2015

SQL Fundamentals

LEARN TO DESIGN & BUILD A WINDOWS SQL DATABASE

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Database

What is a database?
A file structured for the repository of data. Organized for easy retrieval, sorting, grouping, relating to other data, used to analysis information in numerous ways.

Example: Customer database
To store Customer Data, use a simple text file, not easily manageable. Why not use an Excel spreadsheet file? No easy way to relate sales data to customer information

Relational Database Management System RDBMS
Relational Database Theory – Organizing data into tables that can be related together, this reducing redundancy and increasing the integrity of the data.

Normalization – the process of determining what information belongs in which tables to minimize redundancy and increase integrity.

Database Objects
- Tables contain
  - Columns
  - Rows or records the value of a single column and a single row is a called a "field"

Data Integrity

Keeping data valid, of the correct data type, etc., so that it is usable for its intended purpose.
Customers can be moved separate tables

What Needs to be Defined
- The data type for each column in a table
- The maximum size of data that will be stores in the column
- The nullability of a column

In the customer table the credit limit field is a real data type, this is so that the user has to enter a numerical value, so that calculations can be made using the numerical data. The real data type is approximate numerical. The customer since is a date time data type, only dates can be enter into this field. Null fields allow records to be saved to the database, to maintain data integrity.

Primary Key
A field or combination of fields that make a given row unique in the database. A way of differentiating each row in a table when all other fields might be duplicated in other rows in the same table.

Identity column an attribute that will be automatically increment a field of data in each successive row added to the database. Typically used on the primary key fields to make them unique.

Foreign key
Relate one or more rows in one table to a record in another table that shares the same value in its primary key. To check who made the order use customerID as a foreign key to relate the tables in the database. Data is linked, order is linked to the customer who created the order, i.e. query the database; how much a customer has spent. Adding a FK constraint prevents deletions in the customer table to create orphaned rows in the order table. FK constraints enforce "Referential Integrity".

Customer			
KEY	customerID	int (11)	
	firstName	varchar(50)	
	lastName	varchar(50)	
	address	varchar(200)	Null
	city	varchar(200)	Null
	county	char(10)	Null
	zip	char(10)	Null
	creditLimit	real	
	customerSince	datetime	

Order	
KEY	orderID
	orderDate
	orderAmount
	paymentType
FK	customerID

SQL Fundamentals

Download and PowerShell, run SQLite3.exe create new database.

```
sqlite>../sqlite3.exe PatsClothesShop.db
Customer     Order
```

```
sqlite> CREATE TABLE Customer(
   costumerID INT PRIMARY KEY   NOT NULL,
   firstName           CHAR(50) NOT NULL,
   lastName            CHAR(50) NOT NULL,
   address             VARCHAR(200),
   city                CHAR(10),
   county              CHAR(10),
   creditLimit…….      REAL,
   costomerSince       DATETIME
);
```

```
sqlite> CREATE TABLE Order(
   orderID INT PRIMARY KEY    NOT NULL,
   orderDate          DATETIME NOT NULL,
   orderAmount        REAL,
   paymentType        INT,
   customerID         INT      NOT NULL
);
```

```
sqlite>.tables
Customer     Order
```

```
sqlite>.header on
sqlite>.mode column
sqlite>.timer on
```

Insert 5 customers like below

```
INSERT INTO Customers (firstName, lastName, address, city, county, creditLimit,
costomerSince)
VALUES (1, 'Paul', 'Murphy' 32, 'Apt 1', 'Dublin', 'Dublin', 15000.00, '2007-01-01
10:00:00' );
```

Databinding

Utilizing Databinding in a C# Win forms App. Data sets working with the System.Data Namespace (aka ADO.NET) Working with the Visual Studio's IDE's tools, windows, etc. Microsoft Visual Studio 2013 makes it easily to create databases for beginners and experts.

Databinding the user interface controls, retrieve and display data from a data source without requiring the programmer to worry about all the programmatic details of this process. Each user interface control has different properties that can be bound to a data source.

ADO = ActiveX Data Objects
User interface controls must be data binding "aware", ADO.NET(System.Data) classes support data binding.

- ADO.NET creates a connection to a data source (database)
- ADO.NET manages the conversation (requests and responses) between your application and the database.
- ADO.NET manages the data that is retrieved forum the response to the database query.
- BindingSource manages the connection between the user interface controls and the underlying data set retrieved from the database. Provides an application interface to reduce learning curve for the end user. Restrict access to the database to maintain security. To control the presentation of the data. Maintain the integrity of the data.Practice

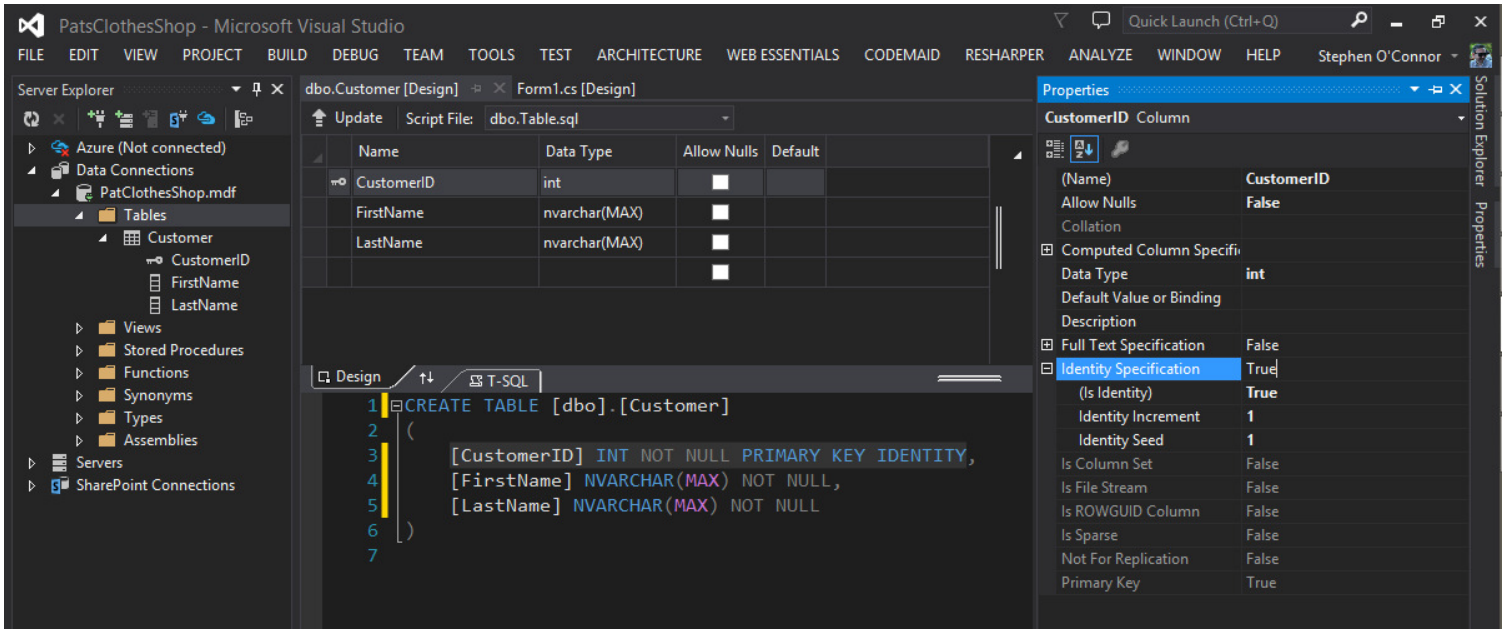
ADO.NET does a lot of the grunt work, it is not necessary to know all about ADO.NET.

