

(420-PS4-AB)

ASP .NET: Web Forms Data Sources (Part 1)

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Outline

- Databases Refresh
 - Relational Databases
 - SQL
- ASP .NET Data Sources
 - Data Binding in ASP .NET
 - Data Binding Expressions
 - Using the SqlDataSource
 - Using the ObjectDataSource (Part 2)
 - Using the EntityDataSource (Part 2)
 - Using the QueryExtender (Part 2)

Databases Refresh

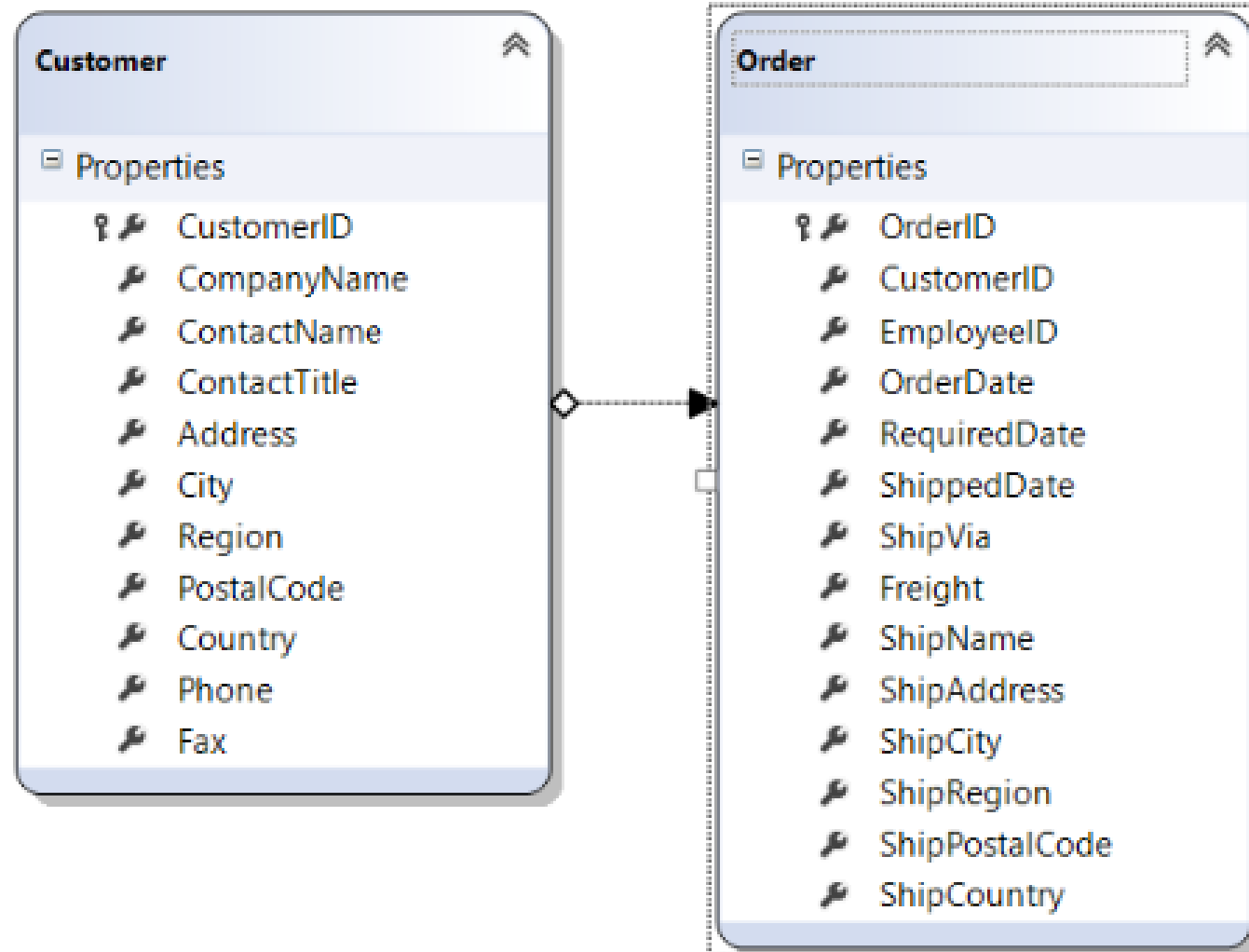
What is a database?

- A *database* is a collection of data that is arranged so it can be accessed, managed, and updated easily.
- Different types of databases:
 - Relational databases (most popular)
 - Flat-file
 - NoSQL
 - Object-relational
 - Object-oriented

Relational Databases

- Consists of **Tables**
 - Stores data in rows and columns.
 - A row consists of full data on an entry (record)
 - A column contains information about specific property of the row.
- Relational
 - Different tables in the database can be related to each other
 - Helps to eliminate duplication of data.

Relational Databases



Different Relational Databases

- Microsoft SQL Server
- Oracle
- SQLite
- MySQL
- Microsoft Access

What is SQL?

- Structured Query Language
- A de facto language for querying relational databases that almost all relational database systems understand.
- Many database vendors add their own extensions to SQL
 - Provides more flexibility and power on their own system
 - Decreases interoperability with other systems.

SQL Different Data Types

- Numeric
- Date and time
- Characters \ Strings
- Binary
- Others

<http://www.teratrax.com/sql-server-data-types-ranges/>

What should I choose?

- Check the requirement of your application.
- Standards: national, international
- Search the web for developers opinions.

- Examples:

Email fields: NVARCHAR(320)

- 64 characters for the "local part" (username).
- 1 character for the @ symbol.
- 255 characters for the domain name.
- NVARCHAR to support Unicode.

Phone numbers: VARCHAR(??)

- International, national, local, extensions.. etc.

Data in SQL: Reading Data

- **SELECT statement**

```
SELECT ColumnName [, OtherColumnNameNames] FROM TableName
```

- **Examples:**

```
SELECT Id, Name FROM Genre
```

```
SELECT Id AS GenreId, Name FROM Genre
```

```
SELECT Id FROM Genre WHERE Name = 'Thomas'
```

```
SELECT Name FROM Genre WHERE Id = 10
```

WHERE Clauses Comparison Operators

OPERATOR	DESCRIPTION
=	The <i>equals</i> operator matches only when the left side and the right side of the comparison are identical.
>	The <i>greater than</i> operator matches when the left side of the comparison represents a larger value than the right side.
>=	The <i>greater than or equal</i> operator matches when the left side of the comparison is equal to or larger than the right side.
<	The <i>less than</i> operator matches when the left side of the comparison represents a smaller value than the right side.
<=	The <i>less than or equal</i> operator matches when the left side of the comparison is equal to or smaller than the right side.
<>	The <i>not equals</i> operator does the reverse of the equals operator and matches when the left side and the right side of the comparison are different.

