

“Caching-In” for SharePoint Performance

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Session overview

- Caching 101
- Understanding each of SharePoint's platform caching options
- How to leverage and control caching
- Scenarios quiz
- Q&A

Why I care about caching

- Formerly the architect for a Fortune 50's publicly facing SharePoint presence
- Highly trafficked environment
 - ~75,000 page views per hour peak (2009)
 - Usually 40 SP-hosted assets per page or more
 - Greater than 1000 requests/second into IIS
- Supported with a single farm (4 WFEs)
- Tired of "SharePoint doesn't scale" claims

Caching 101

Cache: what is it?

browser cache
HTCP
object cache
edge caching
in-memory cache

fragment caching
page-output cache
Web Part caching
virtual memory
BLOB cache

buffer
Office viewing service cache
disk-based caching
ICP
cacheability headers
post-cache substitution

CARP

Cache: what is it?

- A temporary storage area where frequently accessed data can be stored for rapid access
- Rapid access facilitated in two ways
 - Data is placed on a faster medium
 - Data is moved closer to point of usage
- Typically used for data that is expensive to fetch or calculate

Why caching for SharePoint?

- Consider a page request from a client
 - Page rendering requires constituent control rendering w/ merging of file system & DB data
 - Each page request can generate multiple DB lookups for content, navigation, security, etc.
 - Page itself links and references images, CSS, JavaScript, and other resources
- SharePoint request lifecycle is complex
- Better performance, better user experience

SharePoint caching: whatcha got?










- Of primary interest to administrators and what I will be focusing on
 - Object caching
 - BLOB caching
 - Page output caching
 - Office web applications cache
- Mentioned but not covered in any depth
 - Development-related caching (Web Part cache, ASP.NET cache, IVaryByCustomHandler implementation, post-cache substitution, and fragment caching)

Caching in SharePoint

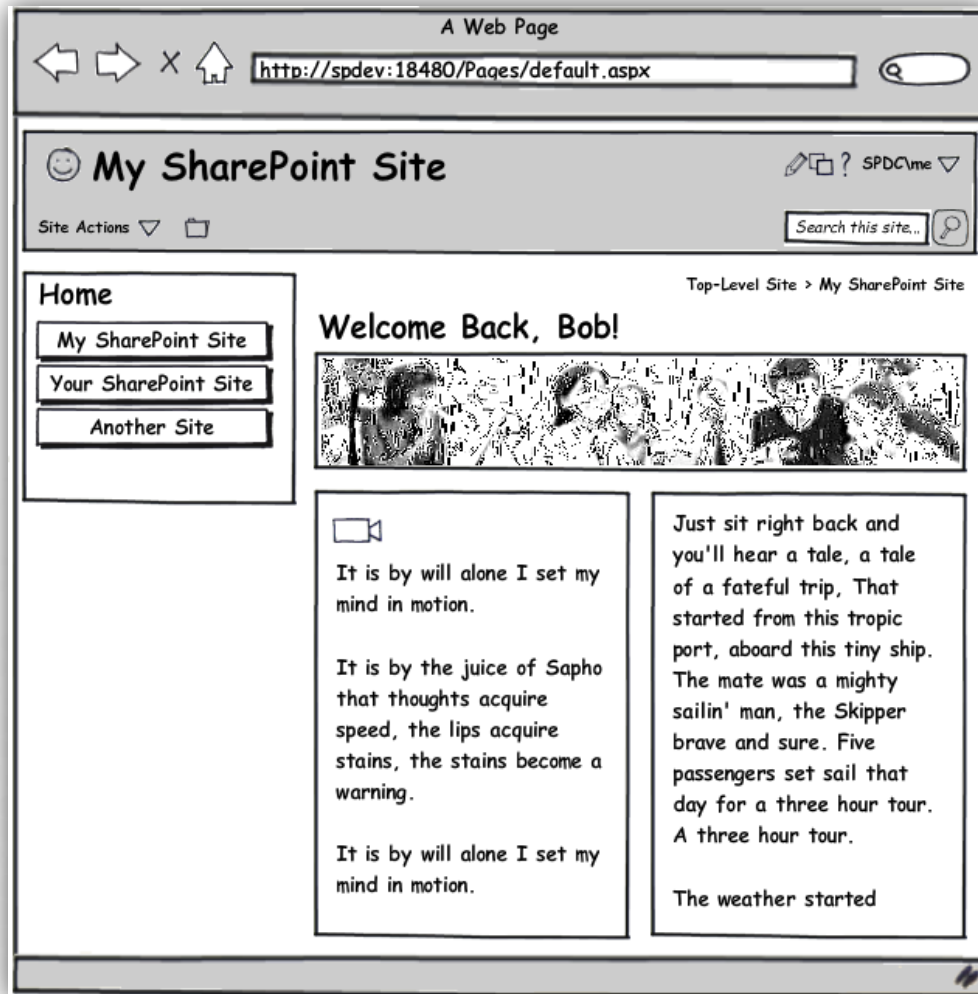
Some plumbing information

- Caching activation
 - “Turned on” with (Office) SharePoint Server Publishing Infrastructure
- Potentially bad news
 - *Not* part of WSSv3 or SharePoint Foundation
 - Some caching can be used with non-publishing sites though

This workflow can be edited in SharePoint Designer.

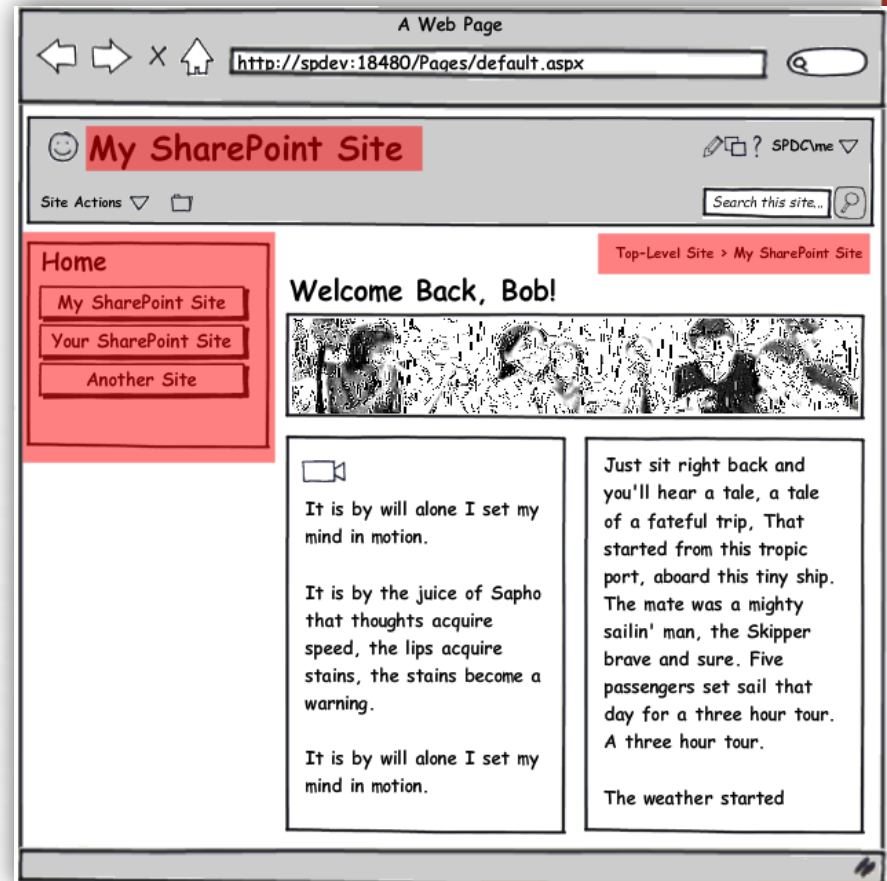
	Report Server Integration Feature Enables rich reporting using Microsoft SQL Server Reporting Services.	Deactivate	Active
	Reporting Creates reports about information in Microsoft SharePoint Foundation.	Activate	
	Search Server Web Parts This feature uploads all web parts required for Search Center.	Activate	
	SharePoint 2007 Workflows Aggregated set of out-of-box workflow features provided by SharePoint 2007.	Activate	
	SharePoint Server Enterprise Site Collection features Features such as InfoPath Forms Services, Visio Services, Access Services, and Excel Services Application, included in the SharePoint Server Enterprise License.	Activate	
	SharePoint Server Publishing Infrastructure Provides centralized libraries, content types, master pages and page layouts and enables page scheduling and other publishing functionality for a site collection.	Deactivate	Active
	SharePoint Server Standard Site Collection features Features such as user profiles and search, included in the SharePoint Server Standard License.	Activate	
	Three-state workflow Use this workflow to track items in a list.	Activate	
	Workflows Aggregated set of out-of-box workflow features provided by SharePoint.	Deactivate	Active

