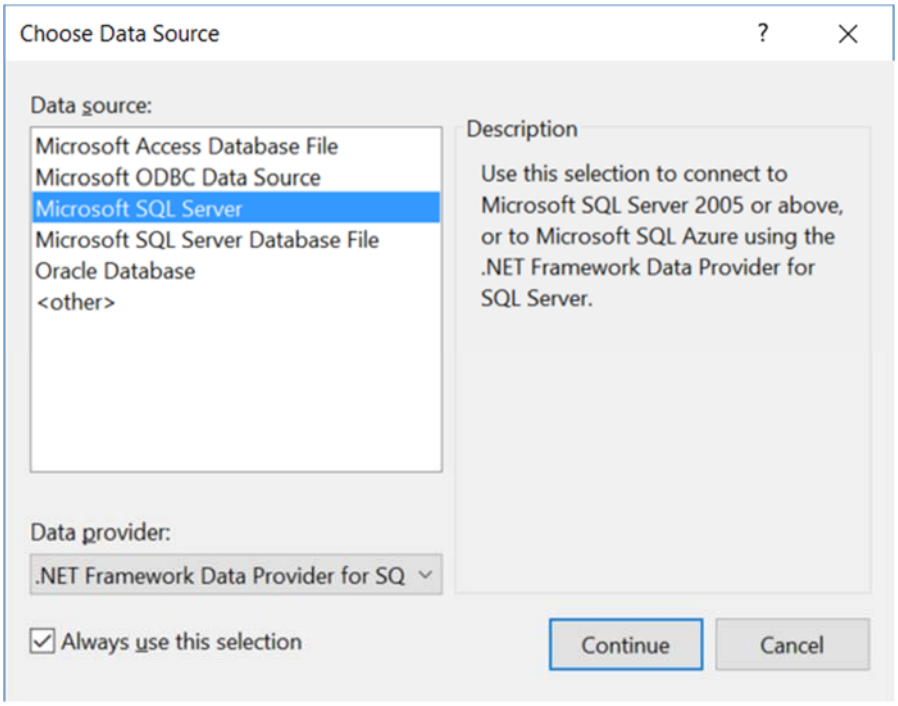

# 2. Linq to SQL

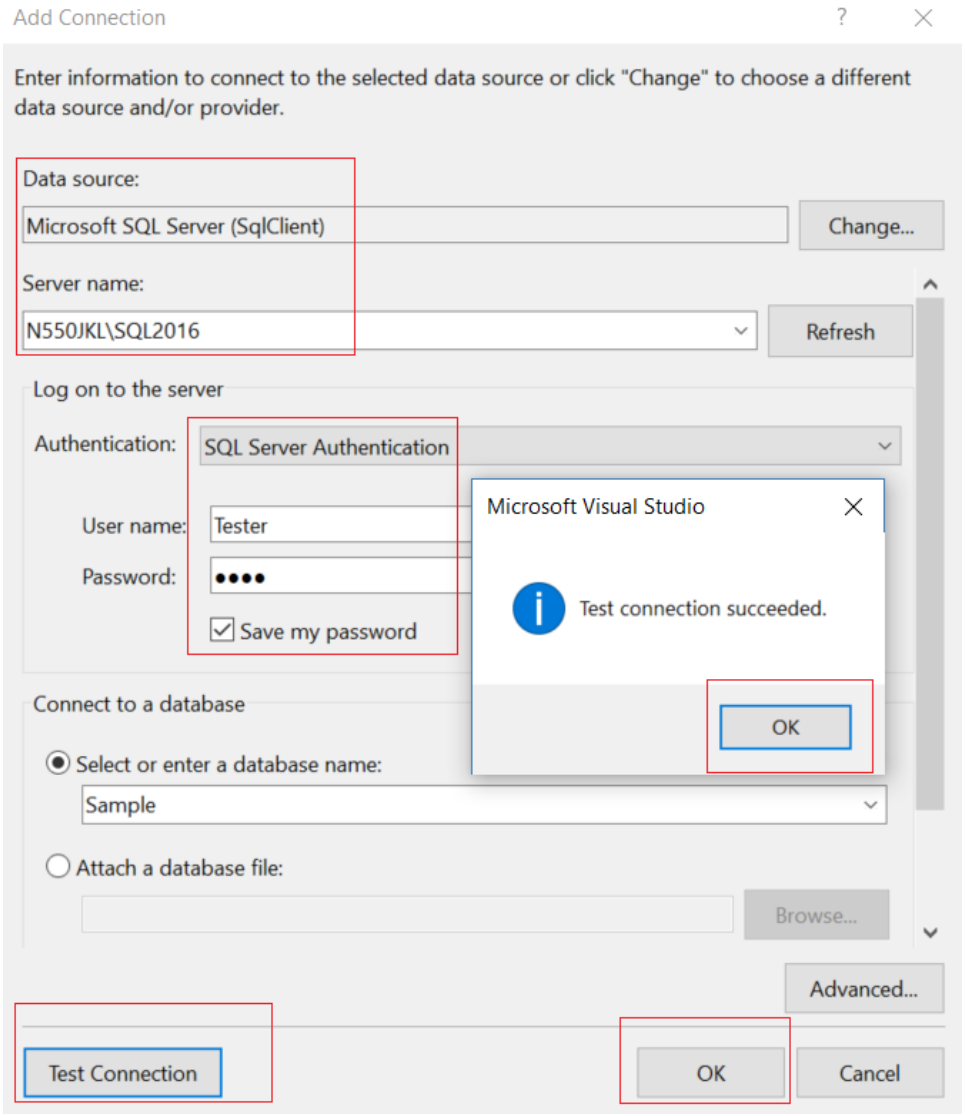
## 2.1. Add Connection

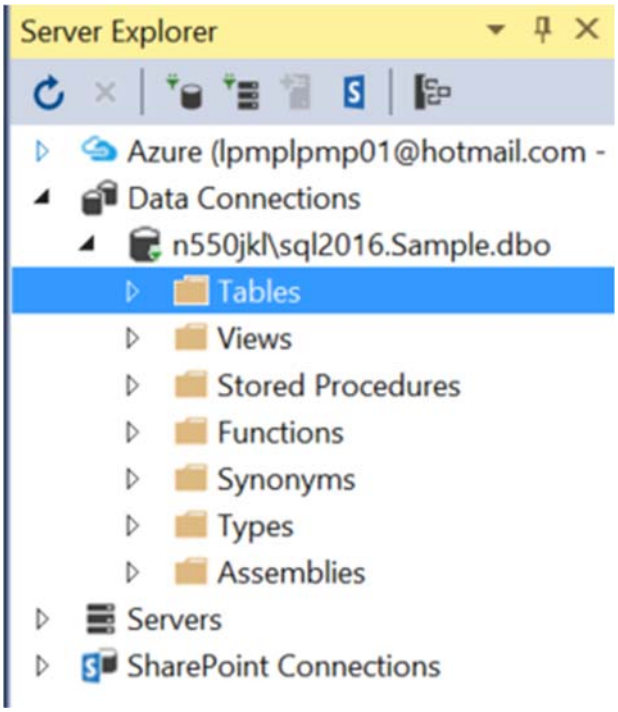
Server Explorer --> Data Connections --> Right click --> Add Connection...

--> Microsoft SQL server -->
Enter your server and database details ....





