



SAP NetWeaver Portal 7.3 – Tuning Caches

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SAP NetWeaver 7.3

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Document History

Document Version	Description
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1.00	First official release of this document
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Tuning Portal Caches

The purpose of this article is to demonstrate how content consumption performance can be improved using the caches available in SAP NetWeaver Portal.

- ❖ This article covers three caching aspects related to end user navigation flow. Additional aspects are planned to be described in future articles

Content Consumption Flow in the Portal

When a user presses a link in the portal, an HTTP request is sent to the server, the request is redirected to a certain Java server node and arrives to the portal container.

In the portal container the request for content is analyzed, executed and a response is prepared for sending back an HTTP response containing the content.

To better realize the Portal content object request flow, the below abstract description can be used:

1. Portal Navigation service calculates the PCD (Portal Content Directory) address of the requested object, using the navigation target provided in the request.
2. PCD searches and builds the requested object using the corresponding tables in the persistency to collect its properties.
3. Portal runtime generates the response including the content of the object.

The screenshot displays the SAP NetWeaver Portal configuration interface. On the left, the 'Navigation Structure Preview' shows a tree view with 'URL iViews' expanded to 'Scalability' (1), which is further expanded to 'Size'. 'Size 10kb' is selected and highlighted in orange. Below this, the 'Load Test iView' section is visible, titled 'Load Test Component' (3). The 'Load Test Component' section shows parameters taken from QueryString / Profile:

Parameter	Value	Description
dynamicMemory	0 kB	Component Dynamic Memory to allocate every roundtrip
staticMemory	0 kB	Component Static Memory to allocate and keep
sessionMemory	0 kB	Session Memory to allocate and keep
size	10240 Bytes	Size of free data string in response

On the right side of the screenshot, a table displays properties for the selected component:

Name	Value
Add Padding Inside Tray	<input checked="" type="checkbox"/>
Allow Client-Side Caching	Yes (2)
Authentication Scheme	default
Cache Level	None
Cache Validity Period	0
Can be Merged	<input checked="" type="checkbox"/>
Code Link	com.sap.portal.pagebuilder.pageBuilder
com.sap.portal.prt.xhtml.compliant	true
ComponentType	com.sapportals.portal.page

Portal Navigation Cache

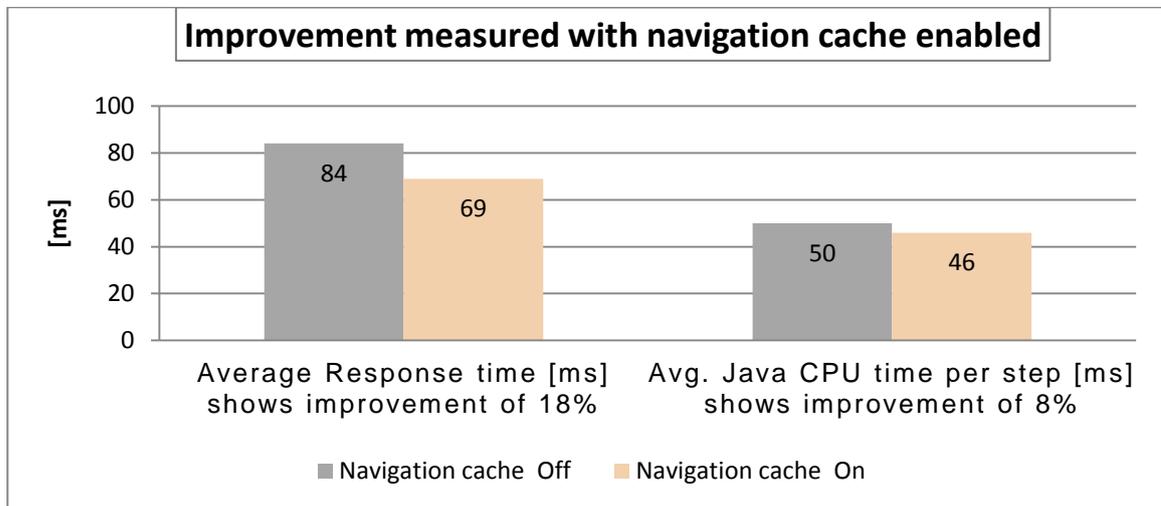
Portal Navigation service calculates the PCD address of the requested object using the navigation target provided in the request.

