

Module 2: Architecting Content Management for Your Web Site

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Summary:

This module describes how to use Web Content Management to plan and design the look and feel of your site, and how to manage content and the approval process.

See [Web Content Management Training Modules](http://go.microsoft.com/fwlink/?LinkId=141931) (http://go.microsoft.com/fwlink/?LinkId=141931) for a complete list of the available downloads.

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Module 2 Overview

Web Content Management (WCM) solutions require a consistent look and feel that represents your organization. This consistency will improve the user experience of your customers. You must also plan for managing content in your WCM solutions must create an approval plan that meets your organizations moderation requirements.

This module describes how to plan and design the look and feel of your site, and how to manage content and the approval process.

Objectives

After completing this module, you will be able to:

* Create a consistent look and feel across a WCM solution ([Lesson 1](#Lesson1))
* Manage content pages in a WCM solution ([Lesson 2](#Lesson2))
* Manage the content approval process in a WCM solution ([Lesson 3](#Lesson3))

Lesson 1: Creating a Consistent Look and Feel

When you plan, design, and develop a WCM solution for your organization, it is important that your users have a positive experience. It is important that the experience they receive is both consistent and intuitive. Microsoft® Office SharePoint® Server 2007 provides many features that you can leverage to help you create such an experience. By using a combination of features such as master pages, page layouts, style sheets, and field controls, you can design a consistent look and feel for your sites that reflects your organization and requires minimal maintenance.

Objectives

After completing this lesson, you will be able to:

* [Understand the page model](#UnderstandingPageModel)
* [Use master pages](#UsingMasterPages)
* [Create custom master pages](#CreatingCustomMasterPages)
* [Use content types](#UsingContentTypes)
* [Use page layouts](#UsingPageLayouts)
* [Use style sheets](#UsingStyleSheets)
* [Use field controls](#UsingFieldControls)

Understanding the Page Model

Office SharePoint Server 2007 is built on top of Windows® SharePoint® Services 3.0 and ASP.NET 2.0. As such, Office SharePoint Server 2007 renders pages based on templates derived from ASP.NET 2.0 called master pages and page layouts. Windows SharePoint Services 3.0 provides the pages and templates that require rendering and ASP.NET 2.0 performs the assembly of the pages. The following subsections describe the various elements of the page model:

* [Master Pages](#MasterPages)
* [Page Layouts](#PageLayouts)
* [Style Sheets](#StyleSheets)
* [Content Pages](#ContentPages)
* [How a Page Is Assembled](#HowPageIsAssembled)

Master Pages

Master pages are templates that are used by page instances in a site. The master page is essentially a Web page that contains shared Web page elements and provides these elements to pages that reference the master page. The master page has content placeholders that determine the general appearance of a site.

By using master pages, you can enforce common controls across pages and sites. These controls can include navigation, search, and language selection controls. The master page can be customized by developers, and any changes made to the master page propagate to all pages that are based on that master page.

Every SharePoint Server site collection includes a master page gallery. The master page gallery is a specialized document library that stores all the master pages and page layouts that are available to that site collection.

Page Layouts

Page layouts are templates that define how a page should look. They are stored as ASPX files, separate from the page content. The placeholders defined in the master page file determine the location of content held in the page layouts. Page layouts provide the details of the page and content fields that are available, and which elements should be present on the page. Users can create pages that are based on page layouts, and the new pages follow your set format.

When you create a page layout, you can include Web Part zones that enable users to add Web parts to pages that they create from your page layout.

Style Sheets

Office SharePoint Server 2007 uses style sheets or cascading style sheets (CSS). You can use these files to customize the look and feel of your site, providing organizational branding through uniform colors, styles, and appearances for the different aspects of your deployment. Multiple pages can use a single style sheet, and so with minimal work you can define a corporate image to suit your organizational needs.

CSS classes are defined in the core.css file, unless you override these classes with your own files. The core.css file can be found in the /\_layouts/<locale ID>/styles/ directory of your Web site.

Content Pages

Many content pages are created automatically when you create a site. This type of page is stored logically within its sites and physically in the corresponding content database. However, some content pages are not stored in the content database and are stored on the front-end Web servers of a farm instead. These pages are the unmodified templates for any site that gets provisioned. When you create a new page with no customizations, the templates stored on the local disk of the front-end Web server are used, which reduces the storage of many content pages in the database. If a page is customized, however, the page is stored in the content database.

How a Page Is Assembled

A page is assembled by ASP.NET 2.0. Requests from a browser are passed to IIS and then on to ASP.NET 2.0. ASP.NET 2.0 requests the page from the Windows SharePoint Services 3.0 file provider, which returns and caches the page (if caching is enabled, which by default it is not.) ASP.NET 2.0 locates a reference to the page layout for the page and requests this from the Windows SharePoint Services file provider. When the page layout is returned, ASP.NET 2.0 compiles it and stores it in memory. The same process occurs for the master page, but this is stored on disk rather than in memory. This means that it does not have to be recompiled again unless it is modified. The page layout then loads and writes to disk each control on the page. The finalized page is then passed back to IIS, and then to the client.

This process is greatly simplified on any subsequent visits by users with the same privileges, because the browser requests the page, IIS passes this request to ASP.NET 2.0, and ASP.NET retrieves any cached page content and renders the HTML for controls. IIS then returns the page to the client.

Using Master Pages

Master pages enable you to create a consistent look and feel for your site; they enable you to position shared items that all pages based on the master page must display. Master pages provide many advantages that you can leverage in your WCM deployments.

You should plan to use master pages, because they can save a great deal of time and effort from unneeded customizations that could have been controlled by using a master page. For the master page planning worksheet, see the [Microsoft Office SharePoint Server 2007 Master Pages Worksheet](http://go.microsoft.com/fwlink/?LinkID=73318&clcid=0x419)(http://go.microsoft.com/fwlink/?LinkID=73318&clcid=0x419)

This section addresses the following aspects of master pages:

* [Master Page Elements](#MasterPageElements)
* [Storage of Master Pages](#StorageofMasterPages)
* [Why Create Custom Master Pages?](#WhyCreateCustomMasterPages)

Master Page Elements

When you use a master page, that page defines a set of elements that are common to all pages derived from the given master page. Typically, the master page defines what is contained in the margins at the top and left side of each Office SharePoint Server page; these areas are known as the page chrome. Common elements found in these regions are navigation controls, search controls, and other cross-site standardizations. You should consider the benefits of producing a standard look and feel across your deployment when you plan for the elements that are made available through your master page.

