



BUILDING TRAINING SOLUTIONS
FOR THE IT WORLD

Developing Data Access Solutions with the Entity Framework and Microsoft Visual Studio 2010

Days: 5
Format: Instructor-Led
Class Code 10265
Certification Exams:
Certification Track:

Recommended Course Sequence

Knowledge of prerequisites
noted below.

*Course content is subject to change
without notice.*

Course Description:

In this course, experienced developers who know the basics of data access (CRUD) in Windows client and Web application environments will learn to optimize their designs and develop better performing data access code by using the ADO.NET Entity Framework, LINQ, WCF Data Services, the Sync Framework, and ADO.NET.

Target Student:

This course is intended for professional .NET software developers who use Microsoft Visual Studio in a team-based, medium-sized to large development environment. They will have experience implementing data access and data binding within their Web and/or Windows client applications and are interested in learning to optimize data access code in their applications by using the Entity Framework, LINQ, and ADO.NET. Members of the

audience are experienced users of Microsoft Visual Studio 2008 SP1 or newer releases of the Visual Studio product. The audience has some experience using Visual Studio 2010 for either Windows client or Web application development.

Typically, this audience has the following knowledge/experience:

- Experience developing n-tier applications that access various data sources
- Experience implementing data binding within their applications
- Some experience using LINQ and ADO.NET
- A conceptual understanding of the Entity Framework

Delivery Method:

Instructor led, group-paced, classroom-delivery learning model with structured hands-on activities.

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At Course Completion:

After completing this course, students will be able to:

- Evaluate a variety of business cases, and then select an appropriate combination of data access technologies and tools most appropriate to each case. Describe the roles of Entity Framework, WCF Data Services, and ADO.NET for building and maintaining applications. Use LINQ on top of these technologies to improve productivity and the quality of their applications.
- Use the tools provided with the Entity Framework to map the conceptual model used by the business logic of an application to the logical data model provided by a database.
- Query an Entity Data Model (EDM) by using common methods such as LINQ to Entities, Entity SQL, and the classes in the EntityClient namespace.
- Perform data modification tasks on data in an EDM.
- Explain the function of the Object Services model implemented by the Entity Framework and the support provided by the Object Services API for addressing the issues faced by enterprise applications that have to handle multiple concurrent users simultaneously accessing the same data.
- Describe best practices for designing and building a scalable, optimized data access layer by using Object Services.
- Customize and extend entities with their own business logic and use advanced mappings to shape the data model to their business and application requirements.
- Reuse existing business classes in a data access layer built by using the Entity Framework.
- Address the architectural issues that can arise when building an n-tier enterprise application by using the Entity Framework.
- Build extensible solutions that can update data in an n-tier enterprise application by using the Entity Framework.
- Access offline data or data that has limited availability in client applications.
- Design, develop, and consume a simple WCF Data Service.
- Use WCF Data Services to update and delete data and to handle multi-user concerns.
- Develop high performance, scalable ADO.NET applications that can query and update data.
- Explain how LINQ to SQL enables development against a logical model which abstracts the low-level details of querying ADO.NET tables and result sets.

Course Outline

Module 1: Architecture and Data Access Technologies

This module describes the commonly used data access technologies and scenarios in which you are likely to use them.

Lessons
■ Data Access Technologies
■ Data Access Scenarios
Lab : Analyzing Data Access Scenarios
■ Identifying Data Access Technologies

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Module 2: Building Entity Data Models

This module introduces the concepts of data modeling, and in particular, Entity Data Models (EDMs). It explains how you can use EDMs to decouple the conceptual data structure in your applications from the logical data structure in the data store.

Lessons
<ul style="list-style-type: none">■ Introduction to Entity Data Models■ Modifying the Entity Data Model■ Customizing the Entity Data Model
Lab : Using Entity Data Models
<ul style="list-style-type: none">■ Generating an EDM from the AdventureWorks Database■ Adding Entities and Associations■ Using the Generate Database Wizard■ Mapping Entities to Multiple Tables■ Implementing an Inheritance Hierarchy■ Using Stored Procedures■ Creating a Complex Type

Module 3: Querying Entity Data

This module explains how to query an entity data model by using common methods such as LINQ to Entities, Entity SQL, and the classes in the EntityClient namespace.

