BP105: A Performance Boost for your IBM Lotus Notes Client

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Agenda

- Introduction

- Laying the basics: What your Notes 8 client looks like

- What makes your Notes client START slow (and how to make it faster)

- What makes your Notes client PERFORM slow (and how to make it faster)

- Performance Tips and Tricks

- Summary and Q & A

Introduction

- Francie Tanner, Technical Director, Americas
  - Over 14 years experience in IBM Lotus consulting
  - Managing, architecting, and supporting
    10 – 100'000 user environments
  - Experienced Lotus instructor and speaker
  - Is from Switzerland, got cold, now lives in the Caribbean

- Florian Vogler, CEO and CTO
  - 20 years of Notes Development & Administration experience
  - Over 10 years client management experience
  - Lives in Germany, hence the funny accent

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What your Notes 8 Client Looks Like: The Beginning

- Let's start at the beginning of (Notes) time
  - (don't worry, if you just got started with Notes 8.5 then this session should still be of value ;-))
  - Version 4, 5, ...
  - C:\Lotus\Notes\Data install
  - Single user client, no Eclipse

- Add to that one or two upgrades
  - Template and ODS updates (or not)
  - Changes to data and program directories -> C:\Program Files\IBM\

- Add to that (at least) one machine change
  - Hopefully proper moving of files

- Add to that server moves/consolidations
  - Outdated workspace icons, bookmarks
  - Outdated replicator page entries and orphaned local replicas

What your Notes 8 Client Looks Like: The Beginning

- Possibly also:
  - Deployment of local replicas and/or archives
    - Pretty much anywhere users like to put them
  - Server name or mail domain name changes
    - Leaving outdated icons/bookmarks/replicas behind
  - ID re-certifications and/or name changes
    - That may or may not have propagated properly via AdminP
  - Location name changes (e.g. think "Office (Network)" vs.. "Online")
    - Again, whatever users feel like doing
  - Connection documents
    - With low priority of hard-coded IP addresses
  - An ECL granting everyone every possible access
  - Duplicating toolbar entries, in English and Spanish
  - Old Notes 4, 5, 6, ... templates

- ....And you already have one messy client going on

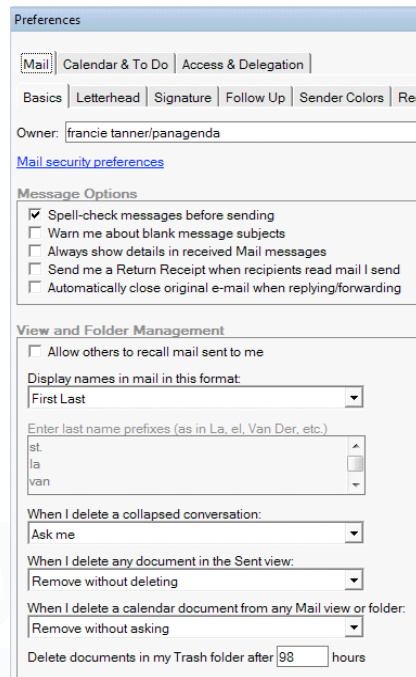# What your Notes 8 Client Looks Like: Version 8

- \> 20,000 files (Notes 6/7 used to have ~550) = +3,700%
  - 17,000 files in Notes Program\framework in 1,800 subdirectories
    - 7,500 (largely undocumented) .properties files
    - 1,500 jar files
    - 1,200 HTML files
  - 3,000 files in Notes Data\workspace in 2,400 subdirectories, out of which 1,850 are empty
    - 900 (largely undocumented) XML files
    - 100+ (largely undocumented) .properties files

- Which is:
  - 20,000 files in 4,600 subdirectories, 8,500+ largely undocumented files
  - Many (many many) subdirectories are plain empty, especially in Data\workspace
  - ... and around 100 NSFs/NTFs (=0.5 %)
  - ... and the good old notes.ini file ...

