

Databases and Visual Basic

Developers and Databases

- Most software applications have a data layer.
- The persistence part of the data layer is usually a database.

Microsoft's Relational Databases

- Relational databases have a long history.
- Microsoft has released several relational databases.
- SQL Server is Microsoft's main relational database.

- You can use Microsoft Visual Studio 201X to create new databases, but Visual Studio is primarily designed for displaying, analyzing, and manipulating the information in existing databases.
- ADO.NET, first introduced in Microsoft Visual Studio .NET 2002, is still the standard data model for database programming in Visual Studio.
- ADO.NET has been improved over the years to work with a large number of data access scenarios, and it has been carefully optimized for Internet use.
- For example, it uses the same basic method for accessing local, client-server, and Internet-based data sources, and the internal data format of ADO.NET is XML.

- Fortunately, most of the database applications that programmers created using Microsoft Visual Basic 2008, 2010 and ADO .NET still function very well, and the basic techniques for accessing a database are mostly the same in Visual Basic 2013.
- However, there are two new database technologies in Visual Studio 201X that will be of considerable use to experienced database programmers.
- These technologies are Language-Integrated Query (LINQ) and the ADO .NET Entity Framework.
- LINQ is included with Visual Studio 201X and offers the capability to write object-oriented database queries directly within Visual Basic code.

- The ADO .NET Entity Framework introduces a new object model, powerful new features, and tools that will make database applications even freer from hard-coded dependencies on a particular data engine or logical model.
- As database technology and the Internet continue to advance, ADO .NET will continue to evolve, and Visual Basic programmers should be well-positioned to benefit.

SQL Server Standard Edition

- Various versions of this popular database system
- The most recent versions: 2012, 2014, and 2016

SQL Server Standard Edition

- Various versions of this popular database system
- The most recent versions: 2012, 2014, and 2016
- Standard, Enterprise, Web, Business Intelligence

SQL Server Express Edition

- Free edition of SQL Server
- Free to use and distribute with an application
- Scaled down version, limited to 1GB RAM and 10GB file size

SQL Server Express LocalDB Edition

- Specialized on-demand version
- Optimized for use on developer computers
- Default edition included in Visual Studio

Microsoft Access

- A relational database management system (DBMS)
- Part of Microsoft Office
- Database similar to SQL Server
- Also includes a UI builder, report generators, code engine, and more

LocalDB Benefits

- Installed with Visual Studio 2012 or later
- Installed with SQL Server 2012 Express or later
- Installed once per machine
- Multiple apps can use LocalDB; each gets a dedicated process.

LocalDB Benefits

- Runs on demand; starts and stops automatically when needed
- By default, no LocalDB process is running on the computer.
- Once the app makes connection, the LocalDB process is started.
- When the last connection is closed, the LocalDB process ends.

What Is a Database?

- A collection of individual data items
- Stored in a highly structured way
- Represents a model of reality

What Is a Database?

- A collection of individual data items
- Stored in a highly structured way
- Represents a model of reality
- Data can be stored in a single location or hard drive
- Or distributed across large networks

