

Accelerated Application Delivery for SAP NetWeaver

Generic and Application-Aware Optimizations



SAP NetWeaver Product Management

September 2008

public

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Agenda



- 1. Overview Optimizations**
2. Generic Optimizations
3. Application-Aware Optimizations
4. Summary

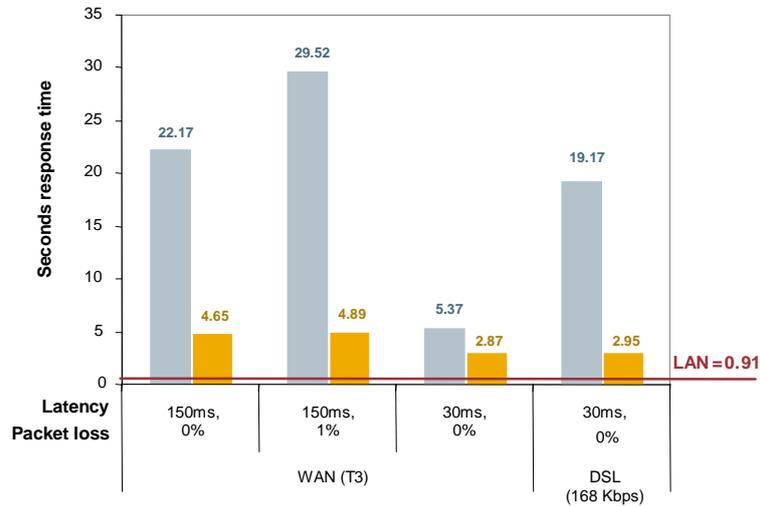
Example SAP NetWeaver Portal - Logon



Showcase: Login to lean SAP NetWeaver Portal: only standard admin roles assigned

Comparing direct access vs. access via AccAD (all over HTTPS)

AccAD access significantly faster than direct access over WAN



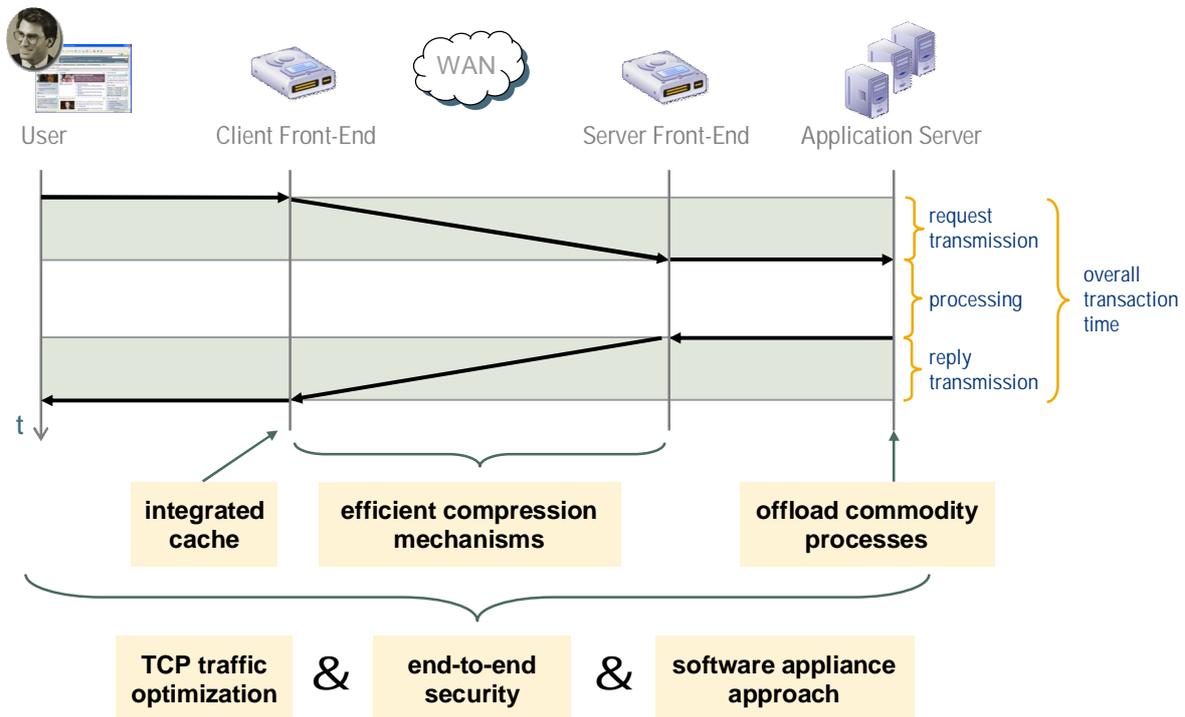
** Example benchmarks measured in SAP Labs, customer results might vary depending on landscape*

