

Windows[®] Communication Foundation 4

John Sharp
content master



online book + practice files



Step by Step

Windows® Communication Foundation 4 Step by Step

John Sharp

Published with the authorization of Microsoft Corporation by:
O'Reilly Media, Inc.
1005 Gravenstein Highway North
Sebastopol, California 95472

Copyright © 2010 CM Group Ltd.

Complying with all applicable copyright laws is the responsibility of the user. All rights reserved. Without limiting the rights under copyright, no part of this document may be reproduced, stored in or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without express written permission of O'Reilly Media, Inc.

Printed and bound in the United States of America.

1 2 3 4 5 6 7 8 9 M 5 4 3 2 1 0

Microsoft Press titles may be purchased for educational, business or sales promotional use. Online editions are also available for most titles (<http://my.safaribooksonline.com>). For more information, contact our corporate/institutional sales department: (800) 998-9938 or corporate@oreilly.com. Visit our website at microsoftpress.oreilly.com. Send comments to mspinput@microsoft.com.

Microsoft, Microsoft Press, ActiveX, Excel, FrontPage, Internet Explorer, PowerPoint, SharePoint, Webdings, Windows, and Windows 7 are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries. Other product and company names mentioned herein may be the trademarks of their respective owners.

Unless otherwise noted, the example companies, organizations, products, domain names, e-mail addresses, logos, people, places, and events depicted herein are fictitious, and no association with any real company, organization, product, domain name, e-mail address, logo, person, place, or event is intended or should be inferred.

This book expresses the author's views and opinions. The information contained in this book is provided without any express, statutory, or implied warranties. Neither the author, O'Reilly Media, Inc., Microsoft Corporation, nor their respective resellers or distributors, will be held liable for any damages caused or alleged to be caused either directly or indirectly by such information.

Acquisitions and Development Editor: Russell Jones
Production Editor: Kristen Borg
Production Services: Octal Publishing, Inc.
Technical Reviewer: Ashish Ghoda and Kenn Scribner
Indexing: Potomac Indexing, LLC
Cover: Karen Montgomery
Illustrator: Robert Romano

978-0-735-64556-1

www.it-ebooks.info

Contents at a Glance

Chapter 1	
Introducing Windows Communication Foundation	1
Chapter 2	
Hosting a WCF Service	45
Chapter 3	
Making Applications and Services Robust	93
Chapter 4	
Protecting an Enterprise WCF Service	121
Chapter 5	
Protecting a WCF Service over the Internet.	165
Chapter 6	
Maintaining Service Contracts and Data Contracts	203
Chapter 7	
Maintaining State and Sequencing Operations.	243
Chapter 8	
Implementing Services by Using Workflows	295
Chapter 9	
Supporting Transactions.	351
Chapter 10	
Implementing Reliable Sessions	379
Chapter 11	
Programmatically Controlling the Configuration and Communications	399
Chapter 12	
Implementing One-Way and Asynchronous Operations.	433

Chapter 13**Implementing a WCF Service for Good Performance 465****Chapter 14****Discovering Services and Routing Messages 491****Chapter 15****Building REST Services 547****Chapter 16****Using a Callback Contract to Publish and Subscribe to Events 599****Chapter 17****Managing Identity with Windows CardSpace 625****Chapter 18****Integrating with ASP.NET Clients and Enterprise Service
Components 647**

Table of Contents

Acknowledgmentsxi
Introductionxiii
1 Introducing Windows Communication Foundation	1
What Is Windows Communication Foundation?	1
The Early Days of Personal Computer Applications	1
Inter-Process Communications Technologies	2
The Web and Web Services	3
Using XML as a Common Data Format	4
Sending and Receiving Web Service Requests	5
JavaScript Object Notation and Rich Internet Applications	5
Handling Security and Privacy in a Global Environment	6
Service-Oriented Architectures and Windows Communication Foundation	7
Building a WCF Service	9
Defining the Contracts	16
Implementing the Service	18
Configuring and Testing the Service	24
Building a WCF Client Application	30
Deploying a WCF Service to Internet Information Services	39
WCF and the Principles of SOA	42
Summary	43
2 Hosting a WCF Service	45
How Does a WCF Service Work?	45
Service Endpoints	46
Processing a Client Request	47
Hosting a WCF Service by Using Windows Process Activation Service	49
Hosting a Service in a User Application	54
Using the ServiceHost Class	55

