Entity Framework – Code First Approach – Part 1

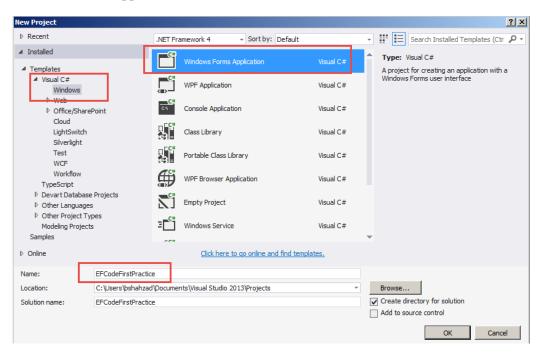
This guide will help you in creating a simple windows application which will interact with database (SQL Server) using Entity Framework.

This tutorial is prepared with Visual Studio 2013 + SQL Server.

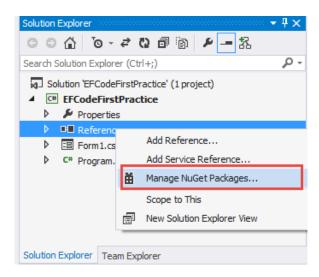
Version	Last updated	Comments	Modified By
V1.0	28-04-2016		Bilal Shahzad
V2.0	29-04-2016	Identity Column	Bilal Shahzad
		screen shot is added in	
		Point 5.	

Step by Step Walkthrough

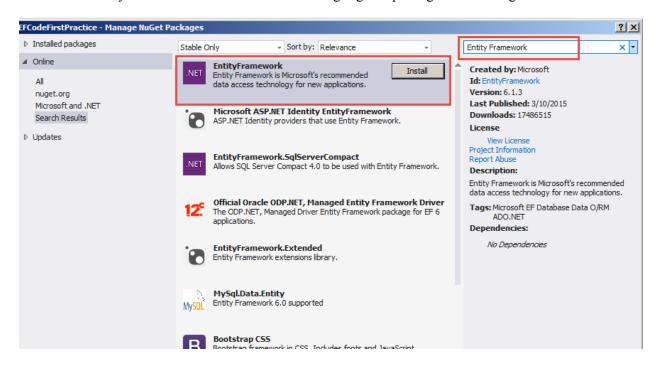
1- Create a new "Windows" Application.



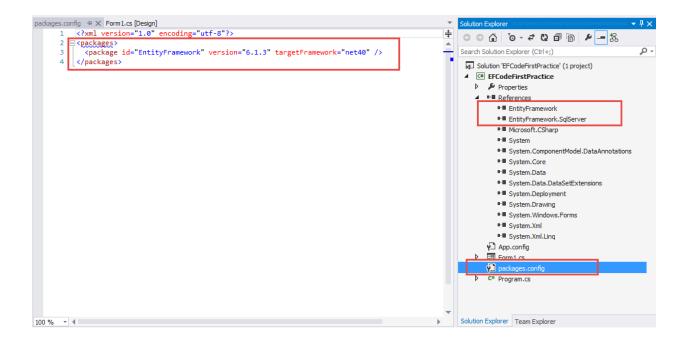
2- To add reference of "Entity Framework" package, right click on "References" and choose "Manage NuGet Packages".



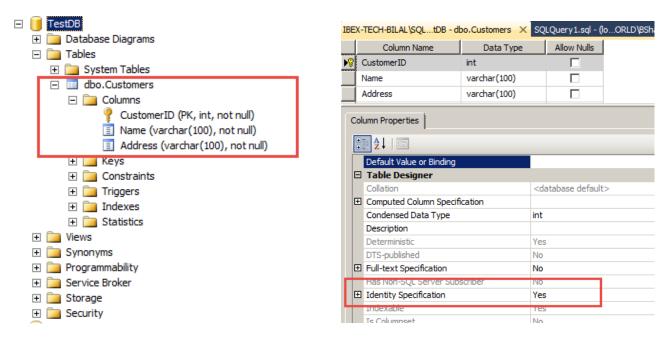
3- Search for "Entity Framework" and then install the highlighted package in following screenshot.



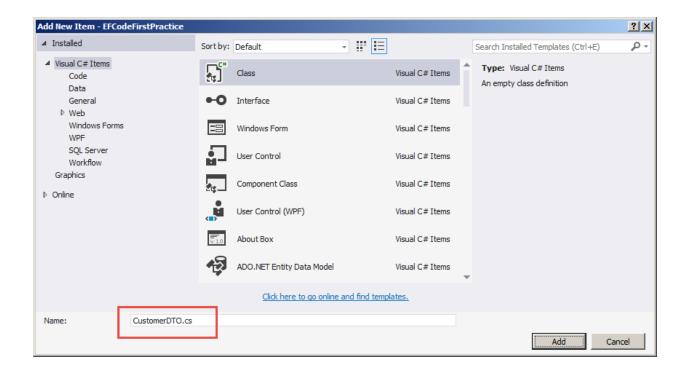
4- This will add highlighted DLLs, "packages.config" file and some configuration detail in "App.config".



