



Lotus Domino Performance Tuning

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Agenda

- What does impact a Domino performance?
- Tools to identify problems
- OS tuning, services
- Domino database tuning
- @Time functions
- Agents, subforms, Tables, icons,
- Domino 6.x, 7.x, 8.x improvements



Tools to identify problem

- User complains
- OS/Domino statistics
- Lotus Domino Domain monitoring
- Log files/debug parameters
- Agent Profiler (Domino 7.x)
- 3rd party tools (Profilers)



Domino server tuning guide

- 1. RAID tuning
- 2. Hardware tuning
- 3. OS tuning
- 4. Domino server configuration tuning
- 5. Enable Transactional Logging
- 6. Database tuning
- 7. View tuning
- 8. Column, agent, script tuning



Raid (cont.)

- Stripe size should be 16K

Data to store	RAID level	Size	Speed
OS	RAID 1	18GB	15K
DATA	RAID 1, 5, 10		
Transactional Logging	RAID 1	18GB	15K

Basics	Security	Ports...	Server Tasks...	Internet Protocols...	MTAs...	Miscellaneous	Transactional Logging	Shared Mail	DB2	Lotus Traveler	Administration
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Basics	
Transactional logging:	Enabled
Log path:	E:\LOGDIR\
Logging style:	Circular
Use all available space on log device:	<input type="radio"/> Yes <input checked="" type="radio"/> No
Maximum log space:	4096 MB
Automatic fixup of corrupt databases:	Enabled
Runtime/Restart performance:	Favor runtime
Quotas	
Quota enforcement:	Check file size when extending the file



Transactional Logging

- TL – Improves performance
- TL - Reduces server restart time
- - Separate disk is necessary
- TL Best Practice
<http://www-1.ibm.com/support/docview.wss?uid=swg27009309>
- TL should be disabled on Clubusy.nsf, log.nsf, mail.box, check notes.ini
<http://www-1.ibm.com/support/docview.wss?uid=swg27009309#INI%20file>
- TL on SAN <http://www-1.ibm.com/support/docview.wss?uid=swg27009309#SAN>

	Recovery Time	Response Time	CPU load
DISABLED	01:40:40 (100%)	233ms (100%)	48.9% (100%)
Standars	00:17:43 (17%)	216ms (93%)	46.3 (95%)
Favor Runtime	00:33:24 (33%)	172ms (74%)	41.0% (84%)
Favor Recovery	00:12:35 (12%)	223ms (96%)	46.7% (96%)



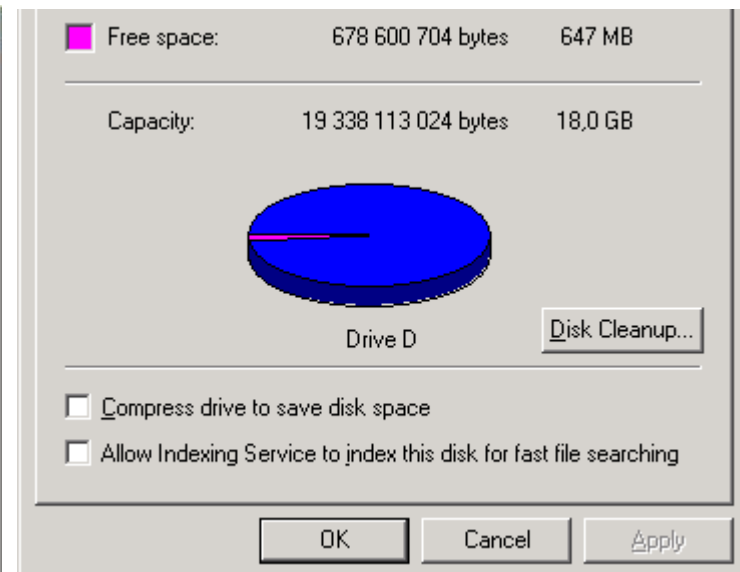
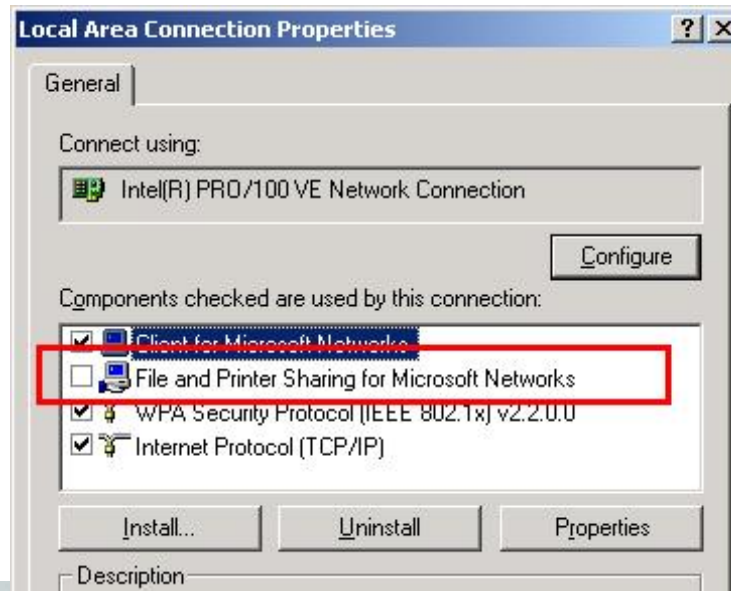
Server types

