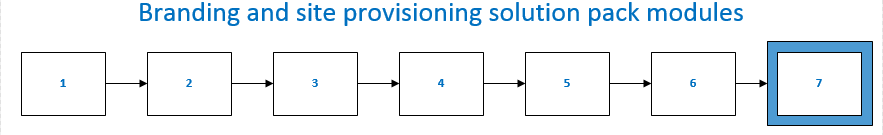
Module 7: Metadata, site navigation, and publishing site features

# Introduction

This module presents SharePoint 2013 and SharePoint Online metadata management, site navigation, and Publishing site features in the context of the app model. It also suggests ways to work with common web programming patterns and libraries to help customize Publishing site branding. This module provides guidance that specifically applies to Publishing sites.



# Key terms and concepts

**Table 1. Key terms and concepts**

|  |  |  |
| --- | --- | --- |
| **Term** | **Definition** | **Guidance** |
| [Content Search Web Part](http://msdn.microsoft.com/en-us/library/office/jj163789(v=office.15).aspx) | A Web Part that displays dynamic search content on pages in ways you can easily format. | [Configure Search Web Parts in SharePoint 2013](http://technet.microsoft.com/en-us/library/jj679900(v=office.15).aspx)  [Configure a Content Search Web Part in SharePoint](http://office.microsoft.com/en-us/office365-sharepoint-online-enterprise-help/configure-a-content-search-web-part-in-sharepoint-HA104119042.aspx)  [Search features in SharePoint Online](http://technet.microsoft.com/en-us/library/sharepoint-online-search-service-description.aspx) |
| [ContentTypeId](http://msdn.microsoft.com/en-us/library/office/aa543822%28v=office.14%29.aspx) | Unique identifiers of content types that are designed to be recursive. | [ContentTypeId](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.contenttypeid%28v=office.15%29.aspx) (CSOM) |
| [Content type](http://msdn.microsoft.com/en-us/library/office/ms472236%28v=office.14%29.aspx) | A reusable collection of metadata (columns), workflow, behavior, and other settings for a category of information in centralized, reusable way. | [Columns](http://msdn.microsoft.com/en-us/library/office/ms196085%28v=office.14%29.aspx)  [Creating content types](http://msdn.microsoft.com/en-us/library/office/ms460224%28v=office.14%29.aspx)  [Custom information in content types](http://msdn.microsoft.com/en-us/library/office/ms468437%28v=office.14%29.aspx)  [SharePoint 2013: Content type report](http://code.msdn.microsoft.com/SharePoint-2013-Content-1fe98b75) (code sample) |
| Content type hub | Part of the Managed Metadata service application; a hub site that publishes content types to other site collections. You can publish, republish, and unpublish content types centrally. | [Publish a content type from a content publishing hub](http://office.microsoft.com/en-us/sharepoint-help/publish-a-content-type-from-a-content-publishing-hub-HA102773265.aspx)  [View error logs for content type publishing](http://office.microsoft.com/en-us/sharepoint-server-help/view-error-logs-for-content-type-publishing-HA102773266.aspx) |
| [Device channels](http://msdn.microsoft.com/en-us/library/office/jj862343(v=office.15).aspx) | Ways of rendering Publishing site pages in multiple ways by using different designs that target multiple devices. | [How to: Add a Device Channel panel snippet in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj862340(v=office.15).aspx) |
| [Display template](http://msdn.microsoft.com/en-us/library/office/jj945138(v=office.15).aspx) | Used in Web Parts that use search technology, display templates to control the display the results of queries made to the search index.  Display templates are available for all search web parts. | [Display template reference in SharePoint 2013](http://technet.microsoft.com/en-us/library/jj944947%28v=office.15%29.aspx) (TechNet) |
| Friendly URLs | A Web address that’s easy-to-read and accurately comprehend. It should represent the contents of its webpage.  SharePoint pages with friendly URLs end in a /. Extension rather than a |  |
| [Managed navigation](http://msdn.microsoft.com/en-us/library/office/jj163978%28v=office.15%29.aspx) | Site navigation powered by SharePoint managed metadata service (taxonomy). Use it to build site navigation derived from a managed metadata taxonomy. | Managed navigation often works best with the product catalog. |
| [Managed metadata](http://msdn.microsoft.com/en-us/library/office/ee559337%28v=office.14%29.aspx) | A hierarchical collection of centrally managed terms that you can use to define and attribute items in SharePoint.  You can use managed metadata to manage content type publishing and to create taxonomies.  In SharePoint 2013 and SharePoint Online, the Managed Metadata Service (MMS) is used to create managed navigation—site navigation powered by taxonomy. | [Customizing navigation controls and providers in SharePoint 2010](http://msdn.microsoft.com/en-us/library/office/bb897739(v=office.14).aspx)  [Introduction to managed metadata](http://office.microsoft.com/en-us/sharepoint-help/introduction-to-managed-metadata-HA102832521.aspx)  [Introduction to managed metadata in SharePoint 2010](http://office.microsoft.com/en-us/sharepoint-server-help/introduction-to-managed-metadata-in-sharepoint-server-2010-HA101859256.aspx) (Office.com)  [Managed metadata administration](http://technet.microsoft.com/en-us/library/ee530393(v=office.14).aspx)  [Managed metadata and navigation in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163949%28v=office.15%29.aspx)  [Managed navigation in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163978%28v=office.15%29.aspx)  [Migrating managed metadata in SharePoint 2010](http://msdn.microsoft.com/en-us/library/office/hh147179(v=office.14).aspx) |
| [Microsoft.SharePoint.Client.Publishing.Navigation](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation(v=office.15).aspx) | Namespace that contains Publishing site navigation classes and members (CSOM). |  |
| [Microsoft.SharePoint.Client.Taxonomy](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.taxonomy(v=office.15).aspx) | Namespace that contains Taxonomy classes and members (CSOM). | [SharePoint 2013: Synchronize term sets with the Term Store](http://code.msdn.microsoft.com/SharePoint-2013-Synchronize-d40638d1) (code sample) (CSOM) |
| Pinning | Pinning is similar to reusing a term. Pinning maintains a shared relationship between the source term and the reuse instance. For example, the shared relationship can span across site collections in a cross-site publishing scenario. Any time the term is added or removed, that action is updated across the hierarchy anywhere the term is pinned. | [How to: Use Code to Pin Terms to Navigation Term Sets in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163273(v=office.15).aspx) |
| Product catalog |  | [Cross-site publishing in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163225%28v=office.15%29.aspx)  [Configure cross-site publishing in SharePoint 2013](http://technet.microsoft.com/en-us/library/jj656774%28v=office.15%29.aspx) |
| [Snippet](http://msdn.microsoft.com/en-us/library/office/jj822367(v=office.15).aspx) | A piece of HTML functionality that you can add to the HTML file generated by the Design Manager. For example, you may want to add a Device Channel panel to your Publishing page—there’s a snippet for that. | [How to: Add a Device Channel Panel snippet to SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj862340(v=office.15).aspx)  [How to: Add an Edit Mode Panel snippet](http://msdn.microsoft.com/en-us/library/office/jj862340(v=office.15).aspx)  [How to: Add a Web Part zone snippet](http://msdn.microsoft.com/en-us/library/office/jj862341(v=office.15).aspx)  [How to: Add a Security Trim snippet](http://msdn.microsoft.com/en-us/library/office/jj822366(v=office.15).aspx) |
| Structured Navigation |  | [How to: Customize navigation in SharePoint 2010](http://msdn.microsoft.com/en-us/library/office/ms558975%28v=office.14%29.aspx)  Customizing SharePoint 2010 site navigation metadata |
| Taxonomy | See Managed metadata. |  |