 **What do you think of this book? We want to hear from you!**

Microsoft is interested in hearing your feedback so we can continually improve our books and learning resources for you. To participate in a brief online survey, please visit:

www.microsoft.com/learning/booksurvey/

Building a Windows Presentation Foundation Application to Host a WCF Service	58
Reconfiguring the Service to Support Multiple Endpoints	72
Understanding Endpoints and Bindings	76
The WCF Predefined Bindings	77
Configuring Bindings	81
Default Endpoints	82
Hosting a WCF Service in a Windows Service	84
Summary	91
3 Making Applications and Services Robust	93
CLR Exceptions and SOAP Faults	94
Throwing and Catching a SOAP Fault	94
Using Strongly Typed Faults	99
Reporting Unanticipated Exceptions	110
Managing Exceptions in Service Host Applications	114
ServiceHost States and Transitions	114
Handling Faults in a Host Application	115
Handling Unexpected Messages in a Host Application	116
Summary	119
4 Protecting an Enterprise WCF Service	121
What Is Security?	121
Authentication and Authorization in a Windows Environment	123
Transport-Level and Message-Level Security	124
Implementing Security in a Windows Domain	127
Protecting a TCP Service at the Message Level	127
Protecting an HTTP Service at the Transport Level	135
Protecting an HTTP Service at the Message Level	142
Authenticating Windows Users	146
Authorizing Users	152
Using Impersonation to Access Resources	160
Summary	163
5 Protecting a WCF Service over the Internet	165
Authenticating Users and Services in an Internet Environment	166
Authenticating and Authorizing Users by Using the ASP.NET Membership Provider and the ASP.NET Role Provider	166

Authenticating and Authorizing Users by Using Certificates	184
Authenticating Service Messages by Using a Certificate	195
Summary	202
6 Maintaining Service Contracts and Data Contracts	203
Modifying a Service Contract	204
Selectively Protecting Operations.	205
Versioning a Service	211
Making Breaking and Nonbreaking Changes to a Service Contract . .	222
Modifying a Data Contract.	224
Data Contract and Data Member Attributes.	224
Data Contract Compatibility	238
Summary	242
7 Maintaining State and Sequencing Operations	243
Managing State in a WCF Service	244
Service Instance Context Modes.	257
Maintaining State with the PerCall Instance Context Mode.	262
Selectively Controlling Service Instance Deactivation.	270
Sequencing Operations in a WCF Service	271
Summary	294
8 Implementing Services by Using Workflows	295
Building a Simple Workflow Service and Client Application.	296
Implementing a Workflow Service	296
Implementing a Client Application for a Workflow Service.	313
Handling Faults in a Workflow Service.	317
Hosting a Workflow Service.	325
Hosting a Workflow Service in IIS.	325
Hosting a Workflow Service in a Custom Application.	328
Implementing Common Messaging Patterns in a Workflow Service	332
Messaging Activities	333
Correlating Request and Reply Messages in a Workflow Service Instance.	335
Using Messaging Activities to Implement Messaging Patterns	336
Managing Sessions and Maintaining State in a Workflow Service	337
Building Durable Workflow Services	347
Summary	350

9	Supporting Transactions	351
	Using Transactions in a WCF Service.	352
	Implementing OLE Transactions	352
	Implementing the WS-AtomicTransaction Protocol.	369
	Designing a WCF Service to Support Transactions.	371
	Transactions, Sessions, and Service Instance Context Modes	371
	Transactions and Messaging	372
	Transactions and Multi-Threading	372
	Implementing Transactions in a Workflow Service	373
	Long-Running Transactions	376
	Summary	377
10	Implementing Reliable Sessions	379
	Using Reliable Messaging.	380
	Implementing Reliable Sessions with WCF	381
	Detecting and Handling Replay Attacks	390
	Configuring Replay Detection with WCF.	391
	Summary	397
11	Programmatically Controlling the Configuration and Communications	399
	The WCF Service Model	399
	Services and Channels.	400
	Behaviors.	401
	Composing Channels into Bindings	403
	Inspecting Messages	408
	Controlling Client Communications	419
	Connecting to a Service Programmatically	419
	Sending Messages Programmatically.	427
	Summary	431
12	Implementing One-Way and Asynchronous Operations	433
	Implementing One-Way Operations	434
	The Effects of a One-Way Operation	434
	One-Way Operations and Transactions	435
	One-Way Operations and Timeouts.	435
	Implementing a One-Way Operation.	436
	Recommendations for Using One-Way Operations.	445