Consider a sample page ...



Object caching

- Speeds access to frequently referenced structural, property, and result data
 - Navigational data
 - Query results (cross-list and cross-site)
 - Site properties
 - Page layouts



Object caching

- Structure and operation
 - A memory-backed cache on each WFE
 - Only cache that is “on” by default
 - Cache is assigned per site collection
 - 100MB *allocation* per site collection by default
 - Conservative cache durations employed to avoid displaying or using stale data
- Additional control with SharePoint 2010
 - **<ObjectCache>** in web.config to govern maximum size

Object caching

- Getting to it
 - Via Site Collection Administration section on Site Settings page
 - Site Collection Object Cache link

The screenshot displays the 'Object cache settings' page in SharePoint. The page title is 'Object cache settings' and the subtitle is 'Configure settings for the object cache.' The user is logged in as 'SPDC\s0ladmin'. The page is divided into several sections:

- Object Cache Size:** A text box for 'Max. Cache Size (MB):' contains the value '100'. A link 'Object Cache Size Learn more about the object cache.' is provided.
- Object Cache Reset:** A section with a description: 'When you select this check box, all entries in the object cache will be flushed immediately when you click OK. If this check box is not selected, the cache will manage the expiration of items based on when they time out or are changed in the site.' There are two checkboxes: 'Object Cache Flush' (unchecked) and 'Force all servers in the farm to flush their object caches' (unchecked).
- Cross List Query Cache Changes:** A section with a description: 'Cross list queries initiated by the Content Query Web Part or other custom implementations can use up server resources. Specifying an amount of time to cache the results of a cross list query can positively impact cross-list query performance but may display results that do not reflect the most recent changes to the items returned by the query. Checking the server each time cross list query runs will produce the most accurate results at the possible cost of slower performance across the site.' There are two radio buttons: 'Check the server for changes every time a cross list query runs' (unchecked) and 'Use the cached result of a cross list query for this many seconds:' (checked). A text box for the number of seconds contains the value '150'.
- Cross List Query Results Multiplier:** A section with a description: 'Each cross list query might retrieve results for a variety of users. To ensure after security trimming that all users will see a valid set of results, the cross list query cache must pull more results than originally requested. Specifying a larger number will retrieve more data from the server and is ideal for site collections that have unique security applied on many lists and sites. Specifying a smaller number will consume less memory per cross list query and is ideally suited for site collections that do not have unique security on each list or site.' A text box for 'Cross list query multiplier:' contains the value '3'.

At the bottom of the page, there are 'OK' and 'Cancel' buttons.

Object caching

- Configuration options
 - Object Cache Size
 - Object Cache Reset
 - Cross List Query Cache Changes
 - Cross List Query Results Multiplier

The screenshot shows the 'Object cache settings' page in SharePoint. The page title is 'Site Collection Administration > Object cache settings' with the subtitle 'Configure settings for the object cache.' The user is logged in as 'SPDC\s0ladmin'. The page has a left-hand navigation pane with links for 'SharePoint Goes Public', 'Press Releases', 'Recycle Bin', and 'All Site Content'. The main content area is divided into several sections:

- Object Cache Size:** Includes a text input for 'Max. Cache Size (MB)' with the value '100'.
- Object Cache Reset:** Contains two checkboxes: 'Object Cache Flush' (unchecked) and 'Force all servers in the farm to flush their object caches' (unchecked). Below them is explanatory text about flushing the cache.
- Cross List Query Cache Changes:** Features two radio buttons: 'Check the server for changes every time a cross list query runs' (unchecked) and 'Use the cached result of a cross list query for this many seconds:' (checked). A text input below the checked option contains the value '60'.
- Cross List Query Results Multiplier:** Includes a text input for 'Cross list query multiplier' with the value '3'. Below this is detailed explanatory text about security trimming and cache performance.

At the bottom right of the page, there are 'OK' and 'Cancel' buttons.