What your Notes 8 Client Looks Like: Version 8

- Add over 80 preference/dialog boxes
  - Each dialog has ~15 settings at average

- For a total of 1,200+ settings sprayed across
  - address book (very few),
  - notes.ini (few),
  - and XML files (lots)

- Plus any plugins, widgets, add-ons, etc. "you" or the user may have added to the Notes client install
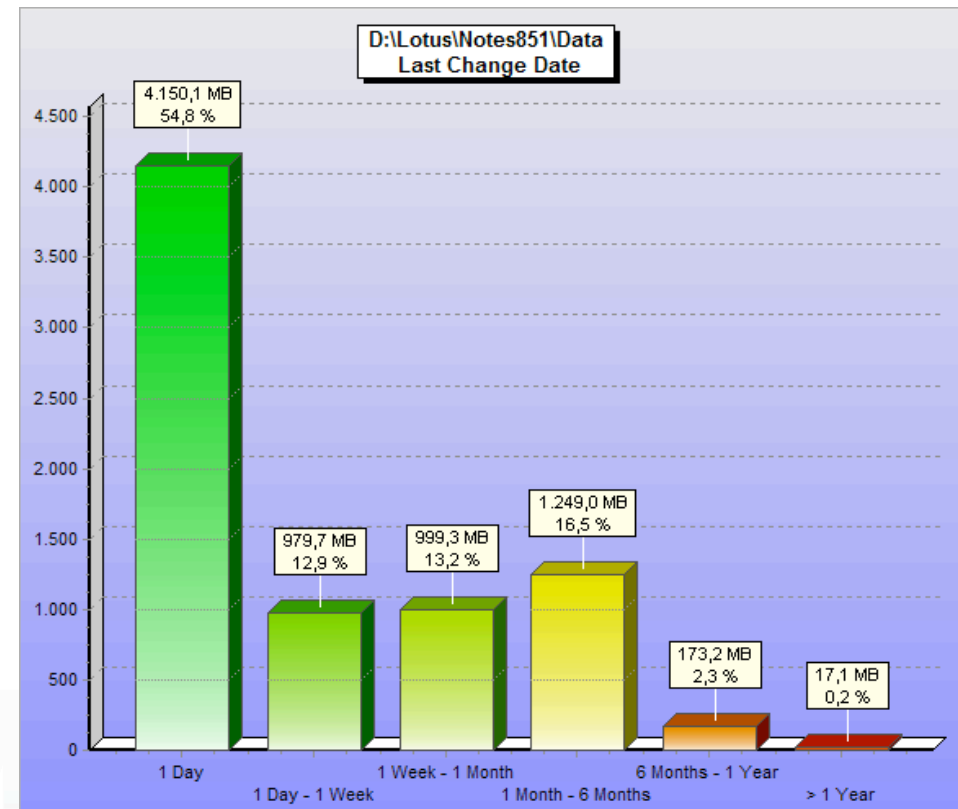
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What makes your Notes Client start slow

- Client Version
  - If you're not on at least 8.5.3 yet -> 8.5.3+ is a significant improvement
  - Pre-loading the client *might* also be recommended

- ~50% of the entire *data volume* in the Data directory changes on a DAILY basis in most setups
  - 5 - 10% in Data\workspace (up to 300 files)
  - DISABLE Antivirus scanning for at least *.ns* in Data Directory. Period.
  - Disable Disk indexing
    - Doubles Notes startup time
    - See http://bit.ly/ACzO6Z

D:\Lotus\Notes851\Data Last Change Date

Period	Value
1 Day	4.150,1 MB / 54,8 %
1 Day - 1 Week	979,7 MB / 12,9 %
1 Week - 1 Month	999,3 MB / 13,2 %
1 Month - 6 Months	1.249,0 MB / 16,5 %
6 Months - 1 Year	173,2 MB / 2,3 %
> 1 Year	17,1 MB / 0,2 %

What makes your Notes Client start slow: Continued

- Client crashes/database fixups
  - especially bad for network based data directories clients

- Outdated Hardware
  - You need >1-2 GB memory if you want to use Notes AND something else
  - Old fixed disks with fragmentation
    - Fun Exercise: Buy a small Solid State Disk and make Notes boot off of that ;-)

- Tons of startup programs/scripts launching during the "boot storm"
  - if the disk is unable to keep up, it's not Notes' fault
  - Again, see http://bit.ly/ACzO6Z

What makes your Notes Client start slow: Continued

- Outdated Data directories
  - Virtually 100% of all NTFs (Laptops: 90%) can be removed by
    - Cleaning up old Notes 4+5+6 templates
    - using ini:SharedDataDirectory= (also with Single User install!)