- Mail – needs more memory (to convert emails)
- Apps – needs more CPU (LotusScripts, indexes require CPU resources)
- CLUSTER – need more MEMORY and CPU ☺
- Use IBM calculators, as well you can use similar environments that runs well



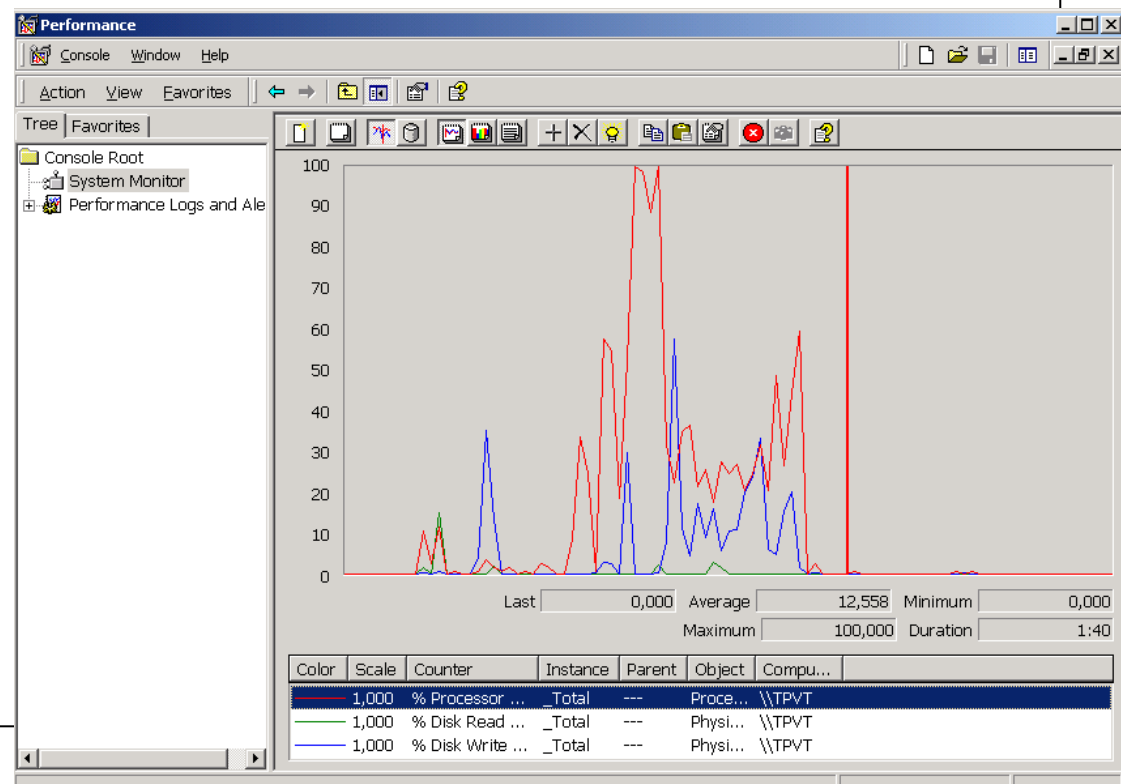
Basic OS tuning (Windows)

- Disable “File and Printer Sharing”
- Disable unused server services (Print Spooler)
- Disable Disk Indexing



Windows Performance tools

- Start with Performance Monitor to identify a bottle neck
- Same tools are available on other OSes




WebAdmin.nsf

People & Groups | Files | Server... | Messaging... | Replication | Configuration

☐ Logout ☐ Preferences

Status | Analysis | Statistics


Server Platform Statistics
Release 6.5.6FP3 on Windows 2003 Server

- All Server Tasks
- Notes Users
- Database Users
- Internet Users
- Quick Console
- Live Console
- HTTP Statistics
- Schedules
- Operating System
- Platform Statistics**
- Services
- Processes

Last sampled: 11:09:28, sample interval is every 1 minute(s) Last update

CPU Statistics

Current utilization:	20 %
Average utilization:	3.4 %
Domino utilization:	24.7 %

Memory Statistics

	Total	Min.	Peak	Avg.
Installed:	4096 MB			
Available:	(7 %) 254 MB	40 MB	3 MB	591 MB

Pagefile utilization:

	15.7 %	23.4 %	8.6 %
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Disk Statistics

Drive name:	Utilization:		
	Current:	Peak	Avg.
C	37.5 %	100 %	19.5 %
D	20 %	100 %	12.6 %
F	0.4 %	67 %	0.3 %

Network Adapter Statistics

Intel(R) PRO_1000 EB Network Connection with I/O Acceleration:

Bandwidth utilization:	NIC Speed:
0 %	1,000 MBit/sec

Total/sec:	Received/sec:	Sent/sec:
0 bytes	0 bytes	0 bytes

Bandwidth utilization:	NIC Speed:
0.2 %	100 MBit/sec

Total/sec:	Received/sec:	Sent/sec:
23,328.6 bytes	6,138.7 bytes	17,189.9 bytes



Lotus Domino/Lotus Notes tuning



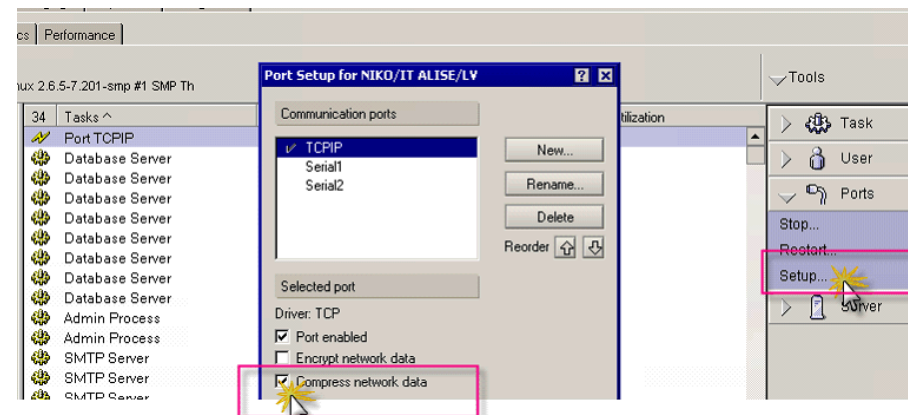
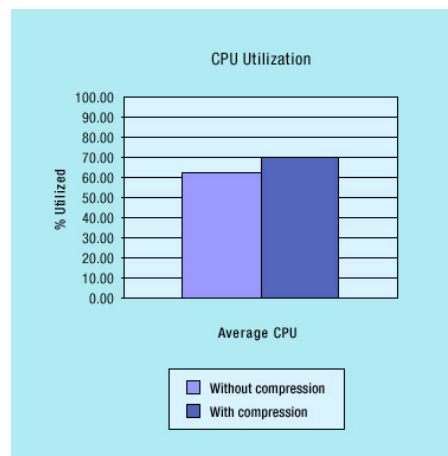
Server Tasks that impact performance

- Remote Debugger (should not be used on production server)
- Server port encryption
- +++ Traffic Compression (Lotus Domino, Lotus Notes)
- Debug parameters (only if advised by support)
- INDEXer (Full text indexer)



Traffic Compression (LN 6.x, 7.x, 8.x)

- Should be enabled in a client, and a server
- Only if both sides support compression, it works
- Processor resources are cheaper than network lease costs



Database	Size before network compression (MB)	Size after network compression (MB)	Percent reduction
db1.nsf (no compression)	106	51	52%
db2.nsf (R5/Huffman compression)	81	54	34%
db3.nsf (Notes/Domino 6/LZ1 compression)	79	52	35%

ODS – On Disk Structure

- ODS 17 Domino 3.x
- ODS 20 Lotus Domino 4
- ODS 41 Lotus Domino 5 (soft deletions)
- ODS 43 Lotus Domino 6x, 7.x (LZ 1 attachment compression, Cluster unread marks)
- ODS 48 Lotus Domino 8.x (Create_R8_Databases=1, design compression, data compression, don't allow simple search)
- compact, after every migration all databases should be upgraded to new ODS, to take benefit from new release features.
- If necessary, you can downgrade ODS to the previous version using compact -r (-r=revert)
- LZ1 attachment compression



Use DDM, Luke!



DDM

- My Events
- By Severity
- By Date
- By Type
- By Server
- By Assignment
- Open Configuration

Open Events
Recent Events
All Events

All open events, sorted by severity

Refresh
Assign...
Change State
Add Comments...

#	Date	Server	Open Events By Severity
2			Fatal
1			Database
1			Database: Compact
99			Failure
3			Application Code
1			Database
89			Message
2			Operation
2			Replication
1			Server
1			Server: Compact
197			Warning (Critical)
3			Database
194			Security
50			Warning (Critical)
4			Database
4			Database
21			Security
21			Security
348			

Monitoring Configuration

- DDM Configuration
 - DDM Probes
 - By Author
 - By Probe Server
 - By Type
 - DDM Filters
 - Server Collection Hierarchy
 - Open Monitoring...
 - Setup Wizards
 - Event Handlers
 - By Server
 - By Type
 - By Severity
 - By Action
 - By Author
 - Event Generators
 - Console Attributes
 - Filters
 - Log Filters
 - DDM Filters
 - Statistic Collection
 - Advanced
 - Names & Messages (Advanced)

