



# IBM Notes V10 Performance Boost

Christoph Adler - panagenda

## **Christoph Adler - Senior Consultant at panagenda**



#### 17 years of IBM (Lotus) solutions experience

#### Focused on

- IBM Notes Client Management
- Analysis and Optimization of ICS infrastructures
- Cloud onboarding
- Application Modernization

#### **Good to know**

- From Germany =
- Frequent traveler ¾
- Geek <sup>®</sup>
- Don't give energy drinks → squirrel mode



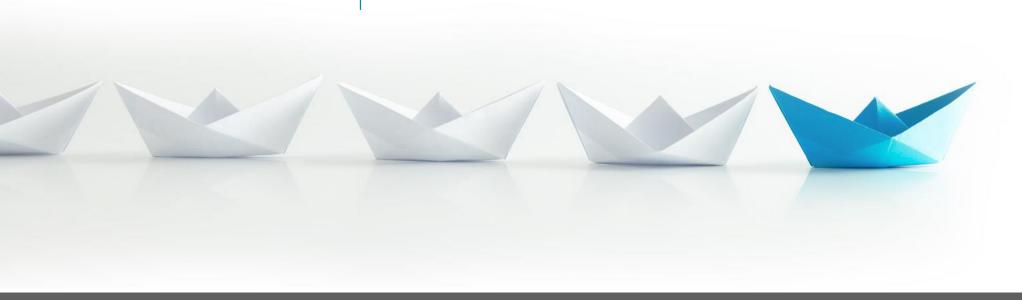






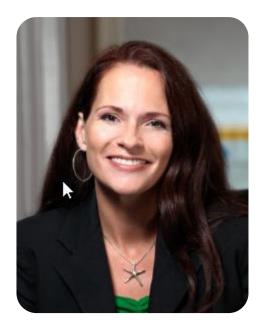


4 things before we start ...

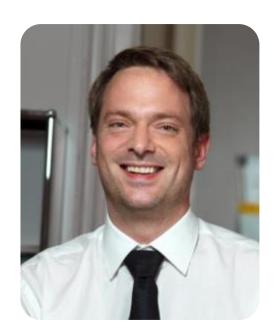


## Thank you!





Francie Tanner



Florian Vogler



**Daniel Reimann** 

## Thank you!







## IBM Notes/Domino V10 will be released < 30 Days



 IBM Domino V10 World Premiere in Frankfurt / Germany October 9<sup>th</sup> 2018

Save your seat here

https://www.fairorg.de/IBM/Event/nomi.cfm/domino18/?token=ibmde

Livestream - 10:15am - 12:45pm CEST <a href="https://www.facebook.com/events/640962392971330/">https://www.facebook.com/events/640962392971330/</a>

Destination Domino

<a href="https://www.ibm.com/collaboration/ibm-domino">https://www.ibm.com/collaboration/ibm-domino</a> <a href="https://www.ibm.com/de-de/collaboration/ibm-domino">https://www.ibm.com/de-de/collaboration/ibm-domino</a>

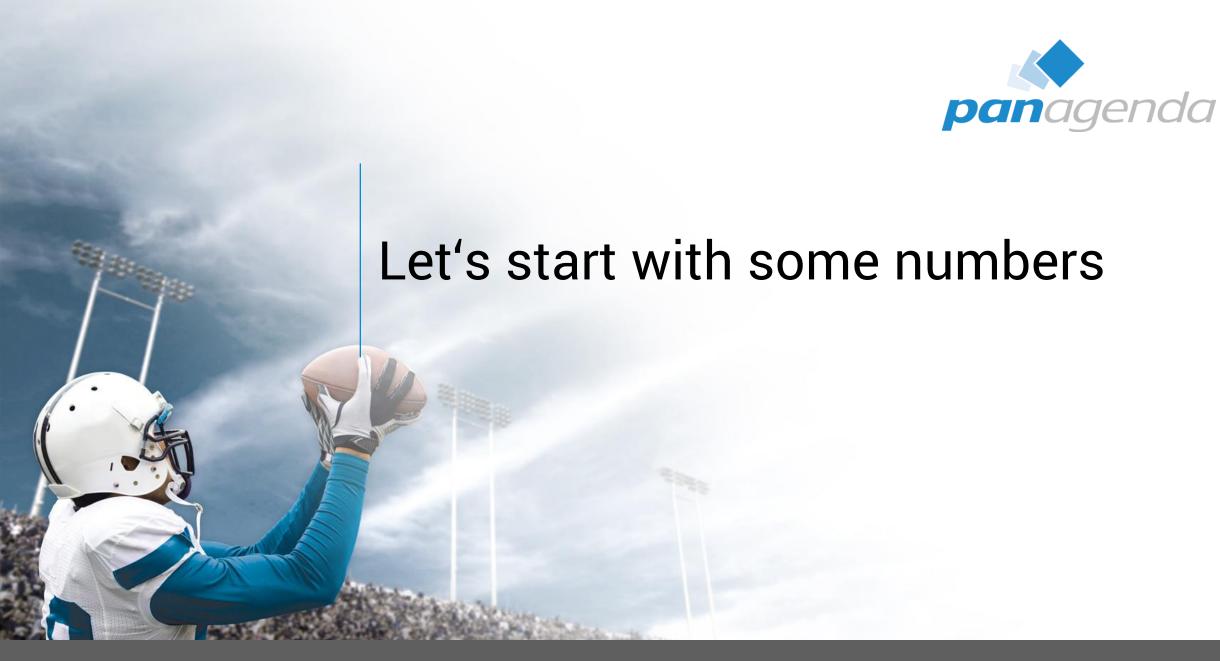
 Domino Product Ideas Lab <u>https://domino.ideas.aha.io/</u>









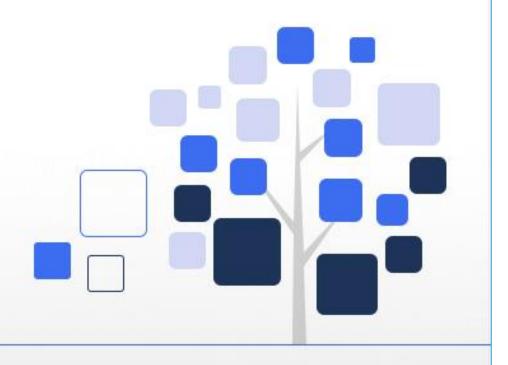


## IBM Notes 9.0.1 Feature Pack 10 Interim Fix 4



- ~35.000 files (Notes 6/7 | 8/9 Basic used to have ~550)
- 28.600 files in Notes Program\framework in 2.700 subdirectories
  - 11.200 (largely undocumented) .properties files
  - 1.200 .jar files
  - 1.300 .html files
- 600 files in Notes Data\workspace in 250 subdirectories
  - 40 (largely undocumented) XML files
  - 40 (largely undocumented) .properties files
- Which is
  - 35.000 files in 2.950 subdirectories
  - 11.280 largely undocumented files
  - ... and >30 NSFs/NTFs/NDKs
  - and the good old notes.ini file





Notes 10

L-GHUS-B2KJGB

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## **IBM Notes 10 Beta-2**



- 22.800 files in Notes Program\framework in 1.900 subdirectories
  - 9.000 (largely undocumented) .properties files
  - 1.000 .jar files
  - 1.200 .html files
- 250 files in Notes Data\workspace in 160 subdirectories
  - 40 (largely undocumented) XML files
  - 40 (largely undocumented) .properties files
- Which is
  - 26.000 files in 2.700 subdirectories
  - 9.000 largely undocumented files
  - ... and >30 NSFs/NTFs/NDKs
  - ... and the good old notes.ini file

## IBM Notes 10 Beta-2 (cont.)



## Add over 60 preference/dialog boxes

Each dialog has ~15 settings at average

#### For a total of 900+ settings sprayed across

- names.nsf (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.

