

Capabilities

Monday, May 29, 2017 7:32 PM

☐ SQL Sever Data Tools is required for the SLQ CLR Template

Module Type	T-SQL	SQLCLR
Stored procedures	✓	✓
User-defined functions	✓	✓
Triggers	✓	✓
User-defined types		✓
Aggregates		✓

Configure SQL Server

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```
SqlClrPreparation.s...er (LABS\delip (52))  -  X

--Enable SQLCLR
-----
sp_configure 'clr enabled', 1;
GO
RECONFIGURE;
GO

--Disable SQLCLR
-----
sp_configure 'clr enabled', 0;
GO
RECONFIGURE;
GO
```

115 %

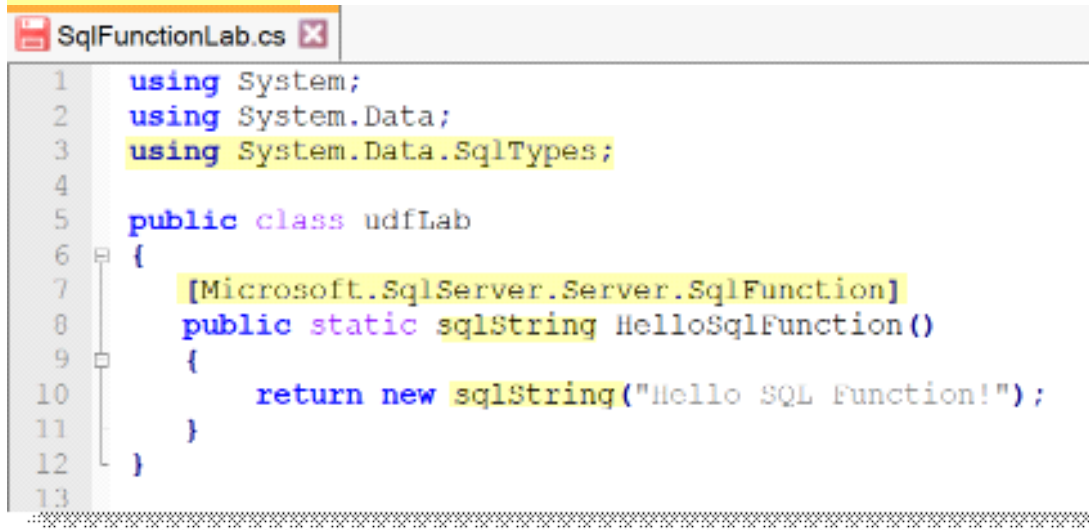
Messages

Configuration option 'clr enabled' changed from 0 to 1. Run the RECONFIGURE statement to install.

Create Simple DLL

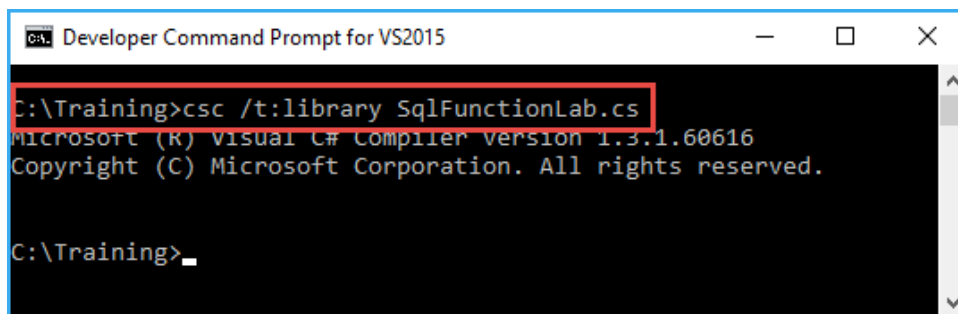
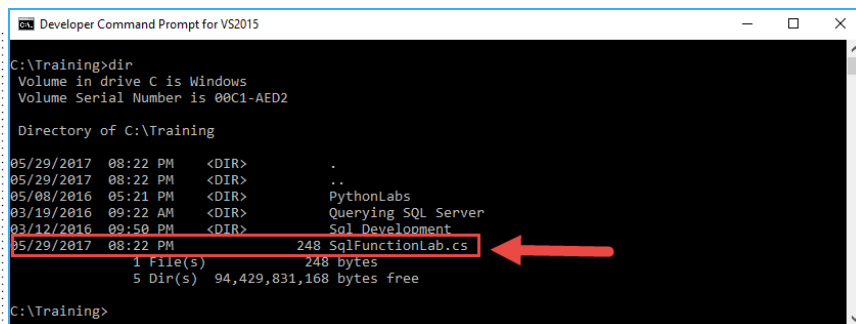
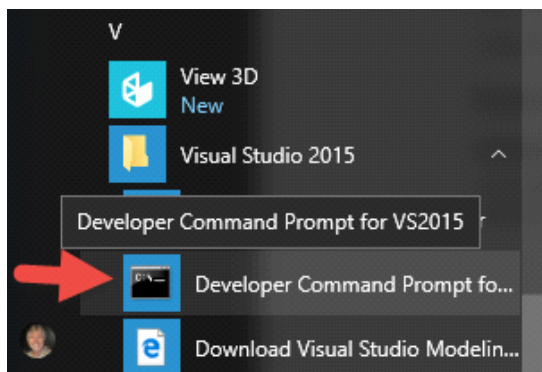
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☐ Create C# File



```
1 using System;
2 using System.Data;
3 using System.Data.SqlTypes;
4
5 public class udfLab
6 {
7     [Microsoft.SqlServer.Server.SqlFunction]
8     public static sqlString HelloSqlFunction()
9     {
10         return new sqlString("Hello SQL Function!");
11     }
12 }
13
```

☐ Compile File



```
Developer Command Prompt for VS2015
03/19/2016 09:22 AM <DIR> Querying SQL Server
03/12/2016 09:50 PM <DIR> Sql Development
05/29/2017 08:25 PM 249 SqlFunctionLab.cs
05/29/2017 08:26 PM 3,584 SqlFunctionLab.dll
2 File(s) 3,833 bytes
5 Dir(s) 94,428,442,624 bytes free

C:\Training>
```

Register and Execute

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The screenshot displays the SQL Server Enterprise Manager interface. On the left, a SQL script is executed in a query window. The script creates an assembly, registers a code module, and creates a CLR function named `dbo.HelloSqlFunction()`. The function returns `nVarChar(50)` and uses the `MyFunctionLibrary.udfLab.HelloSqlFunction` method. The script is executed, and the results pane shows a single row with the value "Hello SQL Function!".

