



IBM Software Group

"Performance Tuning Domino Web Applications"

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Agenda

- Measure Performance of a Web Application
- Performance-Problems and how you can address them

Measure Performance of a Web Application

Definition

Tools

Stopwatch

FasterFox (Firefox Extension)

Solex (Eclipse Plugin)

domlog.nsf

iSpy

IBM Page Detailer



Definition - Performance

- In software engineering, performance testing is testing that is performed to determine how fast some aspect of a system performs under a particular workload. [...]
- Performance testing can serve different purposes. It can demonstrate that the system meets performance criteria. It can compare two systems to find which performs better. Or it can measure what parts of the system or workload cause the system to perform badly. In the diagnostic case, software engineers use tools such as profilers to measure what parts of a device or software contribute most to the poor performance or to establish throughput levels (and thresholds) for maintained acceptable response time. It is critical to the cost performance of a new system, that performance test efforts begin at the inception of the development project and extend through to deployment. The later a performance defect is detected, the higher the cost of remediation. This is true in the case of functional testing, but even more so with performance testing, due to the end-to-end nature of it's scope. [...]
- Source: http://en.wikipedia.org/wiki/Performance_testing



Definition – Responsetime

- [...] in data processing, the response time perceived by the end user is the interval between
 - (a) the instant at which an operator at a terminal enters a request for a response from a computer and
 - (b) the instant at which the first character of the response is received at a terminal.
- Source: http://en.wikipedia.org/wiki/Response_time
- Responsetime is usually affected by
 - Quality and speed of the network
 - Time the server takes to start responding
 - Quality of code
 - Current serverload and other factors affecting processing speed



Stopwatch

- Performance Testing is done manually
- Positive:
 - Low requirements
- Negative
 - Unpreceise
 - Nearly impossible to measure short response times
 - Browsercache usually influences testing



**Fasterfox**<http://fasterfox.mozdev.org/>

Fasterfox / Firefox Extension

- Displays loading time of a webpage

- Positive:

 - Low requirements

 - Can measure even short times

- Negative:

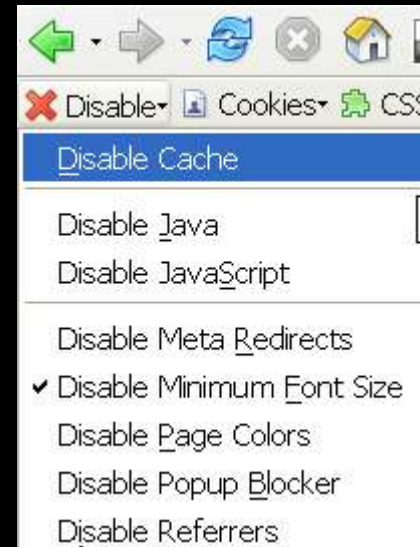
 - Browsercache can influence measurement