# Important: Prerequisite for SharePoint Publishing site branding with CSOM

By default, web content published to public-facing SharePoint on-premises websites is available to anonymous users. By default, both CSOM and REST are not available to anonymous users.

**Important** This scenario describes a potentially serious threat to on-premises SharePoint sites. Before using the remote provisioning model described in Module 5 to provision branding to Publishing sites, ensure that your site’s security and permissions are set up correctly and that you’ve carefully considered the security implications of Anonymous Access.

**Note** This is not possible in Office 365 MT and Office 365 Dedicated sites.

## Introduction

In the event that the site administrator creates a new web application that includes a site collection that uses the Publishing template and enables Anonymous Access in **Site Settings > Site Permissions**, Anonymous Access will be available to every user of the site once the application is created in Visual Studio and uploaded to the app catalog.

Since Anonymous Access is enabled for the on-premises SharePoint Publishing site, what happens if a user who is not authenticated navigates to the site?

If you create a SharePoint-hosted app and add a client app part to the project, navigate to **Central Administration > Apps > Manage App Catalog** and create an app catalog for the web application, publish the SharePoint-hosted app in Visual Studio to create the .app package, and then upload the .app package to the app catalog, the site collection administrator can add the app to the Publishing site. Once the administrator adds the app to the Publishing site, the app is now available to add to a page on the Publishing site.

If you edit the main page of the Publishing site and publish the app to it, the app works as expected.

Clicking on the linked title of the app loads the full-page experience, and SharePoint throws an error. This error means that the anonymous user does not have access to use the CSOM.

This makes sense because CSOM and REST are not available by default to anonymous users.

## Disabled Use Remote Interfaces permissions can introduce a security risk

In **Site Permissions**, there is a **Require Use Remote Interfaces permission** checkbox. It is checked by default.

You can uncheck the **Use Remote Interfaces permission** check box and anonymous users have access to use CSOM and REST. Unchecking **Use Remote Interfaces permission** decouples the user from Use Remote Interfaces permissions, which grants the user access to SOAP, WebDAV, and CSOM. Unchecking the check box also removes the ability to use SharePoint Designer.

There may be times when you want to remove the ability to use SharePoint Designer, but still permit the use of CSOM. The **Use Remote Interfaces permission** check box enables you to let anonymous users access use of CSOM without requiring them to actually have Use Remote Interfaces permissions.

When the **Use Remote Interfaces permission** check box is unchecked, and you click the linked title of the app to load the full-page experience, SharePoint does not throw an error. Basic error handling code interprets this case *as an anonymous user*.

**Warning** When adding apps to public-facing SharePoint sites that use the Publishing template, do not uncheck the **Use Remote Interfaces permissions** check box in Site Permissions. Enabling the use of CSOM for anonymous users presents a possible information disclosure risk—it divulges much more information than you would anticipate. That said, even with access to the full CSOM, SharePoint permissions still apply. Anonymous users will only be able to see lists or items that have been explicitly made available to anonymous users. More than what you see on the webpage is available to anonymous users via CSOM and REST.

## ViewFormPagesLockdown feature

To prevent users from accessing forms pages (i.e., **Pages/Forms/AllItems.aspx**) in a public-facing SharePoint site, use the ViewFormPagesLockdown feature. It is designed to prevent users from seeing Created By and Modified By information. This feature removes the permission to View Application Pages or Use Remote Interfaces. When this feature is active, users cannot go to **Pages/Forms/AllItems.aspx** and view items in that library.

If CSOM and REST are available to all anonymous users—as they would be if the Use Remote Interfaces permissions check box is unchecked—then while they still can’t see Created By and Modified By information in the browser, they can use CSOM or REST to access that information.

## Security trimming

By configuring anonymous access for the web application, you specify the anonymous policy: *Deny write—Has no write access*. This means that users with anonymous access can’t write to the site—even with CSOM or REST code. Anonymous users can only see the information that was granted to them when anonymous access to the site was configured.

Unpublished pages are, by default, not visible to anonymous users. They can only see lists that enable anonymous access.

**Important** In the event that the **Use Remote Interfaces permissions** checkbox is unchecked, use the permissions model and other precautions to be sure that anonymous users don’t have access to things that they should not.

## Denial of service attacks

There is no caching with CSOM. This means that a malicious attacker could in theory query thousands of items from lists simultaneously, all while staying under the default list view threshold and taxing the SharePoint database. Conceivably, this could spread and escalate into a full-blown denial of service attack.

