Microsoft® SharePoint® 2010

# Microsoft® SharePoint® 2010

## Professional Developer's Evaluation Guide

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# Abstract

This evaluation guide is designed to give you an overview of the feature set and extensibility points for Microsoft® SharePoint® 2010, and an understanding of how the professional developer can use these features and extensibility points to create comprehensive solutions. The ultimate goal of this guide is to provide a framework for an effective evaluation of SharePoint 2010 as a solution creation platform. This guide begins with an overview of the types of solutions that you can build by developing on the SharePoint platform. It then describes the developer tools for SharePoint 2010, new platform features, and solution deployment enhancements. This guide is intended for the professional developer, development lead, and software architect. Also available are an evaluation guide for the IT Professional and a SharePoint 2010 product evaluation guide.

For the latest information about SharePoint 2010, go to http://www.microsoft.com/sharepoint. For other product information resources including the IT Professional and product evaluation guides, see *Learning More*, later in this guide. To provide feedback on this guide, send an e-mail message to sp2010fb@Microsoft.com.

# Introduction

Welcome to the *Microsoft SharePoint 2010 Professional Developer's Evaluation Guide*. The goal of this guide is to help you gain sufficient knowledge and understanding of Microsoft® SharePoint® 2010 to evaluate the product.

SharePoint 2010 provides the business collaboration platform for developers to rapidly build solutions using familiar tools while leveraging a rich set of features. Microsoft Visual Studio® 2010 and Microsoft SharePoint Designer 2010 can help enhance developer productivity, and Microsoft Visual Studio Team Foundation Server delivers support for application lifecycle management. Developers can also use the data and programmability enhancements, such as Microsoft Business Connectivity Services, to integrate line-of-business (LOB) data in SharePoint 2010 with read/write capability. SharePoint 2010 also offers developers flexibility with deployment. Using sandboxed solutions, developers can more securely deploy solutions to a shared hosting environment, such as SharePoint Online or SharePoint deployed on-premises.

SharePoint 2010 is a major step forward for SharePoint as a development platform because of the richer set of features it supports, the significant investments made in the suite of tools to increase developer productivity, and the improved accessibility of the platform for developers of all skill levels. This guide will walk you through some of the most compelling enhancements to the SharePoint 2010 platform for developers.

## Summary of What's New

SharePoint 2010 includes many new capabilities and features for professional developers, most of which are highlighted in this guide. Here is a summary of what's new.

| **Tools for Developer Productivity** |
|---|
| Microsoft Visual Studio 2010 SharePoint project types and items |
| Microsoft Visual Studio 2010 SharePoint tools extensibility |
| Microsoft Visual Studio extensions for SharePoint upgrade |
| Windows® 7 and Windows Vista® operating system support |
| Microsoft SharePoint Designer 2010 |
| Developer dashboard |
| Visual Studio Team Foundation Server 2010 integration |
| **Rich Platform Services** |
| SharePoint Ribbon |
| SharePoint Dialog Framework |
| Microsoft Silverlight® Web Part |
| List lookups and relationships |
| Business Connectivity Services |
| LINQ to SharePoint |

| |
|---|
| Performance enhancements<br>Solution throttling<br>Event enhancements<br>Workflow enhancements<br>Client object model<br>Open Data Protocol (OData) REST APIs |
| **Improved Flexibility for Deployments** |
| Sandboxed solutions<br>Silverlight application deployment<br>SharePoint Online<br>Upgrading solutions |

First, we will briefly discuss the key types of solutions that developers can build by taking advantage of the benefits of SharePoint 2010.

## Key Types of Solutions Built on SharePoint by Developers

Developers create solutions every day. SharePoint 2010 makes developing those solutions easier, quicker, and more flexible.

### Building Applications on SharePoint

With the release of SharePoint 2010, SharePoint has broadened and deepened as a platform for application development. Organizations can increase productivity by capitalizing on the features and rich extensibility of SharePoint.

Microsoft Visual Studio 2010, SharePoint Designer 2010, and the SharePoint Web user interface (UI) accelerate development. By providing tools targeted to different kinds of users and by offering a common way to share work between those tools, the development process is more streamlined. Better connectivity between the tools in

SharePoint 2010 facilitates business analysts and even end users to participate in the development process by enabling them to create assets that the developer can use in that development process.

## Business Collaboration Applications

Applications for business collaboration are designed to facilitate and encourage users to work together toward a common goal. Microsoft Office 2010 and related products and technologies, including SharePoint 2010, make developing these types of applications quicker and more effective.

SharePoint 2010 is a Web-based product, and that makes it easy for users to access their information from anywhere through their computer, browser, and smart phone. The built-in document management and list management features that SharePoint users are familiar with are extended in several key ways to accelerate solutions that have not been easy in the past. Data management enhancements enable support for larger lists, better validation, and connectivity to LOB systems.

SharePoint is a suitable development platform for building applications in many scenarios, including those that use document sharing, enterprise portals, Internet sites, human workflow, LOB front-end systems, and other collaboration features. For these collaboration scenarios, SharePoint is a valuable application framework built on ASP.NET and the Microsoft .NET Framework. Consider a custom development solution that doesn’t include SharePoint, an application framework is usually built to structure the UI, navigation, data access methods, user authorization, integration, and content creation and editing. SharePoint provides a comprehensive, supported framework that is this structure for an ASP.NET application, and building on the SharePoint platform means using this framework instead of building your own.

The updated client applications, including Microsoft SharePoint Workspace, enable the mobile workforce in today’s business climate to do work, whether they’re connected to the server or not. This extends the reach of the application from the users in the office to the users out in the field as well.

## User Interface Portal for LOB Application Data

Just as LOB systems are a key need for organizations, so are front-end systems that can help get information into the core LOB systems that drive the organization's transactional and production throughput. Traditional LOB systems have a core set of users who are well educated in their use and a much broader audience of users who are less trained and who interact with the LOB systems only in limited or occasional ways.

The integration of SharePoint 2010 with back-end systems through Business Connectivity Services (formerly known as the Business Data Catalog), enables you to use SharePoint to deliver data to a LOB system. For example, purchase order requests can be routed for approval in SharePoint via a workflow and delivered to the back-end system pre-approved. Similarly, a Microsoft Word form can be created that reads from the LOB system to look up the customer and product descriptions. The end result of the form can be an order in the sales order system. The ability to read information from the LOB system—and to write back changes—makes it easy to integrate SharePoint 2010 and Office 2010 into your existing back-end systems.

## Customizing SharePoint Workloads

SharePoint 2010 offers six workloads, as shown in Figure 1. These capabilities make SharePoint a powerful platform for users and developers.

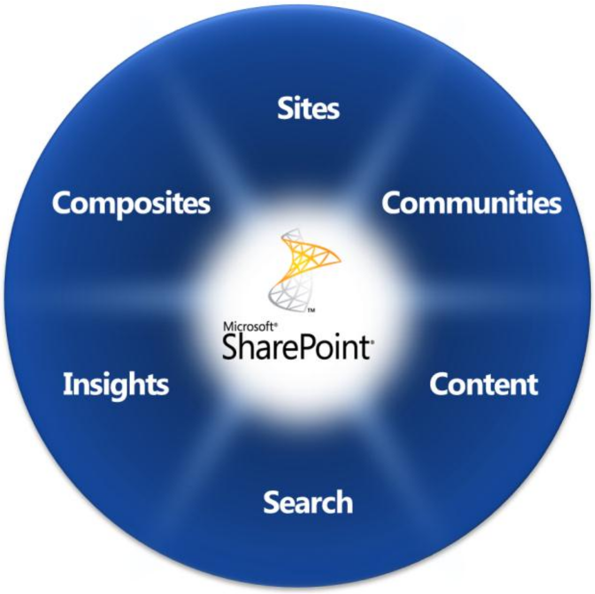


***Figure 1. SharePoint 2010 capabilities***

You can find more detail about each of these workloads in the SharePoint 2010 Evaluation Guide (the product evaluation guide). This *Microsoft SharePoint 2010 Professional Developer's Evaluation Guide* provides an overview of the extensibility points that developers can customize. These possible customizations and extensibility points are shown in the following table.

| **Capability** | **Features** | **Extensibility Points** |
|---|---|---|
| Sites | The portal capability to store and retrieve list and document content in an easy and flexible way, with connectivity to the Microsoft Office client applications. | Web Parts, master pages, pages, delegate controls, and SharePoint lists and libraries with OData access. |
| Communities | The social networking capability to locate and interact with people through expertise, relationships, tagging, and rating of content. | Tagging interfaces, rating interfaces, and custom user profile interfaces. |
| Content | The capability to manage content, whether that content is a Web page, a document, or a set of documents and records management of the content that is created. | Custom page types, field controls, content types, document sets, remote blog storage providers, workflows and Word Automation Services. Records management extensibility and public Web sites extensibility. |
| Search | The capability to search content within and outside of SharePoint, including information in structured database systems. | Predefined search result transformations, Web Parts search functionality for navigation and location of content, and connections to back-end systems. Also IFilters and protocol handlers. |

| | | |
|---|---|---|
| Insights | The capability to leverage Microsoft Excel® to access and display data on a Web page, dashboards, and Key Performance Indicators to transform raw data into actionable information. | Excel Services, Excel user-defined functions, dashboards, key performance indicators, and PerformancePoint Services for SharePoint. |
| Composites | The capability for business users to create solutions through connection and arrangement of the features of the platform. | Web Parts, workflows, and InfoPath Forms Services that increase the tools available for the end user. Access Services for deploying Microsoft Access® solutions to SharePoint. |

### One Web Part Solutions

Web Parts are the simplest building blocks in SharePoint, and developers are often asked to build just one. A Web Part can be used to add a data viewer to a SharePoint site, to show a UI for a custom process, or to show a new kind of social data. Existing ASP.NET Web Parts can easily be used with SharePoint. The possibilities for Web Part use are broad and Web Parts are easy to create for SharePoint Server 2010.

## Improved Developer Productivity Using Better Tools

Developers will have an exciting and rich set of tools for building solutions with SharePoint 2010. Visual Studio 2010 has direct support for the most common kinds of projects that you might want to create in SharePoint 2010, and it has tools for creating SharePoint solution packages (.wsp files). SharePoint Designer 2010 includes new support to help make the transition between designers and analysts to developers smoother and more productive. In addition, the developer tools and SharePoint 2010 can be run on a workstation operating system that is running Windows 7 and Windows Vista SP1, instead of requiring a server operating system for each developer.

## Visual Studio 2010 SharePoint Tools

Visual Studio 2010 includes native support for the most common types of projects that you might want to build with SharePoint 2010, and new tools for more easily defining SharePoint features and SharePoint solutions. It also includes wizards to walk through the most common settings for each project type. Visual Studio 2010 provides the following built-in project templates:

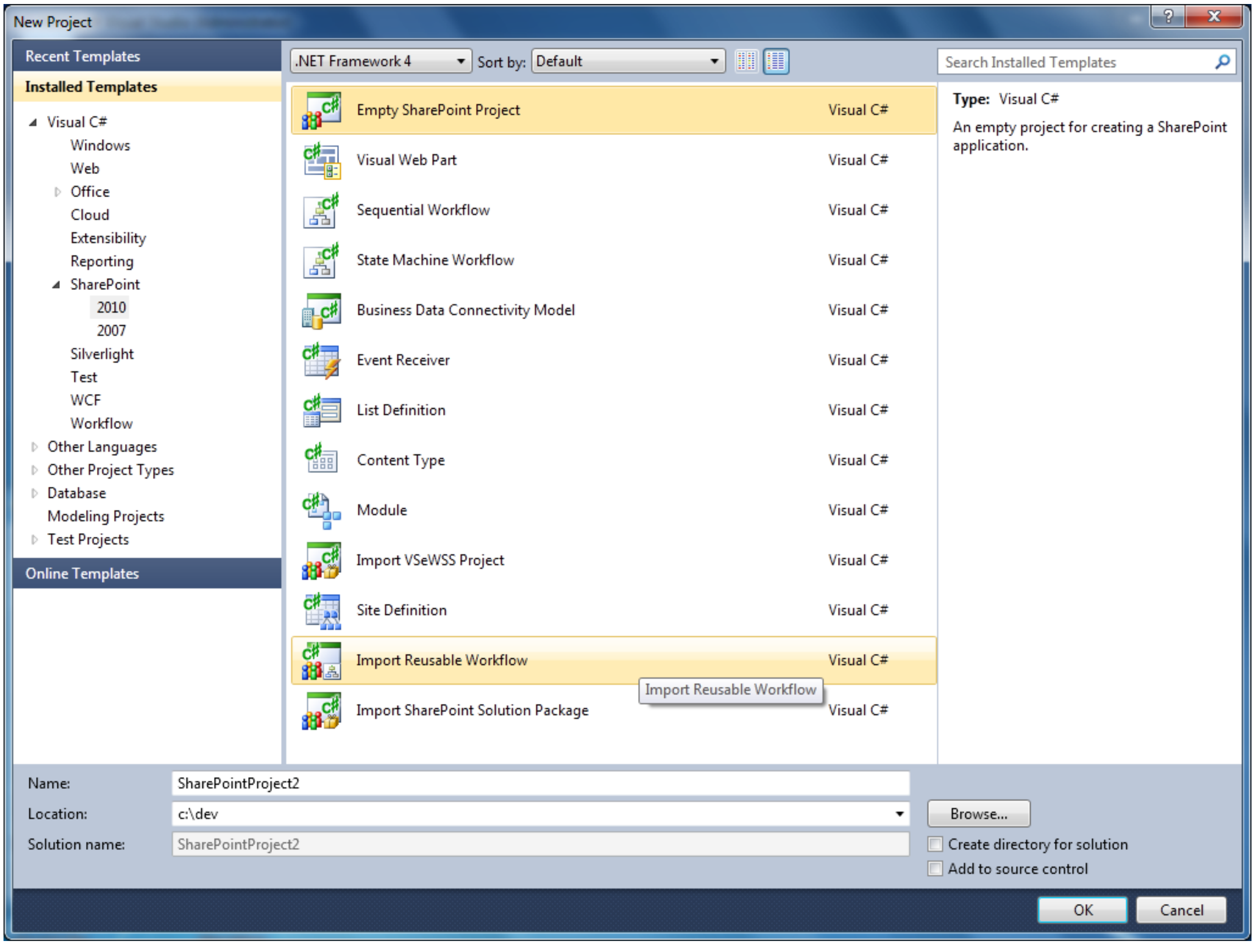
- Empty SharePoint Project
- Visual Web Part
- Sequential Workflow
- State Machine Workflow
- Business Data Connectivity Model
- Event Receiver
- List Definition
- Content Type
- Module (Files)
- Site Definition
- Import Reusable Workflow
- Import SharePoint Solution (WSP) Package

Each project template is available in Microsoft Visual C#® or Microsoft Visual Basic®, and contains initial project items. You can also add typical C# or Visual Basic artifacts. In addition, Visual Studio 2010 includes the following SharePoint project items that you can add to any of your SharePoint projects:

- Visual Web Part
- Web Part
- Sequential Workflow
- State Machine Workflow
- Workflow Association Form
- Workflow Instantiation Form
- Business Data Connectivity Model
- Application Page
- Event Receiver
- Module
- Content Type

- List Definition from Content Type
- List Definition
- List Instance
- Empty Element
- User Control

The project types and project items in Visual Studio 2010 are shown in Figures 2 and 3.



**Type:** Visual C#

An empty project for creating a SharePoint application.

Name: SharePointProject2

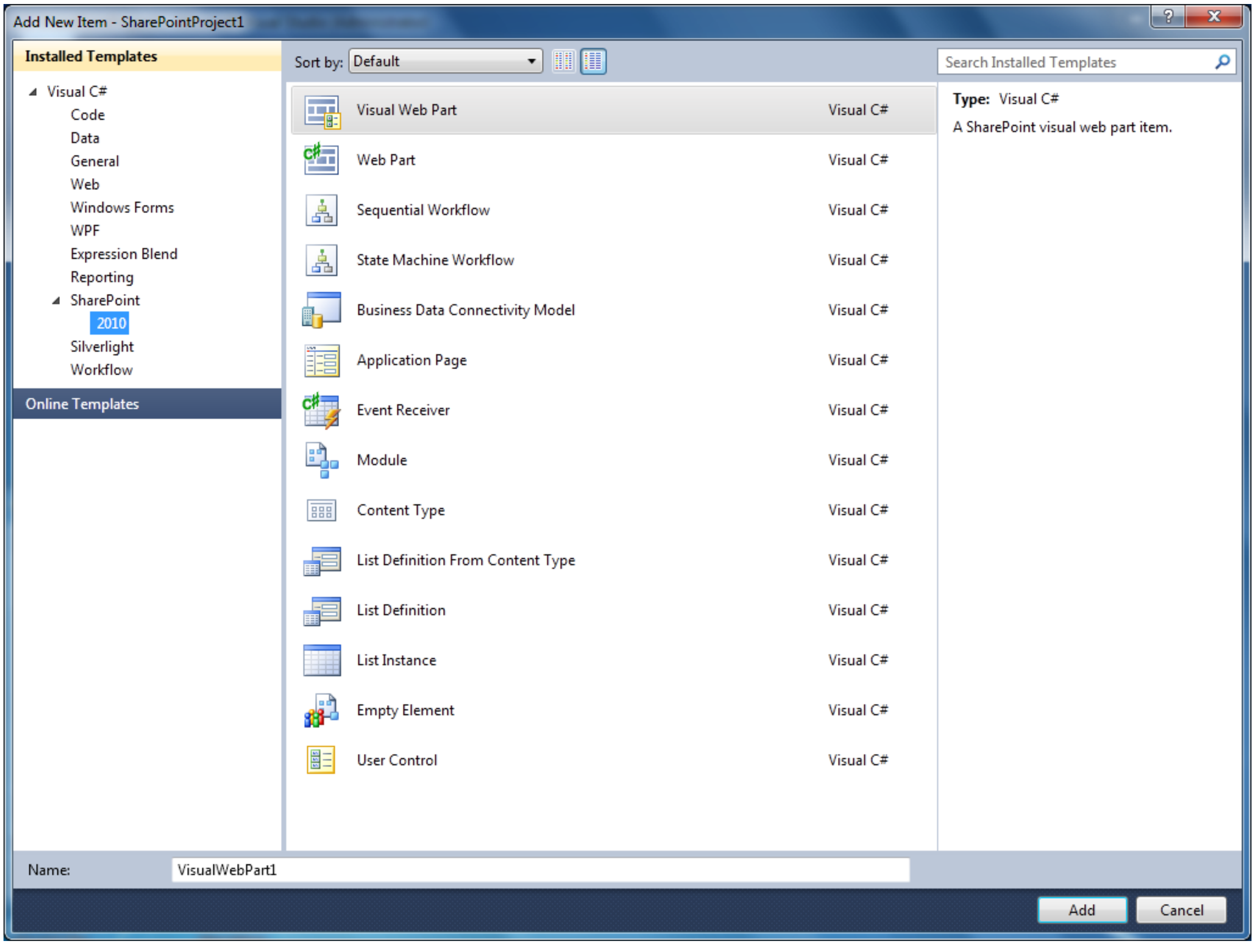
Location: c:\dev

Solution name: SharePointProject2

☐ Create directory for solution

☐ Add to source control

***Figure 2. SharePoint project types in Visual Studio 2010***



Add New Item - SharePointProject1

Sort by: Default

| | |
|---|---|
| Visual Web Part | Visual C# |
| Web Part | Visual C# |
| Sequential Workflow | Visual C# |
| State Machine Workflow | Visual C# |
| Business Data Connectivity Model | Visual C# |
| Application Page | Visual C# |
| Event Receiver | Visual C# |
| Module | Visual C# |
| Content Type | Visual C# |
| List Definition From Content Type | Visual C# |
| List Definition | Visual C# |
| List Instance | Visual C# |
| Empty Element | Visual C# |
| User Control | Visual C# |