- Operating System
  - Windows 7 boots ~40% faster than XP
  - Windows 8 ~55% faster than XP
    - ~20% faster than Windows 7, supposedly

What makes your Notes Client start slow: ODS

- ODS = On Disk Structure
  - ODS 16 = Notes 2
  - ODS 17 = Notes 3
  - ODS 20 = Notes 4 (or templates)
  - ODS 41 = Notes 5
  - ODS 43 = Notes 6 & 7
  - ODS 48 = Notes 8
  - ODS 51 = Notes 8.5

```
Database                    ▾      ⚏ ? X
 ◇    i    ⎙    ⎙    ✐    ⚲    ☸

Size     Disk space: 1.887 MB        % used
         Documents: 13.780           Compact

Activity Created:  05.09.2008 22:15:01    User Detail...
         Modified: 30.03.2011 23:20:33

         Replica ID:  C12572D7:005E2FC0
         ODS version: 51
```
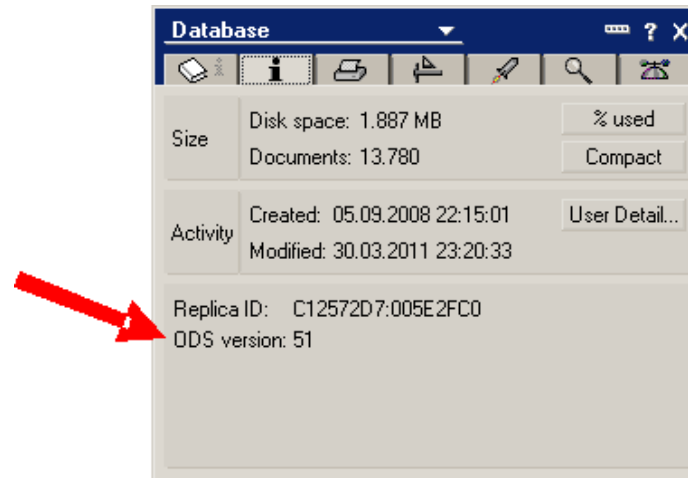
- The difference between ODS 43 and 51 = up to 80% LESS FILE I/O
  - This helps with ANY client AND server hardware

- CAUTION: The ODS is not automatically updated when upgrading clients
  - Except for names.nsf, bookmark.nsf, and desktop*.dsk/ndk – IF – you upgrade properly (think ini:Setup/TemplateSetup=)
  - ODS 48 requires Notes >= 8 and CREATE_R8_DATABASES=1 in notes.ini for NEW db's
  - ODS 51 requires Notes >= 8.5 and CREATE_R85_DATABASES=1 in notes.ini for NEW db's

What makes your Notes Client start slow: ODS

- Good News for Notes 8.5
  - Use NSF_UpdateODS=1 with CREATE_R85_DATABASES=1 for a one-time upgrade of most local databases
    - NOTE: USE WITH EXTREME CARE IF YOUR DATA DIRECTORIES ARE ON A NETWORK DRIVE!
    - NOTE: End users can't access databases during compact

- Impact examples:
  - Startup time of a Notes 8.5.2 client with 3 ODS 20 apps in Notes data = 10 seconds
  - After ODS upgrade: 2 seconds
  - Reduced File I/O of your disks/SAN/NAS after ODS 41 to 51 upgrade by 60%
  - Removing 70% of all old files in Data directories on SAN/NAS = 45% less managed storage (backup)

- The bad news: There is no way to tell what is "out there"
  - 3rd party tools or random inspections are highly recommended

How to Make Notes Startup Faster: ODS Policy

- New to 8.5.2, you can force a local ODS upgrade (in most cases)
    - NOTE: If you previously deployed Create_R8_databases to the INI then this feature won't work
    - NOTE: During compact databases cannot be accessed

Speaking of Policies

- Speaking of policies
  - The ($Policies) view in the local personal address book may contain
    - a.) outdated policies from (very) old releases, e.g. after having upgraded from 6 to 8
    - b.) policies from before a user rename
  - This can significantly increase client startup times by 40 to 80 seconds(!)
  - →clean out your ($Policies) view in local nab from time to time (e.g. every quarter/half year) with e.g. a mailbox postopen script

- Yet another solution for performance problems
  - To prevent re-provisioning of the workspace directory upon EVERY client startup... For Standard (=Eclipse) clients on Citrix, make sure that the rcp.platform.id is the same across all citrix servers
    - /NotesProgramDirectory/framework/rcp/rcplauncher.properties
  - →saves 20+ seconds

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What makes a Notes Client PERFORM slow

- ODS of databases (again)

- Hardware (again)

- Notes.ini

  – EXTMGR_ADDINS = (not just) Local Virus Scanners

  – Disable Notes "plugins" like Norton or McAfee, ect

    • they increase Network traffic by up to 200 – 250%!

