



Core Solutions of Microsoft SharePoint Server 2013



Exam Ref

70-331

Troy Lanphier

Exam Ref 70-331



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- Create and Configure Web Applications and Site Collections
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Core Solutions of Microsoft SharePoint Server 2013

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Troy Lanphier

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To Marlene—none of this would be possible without you believing in me.

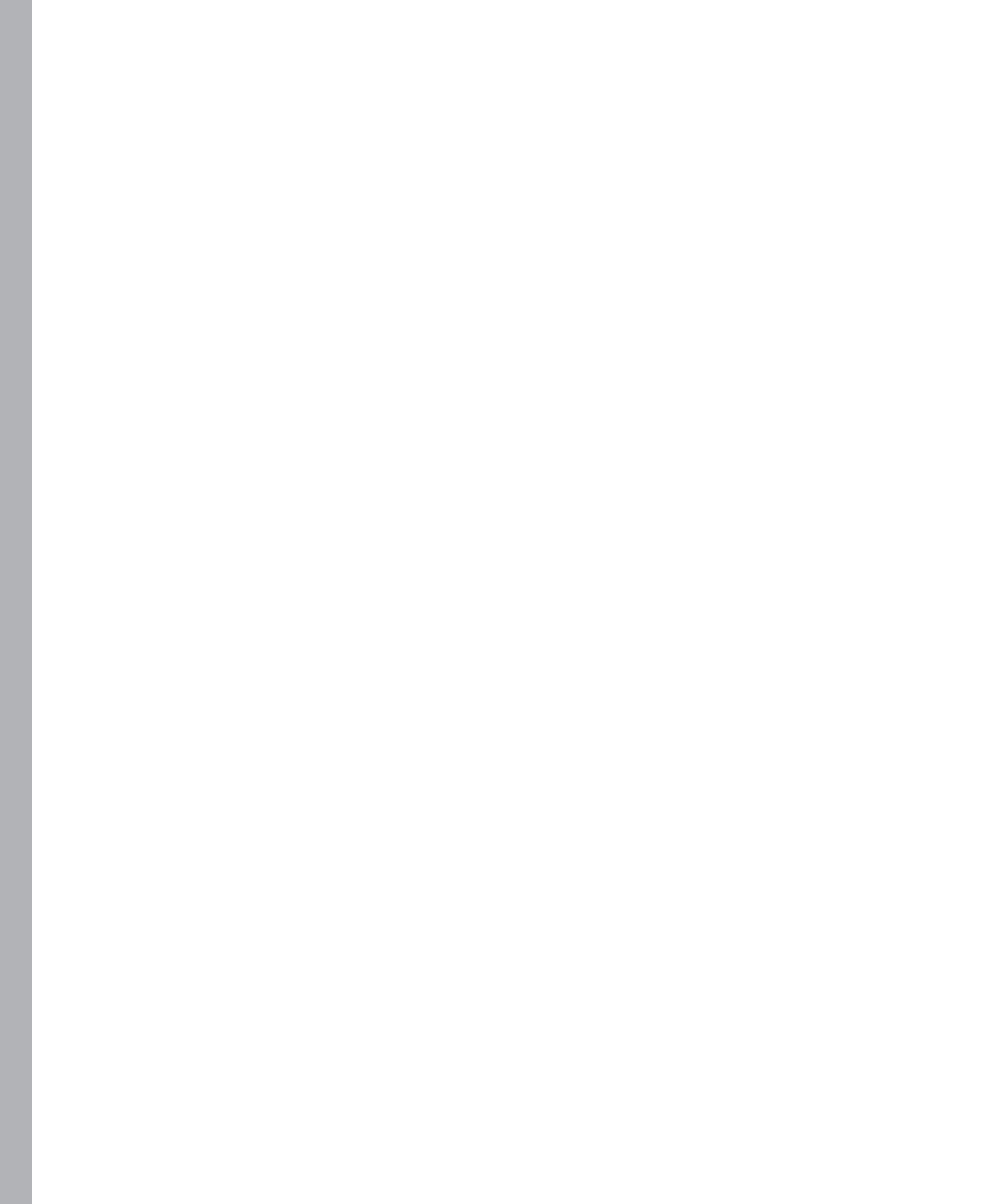
To Mom, for teaching me perseverance.

To Dad, for teaching me to learn by experience.

—TROY LANPHIER

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Introduction

Although this book was written primarily to help you prepare for Exam 70-331: “Core Solutions of Microsoft SharePoint Server 2013,” it is also intended to be a reference that you can refer to during your experiences with SharePoint Server 2013. In many cases, the steps to perform a task are shown to help you feel comfortable with related questions on the exam as well as provide a reference on how to perform the task in a real-life situation. The level of detail in this book will often exceed what is required on the exam because it is an advanced solutions exam. This does not mean there will not be specific questions about steps required to perform a task or requirements needed to install a service application. It does mean that you do not need to focus on being able to spell out a command correctly or know exactly what parameter to pass it. You should focus on the concepts, the overall steps involved with a task, and the components needed for a solution. If you focus on these concepts and go through the tasks in this book, you will be well on your way to passing the exam.

This book is generally intended for exam candidates who have four or more years working with SharePoint Server and related technologies such as SQL Server and Windows Server. The candidate should have hands-on experience with a multiserver SharePoint farm in the capacities of planning, implementing, and maintaining. This includes but is not limited to the areas of high availability, disaster recovery, capacity planning, and exposure to SharePoint Online. Despite having multiple years of experience with a multiserver SharePoint farm, it is doubtful that exam candidates will have experience with all the technologies covered by the exam, and they should focus on the areas in which they have the least exposure. Also, any feature that has been added to SharePoint Server 2013 will likely receive additional coverage on the exam.

This book will help you prepare for the exam, but nothing can take the place of real-life experience. In an effort to make the exams closer to measuring knowledge of the product, they are going more and more to case studies and getting away from simple multiple choice questions. You will still see a number of traditional multiple choice questions, but you will also see questions in which you have to place steps in order and questions in which you have to choose the right set of items from a large list of possible answers. In these cases, practicing the actual implementation of the functionality covered in this book will help you far more than just trying to memorize what is involved.

This book covers every exam objective, but it does not cover every exam question. Only the Microsoft exam team has access to the exam questions, and Microsoft regularly adds new questions to the exam, making it impossible to cover specific questions. You should consider this book a supplement to your relevant real-world experience and other study materials. If you encounter a topic in this book that you do not feel completely comfortable with, use the links you’ll find in the text to find more information and take the time to research and study the topic. Great information is available on MSDN, TechNet, and in blogs and forums.

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Acknowledgments

There are many whom I need to acknowledge in this book, both friends and family. Without the patience, support, and insight of these folks, this book would not exist. First and foremost, this book is for Marlene: Thanks for putting up with the late night writing marathons, working weekends, and the “how does this sound” conversations. For Samantha: Keep checking the oil; that car will run forever. For Kate: “Spoilers!” and “Don’t Blink.”

Beyond family, I have a few folks to thank for allowing me to bounce tech questions off of them: David Frette (“...it’s a custom what?”), Steve Buck (“...sure, PKI is easy!”), Dante Marcuccio (“...I know it’s in there somewhere”), Brian Culver (“...you busy?”), and Angelo Palma (“...hey, you should blog that”). You guys keep SharePoint fun.

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Note that this Exam Ref is based on publically available information about the exam and the author's experience. To safeguard the integrity of the exam, authors do not have access to the live exam.

Design a SharePoint topology

When you begin to design your Microsoft SharePoint implementation, there are two key traits to consider: flexibility and scalability. A flexible SharePoint environment enables the structure and layout to change with minimal impact to users; a scalable SharePoint environment allows for the necessary growth to meet changing business requirements.

This section covers the taxonomical, navigational, and structural considerations that should be addressed before implementing your SharePoint environment.

IMPORTANT

Have you read page xix?

It contains valuable information regarding the skills you need to pass the exam.

Objectives in this chapter:

- Objective 1.1: Design information architecture
- Objective 1.2: Design a logical architecture
- Objective 1.3: Design a physical architecture
- Objective 1.4: Plan a SharePoint Online (Microsoft Office 365) deployment

Objective 1.1: Design information architecture

As human beings, we encounter metadata in our daily lives. We describe items by their physical appearance, their location, or their purpose. We meet other people and learn their names, their titles, and what their roles are within an organization.

As information workers, we seek to capture metadata and make it reusable. Sometimes we simply write a single piece of metadata (such as a phone number) down on a piece of paper; more often we associate other metadata, such as the location, name, and role of the person whose phone number we wrote down.

Sometimes the information captured is of benefit to only a single individual, but this is usually not the case; more often, we see information being shared between ourselves and others in our organization.

As you will see in this objective, planning the design of the information you seek to capture will improve your chances of it being reused and searchable.

This objective covers how to:

- Design an intersite navigational taxonomy.
- Design site columns and content types.
- Design keywords, synonyms, best bets, and managed properties.
- Plan information management policies.
- Plan managed site structure.
- Plan term sets.

Designing an intersite navigational taxonomy

The core navigational elements of SharePoint navigational taxonomy are sites and site collections. A site is the smallest element in this taxonomy and is composed of lists and libraries; a site collection is a grouping of sites that are functionally, navigationally, and administratively related to one another.

Sites within a site collection are automatically related to one another by a parent-child relationship (see Figure 1-1). The first site that is created within a site collection is referred to as the top-level site and it often defines the navigational relationship with all its subsites (child/grandchild/great-grandchild and so on).

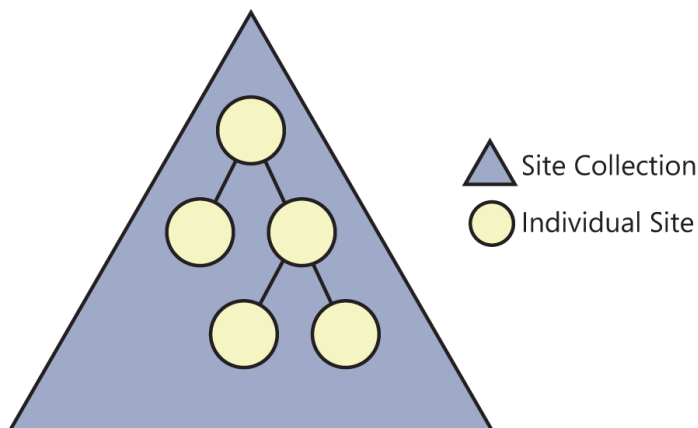


FIGURE 1-1 A site collection and its sites.

If you possess a single site collection for your navigational taxonomy, site navigation is easily configurable. In sites that have the publishing feature enabled, it's a simple task to move the sites around to suit the needs of the business as the organization changes and grows—to a point.

Scalability issues

The initial issue with placing all content within a single site collection is not apparent to users. They are readily adopting the new environment, adding new sites, permission groups, workflows, branding, and content. This site collection is stored within the confines of a single content database; and, more importantly, cannot be scaled across multiple content databases.

As the site collection continues to grow, other issues begin to surface, affecting users and admins alike. These issues include the following:

- **Security groups** As site owners begin creating new sites and subsites, they have the option to specify that the site will not inherit permissions (this is not the default). Each new site can, in theory, add up to three new permission groups: visitors, members, and owners; the sheer number of additional groups can quickly become unwieldy to administer.
- **Permissions inheritance** As the volume of data within a site collection increases, the surface area affected by a permissions change becomes larger. A minor permissions change near the top of a site collection can potentially expose sensitive data at a lower level site, list, or library.
- **Taxonomical changes** Structural taxonomy changes in site columns and content types begin to affect the granular sites as well, especially if the parent column or content type is heavily altered.
- **Recycle bins** Individual sites recycle bins remain fairly easy to administer for the site owners, but the site collection recycle bins begin to have thousands and thousands of documents that must be sorted through by the site collection administrator (SCA) in the event of a restore request.
- **SQL backup and restore** As the sheer volume of content increases within the site collection (and its related content database), backup and restoration times increase in duration along with the amount of data that can be influenced by a database corruption.

Navigational terms

When speaking of navigation, there are four terms that should be defined: global, current, structural, and managed navigation.

Current and global navigation refer to the two major navigation page areas present in traditional web design (also known as the “inverted L”), as shown in Figure 1-2.

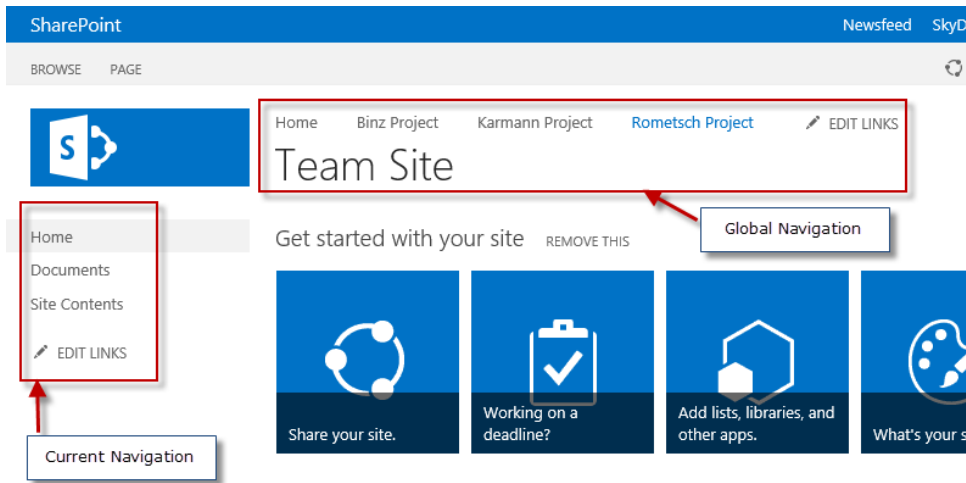


FIGURE 1-2 Global and current navigation.

When discussing intersite navigation taxonomy, this section will be concentrating on the global navigation section, although the current navigation section might be occasionally mentioned.

SharePoint 2013 provides two distinct ways to generate navigation for a SharePoint site or sites, structural and managed navigation. Structural navigation is a defined structure that possesses both automatically generated elements (for example, new links generated when a new list, library, or subsite is added to a site) and manually generated links (perhaps linking to a distinct site collection).

A newer component of SharePoint is the capability to build a metadata structure that assigns the navigational taxonomy to a site. As you might imagine, this structure is fluid, enabling multiple sites and site collections to be unified into a navigational structure that can be subscribed to by a site or site collection.



EXAM TIP

Each of these navigational types has merit. For a group of users who are unfamiliar with creating and maintaining terms and term sets, structural navigation might be a more appropriate choice.

Because the managed navigation option is the newer of the two navigational types, be familiar with how to create this structure within the Term Store Management Tool.

Designing a basic taxonomy

We have already shown that there is an implied parent-child relationship present within a site collection, so designing an intersite taxonomy is then dependent on how navigational relationships can be configured between distinct site collections.

Defining the relationship between sites or site collections is less about the technical details and more about the philosophy of how the SharePoint farm will be used. Toward the end of this section, the technical actions required to configure site collection relationships will be addressed.

Prior to setting up these relationships, other considerations should be discussed:

- Who are the audiences for the respective web applications/sites?
- Will publishing site collections be separated from collaborative site collections?
- What purpose does each web application/site serve?
- What is the preferred URL for each site/site collection?

Org chart navigation

One of the easiest site taxonomies to build echoes the organizational chart. Users visiting the site are immediately greeted with a navigational menu system that starts with each major unit in the company (human resources, information technology, accounting, and so on). This design might be sufficient for a smaller organization with few subdepartments, but tends to be inflexible in a larger organization.

As an example, take the situation in which a user needs to view the status of their 401K benefits. Depending on how large the organization is, the navigation could go something like this:

Intranet → North America → Business Units → Human Resources → Retirement Benefits → 401K Status

If a person needs to get to that site on a regular basis, they might wind up choosing to do either of these:

- Bookmark the 401K site
- Search for the 401K site

One of the constants in business is change; organizational structures are not exempted from this fact:

- **New acquisitions** As a business grows, other businesses are often purchased and folded into the structure.
- **Departmental change** As departments grow within an organization, it is not uncommon to see them split into two different units (for example, accounting becomes accounts receivable and accounts payable).

As you recall from the last section, people might choose to bookmark or search for a site that is nested deeply within the navigation structure. Altering that navigational structure to accommodate change in the org chart might result in the following:

- Broken bookmarks
- Errant search results (depending on how up-to-date your search index is)

Functional navigation

The challenge is not to necessarily make the navigational hierarchy about the structure of the company; instead, you might consider making the hierarchy about the actions taken by a person visiting the site.

Designing the site navigation around activities enables the site to be flexible in purpose. For example, instead of building an HR header that lists all the HR subdepartments, you might instead build a header that lists a series of actions such as these:

- New to the company? A site that is dedicated to the onboarding process of a new employee, which enables them to do the following:
 - Complete all necessary HR and IT forms
 - Kick off workflows and requests for items such as telephones, computer accounts, and so on
- Check retirement status
- Check leave/vacation status

As you can see, these navigation items function as verbs; they have action and intent behind them. If users decide that they would rather visit the HR site to see what items are presented by that team, the HR header link will take them to the HR site.

It becomes apparent that deciding which items get promoted to the navigation requires some interaction with the respective business units. Before proceeding to meet with these groups, develop an arsenal of requirements, gathering questions such as these:

- What are the major components of your business unit?
- What functions do you see your group(s) serving?
- When people call your group, what are the three most common things that they are looking for?
- If people within the organization were to search for your groups, what are the top 10 terms you might see them using?

When you meet with these units, it is important to throw the rule book out: a large white board, some sticky notes (to foster navigation activities), and an open forum is all that is necessary to foster a solid navigational design. Challenge the members of the group to act not as managers or information workers but instead to act as a normal business user would when navigating the site.

Later in this objective, managed site structure will be discussed; in that topic, we will compare the two types of navigation available, managed and structural. These navigation types are discussed at length and compared from a functional standpoint.

Designing site columns and content types

There are two distinct types of columns within SharePoint: list columns and site columns. From a functional perspective, they are identical, with one major difference: site columns are reusable.

List columns

As an example, let's consider a new list for a small company's building management that will be used to assign a new desk to a worker. The company currently has two offices, one in Houston and one in San Antonio, and has only one building in each city. The plan is for the organization to eventually expand into other states.

The requirement is to capture a simple series of metadata elements, and for each office to maintain its own list:

- User name
- Office location
- Phone number
- City
- State
- Zip code

Within each office's list, you could build simple list columns to capture each of these distinct pieces of metadata (also known as information types), shown in Table 1-1.

TABLE 1-1 List columns and information types

List Column Name	Information Type
User name	Person or group
Office location	Choice, enforce unique values
Phone	Choice, enforce unique values
City	Choice
State	Choice
Zip code	Choice

Adding values to each list requires you to visit that list to make changes. Not too bad for one or two lists, but as the company begins to add sites (and lists), maintenance of the multiple list columns could become error-prone.

Site columns

The next step on the path to reusable metadata is to build site columns instead of list columns and associate the site columns to list or library. The major benefit of moving from list columns to site columns is extensibility; what was once a piece of metadata that could be associated with only one list can now be associated to many.

Site columns are created the same way as list columns are, but with one major difference: they are hierarchical in nature. When a site column is instantiated on a particular site, that site and all its child sites inherit the site column and its properties.

Figure 1-3 shows the inheritance of two site columns. This example is purposely oversimplified, but you can see the inheritance of site columns based on where they were initially created.

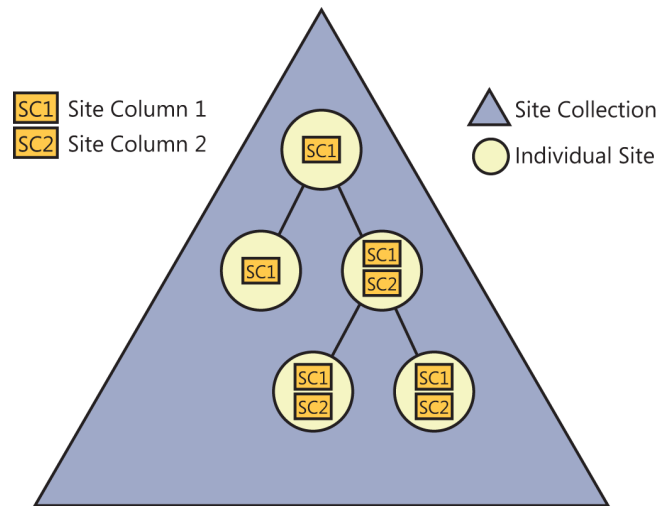


FIGURE 1-3 Site column inheritance.

Site columns are hierarchical:

- A site column that is created at the top-level site in a site collection (SC1) is available to all sites in the site collection.
- A site column created at a subsite level (SC2) is available to that site and its child sites.

After a site column is created, a list can be assigned that column (along with its information type and all metadata). If the metadata associated with the information type changes (for instance, adding a new color choice), this change can be propagated throughout any list that had previously been assigned that site column.

Both list columns and site columns are defined by the type of content they possess (also referred to as the column's information type). Most of these information types are scoped to the particular list or site column, meaning that metadata contained within the column is available only to sites residing in a particular site collection.

This site collection limitation presents a real problem: If you build multiple site collections (and you should be), you must now have a mechanism to make metadata available beyond the site collection boundary without having to build the same information type over and over again in each new site collection.

Fortunately, SharePoint provides a model for presenting information types in multiple site columns across multiple site collections; this model is called the managed metadata service. The MMS allows for the creation of a both local and global term sets, as you will soon see in the "Planning term sets" topic. A global term set can be used to store metadata (terms) for them to be reused and maintained in list and site columns across multiple site collections.

Content types

So far, you have been working with one column at a time: a name, a color, and a product type. Although it is perfectly viable to build each list or library and then assign distinct list or site columns, this does not allow you to manage groupings of similar items in a list or library. To address this need, SharePoint provides the notion of content types.

A content type defines the attributes of a list item, document, or folder. These attributes not only provide descriptive information about the item (metadata and properties) but also provide activities that can be associated with each item (workflows, information management policies, document templates, and other features).

Content types behave in a hierarchical fashion and are inherited from each parent site to its child within the same site collection, as shown in Figure 1-4.