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With Accelerated Application Delivery you can overcome WAN issues like limited bandwidth, high latency and network congestion. As shown in this example scenario for login to the portal, with AccAD results close to LAN access are possible. This presentation will show you how AccAD achieves those significant improvements – with both generic and application aware mechanisms.

Key Capabilities & Optimizations



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Here you can see the general communication flow from end user via CFE – WAN – SFE to the application server and back to the end user. The overall transaction time thus consists of the time for transmitting the request, the processing at the application server itself, and the time for transmitting the reply.

The optimization effects and key capabilities of Accelerated Application Delivery are especially efficient due to the application awareness in all of those areas:

- Integrated cache with caching patterns
- Efficient compression mechanisms
- On the application server, commodity tasks and processes can be offloaded
- TCP traffic optimization

These optimizations are discussed more in detail in the upcoming slides.

Moreover, there are 2 additional aspects that help to have a pretty efficient solution in place:

- **End-to-end security:** All communication between user and CFE, CFE and SFE, SFE and Application Server can be secured.
- **Software appliance:** Accelerated Application Delivery follows a software appliance approach, thus it is preconfigured and contains a straight-forward installation with kickstart files. The common baseline is that it takes at max. 60 min to set up a client front-end.

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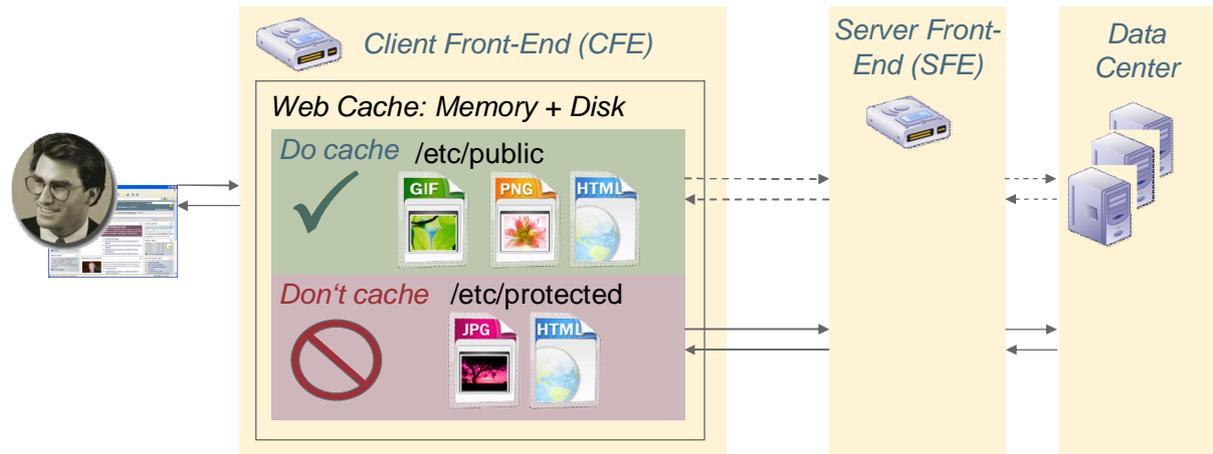


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Configure in Delivery Policy caching patterns

- Type of content to be cached
- Freshness parameters

Observe „Hit by AccAD“ in HTTP Watch



AccAD comes with an integrated web cache which is maintained in the CFE. The Web Cache mechanism includes both disk and memory cache. The remote office can be configured to use content from the web cache instead of sending similar requests all the way to the data center and back. This saves significant time and improves application performance.