 - You can disable caching using the

 - Web Developer Toolbar

 - <https://addons.mozilla.org/extensions/moreinfo.php?id=60>

 - Limited to Firefox/Mozilla Browser

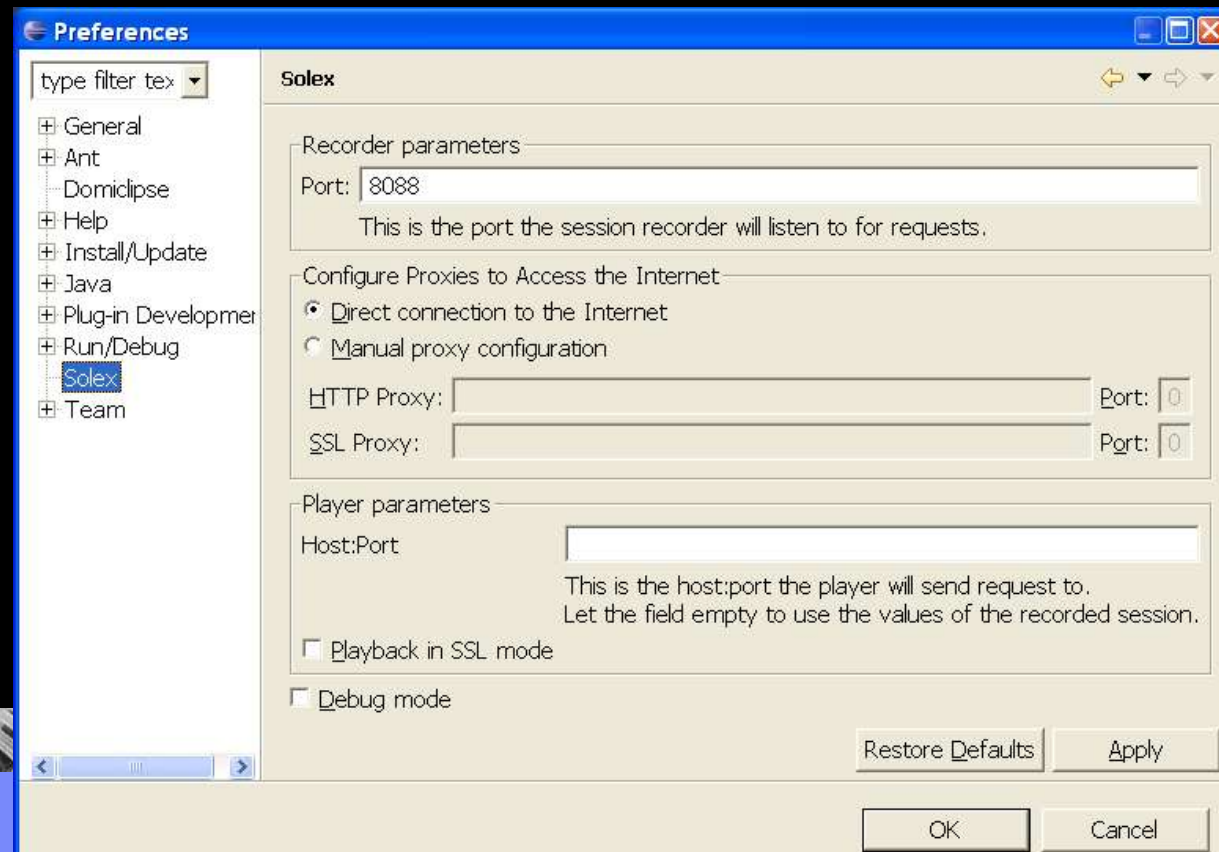


Fasterfox Example

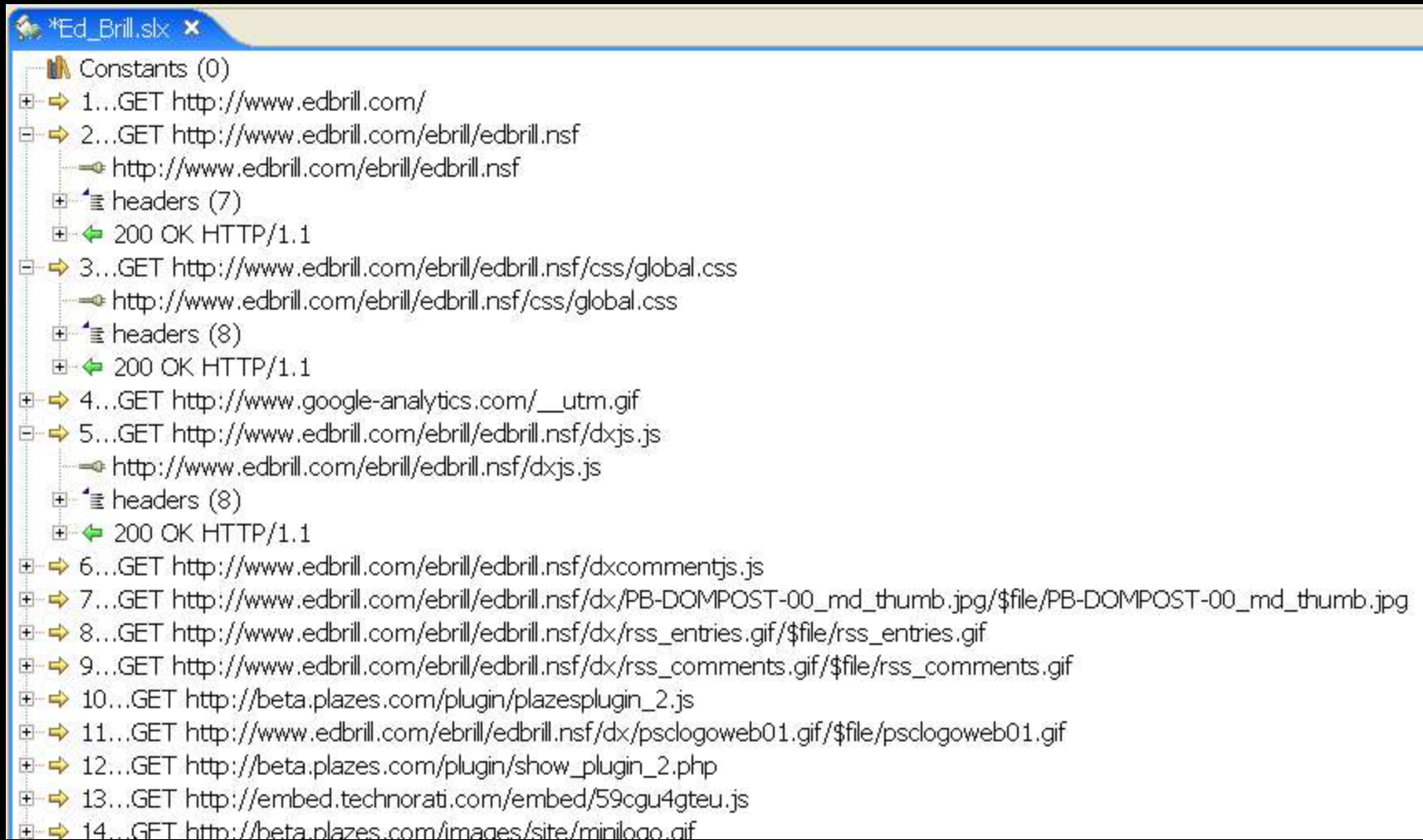
The screenshot shows a Mozilla Firefox browser window with the title "Interface | matters: Microsoft Attacked! - Mozilla Firefox". The address bar contains "http://interfacematters.". The main content area features a large yellow banner with the text "Interface|matters" and a smaller image on the left showing an alien with a speech bubble saying "Exchange must go!" and a sign that says "Microsoft". Below the banner, the date "Thursday, April 06, 2006" is displayed. The main article title is "Microsoft Attacked!". The text of the article reads: "So...like my banner? I wasn't going to put it on here, but I thought some of my Notes pals might get a kick out of it. I was on the phone with a friend late one night and doodling on my tablet pc when the image of the 'Mars Attacks' aliens marching on the Microsoft campus popped into my head (I've learned not to ask...my brain seems to have a mind of its own). So, I fired up the trusty 'ol graphics editor and played around a bit. That's the result at the top of the page. I'll only keep it around for a little while. Too bad it's only make believe! ;-)" and is signed "posted by Chris Blatnick @ 8:17 PM". On the right side, there is a blue box titled "Thoughts about Collaborative Technologies and User Interface Design..." and an "About Me" section with a profile picture of Chris Blatnick, his name, and a bio: "By day, I work as a Collaborative Technologies architect and champion the cause of usability and user interface design." Below the bio are links for "My Profile" and "Contact Me". A red arrow points to the "Contact Me" link. At the bottom of the browser window, the status bar shows "Fertig", a loading icon, "1.402s", and "Adblock".

Solex / Eclipse Plugin

- Solex stores HTTP sessions and is able to playback those sessions. You can even generate variations of the sessions by using rules.
- Solex stores sessions by acting as a local proxy.