```
--Create Assembly Stored in SQL SERVER as Object
Create Assembly MyFunctionLibrary
    From 'C:\Training\SqlFunctionLab.DLL';
Go

--Register Code Modules / Only on in this case
Create Function dbo.HelloSqlFunction()
    Returns nVarChar(50)
    External Name MyFunctionLibrary.udfLab.HelloSqlFunction;
--
    Assembly/DDL      NS/Class  Method
Go

Select dbo.HelloSqlFunction();
```

On the right, the Enterprise Manager tree view shows the database structure. The `Northwind` database is expanded, showing the `Programmability` folder. The `Functions` folder is expanded, showing the `dbo.HelloSqlFunction` function. The `Assemblies` folder is also expanded, showing the `MyFunctionLibrary` assembly. Red arrows point to the `Functions` and `Assemblies` folders. Red circles with numbers 1 and 2 highlight the `dbo.HelloSqlFunction` function and the `MyFunctionLibrary` assembly, respectively.

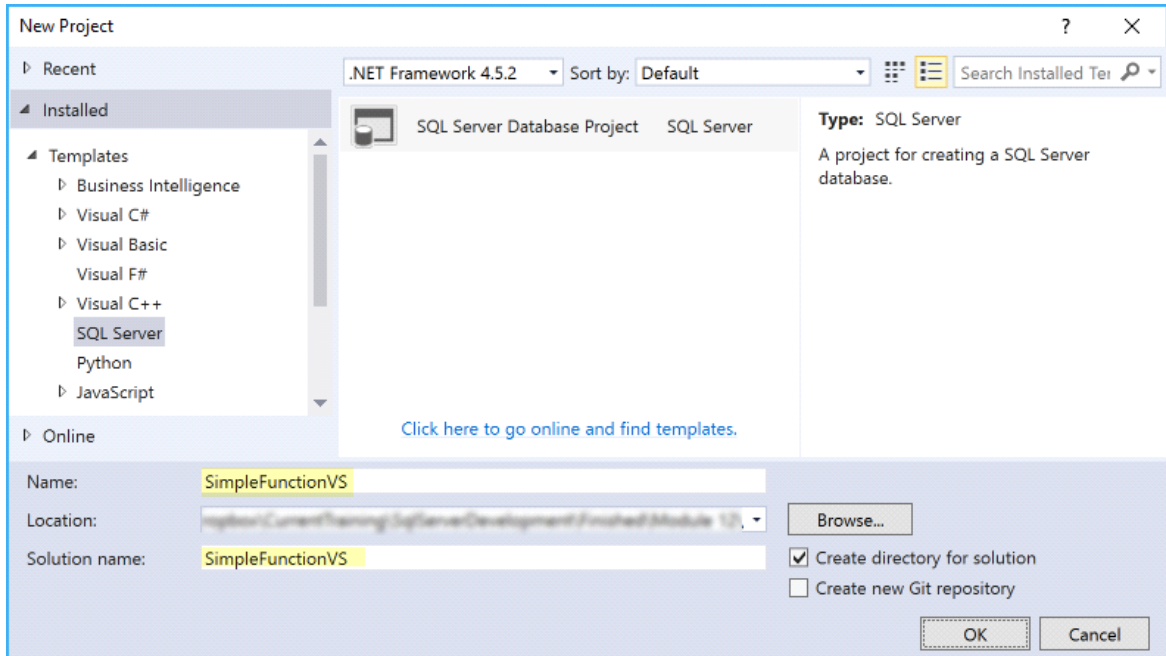
Results:

(No column name)
1 Hello SQL Function!

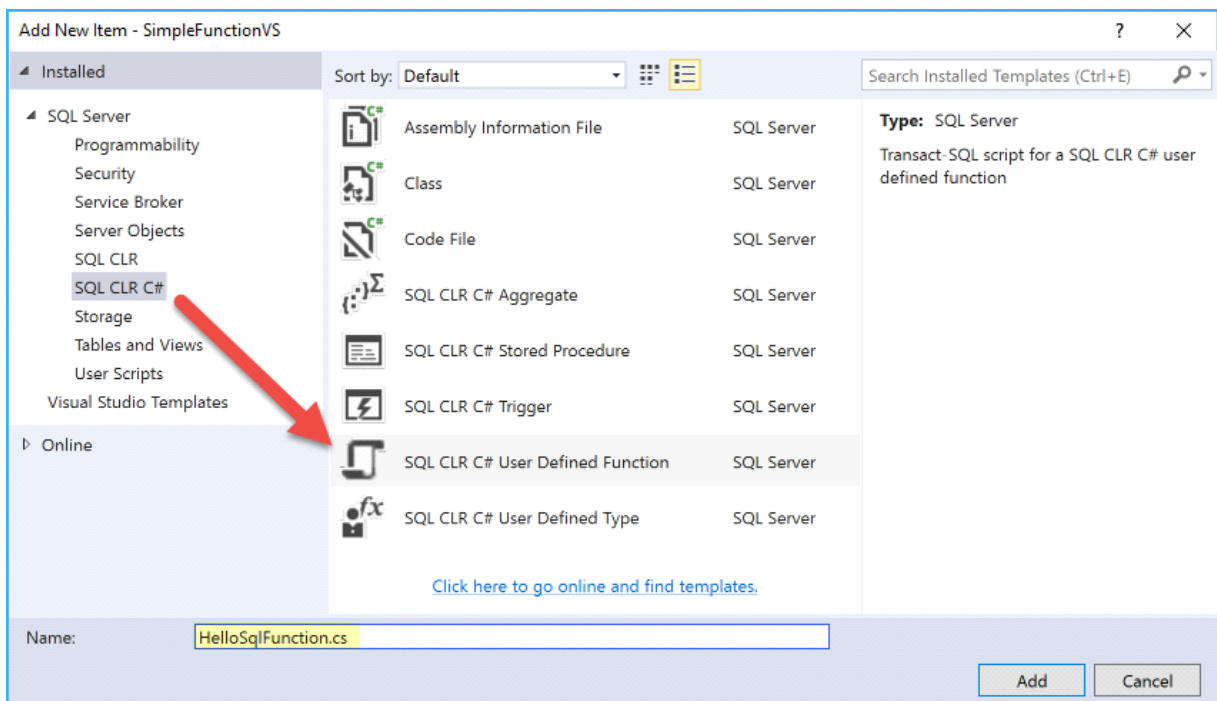
Simple Function VS-2015

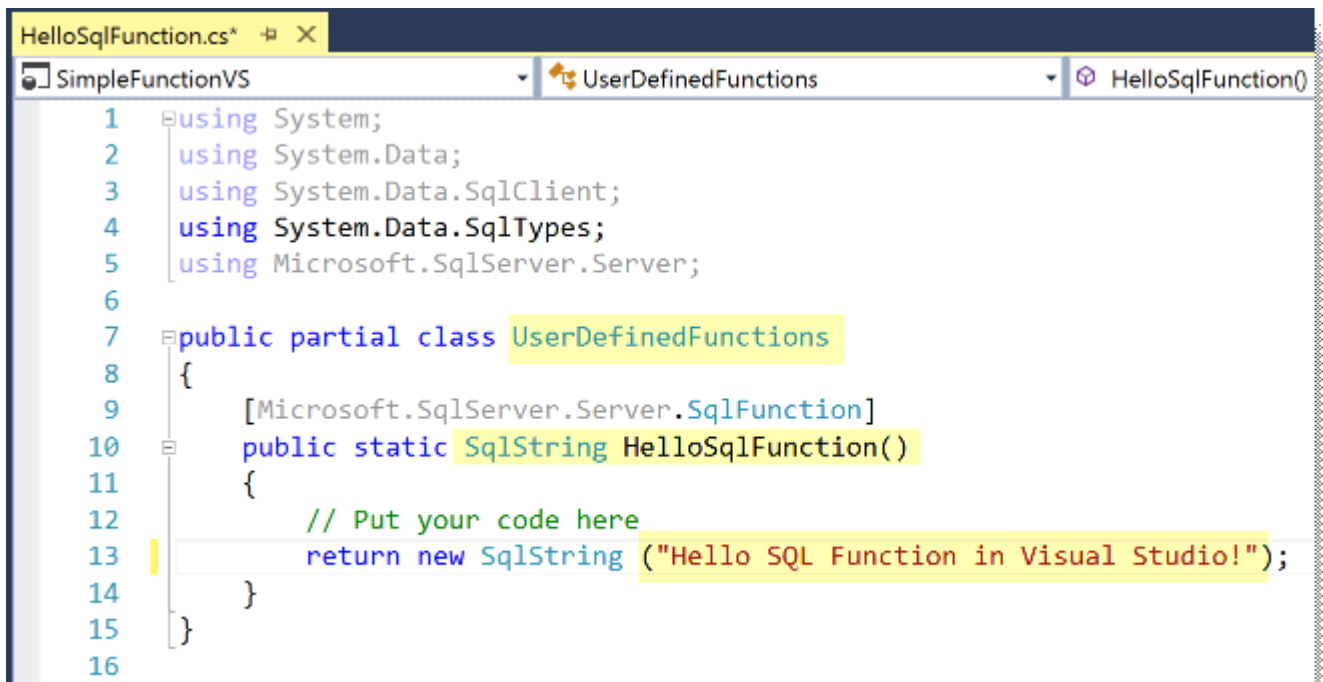
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SqlFunction VS Project



HelloSqlFunction.cs