- Data directory on the network vs.. fixed disk

  – Disk performance is the #1 bottleneck (think SSD vs.. normal HDD, 7,200 rpm vs.. 5,400, network drive vs.. local fixed disk = latency/bandwidth limitation)

What makes a Notes Client PERFORM slow

- Network Settings:
  - Numerous ports are enabled, each with a several second time-out
  - TCPIP is not compressed
    - Port compression reduces Notes network traffic by 50-70%!
    - -> DO NOT do this on Citrix, 5% CPU overhead * concurrent sessions = 3 CPU's required for just network compression

- Install types: Basic vs.. Standard
  - Basic client starts up fast, Standard client, well … not so fast

- Roaming Users
  - Try replicating 80MB each time you logon to Notes before use!

What makes a Notes Client PERFORM slow

- Connection documents
  - Pointing to outdated server names or IP addresses
  - Low priority connection documents, which can cause connectivity failures

- Location documents
  - IP addresses for mailserver --> breaks Policies
  - Outdated mail and home server information
  - Outdated mail file path
  - Outdated Catalog server
  - In general: catalog.nsf … - see next slide

What makes a Notes Client PERFORM slow:
The catalog.nsf problem

- User in New York

- Sends Doc|DB-Link to user in California

- Unfortunately, the user in California does not open the database from a local server

- ... but from the one in New York

- ... or even Alaska *ouch* (dang you, Alphabet!)

How to Make Notes PERFORM faster with Policies

- Manage TCPIP port compression via a Desktop Policy
    - Preventing users from making changes is highly recommended here

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How to Make Notes PERFORM faster with Policies

- Manage enabled ports via a Desktop Policy
  - CAUTION: Changing which ports users have enabled without "seeing" what is out there is very dangerous
  - IF you are able to streamline this, using an enforced Notes.ini is very handy here
    - "Enter machine specific formula" allows for exclusion of Citrix, for example

How to Make Notes PERFORM faster with Policies

- Roll out new Notes clients with manually configured connection documents
  - There is no way to fix these with Policies if created improperly

- Again, keep users from "messing with" connection documents
  - If users create a connection document by typing in the name of a server, DNS hostname or IP address in the "File – Application – Open" server name, then a LOW priority connection document is automatically created
    - This is VERY unreliable and can only be fixed manually without 3rd party tools

Server Connection : server72.947.15.7

Basics | Comments | Advanced

Advanced

Only from Location(s):   *

Only for user: *

Usage priority: Low

Destination server address: 72.947.15.7

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Performance Tuning Tip for Pros

- Search for the file jvm.properties underneath [LotusNotesProgramDir]\framework \rcp (might be in subdirectory ...\deploy)
    - Open it in a text editor
    - First line to look for is: vmarg.Xmx=-Xmx256m
    - Change it to e.g. vmarg.Xmx=-Xmx1024m (Maximum is ½ of physical memory; do NOT change it to more than 1024m regardless of how much memory you have)
- Change vmarg.Xms=-Xms48m to ¼ of what you changed Xmx to; e.g. if you changed vmarg.Xmx to -Xmx1024m then use vmarg.Xms=-Xms256m
- NOT recommended for production / normal end users; for admins & developers only!
    - But in reality, who else counts ;)

Performance Measuring: Client Clocking

- NOTE: All of this should only be done on "ONE" client – slows down client, creates huge log files!

- Use the following to see and measure client performance:
  - CLIENT_CLOCK=1
  - CONSOLE_LOG_ENABLED=1
  - Debug_Outfile=c:\debug.txt
  - Debug_Console=1
  - DEBUG_TCP_ALL=1 (use only if needed)

- Fileserver or local disk Performance Debugging is virtually impossible
  - If on >8.5 try adding DEBUGGINGWCTENABLED=16386 in Notes >= 8.5