Invoking and Implementing Operations Asynchronously.	446
Invoking an Operation Asynchronously in a Client Application	446
Implementing an Operation Asynchronously in a WCF Service	447
Using Message Queues.	457
Summary	464
13 Implementing a WCF Service for Good Performance	465
Using Service Throttling to Control Resource Use	466
Configuring Service Throttling	467
Specifying Memory Requirements	475
Transmitting Data by Using MTOM	476
Sending Large Binary Data Objects to a Client Application.	478
Controlling the Size of Messages	484
Streaming Data from a WCF Service.	487
Enabling Streaming in a WCF Service and Client Application	487
Designing Operations to Support Streaming	488
Security Implications of Streaming	490
Summary	490
14 Discovering Services and Routing Messages	491
Implementing Discovery.	491
Configuring Ad Hoc Discovery	492
Handling Service Announcements	499
Using a Discovery Proxy	507
Implementing Routing	523
Routing Messages Manually	524
Using the RoutingService Class	539
Summary	546
15 Building REST Services	547
Understanding the REST Model	547
Querying Data by Implementing a REST Web Service	549
Updating Data Through a REST Web Service	570
Using WCF Data Services	579
Consuming a WCF Data Service in a Client Application	587
Modifying Data by Using a WCF Data Service	595
Handling Exceptions in a Client Application.	597
Summary	598

16 Using a Callback Contract to Publish and Subscribe to Events	599
Implementing and Invoking a Client Callback	600
Defining a Callback Contract	600
Implementing an Operation in a Callback Contract	601
Invoking an Operation in a Callback Contract	604
Reentrancy and Threading in a Callback Operation	605
Bindings and Duplex Channels	606
Using a Callback Contract to Notify a Client of the Outcome of a One-Way Operation	606
Using a Callback Contract to Implement an Eventing Mechanism	614
Delivery Models for Publishing and Subscribing	620
Summary	623
17 Managing Identity with Windows CardSpace	625
Using Windows CardSpace to Access a WCF Service	626
Implementing Claims-Based Security	626
Using an Identity Provider	641
Claims-Based Authentication in a Federated Environment	643
Summary	646
18 Integrating with ASP.NET Clients and Enterprise Services Components	647
Creating a WCF Service That Supports an ASP.NET Client	647
Exposing a COM+ Application as a WCF Service	657
Summary	668
Index	669

 **What do you think of this book? We want to hear from you!**

Microsoft is interested in hearing your feedback so we can continually improve our books and learning resources for you. To participate in a brief online survey, please visit:

www.microsoft.com/learning/booksurvey/

Acknowledgments

On the back cover of his book, *Dirk Gently's Holistic Detective Agency*, Douglas Adams depicts an invoice presented by Mr. Gently to his client for attempting to find her missing cat. It contains the following items:

Item	Charge
Finding cat (repeated)	£50.00
Detecting and triangulating vectors of inter-connectedness of all things	£150.00
Taking some to beach on Bahamas, tax and accommodation	£1500.00
Struggling on in face of draining skepticism from client, drinks	£27.00
Saving the human race from total extinction	No charge

Douglas Adams's book was published in 1987, but 23 years later I find myself empathizing with Dirk Gently. Happily, my own beloved Felice, Ginger, is still very much with us, but in common with many service-oriented developers these days, I spend more and more time searching for solutions that enable me to connect all things together. Clearly, my home office is not quite a beach on the Bahamas, but I do admit to enjoying a decent amount of time sunning myself in the sand at Edgbaston (the home of Warwickshire County Cricket Club) watching batsmen attempting to endange wicketmen guiding the new pavilion with lofted drives over the boundary, while I contemplate how to configure pieces of software to get them to interoperate and communicate correctly. My wife is always a little skeptical of how our jaunts to see how Warwickshire fares against other county cricket teams amount to "work," but she enjoys the cricket as much as I do, so she does not complain.

In the world of connected solutions, Microsoft Windows Communication Foundation has proved an absolute boon, and although I am yet to be convinced that it has saved the human race from extinction, I have authored papers and even produced a video on how using WCF can help to save your organization (it may be hype-bots, but you know what we technophiles are like when we desperately want to convince management of the need to invest in new software and machinery!). To that end, I always count it an absolute privilege whenever I get the chance to write or speak about my new technology, as I mentioned in the previous edition of this book. Thank a lot Content Master for allowing me to spend a significant amount of my time doing it.