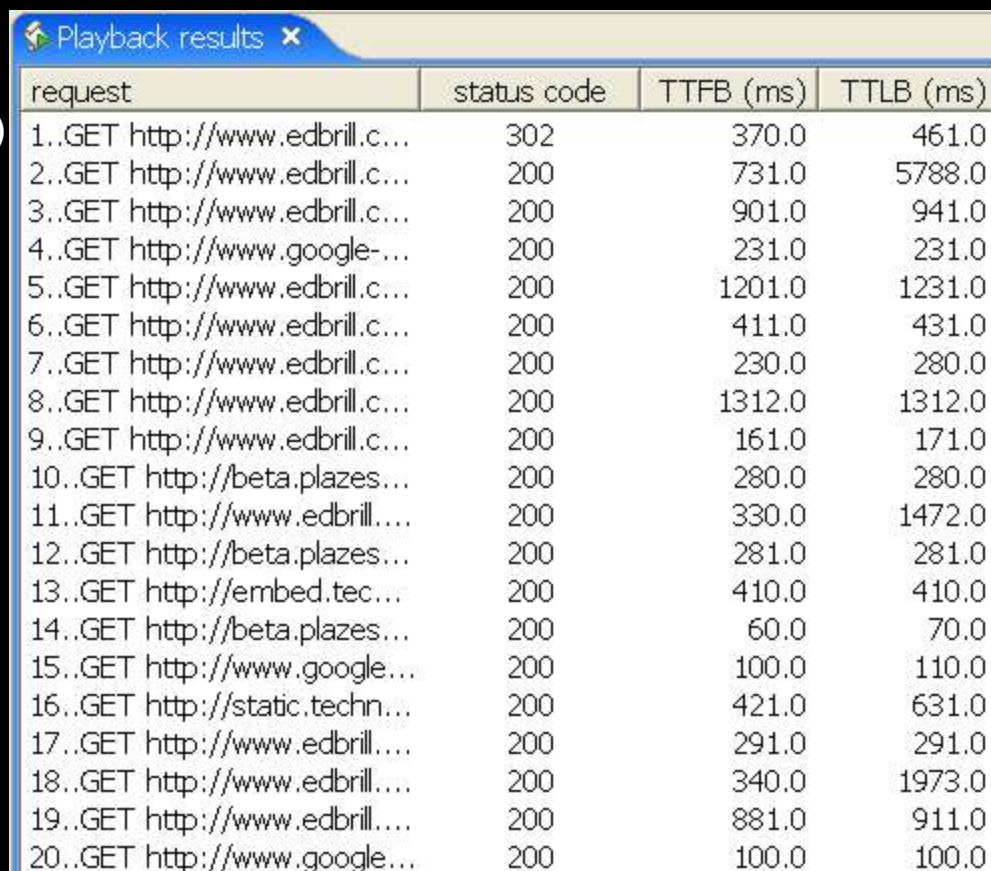


Example: Stored Session



Solex: Playback

- Playback of a previously stored session
 - URI
 - Status Code
 - Time To First Byte (response time)
 - Time To Last Byte



request	status code	TTFB (ms)	TTLB (ms)
1..GET http://www.edbrill.c...	302	370.0	461.0
2..GET http://www.edbrill.c...	200	731.0	5788.0
3..GET http://www.edbrill.c...	200	901.0	941.0
4..GET http://www.google-...	200	231.0	231.0
5..GET http://www.edbrill.c...	200	1201.0	1231.0
6..GET http://www.edbrill.c...	200	411.0	431.0
7..GET http://www.edbrill.c...	200	230.0	280.0
8..GET http://www.edbrill.c...	200	1312.0	1312.0
9..GET http://www.edbrill.c...	200	161.0	171.0
10..GET http://beta.plazes...	200	280.0	280.0
11..GET http://www.edbrill....	200	330.0	1472.0
12..GET http://beta.plazes...	200	281.0	281.0
13..GET http://embed.tec...	200	410.0	410.0
14..GET http://beta.plazes...	200	60.0	70.0
15..GET http://www.google...	200	100.0	110.0
16..GET http://static.techn...	200	421.0	631.0
17..GET http://www.edbrill....	200	291.0	291.0
18..GET http://www.edbrill....	200	340.0	1973.0
19..GET http://www.edbrill....	200	881.0	911.0
20..GET http://www.google...	200	100.0	100.0

Domino Web Server Log / domlog.nsf

HTTP Request:

Server Address:	test.brandlehner.at
Date:	16.04.2006 11:59:17
User Address:	192.168.2.130
Authenticated User:	-
User Agent:	Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR 1.1.4322; FDM; .NET CLR 2.0.50727)
Cookie:	
Request:	GET /homepage.nsf HTTP/1.1
Status:	200 OK (Request fulfilled)
Content Length:	5918 bytes
Content Type:	text/html; charset=windows-1252
Process Time:	7571 ms
Error:	
Translated URI:	C:/Program Files/Lotus/Domino/data/homepage.nsf
Translated Request:	test.brandlehner.at/homepage.nsf
Decoded Query:	
Referring URL:	
Decoded Query:	

domlog.nsf - Facts

- Logs (optionally all) HTTP(S) requests
- Positive:
 - You can see the Domino Servers processing time
- Negative:
 - Logging affects the servers performance, slows it down
 - So, reduce it to the max
 - Exclude URLs (*.gif, ...)
 - Exclude MIME-Types (text/css, ...)
 - Alternative: Logging into textfiles
 - Still slowing down but not affecting the indexer

ISpy / events4.nsf

- Generates „Quality of Service“ Statistics
QOS.HTTP.<Destination Server>.<DUID>.ResponseTime
The ResponseTime is in ms
- Test Intervall is configureable
(default: 15 Minutes)
- Timeout-Treshold configureable
(default: 30 Seconds)
Every Timeout generates an Event

The screenshot displays the IBM ISpy monitoring interface. At the top, there are tabs for Status, Analysis, Monitoring, Statistics, and Performance. Below the tabs, the server information is shown: Server: at00782/Brandlehner, Release 7.0.1 HF29 on Windows NT 5.0. The main area shows a tree view of statistics. The tree is expanded to show 517 statistics, last updated on 16.04.2006 at 14:53:32. The tree structure is as follows:

- 517 statistics - Last updated: 16.04.2006 14:53:32
 - ADMINP
 - Agent
 - Database
 - Disk
 - Domino
 - EVENT
 - FT
 - Http
 - Mail
 - Mem
 - Monitor
 - NET
 - Platform
 - QOS
 - HTTP
 - at00782/Brandlehner
 - CBRR-6NWFwV
 - ResponseTime: 30
 - Mail
 - runjava
 - ISpy: 1

Page Detailer

- <http://www.alphaworks.ibm.com/tech/pagedetailer>
- Get that! The Pro Version offers even more than the free version.