# Client_Clock=1 leads to a debug file of the following format:

```
29.09.2009 11:13:39    Lotus Notes Client gestartet
(1-9 [1]) SERVER_AVAILABLE_LITE: (Connect to Mail01/Server/panagenda/DE: 0 ms) (OPEN_SESSION: 0
0 ms. [26+36=62]
(2-23 [2]) NAME_LOOKUP(CN=panagenda Systemprogrammierung/O=panagenda/C=DE,00000100): (Connect t
(OPEN_SESSION: 0 ms)
0 ms. [122+92=214]
(3-23 [3]) OPEN_DB(CN=Mail01/OU=Server/O=panagenda/C=DE!!mail\mailservice): 0 ms. [134+290=424]
(4-23 [4]) SERVER_AVAILABLE_LITE: 16 ms. [26+120=146]
(5-23 [5]) DB_INFO_GET: 0 ms. [14+140=154]
(6-23 [6]) DB_REPLINFO_GET: 0 ms. [14+32=46]
(7-23 [7]) ISDB2_RQST: 0 ms. [14+16=30]
(8-23 [8]) OPEN_NOTE(REPC1256B06:002C513F-NTFFFF0010,03400000): 0 ms. [48+1396=1444]
(9-23 [9]) DB_MODIFIED_TIME: 0 ms. [14+60=74]
(10-23 [10]) GET_UNREAD_NOTE_TABLE: 0 ms. [290+11830=12120]
(11-23 [11]) DB_REPLINFO_GET: 0 ms. [14+32=46]
(12-23 [12]) OPEN_NOTE(REPC1256B06:002C513F-NTFFFF0010,03000400): 0 ms. [48+1784=1832]
(13-23 [13]) OPEN_COLLECTION(REPC1256B06:002C513F-NTFFFF0020,0000,0000): 0 ms. [42+756=798]
(14-23 [14]) READ_ENTRIES(REPC1256B06:002C513F-NTFFFF0020): 15 ms. [76+65446=65522]
(15-23 [15]) READ_ENTRIES(REPC1256B06:002C513F-NTFFFF0020): 16 ms. [76+65432=65508]
(16-23 [16]) READ_ENTRIES(REPC1256B06:002C513F-NTFFFF0020): 16 ms. [76+65302=65378]
(17-23 [17]) READ_ENTRIES(REPC1256B06:002C513F-NTFFFF0020): 15 ms. [76+65644=65720]
(18-23 [18]) READ_ENTRIES(REPC1256B06:002C513F-NTFFFF0020): 16 ms. [76+38926=39002]
(19-23 [19]) CLOSE_COLLECTION(REPC1256B06:002C513F-NTFFFF0020): 0 ms. [12+0=12]
(20-23 [20]) GET_NAMED_OBJECT_ID($PrivateDesign): 47 ms. [40+24=64]
(21-24 [21]) OPEN_COLLECTION(REPC1256B06:002C513F-NT000F2992,0000,0000): 0 ms. [42+826=868]
(22-24 [22]) READ_ENTRIES(REPC1256B06:002C513F-NT000F2992): 0 ms. [76+84=160]
(23-24 [23]) CLOSE_COLLECTION(REPC1256B06:002C513F-NT000F2992): 0 ms. [12+0=12]
(24-24 [24]) DB_MODIFIED_TIME: 47 ms. [14+60=74]
(25-24 [25]) DB_REPLINFO_GET: 15 ms. [14+32=46]
(26-24 [26]) OPEN_NOTE(REPC1256B06:002C513F-NTFFFF0010,03400000): 0 ms. [48+1396=1444]
(27-24 [27]) OPEN_NOTE(REPC1256B06:002C513F-NTFFFF0010,03400000): 0 ms. [48+1396=1444]
(28-24 [28]) OPEN_COLLECTION(REPC1256B06:002C513F-NTFFFF0020,0040,4000): (29-24 [29]) OPEN_DB(C
```

- TIP: Take a look at Notes RPC Parser on OpenNTF to import such client clock log files and sort by bytes sent/received, ms, and annotate such log files!

Adding to Client Clocking ...

- Network Latency has a major impact on perceived client performance for users that (try to) work on server-side databases

- For example:
  - Number of NRPC calls x (Latency Up + Latency Down) = how long it takes for a client to "talk something through" with the server

  - For example, open mailfile, then switch to calendar, then create calendar entry; all 3 come with a different number of NRPC calls, all of which are affected by latency

  - 30 Calls for opening the mailfile x (60 ms download + 60 ms upload) = 3.600 ms to talk through what's necessary to open the mailfile