Storage of Master Pages

There is more than one way to store a master page for your site. It is possible to use Microsoft® Office SharePoint® Designer 2007 to create a master page that is stored in the master page gallery of your deployment. This effectively stores the master page in the content database for each site collection.

If you want to create multiple site collections that use a custom master page, it is best to deploy that as a custom feature that adds the master page to the master page gallery. Further, if you want to automatically apply that custom master page to all newly created subsites of a given site definition, you can staple that feature to the appropriate site definition and use a feature receiver to make the association.

The PublishingLayouts Feature contains the following master page files, which are available by default on publishing features:

* BlueBand.master (default master page for the Publishing Portal site definition)
* BlackBand.master
* BlackSingleLevel.master
* BlackVertical.master
* BlueGlassBand.master
* BlueTabs.master
* BlueVertical.master
* OrangeSingleLevel.master

Note: The global default master pages — mwsdefault.master (for meeting workspace site definitions) and default.master (for all other site definitions) — are located at:

<Drive>:\Program Files\Common Files\Microsoft Shared\web server extension\12\TEMPLATE\GLOBAL

The publishing layouts master pages are located at:

<Drive>:\Program Files\Common Files\Microsoft Shared\web server extensions\12\TEMPLATE\FEATURES\PublishingLayouts\MasterPages

We strongly recommend that you not modify the default master page files directly. Instead, make a copy of the file and modify the copy.

Why Create Custom Master Pages?

There are many aspects of master pages that you can use in your page creation process. The following list details the key advantages of custom master pages.

* Improved editing experience
* Web-level editing
* Interface reuse
* Consistent pages
* Improved end-user experience

Creating Custom Master Pages

It is possible for developers to create a custom master page. This master page may be based on an existing master page such as the **default.master** or a new, manually created master page. Custom master pages are of great benefit when you are developing a solution for your organization. Creating custom master pages enables you to easily deploy your own organization’s custom branding and to propagate changes in this branding across all pages that inherit from this page.

Note: For more information about creating a new master page, see [How to: Create a Minimal Master Page](http://go.microsoft.com/fwlink/?LinkId=140102&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkId=140102&clcid=0x409).

This section contains the following topics about creating custom master pages:

* [Content Tags](#ContentTags)
* [Microsoft Visual Studio 2005 or 2008](#MicrosoftVisualStudio2005or2008)
* [Office SharePoint Designer 2007](#OfficeSharePointDesigner2007)

Content Tags

Master pages commonly contain many placeholders, or content tags, that define the location of particular pieces of content. The default.master master page contains 32 different content tags. Understanding these tags, which are detailed in the following table, can help you to understand the options available to the developers of custom master pages.

|  |  |
| --- | --- |
| **Placeholder ID** | **Contents** |
| PlaceHolderPageTitle | The site title that is displayed in the browser title bar. |
| PlaceHolderAdditionalPageHead | Any additional content that must go in the HTML HEAD tag, such as style sheet references. |
| PlaceHolderGlobalNavigation | The bar at the very top of the page that contains the global breadcrumb trail, login controls, and the **Help** button. |
| PlaceHolderGlobalNavigationSiteMap | The breadcrumb trail within the bar at the very top of the page. |
| PlaceHolderSiteName | The site name that appears immediately below the top navigation bar. |
| PlaceHolderSearchArea | The search controls that appear to the right of the site name. |
| PlaceHolderTopNavBar | The navigation bar that appears immediately below the site name. This is known as the top navigation bar. |
| PlaceHolderHorizontalNav | The tabs within the top navigation bar. |
| WSSDesignConsole | The Page Editing toolbar that appears directly beneath the top navigation bar when you are editing a page. |
| SPNavigation | An empty placeholder immediately below the top navigation bar. |
| PlaceHolderPageImage | A page image below the top navigation bar, in the left margin of the page, and to the left of the page title. |
| PlaceHolderTitleLeftBorder | A border between the page image and the page title. |
| PlaceHolderTitleBreadcrumb | The breadcrumb trail that appears immediately above the page title. |
| PlaceHolderPageTitleInTitleArea | The page title. |
| PlaceHolderMiniConsole | Page-level commands, such as Edit Page on a wiki site. |
| PlaceHolderTitleRightMargin | A margin to the right of the page title block. |
| PlaceHolderTitleAreaSeparator | A separator between the page title block and the main page content. |
| PlaceHolderLeftNavBarDataSource | The data source for the navigation menu in the left navigation area. |
| PlaceHolderCalendarNavigator | A date picker for calendar lists. When the page displays a calendar list, the date picker appears at the top of the left navigation area. |
| PlaceHolderLeftNavBarTop | An empty placeholder at the top of the left navigation area. |
| PlaceHolderLeftNavBar | The navigation menu in the left navigation area. |
| PlaceHolderLeftActions | An empty placeholder below the navigation menu in the left navigation area. |
| PlaceHolderNavSpacer | A graphic that defines the width of the left navigation area. |
| PlaceHolderLeftNavBarBorder | The right border of the left navigation area. |
| PlaceHolderBodyLeftBorder | The left border of the main page content area. |
| PlaceHolderPageDescription | The text description for the page, underneath the page title. |
| PlaceHolderMain | The main page content. |
| PlaceHolderBodyRightMargin | A margin to the right of the main page content. |
| PlaceHolderFormDigest | The Form Digest time-out control. |
| PlaceHolderUtilityContent | Any content that must be added below the page content, such as footnotes. |
| PlaceHolderBodyAreaClass | Any content that must be added below the page content, such as footnotes. |
| PlaceHolderTitleAreaClass | Additional title styles for the page header. |

Microsoft Visual Studio 2005 or 2008

Developers can use Microsoft® Visual Studio® 2005 or Microsoft® Visual Studio® 2008 to modify or create master pages for your organization. If this is your preferred method of master page customization, you should be aware of the process that your developers must follow.

If a developer bases a master page on an existing master page, the developer should create a copy of the master page, rename it to suit the needs, and then load it into Visual Studio and modify the contents. Note that this process is a purely code-based approach to master page creation and customization.