New DDM Probe
Edit Document
Delete Document
Enable Probes
Disable Probes

Search in View 'DDM Probes' All By Type

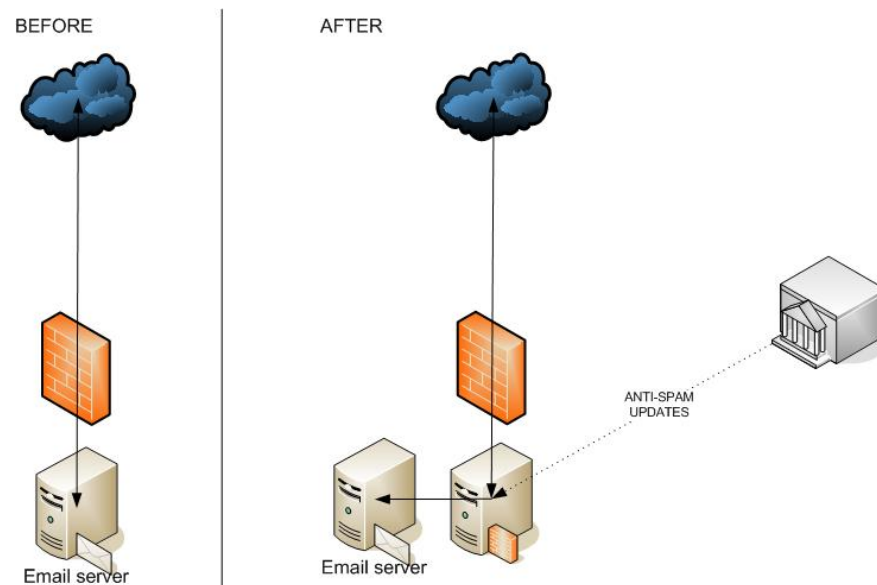
Search for

Total	Enabled	Type	Probe Description	Last Modified By	Last M
7	0	Application Code			
4	0	Database			
10	0	Directory			
12	0	Messaging			
4	0	Operating System			
1	0	CPU			
			Default Operating System/CPU Probe	Lotus Notes Template Development	21.07.2
1	0	Disk			
			Default Operating System/Disk Probe	Lotus Notes Template Development	21.07.2
1	0	Memory			
			Default Operating System/Memory Probe	Lotus Notes Template Development	21.07.2
1	0	Network			
			Default Operating System/Network Probe	Lotus Notes Template Development	21.07.2
2	0	Replication			
5	0	Security			
1	0	Server			
2	0	Web			
47	0				



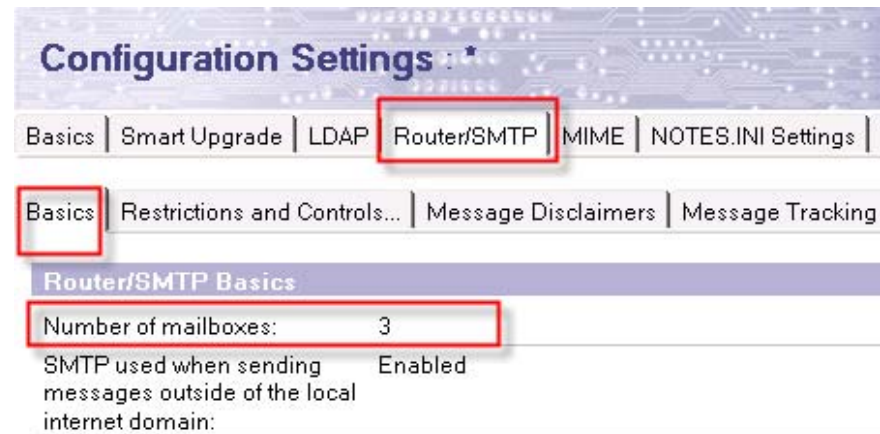
Separate ANTI-SPAM

- Implement “Verify Local Recipient exists in Domino Directory”
- Implement BlackLists (if there is no Anti-SPAM)
- 90% of all emails – SPAM



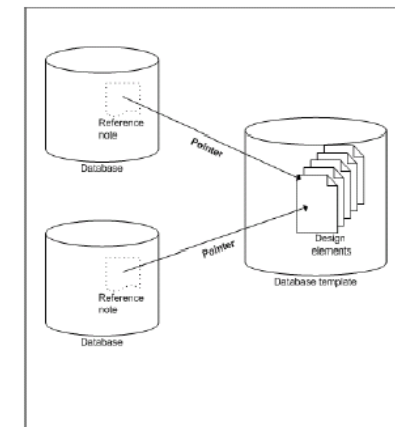
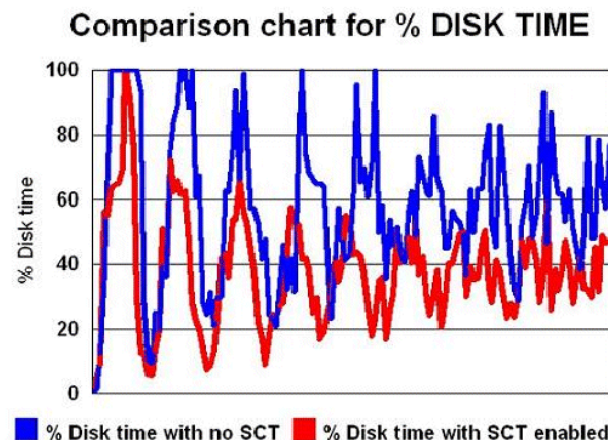
Mail Routing tuning

- Server should have at least 3 mailboxes
- Router when delivers mail, locks a mail.box, thus implementing 3 mailboxes improves mail delivery.
- If one mailbox is corrupted, mail flows thought other mailboxes



Single Copy Template (6.x, 7.x, 8.x)

- Improves read performance for mail servers
- saves ~10MB of space per user,
10 users-100MB, 100user-1GB, 1000-10GB.
- When user count is more than 500, you may
create various STC, in case if STC template is
corrupted, only part of users is not working
- After upgrade, you should re-enable STC in a
Template



Domino performance depending on version

- Domino 7 is 50%-75% faster than Domino 6.x
- Domino 6.x 100% faster than Domino 5.x
- Domino 7 uses CPU more effectively
- Less disk usage (caching)
- Can serve more users than Domino 6, and Domino 5
- Domino 8 ???