WHERE Clauses Combination Operators

OPERATOR	DESCRIPTION
AND	Enables you to join two expressions. For example, the WHERE clause <code>WHERE Id > 20 AND Id < 30</code> gives you all rows with IDs that fall between 20 and 30 (with 20 and 30 themselves not included).
OR	Enables you to define multiple criteria of which only one has to match (although more matches are allowed). For example, the WHERE clause <code>WHERE GenreId = 5 OR GenreId = 8</code> gives you all the rows with a GenreId of 5 or 8.
BETWEEN	Enables you to specify a range of values that you want to match with a lower and upper bound. For example, <code>WHERE Id BETWEEN 10 AND 35</code> gives you all rows whose IDs are between 10 and 35 (including 10 and 35 themselves if they exist in the database).
LIKE	Used to determine if a value matches a specific pattern. You can use wildcards like <code>%</code> to match any string of zero or more characters, and the underscore (<code>_</code>) to match a single character. For example, the WHERE clause <code>WHERE Name LIKE '%rock%'</code> returns all genres that have <code>rock</code> in their name, including Indie Rock, Hard Rock, and so on.

SQL Ordering Data

- ORDER BY: used at the end of the SQL statement
- May contain one or more column names or expressions
- Sorting options
 - ASC: ascending order(default)
 - DESC: descending order
- Example:

```
SELECT Id, Name FROM Genre ORDER BY Name DESC
```

Joining Data

- JOIN: Enables to query a relationship between one or more tables.
- Example:

```
SELECT
    Review.Id, Review.Title, Genre.Name
FROM
    Review
INNER JOIN Genre ON
    Review.GenreId = Genre.Id
```

Joining Data

- INNER JOIN: returns only matching rows.
- OUTER JOIN: enables you to retrieve rows from one table regardless of whether they have a matching row in another table. (Return NULL if not available).
- Example

```
SELECT
    Genre.Id, Genre.Name, Review.Title
FROM
    Genre
LEFT OUTER JOIN Review ON
    Genre.Id = Review.GenreId
```


Data in SQL: Creating Records

- **INSERT statement**

```
INSERT INTO TableName (Column1 [, Column2]) VALUES (Value1  
[, Value2])
```

- **Examples:**

```
INSERT INTO Genre (Name, SortOrder) VALUES  
('Tribal House', 20)
```

- Enclose string and date values in single quotes
- Enter numbers and boolean values directly in your SQL statement.

Data in SQL: Updating Records

- **UPDATE statement**

```
UPDATE TableName SET Column1 = NewValue1 [, Column2 =  
NewValue2] WHERE Column3 = Value3
```

- **Examples:**

```
UPDATE Genre SET Name = 'Trance', SortOrder = 5 WHERE Id =  
13
```

- **WHERE clause** limits the number of rows that get affected with the **UPDATE statement**.

Data in SQL: Deleting Records

- DELETE statement

```
DELETE FROM TableName WHERE Column1 = ValueXYZ
```

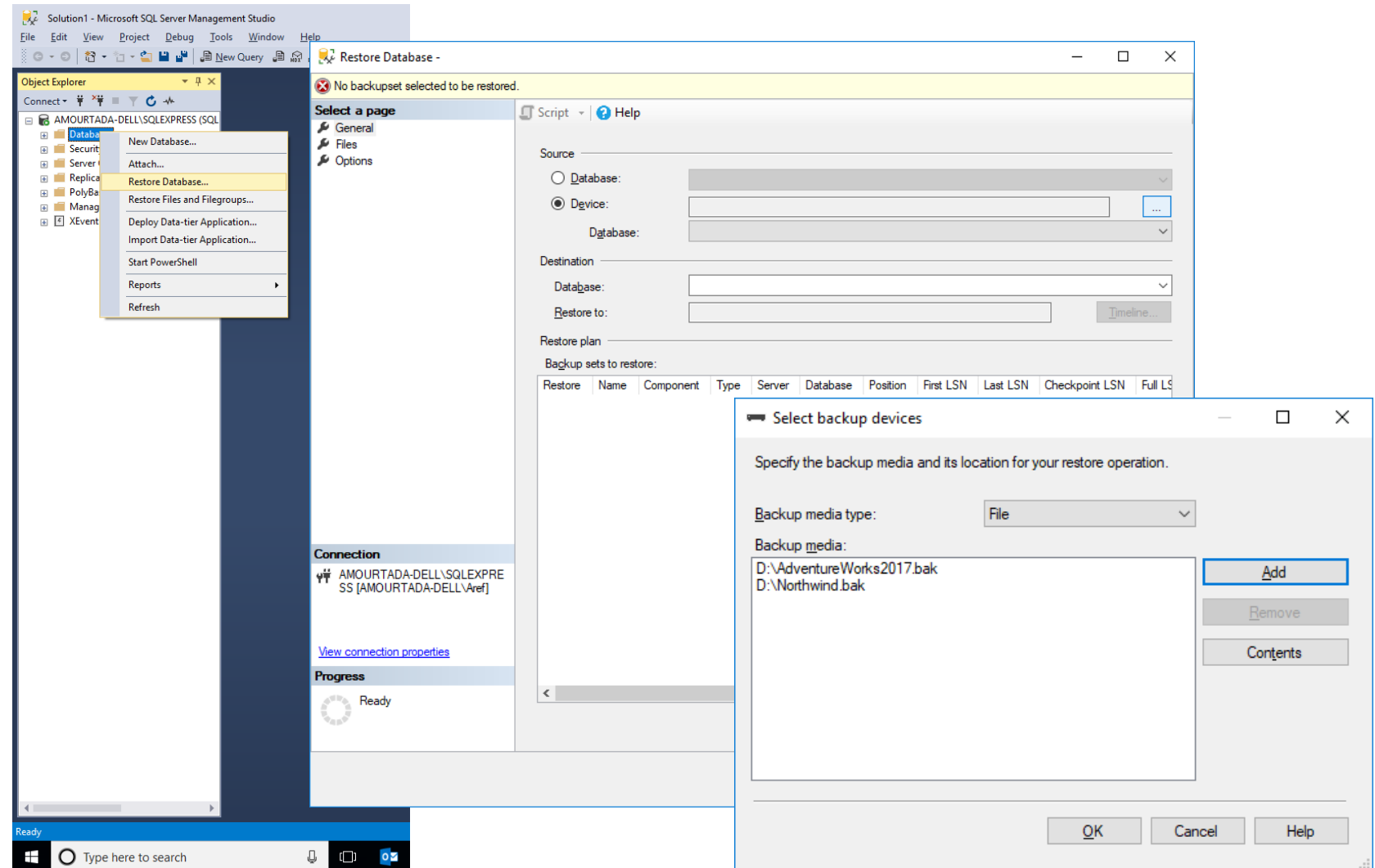
- Examples:

```
DELETE FROM Genre WHERE Id = 13
```