Office SharePoint Designer 2007

An alternative to the use of Visual Studio 2005 or Visual Studio 2008 to customize or create a master page is to use Office SharePoint Designer 2007. By using Office SharePoint Designer 2007, your developers are productive than if they were developing a master page purely in code. Office SharePoint Designer 2007 enables developers to create and customize master pages by connecting to a site. Office SharePoint Designer 2007 also handles check-out and check-in functionality for the master page, and it provides both a code view and a “what you see is what you get” (WYSIWYG) view. A major advantage of Office SharePoint Designer 2007 is that when you select an element in the master page WYSIWYG view, the code for that element is highlighted in the code view for the page. This enables developers to work quickly and efficiently when they create your organization’s master pages.

Using Content Types

Content types define documents and items according to their business purpose. For example, you can define content types for invoices, purchase orders, holiday request forms, and many other business documents. You can use content types to store different types of document in the same list, each with its own specific associated metadata and workflows. Each content type has columns or fields associated with it that determine the metadata stored for that particular content type. The use of content types enables you to maintain a consistent use of metadata across your sites. The following topics provide further detail about content types:

* [Uses of Content Types](#UsesofContentTypes)
* [Content Type Elements](#ContentTypeElements)

Uses of Content Types

Many organizations require multiple types of content. Office SharePoint Server 2007 provides content types that enable administrators to architect a flexible solution for defining metadata, and provides default templates that are specific to a type of content. Content types are independent of document type; you use specific metadata to define and organize your content types.

For example, an invoice content type can include the following characteristics:

* Fields to store the customer name and the due date
* An associated workflow that routes the invoice to the Finance Department for approval
* A routing entry in the Records Management site to retain the invoice for a fixed period of time

Content Type Elements

When you create a content type, you assign site columns to that content type; these columns specify the metadata. For example, you can create a content type that has many columns from the default list of available columns. The following list shows the available data types:

* Single line of text
* Multiple lines of text
* Choice (menu to choose from)
* Number
* Currency
* Date and Time
* Lookup (information already on this site)
* Yes/No (check box)
* Person or Group
* Hyperlink or Picture
* Calculated (calculation based on other columns)
* Full HTML content with formatting and constraints for publishing
* Image with formatting and constraints for publishing
* Hyperlink with formatting and constraints for publishing.
* Summary Links data

For each site column that you add to a content type, you can specify whether the column is required, optional, or hidden.

You also can create workflows for a particular content type. You can create your own custom workflows by using Visual Studio 2005 or Visual Studio 2008, or Office SharePoint Designer 2007. You can also assign the out-of-the-box workflows to your content types; this allows a high level of automation for your particular content types. The following table details the default workflows available:

|  |  |
| --- | --- |
| **Workflow** | **Description** |
| Approval | Routes a document for approval. Approvers can approve or reject the document, reassign the approval task, or request changes to the document. |
| Collect Feedback | Routes a document for review. Reviewers can provide feedback, which is compiled and sent to the document owner when the workflow has completed. |
| Collect Signature | Gathers signatures that are needed to complete a Microsoft Office document. This workflow can be started only from an Office client. |
| Disposition Approval | Manages document expiration and retention by allowing participants to decide whether to retain or delete expired documents. |

The content types that you use to design your WCM pages include a number of standard features besides the site columns and workflows:

* **Information Management (IM) policies:** Auditing, labeling, expiration, barcode, and other IM policies can be associated with a content type.
* **Document conversions:** You can configure which converters are available for documents of each content type.
* **Document information panel settings:** Each content type can have its own Document Information Panel settings for documents associated with Office applications.
* **Group:** All content types are organized into logical groups; for your organization, you might have a group called “our organization’s content pages”.
* **Inheritance:** Most significantly, all content types feature inheritance, allowing child content types to inherit the site columns and settings of their parent.

Using Page Layouts

Page layouts define the arrangement of content on your pages and define which components are displayed in the main content areas. You use page layouts with master pages to define the look, feel, and content for your sites. Page layouts are associated with a particular content type; this restricts the type of content that you can display on pages that use a particular page layout. Further, all page layouts are actually instances of the Page Layout content type.

This section contains the following topics:

* [Page Layouts and Content Types](#PageLayoutsandContentTypes)
* [Storage of Page Layouts](#StorageofPageLayouts)
* [Why Use Page Layouts?](#WhyUsePageLayouts)

Page Layouts and Content Types

By default, there are three publishing content types, which all inherit from the Page content type:

* Article Page
* Welcome Page
* Redirect Page

You can also create your own custom content types on which to base your page layouts. Content types define the metadata for your pages; this includes columns for each of the data elements that you need on your page. If you use the parent content type of **Page** when you create a content type for your page layout, you create a content type with the following columns:

* Title
* Description
* Scheduling Start Date
* Scheduling End Date
* Contact
* Contact E-Mail Address
* Contact Name
* Contact Picture
* Rollup Image
* Target Audiences

Note: You can customize your content by adding more columns. These columns represent the fields that will be available when you create a page layout.

You create page layouts by using Office SharePoint Designer 2007; this tool enables you to create or open and edit page layouts.

Page layouts are typically designed and modified by a Web designer or Web developer. When you use Office SharePoint Designer 2007 to develop your page layouts, you create the layout based on your content types. The custom fields that you have defined for your content types are loaded into the Office SharePoint Designer 2007 **Toolbox** box for use in customizing the page layout. The page layout effectively defines the content that is displayed on your pages.

Storage of Page Layouts

Page layouts are .aspx pages that are stored in the **Master Page and Page Layout** **Gallery**. Content for individual pages is stored in the **Pages** document library as list items. Page layouts are assigned to pages at page creation time — unlike master pages, which are defined at the site level and specify the master page for each page created in the site.

Why Use Page Layouts?

There are many aspects of page layouts that you can use in your page creation process. The following list details the key advantages of page layouts:

* Simplified content authoring
* Simplified publishing
* Flexibility of page layouts

Using Style Sheets

Web pages in Office SharePoint Server 2007 use cascading style sheets (CSS) extensively to customize the look and feel of sites. You typically allocate the job of CSS creation to a Web designer or Web developer, who applies branding and styles that reflect your organization. CSS enables you to create specific styles that you can then apply to individual aspects of your deployment.