IBM Page Detailer

A graphical tool that enables Web content providers to rapidly and accurately measure client side performance of Web pages.

Date Posted: July 2, 2003

Overview

Requirements

Download

FAQs

Forum

Reviews

What is IBM Page Detailer?

IBM Page Detailer is a graphical tool that enables Web site developers and editors to rapidly and accurately assess performance from the client's perspective. IBM Page Detailer provides details about the manner in which Web pages are delivered to Web browsers. These details include the timing, size, and identity of each item in a page. This information can help Web developers, designers, site operators, and IT specialists to isolate problems and improve performance and user satisfaction.

How does it work?

IBM Page Detailer places a probe in the Windows Socket Stack to capture data about timing, size, and data flow, and then it presents the collected data in both graphical and tabular views, clearly showing how the page was delivered to the browser.



The HTTP Header „Expires“ Tag

```
--- WD_CV_WS2_HTTP_HEADER_REQUEST(1057) CSTRING(7) Length=461
GET /Brandlehner/cab_blog.nsf/js/blogsphere_252.js HTTP/1.1
Host: chris.brandlehner.at
User-Agent: Mozilla/5.0 (Windows; U; Windows NT 5.1; de; rv:1.8.0.2)
Accept: */*
Accept-Language: de-at,de;q=0.8,en;q=0.5,en-us;q=0.3
Accept-Encoding: gzip,deflate
Accept-Charset: ISO-8859-1,utf-8;q=0.7,*;q=0.7
Keep-Alive: 300
Connection: keep-alive
Referer: http://chris.brandlehner.at/
Pragma: no-cache
Cache-Control: no-cache

--- WD_CV_WS2_HTTP_HEADER_REPLY(1056) CSTRING(7) Length=239
HTTP/1.1 200 OK
Server: Lotus-Domino
Date: Mon, 17 Apr 2006 20:58:54 GMT
Last-Modified: Mon, 17 Apr 2006 20:58:52 GMT
Content-Type: text/javascript
Content-Length: 3838
Expires: Tue, 18 Apr 2006 20:58:52 GMT
Content-Language: en
```

The „Expires“ Tag tells the browser not to reload an element from the server again till the given time.

Performance-Problems and how you can address them

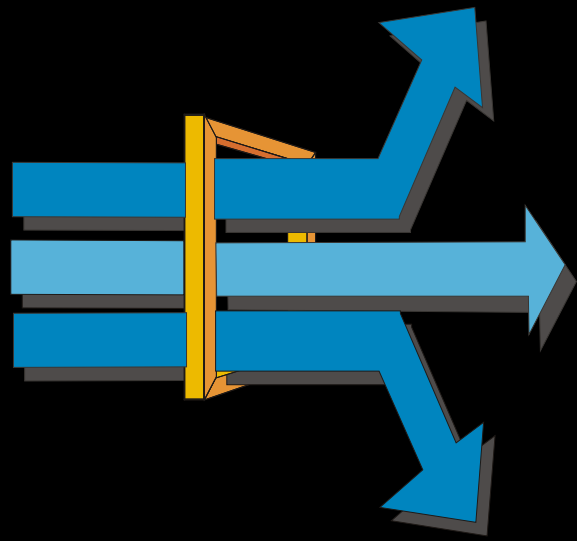
- More Servers – Scaling up
 - Servers for dedicated aspects
 - Load Balancing
- Performance Tuning the Domino Server
- Reducing HTTP Load
- Code Optimization



Have more servers doing separate tasks

Database / Content
<http://www.ibm.com/xyz.nsf>

The screenshot shows an IBM website page with a navigation menu at the top (Home, Products, Services & solutions, Support & downloads, My account) and a search bar. The main content area features a large heading 'Migrate to the Penguin Rebate Program' and a sub-heading 'IBM Linux Migration Program for Partners can help customers realize the benefits of migrating to Lotus Notes and Domino on a Linux platform'. Below this is a section titled 'Migrate to the Penguin Rebate Program:' followed by a detailed paragraph about the rebate program. To the right of the main text are several sidebar sections: 'More info' with links to press releases and white papers, 'Lotus Linux Customers' with a profile of Morphy Richards, and 'Linux' with a link to a software brochure. The page also includes a 'Related links' section on the left and a 'Lotus software' logo at the top right.



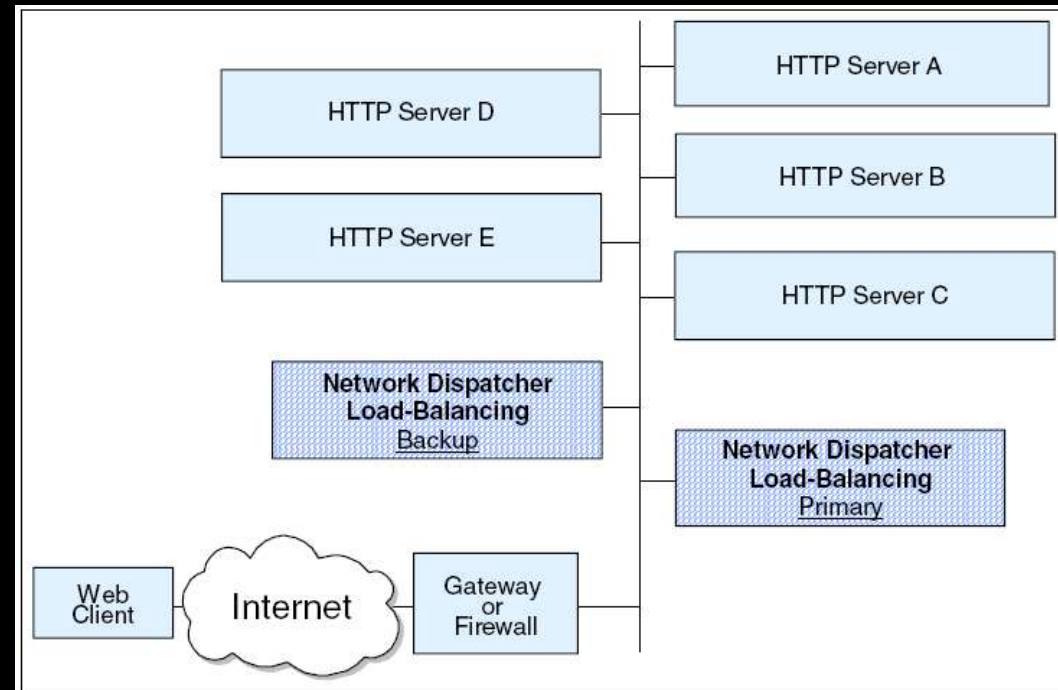
Images
<http://images.ibm.com/xyz/1.jpg>