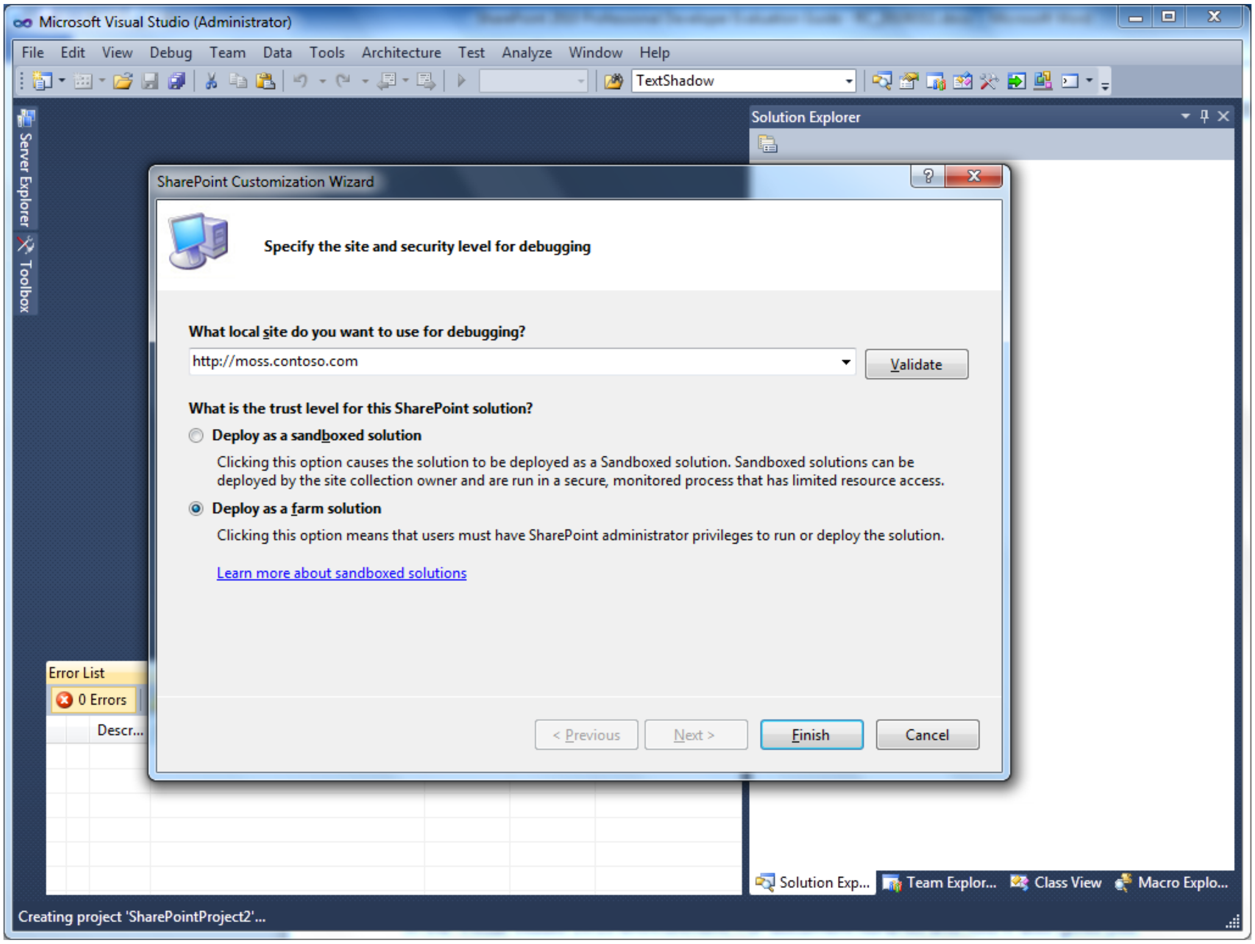
**Type:** Visual C#

A SharePoint visual web part item.

Name: VisualWebPart1

***Figure 3. SharePoint item templates in Visual Studio 2010***

Each project wizard guides you through the process by asking what site you want to use to deploy and debug your solution. It also asks whether the result of the project will be deployed as a sandboxed solution, as shown in Figure 4.



SharePoint Customization Wizard

**Specify the site and security level for debugging**

**What local site do you want to use for debugging?**

http://moss.contoso.com

Validate

**What is the trust level for this SharePoint solution?**

○ **Deploy as a sandboxed solution**

Clicking this option causes the solution to be deployed as a Sandboxed solution. Sandboxed solutions can be deployed by the site collection owner and are run in a secure, monitored process that has limited resource access.

● **Deploy as a farm solution**

Clicking this option means that users must have SharePoint administrator privileges to run or deploy the solution.

Learn more about sandboxed solutions

< Previous | Next > | Finish | Cancel

Creating project 'SharePointProject2'...

***Figure 4. Project wizard connects the development environment to a SharePoint instance***

Visual Studio 2010 also includes support for viewing SharePoint 2010 sites through the Server Explorer. You can now use Server Explorer to look at all of the SharePoint settings for sites, lists, content types, workflow associations, and other objects. Server Explorer enables you to navigate and view SharePoint sites. Server Explorer simplifies the process of checking code against the implementation in the system because all of the implementation details are available to you in the Visual Studio 2010 environment. For document libraries and lists, Server Explorer also gives you quick access to an artifact you view in the Server Explorer through a link to the SharePoint Web UI. Figure 5 shows the Server Explorer with an open SharePoint site.

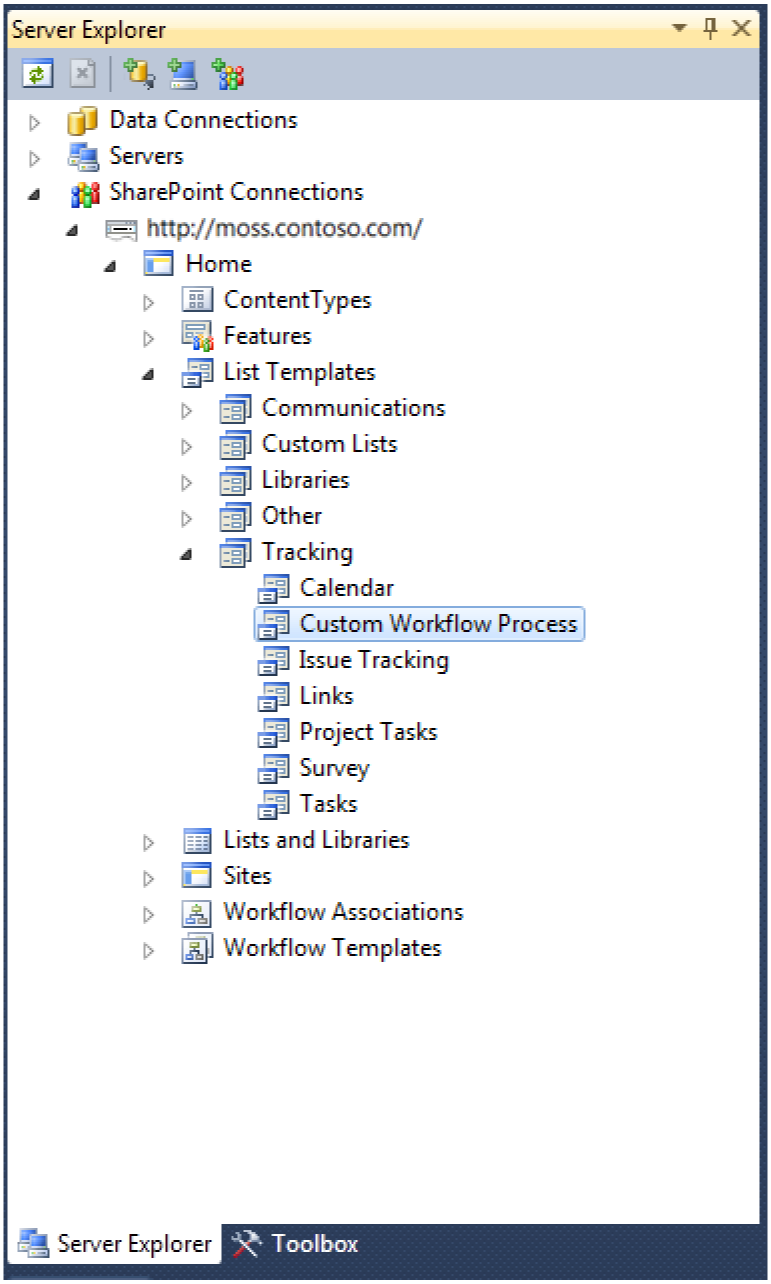


***Figure 5. Navigating SharePoint using Server Explorer***

## Visual Studio 2010 SharePoint Tools Extensibility

Visual Studio 2010 provides a rich set of project templates and tools that developers can use to create custom SharePoint solutions. Although these SharePoint projects and tools work well for many application development scenarios, there may be times when you need different or new functionality. In these cases, you can adapt the SharePoint projects and tools in Visual Studio by using a new Visual Studio extensibility Application Programming Interface (API).

This API lets you create new SharePoint project items or automate and extend existing SharePoint project items, enhance development steps including packaging, validation, deployment and retraction, extend the SharePoint nodes in Server Explorer, and even create new designers.

### Developer Workstation Support for Windows 7 and Windows Vista SP1

SharePoint 2010 makes great advances in the development environments that you can use to create SharePoint solutions. In addition to a broader set of tools for developing solutions for SharePoint, the requirement to be running on a server operating system has been relaxed so that it is possible to develop applications on a local developer workstation that is running a client operating system such as Windows 7. Support for Windows 7 and Windows Vista Service Pack 1 (SP1), in addition to Windows Server 2008, means that developers can build on a non-server operating system locally, and then deploy to a server running Windows Server 2008 for integration, testing, and production.

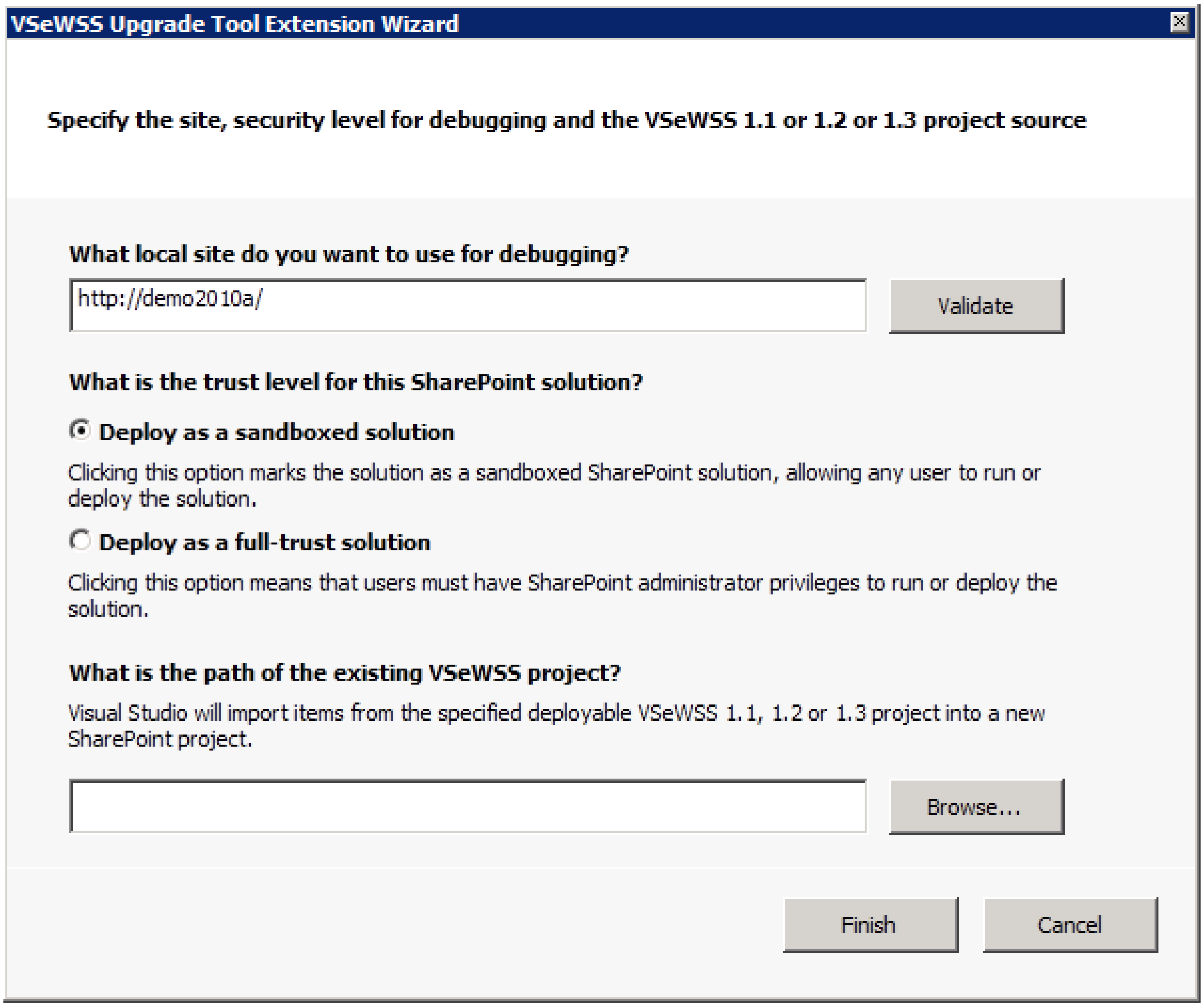
***Note*** *SharePoint 2010 is available only in a 64-bit version and therefore, the operating system, whether client or server, must be a 64-bit version.*

### Upgrading from Visual Studio 2008 Extensions for SharePoint to Visual Studio 2010 SharePoint Tools

Visual Studio 2010 provides developers with many resources to help upgrade their code from Microsoft Office SharePoint Server 2007 to SharePoint 2010.

Projects that are based on the Visual Studio 2008 workflow project templates are upgraded automatically by Visual Studio 2010 to equivalent projects that can still target Office SharePoint Server 2007, but can now be developed in Visual Studio 2010. All other SharePoint projects in Visual Studio 2010 target SharePoint 2010.

Projects that are based on the Visual Studio 2008 extensions for Windows SharePoint Services (VSeWSS) project templates can be upgraded to equivalent projects that target SharePoint 2010 and continuing development on Visual Studio 2010. An upgrade tool is available that upgrades these projects to the new project and packaging format of the Visual Studio 2010 SharePoint tools. Figure 6 shows the wizard that walks you through the upgrade process.


VSeWSS Upgrade Tool Extension Wizard

Specify the site, security level for debugging and the VSeWSS 1.1 or 1.2 or 1.3 project source

What local site do you want to use for debugging?

http://demo2010a/

What is the trust level for this SharePoint solution?

● Deploy as a sandboxed solution

Clicking this option marks the solution as a sandboxed SharePoint solution, allowing any user to run or deploy the solution.

○ Deploy as a full-trust solution

Clicking this option means that users must have SharePoint administrator privileges to run or deploy the solution.

What is the path of the existing VSeWSS project?

Visual Studio will import items from the specified deployable VSeWSS 1.1, 1.2 or 1.3 project into a new SharePoint project.

*Figure 6. First import step in Visual Studio extensions for Windows SharePoint Services*

## SharePoint Designer 2010

SharePoint Designer 2010 is a fully functional participant in the solution creation lifecycle for SharePoint 2010 and comes as a free download for SharePoint customers. You can create complete applications by using the SharePoint Web UI and SharePoint Designer 2010. Or you can create a SharePoint solution package (.wsp file) that can be imported into Visual Studio 2010 for more editing.

The ability of the farm administrator to control the use of SharePoint Designer 2010 is substantially improved. The farm administrator can now specify which SharePoint Designer features are available at a Web application and site collection level. This makes it easier for organizations to allow the use of SharePoint Designer in some areas of a site and restrict it in others.

From the perspective of the user of SharePoint Designer, the fundamental approach is changed. Instead of being focused on pages and used as an HTML or CSS editor, SharePoint Designer is refocused on the artifacts that you create in SharePoint. Sometimes the artifact that you are creating with SharePoint Designer is a master page for a new SharePoint site, but often it is configuring lists and libraries, workflows, content types, data sources, entities, or site level settings. Figure 7 shows the primary left navigation menu of SharePoint Designer, which highlights the new focus on SharePoint artifacts.