## App-only policy

You can use app-only policy with provider-hosted apps. App-only policy permits the app to perform actions that the current user is not authorized to perform. For example, a user with read-only permissions is not be able to write to a list can use an app with app-only permissions to write to a list.

[Authorization and authentication for apps in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/fp142384%28v=office.15%29.aspx)

[Understanding authentication and permissions with apps for SharePoint and Office](http://channel9.msdn.com/Events/Build/2013/3-603) (video)

## SSL is required

When using the app model, implement the Secure Sockets Layer (SSL) protocol to manage security of message transmissions on the Internet. SSL works by the remote web site sending an access token in the HTTP header “Authorization” with a value of “Bearer “ + a base64 encoded (*not* encrypted) string.

**Important** SSL protects your SharePoint publishing site from attackers who want to get to an Authorization token and exploit that access.

## Conclusion

Before you use apps for SharePoint and CSOM to customize site branding and provision site features that are specific to a SharePoint on-premises Publishing site, first ensure that the security and permissions are clearly and logically designed.

**Caution** Unless absolutely necessary, never uncheck the **Require Use Remote Interfaces permission** checkbox when Anonymous Access permissions are enabled on a SharePoint on-premises Publishing site. Doing so could expose both published and unpublished site content to anonymous users, and could leave your site open to a Denial of Service attack.

# Remote provisioning and Publishing sites

You can use the remote provisioning practices described and demonstrated in Module 5 to provision branding and other customizations to SharePoint Publishing sites.

Publishing sites largely depend on content types and the **ContentTypeId**, which links content types to page layouts and display templates. Customizing and provisioning SharePoint Publishing page content depends on this functionality

Other aspects of custom Publishing site provisioning behavior, such as managed metadata services and managed navigation, do not depend on **ContentTypeId** and are fully supported in CSOM.

Other Publishing site customization options, such as device channels and display templates, don’t require custom CSOM. They depend on Design Manager features, CSS, and HTML; and are post-provisioning customizations that most likely you will build from scratch and have no need to migrate.

# Managed metadata in SharePoint 2013 and SharePoint Online

The managed metadata feature, first introduced in SharePoint 2010, enables you define custom hierarchy of metadata tags for use in SharePoint. This section provides a light introduction to managed metadata mainly for those interested in creating a custom site navigation using the managed navigation feature, which is built on the managed metadata infrastructure.

A taxonomy is a hierarchical classification of words, labels, or terms that are organized into groups based on similarities. The smallest unit in a SharePoint taxonomy is the term. Terms can be grouped into *term sets*—commonly done by affinity. Term sets can be grouped by affinity into larger *groups*. See [A brief introduction to Enterprise Managed Metadata in SharePoint 2010](http://msdn.microsoft.com/en-us/library/office/ee832800(v=office.14).aspx) and [Introduction to managed metadata in SharePoint 2010](http://office.microsoft.com/en-us/sharepoint-server-help/introduction-to-managed-metadata-in-sharepoint-server-2010-HA101859256.aspx) for brief overviews of taxonomy features. While new APIs and functionality were introduced to the managed metadata feature set in SharePoint 2013, these articles provide a basic introduction that you can build on.

## The managed metadata programming model

For SharePoint 2013, the .NET server programmability model for managed metadata is defined in a set of namespaces: [Microsoft.SharePoint.Taxonomy](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy(v=office.15).aspx), [Microsoft.SharePoint.Taxonomy.ContentTypeSync](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy.contenttypesync(v=office.15).aspx), [Microsoft.SharePoint.Taxonomy.Generic](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy.generic(v=office.15).aspx), [Microsoft.SharePoint.Taxonomy.OM.CodeBehind](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy.om.codebehind(v=office.15).aspx), [Microsoft.SharePoint.Taxonomy.Upgrade](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy.upgrade(v=office.15).aspx), and [Microsoft.SharePoint.Taxonomy.WebServices](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.taxonomy.webservices(v=office.15).aspx).

The equivalent CSOM classes are in the [Microsoft.SharePoint.Client.Taxonomy](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy(v=office.15).aspx) namespace.

### Key differences between the SSOM and CSOM managed metadata programming models

Unlike some other areas of the SharePoint object model, there is considerable one-to-one affinity between the .NET server programming model classes and members and the CSOM classes and members for managed metadata.

Here are some key differences:

* Content type synchronization is not supported in CSOM.
* The **Group** class, which represents the top layer of organization in the **TermStore**, is only available in the .NET server object model. Its equivalent in CSOM is the **TermGroup** class.
* The **GroupCollection** class, which represents a collection of Group objects, is only available in the .NET server object model. Its equivalent in CSOM is the **TermGroupCollection** class.
* CSOM includes \***MatchInformation** classes that keep custom property and label data in sync with the server.

[Managed navigation in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163978(v=office.15).aspx)

Table 2 compares classes in the .NET server object model and the CSOM object model.