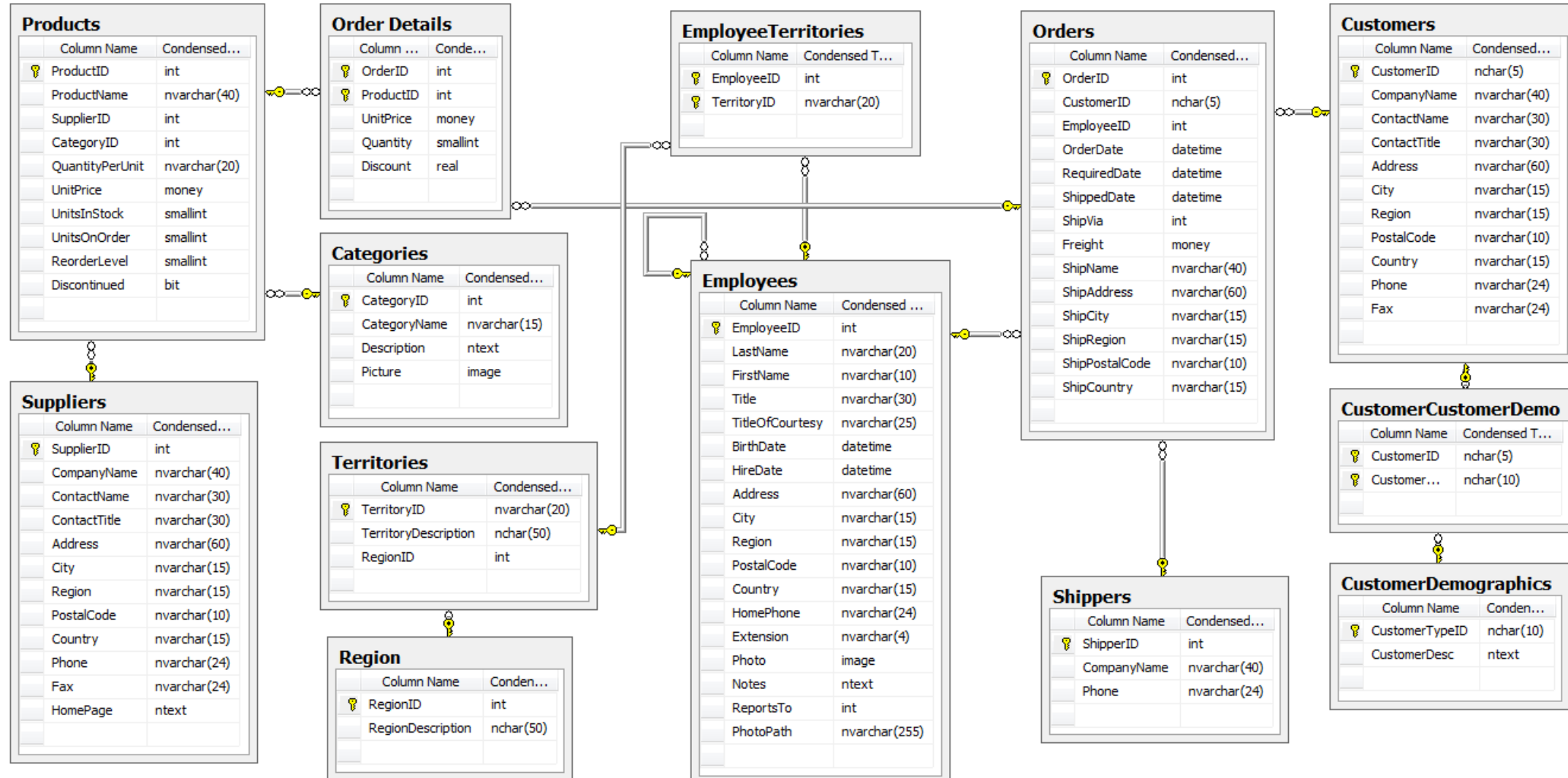
- WHERE clause limits the number of rows that get affected with the UPDATE statement.
- If the WHERE clause was not used, all row will be deleted.

Installing Sample Databases

- Download sample databases from LEA and unzip.
 - Northwind
 - Adventure Works
- Open MS SQL Server Management Studio
 - Connect to server
 - Right click *Databases*
→ *Restore Database...*



Northwind Databases Tables



Data Binding

Data Binding and Data Source Controls

- Data Binding support is built into ASP .NET
 - Allows us to take data from different sources and bind them into web controls.
- Data Source controls allow data to be accessed from data sources and bound to controls
 - Relational data
 - Hierarchical data
 - Custom Objects and Collections

Data Binding – How?

- ASP.NET Web Forms controls supporting data binding have
 - A property `DataSource`
 - A method `DataBind()`
- To bind a control we have to set the property `DataSource` and to call the method `DataBind()` after that
- Binding is usually invoked in `Page_Load()`
- Data aware controls have a `DataSourceID` property that is used to bind a control to a Data Source control

When Does Binding Take Place?

- Data binding in ASP.NET can occur:
 - In `Page_Load()` or `Page_PreRender()`
 - Sometimes `Page.IsPostBack` is checked
 - `Page_Load()` – called before control events
 - `Page_PreRender()` – called after control events
 - In an event handler:
 - E.g. when a button is pressed, in the `ButtonLoad_Click()` event handler
- Data binding transfers the data from the data source to the control's internal structures

Demo: DataBinding Simple Example

- Drop Down List:
 - Create a string array with possible answers to a question.
 - Bind to a drop down list upon page load.
 - Display answer selection in a label.
- List Box
 - Create an array of towns, where each town has an ID and a name.
 - Bind to a list box.
 - Display selection in a label.
- Bulleted List
 - Create an array of search engines: with Name & URL.
 - Bind to a bulleted list.
 - Add a CSS sheet to make the list look like a menu.