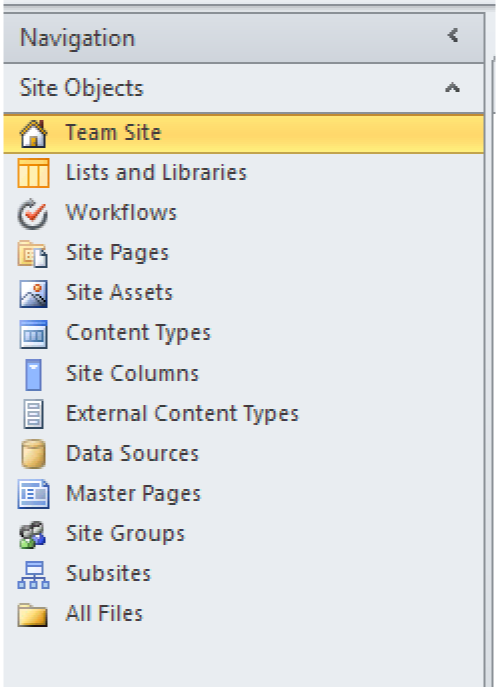
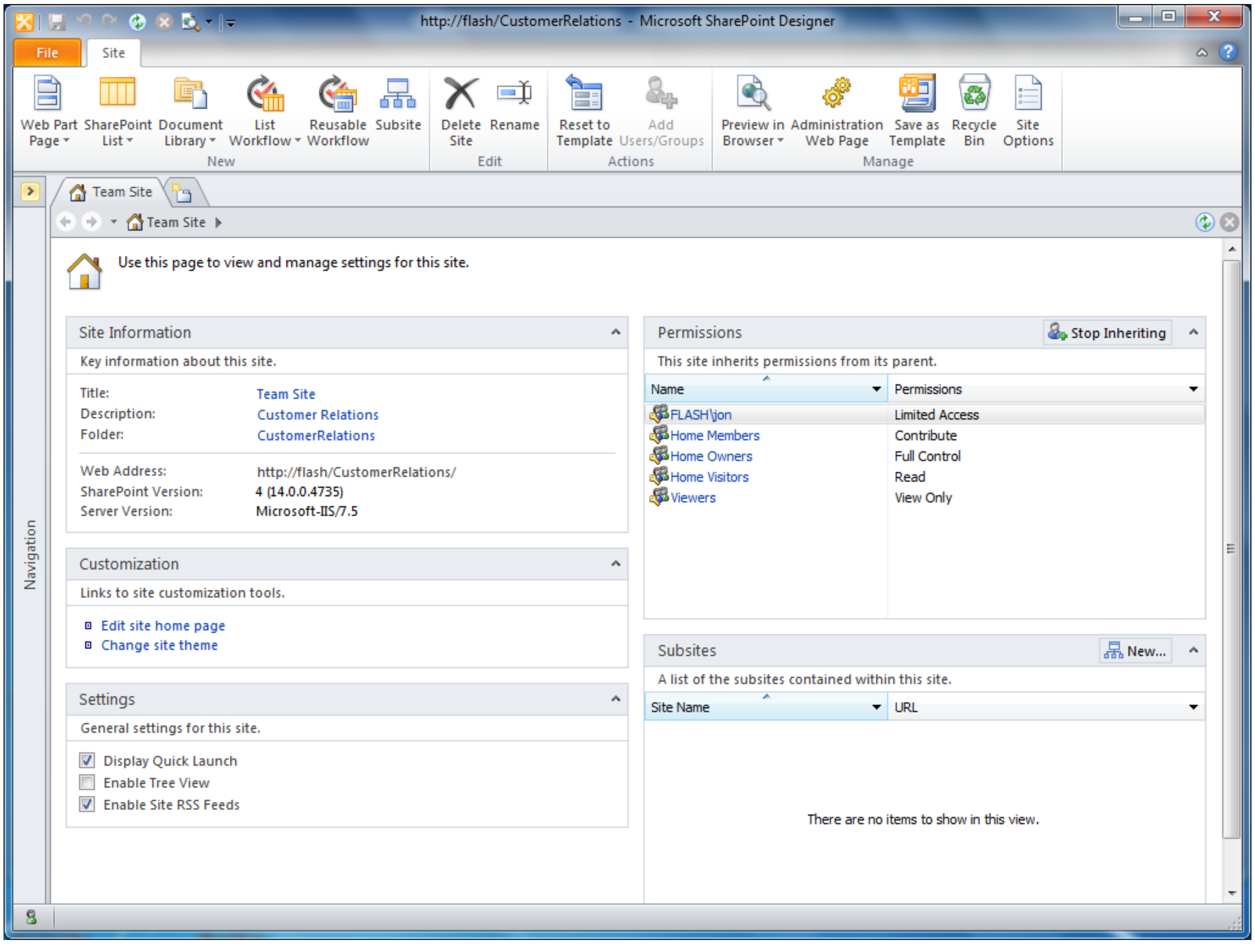


***Figure 7. SharePoint Designer navigation is SharePoint Site focused***

By using a site dashboard in SharePoint Designer 2010, you can see "at a glance" the basic information about the site. The navigation bar enables you to navigate into more details about the specific lists and libraries. Figure 8 shows the site dashboard for a site, which displays the basic site information, permissions, and subsites.



Use this page to view and manage settings for this site.

**Site Information**

Key information about this site.

| | |
|---|---|
| Title: | Team Site |
| Description: | Customer Relations |
| Folder: | CustomerRelations |
| Web Address: | http://flash/CustomerRelations/ |
| SharePoint Version: | 4 (14.0.0.4735) |
| Server Version: | Microsoft-IIS/7.5 |

**Customization**

Links to site customization tools.

- Edit site home page
- Change site theme

**Settings**

General settings for this site.

☑ Display Quick Launch
☐ Enable Tree View
☑ Enable Site RSS Feeds

**Permissions** Stop Inheriting

This site inherits permissions from its parent.

| Name | Permissions |
|---|---|
| FLASH\jon | Limited Access |
| Home Members | Contribute |
| Home Owners | Full Control |
| Home Visitors | Read |
| Viewers | View Only |

**Subsites** New...

A list of the subsites contained within this site.

| Site Name | URL |
|---|---|

There are no items to show in this view.

*Figure 8. Site dashboard in SharePoint Designer provides an "at-a-glance" view of the SharePoint site*

## SharePoint Designer 2010 Workflow Design

In SharePoint Designer 2010, the workflow design experience is a perfect example of how a business analyst can access a tool that can be used as the first step in a development cycle. The workflow designer in SharePoint Designer 2010 enables you to specify a set of steps, conditions, and actions that fit together into a sequential workflow. By clicking a few buttons in the ribbon in the workflow designer, you can create complex workflows that include branching and task assignment. And by assembling the built-in actions and custom actions, you can develop workflows that do not require any custom code.

The UI for building the workflow is a full-page artifact model you can use to develop a workflow similar to any other SharePoint artifact. You do this by referring to other resources and making changes you might need to lists and content types while you build the workflow.

For increased customization developers can build custom actions and custom conditions in Visual Studio 2010 for use in SharePoint Designer workflows. Any custom .NET code can be integrated into simple components for use in SharePoint Designer workflows by this method. This enables collaboration between the business analyst who knows the process to be implemented and who works in SharePoint Designer 2010 with the developer who knows how to implement the technical details and who works in Visual Studio 2010.

It is also possible to export some types of workflow from SharePoint Designer and import it into Visual Studio 2010. This allows for a one time handoff of the workflow model from the business analyst to the developer.

Workflows can also be designed in Microsoft Visio® and imported into SharePoint Designer. Figure 9 shows the Approval workflow when visualized by using Visio.

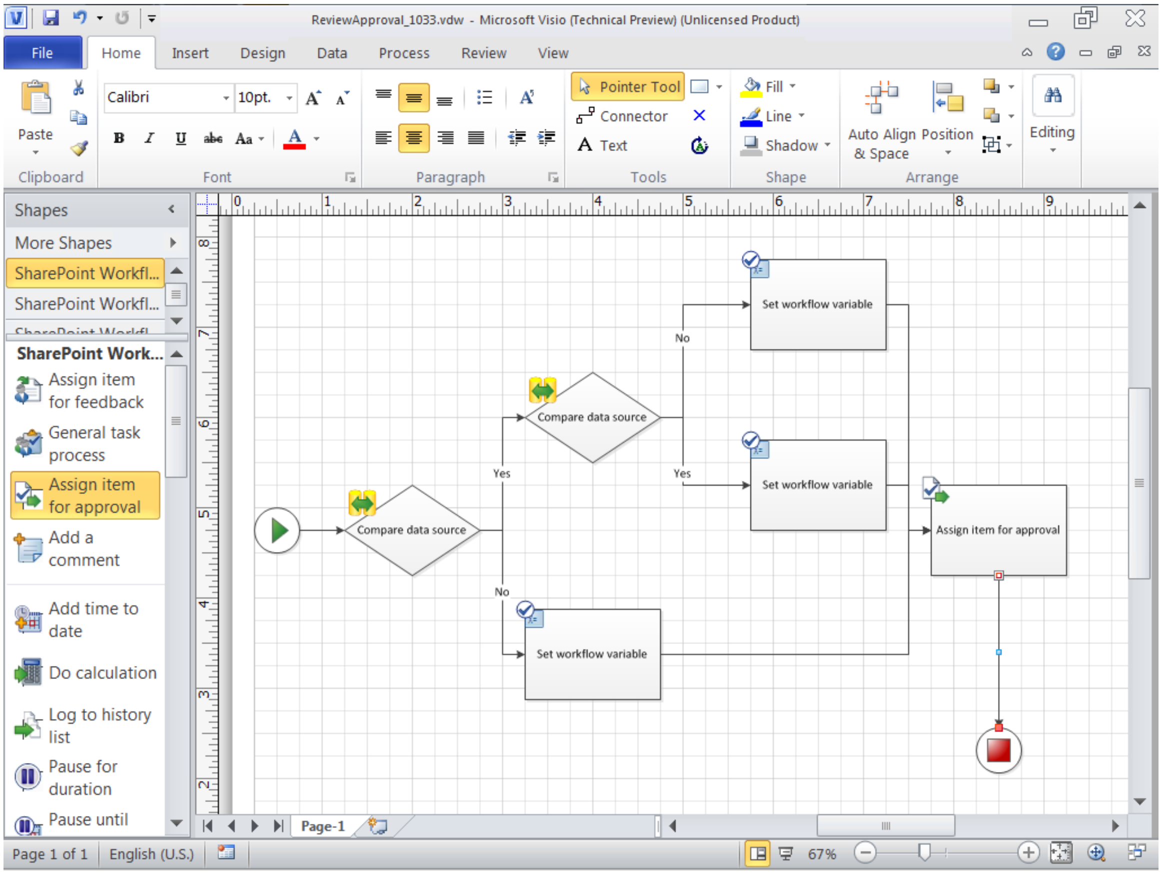


*Figure 9. Workflows visualized in Visio*

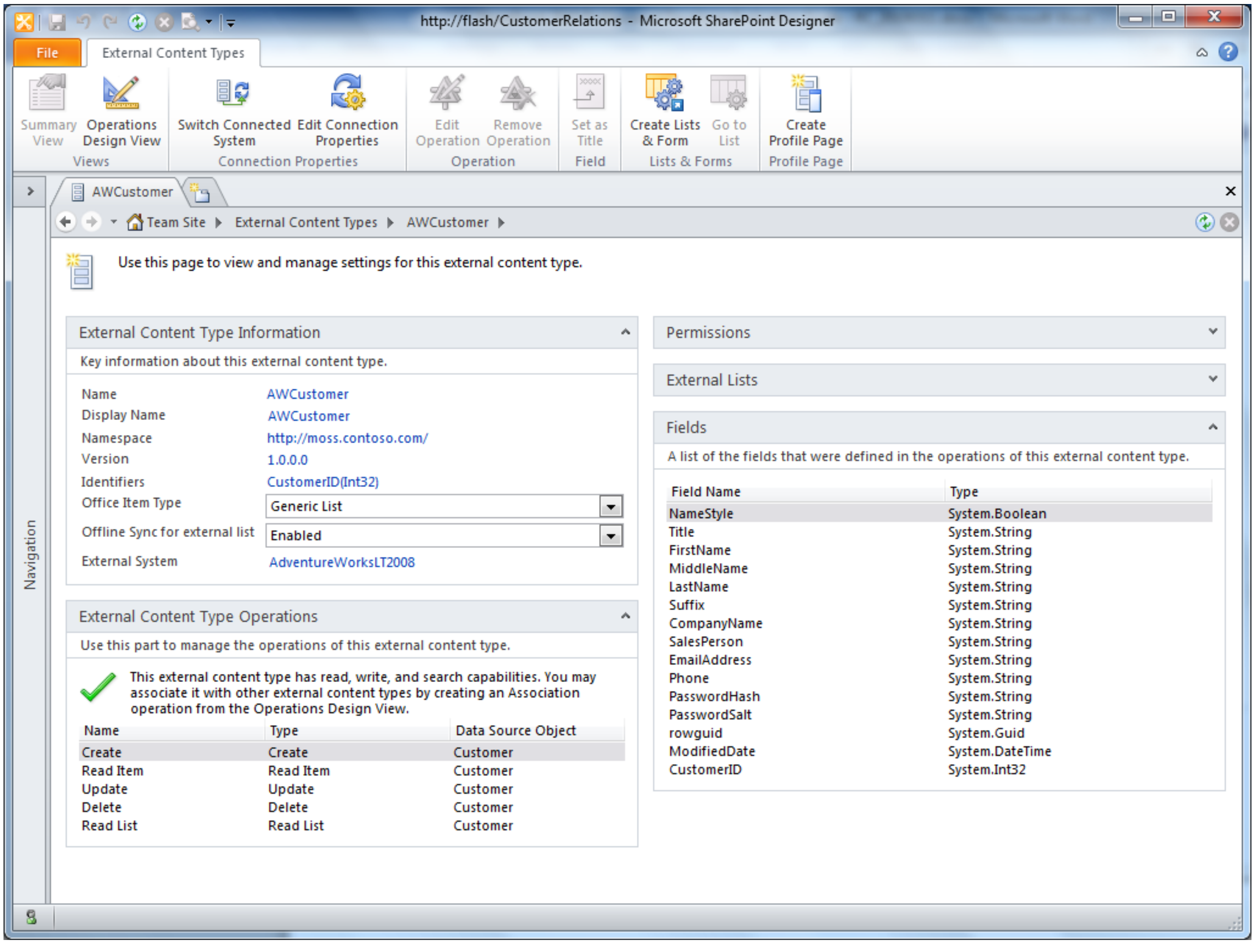
The workflow editor in SharePoint Designer 2010 has two basic modes:

- A non-reusable workflow mode that uses the specific attributes of a list and embeds items such as fields and content types into the workflow.
- A reusable workflow mode to create workflows that can be packaged for redeployment.

The non-reusable workflow provides a simpler design experience when the workflow will exist only in one place. The reusable workflow can be reused anywhere. Therefore, it does not bring context from the current site and requires more work to deliver. Having both modes enables the developer to determine the best workflow solution for the specific scenario.

### SharePoint Designer 2010 Business Connectivity Services Design

Workflows operate on SharePoint data—or on any data that SharePoint can operate on. Business Connectivity Services extends this reach of workflows and other SharePoint features to data outside of SharePoint. SharePoint Designer 2010 makes the process of defining external entities easy. A wizard guides you through making connections to an external system, whether it is a Windows Communication Foundation (WCF) service, a Web service, a .NET Framework class, or a database. After you make the connection, you will see a list of the entities. By right-clicking an entity, you can have SharePoint Designer automatically generate the actions required to support that entity. Within just a few minutes, you can create the connections for all of the tables in your database and connect those to external lists in SharePoint. Figure 10 shows the AdventureWorks customer entity that was created by connecting to the Microsoft SQL Server AdventureWorks sample database.



Use this page to view and manage settings for this external content type.

External Content Type Information

Key information about this external content type.

| | |
|---|---|
| Name | AWCustomer |
| Display Name | AWCustomer |
| Namespace | http://moss.contoso.com/ |
| Version | 1.0.0.0 |
| Identifiers | CustomerID(Int32) |
| Office Item Type | Generic List |
| Offline Sync for external list | Enabled |
| External System | AdventureWorksLT2008 |

External Content Type Operations

Use this part to manage the operations of this external content type.

This external content type has read, write, and search capabilities. You may associate it with other external content types by creating an Association operation from the Operations Design View.

| Name | Type | Data Source Object |
|---|---|---|
| Create | Create | Customer |
| Read Item | Read Item | Customer |
| Update | Update | Customer |
| Delete | Delete | Customer |
| Read List | Read List | Customer |

Permissions

External Lists

Fields

A list of the fields that were defined in the operations of this external content type.

| Field Name | Type |
|---|---|
| NameStyle | System.Boolean |
| Title | System.String |
| FirstName | System.String |
| MiddleName | System.String |
| LastName | System.String |
| Suffix | System.String |
| CompanyName | System.String |
| SalesPerson | System.String |
| EmailAddress | System.String |
| Phone | System.String |
| PasswordHash | System.String |
| PasswordSalt | System.String |
| rowguid | System.Guid |
| ModifiedDate | System.DateTime |
| CustomerID | System.Int32 |

***Figure 10. Entity information for a database-connected customer entity***

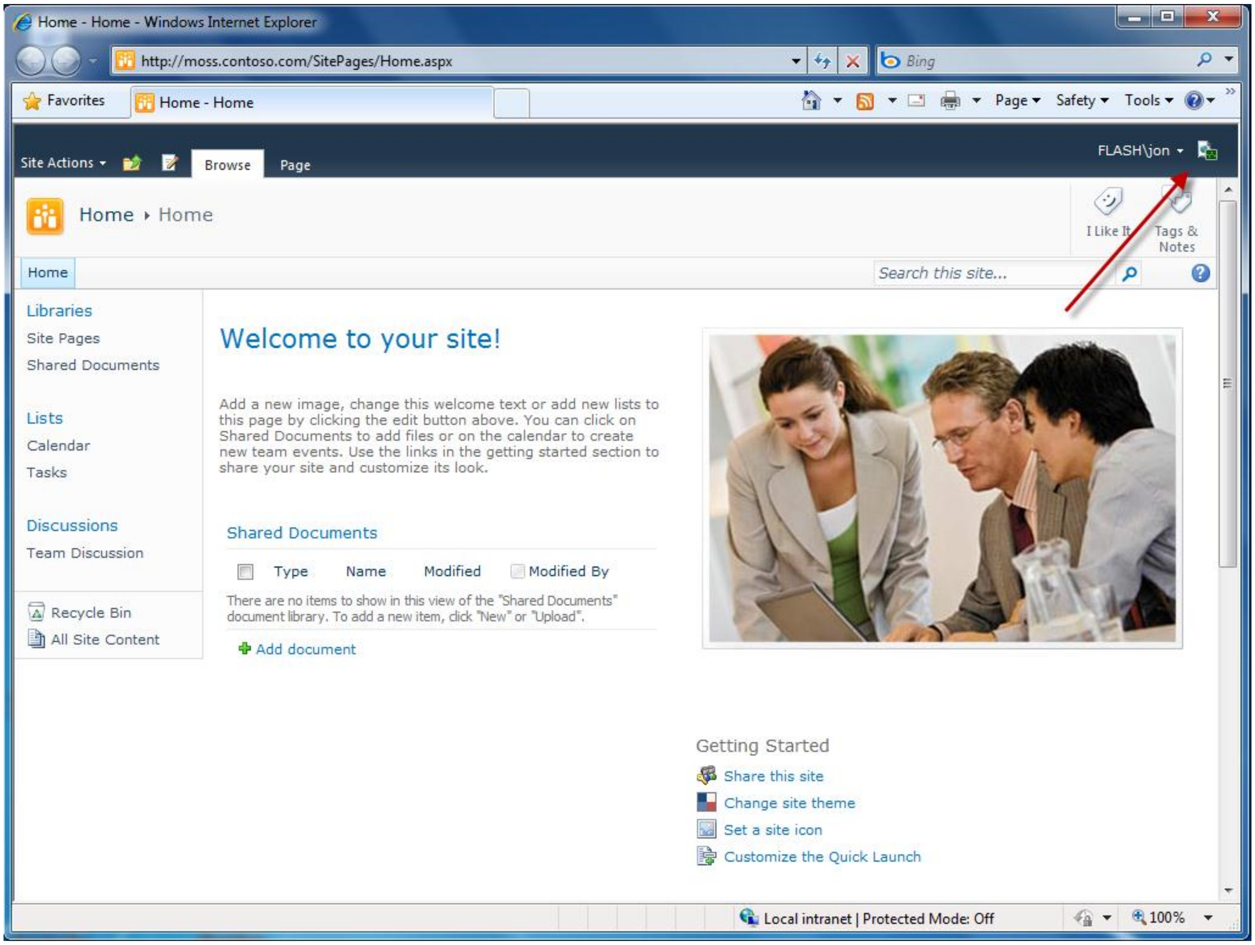
## Developer Dashboard

Developing any complex system creates opportunities for unexpected interactions. In most complex systems, it is difficult to determine what part of the system is causing a delay or is consuming resources. SharePoint 2010 solves this problem by providing a developer dashboard that can be turned on as you need. The developer dashboard records and displays performance statistics related to the code that executed to produce the page. Tracking involves both elapsed time and the load placed on the system by queries and the tracking of exceptions.

