Software + Services
Using WCF and WF

Michael Stiefel
Reliable Software, Inc.
www.reliablesoftware.com

Pre-requisites for this presentation:

1) Understand WCF
2) Understand WFC

Level: Intermediate
Understand Software + Services
Understand WF and WCF Integration
Where Does Computation Happen?
Everywhere
Why?
Hardware Is Cheap

Data Is Expensive To Move
Compute Where Data Naturally Lives
“World of small pieces loosely joined”

Ray Ozzie, Chief Software Architect, Microsoft
MIX Keynote
Computing Ecosystem

Service Oriented Architecture
Service Composition

Software as a Service
Service Delivery

Rich Internet Applications
Experience

Cloud Computing
Service Utility

Software + Services

Web 2.0
Network Effect
Architectural Layers

Client Software
Application Services
Infrastructure Services
Foundation Services
Client Software

- Browsers
- Mobile
- Personal Computers (On/Offline)
- Embedded Devices
- Speech
Application Services

Web Presentation Services
  Static, Dynamic, Rich, Streaming

Monetization
  Transaction, Subscription, Advertising

Programmatic Services
  Web Services, REST, Voice, SMS, SMTP

Collaboration
  Search, Social, Content

Business Intelligence
  Dashboard, Reporting

Workflow, Schemas, Rules
Infrastructure Services

Security
Username / Password, Claims, Roles

Messaging
Service Bus, Peer to Peer

Storage
Files, Relational, Unstructured (Key Value Pairs)

Workflow Engine
Triggered by Events
Coordinated Flows
Foundation Services

Physical Dedicated
Physical Shared
Virtualized Single
Virtualized Shared
Clusters
Vendor Hosted
Self Hosted
Simple Web Site

Client Software
  Browser

Application Services
  Static HTML, Business Logic

Infrastructure Services
  File Storage

Foundation Services
  Physical, Shared Server
Software as a Service

Client Software
  Browser

Application Services
  Static HTML, Web Services, Business Logic, Workflows

Infrastructure Services
  Relational Database

Foundation Services
  Vendor Hosted, Virtualized, Dedicated Servers
Business Logic and Workflows Imply Long Running Business Processes

Business Processes Exposed As Services
How do you expose long running business processes as services?
WCF and WF Integration Encapsulates Long Running Business Services
What is Different in .NET 3.5?

Possible in Framework 3.0

Declarative Model in Framework 3.5

Basis for future integration
New Framework 3.5 Features

Send and Receive Activities

New WCF Context Bindings

New WCF Projects and Templates

System.WorkflowServices assembly
Key Concepts

Workflow setup inside WCF Host

Send messages to right workflow instance
Key Technical Concepts

WCF Extensibility Points

Workflow Context flows with service call
Extend or modify WCF runtime

Extensibility Points:

- Service Host
- Service Model
- Bindings
- Channels
- Security
- Metadata
- Encoders and Serializers
Create context aware bindings:
- WsHttpContextBinding
- BasicHttpContextBinding
- NetTcpContextBinding

Extends binding to allow context flow

Context in SOAP header or HTTP cookie
WF and WCF Dependencies

Workflow uses WCF Extensibility and ContextBindingElement.

WCF knows nothing about Workflow.
Workflow Context

Workflow Instance Id

Correlation to correct instance of a service
Steps

Define Service Interfaces

Add Workflow

Write the Host

Endpoints and Behaviors to App.Config
Receive Activity and Non-WF Client
Simple Activity Demo

Send and Receive Activities
Receive Activity

Processes a service call:
- **ServiceOperationInfo**
- **ContextToken**
- **CanCreateInstance**
- **Databinding to Parameters and Return Value**
- **Fault Message**

**Sequential Composite Activity**
ServiceOperationInfo Demo

Contract First Design

Workflow First Design
    Interface defined inside of workflow type
Receive Activity “Magic”

No Local Services to map services to Workflow Events
No correlations for parallel service waits
Infrastructure builds appropriate workflow queues and correlations
Send Activity

Make a service request:
- ServiceOperation\ nfo
- ChannelToken
- CustomAddress

Associate context with activity
ChannelTokens with same name, owner cached
WorkflowServiceHost

Derives from ServiceHostBase
WorkflowRuntimeBehavior

Get WorkflowRuntime instance through WorkflowRuntimeBehavior

No IExtension<ServiceHostBase>
Coordinated context flow between send and receive activities in separate workflows
Context can distinguish among workflow branches
Multiple Service Hosts

One WindowsServiceHost per workflow
One WorkflowRuntime for each workflow
Contention??
SqlPersistenceService
WorkflowServiceHostFactory

Service definition can be a XAML file or type

<%@ServiceHost Language="C#" Service="foo.xoml"
%>
WCF and WF Integration Much Easier
Extends Declarative Model
Service Encapsulation of Long Running Business Processes