

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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LISTADO

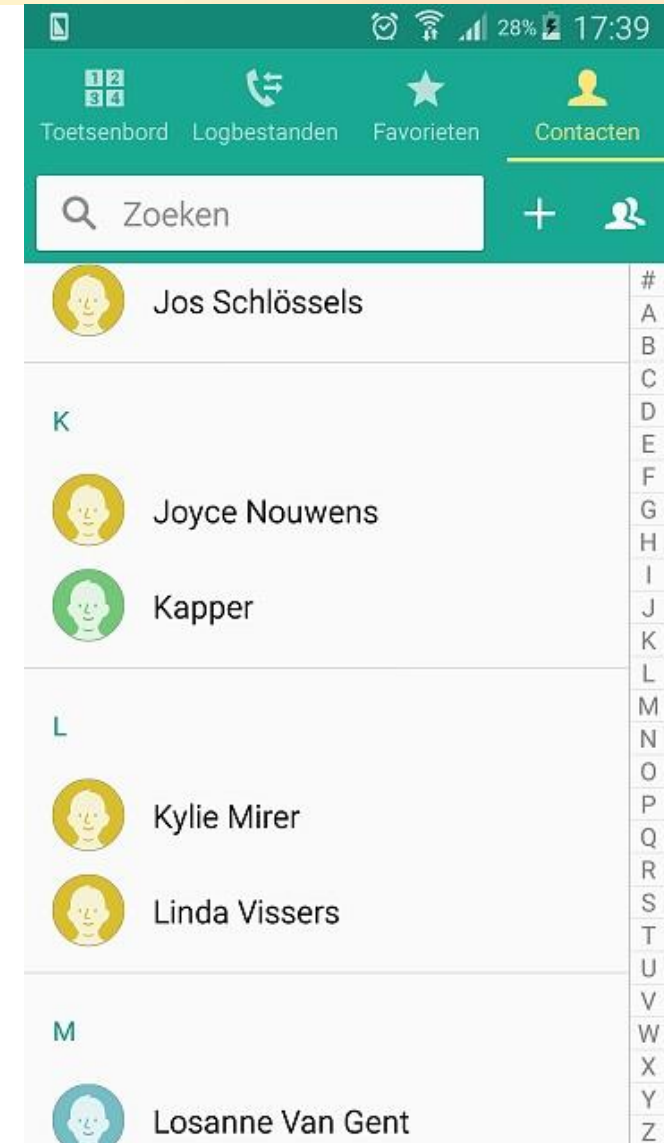
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CRUD Tasks

- 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



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

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>

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

Create a simple data application
with WPF and Entity Framework 6

- ▶ Add new connections
- Add new data sources
- Entity Data Model Tools in Visual Studio
- ▶ Dataset tools in Visual Studio
- ▶ LINQ to SQL Tools in Visual Studio
- ▶ Bind controls to data in Visual Studio
- ▶ Windows Communication Foundation Services and WCF Data Services in Visual Studio
- ▶ Creating and managing databases and data-tier applications in Visual Studio

Additional resources for
troubleshooting data access errors

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 as 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

