How to...

Configure Caches for KM

ASAP "How to…" Paper

1 Business Scenario

Many caches are used in the Knowledge Management platform to ensure performance in the system. It is not only important that caches are created; they must also be configured correctly.

2 The Result

After you have configured the caches as described in this how-to guide, you should have an optimally tuned system as far as caches are concerned.

However, an increase in performance is not dependent only on caches. Other components are also important. The processor performance and main memory of the Portal server, the available bandwidth, number of users, and number of documents managed also influence the performance of the Portal.

3 The Step By Step Solution

3.1 Summary

This document lists the components of the Knowledge Management platform that use caches. As well as a brief explanation of the respective caches, section 3.6 contains a recommendation for configuration in a standard scenario.

The configuration of a cache used in Content Management includes parameters such as capacity and maximum cache size as well as the maximum and average size of a cache entry. You can also specify how long an entry in the cache can be current (default time to live) and whether it is a singleton cache. The best values for these attributes depend on several factors:

- How many entries are added to the cache during what period of time?
- How much memory is needed for the entries in the cache?
- For how long do the entries remain current?
- How important is the efficiency of the components that use the cache?
- How much memory is available on the host?

The following parameters denote the memory caches used in KM.

Memory Cache Parameters

Parameter	Description
Restart Lifetime on Access	Extends the lifetime of cache entries and prevents entries that are still needed from being deleted from the cache.
	A cache normally automatically discards entries that have reached a certain age. This age can be specified in the configuration of a cache. It can also be specified by the software that uses the cache when an entry is set in the cache.
	Sometimes, entries ought not be deleted, since they are still being accessed. This is especially true for caches that contain objects that do not change often or that that are used by an application that does not rely on current data.
Singleton	Instantiation type of cache.
	If Singleton is activated, the memory is only reserved for the cache once. All components that use the cache can then use all the objects in the cache.
	If a cache is not a singleton, the memory is reserved separately for each component that uses the cache. The components can then not access the objects of other components that are contained in the cache.
Assumed Entry Size	Space in bytes adopted for a new cache if the system using the cache specified no other size.
Capacity	Capacity of the cache (that is, maximum number of entries in the cache).
Default Time-to-Live	Time in seconds after which the cache entry is automatically removed from the cache. The value 0 means that the entry never becomes obsolete.
Maximum Cache Size	Maximum total size of all cache entries in bytes. The value 0 means that there is no limit.
Maximum Entry Size	Maximum size of a cache entry in bytes. The value 0 means that there is no limit.

The caches listed are memory caches that are stored in the main memory of the Portal server.

3.2 Prerequisites

You need to be assigned the role KM Admin (EP 5.0) or System Administrator (EP 6.0) in order to configure caches.

3.3 Activities

To create a cache or to change the configuration of an existing cache, choose *Content Management → Utilities → Caches* in the *Configuration* iView.

You can determine the exact value for the capacity of a cache by using the cache monitor (see 3.5).

3.4   Components and Corresponding Caches

3.4.1   ACL Security Manager

The ACL security manager uses a cache in which the access control lists (ACLs) that are valid for resources are stored (effective ACLs). Since ACLs are inherited, there may be an entry in this cache for every resource of the underlying repository. ACLs are small cache entries (a few KB). The AclSecurityManager is used heavily, so its cache should be large.

ca _rsrc_acl (effective ACL cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	Multiple ACL security managers can use the cache together.
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources within the repository that are assigned to the ACL security manager.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the ACLs is not determined.
Maximum Entry Size	0 (unlimited)	

You select the **ca_rsrc_acl** cache in the configuration of repository managers under Content Management → Repository Managers in the *ACL Manager Cache* parameter.

3.4.2   (JDBC) ACL Manager

The (JDCB) ACL manager uses two caches; one for the ACLS, and one for permissions and object types. The ACL cache contains entries for every ACL that is used by the system. The cache for permissions only contains a small number of entries, most of which are static.