It would also be very remiss of me not to thank Russell Jones at O'Reilly Media, who badgered me and patiently waited while I found the time to get started on this project as well as for all his support and help in editing and correcting my grammar during the initial drafts of each chapter, and to Bob Russell at Octopus Publishing, who had the unrewarding job of having to wade through every chapter seeking out any remaining "Britishisms." Additionally,

sincere thanks are due to Ashish Ghoda and Kenn Scribner who took on the daunting task of checking the technical accuracy of my work and who provided valuable advice, guidance, and corrections whenever I was wrong (any remaining technical errors in the book are my own, of course). Also, thanks to Lin Joyner at Content Master, who expended a significant effort at great personal risk to her own sanity, for agreeing to test many of the exercises for me.

Finally, I must pay the greatest tribute to my long-suffering family: to Diana, my wife and fellow cricket-watcher, who is never short of advice when seeing a batsman struggle against a short-pitched delivery ("Just hit the ball!"); to James who grew up and left home to go to university while I was writing Chapter 17; and to Francesca who has learned from my wife what it takes to make a truly excellent cup of tea.

And to Ginger—please stop trying to walk across my keyboard as I type.

—John Sharp

Introduction

Microsoft Windows Communication Foundation (WCF), alongside Windows Workflow Foundation (WF) and Windows Presentation Foundation (WPF), has become part of the primary framework for building the next wave of business applications for the Microsoft Windows operating system. WCF provides the underpinning technology driving distributed solutions based on the Microsoft platform; with it, you can build powerful service-oriented systems designed to address connected services and applications. WCF is also an integral technology for building and accessing services running in the cloud under Windows Azure.

You can use WCF to create new services as well as augment and interoperate with many existing services created by using other technologies. When designing distributed applications in the past, you frequently had to choose a specific technology, such as Web services, COM+, Microsoft Message Queue, or .NET Framework Remoting. That choice often had a fundamental impact on the architecture of your solutions. In contrast, WCF provides a consistent model for implementing scalable and extensible systems that employ a variety of technologies with which you can design and architect your solutions without being restricted by a specific connectivity mechanism.

In short, if you are building professional, service-oriented solutions for Windows, you need to learn about WCF.

Who This Book Is For

This book will show you how to build connected applications and services using WCF. If you are involved in designing, building, or deploying applications for the Microsoft Windows operating system, sooner or later you are going to need to become familiar with WCF. This book will give you the initial boost you need to quickly learn many of the techniques required to create systems based on WCF. The book takes a pragmatic approach, covering the concepts and details necessary to enable you to build connected solutions.

Assumptions

To get the most from this book, you should meet the following profile:

- You should be an architect, designer, or developer who will be creating solutions for the Microsoft Windows family of operating systems.
- You should have experience developing applications using Visual Studio and C#.
- You should have a basic understanding of concepts such as transactions, Web services, security, and message queuing.

Finding Your Best Starting Point in This Book

This book is designed to help you build skills in a number of essential areas. It assumes that you are new to WCF and takes you step by step through the fundamental concepts of WCF, feature by feature. The techniques and ideas that you see in one chapter are extended by those in subsequent chapters; therefore, most readers should follow the chapters in sequence and perform each of the exercises. However, if you have specific requirements or are only interested in certain aspects of WCF, you can use the table below to find your best route through this book.

If you are	Follow these steps
New to Web services and distributed applications and need to gain a basic understanding of WCF.	<ol style="list-style-type: none"> 1. Install the code samples as described in the "Code Samples" section of this Introduction. 2. Work through Chapters 1 to 5 sequentially and perform the exercises. 3. Complete Chapters 6 to 16 as your level of experience and interest dictates.
New to Web services and distributed applications and need to learn how to use WCF to implement solutions using common Web services features such as sessions, transactions, and reliable messaging.	<ol style="list-style-type: none"> 1. Install the code samples as described in the "Code Samples" section of this Introduction. 2. Work through Chapters 1 to 10 sequentially and perform the exercises. 3. Complete Chapters 11 to 13 as your level of experience and interest dictates.
Familiar with Web services and distributed applications, and need to learn about WCF quickly, including its advanced features.	<ol style="list-style-type: none"> 1. Install the code samples as described in the "Code Samples" section of this Introduction. 2. Skip the first chapter for an overview of WCF, but perform the exercises. 3. Read Chapter 2 and perform the exercises. 4. Skip Chapter 3. 5. Read Chapters 4 and 5 and complete the exercises. 6. Skip Chapters 6 to 13, performing the exercises that interest you. 7. Complete the remaining chapters and exercises.
Familiar with security concepts but need to understand how to use the security features that WCF provides.	<ol style="list-style-type: none"> 1. Install the code samples as described in the "Code Samples" section of this Introduction. 2. Skip the first three chapters. 3. Read Chapters 4 and 5 and perform the exercises. 4. Skip Chapters 6 to 15. 5. Read Chapter 17 and complete the exercises. 6. Skip Chapter 18.