5- Now create a database (e.g. TestDB) in SQL Server and then create a table (e.g. dboCustomers) with schema highlighted in screenshot below. Please make sure that for "CustomerID" column "Identity" property is "Yes".



- 6- Now we need to add some classes to do interaction with database using Entity Framework. We'll add an entity (DTO) class to represent our table. We'll add a DbContext class to represent our database. And then we'll add connection string in our configuration file.
- 7- Add a new class file with name "CustomerDTO.cs"



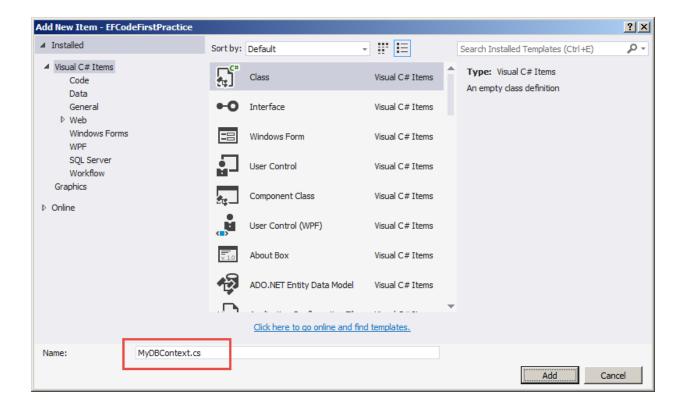
8- In newly created file, add references as highlighted below. Then add the code as shown in the screenshot. Here we are mapping our "CustomerDTO" class with table "Customers". We are also annotating our property with "Key" attribute to declare that this is primary key column.

```
CustomerDTO.cs + × packages.config

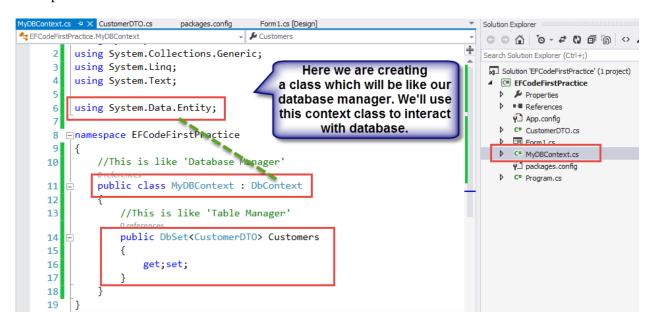
    Address

                                                                                        using System.Text;
                                                                                        Search Solution Explorer (Ctrl+;)
     5
                                                                                         Solution 'EFCodeFirstPractice' (1 project)
         using System.ComponentModel.DataAnnotations;
                                                                                           C# EFCodeFirstPractice
         using System.ComponentModel.DataAnnotations.Schema;
                                                                                           Properties
                                                                                             ■-■ References
     9 ⊟namespace EFCodeFirstPractice
                                                                                             App.config
                                                                                              C# CustomerDTO.cs
    10
         {
                                                                                              == Form1.cs
    11
              [Table("Customers")]
                                                                                              packages.config
                                                                                              C# Program.cs
              public class CustomerDTO
    12
    13
                 [Key]
    14
                                                             Here we are creating our
    15
                  public int CustomerID { get; set; }
                                                                   DTO which is
                                                               corrosponding to our
                  public String Name { get; set; }
    16
                                                                  Database Table
    17
                  public String Address { get; set; }
    18
    19
    20
```

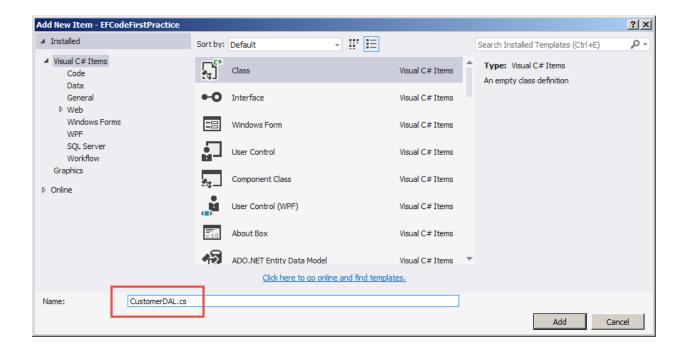
9- Now we need to create a class for our DataContext. Create a class file as shown below.