ACLs are small cache entries that need little memory (a few KB), as permissions and object types are very small (< 1 KB). The ACL manager is used heavily, so its cache should be large.

ca_cm_rep_acl, ca_cm_srv_acl (ACL cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	Multiple ACL managers can use the cache together.
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources with an ACL within the repository that are assigned to the ACL security manager.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the ACLs is not determined.
Maximum Entry Size	0 (unlimited)	

You can select the **ca_cm_rep_acl** and **ca_cm_srv_acl** caches in the configuration of the ACL manager under *Content Management → Utilities → ACL Managers* in the *ACL Cache* parameter.

ca_cm_rep_acl_perm, ca_cm_srv_acl_perm (Permission cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	Multiple ACL managers can use the cache together.
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	100	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	
Maximum Entry Size	0 (unlimited)	

You can select the **ca_cm_rep_acl_perm** and **ca_cm_srv_acl_perm** caches in the configuration of the ACL manager under *Content Management → Utilities → ACL Managers* in the *Permission Cache* parameter.

3.4.3   Application-Defined Properties

The application property service uses one cache to store the properties of resources. Depending on the number and content of the properties, entries can be small or of medium size.

ca_props_1 (Cache for Application-Defined Properties)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources with application-defined properties within the repositories that use the application property service.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size is not determined.
Maximum Entry Size	0 (unlimited)	

The **ca_props_1** cache is already selected under *Content Management → Repository Services → Application Properties Repository Service*.

3.4.4   URL Content Access

The *URL content access* utility uses its cache to store the content of external link resources. The entries can be large.

ca_ca (Cache for URL Content Access)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used external link resources.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the content is not determined.
Maximum Entry Size	0 (unlimited)	

The **ca_ca** cache is already selected under *Content Management → Utilities → URL Content Access*.

3.4.5   JDBC ID Mapper

The JDBC ID mapper uses its cache to store mappings between resource URIs and fixed IDs that remain unchanged even if the resource is renamed. The cache entries are small.

ca_idmapper (JDBC ID Mapper Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources within CM.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache is already selected under *Content Management → Utilities → JDBC ID Mapper*.

3.4.6   CM-Repository

A CM repository uses two other caches in addition to the ACL cache.

3.4.6.1   CM Cache

This cache stores the names of resources, properties, and locks. It does not store content.

ca_cm (CM Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources within the repository.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache **ca_cm** is already selected under *Content Management* → *Repository Managers* → *CM Repository*.

3.4.6.2   Cache for small content

This cache is used by a CM repository manager for content that is smaller than 32 KB.

ca_cm_content (Cache for small content)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used collections within the repository and the number of resources they contain.	
Default Time-to-Live	Half an hour to several hours	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache **ca_cm_content** is already selected under *Content Management* → *Repository Managers* → *CM Repository*.

3.4.7 Web Repository

The Web repository cache is used to store the content of resources (Web pages). The entries can be of medium size or large, but usually they are small (10 KB – 20 KB).

Web Repository Cache

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	Multiple Web repositories can use the cache together.
Assumed Entry Size	10 KB	
Capacity	This value depends on the number of frequently used resources within the repository.	
Default Time-to-Live	1-2 hours	
Maximum Cache Size	This value depends on the amount of memory that should be used by the cache.	
Maximum Entry Size	10 KB	

You should create a separate cache for each Web repository. You can select it in the configuration of the Web repository manager under C*ontent Management* → *Repository Managers* → *Web Repository*.

3.4.8 WebDAV Repository

The WebDAV repository cache is used to store resources. The cache entries are small.

WebDAV Repository Cache

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources within the repository.	
Default Time-to-Live	This value depends on the usage of the connected WebDAV server. Choose a value of minutes if changes are frequently made by other clients.	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

You should create a separate cache for each WebDAV repository. You can select it in the configuration of the WebDAV repository manager under *Content Management* → *Repository Managers* → *WebDAV Repository*.

3.4.9   Lotus Notes Repository

The notes repository cache is used to store databases, views and documents. The cache entries are small.

For each Lotus Notes repository you need to create separate caches for databases, views, and documents. You can select the caches in the configuration of the Lotus Notes repository manager under *Content Management → Repository Managers → Lotus Notes Repository*.

ca_domino (Database cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources and collections within the repository.	
Default Time-to-Live	This value depends on the usage of the connected Lotus Domino server. Choose a value of minutes if changes are frequently made in existing databases.	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

ca_lotus_view (View cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources and collections within the repository.	
Default Time-to-Live	This value depends on the usage of the connected Lotus Domino server. Choose a value of minutes if changes are frequently made in existing views.	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

ca_lotus_document (Document cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently used resources and collections within the repository.	
Default Time-to-Live	This value depends on the usage of the connected Lotus Domino server. Choose a value of minutes if changes are frequently made in existing documents.	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

3.4.10 Object Type Handler Cache

This cache is used by the object type handler service. It stores URIs of resources for which object type definition files exist, and have already been found.

oth (Object Type Handler Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Activated	Prevents entries that are still needed from being deleted from the cache.
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of frequently-used resource URIs within CM as a whole.	
Default Time-to-Live	Half an hour (1800 seconds)	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache **oth** is already selected under *Content Management* → *Global Services* → *Object Type Handler Service*.