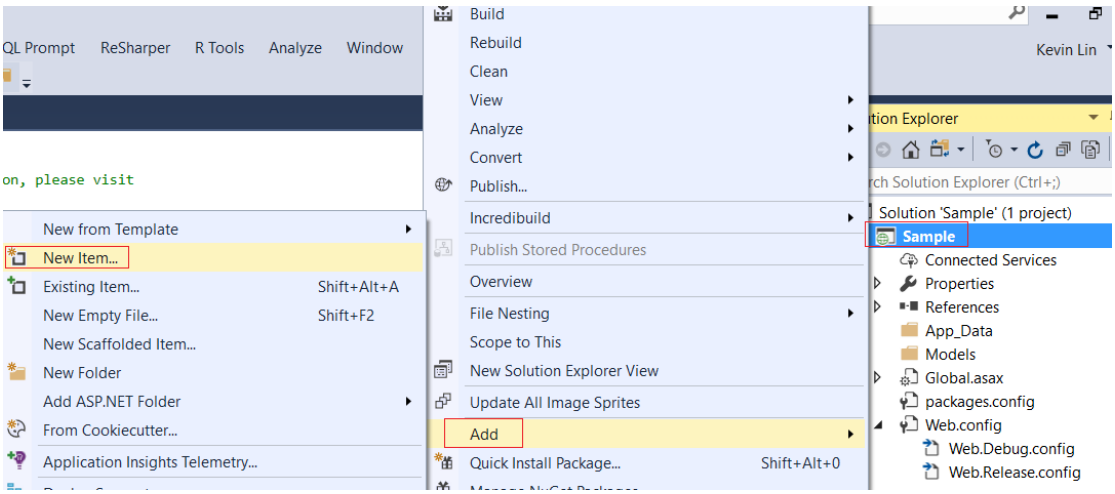



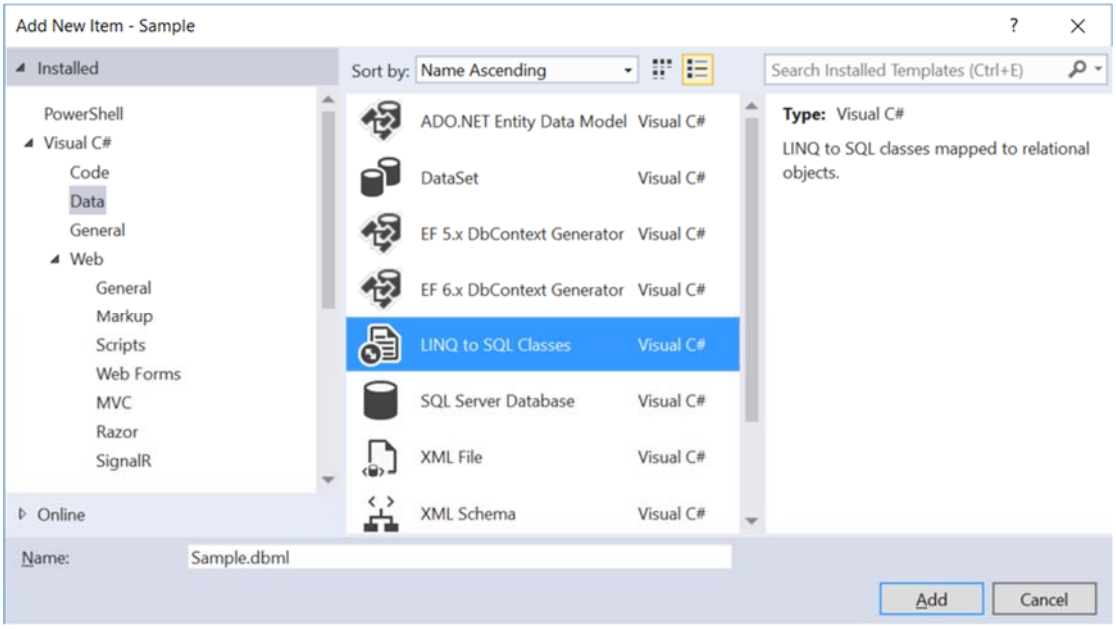

## 2.2. Sample.dbml