10- In newly created file, add code as shown below. Here we are creating a class of type (DbContext). This class will be responsible for managing all interactions with database. This class will contain "DbSet". DbSet will correspond to our tables.



11- Now let's write a class to write our database access logic.



12- Here is the code to save an entity in database.

```
→ SaveCustomer(CustomerDTO dto)

                                                                     2
         using System.Collections.Generic;
                                                                    Search Solution Explorer (Ctrl+;)
      3
         using System.Linq;
                                                                     Solution 'EFCodeFirstPractice' (1
                                                                      EFCodeFirstPractice
     4
         using System.Text;
                                                                       Properties
      5
                                                                        ■•■ References
       ■namespace EFCodeFirstPractice
      6
                                                                         App.config
      7
         {
                                                                         C# CustomerDAL.cs
                                                                         C# CustomerDTO.cs
             0 references
                                                                       Form1.cs
     8
             public class CustomerDAL
                                                                        C# MyDBContext.cs
     9
                                                                         packages.config
                  0 references
                                                                         C# Program.cs
    10
                  public void SaveCustomer(CustomerDTO dto)
    11
                      using (var ctx = new MyDBContext())
    12
    13
                          ctx.Customers.Add(dto);
    14
    15
                          ctx.SaveChanges();
    16
                      }
    17
    18
    19
         }
```

13- Here is the code to get all customers from database (as list of entities) and getting a single customer.

```
CustomerDAL.cs + X MyDBContext.cs CustomerDTO.cs packages.config
                                                            Form1.cs [Design]
                                                                                                                   ○ ○ ☆ · ○ · ⇄ ♡
     18
                                                                                                                   Search Solution Explorer (Ctrl+ 🔑
                                                                                                                    Solution 'EFCodeFirstPractice'
     19
                public List<CustomerDTO> GetAllCustomers()
                                                                                                                      C# EFCodeFirstPractice
     20
                                                                                                                      Properties
                                                                                                                        ■-■ References
     21
                     using (var ctx = new MyDBContext())
                                                                                                                         App.confia
     22
                                                                                                                        C# CustomerDAL.cs
                          var list = ctx.Customers.ToList();
     23
     24
                          return list;
                                                                                                                      Form1.cs
                                                                                                                         C# MyDBContext.cs
     25
                     }
                                                                                                                         packages.config
     26
                                                                                                                        C# Program.cs
     27
                public CustomerDTO GetCustomerByID(int id)
     28
                     using (var ctx = new MyDBContext())
     29
     30
                          var obj = ctx.Customers.Where(c => c.CustomerID == id).FirstOrDefault()
     31
     32
                          return obj;
     33
                     }
     34
     35
     36
```

14- Here is code to delete a customer. To delete/update a record, we'll have to read it first as entity should be attached with context.

```
X MyDBContext.cs
                         CustomerDTO.cs
                                                          Form1.cs [Design]
                                                                                                                     Solution Explorer
                                                     → Ø DeleteCustomer(int id)
                                                                                                                      G D A To - ₽ D E
                     return obj;
32
                                                                                                                     Search Solution Explorer (Ctrl+;)
33
                                                                                                                      Solution 'EFCodeFirstPractice
34
           }
                                                                                                                      ▲ C# EFCodeFirstPractice
                                                                                                                        Properties
           public void DeleteCustomer(int id)
35
                                                                                                                        ▶ ■■ References
                                                                                                                           App.config
36
                                                                                                                        C# CustomerDAL.cs
37
                using (var ctx = new MyDBContext())
                                                                                                                            C* CustomerDTO.cs
38
                                                                                                                           Form1.cs
39
                     var obj = ctx.Customers.Where(c => c.CustomerID == id).FirstOrDefault();
                                                                                                                           C# MyDBContext.cs
40
                     ctx.Customers.Remove(obj);
                                                                                                                            ♀ packages.config
                                                                                                                        ▶ C* Program.cs
41
                     ctx.SaveChanges();
42
43
44
45
46
```