Things to get home

1. Configure separate disk, configure Transactional Logging, RAID 1
2. Transactional Logging - Favour RunTime
3. RAID 1, RAID 10
4. Disks 10K rpm->15K rpm
5. Enable traffic compression (traffic)
6. On email servers, enable SCT (single Copy Template)
7. Archive databases (split database into two big&slow, and smal&fast)
8. Perform OS tuning (Sharing, Spooler, ...)
9. OS monitoring
10. DEBUG_CAPTURE_TIMEOUT, DEBUG_SHOW_TIMEOUT, DEBUG_THREADID (should consult someone)
11. Don't run Oracle or other software on same box with Domino
12. Implement VIEW_REBUILD_DIR (for index rebuilding, else DATA disk will be used)



Application tuning



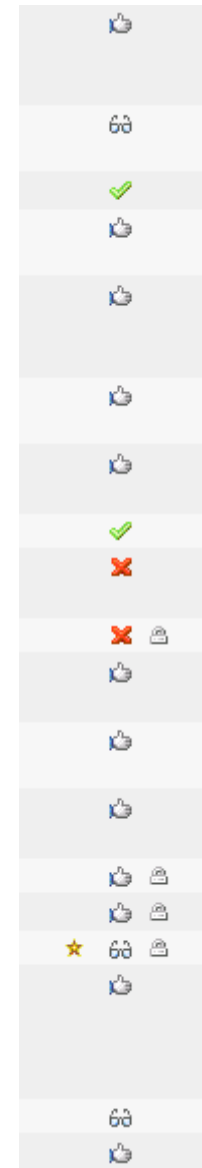
Database size depends on the size of

- Database design
 - Documents
 - Document data
 - Attachment
 - Agent Log (!!!!)
 - Unread Marks
 - View Indices
-
- View indices may occupy 60-80% of database size.
 - View could should not exceed 50 views per database,



View icons -> impacts view index

- `@IF(Status="Status_1";1;
@IF(Status="Status_2";90;
@IF(Status="Status_3;55))`
- This function is calculated EVERY time, when user opens a View, this function is applied to EVERY SINGLE document.
Imagine a database with 40'000 documents, x3 nested @IF
- Solution, calculate function in a document, and store result in this field will store icon number, 1, 90, or 55.
- Tremendously decreases size of View INDEX



Database View (< 50 views)

Manage the views of this database

Use this tool to manage the views of this database.

Selected: ALISE\requests.nsf, 1.9 GB bytes

The view indexes of this database consume 334 MB of disk space, which is 17% of the entire space used by this database.

View name	Size	Owner	Refresh	Discard	N
Problēmas	102 738 200	Template Develc	Automatic	If inactive for 45 da	
Pēc projekta, klienta\stāv	62 556 008	Template Develc	Automatic	On Server After 5 [
Pēc projekta, klienta\stāv	52 858 664	Template Develc	Automatic	On Server After 5 [
Pēc projekta, klienta\stāv	52 210 296	Template Develc	Automatic	On Server After 5 [
Pa projektiem, statusiem	22 077 280	Template Develc	Automatic	On Server After 5 [
Pa projektiem, prioritātēm	19 683 840	Template Develc	Automatic	On Server After 5 [
Pēc projekta\statusa	18 523 720	Template Develc	Automatic	On Server After 5 [
(Pēc pieteikuma koda - u	9 557 688	Template Develc	Automatic	If inactive for 45 da	
(Pieteikumu kodi)	6 513 232	Template Develc	Automatic	If inactive for 45 da	

Properties...

New

Update Link...

Delete Folder...

Manage Directory ACL...

Access Control

Compact...

Full Text Index...

Multi-Database Index...

Advanced Properties...

Quotas...

Move...

Sign...

Replication...

Fixup...

Cluster...

Delete Database...

Analyze...

Find Note...

Create Event...

Manage Views...

Update Redirect...

Edit DB2 Login Information...

Recreate Links to DB2-based NSF databases...

Done

Purge

Show database <path\database_fileName.nsf>

- show database alise\requests.nsf
 - 04.06.2007 17:05:40 Remote console command issued by Vladislavs Tatarincevs/IT ALISE/LV: show database alise\requests.nsf
 - show database alise\requests.nsf
 - Klientu pieteikumi
 - Document Type
 - Documents
 - Info
 - Form
 - View
 - Icon
 - Design
 - ACL
 - Help Index
 - Help
 - Macro
 - Shared Field
 - Repl. Formula
 - Private Design
 - Unknown
 - View sizes
 - Pēc projekta\klienta problēmu kodi
 - Pēc projekta\prioritātes - ar dienām
 - Pēc projekta\statusa, risināšanas ilguma
 - Pēc projekta, klienta\stāvokļa, atbildīgā
 - (Pieteikumu kodi)
 - Problēmas
 - (Pēc pieteikuma koda - uniq)
- | | Live | Deleted |
|----------------|--------|---------|
| Documents | 30 634 | 7 |
| Info | 1 | 0 |
| Form | 33 | 0 |
| View | 61 | 0 |
| Icon | 1 | 0 |
| Design | 1 | 0 |
| ACL | 1 | 0 |
| Help Index | 0 | 0 |
| Help | 1 | 0 |
| Macro | 80 | 0 |
| Shared Field | 1 | 0 |
| Repl. Formula | 2 | 0 |
| Private Design | 0 | 0 |
| Unknown | 71 | 0 |
- | | Bytes |
|---|-------------|
| Pēc projekta\klienta problēmu kodi | 0 |
| Pēc projekta\prioritātes - ar dienām | 185 080 |
| Pēc projekta\statusa, risināšanas ilguma | 185 256 |
| Pēc projekta, klienta\stāvokļa, atbildīgā | 52 210 296 |
| (Pieteikumu kodi) | 6 513 232 |
| Problēmas | 102 738 200 |
| (Pēc pieteikuma koda - uniq) | 9 557 688 |