To improve the performance of navigation service, a mechanism, which caches the results of previous lookups of PCD targets per navigation target, was added. To learn more about the navigation cache service refer to SAP Library: [Caching Navigation Nodes](#).

Chart: enabling the navigation cache

The chart below shows the overall performance improvement measured when enabling the navigation cache, as measured in lab tests.

- *Configuration:* The basic configuration of enabling the navigation cache was applied.



Portal Content Directory (PCD) Cache

The PCD searches and builds the requested object using the corresponding tables in the persistency to collect its properties.

To improve the performance of the PCD service, a mechanism was added that caches the results of previous lookups of PCD objects per PCD target.

Since a PCD object maintains many attributes that are maintained in a few DB tables, and caching any object ever requested is not realistic when considering the available resources in a casual hardware setup, a solution was developed using Java soft references.

To learn more about the PCD cache read SAP Note: [Note 905211 - PCD Cache Optimizer Tuning](#).

Note: The SAP JVM option `-XX:SoftRefLRUPolicyMSPerMB=<value>`, sets the eviction policy for soft references in number of milliseconds per MB of free space in the heap.

For example, if the value is set to 1000 and the current available heap size is 500MB, the eviction period of the object reference would be $1000 \times 500 = 500000 \text{ms} = 500 \text{ seconds}$

Chart: setting value of `-XX:SoftRefLRUPolicyMSPerMB=1000`

The chart below shows the Key Performance Indicators (KPI) improvement, measured when changing from a default template value of 1 to a value of 1000 as measured in lab tests.

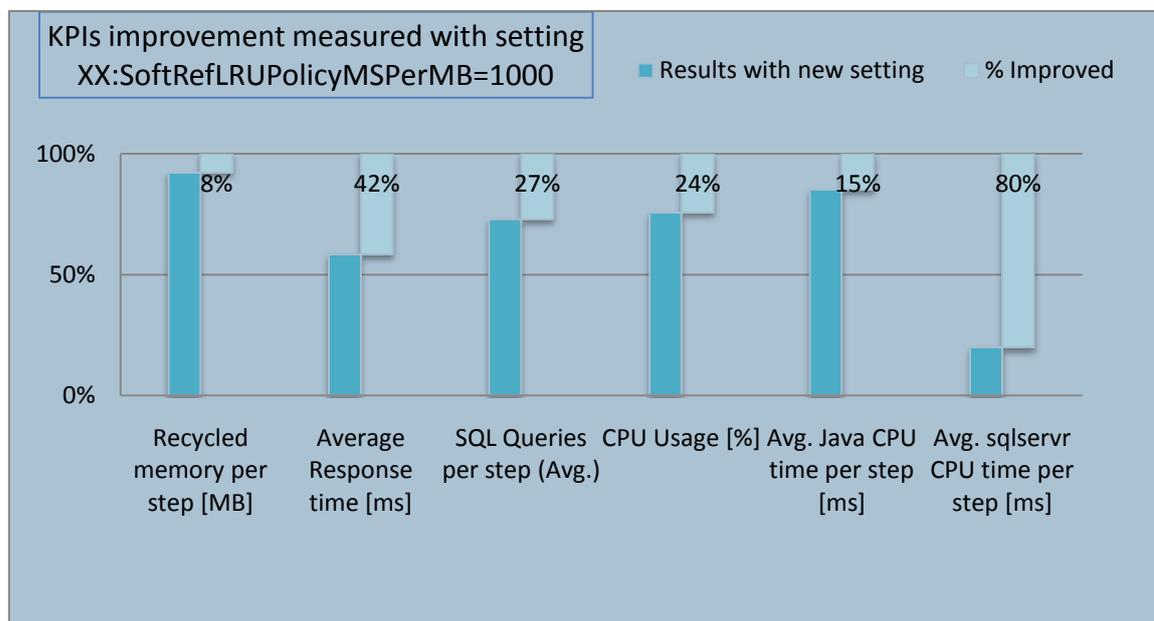
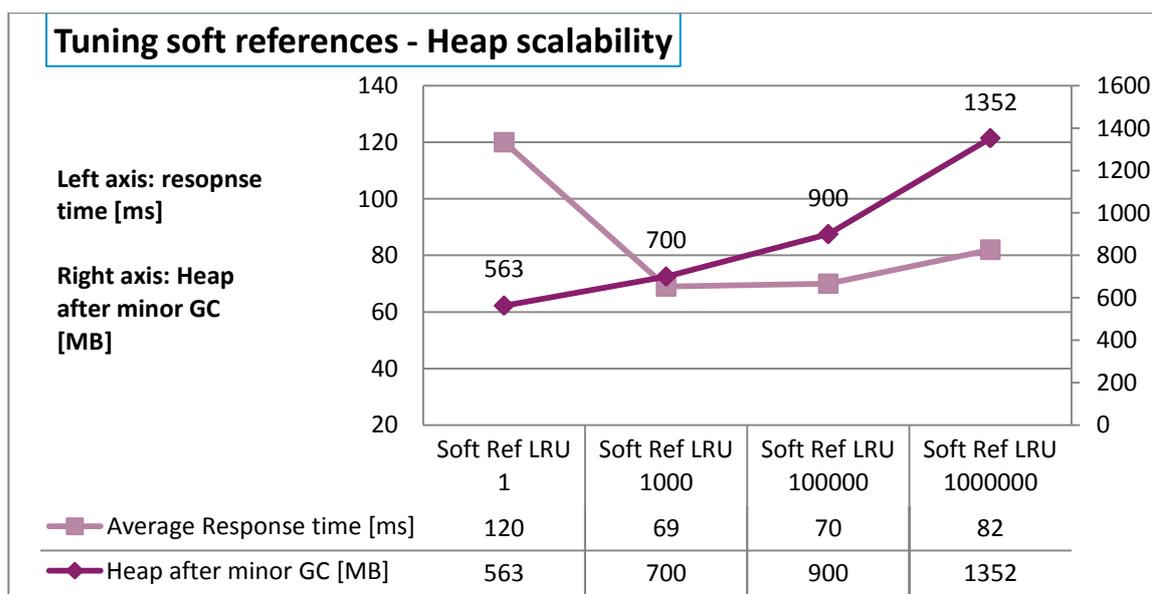