**Table 2. Taxonomy object model comparison**

|  |  |
| --- | --- |
| **SSOM** | **CSOM** |
| [ChangedGroup](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedgroup(v=office.15).aspx) | [ChangedGroup](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedgroup(v=office.15).aspx) |
| [ChangedItem](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changeditem(v=office.15).aspx) | [ChangedItem](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changeditem(v=office.15).aspx) |
| [ChangedItemCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changeditemcollection(v=office.15).aspx) | [ChangedItemCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changeditemcollection(v=office.15).aspx) |
| [ChangedItemType](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changeditemtype(v=office.15).aspx) | [ChangedItemType](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changeditemtype(v=office.15).aspx) |
| [ChangedOperationType](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedoperationtype(v=office.15).aspx) | [ChangedOperationType](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedoperationtype(v=office.15).aspx) |
| [ChangedSite](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedsite(v=office.15).aspx) | [ChangedSite](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedsite(v=office.15).aspx) |
| [ChangedTerm](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedterm(v=office.15).aspx) | [ChangedTerm](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedterm(v=office.15).aspx) |
| [ChangedTermSet](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedtermset(v=office.15).aspx) | [ChangedTermSet](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedtermset(v=office.15).aspx) |
| [ChangedTermStore](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.changedtermstore(v=office.15).aspx) | [ChangedTermStore](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changedtermstore(v=office.15).aspx) |
|  | [ChangeInformation](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.changeinformation(v=office.15).aspx) |
|  | [CustomPropertyMatchInformation](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.custompropertymatchinformation(v=office.15).aspx) |
| [FeatureIds](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.featureids(v=office.15).aspx) |  |
| [Group](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.group(v=office.15).aspx) |  |
| [GroupCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.groupcollection(v=office.15).aspx) |  |
| [HiddenListFullSyncJobDefinition](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.hiddenlistfullsyncjobdefinition(v=office.15).aspx) |  |
| [ImportManager](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.importmanager(v=office.15).aspx) |  |
| [Label](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.label(v=office.15).aspx) | [Label](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.label(v=office.15).aspx) |
| [LabelCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.labelcollection(v=office.15).aspx) | [LabelCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.labelcollection(v=office.15).aspx) |
|  | [LabelMatchInformation](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.labelmatchinformation(v=office.15).aspx) |
| [MobileTaxonomyField](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.mobiletaxonomyfield(v=office.15).aspx) | [MobileTaxonomyField](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.mobiletaxonomyfield(v=office.15).aspx) |
| [StringMatchOption](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.stringmatchoption(v=office.15).aspx) | [StringMatchOption](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.stringmatchoption(v=office.15).aspx) |
| [TaxonomyField](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyfield(v=office.15).aspx) | [TaxonomyField](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.taxonomyfield(v=office.15).aspx) |
| [TaxonomyFieldControl](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyfieldcontrol(v=office.15).aspx) |  |
| [TaxonomyFieldEditor](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyfieldeditor(v=office.15).aspx) |  |
| [TaxonomyFieldValue](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyfieldvalue(v=office.15).aspx) | [TaxonomyFieldValue](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.taxonomyfieldvalue(v=office.15).aspx) |
| [TaxonomyFieldValueCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyfieldvaluecollection(v=office.15).aspx) | [TaxonomyFieldValueCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.taxonomyfieldvaluecollection(v=office.15).aspx) |
| [TaxonomyItem](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyitem(v=office.15).aspx) | [TaxonomyItem](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.taxonomyitem(v=office.15).aspx) |
| [TaxonomyItemPicker](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyitempicker(v=office.15).aspx) |  |
| [TaxonomyRights](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomyrights(v=office.15).aspx) |  |
| [TaxonomySession](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomysession(v=office.15).aspx) | [TaxonomySession](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.taxonomysession(v=office.15).aspx) |
| [TaxonomyWebTaggingControl](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.taxonomywebtaggingcontrol(v=office.15).aspx) |  |
| [Term](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.term(v=office.15).aspx) | [Term](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.term(v=office.15).aspx) |
| [TermCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termcollection(v=office.15).aspx) | [TermCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termcollection(v=office.15).aspx) |
|  | [TermGroup](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termgroup(v=office.15).aspx) |
|  | [TermGroupCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termgroupcollection(v=office.15).aspx) |
| [TermProperty](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termproperty(v=office.15).aspx) |  |
| [TermPropertyToolPart](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termpropertytoolpart(v=office.15).aspx) |  |
| [TermSet](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termset(v=office.15).aspx) | [TermSet](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termset(v=office.15).aspx) |
| [TermSetCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termsetcollection(v=office.15).aspx) | [TermSetCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termsetcollection(v=office.15).aspx) |
| [TermSetItem](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termsetitem(v=office.15).aspx) | [TermSetItem](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termsetitem(v=office.15).aspx) |
| [TermStore](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termstore(v=office.15).aspx) | [TermStore](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termstore(v=office.15).aspx) |
| [TermStoreCollection](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termstorecollection(v=office.15).aspx) | [TermStoreCollection](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.taxonomy.termstorecollection(v=office.15).aspx) |
| [TermStoreOperationException](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.termstoreoperationexception(v=office.15).aspx) |  |
| [TreeControl](http://msdn.microsoft.com/en-US/library/office/microsoft.sharepoint.taxonomy.treecontrol(v=office.15).aspx) |  |

# Page layouts

For Publishing sites, the page layout defines the layout of a specific class of pages. It defines also defines the customizable regions of a page with content placeholders, which are filled in by content from matching regions on page layouts.

Page layouts are usually based on a custom content type. Content types define custom content fields that you want to display on a page. Usually, you’ll create a custom content type that includes fields that map to the page design you or your design team had previously planned.

Custom field controls can include text, images, video, or other types of content. SharePoint provides standard out-of-the-box content types for Article, Catalog, Welcome Page, and more—access the page layout content types by navigating to **Site Settings > Site Content Types**. These out-of-the-box page layout content types can serve as parent content types for a custom content type you create. The custom content type inherits properties from the parent content type.

All page layout content types inherit from the Page content type. After you create a custom content type, SharePoint displays the columns that the new content type inherited from the Page content type. You can add new site columns to represent new custom fields that you want to display in your page layout.

Specify a type for each site column. A type is a value such as “single line of text” or “Full HTML”. Consider factors like the degree of descriptiveness or control that the user should have when working with the field when specifying its type.

After you’ve created all of the fields that store the content in your page layout, you can [create the page layout in Design Manager](http://msdn.microsoft.com/en-us/library/office/jj822368%28v=office.15%29.aspx). After you create the page layout, publish it by navigating to **Site Settings > Master pages and page layouts**. An HTML file and an ASPX file are present. The HTML file is the master, and you can edit it using any HTML editor. After you save the file and publish it, Design Manager incorporates changes and converts the updated HTML file to ASPX format, which SharePoint uses to render the page.

To publish the page layout, select the HTML file and click **Publish** in the ribbon.

**Note** See Module 2 for more background information on the SharePoint page model.

To create a page based on the new layout, go to New Page. Navigate to **Page > Page Layouts** to see the new page layout in the list of available page layouts. When you choose the new page layout, you should see all of the new fields you specified when creating a new content type for the new page layout.