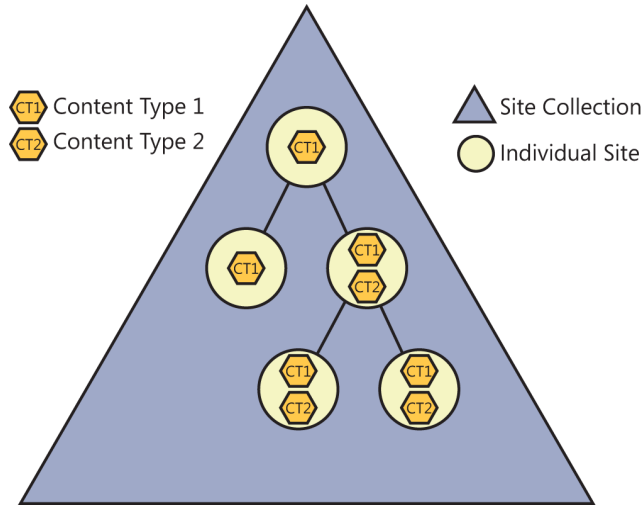


FIGURE 1-4 Content type inheritance.

The hierarchy of content types behaves similarly to the hierarchy of site columns, meaning the following:

- A content type that is created at the top-level site in a site collection (CT1) is available to all sites in the site collection.
- A site column created at a subsite level (CT2) is available to that site and its child sites.

After a content type is created, a list or library can be assigned that content type. If the content type is changed (for instance, a new retention policy stage or new site column), these changes can be propagated throughout any list or library that had previously been assigned that content type.

It should be noted that all content types are related: documents, items, pages, lists, libraries, and more are all part of a large ecosystem of content types.

For example, when you provision a new document library, the default content type provisioned is Document. If you were to want to build a hierarchy of legal documents and have contracts as one of the available content types, its content type hierarchy might look something like Figure 1-5.

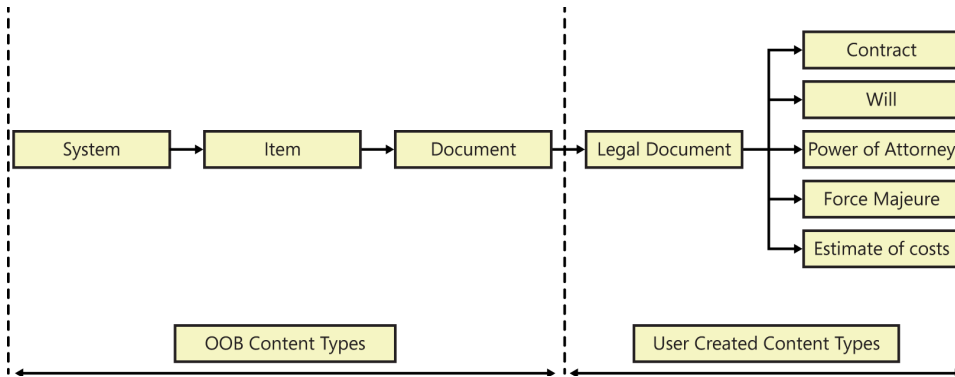


FIGURE 1-5 Content type hierarchy.

In this case, you might assign a core set of site columns to the legal document content type and then assign workflows, retention policies, and more site columns to the individual child content types (contract, will, and so on).

Any site collection created within a SharePoint environment is automatically populated with a series of content types that themselves are composed of out-of-the-box (OOB) site columns. The number and type of content types provisioned depend on the two different factors:

- **Site template** The template you choose when provisioning a new site will determine what content types are created.
- **Features** The features you select to add to an existing SharePoint site/site collection can also provide new content types.

The key here is to remember the scope. So far, we have a series of site columns that can inherit managed metadata, but the content type is still limited in application scope to the site collection.

If this structure is to be truly extensible, it's time to learn how to apply content types from outside the site collection. For that, we will use the Managed Metadata Service (MMS) and a concept known as a content type hub.

Content type hub

Although content types can easily be defined within the boundaries of a site collection, you haven't yet seen any provision for creating a content type that can be used in multiple site collections. This situation is quickly remedied by the use of a content type hub.

A content type hub is aptly named and is simply a normal site collection that has been specified to provide content types to other site collections.

Content types are syndicated by the MMS; the process is fairly straightforward:

1. The MMS is configured to allow the content type hub to be the only source for centralized content type syndication.

2. The MMS Connection is configured to consume content types from the hub's content type gallery.
3. Content types are placed in the content type hub for syndication.
4. Content types are published by the Content Type Subscriber timer job on a regular basis (every hour by default) to all web applications that are connected to the MMS application.



EXAM TIP

Content types that are syndicated function exactly as those built within site collections. When a content type is published into a web application, it is simply placed into the content type gallery of each site collection for use.

External content types

External content types incorporate Business Connectivity Services (BCS) functionality to enable external data to be represented within SharePoint sites. These content types are meta-data that represent the following:

- Connectivity information to data
- Data definitions for the data
- Behaviors applied to data

Information that is provided via the use of external content types is reusable, mimicking the behavior of normal content types within a site or site collection. Workers interacting with an external content type do not have to be aware of the underlying data type, connection type, or security present in the content type.

As the ultimate goal is to present external content exactly the same as internal content contained within SharePoint itself, external content types act the same as any other data presented in and consumed by both Microsoft Office and SharePoint. This includes the ability to search the content as well as taking it offline in Microsoft Outlook 2013.

External content types are highly useful after they are configured, allowing for the creation of lists and data columns within SharePoint that function identically to their native SharePoint counterparts.

As the information represented by external content types is provided by BCS, it only stands to reason that there would be some specific web parts created for this purpose:

- **Business Data List** Displays a list of entity instances from a business application presented by BCS, such as a customer or order list
- **Business Data Item** Displays the details of an item from a business application presented by BCS, such as a particular customer or order
- **Business Data Item Builder** Creates a BCS item, providing it to other web parts

- **Business Data Related List** Displays a list of related items from a business application presented by BCS, such as all orders related to a particular customer
- **Business Data Actions** Displays a list of actions available to a portal user, such as sending e-mail or editing customer information

External content type and item pickers are also available for use within SharePoint along with profile pages, which can display details about a particular item. If more functionality is desired than what is presented by the OOB tools, development using external content types is available via the following:

- SharePoint object model
- Client object model
- Representational State Transfer (REST) URLs

NOTE SHAREPOINT DESIGNER (SPD) 2013 AND EXTERNAL CONTENT TYPES

SharePoint Designer (SPD) has always been a tool that is heavily integrated with the SharePoint platform. In certain governance situations, it might make sense to limit the use of SPD, but note that there are some things that SPD does exceptionally well that are beyond the scope of other toolsets. Designing SharePoint/BCS external content types is one of those functional requirements that heavily promotes the use of SPD for knowledge worker design specialists.

Designing keywords, promoted results, and managed properties

Search has always been a keystone technology within SharePoint, and an already-adept search functionality has been heavily improved by the integration of FAST search. FAST search (an additional technology that can be installed alongside SharePoint Server 2010) is now a core technology within SharePoint Server 2013 and provides additional functionality not present within SharePoint Server 2010 search.

As you might have noticed from the title of this section, we are not heavily focused on the technicalities of search at this point; instead, we will lightly cover search architecture, choosing to focus on how search queries and results are “shaped” via the use of keywords, promoted results, and managed properties.

Core search components

Search can be broken down into six major components: Search Administration, Crawl, Content Processing, Analytics Processing, Indexing, and Query Processing.

The relationship between these components can be seen in Figure 1-6.

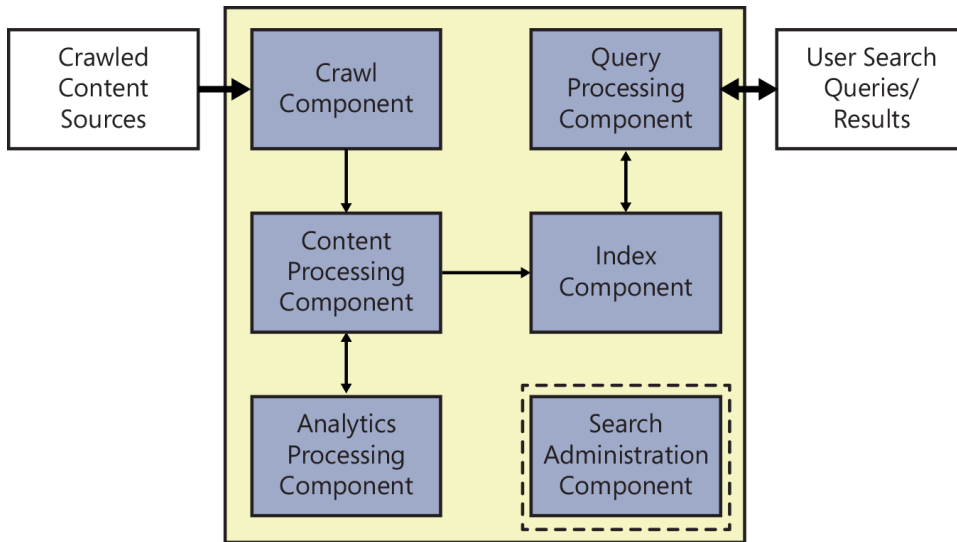


FIGURE 1-6 Search component relationships.

As you can see, the six components together accomplish two major tasks: crawls and queries. At one end of the process, content sources (such as file shares and SharePoint content) are crawled by the Crawl component; on the other end, the information has been broken down by search and is available for querying by users.

MORE INFO SEARCH IN SHAREPOINT SERVER 2013

For a detailed description of each search component and database, visit the TechNet article “Overview of Search in SharePoint Server 2013” at <http://technet.microsoft.com/en-us/library/jj219738.aspx>.

The Search Administration component simply provides for the administration of the search components, also providing for the creation and initialization of new search components. Unlike the rest of the components, Search Administration does not provide any information transfer to or from any of the other components.

The Crawl component simply performs a crawl of the content available in the content sources; this is usually accomplished via the use of an indexing connector or protocol handler and depends on the type of file being crawled (Word, Excel, Acrobat, and so on).

After the content has been crawled, it is passed on from the Crawl component to the Content Processing component. Several operations are carried out within this step, one of which is the mapping of crawled properties to managed properties (which is discussed shortly). Additionally, items that have been crawled are turned into artifacts in this stage for inclusion within the search index. Link and URL information is stored in the link database and then processed and forwarded to the Analytics Processing component.

There are two major types of analysis present in the Analytics Processing component: search analytics and usage analytics.

- Search analytics focuses on the analysis of content being crawled and added to the search index. Items that are analyzed within search analytics improve search relevance and recall; these include metrics such as click distance, social tags and distance, and so on.
- Usage analytics focuses on user actions within search, providing a statistical analysis of usage counts (such as viewed or clicked items), recommendations (based on the user's interactions within the site), and activity ranking (the tracking of usage events) to influence search relevancy.

After analytics processing is complete, search relevance for items such as links and URLs are returned back to the Content Processing component.

After content is received from the Content Processing component, the Index component writes this content to the search index. This component also receives requests for information contained in the search index and returns result sets to the Query Processing component.

The Query Processing component receives and analyzes incoming search queries, which improve the precision, recall, and relevance of the search result sets. The resulting queries are sent to the Index component, which returns a set of search results (that are also processed) for a particular query to the front-end server.



EXAM TIP

Search is a critical component of any SharePoint 2013 farm. A thorough understanding of each search component's role within the farm helps determine which component(s) are assigned to a particular server.

Making search meaningful

Now that you have a basic understanding of the SharePoint 2013 search mechanisms, you see how everyday business users can improve search results for their particular section of a SharePoint installation.

From a design perspective, it's fairly straightforward to build a basic search engine—such a system can crawl, parse, and index content; it can also perform basic search ranking by the frequency with which a word or phrase occurs.

As content in this basic search engine grows, however, it becomes more and more difficult to find specific content within the growing search index. A high-value search result might be hard to locate when it is surrounded (and perhaps outranked) by other documents with similar search terms; for instance, a document displaying this year's 401K plan should appear first in search but might instead be displayed after documents detailing previous years' 401K plans.

Fortunately, business users who generate SharePoint lists and documents can influence search results for the content they generate.

Keywords

Within a SharePoint 2013 site, descriptive metadata (words or phrases) can be directly assigned to any list item or document; these words and phrases are called keywords. These keywords are generated as a folksonomy, meaning that they are created by individual users on a site.

Although terms are stored within a series of term sets, enterprise keywords are stored within a single term set within the managed metadata service. This specialized term set is nonhierarchical and simply called the “keyword set.” As with the managed terms, enterprise keywords are stored in the term store database.

Adding keywords to a list item or document is fairly straightforward, but requires a bit of configuration prior to use.

The basic configuration process requires two steps:

1. The MMS Connection must be configured to be the default storage location for keywords.
2. The enterprise keywords site column can then be added to content types.

IMPORTANT MISSING DEFAULT TERM STORE

When you are adding new keywords, you might see this message: **The Site Does Not Contain A Default Keywords Term Store.** This occurs when you have not yet selected the default storage location for keywords within your SharePoint environment.

To configure the default storage location, follow these steps:

1. Open Central Administration and select **Application Management**.
2. Under Service Applications, select **Manage Service Applications**.
3. Select the **MMS Connection**.
4. From the ribbon, choose the **Properties** link.
5. On the Edit Managed Metadata Service Connection page, select the check box for **This Service Application Is The Default Storage Location For Keywords** (see Figure 1-7).

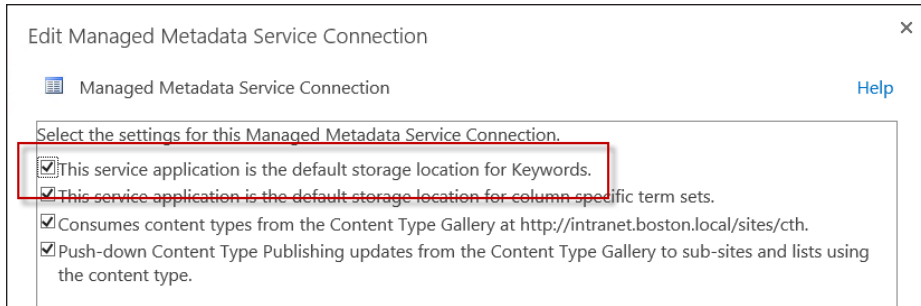


FIGURE 1-7 Default storage location for keywords.

Next, the enterprise keywords column must be added to a list or document library; this column allows for multiple values. After this column has been added, new keywords can be added to the list item (see Figure 1-8).

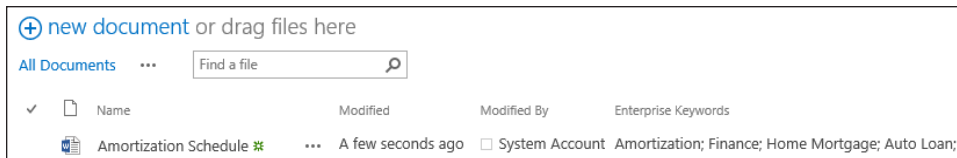


FIGURE 1-8 Keywords added to the list item.

After keywords are added to a list item or document, they are automatically added to the Managed Metadata term store (see Figure 1-9).

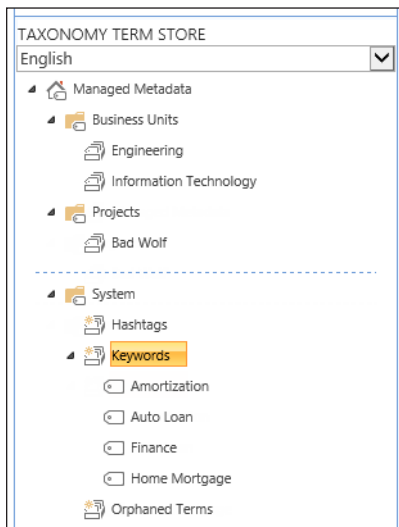


FIGURE 1-9 Taxonomy term store.

All keywords are stored in the keyword set that is contained within the System group; none of the specialized term sets within the System group enables you to build any sort of hierarchy.

Keywords that are regularly used by business users in the organization can be reviewed and moved into term sets; doing so enables the keyword to become centrally managed as a term and moved into appropriate term sets.

To transform a keyword into a term, simply right-click it and select **Move Keyword** (see Figure 1-10).

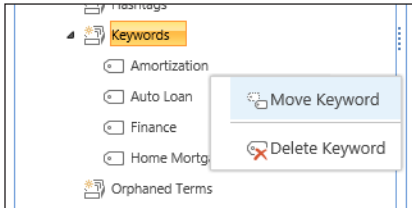


FIGURE 1-10 Moving a keyword to a term set.

A series of destinations appear; at this point, you can select a term set (see Figure 1-11). At this point, you can also decide whether this word can continue to be used as a distinct keyword outside of the new term set.

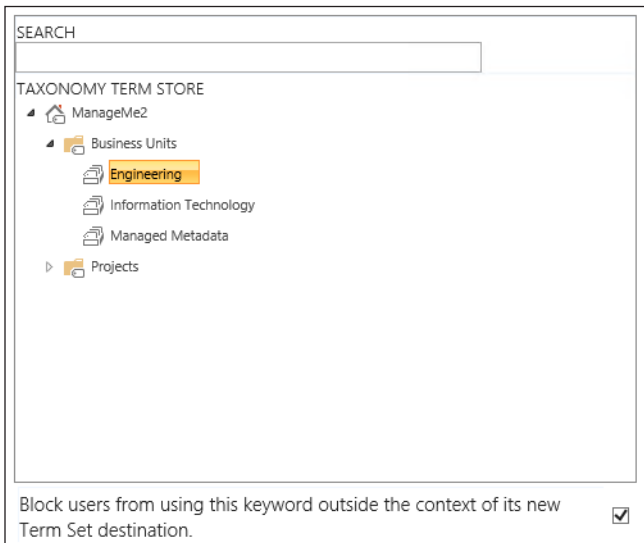


FIGURE 1-11 Choosing a destination term store.

Note that this conversion is one-way; after the keyword is changed into a term, it cannot be converted back to a keyword.

Promoted results

In previous versions of SharePoint, there was a concept known as a best bet, which was simply a search result that was promoted within the search results to be a preferred search result for a particular search topic. For instance, when a user would type in a search query that included a keyword such as “HR” or “Human Resources,” the search results could be configured to display a best bet at the top of the search results that would promote the URL of the Human Resources web site.

In SharePoint 2013, best bets have been replaced by promoted results. Although the two act in a very similar fashion, there is one distinct difference between the two—how they are triggered.

Best bets used a combination of keywords and synonyms to trigger the display of a preferred result for a search. If multiple keywords were to be specified (but they were not synonyms of one another), multiple keyword entries were required. Additionally, a best bet could itself be triggered to have start, end, and review.

Promoted results improves on this concept specifically based on how they are triggered. Instead of using keywords as triggers, promoted results are triggered by query rules. These rules can be configured for use at one of two levels:

- At the site collection level:
 - Specified within Site Collection Administration → Site Query Rules
 - Scoped to the entire site collection
- At the site level:
 - Specified within Search → Query Rules
 - Scoped to the particular site

After the new query rule has been added, the process of adding a new promoted result in SharePoint 2013 is almost identical to that of creating a new best bet in SharePoint 2010. Adding a promoted result is shown in Figure 1-12.

The image shows a dialog box titled "Add Promoted Result" with a close button (X) in the top right corner. The dialog contains the following elements from top to bottom: a "Title" text box, a "URL" text box, a checkbox labeled "Render the URL as a banner instead of as a hyperlink", and a "Description" text box. At the bottom right of the dialog are two buttons: "Save" and "Cancel".

FIGURE 1-12 Adding a promoted result.

As with best bets, a promoted result can display a message and a link to a location or item.

A new field has been added to the promoted result: Render The URL As A Banner Instead Of As A Hyperlink. It provides for the display of a banner about a topic instead of a normal text URL.

Building a new query rule to contain the promoted result requires three actions:

1. Selecting an appropriate search context
2. Specifying the query condition(s); choices include the following:
 - A. Query Matches Keyword Exactly
 - B. Query Contains Action Term
 - C. Query Matches Dictionary Exactly
 - D. Query Mode Common in Source
 - E. Result Type Commonly Clicked
 - F. Advanced Query Text Match
3. Specifying the resulting action(s):
 - A. Add a Promoted Result Above Search Results
 - B. Add a Result Block Displaying A Specific Portion Of Search Results
 - C. Change The Ranked Results By Changing The Query

IMPORTANT ALTERING EXISTING QUERY RULES

Simply stated, SharePoint 2013 does not enable you to alter any of the built-in query rules. If you want to build a query based on an existing rule, you must first copy it and then alter the copy; the original's edit menu is always grayed out.

CREATING A SAMPLE PROMOTED RESULT

Let's go through the process of creating a simple promoted result. The requirements for this example are as follows:

- The Human Resources site (<http://hr.boston.local>) has to be displayed within search as a promoted result when users specify one of the following search phrases:
 - 401K
 - Benefits
 - Vacation
 - Hiring
 - Termination
 - Recruiting
 - Leave
- To keep this simple, the accompanying query rule will require an exact match between the query and the keyword.
- You will not show the promoted result as a banner, merely displaying it instead as a URL for the users to click.
- The query will be scoped to your particular site, not the entire site collection.

First, you must build the query itself. To begin, do the following:

1. In the upper-right corner of the screen, select Settings (gear icon).
2. Scroll down and select Site Settings.
3. On the Site Settings page, scroll to the Search section and select Query Rules.
If you want to instead build a query that affects the entire site collection, from Site Collection Administration, select Search Query Rules.
4. On the Manage Query Rules page, select the Local SharePoint results (System) context (note that there are several other contexts in an OOB configuration).
5. A series of queries appear beneath the query rule section; unless you have already built some queries, these rules are built in and cannot be edited.
6. Select the New Query Rule selection beneath the context selection.
7. On the Add Query Rule page, make the following selections:

- A.** In the General Information section, choose the following:
 - Rule Name: HR Promotion
- B.** In the Query Conditions section, choose the following:
 - Query Conditions: Query Matches Keyword Exactly
 - Query Exactly Matches One Of These Phrases (Semi-Colon Separated): 401K; Benefits; Vacation; Hiring; Termination; Recruiting; Leave

Now that the context and query conditions have been set, it's time to build the promoted result, as follows:

1. In the Actions section, select Add Promoted Result.
2. Note that although Add New Promoted Result is selected, you can also choose to select an existing promoted result and make changes.
3. Add the following items:
 - A. Title: Human Resources**
 - B. URL: *http://hr.boston.local***
 - C. Render The URL As A Banner:** Leave unselected
 - D. Description: The HR Team Is Available To Assist With All Your Human Resources Requirements**
4. Click **Save**.
5. Click the **Publishing** menu item (below the Actions section). In this section, you can do the following:
 - A.** Choose to activate/deactivate the rule (note that you are not activating/deactivating the promoted result)
 - B.** Set the following fields:
 - Start Date
 - End Date
 - Review Date
 - Contact for this Query Rule

After you click **Save** to complete the creation of the query rule, you should see the completed query rule on the Manage Query Rules page (see Figure 1-13).