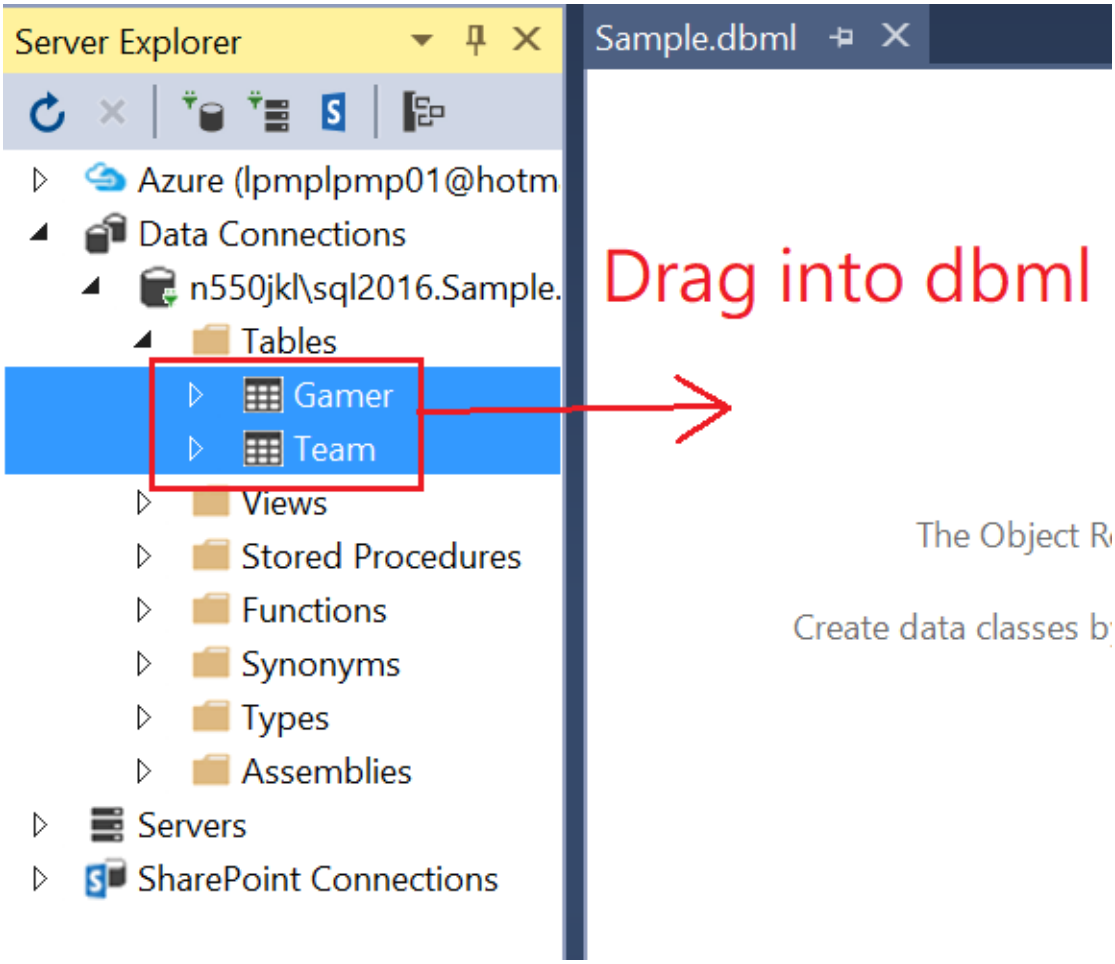
ProjectName --> Right Click --> Add --> New Item...
--> Linq to SQL classes -->
Name : **Sample.dbml**

