Building Workflow 4.0 Service Applications

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About Brian

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Publishing

Developing Applications with Windows Workflow Foundation, LiveLessons training DVD, June 2007

Smart Client Deployment with ClickOnce, Addison Wesley, January 2007

Data Binding in Windows Forms 2.0, Addison Wesley, January 2006


Speaking

Microsoft TechEd US, Europe, Malaysia, Visual Studio Connections, DevTeach, INETA Speakers Bureau, MSDN Webcasts

Updates will be available at http://www.devconnections.comupdates/LasVegas_Fall09/VS
Agenda

- Workflows in Service Applications
- Exposing Services from Workflows
- Consuming Services from Workflows
- Service Call Correlation

Workflow as Orchestration

Loan Application Process
- Submit Loan Application
- Validate Application
- Send to Reviewer
- Approve Application
- Fund Application

Validation Service
- Validation Biz Layer

Notification Service
- Notification Biz Layer
- Notification Data Layer
- Exchange

Approval Service
- Approval Biz Layer
- Approval Data Layer
- SQL DB

Funding Service
- Funding Biz Layer
- Funding Data Layer
- SQL DB

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Workflow as Service Operation

Transfer Money

Loan Application Process

- Approve Transfer
- Debit Account
- Credit Account
- Transfer Funds

Authorization Manager
Debit Manager
Credit Manager
Fund Manager

Workflow Coordination

Loan Application Process

- Submit Loan Application
- Validate Application
- Send to Reviewer
- Approve Application
- Fund Application

Loan Approval Process

- Check Credit
- Review Finances
- Approver Decision

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WF Service Capabilities

- WF leverages WCF’s ability to define, expose, and call services
  - Interoperable
  - Extensible
  - Productive
  - Complies with SOA tenets

WF 4.0 Service Capabilities

- Core namespace:
  - System.ServiceModel.Activities
- WF can expose workflows as services
  - Activities as service operation implementation
  - Receive activity
  - SendReply activity
- WF Workflows can be clients to services
  - Send activity
  - ReceiveReply activity

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Workflow Service Hosting

- **WorkflowServiceHost class**
  - WCF ServiceHost for the workflow as a service implementation class
  - Creates a workflow runtime instance for each workflow it runs
  - Can be created implicitly for you with IIS/WAS hosting

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Workflows as Services

Exposing Workflow Services

• Several approaches
  • Programmatic
  • XAML-based (non-messaging activities)
  • Messaging activities

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Exposing Services with Messaging Activities

• Add a Receive activity to a workflow
• Define the service operation it represents
• Define the service contract name
• Define the parameters to the operation
  ● Data contracts or Message contracts
• No current ability to point to a predefined service contract as an interface

Exposing Workflow Services

• Workflow must be hosted in a WorkflowServiceHost
• Must configure host for the services
  ● Config-based WCF settings
  ● Programatically through the service host
  ● Implicitly through default endpoints/behaviors/bindings
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**Consuming Services From Workflows**

- **Add Service Reference…**
  - Generates custom activity for that service
  - Adds configuration to call
  - Drag/drop and bind parameters
- **Manual:**
  - Add Send activity to workflow
  - Set contract name, operation name, endpoint info
  - Add input/return parameters
- **No need to be hosted in WorkflowServiceHost**

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Service Call Correlation

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Correlation

- To dispatch incoming message, the runtime must correlate the incoming message with a running instance of a workflow
  - Unless workflow activated by service call with CanCreateInstance = true on Receive activity
- Need a correlation token
  - Identifies the workflow instance and the target activity
- Three types:
  - Request-Reply
  - Context (protocol)
  - Content

Request-Reply Correlation

- Receive-SendReply pair
  - Hook up correlation handler in Receive
  - Point SendReply to Receive
- Send-ReceiveReply pair
  - Hook up correlation handler in Send
  - Use CorrelationScope activity
Context Correlation

- Also called protocol correlation
  - Context passed via underlying protocol, transparent to workflow or client
- Context contains workflow instance ID and destination activity (operation as action)
- Context passed as either custom header in SOAP message or cookie for basic and web bindings
- Gets round-tripped by proxy like browser does with cookies
- Simple means of correlation if both client and service are .NET
- Requires use of context bindings:
  - BasicHttpContextBinding, WsHttpContextBinding, NetTcpContextBinding

Content Correlation

- Correlate based on message contents
  - Ex: CustomerId property on data contract
- No special bindings required
- Set up correlation properties on the receive activity
  - Based on XPath

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Resources

- .NET Framework 4.0 Beta 2 Docs: http://msdn.microsoft.com/en-us/library/w0x726c2%28VS.100%29.aspx
- MSDN Workflow Developer Center: http://msdn.microsoft.com/wf

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