Static files / Downloads / CSS / ...
<http://download.ibm.com/xyz/hannover.pdf>

Load Balancing / applies to every webserver

- Network Dispatcher (WebSphere Edge Server)
- Cisco Local Director (Hardware)
- Reverse Proxy Load Balancer

<http://www.apsis.ch/pound/> (OpenSource für: Linux, Solaris, OpenBSD)



Tuning – Domino Web Engine

■ Server Document – Domino Web Engine

maximum cached designs

„historic“ Feature, low impact

maximum cached users

Very important to performance

Increase based on your user count from 64 up to 10000 or even more!

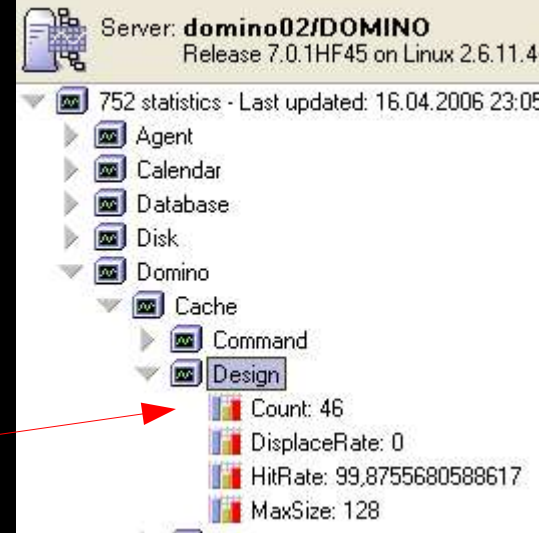
<http://www-128.ibm.com/developerworks/lotus/library/domino7-internet-performar>

Cached user expiration interval

Configures how long domino caches a user session, while the cache is valid Domino will not check modifications on ACL, groups or the users Internet Password.

You can usually increase the default time but be aware of the impact

Memory Caches	
Maximum cached designs:	128
Maximum cached users:	64
Cached user expiration interval:	120 seconds





Tuning – Domino Web Agents

- **Run web agents concurrently?**

If there is no application on your server that explicitly states problems with that feature, you should always enable that setting

- **Web agent timeout**

Protects your server from mad agents (being in an endless loop)

Starting with Domino 7 you should place a DDM Probe for WebAgents runtime

- *... we will talk about Web Agents later on again*



Tuning – Domino HTTP Basics

- **DNS Lookups**

Decreases Performance, disabled if there is no major need for that feature

If enabled, have the DNS cache activated

- **Number (of) active threads**

All HTTP-Requests go to that number of threads

- Strategy...

- Effect...

Basics	
Host name(s):	<input type="text"/>
Bind to host name:	<input type="text" value="Disabled"/>
DNS lookup:	<input type="text" value="Disabled"/> ←
DNS lookup cache:	<input type="text" value="Enabled"/>
DNS lookup cache size:	<input type="text" value="256"/>
DNS lookup cache found timeout:	<input type="text" value="120"/> seconds
DNS lookup cache not found timeout:	<input type="text" value="240"/> seconds
Number active threads:	<input type="text" value="4"/> ← Explaining that the following slides

HTTP Threads – Strategy (Technote 1201715)

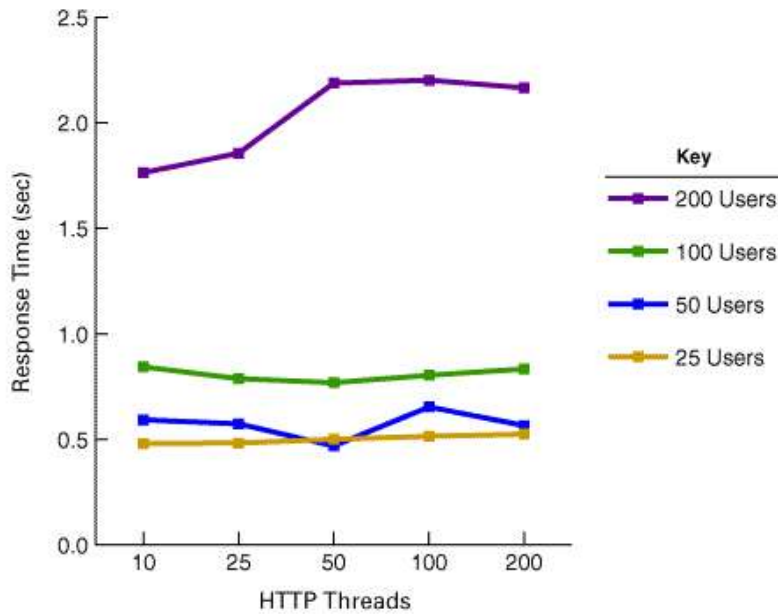


- **HTTPQueueMethod=0** - This setting is the default, and represents no change in queueing from the R6.0 and above. The accept thread will evenly distributed network connections to all worker threads using a round robin method. Connections are assigned to a specific thread.
- **HTTPQueueMethod=1** - This setting will cause the accept thread to find the worker thread that has the least number of network connections assigned to it and assign the new network connection to that worker thread. It is still possible that a new network connection may be assigned to a thread that is in the process of processing a long running request. It is recommended but not required that persistent connections are disabled when using this option to get the maximum effect. This will limit the possible wait time if a new network connection is queued to a thread that already is busy with other connections(s)
- **HTTPQueueMethod=2** - This setting will cause the accept thread to put the incoming network connections on a queue from which the worker threads will pull from. This is the same model as R5. It is also recommend but not required that persistent connections be disabled when using this option to get the maximum effect.