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ELIMINAR

LISTADO

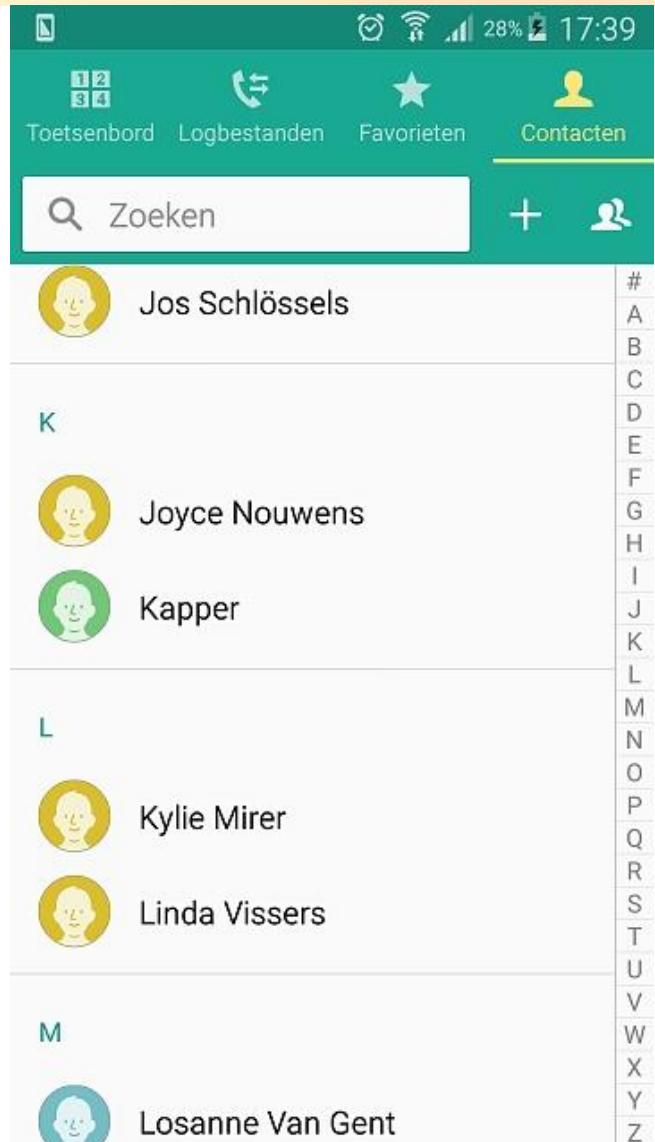
CERTIFICADO

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CRUD Tasks

- Create
- Read
- Update
- Delete
- All performed by a database engine



Database Management System

- Abbreviated as DBMS
- Desktop systems like Microsoft Access
- Server-based systems such as SQL Server or Oracle



FileMaker Cloud Computing



Client
Site

On Travel

On The
Road

Anywhere



OnMyBusiness.com

Tables store data in rows and columns.

Rows

- Records
- Made up of a series of values
- Every record in the table has an identical structure
- Each record represents a single entity

	A	B	C	D	E	F
268	15397	LCDO	JORGE	L	ANGLERO	FIGUEROA
269	16328	LCDA	KARLA	M	ANGLERO	GONZALEZ
270	16329	LCDA	MICHELLE	N	ANGLERO	GONZALEZ
271	10610	LCDO.	ROBERTO	L	ANGLERO	ORTIZ
272	14617	LCDA.	BEATRIZ	L.	ANNEXY	GUEVARA
273	14419	LCDA	ZAIDA	J	ANQUEIRA	PEREZ
274	6800	LCDO.	FRANCISCO		ANSA	TORO
275	14644	LCDA	FABIOLA		ANSOTEGUI	BLANC
276	12839	LCDO.	SALVADOR	J	ANTONETTI	STUTTS
277	5919	LCDO.	LUIS	F	ANTONETTI	ZEQUEIRA
278	4381	LCDO.	SALVADOR		ANTONETTI	ZEQUEIRA
279	8542	LCDO.	JORGE		ANTONGIORGI	BETANCOURT
280	11355	LCDA.	MARI	N	APARICIO	LASPINA
281	15010	LCDA	LAVINIA		APARICIO	LOPEZ
282	7708	LCDO.	JOSE		APARICIO	MALDONADO
283	16913	LCDA	FRANCES	M	APELLANIZ	ARROYO
284	15550	LCDA	JESSICA	M	APELLANIZ	ARROYO
285	12104	LCDA.	SANDRA	M	APELLANIZ	BARRETO
286	5148	LCDO.	CARLOS	A	APONTE	
287	607	LCDO.	FAUSTINO	R	APONTE	ALVAREZ
288						

Rows

- Records
- Made up of a series of values
- Every record in the table has an identical structure
- Each record represents a single entity

Rows are unique - No duplicates allowed

The Rules of Relations

- Cells contain single values
- Columns store a single type of information
- Column names are unique
- Order is insignificant

System Categories

- **Major server DBMS vendors**

Microsoft SQL Server

Oracle

DB2

PostgreSQL

MySQL

Instant Saving – Almacenamiento al instante

System Categories

- **Desktop database management systems**

Easy installation and management

Designed for lighter-weight applications

- **Major vendors**

Microsoft Access

FileMaker Pro

WHAT DOES A CLASS DEFINE?

ATTRIBUTES

name
height
weight
gender
age

BEHAVIOR

walk
run
jump
speak
sleep

<https://msdn.microsoft.com/en-us/library/jj943772.aspx>

Create a simple data app X

com/en-us/library/jj943772.aspx

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... > Visual Studio 2015 > Accessing data in Visual Studio > Visual Studio data tools for .NET ▾

Create a simple data application by using ADO.NET

Visual Studio 2015 | Other Versions ▾

When you create an application that manipulates data in a database, you perform basic tasks such defining connection strings, inserting data, and running stored procedures. By following this topic, you can discover how to interact with a database from within a simple Windows Forms "forms over data" application by using Visual C# or Visual Basic and ADO.NET. All .NET data technologies—including datasets, LINQ to SQL, and Entity Framework—ultimately perform steps that are very similar to those shown in this article.

