



Software + Services Using WCF and WF

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Pre-requisites for this presentation:

- 1) Understand WCF
- 2) Understand WF

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

Software + Services

“World of small pieces loosely joined”

Ray Ozzie, Chief Software Architect, Microsoft
MIX Keynote

Computing Ecosystem

Service Oriented Architecture
Service Composition

Rich Internet Applications
Experience

Software + Services

Software as a Service
Service Delivery

Web 2.0
Network Effect

Cloud Computing
Service Utility

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

WCF Extensibility Points

Extend or modify WCF runtime

Extensibility Points:

Service Host

Service Model

Bindings

Channels

Security

Metadata

Encoders and Serializers

ContextBindingElement

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



Context Demo

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:

ServiceOperationInfo

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>

Context Flow Demo

Coordinated context flow between send and receive activities in separate workflows

Workflow Conversations Demo

Context can distinguish among
workflow branches

Multiple Service Hosts

One WindowsServiceHost per workflow

One WorkflowRuntime for each
workflow

Contention??

SqlPersistenceService

Extended Example Demo



WorkflowServiceHostFactory

Service definition can be a XAML file or type

```
<%@ServiceHost Language="C#" Service="foo.xoml"  
Factory="System.ServiceModel.Activation.WorkflowServiceHostFactory"  
%>
```

Summary

WCF and WF Integration Much Easier

Extends Declarative Model

Service Encapsulation of Long Running Business
Processes