This section contains the following topics:

* [Style Sheet Properties](#StyleSheetProperties)
* [Limitations of Style Sheets](#LimitationsofStyleSheets)
* [Storage of Style Sheets](#StorageofStyleSheets)
* [Using JavaScript in Office SharePoint Server 2007 Pages](#UsingJavaScriptinSharePointServer)

Style Sheet Properties

When your Web developers create custom CSS, they can customize many properties of the site. The following table details areas of customization that you should consider when you architect your organization’s site.

|  |  |
| --- | --- |
| **Property Type** | **Description** |
| Fonts | You can create styles for properties such as Font, Font Family, Font Size, Font Style, Font Variant, and Font Weight. |
| Colors and Background | You can create styles for properties such as Background, Background Attachment, Background Color, Background Image, Background Position, Background Repeat, and Color. |
| Text | You can create styles for properties such as Letter Spacing, Line Height, Text Alignment, Text Decoration, Text Indentation, Text Transformation, Vertical Alignment, and Word Spacing. |
| Boxes | You can create styles for properties such as Border, Border Color, Border Style, Border Width, Bottom Border, Bottom Border Width, Bottom Margin, Bottom Padding, Clear, Float, Height, Left Border, Left Border Width, Left Margin, Left Padding, Margin, Padding, Right Border, Right Border Width, Right Margin, Right Padding, Top Border, Top Border Width, Top Margin, Top Padding, and Width. |
| Classifications | You can create styles for properties such as Display, List Style, List Style Image, List Style Position, List Style Type, and Whitespace. |
| Units | You can create styles for properties such as Color Units, Length Units, Percentage Units, and URLs. |

Limitations of Style Sheets

When your site customizations require that Web developers work with CSS, you must be aware of the limitations that your developers will face when they create style sheets.

The following table details some of the major limitations that you will face.

|  |  |
| --- | --- |
| **Limitation** | **Description** |
| Browser compatibility | When you develop CSS, you should be aware of the many different browser environments that you will design for. It is important to note that you cannot place fixes for incompatibility in the CSS. |
| Tableless design | CSS does not allow for the use of tables in your design, so you should plan for this. |
| Complicated to design | CSS can become highly complex, especially when you work with many files that specify styles for your sites. It can be easy for developers to lose track of their style sheets, which can make the debug process very difficult. |
| CSS hierarchy and inheritance can cause problems | When you use CSS for your site, you should be aware of the difficulties that your Web developers may experience because of the way in which CSS applies styles. If you define a style, and later in your style sheet this style is defined again, the first style is completely overwritten. This can cause many problems for Web developers when style sheets become large. |

Storage of Style Sheets

The default main CSS file used by Office SharePoint Server 2007 is the core.css file. This file defines styles that the default pages of an Office SharePoint Server 2007 site inherit.

The installation for all default CSS files for Office SharePoint Server 2007 can be found at the following location.

<Drive>:\Program Files\Common Files\Microsoft Shared\web server extensions\12\TEMPLATE\LAYOUTS\<locale ID>\STYLES

You can examine the files in this folder to get a feel for the customizations that are possible by using them.

Using JavaScript in Office SharePoint Server 2007 Pages

In addition to modifying style sheets, you can use JavaScript to modify the behavior of individual pages. For example, you could disable hyperlinks on a page or you could add customize context menu items.

Office SharePoint Server 2007 includes hundreds of JavaScript functions, contained in JavaScript files in the \TEMPLATE\LAYOUTS folder. If you want to modify an existing behavior, you should create a JavaScript function with the same name in your page to override the default function.

You can insert JavaScript function into a SQL Server page in various ways. For example, you can do the following:

* Add the JavaScript function to the PlaceHolderAdditionalPageHead content placeholder that is defined by the master page.
* Use a hidden Content Editor Web Part to host the JavaScript function.

Using Field Controls

Field controls enable customization of the pages that your sites contain. When you create a content type and subsequently base a page layout on that content type, field controls are created for the fields or columns that you chose to display on your pages. The following sections will help you learn about using field controls:

* [What Is a Field Control?](#WhatIsaFieldControl)
* [When to Use Field Controls](#WhentoUseFieldControls)
* [Field Controls vs. Web Parts](#FieldControlsvsWebParts)

What Is a Field Control?

Page layouts contain field controls; these controls are responsible for rendering content on a page. Field controls access data from columns defined by a layout’s content type. Field controls display content to visitors and offer them edit options where permissions allow it. The placement of the field controls is the responsibility of the page designer who places and formats the control. Content owners then use these controls to display the content for their pages, but they cannot customize the location of the content on the page.

When to Use Field Controls

If it is critical that your content follow a specific format and positioning within the page, you should use field controls in your page layouts. Be aware that you can only position field controls at design time. When content owners modify the field controls, they will be allowed to add and modify content, but will be denied control of formatting and positioning.

Field Controls vs. Web Parts

Page layouts can contain both field controls and Web Parts. The questions you must ask yourself when designing you architecture are “When should I use field controls*?*” and “When should I use Web Parts?”

The following table shows the differences between field controls and Web Parts, and explains which situations will require that you use each.

|  |  |
| --- | --- |
| **Content Controls** | **Explanation** |
| Field Controls | The content for a field control is stored in a field or column of the list item for the page. You can only position field controls at design time, and there is no scope for personalization. You should use field controls if your sites require content to appear in a specific location or with a set format. |
| Web Parts and Web Part zones | The content for a Web Part is stored in the Web Part data for your page. The important thing to remember is that by adding a Web Part zone to your page layout, your Web designer can control the location of content on the page. Content owners can perform customizations and personalize the content by managing the Web Parts within these zones. These customizations include the location of the content within the zones and the formatting. You should use Web Parts if you need to provide content owners with control of content layout and formatting, or if the structure of content in a certain part of a page is unimportant. |

Lesson 2: Managing Content Pages

When you plan, design, and develop a WCM solution for your organization, it is important that you create a solution that enables authorized parties to manage content pages. Office SharePoint Server 2007 provides many features that you can leverage to help you manage the content page creation process. By understanding the storage of pages and the content life cycle and by using item versioning, document converters, and site variations, you can manage your content pages easily.

Objectives

After completing this lesson, you will be able to:

* [Describe storage of pages](#PageStorage)
* [Understand item versioning](#ItemVersioning)
* [Understand document converters](#DocumentConverters)
* [Describe site variation](#SiteVariations)
* [Describe the content life cycle](#ContentLifeCycle)

Page Storage

This section describes the following aspects of page storage:

* [Pages stored in document libraries](#PagesStoredinDocumentLibraries)
* [Adding site columns to sites](#AddingSiteColumnstoSites)
* [Adding columns to document libraries](#AddingColumnstoDocumentLibraries)
* [Check-in and check-out](#CheckinandCheckout)
* [Multimedia file storage issues](#MultimediaFileStorageIssues)

Pages Stored in Document Libraries

Your site pages are stored in the Pages library for the site. You can also store pages in document libraries; however, you must consider some security issues before you plan to store pages this way. Pages that are stored in document libraries can be opened and edited by using a text editor. When your pages are ASP.NET pages, you must be aware of any information that may be considered sensitive. This information may include logon credentials such as identities and passwords. You must remember that anyone who has access to the document library has access to the content of the pages stored in the library.