You can turn on the developer dashboard by running the following Stsadm command:

```
stsadm -o setproperty -pn developer-dashboard -pv OnDemand
```

After you enable the developer dashboard, you can turn it on or off by clicking the developer dashboard action in the upper-right corner of any page, as shown in Figure 11.

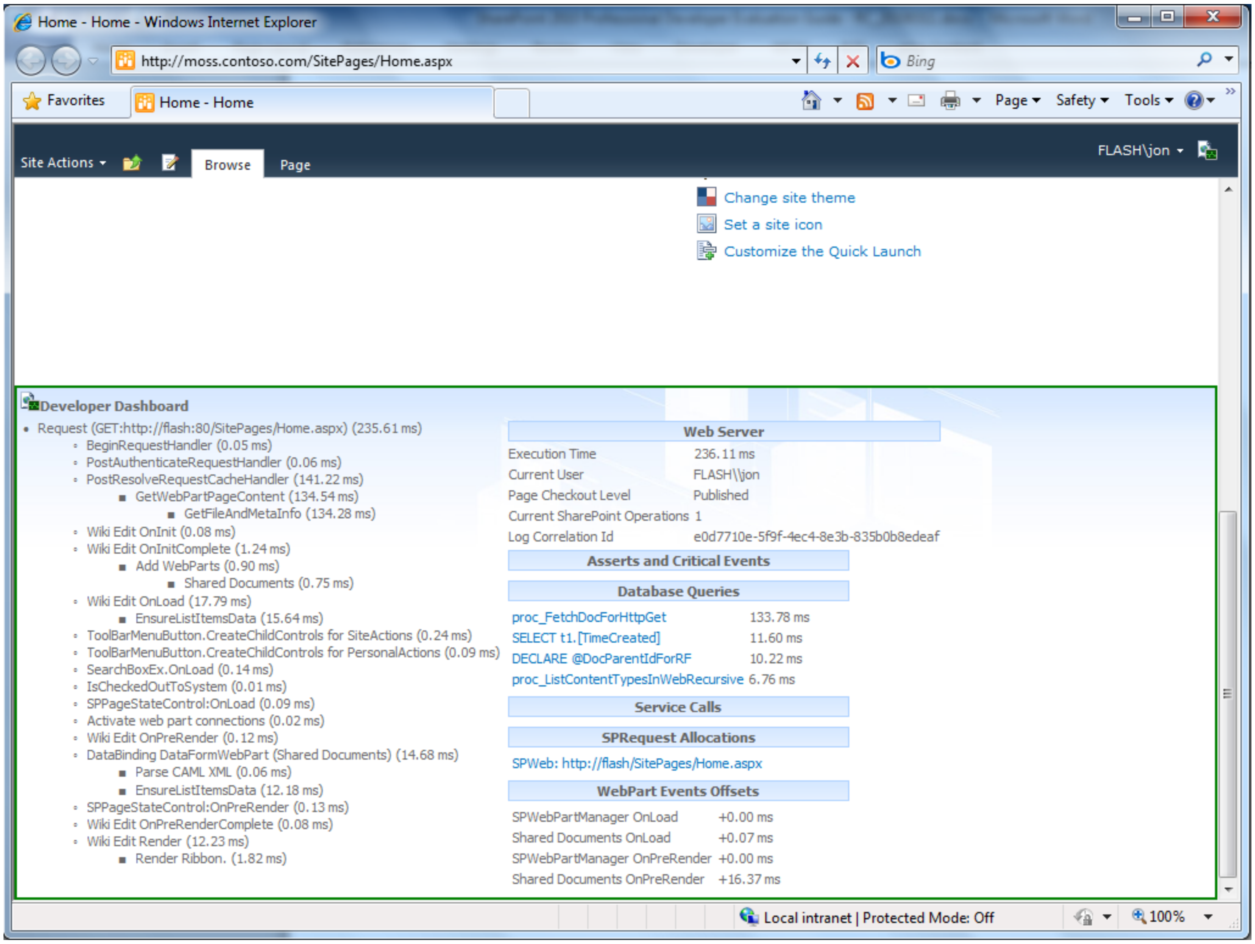


Add a new image, change this welcome text or add new lists to this page by clicking the edit button above. You can click on Shared Documents to add files or on the calendar to create new team events. Use the links in the getting started section to share your site and customize its look.

There are no items to show in this view of the "Shared Documents" document library. To add a new item, click "New" or "Upload".

***Figure 11. Developer dashboard command***

By turning on the detailed view—using a link in the developer dashboard itself—you get a function-by-function level trace of the time it took to load the page, and of the tracing provided by ASP.NET. Using this tracing, you can pinpoint exactly which component on the page is generating a load on the system, and which components are affecting the page load time. Figure 12 shows both the summary view of the developer dashboard without the extended tracing.


Home - Home - Windows Internet Explorer
http://moss.contoso.com/SitePages/Home.aspx
Bing
Favorites
Home - Home
Page
Safety
Tools
Site Actions
Browse
Page
FLASH\jon
Change site theme
Set a site icon
Customize the Quick Launch
Local intranet | Protected Mode: Off
100%

```
Developer Dashboard
• Request (GET:http://flash:80/SitePages/Home.aspx) (235.61 ms)
    ◦ BeginRequestHandler (0.05 ms)
    ◦ PostAuthenticateRequestHandler (0.06 ms)
    ◦ PostResolveRequestCacheHandler (141.22 ms)
        ▪ GetWebPartPageContent (134.54 ms)
            ▪ GetFileAndMetaInfo (134.28 ms)
    ◦ Wiki Edit OnInit (0.08 ms)
    ◦ Wiki Edit OnInitComplete (1.24 ms)
        ▪ Add WebParts (0.90 ms)
            ▪ Shared Documents (0.75 ms)
    ◦ Wiki Edit OnLoad (17.79 ms)
        ▪ EnsureListItemsData (15.64 ms)
    ◦ ToolBarMenuButton.CreateChildControls for SiteActions (0.24 ms)
    ◦ ToolBarMenuButton.CreateChildControls for PersonalActions (0.09 ms)
    ◦ SearchBoxEx.OnLoad (0.14 ms)
    ◦ IsCheckedOutToSystem (0.01 ms)
    ◦ SPPageStateControl:OnLoad (0.09 ms)
    ◦ Activate web part connections (0.02 ms)
    ◦ Wiki Edit OnPreRender (0.12 ms)
    ◦ DataBinding DataFormWebPart (Shared Documents) (14.68 ms)
        ▪ Parse CAML XML (0.06 ms)
        ▪ EnsureListItemsData (12.18 ms)
    ◦ SPPageStateControl:OnPreRender (0.13 ms)
    ◦ Wiki Edit OnPreRenderComplete (0.08 ms)
    ◦ Wiki Edit Render (12.23 ms)
        ▪ Render Ribbon. (1.82 ms)

                     Web Server
Execution Time                 236.11 ms
Current User                   FLASH\\jon
Page Checkout Level            Published
Current SharePoint Operations  1
Log Correlation Id             e0d7710e-5f9f-4ec4-8e3b-835b0b8edeaf

             Asserts and Critical Events

                  Database Queries
proc_FetchDocForHttpGet             133.78 ms
SELECT t1.[TimeCreated]             11.60 ms
DECLARE @DocParentIdForRF           10.22 ms
proc_ListContentTypesInWebRecursive 6.76 ms

                   Service Calls

               SPRequest Allocations
SPWeb: http://flash/SitePages/Home.aspx

              WebPart Events Offsets
SPWebPartManager OnLoad       +0.00 ms
Shared Documents OnLoad       +0.07 ms
SPWebPartManager OnPreRender  +0.00 ms
Shared Documents OnPreRender  +16.37 ms
```

***Figure 12. Developer dashboard showing the elapsed time of every operation***

## SharePoint 2010 Application Lifecycle Management

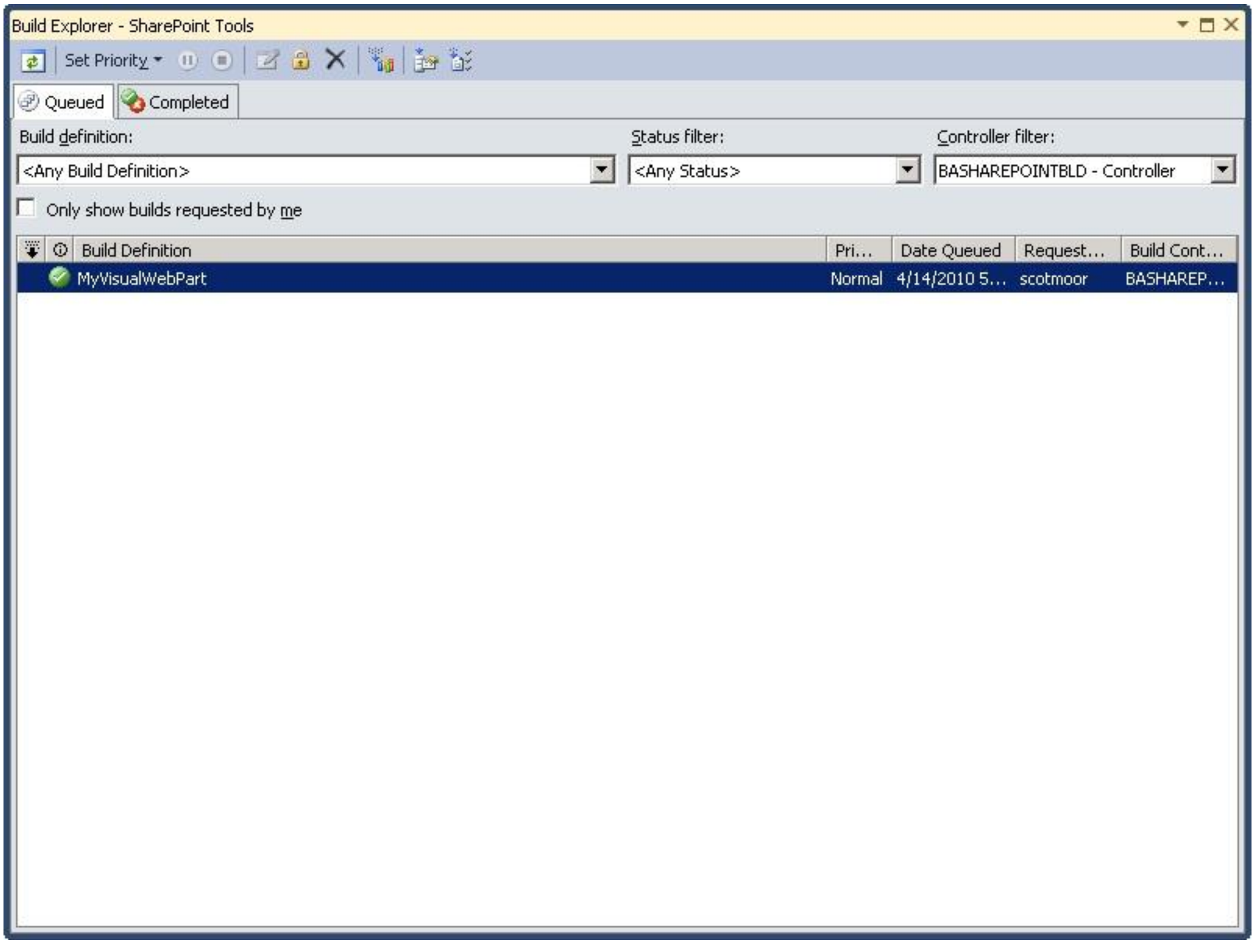
The lifecycle for development in SharePoint 2010 includes not only developers but also business analysts and end users. Analysts and end users develop the foundation for the solution they want in the Web UI and in SharePoint Designer 2010. You use SharePoint Designer 2010 to export changes into the standard SharePoint solution package (.wsp file), which you can then import into Visual Studio 2010 and use as the starting point for coding development. Connecting the rapid prototyping phase of a project and directly linking it into the development process significantly enhances developer productivity. Further, because there is no loss of work between the work done in the Web UI and in SharePoint Designer, the end users and business analysts can truly start the development process, and then turn the artifacts over to the developer when there are features that they cannot create through the Web UI and SharePoint Designer.

By connecting the work of the end user and business analyst with the developer's work, SharePoint makes it possible for the user to start the development process to facilitate a more rapid development process overall.

In addition, developers can provide custom components to non-developers who need to build a SharePoint site in the following three key ways:

- **Building a Web Part**
  Developers can build a typically small part of a Web page, a Web Part, in Visual Studio 2010, and add any required code. Non-developers can then add Web Parts to content pages as they build out sites.
- **Building a Workflow Action**
  Developers can build new workflow actions that contain custom code in Visual Studio 2010, and deploy them to SharePoint for use in SharePoint Designer workflows. Then, non-developers can use the workflow actions to create workflow models in SharePoint Designer 2010.
- **Building a BCS External Content Type**
  Developers can build an external content type that includes the structure of some external data, the methods required to access the data, and the authentication requirements. After the external content type is built and deployed to SharePoint, non-developers can use that data while building a site.

Visual Studio 2010 also supports tight integration with Visual Studio Team Foundation Server, which includes both source control and team builds. Figure 13 shows the definition of a specific build definition for SharePoint projects.



Build definition: <Any Build Definition>

Status filter: <Any Status>

Controller filter: BASHAREPOINTBLD - Controller

□ Only show builds requested by me

| Build Definition | Pri... | Date Queued | Request... | Build Cont... |
|---|---|---|---|---|
| MyVisualWebPart | Normal | 4/14/2010 5... | scotmoor | BASHAREP... |

***Figure 13. SharePoint project-specific build process implemented in Team Foundation Server***

## Better Solutions with Rich Platform Services

SharePoint 2010 is a rich platform on which you can build your application. The Microsoft .NET Framework provides base-level services that developers can import and use through code. The SharePoint 2010 platform extends this with additional libraries and functionality that can be called directly from developer code. SharePoint also provides a set of end user and business analyst tools that integrate tightly into the features and APIs available to developers. Figure 14 shows a diagrammatic overview of the components of the platform.