HTTP Threads - Effect

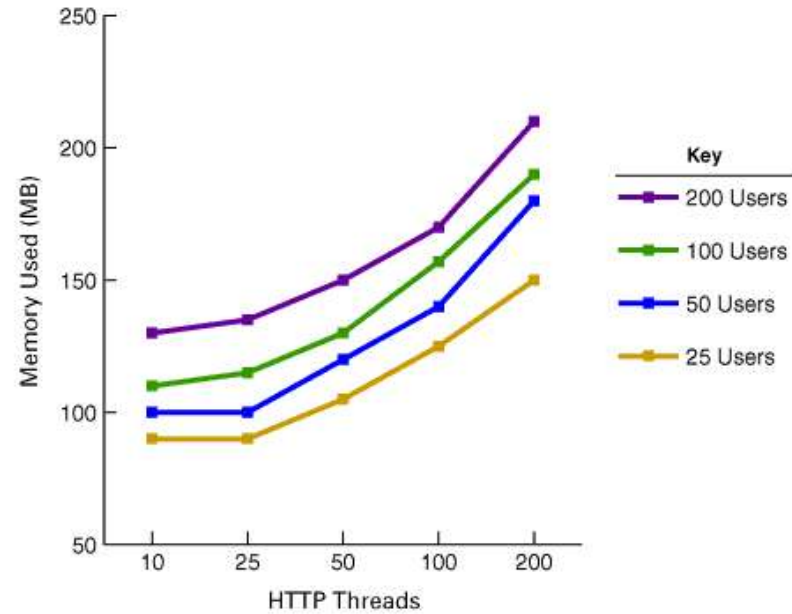
- Keep the number of HTTP threads low
- Source: http://www-128.ibm.com/developerworks/lotus/library/ls-HTTP_Threads_settings/side1.html

Response Time



Small is beautiful!

Memory Used



HTTP - Network Settings

- The "**Listen Queue Size: 512**" indicates the number of simultaneous network connections to the server's network card. It is a low level setting, which directly affects your network cards TCPIP socket layer. In addition, each operating system has also its own internal maximum Listen Queue Size, and if you set Domino's LQS higher than the operating system's, the operating system's limit will be used instead.
- When Domino's HTTP task starts, it initializes the network card along with this parameter, telling the network card that you can only accept 512 simultaneous connections, if there are more incoming connection requests, they will have to wait until the queue gets smaller than 512.
- *Thanks to Mika Heinonen for that explanation: <http://siipi.com/mika>*



HTTP – Network Settings

- **Maximum number of concurrent network sessions**
- No documentation available, but it seems to be a good guess to have that value at least equal or slightly higher than the „Listen queue size“

<http://www-128.ibm.com/developerworks/lotus/library/domino7-internet-performance/>



Authentication

- If possible use „Multiple Server (SSO) Session authentication“ to improve performance

The Domino Server just has to check the Ltpa-Token and do not have to create a new user session

Configure „maximum active sessions“ to be the same as „concurrent user“



Server: **domino02/DOMINO** **hetzner2.protekt.or.at**

Basics | Security | Ports... | Server Tasks... | Internet Protocols... | MTAs... | Miscellaneous | Transactional Logging | Shared Mail | D

HTTP | Domino Web Engine | DIIOP | LDAP |

HTTP Sessions

This section does not apply as "Load Internet configurations from Server/Internet Sites documents" has been enabled.

Maximum active sessions:

1000

Reducing HTTP Load

- Tell spiders to go away or to ignore specific directories or databases - robots.txt
- Tell browsers to cache static data

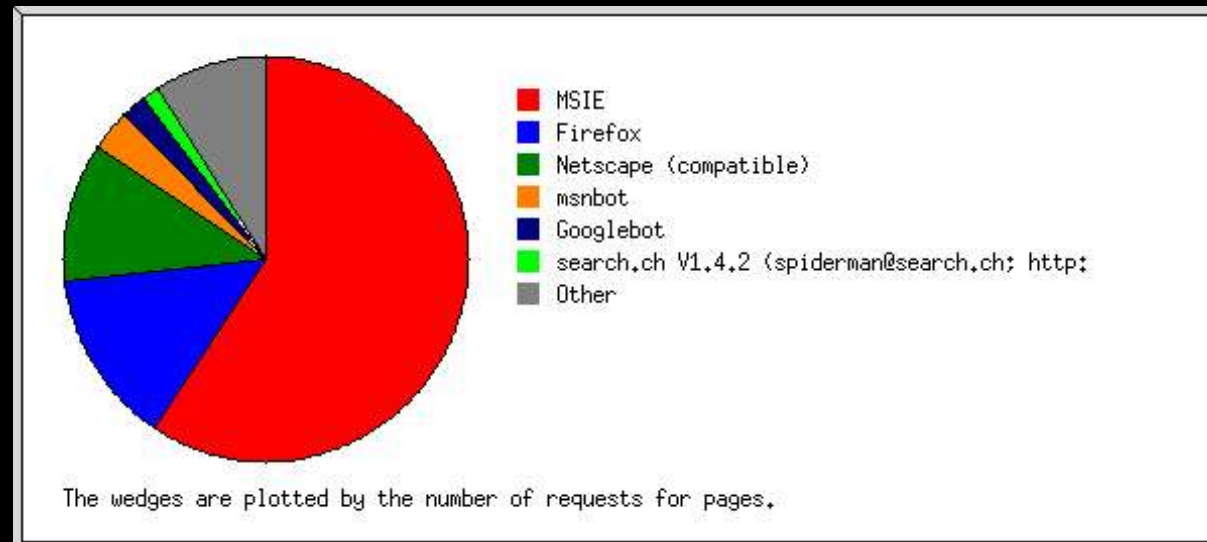
robots.txt

```
# This is a file retrieved by webwalkers a.k.a. spiders that
# conform to a defacto standard.
# See <URL:http://www.searchengineworld.com/robots/robots_tutorial.htm>
# Format is:
#   User-agent: <name of spider>
#   Disallow: <nothing> | <path>
# Sites listing Bots by User-agent:
# - http://net-promoter.com/robots-txt/spider_list
# - http://www.pgts.com.au/pgtsj/pgtsj0208d.html
# -----
```

```
User-agent: *
Disallow: /help
Disallow: /icons
Disallow: images/*_gif
Disallow: images/*_png
```

```
User-agent: psbot
Disallow: /*
```

```
User-agent: msnbot
Disallow: /*_gif
```