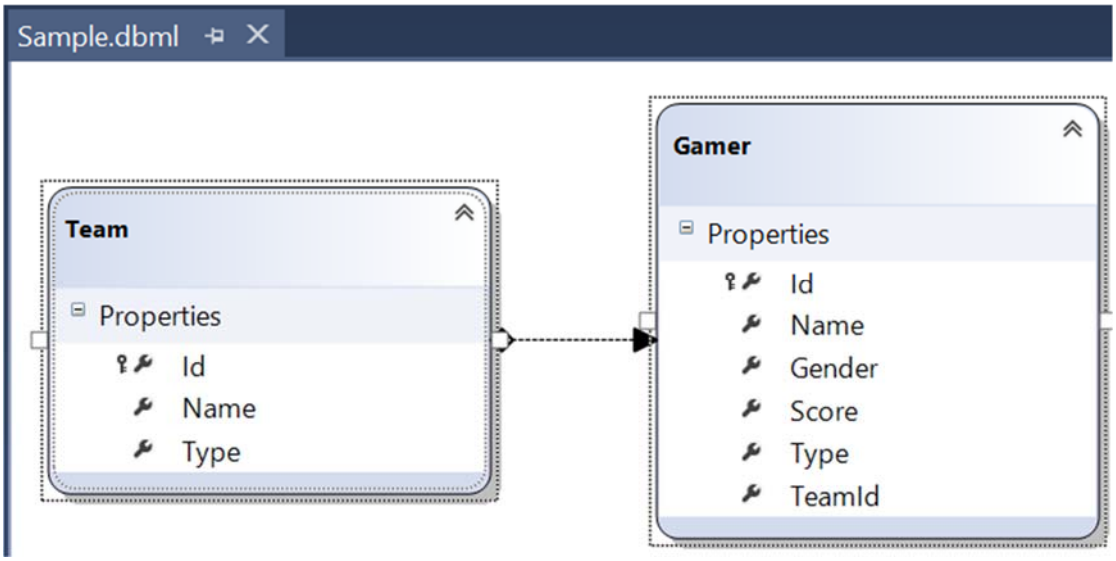
I name it as "Sample.dbml",
because I know this is for connection to "Sample" Database.

-->
Drag Table from Server Explorer into DBML

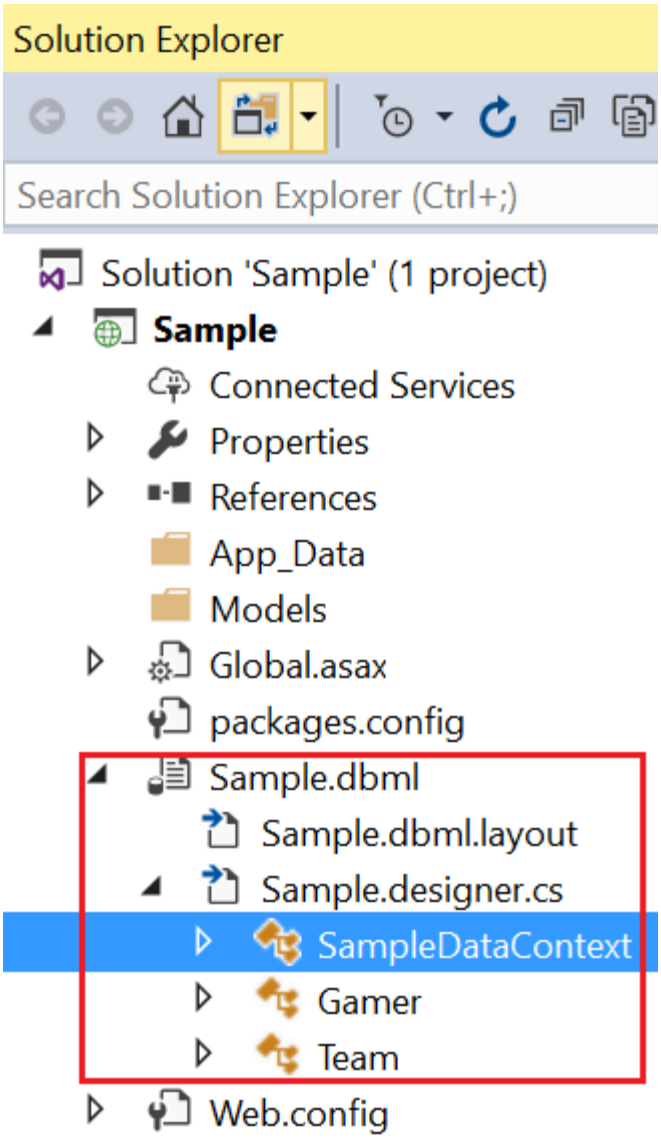





Save the dbml, it will generate the following files.
The DataContext context is the entry point to database.




## 2.3. WebForm1.aspx

### 2.3.1. WebForm1.aspx

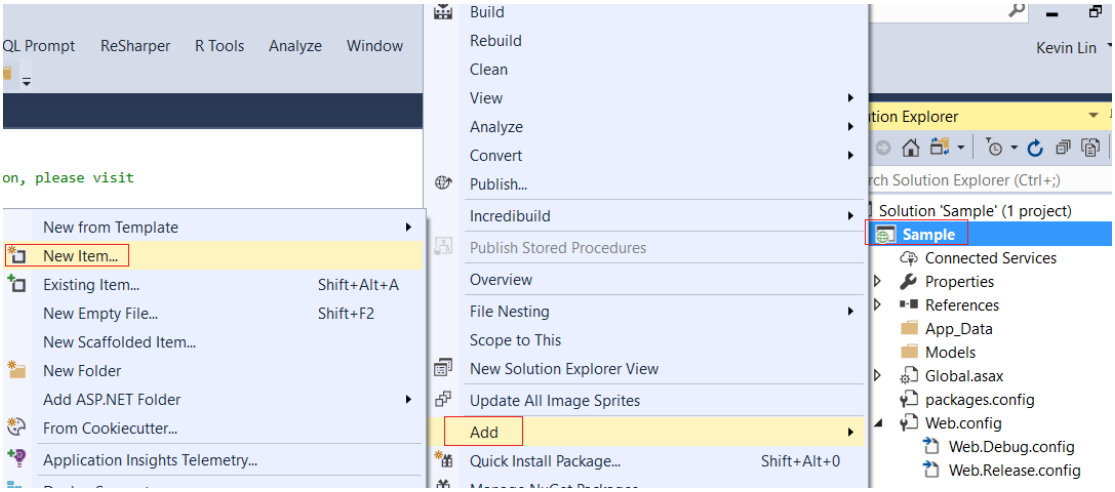
ProjectName --> Right Click --> Add --> New Item...