Write application interface

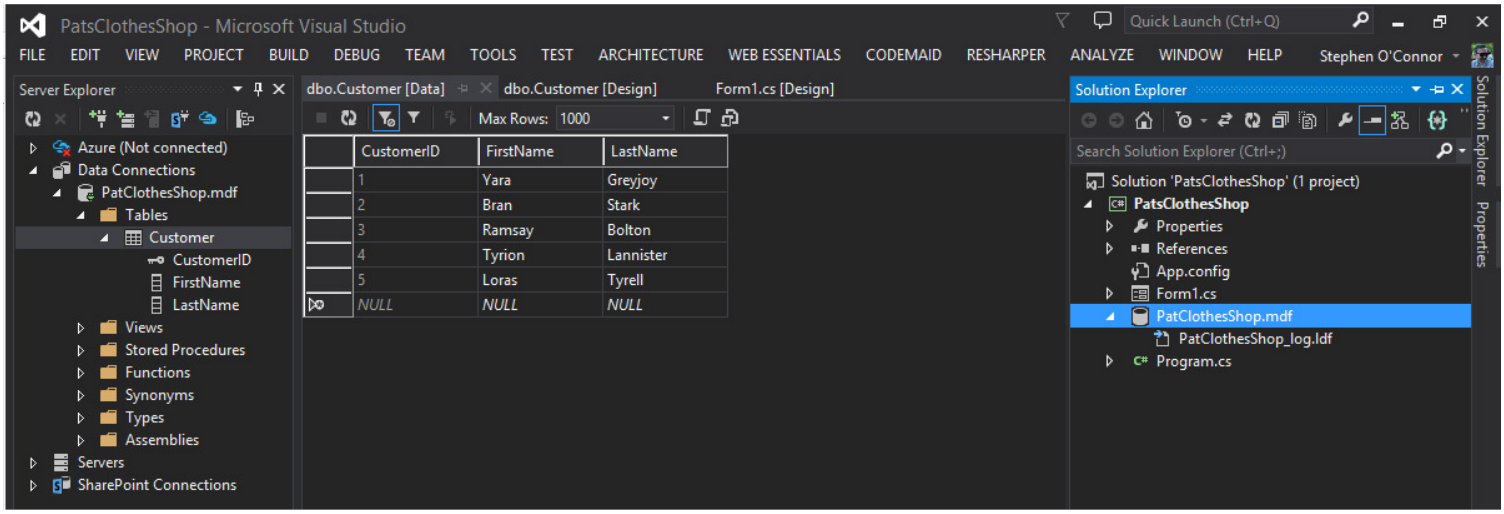
- Reduce the learning curve for the end user
- Restrict access to the database to maintain security
- To control the presentation of the data – website, content management system
- To maintain the integrity of the data

SQL Server
A high end relational database management system.
SQL server 2013 Express Edition, similar power, but intended for smaller projects.
In Visual Studio 2013 download the latest SQL Server Data Tools, if already not installed.

Learn by doing
Create a new project and a database called PatClothesShop
Create a project called Pats
Add a table called customer with the data below.

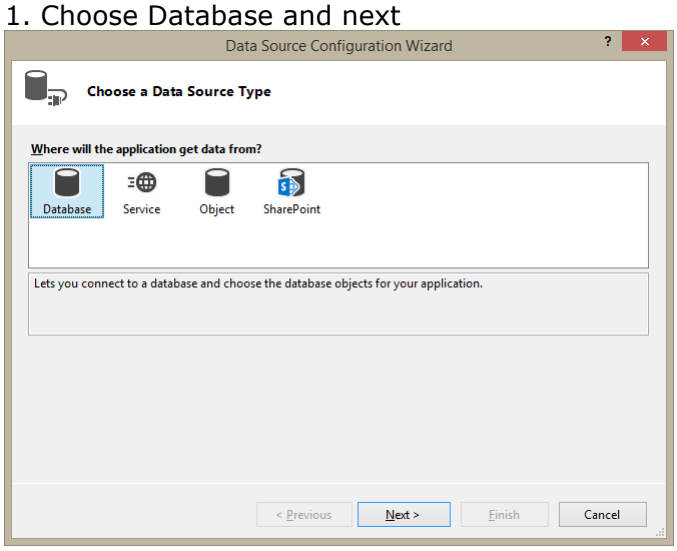


Go to show table data in the Server Explorer add five persons.

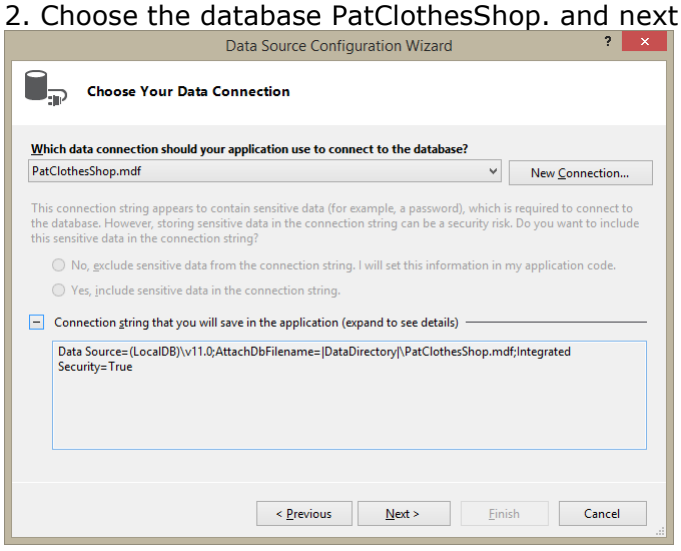


On the menu bar, choose View, Other Windows, Data Sources (or choose the Shift+Alt+D keys). Follow the steps.