Client-Caching – static data

- <http://www-128.ibm.com/developerworks/lotus/library/dwa-clientperf/>

- Some ideas:

/icons/* - Icons

/download/* - Applets

/\$File/* -

On „read only“ sites
this makes sense

*.css – Cascaded Style Sheet

- An Admin can do a lot if the Developer generates good (cacheable) URLs in the app

Web Site Rule

Basics | Comments | Administration

Basics

Description: icons rule

Type of rule: HTTP response headers

Incoming URL pattern: /icons/* ←

HTTP response codes: 200, 206

Expires header:

Don't add header

Add header only if application did not

Always add header (override application's header)

Specify as number of days

Specify as date

Expires after 364 days →

Custom headers:

Name:	Value:	<input type="checkbox"/> Override
Name:	Value:	<input type="checkbox"/> Override
Name:	Value:	<input type="checkbox"/> Override

Code optimization

- „Hide“ Formula
- Preferred design elements
- @DbLookup
- WebQueryOpenAgent
- @SetHTTPHeader
- JavaScript
- DocType

„Hide“ Formula

- Avoid whenever possible
- Do not use the same design element for Notes and the web by hiding based on the client

It is better (because it is faster and easier to maintain) to have separate design elements per client

Name	Alias	Last Modified	Last Modified By		Language
ClientStory	Story	14.03.2006 07:13:51	Chad Schellhout/Schellhout	✓	English
Web - Story	Story	21.02.2006 16:34:56	Christian Brandlehner/Brandlehner	✓	English
Client - Story Response	StoryResponse	28.02.2006 11:02:53	Christian Brandlehner/Brandlehner	✓	English
Web - Edit Comments	StoryResponse	21.02.2006 16:35:09	Christian Brandlehner/Brandlehner	✓	English
NotesVideo_de	Video	18.01.2006 09:08:30	hobbes/qtzar.com	✓	German
NotesVideo_en	Video	18.01.2006 09:08:30	hobbes/qtzar.com	✓	English

Preferred design elements

- „Image Resources“ are better than embedded images in documents



Name	Alias
imgND6.gif	images/nd6.gif
imgND7.gif	images/nd7.gif
imgND8.gif	images/nd8.gif

You can use the path in the alias for a HTTP reply rule (Expires Tag)

Preferred design elements

- „File Resources“ are way faster than an attachment in a document
- „File Resources“ are very flexible due to the configurable MIME type

The screenshot displays a web application interface with a file manager and a file resource properties dialog. The file manager shows a table of files with columns for Name and Alias. The file resource properties dialog is open for the file 'bs.js' and shows the Mime type set to 'text/javascript'.

Name	Alias
anchors.htc	FCKeditor/editor/css/behaviors/anchors.htc
ar.js	FCKeditor/editor/lang/ar.js
bg.js	FCKeditor/editor/lang/bg.js
browser.html	FCKeditor/editor/filemanager/browser/default/browser.html
bs.js	FCKeditor/editor/lang/bs.js

File Resource Properties Dialog:

- Web Properties: Read Only
- Mime type: text/javascript
- 30.03.2005 23:19:20 Christian Brandlehner/Brandlehner
- 19.04.2006 07:59:09 Christian Brandlehner/Brandlehner

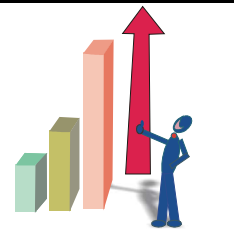
Warning: Never forget the Mime type in a web app

@DbLookup

- *„The only time to use a nocache is when you have a demonstrated problem without it. Too many people use it as if it was part of the standard syntax of @dblookup, rather than as a problem solver.“*

Alan „Eddy“ Bell

- Nothing to add, just do it, use ReCache



WebQueryOpenAgent

- Avoid WebQueryOpenAgents

There is an IMG trick using HTTP Status Code 302 (moved temporarily):

place that on your page to call an agent with an argument

```

```

the agent returns an empty image to avoid a redirect to a page stating that the agent finished running

...

```
Call CodeToIncreasePagecounter(duid)
```

```
Print "[/icons/ecblank.gif]"
```

...

WebQueryOpenAgent - Performance

- Agent Profiling – use that for your WQOAgents

17.04.2006 13:15:02 CEDT

Elapsed time: 34 msec

Methods profiled: 11

Total measured time: 29 msec

Class	Method	Operation	Calls	Time
View	GetAllDocumentsByKey		4	14
View	Refresh		1	8
View	GetFirstDocument		1	5
Database	GetView		3	1
Document	[expandedname]	Set	1	1
DocumentCollection	Count	Get	13	0
Document	[expandedname]	Get	8	0
Document	HasItem		3	0
Session	CurrentDatabase	Get	2	0
Session	DocumentContext	Get	2	0
Database	GetProfileDocument		1	0