```
1 using System;
2 using System.Data;
3 using System.Data.SqlClient;
4 using System.Data.SqlTypes;
5 using Microsoft.SqlServer.Server;
6
7 public partial class UserDefinedFunctions
8 {
9     [Microsoft.SqlServer.Server.SqlFunction]
10    public static SqlString HelloSqlFunction()
11    {
12        // Put your code here
13        return new SqlString ("Hello SQL Function in Visual Studio!");
14    }
15 }
16
```

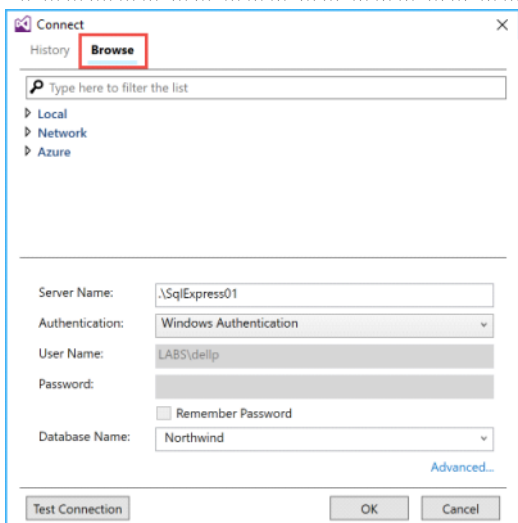
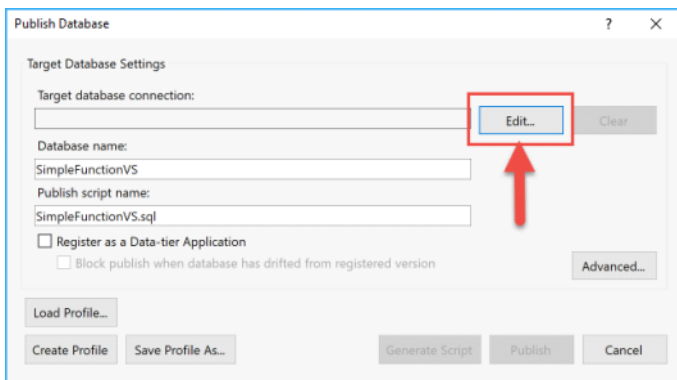
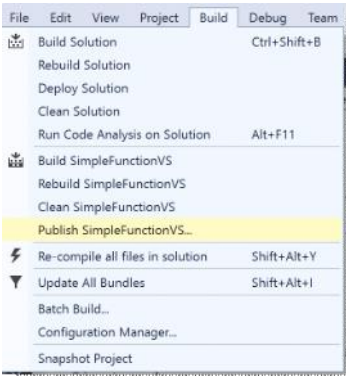
Implement fn in SQL

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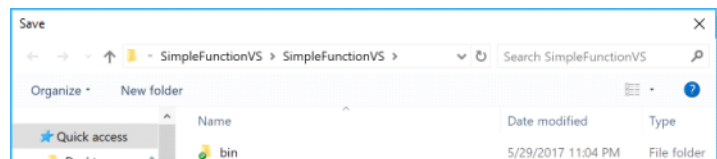
Build Solution



Publish to SQL Server - Northwind



Profile - Can be used for automation in deployment



target database connection:

Data Source=.\SqlExpress01;Integrated Security=True;Persist Security Info=False

Database name:

Northwind

Publish script name:

SimpleFunctionVS.sql

☐ Register as a Data-tier Application

☐ Block publish when database has drifted from registered version

Advanced...

Load Profile...

Create Profile Save Profile As... Generate Script Publish Cancel

The screenshot displays the SQL Server Enterprise Edition interface. The main area shows a script being executed, which includes commands to alter a database, create an assembly, drop files, add a file, print messages, create a function, and update completion status. A red box highlights the assembly creation and file management sections, with a red arrow pointing to the assembly name [SimpleFunctionVS].

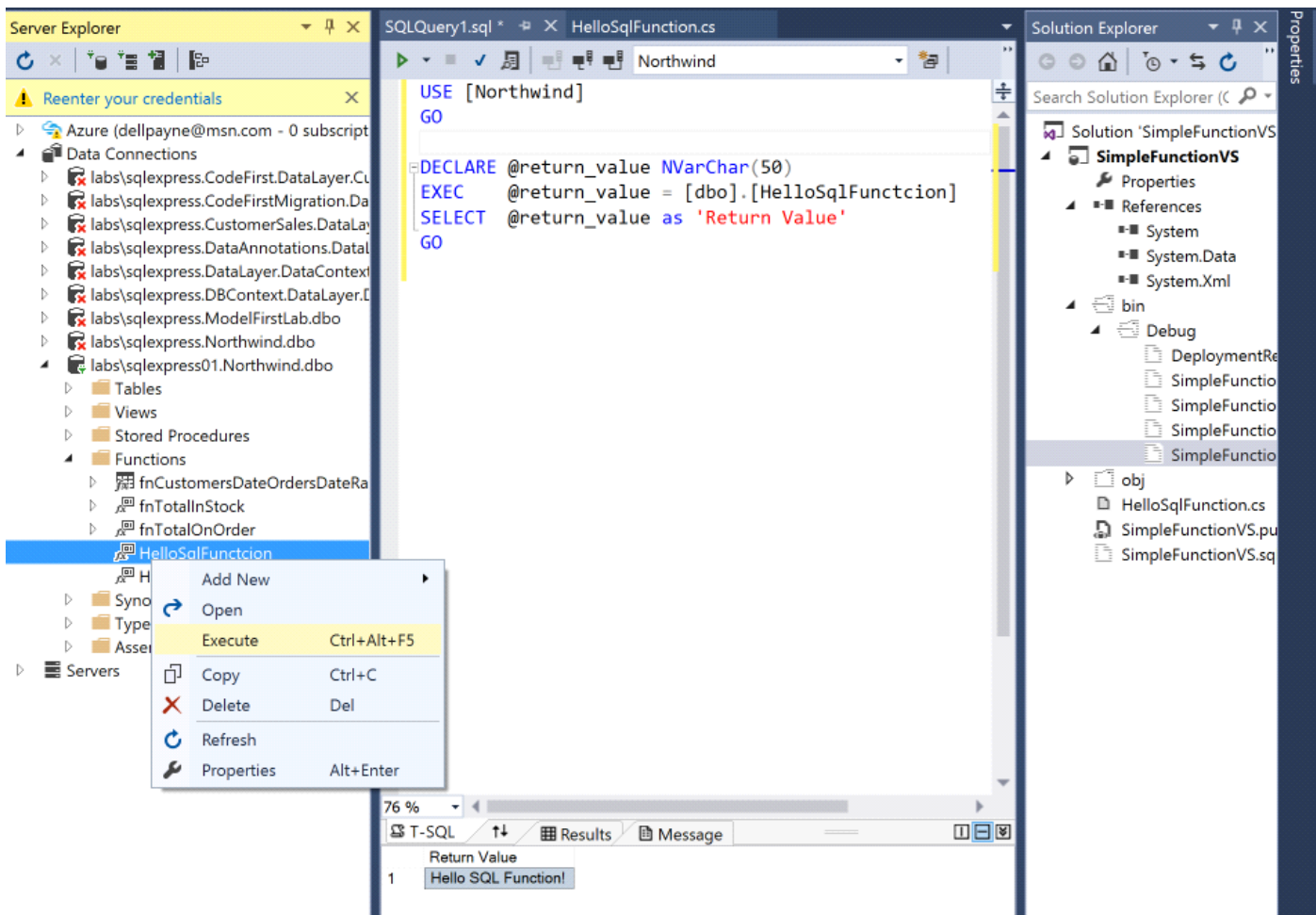
```
WHERE [name] = N'$(DatabaseName)')  
BEGIN  
    ALTER DATABASE [$(DatabaseName)]  
        SET QUERY_STORE (CLEANUP_POLICY = (STALE_QUERY_THRESHOLD_DAYS:  
        WITH ROLLBACK IMMEDIATE;  
END  
  