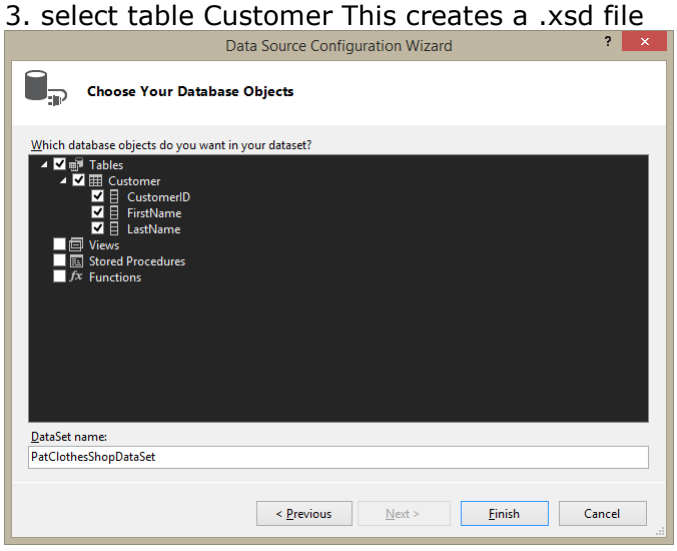
1. Choose Database and next



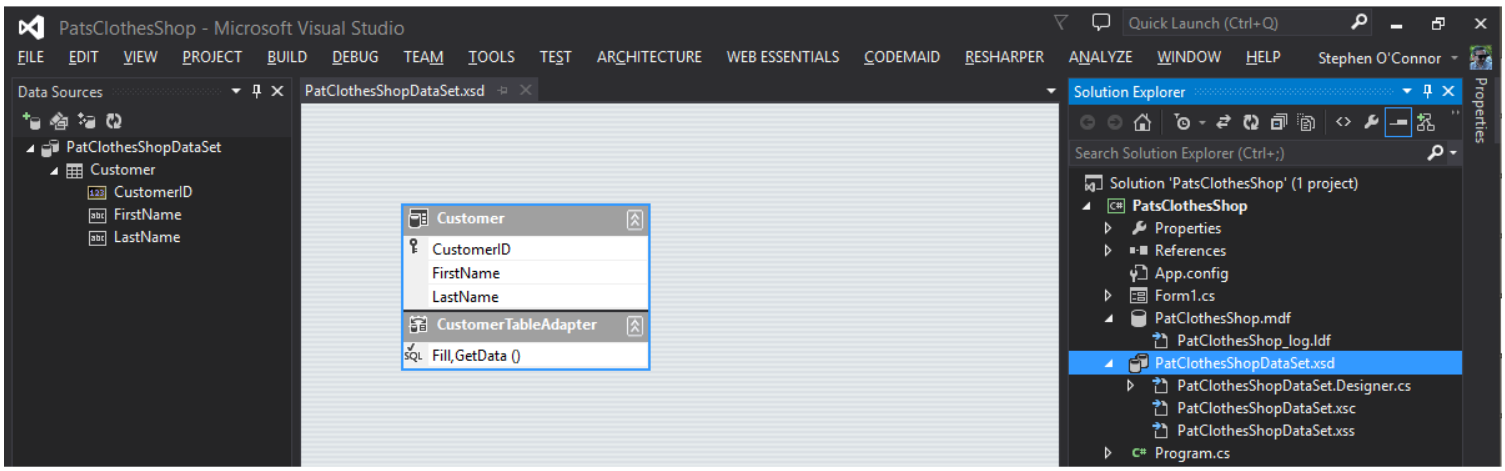
2. Choose the database PatClothesShop. and next



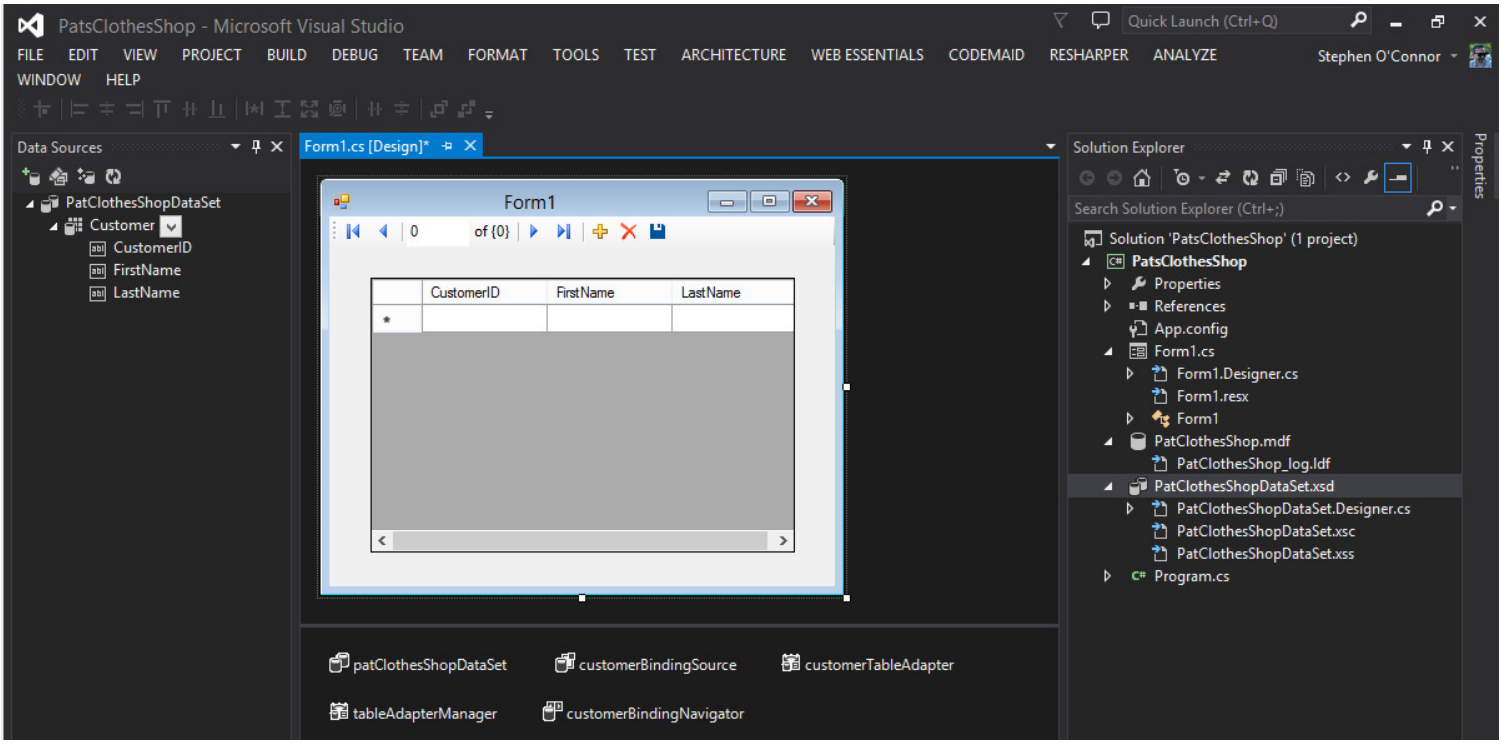
3. select table Customer This creates a .xsd file



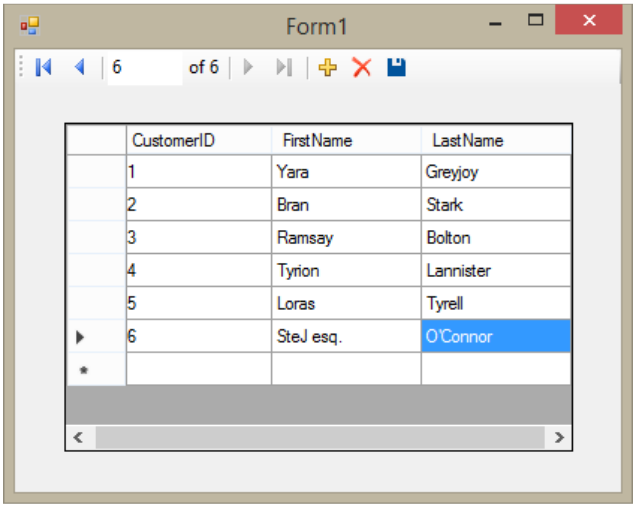
A PatClothesDataSet.xsd file right click on the xsd file and view designer mode. Xsd file is the xml schema document. The xsd file a local copy of database, this file defines the database, temporary stores the data.