If you view the page and the HTML isn’t rendering how you expect, you can edit the HTML. Using Design Manager, you can edit the HTML file in any HTML editor and then use Design Manager to upload the updated file.

[How to: Apply styles to page fields in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/dn205272.aspx)

[How to: Create a page layout in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/office/jj822368%28v=office.15%29.aspx)

[How to: Customize page layouts for a catalog-based site in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/dn144674(v=office.15).aspx)

[How to: Map a network drive to the SharePoint 2013 Master Page Gallery](http://msdn.microsoft.com/en-us/library/office/jj733519%28v=office.15%29.aspx)

# Site navigation in SharePoint 2013 and SharePoint Online

Navigation elements on SharePoint pages are customizable. Navigation functionality enables users of a site to move between elements of the site structure, including subsites and pages. A SharePoint site can contain links to targets in SharePoint or external to the site.

## Global and current navigation

Global navigation refers to navigation elements that help users move from one SharePoint site to another. Local navigation refers to navigation within a SharePoint site.

## Structured navigation

Structured navigation is a static approach to implementing navigation on SharePoint sites. It is usually developed to match the company’s structure, which requires restructuring the SharePoint site navigation. Restructuring work often means moving subsite and/or pages, and refreshing links to point to new targets.

Structured navigation may be sufficient for fairly flat, shallow site structures if your company structure (and therefore, site structure) is stable for long periods of time. For deeper and more complex site structures, and companies with Publishing site navigation structures that need to grow and change dynamically, managed navigation may be the better option.

[How to: Customize navigation in SharePoint 2010](http://msdn.microsoft.com/en-us/library/office/ms558975%28v=office.14%29.aspx) (structured navigation)

## Managed navigation

Managed navigation is built on the core Publishing site and Taxonomy infrastructure. Managed navigation is bound to a single site collection. It uses term sets and terms to define global and local navigation. For example, you can create a term set that defines global navigation overall, and then add terms to that term set for specific navigation elements in the global navigation.

[Managed navigation in SharePoint 2013](http://msdn.microsoft.com/en-us/library/office/jj163978%28v=office.15%29.aspx)

[Overview of managed navigation in SharePoint 2013](http://technet.microsoft.com/en-us/library/dn194311%28v=office.15%29.aspx)

### Navigation object model overview

The following notes sketch out some key high-level points about classes, methods, and properties in the SharePoint navigation extensibility model for Publishing sites. For more information, click the links to class topics in Table 3 and explore notes about the classes and members that interest you.

**NavigationTerm** and **NavigationTermSet** classes add properties and methods that are specific to managed navigation. Additional state is stored in the **CustomProperties** property of the **NavigationTerm** class.

**NavigationTerm** and **NavigationTermSet** classes have two modes: “editable” and “read-only”. In the .NET server object model, **NavigationTerm** objects are stored in the taxonomy navigation cache, which can only be accessed by functions in the **TaxonomyNavigation** static class.

**PortalSiteMapNodeProvider** objects in the .NET server object model provide an interface between the data-driven site navigation features and site map data sources. Usually, a developer will write a custom site map node provider to store site maps in an XML file or a data format that’s not supported by SharePoint by default.

CSOM includes some unique classes and enumerations that are worth noting:

* The **NavigationLinkType** enumeration defines the type of navigation node in a navigation tree. You can specify a node as a root node, a friendly URL, or a standard link.
* The **StandardNavigationScheme** enumeration identifies the navigation as either global navigation or local navigation.
* The **StandardNavigationSource** enumeration includes three choices for both global navigation and local navigation. Each choice represents a state that corresponds to the configuration of underlying providers.
* The **StandardNavigationSettings** class manages the global and local navigation schemes.

**Table 3. Publishing navigation classes in SSOM and CSOM**

|  |  |
| --- | --- |
| **SSOM** | **CSOM** |
| [CachedObjectSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.cachedobjectsitemapnode%28v=office.15%29.aspx) |  |
| [NavigationComparer](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.navigationcomparer%28v=office.15%29.aspx) |  |
|  | [NavigationLinkType](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationlinktype(v=office.15).aspx) |
| [NavigationTerm](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.navigationterm%28v=office.15%29.aspx) | [NavigationTerm](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationterm(v=office.15).aspx) |
|  | [NavigationTermCollection](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationtermcollection(v=office.15).aspx) |
| [NavigationTermSet](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.navigationtermset%28v=office.15%29.aspx) | [NavigationTermSet](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationtermset(v=office.15).aspx) |
| [NavigationTermSetItem](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.navigationtermsetitem%28v=office.15%29.aspx) | [NavigationTermSetItem](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationtermsetitem(v=office.15).aspx) |
| [NavigationTermSetView](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.navigationtermsetview%28v=office.15%29.aspx) | [NavigationTermSetView](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.navigationtermsetview(v=office.15).aspx) |
| [PortalHierarchicalDataSourceView](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalhierarchicaldatasourceview%28v=office.15%29.aspx) |  |
| [PortalHierarchicalEnumerable](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalhierarchicalenumerable%28v=office.15%29.aspx) |  |
| [PortalHierarchyData](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalhierarchydata%28v=office.15%29.aspx) |  |
| [PortalListItemSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portallistitemsitemapnode%28v=office.15%29.aspx) |  |
| [PortalListSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portallistsitemapnode%28v=office.15%29.aspx) |  |
| [PortalNavigation](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalnavigation%28v=office.15%29.aspx) |  |
| [PortalSiteMapDataSource](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalsitemapdatasource%28v=office.15%29.aspx) |  |
| [PortalSiteMapDataSourceSwitch](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalsitemapdatasourceswitch%28v=office.15%29.aspx) |  |
| [PortalSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalsitemapnode%28v=office.15%29.aspx) |  |
| [PortalSiteMapProvider](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalsitemapprovider%28v=office.15%29.aspx) |  |
| [PortalWebSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.portalwebsitemapnode%28v=office.15%29.aspx) |  |
| [ProxySiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.proxysitemapnode%28v=office.15%29.aspx) |  |
| [SiteNavigationSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.sitenavigationsettings%28v=office.15%29.aspx) |  |
| [SiteNavigationSettingsWriter](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.sitenavigationsettingswriter%28v=office.15%29.aspx) |  |
| [SPNavigationSiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.spnavigationsitemapnode%28v=office.15%29.aspx) |  |
|  | [StandardNavigationScheme](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.standardnavigationscheme(v=office.15).aspx) |
|  | [StandardNavigationSource](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.standardnavigationsource(v=office.15).aspx) |
|  | [SiteMapProviderSettingsCollection](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.sitemapprovidersettingscollection(v=office.15).aspx) |
|  | [StandardNavigationSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.standardnavigationsettings(v=office.15).aspx) |
|  | [SwitchableSiteMapProviderSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.switchablesitemapprovidersettings(v=office.15).aspx) |
| [TaxonomyNavigation](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomynavigation%28v=office.15%29.aspx) | [TaxonomyNavigation](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.taxonomynavigation(v=office.15).aspx) |
| [TaxonomyNavigationCacheConfig](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomynavigationcacheconfig%28v=office.15%29.aspx) |  |
| [TaxonomyNavigationCacheStatistics](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomynavigationcachestatistics%28v=office.15%29.aspx) |  |
| [TaxonomyNavigationContext](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomynavigationcontext%28v=office.15%29.aspx) |  |
| [TaxonomySiteMapNode](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomysitemapnode%28v=office.15%29.aspx) |  |
| [TaxonomySiteMapProvider](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.taxonomysitemapprovider%28v=office.15%29.aspx) |  |
|  | [TaxonomySiteMapProviderSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.taxonomysitemapprovidersettings(v=office.15).aspx) |
| [WebNavigationSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.publishing.navigation.webnavigationsettings%28v=office.15%29.aspx) | [WebNavigationSettings](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation.webnavigationsettings(v=office.15).aspx) |