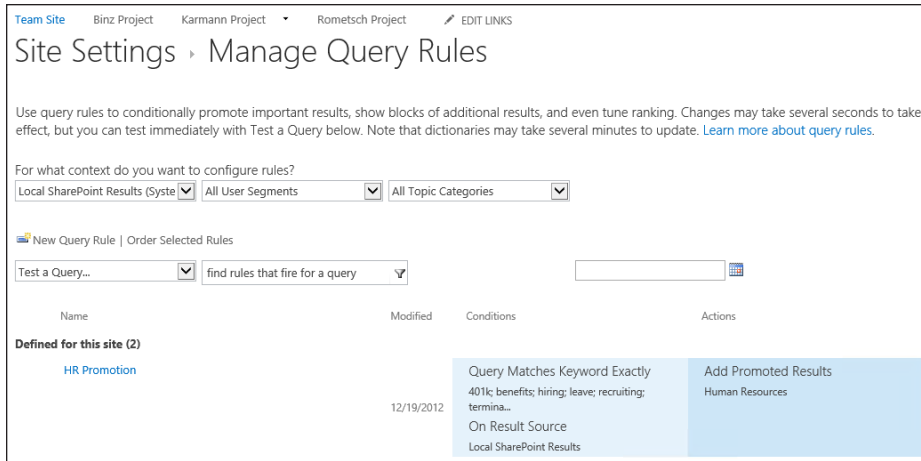


FIGURE 1-13 Manage Query Rules page.

At this point, you can return to the main page for your site and verify that your promoted results are working as expected. Type any of the following search terms and click the search icon (see Figure 1-14):

- 401K
- Benefits
- Vacation
- Hiring
- Termination
- Recruiting
- Leave

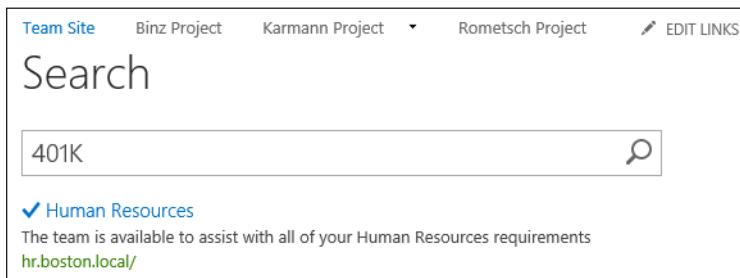


FIGURE 1-14 Successfully promoted result in search.

Managed properties

Items within a list or library have metadata that is stored in columns such as author, title, and subject. The metadata captured from populated columns (columns that have metadata assigned) is stored as crawled properties. This metadata is captured from both built-in columns and columns that are added by users.

To make these properties useful within search, they need to be converted to managed properties. Managed properties enable a user to search for list items or documents based on the columns that have been used in the list or library.

MORE INFO WORKING WITH MANAGED PROPERTIES IN SHAREPOINT SERVER 2013

For more information about adding, editing, and deleting managed properties, see the TechNet article “Manage the Search Schema in SharePoint Server 2013” at <http://technet.microsoft.com/en-us/library/jj219667.aspx>.

So, for instance, if you want to perform an advanced search based on documents in which the author of the item is Bob Ford, and the title contains the word “Equipment,” the crawled properties for each of these columns must first be mapped to a corresponding managed property.

In SharePoint 2010, the mapping between crawled properties and managed properties had to be created manually in the search service application. After the mapping was created, a full search had to complete before the managed properties could be used in a custom search results page (rendered via XSLT). For some environments, this might cause issues because a full crawl of the search corpus could take several days.

Thankfully, the creation of a managed property is quite a bit more streamlined within SharePoint 2013. The ability to create a managed property within Central Administration still exists, but it is also possible (and very likely, as you will see in a moment) to build a managed property at the site collection level. When a crawled property is created by search crawls of the list or library, a corresponding default mapping to a managed property is created at the site collection level.

Creating a managed property at the site collection level is pretty straightforward:

1. Create a site column.
2. Add the site column to the list or library.
3. Add value(s) to an item using the new column (**Phase**, in this example), as shown in Figure 1-15.

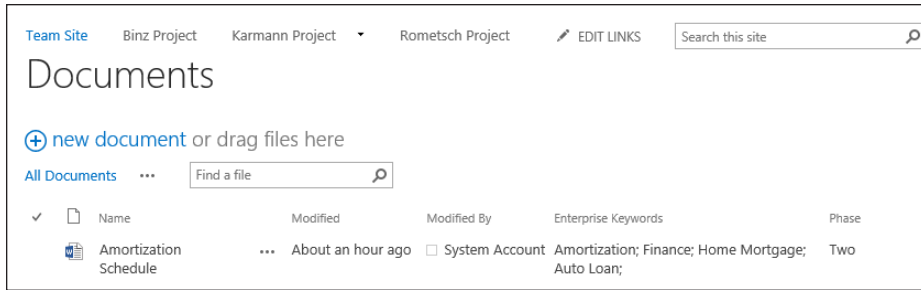


FIGURE 1-15 New site column: Phase.

4. After a search crawl occurs:
 - A. A crawled property is created from the site column.
 - B. A managed property is created and mapped to the crawled property.
5. To review the newly created properties:
 - A. From Site Settings, Site Collection Administration, select Search Schema.
 - B. On the page that follows, you can choose to see the crawled properties (see Figure 1-16).

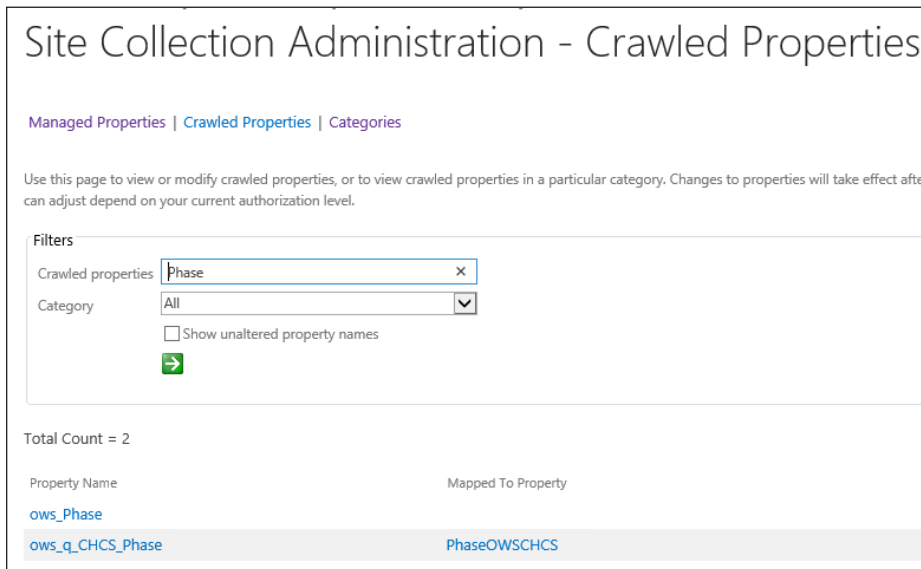


FIGURE 1-16 Crawled properties (site collection level).

In the previous screen shot, you see both the crawled properties (ows_Phase and ows_q_CHCS_Phase) and the managed property (PhaseOWSCHCS). If you choose to see just the managed properties (by selecting its link and then entering the name of the managed

property) you see only the managed property itself, along with the attributes for the property. The example property and its attributes are shown in Figure 1-17.

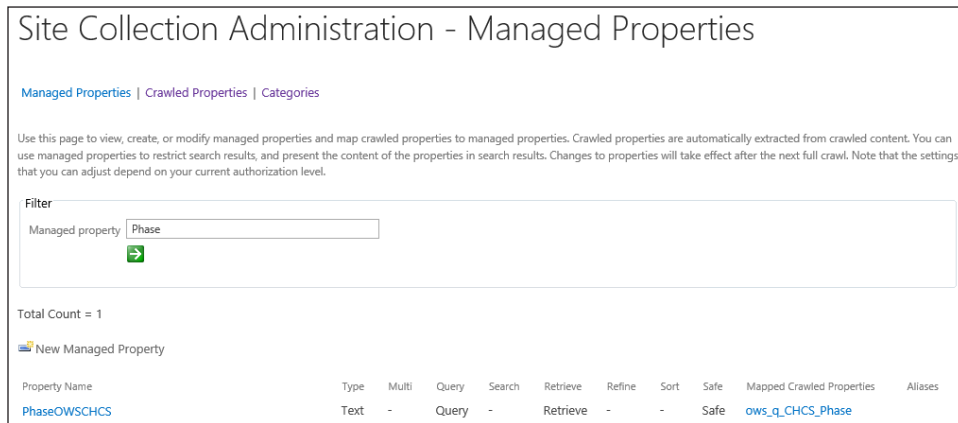


FIGURE 1-17 Managed properties (site collection level).

If you decide to create a new managed property at the site collection level, there are a few restrictions:

- They can be of the type Text or Yes/No (Boolean).
- They cannot be refinable, which means that they cannot be used as a refiner for search results.
- They cannot be sortable, which means that they cannot be used for sorting the result set.

If you want to change the refinable or sortable attributes of an automatically created managed property, you can do so after it is created. This change can be made within the search service application settings.

Unlike managed properties created at the site collection level, there are no limitations on managed properties created from within the search service application; otherwise, there are no differences between automatically generated managed properties and ones that are manually generated from the search service application.

To create a managed property from Central Administration, follow these steps:

1. Open Central Administration and navigate to the Service Applications screen (from Application Management, select Manage Service Applications).
2. Select the name of the Search Service Application and then select the Manage menu item from the ribbon.
3. Under the Queries and Results navigation menu, select Search Schema.

At this point, configuration is identical to the menus found in the site collection administration. None of the attributes limitations exists for managed properties created in the search service application.



EXAM TIP

Understand the limits placed on managed properties created at the site collection level (text/Boolean, neither sortable nor refinable) versus those created at the service application level.

Planning information management policies

In an increasingly litigious corporate world, the ability to regulate the lifecycle of content is no longer an optional feature for an electronic content management (ECM) system; it has become a core requirement.

SharePoint 2013 provides specific functionality designed to regulate the creation, interaction, and disposition of content. An information management policy is a set of rules that can be assigned to any given piece of content. These rules (also known as policy features) then define behaviors, such as the retention schedule, auditability, or markings (bar codes and labels) for a given piece of content.

MORE INFO INFORMATION MANAGEMENT POLICY PLANNING REFERENCE

For more details on the creation and use of information management policies, see the TechNet article “Plan for Information Management Policy in SharePoint Server 2013” at <http://technet.microsoft.com/en-us/library/cc262490.aspx>.

There are four sets of policy features available in SharePoint Server 2013: retention, auditing, bar codes, and labels.

Retention policy features

Documents that have to comply with legal regulations often have a retention requirement. This requirement essentially regulates the amount of time that a document can (or should) be legally discoverable within any given ECM system.

After a retention policy feature has been enabled in SharePoint, a retention stage must be added to describe how the item will be managed according to the information management policy. This retention stage requires two elements to be valid: an event and an action. A third element, recurrence, is utilized only when certain actions are selected.



EXAM TIP

Although one stage is the requirement for a retention policy to be considered valid, it is possible to build multiple stages as your business needs require.

An event describes what causes the stage to activate and can either be based on a date property or a custom retention formula (developed via custom code and grayed out by default). The date property is composed of a time period values + a set number of years as defined by your company's file plan. The time period values will be one of these three values:

- **Last Modified** The date the item was last changed
- **Created Date** The date the item came into existence, or
- **Declared Record** The date that an item was declared a legal record

An action defines what happens to the item after the event has taken place and is one of the following:

- **Move to recycle bin** Relocates the item to the site's recycle bin.
- **Permanently delete** Bypasses the recycle bin functionality and permanently discards the item.
- **Transfer to another location** Moves the item to a pre-defined destination location that must be registered for a site.
- **Start a workflow** Can run a workflow; this option is not available for a site collection policy (discussed in the next section), but is available for a retention schedule based on a list or a content type.
- **Skip to next stage** Causes the item to skip to the next retention stage.
- **Declare record** Sets the item to be a legal record, defined "in place" for the site; requires the In Place Records feature to be enabled in the site.
- **Delete previous drafts** Removes all prior draft (minor) versions of a document; activates the recurrence element, enabling the stage to be repeated based on a periodic schedule.
- **Delete all previous versions** Removes all prior major and minor versions of a document; activates the recurrence element, enabling the stage to be repeated based on a periodic schedule.

Auditing policy feature

A vital element in any information management policy, auditing enables key personnel to monitor how a document is interacted with and by whom. When the auditing policy feature is enabled, any combination of the following five events can be audited:

- Opening or downloading documents, viewing items in lists, or viewing item properties
- Editing items
- Checking out or checking in items
- Moving or copying items to another location in the site
- Deleting or restoring items

IMPORTANT REVIEWING AUDITING POLICY EVENTS

Events generated by the auditing policy feature can be viewed in Site Settings → Site Collection Administration → Audit log reports.

Barcode policy feature

Due to legal regulation and other concerns, documents are sometimes still rendered as paper documents. Printed versions of these documents must still be managed; thus SharePoint's information policies include the barcode policy feature. When enabled, this feature creates a unique identifier value for a document and then inserts a bar code image of that value in the document. Although the default bar codes are compliant with the Code 39 standard (ANSI/AIM BC1-1995, Code 39), you can use the policies object model to add other bar code providers.

Labeling policy feature (deprecated in SharePoint 2013)

The labeling policy feature is provided in SharePoint 2013 for backward compatibility and should not be actively used in new SharePoint sites. The purpose of this policy feature was to enable fixed text and/or document properties to be applied to the printed version of a document.

Assigning an information management policy

Information management policies can be assigned three different ways:

- Policy features can be associated with a site collection policy template; that policy template can be associated with a content type, list, or library.
- Policy features can be associated directly with a content type; the content type can then be added to lists and libraries.
- Policy features can be associated directly with a list or library.

Note the hierarchy in the three different applications of information management; the more direct the application of policy features, the more difficult the administration of the features would be across multiple libraries, lists, or sites.

Another benefit of applying the policy features via site collection policy templates is the prevention of lower-level policy overrides. After the policy has been applied at a high level (the top of the site collection), all subordinate levels utilizing the same content type must inherit the information management policies present in the top-level content type.

IMPORTANT EXPORTING SITE COLLECTION POLICY TEMPLATES

After site collection policy templates are created, they can be exported for use on other site collections.

Each of the four policy features can be disabled via Central Administration. To disable any of the features, go into Central Administration. From Security, Information Policy, select Configure Information Management Policy.

Creating a new site collection policy

To create a new site collection policy, follow these steps:

1. In the upper-right corner of the screen, select **Settings** (gear icon).
2. Scroll down and select **Site Settings**.
3. On the Site Settings page, scroll to the Site Collection Administration section.
4. Select the **Content Type Policy Templates** section.
5. On the Policies page, click **Create** to begin creating a new information management policy (note that you can also import an existing policy).
6. Type the name of the new policy (and optionally an administrative description of the policy).
7. Type a policy statement. This statement appears to users when they interact with items subject to this policy.
8. Choose and configure any or all policy features as applicable.



EXAM TIP

Site collection policies are scoped to a single site collection. For the sake of consistency, it is possible to export a policy from one site collection and then import it to another for reuse. Be familiar with the steps required in this process.

Planning a managed site structure

SharePoint Server 2010 introduced a new concept to navigation, namely the use of metadata for navigation within lists and libraries. By assigning metadata to individual items (using the term store, which we will be covering in the next section), the content of larger lists and libraries could be more easily navigated and displayed (similar to how views can be used) by using filters on one or more pieces of metadata.

SharePoint Server 2013 expands on this concept, introducing the notion of metadata-based navigation. Using the MMS, a navigational structure can be generated on a fairly dynamic basis, tying multiple sites and site collections together into an organized (and exceptionally flexible) structure.

Metadata-based navigation specifically addresses two key navigational considerations found in previous versions of SharePoint: complex URLs and site collection boundaries.

Complex URLs

In prior versions of SharePoint, it was not uncommon to see complex URLs for pages such as `/Lists/Posts/Post.aspx?ID=132` or `/Pages/Default.aspx`. This sort of URL is not only unfriendly to users trying to remember the location of a particular page but also difficult to integrate into an effective Search Engine Optimization (SEO) strategy.

When attempting to simplify these navigational structures, administrators often would result to non-SharePoint technologies such as the URL rewrite module (found in Internet Information Services [IIS]) to simplify URLs into friendlier URLs. Using this rewriting technology, a structure such as `/pages/default.aspx` could be more simply represented as `/default.aspx`.

As with any other technology, the additional administration required for the rewrites to take place could theoretically cause problems, including the following:

- **An administrator's IIS experience level** Some advanced knowledge of IIS was required for installing and troubleshooting the rewrite module.
- **Regular expressions (Regex)** The IIS rewrite module relies on the pattern-matching capability of regular expressions to take a particular URL structure (for example, `/pages/default.aspx`) and rewrite it (for example, `/default.aspx`).
- The notion that the rewrites happen outside of SharePoint's control, potentially causing issues with navigation, search, and so on if configured incorrectly.

Site collection boundaries

There was also the additional issue of navigation across multiple site collections. When a user navigated within the boundaries of a single site collection, the structure was uniform and consistent, using the global and current site navigational model provided by the SharePoint Server publishing functionality.

The use of a single site collection is easy but not scalable; thus the need for multiple site collections. After multiple site collections were put into use (mostly for the purposes of scalability), a user would encounter an entirely new navigational structure in each distinct site collection.

Path-based navigation

When two site collections need to be included in the same navigational structure, path-based site collections can be used. These site collections are related via the use of managed paths. Two distinct types of managed paths were used: explicit and wildcard.

Explicit managed paths enable two site collections to be put into the same URL path. For instance, if you had a site collection at `http://your.url.com/`, you could create an explicit managed path (for example, `/yoursite`) to store another site collection at `http://your.url.com/yoursite`.

Wildcard managed paths enable one site collection to be the “implied” parent of several site collections. Doing so requires two things:

- All site collections are nested under a path that itself is not a site.
- All site collections in the wildcard are at the same URL level.

If you had a site collection at <http://your.url.com/>, you could build a wildcard managed path (</projects>) to contain all your projects, each in its own site collection. So the projects would be located at <http://your.url.com/projects/project1>, </project2>, </project3>, and so on. If a user decided, however, to navigate directly to <http://your.url.com/projects>, there would be a problem; there is no site at that level, only the wildcard managed path.

MORE INFO DEFINING MANAGED PATHS

For more information about creating and implementing new managed paths, review the TechNet article “Define managed paths in SharePoint Server 2013” at <http://technet.microsoft.com/en-us/library/cc261845.aspx>.

Using metadata for managed navigation

SharePoint Server 2013 introduces a new concept: the idea that navigational metadata can be stored as a descriptive element within the term store. Instead of having to nest site collections under one another for a clean navigational structure and then having to replicate the desired navigation set across each site collection, it is now possible to arrange sites and site collections within a clean, user-friendly, SEO-friendly structure.

After you have designed your navigational metadata structure, SCAs can utilize the metadata control within each site collection to “subscribe” to the navigational structure; conversely, it is also possible for the site administrators to build their own navigational structure in the term store.

Here’s the best part: After they are created, these structures are extremely flexible, allowing for changes to be made without the need for potential disruptions (managed paths, backup/restores, and so on).

Implementing managed navigation

Managed navigation is dependent on one or more term sets. A term set is nothing more than a grouping of terms within the term store. Each term set defines a navigational structure, and multiple navigational structures can be utilized, even within a single site collection (if desired).

Within a site, global and current navigation can each utilize a term set for navigation. Note that global and current navigation cannot utilize two separate term sets—only one term set can be specified on the navigation settings page of a site. The individual terms can be set to show in global navigation, current navigation, or both (as you will see shortly).

By default, a SharePoint site utilizes structural navigation; if you have used prior versions of SharePoint, this interface is familiar (see Figure 1-18).

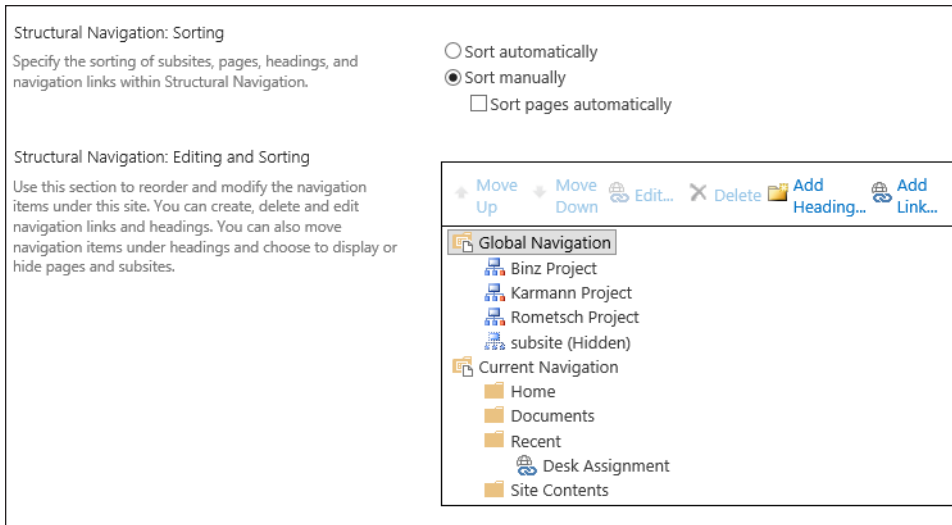


FIGURE 1-18 Structural navigation.

Converting a site from structural to managed navigation requires only a few steps:

1. In the upper-right corner of the screen, select Settings (gear icon).
2. Scroll down and select Site Settings.
3. On the Site Settings page, scroll to the Look and Feel section and select Navigation.
4. On the Navigation Settings page, you can change global or current navigation from structural to managed navigation (see Figure 1-19).