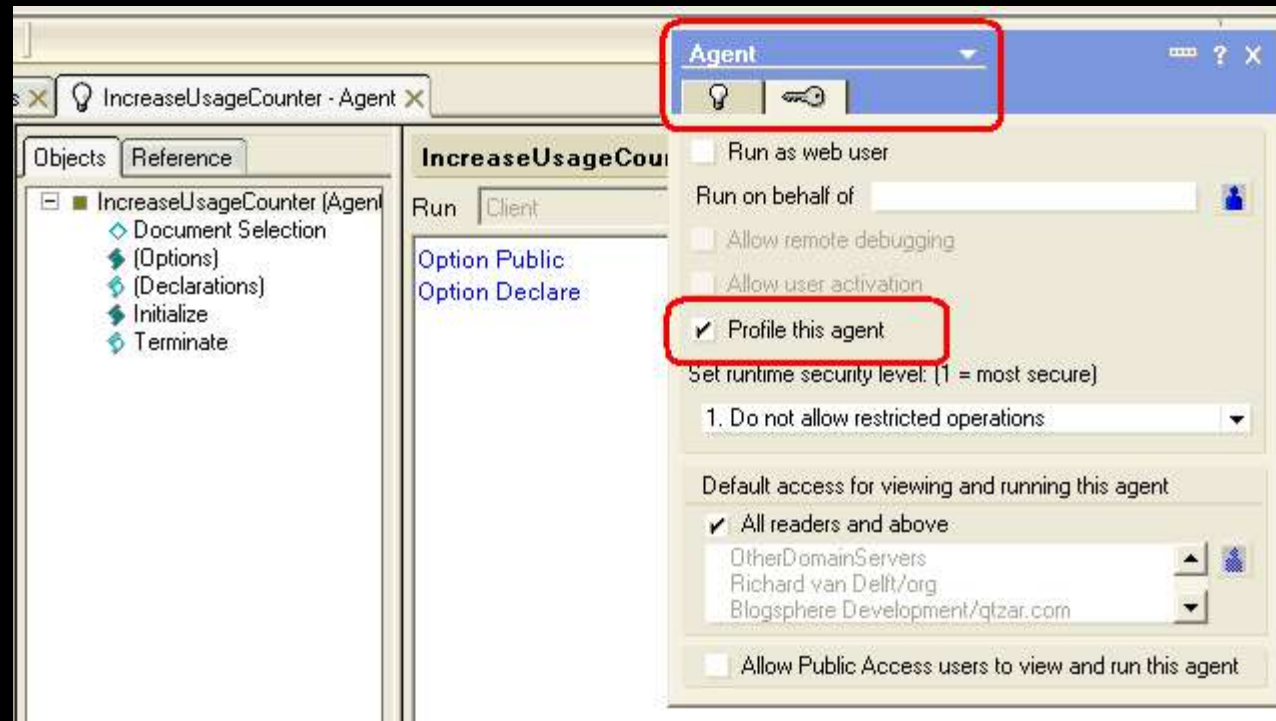
Agent Profiling - \$BEProfile

- You have to create a form named „\$BEProfile“ containing only one field of type RichText named „Body“



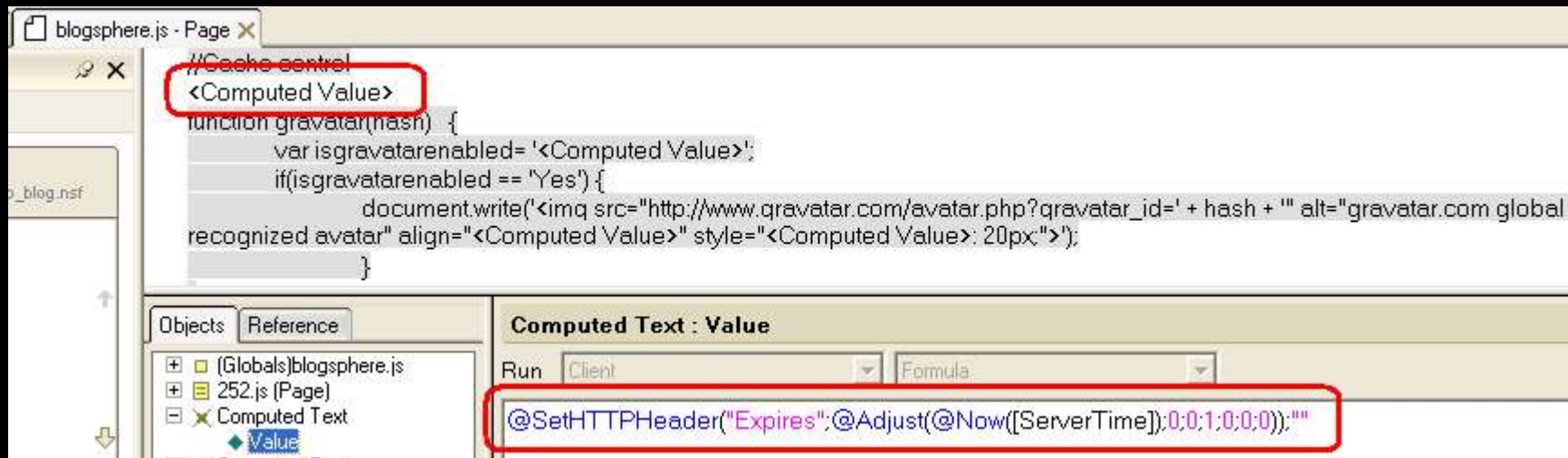
Agent Profiling – activate per agent

- Activate Profiling in the agent properties



@SetHTTPHeader

- The „Expires“-Tag in the HTTP Header could also be set using @SetHTTPHeader



JavaScript

- Instead of repeated computed text per document (Form, Page), as often seen with translations, it makes sense to compute only once in a JavaScript file (a page) and call that (cacheable) JavaScript several times on your document

```
<script language="JavaScript" type="text/javascript">xmllink();</script>
```

```
function xmllink() {  
    document.write(''); }  
}
```

DOCTYPE

- Domino Default:
`<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN">`
- DominoCompleteDoctype=1
`<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN" "http://www.w3.org/TR/html4/loose.dtd">`
- DominoCompleteDoctype=2
 - `<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN" "http://www.w3.org/TR/html4/strict.dtd">`
- The notes.ini parameter **DominoCompleteDoctype** exists since version 6.5.3

Example – Quirks Mode

The screenshot shows a web browser window displaying the Lotus Domino 7 Designer Help page. The browser's address bar shows the URL `http://www-12.lotus.com/ldd/doc/domino_notes/7.0/help7_designer.nsf/Main?OpenF`. The browser's status bar indicates "US Quirks Mode". A red box highlights the "Quirks Mode" text in the status bar. A "view-source" window is open, showing the HTML source code of the page. A red box highlights the first line of the source code: `<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Frameset//EN">`. The "view-source" window also shows the following code:

```
<html>
<head>
  <script language="JavaScript" type="text/javascript">
    <!--
    self._domino_name = "_Main";
    // -->
  </script>
```

DOCTYPE - Impact

- * **Quirks mode** handles the older HTML, and works with and checks for unclosed tags,
, and all the rest. As you might expect, this slows down document parsing, and therefore, delays its browser display.
- * **Standards mode** handles constrained HTML and XHTML, and expects the document to be well structured and organized. As a result, parsing is faster, and the page displays more quickly (and almost identically across browsers).
- Quelle: Brett McLaughlin <http://www-128.ibm.com/developerworks/library/wa-slicksite/>

Even more questions?

- Visit:

<http://chris.brandlehner.at>

<http://www.openntf.org>

<http://www.selfhtml.org>