Chart: Tuning soft references - scalability

Setting the PCD soft cache LRU lifetime (Least Recently Used) to a higher value improves server performance but has its price.

In the chart below, the heap size (after minor GC) is correlated with the measured improvement in response time, as measured in lab tests.



The chart shows that response time can be reduced to a certain level, but with high LRU settings the required heap is bigger; other components are affected and the response time will start to grow again.

The LRU setting is dependent on content and memory requirements, and on available resources. A suggested technique to identify the correct setting would be configuring different values and reviewing GC activity under load (real or simulated), the goal being to minimize response time (or any other KPI) while the heap size after minor GC remains as low as needed for other server functionality. As a starting point it is recommended to use *SoftRefLRUPolicyMSPerMB=1000*

Portal Runtime Cache

You can optimize portal performance by adding selected portal pages and iViews to the portal runtime cache.

Performance optimizations when consuming remote content via portal

The PRT cache can be a good solution for improving response times when consuming content which is displayed inside the portal page and retrieved from a remote back end of any type. The implementation of the PRT cache in this case should be configured with care, and must be verified depending on the content type and validity.

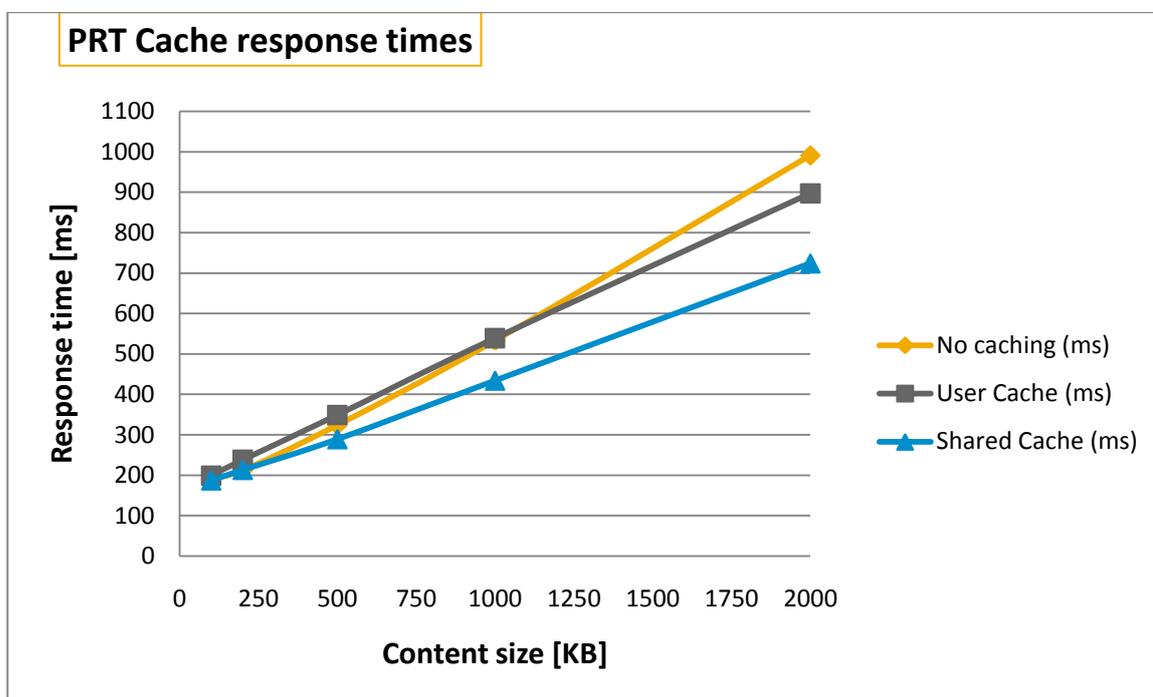
To read more on the caching options see SAP Library: [Activating and Clearing the Portal Runtime Cache](#).