Caching patterns enable application and content aware caching and those can be configured in the delivery policy. Those caching patterns determine which type of content is cached and when the content expires. This pattern includes a URL to be cached and content matching the pattern will be cached or won't be cached according to the configuration. The example above might illustrate a potential setting: graphics and html files in the folder /etc/public/ can be cached. However content in another access path cannot be cached – this might be necessary if the html pages are generated dynamically or BI generates graphics. Freshness parameters can be set in the caching rules. In case the server provides freshness parameters as well for a certain resource then those will be regarded by the cache – unless AccAD was configured to overwrite them.

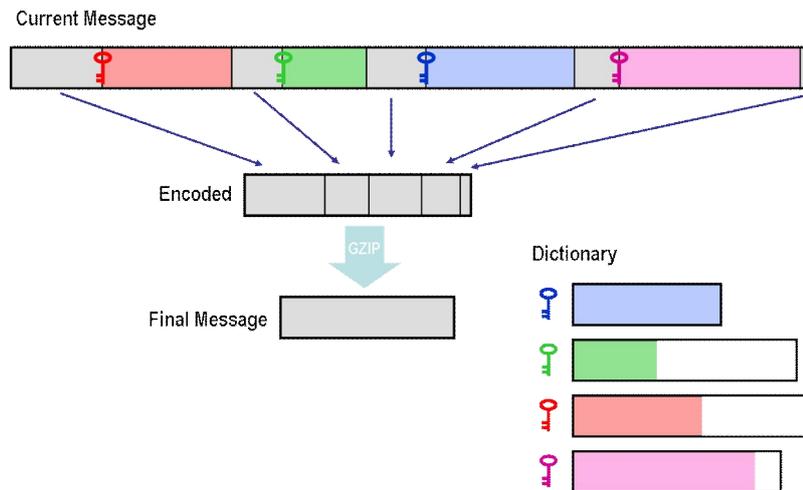
The X-Cache header variable is set in the HTTP-ResponseContent with „Hit by AccAD“ which can be observed using HTTP Watch or other http tracing tools.

Between Browser and CFE

- GZIP compression

Between CFE and SFE

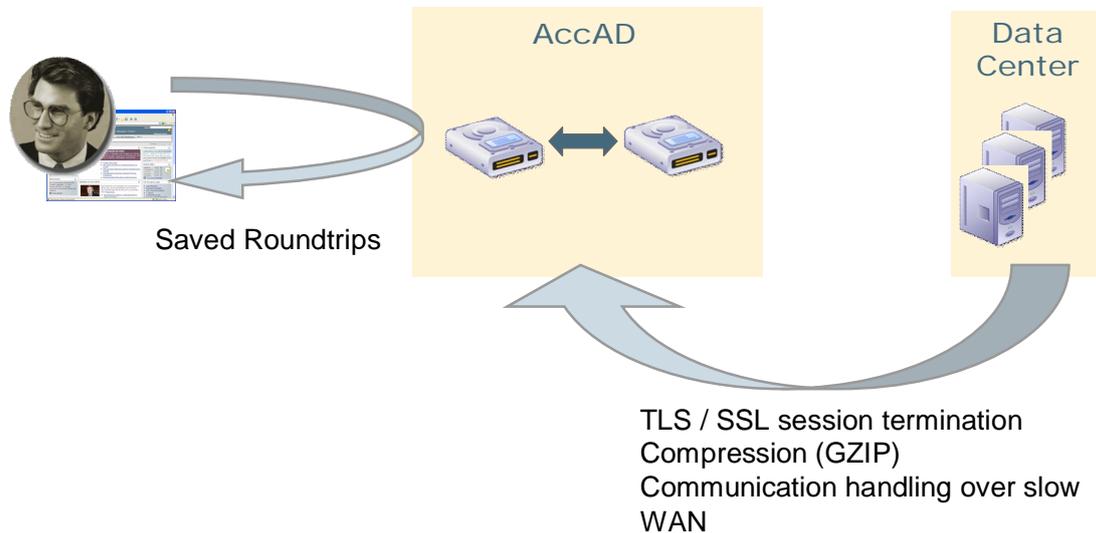
- Messages are analysed to recognize patterns
- Synchronous dictionaries at CFE and SFE