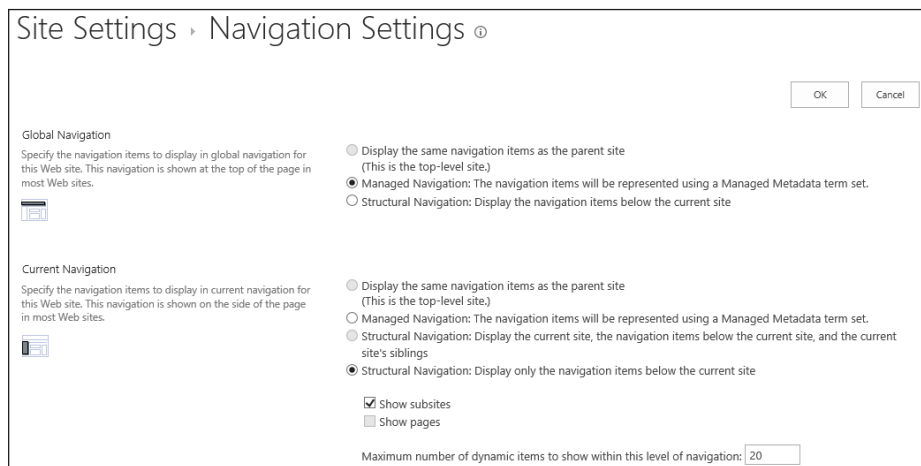


FIGURE 1-19 Navigation settings.

Next, the term set to be used for navigation needs to be created (or specified). The next major section shows how term sets can be created within Central Administration, in the Term Store Management console. If navigational term sets are created from Central Administration, they are available globally (for use across multiple site collections).

For now, we will create the term set from the site collection navigation settings, meaning that they are available locally (only within the current site collection).

Continuing the previous set of steps:

5. After configuring global or current navigation to use managed navigation, scroll down to the Managed Navigation: Term Set section.
6. At this point, you can locate a term set that describes your intended navigation or you can build a new term set; to do so, select the Create Term Set button (see Figure 1-20).

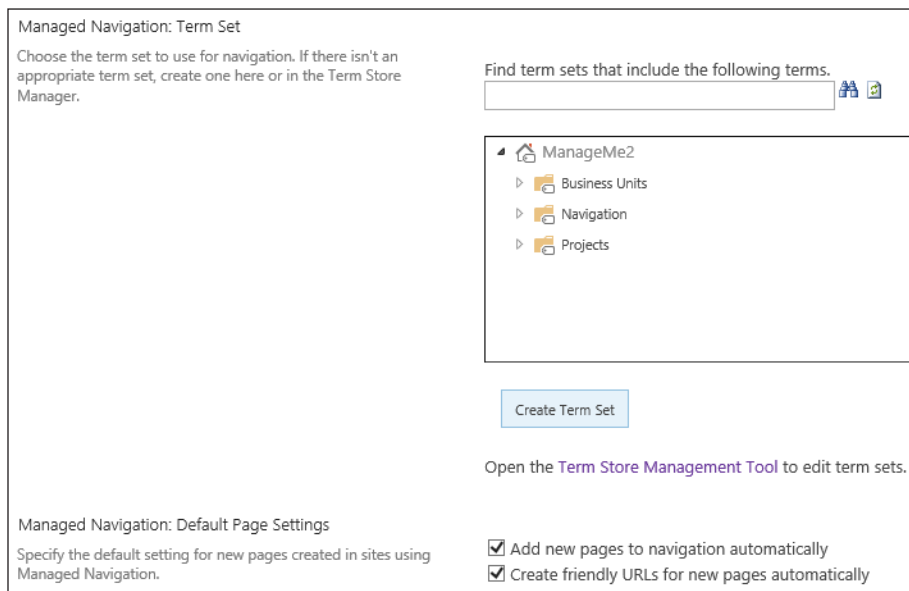


FIGURE 1-20 Managed Navigation: Term Set.

7. If you create the term set with the button, it will build a group that begins with Site Collection and a default term set (see Figure 1-21); optionally, you could instead open the Term Store Management Tool and build the term set manually. You have to use the tool to build the navigational terms regardless of how the term set was created.

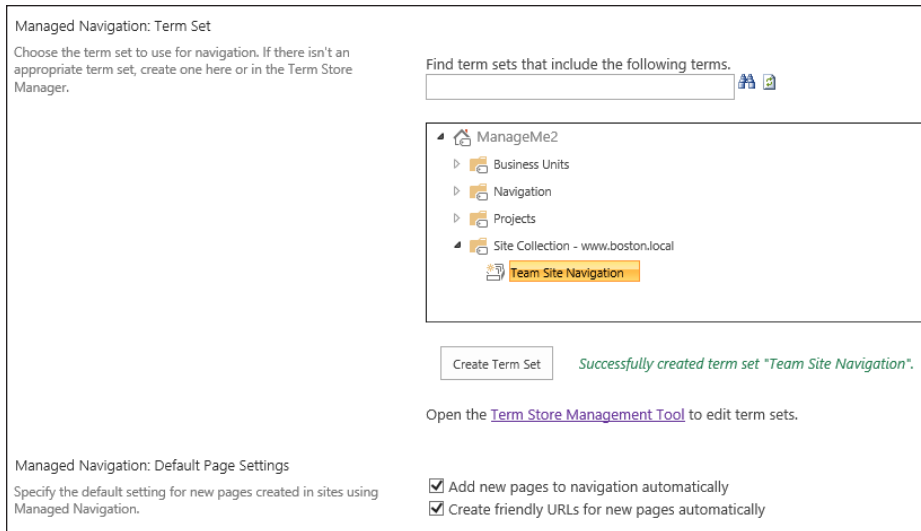


FIGURE 1-21 Create a new term set for managed navigation.

8. Open the Term Store Management Tool.
9. When you open the term set and select Intended Use, note that the set is already configured for site navigation; if the set was created from Central Administration, you need to select this check box (see Figure 1-22).

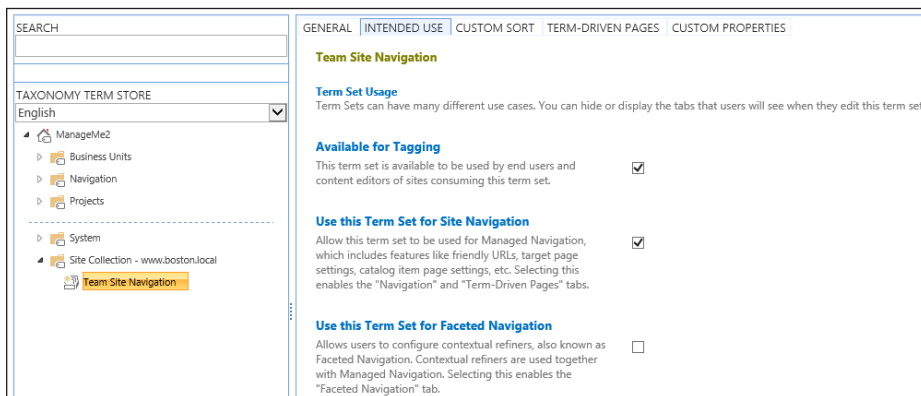


FIGURE 1-22 New term set, built for navigation.

10. Creating a new term is as simple as selecting the drop-down menu and selecting Create Term (see Figure 1-23).

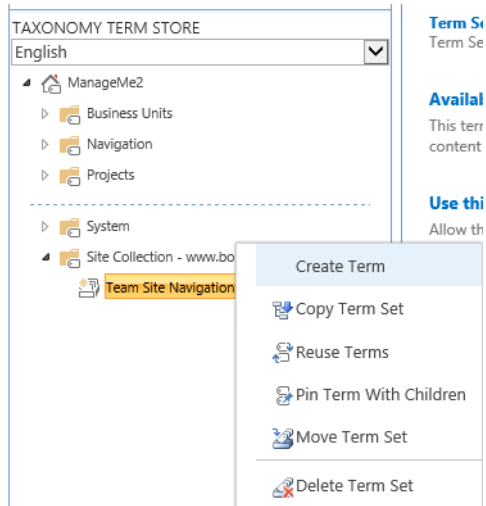


FIGURE 1-23 Creating a new term in the navigational term set.

11. Within each node (term), you can specify whether the term is for use in global or current navigation menus; you can also use the term as a link/header or as a term-driven web page (see Figure 1-24).

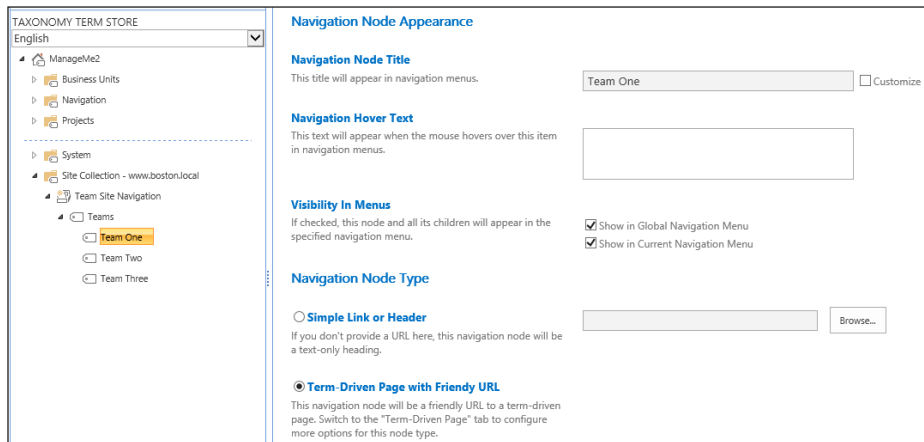


FIGURE 1-24 Navigation node settings.

12. Choosing each node type to be a simple link or header, the finished navigation looks like Figure 1-25.

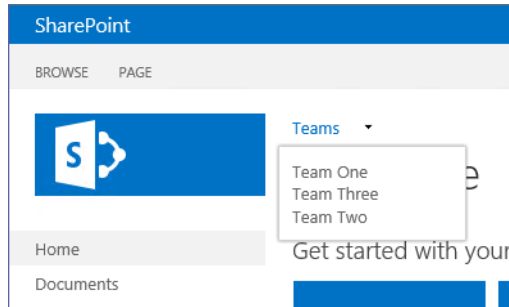


FIGURE 1-25 Completed metadata navigation.



EXAM TIP

Regardless of which navigation type you choose, the ability to create a reliable navigation-
al structure is a critical component in site hierarchy design. Be familiar with the structural
navigation concepts (such as managed paths) as well as metadata navigation configuration
requirements.

Planning term sets

Term sets are part of the larger set of MMS functionality present in a SharePoint Server
2013 ECM solution. MMS encompasses two distinct groupings of metadata: taxonomy and
folksonomy.

- **Taxonomy** The more formalized of the two groupings, taxonomy is hierarchical and deliberate in nature and includes terms and term sets.
- **Folksonomy** The more casual of the two groupings, folksonomy imparts items with metadata via the use of tags/keywords; no hierarchy can be implied or defined.

A term set is nothing more than an intelligent grouping of related terms; terms are nothing more than metadata that can be associated with items in a SharePoint list or library.



EXAM TIP

SharePoint administrators are often not the people who define term sets. Most term sets start as tags and keywords (folksonomy) and are then promoted to a more formal status as part of a term set (taxonomy). Be familiar with how this transition takes place.

Terms

One of the more interesting behaviors of terms is that they can be nested, up to seven levels deep. Additionally, you can designate certain levels of terms as “unavailable for tagging,” meaning that you will be using them only for navigational purposes (such as grouping topics by letter, for example, A–F, G–J, and so on).

Term sets

Term sets with SharePoint are stored within a term store, which is stored within a MMS application. A SharePoint implementation is not limited to a single metadata service application; multiple service applications might be present to service different legal or organizational functions.

Term sets can have a status of either open or closed. An open term set enables anyone to contribute a new term; a closed term set only enables contributors and owners to be able to add a new term.

IMPORTANT SHAREPOINT METADATA HIERARCHY

MMS Application(s) → Taxonomy Term Store (organized by language) → Term Set Group → Term Sets → Terms

Defining term set functionality

As human beings, we use metadata on a regular basis. We have logical groupings of metadata that describe our existence, such as these:

- **Colors** Red, orange, yellow, green, blue, indigo, violet
- **Sizes** X-small, small, medium, large, X-large
- **Fabrics** Polyester, cotton, wool, silk

In these examples, colors, sizes, and fabrics could all be valid term sets; their values would be considered as terms with a SharePoint environment. Additionally, these term sets could be grouped into a larger term set group, such as clothing.

Local versus global term sets

As term sets are being designed, it is important to consider the audience who will be consuming the metadata. During this design phase, questions such as these often arise:

- Does everyone in the enterprise need access to a particular term?
- Is the term specific in scope?
- Who should be managing the term set?
- What is the desired “footprint” of the term set?

A SharePoint MMS application is associated to a web application via the service application proxy. Terms provided via the proxy can be assigned to items within the desired SharePoint web application; the only consideration that must be made is one of scope.

Term sets are assigned by way of the Term Set Management Tool, which can be utilized at two distinct levels: site collection administration and Central Administration. Term sets created via site collection administration are called local term sets; those created via Central Administration are called global term sets.

Often, terms are generated specifically for the use of a single component/entity of the business; term sets that are scoped to a single site collection are known simply as local term sets.

Storing terms in a local term set simply means that the terms are available for use only within the site collection in which they are generated (although the term set is stored centrally within the MMS application). Such an arrangement might be preferable for items intended to be limited to one segment of the business and/or requiring less formal information management oversight (such as working with an enterprise librarian).

The creation and management of local term sets is done by site collection owners and administrators using the Term Store Management Tool.

Term sets that apply to a large section of the business are generally designed by an information management team. These term sets are often more formalized and are intended for application across multiple sites and site collections within a web application.

The creation and management of global term sets can be done by farm administrators, or (preferably) alongside appropriately trained business stakeholders who have been granted access via the MMS instance management page in Central Administration.

Core term set planning

The process of creating an information taxonomy can seem daunting, even in a relatively small business. The key to a successful metadata planning effort is to approach the information plan one piece at a time.

Members of a particular business unit often volunteer to be early adopters of this information management strategy and are willing advocates for a successful ECM implementation. Traditionally, this is the point at which IT has often attempted to interface with the business stakeholders directly, presumably to try and assess any technical pitfalls that could arise.

As it turns out, it is a common misconception to assume that term set designers have to be technical in order to design an effective metadata taxonomy; truthfully, they do not. Working with an enterprise librarian or design team, it is quite preferable to involve this group of term set designers in planning simply because they have firsthand knowledge of the products and processes that are pertinent to their segment of the business.

MORE INFO TERM SET PLANNING WORKSHEETS

Microsoft provides two distinct metadata planning worksheets in Microsoft Excel format. The term sets planning worksheet (<http://go.microsoft.com/fwlink/?LinkId=163486&clcid=0x409>) provides a basic worksheet that can be implemented manually; the detailed term set planning worksheet (<http://go.microsoft.com/fwlink/?LinkId=163487&clcid=0x409>) can be used for more in-depth metadata design. Of extra benefit is the fact that the detailed worksheet can be directly imported (in Comma-Separated Value [CSV] format) into the Term Store Management Tool.

Successfully planning a term set involves four core activities: identifying each term set, identifying a term set owner, designing term set groups, and defining the term sets themselves.

Identifying term sets

Identifying what items should belong in a term set (and at what level) is often the hardest part of the entire metadata process. The sheer amount of metadata present in a business can be overwhelming, but there is an easy way to overcome the initial shock: Look for the pain points.

Specifically, you are looking for places that even a limited application of metadata could streamline processes and make information more readily searchable, such as the following:

- Custom columns, particularly those that enable the selection of one or more values (such as choice fields)
- Words or phrases that are being regularly used to tag an item (from folksonomy to taxonomy)
- Metadata that users often use to sort or filter items in a list or library
- Acronyms or abbreviations for a function or product
- Items that are, by definition, hierarchical in nature (for example, inventories)

Items that probably should not be included in a term set might include these:

- Items that have column metadata fields that have already been provided with the SharePoint framework (built-in columns)
- Boolean (yes/no) values
- Items that might have different values in different segments of a business
- Items that have no well-defined values

Identifying term set owners

A term set owner is the person or group responsible for the maintenance of terms in a particular term set. As an example, if a business has locations that are added and removed on a regular basis, the term set owner is the person who does the additions and deletions of terms from the term set.

In more formal term sets (global term sets, in particular), the term set owner is often not a single individual but a small team of people who are responsible for the overall correctness of the term set.

Determine term set groups

Term set groups define security for a particular term set; they also provide for the logical grouping of term sets. Earlier in this section, we combined the term sets of colors, sizes, and fabrics into a term set group.

Users can be designated as contributors for a term set, and these people can be enabled to manage a particular term set in the group. Additionally, individuals can be designated as term set group managers, enabling them to assign and remove permissions to a term set or sets as required.

Defining the term set

After owners are defined for a particular term set, they can either choose to define the term set on their own or designate contributors to a term set to more fully develop the term set. Defining a term set boils down to these three distinct questions:

- What terms belong in any given term set?
- How are terms organized with a term set?
- Who are designated contributors for a given term set?

Creating a new term set

There are at least two ways to begin the process of generating a new term set, and they both use the Term Store Management Tool.

SCAs/owners can find the Term Store Management Tool from any site in the site collection. To begin using the Term Store Management Tool do the following:

1. Click the Settings icon in the upper-right corner of the site.
2. When the drop-down menu appears, select Site Settings.
3. From the Site Settings page that appears, within the Site Administration section, select the Term Store Management link.

Farm administrators and designated term store administrators can find the Term Store Management Tool from within Central Administration. To begin using the Term Store Management Tool, follow these steps:

1. Open Central Administration.
2. In the Application Management section, select Manage Service Applications.
3. Look for the name of the MMS and select its link.
4. The Term Store Management Tool will appear.

Creating a term set from the Term Store Management Tool

Within the Term Set Management Tool, there are two panes. The leftmost pane is hierarchical and enables the administrator to navigate down through the following:

- The Taxonomy Term Store that is being administered (based on language)
- The name of the MMS instance (icon depicted as a house icon with a tag overlay)
- The name of a term set (icon depicted as a manila file folder with a tag overlay)

- The term set (depicted as a series of tags in a group)
- To create a new term (depicted as a single tag)

To create the new term set, do the following:

1. Select an existing term set group and then click its drop-down arrow.
2. Note the options; you can do the following:
 - A. Create a new term set.
 - B. Import a term set (from a comma-delimited UTF-8 CSV file, generated with the detailed planning workbook).
 - C. Delete a group (deletes the entire term set Group).
3. Selecting To create a new term set enables you to type a value for its name.
4. At this point, there are four tabs associated with your term set: General, Intended Use, Custom Sort, and Custom Properties.
5. On the General tab for the service application, you can specify the following:
 - A. Term Set Name: Specifies the term set name
 - B. Description: Enables you to type a description for the term set
 - C. Owner: Enables you to choose a primary user or group to designate as an owner for the term set
 - D. Contact: Enables you to specify an e-mail for term suggestions and feedback; without this value entered, the suggestion feature is disabled
 - E. Stakeholders: Enables you to specify people and groups within the organization who should be notified before major changes are made to the term set
 - F. Submission Policy: Enables the term set to be closed or opened; after it's closed, only metadata managers can add terms to the set
 - G. Unique Identifier: Displays the GUID associated with this term set
6. On the Intended Use tab, you can specify the following:
 - A. **Available For Tagging** Enables the term set to be used by end users and content editors of sites
 - B. **Use This Term Set For Site Navigation** Enables the term set to be used for managed navigation
7. On the Custom Sort Order tab, you can specify either of the following:
 - A. Use Default Sort Order According To The Current Language
 - B. Use a Custom Sort Order
8. On the Custom Properties tab, you can create any new custom properties for use in the term set.



Thought experiment

Designing a navigational taxonomy

In the following thought experiment, apply what you've learned about this objective. You can find answers to these questions in the "Answers" section at the back of this chapter.

You have been tasked with the implementation of a navigational taxonomy for your enterprise portal. The taxonomy will be designed by the corporate communications department and deployed by the SharePoint team. Additionally, it will be required that certain search terms will automatically promote the corresponding sites in the portal.

Describe a general approach you might take for this deployment.

Objective summary

- A site collection is a group of sites that are functionally, navigational, and administratively related to one another.
- Managed navigation uses a metadata structure to assign the navigational taxonomy of a site.
- A content type hub is a specific type of site that has been designated as the source that provides content types to other site collections.
- There are six major components to search in SharePoint 2013: Search Administration, Crawl, Content Processing, Analytics Processing, Indexing, and Query Processing.
- Regularly used keywords can be moved into term sets, allowing for central administration of terms.
- An information management policy is a set of rules that can be assigned to any given piece of content.

Objective review

Answer the following questions to test your knowledge of the information in this objective. You can find the answers to these questions and explanations of why each answer choice is correct or incorrect in the “Answers” section at the end of this chapter.

1. You are attempting to add new keywords to a SharePoint and receive a message that states The Site Does Not Contain A Default Keywords Store. How should you correct this issue?
 - A. Add an enterprise keywords site column to the site’s content types.
 - B. In Central Administration, add an MMS application to the SharePoint farm.
 - C. Edit the MMS Connection and then select This Service Application Is The Default Storage Location For Keywords.
 - D. Activate the managed keyword service application in Central Administration.
2. You want to define a new information policy feature. The legal requirement for the document type requires that you produce and retain physical copies of each document. You want to use a policy feature that will be supported in the next version of SharePoint.

Which of the following policy feature types should you choose?

- A. Retention
 - B. Bar codes
 - C. Labels
 - D. Auditing
3. Within the managed metadata service, you want to designate a set of terms specifically for SharePoint navigation. What selection should you make within the Intended Use tab to accomplish this action?
 - A. Use This Term Set For Managed Navigation
 - B. Make Term Set Unavailable For Tagging
 - C. Enable Team Site Navigation
 - D. Use This Term Set For Site Navigation

Objective 1.2: Design a logical architecture

In the last objective, you designed the core informational elements for use within the farm. With this component of the plan in hand, you can now shift your focus onto determining the layout of technical components required to implement the newly generated informational design.

This objective focuses on the capabilities present in IIS and SharePoint, which enable you to determine the required structure to implement the logical design, including such topics as storage, authentication, URLs, web applications, and other components.