UNREAD MARKS

- Unread Marks – enabled by Default
- Each user has his own set
- 10 users-10 sets, 1000-1000sets
- Before the 6th version, unread marks where stored in Workspace file, starting from 6.x in database
- 70% applications don't use UM, but by default they are calculated

			User 1		
			1	Document	1
			2	Document	2
			5	Document	5
			User 2		
			#		
			1	Document	1
			2	Document	2
			3	Document	3
			4	Document	4
			5	Document	5
			User 3		
			#		
			1	Document	1
			2	Document	2
			3	Document	3
			user 4		
			#		
			1	Document	1
			2	Document	2
			4	Document	4
			5	Document	5
			User 5		
			#		
			1	Document	1
			3	Document	3
			5	Document	5

View		
#		
1	Document	1
2	Document	2
3	Document	3
4	Document	4
5	Document	5



VIEW Sorting

- Two-way sorting for columns
Creates a 2^n tables, where **n** is sortable column count, and only one subset will be displayed to a user

Alias ◇

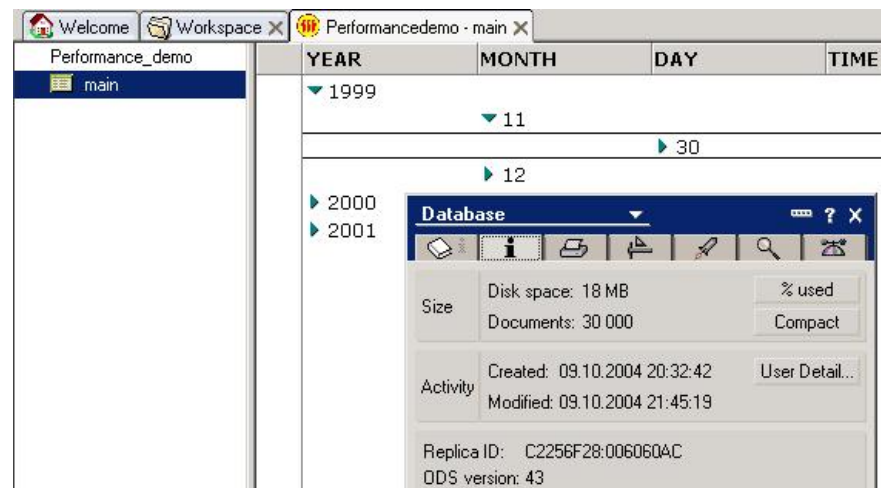
Last Modified ◇

Last Modified By ◇

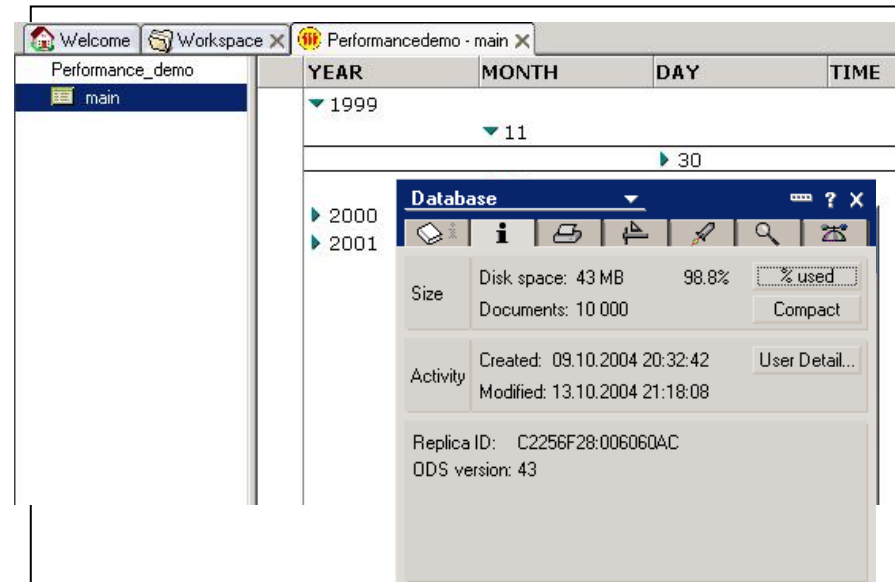


Categorization

- Don't use more than 3 categorized columns in a view. Categorized columns are performance killers.



@Time functions



Performance demo - main

YEAR	MONTH	DAY	TIME
1999	11	30	
2000			
2001			

Database

Size: Disk space: 43 MB 98.8% % used
Documents: 10 000 Compact

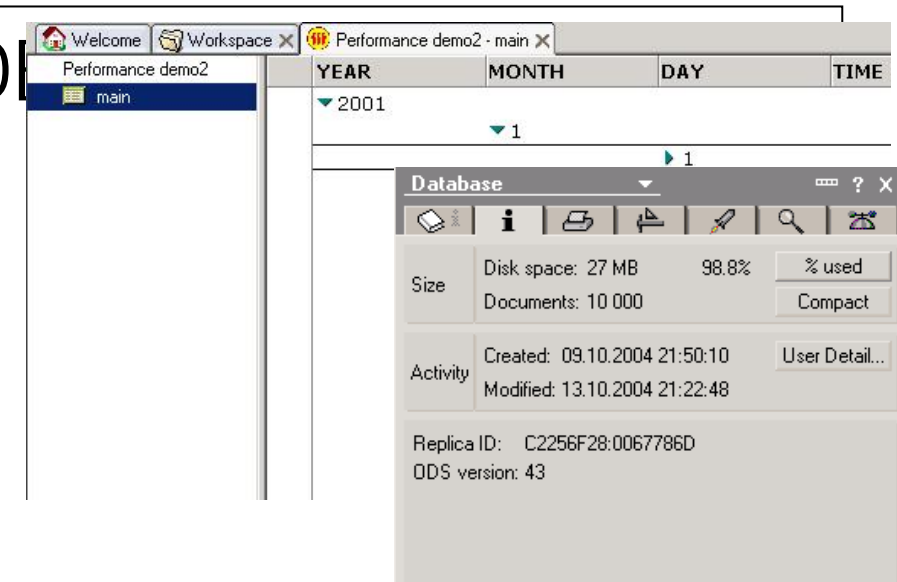
Activity: Created: 09.10.2004 20:32:42 User Detail...
Modified: 13.10.2004 21:18:08