In the segment between CFE and the browser of the user, the http traffic is compressed using a GZIP algorithm – of course there AccAD specific compression cannot be used, because the browser has to be able to „understand“ the reply from the CFE. The administrator can decide which content will be compressed in the processing rules that can be configured via the admin plug-in.

Between CFE and SFE, AccAD minimizes the traffic flow with an adaptive context aware compression method. The messages that should be transmitted are analysed to recognize patterns. Those patterns are saved in dictionaries on CFE and SFE – of course the same dictionary exists everywhere. If a message arrives, then content segments are replaced with short keys from the dictionary if they were found. The message is encoded and this compression reduces it's size significantly. The messages are then further compressed with a gzip algorithm.

AccAD can offload up to ~ 50 % CPU usage from original server



As a nice side effect some commodity tasks are offloaded from the application server to the relatively cheap „AccAD infrastructure“ (in comparison to the application servers). Tasks are for example the TLS / SSL termination. TLS/SSL sessions are terminated in the CFE already, because processing of un-encrypted content is mandatory for being able to optimize the traffic. The TLS/SSL termination eliminates the need of several round-trips for TLS/SSL handshake over WAN. But of course, the user's information like the certificate or the resolved CN may be configured to be carried as HTTP header following SAP J2EE convention for authorization purposes such as SSO.

Other tasks that are offloaded from the server are:

- Compression: GZIP the communication between browser and server
- Handling communication over slow WAN: keep less connections open
- Save roundtrips: cached content can be used immediately and does not put additional load onto the application server

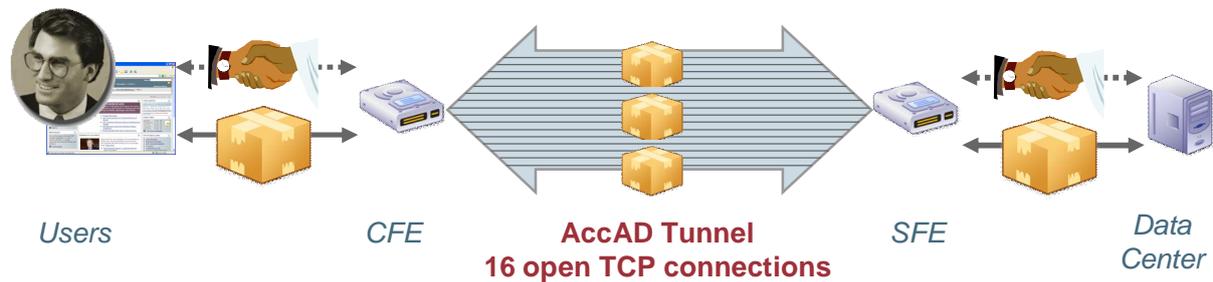
Our internal benchmark tests showed that offloading of approximately 50 % of CPU usage with increased number of users is possible.

1. TCP termination

- Handshake and Flow-Control performed at CFE
- TCP reconnection at Data Center

2. Optimized Tunnel

- Default: 16 connections remain open
- Messages transmitted in fragments over different streams



The TCP (transmission control protocol) optimizations is efficient due to 2 reasons: The TCP termination itself and the optimized tunnel.

The TCP termination happens in the CFE of AccAD – thus in the remote location where we have no issues with latency or bandwidth restrictions. Thus here for every request a TCP connection is opened before the browser can transmit the request itself. The corresponding re-connection on the data center side then happens between SFE and the application that handles the request. Between CFE and SFE we have high latency and low bandwidth and thus here TCP connections remain open.