- Tuning hint: Depending on the nature of the cached content, it is recommended to configure `< caching.persistence.clean.period >` to a value higher than the default (5 minutes), such as 1000 minutes.

Chart: PRT cache plain response times

The below chart shows the response times of content generated on the portal server itself, when consumed via the PRT cache (shared or user levels), compared with no PRT cache usage, as measured in lab tests.

Various large content sizes are measured.



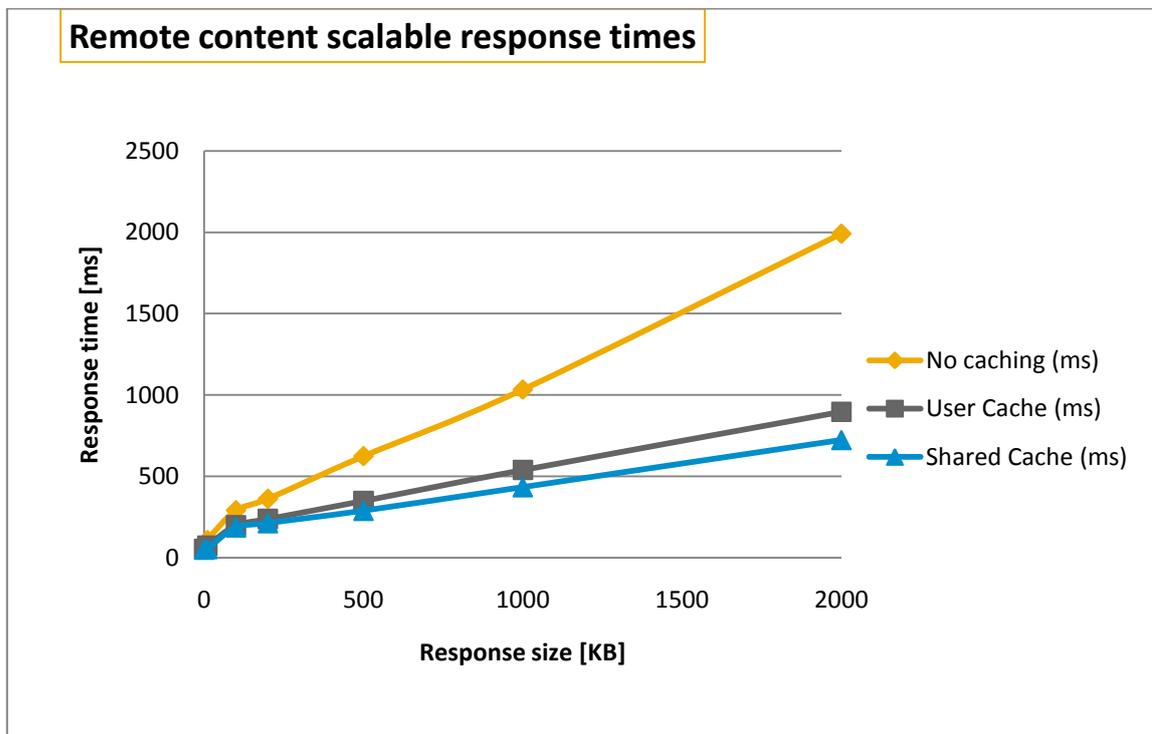
The chart shows that, when running content which can be generated fast, the efficiency of the PRT cache is gained for quite large objects only.