This objective covers how to:

- Plan application pools.
- Plan web applications.
- Plan for software boundaries.
- Plan content databases.
- Plan host header site collections.
- Plan zones and alternate access mapping.

Planning application pools

As you will discover in the planning for software boundaries section, there is a supported limit of 10 application pools per web server.

At first, it would seem that this number might be some sort of mistake; you see, if you were to build a basic SharePoint farm and run the Farm Configuration Wizard from Central Administration, you would see from IIS Manager that there are already 12 application pools in service before you've built your first web application.

Let's set aside the limits discussion for a moment and talk about what an application pool is used for.

How is an application pool used?

An application pool is a construct used to group web applications logically, based on a number of criteria such as authentication, performance, isolation, and configuration. Web applications contained in an application pool provide functionality for one or more web sites in an IIS farm.

Confused yet? Let's take a look at a SharePoint-specific example of how application pools, web applications, and sites interact.

If you build a SharePoint farm, activate the default service applications (manually or via the Farm Configuration Wizard) and then build the first site (using the defaults provided). You wind up with several application pools, even more web applications, and a few SharePoint-specific web sites (see Figure 1-26).

Name	Status	.NET Fram...	Manage...	Identity	Applications
.NET v2.0	Started	v2.0	Integrated	ApplicationPoolIdentity	0
.NET v2.0 Classic	Started	v2.0	Classic	ApplicationPoolIdentity	0
.NET v4.5	Started	v4.0	Integrated	ApplicationPoolIdentity	0
.NET v4.5 Classic	Started	v4.0	Classic	ApplicationPoolIdentity	0
40fce3a55a5241388ba0bdc95aeb74e5	Started	v4.0	Integrated	BOSTON\sp_farm	1
94ca44be04f7490593869a4b828c2785	Started	v4.0	Integrated	BOSTON\sp_farm	15
c6b7735fa4334e2093874543a7a272a8	Started	v4.0	Integrated	BOSTON\sp_farm	1
Classic .NET AppPool	Started	v2.0	Classic	ApplicationPoolIdentity	0
DefaultAppPool	Started	v4.0	Integrated	ApplicationPoolIdentity	1
SecurityTokenServiceApplicationPool	Started	v4.0	Integrated	BOSTON\sp_farm	3
SharePoint - 80	Started	v4.0	Integrated	BOSTON\sp_farm	1
SharePoint Central Administration v4	Started	v4.0	Integrated	BOSTON\sp_farm	1
SharePoint Web Services Root	Stopped	v4.0	Integrated	LocalService	1

FIGURE 1-26 Application pools supporting a SharePoint farm.

Looking at these application pools, we see that there is a SharePoint - 80 application pool. Filtering on this pool (by right-clicking the app pool and selecting view applications), you see that this pool hosts a single application for the SharePoint - 80 site (see Figure 1-27).

Virtual Path	Physical Path	Site	Application Pool
Root Application	C:\inetpub\wwwroot\wss\VirtualDirectories\80	SharePoint - 80	SharePoint - 80 (v4.0)

FIGURE 1-27 The root web application for the SharePoint - 80 site.

There is also another application pool that hosts a different application but is also providing services to the SharePoint - 80 site. Filtering instead on the SecurityTokenServiceApplicationPool, you see that it is linked to the SharePoint - 80 site as well as to the Central Administration and SharePoint Web Services sites (see Figure 1-28).

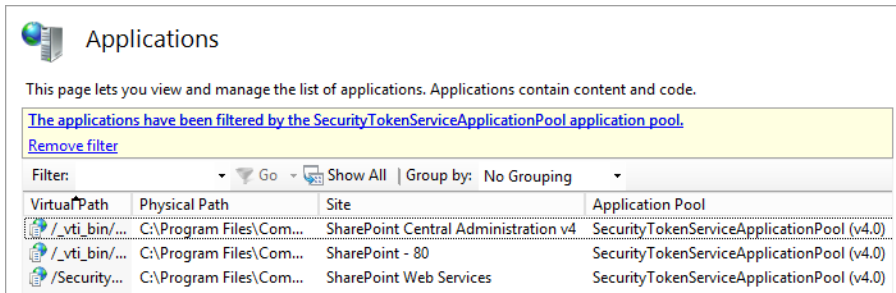


FIGURE 1-28 The SecurityTokenServiceApplicationPool and its associated sites.

Web application pool limits guidance

As a rule, you should seek to minimize the number of web application pools. Software boundary and limits guidance (which is covered shortly) states that no more than 10 web application pools exist in a farm.

There are two core reasons for this limitation: available random access memory (RAM) and usage characteristics.

Each web application pool adds about 100–200 megabytes (MB) of overhead to begin with plus the amount of memory required to run each site in the pool.

Before you add a new pool, consider whether an existing pool can be used to host any new web applications. The number of pools might not initially be an issue, but as SharePoint usage grows within your organization, you might find that the web servers in your farm begin to run short of available RAM.

A heavily trafficked web application pool can quickly generate a RAM load that can grow into the multigigabyte (GB) range (sometimes exceeding the 10 GB mark).

Considerations for building web applications

You might want to build a new web application pool for any of the following reasons:

- Grouping web applications that run with the same configuration settings
- Isolating web applications that require unique configuration settings
- Providing security by running a particular group of web sites under a closely monitored service account for auditing purposes
- Resource isolation:
 - To prevent an outage of the entire IIS application based on one or more misbehaving or failed web applications
 - For ISPs to separate application pools based on customer resource needs

Before adding a new web application, consider using Performance Monitor (perfmon.exe) to get a baseline of existing RAM usage. Monitoring a SharePoint environment is a topic that is covered in Chapter 5, “Maintain a core SharePoint environment.”

Planning web applications

Because there are software boundaries and limits that affect web application pools, it only stands to reason that there would be metrics around the number of web applications in a SharePoint farm.

For any SharePoint farm, the supported number of web applications is 20 per farm.



EXAM TIP

In the section on planning for software boundaries, you will note that the supported limit for web applications in a farm is set to 20. This is not a per-web application pool limit, but a limit for the entirety of the SharePoint farm. As with the web application pools, this limitation is memory-dependent, and baseline RAM monitoring is recommended before increasing the web application count to that level.

Planning the web app configuration

Several configuration items must be considered when planning web applications in a new SharePoint farm. Recording each of these decisions on or before the new web application is implemented results in a streamlined, repeatable installation as well as providing documentary evidence of the installation processes that have occurred previously.

Although the name of the web application might seem trivial at first, developing a naming standard for both your web applications and the content databases that they interact with is a key first effort at documentation. There are few feelings worse than receiving that phone call after stopping/deleting the wrong web application during business hours.

Determining the purpose of a web application before it is implemented guides the direction of its configuration. Defining this purpose can be as easy as developing a set of questions such as the following:

- What group of users does this application serve (intranet, extranet, Internet)?
- How are users expected to authenticate?
- What type of navigation do users expect when they visit the site or site collections in this web application?

Although not technically part of a web application's design, the manner in which site collections will be created and deployed has a direct bearing on how a web application should be configured. There are two distinct choices:

- Host named site collections
- Path-based site collections

Configuration choices made at creation time for the web application have direct bearing on which type of site collections can be utilized within your new web application.

Host named site collections are discussed later in this chapter (and will be compared with path-based site collections).

Authentication provider and type

When a new web application is created, there are several choices available for authentication. Choosing which authentication methods will be available generally depends on the audience the web application will serve:

- Windows authentication
 - Integrated Windows authentication (NTLM or Kerberos)
 - Basic authentication
- Forms-based authentication
 - Using the ASP.NET membership and role provider
- Trusted identity provider
 - SAML token-based authentication

Anonymous access

Although not technically a form of authentication, enabling anonymous access for a web application enables users to retrieve content without the need for a user name/password combination.

Allowing anonymous access does not mean that content in a web application will be immediately available to users; it simply means that site administrators can enable anonymous authorization to site content.

This setting should be left on when using forms authentication mode because certain forms-aware client applications might not correctly authenticate without it.

Database server and authentication type for the web application

Working with the SQL DBA team, you should be able to determine which Microsoft SQL database server or instance should host your SharePoint content databases.

The SQL database administrator (DBA) will let you know which type of authentication is acceptable, but this authentication must be one of the following:

- Windows authentication (recommended)
- SQL authentication

Specifying a failover database server

There are currently three types of high availability (HA) solutions provided by SQL Server; however, the only one that SharePoint is aware of (the others are transparent) is SQL database mirroring.

When a SharePoint database is mirrored, SharePoint must not only know the name/instance of the principal server (where the database read/write transactions are occurring) but also the name/instance of the mirror server (the read-only copy of the database). If the

mirrored database is failed over, SharePoint then knows the location of the alternative name/instance.

As stated previously, there are three SQL HA options available:

- SQL clustering (SQL 2008 R2 and 2012)
- SQL high availability groups (SQL 2012)
- SQL mirroring (SQL 2008 R2 and 2012)

IMPORTANT SQL MIRRORING HAS BEEN DEPRECATED AFTER SQL 2012

Although SQL mirroring is still supported in SQL 2012, it has been deprecated, meaning that it will not be supported in the next version of SQL. If you are creating a new SharePoint 2013 farm or upgrade, now might be a good time to consider one of the other options (high-availability groups are the preferred replacement for mirroring).

SQL database planning is discussed in greater detail later in this section.

Service application connections

SharePoint 2013 provides service application functionality (User Profile, Search, Excel Services, and so on) via a series of service application proxies.

These proxies are usually collected into a proxy group (the first one is called “default,” appropriately enough), but it is possible to connect to one or more proxies by simply selecting a custom connection and selecting the check boxes of the proxies that you want to connect the new web application to.

Alternate Access Mapping (AAM) URLs and web application zones

Alternate Access Mapping (AAM) URLs are a mechanism that allows for a single site collection to be associated to multiple URLs.

Zones are logical constructs that define several different means of accessing the same web application. Each zone can have different types of authentication mechanisms based on how a user would be accessing the site.

Both AAMs and zones are covered later in this section.

Planning for software boundaries

Software boundaries can be interpreted as operational limitations for a system. Some limits are finite, with a maximum allowed value, whereas others exceed performance or recommended limitations.

Boundaries, thresholds, and limits

To better understand these limits, consider a new car. This car might have the following:

- Four doors (a boundary)
- A maximum weight recommendation (occupants and cargo) of 1,000 pounds (a threshold)
- A maximum engine rotations per minute (RPM) limitation as given by the tachometer (a limit)

The number of doors that the car possesses is a value that cannot be changed without significantly altering the car's design. Exceeding the weight recommendation probably won't cause the car to stop functioning, but will significantly affect both its performance and economy. Finally, exceeding the maximum RPM limitation is entirely possible, but the engine could fail and would surely not be warranted by the manufacturer.

Similar to our car analogy, SharePoint Server 2013 has three classes of software boundaries and limits: boundaries, thresholds, and supported limits.

Boundaries

A boundary is an absolute limit, meaning that the value given cannot be exceeded in the current version of SharePoint.

An example of this type of limit is the number of zones in a web application; there are always five: default, intranet, extranet, Internet, and custom.

Thresholds

A threshold has an initial value set, meaning that the value can be modified to a maximum value (boundary).

Before altering these values, consideration should be given as to whether your specific infrastructure can accommodate the increased load that might be caused by this change.

Supported limits

A supported limit for any particular configuration parameter is a set value based on testing conducted by Microsoft.

Although you can exceed supported limits, you might encounter unexpected results; these results could come in the form of diminished performance or unexpected behavior in the farm.

Boundary and limits overview

By the time SharePoint Server 2013 is released to manufacturing (RTM), it has gone through several development cycles. In addition to these development efforts, it has perhaps been vetted by Microsoft development and IT Pro teams, business users within Microsoft,

Technology Adoption Program (TAP) members from larger external corporations, selected external partners, and others.

A direct result of the internal and external testing and usage studies carried out by Microsoft is the sheer amount of metrics documented in this process. Operational characteristics are gathered and compiled for each major component of a SharePoint farm, and recommendations are documented for optimal performance characteristics.

MORE INFO SOFTWARE BOUNDARIES AND LIMITS FOR SHAREPOINT 2013

Microsoft regularly updates a complete listing of the software boundaries and limits of SharePoint. The current software boundaries and limitations for SharePoint can be found on TechNet at <http://technet.microsoft.com/en-us/library/cc262787>.

Listed in the following sections is a subset of the recommended guidelines for major components of a SharePoint environment, along with their values and limit types. The sections shown do not include limits for SharePoint features such as Search, Managed Metadata, or Workflow (they can, however, be found in the software boundaries and limits TechNet article).

Web application limits

These limits include the following guidelines:

- **Web application** This is a supported limit of fewer than 20 web applications per farm. Limit the number of web applications as much as possible, choosing instead to create additional host named site collections.
- **Zone** This is a boundary limit of five zones per each web application and is hard-coded into the system; the zones include default, intranet, extranet, Internet, and custom.
- **Managed path** This is a supported limit of 20 per web application; each managed path is cached on the web server, requiring additional CPU resources to process. Although exceeding this limit is possible, the system should be tested in depth to ensure no performance degradation.
- **Solution cache size** This is a threshold limit of 300 MB per web application. The InfoPath Forms Service keeps solutions in cache to avoid retrieving them from disk. When the cache size is exceeded, performance is degraded. This limit value can be changed using the Set-SPInfoPathFormsService PowerShell cmdlet.

Web server and application limits

These limits include the following guidelines:

- **Application pools** This is a supported limit of 10 per web server; this number is a guideline that is heavily influenced by the following:
 - The amount of RAM available on the web servers.

- The usage characteristics for any given web application. A single highly active app pool can consume in excess of 10 GB of RAM.

Content database limits

These limits include the following guidelines:

- **Number of content databases** This is a supported limit of 500 per farm; exceeding this number does not tend to alter performance for end user operations on SharePoint:
 - It does negatively affect the performance of administrative operations (such as creating a new site collection).
 - If a large number of content databases are added to a farm, the recommendation is that PowerShell be favored over the web management interface for administering the web application.
- **Content database size** There are three supported limits:
 - For general usage scenarios, the supported limit is 200 GB per content database, with a limit of 100 GB recommended to ensure ease of backup and restore for site collections.
 - For all usage scenarios, the supported limit is 4 terabytes (TB) per content database, but you must be able to do the following:
 - Provide disk subsystem performance of 0.25 IOPS per GB minimum, with a preferred value of 2 IOPS per GB for optimal performance.
 - Have developed plans for high availability, disaster recovery, future capacity, and performance testing.
 - For document archive scenarios (only), there is no explicit content database limit; sites in these databases must be based on the document center or records center site templates:
 - As an average, less than 5 percent of the content in this database can be accessed and less than 1 percent modified or written.
 - Interactive elements such as alerts, workflows, link fix-ups, or item level security should not be used (content routing workflows are the exception).

MORE INFO ESTIMATING PERFORMANCE AND CAPACITY REQUIREMENTS FOR LARGE-SCALE DOCUMENT REPOSITORIES

Large document repositories, such as those found in the all usage and document archive scenarios of the preceding “Content database limits” section, should be constructed based on the guidelines found in the Estimate Performance and Capacity Requirements for Large Scale Document Repositories document at <http://technet.microsoft.com/en-us/library/ff608068.aspx>. This document was written for the 2010 version of SharePoint Server, but is still quite pertinent and will most likely be updated in the near future.

- **Content database items** This is a supported (and tested) limit of 60 million items; exceeding this limit should include multiple content databases.
- **Site collections per content database** This is a supported limit of 10,000 site collections maximum:
 - 2,500 nonpersonal site collections and 7,500 personal site collections.
 - 10,000 personal site collections.
 - This limitation has to do with upgrade times; larger numbers of site collections results in more difficult upgrades.
 - Content databases have a default warning and maximum levels of 2,000 and 5,000 sites, respectively.
 - Setting the warning and maximum levels for the number of sites in a content database can be done via Central Administration or the Set-SPContentDatabase commandlet with the -WarningSiteCount parameter.
- **Remote BLOB storage subsystem on Network Attached Storage (NAS)** This is a boundary limit of 20 milliseconds maximum to the first byte response time from the NAS.

Site collection limits

These limits include the following guidelines:

- **Site collections per farm** This is a supported limit of 750,000 sites (500,000 personal sites and 250,000 standard sites):
 - An excessive concentration of site collections within a single web application can place a substantial load on the memory allocated to a web server.
 - Search crawls across a large volume of site collections can also generate excessive memory loads on a web server.
 - As a safety measure, you should plan to configure a web application to recycle before memory on any web server falls beneath 2 GB.
- **Web sites per site collection** This is a supported limit of 250,000 per site collection and speaks directly to the amount of sites that are nested beneath other sites in a particular site collection.
- **Site collection size** This is a supported limit wherein a single site collection can utilize all the space afforded to it by the content database. As a result, the recommendation is that the content database (and by extension, the site collection) be limited to 100 GB.
- **Number of device channels per publishing site collection** This is a boundary limit of 10 device channels.

List and library limits

These limits include the following guidelines:

- **List row size** This is a boundary limit of 8,000 bytes per row; 256 bytes are reserved for built-in columns, which leaves 7,744 bytes for end-user columns. The size per type of column is discussed in the section on column limits.
 - This limit can present itself when promoting a large amount of columns from an InfoPath form.
- **File size** This is a boundary limit of 2 GB; the default maximum file size is 50 MB but can be increased to 2 GB. Increasing file size to 2 GB can have a negative effect on farm performance.
- **Documents** This is a supported limit of 30 million documents per library; however, care should be given in advance about how documents will be presented with the use of nesting folders or views.
- **Major versions** This is a supported limit of 400,000 major versions of documents; exceeding this amount can cause issues with basic file operations (open, save, delete, version history, and so on).
- **Minor versions** This is a boundary limit of 511 minor file versions and cannot be exceeded.
- **Items** This is a supported limit of 30 million items per list; performance can be increased in large lists by way of views, and so on, although the limit can itself be affected by the following:
 - How many columns are in the list; large numbers of columns in a large list will negatively affect performance.
 - What the usage characteristics of the list are; large numbers of users reading and writing content to a large list will negatively affect performance.
- **Rows size limit** This is a supported limit of six table rows internal to the database used for a list or library item; so called “wide lists,” which contain a large number of columns (see list row size on the previous page) might be wrapped over several table rows in a content database.
 - Six rows is the default size limit.
 - To accommodate more rows, farm administrators can alter the number of rows using PowerShell and the object model method `SPWebApplication.MaxListItemRowStorage`.
- **Bulk operations** This is a boundary limit of 100 items per bulk operation; the user interface allows for the selection of and interaction with a maximum of 100 items in any one operation.
- **List view lookup threshold** This is a threshold limit of eight join operations per query; specifies the maximum number of joins per query (lookup, person/group, workflow status, and so on) and blocks any join requests beyond the limit.

- **List view threshold** Specifies the maximum number of items that can be processed by a user during business hours. Outside this time window, queries are unrestricted.
 - List view threshold for users is a threshold limit of 5,000 items processed at any one time.
 - List view threshold for auditors and administrators is a threshold limit of 20,000 items processed at any one time.
- **Subsite** This is a threshold limit of 2,000 per site view; enumerating subsites for a given site past the 2,000 limit (via the interface) does not perform well. This limitation also affects the all site content page and the tree view control.
- **Coauthoring in Word and PowerPoint (.docx, .pptx, and .ppsx files)** This is a threshold limit of 10 concurrent editors per document; it is possible to have as many as 99 coauthors for any given document (this is a hard limit), but performance will degrade after 10 coauthors are editing the document.
- **Security scope** This is a threshold limit of 1,000 per list; this is a maximum number and should not be exceeded.

MORE INFO DESIGNING LARGE LISTS AND MAXIMIZING LIST PERFORMANCE

Lists and document libraries containing a large volume of items have the same performance characteristics and supported limits. As the amount of individual items increases, performance can be adversely affected. Microsoft provides prescriptive guidance for maximizing the performance of large lists and libraries in the “Designing large lists and maximizing list performance” document that can be found at <http://technet.microsoft.com/en-us/library/cc262813>. This document was written for the 2010 version of SharePoint Server but is still quite pertinent and will most likely be updated in the near future.

Page limits

These limits include the following guideline:

- **Web parts** This is a threshold limit of 25 per wiki or web part page; this limit is an estimate because the complexity of the web parts determines how many can be used on a page before performance is affected.

Security limits

These limits include the following guidelines:

- **Number of SharePoint groups a user can belong to** This is a supported limit of 5,000; this is not a hard limit, but follows the way Active Directory membership behaves. Exceeding this limit causes slower performance based on the amount of security checks required for an individual user.

- **Users in a site collection** This is a supported limit of 2 million per site collection; if this number is to be exceeded, management of the site collection should be done via PowerShell instead of the user interface.
- **Active Directory principals/users in a SharePoint group** This is a supported limit of 5,000 per SharePoint group; performance is the main consideration here because fetching user for permissions validation and rendering memberships can be adversely affected.
- **SharePoint groups** This is a supported limit of 10,000 per site collection; beyond 10,000 groups, actions such as adding a user to a group, creating a new group, and rendering group views can take more time to process.
- **Security principal; size of the security scope** This is a supported limit of 5,000 per Access Control List (ACL); every time the scope changes, there is a calculation that occurs. As the scope size increases, so does the amount of time required for the calculation.



EXAM TIP

There is a significant number of these metrics given for SharePoint 2013. It would be quite hard to memorize each limit and know whether it is a boundary, threshold, or limit (for the test); concentrate on the ones that have the largest impact—those that affect RAM, storage, and processor capacity.

Planning content databases

SharePoint administrators often become de facto SQL administrators as well; the level of SQL familiarity required by a SharePoint implementer is often fairly significant. SQL databases constitute an entire segment of the web/app/data SharePoint farm environment, so it only stands to reason that a SharePoint installation's health is heavily invested in the performance and storage characteristics of the SQL environment that supports it.

Software boundary considerations

In the previous section, there are some boundaries given for content databases:

- Five hundred content databases per farm (supported limit)
- General content database size recommendations:
 - 100 GB maximum recommended
 - 200 GB supported limit
- A supported limit of 4 TB per content database for archival content databases with very little read/write access
- No explicit limit for content databases housing document center or record center sites

If you examine these limits for a moment, you come to the realization that an environment approaching these levels would be quite large. A farm containing 500 databases with an average content database size of 50 GB each would place the SQL back-end storage requirement somewhere in the neighborhood of 25 TB of storage required.