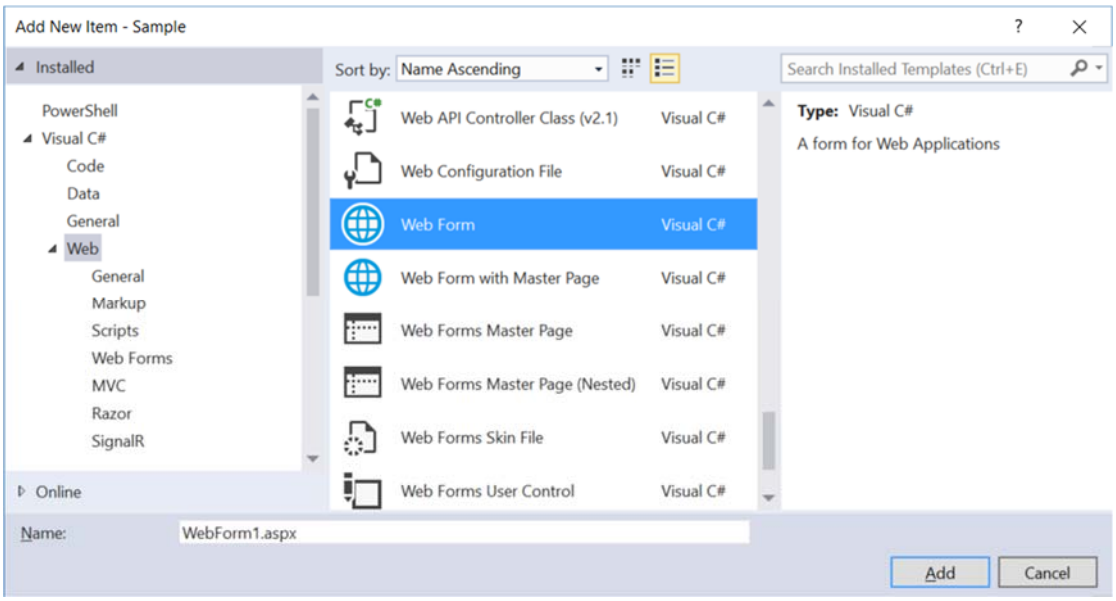
-->

**WebForm**

Name :

**WebForm1.aspx**



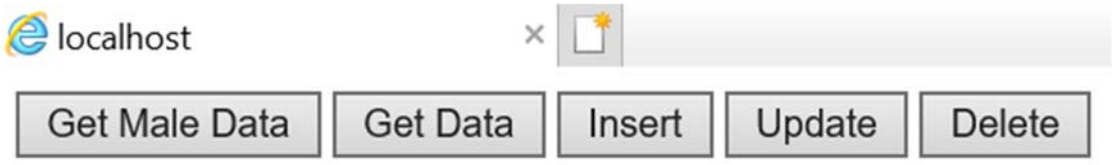




```
<%@ Page Language="C#" AutoEventWireup="true" CodeBehind="WebForm1.aspx.cs" Inherits="Sample.WebForm1" %>
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title></title>
</head>
<body>
    <form id="form1" runat="server">
        <div>
            <asp:GridView ID="GridView1" runat="server"></asp:GridView>
            <asp:Button ID="btnGetMaleData" runat="server" Text="Get Male
Data" OnClick="btnGetMaleData_Click" />
            <asp:Button ID="btnGetData" runat="server" Text="Get Data" OnClick="btnGetData_Click" />
            <asp:Button ID="btnInsert" runat="server" Text="Insert" OnClick="btnInsert_Click" />
            <asp:Button ID="btnUpdate" runat="server" Text="Update" OnClick="btnUpdate_Click" />
            <asp:Button ID="btnDelete" runat="server" Text="Delete" OnClick="btnDelete_Click" />
        </div>
    </form>
</body>
</html>
```