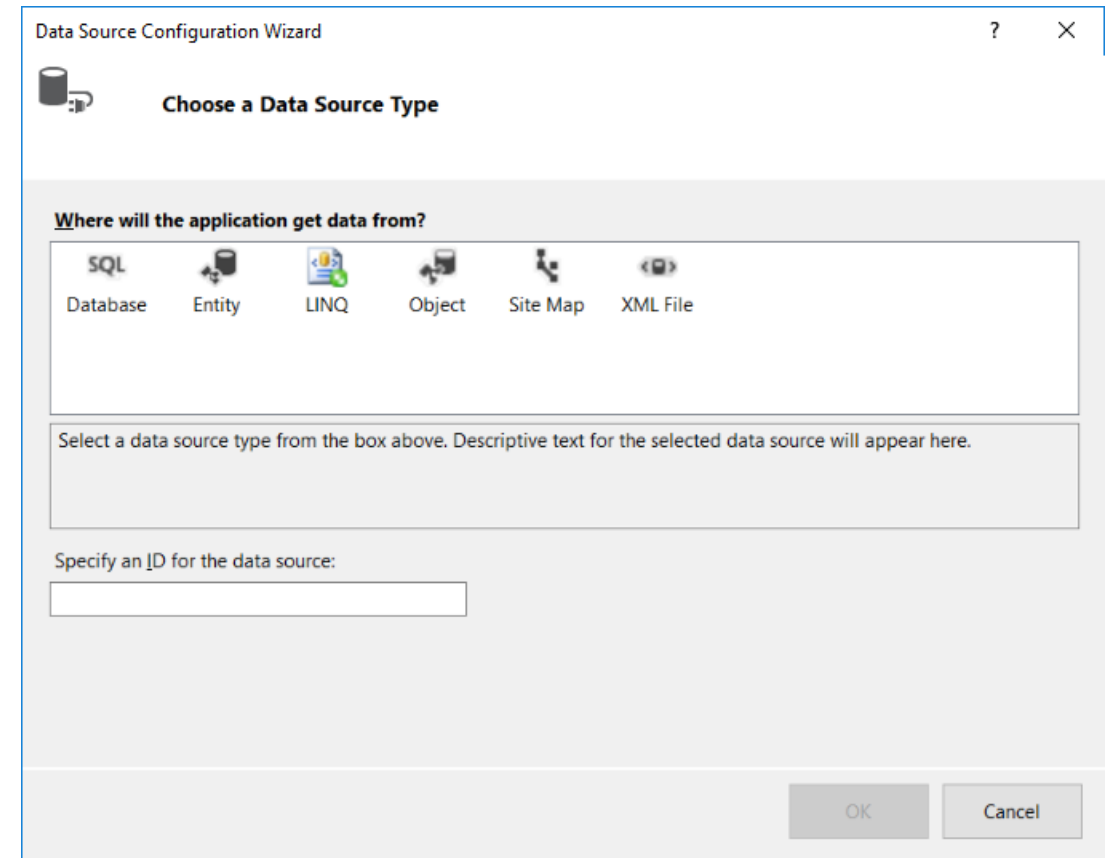
Exercise: Lunch Orders

- You are part of a team organizing a national conference where attendees will be coming from different cities. You were asked to create a web form to track the meal orders. For each order you need to track:
 - **Order number** (start by 1)
 - **City**: create an array of cities and bind it to list box.
 - **Gender**: create an array (Male – Female) and bind to drop down list.
 - **Meal Options**: create an array menu items: ID & Text(example: burger, steak, salad, Coke). Bind to check box list.
 - **Payment Method**: create an array menu items: ID & Text (Cash, Credit Card, Android pay & Apple pay). Bind to radio button list.
- Add a button to submit each order and add order into a List box.

Data Source Controls

Types of Data Source Controls

- **SQL Database:** Can be used with multipole types of DBs (Not only SQL Server)
- **Entity:** Entity Framework models.
- **LINQ:** LINQ to SQL diagrams.
- **Object:** N-tier or N-layer architecture - reusability
- **SiteMap:** used for navigational purposes. (Hierarchical)
- **XML File:** used for XML feeds such as RSS feeds. (Hierarchical)



Data Binding Expressions

- Data binding expressions provide a compact and simple way to bind specific data to controls
- ASP.NET data binding expressions:
 - `<%# Eval (...) %>`
 - `<%# Bind (...) %>`
 - `<%# XPath (...) %>`
- Data binding expression example:
 - `<%# Eval("FieldName") %>`

Using Data Binding: Example

```
<asp:GridView ID="gvCustomers" runat="server">
    <asp:TemplateColumn>
        <ItemTemplate>
            <%# Eval("ContactName") %>
        </ItemTemplate>
    </asp:TemplateColumn>
</asp:GridView>
```

SqlDataSource Control

SqlDataSource Control

- Provides a lot with a little effort,
- Makes it easy to query various types of DBs.
- SqlDataSource provides declarative data binding between a database and controls:
 - Supports four managed providers (SQL, OleDb, ODBC, Oracle)
 - Loads data into memory (DataSet mode) or stream data (DataReader mode) (can be changed using DataSourceMode property)
 - Supports filtering and sorting
 - Supports select, insert, update and delete commands
 - Provides built-in caching support

SqlDataSource Code Example

```
<asp:DataList id="dlCusts" DataSourceID="sqlCustomers"
  runat="server">
  <ItemTemplate>
    <%# Eval("ContactName") %>
  </ItemTemplate>
</asp:DataList>
```

```
<asp:SqlDataSource
  id="sqlCustomers"
  runat="server"
  ConnectionString="<%%$ ConnectionStrings:ConnStr %>"
  SelectCommand="GetCustomers"
  SelectCommandType="StoredProcedure" />
```

Access connection
string key in
web.config.

Data Source Parameter

Parameter Type	Description
Parameter	Represents a parameter in a parameterized SQL query, a filtering expression, or a business object method call.
ControlParameter	Binds the value of a Control property to a parameter used by a data source control.
CookieParameter	Binds the value of a client-side HTTP cookie to a parameter used by a data source control.
FormParameter	Binds the value of a form variable in the Form collection to a parameter used by a data source control.
ProfileParameter	Binds the value of an ASP.NET Profile property to a parameter used by a data source control.
QueryStringParameter	Binds the value of a QueryString parameter to a parameter used by a data source control.
SessionParameter	Binds the value of a session variable to a parameter used by a data source control.

Using ControlParamter Example

```
<asp:SqlDataSource ID="sdsCustomersByCountry" runat="server"
  SelectCommand="GetCustomersByCountry"
  SelectCommandType="StoredProcedure">
  <SelectParameters>
    <asp:ControlParameter ControlID="ddCountries"
      Name="Country" PropertyName="SelectedValue"
      Type="String" />
  </SelectParameters>
</asp:SqlDataSource>
```

Assign parameter data
from DropDownList
value

Using QueryStringParamter Example

```
<asp:SqlDataSource ID="sdsCustomersByCountry" runat="server"
    SelectCommand="GetCustomersByCountry"
    SelectCommandType="StoredProcedure">
    <SelectParameters>
        <asp:QueryStringParameter
            Name="Country" QueryStringField="CountryName"
            Type="String" />
    </SelectParameters>
</asp:SqlDataSource>
```

Assign parameter data
from QueryString
value.

Demo: SQLDataSourceDEMO

- Build a simple page using multiple controls all loading data from SQL Server database.
- Task:
 - Use sample database: **Northwind**
 - Load all **Countries** in the **Customers** table in the DB into a drop down list.
 - Upon selection of a country, load all **Customers** from that country into a **GridView**
 - Finally, select a Customer from the GridView and display all details in a **DetailsView**.

Demo: Snapshots

localhost:65064/Deafault x

localhost:65064/Deafault.a

Select a country:

- Select a country
- Argentina
- Austria
- Belgium
- Brazil
- Canada
- Denmark
- Finland
- France
- Germany
- Ireland
- Italy
- Mexico

Load countries in a drop down list

Select a country:

	<u>Customer ID</u>	<u>Title</u>	<u>Name</u>
Select	BOTTM	Accounting Manager	Elizabeth Lincoln
Select	JAC	Teacher	John Abbott
Select	LAUGB	Marketing Assistant	Yoshi Tannamuri
Select	MEREP	Marketing Assistant	Jean Fresnière

Load all customers from that country in Grid View

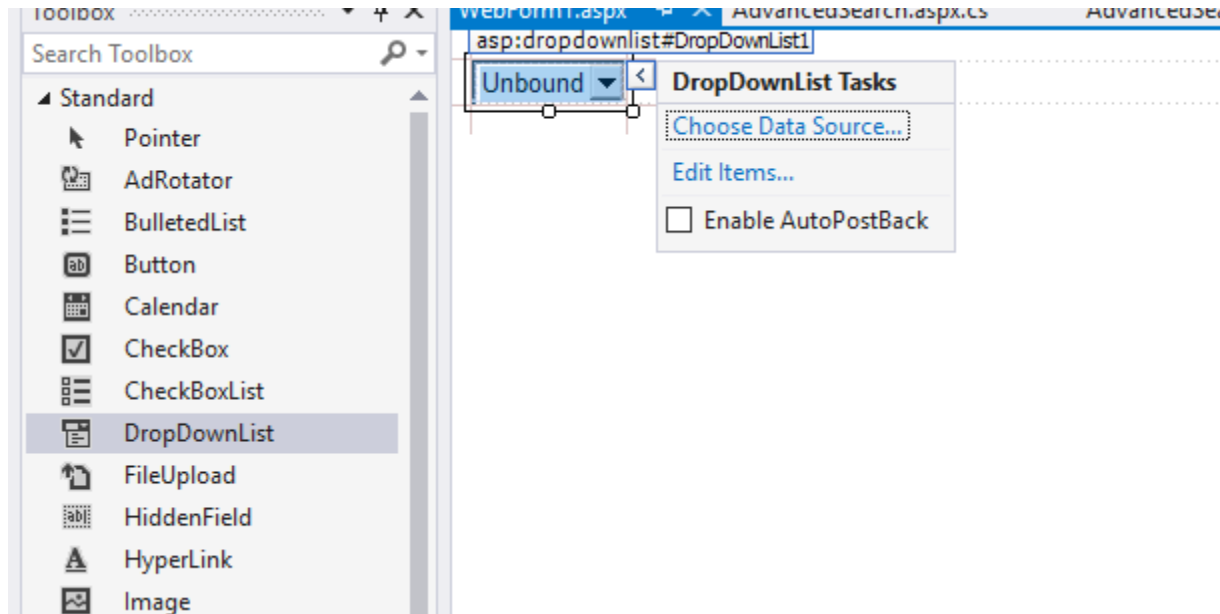
Select a country:

	<u>Customer ID</u>	<u>Title</u>	<u>Name</u>
Select	BOTTM	Accounting Manager	Elizabeth Lincoln
Select	JAC	Teacher	John Abbott
Select	LAUGB	Marketing Assistant	Yoshi Tannamuri
Select	MEREP	Marketing Assistant	Jean Fresnière

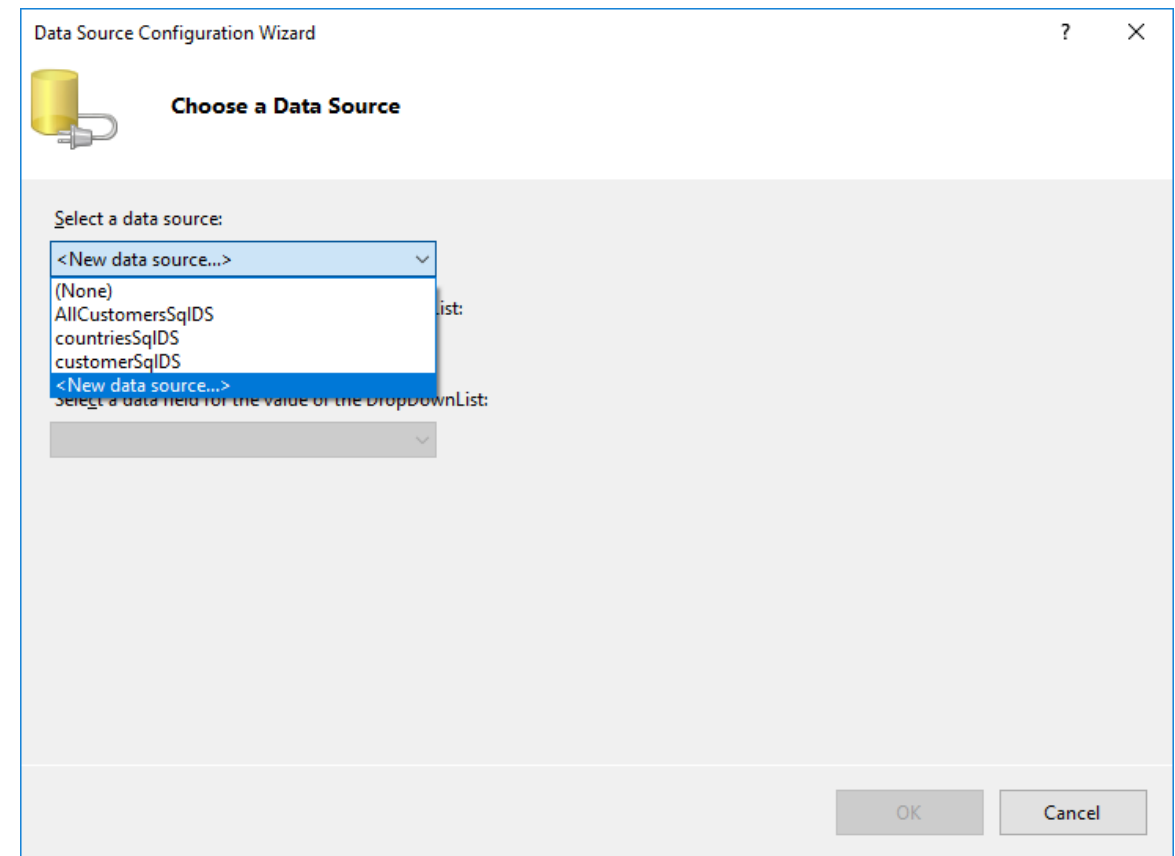
Customer ID	JAC
Name	John Abbott
Title	Teacher
Company	John Abbott
Phone	(509) 123-4567
Fax	514 5556677
Address	3550 Boul XYZ
City	Montreal
Postal-Code	h67 h6t
Region	Montreal
Country	Canada
Edit	