In this optimized tunnel, by default 16 connections / streams remain open as long as the tunnel is open. Each AccAD internal message is decomposed into fragments, transmitted over the different streams and then re-assembled on the receiving side (SFE). This increases the overall transmission throughput and decreases the sensitivity to packet loss.

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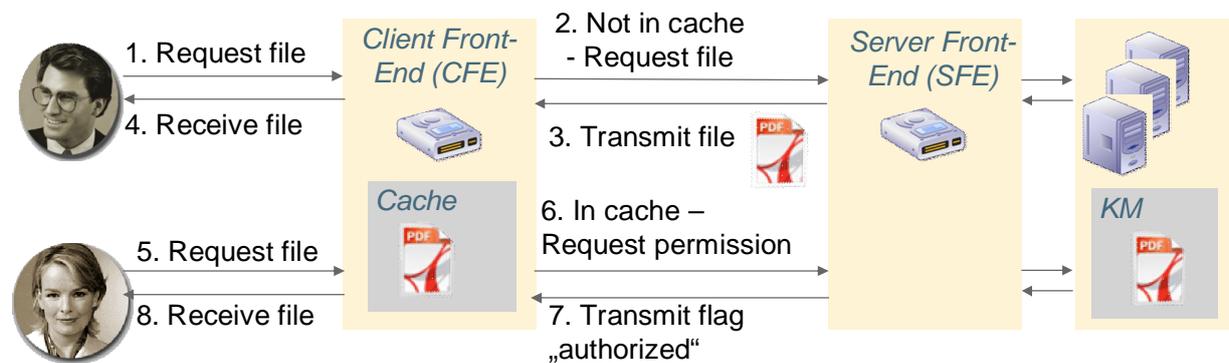


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SAP application-specific mechanisms improve WAN performance considerably

Knowledge Management documents

- Documents are bound to permissions



Here the application aware caching mechanism for Knowledge Management within Accelerated Application Delivery is illustrated. Whenever a user requests a KM document as the first user, the cache is checked but still empty and thus the file is requested from the SFE of the data center. The file is then transmitted to the Client Front-End, located into the cache and delivered to the end user. This flow is already automated in comparison to setups without AccAD due to TCP and HTTP compression and parallelizing mechanisms. If the second user wants to access the document, then this is already located in cache. Since KM documents hold permissions, a small request is sent to the SFE in order to request the permissions for this document. The according flag will be transmitted from the data center, via the SFE back to the CFE. If this flag says „authorized“ then the user receives the file from the CFE – if not, he will receive a permission error.

Moreover, within this response of the server it can be checked whether the document is still valid and not outdated. In case the document on the CFE would not be the same anymore like the one in the data center, this document will then be loaded again.

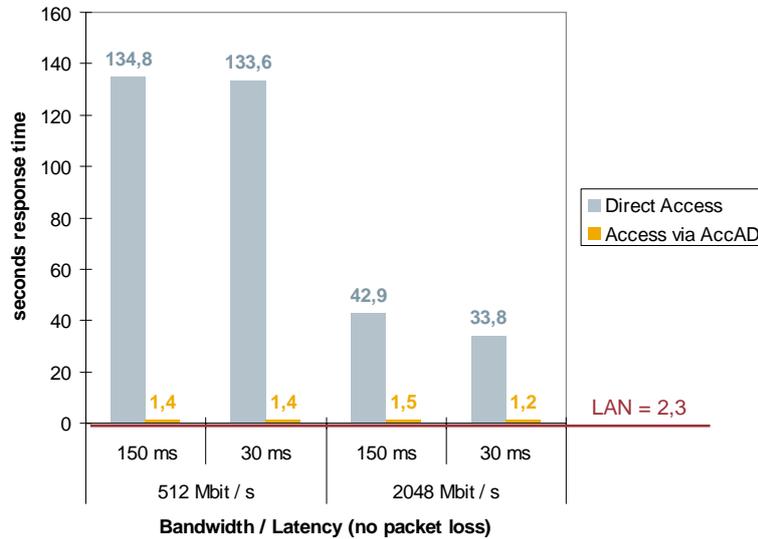
Example SAP NetWeaver Portal - Knowledge Management