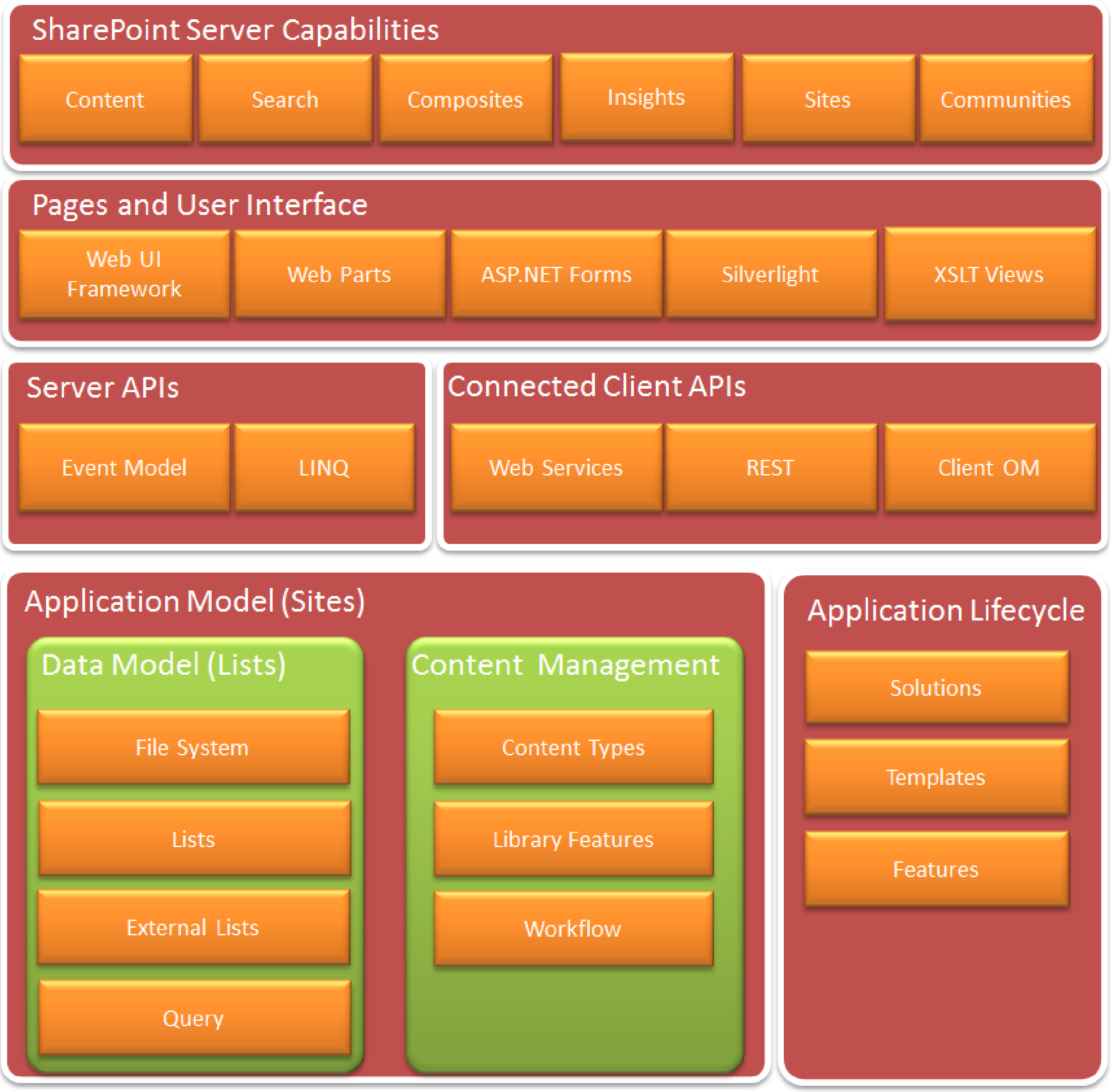
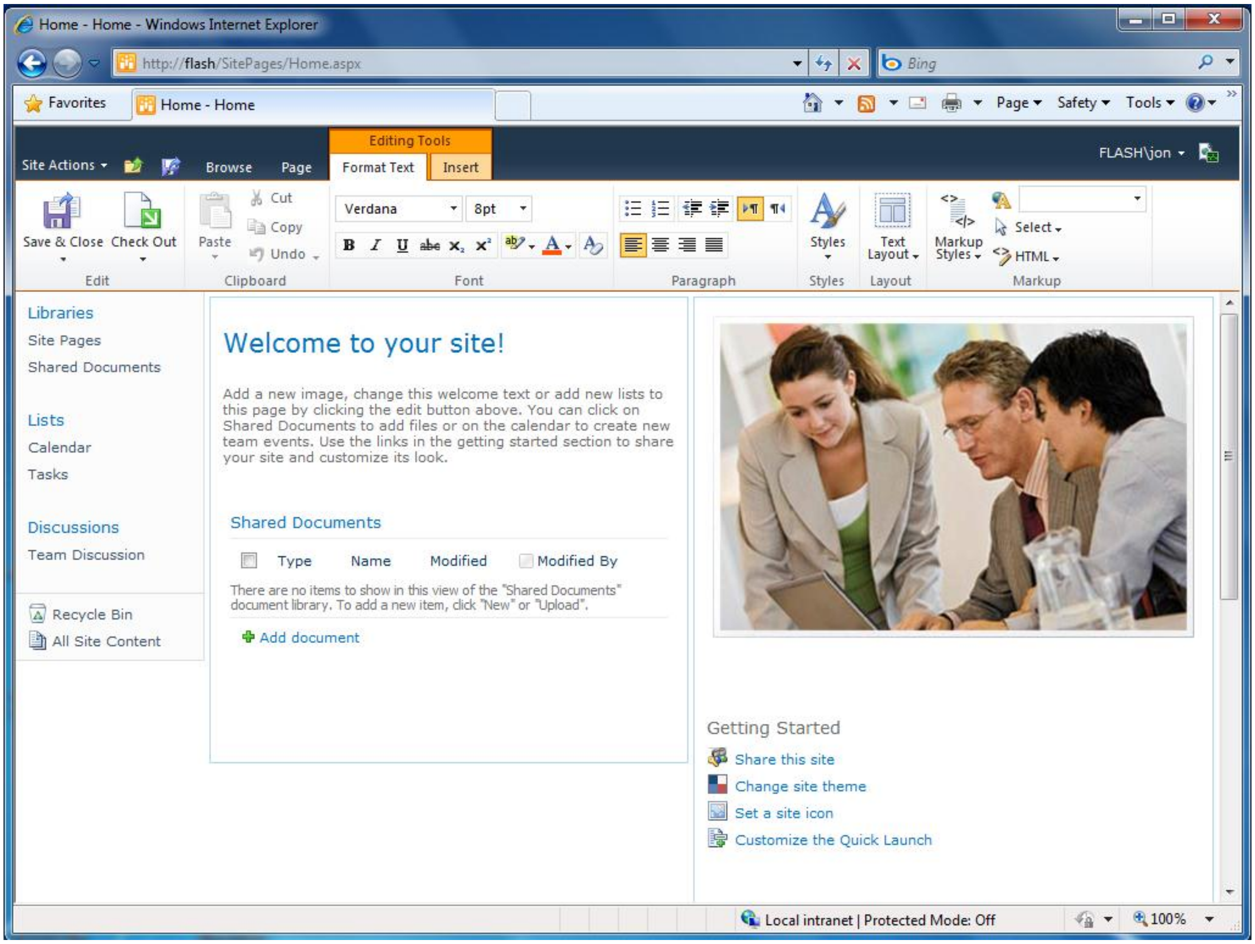


***Figure 14. Overview of the SharePoint platform***

## User Interface

The look and feel of SharePoint is radically changed from earlier versions of the product. In addition to being more accessible to the user, SharePoint enables improved extension points. The new UI components that you can extend and build applications with include the Microsoft Office Fluent™ user interface ribbon and an extensible dialog system. Figure 15 shows the new home page for the default team site template in edit mode.



Welcome to your site!

Add a new image, change this welcome text or add new lists to this page by clicking the edit button above. You can click on Shared Documents to add files or on the calendar to create new team events. Use the links in the getting started section to share your site and customize its look.

There are no items to show in this view of the "Shared Documents" document library. To add a new item, click "New" or "Upload".

***Figure 15. New SharePoint home page with the enhanced user interface***

SharePoint 2010 supports XSLT transformation views that take advantage of a standard for transforming information from XML into HTML. XSLT support means that any XSLT editor can help you create compelling views. SharePoint Designer 2010 improves on its support for XSLT view generation by enabling you to edit the template for an individual item or for the overall view. The new XSLT engine provides a mechanism for exporting and reusing list views between sites by removing the requirement that a view be associated by a GUID.

Mixing the display content and code has never been so easy. In SharePoint 2010, the dividing line between content and code is blurred because you can now add Web Parts as a part of content. This means that you can make your components finer grained and gain even more component re-use.

Web Parts are arguably the most frequently used extension points for SharePoint. Nearly every project includes at least one Web Part. Developer tooling for creating Web

Parts is extended to Visual Web Parts, which manages an ASP.NET User Control (ASCX) connected to a Web Part class. Using this approach, the developer can leverage the visual designers in Visual Studio 2010 to edit Web Parts. In addition, compared to the previous server control-type, nonvisual approaches, this can provide dramatic improvements in developer productivity.

### Building User Interfaces

SharePoint 2010 takes advantage of wiki concepts for managing content and extends these concepts by enabling the inclusion of Web Parts within the wiki pages. In earlier SharePoint versions, you could add Web Parts to Web Part zones. SharePoint 2010 provides the developer and the user with complete control of the UI, including the placement of Web Parts anywhere on the page. For example, you can put the results of a survey next to text describing that survey, so you can intermingle the results of code and content on the page to create rich, live content scenarios.

### SharePoint 2010 Server Ribbon

The context-sensitive ribbon interface is now integrated into the SharePoint 2010 user experience. Your applications can extend the ribbon interface to include new menu items and options both on a global level and based on the context of the user. Figure 16 shows how SharePoint changes the ribbon when a user selects a list Web Part. In the figure, the arrow shows the addition of the Web Part Tools section to the ribbon when the list Web Part is selected.

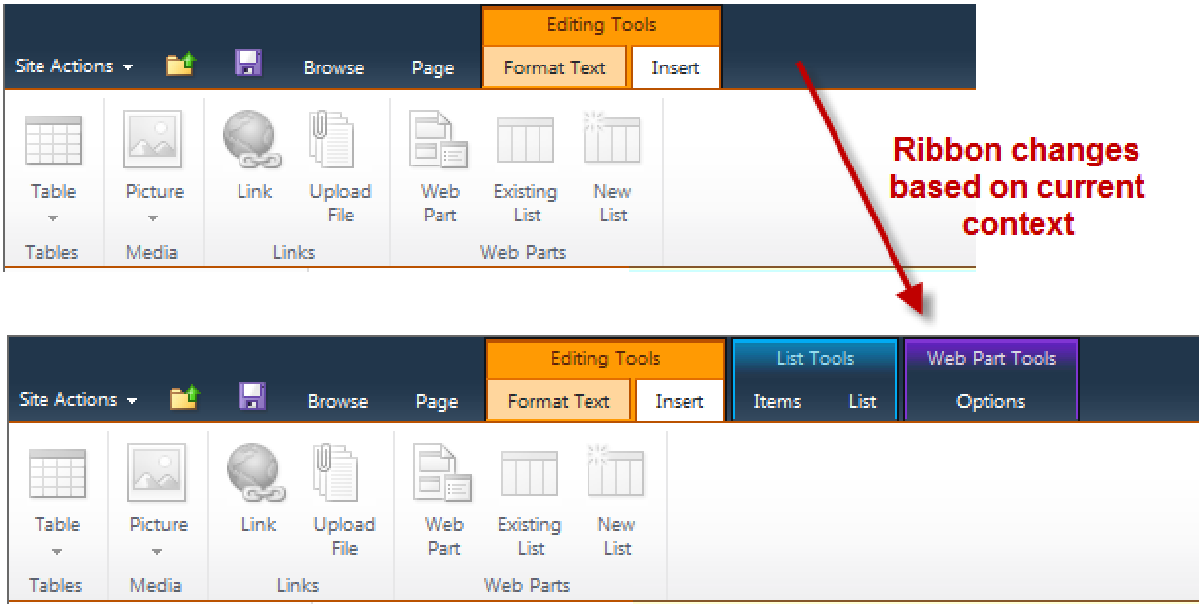
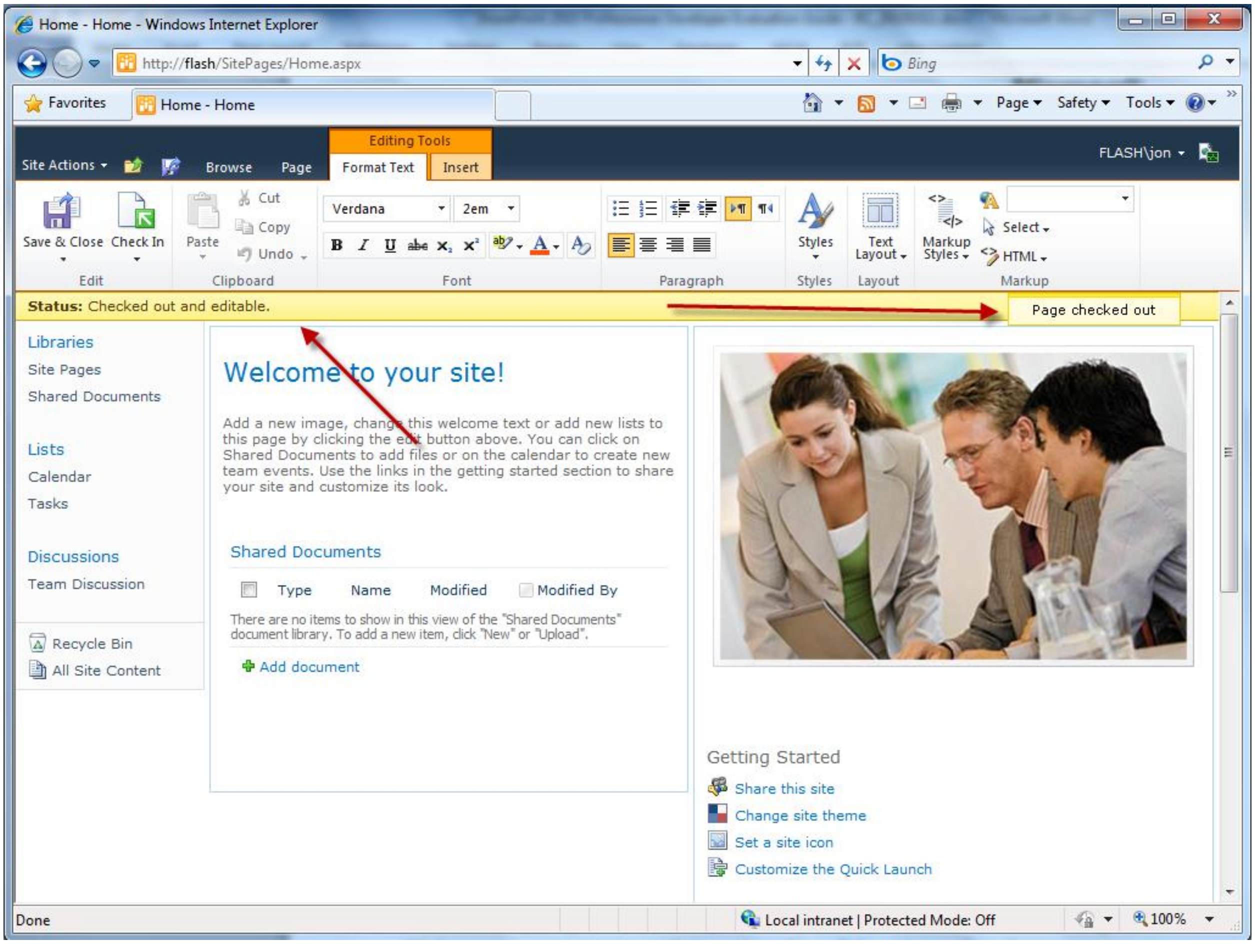

Ribbon changes based on current context

***Figure 16. SharePoint Server 2010 enables developers to easily control the entire page experience, from menus to content***

The UI now features a status bar below the ribbon to indicate the status of the page that you are working on. The status bar provides a consistent location for the display of overall settings, status, or errors on the page, as shown in Figure 17.



**Status:** Checked out and editable.

Welcome to your site!

Add a new image, change this welcome text or add new lists to this page by clicking the edit button above. You can click on Shared Documents to add files or on the calendar to create new team events. Use the links in the getting started section to share your site and customize its look.

There are no items to show in this view of the "Shared Documents" document library. To add a new item, click "New" or "Upload".

*Figure 17. SharePoint Server 2010 has a consistent place to communicate status and errors*

## SharePoint 2010 Dialog Framework

A serious challenge in UI design for the Web is the long page-refresh times and the constant switching of context from one page to another. SharePoint 2010 solves these challenges through the use of ASP.NET AJAX requests for partial updates, and by providing a flexible pop-up dialog framework that enables you to pop up entry boxes on top of the existing page. Instead of users having to navigate to a new page and then come back after the data entry is complete, the user stays on the same page and a dialog appears above the page. This reduces the time the user spends watching an hourglass icon, and helps to keep the user in context as he or she can still see the page that the dialog relates to.

The dialog boxes are just pages that load with a special master page, and are completely customizable by users and developers to meet specific needs. Figure 18 shows a new announcement being entered in a dialog over a wiki Web page.