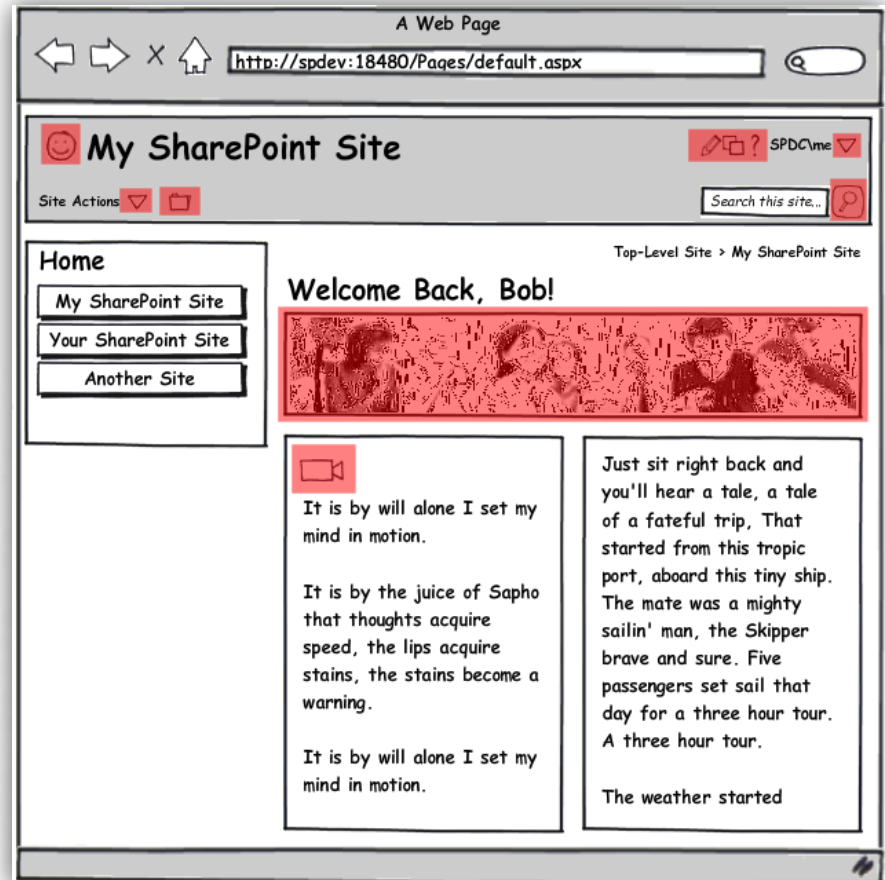
Object caching

Recommendations

- Be careful with the Object Cache Size allocation!
- Cross List Query Cache Changes
 - Off by default for MOSS, on by default for SharePoint 2010
 - Turn off or reduce time if queries are run against volatile data
 - Turn on to reduce system loading and increase response time
- Cross List Query Results Multiplier
 - Increase if per-site and per-list permissions are in use, especially if per-item permissions are also applied in lists
 - Reduce for sites where anonymous access prevails

BLOB caching

- Improves efficiency and speed of serving BLOB (Binary Large Object) data in lists
 - Images and icons
 - Audio files
 - Video (including Flash)
 - Cascading style sheets
 - Javascript

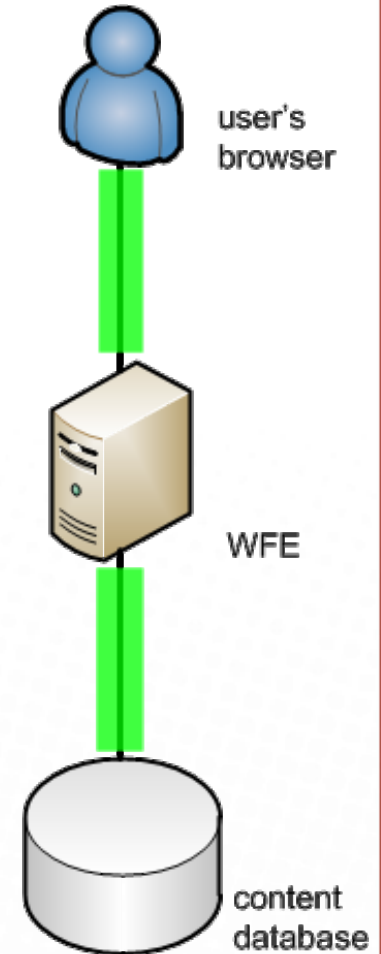


BLOB caching

- Structure and operation
 - Also known as “disk-based caching”
 - Cache is backed by file system storage on WFEs
 - Turned “off” by default
 - Enabled and disabled per IIS web site
 - Disk allocation, file types cached, and client cacheability settings are configurable

BLOB caching

- Yields performance improvements through (up to) two different offloads
 - Once enabled, reduces network traffic between WFEs and content databases
 - Can also reduce load on WFEs by instructing client browsers to cache
- New in SharePoint 2010
 - HTTP byte range support, throttling



BLOB caching

- Getting to it
 - Accessed through the web.config for each IIS site
- What can be configured
 - File system cache location
 - Pattern of files to be cached
 - Maximum disk space cache can consume
 - Client cacheability (**max-age**)
 - Some service-related params

```
337 <Action id="0ff1ce14-1014-0000-0000-00000000" />
338 <Action id="0ff1ce14-1015-0000-0000-00000000" />
339 <Action id="0ff1ce14-101f-0000-0000-00000000" />
340 <Action id="5055b13f-c200-45dd-8dbd-b046710e" />
341 <Action id="2ac909bc-29ed-42dd-8b47-548a927c" />
342 <Action id="ea2d54ca-cd14-48a7-a5ca-b10b2414" />
343 <Action id="0ff1ce14-1019-0000-0000-00000000" />
344 <Action id="0ff1ce14-101a-0000-0000-00000000" />
345 <Action id="0ff1ce14-101b-0000-0000-00000000" />
346 <Action id="0ff1ce14-101c-0000-0000-00000000" />
347 <Action id="0ff1ce14-101d-0000-0000-00000000" />
348 <Action id="0ff1ce14-101e-0000-0000-00000000" />
349 <Action id="0ff1ce14-1020-0000-0000-00000000" />
350 <Action id="0ff1ce14-1021-0000-0000-00000000" />
351 <Action id="ec0076ac-0c35-4880-8422-8062f592" />
352 <Action id="602bc8c3-9286-49a3-b973-3376ca78" />
353 <Action id="00e22a78-33ff-41ac-b0fb-ee46d163" />
354 <Action id="4b60e42e-e6fc-4188-80d2-ef39e7cc" />
355 <Action id="1d415973-1146-4bc2-8324-83dfff5b" />
356 </MergedActions>
357 <BlobCache location="C:\BlobCache\14" path="\." />
358 <ObjectCache maxSize="100" />
359 <OutputCacheProfiles useCacheProfileOverrides=
360 <RuntimeFilter Assembly="Microsoft.Office.Serv
361 </SharePoint>
362 <system.web>
363 <securityPolicy>
364 <trustLevel name="WSS_Medium" policyFile="C:
365 <trustLevel name="WSS_Minimal" policyFile="C
366 </securityPolicy>
367 <httpHandlers />
368 <customErrors mode="On" />
369 <httpRuntime maxRequestLength="51200" />
370 <authentication mode="Windows" />
371 <identity impersonate="true" />
372 <authorization>
```

BLOB caching

- **<BlobCache>** element in MOSS 2007

```
<BlobCache location="C:\blobCache" path="\. (gif|jpg|png|css|js)$" maxSize="10" enabled="false" />
```