## 2.3.2. WebForm1.aspx.cs - PrintGeneratedSql

```
using System;
using System.Linq;
namespace Sample
{
    public partial class WebForm1 : System.Web.UI.Page
    {
        protected void Page_Load(object sender, EventArgs e)
        {
            //GetData();
        }
        protected void btnGetMaleData_Click(object sender, EventArgs e)
        {
            using (SampleDataContext dbContext = new SampleDataContext())
            {
                // Write the generated sql query to the webform
                dbContext.Log = Response.Output;
                //// Write the generated sql query to the Console window
                //dbContext.Log = Console.Out;
                //dbContext.Log = Response.Output;  and
                //dbContext.Log = Console.Out;
                //You may only choose one to use.
                IOrderedQueryable<Gamer> gamerQueryable = from gamer in dbContext.Gamers
                    where gamer.Gender == "Male"
                    orderby gamer.Score descending
                    select gamer;
                GridView1.DataSource =
                    gamerQueryable;
                Response.Write($"<br/>gamerQueryable.ToString()<br/>{gamerQueryable.ToString()}<br/><br/>
");
                Response.Write($"<br/>dbContext.GetCommand(gamerQueryable).CommandText<br/>{dbContext.Get
Command(gamerQueryable).CommandText}<br/><br/>");
                Response.Write($"<br/>dbContext.GetCommand(gamerQueryable).CommandType<br/>{dbContext.Get
Command(gamerQueryable).CommandType}<br/><br/>");
                GridView1.DataBind();
            }
        }
        private void GetData()
        {
            using (SampleDataContext dbContext = new SampleDataContext())
            {
                IQueryable<Gamer> gamerQueryable =
                    from gamer in dbContext.Gamers
                    select gamer;
                GridView1.DataSource = gamerQueryable;
                GridView1.DataBind();
            }
        }
        protected void btnGetData_Click(object sender, EventArgs e)
        {
            GetData();
        }
        protected void btnInsert_Click(object sender, EventArgs e)
        {
            using (SampleDataContext dbContext = new SampleDataContext())
            {
                Gamer newGamer = new Gamer
                {
```

```
                    Name = "newGamer",
                    Gender = "Male",
                    Score = 4000,
                    Type = "Fire",
                    TeamId = 1
                };
                dbContext.Gamers.InsertOnSubmit(newGamer);  //insert into dbContext
                dbContext.SubmitChanges();  //Submit dbContext into Database
            }
            GetData();
        }
        protected void btnUpdate_Click(object sender, EventArgs e)
        {
            using (SampleDataContext dbContext = new SampleDataContext())
            {
                //Get the last gamer
                int lastId = dbContext.Gamers.Count();
                Gamer gamer = dbContext.Gamers.SingleOrDefault(
                    x => x.Id == lastId);
                if (gamer != null) gamer.Score = 5555;
                dbContext.SubmitChanges();
            }
            GetData();
        }
        protected void btnDelete_Click(object sender, EventArgs e)
        {
            using (SampleDataContext dbContext = new SampleDataContext())
            {
                //Get the last gamer
                int lastId = dbContext.Gamers.Count();
                Gamer gamer = dbContext.Gamers.SingleOrDefault(
                    x => x.Id == lastId);
                //delete the last gamer from dbContext
                if (gamer != null) dbContext.Gamers.DeleteOnSubmit(gamer);
                dbContext.SubmitChanges();  // Save dbContext into Database.
            }
            GetData();
        }
    }
}
```

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localhost

gamerQueryable.ToString()
SELECT [t0].[Id], [t0].[Name], [t0].[Gender], [t0].[Score], [t0].[Type], [t0].[TeamId] FROM [dbo].[Gamer] AS [t0] WHERE [t0].[Gender] = @p0 ORDER BY [t0].[Score] DESC

dbContext.GetCommand(gamerQueryable).CommandText
SELECT [t0].[Id], [t0].[Name], [t0].[Gender], [t0].[Score], [t0].[Type], [t0].[TeamId] FROM [dbo].[Gamer] AS [t0] WHERE [t0].[Gender] = @p0 ORDER BY [t0].[Score] DESC

dbContext.GetCommand(gamerQueryable).CommandType
Text

SELECT [t0].[Id], [t0].[Name], [t0].[Gender], [t0].[Score], [t0].[Type], [t0].[TeamId] FROM [dbo].[Gamer] AS [t0] WHERE [t0].[Gender] = @p0 ORDER BY [t0].[Score] DESC -- @p0: Input NVarChar (Size = 4000; Prec = 0; Scale = 0) [Male] -- Context: SqlProvider(Sql2008) Model: AttributedMetaModel Build: 4.7.2556.0

| Id | Name | Gender | Score | Type | TeamId |
|---|---|---|---|---|---|
| 3 | Name3 EFGH | Male | 6500 | Fire | 2 |
| 1 | Name1 ABC | Male | 5000 | Water | 1 |
| 7 | Name7 XYZ | Male | 4500 | Metal | |
| 6 | Name6 PQRSTUVW | Male | 4000 | Earth | 3 |
| 5 | Name5 NOP | Male | 3000 | Wood | 1 |

Get Male Data | Get Data | Insert | Update | Delete

---

localhost

| Id | Name | Gender | Score | Type | TeamId |
|---|---|---|---|---|---|
| 1 | Name1 ABC | Male | 5000 | Water | 1 |
| 2 | Name2 ABCDE | Female | 4500 | Fire | 3 |
| 3 | Name3 EFGH | Male | 6500 | Fire | 2 |
| 4 | Name4 HIJKLMN | Female | 45000 | Water | 2 |
| 5 | Name5 NOP | Male | 3000 | Wood | 1 |
| 6 | Name6 PQRSTUVW | Male | 4000 | Earth | 3 |
| 7 | Name7 XYZ | Male | 4500 | Metal | |

Get Male Data | Get Data | Insert | Update | Delete

---

| Id | Name | Gender | Score | Type | TeamId |
|---|---|---|---|---|---|
| 1 | Name1 ABC | Male | 5000 | Water | 1 |
| 2 | Name2 ABCDE | Female | 4500 | Fire | 3 |
| 3 | Name3 EFGH | Male | 6500 | Fire | 2 |
| 4 | Name4 HIJKLMN | Female | 45000 | Water | 2 |
| 5 | Name5 NOP | Male | 3000 | Wood | 1 |
| 6 | Name6 PQRSTUVW | Male | 4000 | Earth | 3 |
| 7 | Name7 XYZ | Male | 4500 | Metal | |
| 8 | newGamer | Male | 4000 | Fire | 1 |