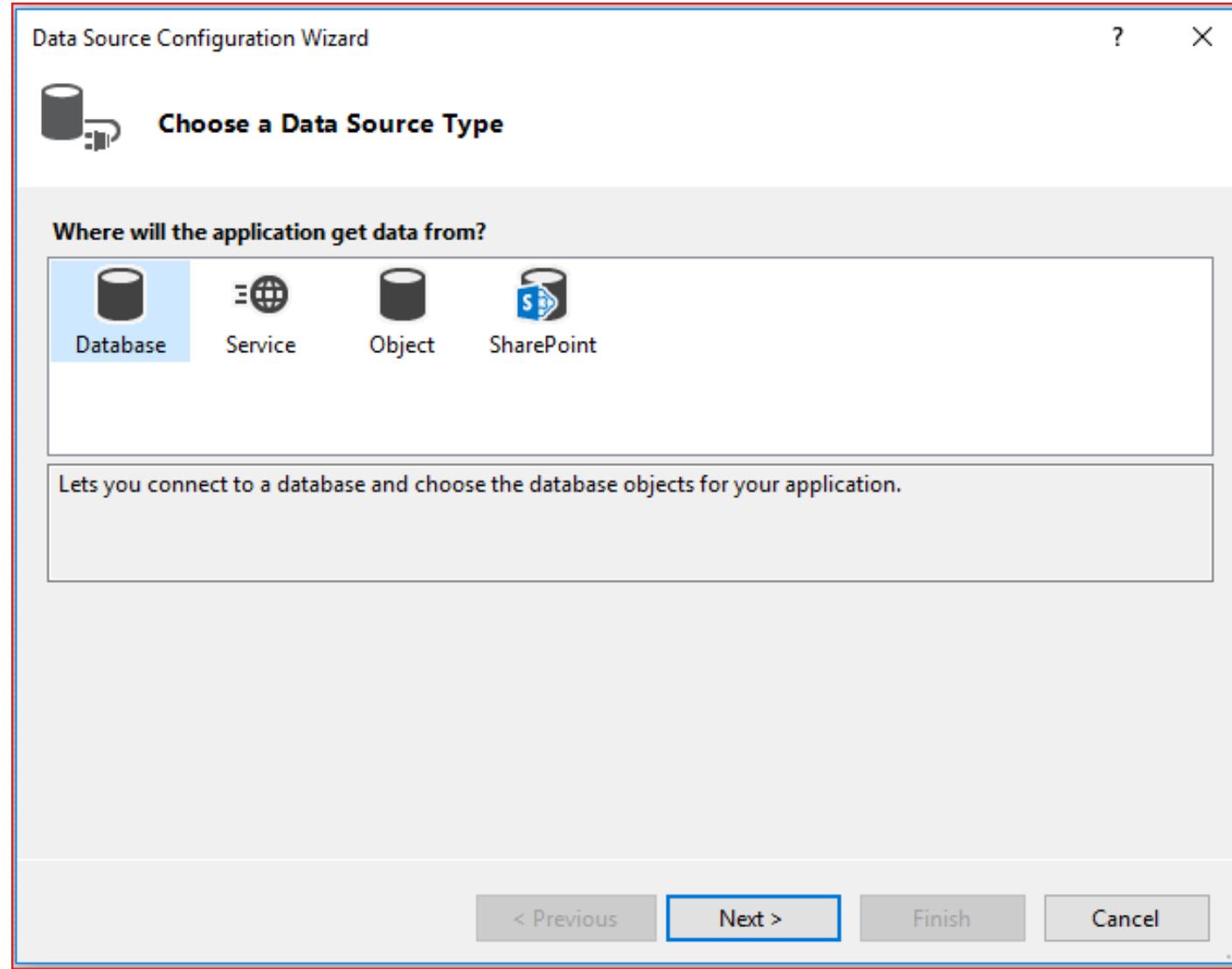
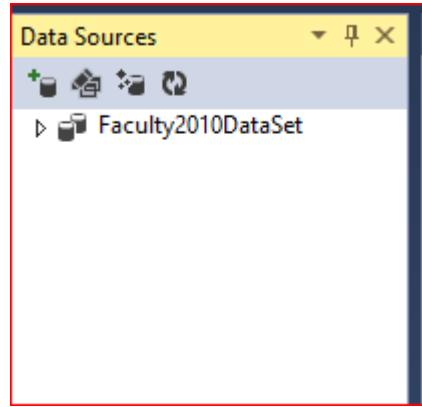
This article demonstrates a simple way to get data out of a database in a very fast manner. If your application needs to modify data in non-trivial ways and update the database, you should consider using Entity Framework and using data binding to automatically sync user interface controls to changes in the underlying data.

Important

To keep the code simple, it doesn't include production-ready exception handling.