Accounts

Trusted Sites

Basic Notes Client Configuration

Calendar and To Do

Access and Delegation

Regional Settings

Contacts

Fonts, Colors and Themes

Live Text

Locations

Log Settings

Mail

Access and Delegation

Internet

Sending and Receiving

Notes Ports

Regional Settings

Bidirectional

Replication and Sync

Default

Sametime

Accessibility

→ Auto-Status Changes

Calendar Service

Chat Window and Transcript

Contact List

Notifications

Server Communities

schon panagorda com

Spell Checking Status Messages Sametime Meeting Rooms

Meeting Room Invitations

Meeting Room Servers

Search

Search List

Spell Check

Toolbar

Customize

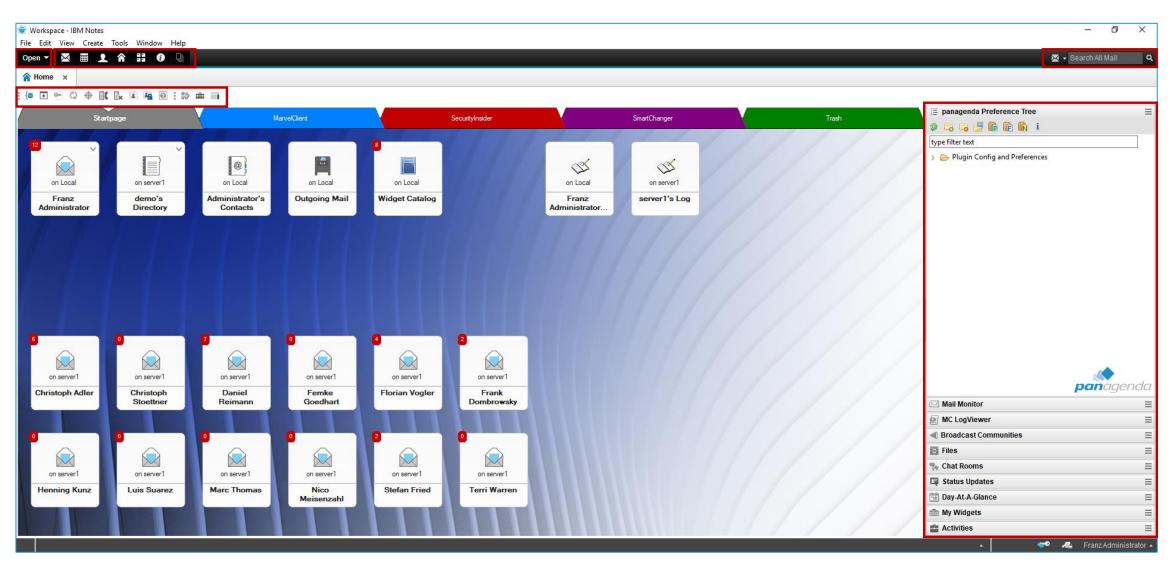
Toolbars

Widgets Windows

XPages Performance

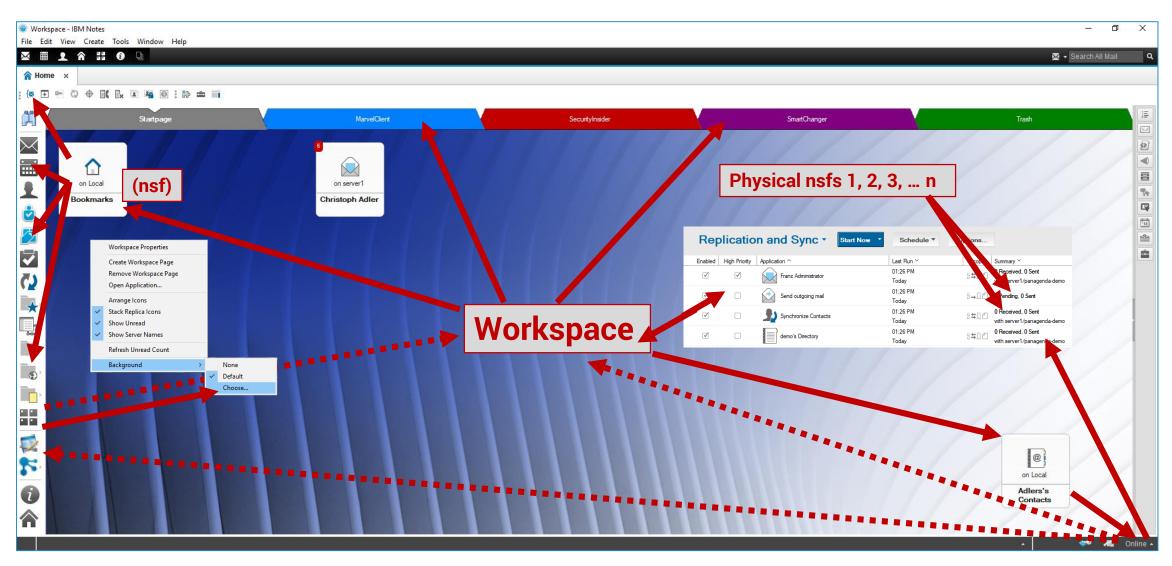
## IBM Notes 10 Beta-2 (cont.)

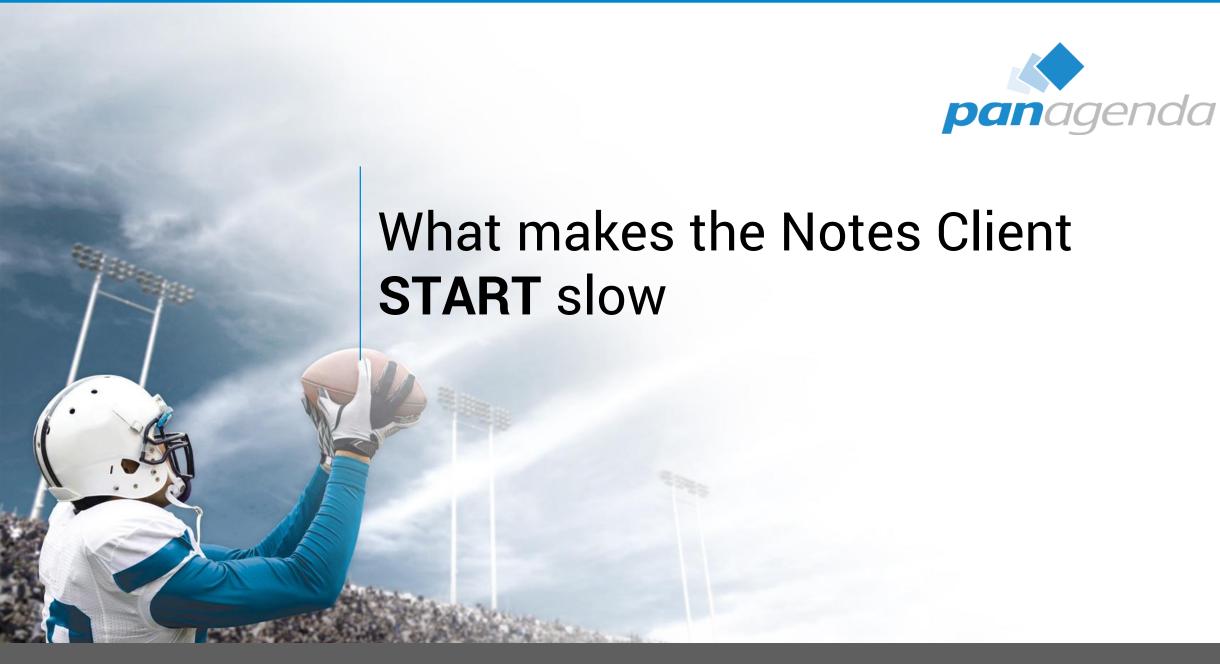




## IBM Notes 10 Beta-2 (cont.)







## **IBM Notes release**



# If you're not on at least 9.0.1 yet → 9.0.1 FP10 IF4 is a significant improvement Again, IBM Notes V10 arrives <30 days