[Managed navigation in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/office/jj163978(v=office.15).aspx)

[Microsoft.SharePoint.Client.Publishing.Navigation](http://msdn.microsoft.com/en-us/library/office/microsoft.sharepoint.client.publishing.navigation(v=office.15).aspx)

# Publishing site features and the Publishing CSOM

SharePoint 2013 and SharePoint Online include a few features that are specific to SharePoint Publishing sites.

* Device Channels enable you to target a single Publishing site design to multiple devices and browsers.
* Display templates make it possible to brand and customize the appearance of Search-related Web Parts.
* Image renditions defines the dimensions that are used to display images on pages in SharePoint 2013 Publishing sites

This section describes features that are available for use in the [Microsoft.SharePoint.Client.Publishing](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.publishing%28v=office.15%29.aspx) namespace of the CSOM programming model.

## Device channels and device channel panels

Today, browsing a site on a mobile device is a common scenario. You can use device channels and Device Channel Panels to optimize your site for smart phone and tablet consumption. By creating a unique channel for each device you want to target, you can render a SharePoint Publishing site in more than one way—author a single site only once, and map the site and its content to different master pages and style sheets to different targets.

### Device channels

Create channels in the Design Manager. After you create a channel, map it o the mobile device or browser with the user agent string of the incoming device.

A device can belong to more than one channel. In that event, you can rank channels in the event that a device belongs. For example, if you create channels for “smartphones” and another for a specific device configuration, you can rank the channels so that devices with the specific configuration get the channel specifically for them, while all other smart phones get the “smartphones” channel.

Including the default channel, you can create up to ten channels in Design Manager. The “default” channel captures all traffic not caught by one of the other channels. When you create a new channel, the following fields are required.

* **Name**: Identifies this channel and distinguish it from others.
* **Channel alias**: How code, the query string, cookies, or Device Channel Panels distinguish differences between channels.
* **Device Inclusion Rules**: The user-agent substrings that direct requests from devices (each should be on a different line).

You can also complete the following fields:

* **Description**: Describes what this channel does.
* **Active**: When checked, the channel uses the related assets for the channel to direct traffic. Otherwise, the query string ?DeviceChannel=<alias> previews the site in the channel.

After you create device channels, map a master page to each one. Since master page customizations are increasingly rare, this is often the default out-of-the-box master page (i.e., seattle.master). If you create a unique master page for one or more device channels, you can reference a different CSS file than the master page for the default channel. Page layouts you create will work with every channel you create. You can the Device Channel Panel control to differentiate page layout designs between channels.

[Device Channels in SharePoint 2013](http://msdn.microsoft.com/en-us/library/jj862343.aspx)

### Device channel panels

The device channel panel is a container control that is mapped to one more channels. You can add a device channel panel control to a page layout, and the panel will control what content is rendered in each channel. When one or more of those channels are active when the page is rendered, all of the contents of the device channel panel are rendered. Use the device channel panel to determine when to include specific content for one or more specific channels.

Consider a page layout that includes ten fields. Some of those fields are available to all channels, and several are only intended to be rendered to specific channels. For example, consider a “mobile header banner” field that only renders on smartphones, or a large custom sidebar that should only be rendered on desktops and tablets.

You can also use the device channel panel to change the styling and placement of content on a page by adding channel-specific CSS to the device channel panel

[How to: Add a Device Channel Panel snippet in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/office/jj862340%28v=office.15%29.aspx)

[How to: Brand snippets by using CSS in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/office/dn205275%28v=office.15%29.aspx)

### User-agent strings and device channels

A user-agent string is a small string of data that identifies the browser. This information can be sent to the server, which identifies the user agent.

[What will Windows Internet Explorer report as the user-agent string?](http://msdn.microsoft.com/en-us/library/cc817582.aspx)

Device channels assign a request to a corresponding device channel based on the user-agent string (or substrings) of the device (or browser) the user is browsing from. The front-end web developer creates and sets up channels to capture traffic.

### Order of resolution for device channels

When creating multiple channels, put them in the order in which you want them to resolve. The first channel that includes a device inclusion rule that matches the user agent string is used.

