

# Windows Workflow Foundation Using Visual Basic 2005

## Table of Contents

INTRODUCTION .....	INTRO-1
Prerequisites .....	INTRO-2
Installing the Practice Files .....	INTRO-3
Software Requirements .....	INTRO-3
Sample Database .....	INTRO-3
Security .....	INTRO-4
Installation .....	INTRO-5
About the Authors .....	INTRO-6
INTRODUCTION TO WORKFLOW .....	1-1
What Is Windows Workflow Foundation? .....	1-2
What Types of Applications Might Benefit from Workflow Support? .....	1-5
What You Need to Use Windows Workflow .....	1-6
Two Types of Workflows .....	1-11
Activities: Workflow “Controls” .....	1-12
Creating Your First Workflow .....	1-13
Create a Sequential Workflow Project .....	1-13
Workflow Activities .....	1-17
Add Activities to the Workflow .....	1-20
Debugging Your Workflow .....	1-23
Workflow Architecture .....	1-24
Examine the Startup Code .....	1-26
Two Ways of Creating Workflows .....	1-30
Hosting a Workflow in a Windows Application .....	1-34
Create the Workflow .....	1-35
Create the Form and Pass Parameters .....	1-42
LAB 1: INTRODUCTION TO WORKFLOW .....	1-49
Lab 1 Overview .....	1-50
Create the Workflow .....	1-51
Add a While Activity .....	1-55
Pass Parameters .....	1-60
HANDLING CONDITIONS AND EXCEPTIONS .....	2-1
Introducing Conditional Activities .....	2-2

IfElse Activity .....	2-3
Working with the IfElse Activity .....	2-3
Use an Expression as a Condition.....	2-5
Add or Remove IfElse Branches.....	2-8
Use a Method as a Condition.....	2-9
While Activity .....	2-13
ConditionedActivityGroup Activity.....	2-18
Using the ConditionedActivityGroup Activity.....	2-19
Replicator Activity .....	2-24
Using a Custom Activity .....	2-29
Handling Exceptions .....	2-32
Using the WorkflowTerminated Event.....	2-32
Using the FaultHandler Activity.....	2-35
Using the Throw Activity .....	2-38
LAB 2: HANDLING CONDITIONS AND EXCEPTIONS.....	2-47
Lab 2 Overview.....	2-48
IfElse and While Activities.....	2-49
ConditionedActivityGroup Activity.....	2-54
Replicator and Exception Handling.....	2-59
FLOW ACTIVITIES.....	3-1
Introducing Flow Activities .....	3-2
Delay Activity and Handling Properties.....	3-3
Working with the Delay Activity .....	3-4
Bind the TimeoutDuration Property.....	3-10
In Summary.....	3-23
Listen Activity.....	3-24
In Summary.....	3-28
Suspend and Terminate Activities .....	3-29
Using the Suspend Activity .....	3-29
Using the Terminate Activity .....	3-34
Parallel and SynchronizeScope Activities.....	3-40
Using a Delay Activity to Terminate a Parallel Activity.....	3-43
Synchronizing Access to Activities.....	3-49
Handling Cancellation.....	3-53
LAB 3: FLOW ACTIVITIES.....	3-63
Lab 3 Overview.....	3-64

Use a Parallel Activity to Create the Game .....	3-65
Make the Game Work by Synchronizing .....	3-75
Use a Suspend Activity to Prompt for Replay .....	3-77
<b>MAKING DECISIONS IN WORKFLOWS .....</b>	<b>4-1</b>
Using Rules in Workflows .....	4-2
Using a RuleSet .....	4-3
Using the Policy Activity .....	4-5
Calling Methods in Rules .....	4-10
Setting Priorities .....	4-14
Forward Chaining .....	4-19
Implicit Forward Chaining .....	4-19
Attribute-Based Chaining .....	4-25
Explicit Chaining .....	4-27
Controlling Chaining .....	4-28
<b>LAB 4: MAKING DECISIONS IN WORKFLOWS .....</b>	<b>4-35</b>
Lab 4 Overview .....	4-36
Using a Policy Activity .....	4-37
Setting Priorities .....	4-42
Using Chaining .....	4-45
<b>WORKFLOW COMMUNICATIONS .....</b>	<b>5-1</b>
Calling Methods in the Host from the Workflow .....	5-2
Handling Cross-Threading Issues .....	5-2
Create the Console Application .....	5-3
Create the Interface .....	5-3
Create the Workflow .....	5-4
Create the Interface Implementation .....	5-10
Hook up the Plumbing .....	5-11
Add a Windows Application Host .....	5-13
In Summary .....	5-18
Handling Host Events in the Workflow .....	5-19
Create the Solution .....	5-20
Add the EventArgs Class .....	5-20
Create the Interface .....	5-22
Create the Host Application .....	5-23
Create the Host Interface Implementation .....	5-24
Hook up the Event .....	5-25
Create the Workflow .....	5-26