GO  
USE [$(DatabaseName)];  
  
GO  
PRINT N'Creating [SimpleFunctionVS]...';  
  
GO  
CREATE ASSEMBLY [SimpleFunctionVS]  
    AUTHORIZATION [dbo]  
    FROM 0x4D5A9000030000004000000FFFF000B8000000000000040000000000000  
  
GO  
ALTER ASSEMBLY [SimpleFunctionVS]  
    DROP FILE ALL  
    ADD FILE FROM 0x4D6963726F736F667420432F432B28204D534620372E3030000A:  
  
GO  
PRINT N'Creating [dbo].[HelloSqlFunction]...';  
  
GO  
CREATE FUNCTION [dbo].[HelloSqlFunction]  
    (  
    RETURNS NVARCHAR (MAX)  
    AS  
    EXTERNAL NAME [SimpleFunctionVS].[UserDefinedFunctions].[HelloSqlFunci  
  
GO  
PRINT N'Update complete.';
```

The Solution Explorer on the right shows the project structure for 'SimpleFunctionVS'. It includes references to System, System.Data, and System.Xml. The bin directory contains Debug files: DeploymentReport.txt, SimpleFunctionVS.dacpac, SimpleFunctionVS.dll, SimpleFunctionVS.pdb, and SimpleFunctionVS.publish.sql. The obj directory contains HelloSqlFunction.cs, SimpleFunctionVS.publish.xml, and SimpleFunctionVS.sqlproj.user.

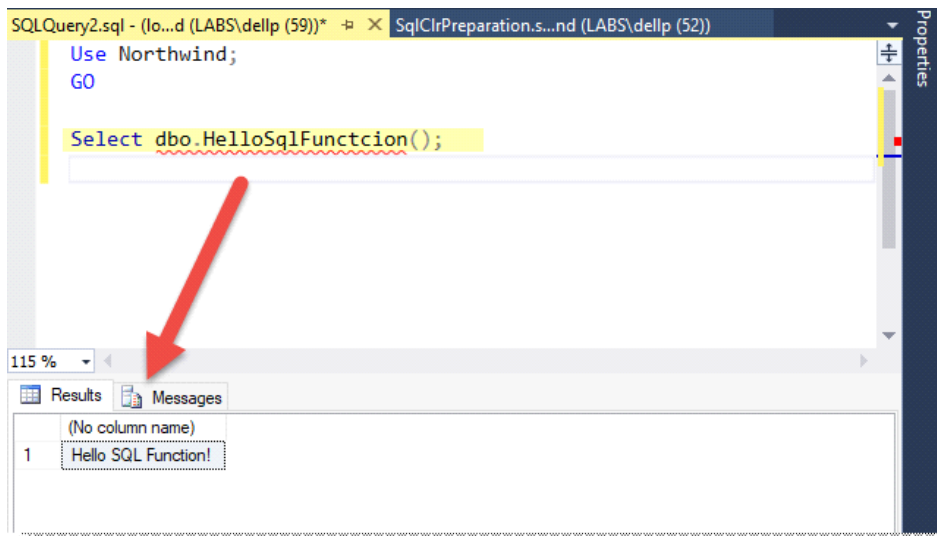
Execute VS Function

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- ☐ In Visual Studio make a connection and execute from Server Explorer



- ☐ Execute in SSMS



Use

Create Stored Procedure

Tuesday, May 30, 2017 4:53 PM

The screenshot displays the SQL Server Enterprise Manager interface. The top pane shows the SQL script for creating and executing a stored procedure. The script includes a 'Use Northwind;' statement, a 'GO' command, an 'If Exists' block to drop the procedure if it exists, another 'GO' command, a 'Create Procedure' block for 'dbo.GetProducts' with a parameter '@CatID int', an 'AS' block containing a 'Select' statement for products filtered by category, another 'GO' command, and an 'Execute' statement for 'dbo.GetProducts 1;'. The bottom pane shows the results of the execution, a table with 9 rows of product data. A status bar at the bottom indicates the query was executed successfully, returning 12 rows.