Replica ID: C2256F28:006060AC
ODS version: 43

YEAR (Column) : Column Value

Display ☐ Simple Function ☐ Field ☒ Formula

@Year(Date)



Performance demo2 - main

YEAR	MONTH	DAY	TIME
2001	1		

Database

Size: Disk space: 27 MB 98.8% % used
Documents: 10 000 Compact

Activity: Created: 09.10.2004 21:50:10 User Detail...
Modified: 13.10.2004 21:22:48

Replica ID: C2256F28:0067786D
ODS version: 43

YEAR (Column) : Column Value

Display ☐ Simple Function ☐ Field ☒ Formula ☒

year



Calculate @Time functions in a form, and in the view just display results





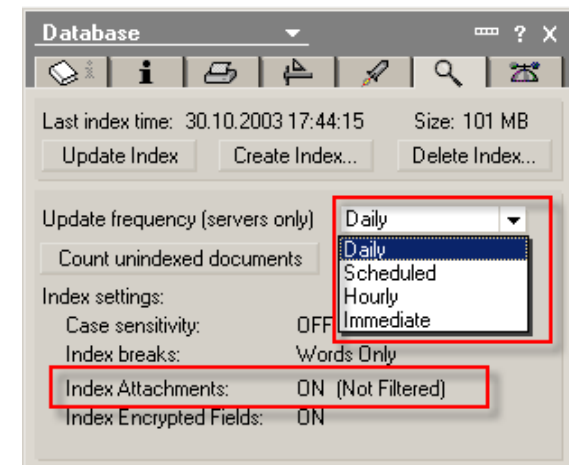
Tip of the Year!

- Instead of using @Today, create an agent that stamps today's date to a field fld_Today, then use this field instead of @Today
- Benefit from this:
Calculate once per night, use it all the day long



Full-Text index

- By default index trigger is IMMEDIATE
- Index can occupy space that is close to db size
- Better use Daily trigger
notes.ini
UPDATE_NO_FULLTEXT=1
TN #1092096
- VIEW_REBUILD_DIR notes.ini



Use LotusScript Agent to cycle through NotesDb directory, and change trigger (on mail servers)

Attachment compression

- LZ1 should be enabled only when clients are 6.x, or 7.x, don't try this in a mixed environment (5.x)
- Better enable this when all clients are at least 6.5.5 or 6.5.6 (previous versions have some bugs)
- You can convert existing attachments

Load compact -ZU mail\filename.nsf

Don't run this command during office hours... ☺

Upgrading existing attachments from Huffman to LZ1 compression

<http://www-1.ibm.com/support/docview.wss?uid=swg21256241>



Agent Profiling

Agent

☐ Run as web user

Run on behalf of

☐ Allow remote debugging

☐ Allow user activation

☒ **Profile this agent**

Set runtime security level: (1 = most secure)

1. Do not allow restricted operations

Default access for viewing and running this agent

☒ All readers and above

OtherDomainServers
Raphael Savir/Westford/IBM
Raphael Savir/LSDevelopment

☐ Allow Public Access users to view and run this agent

Slow Mail Agent (ByViewEntryCollection) Profile

02/10/2005 06:31:47 PM EST
Elapsed time: 76800 msec
Total measured time: 75499 msec

Class	Method
View	GetAllEntriesByKey
Database	Open
DbDirectory	GetNextDatabase
Database	GetView
DbDirectory	GetFirstDatabase

Slow Mail Agent (GetMail_ftSearch) Profile

02/10/2005 06:17:14 PM EST
Elapsed time: 3400179 msec
Total measured time: 3375808 msec

Class	Method	Operation	Calls	Time
Database	FTSearch		27	3312723
			76	48044
base			76	8292
base			1	3204
ument			243	2402
	Get		27	761
ment			26	261
	Get		1	101
	Get		76	10
	Get		243	10
	Get		76	0
	Get		76	0
base	Get		1	0
ory			1	0

Slow Mail Agent (AllDocs) Profile

02/10/2005 10:19:16 PM EST
Elapsed time: 1675560 msec
Total measured time: 1460396 msec

Class	Method	Operation	Calls	Time
DocumentCollection	GetNextDocument		1300359	1403516
Document	Size	Get	1300359	40625
Database	Open		89	14182
DocumentCollection	GetFirstDocument		31	1663
DbDirectory	GetNextDatabase		89	380
DbDirectory	GetFirstDatabase		1	20
Database	Title	Get	89	10
Database	FilePath	Get	89	0
Database	Size	Get	89	0
Database	AllDocuments	Get	31	0
Session	CurrentDatabase	Get	1	0
Session	GetDbDirectory		1	0
Database	Server	Get	1	0



Database Advanced Settings

- DB Advanced settings impact performance
 - User Activity Logging
- 
- A screenshot of the Oracle Enterprise Manager (OEM) console interface. The top bar is dark blue with the word 'Database' in white, followed by a dropdown arrow. To the right of the bar are three small icons: a list, a question mark, and a close button. Below the bar is a horizontal toolbar with several icons: a folder, a person, a server, a network diagram, a pencil, a magnifying glass, and a gear. The background of the console is a light blue grid pattern.