**Table 4. Example: Order of resolution for device channels**

|  |  |  |
| --- | --- | --- |
| **Channel** | **Order 1** | **Order 2** |
| 1 | Windows Phone 8 | Windows Phone |
| 2 | Windows Phone | Windows Phone 8 |
| 3 | Default | Default |

If order 1 is active, a user requesting a page from a Windows 8 phone receives device channel 1 labeled **Windows Phone 8**. A user with any other Windows phone would use channel 2, and everything else would use channel 3. However, using order 2, a user requesting a page from a Windows 8 phone would always receive device channel 1 labeled **Windows Phone** and would never use the device channel specified for it.

After you define and order device channels in the applicable order, you can apply different master pages to each channel. By default, all channels will use the master page of the default channel.

There is no public API for manipulating device channels and device channel panels in CSOM.

## Display Templates

SharePoint Publishing sites use display templates control which managed properties are shown in the search results, and how they appear in the Web Part. Only Search Web parts use display templates—the Content Query Web Part is not a Search Web Part, and does not use display templates.

Table 5 lists the types of display templates, in the order in which SharePoint applies them.

**Table 5. Display templates**

|  |  |
| --- | --- |
| **Display template** | **Notes** |
| Control Display templates | The Control display template applies to the entire web part, so SharePoint applies it first, and only once. It provides HTML that structures the overall layout for presenting search results. For example, a control display template might provide HTML for the heading and the beginning and end of a list. This template is rendered only once in the Web Part. |
| Group Display templates | The Group display template is applied next, and is applies once per group to the Search Results Web Part. |
| Item Display templates | The Item Display template is applied last unless a Filter Display template is applied. Item Display templates are applied to each item. This template determines how each item in the result set is displayed in the Web Part. For example, it might provide the HTML for a list item that is plain text, a list item that contains a picture, or a list item that formats a block of additional links and summary description information to help provide more context for the search results. |

SharePoint stores display templates in the **Display Templates** folder in the **Master Page Gallery**. Each display template is associated with a content type in the Master Page Gallery. To identify the content type for each display template file while using a mapped drive is to use the file name.

The event receivers that convert and update master pages and page layouts from HTML to JavaScript also convert display templates from HTML to JavaScript. The conversion and synching is unidirectional—it does not convert from JavaScript back to HTML.

There is no public API for manipulating display templates in the object model.

### Display template structure

Each display template contains a title, a header that contains custom elements bounded by a <mso:CustomDocumentProperties> tag, a <body> tag that contains a script block and a <div> tag.

The custom document properties provide important information to SharePoint about the display template. Each display template is associated with a content type, which is identified by <ContenTypeId>. You can set other properties that determine whether to hide or show the template in the list of available display templates for the Web Part, the HTML to JavaScript managed property mapping, the context in which the display template is used, whether a .js file is currently associated with the display template HTML, and whether the conversion from HTML to JavaScript was successful or if warnings and errors were produced.

From within the <script> tag, you can reference external CSS or JavaScript files outside if the main display templates HTML file.

If [Content Approval is required in the Master Page Gallery](http://office.microsoft.com/en-us/sharepoint-help/require-approval-of-items-in-a-site-list-or-library-HA102853936.aspx), all CSS, JavaScript, and other resources files must be published before they are available to master pages and page layouts.

The <div> tag contains an ID that matches the name of the display template HTML file. Place CSS or JavaScript that you want to include that customizes how this Web Part is displayed must be placed in the <div> block.

### Display template processing

SharePoint defines display templates in HTML files and JavaScript. If in Design Manager you change an HTML file that contains a display template definition and save changes, SharePoint compiles changes into a JavaScript file that has the same name. SharePoint uses this JavaScript file to render Web Parts on pages.

**Important** Never directly edit the JavaScript file containing the display template definition. Only update the HTML file.

**Important** The conversion process requires the HTML file to be XML-compliant. For example, use <br>, not <br/>.

[How to: Convert an HTML file to a master page in SharePoint Server 2013](http://msdn.microsoft.com/en-us/library/office/jj822370(v=office.15).aspx)

### Creating new display templates

The easiest way to create a new display template is to modify an existing template. Different display templates change the appearance of different search-related Web Parts, including the Content Search Web Part, Refinement Web Part, Taxonomy Refinement Web Part, and the Search Results Web Part.

[SharePoint 2013 Design Manager display templates](http://msdn.microsoft.com/en-us/library/office/jj945138%28v=office.15%29.aspx)

[Configure Search Web Parts in SharePoint Server 2013](http://technet.microsoft.com/en-us/library/jj679900%28v=office.15%29.aspx)

[Configure properties of a Refinement Web Part in SharePoint Server 2013](http://technet.microsoft.com/en-us/library/gg549985%28v=office.15%29.aspx)

[Display template reference for SharePoint Server 2013](http://technet.microsoft.com/en-us/library/jj944947%28v=office.15%29.aspx)

### Properties that can be used in display templates

Before you start to identify properties that you can use in a display template, locate an existing display template you want to build from and then save it with a new name.

Display template code is located within the <mso:ManagedPropertyMapping> . . . </mso:ManagedPropertyMapping> tag.

<mso:ManagedPropertyMapping msdt:dt="string">'Picture URL'{Picture URL}:'PublishingImage;PictureURL;PictureThumbnailURL','Link URL'{Link URL}:'Path','Line 1'{Line 1}:'Title','Line 2'{Line 2}:'Description','Line 3'{Line3}:'','SecondaryFileExtension','ContentTypeId'</mso:ManagedPropertyMapping>

Next, open **Site Settings > Search Schema**, and then search for a column name in the **Managed property** filter box that you want to include in a display template. Select the managed property, then edit and copy the property name. For example:

<mso:ManagedPropertyMapping msdt:dt="string">'Picture URL'{Picture URL}:'PublishingImage;PictureURL;PictureThumbnailURL','Link URL'{Link URL}:'Path','Line 1'{Line 1}:'Title','Line 2'{Line 2}:'Description','Line 3'{Line3}:'','owsTXTPrice','owsTXTColor'</mso:ManagedPropertyMapping>

**Note** In this example, PictureURL is mapped to the first managed property that is present when search is getting results for PublishingImage, PictureURL, or PictureThumbnailURL.