15- Here is code to update a customer. To delete/update a record, we'll have to read it first as entity should be attached with context.

```
nerDAL.cs + X MyDBContext.cs
                             CustomerDTO.cs packages.config
                                                            Form1.cs [Design]
                                                                                                                            ▼ Solution Explorer
EFCodeFirstPractice.CustomerDAL
                                                             → Q UpdateCustomer(CustomerDTO dto)
                                                                                                                               G ⊖ 🙆 G ⊖ €
     40
                     ctx.Customers.Remove(obj);
                                                                                                                               Search Solution Explorer (C 🔎
     41
                     ctx.SaveChanges();
                                                                                                                                Solution 'EFCodeFirstPrac
     42
                                                                                                                                  C# EFCodeFirstPraction
                                                                                                                                  Properties
     43
            }
                                                                                                                                  ▶ ■·■ References
     44
                                                                                                                                     Ann config
                                                                                                                                     C# CustomerDAL.cs
     45
            public void UpdateCustomer(CustomerDTO dto)
                                                                                                                                     C# CustomerDTO.cs
     46
                                                                                                                                  Form1.cs
     47
                using (var ctx = new MyDBContext())
                                                                                                                                     C# MyDBContext.cs
                                                                                                                                     packages.config
     48
                                                                                                                                     C# Program.cs
     49
                     //Read the object from database
                     var obj = ctx.Customers.Where(c => c.CustomerID == dto.CustomerID).FirstOrDefault();
     50
     51
                     //Make changes
     52
                     obj.Name = dto.Name;
     53
                     obj.Address = dto.Address;
     54
                     //Save Changes
     55
                     ctx.SaveChanges();
     56
     57
     58
```

16- We need to define our connection string in our configuration file (app.config or web.config). With default settings, connection string name should match with our Data context class. So here we are providing following information (change this information according to your system)

Connection String Name: MyDBContext

Server: =.\SQLEXPRESS2008

Database: TestDB User Id: Sa

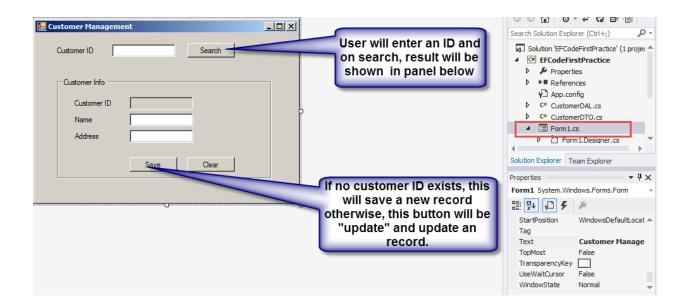
Password: P@ssword12345

```
nfig + X Form1.cs
                                                                              MyDBContext.cs
                                                                                                                     CustomerDTO.cs packages.config Form1.cs [Design]

    Solution Explorer

              <?xml version="1.0" encoding="utf-8"?>
                                                                                                                                                                                                                                                                                                                                                00000-21
         Search Solution Explorer (Ctr
                 <configSections>
                                                                                                                                                                                                                                                                                                                                                 ▲ EFCodeFirstPrac
                        <!-- For more information on Entity Framework configuration, visit <a href="http://go.microsoft.com/fwlink/?LinkID=237468">http://go.microsoft.com/fwlink/?LinkID=237468</a>
                                                                                                                                                                                                                                                                                                                                                           Properties
                        <section name="entityFramework" type="System.Data.Entity.Internal.ConfigFile.EntityFrameworkSection, EntityFrameworkSection, EntityFrameworkSecti
                                                                                                                                                                                                                                                                                                                                                            ■·■ Reference
                    </configSections>
                                                                                                                                                                                                                                                                                                                                                            App.config
                   <connectionStrings>
                                                                                                                                                                                                                                                                                                                                                       C# CustomerDTO.c
                        <add name="MyDBContext"
                                    connectionString="Data Source=.\SQLEXPRESS2008;Initial Catalog=TestDB;User Id=sa;Password=P@ssword12345;"
                                                                                                                                                                                                                                                                                                                                                       Form1.cs
                                                                                                                                                                                                                                                                                                                                                             C# MyDBContext.c
                                    providerName="System.Data.SqlClient" />
 10
                                                                                                                                                                                                                                                                                                                                                             packages.confi
 11
                    </connectionStrings>
                                                                                                                                                                                                                                                                                                                                                            C# Program.cs
 12
                    <entityFramework)</pre>
                        <defaultConnectionFactory type="System.Data.Entity.Infrastructure.LocalDbConnectionFactory, EntityFramework">
 13
 14
                             <parameters>
                                   <parameter value="v11.0" />
 15
                                                                                                                                                                                                                                                                                                                                                  XML Document
 16
                                                                                                                                                                                                                                                                                                                                                17
                        </defaultConnectionFactory>
                                                                                                                                                                                                                                                                                                                                                    Encoding
 18
                        oviders>
                                                                                                                                                                                                                                                                                                                                                    Output
                             19
                                                                                                                                                                                                                                                                                                                                                    Schemas
 20
                        </providers>
                                                                                                                                                                                                                                                                                                                                                    Stylesheet
 21
                   </entityFramework>
             </configuration>
```

17. Now are done with all logic to interact with database. Let's design your windows form as shown in the screenshot below. Name your controls properly. Here we are allowing the user to save a new customer. If user searches a customer by providing the ID, record will be loaded in the panel and record will be updated if user saves it.