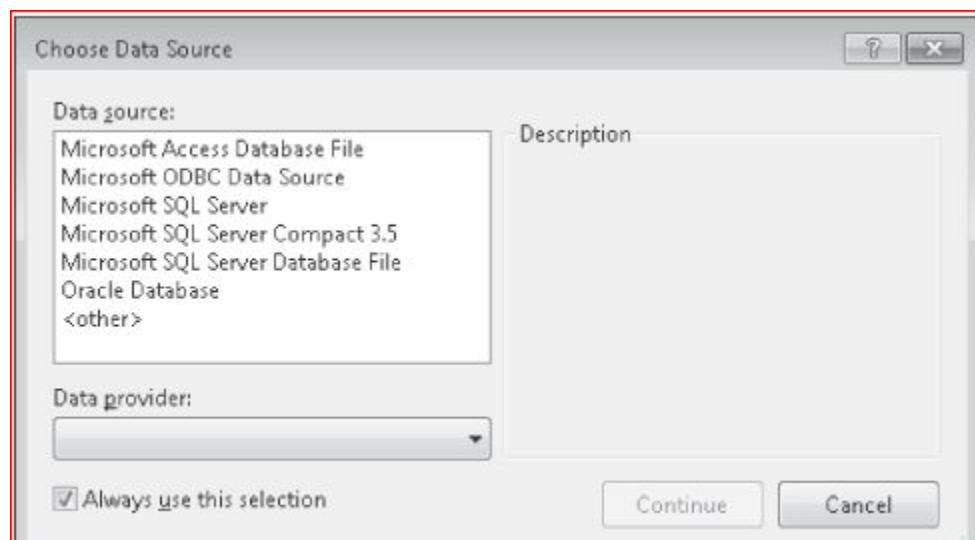
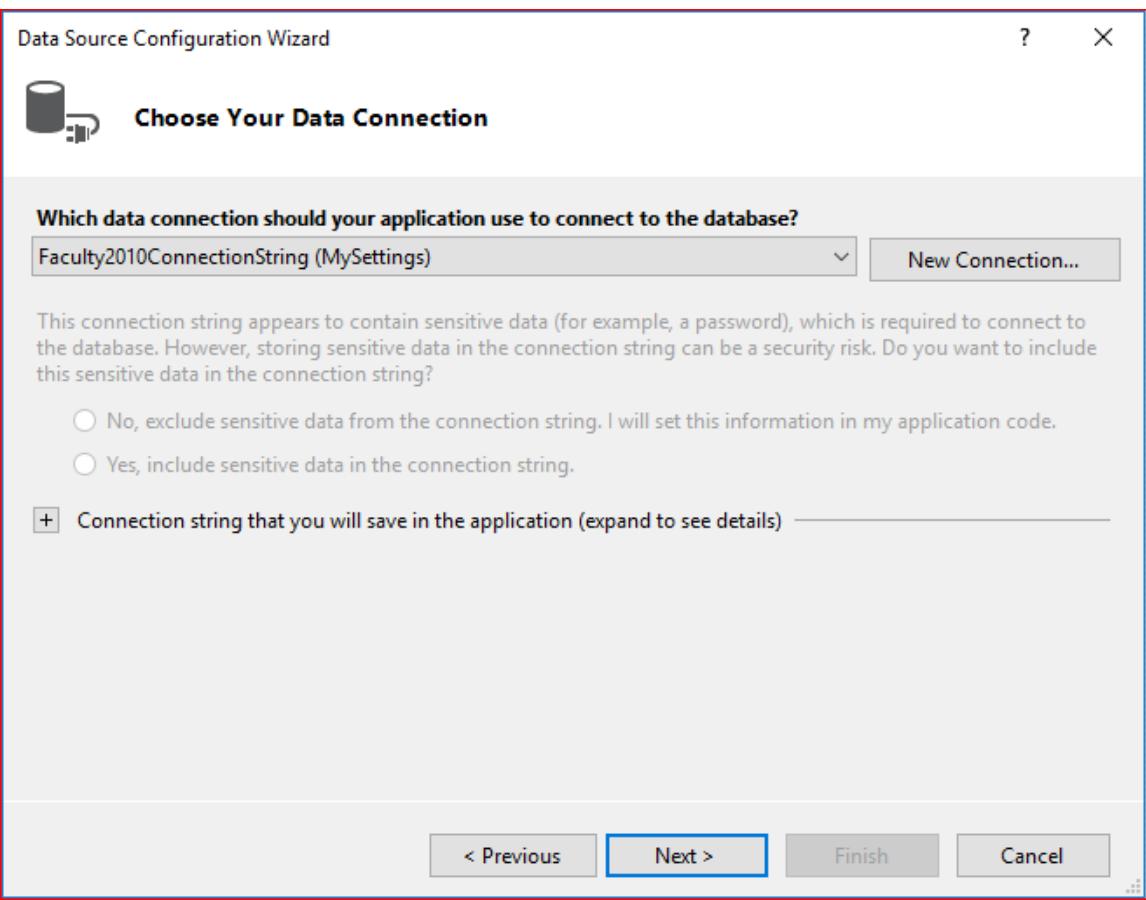
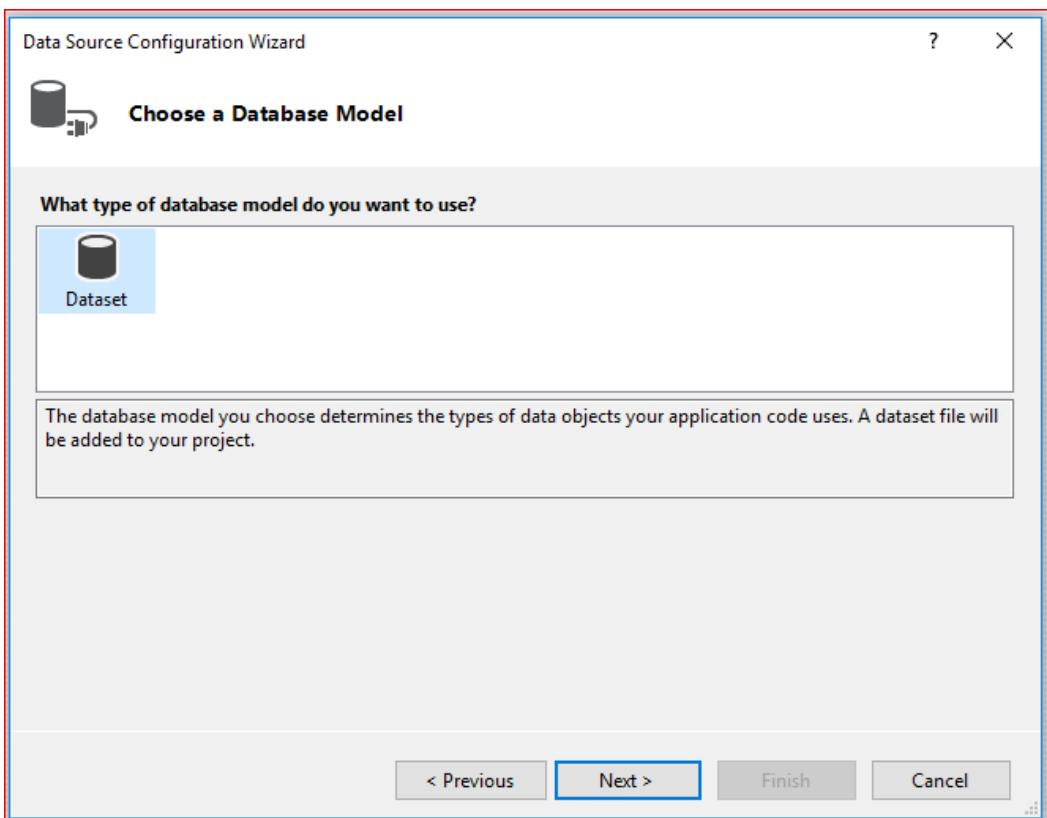
In this topic