Adding Site Columns to Sites

You can create your own site columns for your sites; this enables you to manage content stored within your site. You should consider the type of content that you may need to store in document libraries. You can apply the site columns you create to your lists and can even set them as required fields rather than optional. This enables you to maintain flexible control of the content your users can upload to a site.

Adding Columns to Document Libraries

When you have created site columns to suit your organizational needs, you can add them to document libraries and other lists within the site collection where a field is required. This process ensures that the documents placed in the library or list have the field completed. The following steps summarize the process of adding site columns to your document libraries:

► Add site columns to document libraries

1. Browse to your document library.
2. On the Settings menu, click **Document Library Settings**.
3. On the Customize <Document library name> page, in the Columns section, click **Add from existing site columns**.
4. On the Add Columns from Site Columns: <Document library name> page, select your column, click **Add**, and then click **OK**.

Return to your document library and observe the new column.

Check-in and Check-out

In Office SharePoint Server 2007 there is a built-in check-in and check-out system that prevents conflicting edits from being made to a page. The system manages this process by allowing the edit of only the checked-out version of a page, and only by the user who has the page checked out. Note that it is possible for users to work in collaboration on their pages, but this requires that one author checks the document in to the library before another author checks it out.

Versioning and check-in/check-out functionality is automatically enabled in some libraries, such as the Pages library. In standard document libraries, you must manually enable these features.

Multimedia File Storage Issues

Multimedia files are stored in libraries in the same way other content is stored. The actual data is stored in Microsoft® SQL Server® in the form of a binary large object (BLOB). For a WCM solution, this data is retrieved every time a user visits the site; this increases load times considerably and in the long term causes user dissatisfaction. It is possible to activate disk-based caching of such items, which enables you to reduce the number of roundtrips to SQL Server that are required. Office SharePoint Server 2007 offers BLOB caching, which is a disk-based cache process whereby when the BLOB is first retrieved from the database, it is stored on the local disk, so roundtrips are not required as new requests use the disk-based item. This feature is not active by default, but it can be activated through a modification to the Web.config file. Additionally, BLOB caching allows for the implementation of a cache duration property to be placed on the file. If the user’s browser uses caching, subsequent requests for that object can be retrieved directly from the user’s machine cache, instead of requesting it from the server. For specific procedures and settings, see [Disk-based Caching for Binary Large Objects](http://go.microsoft.com/fwlink/?LinkID=123947&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkID=123947&clcid=0x409).

Item Versioning

Items or pages that you create for your sites are given a version number. This version number tracks the progress of a page through the approval and deployment processes. When you have created a new version of an item, the previous version is not discarded (unless you have applied version limits on the list). Rather, the previous version is instead stored to enable rollback of items. This section contains the following topics:

* [Major and Minor Versions](#MajorandMinorVersions)
* [Role in Deployment](#RoleinDeployment)
* [Storing Old Versions](#StorageofOldVersions)

Major and Minor Versions

Your pages are given a version number, which may be major or minor version numbers. This plays an important role in the approval process for a site. The major version number represents a published version of a page, while minor versions represent the draft versions. For example, if a page is published and has the version number 1.0, and subsequent drafts are created with new modifications, each of these draft pages is given a minor version number: the first revision is given a version number of 1.1, the second revision is given 1.2, and so on. Finally, when the content is approved and published, the new approved site is allocated the version number 2.0.

Role in Deployment

Versions play a role in the deployment process; they are used to determine which pages to transfer between environments. During the automatic deployment process, content migrates between environments. Only the most recent major version and the most recent minor version of each page are copied from the source site collection to the destination site collection. During the manual deployment of content, you use the Stsadm command-line tool to export or import content. By using the manual deployment method, you can specify the version levels that you want to deploy to your new environment. The following list details the four available variations of export version control:

* Exports the last major version of each file and list item
* Exports the latest version, either last major or last minor
* Exports the last major and minor version of each file and list item
* Exports all versions of a file and list item

Storage of Old Versions

When you create and publish a page, the major and minor versions are stored in the Pages list for the site you work with. The pages stored in this list are accessible by site owners who can select **Unpublish this version**. This option causes the site to revert to its previous major version. You also have the option to view the version history of a page that enables you to see all major versions of the site and any minor versions that have been created.

Document Converters

Document converters provide for a high level of automation to your sites, so that documents uploaded in one format can be converted to a Web page. This enables users to create different pages from existing content with minimal time and effort.

Note: Document converters are installed at the Web Application level and are available to each site and document library in that application. You cannot disable document converters for a specific site or library.

You can implement document converters to perform different types of conversion for different content types. For example, if you have content types of **Invoice** and **Contract**, you can configure the document converters to format the output page in different ways.

When a page is generated in this way, it holds a property that references the document upon which it was based. This is also true for the original document, which is modified to contain a reference to the newly created page. Note that only the latest created page is referenced in the source document.

This section contains the following topics relating to document conversion:

* [Converter Processes](#ConverterProcesses)
* [Converters Available with Office SharePoint 2007](#ConvertersAvailablewithSharePoint2007)
* [Custom Converters](#CustomConverters)
* [Advantages of Converters](#AdvantagesofConverters)
* [Other Considerations](#OtherConsiderations)

Converter Processes

The conversion process can be very resource-intensive and relies on the **DocConversionLoadBalancerService** and **DocConversionLaunchersService** services to manage the conversions. Together these services load-balance, schedule, and prioritize the conversion of documents. Both services must be enabled and configured on your server farms for the conversion of documents to take place. The **DocConversionLoadBalancerService** service receives requests for conversion from across your farm. These requests are then load-balanced by the service, and for each conversion request it returns a URI to the **DocConversionLaunchersService**. Remoting is then used by Office SharePoint Server 2007 to connect to the launcher service. This service schedules and starts conversions; it stores to disk the document that is to be converted and then calls the appropriate converter by using the command line. When conversion is complete, Office SharePoint Server 2007 performs post-processing and places the converted document into the document library.