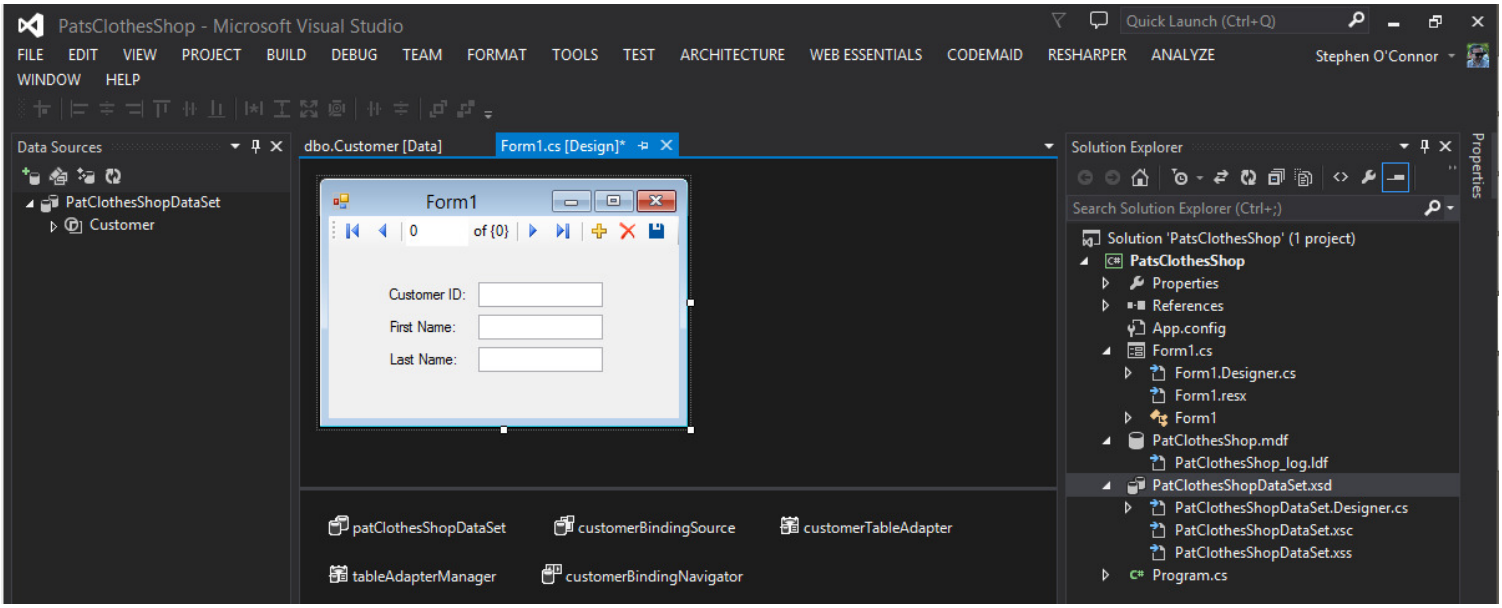
Drag and drop customer table from the Data Sources toolbar.



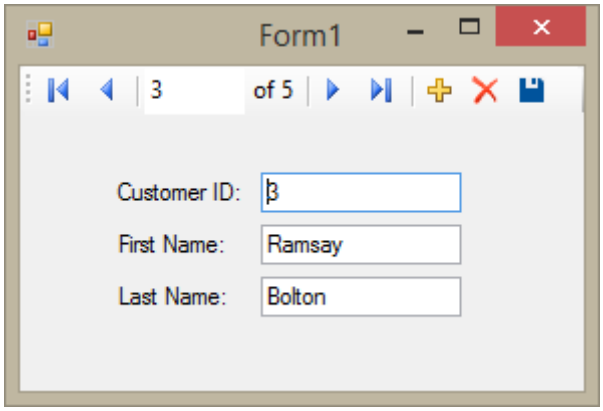
Run the project. A grid of the database navigate through the grid and add an extra row.



To create a Form view; select details from the drop down onto Form1



Run the application and navigate through the details view.



Designer tray.
patClothesShopDataSet
The local container for the data within the application. Once the form is opened the dataset gets populated from the data from the database. Temporary storage container.

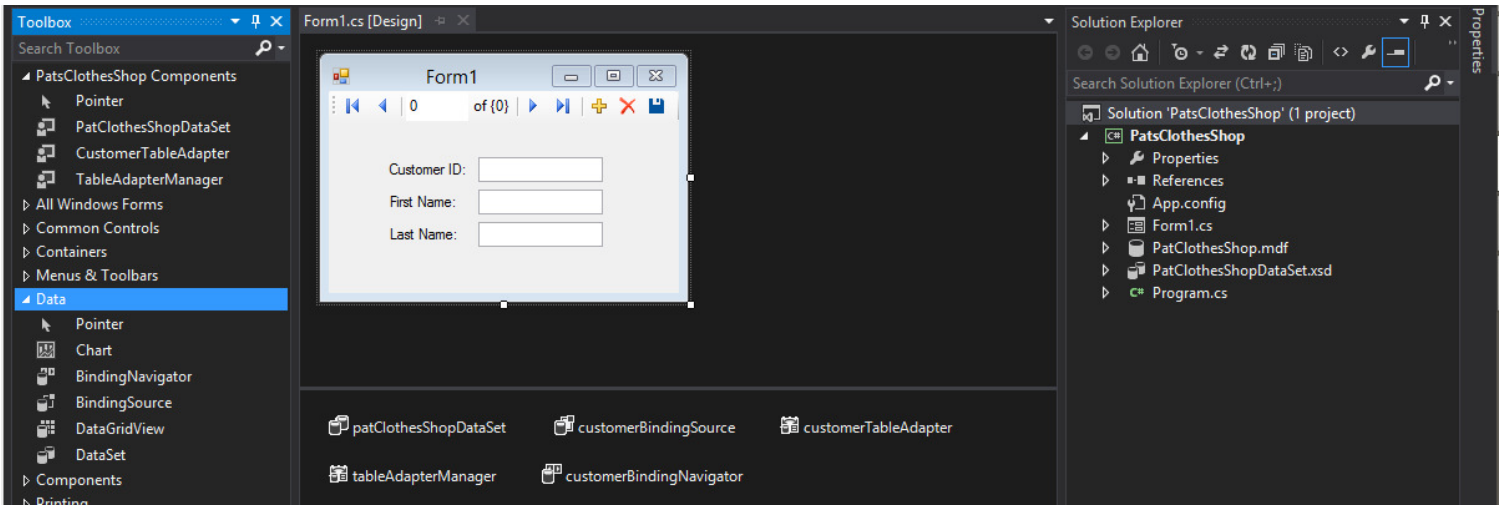
patClothesShopBindingSource
Object /bridge between the information in the dataset and the current row that's being displayed on the form. Keep all of the controls on the form bound to row of data in the DataSet. Co-ordinates what row of data should be currently displayed. The user indicated wanted to go to the first row or the next row or the last row

patClothesShopTableAdapter
Retrives data from the database, it contains a connection to the database. Contains an object that connects to the PatClothesShop.mdf to retrieve and resolve the information back into the database. Delete, update, add.

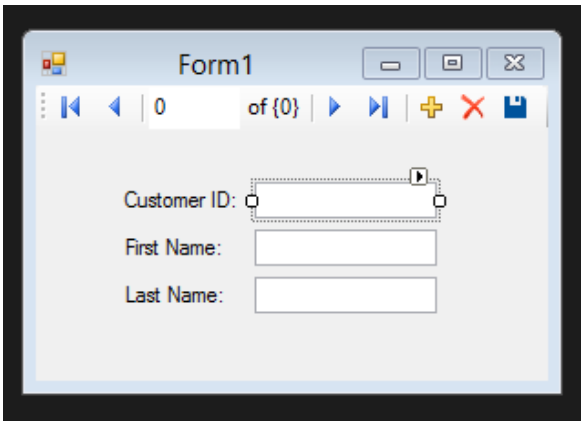
patClothesShopAdapterManager
Service interface

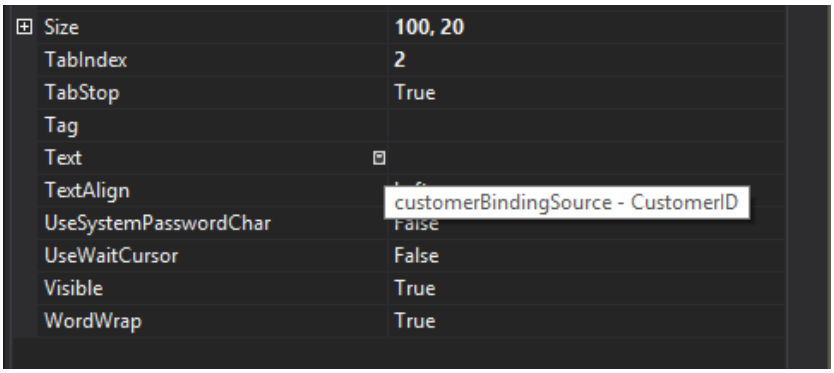
patClothesShopBindingNavigator
Toolbar at the top of the form.