## Image renditions

An [image rendition](http://msdn.microsoft.com/en-us/library/office/jj720398(v=office.15).aspx) defines the dimensions that are used to display images on pages in SharePoint 2013 Publishing sites.

Image renditions can be instantiated and manipulated using the client CSOM. You can specify metadata such as the height, width, name, and version of an image rendition via the [ImageRendition class in the CSOM](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.publishing.imagerendition(v=office.15).aspx). You can use methods and properties in the [SiteImageRenditions class](http://msdn.microsoft.com/en-us/library/microsoft.sharepoint.client.publishing.siteimagerenditions(v=office.15).aspx) read and write image renditions from a site collection.

# SharePoint and common web programming techniques

Frequently, SharePoint designers and developers express an interest in using standard web programming techniques with SharePoint—particularly when they are designing Publishing sites.

## Responsive design

Device channels—described earlier in this document—is a SharePoint 2013 feature that makes it possible build a site once and target it to render correctly on specific devices and browsers.

The web development community uses *responsive design* and the “fluid grid” approach to managing how layouts render, to design sites to render correctly on any browser or device. In a responsive design, elements on a page rearrange themselves to fit the user’s device and screen orientation (portrait or landscape).

Responsive design is based on the media queries feature in CSS3. It uses media queries to match the width of the device’s display and then applies styles on the client side to render the content. Media queries make it possible for a designer to target specific site properties, such as screen width. You can use media queries to create flexible layouts and images, and conditionally call CSS file alternatives.

Members of the SharePoint community have developed [responsive design solutions](http://responsivesharepoint.codeplex.com/) (CodePlex) and tested them with SharePoint. We’ve also [written about responsive design on the SharePoint Developer blog](http://blogs.msdn.com/b/sharepointdev/archive/2013/04/01/implementing-your-responsive-designs-on-sharepoint-2013.aspx).

## Adaptive design

Adaptive web design (sometimes called “adaptive web delivery”) is very similar to responsive web design. An adaptive design listens for devices or browsers and chooses how to optimally render pages.

The device channels feature in SharePoint 2013 is an adaptive design—it delivers adaptive layouts to each device based on page layout, the specifications of each device channel, and in the ordering defined in the device channel panel.

## Using device channels and responsive design together

You can use device channels and responsive web design techniques together to build a responsive public-facing SharePoint Publishing site. Consider creating a single custom master page for devices, such as phones and tablets, and another for web browsers, and associate each one with a device channel. Then, use fluid grids, flexible images, and CSS3 media queries to craft the best viewing experience for each device and browser your site needs to support.

# Adding jQuery to a SharePoint site

There are several ways to add jQuery to a SharePoint site. You can include jQuery at the site level, page level, or within sections of a page—such as one of the page regions described in Module 2, or in a Web Part you’ve added to the page layout.

You can use a custom action to load jQuery from a Document Library. Do this if you need to make jQuery available to all pages in a SharePoint site. While this approach is flexible, it’s not easily governed, which affects both the site designer and the administrator. JavaScript files can be stored in the Document Library and maintained without requiring the intervention of a site administrator, but without governance, they can also be accidentally modified or deleted. This approach is worth noting because while it is possible; it is not recommended.

You can also load jQuery from the SharePoint root by using **ScriptLinkControl**. You can use the control to insert scripts that are running on a remote site—you can modify the scripts without having to touch the SharePoint installation at all. The **ScriptLinkControl** approach makes sense when you want to use jQuery on an application page or in Web Part that is displayed on a page. While provisioning with this option is slow and will impact performance because jQuery is added to one page at a time, deploying the jQuery file to the SharePoint rule circumvents other legacy requirements. This last point may be attractive if you need to migrate your SharePoint 2013 full-trust code (FTC) solution to CSOM, and as part of the job migration includes moving and refactoring custom JavaScript and jQuery behaviors.

Finally, you can load jQuery from a Content Delivery Network (CDN) using the Content Editor Web Part. This is useful if you need to add jQuery to one or a few pages—including Wiki and Web Part pages. Since you’re loading the jQuery file from a CDN, you don’t need to store extra files on the SharePoint server, and users get the benefit of a distributed, cached version of the jQuery files. SharePoint calls the jQuery file from the CDN, and you can add custom jQuery code that you author to the Content Editor Web Part.

# Building SharePoint provider-hosted apps with ASP.NET MVC 5

You can build custom provider-hosted apps with model-view-controller (MVC) pattern in SharePoint. This model separates the application into three interconnected parts that separate the internal representations of information from the way they are viewed and accepted by the user.

The model represents the underlying structure of the software (the “is”), the view (usually user interface elements that show what the model is), and the controller—the classes that connect the model and the view.

You can wrap ASP.NET .mvc content in SharePoint Sites master page content. In fact, you can use Office 365 APIs to create a SharePoint 2013 app with ASP.NET MVC 5.

APIs for MVC for SharePoint development are defined in **Filters\SharePointContextFilterAttribute.cs** and **SharePointContext.cs**. These APIs wrap the steps that the web project takes to seamlessly communicate to SharePoint in a single call, so that the logic you need to implement is much simpler.

The SharePoint Context Filter attribute performs additional processing to get standard information when redirected from SharePoint to your remote web application, such as Host Web Url. It also determines whether the app needs to be redirected to SharePoint for the user to sign in (e.g., bookmarks). You can apply this filter either to the controller or to a view.

SharePoint Context classes encapsulate all the information from SharePoint so that you can create specific contexts for the app web and host web immediately and communicate with SharePoint.

[ASP.NET MVC Overview](http://www.asp.net/mvc/overview)

[Introducing MVP support for apps for SharePoint](http://blogs.msdn.com/b/officeapps/archive/2013/07/09/introducing-mvc-support-for-apps-for-sharepoint.aspx) (Chakkaradeep Chandran)

# Conclusion

This module described important considerations for working with CSOM in SharePoint Publishing sites. It also included guidance for page layouts, provided a brief overview of managed metadata and site navigation options and CSOM programmability, and briefly explored the connection between common web programming patterns such as responsive design and MVC, and SharePoint.