Note: Both **DocConversionLoadBalancerService and DocConversionLauncherService run as isolated, low-privilege processes under local accounts. If you are building a completely stand-alone environment that has Office SharePoint Server 2007, SQL Server, and a DC all in one server, you will not be able to use document conversion services because there are no local accounts.**

Converters Available with Office SharePoint Server 2007

The following table lists the document converters that are supplied with Office SharePoint Server 2007 and briefly explains the functionality of each.

|  |  |
| --- | --- |
| **Converter** | **Description** |
| DOCX to HTML | Converts a Word document to a Web page. |
| DOCM to HTML | Converts from a Word document with macros to a Web page. |
| XML to HTML | Converts from a Microsoft® InfoPath® form to a Web page. |
| XML to HTML | Converts from an XML document to a Web page. |

Note that developers can create custom document converters by using the Office SharePoint Server 2007 object model. This enables you to convert from a given format to a Web page, or to your own custom format.

Custom Converters

It is possible to create a custom converter; this enables you to convert a particular document format into your own required format. A developer can create a custom converter. For further information about document converters and the customization process, see [Document Converters Overview](http://go.microsoft.com/fwlink/?LinkID=107654&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkID=107654&clcid=0x409).

Advantages of Converters

When you use document converters in your deployment, you should consider the following advantages that they provide:

* Automatic creation of pages based on existing content
* Reduced user-involvement for page creation
* User familiarity with creation programs
* Content-type-based conversion configuration

Other Considerations

When you consider document converters for your deployment, there are number of factors that you must take into consideration. The following list details the key considerations:

* Documents can be converted immediately or asynchronously, depending on conversion configurations.
* Conversions can be performed by using the user interface (UI) or through the Office SharePoint Server 2007 object model.
* The speed of conversions can be affected by the number of converter launcher services running and the number of conversion requests received.
* Conversion will fail if there is no converter launcher available to handle the request, but Office SharePoint Server 2007 handles this by resubmitting requests for conversion.
* Conversion cannot be run on a domain controller.

Site Variations

One of the difficulties you might encounter when you plan for Web content management is the diverse nature of your organization’s customer base. Your customers may require access to information in multiple languages and from different platforms. Retaining multiple versions of Web sites for this purpose consumes time and is in general very difficult to maintain. Office SharePoint Server 2007 provides site variations for handling this issue. Site variations enable you to maintain, both manually and automatically, similar variations of Web sites for Web publishing environments. This section contains the following topics:

* [Managing Multiple Site Variations](#ManagingMultipleSiteVariations)
* [Site Variations for Languages](#SiteVariationsforLanguages)
* [Site Variations for Mobile Devices](#SiteVariationsforMobileDevices)

Managing Multiple Site Variations

When you have created multiple variations, you can manage them by using the site variation management system provided by Office SharePoint Server 2007. This system allows administrators to create a site and then generate many variations of this site; one of these variations is then set to be the primary, or source, variation. For each variation of a site, you allocate a variation label that represents the type of site that you have created. For example, in a multilingual environment, you might have a variation label of **English** and another of **French**. When you have created variations in this way, you can select to automatically or manually update the variations of a page when the source page is updated. The automatic process uses workflows to send a request for translation for each variation that has been set for update. Following the update of a variation, the workflow flags the variation for approval.

The following list details some limitations of site variations that you must be aware of:

* You can define only one set of variations for a site.
* You can have only one source variation for a site.
* Office SharePoint Server 2007 supports up to fifty variations per site.
* Changes made on a target variation site may be overwritten by changes made on the source variation.
* Web Parts are propagated to variation sites. However, certain types of Web Parts (such as List View Web Parts) are not “variation-aware.” To mitigate this, configure the variations not to copy Web Parts.
* Variations do not provide automatic translation of site content.

Site Variations for Languages

For sites that require multilingual support, you can provide variations based on each language required. For example, if you require English, French, and German versions of your site, you can create a variation for each. In this case, all native Office SharePoint Server elements, such as context menus, the site action menu, and Web Parts, will be displayed in the appropriate browser language for each user. If your organization is based in a predominantly English market, you should set your English site as the primary variation. When this is complete, content creators manage the English site, and when they have completed work on the site, the changes can be duplicated to the variation sites of each language. The process of translating the language is not carried out automatically, but a workflow can be configured to notify a translator who can then perform the translations on a specific site.

Note: Office SharePoint Server 2007 directs users to a site with appropriate language as determined by the user’s browser settings. In the event of there being no site variation to match the browser settings, the user is automatically sent to the source variation.

Site Variations for Mobile Devices

In most cases, variations based on languages will need to look the same. However, if you are working with device-based variations, you will, in most cases, need to change the look of the variation site. The reason for such changes is to enable the device to display the site correctly; for example a personal digital assistant (PDA) cannot display as much content as a regular screen. Variation sites enable you to use custom master pages, layout pages, or style sheets. In some situations, you may need to simplify your site for a mobile device by creating a simplified layout for your target device. You might also want to disable page authoring features when the user visits your site from a mobile device.

Note: For more information about site variations, see [Plan variations](http://go.microsoft.com/fwlink/?LinkId=140104&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkId=140104&clcid=0x409).

The Content Life Cycle

Content that your users create follows a specific life cycle. This life cycle consists of content creation and approval, the archive process, and the deletion of content:

* [Creation of Content](#CreationofContent)
* [Archived Content](#ArchivedContent)
* [Searching Archived Content](#SearchingArchivedContent)

Creation of Content

Your users create content either by using the user interface to create a document of a specific type (this process starts external Office applications), or by uploading content created externally to Office SharePoint Server. The process of creating content for pages involves a content owner who edits the content stored on a page. When content has been edited, it then goes through an approval process. The creation and editing of these pages generates minor versions until a version is published; at this point, a page with a major version number is created. The pages are stored in the **Pages** library for your site.

Archived Content

Your organization will potentially contain thousands or millions of documents. When you design an archive, consider locating documents so that they are easy to find, provide adequate storage for the archive, and consider the use of a dedicated Web application for the archive, depending on usage, performance, security, and other requirements.

Note: A content archive should be designed to be a separate Web application. This is the simplest way to ensure that all the archived documents are in a separate content database and can have a separate backup and recovery schedule.