Go to toolbox and select data to show data tools that can be added manually to the form.

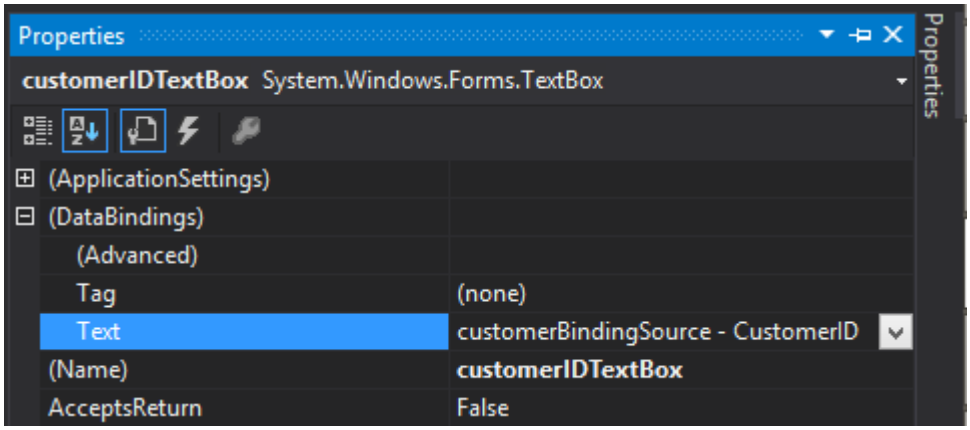


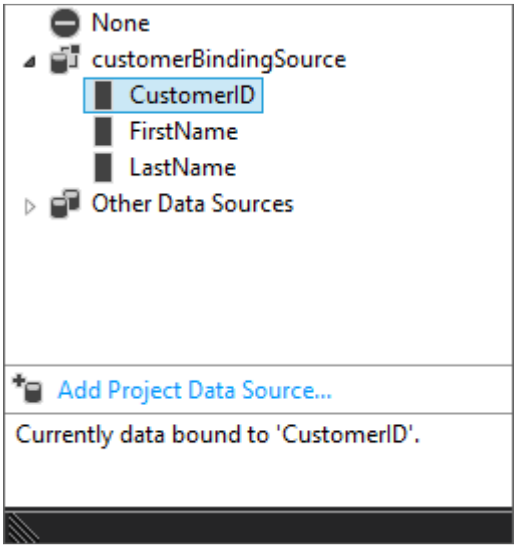
Properties of the first textbox. In the Text a Database icon is displayed.



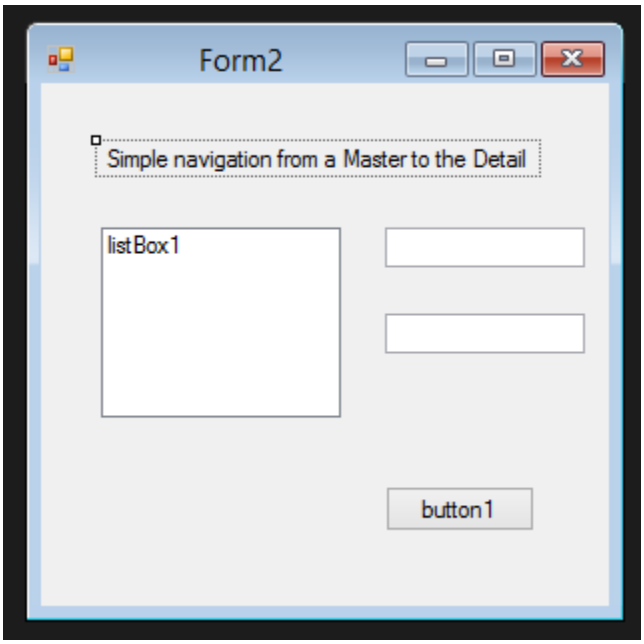


Select and right click to display the propertites of the textbox. CustomerID is binded to the first textbox. Binding source schema document. By using the data sources toolbar the database can be dragged and dropped onto the form, sets the textboxs automatically.



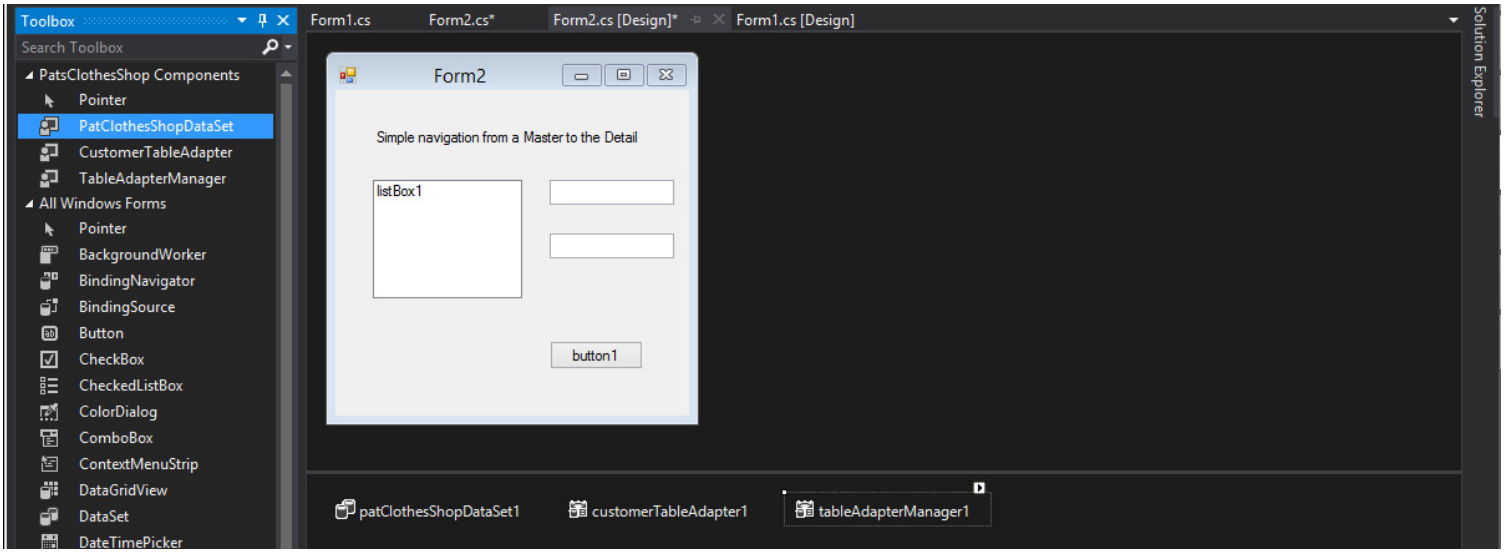


Add the data items manually.
Strongly typed components or preconfigured.
Create a new form form2 add the items displayed in the below image. Label, Listbox, 2 textboxs and a button.



