Part 1: Pro LINQ: Language Integrated Query in C#

1 Hello LINQ

A Paradigm Shift

Query XML
Query a SQL Server Database

Introduction

LINQ Is About Data Queries
How to Obtain LINQ

LINQ Is Not Just for Queries

Tips to Get You Started

Use the var Keyword When Confused
Use the Cast or OfType Operators for Legacy Collections
The OfType Operator versus the Cast Operator
Don’t Assume a Query Is Bug-Free
Take Advantage of Deferred Queries
Use the DataContext Log

2 C# Language Enhancements for LINQ

C# Language Additions

Lambda Expressions
Expression Trees
Keyword var, Object Initialization, and Anonymous Types
Extension Methods
Partial Methods
Query Expressions
Part 2: LINQ to Objects

3 LINQ to Objects Introduction

LINQ to Objects Overview
IEnumerable<T>, Sequences, and the Standard Query Operators
Returning IEnumerable<T>, Yielding, and Deferred Queries
Func Delegates
The Standard Query Operators Alphabetical Cross-Reference
A Tale of Two Syntaxes

4 Deferred Operators

Referenced Namespaces
Referenced Assemblies
Common Classes
The Deferred Operators by Purpose
  Restriction
  Projection
  Partitioning
  Concatenation
  Ordering
  Join
  Grouping
  Set
  Conversion
  Element
  Generation

5 Nondeferred Operators

Referenced Namespaces
Part 3: LINQ to SQL

6 LINQ to SQL Introduction

Introducing LINQ to SQL

The DataContext

Entity Classes

Associations

Concurrency Conflict Detection

Concurrency Conflict Resolution

Prerequisites for Running the Examples

Obtaining the Appropriate Version of the Northwind Database

Generating the Northwind Entity Classes

Generating the Northwind XML Mapping File

Using the LINQ to SQL API

IQueryable<T>

Some Common Methods

GetStringFromDb()

ExecuteStatementInDb()

7 LINQ to SQL Tips and Tools

Introduction to LINQ to SQL Tips and Tools
Tips

Use the DataContext.Log Property
Use the GetChangeSet() Method
Consider Using Partial Classes or Mapping Files
Consider Using Partial Methods

Tools

SQLMetal
The Object Relational Designer

Use SQLMetal and the O/R Designer Together

8 LINQ to SQL Database Operations

Prerequisites for Running the Examples

Some Common Methods
Using the LINQ to SQL API

Standard Database Operations

Inserts
Queries
Updates
Deletes

Overriding Database Modification Statements

Overriding the Insert Method
Overriding the Update Method
Overriding the Delete Method

Example
Overriding in the Object Relational Designer

Considerations

SQL Translation
9 The LINQ to SQL DataContext

Prerequisites for Running the Examples

Some Common Methods

Using the LINQ to SQL API

[Your]DataContext Class

The DataContext Class

The DataContext Class Implements IDisposable

Primary Purposes

The Data Context Lifetime

DataContext() and [Your]DataContext()

SubmitChanges()

DatabaseExists()

CreateDatabase()

DeleteDatabase()

CreateMethodCallQuery()

ExecuteQuery()

Translate()

ExecuteCommand()

ExecuteMethodCall()

GetCommand()

GetChangeSet()

GetTable()

Refresh()

10 LINQ to SQL Concurrency Conflicts

Prerequisites for Running the Examples

Some Common Methods

Using the LINQ to SQL API
Part 4: LINQ to Entities

11 LINQ to Entities

The Four Steps for Inserting a Record
Creating an Entity Type with the Create[T] Method
Inserting an Attached Entity Object
Attaching Objects After They Have Been Created
Attaching Objects in the Other Direction
Obtaining an IQueryable Result from LINQ to Entities
Similar LINQ to Entities Queries
Using a Compiled LINQ to Entities Query
Displaying the SQL Statement
The Effect of Lazy Object Loading
Eager Loading of the Orders Data
Eagerly Loading Multiple Related Entity Types
Explicit Loading to Control Database Queries
Using LINQ to Query a Database View
Querying an Imported Stored Procedure
A LINQ to Entities Inner Join
A LINQ to Entities Outer Join
A Simple Entity Object Update
Updating an Associated Type Relationship
Deleting a Record by Deleting an Entity Object
Deleting a Record Using the EntitySet Class
Deleting an Entity Object Without Dealing with Related Objects
Manually Deleting a Graph of Related Objects
Deleting with Cascades Enabled
An Example of a Concurrency Problem
Handling a Concurrency Conflict

Part 5: LINQ to XML

12 The LINQ to XML API

Referenced Namespaces

Significant API Design Enhancements
- XML Tree Construction Simplified with Functional Construction
- Document Centricity Eliminated in Favor of Element Centricity
- Names, Namespaces, and Prefixes
- Node Value Extraction

The LINQ to XML Object Model

Deferred Query Execution, Node Removal, and the Halloween Problem

XML Creation
- Creating Elements with XElement
- Creating Attributes with XAttribute
- Creating Comments with XComment
- Creating Containers with XContainer
- Creating Declarations with XDeclaration
- Creating Document Types with XDocumentType
- Creating Documents with XDocument
- Creating Names with XName
- Creating Namespaces with XNamespace
- Creating Nodes with XNode
- Creating Processing Instructions with XProcessingInstruction
Creating Streaming Elements with XStreamingElement

Creating Text with XText

Creating CData with XCData

XML Output

Saving with XDocument.Save()

Saving with XElement.Save()

XML Input

XML Loading with XDocument.Load()

Loading with XElement.Load()

Parsing with XDocument.Parse() or XElement.Parse()

XML Traversal

Traversal Properties

Traversal Methods

XML Modification

Adding Nodes

Deleting Nodes

Updating Nodes

XElement.SetElementValue() on Child XElement Objects

XML Attributes

Attribute Creation

Attribute Traversal

Attribute Modification

XML Annotations

Adding Annotations with XObject.AddAnnotation

Accessing Annotations with XObject.Annotation() or XObject.Annotations()

Removing Annotations with XObject.RemoveAnnotations()

Annotations Example

XML Events

XObject.Changing

XObject.Changed
A Couple of Event Examples

Trick or Treat, or Undefined?

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Introduction to LINQ to XML Operators

Ancestors

Prototypes

Examples

AncestorsAndSelf

Prototypes

Examples

Attributes

Prototypes

Examples

DescendantNodes

Prototypes

Examples

DescendantNodesAndSelf

Prototypes

Examples

Descendants

Prototypes

Examples

DescendantsAndSelf

Prototypes

Examples

Elements

Prototypes
Part 6: LINQ to DataSet

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Assembly References
Referenced Namespaces
Common Code for the Examples
DataRow Set Operators
  Distinct
  Except
  Intersect
  Union
  SequenceEqual
DataRow Field Operators
  Field<T>
  SetField<T>
DataTable Operators
  AsEnumerable
  CopyToDataTable<DataRow>