## **Software lifecycle of IBM Collaboration Solutions**

http://www-01.ibm.com/software/support/collaboration/lifecycle/

▲ View	Product name     (** indicates comments/exception)	∀ersion     Rel./Mod.	Policy type	<b>♦ Product ID</b>	General availability	<b>⊕</b> End of Support
	IBM Notes	9.0.X	Е	5724-Z14	2013-04-12	
	<u>Lotus Notes</u>	8.5.X	Е	5724-E62	2009-01-23	2018-09-30
	<u>Lotus Notes</u>	8.0.X	S	5724-E62	2007-09-21	2015-04-30
	<u>Lotus Notes</u>	7.0.X	S	5724-E62	2005-10-07	2011-04-30
	<u>Lotus Notes</u>	6.5.X	S	5724-E70	2003-11-07	2010-04-30
	<u>Lotus Notes</u>	6.0.X	S	5724-E70	2002-09-30	2007-04-30
	<u>Lotus Notes</u>	5.0.x	S	LOT0-050	1999-03-30	2005-09-30

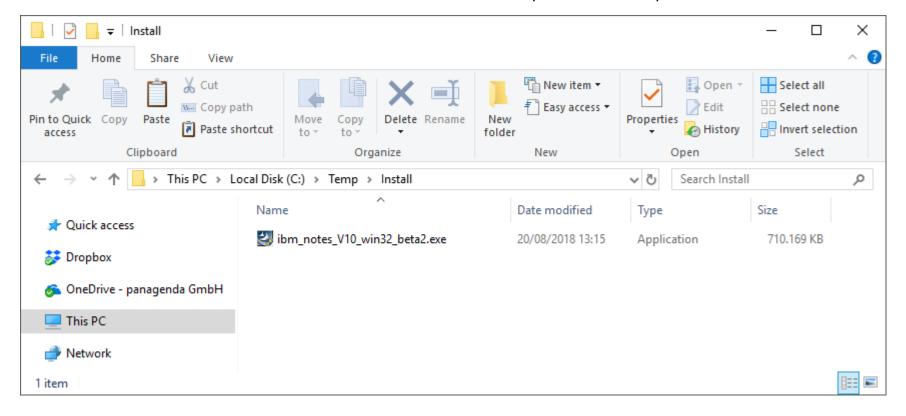
## **IBM Notes release (cont.)**



#### **How-to install IBM Notes V10 Beta-2**

1. Run the following command:

"c:\temp\Install\ibm\_notes\_V10\_win32\_beta2.exe" -s -a /s /v"SETMULTIUSER=1 /qb+ /lime " c:\temp\Install \msiinst\_NotesV10-Beta2.log""



## **Antivirus realtime scanning in Data directory**



~55% 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\*

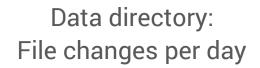
\*.ndk

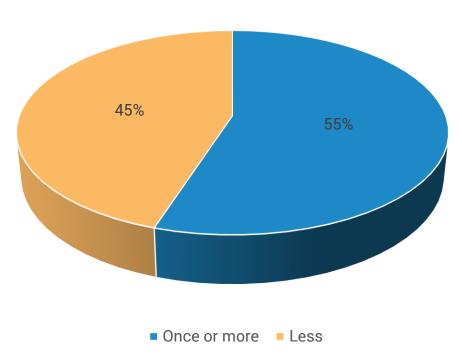
\*.xml

\*.properties

\*.jar

in Data Directory.





## What makes the Notes Client START slow (cont.)



#### Client crashes/database fixups

Especially bad for network based data directories clients

#### **Outdated Hardware**

- You need >4 GB memory if you want to use Notes AND something else
- Old fixed disks with fragmentation
- Fun Exercise: Buy a Solid State Disk and make Notes start 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

## What makes the Notes Client START slow (cont.)



#### **Outdated Data directories**

- Virtually 100% of all NTFs (Laptops: 90%) can be removed by
- Cleaning up old Notes 4+5+6/7 templates
- using ini:SharedDataDirectory= (also with Single User install!)

#### **Operating System**

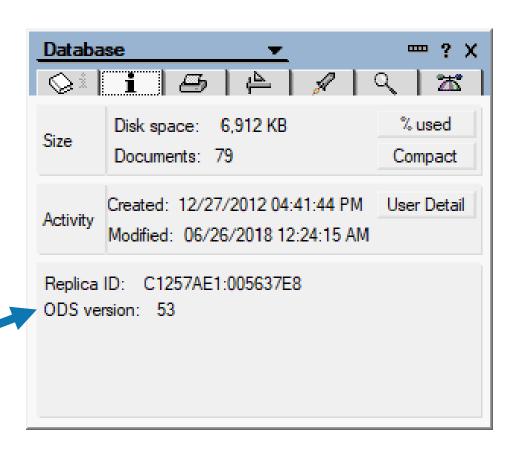
- Windows 8.1 boots ~20% faster than Windows 7
- Windows 10 ~15% faster than 8.1
  - "Meltdown" and "Spectre" and upcoming "Spectre-NextGeneration" patches may have a negative performance impact

## **ODS of local databases**



#### **ODS = On Disk Structure**

- ODS 16 = Notes 2
- ODS 17 = Notes 3
- ODS 20 = Notes 4
- ODS 41 = Notes 5
- ODS 43 = Notes 6 & 7
- ODS 48 = Notes 8
- ODS 51 = Notes 8.5 & 9
- ODS 52 = Notes 9.0.1
- ODS 53 = Notes 10



The difference between ODS 43 and 53 = up to 80% LESS FILE I/O
This helps with ANY client AND server hardware

## **ODS of local databases (cont.)**



## CAUTION: The ODS is not automatically updated when upgrading clients

- ODS 52 requires Notes >= 9.0.1 and CREATE\_R9\_DATABASES=1 in notes.ini for NEW db's
- ODS 53 requires Notes >= 10 and CREATE\_R10\_DATABASES=1 in notes.ini for NEW db's

#### **Good News for Notes (since 8.5)**

- Use NSF\_UpdateODS=1 with CREATE\_R85/9/10\_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 OR databases will be ignored if in use

## Manually upgrade ODS of local databases/templates

Run the following command line:

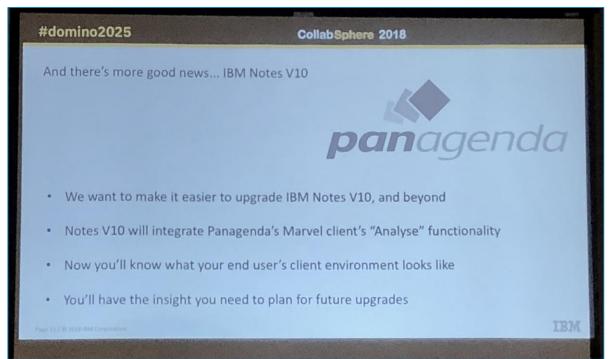
```
ncompact.exe -C -ODS -* -Client -UpdateIndexes
```