Add a button to form1 to open form2. Type the code below to create an instance of the class Form2

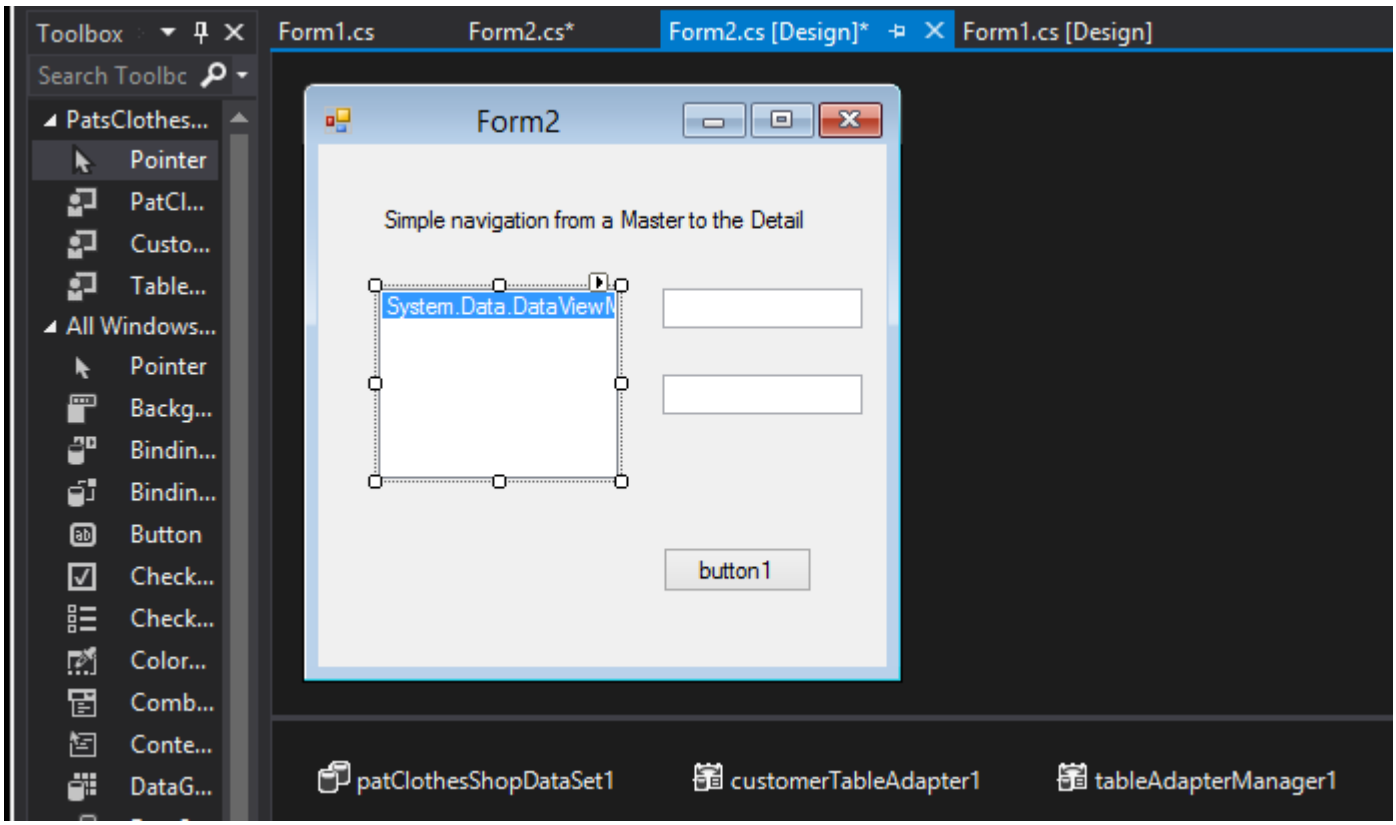
```
Form2 myForm = new Form2();
            myForm.Show();
```

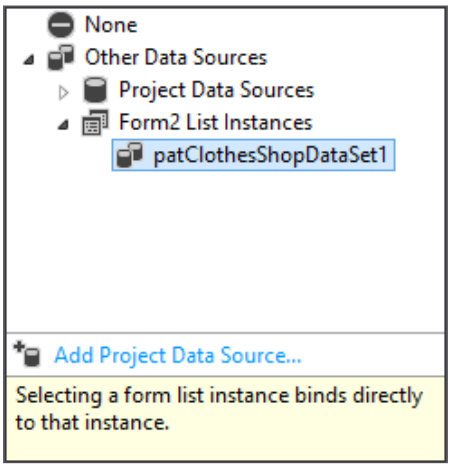


Double click form2 type the code below. Fill method passes in `patClothesShopDataSet1.Customer`
Fill method takes action to grab the data from the database and populate the customer table of the database with the data it retrieves.

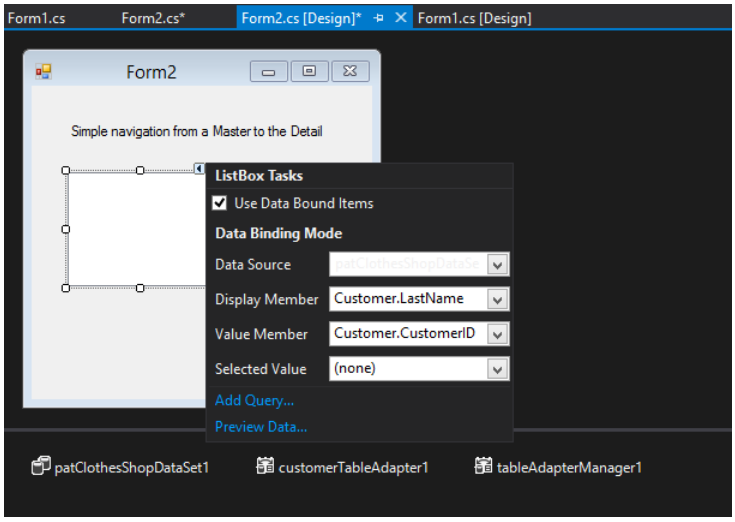
```
private void Form2_Load(object sender, EventArgs e)
        {
            customerTableAdapter1.Fill(patClothesShopDataSet1.Customer);
        }
```

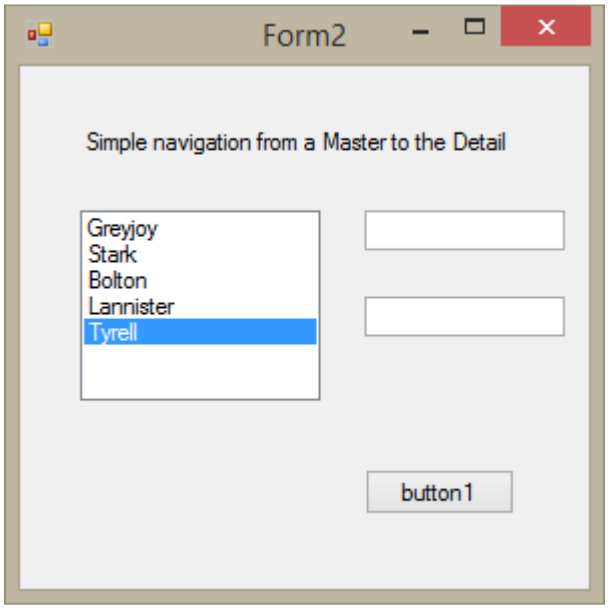
Select the listbox click the arrow and select patClothesShopDataSet1, from the pop-up box.