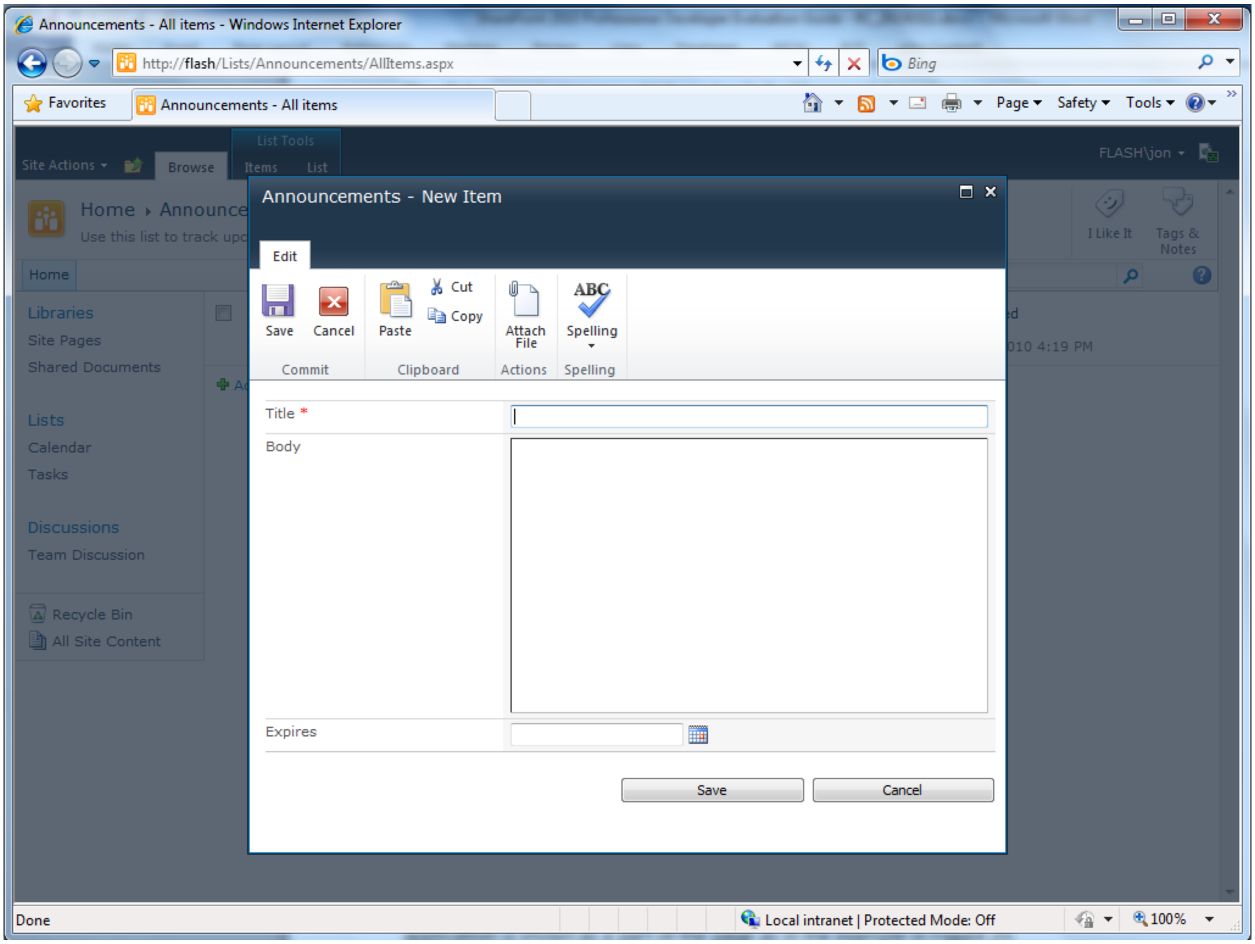
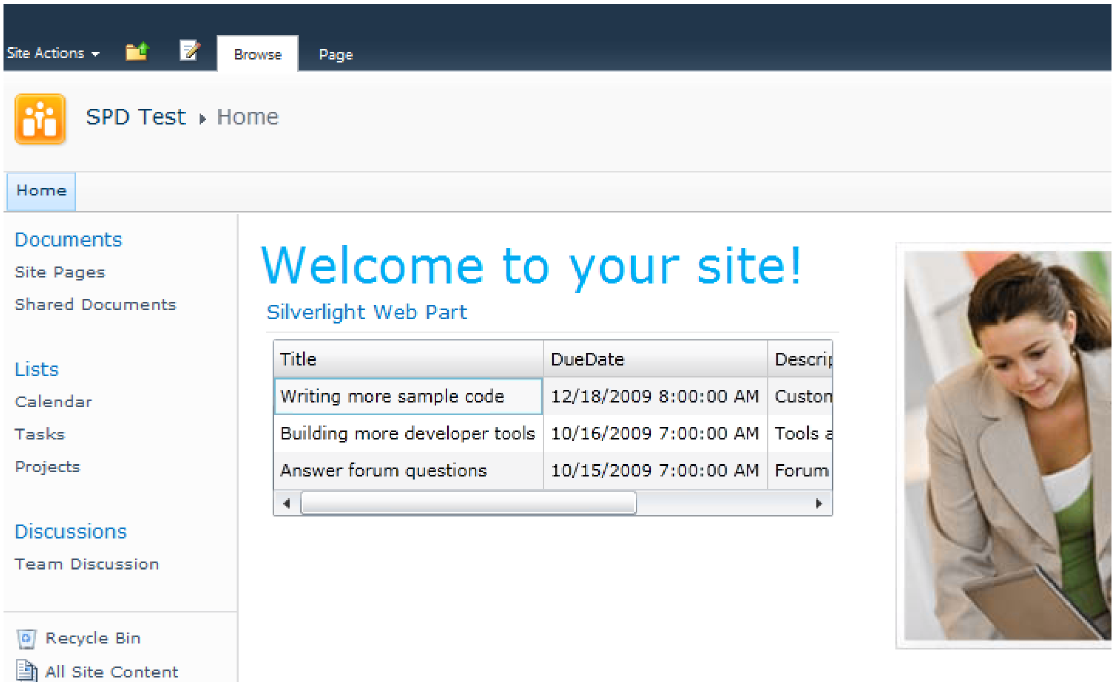


*Figure 18. Web dialogs provide quick entry and consistent context*

## New Silverlight Web Part

Sometimes, the UI must provide a level of interactivity that is simply not possible with XHTML technologies. But Microsoft Silverlight can help. Silverlight is a great way to use your .NET Framework development skills to create rich interactive experiences for the Web. SharePoint now includes native support for Silverlight files. Simply develop your Silverlight application (.xap file) and deploy it to the server. You can then add the Silverlight application to your Web page by adding the Silverlight Web Part and providing the location of the .xap file. The Silverlight application appears as a part of the page, as shown in Figure 19.



| Title | DueDate | Descrip |
|---|---|---|
| Writing more sample code | 12/18/2009 8:00:00 AM | Custon |
| Building more developer tools | 10/16/2009 7:00:00 AM | Tools a |
| Answer forum questions | 10/15/2009 7:00:00 AM | Forum |

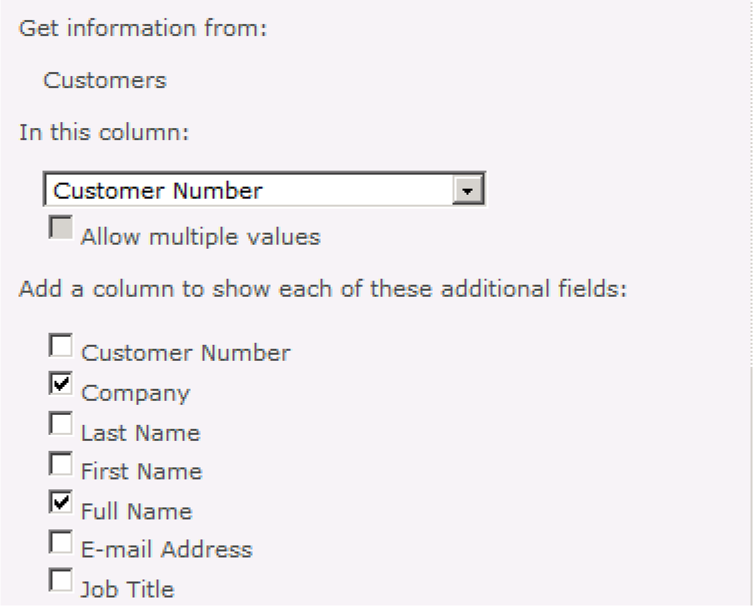
***Figure 19. Silverlight brings even richer interactivity to SharePoint 2010***

## Data and Programmability

SharePoint provides a wealth of features and services developers can use to quickly develop solutions to organizational problems that can relate data, connect to other systems, manage a process flow, and be deployed anywhere.

### SharePoint List Lookups and Relationships

In a typical system, data is somewhat normalized. Not all of the system's data exists in one large table or list. Instead, data exists in sets of tables or lists that have one entry for each entity across multiple tables. Using the SharePoint lookup field, you can connect an identifier of one list to display a different, friendlier field, such as a name, for users to select. SharePoint 2010 enables you to create additional columns that display other fields from another list. In the case of a customer, it is possible to create a lookup on the ID of the other list to display the customer name and bring across multiple other fields. Figure 20 shows the definition for this customer lookup.



Get information from:

Customers

In this column:

Customer Number ▾

☐ Allow multiple values

Add a column to show each of these additional fields:

☐ Customer Number
☑ Company
☐ Last Name
☐ First Name
☑ Full Name
☐ E-mail Address
☐ Job Title

***Figure 20. Define lookup fields that bring other fields into the list***

Another major improvement in lookup fields is that you can now use them to enforce relationships. You can choose to reject deletions, which would otherwise orphan data, or you can have SharePoint automatically cascade deletions so that when you delete a customer, all of their invoices are deleted as well. As a result, you can now use SharePoint 2010 to create sites that have related data connected in ways familiar to users of traditional database tools—with the additional UI options provided by SharePoint.

### Business Connectivity Services

Business Connectivity Services provides access to external data sourced from an LOB system, Web services, or other external data provider within SharePoint 2010 and Office 2010 applications. Both SharePoint 2010 and Office 2010 applications have product features that can use external data directly, and SharePoint Designer 2010 and Visual Studio 2010 provide tools for working with external data. Business Connectivity Services is built on the Business Data Catalog, that was included in Office SharePoint Server 2007, and adds write capability, new tools, offline caching from Office Client 2010 applications, and more.

Enhancements in the infrastructure configuration enable you to specify which servers can manage this process, enhance the ability to locate the profile pages created for the entities, and create opportunities for easier connections to existing data sources.

External lists also provide a greater level of control for the developer because the table structure, indexing, and access methods can be customized to improve performance of the list or to match internal guidelines. This enables developers to include large lists and tables in existing systems in their solutions, and the ability to fine-tune the performance as they better understand how the users will use the tool.

Figure 21 shows how the inclusion of Business Connectivity Services creates opportunities to use SharePoint features and APIs against your existing LOB data that is available via direct database access or Web services.

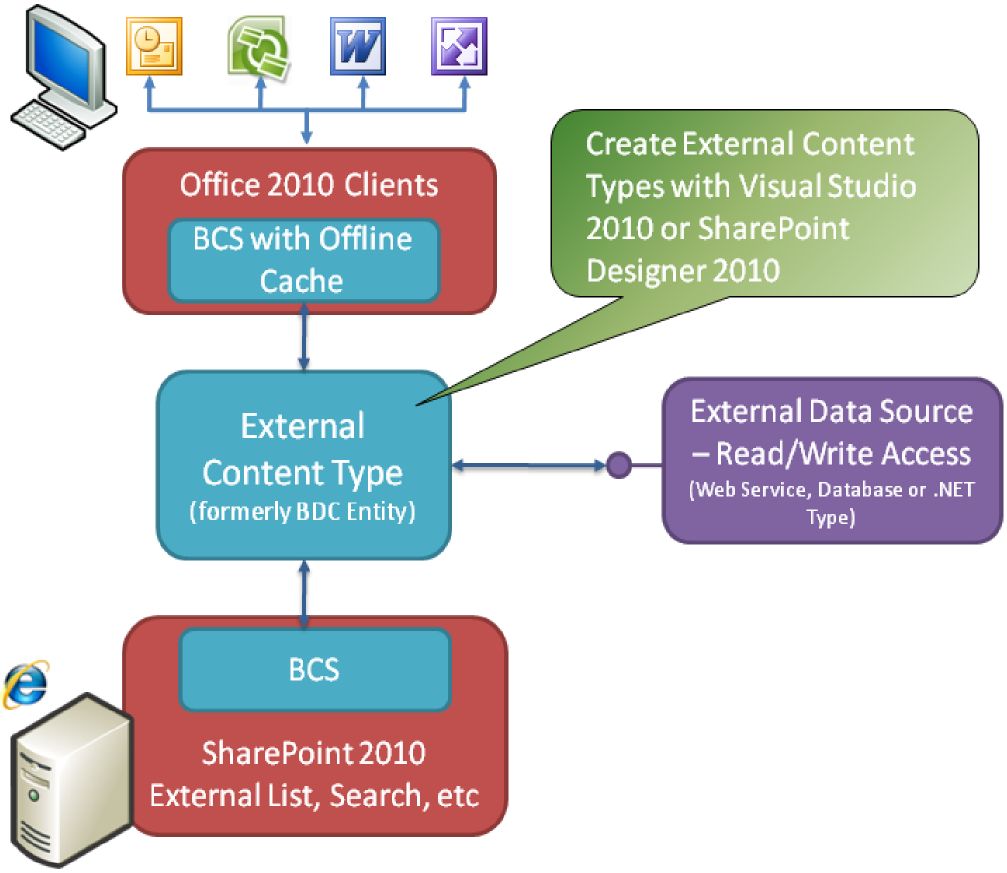
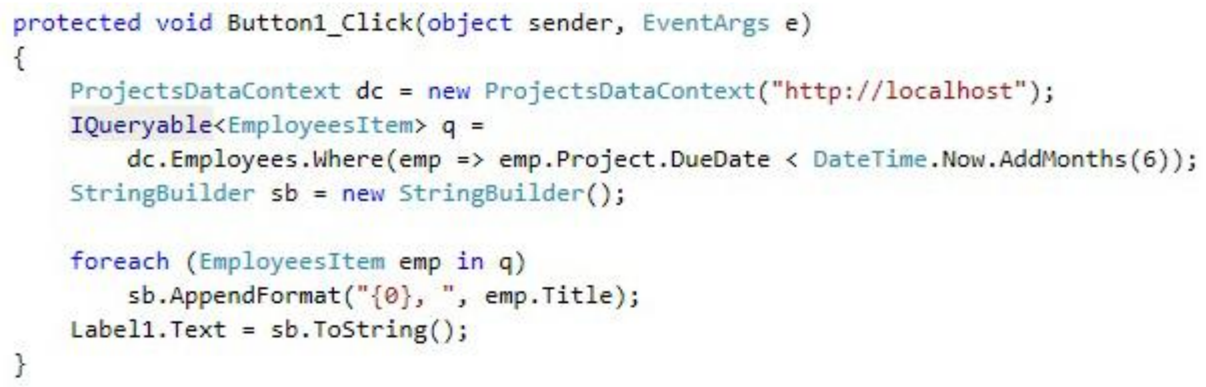

Office 2010 Clients
BCS with Offline Cache
Create External Content Types with Visual Studio 2010 or SharePoint Designer 2010
External Content Type (formerly BDC Entity)
External Data Source – Read/Write Access (Web Service, Database or .NET Type)
BCS
SharePoint 2010 External List, Search, etc

*Figure 21. Architecture of Business Connectivity Services*

### LINQ to SharePoint

Language-integrated query (LINQ) is a new data access paradigm that enables developers to express SQL-like syntax against a variety of data sources in-line with their code. LINQ can improve performance by allowing the back-end data source to determine the best way to solve the query. SharePoint now fully supports LINQ for querying lists so that you can query information from the platform in a more condensed format that is easier to understand. LINQ also provides strongly typed access to data in Visual Studio, offering compile-time validation to help avoid run-time errors. Figure 22 shows a LINQ expression that targets SharePoint.



```
protected void Button1_Click(object sender, EventArgs e)
{
    ProjectsDataContext dc = new ProjectsDataContext("http://localhost");
    IQueryable<EmployeesItem> q =
        dc.Employees.Where(emp => emp.Project.DueDate < DateTime.Now.AddMonths(6));
    StringBuilder sb = new StringBuilder();

    foreach (EmployeesItem emp in q)
        sb.AppendFormat("{0}, ", emp.Title);
    Label1.Text = sb.ToString();
}
```

***Figure 22. Sample method that uses LINQ for SharePoint***

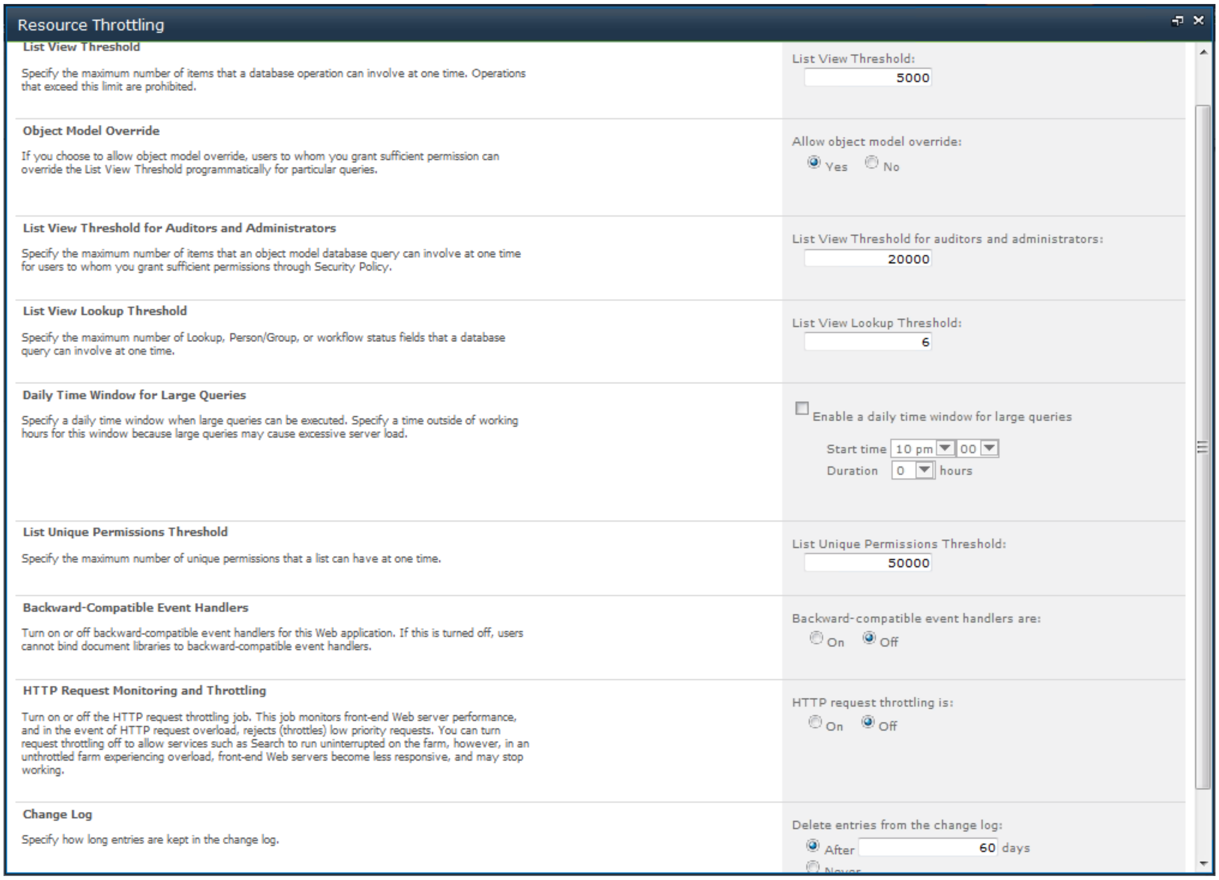
### Performance Enhancements

From optimizations in the code and SQL queries to generate SharePoint native interfaces, to radical changes in the implementation of views and greater flexibility for the use of large lists outside of the core data structures—SharePoint 2010 delivers improved performance by reducing choke points in the software that are related to size of data and enabling more optimized queries.

SharePoint is fine-tuned in key areas to yield better performance, including XSLT view processing and list data operations. SharePoint list data operation improvements include core enhancements, the automatic creation of indexes on lists when necessary, and improved time to first byte. In addition, the SharePoint client object model is designed to be batched so that the number of round trips between the browser and the server are reduced to improve the overall performance of the client object model.

The use of sandboxed solutions (discussed in Sandboxed Solutions, later in this guide) enables monitoring and management of solutions at a site-collection level to limit the negative impact of a poorly performing SharePoint solution package (.wsp file).