The screenshot shows a 'User Activity' dialog box. It features a table with four columns: 'Date/Time', 'Reads', 'Writes', and 'User'. To the right of the table is a summary section with four columns: 'Total', 'Uses', 'Reads', and 'Writes'. The summary section shows values for 'Last Day', 'Last Week', and 'Last Month'. At the bottom of the dialog are two checkboxes: 'Record activity' and 'Activity is confidential', a 'Copy to clipboard' button, and 'OK' and 'Cancel' buttons.

Date/Time	Reads	Writes	User

Total	Uses	Reads	Writes
Last Day	0	0	0
Last Week			
Last Month			

☐ Record activity
 ☐ Activity is confidential
 Copy to clipboard
OK Cancel

Database

Unread Mark Options

☐ Don't maintain unread marks

Replicate unread marks:

☒ Never ☐ Clustered servers only ☐ All servers

Advanced Options

☐ Optimize document table map

☐ Don't overwrite free space

☐ Maintain LastAccessed property

☐ Disable transaction logging

☐ Don't support specialized response hierarchy

☐ Use LZ1 compression for attachments

☐ Don't allow headline monitoring

☐ Allow more fields in database

☐ Support Response Thread History

☐ Don't allow simple search

☐ Allow compression of database design

☐ Allow soft deletions

Permanently delete documents after 48 hours

Limit entries in \$UpdatedBy fields 0

Limit entries in \$Revisions fields 0



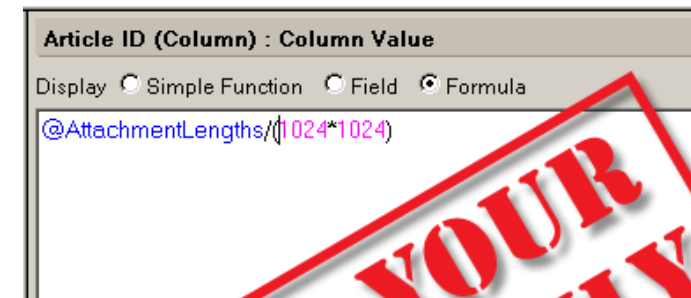


Performance Nightmare stories



Performance Worst Practice

- A developer created a column to depict a document size in megabytes.
- To be sure how many bytes in one megabyte he multiplied (1024*1024) 🤔
- Multiplication took place for 32'000 documents, for EACH document



Performance worst practice (cont)

- CPU spikes on mail server every 5 minutes (3000 users)
- Every Spike is about 2 minutes when CPU utilized for 100%
- A cause of the problem:
- One mail files, of a department manager, db.size=1GB, with
Full-text index IMMEDIATE



Internet resources

<http://www.redbooks.ibm.com/redpapers/pdfs/redp4182.pdf>

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

- RedPaper – Lotus Domino Domain Monitoring

<http://www.redbooks.ibm.com/redpapers/pdfs/redp4089.pdf>

Domino Tuning Parameters in notes.ini

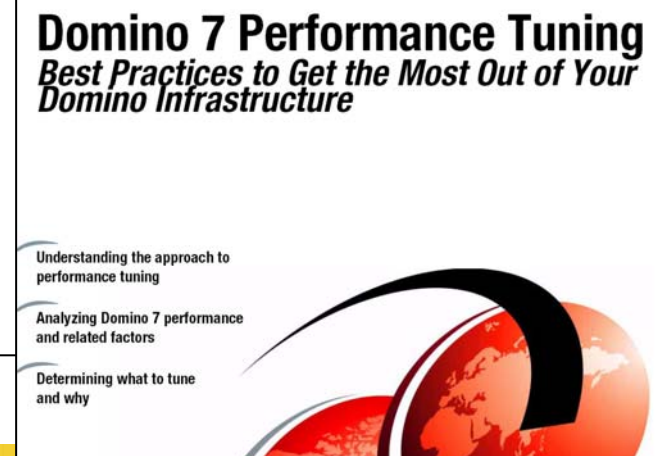
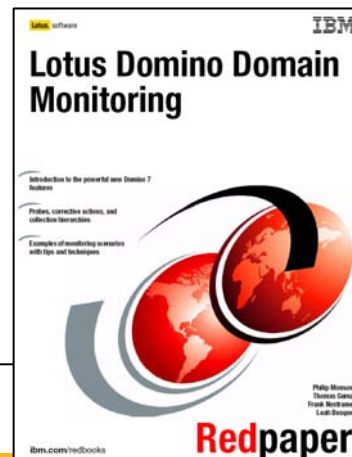
<http://www.redbooks.ibm.com/abstracts/tips0421.html?Open>

NameLookup performance fixes that address unnecessary updates

<http://www-1.ibm.com/support/docview.wss?uid=swg21254752>

Notes/Domino Best Practices: Performance (very good)

<http://www-1.ibm.com/support/docview.wss?uid=swg27008849>



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Thank you