## **ODS of local databases (cont.)**



## **Impact examples**

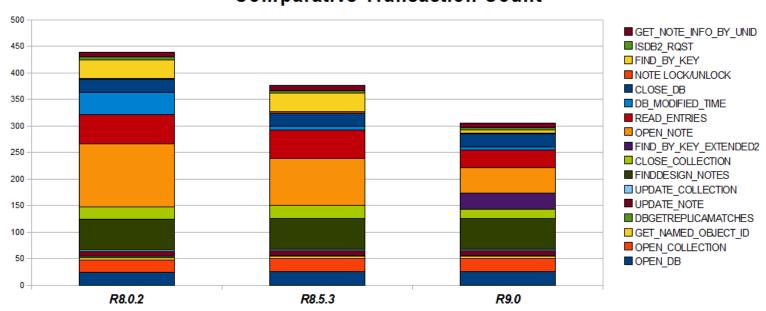
- Startup time of a Notes 10 client with 3 ODS20 databases in Notes data = 43 seconds
  - After ODS upgrade: 14 seconds
- Reduced File I/O of your disks/SAN/NAS after ODS43 to 53 upgrade by ~65%
- Removing 70% of all old files in Data directories on SAN/NAS =  $\sim$ 45% less managed storage (backup) AND much faster start



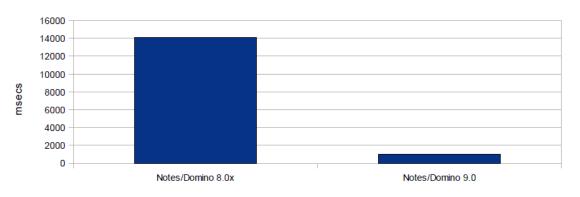
## IBM / HCL helps!



#### **Comparative Transaction Count**



#### Transaction Times 8.0x to 9.0







## **Eclipse Workspace improvement**



- Every IBM Notes Client start in a virtual environment (Citrix, vmware, etc.) is a first (setup) start and takes at least 23 sec on average
- ~65% 70% of time during first starts is used to build the workspace folder (at least 15 sec)
- A typical new workspace folder (IBM Notes V10 Beta-2) consists of
  - >= 250 files
  - >= 160 folders
  - >85 MB (including 64MB \*xpdplat\_.jvm\_G35 file → search for "NotesShareClasses improvement")

Building/Updating the workspace folder causes lots of file I/O

## **Eclipse Workspace improvement (cont.)**



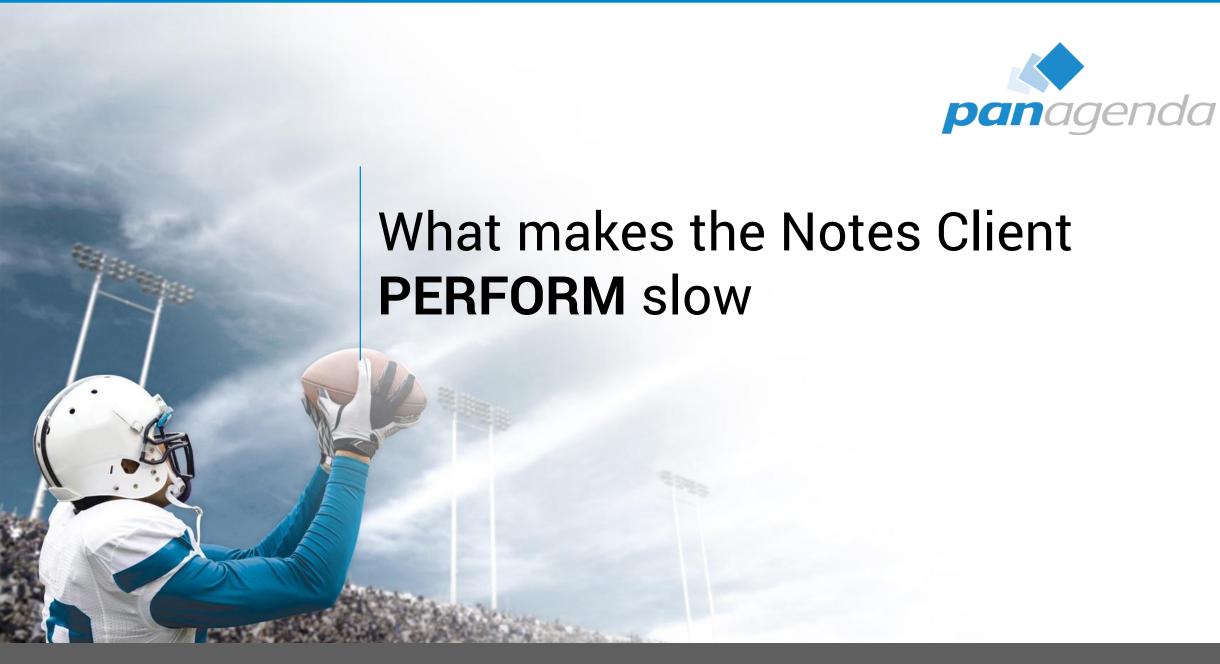
#### Accelerate the IBM Notes Client start to be >65% faster (with less file I/O)

- 1. With a non-admin user (Windows + IBM Notes) run an initial setup of IBM Notes
- 2. Start IBM Notes and wait for 2-3minutes
- Exit IBM Notes
- 4. Start IBM Notes again and wait for 2-3minutes
- 5. Exit IBM Notes
- 6. Create the following folder  $\rightarrow$  %ProgramData%\IBM\Notes\Data\Common
- 7. Copy the workspace folder from %LocalAppData%\IBM\Notes\Data to %ProgramData%\IBM\Notes\Data\Common

## **Eclipse Workspace improvement (cont.)**



- 8. Delete the following files & folders in %ProgramData%\IBM\Notes\Data\Common\workspace
  - a. UDM
  - b. Logs → all but .prov2install
  - c. .metadata\.plugins\com.ibm.collaboration.\*
  - d. .metadata\.plugins\com.ibm.rcp.personality.framework
  - e. .metadata\.plugins\com.ibm.rcp.security.auth
  - f. .metadata\.plugins\com.ibm.rcp.managedsettings



## What makes the Notes Client PERFORM slow



## **Again**

- ODS of local databases
- Hardware

#### Notes.ini

- EXTMGR\_ADDINS = (not just) local virus scanners
- Disable Notes "plugins" like virus scanners etc.
  - 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; 7.200rpm vs. 5.400rpm; network drive vs. local fixed disk

## **Port settings**



#### Port settings are included in the notes.ini

Type / Active / Encryption / Compression / Timeout

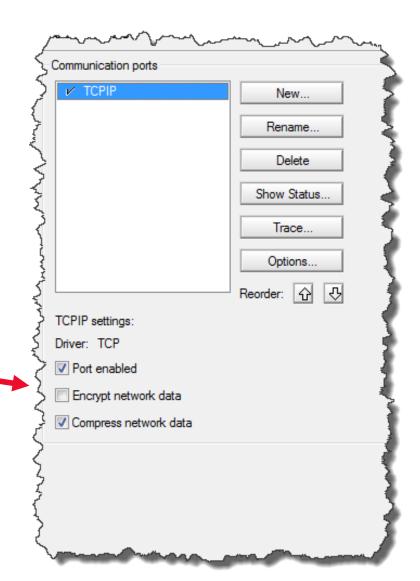
#### Legacy

LAN0 / COMx / DisabledPorts → should be removed

#### **Good idea**

- Use TCPIP according to the client type
- PORTS = TCPIP
- TCPIP = TCP,0,15,0,,12320, → Desktops
- TCPIP = TCP,0,15,0,,45088,  $\rightarrow$  Laptops
- TCPIP = TCP,0,15,0,,12288, → Citrix / VDI
- Hardware compression (e. g. Riverbed)?

Don't forget the **Domino** servers!