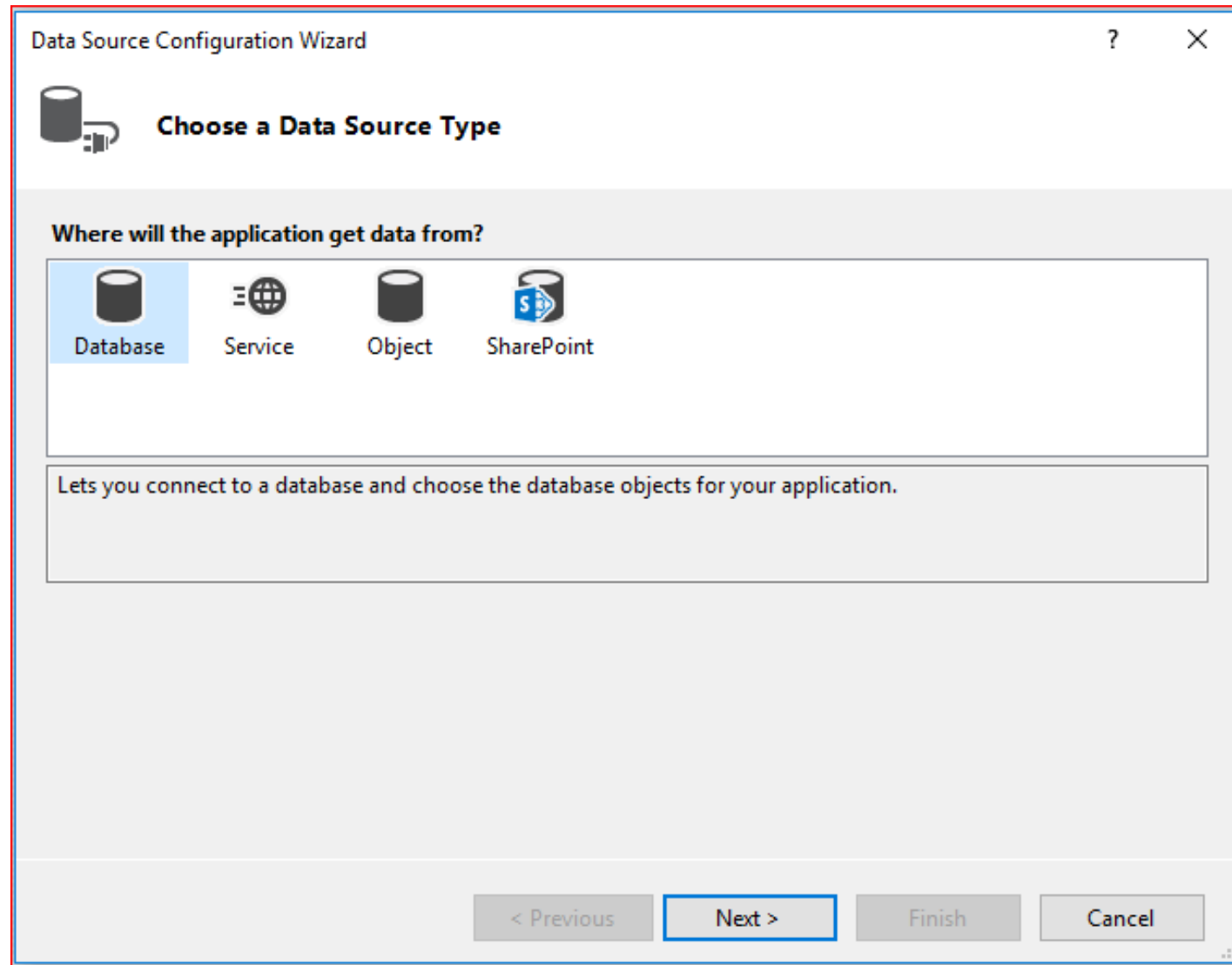
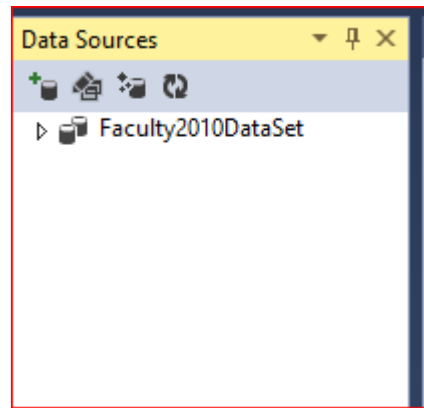
- [Set up the sample database](#)
- [Create the forms and add controls](#)
- [Store the connection string](#)
- [Retrieve the connection string](#)
- [Write the code for the forms](#)
- [Test your application](#)

- Print
- Export (0)
- Share

IN THIS ARTICLE

Prerequisites


- 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 Source Configuration Wizard

 **Choose a Database Model**


What type of database model do you want to use?

 Dataset

The database model you choose determines the types of data objects your application code uses. A dataset file will be added to your project.

< Previous **Next >** Finish Cancel

Data Source Configuration Wizard

 **Choose Your Data Connection**

Which data connection should your application use to connect to the database?

Faculty2010ConnectionString (MySettings) **New Connection...**

This connection string appears to contain sensitive data (for example, a password), which is required to connect to the database. However, storing sensitive data in the connection string can be a security risk. Do you want to include this sensitive data in the connection string?

☐ No, exclude sensitive data from the connection string. I will set this information in my application code.

☐ Yes, include sensitive data in the connection string.

☒ + Connection string that you will save in the application (expand to see details) _____

< Previous **Next >** Finish Cancel

Choose Data Source

Data source:

Microsoft Access Database File
Microsoft ODBC Data Source
Microsoft SQL Server
Microsoft SQL Server Compact 3.5
Microsoft SQL Server Database File
Oracle Database
<other>

Description

Data provider:

☒ Always use this selection

Continue Cancel

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 Access Database File (OLE DB) Change...

Database file name:
 Browse...

Log on to the database

User name:


Password:

☐ Save my password

Advanced...

Test Connection OK Cancel

Data Source Configuration Wizard

 **Choose Your Database Objects**


Which database objects do you want in your dataset?

- ☒ Tables
- ☐ Views

DataSet name:

< Previous Next > Finish Cancel

Microsoft Visual Studio

 Test connection succeeded.

