Introduction to Windows Workflow Foundation

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Windows Workflow Foundation

- A single workflow technology for Windows
- Platform level workflow framework for use within Microsoft products & ISV applications
- Will be used by BizTalk Server, Office 12, and Dynamics
- Available to all Windows customers
- Microsoft is redefining workflow
  - Unified technology for System & Human workflow
  - Multiple styles: sequential, rules-based, state machine
  - Supports dynamic interaction
- Microsoft is taking workflow mainstream
  - Consistent and familiar programming model for reaching mainstream application developer
  - Available to millions of end-users through Office “12”
  - Extensible platform for ISVs

Take Workflow Mainstream: Office “12”

Office “12” Workflow Vision

- Provide document centric workflow as an integrated part of the Office experience
- Empower information workers with common workflow solutions and activities out of the box

Workflow Enabled Office

- Outlook: Receive notifications and track tasks
- SharePoint: Start participating in SharePoint workflows
- FrontPage: Create and customize workflows
- Word, PowerPoint, Excel, InfoPath: Start participating in SharePoint workflows

Activities out of the box

Roadmap

- Third foundational WinFX technology for Vista
- Windows Communication Foundation (Indigo)
- Windows Presentation Foundation (Avalon)
- Windows Workflow Foundation (WinOES/WinWS)
- Support for Windows XP & Windows Server 2003
- Licensed as part of Windows – no additional charge
- Public announce and Beta 1 available at PDC
- Beta Dec 2005 and RTW H2 2006
**Workflow Software Challenges**

**Real World Behavior**
- Orders are confirmed in 48 hours and shipped within 30 days.
- Most suppliers confirm our orders but some may need followup.
- What is the status of this order and what is the next step?

**Software Challenges**
- Long Running and Stateful Workflows: run for up to 30 days and must maintain state throughout.
- Flexible Control Flow: flexibility for people to override or skip steps in the workflow.
- Transparancy: rendering runtime state within a visualization of the workflow control flow.

**Microsoft’s Workflow Strategy is …**
- to provide Windows Workflow Foundation as a part of the developer framework for Windows
- and enterprise applications that build on top of Windows Workflow Foundation for specific scenarios.

**Why Workflow Technology?**

**Developer Productivity**
- Workflows technology provides abstractions convenient to describe real world scenarios.

**Workflow software challenges**
- Workflows are long running and stateful.
- Workflows require flexible control flow.
- Workflows must provide transparency.

**Windows Workflow Foundation**

*Deliver best-in-class workflow platform & tools for Microsoft products and partner/customer ecosystem*

- Single workflow technology for Windows
- Available to all customers of Windows
- Available for use across a broad range of scenarios
- Redeﬁning workflow
- Extensible framework & API to build workflow-centric products
- One technology for human and system workﬂow
- Take workﬂow mainstream
- Incremental learning for mainstream .NET developers
- Fundamental part of the Office “12” value proposition
- Strong workﬂow partner & solution ecosystem

**Workflow Scenario Spectrum**

- **Human Workflow**
  - Participants: people, roles
  - Flow style: ﬂexible, dynamic
  - Data: unstructured, documents
- **System Workflow**
  - Participants: apps, services
  - Flow style: prescriptive, protocols
  - Data: structured, transactional

- **Human-System Workflow**
  - Participants: people, roles, apps, services
  - Flow style: hybrid
  - Data: mixed types

- **Business to Business**
  - Participants: trading partners
  - Flow style: choreography
  - Data: XML-based

- **Supply Chain Agenda**
  - Participants: supply chain partners
  - Flow style: orchestration
  - Data: structured, transactional

**What is a workflow?**

*A set of activities that coordinate people and/or software...

…organized into some form of workflow.*

Example activities:
- EscalateToManager
- CheckInventory

Like a flowchart:...