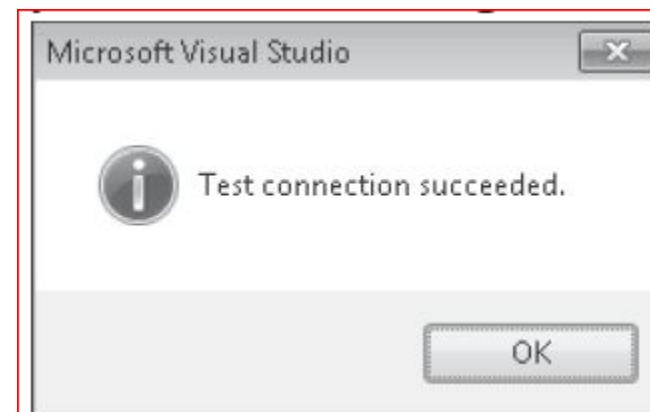
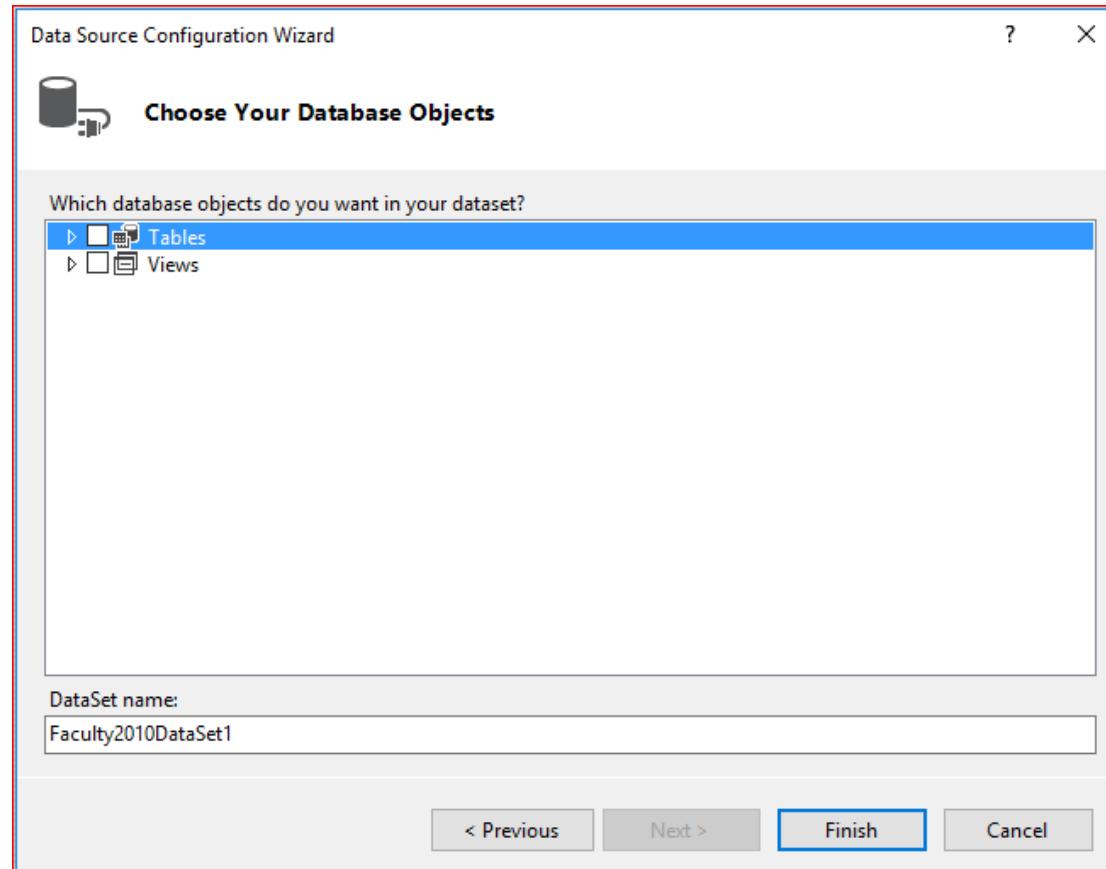
- [Set up the sample database](#)
- [Create the forms and add controls](#)
- [Store the connection string](#)
- [Retrieve the connection string](#)
- [Write the code for the forms](#)
- [Test your application](#)