OK

Data Sources Faculty2010DataSet.xsd Form1.vb [Design]

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

- Fill,GetData ()
- SortLastNames ()

Output

Show output from: Debug

```
'ADO Faculty Form.vshost.exe' (CLR v4
'ADO Faculty Form.vshost.exe' (CLR v4
'ADO Faculty Form.vshost.exe' (CLR v4
'ADO Faculty Form.vshost.exe' (CLR v4
The thread 0x1a34 has exited with code
The thread 0x68c has exited with code
The program 'f87121 ADO Faculty Form.v
```

Data Source Configuration Wizard

Choose Your Database Objects

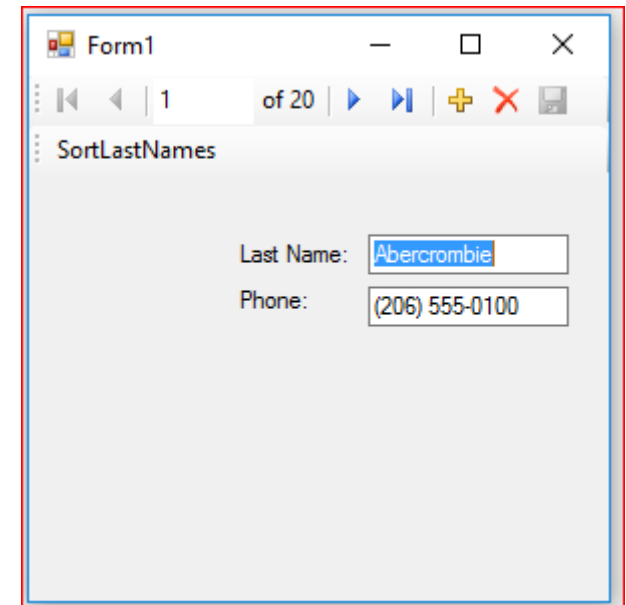
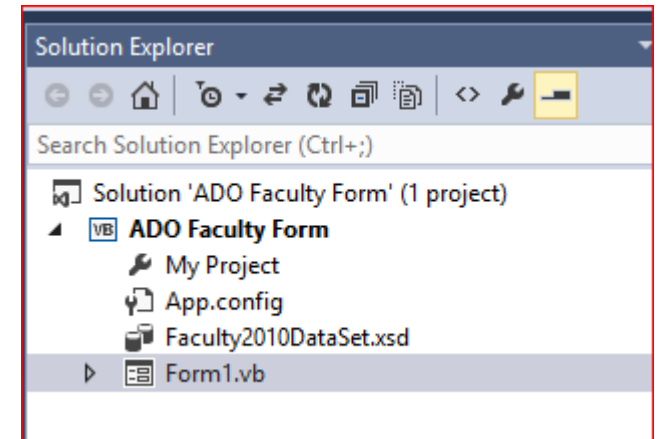
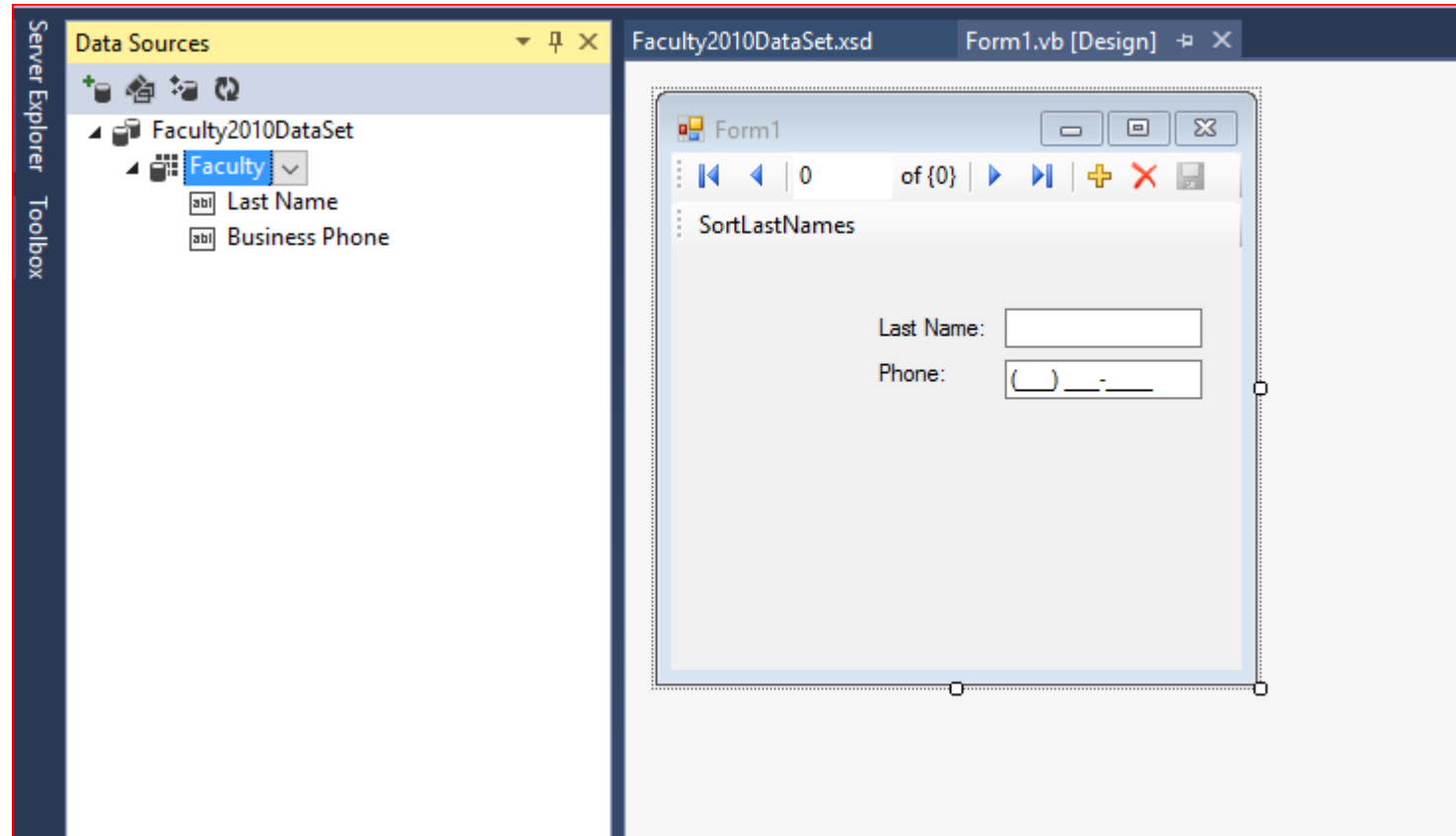
Which database objects do you want in your dataset?