3.4.11 Rendering Cache

This cache is used by the KM user interface. It stores various interface-related objects and settings temporarily.

rendering (Rendering Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Activated	Prevents entries that are still needed from being deleted from the cache.
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	5000	
Default Time-to-Live	Half an hour (1800 seconds)	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache **rendering** is already selected under *Content Management → User Interface → Debugging Settings*.

3.4.12 Control Status Service Cache

The *control status service* allows rendering components (for example, controls) to persist structured data using HTTP request cycles and to access this data. The data is stored temporarily in the corresponding cache.

css (Status Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Activated	Prevents entries that are still needed from being deleted from the cache.
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	5000	Increase this value if you receive error messages (for example, *Cache Expired*) when working with iViews based on the flexible user interface.
Default Time-to-Live	Half an hour (1800 seconds)	The cache is checked for obsolete entries within one CM installation, so this value can be high.
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

The cache **css** is already configured and used internally by the system.

3.4.13 XSLT Pipeline Processor Cache

This cache stores data structures of the XSLT pipeline processor temporarily. These data structures are used for XML transformations.

ca_pipeline (XSLT Pipeline Processor Cache)

Parameter	Setting
Restart Lifetime on Access	Not activated
Singleton	Activated
Assumed Entry Size	0
Capacity	50
Default Time-to-Live	0
Maximum Cache Size	0 (unlimited)
Maximum Entry Size	0 (unlimited)

The cache **ca_pipeline** is already selected under *Content Management → Global Services → Pipeline Add-Ons → XSLT Pipeline Processor*.

3.4.14   TREX Java Client

The TREX Java Client uses the following caches:

- Memory cache
- Administration cache

For an overview of TREX caches, see *Configuration* → *TREX Caches*. The necessary caches are already selected. The persistent caches trexfile and trexfilesec are currently not used.

3.4.14.1   Memory Cache

This cache is used to store search requests and responses.

trexmemory (Memory Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of the cache is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of different search requests.	
Default Time-to-Live	A few minutes	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

3.4.14.2   Administration Cache

This cache is used to store TREX commands that are initiated by the TREX administrator control.

trexadmin (Administration Cache)

Parameter	Setting	Description
Restart Lifetime on Access	Not activated	
Singleton	Activated	
Assumed Entry Size	0	This value is not used if the maximum size of an entry is set to unlimited (that is, `Maximum Cache Size = 0`)
Capacity	This value depends on the number of different search requests.	
Default Time-to-Live	A few minutes	
Maximum Cache Size	0 (unlimited)	The actual size of the mappings is not determined.
Maximum Entry Size	0 (unlimited)	

3.5   Use of the Cache Monitor

You can find the cache monitor in the KM Admin workset. You can use the cache monitor to check the current status of caches. You can use the displayed data for analyses.

Entries in the Cache Monitor

Entry	Description
ID	Cache identifier
Size	Current size of the cache in bytes. The size of the entries is not known for all caches. This is because not every program specifies a size explicitly when an entry is created. However, in the case of a Web repository manager, the size is specified and displayed.
Capacity	Capacity of the cache that was specified when the cache was configured.
Maximum	Maximum number of entries that can be stored in the cache at one time.
Current	Current number of entries in the cache.
Gets	Total number of all successful accesses to the entries in the cache.
Hits	Number of successful accesses to entries in the cache. A successful access means that the entry searched for by the system was found in the cache.
Ratio	Ratio of *Hits* to *Gets*. Specified as a percentage. The higher the value, the more effective the cache.
Added	Number of objects added to the cache since the start of the measurement period.
Removed	Number of objects removed from the cache since the start of the measurement period. Such objects have been overwritten by new objects or have become invalid due to exceeding the *Entry Default Time to Live* value.

Note that the memory caches are reset when the Portal is restarted. Therefore, a restart sets the data displayed in the cache monitor to zero.

3.5.1   Analysis of Displayed Data

Depending on the scenario and the caches used, there are different ways of analyzing the data displayed in the cache monitor.

The following example shows how you can optimize the capacity of a cache.