## Port settings (cont.)



## **Legacy/Default port encryption for Notes/Domino**

RC4 128Bit (Rivest Cipher 4)

## Best practice settings for port encryption on Domino server >= 9.0.1 Fix Pack 7

- AES-GCM 128Bit (Advanced Encryption Standard)
- notes.ini
  - PORT\_ENC\_ADV=84

## See the following Technote for details and read before you use the parameter:

http://www-01.ibm.com/support/docview.wss?uid=swg21990283

## jvm.properties file



## To speed up the IBM Notes JVM it's useful to optimize memory settings

## Open %ProgramFiles(x86)%\IBM\Notes\framework\rcp\deploy\jvm.properties

- Modify vmarg.Xmx from "-Xmx256m" to "-Xmx1024m"
- Modify vmarg.Xms from "-Xms64m" to "-Xms256m"

## The implicit rules

- Do not change vmarg.Xmx to more than -Xmx1024m regardless of how much memory you have
- vmarg.Xms should always be ¼ of what you changed Xmx to

#### Note

The above defaults have been changed by IBM over the last couple of Notes releases.
 You might find other values than Xmx256m and Xms64m in your setups.

## What makes the Notes Client PERFORM slow (cont.)



## Install types: Basic vs. Standard

Basic client starts up fast, Standard client, well ... not so fast

#### **IBM Roaming Users**

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

#### **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
- Catalog server (think db links, doc links, new bookmarks)

## Why is the Catalog important?



## Ever wondered what exactly happens when you click on db links / doc links / view links

- 1. Notes checks whether you already have a workspace icon pointing to the replica ID in the link. If yes, the top most icon on the stack decides on which server the db will open
- 2. If there's no icon on the workspace, Notes asks the catalog server in your currently selected location document where the db is to be found. So, make sure your catalog is up to date! No catalog server? Notes will ask your home mail server!
- 3. Are you replicating your catalog.nsf across all servers? Bad news: If 2.) applies, Notes will open the database on the server it finds first in the catalog which is sorted alphabetically. In global infrastructures that might be a server far far away, e. g. in Asia

Make sure to use an appropriate catalog server in your location documents!



# **PERFORMANCE** Tips and Tricks

## **Performance Measuring with 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

## Performance Measuring with Client Clocking (cont.)



## Client\_Clock=1 leads to a debug file of the following format:

```
[AD10:0002-7828] (1-7 [1]) NAME LOOKUF32(CN=christoph adler/O=panagenda,00000200): (Connect to mail01/panagenda: 0 ms) (Exch names: 0 ms) (Authenticate: 0 ms.)
[AD10:0002-7828] (OPEN SESSION: 33 ms)
[C5A0:0002-1E00] 06.02.2017 00:34:03 Dynamic Client Configuration started
[AD10:0002-7828] 32 ms. [204+292=496]
[C5A0:0002-1E00] 06.02.2017 00:34:03 Initializing Dynamic Client Configuration
[AD10:0002-7828] (2-7 [2]) OPEN DB(CN=mail01/O=panagenda!!mail\cadler.nsf): [C5A0:0002-1E00] (1-7 [3]) NAME LOCKUP(CN=christoph adler/O=panagenda,00000102): (Opened:
REPC1257A84:003EC752) 33 ms. [138+294=432]
[AD10:0002-7828] (3-7 [3]) DB REPLINFO GET(REPC1257A84:003EC752): 30 ms. [18+36=54]
(Connect to mail01/panagenda: 134 ms) (Exch names: 0 ms) (Authenticate: 0 ms.)
[C5A0:0002-1E00] (OPEN SESSION: 33 ms)
[C5A0:0002-1E00] 32 ms. [260+88=348]
[C5A0:0002-1E00] (2-7 [5]) NAME LOOKUP(CN=christoph adler/O=panagenda,00000100): 33 ms. [356+198=554]
[C5A0:0002-1E00] 06.02.2017 00:34:03 Dynamic Client Configuration updating policy information
[C5A0:0002-1E00] (3-7 [6]) SERVER AVAILABLE LITE(CN=mail01/O=panagenda): 31 ms. [30+104=134]
[C5A0:0002-1E00] (4-7 [7]) SV INFO GET RQST: 31 ms. [18+52=70]
[C5A0:0002-1E00] (5-7 [8]) OPEN DB(CN=mail01/O=panagenda!!names.nsf): (Opened: REPC12572D7:004CB9E3) 33 ms. [138+294=432]
[C5A0:0002-1E00] (6-7 [9]) GET DBINFO(REPC12572D7:004CB9E3): 31 ms. [18+20=38]
[C5A0:0002-1E00] (7-7 [10]) FINDDESIGN NOTES (REPC12572D7:004CB9E3): 31 ms. [48+20=68]
[C5A0:0002-1E00] (8-7 [11]) ISDB2 RQST(REPC12572D7:004CB9E3): 29 ms. [18+20=38]
[C5A0:0002-1E00] (9-7 [12]) OPEN COLLECTION(REPC12572D7:004CB9E3-NT00000882,0000,0000): 32 ms. [46+38=84]
[C5A0:0002-1E00] (10-7 [13]) UPDATE COLLECTION(REPC12572D7:004CB9E3-NT00000882): 30 ms. [28+16=44]
[C5A0:0002-1E00] (11-7 [14]) READ ENTRIES(REPC12572D7:004CB9E3-NT00000882): 33 ms. [80+866=946]
[C5A0:0002-1E00] (12-8 [15]) CLOSE COLLECTION(REPC12572D7:004CB9E3-NT00000882): 0 ms. [16+0=16]
[C5A0:0002-1E00] (13-8 [16]) SV INFO GET RQST: 35 ms. [18+52=70]
[C5A0:0002-1E00] (14-8 [17]) GET POLICY RQST(REPC12572D7:004CB9E3): 32 ms. [1050+28=1078]
[C5A0:0002-1E00] (15-8 [18]) SV INFO GET RQST: 30 ms. [18+52=70]
[C5A0:0002-1E00] (16-8 [19]) GET POLICY RQST(REPC12572D7:004CB9E3): 34 ms. [1050+28=1078]
[C5A0:0002-1E00] (17-8 [20]) SV INFO GET RQST: 34 ms. [18+52=70]
[C5A0:0002-1E00] (18-8 [21]) GET POLICY RQST(REPC12572D7:004CB9E3): 33 ms. [1050+28=1078]
[C5A0:0002-1E00] (19-8 [22]) SV INFO GET RQST: 38 ms. [18+52=70]
[C5A0:0002-1E00] (20-8 [23]) GET POLICY RQST(REPC12572D7:004CB9E3): 34 ms. [1050+28=1078]
[C5A0:0002-1E00] (21-8 [24]) SV INFO GET RQST: 31 ms. [18+52=70]
[C5A0:0002-1E00] (22-8 [25]) GET_POLICY_RQST(REPC12572D7:004CB9E3): 35 ms. [1050+3364=4414]
[C5A0:0002-1E00] (23-8 [26]) SV INFO GET RQST: 32 ms. [18+52=70]
[C5A0:0002-1E00] (24-8 [27]) GET POLICY RQST(REPC12572D7:004CB9E3): 39 ms. [1050+28=1078]
[C5A0:0002-1E00] (25-8 [28]) SV_INFO_GET_RQST: 31 ms. [18+52=70]
[C5A0:0002-1E00] (26-8 [29]) GET POLICY RQST(REPC12572D7:004CB9E3): 32 ms. [1050+28=1078]
[C5A0:0002-1E00] (27-8 [30]) SV INFO GET RQST: 30 ms. [18+52=70]
[C5A0:0002-1E00] (28-8 [31]) GET POLICY RQST(REPC12572D7:004CB9E3): 33 ms. [1050+28=1078]
[C5A0:0002-1E00] (29-8 [32]) SV INFO GET RQST: 31 ms. [18+52=70]
[C5A0:0002-1E00] (30-8 [33]) GET POLICY RQST(REPC12572D7:004CB9E3): 33 ms. [1050+28=1078]
[C5A0:0002-1E00] (31-8 [34]) SV_INFO_GET_RQST: 31 ms. [18+52=70]
[C5A0:0002-1E00] (32-8 [35]) GET POLICY RQST(REPC12572D7:004CB9E3): 32 ms. [1050+28=1078]
[C5A0:0002-1E00] 32 ms. [1050+28=1078] (Session Closed)
[C5A0:0002-1E00] 06.02.2017 00:34:04 Dynamic Client Configuration updating location information
[C5A0:0002-1E00] 06.02.2017 00:34:04 Dynamic Client Configuration shutdown
```