```
Use Northwind;
GO

If Exists ( Select * From INFORMATION_SCHEMA.ROUTINES
            Where SPECIFIC_SCHEMA = N'dbo'
            And SPECIFIC_NAME = N'GetProducts' )
    Drop Procedure dbo.GetProducts;
GO

Create Procedure dbo.GetProducts
    @CatID int
AS
    Select ProductID, ProductName, SupplierID,
           UnitPrice, UnitsInStock, UnitsOnOrder,
           ReorderLevel, Discontinued
    From Products
    Where CategoryID = @CatID
    Order By ProductName
GO

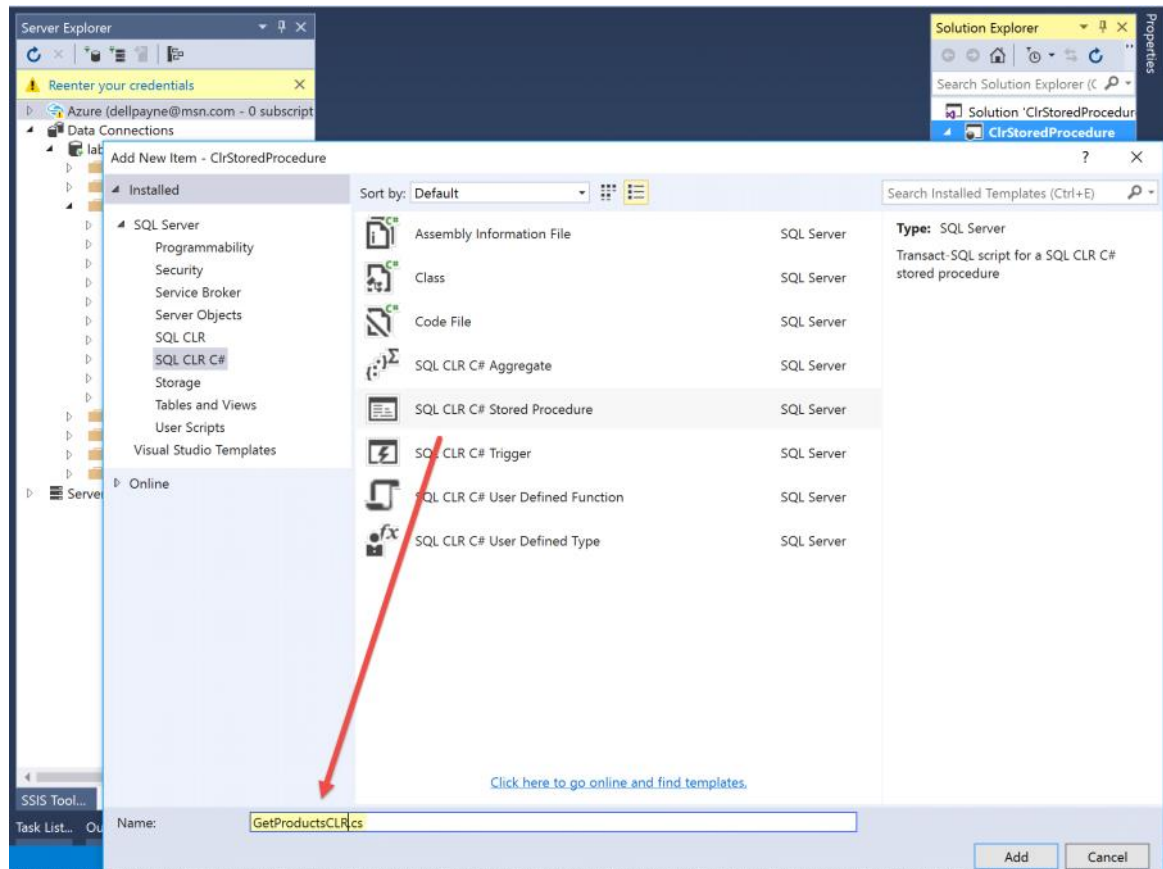
Execute dbo.GetProducts 1;
```

	ProductID	ProductName	SupplierID	UnitPrice	UnitsInStock	UnitsOnOrder	ReorderLevel	Discontinued
1	1	Chai	1	18.00	39	0	10	0
2	2	Chang	1	19.00	17	40	25	0
3	39	Chartreuse verte	18	18.00	69	0	5	0
4	38	Côte de Blaye	18	263.50	17	0	15	0
5	24	Guaraná Fantástica	10	4.50	20	0	0	1
6	43	Ipoh Coffee	20	46.00	17	10	25	0
7	76	Lakkalikööri	23	18.00	57	0	20	0
8	67	Laughing Lumberjack Lager	16	14.00	52	0	10	0
9	70	Outback Lager	7	15.00	15	10	30	0

Query executed successfully. (local)\sqlexpress01 (13.0 ... | LABS\dellp (54) | Northwind | 00:00:00 | 12 rows

Create SP CLR

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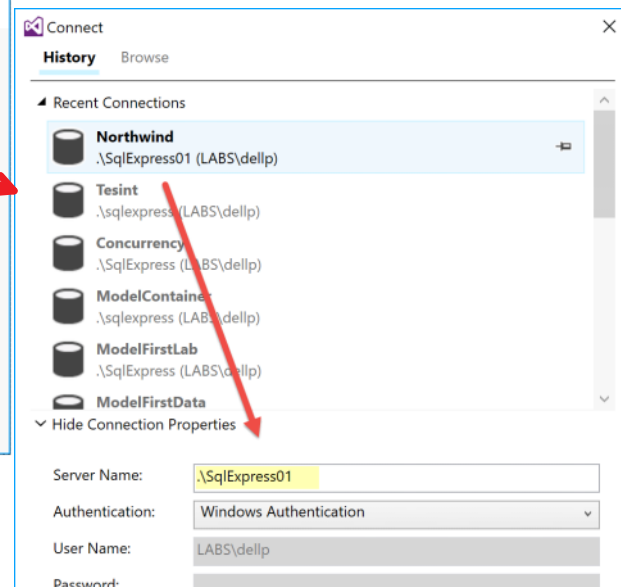
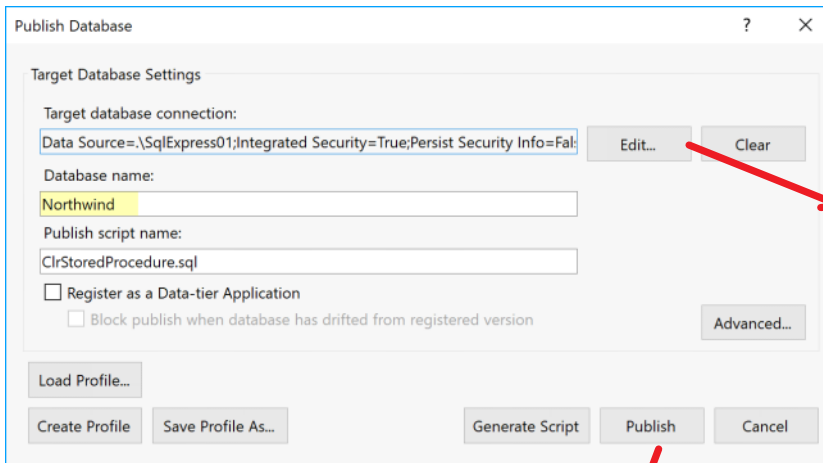
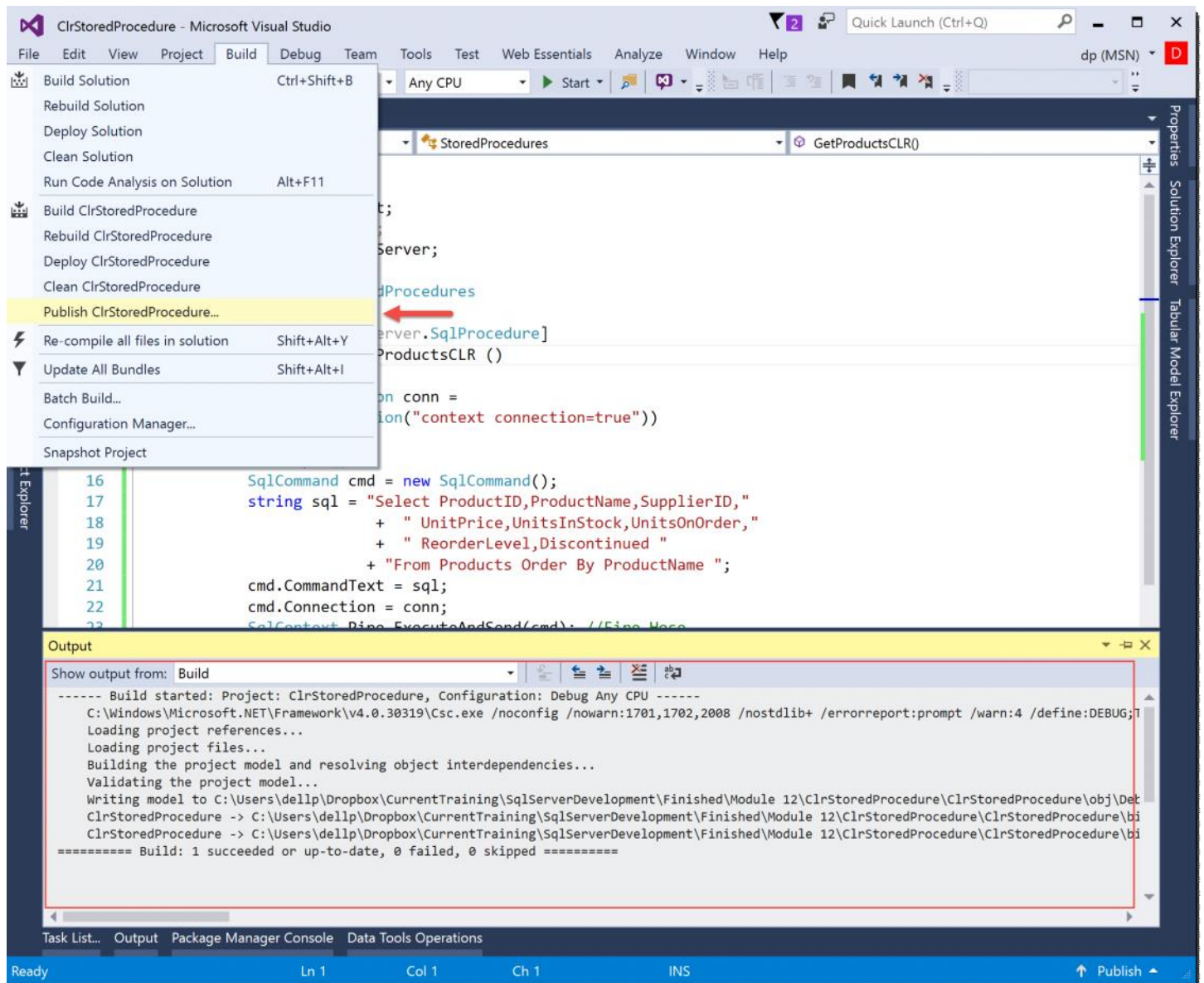


