

ADO.NET

ActiveX Data Objects

Outline of the Lecture

- Application Models (Services Model).
- Benefits of ADO.NET.
- The Object Model.
- ADO.NET Namespaces.

Application Models (Services Model)

- Every application can be broken down into three distinct services:
 - **Presentation Service:** User interface (UI).
 - **Business Service:** Logic part.
 - **Data Service:** data source.
- The model can be one of four special types: *1-tier, 2-tier, 3-tier, or n-tier*.
 - **One-Tier:** the three services are physically located in one computer.
 - **Two-Tier:** classic client/server model (*Intelligent Client model* or *Intelligent Server model*).
 - **Three Tier.**
 - **n-Tier.**

Benefits of ADO.NET

- **ADO.NET** is a group of classes that are used to access data.
- **ADO.NET** supports *multi-tier* Application models.
- **ADO.NET** uses *XML* to move data between components.
- **ADO.NET** supports the disconnected nature of environment.

The Object Model

- ADO.NET has evolved from *DAO* (Data Access Objects), *VBSQL* (Visual Basic SQL), *RDO* (Remote Data Objects), and *ADO* (ActiveX Data Objects).

ADO.NET Programming (Introduction)

- The object model of ADO.NET contains two major components:
 - **DataSet** classes
 - **.NET data provider** classes.
- The **DataSet** class manages data storage in a *disconnected in-memory cache*. The DataSet class is totally independent of the underlying data source. This way the application can use all the features of the DataSet regardless of where the data came from (SQL Server, Access, Oracle, DB/2, and so on).
- The **DataSet** Class: The DataSet is a *collection* of **DataTable** objects that represents the underlying data. A DataSet has one or more *tables* associated with it. The tables are accessed through a **Tables** property that refers to a collection of **DataTable** objects in the DataSet. If the tables have relationships between them, those relationships are available through the **Relations** property, which refers to a collection of **DataRelation** objects in the DataSet. By using the DataRelation object, you can *join* two tables together to programmatically read the data in a *parent/child relationship*.
- A DataSet can be *bound* to most controls in a mobile form (data binding is the process by which a control is automatically synchronized with the DataSet). The data binding provides the underlying services needed to build data forms easily.
- A **.NET data provider** class is *specific* to the type of data source—.NET data-provider classes are custom built for particular data sources. The .NET data provider classes can include the ability to *connect* to, *retrieve* data from, *modify* data in, and *update* data sources.
- Microsoft supplies three .NET data providers

Data Provider	Description
SQL Server .NET	This is an optimized provider for use with Microsoft SQL Server 7.0 or higher databases.
OLE-DB .NET	This is the provider for all OLE-DB provider connections; you can use this .NET data provider for connections to Oracle, DB/2, Informix, and Access.
ODBC .NET	ODBC is legacy support from the .NET Framework.

- There are four objects in each of the .NET data providers, as listed here (the prefix replacing the Xxx for each of these objects is specific to the provider):
 - **XxxConnection** (for example, *SqlConnection* or *OleDbConnection*)
 - **XxxCommand** (for example, *SqlCommand* or *OleDbCommand*)
 - **XxxDataReader** (for example, *SqlDataReader* or *OleDbDataReader*)
 - **XxxDataAdapter** (for example, *SqlDataAdapter* or *OleDbDataAdapter*)

ADO.NET Programming (Introduction)

- The ***XxxConnection*** object is used to encapsulate the connection between the code and a specific data source.
- ***XxxCommand*** objects are used to execute commands on the data source. In the case of SQL Server, the SqlCommand is used to execute a *stored procedure* on the server.
- The ***XxxDataReader*** provides a *forward-only read-only data stream* from the data source. You can access the data stream through the *ExecuteReader* method of the XxxCommand object. The xxxCommand object is usually the result of an *SQL SELECT* statement or a *stored procedure* call.
- The ***XxxDataAdapter*** lets you *manage* the disconnected nature of the ADO.NET environment by acting as the manager of the XxxConnection and DataSet objects. You use the XxxDataAdapter to *populate* the DataSet and to *update* the data source with any changes that have been made to the DataSet.

ADO.NET Namespaces

Namespace	Description
System.Data	Contains the core classes of ADO.NET, including the classes that enable disconnected data (such as the DataSet class).
System.Data.SqlClient	Contains the SQL Server .NET data provider
System.Data.OleDb	Contains the OLE-DB .NET data provider
System.Data.ODBC	Contains the ODBC .NET data provider