17- In the "Save" button click event, add following code. This code is reading the values from text boxes. If "readyonly" customer id text box is not having anything, it will insert the record otherwise it will update the record.

```
orm1.cs <sup>+</sup> × CustomerDAL.cs MyDBContext.cs CustomerDTO.cs packages.config Form1.cs [Design]

→ Ø<sub>a</sub> btnSave_Click(object sender, EventArgs e)
terCodeFirstPractice.Form1
                    1 reference
                    private void btnSave_Click(object sender, EventArgs e)
     19 Ė
     20
                         CustomerDTO dto = new CustomerDTO();
     21
                         //Get value from ID textbox
     22
     23
                         int id = 0;
     24
                         Int32.TryParse(txtCustomerID.Text, out id);
     25
                         dto.CustomerID = id;
     26
                         dto.Name = txtName.Text;
     27
                         dto.Address = txtAddress.Text;
     28
                                                                               Parse textbox
     29
                                                                            value, if no valid id,
     30
                         CustomerDAL dal = new CustomerDAL();
                                                                            it will place 0 in id.
     31
                         if (id == 0) //Insert Case
     32
                         {
     33
                             dal.SaveCustomer(dto);
     34
                         }
                         else //update case
     35
     36
                              dal.UpdateCustomer(dto);
     37
     38
                         }
     39
     40
                         MessageBox.Show("Record is saved!");
```

18 – Run the application; provide some data and click "Save". If you face any error here, check if all steps are followed correctly.



18- Run query in SQL Server to verify if data is saved or not.



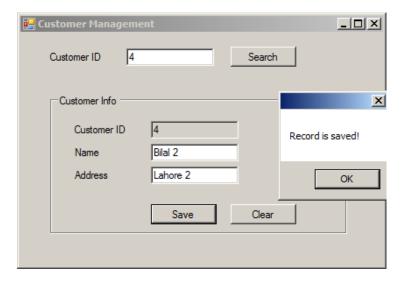
19- Now let's write logic of Search button click event handler. Here we are getting record against the id and showing in the fields.

```
App.config
           Form1.cs + X CustomerDAL.cs
                                       MyDBContext.cs
                                                       CustomerDTO.cs
                                                                                       Form1.cs [Design]
                                                                                                             ▼ Solution Explorer
                                                                       packages.config
                                                     → Ø btnSearch_Click(object sender, EventArgs e)
terCodeFirstPractice.Form1
                                                                                                                G O A O - 2 Q A B
                                                                                                               Search Solution Explorer (Ctrl+;)
      43
                      private void btnSearch_Click(object sender, EventArgs e)
                                                                                                                 Solution 'EFCodeFirstPractice' (1 p
      44
                                                                                                                 ▲ C# EFCodeFirstPractice
                           int id = 0;
      45
                                                                                                                   Properties
                                                                                                                   ▶ ■■ References
                           Int32.TryParse(txtCustomerIDToSearch.Text, out id);
      46
                                                                                                                      Ŷ☐ App.config
                           if (id == 0)
      47
                                                                                                                     C# CustomerDAL.cs
      48
                                                                                                                      C# CustomerDTO.cs
      49
                                MessageBox.Show("Invalid ID");
                                                                                                                  ▶ ≣ Form1.cs
      50
                                return;
                                                                                                                      ►" MVDBContext.cs
                                                                                                                      packages.config
      51
                           }
                                                                                                                   C# Program.cs
      52
                           else
                                                                                                                Solution Explorer Team Explorer
      53
                           {
                                                                                                                Properties
      54
                                CustomerDAL dal = new CustomerDAL();
      55
                                var obj = dal.GetCustomerByID(id);
                                                                                                                56
                                if (obj != null)
      57
      58
                                     txtCustomerID.Text = obj.CustomerID.ToString();
                                     txtName.Text = obj.Name;
      59
                                     txtAddress.Text = obj.Address;
      60
      61
                                }
                                else
      62
                                     MessageBox.Show("Invalid ID");
      63
      64
```

20- Run the application, provide the ID and search it.

🔛 Customer Managem	ent		_
Customer ID 4		Search	
Customer Info			
Customer ID	4		
Name	Bilal		
Address	Lahore		
	Save	Clear	

21- Now make any changes in the data and Save.



22- Verify in SQL Server if changes are made or not.