Lessons
<ul style="list-style-type: none">■ Retrieving Data by Using LINQ to Entities■ Retrieving Data by Using Entity SQL■ Retrieving Data by Using EntityClient Provider■ Retrieving Data by Using Stored Procedures■ Unit Testing Your Data Access Code
Lab : Querying Entity Data
<ul style="list-style-type: none">■ Retrieving All Contact Entities■ Retrieving Contact Entities by Using a Filter■ Retrieving RewardsClaimed Entities■ Querying the Rewards Family of Entities■ Executing a Stored Procedure

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Module 4: Creating, Updating, and Deleting Entity Data

This module introduces you to the ways that the Entity Framework enables you to modify the data in your database. You apply changes to the entities managed by theObjectContext class. TheObjectContext class is responsible for tracking all changes to entities and then persisting these changes to the database on request.

Lessons
<ul style="list-style-type: none">■ Understanding Change Tracking in the Entity Framework■ Modifying Data in an Entity Data Model
Lab : Creating, Updating, and Deleting Entity Data
<ul style="list-style-type: none">■ Maintaining Contact and Reward Data■ Maintaining RewardsClaim Data

Module 5: Handling Multi-User Scenarios by Using Object Services

This module introduces the concurrency model that the Entity Framework uses to address the issues faced by applications that must support multiple users who access the same data simultaneously. It also describes how the Entity Framework can make use of transactions to ensure data integrity.

Lessons
<ul style="list-style-type: none">■ Handling Concurrency in the Entity Framework■ Transactional Support in the Entity Framework
Lab : Handling Multi-User Scenarios by Using Object Services
<ul style="list-style-type: none">■ Handling Concurrency of Rewards Claimed Data■ Updating the RewardsClaimed and ArchivedRewardsClaimed Information by Using a Transaction

Module 6: Building Optimized Solutions by Using Object Services

This module explains best practices for designing and building a scalable, optimized data access layer by using Object Services. The module introduces several techniques that can be used to optimize the performance of queries that execute against the conceptual model.

Lessons
<ul style="list-style-type: none">■ The Stages of Query Execution■ Change Tracking and Object Materialization■ Using Compiled Queries■ Using Design-Time Generated Entity Framework Views■ Monitoring Performance■ Performing Asynchronous Data Modifications
Lab : Building Optimized Solutions by Using Object Services
<ul style="list-style-type: none">■ Improving the Performance of Query Operations■ Improving the Performance of Update Operations

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Module 7: Customizing Entities and Building Custom Entity Classes

This module describes how to customize and extend entities with your own business logic.

Lessons
<ul style="list-style-type: none">■ Overriding Generated Classes■ Using Templates to Customize Entities■ Creating and Using Custom Entity Classes
Lab : Customizing Entities and Building Custom Entity Classes
<ul style="list-style-type: none">■ Using a Template to Add Custom Functionality to Entity Classes■ Creating Custom Entity Classes

Module 8: Using POCO Classes with the Entity Framework

This module introduces the ways in which you can define custom entity classes in your Entity Framework application. By default, Microsoft Visual Studio generates a set of entity classes for you from the Entity Data Model (EDM). Instead of these generated classes, you may want to use an existing set of "plain old" CLR objects (POCO) business classes in your application. You can also extend the generated entity classes to add custom business functionality to your entity objects.

Lessons
<ul style="list-style-type: none">■ Requirements for POCO Classes■ POCO Classes and Lazy Loading■ POCO Classes and Change Tracking■ Extending Entity Types
Lab : Using POCO Classes with the Entity Framework
<ul style="list-style-type: none">■ Using POCO Classes■ Extending Your POCO Classes

Module 9: Building an N-Tier Solution by Using the Entity Framework

This module explains how to address the architectural issues that can arise when building an N-Tier enterprise application by using the Entity Framework.

Lessons
<ul style="list-style-type: none">■ Designing an N-Tier Solution■ Defining Operations and Implementing Data Transport Structures■ Protecting Data and Operations
Lab : Building an N-Tier Solution by Using the Entity Framework
<ul style="list-style-type: none">■ Creating the Contacts and Orders Data Access Tier■ Protecting Data Access Operations

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Module 10: Handling Updates in an N-Tier Solution by Using the Entity Framework

This module describes how you can handle data modifications in an n-tier solution. The module describes the different strategies for handling modifications that you should use for the different alternative formats for transporting data between tiers: data transfer objects (DTOs), self-tracking entities (STEs), and simple entities (SEs). The module also describes how to manage the exceptions that can occur during the data modification process.