```
GetProductsCLR.cs*  X
ClrStoredProcedure  StoredProcedures

1  using System;
2  using System.Data;
3  using System.Data.SqlClient;
4  using System.Data.SqlTypes;
5  using Microsoft.SqlServer.Server;
6
7  public partial class StoredProcedures
8  {
9      [Microsoft.SqlServer.Server.SqlProcedure]
10     public static void GetProductsCLR (int catID)
11     {
12         using (SqlConnection conn =
13             new SqlConnection("context connection=true"))
14         {
15             conn.Open();
16             SqlCommand cmd = new SqlCommand();
17             string sql = "Select ProductID,ProductName,SupplierID,"
18                 + " UnitPrice,UnitsInStock,UnitsOnOrder,"
19                 + " ReorderLevel,Discontinued "
20                 + "From Products "
21                 + "Where CategoryID = @catID "
22                 + "Order By ProductName";
23
24             cmd.Connection = conn;
25             cmd.CommandText = sql;
26             cmd.Parameters.AddWithValue("@catID", catID);
27             SqlContext.Pipe.ExecuteAndSend(cmd); //Fire Hose
28         }
29     }
30 }
31
```


Build and Publish

Tuesday, May 30, 2017 5:14 PM



Authentication: Windows Authentication

User Name: LABS\dellp

Password:

☐ Remember Password

Database Name: Northwind

Data Tools Operations

▼

▼ Publish Northwind to \SqlExpress01 5:38:38 PM - 5:38:48 PM (0:00:09)

- Creating publish preview...
- Creating database script...
- Executing publish script on database 'Northwind'...

Publish completed successfully

[View Preview](#)

[View Script](#)

[View Results](#)

[Advanced...](#)