EXAM TIP

In some organizations, the data tier of your SharePoint farm will be administered by one or more SQL database administrators. This team will most likely not be familiar with the specifications and limitations present in SharePoint 2013, so you will need to be able to explain these metrics to them.

A database of 50 GB in size is quite common. As the database continues to grow beyond this limit exceeding 100 GB in size, it will set off the SharePoint Health Analyzer rule: Some content databases are growing too large.

MORE INFO SHAREPOINT HEALTH ANALYZER

In fact, there are two SharePoint Health Analyzer rules that have to do with database sizing. The first database has large amounts of unused space is a weekly check that databases that exceed 100 GB in size will set off the SharePoint Health Analyzer rule: Some content databases are growing too large.

Scaling a SharePoint implementation

A content database can house several site collections, but a site collection can reside only within a single content database; with this thought in mind, we begin to consider how to “scale-out” our environment.

Before contemplating the site collection taxonomy, you might first want to consider the lifecycle of site collections. Some site collections are fairly permanent, providing the structural backbone of your SharePoint environment; others might be quite temporary (a one-off collaborative site collection, for instance).

In an environment in which you, the SharePoint administrator, are responsible for managing growth, the initial goal is scalability. By scaling your SharePoint environment to multiple site collections, you now can control growth.

As shown in Figure 1-29, a content database is initially configured with six site collections:

1. Over time, one of the site collections begins to experience rapid growth and begins to cause the content database to increase in size.
2. The SharePoint farm administrator recognizes this growth and moves the larger site collection into its own content database to manage growth.
3. After the content database is moved, its growth can be restricted by setting maximum number of site collections in the database to 1.

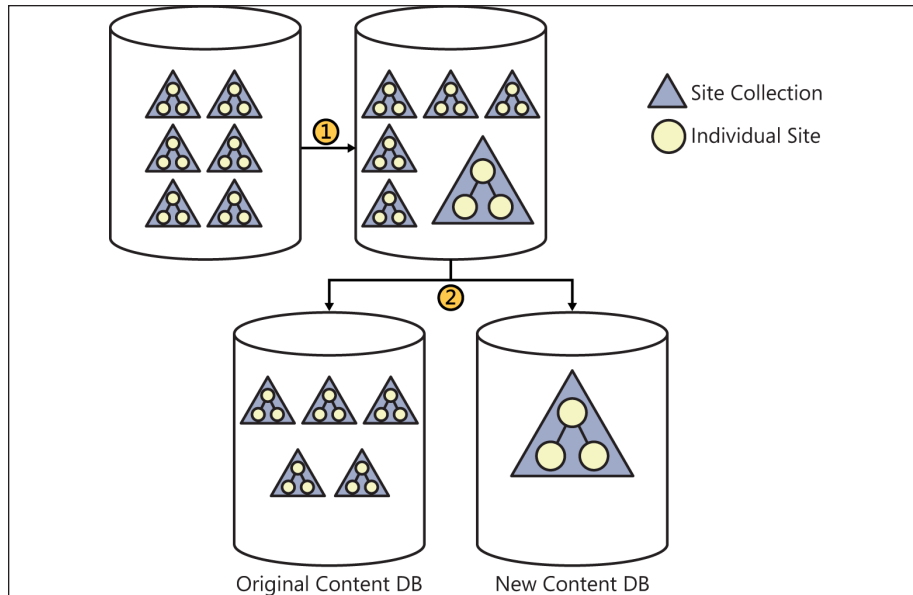


FIGURE 1-29 Moving a site collection into its own content database.

Planning host named site collections

This section and the one that follows, “Planning zones and Alternate Access Mapping,” are closely related; not because one follows the other, but because the two of them put together result in a choice about how a user will ultimately access any particular URL within a SharePoint farm.

A little history

One of the primary reasons administrators used to build separate web applications for a SharePoint site was to enable a farm to have distinct URLs for different web applications. A business unit within an organization would request a particular URL for its function, such as `hr.yoursharepointname.com` for HR.

The farm administrator would then oblige by generating a new web application for the HR group and assigning it the `hr.yoursharepointname.com` host header. Other business units would find out about the new URL and begin to have the same requirement; soon the farm administrator could have several web applications:

- Corporate portal
- Human resources
- Information technology
- Accounting
- Operations

- Sales
- Marketing/communications
- Engineering
- Central Administration
- Personal sites (My Sites)

As you have seen in previous sections, the supported limit for web applications is 20 per farm. If you were to build a farm and give each business unit its own web application (simply to give it a distinct URL), you might find that your farm is quickly trending toward the 20 web application limit.

Using host named site collections

Starting with SharePoint 2007, host named (also known as host header) site collection functionality has been a native component of SharePoint. Multiple host headers can be hosted within a single web application, enabling you to assign vanity URLs to multiple site collections contained within that web application.

Setting up a new web application for host named site collections (HNSCs) requires a bit of forethought as well as some basic knowledge of PowerShell.



EXAM TIP

As of this writing, the default behavior of the `New-SPWebApplication` cmdlet is to create a web application in Windows classic authentication mode. This behavior can be averted by using the `-AuthenticationProvider` switch. Windows classic authentication mode is deprecated (read: not preferred/might be removed at a later date), and should not be used; claims authentication (Windows NTLM) should be used instead. PowerShell will dutifully warn you of the missing switch, but only after it has executed the cmdlet and created the web application in Windows classic mode.

When you create the new web application to contain the host named site collections, it is important to note that host headers are not assigned to the web application itself. Any host headers assigned within this web application will be assigned to the individual site collections.

When a new SharePoint installation is created, it often is the case that a new web application has also been created by default at TCP port 80 (called the Default Web Site). This site must be deleted as the new HNSC web application will need to respond to TCP port 80.

As with any other technology using host headers, DNS entries and load balancer configurations will be required for any new host named site collections.

The Central Administration interface for creating new web applications does not provide a way to build a new HNSC-based web application.

When the HNSC web application is created, a root site collection should also be created; this site collection should not be available for use, nor should it have a template assigned.

Assuming that the domain name for your SharePoint farm is something along the lines of yoursharepointname.com, you should request that your administrators place a wildcard (*) entry in DNS and point it to the IP address of your web server. Any requests that are made to this domain will then be referred to SharePoint.



EXAM TIP

Creating (and most of the maintenance duties for) host named site collections is done entirely in PowerShell.

Setting up host named site collections

Now that you know some of the caveats associated with host named site collections, let's run through some of the steps required to build a web application for use with SharePoint host named site collections.

Note that these steps are very manual for the purpose of instruction; it is recommended that these steps be converted to a PowerShell script or function for repeatability.

The following steps assume:

- The wildcard and host header DNS entries have been made by your DNS admins.
- You have already removed the default web site in IIS on each web server in your farm.
- You know the user name/password of the account that will run the web application service.
- You are logged in as the farm account or another account with the correct farm/DB permissions.

This example build uses the following names/values:

- Application pool name: Intranet Pool - 80
- Application pool managed service account: boston\sp_app
- Web application name: Boston SharePoint Content
- Web server URL: http://ws2012sp13
- ContentDB SharePoint_Content_Boston (this database will be automatically built in the PowerShell commands shown following)

To build the example HNSC web application, do the following:

1. Open a SharePoint 2013 Management Shell (PowerShell) as administrator (choose to run as administrator).

2. Set the variables for your example web application:
 - A. \$AP = Intranet Pool - 80
 - B. \$APAcct = boston\sp_app
 - C. \$APMail = spapp@boston.local
 - D. \$WA = Boston SharePoint Content
 - E. \$WSUrl = http://ws2012sp13
 - F. \$ContentDB = SharePoint_Content_Boston
3. Set the variable for claims authentication:
 - A. \$Provider = New-SPAuthenticationProvider
4. Create the example web application:
 - A. New-SPWebApplication -ApplicationPool \$AP -ApplicationPoolAccount \$APAcct -Name \$WA -Port 80 -AuthenticationProvider New-SPAuthenticationProvider -DatabaseName \$ContentDB

Next, you need to build the empty (but necessary) site collection at the root of the web application:

1. Set the variables for the root site collection:
 - A. \$OAlias = **boston\troy**
 - B. \$OMail = **troy@boston.local**
2. Create the root site collection (note that there is no template assigned):
 - A. New-SPSite -URL \$WSUrl -ownerAlias \$OAlias -owneremail \$OMail

To build a host named site collection, do the following:
3. Set the variables for the site collection. This example uses the same account as the admin account and e-mail, but you can specify a different owner alias and e-mail as appropriate:
 - A. \$hostName = **Boston Local**
 - B. \$hostUrl = **http://www.boston.local**
 - C. New-SPSite -url \$hostUrl -HostHeaderWebApplication \$WSUrl -owneralias \$OAlias -owneremail \$OMail -template sts#0

When to not use host named site collections

Although creating host named site collections is the preferred choice for SharePoint 2013 installations, there are times when path-based site collections are more appropriate.

Distinct web applications might be preferable in the following situations:

- You want to provide greater security by provisioning separating web applications; optionally, each could run under its own managed account/password.
- You want to assign a completely different URL to a site that does not conform to the HNSC URL structure.

Path-based site collections might be preferable in the following situations:

- You intend to enable the self-service site creation functionality in a web application.
- You need to provide unique wildcard inclusions; wildcard inclusions in an HNSC-enabled web application are shared across all host name sites.

Planning zones and alternate access mappings

There are five zones available in SharePoint: default, intranet, extranet, Internet, and custom. While there is no functional difference (by default) between the zones, they provide a structure to configure access for different user segments accessing the same web application.

When a new SharePoint web application is created, its URL is stored in the default zone. If claims authentication is to be added along with another authentication mechanism, some consideration should be given to adding it to the default zone so the same URL can be used both inside the network and from outside the network.

IMPORTANT NTLM AUTHENTICATION AND SEARCH CRAWLS

At least one zone must be configured to enable NTLM authentication for the crawl component of search to be able to access content.



Thought experiment

Site collection implementation

In the following thought experiment, apply what you've learned about this objective. You can find answers to these questions in the "Answers" section at the back of this chapter.

In your organization, you have a few business groups that require separate vanity URLs for their portion of the intranet. Your SharePoint administrative staff is not well-versed in PowerShell but is comfortable with Central Administration. Additionally, you have a few business units that require the separation of content to meet legal and regulatory requirements. What type of site collection design might you use within this environment?

Objective summary

- A heavily trafficked web application pool can quickly generate a RAM load that can grow into the multi-GB range.
- There can be a maximum number of 500 content databases in a SharePoint farm.
- Host named site collections require configuration via PowerShell.
- A host named site collection should always have a root site collection, but this site collection should not be available for use or have a template assigned.

Objective review

Answer the following questions to test your knowledge of the information in this objective. You can find the answers to these questions and explanations of why each answer choice is correct or incorrect in the “Answers” section at the end of this chapter.

1. You want to build a navigational structure in which each site collection can have its own vanity URL. Which site collection designation should be used for the web application?
 - A. Fully qualified domain name (FQDN) site collections
 - B. Host named site collections
 - C. Domain named site collections
 - D. Path-based site collections
2. Which of the following SQL high availability (HA) solutions require configuration in SharePoint content databases?
 - A. SQL log shipping
 - B. SQL mirroring
 - C. SQL high availability groups
 - D. SQL clustering
3. Which of the following statements are true concerning web applications and application pools in a SharePoint environment? (Choose all that apply.)
 - A. There is a threshold limit of 20 web applications per SharePoint farm.
 - B. There is a supported limit of 20 web applications per SharePoint farm.
 - C. There is a supported limit of 10 application pools per web server in a SharePoint farm.
 - D. There is a threshold limit of 10 application pools per web server in a SharePoint farm.

Objective 1.3: Design a physical architecture

A key design characteristic of SharePoint Server is its scalability. Any given SharePoint installation can be designed for a small user intranet, a large enterprise, or a public web site. It can be focused on serving web page requests, dedicated to search services, or tuned for other applications such as Microsoft Excel or BCS.

One of the only constants in IT is change, and SharePoint is no exception to this rule. An effective SharePoint design accounts for the current and expected requirements of an organization. After the initial design is implemented, the SharePoint farm can then be modified and tuned to suit the changing requirements of the business.

This objective covers how to:

- Design a storage architecture.
- Configure basic request management.
- Define individual server requirements.
- Define service topologies.
- Plan server load balancing.
- Plan a network infrastructure.

Designing a storage architecture

SharePoint Server farms are data-intensive, requiring both large storage capacities and solid in input/output (I/O) storage design to ensure the best performance possible. This back-end storage is attached to the SQL (data tier) instance of the SharePoint farm.

Three storage architectures are supported within a SharePoint environment: Direct Attached Storage (DAS), Storage Area Network (SAN), and Network Attached Storage (NAS). DAS and SAN storage architectures are fully supported; NAS storage is supported only for content databases configured to use Remote Blob Storage (RBS).

MORE INFO DESIGNING THE STORAGE SUBSYSTEM

Planning and configuring the storage layer of a SharePoint farm infrastructure can be a complex task. For more detailed information about each storage architecture, see the TechNet article "Storage and SQL Server Capacity Planning and Configuration" at <http://technet.microsoft.com/en-us/library/cc298801.aspx>.

Each storage architecture has an associated set of hardware and administrative costs; the storage type you choose often has to do with the hardware and administrative structure you have available within your enterprise.

Direct Attached Storage (DAS)

DAS describes an environment in which each server maintains its own discrete storage without benefit of a storage network. Modern servers support two distinct types of drives: Serial Attached SCSI (SAS) and Serial Attached ATA (SATA).

Choosing this type of storage has the following benefits and drawbacks:

- The initial setup and administration of DAS is pretty straightforward, requiring only the attachment of the storage hardware to the server(s).
- The future storage growth of this solution is limited to the available interconnects to the server's motherboard:
 - After there are no more connections available to the server backplane, the server must be replaced to allow for future growth.
 - After the I/O capacity of the motherboard is saturated, the server must be replaced with a larger server to allow for future growth.
- Long-term administration of the storage subsystems must be completed on a per-server basis, with no provision for centralized storage.
- Any remaining space available in the storage subsystem is unusable for other servers in the farm/enterprise.

Storage Area Network (SAN)

SAN utilizes a storage network to abstract the storage subsystem from the server hosts to which they are attached. The benefits of this abstraction are immediate: the storage subsystem can be centrally managed and expanded as desired.

The Fibre Channel connections between the storage and host are attached using either twisted-pair copper wire or fiber-optic cables. A host connected to the SAN uses a host-based adapter to transfer SCSI commands to the storage using the Fibre Channel Protocol (FCP) for transport.

Choosing this type of storage has the following benefits and drawbacks:

- Available storage within the SAN can be assigned as required to any participating host because there is no longer a 1:1 relationship between storage and host.
- SAN connectivity eases the configuration of cluster storage, enabling storage to be presented to and more easily moved back and forth between cluster nodes.
- The initial setup of the storage layer requires in-depth administrative knowledge of the storage vendor subsystem utilized in the SAN.
- Incorrect configuration of the SAN can have a far-reaching effect; degraded performance or corruption can occur when improper configuration occurs.
- SAN I/O metrics should be watched carefully to ensure that performance is not degraded by saturation of SAN connectivity.

Network Attached Storage (NAS)

NAS storage provides file-based data storage to other devices on the network. Connectivity and I/O metrics from such a system are often subpar when compared to DAS- or SAN-connected storage. As such, this type of storage is supported only for content databases that have been configured to utilize RBS.



EXAM TIP

All network storage connected to SharePoint is required to meet two criteria. The first criterion is that the storage must respond to a ping within 1 millisecond (ms), meaning that the storage will most likely be located within the same datacenter as the host. The second criterion is that the first byte of requested data must be returned within 20 ms (this is true regardless of the disk subsystem chosen).

Disk and RAID types

The types of disks chosen can have an effect on the performance of your storage subsystem. Additionally, the redundant array of independent disks (RAID) configuration of the drives can have a dramatic effect on the performance characteristics of storage.

SharePoint 2013 supports several types of disks:

- Small Computer System Interface (SCSI)
- Serial Advanced Technology Attachment (SATA)
- Serial Attached SCSI (SAS)
- Fibre Channel (FC)
- Integrated Drive Electronics (IDE)
- Solid State Drive (SSD)

Without going into on-disk caching, rotation speed, or other in-depth storage tuning discussions, you can pretty much break down this list in terms of newer, faster drive technologies (SSD, SAS, SATA, FC) and older legacy technologies (SCSI and IDE). Often, the type of drive you choose will simply come down to the available interface types provided by your storage subsystem.

SharePoint 2013 supports all RAID types, but the recommendation for best performance characteristics is to implement RAID 1+0 (also known as RAID 10).

This RAID type configures drives in a striped set of mirrored drives—the mirroring component provides fault tolerance, and the striped component maximizes performance. In such a system, multiple drives can sustain losses but the RAID does not fail unless a mirror loses all its drives.

Configuring basic request management

Traditional load balancing technologies enable incoming traffic to be routed to one or more SharePoint web servers. The amount of intelligence applied to these routing actions varies in scope from the most rudimentary types of routing (such as DNS round-robin) to advanced routing as seen in dedicated load balancing solutions.

Although it is possible to configure an external load balancer to understand the specific behaviors required for a SharePoint environment, such solutions can have shortcomings:

- Changes made at the load balancer level can have dramatic effects on the SharePoint farm, resulting in inconsistencies or outages.
- Changes made within the SharePoint farm but not reflected in the load balancer configuration (such as search crawler changes) can have a negative effect on performance.

For instance, consider a SharePoint farm that is both serving user requests and search crawls at the same time. Enough search requests might cause the SharePoint environment to have increased latency serving user requests; such a situation could result in a perceived outage, causing irregular work stoppages.

MORE INFO CONFIGURING REQUEST MANAGER

There are several different ways in which Request Management can be configured. These configurations are discussed in the TechNet article “Configure Request Manager in SharePoint Server 2013” at <http://technet.microsoft.com/en-us/library/jj712708.aspx>.

Request Management versus throttling

Earlier versions of SharePoint included the notion of HTTP request throttling, in which the current state of each web server was evaluated, and incoming requests could be throttled before a server reached a nonresponsive status. The current health of a web server could be observed in the HTTP response within a header called X-SharePointHealthScore.

Request Management is a new form of intelligent request routing and throttling available within SharePoint 2013. Request Management can be enabled on a per web-application basis, enabling incoming requests to be evaluated against a set of rules to determine which web server (if any) will respond.

Deployment modes

There are two deployment modes for request management: dedicated and integrated.

Dedicated mode deployments are useful in larger environments and allow for the segmentation of request management activities away from the web servers servicing the requests.

In an integrated mode deployment, request management is handled directly on the web servers, meaning that any server running the SharePoint Foundation Web Application Service also has the Request Management service instance provisioned.

Throttling rules

An incoming HTTP request will first be evaluated by the throttling rules; if an incoming request matches a throttling rule, the request is refused immediately.

Throttling rules also have a couple of other options worth noting: Expiration and Threshold. The Expiration option enables you to set an expiration date and time for the rule; the Threshold option enables you to automatically remove a routing target (web server) if the health score exceeds the value you select (health scores from 0 to 10).



EXAM TIP

Unless otherwise specified, throttling is enabled by default on each web app created in the farm.

Throttling rules can be enabled or disabled using the `-ThrottlingEnabled` parameter of the `Set-SPRequestManagementSettings` cmdlet. Additional configuration for the throttling rules can be administered using the `Get-/Set-SPThrottlingRule` PowerShell cmdlet.

Routing rules and execution groups

Next to be evaluated are routing rules. These rules are accumulated into a series of three execution groups (0, 1, and 2). Group 0 is the highest level (evaluated first), followed by groups 1 and 2.

There are a couple of rather important things to know about execution group behavior:

- Routing rules that are not associated with an execution group are automatically associated with execution group 0.
- If an incoming request is matched by a rule within an execution group, no further rules or groups are evaluated and the request is routed and prioritized.

Unless otherwise specified, routing is enabled by default on each web app created in the farm.

Routing rules can be enabled or disabled using the `-RoutingEnabled` parameter of the `Set-SPRequestManagementSettings` cmdlet. Additional configuration for the throttling rules can be administered using the `Get-/Set-SPThrottlingRule` PowerShell cmdlet.

There are no PowerShell cmdlets for working with execution groups because they are configured along with the creation/administration of routing rules.

Rule syntax

Rules control the evaluation criteria for the throttling, prioritization, or routing of incoming HTTP requests. The criteria for each rule consist of match properties, match types, and match values. Each rule chooses a match property, assigns an operator to it, and then assigns a value for the match.

IMPORTANT THROTTLING AND ROUTING RULE SYNTAX

The syntax used for these rules is identical for both throttling and routing.

There are eight types of match properties that specify an HTTP header for the match values:

- CustomHeader
- Host
- HttpMethod
- IP
- SoapAction
- Url
- UrlReferrer
- UserAgent

There are four associated operators for the match:

- RegEx
- Equals
- Starts with
- Ends with

Rules criteria can be administered using the `New-SPRequestManagementRuleCriteria` cmdlet. This cmdlet enables an administrator to set the match properties, match types, and match values for throttling or routing rules.

Routing targets

Any machine running the SharePoint Foundation Web Application Service is a potential routing target (a machine that could service incoming HTTP requests). An appropriate server is selected via one of two weighting schemes: static- or health-weighted.

Static-weighted routing enables an administrator to predefine which servers will be more or less able to serve requests. This weighting is set by fault to a value of 1; changing this value to a lower integer value (say 0 or -1) will cause a server to be utilized less; changing the value to an integer value greater than 1 would cause a server to be considered “stronger” and thus more utilized.

For instance, in an environment in which servers are being refreshed (older servers being replaced by newer servers), the SharePoint web servers might not be identical in hardware configuration or resources. In such a situation, it might be preferable to assign a higher

weight to a server with more resources while assigning a lower weight to a server that is older or less able to serve requests.

Unlike static-weighting routing, health-weighted routing is assigned by analyzing the health of a given server in the machine pool. Each server in a SharePoint environment has a health score, assigned by the SharePoint Health Analyzer, varying from a score of 0 (healthy) to 10 (unhealthy).



EXAM TIP

The deployment mode can be configured using the `-RoutingWeightScheme` switch of the `Set-SPRequestManagementSettings` cmdlet.