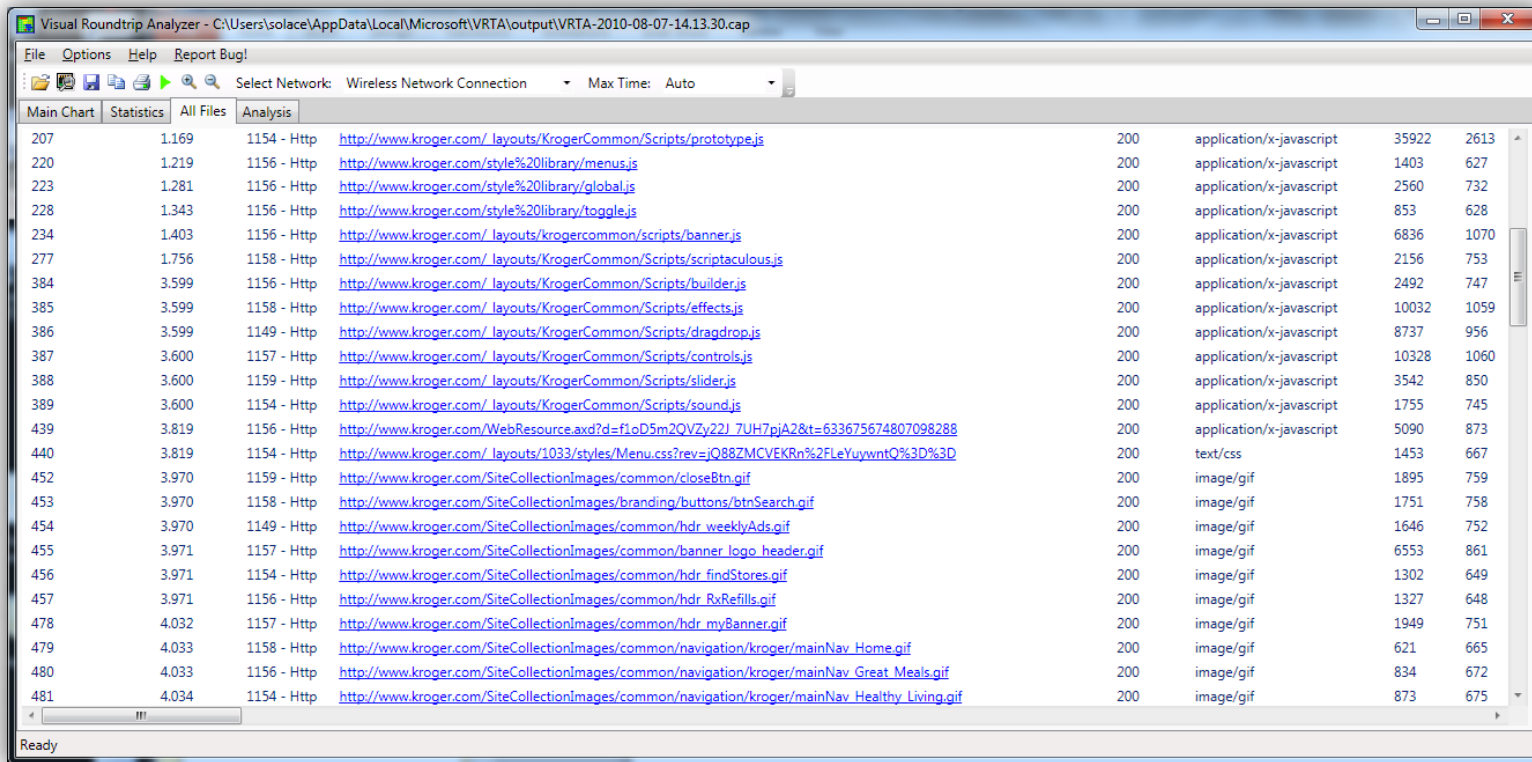
- **<BlobCache>** element in SharePoint 2010

```
<BlobCache location="C:\BlobCache\14" path="
\". (gif|jpg|jpeg|jpe|jfif|bmp|dib|tif|tiff|ico|png|wdp|hdp|css|js|asf|avi|flv|m4v|mov|mp3|mp4|mpeg
|mpg|rm|rmvb|wma|wmv)$" maxSize="10" enabled="false" />
```

- **max-age** attribute

- Easily added to yield client-side caching of BLOB assets
- Client will use local assets without round-trips to server

BLOB caching



Visual Roundtrip Analyzer - C:\Users\solace\AppData\Local\Microsoft\VRTA\output\VRTA-2010-08-07-14.13.30.cap

File Options Help Report Bug!

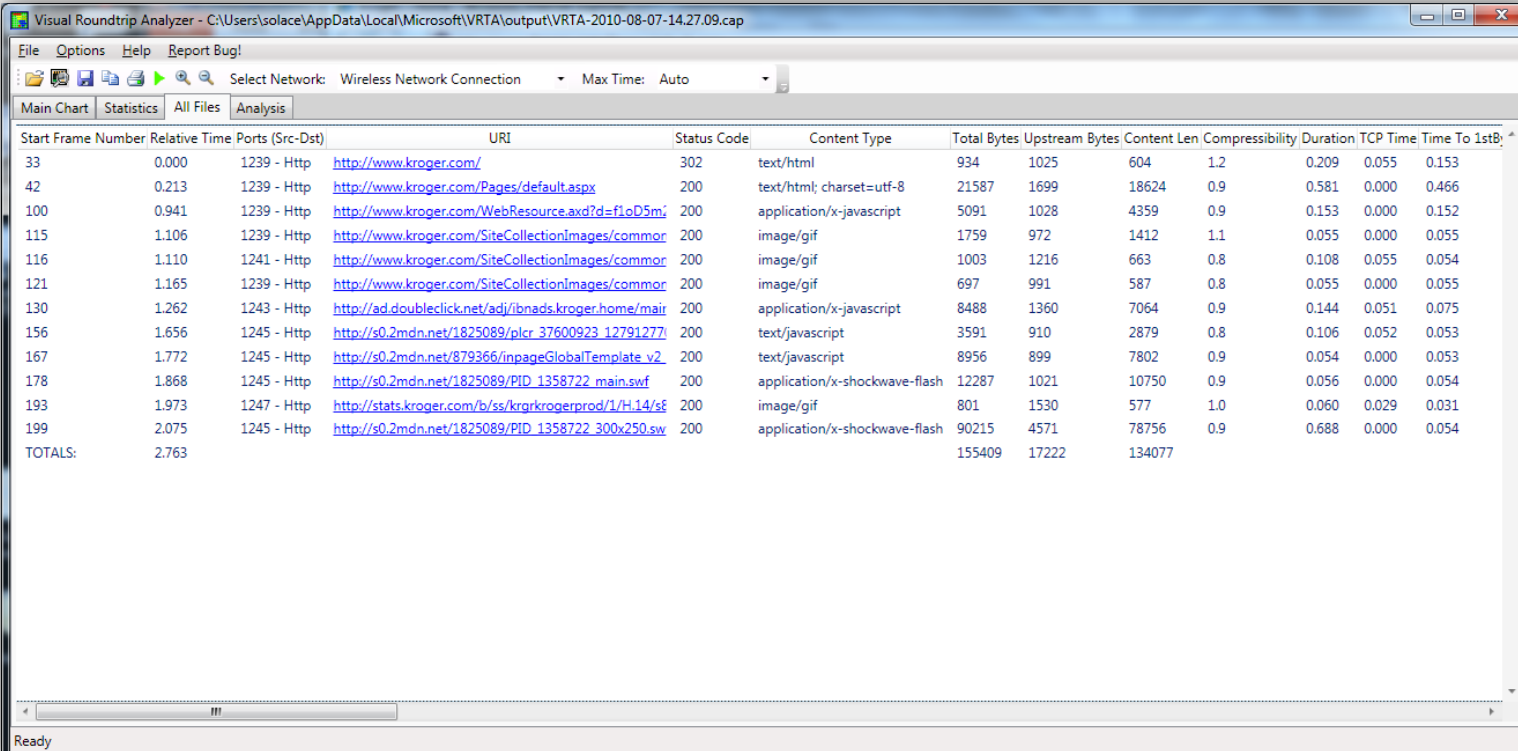
Select Network: Wireless Network Connection Max Time: Auto