In addition, SharePoint 2010 monitors and manages large-running queries via application-level settings. You can use these settings to set limits and warnings when the number of records returned from a query is large. An object model override can also enable developers to bypass these limits—provide an exclusion for a time during the day when the queries are allowed—so that large reports can be generated in batches during the evening. Figure 23 shows the Query throttling sections of the Web application **Resource Throttling** dialog box.



Resource Throttling

**List View Threshold**

Specify the maximum number of items that a database operation can involve at one time. Operations that exceed this limit are prohibited.

List View Threshold: 5000

**Object Model Override**

If you choose to allow object model override, users to whom you grant sufficient permission can override the List View Threshold programmatically for particular queries.

Allow object model override:
● Yes ○ No

**List View Threshold for Auditors and Administrators**

Specify the maximum number of items that an object model database query can involve at one time for users to whom you grant sufficient permissions through Security Policy.

List View Threshold for auditors and administrators: 20000

**List View Lookup Threshold**

Specify the maximum number of Lookup, Person/Group, or workflow status fields that a database query can involve at one time.

List View Lookup Threshold: 6

**Daily Time Window for Large Queries**

Specify a daily time window when large queries can be executed. Specify a time outside of working hours for this window because large queries may cause excessive server load.

□ Enable a daily time window for large queries
Start time 10 pm 00
Duration 0 hours

**List Unique Permissions Threshold**

Specify the maximum number of unique permissions that a list can have at one time.

List Unique Permissions Threshold: 50000

**Backward-Compatible Event Handlers**

Turn on or off backward-compatible event handlers for this Web application. If this is turned off, users cannot bind document libraries to backward-compatible event handlers.

Backward-compatible event handlers are:
○ On ● Off

**HTTP Request Monitoring and Throttling**

Turn on or off the HTTP request throttling job. This job monitors front-end Web server performance, and in the event of HTTP request overload, rejects (throttles) low priority requests. You can turn request throttling off to allow services such as Search to run uninterrupted on the farm, however, in an unthrottled farm experiencing overload, front-end Web servers become less responsive, and may stop working.

HTTP request throttling is:
○ On ● Off

**Change Log**

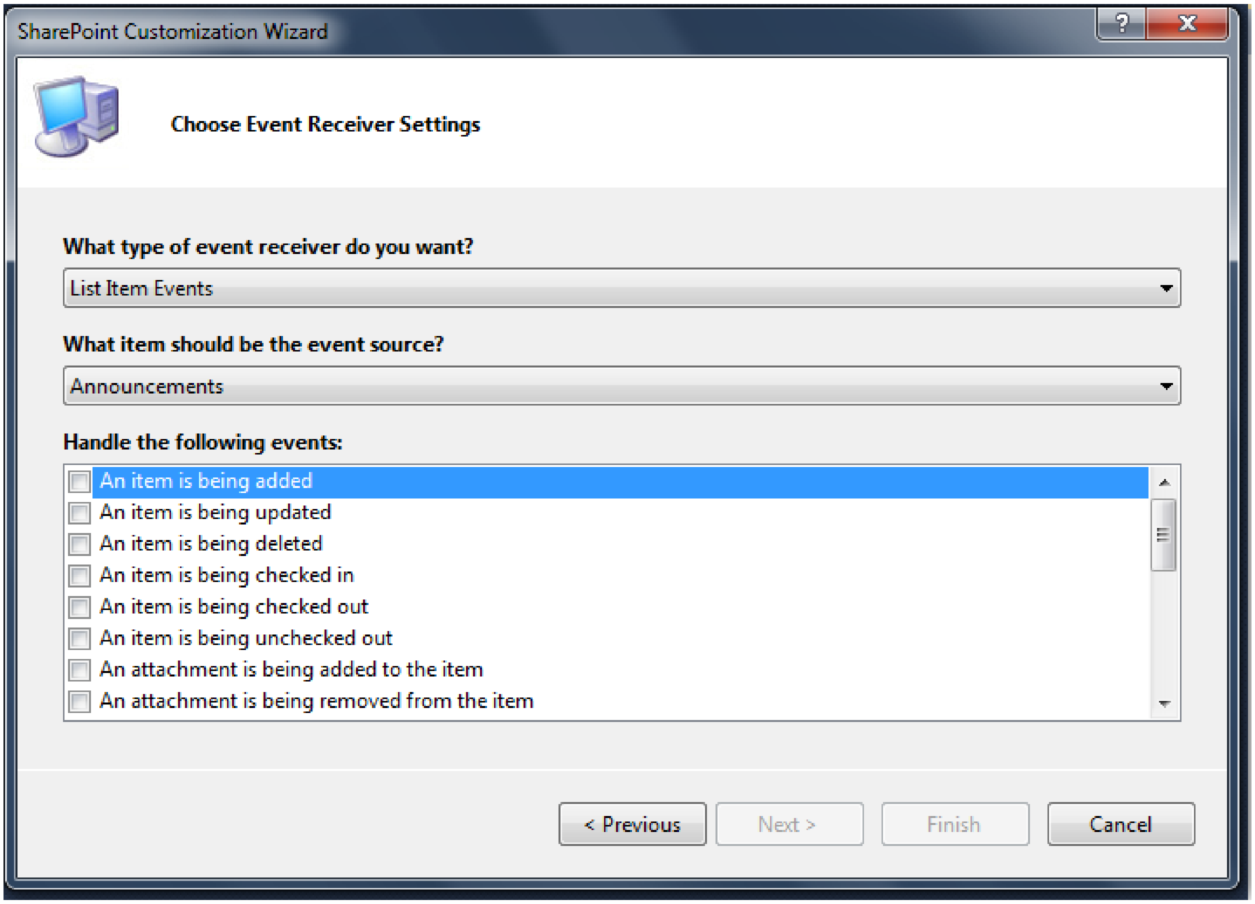
Specify how long entries are kept in the change log.

Delete entries from the change log:
● After 60 days
○ Never

***Figure 23. Query throttling can be configured for users and administrators with warnings and hard limits***

## Event Enhancements

In SharePoint 2010, the **SPListEventReceiver** class enables you to track events, including when a list is added. You can also use **SPWebEventReceiver** to track Web site events, including additions of Web sites, and deletions of site collections and Web sites. Figure 24 shows the SharePoint Customization Wizard in Visual Studio 2010 for creating a Web event.



SharePoint Customization Wizard

**Choose Event Receiver Settings**

**What type of event receiver do you want?**

List Item Events

**What item should be the event source?**

Announcements

**Handle the following events:**

- □ An item is being added
- □ An item is being updated
- □ An item is being deleted
- □ An item is being checked in
- □ An item is being checked out
- □ An item is being unchecked out
- □ An attachment is being added to the item
- □ An attachment is being removed from the item

***Figure 24. Visual Studio Event Receiver Wizard for Web events***

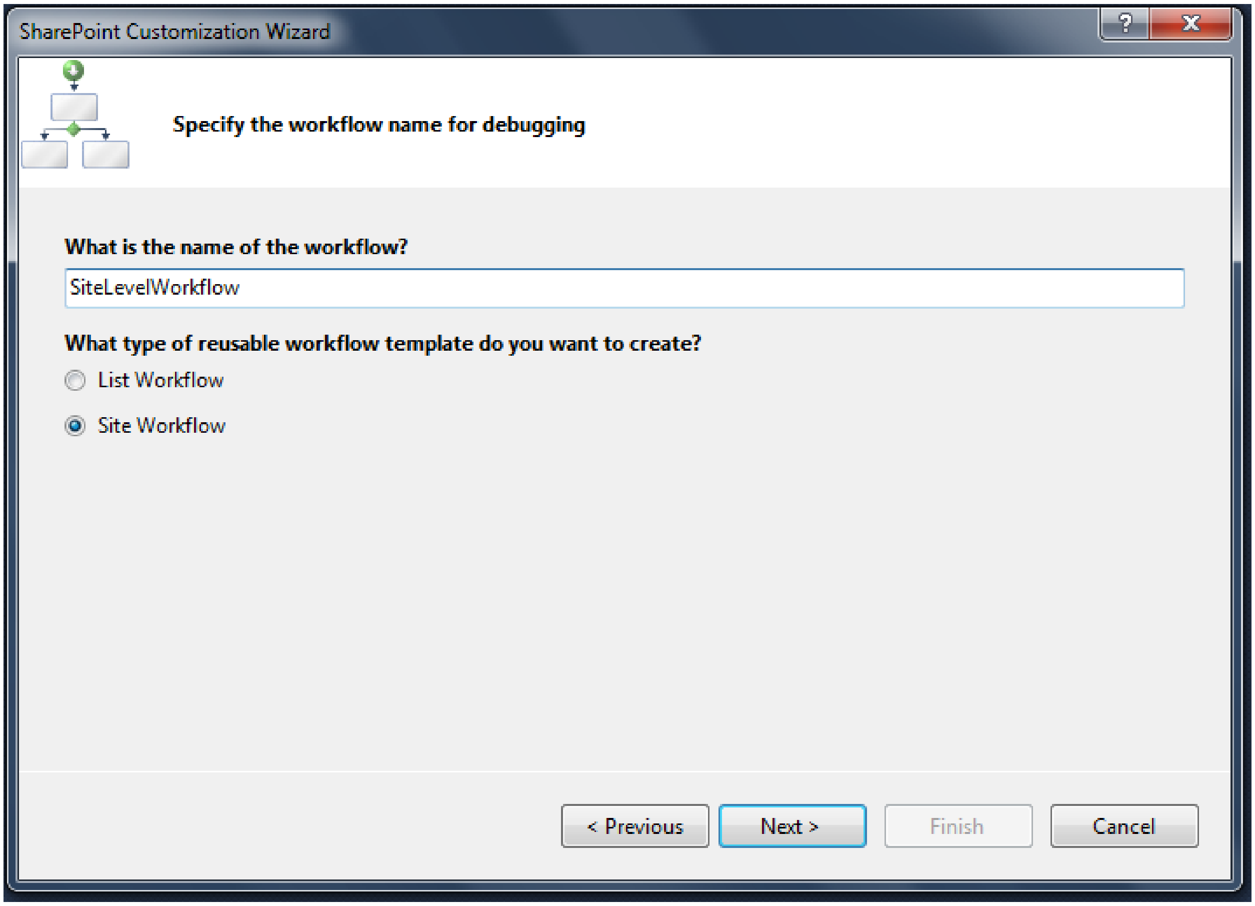
### Workflow Enhancements

In SharePoint 2010, because you can associate workflows with a site, you do not need to associate a workflow instance with a specific item in a list. Site-level workflows are a useful mechanism to create generic functionality using Windows Workflow Foundation (WF).

Before SharePoint 2010, workflows had to be associated with a list. So if you found a problem that would be well-suited to using a workflow that wasn't list-related or document-related, you would have to determine some way to associate that type of workflow with a list. This often led to "dummy" list items that were created to be only a vehicle for a workflow.

With the ability to create a workflow that is not attached to a list, SharePoint 2010 enables several new workflow scenarios that where impossible or difficult before.

To create a site-level workflow, you pick the **Site Workflow** option when creating a new workflow with Visual Studio 2010. You can do this by picking one of the workflow project templates or by adding a new workflow to an existing project.



**Specify the workflow name for debugging**

**What is the name of the workflow?**

SiteLevelWorkflow

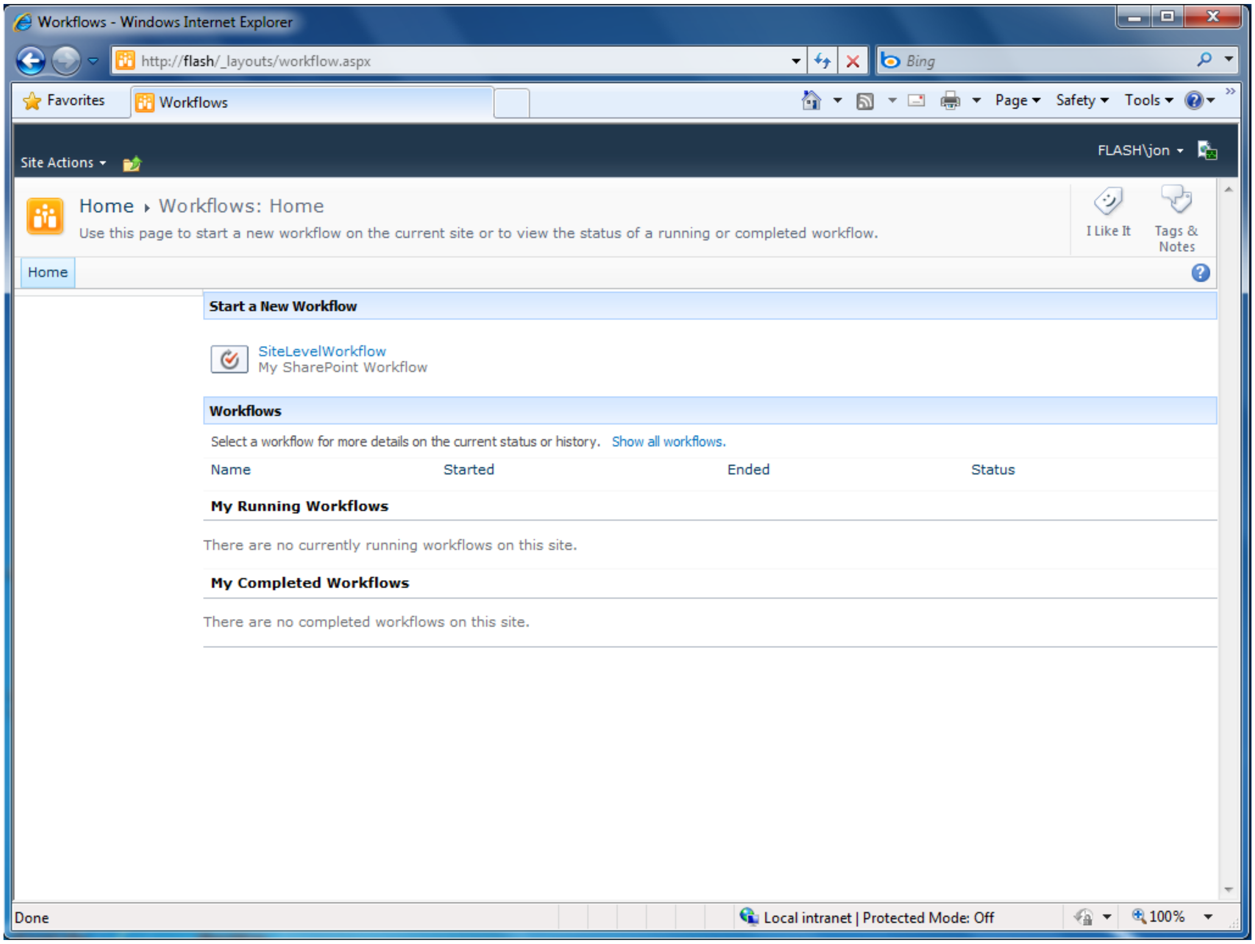
**What type of reusable workflow template do you want to create?**

○ List Workflow

● Site Workflow

***Figure 25. Site-level workflow option***

After you deploy a site workflow, it can be started via its deployed initiation page within SharePoint. The **Site Actions** menu provides a new action that can display the site workflow page. The site workflow page is a dashboard where you can see all your site workflows, start a site workflow, and monitor its execution.


Workflows - Windows Internet Explorer
http://flash/_layouts/workflow.aspx
Bing
Favorites
Workflows
Page
Safety
Tools
Site Actions
FLASH\jon
I Like It
Tags & Notes
Home
Done
Local intranet | Protected Mode: Off
100%

Home ▸ Workflows: Home

Use this page to start a new workflow on the current site or to view the status of a running or completed workflow.

**Start a New Workflow**

SiteLevelWorkflow
My SharePoint Workflow

**Workflows**

Select a workflow for more details on the current status or history. Show all workflows.

| Name | Started | Ended | Status |
|---|---|---|---|

**My Running Workflows**

There are no currently running workflows on this site.

**My Completed Workflows**

There are no completed workflows on this site.

***Figure 26. Site workflow page***

Workflow enhancements also enable you to run rules-only workflows in a non-persisted and blocking way. This creates the opportunity to perform simple event receiver-like activities without writing code. You simply declare a rules-only workflow and associate it with a list. Because these workflows are not allowed to persist to the disk, they are run quickly.

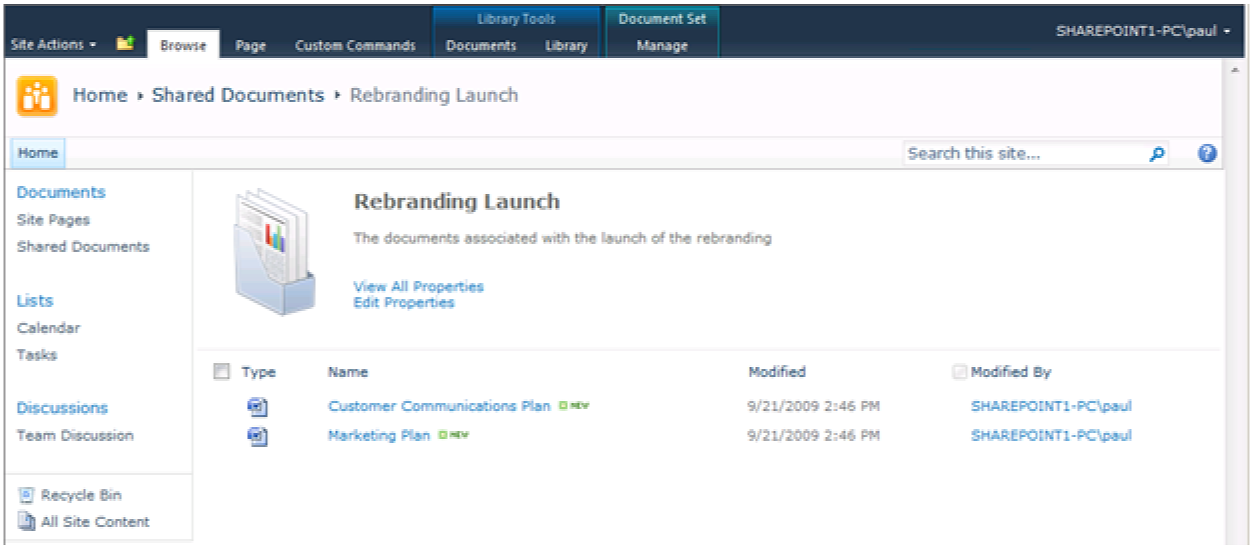
Visio 2010 adds support to visualize what step a workflow is in, via a Visio diagram. This support enables users to see the current state of the workflow and the number of additional planned steps before the workflow finishes.