Load a specific customer information in a details view

Demo: Snapshots: Adding a data source for a control

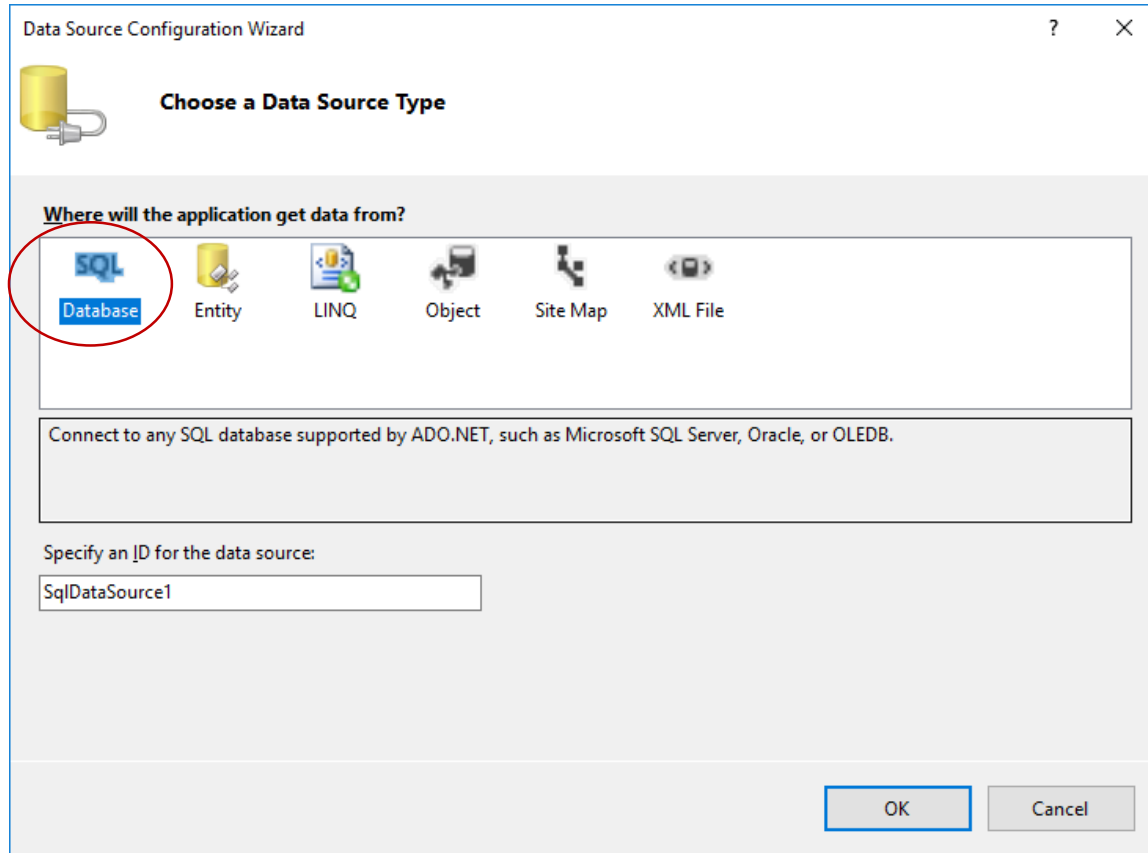


Choose Data Source

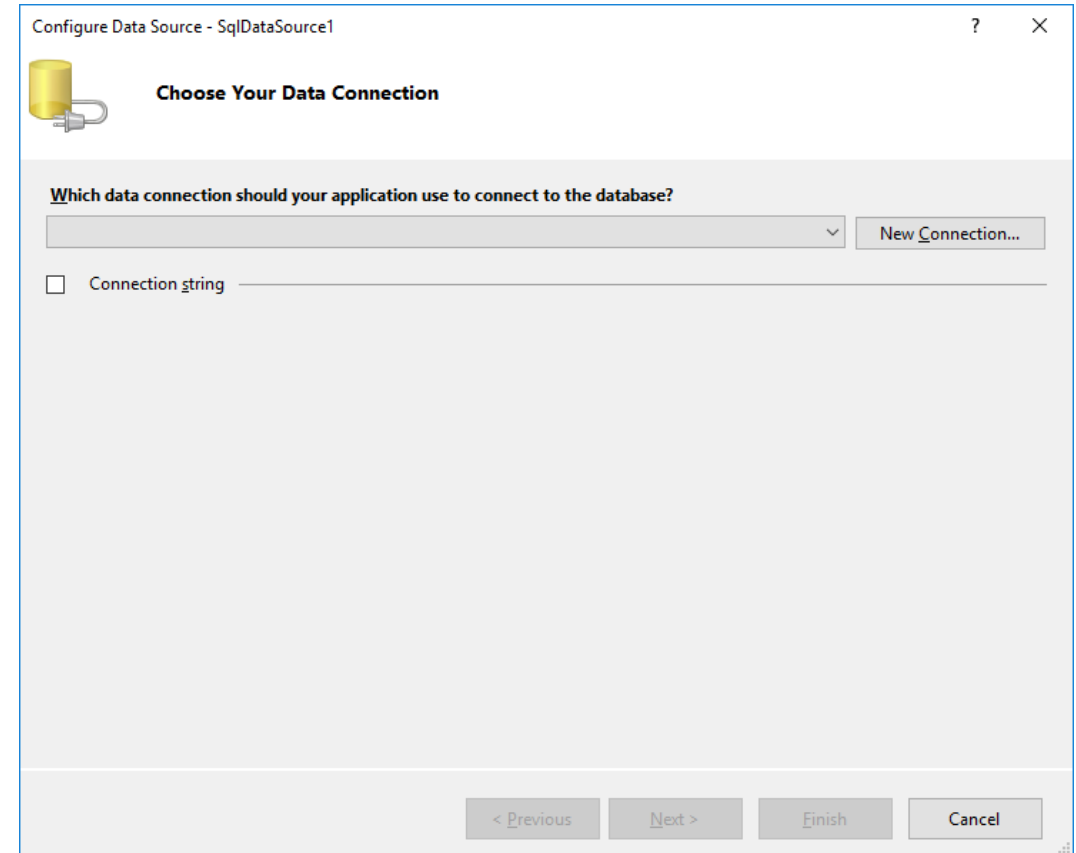


New Data Source

Demo: Snapshots: SQL Data Source



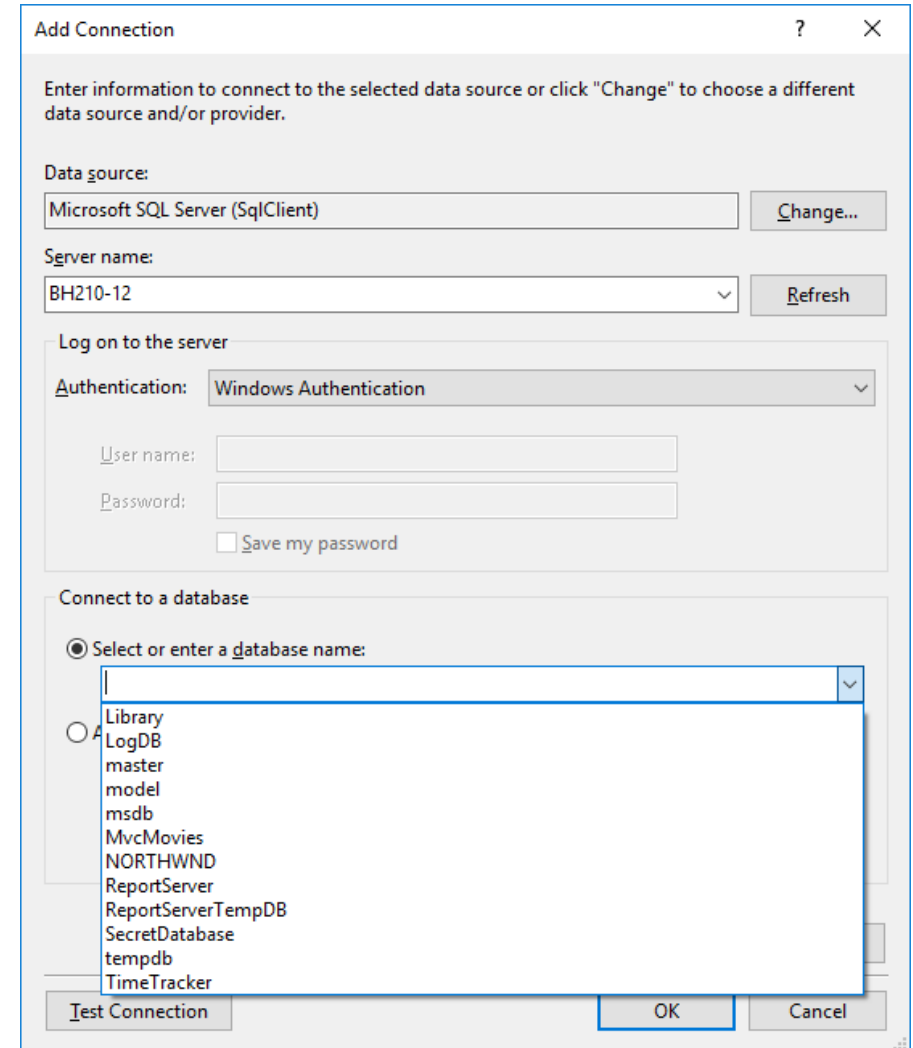
SQL Database



New Connection: When connecting to a new database
Or choose from the drop down list

Demo: Snapshots: Adding a new connection

- Data Source: add you own server name.
- Select the database from the drop down.