Chart: PRT cache improves remote content scalable response times

The chart below shows the response times of content generated on a remote back end, where the response times on the back end are scaling up in a reasonable manner with content size, when consumed via the PRT cache (shared or user levels) compared with no PRT cache usage, as measured in Lab tests.

The values below added for each size:

Content size [KB]	0	10	100	200	500	1000	2000
Backend round trip [ms]	1	50	100	150	300	500	1000

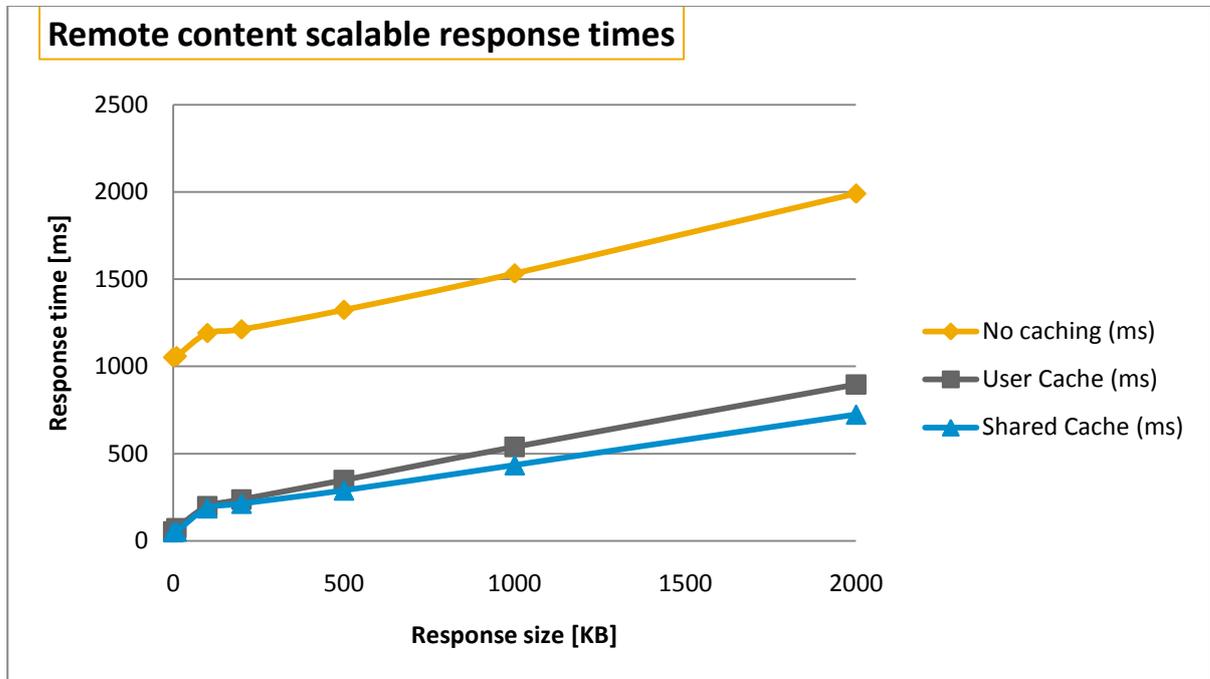


It is easy to realize that when running content retrieved from a remote resource, the efficiency of the PRT cache may be very effective and with a better scalability factor than no content caching.

Chart: PRT Cache improves remote content with constant response time

The below chart shows the response times of content generated on a remote back end, where the response times on the backend are constant, when consumed via the PRT cache (shared or user levels) compared with no PRT cache usage, as measured in lab tests.

A constant 1000ms back-end round trip response time was added.



With a constant back-end response time, the advantage of using the PRT cache is a simple case of the feature and its efficiency can be well defined.

Conclusions

PCD cache

- Pros: Strongly effects performance and enables improvement of the navigation cache.
- Cons: May cause a heap.

Navigation cache

- Performance improvement of 18% was measured.
- The navigation performance improvement is similar for various navigation steps.

Portal runtime cache

- Requires content consideration:
 - By definition will improve performance when a back-end/remote content producer has a certain response time.
 - Specifically for large objects when using shared cache.