## Document Sets

SharePoint 2010 includes an Enterprise Content Management (ECM) feature named *document sets*. A document set is a folder-like entity that can contain other documents. And because it is a content type in its own right, it can have workflows associated with it as well.

Document sets coupled with workflows create powerful new scenarios where you can route complex documents for approval. Consider a multipart proposal that requires approval. By attaching a workflow to a child document set content type, you manage the whole package at one time.

Document sets also manage shared metadata in the documents that it contains, so workflows can easily change the properties of all of the documents in a document set. Figure 27 shows a document set that contains two documents.



Home ▸ Shared Documents ▸ Rebranding Launch

Rebranding Launch

The documents associated with the launch of the rebranding

| □ Type | Name | Modified | □ Modified By |
|---|---|---|---|
| | Customer Communications Plan NEW | 9/21/2009 2:46 PM | SHAREPOINT1-PC\paul |
| | Marketing Plan NEW | 9/21/2009 2:46 PM | SHAREPOINT1-PC\paul |

***Figure 27. Document sets enable workflows to run on sets of documents simultaneously***

### SharePoint 2010 API Choices

SharePoint 2010 makes SharePoint APIs available on every platform, from the Web server to the client. This is done by integrating access to data that is not hosted on SharePoint, and by providing a richer set of tools for creating SharePoint solutions. The platform is broader in the types of applications it can support, and deeper in the scenarios that it can support.

In SharePoint 2010, the developer can use several object models to access the server. The Client object model (Client OM) is a unified model that uses the same or similar programming concepts as the Server object model (Server OM). The Client OM can be accessed via Web services, a client ECMAScript (Jscript, JavaScript) API, and REST. This paves the way for richer applications by dramatically simplifying access to SharePoint data from client computers and other computers in the infrastructure. Figure 28 shows the SharePoint object model options.

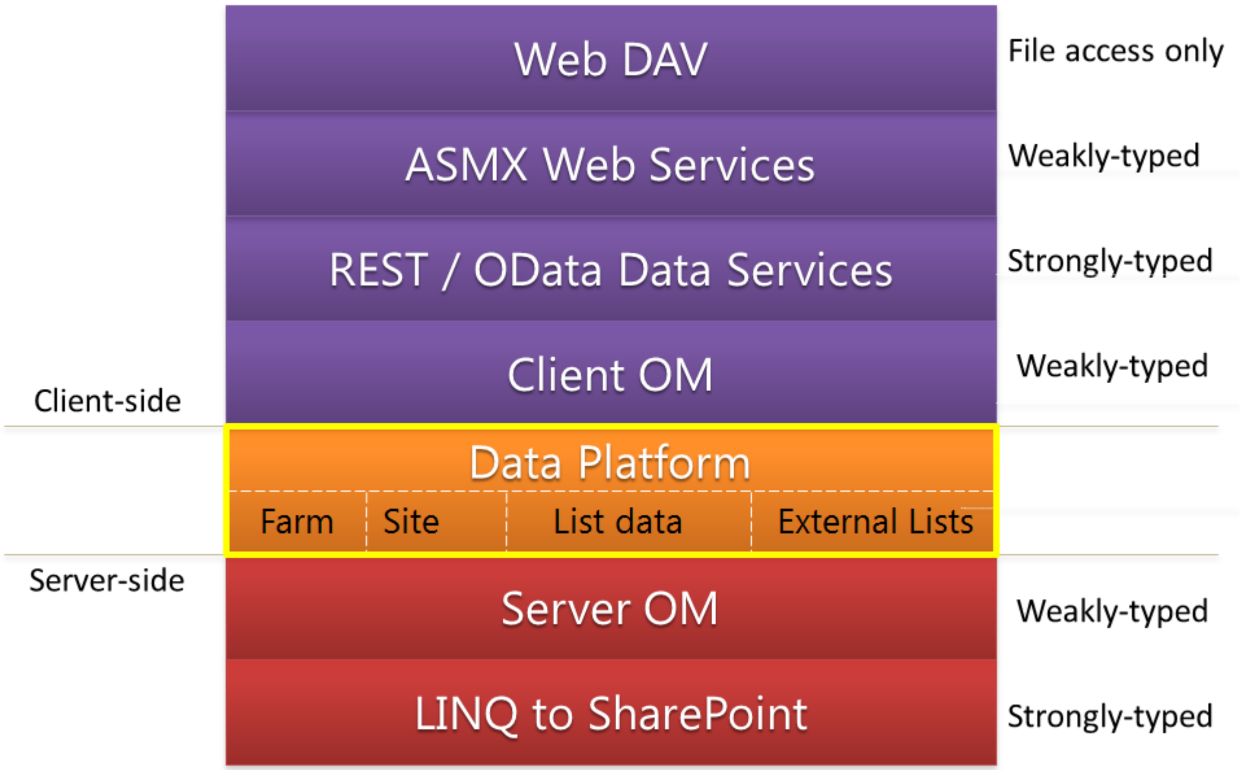
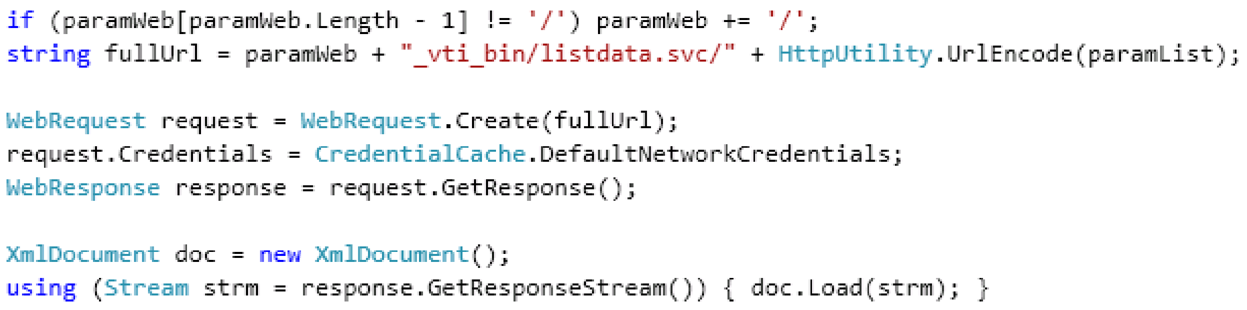


*Figure 28. SharePoint object model options*

Through the use of WCF-based services and OData Data Services v.1.5, you can access the WCF services via a REST interface. This makes it possible to initiate a simple Web request to get data. This makes it easy to get access to SharePoint data from any client application. The basic C# code to access a REST service is shown in Figure 29.



```
if (paramWeb[paramWeb.Length - 1] != '/') paramWeb += '/';
string fullUrl = paramWeb + "_vti_bin/listdata.svc/" + HttpUtility.UrlEncode(paramList);

WebRequest request = WebRequest.Create(fullUrl);
request.Credentials = CredentialCache.DefaultNetworkCredentials;
WebResponse response = request.GetResponse();

XmlDocument doc = new XmlDocument();
using (Stream strm = response.GetResponseStream()) { doc.Load(strm); }
```

*Figure 29. Loading data from a list via a Web request in C#*

Having the APIs available everywhere makes it possible to integrate to SharePoint from a wide variety of applications, whether they are sophisticated implementations including the latest features such as WCF, a Web based application, or a legacy application with limited options for integration. By providing a set of similar APIs that are accessible from a client, the server, or the cloud, the benefits provided by SharePoint are available to all kinds of applications including those on non-Windows platforms.

## Flexible Deployment Increases the Value of SharePoint Solutions

The need to deliver business solutions as cost effectively as possible has led organizations to share platforms between applications. Servers and farms are being tasked with supporting dozens of applications, not just one or two applications as they have in the past. This creates challenges for centralized infrastructure teams that are tasked with maintaining a stable platform for all of the developers who are creating solutions. SharePoint 2010 has a set of solutions that are specifically designed for this shared platform scenario—such as the one run by Microsoft in the SharePoint Online offering.

### Sandboxed Solutions

SharePoint 2010 has significant improvements for multi-stakeholder scenarios where it is necessary to provide a level of isolation between different sets of code, both from a security perspective and from a performance maintenance perspective.

Sandboxed solutions are SharePoint solution packages (.wsp files) that are limited in what they can do and in what server resources they can use. What sandbox solutions can do is limited by using process isolation and Code Access Security that is limited to the SharePoint site. Resources that sandboxed solutions can use are limited by process monitoring, logging, and log aggregation. Any individual action is limited and the solution is also given a daily limit of resources. This provides for a completely isolated system that ensures the code running in a sandboxed solution cannot reach out to access information beyond the scope of the deployment. Specifically, sandboxed solutions cannot make updates to the SharePoint object model beyond the scope of the **SPSite** object. Farm-level and Web application-level changes are allowed only for read operations. Figure 30 shows how the process works, from retrieving the code to returning the results to the user.

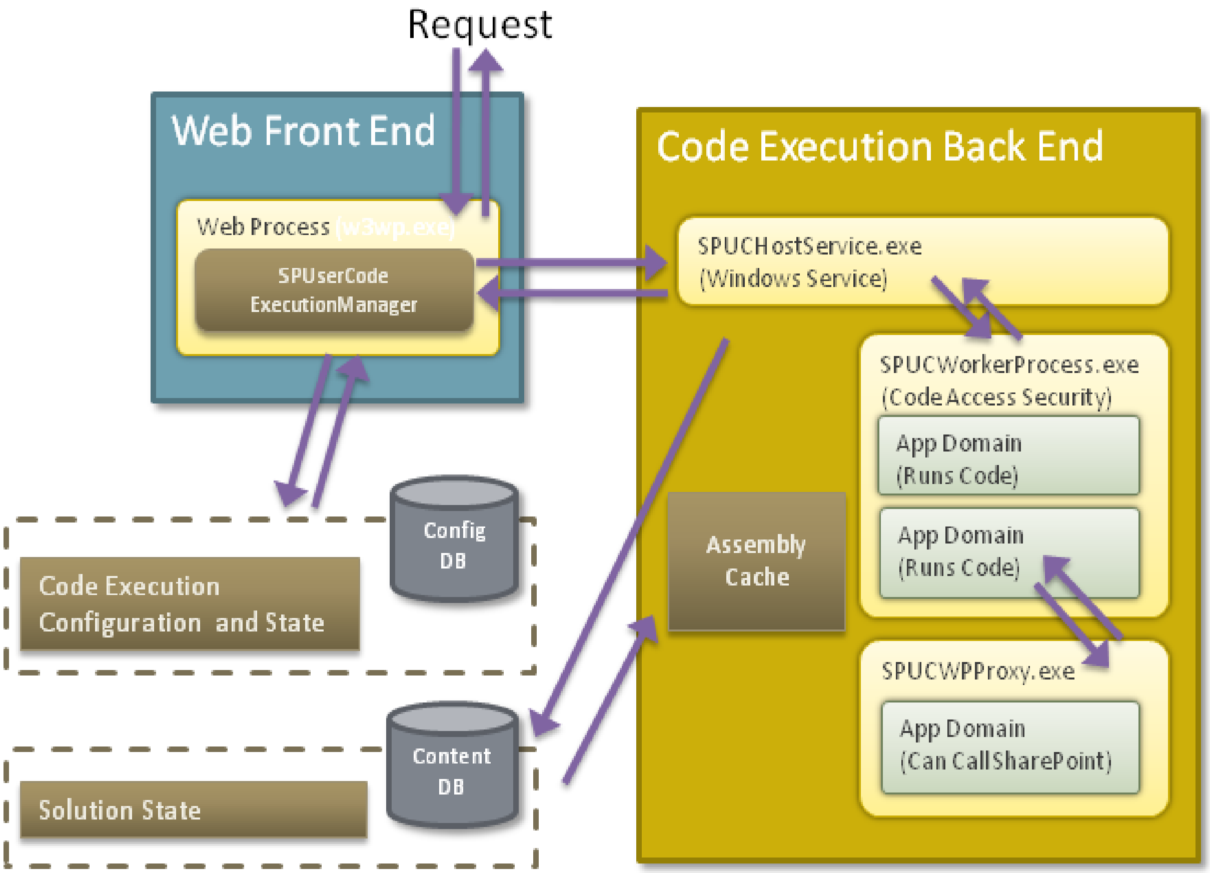
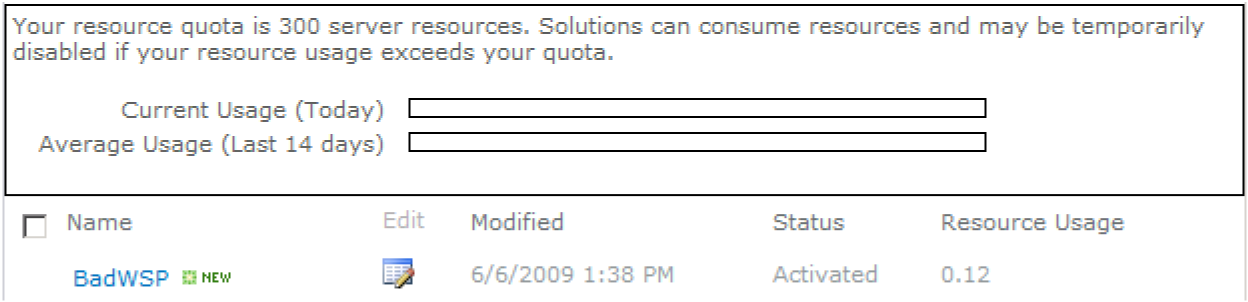

Request
Web Front End
Web Process (w3wp.exe)
SPUserCode ExecutionManager
Code Execution Back End
SPUCHostService.exe (Windows Service)
SPUCWorkerProcess.exe (Code Access Security)
App Domain (Runs Code)
App Domain (Runs Code)
Assembly Cache
SPUCWPProxy.exe
App Domain (Can Call SharePoint)
Config DB
Code Execution Configuration and State
Content DB
Solution State

***Figure 30. SharePoint sandboxed solution execution***

Each sandboxed solution is stored in a solution gallery that is similar to the Web Part gallery. SharePoint tracks and displays the resource usage as an abstract concept known as *points*. Administrators can set the maximum number of points that a site collection can use through quotas. When the utilization of the site collection exceeds its quota, solutions are temporarily disabled. This prevents a single site collection from consuming all of the resources on the server farm. Resource limits for sandboxed solutions are designed to avoid disruption of document library users on the same server.

Figure 31 shows a site collection with 300 allocated resources and a solution named "BadWSP" that has consumed 0.12 resources to date.



Your resource quota is 300 server resources. Solutions can consume resources and may be temporarily disabled if your resource usage exceeds your quota.

Current Usage (Today)

Average Usage (Last 14 days)

| □ Name | Edit | Modified | Status | Resource Usage |
|---|---|---|---|---|
| BadWSP NEW | ✎ | 6/6/2009 1:38 PM | Activated | 0.12 |

***Figure 31. Sandboxed solution resource management***

## SharePoint Online

SharePoint Online is a shared hosting service, and the 2007 version of SharePoint Online does not allow custom code to be uploaded in the standard offering. Custom code is allowed only on dedicated farms, and then only after an exhaustive review. Sandboxed solutions in SharePoint 2010 enable SharePoint Online to allow the installation of user-provided code on the shared platform. This opens a new arena for developers who want to create solutions for customers who want to use hosting instead of maintaining their own servers.

## Silverlight Development on SharePoint

While sandboxed solutions allow for custom code running on the server, developers can also choose to build Silverlight applications that run in the browser on the client machine. These applications can be part of the SharePoint site UI as a web part or other part of the site and because the code executes on the client machine, there is no cause for concern over custom code overloading the server. The Client OM allows developers building Silverlight applications to make calls to SharePoint right from within their code.

## Upgrading Solutions

As developers revise solutions on the platform, SharePoint 2010 provides upgrade semantics in the solution package (.wsp file) to enable seamless upgrade of developer-provided solutions from one version to another.

The addition of upgrading semantics includes support for including <BindingRedirect> elements in the web.config file, to allow redirection from one assembly version to another. The solution package (.wsp file) includes a version for SharePoint features and syntax around upgrade actions that should be performed based on what version range the SharePoint feature was before it was upgraded.

A new **FeatureUpgrading** event is raised when a feature is upgraded from a previous version to a new version. Developers can use this to capture and upgrade any items in the feature that cannot be upgraded via the declarative XML syntax.

In addition, new API methods exist to make it easier for developers and administrators to identify which features are activated across the farm, and what version those features are. In turn, this makes it easy for developers to see where their features are activated, and in which locations the feature has not yet been upgraded.

## Conclusion

Whether the challenge that you are trying to solve is a simple one-off application with a few data tables or the front-end for an enterprise solution that drives the organization, Microsoft SharePoint 2010 and the Microsoft Office 2010 client applications provide the development platform you need. The new Visual Studio 2010 SharePoint Developer Tools will make SharePoint developers more productive with SharePoint 2010. The new platform features in SharePoint 2010 such as Business Connectivity Services will open up new opportunities for development. And the new flexibility for deployment including Sandboxed Solutions and Silverlight will reduce risk for custom code in shared server farms.

SharePoint 2010 has many opportunities for customization using the HTML UI and SharePoint Designer 2010 that does not require developers and can result in customized composite solutions. Developers can support people doing customizations in this way by building several types of components in Visual Studio 2010. Developers can build Web Parts, BCS External Content Types and Workflow actions that can be used to extend the capabilities of these composite solutions.

Whether you are supporting a composite solution to customize SharePoint workloads or creating an application that makes use of and builds on SharePoint features, developing your solutions by building on the benefits of the SharePoint platform enables you to get more done.

## Learning More

To learn more about SharePoint 2010, see the following resources:

- SharePoint Developer Center (http://msdn.microsoft.com/sharepoint)
- SharePoint Forums (http://mssharepointforums.com)
- Getting Started Developing on SharePoint 2010 (http://mssharepointdeveloper.com)
- Microsoft SharePoint Server 2010 Evaluation Guide For IT Professionals (http://go.microsoft.com/?linkid=9727162)
- SharePoint Server 2010 Evaluation Guide for Technical and Business Decision Makers (http://go.microsoft.com/?linkid=9727161)