Line	Time	Method	URL	Size	Content Type	Response Size	Response Time
207	1.169	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/prototype.js	200	application/x-javascript	35922	2613
220	1.219	Http	http://www.kroger.com/style%20library/menus.js	200	application/x-javascript	1403	627
223	1.281	Http	http://www.kroger.com/style%20library/global.js	200	application/x-javascript	2560	732
228	1.343	Http	http://www.kroger.com/style%20library/toggle.js	200	application/x-javascript	853	628
234	1.403	Http	http://www.kroger.com/_layouts/krogercommon/scripts/banner.js	200	application/x-javascript	6836	1070
277	1.756	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/scriptaculous.js	200	application/x-javascript	2156	753
384	3.599	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/builder.js	200	application/x-javascript	2492	747
385	3.599	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/effects.js	200	application/x-javascript	10032	1059
386	3.599	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/dragdrop.js	200	application/x-javascript	8737	956
387	3.600	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/controls.js	200	application/x-javascript	10328	1060
388	3.600	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/slider.js	200	application/x-javascript	3542	850
389	3.600	Http	http://www.kroger.com/_layouts/KrogerCommon/Scripts/sound.js	200	application/x-javascript	1755	745
439	3.819	Http	http://www.kroger.com/WebResource.axd?d=f1oD5m2QVzY221_7UH7pjA2&t=633675674807098288	200	application/x-javascript	5090	873
440	3.819	Http	http://www.kroger.com/_layouts/1033/styles/Menu.css?rev=IQ88ZMCKEKrn%2FLeYuywntQ%3D%3D	200	text/css	1453	667
452	3.970	Http	http://www.kroger.com/SiteCollectionImages/common/closeBtn.gif	200	image/gif	1895	759
453	3.970	Http	http://www.kroger.com/SiteCollectionImages/branding/buttons/btnSearch.gif	200	image/gif	1751	758
454	3.970	Http	http://www.kroger.com/SiteCollectionImages/common/hdr_weeklyAds.gif	200	image/gif	1646	752
455	3.971	Http	http://www.kroger.com/SiteCollectionImages/common/banner_logo_header.gif	200	image/gif	6553	861
456	3.971	Http	http://www.kroger.com/SiteCollectionImages/common/hdr_findStores.gif	200	image/gif	1302	649
457	3.971	Http	http://www.kroger.com/SiteCollectionImages/common/hdr_RxRefills.gif	200	image/gif	1327	648
478	4.032	Http	http://www.kroger.com/SiteCollectionImages/common/hdr_myBanner.gif	200	image/gif	1949	751
479	4.033	Http	http://www.kroger.com/SiteCollectionImages/common/navigation/kroger/mainNav_Home.gif	200	image/gif	621	665
480	4.033	Http	http://www.kroger.com/SiteCollectionImages/common/navigation/kroger/mainNav_Great_Meals.gif	200	image/gif	834	672
481	4.034	Http	http://www.kroger.com/SiteCollectionImages/common/navigation/kroger/mainNav_Healthy_Living.gif	200	image/gif	873	675

Ready

- **max-age** in action – initial request
 - 125 HTTP requests

BLOB caching



Visual Roundtrip Analyzer - C:\Users\solace\AppData\Local\Microsoft\VRTA\output\VRTA-2010-08-07-14.27.09.cap

File Options Help Report Bug!

Select Network: Wireless Network Connection Max Time: Auto

Main Chart Statistics All Files Analysis

Start Frame Number	Relative Time	Ports (Src-Dst)	URI	Status Code	Content Type	Total Bytes	Upstream Bytes	Content Len	Compressibility	Duration	TCP Time	Time To 1stB
33	0.000	1239 - Http	http://www.kroger.com/	302	text/html	934	1025	604	1.2	0.209	0.055	0.153
42	0.213	1239 - Http	http://www.kroger.com/Pages/default.aspx	200	text/html; charset=utf-8	21587	1699	18624	0.9	0.581	0.000	0.466
100	0.941	1239 - Http	http://www.kroger.com/WebResource.axd?d=f1oD5m	200	application/x-javascript	5091	1028	4359	0.9	0.153	0.000	0.152
115	1.106	1239 - Http	http://www.kroger.com/SiteCollectionImages/commor	200	image/gif	1759	972	1412	1.1	0.055	0.000	0.055
116	1.110	1241 - Http	http://www.kroger.com/SiteCollectionImages/commor	200	image/gif	1003	1216	663	0.8	0.108	0.055	0.054
121	1.165	1239 - Http	http://www.kroger.com/SiteCollectionImages/commor	200	image/gif	697	991	587	0.8	0.055	0.000	0.055
130	1.262	1243 - Http	http://ad.doubleclick.net/adj/ibnads.kroger.home/mair	200	application/x-javascript	8488	1360	7064	0.9	0.144	0.051	0.075
156	1.656	1245 - Http	http://s0.2mdn.net/1825089/plcr_37600923_12791277	200	text/javascript	3591	910	2879	0.8	0.106	0.052	0.053
167	1.772	1245 - Http	http://s0.2mdn.net/8793866/inpageGlobalTemplate_v2	200	text/javascript	8956	899	7802	0.9	0.054	0.000	0.053
178	1.868	1245 - Http	http://s0.2mdn.net/1825089/PID_1358722_main.swf	200	application/x-shockwave-flash	12287	1021	10750	0.9	0.056	0.000	0.054
193	1.973	1247 - Http	http://stats.kroger.com/b/ss/krgrkrogerprod/1/H_14/sf	200	image/gif	801	1530	577	1.0	0.060	0.029	0.031
199	2.075	1245 - Http	http://s0.2mdn.net/1825089/PID_1358722_300x250.sw	200	application/x-shockwave-flash	90215	4571	78756	0.9	0.688	0.000	0.054
TOTALS:	2.763					155409	17222	134077				