Call the Workflow and Raise the Event.....	5-30
In Summary.....	5-33
Bi-Directional Communications.....	5-34
Modify the Interface .....	5-34
Modify the Interface Implementation.....	5-35
Modify the Workflow.....	5-36
LAB 5: WORKFLOW COMMUNICATIONS.....	5-43
Lab 5 Overview.....	5-44
Examine the Existing Workflow .....	5-45
Call a Method from the Workflow.....	5-50
Raise an Event to the Workflow.....	5-56
CREATING STATE MACHINE WORKFLOWS.....	6-1
Introduction to State Machines .....	6-2
State Machine Activities.....	6-4
Using the State Activity .....	6-4
Using the SetState Activity.....	6-6
Using the StateInitialization Activity .....	6-7
Using the StateFinalization Activity.....	6-8
Using the EventDriven Activity.....	6-8
Creating a State Machine Workflow .....	6-10
Creating the Workflow States .....	6-11
Defining the State Transitions.....	6-13
Creating the EventArgs Class.....	6-16
Creating the Interface .....	6-17
Creating the Host Application .....	6-18
Creating the Host Interface Implementation .....	6-19
Examining the Form's Code.....	6-21
Completing the Workflow .....	6-23
Running the Application.....	6-27
Circular Navigation in State Machines.....	6-32
LAB 6: CREATING STATE MACHINE WORKFLOWS .....	6-43
Lab 6 Overview.....	6-44
Define the State Machine Workflow.....	6-45
Create an Interface and Complete the Workflow.....	6-48
Create a Windows Host Application .....	6-56

USING AND BUILDING PERSISTENCE SERVICES .....	7-1
Introducing Workflow Persistence .....	7-2
Examining the Sample Workflow .....	7-2
Life without Persistence .....	7-12
Using the SQL Persistence Service.....	7-17
Setting up SQL Persistence.....	7-17
Introducing the SQL Persistence Service .....	7-19
Automatic Unload on Idle.....	7-21
Using a Configuration File to Provide Settings .....	7-26
Persistence and Serialization.....	7-30
Creating a Custom Persistence Service .....	7-32
Building the Custom Persistence Service .....	7-35
Reviewing the Situation .....	7-50
LAB 7: USING AND BUILDING PERSISTENCE SERVICES .....	7-55
Lab 7 Overview.....	7-56
Examine the Workflow and Host Application .....	7-58
Configure the SQL Database and Add Configuration File Settings .....	7-64
Add Persistence in Code .....	7-68
USING AND BUILDING TRACKING SERVICES.....	8-1
Workflow Tracking Services .....	8-2
Tracking Events .....	8-3
Using the SQL Tracking Service.....	8-5
Setting Up SQL Tracking .....	8-5
Adding Tracking to a Workflow .....	8-8
Querying Tracking Data by Hand.....	8-10
Querying Tracking Data in Code.....	8-11
Creating User Tracking Points .....	8-18
Tracking the Evaluation of Rules in RuleSets.....	8-21
Using a Configuration File to Provide Settings .....	8-25
Tracking Profiles .....	8-28
Default Tracking Profile.....	8-28
Custom Tracking Profiles.....	8-32
Creating a Tracking Profile in XML .....	8-34
Creating a Tracking Profile in Code .....	8-37
Tracking Profile Version Numbers .....	8-45
Modifying a Profile .....	8-48
Deleting a Profile.....	8-51