Add Connection

Enter information to connect to the selected data source or click "Change" to choose a different data source and/or provider.

Data source:
Microsoft SQL Server (SqlClient) Change...

Server name:
BH210-12 Refresh

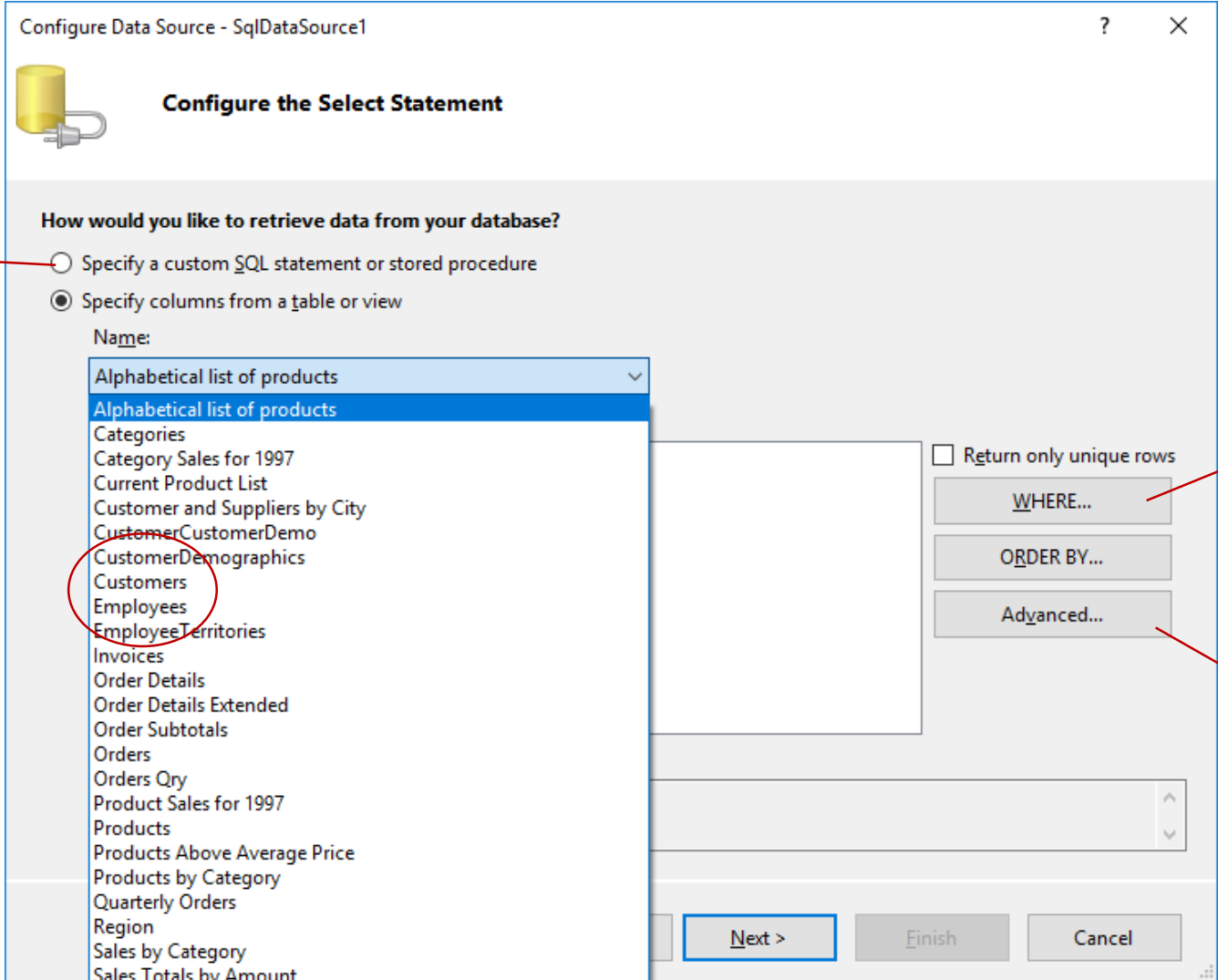
Log on to the server
Authentication: Windows Authentication
User name:
Password:
☐ Save my password

Connect to a database
☒ Select or enter a database name:

☐ Library
☐ LogDB
☐ master
☐ model
☐ msdb
☐ MvcMovies
☐ NORTHWND
☐ ReportServer
☐ ReportServerTempDB
☐ SecretDatabase
☐ tempdb
☐ TimeTracker

Test Connection OK Cancel

Demo: Snapshots: SQLDataSource Options (1)



Configure Data Source - SqlDataSource1

Configure the Select Statement

How would you like to retrieve data from your database?

- ☐ Specify a custom SQL statement or stored procedure
- ☒ Specify columns from a table or view

Name:

- Alphabetical list of products
- Alphabetical list of products
- Categories
- Category Sales for 1997
- Current Product List
- Customer and Suppliers by City
- CustomerCustomerDemo
- CustomerDemographics
- Customers
- Employees
- EmployeeTerritories
- Invoices
- Order Details
- Order Details Extended
- Order Subtotals
- Orders
- Orders Qry
- Product Sales for 1997
- Products
- Products Above Average Price
- Products by Category
- Quarterly Orders
- Region
- Sales by Category
- Sales Totals by Amount

☐ Return only unique rows

WHERE...

ORDER BY...

Advanced...

Next > **Finish** **Cancel**


Write your own query

WHERE clause

UPDATE, INSERT, DELETE

Demo: Snapshots: SQLDataSource Options (2)

Configure Data Source - SqlDataSource1

 **Test Query**

To preview the data returned by this data source, click Test Query. To complete this wizard, click Finish.

CustomerID	CompanyName	ContactName	ContactTitle	Address
ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57
ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constituc
ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner	Mataderos 2312
AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.
BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berguvsvägen 8
BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative	Forsterstr. 57
BLONP	Blondesddsl père et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber
BOLID	Bólido Comidas preparadas	Martín Sommer	Owner	C/ Araquil, 67
BONAP	Bon app'	Laurence Leblanc	Owner	12 rue des Bouchers

Test Query

SELECT statement:

SELECT * FROM [Customers]