Showcase: Download Powerpoint Document persisted in KM (size: 8.36 MB)

Comparing direct access vs. access via AccAD (all over HTTPS)

AccAD access even slightly faster than LAN access

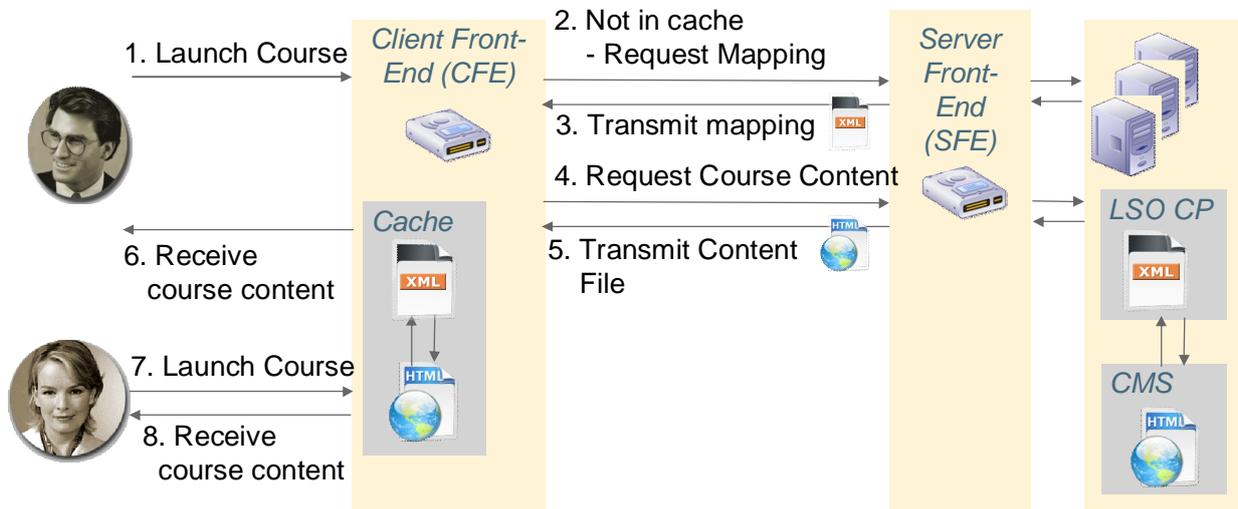


** Example benchmarks measured in SAP Labs, customer results might vary depending on landscape*



SAP Learning Solution

- Every user with different URL; course versions have IDs → Content Player resolves URL to corresponding course content version



The SAP Learning Solution contains several specialities in execution due to a complex system of object versioning. Training courses can change over time and the user has to be assigned to a specific version of the course that he took. Thus several versions of the same object are valid for different user groups. There is a mapping file existing within the SAP Learning Solution in the „Content Player“ that transfers the logical path (the URL) to a physical path where the documents are located in a content management system.

For the SAP Learning Solution an application aware on-demand caching is provided as well. Here the first end user launches a course and since no information is yet cached on the CFE, he requests the information from the SFE and thus the data center. This request is split into 2 different roundtrips: request the mapping file from the SAP Learning Solution Content Player and transmitting this file. Then requesting the course content itself which can be found via the content player on a Content Management System like for example the Knowledge Management of the SAP NetWeaver Portal. This content file then is transmitted back to the CFE – both the content file as well as the XML based mapping file are placed into the CFE's cache and the content is sent back to the end user who requested it. The next user, who is launching the same course but with a slightly different URL can use the mapping file available on the CFE to find the physical path of this course and thus receive the cached course details from the CFE. Thus 2 effects are addressed: the Learning Solution content can be cached efficiently in the remote locations and secondly load is taken from the Content Player of the LSO, since the mapping file and resolution then happens for many users directly on the CFE instead of the application server.

Thank you!





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