Get Male Data | Get Data | Insert | Update | Delete

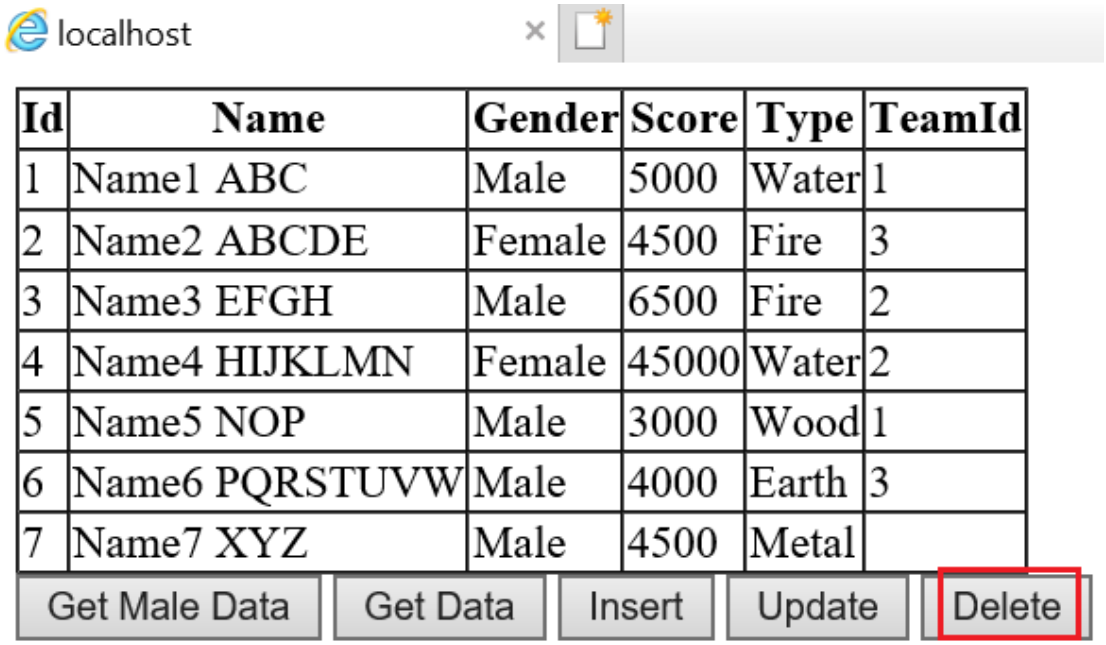
---

localhost

| Id | Name | Gender | Score | Type | TeamId |
|---|---|---|---|---|---|
| 1 | Name1 ABC | Male | 5000 | Water | 1 |
| 2 | Name2 ABCDE | Female | 4500 | Fire | 3 |
| 3 | Name3 EFGH | Male | 6500 | Fire | 2 |
| 4 | Name4 HIJKLMN | Female | 45000 | Water | 2 |
| 5 | Name5 NOP | Male | 3000 | Wood | 1 |
| 6 | Name6 PQRSTUVW | Male | 4000 | Earth | 3 |
| 7 | Name7 XYZ | Male | 4500 | Metal | |
| 8 | newGamer | Male | 5555 | Fire | 1 |

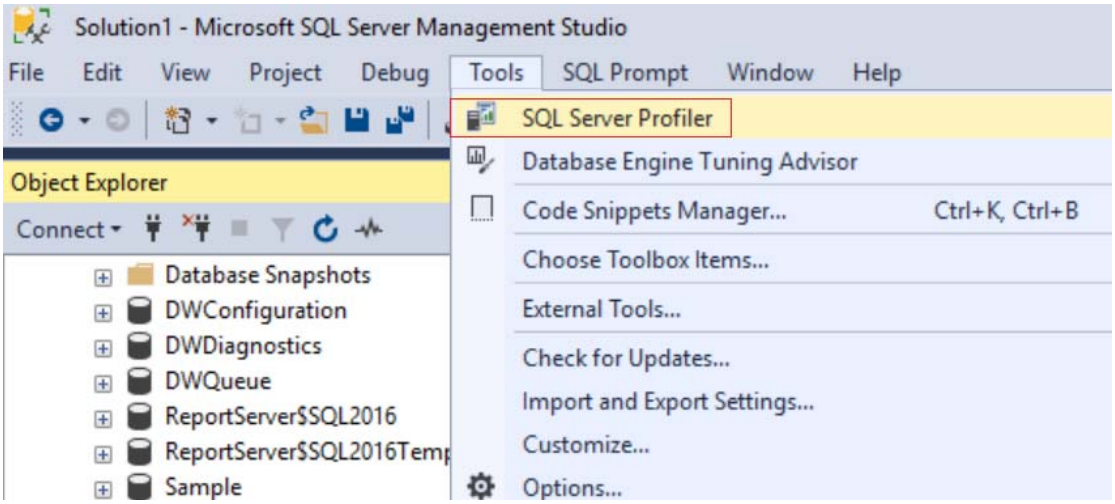
Get Male Data | Get Data | Insert | Update | Delete

