This three-day intensive course teaches the essential elements of ADO.NET for Web applications such that at the end of the course the programmer is able to utilize its tremendous database manipulation powers to build effective database applications. The course includes a major case study demonstrating the use of ADO.NET in a realistic setting. It is current to .NET 4.5.1, Visual Studio® 2013 and SQL Server® 2012 Express.

**Audience:** Programmers with a working knowledge of C# who want to build Web applications using .NET and the C# language.

**Prerequisites:** A basic knowledge of SQL and of programming the .NET Framework using C#. The student should also understand the fundamentals of XML. To get full benefit from the examples in the course the student should be able to write simple Web Forms applications. A working knowledge of SQL Server is also desirable.

**Number of Days:** 3 days

1. **Introduction to ADO.NET**
   - Microsoft Data Access Technologies
   - ODBC
   - OLE DB
   - ActiveX Data Objects (ADO)
   - Accessing SQL Server before ADO.NET
   - ADO.NET
   - ADO.NET Architecture
   - .NET Data Providers
   - Programming with ADO.NET Interfaces
     - .NET Namespaces
     - Connected Data Access
     - SQL Express LocalDB
     - SqlLocalDB Utility
     - Visual Studio Server Explorer
     - Queries
     - SQL Server Management Studio
     - ADO.NET Class Libraries
   - Connecting to an OLE DB Data Provider
   - Using Commands
   - Creating a Command Object
   - ExecuteNonQuery
   - Using a Data Reader
   - Disconnected Datasets
   - Data Adapters
   - Buy Computer
   - Model

2. **ADO.NET Connections**
   - ADO.NET Block Diagram
   - .NET Data Providers
   - Namespaces for .NET Data Providers
   - BasicConnect (version 1)
   - Using Interfaces
   - IDbConnection Properties
   - Connection String
   - SQL Server Connection String
   - OLE DB Connection String
   - SQL Server Security
   - IDbConnection Methods
   - BasicConnect (version 2)
   - Connection Life Cycle
   - BasicConnect (version 3)
   - Database Application Front-ends
   - Connection Pooling
   - Pool Settings for SQL Server
   - Connection Events
ADO.NET Exception Handling

3. **ADO.NET Commands**

- Command Objects
- Creating Commands
- Executing Commands
- Dynamic Queries
- Parameterized Queries
- Command Types
- Stored Procedures
- Testing the Stored Procedure
- Stored Procedures in ADO.NET
- Batch Queries
- Transactions

4. **DataReaders and Connected Access**

- DataReader
- Using a DataReader
- Closing a DataReader
- IDataRecord
- Type-Safe Accessors
- GetOrdinal()
- Null Data
- Testing for Null
- ExecuteReader Options
- Returning Multiple Result Sets
- DataReader Multiple Results Sets
- Obtaining Schema Information

5. **Data Sets and Disconnected Access**

- DataSet
- DataSet Architecture
- Why DataSet?
- DataSet Components
- DataAdapter
- Data Access Class
- Retrieving the Data
- Filling a DataSet
- Accessing a DataSet
- Updating a DataSet Scenario
- Adding a New Row
- Searching and Updating a Row
- Deleting a Row
- Row Versions
- Row State
- BeginEdit and CancelEdit
- DataTable Events
- Updating a Database
- Insert Command
- Update Command

6. **More about DataSets**

- Delete Command
- Exception Handling
- Command Builders

7. **XML and ADO.NET**

- ADO.NET and XML
- Rendering XML from a DataSet
- XmlWriteMode
- Reading XML into a DataSet
- DataTypes and XML Schema
- ModelSchema.xsd
- Reading XML Schema
- XmlReadMode
- Writing Data as Attributes
- XML Data in DataTables
- Typed DataSets
- Table Adapter
- Using a Typed DataSet
- Synchronizing DataSets and XML
- Using XmlDataDocument
- Windows Client Code
- Web Client Code
- XML Serialization
- Default Constructor

8. **Concurrency and Transactions**

- DataSets and Concurrency
- Handling Concurrency Violations
- Pessimistic Concurrency
- Transactions
- Programming ADO.NET Transactions
- ADO.NET Transaction Code
- Using ADO.NET Transactions
9. Additional Features
AcmePub Database
Connected Database Access
Long Database Operations
Asynchronous Operations
Multiple Active Result Sets
Bulk Copy

10. LINQ and Entity Framework
Language Integrated Query (LINQ)
LINQ to ADO.NET
Bridging Objects and Data
Object Relational Designer
IntelliSense
Basic LINQ Query Operators
Obtaining a Data Source
Filtering
Ordering
Aggregation
Obtaining Lists and Arrays
Deferred Execution
Modifying a Data Source
Performing Inserts via LINQ to SQL
Performing Deletes via LINQ to SQL
Performing Updates via LINQ to SQL
LINQ to DataSet
Using the Typed DataSet
ADO.NET Entity Framework
Exploring the EDM
AcmePub Tables
AcmePub Entity Data Model
XML Representation of Model
Entity Data Model Concepts
Conceptual Model
Storage Model
Mappings
Querying the EDM
Class Diagram
Context Class
List of Categories
List of Books
Entity Framework in a Class Library
Data Access Class Library
Client Code

11. Appendix A – Acme Computer Case Study

12. Appendix B – SQL Server 2012 Express
SQL Server Express
SQL Server 2012 Express LocalDB
AttachDBFileName
Database
Moving from LocalDB to SQL Server

13. Appendix C – Learning Resources