Execute CLR Procedure

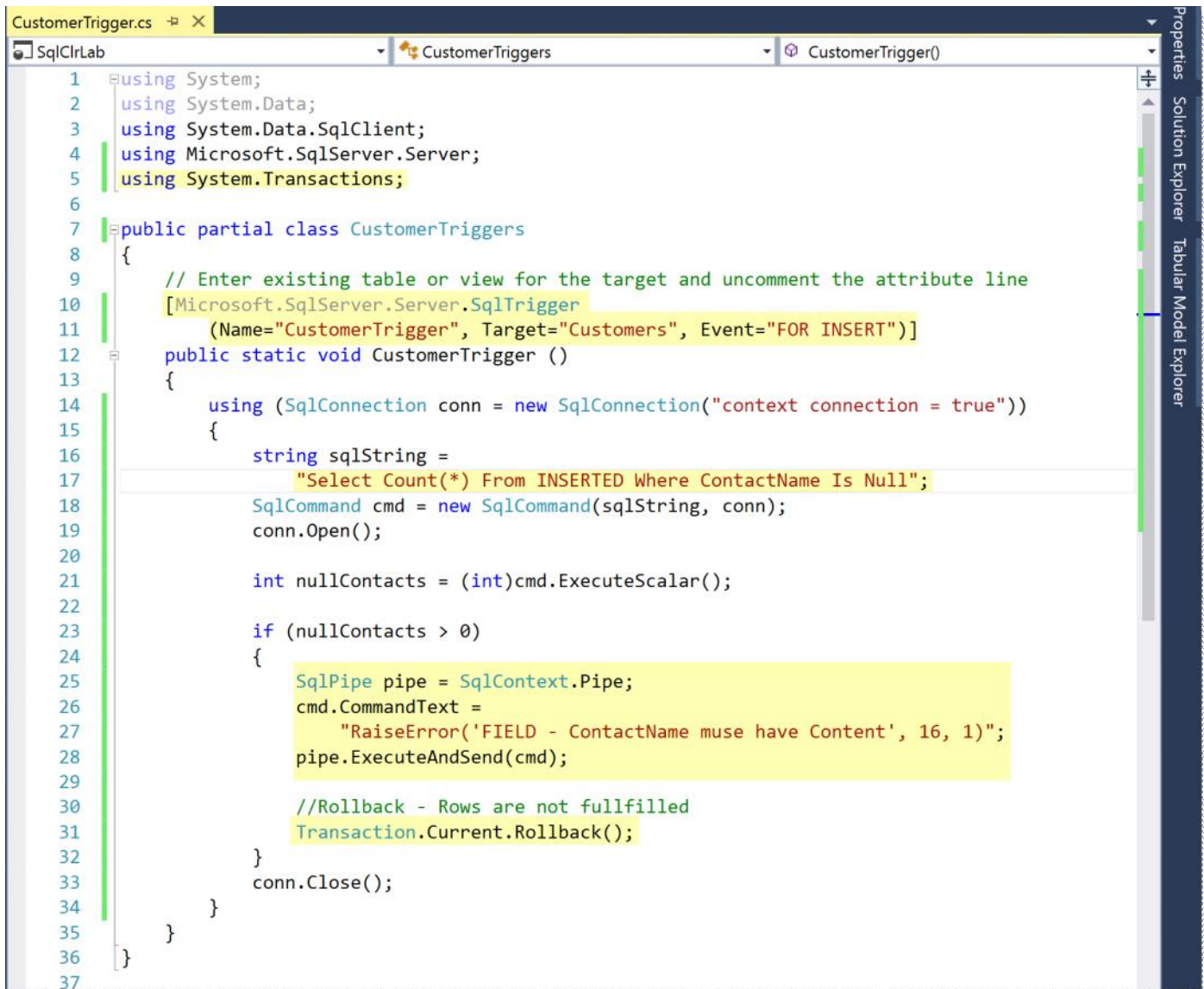
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The screenshot shows the SQL Server Enterprise Manager interface. On the left, the Object Explorer displays the database structure for 'Northwind'. The 'Stored Procedures' folder is expanded, and 'dbo.GetProductsCLR' is highlighted with a red box. A red arrow points from this box to the 'Exec GetProductsCLR 1' command in the SQL Query window. The SQL Query window shows the command 'Exec GetProductsCLR 1' and the results of the query. The results are displayed in a table with 12 rows and 8 columns: ProductID, ProductName, SupplierID, UnitPrice, UnitsInStock, UnitsOnOrder, ReorderLevel, and Discontinued. The status bar at the bottom indicates 'Query executed successfully.' and '12 rows'.

	ProductID	ProductName	SupplierID	UnitPrice	UnitsInStock	UnitsOnOrder	ReorderLevel	Discontinued
1	1	Chai	1	18.00	39	0	10	0
2	2	Chang	1	19.00	17	40	25	0
3	39	Chartreuse verte	18	18.00	69	0	5	0
4	38	Côte de Blaye	18	263.50	17	0	15	0
5	24	Guaraná Fantástica	10	4.50	20	0	0	1
6	43	Ipih Coffee	20	46.00	17	10	25	0
7	76	Lakkalikööri	23	18.00	57	0	20	0
8	67	Laughing Lumberjack Lager	16	14.00	52	0	10	0
9	70	Outback Lager	7	15.00	15	10	30	0
10	75	Rhönbräu Klosterbier	12	7.75	125	0	25	0
11	34	Sasquatch Ale	16	14.00	111	0	15	0
12	35	Steeleye Stout	16	18.00	20	0	15	0

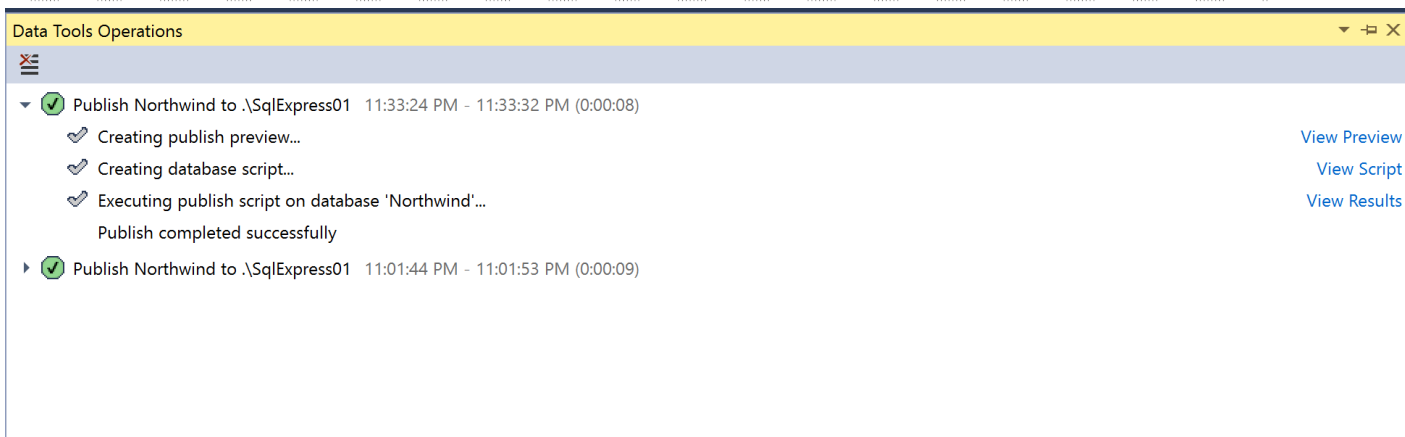
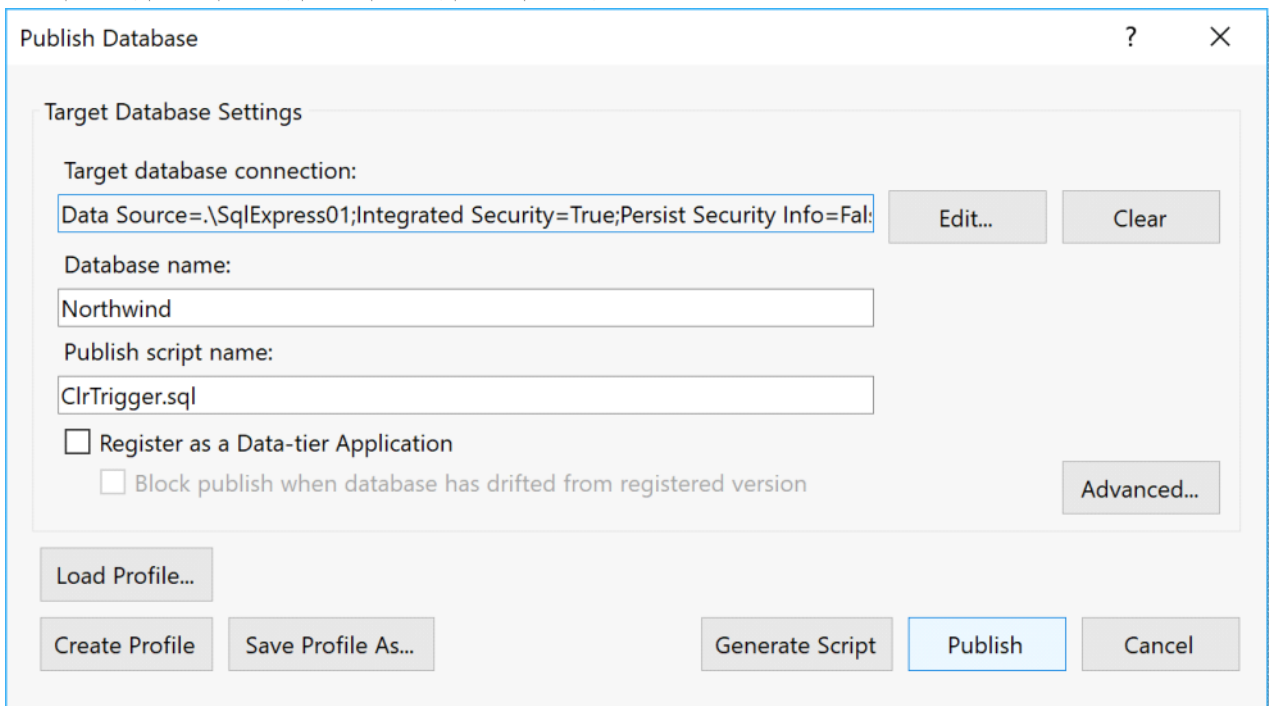
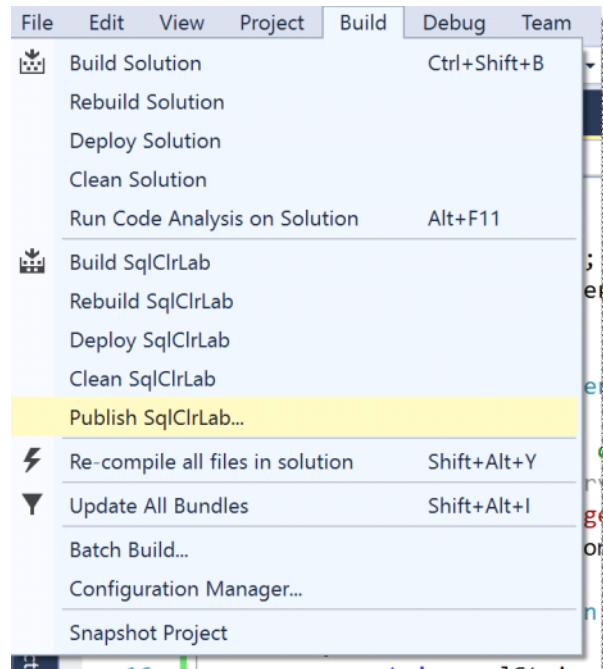
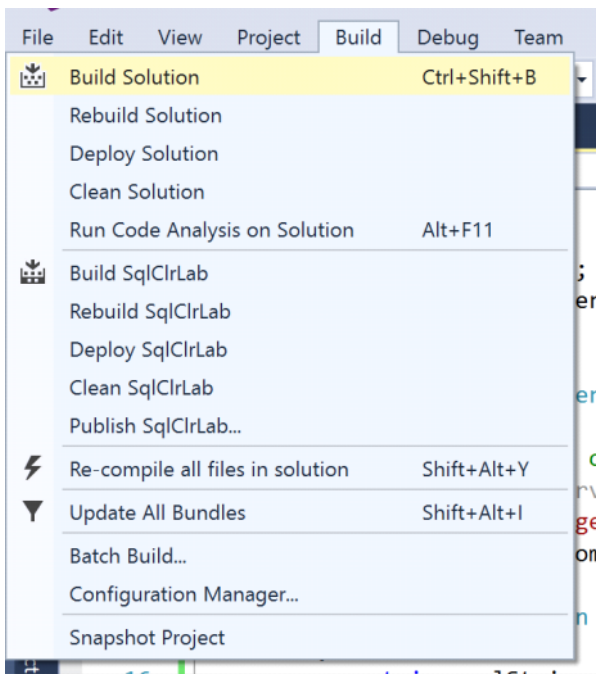
Create Trigger & Publish

Wednesday, May 31, 2017 10:24 PM