Searching Archived Content

When you have archived content that you want to surface for your users, you must index the archive regularly. Because users may only be able to locate content by using the search features, your organization may require the creation of custom search scopes for the archived content.

Lesson 3: Approving Content

When you plan, design, and develop a WCM solution for your organization, it is important that you develop an intuitive approval process for your content. Office SharePoint Server 2007 provides many features that you can leverage to implement your own approval processes. To create a suitable approval solution, you must first understand the approval process: how to manage it with workflows, how to create custom workflows, and how to design the approval process. Finally, you must understand the role of the approval process with variations.

Objectives

After completing this lesson, you will be able to:

* [Understand content approval](#IntroducingContentApproval)
* [Manage the approval process with workflows](#ManagingApprovalProcesswithWorkflows)
* [Add custom workflows](#AddingCustomWorkflows)
* [Understand variations and content approval](#VariationandContentApproval)

Introducing Content Approval

When you develop your WCM deployment, you will need an approval process through which you can submit and validate pages. In many cases, your organization will require that your pages be approved before they are placed on the live site or farm and exposed to the public:

* [Approving content pages and media files](#ApprovingContentPagesanMediaFiles)
* [Approving master pages and page layouts](#ApprovingMasterPagesandPageLayouts)

Approving Content Pages and Media Files

Approving content pages and media files enables you to control the quality of your content through moderation.

When you plan for page approval, you must select one of the three approval categories. The following table details the options available to you when you plan for content and multimedia approval.

|  |  |
| --- | --- |
| **Approval Type** | **Description** |
| None | This means that when pages and content are created, the changes are visible on the live server. |
| Simple Moderation | This type of approval has content editors that create pages and content, then submit this for approval by a member of the Approver group. |
| Approval Workflow | An automated process in which, when content creators submit content, members of the approval group are notified by e-mail and tasks added to the approver’s task list. |

Note: Media files that have not been approved will not display on content pages that have been approved.

Approving Master Pages and Page Layouts

Master pages and page layouts are stored in a document library referred to as the **Master Page and Page Layout Gallery**. By default, this library supports versioning and workflows. This means that you can have developers create minor and major versions of master pages and page layouts; these can then be submitted for approval, either manually or by using the automated workflows.

When you plan for the approval process for your master pages and page layouts, you must consider the following questions:

* **Do your master pages require approval?**

In most cases, an approval requirement is a good idea, because master pages define the look and feel for entire broad sets of pages in your site.

* **Do your page layouts require approval?**

Again, in most cases, an approval requirement is a good idea, because page layout changes will potentially affect the look and feel of many pages in your site.

* **Does the process of approval require automation?**

This will be dependent on the scale and scope of your approval process. If this is a single-stage approval process where anyone with approval authority can approve the master page or page layout change, and you have a small number of approvers, a simple approval model coupled with approvers who subscribe to alerts on the master page gallery may suffice. Otherwise, an automated workflow will likely be the most appropriate solution.

Managing the Approval Process with Workflows

Office SharePoint Server 2007 enables you to manage your content approval process by using workflows. These workflows can automatically activate on content check-in or can be activated manually by the user. This section includes the following topics:

* [What Is a Workflow?](#WhatIsaWorkflow)
* [Built-in Workflows](#BuiltinWorkflows)

What Is a Workflow?

A workflow is a process that comprises a series of steps and conditions. For example, if you have an established content approval process for documents in your organization, you can create a workflow that models that process. The workflow effectively manages how your documents move through the business process. Workflows will play an important role in the approval process for your pages. When content owners complete their work on a page, they check the document in for approval. At this point, a workflow may begin behind the scenes. This workflow can be customized to enable an automatic e-mail dispatch that notifies the relevant content reviewer that the page is ready for review. This automation process can take content from the beginning to the end of the publishing process, and can be used not only to send e-mail messages, but also to add approval tasks to users’ task lists. One of the most beneficial aspects of workflows is that your content owners can track the status of the approval.

A workflow is composed of a sequence of events such as workflow initiation, task creation, and task completion. When you add a workflow, a workflow history database is automatically created to track the events for the workflow. The workflow history database stores key information about each event including date, status, participant, and description. Workflow history entries are placed in a SharePoint list that is linked to the associated list or document library for purposes of status and error reporting.

Office SharePoint Server 2007 runs a daily Workflow Auto Cleanup job to remove entries from the workflow history list 60 days after a workflow is completed or cancelled. You can disable the Workflow Auto Cleanup job if you want to track workflow history for a longer period. However, as with any SharePoint list, if your workflow history list exceeds 2000 items, site performance may be affected. If you are concerned about the size of your workflow history list, you can reenable the Workflow Auto Cleanup job. For more information about disabling this job and implementing other options for retaining workflow histories, see [Disable automatic cleanup of workflow history](http://go.microsoft.com/fwlink/?LinkId=140106&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkId=140106&clcid=0x409).

Built-in Workflows

Built-in workflows are the low-complexity workflow type. These are suitable for use by any SharePoint user and require no special tools to configure. You can associate these workflows with a list, document library, or content type and set them to start either manually, automatically when an item is created, or automatically when an item is modified.

There are seven predefined workflows available in Office SharePoint Server 2007:

* **Approval**:   This workflow provides a simple approval process that enables you to assign one or more approvers and a due date, and provides the ability to notify other users that the workflow has begun. You should use this workflow if your organization has a simple approval process that does not require a multitude of steps. This workflow is automatically available in document libraries.
* The Approval workflow is the one most used in publishing. This workflow routes a document or item to one or more people for approval before it publishes the document or item on the production system. A version of the Approval workflow is also associated by default with the Pages library in a publishing site, and it can be used to manage the approval process for the publication of Web pages.
* **Collect Feedback:**  This workflow enables you to collect feedback from multiple reviewers. When this workflow starts, it may be configured with a list of reviewers, a due date, and a list of other people who must be notified of the workflow commencement. Reviewers can provide feedback, which is then compiled and sent to the person who initiated the workflow. This workflow should be used if your documents regularly require feedback from one or more users. This workflow is automatically available in document libraries.
* **Collect Signatures:** This workflow routes an Office 2007 document to a group of people to collect their digital signatures. It must be started in an Office 2007 client program. Participants must complete their signature tasks by adding their digital signature to the document in the relevant Office program. This workflow is automatically available in document libraries. However, this workflow appears for a document in the document library only if that document contains one or more Microsoft Office Signature Lines.
* **Disposition Approval:**   This workflow, which supports records management processes, manages document expiration and retention by allowing participants to decide whether to retain or delete expired documents. It is intended for use primarily within a Records Center site.
* **Three-state:**   This workflow can be used to manage business processes that require organizations to track a high volume of issues or items, such as customer support issues, sales leads, or project tasks. It is available for activation as a feature.
* **Group Approval:**   This workflow is similar to the Approval workflow, but it uses a designated document library and offers a personalized view of the approval processes in which a user is participating. It provides a hierarchical organization chart from which to select the approvers and allows the approvers to use a stamp control instead of a signature. This workflow is available only for East Asian versions of Office SharePoint Server 2007.
* **Translation Management:**  This workflow manages the manual document translation process by creating copies of the document to be translated and by assigning translation tasks to translators. It is available only for Translation Management libraries.