Ready

- **max-age** in action – subsequent request
 - 11 HTTP requests

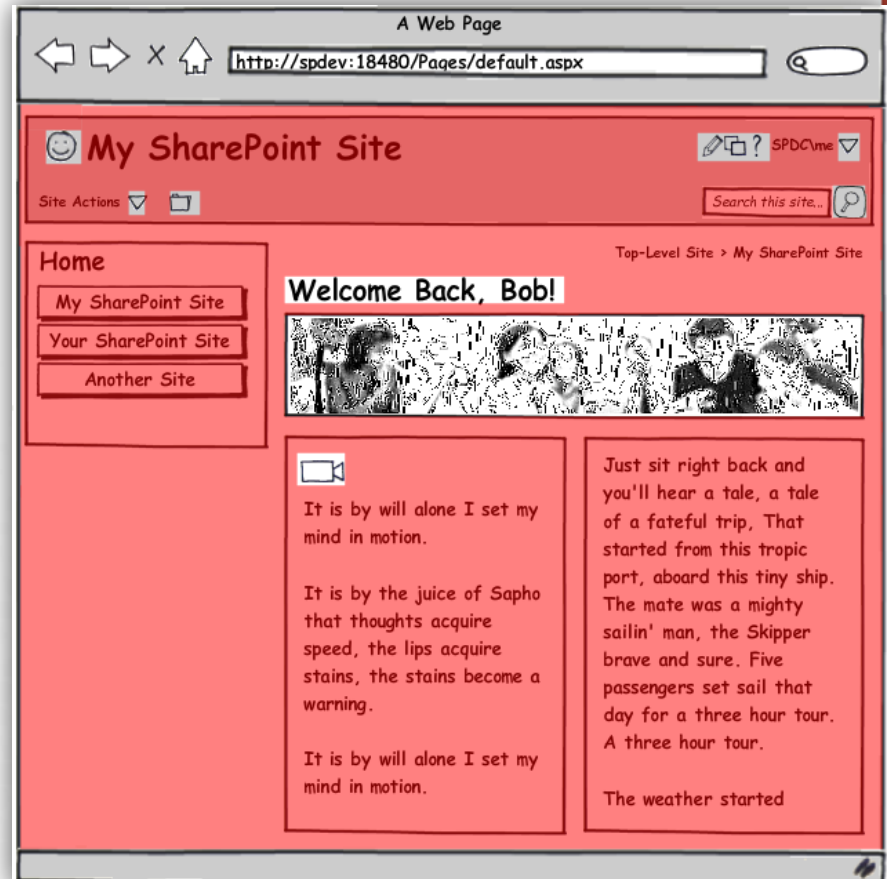
BLOB caching

Recommendations

- Turn it on (that is, set **enabled="true"**)
- Adjust the **location** attribute to point to a data disk
- Ensure enough disk space on WFEs to support sum of **maxSize** attribute values (in GB) across web.config files
- Do not attempt to manually manage BLOB cache contents.
 - Do not delete individual cached files
 - Use built-in flushes (per-server) or full-farm add-on (2007)
 - If required, cache folder associated with IIS web site can be deleted, but only when associated app pool is spun-down
- If using the **max-age** attribute, understand the implications

Page output caching

- Allows pages that were rendered for one user to be stored and served to other users
- Piggybacks on ASP.NET's output caching mechanism



Page output caching

- Structure and operation
 - Pages are rendered and stored in memory by key
 - Primarily managed through a system of profiles
 - Key is composed of attributes specified by a caching profile
 - Users with matching attributes can be served cached page
 - Cache is enabled per site collection
 - Page output cache is off by default
- Additional control in SharePoint 2010
 - **<OutputCacheProfiles>** override in web.config file

Page output caching

- Profiles specify caching characteristics
 - User equivalence (cache key generation) criteria
 - How long pages are cached
 - Whether or not to check for page changes on each request
 - If and how pages are cached on server and client
 - Custom caching parameters
- Profiles can vary based on access type
 - Authenticated profile assignment
 - Anonymous profile assignment

Page output caching

Like a big lookup table

1. Page request comes in
2. Key is built based on request
3. Lookup is performed
4. If key is found in cache
 - Page is returned from cache
5. If key isn't found in cache
 1. Page is rendered
 2. Rendered page is inserted with key
 3. Page is returned

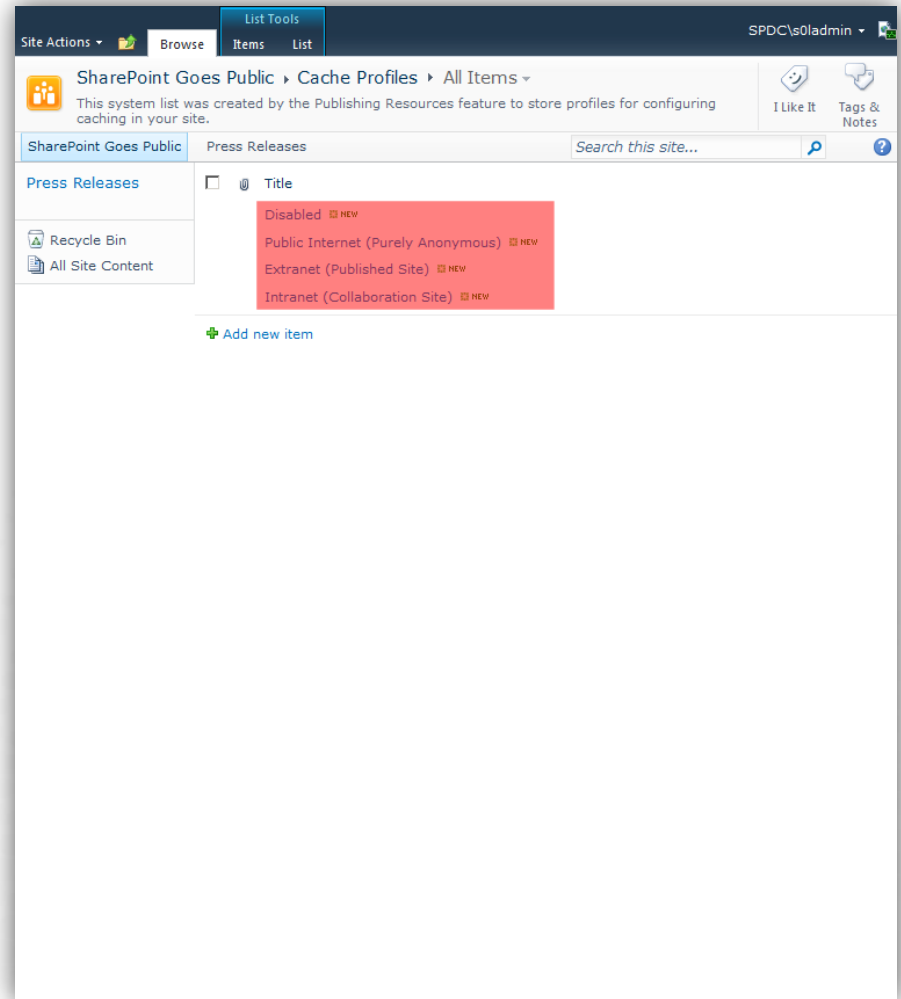
Page Output Cache

KEY	PAGE
Anonymous Internet Explorer 8 /default.aspx	<HTML> ... </HTML>
Anonymous Firefox 3 /default.aspx	<HTML> ... </HTML>
Joe Smith Internet Explorer 8 /default.aspx	<HTML> ... </HTML>
Anonymous Internet Explorer 8 /anotherPage.aspx	<HTML> ... </HTML>
Anonymous Firefox 3 /anotherPage.aspx	<HTML> ... </HTML>

Page output caching

Basics for enabling

Step 1: Create profiles



Page output caching

Basics for enabling

Step 1: Create profiles

Step 2: Select profiles

The screenshot shows the 'Output Cache Settings' page in SharePoint. The page title is 'Site Collection Administration > Output Cache Settings' with the subtitle 'Configure site-wide cache settings.' The user is identified as 'SPDC\sqladmin'. The page is divided into several sections:

- Output Cache:** Contains a checkbox for 'Enable output cache' which is currently unchecked.
- Default Page Output Cache Profile:** Contains two dropdown menus for 'Anonymous Cache Profile' and 'Authenticated Cache Profile', both set to 'Disabled'. Below each dropdown, it says 'Caching is not enabled'.
- Page Output Cache Policy:** Contains two checkboxes: 'Publishing Sites: Publishing sites can use a different page output cache profile' and 'Page Layouts: Page layouts can use a different page output cache profile', both of which are unchecked.
- Debug Cache Information:** Contains a checkbox for 'Enable debug cache information on pages' which is unchecked.