If you are	Follow these steps
Referencing the book after working through the exercises	<ol style="list-style-type: none"> 1. Use the index or the Table of Contents to find information about particular subjects. 2. Read the Summary sections at the end of each chapter to find a brief review of the concepts and techniques presented in the chapter.

Conventions and Features in This Book

This book presents information using conventions designed to make the information readable and easy to follow. Before you start, read the following list, which explains conventions you'll see throughout the book and points out helpful features that you might want to use:

- Each exercise is a series of tasks. Each task is presented as a series of numbered steps (1, 2, 3, and so on). A bullet (■) indicates an exercise that has only one step.
- Reader aids labeled "Note" and "Tip" provide additional information or alternative methods for completing a step successfully.
- Reader aids labeled "Important" alert you to information you need to check before continuing.
- Text that you type appears in **bold**.
- A plus sign (+) between two key names means that you must press those keys at the same time. For example, "Press Alt+Tab" means that you hold down the Alt key while you press the Tab key.

System Requirements

You'll need the following hardware and software to complete the practice exercises in this book:

- Microsoft Windows 7 Professional, Enterprise, or Ultimate editions.



Note Some of the exercises require you to create local users and security groups. This feature is not available with Windows 7 Home Basic or Home Premium editions.

- Microsoft Visual Studio 2010 Professional, Premium, Ultimate, or Test Professional editions, including SQL Server 2008 Express.



Note The exercises in this book are not intended to work with Visual Studio 2010 Express edition.

- 1.6 GHz or faster 32-bit (x86) or 64-bit (x64) processor.
- 1 GB RAM (32-bit) or 2 GB RAM (64-bit).
- 20 GB available hard disk space (32-bit) or 25 GB (64-bit).
- DirectX 9 graphics device with WDDM 1.0 or higher driver.
- Microsoft mouse (or compatible) pointing device.

Some of the exercises require that you have installed Internet Information Services (IIS) and Message Queuing (MSMQ). You will also need the *AdventureWorks* database provided with the code samples for this book. Download and installation instructions are provided later in this introduction.



Important If you have other tools or services that establish network connections, you may need to temporarily halt them if they use the same ports required by the exercises in this book (alternatively, you can replace the port numbers referenced by the exercises with others of your own choice). For example, some of the exercises reference port 8080. If you have the Apache Web server running on your development computer, it defaults to using port 8080, so you may need to halt or reconfigure this service.

Code Samples

Follow these steps to download and install the code samples and other companion content on your computer so that you can use them with the exercises:

1. Navigate to <http://oreilly.com/catalog/9780735645561/>.
2. Click the Companion Content link.

You'll see instructions for downloading the .zip archive containing the companion content files.

3. Unpack the .zip archive into your Documents folder. This action creates the following folder containing the exercise and solution files for each chapter:

Microsoft Press\WCF Step By Step

Installing and Configuring Internet Information Services and Microsoft Message Queue

Many of the exercises in this book require you to build WCF services hosted by using Internet Information Services (IIS). You must make sure that you have installed and configured IIS on your computer, and you must have installed ASP.NET version 4.0 with IIS. Additionally, some exercises use Microsoft Message Queue (MSMQ) as the transport for connecting client applications to services, so you must also install the MSMQ Server Core. The following instructions describe how to do this. Note that you require administrative access to your computer to install and configure IIS and MSMQ.

1. Log on to Windows as an account that has Administrator access.
2. On the Windows Start menu, click Control Panel, and then click Programs. In the Programs pane, under Programs And Features, click Turn Windows Features On Or Off.
3. In the Windows Features dialog box, expand Internet Information Services, and then select the following features:
 - ❑ Web Management Tools | IIS Management Console
 - ❑ Web Management Tools | IIS 6 Management Compatibility | IIS 6 Metabase and IIS 6 Configuration Compatibility
 - ❑ World Wide Web Services | Application Development Features | ASP.NET (this will also select .NET Extensibility, ISAPI Extensions, and ISAPI Filters)
 - ❑ World Wide Web Services | Common Http Features | Directory Browsing (Default Document should already be selected)
 - ❑ World Wide Web Services | Security | Basic Authentication and World Wide Web Services | Security | Windows Authentication (Request Filtering should already be selected)
4. Expand Microsoft Message Queue (MSMQ) Server, and then select Microsoft Message Queue (MSMQ) Server Core (do not select the individual items in the Microsoft Message Queue (MSMQ) Server Core folder).
5. Click OK, and then wait for the features to be installed and configured.