Data Source Connection Wizard

- The Data Source Connection Wizard is a feature within the Visual Studio 201X IDE that automatically prepares your Visual Basic program to receive database information.
- The wizard prompts you for the type of database that you will be connecting to (a local or remote database, Web service, custom data object that you have created, or Microsoft SharePoint site), establishes a connection to the data, and then creates a dataset or data entity within the program to hold specific database tables and fields.
- The result is that the wizard opens the Data Sources window and fills it with a visual representation of each database object that you can use in your program.





Data Sources

Faculty2010DataSet

- Faculty
 - Last Name
 - Business Phone

Faculty2010DataSet1

- Faculty
 - ID
 - Company
 - Last Name
 - First Name
 - E-mail Address
 - Date of Birth
 - ID Number
 - Faculty ID
 - Department
 - Faculty Type
 - Office
 - Education Level/Degree
 - Focus Area
 - School/Program Name
 - Date of Hire
 - Salary
 - Job Title
 - Business Phone
 - Home Phone
 - Mobile Phone
 - Fax Number
 - Address
 - City
 - State/Province
 - ZIP/Postal Code
 - Country/Region
 - Web Page
 - Notes
 - Attachments
 - Physician Name
 - Physician Phone Number
 - Allergies
 - Medications
 - Emergency Contact Name
 - Emergency Contact Phone 1
 - Emergency Contact Phone 2
 - Emergency Contact Relationship

Faculty

Last Name

Business Phone

FacultyTableAdapter

SQL Fill,GetData ()

SQL SortLastNames ()

Output

Show output from: Debug

```
'ADO Faculty Form.vshost.exe' (CLR v4.0.30319.42000) [C:\Users\...]
```

'ADO Faculty Form.vshost.exe' (CLR v4.0.30319.42000) [C:\Users\...]