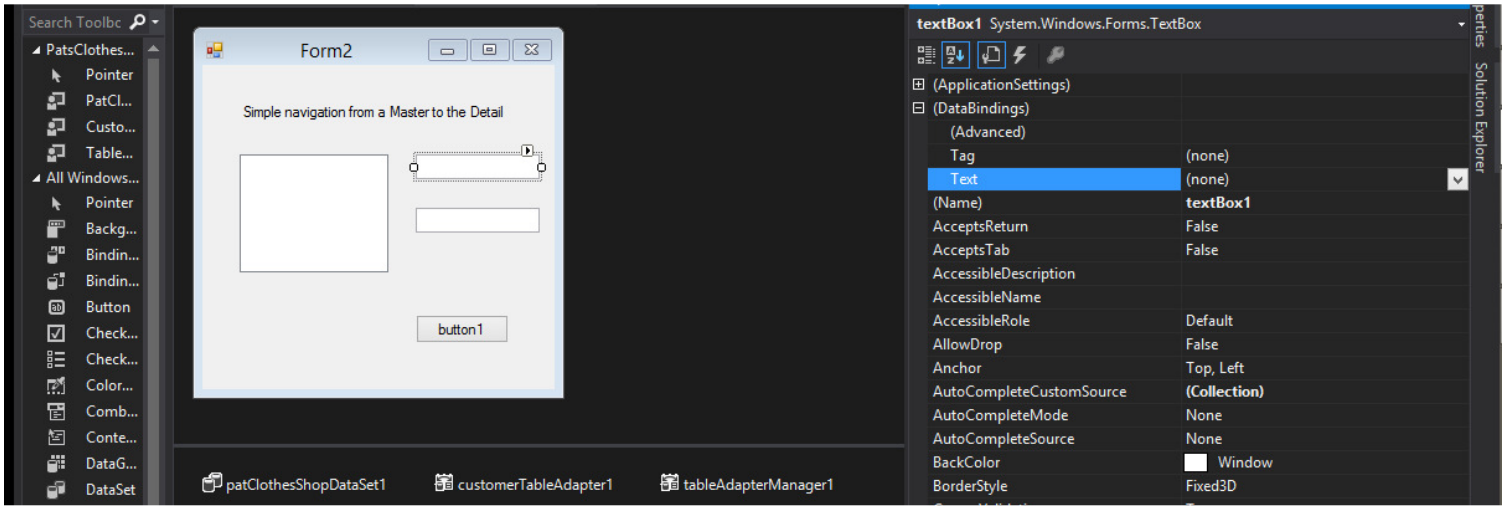


Select the list box and click the arrow button to data bound the listbox to the dataabse. Check the checkbox Use data bound items. From the pop-up select the data source patclothesshop1. In Display member select the last name and Customer last name this will displayed. In value member select the CustomerID, which is always unique.

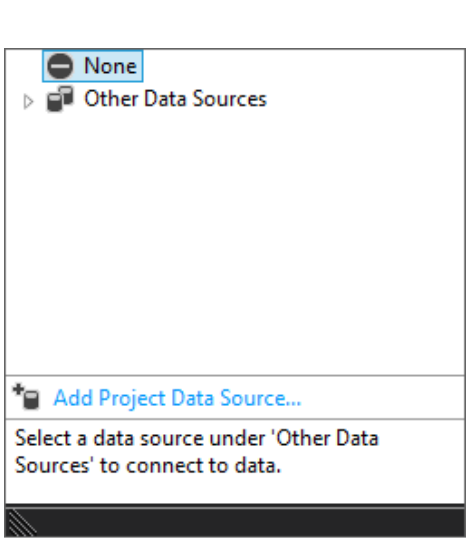


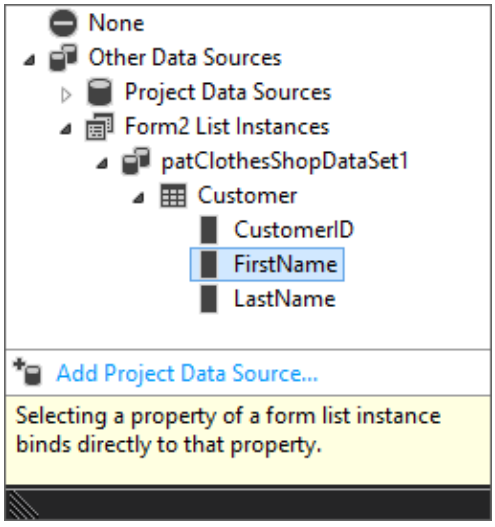


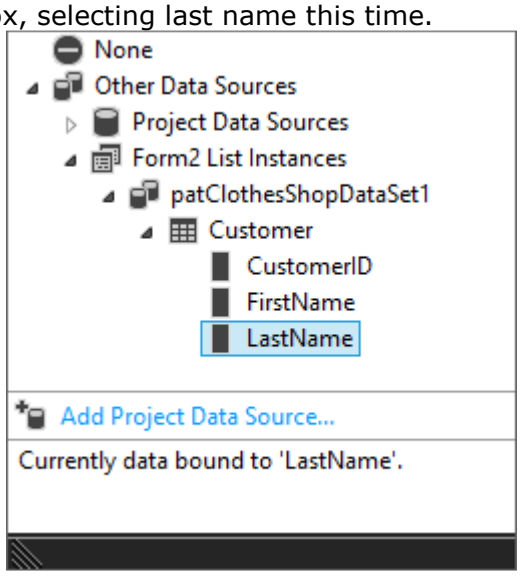
Bind the textboxs on the right with the listbox on the left. Select the first textbox and right click properties go to databindings and select text click the drop down arrow.



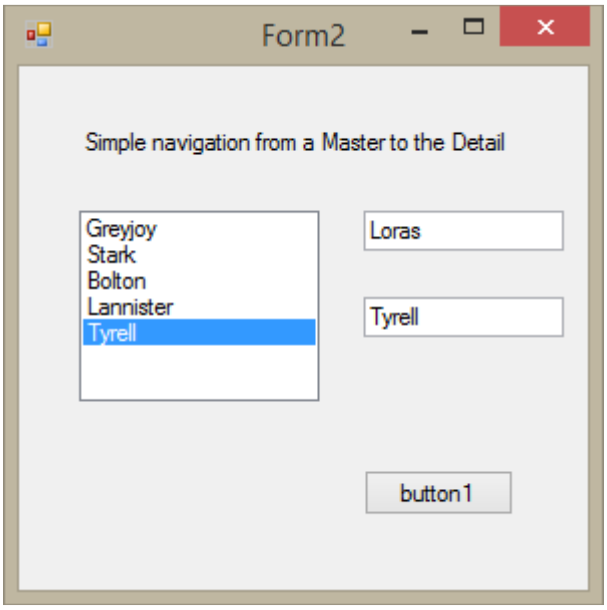
From the pop-up select first name for the first textbox. Go back to the form and select and right click the second textbox go to properties and repeat steps for the second textbox, selecting last name this time.