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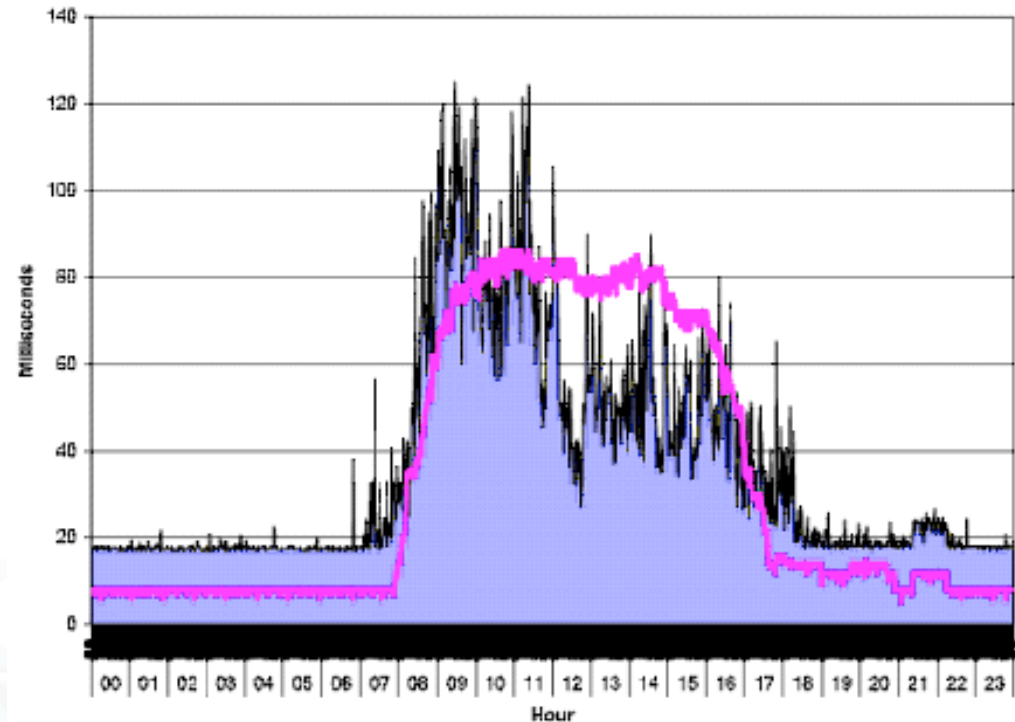
Performance Tuning: Understanding Cache.ndk

- We've all been "advised to"/guilty of deleting the cache.ndk in an effort to cure Notes performance problems/symptoms
  - Some companies even delete cache.ndk on a scheduled basis

- HOWEVER, let us explain the impact of that on Notes performance ...
  - Increases traffic between client and server by 4,000% (forty times more traffic, yes) (10,000+% if the data directory is on a network drive)
  - The more databases end users use, the worse it gets
  - There is always a root cause – deleting cache.ndk only fixes symptoms (since 1992 I've had to delete my cache.ndk only once(!))
  - Let's look at some detailed traffic analysis for just ONE application (the mail file) of ONE user ...

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Understanding Cache.ndk

After deleting Cache.ndk				Keeping / NOT deleting Cache.ndk		
MS	**SENT**	**RECEIVED**		**MS**	**SENT**	**RECEIVED**
2,723	**5,998**	**1,553,446**		**111**	**1,510**	**38,214**

100 users =
150 MB vs.. 3.7 MB
(2,5%; -97,5%; +4000%)

1000 users =
1.5 GB vs.. 37 MB

Excluding Fileservers!

Performance Tuning Support: The Non-Standardization Problem

- Configurability and connectivity are both a – if not *the* – major strength and weakness of IBM Lotus Notes / Domino

- Whilst ~90% of your Notes clients work "somehow" between initial setup and the next new machine through skilled end users, training, Helpdesk, etc ...

- … the remaining ~10%, typically require 75+% of all support efforts because those clients do not correspond to the corporate standard

  - I bet virtually all your VIPs are part of the "~10%"

  - High frustration with Notes = high willingness to migrate off Notes

    - This can be prevented through standardization and lock-down

    - Standardization of (not just, but especially) VIP clients is a **must**

Standardization Tips Using Policies

- Setup and automate as many "fool proof" settings as possible with policies
  - Local replica creation
  - Managed local replicas
  - Notes.ini parameters
  - ODS upgrades
  - Ports and compression

- Keep users current on Notes versions
  - Don't forget about patches and fix packs!