Installing ASP.NET Version 4.0

The exercises in this book rely on ASP.NET Version 4.0 being installed and configured with IIS. To do this, perform the following tasks:

1. On the Windows Start menu, click All Programs, click Microsoft Visual Studio 2010, click Visual Studio Tools, right-click Visual Studio Command Prompt (2010), and then click Run As Administrator. In the User Account Control dialog box, click Yes.
2. In the Visual Studio Command Prompt window, type the following command:

```
aspnet_regiis -iru
```
3. When the command has completed, leave the Visual Studio Command Prompt window open; you will use it again after installing the *AdventureWorks* database.

Installing and Configuring the *AdventureWorks* Database

The exercises and examples in this book make use of the *AdventureWorks* sample database. If you don't already have this database installed on your computer, a copy of the database installation program is supplied with the companion content for this book. Follow these steps to install and configure the database:

1. Log on to Windows as an account that has administrator access if you have not already done so.
2. Verify that the SQL Server (SQLEXPRESS) service is running.



Tip Start the SQL Configuration Manager utility in the Configuration Tools folder, located in the Microsoft SQL Server 2008 program group. In the left pane, click SQL Server Services. In the right pane, examine the status of the SQL Server (SQLEXPRESS) service. If the status is Stopped, right-click the service, and then click Start. Wait for the status to change to Running, and then close SQL Configuration Manager.

3. Using Windows Explorer, move to the Microsoft Press\WCF Step By Step\Setup folder located within your Documents folder.
4. Double-click the file *AdventureWorks2008_SR4.exe*. If the User Account Control dialog box appears, click Yes.
5. Wait while the WinZip Self-Extractor tool unzips the installation program.
6. When the SQL Server 2008R2 Database Installer dialog box appears, read the license agreement. If you agree with the license terms, select the I Accept The License Terms check box, and then click Next.

7. On the AdventureWorks 2008 Community Sample Database SR4 page, set the Installation Instance to SQLEXPRESS, select the *AdventureWorks OLTP* database, deselect all other databases, and then click Install.



Note Make sure that you select the AdventureWorks OLTP database and *not* AdventureWorks OLTP 2008. Depending on how you have configured SQL Server, not all databases will be available anyway, and you may see a warning icon against some of these databases. You can ignore these warnings because these databases are not required.

8. On the Installation Execution page, wait while the database is installed and configured, and then click Finish.
8. Return to the Visual Studio Command Prompt window running as Administrator in the Microsoft Press\WCF Step By Step\Setup folder.
9. Type the following command:

```
osql -E -S .\SQLEXPRESS -i aspnet.sql
```

This command should complete without any errors (it will display a series of prompts, "1> 2> 1> 1> 2> 1> 1> 2> 1> 2> 1>").



Note The script *aspnet.sql* creates user accounts for the DefaultAppPool and ASP.NET v4.0 applications pools used by IIS and grants these accounts access to the *AdventureWorks* database.

10. Close the Visual Studio Command Prompt window.

Using the Code Samples

Each chapter in this book explains when and how to use any code samples for that chapter. When it's time to use a code sample, the book will list the instructions for how to open the files. The chapters are built around scenarios that simulate real programming projects, so you can easily apply the skills you learn to your own work.

For those of you who like to know all the details, following is a list of the code sample, Visual Studio projects, and solutions, grouped by the folders where you can find them.



Important Many of the exercises require administrative access to your computer. Make sure you perform the exercises using an account that has this level of access.