## Performance Measuring with Client Clocking (cont.)



#### **OpenNTF - NRPC Parser**

#### Link:

http://www.openntf.org/internal/home.nsf/project.xsp?action=openDocument&name= Notes%20RPC%20Parser

#### **Last Update:**

v1.0.14 - Nov 10, 2016

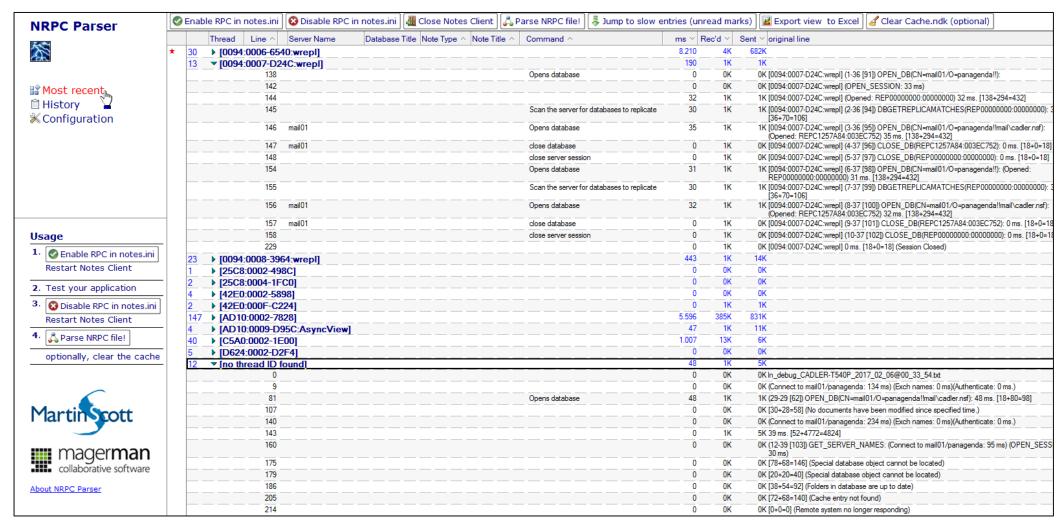
## **Developed by:**

Jamie Magee, MartinScott Consulting LLC, US
Andrew Magerman, Magerman Collaborative Software GmbH, Switzerland

## Performance Measuring with Client Clocking (cont.)



## **OpenNTF - NRPC Parser**



## 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
- Let's look at some detailed traffic analysis for just ONE application (the mail file) of ONE user ...