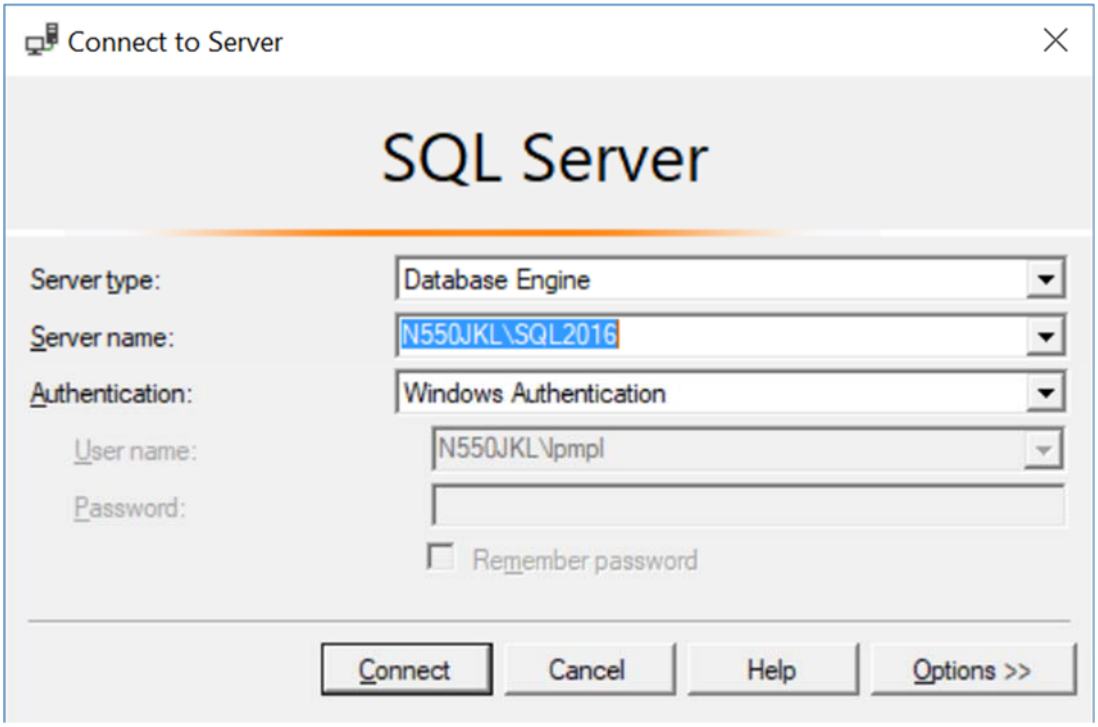
---

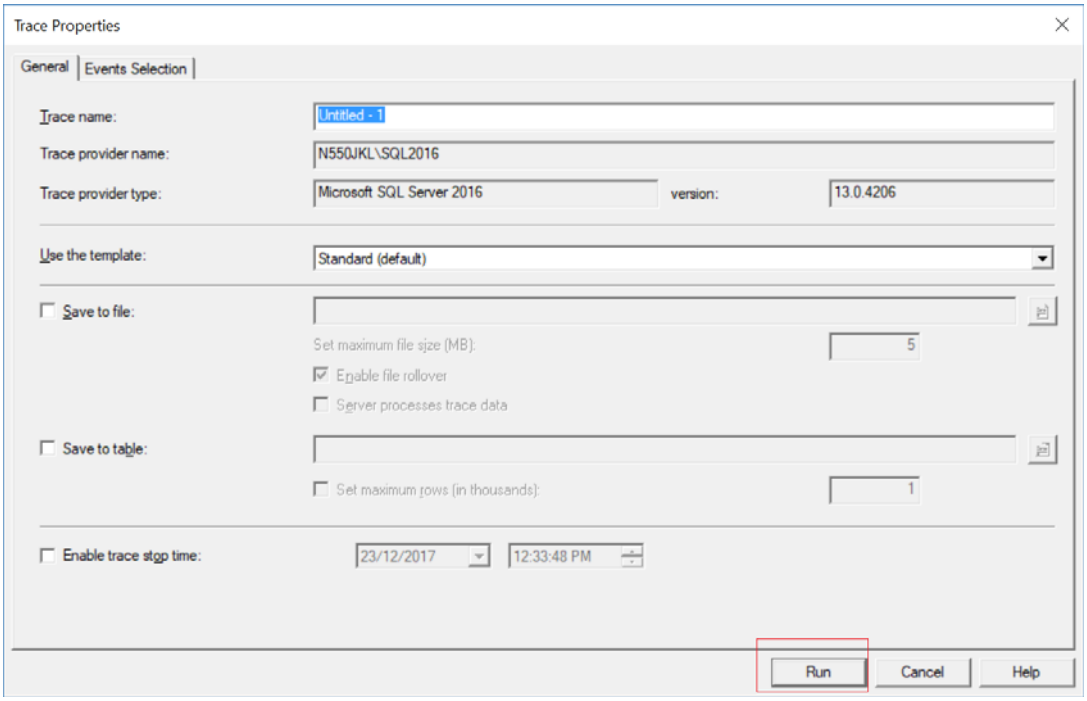



## 2.4. SQL Profiler

Tools --> SQL Server Profiler






Now, go back to VS2017, and run WebForm2.aspx again
You will see Linq to SQL provider convert Linq to TSQL.