At the bottom of the page, there are 'OK' and 'Cancel' buttons.

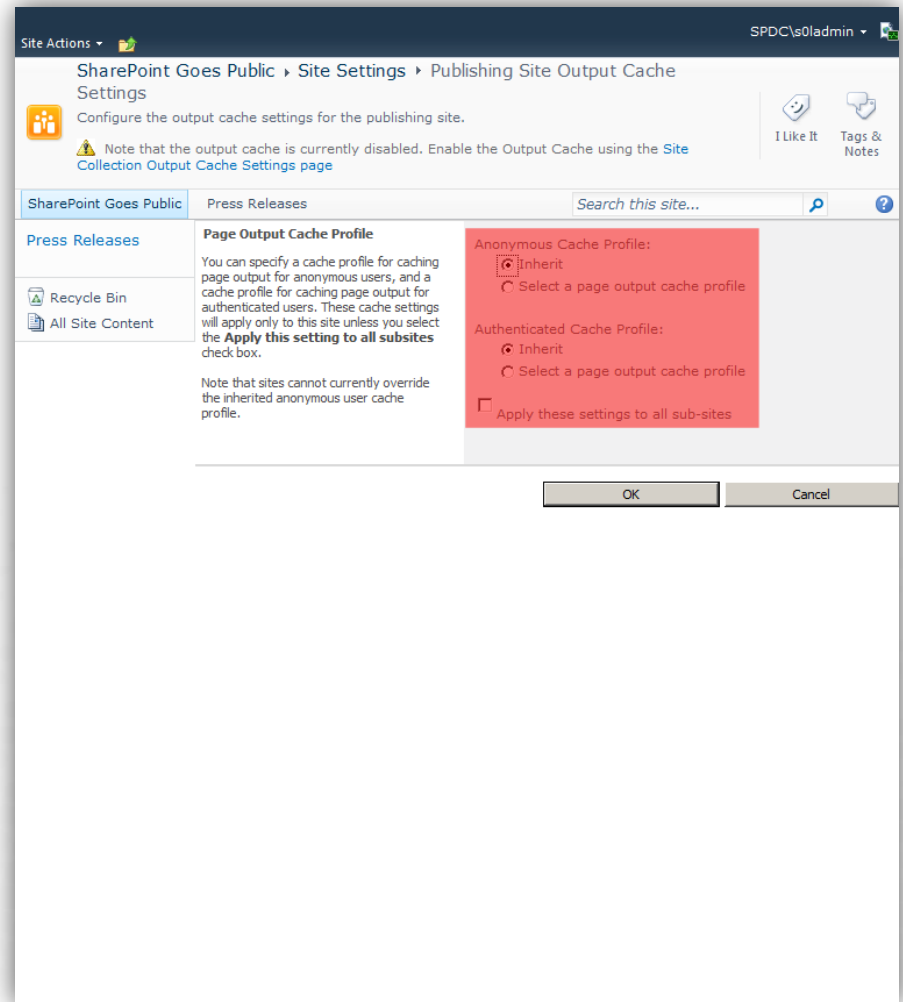
Page output caching

Basics for enabling

Step 1: Create profiles

Step 2: Select profiles

Step 3: Vary by subsite



Page output caching

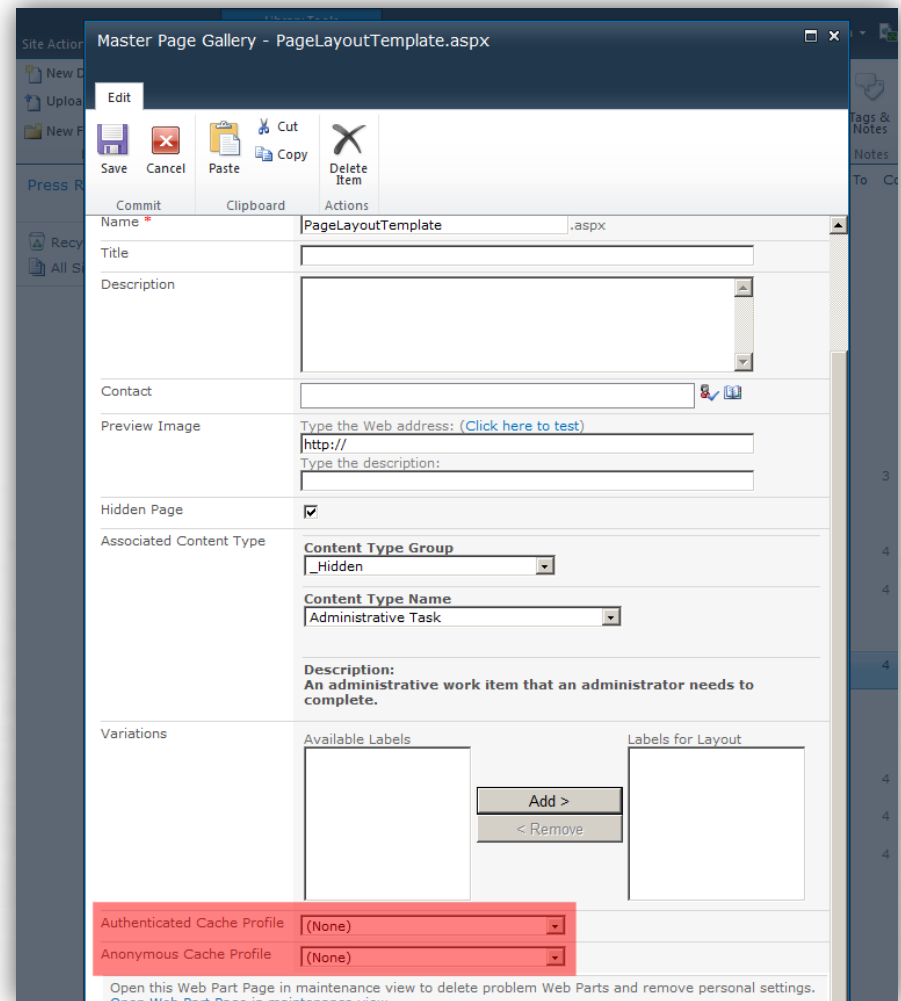
Basics for enabling

Step 1: Create profiles

Step 2: Select profiles

Step 3: Vary by subsite

Step 4: Vary by layout



Page output caching

Basics for enabling

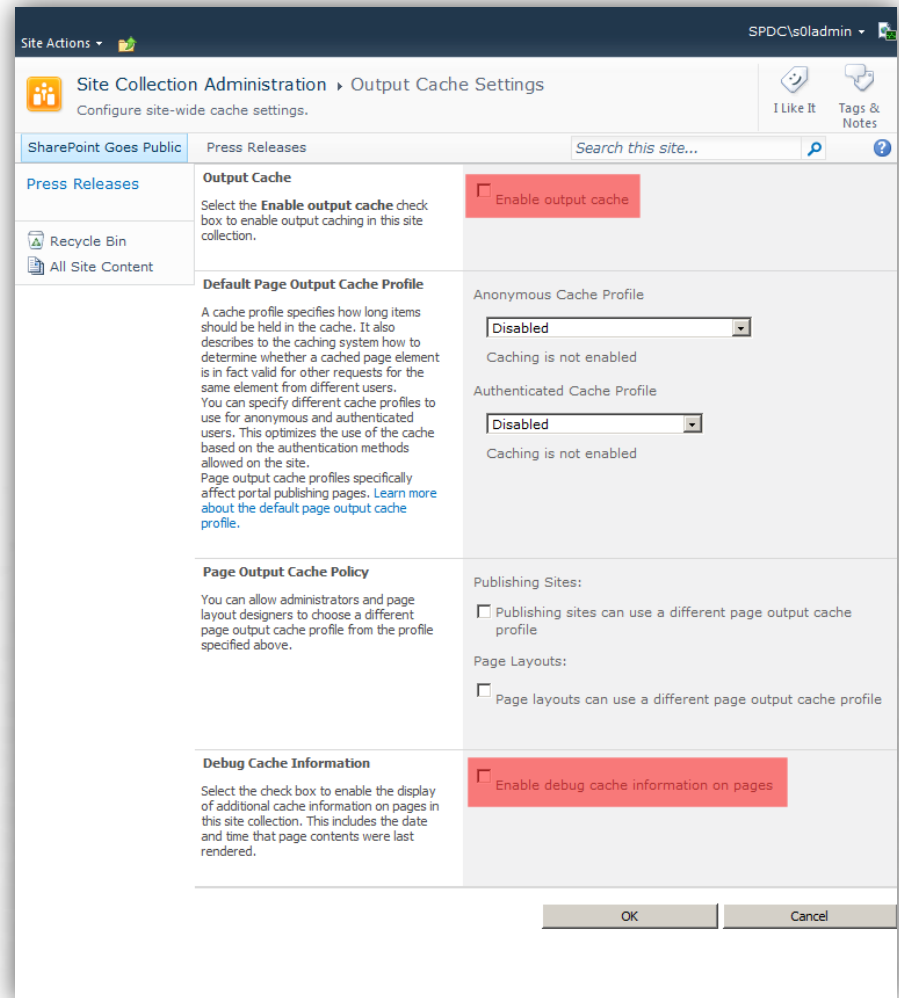
Step 1: Create profiles

Step 2: Select profiles

Step 3: Vary by subsite

Step 4: Vary by layout

Step 5: Enable cache



Page output caching

Recommendations

- Biggest bang comes in purely anonymous usage scenarios
 - Caching becomes less attractive as user equivalence drops
- Perform extensive multi-user concurrent testing before implementing in production
 - Test each profile scenario in-use (authenticated/anonymous)
 - Test deviation scenarios (per-site/per-layout profile use)
 - Failure to tune properly can result in information “leaking” from one user to another
- Debug cache information is your friend
 - Helps you understand how page was evaluated and rendered

Office Web Apps Cache

The screenshot shows the SharePoint 2010 Central Administration interface. The top navigation bar includes 'Site Actions', 'SPDC\s0ladmin', and 'Microsoft SharePoint 2010 Central Administration > Site Collection List'. On the right, there are 'I Like It' and 'Tags & Notes' icons. A left-hand navigation pane lists various administration tasks, with 'Central Administration' selected. The main content area features a 'URL Search' field and a 'Web Application' dropdown set to 'http://spdev:18480/'. Below this is a table listing site collection details for the selected URL.

URL	Web Application
/sites/Office_Viewing_Service_Cache	http://spdev:18480/
URL	http://spdev:18480/sites/Office_Viewing_Service_Cache
Title	Team Site
Description	
Primary administrator:	SPDC\s0ladmin
E-mail address:	
Database Name	WSS_Content_PublishingTestWeb

At the bottom right of the interface are 'OK' and 'Cancel' buttons.

- Specific to SharePoint 2010

Office Web Apps Cache

- What it is
 - A standard SharePoint site collection (Team Site)
 - Relative URL: /sites/Office_Viewing_Service_Cache
 - Office Web Apps Cache Creation timer job creates it
 - Contains rendered images and XAML for Office docs
 - One created per web application
- Defaults
 - Allowed to grow to 100GB
 - Documents live for 30 days until they are removed by the Office Web Apps Expiration timer job

Office Web Apps Cache

Recommendations

- Relocate cache to a dedicated database using **Set-OfficeSPWebAppsCache** PowerShell cmdlet