If the displayed peak value for a measurement over a long period of time is smaller than the capacity of the cache, you can reduce the capacity of the cache under *Content Management → Utilities → Caches*.

However, if the peak value and the current number of entries reached the capacity limit, you should increase the value of the cache.

3.6 Recommendations for the cache configuration in a standard scenario.

The following table contains recommendations for the cache configuration of a 'normal' KM implementation. If certain repositories are accessed particularly often (for example, a Web repository), adapt the listed values appropriately. The cache monitor is helpful for this.

Cache	Technical name	Restart Lifetime on Access	Singleton	Assumed Entry Size	Capacity	Default time-to-live	Max Cache Size	Max Entry Size
effective ACL Cache	ca _rsrc_acl	-	Activated	0	10000	1800	0	0
ACL Cache	ca_cm_rep_acl ca_cm_srv_acl	-	Activated	0	10000	1800	0	0
Permission Cache	ca_cm_rep_acl_perm ca_cm_srv_acl_perm	-	Activated	0	100	1800	0	0
Caches for Application-Defined Properties	ca_props_1	-	Activated	0	10000	1800	0	0
Cache for "URL Content for Access"	ca_ca	-	Activated	0	1000	1800	0	0
JDBC ID Mapper Cache	ca_idmapper	-	Activated	0	10000	1800	0	0
CM Cache	ca_cm	-	-	0	5000	1800	0	0
CM Cache for Small Content	ca_cm_content	-	Activated	0	10000	1800	0	0
Web Repository Cache	Not defined by default.	-	Activated	10000	10000	7200	10000000	10000
WebDAV Repository Cache	Not defined by default.	-	Activated	0	1000	1800	0	0
Lotus Notes Repository Cache	Not defined by default.	-	Activated	0	100	1800	0	0
Lotus Notes View Cache	Not defined by default.	-	Activated	0	1000	1800	0	0
Lotus Notes Document Cache	Not defined by default.	-	Activated	0	10000	1800	0	0
Object Type Handler Cache	oth	Activated	Activated	0	5000	1800	0	0
Rendering Cache	rendering	Activated	Activated	0	5000	1800	0	0
Control Status Service Cache	css	Activated	Activated	0	5000	1800	0	0
XSLT Pipeline Processor Cache	ca_pipeline	-	Activated	0	50	0	0	0
TREX Administration Cache	trexadmin	-	Activated	0	100	300	0	0
TREX Memory Cache	trexmemory	-	Activated	0	100	300	0	0

4 Copyright

- No part of this publication may be reproduced or transmitted in any form or for any purpose without the express permission of SAP AG. The information contained herein may be changed without prior notice.

- Some software products marketed by SAP AG and its distributors contain proprietary software components of other software vendors.

- Microsoft®, WINDOWS®, NT®, EXCEL®, Word®, PowerPoint® and SQL Server® are registered trademarks of Microsoft Corporation.

- IBM®, DB2®, DB2 Universal Database, OS/2®, Parallel Sysplex®, MVS/ESA, AIX®, S/390®, AS/400®, OS/390®, OS/400®, iSeries, pSeries, xSeries, zSeries, z/OS, AFP, Intelligent Miner, WebSphere®, Netfinity®, Tivoli®, Informix and Informix® Dynamic Server^{TM} are trademarks of IBM Corporation in USA and/or other countries.

- ORACLE® is a registered trademark of ORACLE Corporation.

- UNIX®, X/Open®, OSF/1®, and Motif® are registered trademarks of the Open Group.

- Citrix®, the Citrix logo, ICA®, Program Neighborhood®, MetaFrame®, WinFrame®, VideoFrame®, MultiWin® and other Citrix product names referenced herein are trademarks of Citrix Systems, Inc.HTML, DHTML, XML, XHTML are trademarks or registered trademarks of W3C®, World Wide Web Consortium, Massachusetts Institute of Technology.

- JAVA® is a registered trademark of Sun Microsystems, Inc.

- JAVASCRIPT® is a registered trademark of Sun Microsystems, Inc., used under license for technology invented and implemented by Netscape.

- MarketSet and Enterprise Buyer are jointly owned trademarks of SAP AG and Commerce One.

- SAP, SAP Logo, R/2, R/3, mySAP, mySAP.com and other SAP products and services mentioned herein as well as their respective logos are trademarks or registered trademarks of SAP AG in Germany and in several other countries all over the world. All other product and service names mentioned are trademarks of their respective companies.