Machine pools

Machine pools are groupings of routing targets. Requests that match a given routing rule can be routed to a particular grouping of SharePoint web servers (instead of all of them), whereas requests that do not match a rule are routed to any available web server in the farm. Machine pools can be administered using the `Get-/Set-SPRoutingMachinePool` cmdlet.

Monitoring request management

There are a series of metrics that can be tracked within the Event Viewer to monitor the health of request management (see Table 1-2).

TABLE 1-2 Request management counters

Counter name	Description
Connections Current	The total number of connections that are currently open by Request Manager.
Connections Reused / Sec	The number of connections per second that are reused when the same client connection makes another request without closing the connection.
Routed Requests / Sec	The number of routed requests per second. The instance determines the application pool and server for which this counter tracks.
Throttled Requests / Sec	The number of throttled requests per second.
Failed Requests / Sec	The number of failed requests per second.
Average Processing Time	The time to process the request that is the time to evaluate all the rules and determine a routing target.
Last Ping Latency	The last ping latency (that is, Request Manager's PING feature) and the instance determine which application pool and machine target.
Connection Endpoints Current	The total number of endpoints that are connected for all active connections.
Routed Requests Current	The number of unfinished routed requests. The instance determines which application pool and machine target.

These metrics levels can be monitored in both the event and tracing logs using the Set-SPLoLevel PowerShell command. For instance, the following PowerShell command will increase the trace severity levels to verbose:

```
Set-SPLoLevel "Request Management" -TraceSeverity Verbose
```

Defining individual server requirements

The configuration of each server in your new SharePoint farm depends greatly on the topology you choose. If your environment is very small, you might start your design with a single server and then grow the farm to multiple servers as demand increases.

Interestingly enough, a single server installation of SharePoint requires significantly more memory and hard disk resources than a distributed server installation using more than one server. The reason for this requirement is rather straightforward: A single server installation really is two installations in one: a SharePoint server and a database server (either built-in or SQL).

The requirements you choose are also based on the version of SharePoint you are using. If you are installing SharePoint Foundation 2013, for instance, you might need as little as 8 GB of RAM to get started.

Single server installations

Single server installations of SharePoint are most often used for evaluation or development environments, not production. This approach should be used only in an environment with a limited number of users.

In such an environment, SharePoint and the built-in database or SQL server tend to contend for resources (particularly RAM), and the users' perception of the farm's performance might suffer as a result.

The following requirements do not really address items such as the storage space required for the databases and any other services (such as search indexes). The recommendation is to add a secondary drive for the storage of such information.

The basic requirements for a single server SharePoint farm depend greatly on the SharePoint installation chosen and are shown in Table 1-3.

TABLE 1-3 Single server hardware requirements

Installation Type	RAM	Processor	Hard Disk Space
Single Server SharePoint Foundation 2013 installation	8 GB	64-bit, 4 cores	80 GB for system drive
Single Server SharePoint Server 2013 installation	24 GB	64-bit, 4 cores	80 GB for system drive



EXAM TIP

The amount of free disk space available on the system drive of a SharePoint server should never fall below two times the amount of server RAM; this limit is specifically designed to allow memory dumps to be stored on the disk subsystem if necessary.

Three tier server installations

Because we have determined that a single server is not the preferred installation for a production SharePoint farm, you should now learn about the hardware requirements for a tiered installation. In such an environment, the web and application tier servers are separated from the SQL servers and have different hardware requirements (see Table 1-4).

TABLE 1-4 Three tier server hardware requirements

Installation Type	RAM	Processor	Hard Disk Space
Web or application server in a three tier farm	12 GB	64-bit, 4 cores	80 GB for system drive
Database servers in a three tier farm	8 GB for small deployments; 16 GB for medium deployments	64-bit/4 cores for small deployments; 64-bit/8 cores for medium deployments	80 GB for system drive

MORE INFO DISK SPACE CAPACITY PLANNING

The hard disk space column in this table does not show database, transaction log, TempDB or any other space requirements for the SQL database server. These requirements have to be assessed as part of your capacity planning and should be included in your completed design. Information about planning the storage and SQL server capacity planning can be found at <http://technet.microsoft.com/en-us/library/cc298801.aspx>; overall information about SharePoint Server 2013 capacity planning can be found at <http://technet.microsoft.com/en-us/library/ff758647.aspx>.

Software requirements for single-server installations

The software requirements for members of a SharePoint farm are well defined and depend on the role of the server within the farm.

The minimum requirements for a single server with built-in database are the following:

- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter; or the 64-bit edition of Windows Server 2012 Standard or Datacenter.
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876).

- FIX: IIS 7.5 configurations are not updated when you use the ServerManager class to commit configuration changes (KB 2708075).
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
 - Windows Server 2008 R2 SP1 (KB 2759112)
 - Windows Server 2012 (KB 2765317)
- The Setup program installs the following prerequisite for a single server with built-in database:
 - Microsoft SQL Server 2008 R2 SP1 Express Edition
- The Microsoft SharePoint Products Preparation Tool installs the following prerequisites for a single server with built-in database:
 - Web Server (IIS) Role
 - Application Server Role
 - Microsoft .NET Framework version 4.5
 - SQL Server 2008 R2 SP1 Native Client
 - Microsoft WCF Data Services 5.0
 - Microsoft Information Protection and Control Client (MSIPC)
 - Microsoft Sync Framework Runtime v1.0 SP1 (x64)
 - Windows Management Framework 3.0, which includes Windows PowerShell 3.0
 - Windows Identity Foundation (WIF) 1.0 and Microsoft Identity Extensions (previously named WIF 1.1)
 - Windows Server AppFabric
 - Cumulative Update Package 1 for Microsoft AppFabric 1.1 for Windows Server (KB 2671763)

Software requirements for web and application server installations

The minimum requirements for web and application servers in a farm are the following:

- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter; or the 64-bit edition of Windows Server 2012 Standard or Datacenter.
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876).
- FIX: IIS 7.5 configurations are not updated when you use the ServerManager class to commit configuration changes (KB 2708075).
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
 - Windows Server 2008 R2 SP1 (KB 2759112)
 - Windows Server 2012 (KB 2765317)
- The Microsoft SharePoint Products Preparation Tool installs the following prerequisites for front-end web servers and application servers in a farm:

- Web Server (IIS) role
- Application Server role
- Microsoft .NET Framework version 4.5
- SQL Server 2008 R2 SP1 Native Client
- Microsoft WCF Data Services 5.0
- Microsoft Information Protection and Control Client (MSIPC)
- Microsoft Sync Framework Runtime v1.0 SP1 (x64)
- Windows Management Framework 3.0 which includes Windows PowerShell 3.0
- Windows Identity Foundation (WIF) 1.0 and Microsoft Identity Extensions (previously named WIF 1.1)
- Windows Server AppFabric
- Cumulative Update Package 1 for Microsoft AppFabric 1.1 for Windows Server (KB 2671763)

Software requirements for database server installations in a farm

The minimum requirements for database installations in a farm are as follows:

- One of the following:
 - The 64-bit edition of Microsoft SQL Server 2012
 - The 64-bit edition of SQL Server 2008 R2 Service Pack 1
- The 64-bit edition of Windows Server 2008 R2 Service Pack 1 (SP1) Standard, Enterprise, or Datacenter; or the 64-bit edition of Windows Server 2012 Standard or Datacenter.
- The SharePoint parsing process crashes in Windows Server 2008 R2 (KB 2554876).
- FIX: IIS 7.5 configurations are not updated when you use the ServerManager class to commit configuration changes (KB 2708075).
- Hotfix: ASP.NET (SharePoint) race condition in .NET 4.5 RTM:
 - Windows Server 2008 R2 SP1 (KB 2759112)
 - Windows Server 2012 (KB 2765317)
 - Microsoft .NET Framework version 4.5

Defining service topologies

Scaling a SharePoint 2013 installation requires planning for the distribution of service applications across the farm environment. Because each implementation differs in terms of the amount of data, services offered, and users supported, no single topology is appropriate for any given business.

The following topologies are by no means the only ones available, but they give guidance as topology starting farms for your design.

Smallest (practical) fault tolerant farm

In this farm type, each tier (web, application, and data) must provide fault tolerance. At the web tier, user requests are distributed across both servers using server load balancing (hardware- or software-based). The application layer servers each run all required service application roles.

IMPORTANT COMBINING THE WEB AND APPLICATION TIERS

Although you could technically collapse the web and application tiers into two servers instead of the four specified, performance would suffer considerably as demand increases for the services provided by the application tier.

The data tier for this farm is load balanced using Clustering, Mirroring, or SQL2012 AlwaysOn technologies (Availability Groups, Mirroring, or Clustering). All three tiers are shown in Figure 1-30.

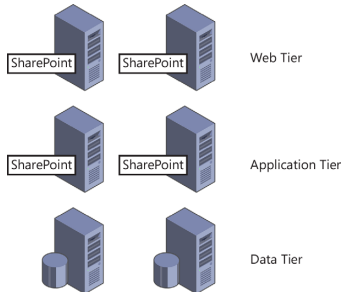


FIGURE 1-30 Smallest fault tolerant farm.

Search optimized farm

In a SharePoint environment that maintains a lot of content, search traffic can begin to produce a lot of traffic on the web servers. Segmenting the Crawl, Query, and Index components can improve the user experience, moving the search-centric activities onto dedicated servers.

In this configuration, a new web server is dedicated to the Crawl component in the web tier and the Query/Index components are moved onto their own fault tolerant server set (see Figure 1-31).

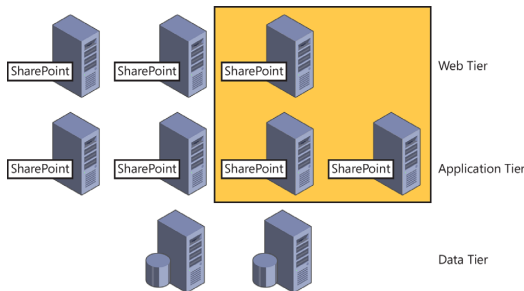


FIGURE 1-31 Search optimized farm.

Service application scaling

As the SharePoint environment continues to grow, a server can continue to be scaled out via server groups. Groupings of servers can be created at each tier based on the service applications or roles that will deliver. These groupings are logical (not configuration-based) in nature, giving administrators guidance about which set of servers should maintain a particular service application or role.



EXAM TIP

Know the roles and servers assigned at each tier of the smallest fault-tolerant SharePoint farm.

Planning server load balancing

A key part of HA, server load balancing provides technologies that can improve the resiliency of any IIS-based web farm, SharePoint included.

Server load balancing is a technology that has been around for over a decade. At a very basic level, the role of load balancing is simply to distribute incoming web requests across multiple web servers; you could do a very similar thing via round-robin DNS.

Any load balancer intended for use with SharePoint requires the capability to set up persistent/sticky/affinity sessions. Failure to properly configure affinity does not immediately manifest itself in problems, but causes problems with technologies such as Kerberos, SSL, and forms authentication.

Web tier load balancing

Web tier load balancing is accomplished via one of two technologies:

- Windows Network Load Balancing (NLB)
- Hardware load balancing

Windows Network Load Balancing (NLB) is a feature that can be activated from within the Add Roles And Features Wizard of Server Manager. This feature distributes incoming traffic across a series of web servers using the TCP/IP networking protocol.

In this type of load balancing, a virtual IP address is assigned to multiple servers at once. Although each web server is capable of responding to a single HTTP/HTTPS request, it is recommended that affinity be set up in load balancing so a user who starts a session with a particular web server stays with that server until the end of the session.

Because this is a built-in server feature, hardware and operating system resources are consumed in order for load balancing to operate, and this feature must be monitored along with the rest of the server functionality. As new web servers are added into the SharePoint farm, it is necessary for an administrator familiar with the load balancing services to configure this feature on any new server.

Although Windows NLB is quite durable, hardware load balancers are often preferred in larger enterprise server environments. These environments tend to acquire an administrator familiar with the specific skills required by the manufacturer of a dedicated load balancing system.

There are several reasons for building a dedicated load balancer layer within your organization:

- Centralized administration of load balancing.
- Performance impact of load balancing is not present on web servers.
- Multiple service types (Citrix, web servers, and so on) can be presented by the load balancing system.

Planning a network infrastructure

When planning the layout of a SharePoint farm, it is important to remember that the farm not only communicates with SharePoint users but also requires communications within the farm (to each tier) and communications to other servers in the network (such as Exchange or Lync servers). Effective network infrastructure planning requires that each of these connection types be considered in the overall design.

Interserver and end-user communication

There are two distinct types of network communication present within a SharePoint farm: user facing and interserver. Communications between servers within the farm can be quite intense at times; during these times, users might experience diminished performance if both types of communication take place across the same network interface.

As a result, servers in the web and application tiers of a SharePoint farm should have two distinct network interfaces:

- The first network interface card (NIC) handles user requests, routing traffic back and forth to users.
- The second NIC handles interserver connectivity, routing traffic back and forth between the SharePoint servers (web and app tier) and the data tier.

Network latency and stretched farms

Latency and bandwidth are concepts that go hand in hand. The best way to understand the relationship between these two is to imagine driving on a freeway. The speed limit (bandwidth) relates to how fast the traffic can travel on the freeway, whereas the traffic congestion present on the freeway can cause the commute time (latency) for any one car to increase.

SharePoint farm servers should be connected to each other with a minimum connectivity speed of 1 Gbps. Although it is possible to achieve this connection speed over a wide area network (WAN) connection, the network latency (time taken for a byte to travel from source

to destination) often exceeds 1ms. Microsoft requires that the latency between SharePoint servers and the content database be less than 1 ms apart.

Unfortunately for system administrators, this latency requirement also prohibits the members of any one SharePoint farm from being located in two data centers (no matter how closely located these centers are). All servers belonging to a server farm must be physically located in the same datacenter to be supported.



EXAM TIP

The connection speed between all SharePoint servers in a farm must meet or exceed 1 Gbps. Additionally, the network latency between the web/application tiers and the data tier should be less than 1 ms.

Internet Protocol (IP) support in SharePoint 2013

SharePoint 2013 fully supports IPv6, the latest revision of the Internet Protocol. Microsoft recommends that you leave IPv6 enabled on your SharePoint servers; if your network does not support IPv6, IPv4 will be used as a default.



Thought experiment

Minimizing farm hardware expense

In the following thought experiment, apply what you've learned about this objective. You can find answers to these questions in the "Answers" section at the back of this chapter.

You are designing a small SharePoint environment to support 2000 users. Because this environment is heavily utilized for day-to-day operations and workflow, high-availability is a must. Additionally, there are several departments that make extensive use of features such as Excel Services.

You have rather stringent budget specifications and must weigh the value of purchasing server hardware against the cost of purchasing other equipment. What server layout approach should you propose and how might you address availability requirements?

Objective summary

- SharePoint supports three storage architectures: Direct Attached Storage (DAS), Storage Area Network (SAN), and Network Attached Storage (NAS).
- RAID 1+0 (RAID 10) storage offers the best performance in a SharePoint farm.

- Request Management can be enabled on a per-web application basis, enabling incoming requests to be evaluated against a set of rules to determine which web server (if any) will respond.
- Both Request Management routing and throttling are enabled by default in a SharePoint farm.
- SharePoint can be installed on the 64-bit versions of Windows 2008 R2 or Windows Server 2012.
- All servers in a SharePoint farm should be physically located in the same datacenter.

Objective review

Answer the following questions to test your knowledge of the information in this objective. You can find the answers to these questions and explanations of why each answer choice is correct or incorrect in the “Answers” section at the end of this chapter.

1. You want to utilize NAS storage within your SharePoint farm. Which of the following components are supported in this configuration?
 - A. Content databases
 - B. RBS
 - C. Configuration databases
 - D. Service application databases
2. You want to build a server farm specifically intended to handle incoming request management processing duties. Which deployment mode should you choose?
 - A. Affinity mode
 - B. Integrated mode
 - C. Dedicated mode
 - D. Throttling mode
3. The smallest fault-tolerant SharePoint 2013 farm should include how many servers?
 - A. 3 (one in each tier)
 - B. 4
 - C. 5
 - D. 6

Objective 1.4: Plan a SharePoint Online (Microsoft Office 365) deployment

Designing a modern SharePoint implementation requires knowledge of two distinct implementation types: on-premise and cloud-based. These two implementation types can be hybridized, allowing for a uniform experience for your corporate user located both on-premise and at remote offices (using SharePoint Online).

This objective covers how to:

- Evaluate service offerings.
- Plan service applications.
- Plan site collections.
- Plan customizations and solutions.
- Plan security for SharePoint Online.
- Plan networking services for SharePoint Online.

Evaluating service offerings

The previous Office 365 offering focused heavily on business clients in two subscription types: Small Business Plan (Plan P1) and two Midsize Business and Enterprise plans (Plan E1 and Plan E3). These types provided varying functionality, but focused on four core service offerings, all of which were cloud-based:

- Microsoft Exchange Online
- SharePoint Online
- Lync Online
- Microsoft Office Professional Plus

There are a total of four subscription types in this newest Office 365 platform. Small Business Premium and Enterprise continue to support business users; Home Premium and ProPlus extend the Office client in the cloud to the home and businesses that want to simply deploy Office without Exchange, SharePoint, and so on.

IMPORTANT SHAREPOINT IN OFFICE 365 SUBSCRIPTIONS

Neither Office 365 Home Premium nor Office 365 ProPlus includes any type of SharePoint offering in their subscription types. As in the previous Office 365, SharePoint is included within the Small Business and Enterprise subscription types and includes services that vary on the type of plan chosen.

SharePoint plans and subscription levels

Before discussing the major subscription types, it should be stated that there are individual plan levels that apply to the online components (SharePoint, Exchange, and Lync) within each subscription.

Although the combinations of plans, subscriptions, and levels can seem to be confusing (and occasionally overwhelming), the resulting customizability of each enables an organization to truly tailor the type of online environment that is required.

There are two plan levels that specifically apply to a SharePoint Online environment: Plan 1 and Plan 2. Additionally, Enterprise external users are also discussed as Enterprise levels (E1–E4 levels of SharePoint Online) allow for external collaboration with users not located within your organization.

MORE INFO PLANS, SUBSCRIPTIONS, AND LEVELS

A very thorough listing of each component's availability within each level of the SharePoint Online offering can be found at <http://technet.microsoft.com/en-us/library/jj819267.aspx>.

Office 365 Home Premium

The Home Premium subscription focuses on the availability of client services to users, providing access to Office 2013, SkyDrive, and Skype Services; it does not include Exchange Online, SharePoint Online, Lync Online, Project Online, or Visio Online services.

This subscription includes the following:

- The ability to install Office on up to five PCs, Macs, or tablets, shared among all users in the home
- Core Office applications: Microsoft Word, Excel, PowerPoint, and OneNote
- E-mail, publishing, and database applications: Microsoft Outlook, Publisher, and Access
- Office on Demand: Streaming versions of Office applications, requiring Windows 7 or 8 and an Internet connection
- Skype services, offering 60 minutes of free calling to 40-plus countries worldwide
- An additional 20 GB of SkyDrive online storage

Office 365 ProPlus

The ProPlus subscription focuses purely on the Microsoft Office client suite, omitting web-based services such as SharePoint, Exchange, and so on; if desired, these services can be purchased separately.

One of the more interesting components of this subscription is called Click-to-Run. Using this type of installation (instead of a traditional Windows Installer-based [*.msi]), users can begin using a program before it is completely downloaded.

This subscription includes the following:

- The ability to install Office on up to five PCs, Macs, or tablets per licensed user
- Core Office applications: Word, Excel, PowerPoint, and OneNote
- E-mail, publishing and database applications: Outlook, Publisher, and Access
- Unified communications and forms: Lync and InfoPath
- Office on Demand: Streaming versions of Office applications, requiring Windows 7 or 8 and an Internet connection
- Access to Enterprise features via Active Directory Domain Services (AD DS):
 - Single sign-on/identity federation
 - Active Directory synchronization
 - Domains

Office 365 Small Business Premium

Office Small Business Premium is the least-expensive subscription that offers SharePoint Online and is designed for small businesses with up to 10 employees. This subscription does not include either the Skype services or the additional SkyDrive storage granted by the Home Premium subscription, but does include the following:

- The ability to install Office on up to five PCs, Macs, or tablets per licensed user
- Core Office applications: Word, Excel, PowerPoint, and OneNote
- E-mail, publishing and database applications: Outlook, Publisher, and Access
- Unified communications and forms: Lync and InfoPath
- Office on Demand: Streaming versions of Office applications, requiring Windows 7 or 8 and an Internet connection
- A 25 GB Outlook mailbox, shared calendar, contact manager, scheduling, and task-list tools; and 10 GB of cloud-based storage (plus 500 MB per licensed user)
- The ability to set up, build, and maintain a public-facing web site with no additional hosting fees (SharePoint)
- Access to Lync Online (Plan 1)
- Access to SharePoint Online (Plan 1)
- Access to Exchange Online (Plan 1)

Office 365 Enterprise

The Enterprise subscription level of Office 365 is the top of the line, basically including the entire Office stack, both online and offline. This product provides functionality normally associated with on-premise installations, including information rights management, federation, and enterprise records management.

This subscription includes the following:

- The ability to install Office on up to five PCs, Macs, or tablets per licensed user
- Core Office applications: Word, Excel, PowerPoint, and OneNote
- E-mail, publishing and database applications: Outlook, Publisher, and Access
- Unified communications and forms: Lync and InfoPath
- Office on Demand: Streaming versions of Office applications, requiring Windows 7 or 8 and an Internet connection
- A 25 GB Outlook mailbox, shared calendar, contact manager, scheduling and task-list tools, and 10 GB of cloud-based storage (plus 500 MB per licensed user)
- The ability to set up, build, and maintain a public-facing web site with no additional hosting fees (SharePoint)
- Access to Lync Online (Plan 2)
- Access to Exchange Online (Plan 2)
 - Data loss prevention that is compliant with regulatory standards
- Access to SharePoint Online (Plan 2), including the following:
 - Site mailboxes to enhance collaboration
 - Archiving, eDiscovery venter to identify, hold, and analyze information from Exchange, SharePoint, and Lync



EXAM TIP

Although it might seem trivial at first, knowing which functionality is available at each subscription level is a critical component of your Office 365 design and planning effort.

Planning service applications

Because SharePoint Online is a multitenant application within Office 365 (meaning that your SharePoint environment is contained in a series of farms that serve other Microsoft customers), there are some differences between the service applications that would be found in an on-premise environment and in SharePoint Online.