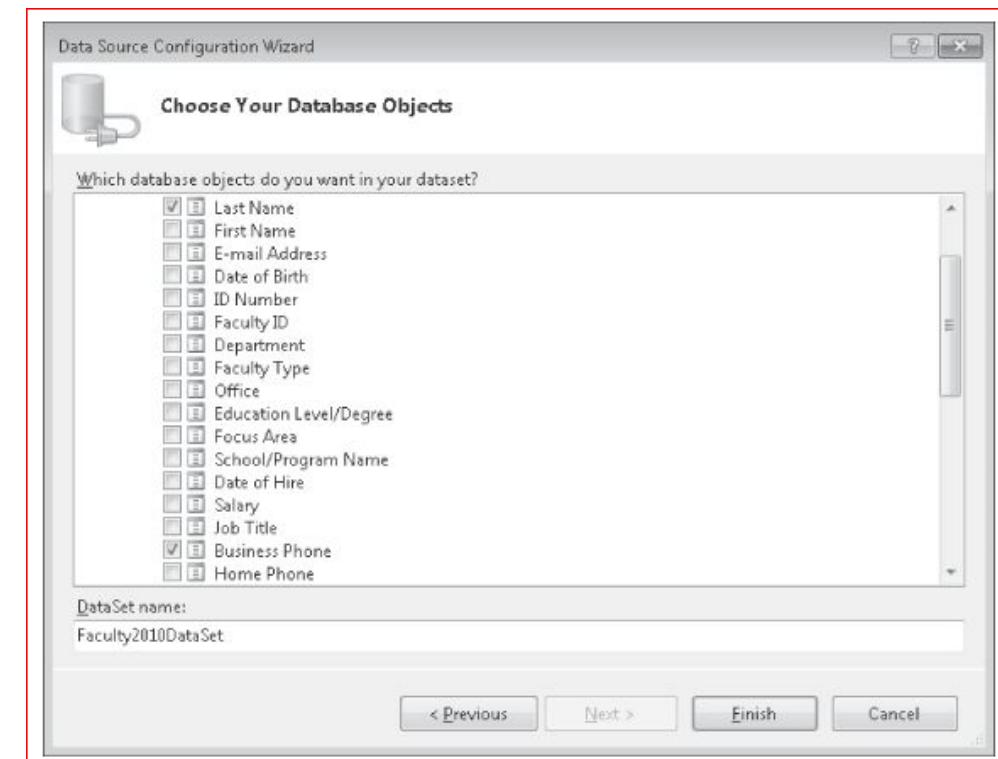
'ADO Faculty Form.vshost.exe' (CLR v4.0.30319.42000) [C:\Users\...]

'ADO Faculty Form.vshost.exe' (CLR v4.0.30319.42000) [C:\Users\...]

The thread 0x1a34 has exited with code 0.

The thread 0x68c has exited with code 0.

The program '[58712] ADO Faculty Form.vshost.exe' has exited with code 0.



Server Explorer Toolbox

Data Sources

Faculty2010DataSet

- Faculty
- Last Name
- Business Phone

Faculty2010DataSet.xsd Form1.vb [Design]

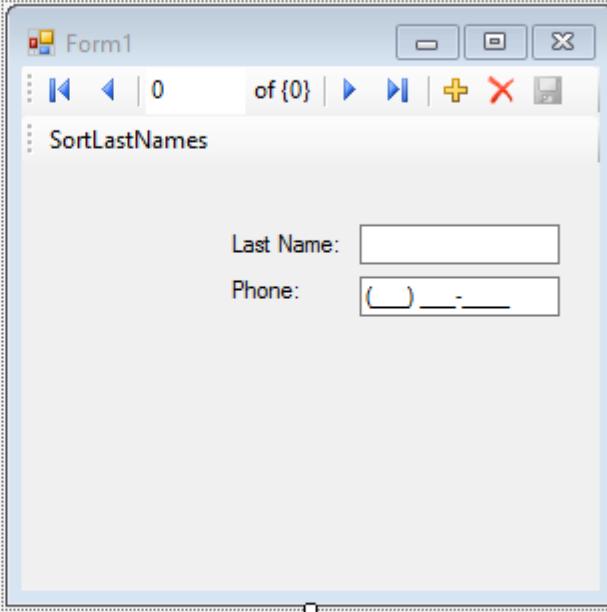
Form1

0 of {0}

Last Name:

Phone:

SortLastNames



Solution Explorer

Search Solution Explorer (Ctrl+;)