< Previous Next > Finish Cancel

You test your
query before
finishing

Exercise: AdvancedSearch Page

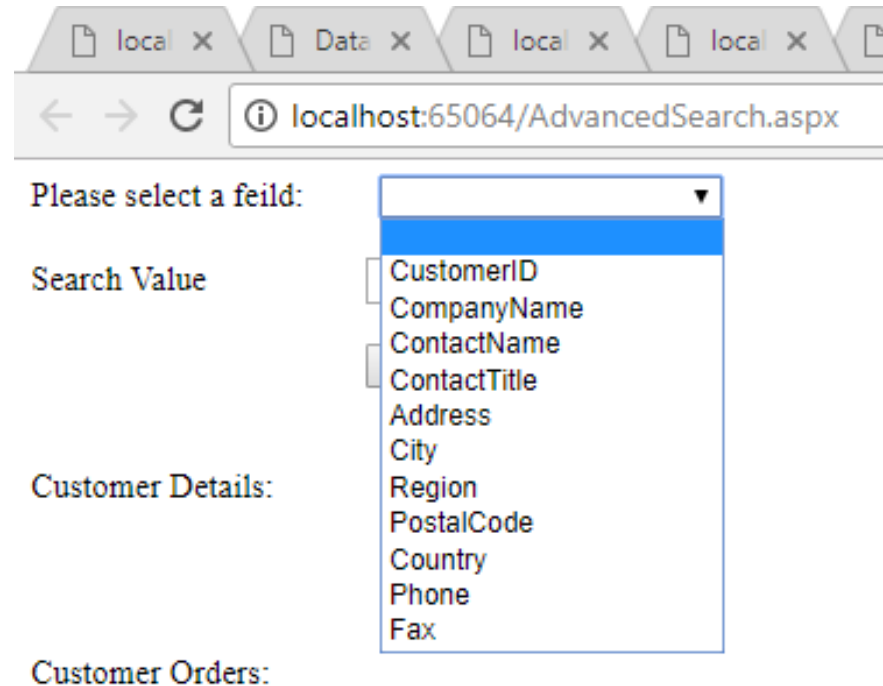
- Add an advanced search page that will load the fields of the **Customer** table into a drop down list.
- Add a **textbox** for the user search input and a search **button**.
- Query database based on the selected field and user input.
- Display results: **Customer** records in a **GridView**.
- Upon selection of a specific **Customer** load all the **Orders** for that customer in another **GridView**

Exercise: AdvancedSearch Page – Hints

- User SQLDataSource
- Hint on loading data fields
 - User a custom query

```
SELECT COLUMN_NAME  
FROM INFORMATION_SCHEMA.columns  
WHERE table_name='Customers'
```

Exercise: Snapshots: AdvancedSearch Page



local x Data x local x local x

localhost:65064/AdvancedSearch.aspx

Please select a feild:

Search Value

Customer Details:

Customer Orders:

- CustomerID
- CompanyName
- ContactName
- ContactTitle
- Address
- City
- Region
- PostalCode
- Country
- Phone
- Fax

Exercise: Snapshots: AdvancedSearch Page

← → ↻ ⓘ localhost:65064/AdvancedSearch.aspx

Please select a field:

Search Value

Customer Details:

	CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode	Country	Phone	Fax
Select	ERNSH	Ernst Handel	Roland Mendel	Sales Manager	Kirchgasse 6	Graz		8010	Austria	7675-3425	7675-3426
Select	FURIB	Furia Bacalhau e Frutos do Mar	Lino Rodriguez	Sales Manager	Jardim das rosas n. 32	Lisboa		1675	Portugal	(1) 354-2534	(1) 354-2535
Select	GODOS	Godos Cocina Típica	José Pedro Freyre	Sales Manager	C/ Romero, 33	Sevilla		41101	Spain	(95) 555 82 82	
Select	LAMAI	La maison d'Asie	Annette Roulet	Sales Manager	1 rue Alsace-Lorraine	Toulouse		31000	France	61.77.61.10	61.77.61.11
Select	LONEP	Lonesome Pine Restaurant	Fran Wilson	Sales Manager	89 Chiaroscuro Rd.	Portland	OR	97219	USA	(503) 555-9573	(503) 555-9646
Select	PICCO	Piccolo und mehr	Georg Pipp	Sales Manager	Geislweg 14	Salzburg		5020	Austria	6562-9722	6562-9723
Select	RICSU	Richter Supermarkt	Michael Holz	Sales Manager	Grenzacherweg 237	Genève		1203	Switzerland	0897-034214	
Select	SEVES	Seven Seas Imports	Hari Kumar	Sales Manager	90 Wadhurst Rd.	London		OX15 4NB	UK	(171) 555-1717	(171) 555-5646
Select	SPLIR	Split Rail Beer & Ale	Art Braunschweiger	Sales Manager	P.O. Box 555	Lander	WY	82520	USA	(307) 555-4680	(307) 555-6525
Select	VAFFE	Vaffeljernet	Palle Ibsen	Sales Manager	Smagsloget 45	Århus		8200	Denmark	86 21 32 43	86 22 33 44
Select	WELLI	Wellington Importadora	Paula Parente	Sales Manager	Rua do Mercado, 12	Resende	SP	08737-363	Brazil	(14) 555-8122	

Exercise: Snapshots: AdvancedSearch Page

localhost:65064/AdvancedSearch.aspx

Customer Details:

	CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode	Country	Phone	Fax
Select	ERNSH	Ernst Handel	Roland Mendel	Sales Manager	Kirchgasse 6	Graz		8010	Austria	7675-3425	7675-3426
Select	FURIB	Furia Bacalhau e Frutos do Mar	Lino Rodriguez	Sales Manager	Jardim das rosas n. 32	Lisboa		1675	Portugal	(1) 354-2534	(1) 354-2535
Select	GODOS	Godos Cocina Típica	José Pedro Freyre	Sales Manager	C/ Romero, 33	Sevilla		41101	Spain	(95) 555 82 82	
Select	LAMAI	La maison d'Asie	Annette Roulet	Sales Manager	1 rue Alsace-Lorraine	Toulouse		31000	France	61.77.61.10	61.77.61.11
Select	LONEP	Lonesome Pine Restaurant	Fran Wilson	Sales Manager	89 Chiaroscuro Rd.	Portland	OR	97219	USA	(503) 555-9573	(503) 555-9646
Select	PICCO	Piccolo und mehr	Georg Pipp	Sales Manager	Geislweg 14	Salzburg		5020	Austria	6562-9722	6562-9723
Select	RICSU	Richter Supermarkt	Michael Holz	Sales Manager	Grenzacherweg 237	Genève		1203	Switzerland	0897-034214	
Select	SEVES	Seven Seas Imports	Hari Kumar	Sales Manager	90 Wadhurst Rd.	London		OX15 4NB	UK	(171) 555-1717	(171) 555-5646
Select	SPLIR	Split Rail Beer & Ale	Art Braunschweiger	Sales Manager	P.O. Box 555	Lander	WY	82520	USA	(307) 555-4680	(307) 555-6525
Select	VAFFE	Vaffeljernet	Palle Ibsen	Sales Manager	Smagsloget 45	Århus		8200	Denmark	86 21 32 43	86 22 33 44
Select	WELLI	Wellington Importadora	Paula Parente	Sales Manager	Rua do Mercado, 12	Resende	SP	08737-363	Brazil	(14) 555-8122	

Customer Orders:

OrderDate	ShipVia	ShipCountry	Freight	OrderID
7/15/1996 12:00:00 AM	2	Brazil	13.9700	10256
1/21/1997 12:00:00 AM	1	Brazil	44.1200	10420
7/1/1997 12:00:00 AM	1	Brazil	13.4100	10585
8/25/1997 12:00:00 AM	2	Brazil	0.1400	10644
12/30/1997 12:00:00 AM	1	Brazil	55.2300	10803
1/1/1998 12:00:00 AM	1	Brazil	4.8700	10809
2/20/1998 12:00:00 AM	2	Brazil	1.6600	10900
2/24/1998 12:00:00 AM	2	Brazil	13.7200	10905
3/9/1998 12:00:00 AM	3	Brazil	47.5900	10935

Q & A