- ☒ 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

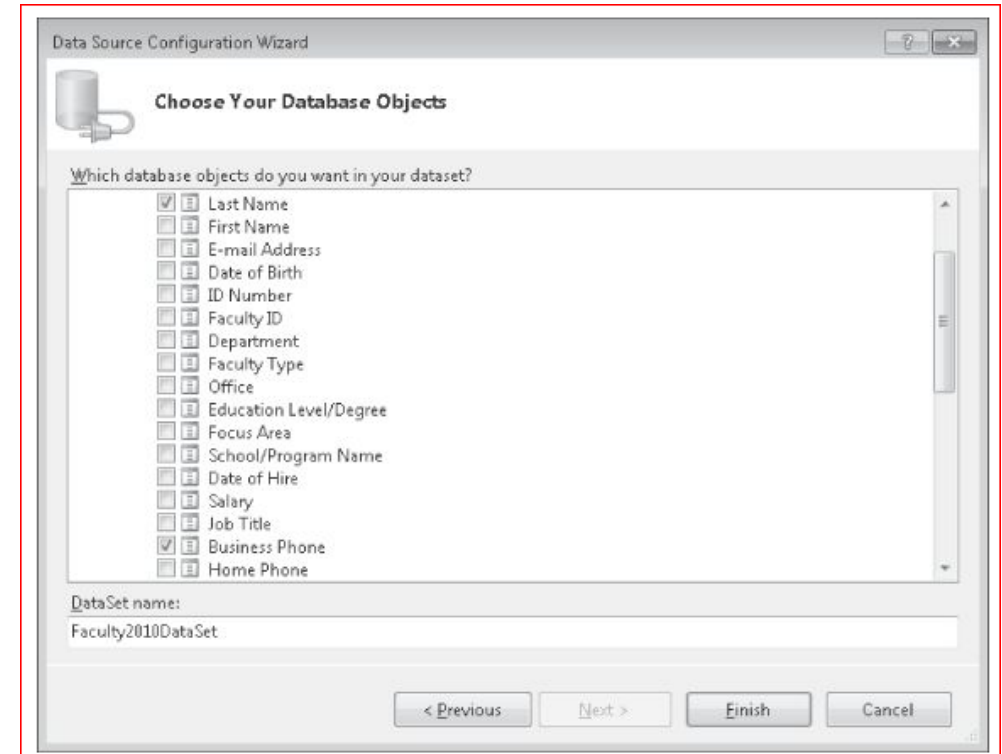
DataSet name:

Faculty2010DataSet

< Previous Next > Finish Cancel



- 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...** 