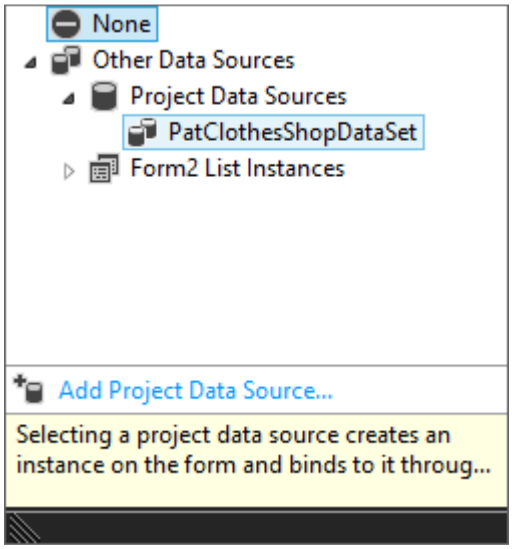


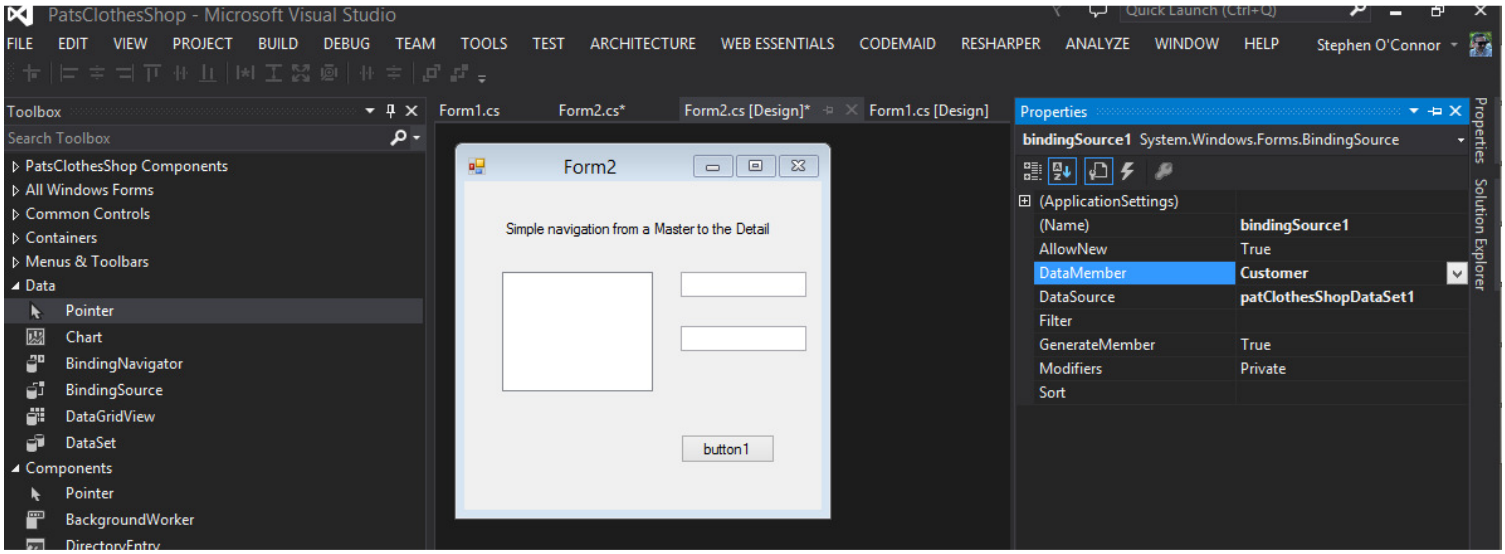


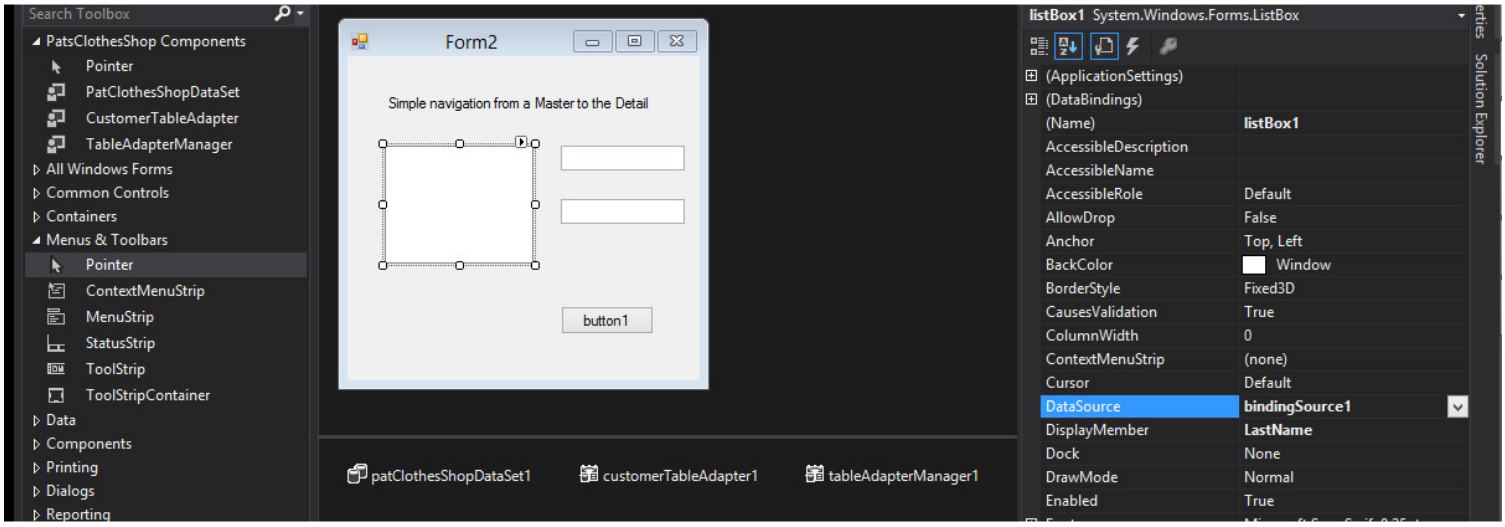
Run the application, open second form. Select from the listbox to display the first name and last name of the person in the textboxs.

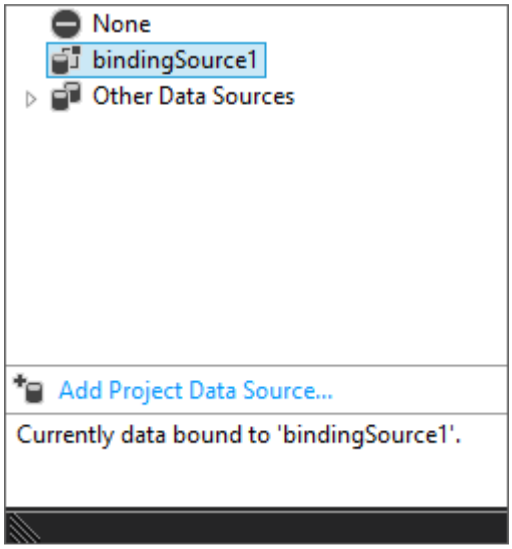


Updating capabilities.

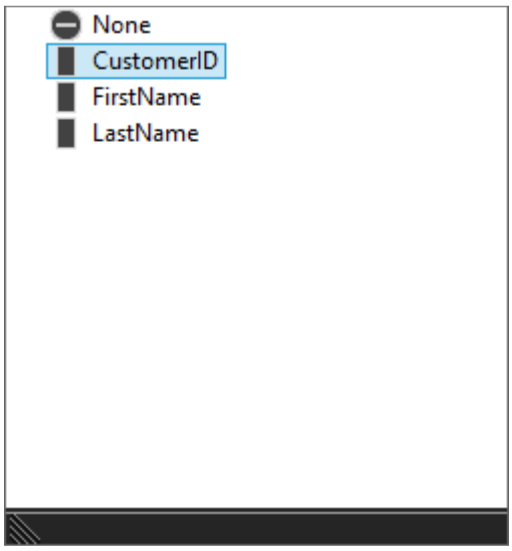








Value member



SQL Fundamentals

My Set-up