SharePoint services in Office 365

Not all SharePoint services in an on-premise installation of SharePoint have a matching analog within the SharePoint Online product line.

Table 1-5 shows a listing of the service applications found in SharePoint 2013 and the services available within SharePoint Online.

TABLE 1-5 SharePoint Online service comparison

Service Application	SharePoint Online Plan	Subscription Level	Note
Access Service	All plans	All levels	Not configurable
Access Service 2010	Not available	Not available	-----
App Management Service	All plans	All levels	-----
Business Data Catalog Service	Plan 2 only	E3 and E4 only	Configurable from the SharePoint Admin Center web site
Excel Service Application	Plan 2 only	E3 and E4 only	Not configurable
Machine Translation Service	All plans	All levels	Not configurable
PerformancePoint Service	Not available	Not available	-----
PowerPoint Automation Service	Not available	Not available	-----
Managed Metadata Service	All plans	All levels	Configurable from the SharePoint Admin Center web site
Search Service	All plans	All levels	Configurable from the SharePoint Admin Center web site
Secure Store Service	Plan 2 only	E3 and E4 only	Configurable from the SharePoint Admin Center web site
State Service	Not available	Not available	-----
User and Health Data Collection Service	Not available	Not available	The Office 365 admin console provides health information on a per-service basis
User Profile Service	All plans	All levels	Configurable from the SharePoint Admin Center web site
Visio Graphics Service	Plan 1 and 2	E1 through E4	-----
Word Automation Services	Not available	Not available	-----
Work Management Service	Not available	Not available	-----
Microsoft SharePoint Foundation Subscription Settings Service	Not available	Not available	-----

Planning site collections

Site collections in SharePoint Online are very similar to their on-premise counterparts. As we discussed at the beginning of this chapter, a site collection is nothing more than a grouping of sites that are functionally, navigational, and administratively related to one another (see Figure 1-32).

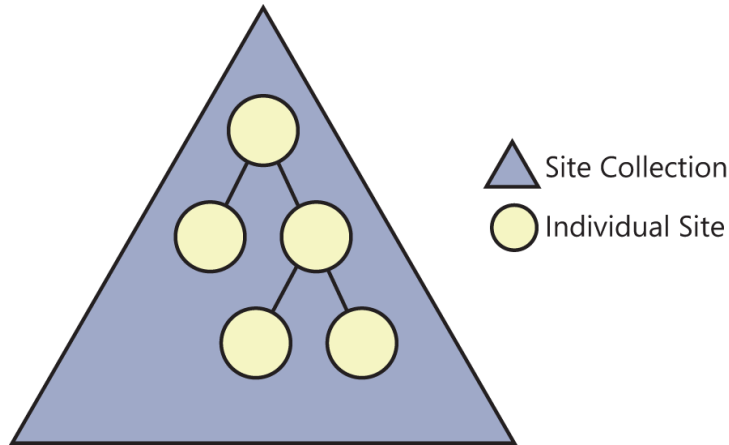


FIGURE 1-32 Sites within a site collection.

Site collection admin center

Creating a new SharePoint online site collection is accomplished within the Site Collections menu of the SharePoint admin center (see Figure 1-33).

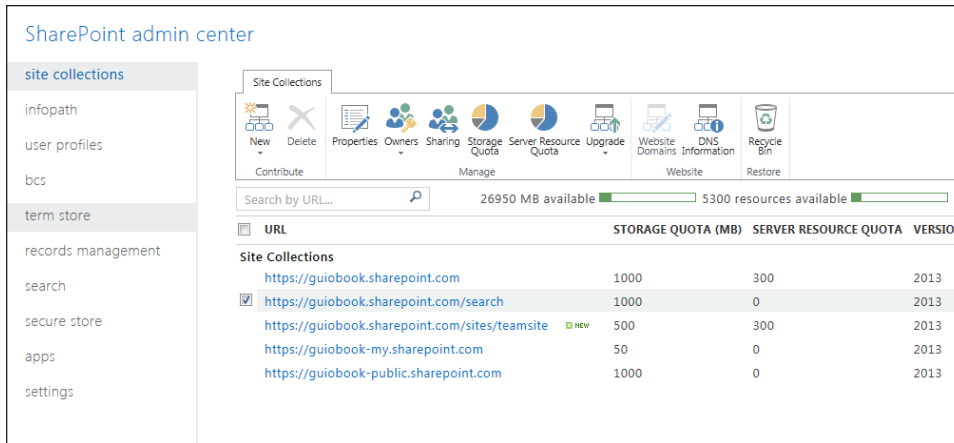


FIGURE 1-33 SharePoint admin center.

From this console, you can build a private site collection or a public web site.

Site collection types

Two types of site collections can be created within SharePoint Online: multiple private site collections and a single public web site.

- Each Office 365 subscription enables you to create a single public web site for your business; after this site has been created, the option to create it becomes grayed out.
- All SharePoint Online site collections (except the public web site) are initially created as private site collections. After creation, external users can be added to these site collections.

Before building a new site collection, you will want to consider factors such as the target audience of the site collection and how much data will be stored in the site collection.

Site collection administrators (SCAs)

In an on-premise SharePoint installation, each site collection has primary administrators and SCAs. Although others can be assigned the same permission levels, they do not receive SCA quota e-mail, for instance.

SharePoint Online site collections have a single designated SCA. This tenant administrator retains full control and is responsible for the administration of a site collection.

Other SCAs can be added as backups for the primary site collection admin. Additionally, external support partners can be given access to the site collection from a help desk or administrative perspective.

Storage quotas

There is a maximum amount of space that is given to a SharePoint Online subscription. A dedicated amount of this space can be given to each new site collection as a quota that limits the overall size for the site collection. There is no default amount of space issued—the quota is assigned as part of the site creation process.

Optionally, an e-mail can be sent to SCAs when a certain percentage of the overall quota size has been consumed.

Server resource quotas

Each SharePoint Online installation is granted a server resource quota. This amount represents the memory and processor resources that are utilized by the entirety of all site collections in the installation.

As a new site collection is created, it is assigned a percentage of the resources for use; the idea of this quota is to prohibit a single site collection from consuming all available resources within an installation. Adding new sandboxed solutions or apps to the site collection can cause this number to increase.

Sharing

Although site collections are created for private use, external users can be added to the permissions structure. These users can be granted reader, contributor, and even owner permissions.

Sharing is enabled on a per-site collection basis. Within the SharePoint admin console, there are three options for sharing:

- Don't Allow Sharing Outside Of Your Organization
- Allow External Users Who Accept Sharing Invitations And Sign In As Authenticated Users
- Allow Both External Users Who Accept Sharing Invitations And Anonymous Guest Links

After sharing is enabled, users can share an entire site or individual documents on a site. These users are fully authenticated, signing in with either a Microsoft account or a Microsoft Office 365 ID. If anonymous guest links have been enabled, users can share individual documents anonymously.

Planning customizations and solutions

As with an on-premise installation of SharePoint, SharePoint Online can be heavily modified to suit the requirements of your business users. These modifications can vary in scope from customizations produced for a small grouping of users to solutions that can be applied to major segments of your SharePoint Online environment.

There are three major customization levels present in a SharePoint farm: browser-based, tool-based, and developer-based.

Browser-based customizations

SharePoint users with the appropriate permission level can make customizations to any SharePoint site using nothing more than their web browser. These customizations do not require much technical expertise and are scoped to a particular site or site collection.

Browser-based customizations include the following:

- Changing the site theme to one of 18 available themes (“What’s your style?”)
- Adding a logo and description to your site (“Your site. Your brand.”)
- Editing site pages, choosing customizing the appearance of web parts and other content to be displayed
- Altering the global and current navigation elements of a site
- Creating and altering the appearance of list and library views

Tool-based customizations

Sometimes the modifications available through the browser are not adequate; if the person making the changes is technically adept (but not a software developer), the next available option is using a tool-based customization.

These sorts of modifications are made using SharePoint tools such as InfoPath Designer for developing customized InfoPath forms; SharePoint Designer (SPD) for making more-detailed site modifications such as altering/creating page layouts and creating workflows; or any of the Office 2013 client tools such as Microsoft Access, Microsoft Excel, or Microsoft Visio 2013.

Developer-based customizations

The last option for making modifications to a SharePoint Online installation is to build custom code solutions. Solutions developed using Visual Studio 2012 can be activated on your SharePoint Online installation and run in the site’s sandboxed solution environment.

Planning security for SharePoint Online

There are two aspects to securing any system: authentication and authorization.

Authentication versus authorization

Authentication is the process of determining the identity of a principal (a person trying to log in to your environment). When a principal tries to authenticate to a system, credentials are provided (such as a password) to verify the principal’s identity.

Authorization is the process of verifying an authenticated user’s access to a system. This access is usually associated with some sort of ACL.

When a user tries to access SharePoint Online, the user name is checked against the permissions of the site (either as an individual or as a member of a permissions group). If no permissions have been granted, access is denied to the site.

Office 365 authentication

There are two distinct authentication methods present in Office 365: Microsoft Online IDs and Federated IDs.

Microsoft IDs are issued and maintained by Microsoft—you might already have one of these in the form of an Office 365, Hotmail, SkyDrive, or Xbox Live account.

Using a Microsoft ID, a user can authenticate to multiple systems (Office 365 included) using a single user name and password.

Identity federation (also called single sign-on) is a mechanism for enabling users within your organization to use their standard Active Directory corporate user name and password to access Office 365.

Federation with Office 365 requires the use of Active Directory Federation Services (ADFS) 2.0. After this configuration has been completed, all identities are managed only on-premises.



EXAM TIP

Authentication is the process of determining the identity of a principal; authorization is the process of verifying an authenticated user's access to a system.

Planning networking services for SharePoint Online

With the arrival of Office 365, the ability to extend corporate SharePoint infrastructures to the cloud became reality. SharePoint 2010 provided basic federation between on-premise Active Directory and cloud authentication, but provided no further service connectivity.

SharePoint 2013 integration

SharePoint 2013 and the newest version of Office 365 now provide three levels of integration: domain federation, server-to-server (S2S) trust and identity management, and service integration.

- As with SharePoint 2010, federated authentication and account synchronization is available between on-premise Active Directory and Windows Azure Active Directory. Besides providing authentication services, Windows Azure also acts as a trusted token issuer between the two environments.
- Using the OAuth 2.0 protocol, a trusted communication channel is established between a SharePoint Online installation and SharePoint Server 2013. Additionally, federated users can be authenticated using this functionality.
- Services such as Search, BCS, and Duet Enterprise Online can now be integrated between SharePoint Server 2013 and SharePoint Online.

SharePoint hybrid topologies

There are three hybrid topologies that can be used to configure the relationship between on-premise and cloud installations of SharePoint. The authentication topology you choose will then determine the services you can support:

- One-way outbound supports SharePoint Server 2013 queries of online site collections, returning the federated results to the on-premise SharePoint Server 2013 search.
- One-way inbound supports SharePoint Online queries of on-premise SharePoint Server 2013 site collections, returning the federated results to SharePoint Online search. It also supports SharePoint Online BCS connectivity to an on-premise SharePoint BCS installation.
- Two-way (bidirectional) topology supports SharePoint Server 2013 Search, BCS, and Duet Enterprise Online connections between on-premise and cloud-based installations of SharePoint.

MORE INFO IMPLEMENTATION PHASES FOR SHAREPOINT HYBRIDIZATION

Configuring a hybrid on-premise and cloud-based installation of SharePoint requires a significant amount of planning and configuration effort. This effort is broken into three phases: configuration of the basic environment, identity management infrastructure, and service configuration. The hybridization of SharePoint is covered in the TechNet article "Hybrid for SharePoint Server 2013" at <http://technet.microsoft.com/en-us/library/jj838715.aspx>.



Thought experiment

Deploying the office client

In the following thought experiment, apply what you've learned about this objective. You can find answers to these questions in the "Answers" section at the back of this chapter.

Your organization is planning to move its core infrastructure to Office 365. Core services such as SharePoint and Exchange are required going forward. Management wants to absorb the cost of purchasing and deploying Office 2013 as part of the solution you propose. Which subscription of Office 365 would you select?

Objective summary

- Office Small Business Premium is the least-expensive subscription that offers SharePoint Online.
- A site collection is nothing more than a grouping of sites that are functionally, navigational, and administratively related to one another.
- Only a single public web site can be created per Office 365 subscription.
- Three types of customization are present in SharePoint Online: browser-based, tool-based, and developer-based.
- Authentication to an Office 365 site can occur using one of two mechanisms: Microsoft IDs and Active Directory Federation System 2.0.

Objective review

Answer the following questions to test your knowledge of the information in this objective. You can find the answers to these questions and explanations of why each answer choice is correct or incorrect in the “Answers” section at the end of this chapter.

1. Which of the following Office 365 subscriptions include SharePoint Online as a component? (Choose all that apply.)
 - A. Office 365 Home Premium
 - B. Office 365 Small Business Premium
 - C. Office 365 ProPlus
 - D. Office 365 Enterprise
2. Which of the following services are not included in SharePoint Online? (Choose all that apply.)
 - A. Word Automation Services
 - B. Excel Calculation Services
 - C. PerformancePoint Services
 - D. Visio Graphics Services
3. Your Office 365 users complain that they cannot share the contents of their site collections with outside partners. Which section of the SharePoint admin center is appropriate for correcting this issue?
 - A. Settings
 - B. Search
 - C. Apps
 - D. Site collections

Chapter summary

- The MMS application is a required component for creating managed navigation hierarchies.
- A given retention policy requires at least one retention stage to be created, but can be composed of more than one retention stage (if required).
- Site collection policies are reusable; they can be exported from one site collection and imported to another for reuse.
- Structural navigation relies on the use of managed paths; metadata navigation relies on the use of a term set to create a navigational structure.
- The number of supported web applications in a farm is set to 20; this limit relies heavily on the amount of memory available to servers in the farm.
- A boundary is an absolute limit. A threshold is a limit that can be altered up to a maximum limit (but might affect performance). A supported limit is one that, if exceeded, might result in unexpected farm behavior.
- Use the `-AuthenticationProvider` switch with the `New-SPWebApplication` switch to avoid creating the web application in Windows Classic authentication mode.
- Regardless of the storage type used with SharePoint, it must meet two metrics: be capable of responding within 1 ms and of returning the first byte of data within 20 ms.
- The connection speed between all SharePoint servers in a farm must meet or exceed 1 Gbps. Additionally, the network latency between the web/application tiers and the data tier should be less than 1 ms.
- Authentication is the process of determining the identity of a principal; authorization is the process of verifying an authenticated user's access to a system.

Answers

Objective 1.1: Thought experiment

This is a two-part effort:

Because the navigational taxonomy is to be generated externally, you could create a sample CSV file to be given to the Corporate Communications group. This group could then generate the navigational terms for you to import into the term set.

After the navigational structure is complete, the Corporate Communications department would then need to generate a series of search terms to promote each of the major sites in search results. You would then generate a series of query rules that would render the appropriate promoted results on the search page.

Objective 1.1: Review

1. Correct answer: C

- A. Incorrect:** An enterprise keywords site column is used for keyword storage, but will not cause the error.
- B. Incorrect:** Although the MMS is indeed required, additional configuration steps are required.
- C. Correct:** A default keywords term store must be selected in the MMS for enterprise keywords to be used.
- D. Incorrect:** No Managed Keyword Service application exists in SharePoint 2013.

2. Correct answer: B

- A. Incorrect:** The retention policy feature defines the lifecycle of content contained within SharePoint.
- B. Correct:** The barcode policy feature is the only feature type that is both supported beyond SharePoint 2013 and useful for tracking physical documents.
- C. Incorrect:** The labeling policy feature is a backward-compatible feature that works with printed documents; it is also deprecated, meaning that it will not be available in newer versions of SharePoint (beyond SharePoint 2013).
- D. Incorrect:** The auditing policy feature defines monitoring of user document interactions, such as edits, deletions, and so on.

3. Correct answer: D

- A. Incorrect:** Although managed navigation is the goal you are working toward, there is no menu item by this name within the Intended Use tab.
- B. Incorrect:** Making a term set unavailable for tagging is an effective way to group terms together (for example, by an alphabetical grouping, such as A–F), but does not enable the term set for navigation.
- C. Incorrect:** There is no option by this name in the Intended Use tab.
- D. Correct:** The correct selection to enable managed navigation, it designates that a particular term set be used explicitly for the navigation of a site (or sites).

Objective 1.2: Thought experiment

In order to effectively maintain separation of content, you would most likely need to build a web application that uses separate security credentials and content databases. Although this requirement might not by itself preclude the use of host named site collections, the lack of PowerShell experience would be an issue as host named site collections cannot be created via the Central Administration interface.

Objective 1.2: Review

1. Correct answer: B

- A. Incorrect:** Although host named site collections technically use FQDNs in DNS, this is not the correct designation for the site collection.
- B. Correct:** Host named site collections allow for the assignment of vanity URLs to each site collection in a web application.
- C. Incorrect:** There is no such thing as a domain named site collection.
- D. Incorrect:** Path-based site collections are the alternative to host named site collections.

2. Correct answer: B

- A. Incorrect:** SharePoint is not aware of content databases replicated via log shipping.
- B. Correct:** Each content database in SharePoint can specify an alternative SQL server for use with mirroring.
- C. Incorrect:** SharePoint is not aware of SQL availability groups.
- D. Incorrect:** SharePoint is not aware of clustered SQL database servers.

3. Correct answers: B, D

- A. Incorrect:** The limit of 20 web applications per SharePoint farm is a supported limit.
- B. Correct:** There is a supported limit of 20 web applications per SharePoint farm.
- C. Incorrect:** The limit of 10 application pools per web server in a SharePoint farm is a threshold limit.
- D. Correct:** There is a threshold limit of 10 application pools per web server in a SharePoint farm.

Objective 1.3: Thought experiment

There are two key requirements present in this environment: budget and high-availability. If given the choice between buying a hardware load balancing solution and buying another piece or two of server hardware, the servers will most likely win out.

You will probably propose a three-tiered solution (to accommodate the Excel Services load) and have a pair of servers in each tier. Additionally, you will most likely use a SQL HA solution and install Windows NLB on your web tier versus spending money on a dedicated load balancer solution.

Objective 1.3: Review

1. Correct answer: B

- A. Incorrect:** Content databases are not supported on NAS storage.
- B. Correct:** RBS is fully supported on NAS storage.
- C. Incorrect:** Configuration databases are not supported on NAS storage.
- D. Incorrect:** Service application databases are not supported on NAS storage.

2. Correct answer: C

- A. Incorrect:** There is no such mode in Request Management. Affinity has to do with server load balancing on the web tier.
- B. Incorrect:** An integrated mode server farm handles request management policies along with all other operations on the web tier of the farm.
- C. Correct:** A dedicated mode server farm exclusively handles request management policies in larger implementations of SharePoint.
- D. Incorrect:** There is no such mode in Request Management. Throttling, although associated with request management, is accomplished via a series of rules.

3. Correct answer: D

- A. Incorrect:** Three servers (one in each tier) would not provide any fault tolerance.
- B. Incorrect:** Four servers would enable load balancing in two of the three tiers. Although you could technically collapse the web and application tiers, performance would suffer.
- C. Incorrect:** Five servers would allow for load balancing in two of the three tiers.
- D. Correct:** A six-server farm is the smallest practical design for load balancing in each tier.

Objective 1.4: Thought experiment

There are two distinct subscription plans in Office 365 that provide SharePoint and Exchange functionality: Office 365 Small Business Premium and Office 365 Enterprise. The ability to deploy Office as part of the solution is also provided with both of these subscription levels.

You will most likely narrow down the desired version of Office 365 based on the functionality required. For instance, if your office has more than 10 people, you should be considering the Office 365 Enterprise subscription as your solution.

Objective 1.4: Review

1. Correct answers: B, D

- A. Incorrect:** Office 365 Home Premium does not include access to SharePoint Online.
- B. Correct:** Office 365 Small Business Premium includes access to SharePoint Online.
- C. Incorrect:** Office 365 ProPlus does not include access to SharePoint Online.
- D. Correct:** Office 365 Enterprise includes access to SharePoint Online.

2. Correct answers: A, C

- A. Correct:** Word Automation Services is not available in any SharePoint Online plan level.
- B. Incorrect:** Excel Calculation Services is included in SharePoint Online.
- C. Correct:** PerformancePoint Services is not available in any SharePoint Online plan level.
- D. Incorrect:** Visio Graphics Services is included in SharePoint Online.

3. Correct answer: D

- A. Incorrect:** Settings controls the general settings of your SharePoint Online subscription.
- B. Incorrect:** Search controls the configuration of search in your SharePoint Online subscription.
- C. Incorrect:** Apps controls the installation and configuration of applications installed from the Office App Store.
- D. Correct:** Quotas are part of the configuration for site collections.

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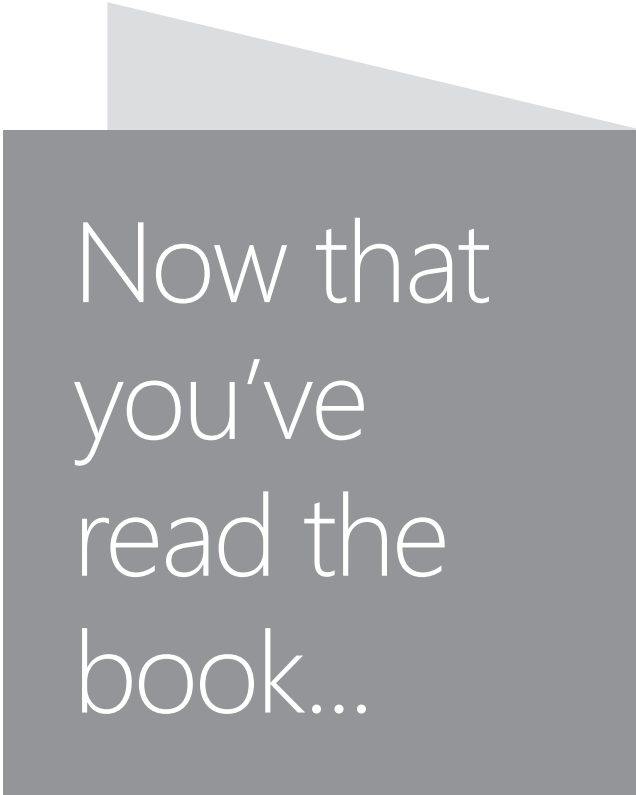
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