Or a state diagram:...
**Windows Workflow Foundation**

**Key Concepts**
- Workflows are a set of Activities
- Workflows run within a Host Process: any application or server
- Developers can build their own Custom Activity Libraries

**Components**
- **Base Activity Library:** Out-of-box activities and base for custom activities
- **Runtime Engine:** Workflow execution and state management
- **Runtime Services:** Hosting flexibility and communication
- **Visual Designer:** Graphical and code-based construction

**Workflow Basics**

**A workflow is a class**

```csharp
Imports System.Workflow.Activities
Public Class MyWorkflow
    Inherits SequentialWorkflow
    Implements ISerializableWorkflow
End Class
```

**Workflow Authoring Modes**

- **Markup Only (Declarative)**
  - XML defines workflow structure, logic, and data flow

- **Markup and Code**
  - XAML/Visual Studio workflow editor
  - Code defines workflow

- **Code Only**
  - Code defines workflow

**Application Generated**

**Workflow Execution**

- Create instance
- App calls `StartWorkflow()`
- Instance Manager loads workflow type
- Enqueues `WF1` with Scheduler
- Execute until idle
  - Scheduler dequeues WF1 and calls `Execute` (SequentialWorkflow base)
- Enqueue Sequence
- Dequeue Sequence and call `Execute` (OnEvent)
- Dequeue `OnEvent` and call `Execute`

- Persist to disk
  - InstanceMgr calls Save() on WF1
- Activity base class to serialize or deserialized state
  - InstanceMgr call Persistence service passing serialized stream to disk
**Activity Basics**

- Activities are the building blocks of workflows
  - A single execution, re-use and composition
  - Basic activities are steps in a workflow
  - Composite activities contain other activities
    - EG: Sequence
    - Base Activity Library provides out-of-the-box activity set
    - Partners and developers author custom activities
      - EG: ApproveOrder
- Activities are classes:
  - Properties and events are defined by the activity author and programmable from workflans
  - Has methods that are called by the activity author but invoked by the workflow runtime (EG: Execute) or designer
  - Can be built into workflow assemblies or deployed as re-usable libraries

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**Activities: An Extensible Approach**

- Base Activity Library
- Custom Activity Libraries
- Domain Specific Workflow Techniques

Sequencing engine driven by activities (no fixed language)

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**Activities: Optional Features**

- Companion Classes:
  - [Designer(typeof(MyDesigner))]
  - [Validator(typeof(MyValidator))]
  - [CodeGenerator(typeof(MyCodeGenerator))]
  - [ToolboxItem]

Behaviors:
- [SupportsTransaction]
- [SupportsExceptionHandler]

```csharp
public class MyActivity : Activity
{
    ...
}
```

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**Flexible Control Flow**

- Sequential Workflow:
  - Sequential structure specifies processing order
  - Prescriptive: formal, Automation process
  - Flowchart metaphor

- State Machine Workflow:
  - External events drive processing order
  - Reactive, event-driven
  - Simple Conditions, complex Policies
  - Constrained Activity Group

Rules-driven Activities:
- Rules + data state drive processing order

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**Agenda**

- Roadmap for Workflow
- Introduction to Windows Workflow Foundation
- Windows Workflow Foundation Development
  - Basic Authoring
  - Activities
  - Control Flow
- Resources

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**Windows Workflow Foundation Resources**

- MSDN® Workflow Page
- Download the Microsoft® Visual Studio® Extensions
- Download 12 Hands-on Labs
  - [http://msdn.microsoft.com/visualstudio](http://msdn.microsoft.com/visualstudio)
- Community Site
  - Download samples, tools, and runtime service components
- Forums
  - Ask questions in the forums
**Take Workflow Mainstream: Partners**

- ISV and SI Readiness
  - 300 ISVs supported through ASCEND program in FY06
  - 300 SIs trained in US/EMEA
  - Beta Book
  - Quicklearn course
  - www.WindowsWorkflow.net

**TAP Early Adopters**

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