Solution Folder	Description
Chapter 1	
Completed\ProductsService	This solution gets you started. Creating the ProductsService project lists you through the process of building a simple WCF service hosted by IIS. You can use the service to query and update product information in the AdventureWorks database. The ProductsClient project is a console-based WCF client application that connects to the ProductsService service. You use this project for testing the WCF service.
Chapter 2	
ProductsClient	This solution is the starting point for the exercises in this chapter. It contains a copy of the completed client application from Chapter 1.
Completed\ProductsClient	This solution contains a version of the client application that connects to the ProductsService service by using a TCP connection.
Completed\IIS\ProductsServiceHost	This solution contains Windows Presentation Foundation application that services a host environment for the ProductsService service. You use this application to manually start and stop the service. You configure the ProductsClient application to connect to the service hosted by this application by using an HTTP endpoint.
Completed\Windows\ProductsService	This solution contains a Windows service that hosts the ProductsService service. You can start and stop the service from the services applet in the Windows Control Panel. You reconfigure the ProductsClient application to connect to this service by using an endpoint based on the Named Pipe transport.
Chapter 3	
ProductsServiceHost	This solution contains a copy of the ProductsServiceHost, ProductsServiceHost and ProductsClient applications from Chapter 2. It is used as a starting point for the exercises in this chapter.
Completed\UntypedProductsServiceFault	The ProductsService service in this solution traps exceptions and reports them back to the client application as untyped SOAP faults, which are caught and handled by the ProductsClient application.
Completed\StronglyTypedProductsServiceFault	The ProductsService service in this solution reports exceptions as typed SOAP faults defined by using fault contracts. The ProductsClient application catches these strongly typed SOAP faults as exceptions.
Chapter 4	
ProductsService	This solution contains three projects: the ProductsService service, the ProductsServiceHost application and the ProductsClient. These projects are configured to catch and handle SOAP faults as described in Chapter 3. This solution forms the starting point for the exercises in this chapter.

Solution Folder	Description
Chapter 4 (continued)	
Completed\NetTcpProductsService\WithMessageLevelSecurity	This solution contains an implementation of the <i>ProductsService</i> service, the <i>ProductsServiceHost</i> application, and the <i>ProductsClient</i> application that applies message-level security over a TCP binding.
Completed\AsichttpProductsService\WithTransportLevelSecurity	This solution shows how to implement transport-level security over an HTTP binding.
Completed\WS2007HttpProductsService\WithMessageLevelSecurity	This version of the solution contains a host that implements message-level security over an HTTP binding.
Completed\ProductsService\WithBasicAuthentication	This solution contains a version of the <i>ProductsService</i> service that implements basic authentication and displays the name of the user calling the <i>GetProducts</i> operations. The client application explicitly provides the name and password of the user connecting to the service.
Completed\ProductsService\WithWindowsAuthentication	This solution is similar to the previous one, except that the <i>ProductsService</i> service implements Windows authentication. The credentials for the client application are picked up from the user's login session.
Completed\ProductsService\WithAuthorization	The <i>ProductsService</i> service in this solution authorizes users according to the Windows security groups to which they belong. Users that do not belong to a specified security group are denied access when they attempt to invoke operations.
Chapter 5	
Programs\Client	This folder contains a copy of the client application that is used for testing the various configurations of the <i>InteractProductsService</i> service in this chapter.
Completed\ASPNB\Membership	This solution contains the <i>InteractProductsService</i> service that is deployed to IIS and authenticates users by using the ASP.NET Role Provider rather than Windows security groups.
Completed\ASPNET\Membership\UsingCertificates	The <i>InteractProductsService</i> service in this solution uses the ASP.NET Role Provider in conjunction with certificates to authenticate users.
Completed\MutualAuthentication\UsingCertificates	The <i>InteractProductsService</i> service in this solution uses a certificate to authenticate itself to the client application.
Chapter 6	
ProductsService	This solution contains an amended copy of the <i>ProductsClient</i> , <i>ProductsServiceLibray</i> , and <i>ProductsServiceHost</i> projects from Chapter 4. The service implements message-level security and authenticates users by using Windows tokens. This solution is used as the starting point for the exercises in this chapter.