 - Once in its own DB, it can be excluded from backups
- For web apps housing largely static Office docs
 - Increase cache expiration period
 - Increase cache size
- For web apps where Office content is volatile
 - Decrease cache expiration period
 - Decrease cache size

Scenarios: Quiz Time!

Object caching

ACTION

- Cache size reduced (significantly) below 100MB

POTENTIAL RESULT

- Object cache fills and becomes memory constrained
- Resource contention and ejections lead to cache compactions
- Under heavy load, compaction process leads to thrashing
- SharePoint's ability to serve pages falls through the floor

WHAT TO WATCH

- **Publishing Cache Hit Ratio** performance counter
- **Total Number Of Cache Compactions** performance counter

Page output caching

OBSERVATION

- User A requests a page. User B requests same page.
- User B sees information tied to User A

POTENTIAL CAUSE

- Page output cache profile isn't granular enough

WHAT YOU CAN DO

- Refine the output profile in-use (use additional attributes)
- Set caching exclusions by sub-site or page layout type
- Use post-cache substitution (donut caching) in custom code
- Leverage custom caching handler (IVaryByCustomHandler)

Page output caching

OBSERVATION

- Memory consumption of ASP.NET worker process grows significantly; performance may deteriorate

POTENTIAL CAUSE

- Too many pages being cached (excessive memory load)

WHAT YOU CAN DO

- Adjust caching profiles if possible to reduce page load
- Selectively disable caching for highly varying sub-sites
- Adjust **cache** element values in web.config that control ASP.NET worker process (e.g., **privateBytesLimit**)

BLOB caching

OBSERVATION

- Path property is set correctly, but images stored in site collection aren't being cached in file system

POTENTIAL CAUSE

- BLOB cache only works with resources that are stored within list items in lists or document libraries

WHAT YOU CAN DO

- Leverage built-in libraries such as Site Collection Images
- Move resources to a custom list

BLOB caching

OBSERVATION

- Image is changed on a SharePoint site. Some client browsers show new image, others show old image.

POTENTIAL CAUSE

- **max-age** attribute is in-use with BLOB caching

WHAT YOU CAN DO

- Instruct clients to clear their browser cache
- Avoid using the **max-age** attribute with web apps serving site collections housing very volatile BLOB content
- This behavior is by design

Questions?

References and Resources

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The SharePoint 2007 Disaster Recovery Guide

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The SharePoint 2010 Disaster Recovery Guide

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