Lessons
<ul style="list-style-type: none">■ Tracking Entities and Persisting Changes■ Managing Exceptions in an N-Tier Solution
Lab : Handling Updates in an N-Tier Solution by Using the Entity Framework
<ul style="list-style-type: none">■ Handling Updates in the Data Access Tier■ Detecting and Handling Order Conflicts

Module 11: Building Occasionally Connected Solutions

This module describes how to access offline or occasionally connected data in client applications.

Lessons
<ul style="list-style-type: none">■ Offline Data Caching by Using XML■ Using the Sync Framework
Lab : Building Occasionally Connected Solutions
<ul style="list-style-type: none">■ Modifying the Orders Application to Use Offline XML Data■ Modifying the Orders Application to Synchronize Locally Cached Data

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Module 12: Querying Data by Using WCF Data Services

Windows Communication Foundation (WCF) Data Services enable you to create highly flexible data services that can be used to provide access to data across the Internet or a corporate network. You can access these services by using REST-style URIs, and they can be easily consumed by a wide variety of applications. As WCF Data Services are built on top of standard Internet protocols such as HTTP and the Atom Publishing Protocol, they are an ideal choice for delivering data to AJAX applications and Rich Interactive Applications built using technologies such as Microsoft Silverlight.

Lessons
<ul style="list-style-type: none">■ Introduction to WCF Data Services■ Creating a WCF Data Service■ Consuming a WCF Data Service■ Protecting Data and Operations in a WCF Data Service
Lab : Creating and Using WCF Data Services
<ul style="list-style-type: none">■ Exposing Order Data as a WCF Data Service■ Consuming a WCF Data Service■ Restricting Access to Data Exposed by a WCF Data Service■ Implementing a Business Operation in a WCF Data Service

Module 13: Updating Data by Using WCF Data Services

This module describes how to use WCF Data Services to create, update, and delete data. WCF Data Services use standard internet protocols such as HTTP and the Atom Publishing Protocol to enable update access to data across the Internet or a corporate network.

Lessons
<ul style="list-style-type: none">■ Creating, Updating, and Deleting Data in a WCF Data Service■ Preventing Unauthorized Updates and Improving Performance■ Using WCF Data Services with Nonrelational Data
Lab : Updating Data by Using WCF Data Services
<ul style="list-style-type: none">■ Updating Entities by Using a WCF Data Service■ Creating and Deleting Entities by Using a WCF Data Service■ Restricting Create, Update, and Delete Requests

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Module 14: Using ADO.NET

ADO.NET is a highly flexible framework for building applications that require access to data held in a data source. This module introduces ADO.NET and explains how you can use it to develop scalable, high-performance, data-driven applications.

Lessons
<ul style="list-style-type: none">■ Retrieving and Modifying Data by Using ADO.NET Commands■ Retrieving and Modifying Data by Using DataSets■ Managing Transactions and Concurrency in Multiuser Scenarios
Lab : Using ADO.NET
<ul style="list-style-type: none">■ Using ADO.NET to Retrieve Read-Only Information Quickly and Perform Simple Data Modifications■ Developing the Product List Web Application■ Enabling Data Modifications

Module 15: Using LINQ to SQL

ADO.NET provides a mechanism that enables you to build applications that can query and maintain data that is held in a variety of sources in a database-agnostic manner. However, building applications by using ADO.NET requires that you are familiar with the Structured Query Language (SQL) language and features of the database management system that you are connecting to. Language-Integrated Query (LINQ) to SQL provides a higher-level abstraction for managing data that is held in a Microsoft SQL Server database, and is an ideal stepping stone for migrating ADO.NET applications toward the ADO.NET Entity Framework. This module introduces LINQ to SQL and explains how you can use it to abstract the low-level details of ADO.NET queries by developing against a logical data model.

Lessons
<ul style="list-style-type: none">■ Implementing a Logical Data Model by Using LINQ to SQL■ Managing Performance and Handling Concurrency
Lab : Using LINQ to SQL
<ul style="list-style-type: none">■ Using LINQ to SQL to Build a Data Access Layer■ Updating a Database by Using a Stored Procedure■ Building a Custom Entity Class