Solution Folder	Description
Chapter 6 (continued)	
ProductsServiceWithVersionedServiceContract	This solution contains an implementation of the <i>ProductsService</i> service and a client application that provides these two versions of the service contract. It is used by some of the exercises in the second part of the chapter.
Completed\ProductsServiceWithProtectedOperations	This solution contains a version of the <i>ProductsService</i> service in which client applications are required to encrypt and sign request messages for some operations, but only sign requests for others. The proxy class in the <i>ProductsClient</i> application has been updated to encrypt and sign, or just sign, messages, as appropriate. The purpose of this solution is to show how changing security requirements for operations can break a service contract.
Completed\ProductsServiceWithAdditionalBusinessLogic	The <i>ProductsService</i> service in this solution contains additional methods. However, because these methods implement internal logic for the service and are not exposed as part of the service contract, they do not require that existing client applications are updated.
Completed\ProductsServiceWithModifiedServiceContract	This solution contains a version of the <i>ProductsService</i> service with an additional operation and a modified service contract. The client application has not been updated, but it still works although it can not invoke the new operation.
Completed\ProductsServiceWithVersionedServiceContract	The <i>ProductsService</i> service in this solution exposes two versions of the service contract, enabling existing client applications to use the old contract while exposing the additional operation to new client applications.
Completed\ProductsServiceWithAdditionalFieldsInDataContract	This solution shows the effects that modifying a data contract can have on client applications and how you can implement a data contract that supports clients expecting different versions of a data contract.
Chapter 7	
Completed\ShoppingCart	This solution contains a completed version of the initial <i>ShoppingCartService</i> service that implements shopping cart functionality and a client application that exercises this functionality. This solution is used as the basis for subsequent exercises in this chapter.
Completed\ShoppingCartContextModes	The <i>ShoppingCartService</i> service in this solution demonstrates the use of the <i>SingleInstanceContextMode</i> .
Completed\ShoppingCartWithState	The <i>ShoppingCartService</i> service in this solution uses the <i>PerCall</i> instance context mode and contains code that saves the instance state to XML files.
Completed\ShoppingCartWithSequenceOperations	This solution shows how to control the sequence in which a client application can invoke operations and control the lifetime of a session.

Solution Folder	Description
Chapter 7 (continued)	
DurableShoppingCart	This solution contains a version of the <i>ShoppingCartService</i> service that in turn uses the <i>PerSession</i> instance context mode. The solution also contains a GUI client application called <i>ShoppingCartGUIClient</i> . This solution is used by exercises that convert the <i>ShoppingCartService</i> service to a durable service.
Completed\DurableShoppingCart	This solution contains a completed implementation of the durable version of <i>ShoppingCartService</i> .
Chapter 8	
Completed\ProductsWorkflow	This solution contains a workflow service called <i>ProductsWorkflowService</i> that retrieves the details of a specified product. The solution also includes a basic example client application to test the service.
Completed\ProductsWorkflowWithFaultHandling	The <i>ProductsWorkflowService</i> service in this solution shows how to catch exceptions in a service and send SOAP faults to a client application.
ProductsClient	This version of the client application for the <i>ProductsWorkflowService</i> service that generates SOAP faults.
Completed\ProductsWorkflowWithIISDeployment	This solution shows how to deploy the <i>ProductsWorkflowService</i> service to IIS.
Completed\ProductsWorkflowWithCustomHost	This solution demonstrates how to create a custom host application for a workflow service.
Completed\ShoppingCartService	This solution contains a complete version of the <i>ShoppingCartService</i> service implemented as a workflow service.
ShoppingCartGUIClient	This is a copy of the <i>ShoppingCartGUIClient</i> developed in Chapter 7. It is used to test the workflow version of the <i>ShoppingCartService</i> service.
Completed\ShoppingCartWithHostAndClient	This solution contains a complete version of the workflow version of the <i>ShoppingCartService</i> service, hosted in a custom host application and accessed from the <i>ShoppingCartGUIClient</i> application.
Completed\DurableShoppingCartWithHostAndClient	This solution demonstrates how to implement a workflow service as a durable service.
Chapter 9	
ShoppingCartService	This solution contains a copy of the non-durable <i>ShoppingCartService</i> , <i>ShoppingCartServiceHost</i> , and <i>ShoppingCartClient</i> projects from Chapter 7. It is used as the starting point for the exercises in this chapter.

- [download Dark Alliance: The CIA, the Contras, and the Cocaine Explosion \(2nd Edition\) pdf, azw \(kindle\), epub](#)
- [download online MasterChef: The Finalists](#)
- [download online When Abortion Was a Crime: Women, Medicine, and Law in the United States, 1867-1973](#)
- **[Actions and Objects from Hobbes to Richardson here](#)**

- <http://honareavalmusic.com/?books/Manhounds-of-Antares--Dray-Prescot--Book-6--Havilfar-Cycle--Book-1-.pdf>
- <http://metromekanik.com/ebooks/The-South--A-Novel.pdf>
- <http://qolorea.com/library/When-Abortion-Was-a-Crime--Women--Medicine--and-Law-in-the-United-States--1867-1973.pdf>
- <http://serazard.com/lib/Thraxas-At-War--Thraxas--Book-7-.pdf>