## Performance Tuning - Understanding cache.ndk (cont.)



	After d	eleting	cache.ndk	Keeping / NOT deleting cache.ndk				
() 484 (N) OPEN, JR(Chronolou)O-yanagandaiChrolftregler.ndf; Connect to anabolyanaganda. 127 mi) (b.	MS	SENT	RECEIVED		MS	SENT	RECEIVED	
IONE WINSON Pro	2,723	5,998	1,553,446		111	1,510	38,214	
	_/	- /	200			_,	/	
010, [84:20-549]		18 82 54	20 204 1388	[3-14](6) (2454. [36](2-minut(2-0-page-adjinet(2-minut(2-minut(2-0-page))) (Connect to annixy) (margin (Connect to annixy) (margin (Connect to annixy) (margin (Connect to annixy)) (margin (C	9	96		
		54 54	1876 2930	(5-84 (8) GET_UNREAD_NOTE_TABLE: 36 ns. (82-3000-2302) (6-84 (9) OPEN_NOTE[REPCI2S/3207-00962/C0-NTFFF0000,03000400) 0 ns. [54+3308-1342]	26 0	8		
9-804 [12]] OPEN_NOTE(REPCLESYED188822PC0-NT0000834E,8240E134); 13-94. [34-4438-4413] [0-604 [13]] OPEN_NOTE(REPCLESYED75062EPC0-NT000040E,00400009; 15 76. [30-1394-3344] 13-464143[-67 NAMOD 06107 106502PH; 615c6mdestroff: 16 76. [67-68-68]	15 16	54	1594	[F-94]33[ OFF_MANUS_SERECT_SOSparing_SExcanolarporting_() in to _Section () [II-94]31[ OFFI_MOTISEPCLESTOD-ROSESPCO-MODESPORE_() in the _SEXESPA-SEZE [IP-94]32[ OFFI_MANUS_DIRECT_SEXESPCORE_() in Observious distables profile _S firm_SEX-381-982 [IP-94]32[ OFFI_MANUS_DIRECT_SEXESPCORE_() in Observious distables profile _S firm_SEXESPCORE_() in Observious distables pr	26	2		
[12-664 [15]] OPEN INCTEREPC1257297-06562FCO AROSSOSASE 664000281: 15 ms. [52+5600-5652]	0 13	59 52	38 5400	[10:34 [13] OPEN NOTE(REPCLESTS) THREE OF NOTE(REPCLESTS) OF NO. [12:156-248]		68 52		
13-68 (18) OPEN_NOTE REPCLIS7297-90962PO ATROXX0846-09400001; 18 ms. (52-1560-0894) 14-685 (17) OPEN_NOTE REPCLIS7297-90962PO ATROXX080014; 11 ms. (58-1518-1579)	39 31	52 58	1562 1518	(13-94 [14]) OPEN, COLLECTION/REPCLEST/2018/05/2/CII-NT0000120A,0040,4000) DVIS. [1884] (13-94 [15]) ECT, NOTE, NATO 6 HIS. [224-08-020] (13-94 [16]) ECT, COLLETION 8 HIS. [14-08-04]	- 1	22 22		
35-685 [18] OPEN_NOTE(REPC1257207-005C2FCO-NT00000406,00000000) 18 HH. [12+1290-1842] 36-685 [18] OPEN_NOTE(REPC1257207-00562FCO-NT0000041A,03400014]: 0 HIS [58+1376-1434]	38 0	53 58	1390 1336	(14-34 [17]) POLL DEL SEQNUM: (Connect to anubis/penagenda: 0 mg (OPEN_SESSION: 16 m	0	36		
17-665   [25]   GET_NAMED_GEGECT_DESprofile_028anthive database profile_): 0-ms. [68+28+96]   18-665   [25]   OPEN_NOTE REPC1257297-85962PCO ARXX00088PC,80400026): 0-ms. [52+298-246]	0	68 12	38 296	0 ms. [54+(8+9)] (13-34 [18]) READ_ENTRIES(REPC1297201/000829/CB-N179900120A); 38 Ws. [69-9356+8004]	28	54 60		
[39-685 [22]   OPEN_NOTE(REPCLIST297-90562PCO-ATROD0611A4,GA406126]:-3 ms. [58+1294-1153] [20-685 [25]   OPEN_NOTE(REPCLIST297-90562PCO-ATROD06865,63400114): 8 ms. [58+1698+1756]	8	58 58	1294 1690	For (Sectional Conference Conference Conference Americana) in in, [Section-and [Institute Conference Conferenc	0	60		
21 685 (241) OPEN_NOTE(REPCLEST297-96502FCO ARXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	0 38	52 52	1376 3190	(18-95 [212] OPEN_MOTE[REPC125730740952FC0-NT0000084C,03400000]: 31 ns. [50+20978+2] (13-97 [22] OPEN_COLLECTION/REPC125720740952FC0-NT0000084C,0440,4400]: 16 ns. [350+C	26 28	50 108		
23-68 [26] OPEN_NCTRIMEPC1257257-00502FCD-NT0000358A_6040033():0 ms. (36-1254-1338) 34-685 [27] OPEN_NCTRIMEPC1257257-00502FCD-NT000005-2,0040014():15-ms. (38-7264-7338)	0 33	36	1234 7286	[26-37 [25] GET_BOTE_BRF0: 0 ms. [22+08+226] [23-37 [24] GET_COLLATION 0 ms. [28+28+26]	0	22 36		
25-685 [28] OPEN_NOTE(REPCLIST29780562FC0-AT00008503_03480014); 0 ms. [54-1182-1248] 36-685 [28] OPEN_NOTE(REPCLIST29780562FC0-AT0000856_09000001; 0 ms. [53-1596-1648]	0	56	2192	[22-17 [25] READ (INTRIBUREPC127700700042FC0-NT0000086]: 0 ms. [56-106:173] [29-17 [36] (095N COLLECTION/REPC125720710962FC0-NT0000296.0881,000** 14 ms. [144-1	9	66		
[27-685 [36]] OPEN_NOTE[REPCLIST237-80502FC0 AF0000856A_88600005]; 16-rs. [32-1546-1593] 28-685 [35]] OPEN NOTE[REPCLIST237-80502FC0 AF00008504.6340014; 5 ms. [58-1586-1594]	36	92	1540 1540	(20-37 (26) GET COLLATION: 8 ms. (38+38+34)	9	22		
20-000 [33] (OPEN_NOTINEFICEST207505025FCO-AT00008304;2-040034]; 8 ms. [3842300-1394] 20-005 [33] (OPEN_NOTINEFICEST207705025FCO-AT00008304;2-04400000]; 16 ms. [3842300-1394] 20-005 [335] (OPEN_NOTINEFICEST2077065025FCO-AT00008304,0-040016] 9 ms. [3842300-1398]	36	50 52	1330 1384	(25-37 [28] GET_COLLATION O'NL. [31/95-94] (26-37 [28] GET_MANED_OBSECT_DISSprotile_Eldicalendersettings_conflorian vogles/orpana( (27-37 [28] GROW NOTE(SEPC)2573001000257CO-NT0000095A,00000030) o'ns; (\$2-000-640)				
20-685 [34] OPEN_COLLECTION/REPCLISTED RESERVES NTRODELEDA, BARBOLISE) IS INS. [58-1250-1288] [31-685 [34] OPEN_COLLECTION/REPCLISTED RESERVES INTRODELEDA, BARB, 4000]. (32-685 [38] POLL_DEL_SEQ		59	1330	[27-37] [30] ORDA, MOTELER CLESTED CHROSCOPIC ANTRODOSCA, 000000000) O. ms. [32-500-540] [28-37] [32] PANO, 3Y, 42Y OVE, [32-38-90] [28-37] [32] PANO, 3YTHE SHEPC LEST ZOT CONSERVED ANTRODOSCIPE O. ms. [48-462-460]		8		
IS no. [54:50:52] (33:605 [36]) OPEN_DB(Chivanulos/Orquesagendal/mathfrogler.nof); (Connect to anulos/paragenda 136 no) (		34		(25-37 [32] READ_PATRESPERFC1[27:307000029*CD-NT00000295] 0 ms. [60+602+050] [30-38 [33] READ_RATRESPERFC1[27:307000029*CD-NT0000086] 0 ms. [70+236-228] [32-39 [34] SERVER TRADE DYN. [34-24-38]		66 70		
(DPE) \$255000 0 NN) 96 Nn. [128+256x108]		139	296	(15-10 [34] MEGIN, THUC EVAL [SECRETA]		14		
(04-685 [37] CUOSE_08(REPC1257297-085E2FC0): 15 ms. [1840-18] 112 ms. [188-78838-7044]	15	38 305	70036					
\$2.000.00000000000000000000000000000000	0 36	22 52	106 11796					
(38-685 [40]) OPEN_NOTE[REPC1257297409529F00 NIT00000682,00400004]; 960 rts. [52+184248-184300]	160	16 52	18 184248					
29.687 [45]   OPEN_NOTE  REPCLESTEDT-00962FCO.NT00000516,00400006  47.4% [34-51606-15986]   40.687 [45]   OPEN_NOTE  REPCLESTEDT-00962FCO.NT000002A4,00400006  11.4% [34-16224-06278]	47 31	54 54	33800 38234					
E1-687  46   OPEN_NOTE  8EPC1257207-00563FC0-N/000002342,08600000  1.56 min. [56+001953:102006]   B2-686  65   OPEN_NOTE  8EPC1257207-00563FC0-N/000005FA,08600000  1.67 min. [56+16686-16700]	156 47	54 54	101952 19600	100				
43 686 [46] OPEN_NOTE[REPC137297-90502FCO NT0000825A,08400001; 16 ms. [32*13588-13640] 44-686 [47] OPEN_NOTE[REPC137297-90502FCO-NT000081C2,08400001; 31 ms. [34*23492-22546]	36 31	52 54	13506 23492	100 us	CArc	2 =		
45-688 [46] OPEN_NOTE[REPCLISTED7-00942FCO-AF00000956,00400000] 218 mm. [54-82184-82286] 86-689-1891 READ ENTREPURENCELISTED7-00962FCO-AF000012041 16-mm. [72-4946-48187	238	54 72	82384 1986	1 00 u	<b>3</b> C13	<b>)</b> –		