Creating a Custom Tracking Service .....	8-54
Building a Custom Tracking Service .....	8-54
LAB 8: USING AND BUILDING TRACKING SERVICES .....	8-65
Lab 8 Overview .....	8-66
Configure the Tracking Database .....	8-67
Use the SQL Tracking Service .....	8-70
Create a Custom Tracking Profile.....	8-78
CREATING CUSTOM ACTIVITIES.....	9-1
Introducing Custom Activities .....	9-2
Simple vs. Composite Activities .....	9-2
Dependency Properties in Activities .....	9-4
Creating a Simple Activity .....	9-5
Create the Solution .....	9-6
Add Functionality to the Activity .....	9-6
Test the Activity.....	9-11
Set the Activity Display Name .....	9-12
Creating a More Complex Activity .....	9-15
Create the LoadTextFile Activity .....	9-15
Test the LoadTextFile Activity .....	9-18
Adding a Toolbox Bitmap.....	9-20
Adding a Validator.....	9-23
Adding a Designer .....	9-28
Modifying an Activity's Theme .....	9-37
Creating Composite Activities.....	9-43
Creating the Activity .....	9-43
Using Property Promotion.....	9-45
Is That All? .....	9-49
LAB 9: CREATING CUSTOM ACTIVITIES .....	9-55
Lab 9 Overview .....	9-56
Create and Test the WriteToFile Activity .....	9-58
Add a Validator .....	9-63
Create a Composite Activity .....	9-66
HANDLING WORKFLOW TRANSACTIONS .....	10-1
Transactions .....	10-2
Transactions in Workflows.....	10-4
Using the TransactionScope Activity .....	10-10

Transactions and Batches of Work.....	10-12
Exploring the BankAccountService Class.....	10-14
Compensation in Workflows .....	10-19
Using the CompensatableTransactionScope Activity .....	10-20
Using the Compensate Activity .....	10-33
Using the CompensatableSequence Activity .....	10-37
<b>LAB 10: HANDLING WORKFLOW TRANSACTIONS .....</b>	<b>10-41</b>
Lab 10 Overview .....	10-42
Transactions in Workflows.....	10-43
Transactions and Batches of Work.....	10-53
Compensation in Workflows .....	10-66
<b>DYNAMIC WORKFLOW UPDATES .....</b>	<b>11-1</b>
Introduction to Dynamic Updates.....	11-2
Performing Dynamic Updates .....	11-3
Update Steps .....	11-4
Modifying a Workflow from the Host Application .....	11-6
Investigate the Sample Workflow.....	11-7
Investigate the Host Application.....	11-10
Restricting Workflow Changes.....	11-18
Modifying a Workflow from within the Workflow .....	11-21
Investigate the Sample Workflow.....	11-22
Investigate the Host Application.....	11-24
Dynamic Rule Conditions .....	11-26
Modifying a Rule Condition .....	11-27
Examine the Host Application .....	11-28
Replacing All the Rule Conditions.....	11-34
<b>LAB 11: DYNAMIC WORKFLOW UPDATES.....</b>	<b>11-43</b>
Lab 11 Overview .....	11-44
Examine the Existing Workflow .....	11-45
Add an Instance of the BackupFileActivity Dynamically .....	11-52
Modify the FileCountOK Rule Condition Dynamically.....	11-55
<b>WORKFLOWS AND WEB SERVICES.....</b>	<b>12-1</b>
Workflow-Based Web Services .....	12-2
Using the WebServiceInput Activity .....	12-3
Using the WebServiceOutput Activity .....	12-3
Using the WebServiceFault Activity .....	12-6

Building a Workflow Web Service .....	12-7
Create the Interface .....	12-7
Create the Workflow .....	12-7
Publish the Workflow as a Web Service .....	12-11
Add Validation .....	12-14
Add a Windows Application Host .....	12-17
Maintaining State in Web Services .....	12-22
Modify the Workflow .....	12-22
Test the Workflow .....	12-25
Modify the Form .....	12-26
Test the Web Service .....	12-27
Maintain Web Service State in the Client .....	12-28
Invoking a Web Service in a Workflow .....	12-30
Add Fault Handling .....	12-34
LAB 12: WORKFLOWS AND WEB SERVICES .....	12-39
Lab 12 Overview .....	12-40
Build a Workflow Web Service .....	12-41
Maintain State in a Web Service .....	12-53
Invoke a Web Service in a Workflow .....	12-60
INDEX .....	INDEX-1