Adding Custom Workflows

In many circumstances, the standard built-in approval workflow is sufficient to manage the approval process of your organization. However, in some cases you might need to develop your own custom workflows. These workflows are created by a developer in either Office SharePoint Designer 2007 or Visual Studio 2005 or Visual Studio 2008. You should consider the benefits to your organization from the development of a custom workflow and should attempt to map your workflows as closely to business processes as possible:

* [Developing Workflows with Office SharePoint Designer 2007](#DevelopingWorkflowswithSharePoint2007)
* [Developing Workflows with Visual Studio 2005 or 2008](#DevelopingWorkflowswithVisualStudio)

Developing Workflows with Office SharePoint Designer 2007

You can develop workflows by using Office SharePoint Designer 2007. This offers the following advantages over development with Visual Studio:

* Simplified development, so users do not need much developer experience
* Simplified deployment because the workflow is specific to a given list
* Expedited development times
* Expedited test times

However, be aware of the following limitations of building workflows with Office SharePoint Designer:

* Cannot add custom code or custom activities to your workflow
* Can create only sequential workflows
* Can use only ASP.NET based forms
* Workflows are bound to list or document libraries at the time they are created.
* Cannot do workflow modifications (that is, changes while workflow is in process)
* Cannot associate a workflow to a content type

When you require custom workflows, you must assess the level of customization that you require. It is possible to create and import custom workflow actions to Office SharePoint Designer, but this will require the time of your developers.

For reference, the following table lists the default set of conditions and actions that are available to you when you use Office SharePoint Designer 2007. You can use this to determine whether your deployment will require the use of Visual Studio.

|  |  |
| --- | --- |
| **Type of Workflow Element** | **Names** |
| Conditions | Compare Document fields  Compare any data source  Title field contains keywords  Modified in a specific data span  Modified by a specific person  Created in a specific data span  Created by a specific person  The file type is a specific type  The file size in a specific range kilobytes |
| Actions | Add Time to Date  Assign a Form to a Group  Assign a To-do Item  Build Dynamic String  Check In Item  Check Out Item  Collect Data from a User  Copy List Item  Create List Item  Delete Item  Discard Check Out Item  Do Calculation  Log to History List  Pause for Duration  Pause Until Date  Send an Email  Set Content Approval Status  Set Field in Current Item  Set Time Portion of Date/Time Field  Set Workflow Variable  Stop Workflow  Update List Item  Wait For Field Change in Current Item |

Developing Workflows with Visual Studio 2005 or 2008

If you decide that you need to develop custom workflows beyond those that you can create in Office SharePoint Designer 2007, you need to create them in Visual Studio. Creating a workflow through Visual Studio is more complicated than creating a workflow in Office SharePoint Designer 2007, so you almost certainly will require an experienced developer to create your workflows. Your workflows can incorporate Microsoft Office InfoPath® forms that enable users to interact with them. Creating your workflows by using Visual Studio 2005 is different from Office SharePoint Designer in the following ways:

* Workflows created in Office SharePoint Designer 2007 cannot be deployed to multiple lists.
* Workflows created in Office SharePoint Designer 2007 cannot be modified.
* Workflows cannot be created against content types in Office SharePoint Designer 2007.
* Workflows authored in Office SharePoint Designer 2007 can only be sequential, while workflows created in Visual Studio 2005 can be either state-based or sequential.

Note:    For more information about the differences between authoring workflows in Office SharePoint Designer 2007 and Visual Studio 2005, see [Workflow Development Tools Comparison](http://go.microsoft.com/fwlink/?LinkID=107766&clcid=0x409) at (http://go.microsoft.com/fwlink/?LinkID=107766&clcid=0x409).

Variation and Content Approval

When you implement variations in your deployment, you must be aware of how this will affect the approval process for your variations.

Extra Approval Steps to Consider for a Site Variation

The use of site variations introduces added complexity to the approval process for sites. The **Pages** library on both the source and target sites must have major and minor versioning.

The procedure for approval of variation sites is as follows:

► Get variation sites approved

1. Content on the source variation is submitted for approval.
2. An e-mail message is sent to each of the target variation site owners.
3. The source page is approved.
4. The page is copied from the source site to the target site; this action can be performed manually or automatically.

Note:    When the copy process occurs, the page on the target site is always allocated a minor version number.

Pages must be approved and published on the source site before they are copied to the target site. This is also true for resources used by the page, such as images. Your page may be approved and published, but an image required by that page might not have gone through the approval process and therefore will not appear on the target site yet.

Always remember that if you create customizations on a target site, they will be overwritten when the source site is transferred to the target.

Review of Module 2

* Creating a Consistent Look and Feel
* Managing Content Pages
* Approving Content

References

The following videos provide supplemental information to these modules. There is no one-to-one correspondence between the modules and the videos:

* [Video 1](http://go.microsoft.com/fwlink/?LinkId=140097&clcid=0x409) (http://go.microsoft.com/fwlink/?LinkId=140097&clcid=0x409)
* [Video 2](http://officecpub/Teams/itpro/Documents/White%20paper%20library/WCM%20modules/Video%202) (http://go.microsoft.com/fwlink/?LinkID=140063&clcid=0x409)
* [Video 3](http://officecpub/Teams/itpro/Documents/White%20paper%20library/WCM%20modules/Video%203) (http://go.microsoft.com/fwlink/?LinkID=140068&clcid=0x409)
* [Video 4](http://officecpub/Teams/itpro/Documents/White%20paper%20library/WCM%20modules/Video%204) (http://go.microsoft.com/fwlink/?LinkId=140101&clcid=0x409)