17 689 [31] GET_ALLFOLDEROHANIES_ROST: 32 ms. [76+3624-7790]   ISLAMS [32] COPEN_ROTS (RETURN CLEATER FOR A TOMOSTOCI COMMUNICATION (RESPONDED TO A COMMUNICATION COMMUN	32	76 34	7634 M234					
(#0.609 [30]) OPEN_NOTE(REPCLISTED FREEERO APROXESSES, 60460000); 129 Ha. [54-12112-12160] DO 609 [31] OPEN NOTE(REPCLISTED FREEERO APROXESSES, 60460000); 112 Ha. [54-127739-127812]	129 312	34 54	73112 117738	1 CO N	4D	- 27	NAD	
51-680 [54] OPEN_NOTE[REPC1157207-805GFC0-NT0008039E,00408000]: 94-ms. [54-42404-62654]	94	54	636M	150 M	IK V	$^{\prime}$ S $\rightarrow$ $^{\prime}$	MB	
D1-600 [25]   OPEN_MOTIS[REPLIZE/20/2005/CO-NONCOMENTAL, BEIND, SERVIC, SERVICE/SERVICE/   D2-600 [26]   OPEN_MOTIS[REPLIZE/20/2005/CO-NONCOMENTAL, 60400000]; SERVIC, [54-996-7980]   D3-600 [26]   OPEN_MOTIS[REPLIZE/20/2005/CO-NONCOMENTAL, 60400000]; SERVIC, [54-9122-4278]   D3-600 [27]   TREDOSSER, NOTIS: Error, [46-90-40]	35	34	6122	10011	1 U	o. o, i	IVID	
(35-680[34] OPEN NOTE(REPCLIST207-80952FCO AT00008845,04800000) 109 ms. [50-209821-22032] [56-690[58] OPEN NOTE(REPCLIST207-80952FCO AT000089F6,04800000) 16 ms. [54-5646-1780]	109	50	2092					
[57.490 [60] OPEN_NOTE(REPCLIST207-008(2)FO AT00000412,04000000] 18-Hs. [34-5542-2394] [36-600 [60] OPEN_NOTE(REPCLIST207-008(2)FO AT0000054A,00400000] 10-Hs. [34-5222-2862]	26	94	1542					
[35-611 [62]] OPEN, NOTE/REPCLISTED FROM \$250 ATTROMORPA, BARCORD   0 ms. [54-1576-1680] 100-611 [62] OPEN, NOTE/REPCLISTED FROM \$250 CO. ATTROMORPA, \$64000000000000000000000000000000000000	0	54	1536					
	0	54	3460					
(63-691 [66]) OPEN_NOTE(REPCLIST297-90962FCO-NT00000522,00400000]: 0 ms. [54-2330-2384]		54	2330					
(85-681 (98) OPEN_NOTE(REPCLIST/297-00563FCO N/100000641_004000000): 0 ms. [54+1390-1444]		54	1390					
[87-691 [79]] OPEN_NOTE[REPC1157297-00362FCO NEOCO008104,00400006] 0 Hs. [54+1308-1592]		34	1308					
	38 36	54 58	4000 1236	1000		<b>40</b> –		
/4* 094 [74] 075%_91/11(MPCLIS7297-095GFCO AF0000138A, 0A400136) -0 HH. [58+1796-1854] 71-094 [74] 075%_91/15[MEPCLIS7297-095GFCO AF000005A2,0340034]; 10 HS. [58+1828-05274]	0 36	58 58	1796 30236	1000	HSE	rg =		
72-694 [73]: OPEN_NOTE(REPCLESTED F00962FCO ATRODOSISOA, COADELSA): 0 res. [58+1556-1392] 73-694 [74]: OPEN_NOTE(REPCLESTED F00962FCO ATRODOSISEC, DARGULLE): 0 res. [58+1202-1300]	0	56 38	1599 1292	1000	450			
74-64 [77] OPEN_INCRERECLIST237005GFCO-N70000846[,0380314]; 16 Hs. [18+40514130] 25-64 [78] OPEN_INCREREPCLIST207005GFCO-N700013C4,04400136]; 0 Hs. [56-1256-1312]	38 0	58 56	4862 1296					
(% 694 [76] OPEN_NOTE(REPC1157207-009E2FCO ATRODO059E,COM05LIG) 15 ms. (50-10996-LESSA) (77-004 [88]) OPEN_COLLECTION(REPC12071E7/S0582FCS-N75000686,0040,4000); (78-004 [88]) OPEN_DB(CN-4	25	58	300%	1.5 GE	$\sim$	27 N	1D	
(79-604 [ID]) CLOSE, DBJ REPCL257297-005E2FC0]: 0-ms. [38+0-18] 100-ms. [106-632481-52940]		18 106	0 5290	1.3 (1)	7 V.S	5 / IV	/ID	
90 695 (301) GET_MOTE_MOTO. 18 nts. (22+108-128) 81 495 (34) GET_COLLATION O nts. (10+18-54)	36 0	22 19	106 18	1.0 01		. 0		
E3 695 [95]   READ_ENTRESS/REPC125720700527CO N700003866] 13 Ho. [66-909-172]  E3 685 [86]   OPEN_NCTS/REPC125720700527CO N7000035CA, E3480114]: 16 Ho. [54-3222-2078]	33 38	99 54	306 3022					
(84-685 (871) OPEN (NOTE) REPCLIST 7207-2056 (FOO NOTOCOLISE, BARDOLIS): 56 ms. [54-1,226-1,330] (85-685 (881) OPEN_COLLECTION (REPCLIST 7207-2056 (FOO NOTOCOLISE, BARDOLISE): 684-685 (881) OPEN_DB(CN-a	36	54	1236					
87-695 [96] CLOSE_DB(REPC1237297-06962PC0); 6:no. [18+6-28]		38 394	0 99034					
88-685 (00) GET_MOTE_MOTO 0-ms (22+386+330) 89-685 (00) GET_COULATION 0-ms (36+38+34)		22 14	106 10					
177 ms. (1944) 000-000-000 ms. (20-184-120) (189-00) 20(3) 637 (COLATION On one, (1841-184) (189-00) 20(3) 637 (COLATION One one, (1841-184) (189-00) (20(3) 637 (COLATION ONE) (1854-1844) (184-00) (20(3) 637 (COLATION ONE) (1854-1844)		13	100					
\$2 600 [00] 7160_8F_\$E710 His. [\$21486-60] \$3-605 [96] READ_BNTRES(REPC1157207)00562FC0-NT00001296]; 0 mis. [68+6041672]		32 48	36 654					
94-696(971) READ_ENTRES(REPCLIST207:00063FC0-NT00000066): 0 ms. [78+158:228] 95-696(98): OPEN_NOTEIREPCLIST207:00062FC0-NT00000105.804000001: 16 ms. [52+2754-2894]	0 36	70 92	158 2794					
[56-697 [59]] OPEN_NOTE[REPCLISTED7-00502FCO-NT00001310;53400114]; 339 ms. [581-340141-940200] (57-686 [380] OPEN_NOTE(REPCLISTED7-00502FCO-NT000028A-00400000]; 47 ms. [581-23400-13454]	559 47	36 54	240142 23400					
(98 686 [1812] OPEN NOTE(REFCEST/207/08562FCD NTE0002332,00000000) 0 Hs. [14+628-1682] (99 696 [182] OPEN NOTE(REFCEST/207/08562FCD NTE0000778,02000041 15 Hs. [56+2366-2422]	0	54 54	3435 2366	Exclud	dina	Eilas	rvorol	
300-898 [305] OPEN_NOTE(REPC135720790562FCD AT00003256,00000000); 0 ms. [58-2572-3436] 201-898 [304] OPEN_NOTE(REPC135720790502FCD AT000000043,00000000); 31 ms. [58-2572-3436]	0 38	54 34	2572 1330	EXCILIC	JII I ( )	riiese	:i veis!	
[202-096 [205]] OPEN, INCRESEDE LES TOUTROSES FOR ATTROMOSEDE, BORROSSODI; TO HEL. [32-54228754770] [202-096 [206]] OPEN, INCRESEDE LES TROTTOMOSED FOR ATTROMOSED FOR HEL. [32-54228754470]	79	52 54	54218 1380	_,	9		- · · · · · · ·	
304-698 (301) OPDN_NOTG/REPCLIST20790562FC0 AT08808282,00400808) 0 ms. (52+2362-24546) 305-698 (308) OPDN_NOTG/REPCLIST20790562FC0 AT08808256,00400800) 0 ms. (52+2362-24546)	0	52	2382 3090					
00-498   109    OPEN_NOTE  REPCLESTZOT/90962FCD-NT080952A-00409905 : 0-ms.   54×2172×2226    007-498   11381   OPEN_NOTE  REPCLESTZOT/90962FCD-NT080952A-00409005 : 0-ms.   54×2172×2226	0	9	2172					
(00-694 (11)) (68V/8, TAVE 0 ns. (14-)4-38)	9	14	34					
(133-896 [111] OPEN_NOTE(PEPC13720700027C0 NT0000326_00000000) 0 == [38-200-2294]		34	2340					
[111-68 [114] OHEN, NOTE/REPCLISTZOTHOOSEFCO-NT00000252,00400000]; 26 ms. [54-2286-2240] [112-68 [115] OHEN, NOTE/REPCLISTZOTHOOSEFCO-NT00000256,00400000]; 0 ms. [54-2252-230] [113-68 [116] OHEN, NOTE/REPCLISTZOTHOOSEFCO-NT00000362,00400000]; 0 ms. [54-2252-2340]	38 0	51	1100 2652					
313-696 [134] OPEN_MOTEIJREPCLISTZOT/ROSESFED NT00000262,00000000; e.m., [34-9280-1934] 314-696 [137] OPEN_MOTEIJREPCLISTZOT/ROSESFED NT0000026A,00400000; e.ms. [34-25N4-2428]		54 54	2200 2534					
3.15-498 [3.18]] OPEN_NOTE(REPC3257207-90562FCD-NT08090222,00400600]; 0 ms. [54+1390-1444]		34	1390					

## **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/feature packs current (if stable)

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

All client issues are solvable





# **Q&A**





## Vielen Dank!