```
1 using System;
2 using System.Data;
3 using System.Data.SqlClient;
4 using Microsoft.SqlServer.Server;
5 using System.Transactions;
6
7 public partial class CustomerTriggers
8 {
9     // Enter existing table or view for the target and uncomment the attribute line
10    [Microsoft.SqlServer.Server.SqlTrigger
11    (Name="CustomerTrigger", Target="Customers", Event="FOR INSERT")]
12    public static void CustomerTrigger ()
13    {
14        using (SqlConnection conn = new SqlConnection("context connection = true"))
15        {
16            string sqlString =
17                "Select Count(*) From INSERTED Where ContactName Is Null";
18            SqlCommand cmd = new SqlCommand(sqlString, conn);
19            conn.Open();
20
21            int nullContacts = (int)cmd.ExecuteScalar();
22
23            if (nullContacts > 0)
24            {
25                SqlPipe pipe = SqlContext.Pipe;
26                cmd.CommandText =
27                    "RaiseError('FIELD - ContactName muse have Content', 16, 1)";
28                pipe.ExecuteAndSend(cmd);
29
30                //Rollback - Rows are not fullfilled
31                Transaction.Current.Rollback();
32            }
33            conn.Close();
34        }
35    }
36 }
37
```

☐ Build and Publish



Test Trigger

Wednesday, May 31, 2017 11:28 PM

The screenshot shows the SQL Server Enterprise Manager interface. The top pane is a query window titled 'InsertCustomer.sp.s...d (LABS\dellp (53))*'. It contains the following SQL code:

```
USE Northwind;
GO

BEGIN TRY
    INSERT INTO Customers
        (CustomerID ,CompanyName, ContactName)
    VALUES ('dpayn', 'Payne Inc', NULL);
END TRY
BEGIN CATCH
    SELECT ERROR_NUMBER() AS ErrorNum, ERROR_MESSAGE() AS ErrorMessage;
END CATCH;

--BEGIN TRY
--    INSERT INTO Customers
--        (CustomerID ,CompanyName, ContactName)
--    VALUES ('dpayn', 'Payne Inc', 'Dell Payne');
--END TRY
--BEGIN CATCH
--    SELECT ERROR_NUMBER() AS ErrorNum, ERROR_MESSAGE() AS ErrorMessage;
--END CATCH;
```

The bottom pane shows the 'Messages' tab. It displays the following error message:

Msg 102, Level 15, State 1, Line 3
Incorrect syntax near 'FIELD - ContactName muse have Content'.

Below the error message, it shows the execution results:

(0 row(s) affected)

(1 row(s) affected)

The status bar at the bottom indicates: 'Query completed with errors. (local)\sqlexpress01 (13.0 ... LABS\dellp (53) | Northwind | 00:00:00 | 1 rows

Potential Error FIX

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<http://umashanthan.blogspot.com/2014/03/how-to-create-and-deploy-clr-in-sql.html>

When you try to deploy it, you might get error an error as:

SQL71501: Trigger: [dbo].[MyCLRTrigger] has an unresolved reference to object [dbo].[TransSample]

This problem is due to project does not have proper metadata about the Target Database object for that import the target database under project to do it, follow the following steps:

Close the project and locate to the project folder and delete the *.dbmdl file, then open the project aging and import the database by right click on project and under import as shown below screen dump. Once you have done this you would be able to deploy the CLR successfully.