Solution 'ADO Faculty Form' (1 project)

- ADO Faculty Form
- My Project
- App.config
- Faculty2010DataSet.xsd
- Form1.vb

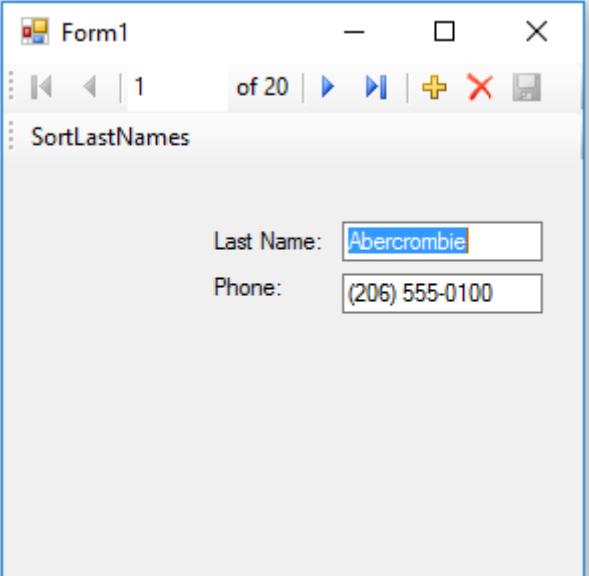
Form1

1 of 20

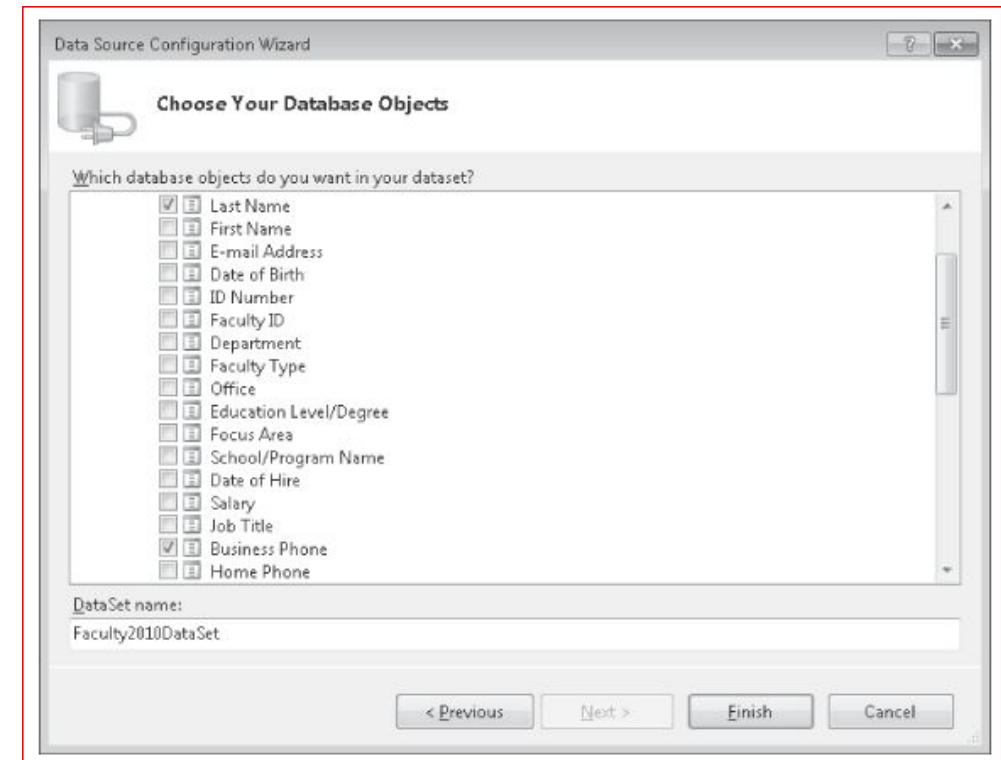
Last Name:

Phone:

SortLastNames



- The dataset is displayed in a hierarchical (tree) view in the Data Sources window, with a root node for each of the objects that you selected in the wizard.
- Each time you run the wizard to create a new dataset, a new dataset tree is added to the Data Sources window, giving you potential access to a wide range of data sources and views within a single program.



The Data Sources Window

- The Data Sources window is a useful and timesaving feature of the Visual Studio 201X IDE.
- Its purpose is to display a visual representation of the datasets that have been configured for use within your project, and to help you bind these datasets to controls on the form.
- Remember that a dataset is just a temporary representation of database information in your program, and that each dataset contains only a subset of the tables and fields within your entire database file; that is, only the items that you selected while using the Data Source Configuration Wizard.

**TO BE
CONTINUED...»**