- Manage expectations
  - Present a summary of policy choices to management and make THEM pick and enforce (or not)

- When in doubt, don't allow users to change settings set via policy
  - Better yet, make management choose
  - Think of users creating local mail file archives on C:\ and H:\ and mail\a_ftanner.nsf

The Policy Challenge

- Policies depend on an already functioning/setup client
  - This is typically only around 70% of users actually receiving policies
    - Your $Policies view, Admin server for your mail file and other factors matter here

- They don't provide you with an inventory before making changes
  - Client Management "in the dark" is never a good thing

- They don't easily adapt to your users' unique situation
  - LAN vs. VPN, Citrix users, functions outside the data directory

- Most settings cannot be UNset once set
  - Think about it...

- They cannot typically repeat actions
  - If the user "messes with" something it's usually broken until they call for help

- They aren't predictable
  - Can happen after startup.... or not...

The Policy Challenge: Policy Debugging

- If a policy isn't working, check:

  - Server based Policy Synopsis Tool

  - $Policies view in the local names.nsf

  - Location document home server

  - Mail file admin server

    - Should be the home server

- If all else fails:

  - debug_policy=2 along with

  - debug_outfile=C:\policy_debugging

  - Restart the Notes client

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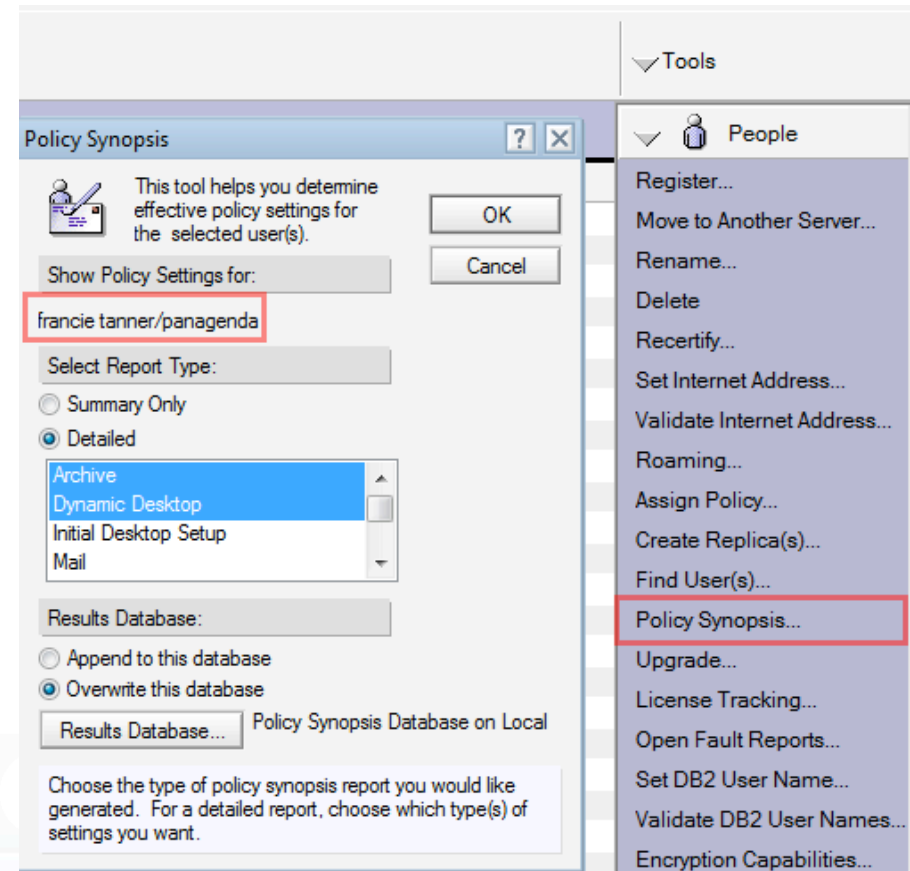
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- What makes a Notes client PERFORM slow (and again faster)

- Performance Tips and Tricks

- **Summary and Q & A**

Summary

- Update/clean out your ODS, databases and templates and hardware

- Standardize whenever and however possible
    - This will save you hugely on support time/cost

- Keep your users version/fix packs current
    - Each release brings performance improvements but also resource demands

- Work around your inability to see clients
    - Write an inventory agent, login script, get a 3rd party tool

- Any challenge can be overcome with Knowledge and Tools
    - → don't just reinstall
    - → don't give up
    - → if you fight for the Notes client, it will pay you back with much more than just email

Q&A

- Got questions?
- Feel free to contact us:

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