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ID205 – The Latest IBM Domino® 8.5.1 Performance Data, Server Resource Utilization and Deployment Tips

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Agenda

- Deployment tips and Best Practices
 - Performance with Local replica of mail databases
 - Performance impact of different Transaction Logging modes
 - How can misalignment of data on a SAN wreck your server's performance
 - VMware® performance/best practices
 - Running IBM Lotus iNotes® through an F5 box
 - Lotus iNotes® deployment tips
 - Mail journaling overhead
- IBM Lotus Domino 8.5.1 performance data
 - Domino 8.5.1 DAOS new features
 - Lotus iNotes® 8.5.1 – Notes ID vault
 - IBM Lotus Xpages® improvements and best practices
- Performance of IBM Lotus Foundations® systems
- IBM Lotus Notes Traveler® server performance

Domino Performance with Local replica of mail databases

- Test was done with 100% server databases and 100% local databases on client

Domino Performance with Local replica of mail databases

| | | | | |
|-----------------------|------|-------|------|------|
| Poll for new mail | 5min | 1min | 5min | 1min |
| Percent local replica | 0 | 0 | 100 | 100 |
| Transactions /Min | 8690 | 10638 | 5335 | 8211 |
| Total % CPU on server | 28 | 30 | 23 | 25 |
| Disk I/Os on server | 400 | 391 | 297 | 304 |

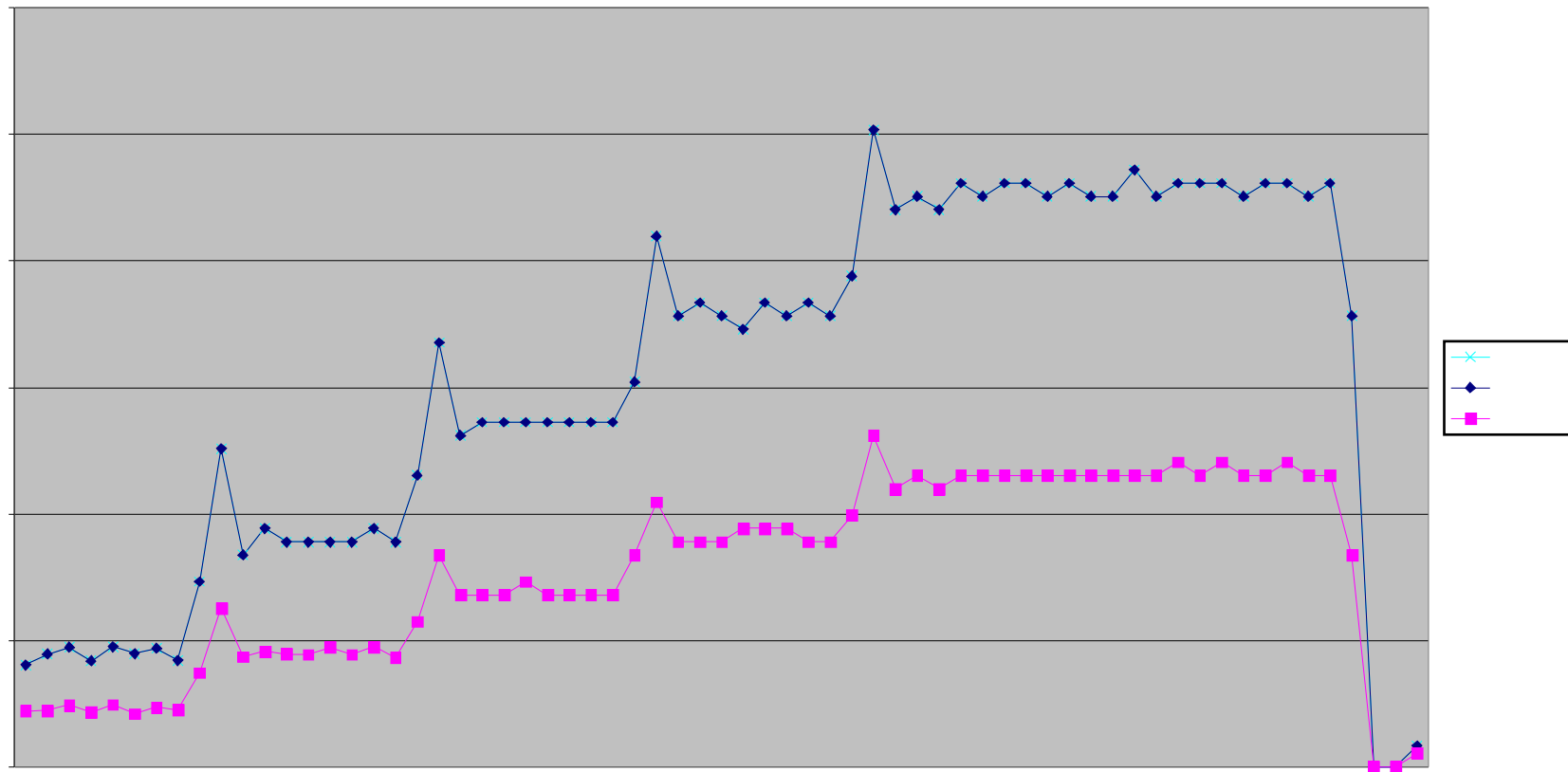
Performance impact of different Transaction Logging modes

- Test was to see what the disk activity was on the Transaction Log file under a load for Circular, Archive and Linear modes
 - Transaction log file was on it's own drive
 - Workload was N85mail driving to 5000 users for each test
 - Server was AIX Power 5+ 2 cores

Performance impact of different Transaction Logging modes



Performance impact of different Transaction Logging modes



Performance impact of different Transaction Logging modes

Deployment tip

- Conclusion
 - Archive and Linear performed the same in both write transactions /sec and bytes/sec
 - Circular mode was lower in write transactions/sec and bytes/sec than Archive and Linear

How can misalignment of data on a SAN wreck your server's performance

- Incorrect Disk Partitioning Offset will impact disk performance.
- Example of what it can do:

| | <u>Mis-aligned</u> | <u>Aligned</u> | <u>%Change (rounded to whole)</u> |
|-------------------------|--------------------|----------------|-----------------------------------|
| FCP Latency | 8.71 | 2.26 | 74% |
| LUN Latency | 8.29 | 1.80 | 78% |
| CPU | 12% | 8% | 33% |
| Disk Utilization | 40% | 19% | 52% |
| Disk Reads (kb) | 3,507 | 2,661 | 24% |
| Disk Writes (kb) | 13,179 | 9,619 | 27% |
| User Response time (ms) | 33 | 16 | 52% |

Best Practice

- How can it do this?

How can misalignment of data on a SAN wreck your server's performance

- In this case the alignment was one sector off
 - Result had to wait one disk revolution to get data requested
- Work with your SAN vendor to check this
 - In this case vendor (Network Appliance) had tools to clearly show this
- Default O/S settings are usually correct, but check
- This holds true for running physical or under a virtual O/S

VMware® performance/best practices

- Results of VMware® /IBM domino testing
 - Domino in a VMware® host environment can perform similar to domino in a Physical, non VMware® environment
 - Nehalem CPUs with EPT and Large Pages enabled vs Non-Nehalem CPUs
 - % CPU at least 50% lower
 - Response time at least 15% faster
 - Watch host resources and don't constrain domino resources (memory and I/O)

Domino 8.5 performance on Windows 2003

| | Notes® Client User | iNotes® Full Mode User |
|-----------------------|-------------------------------------|-------------------------------|
| CPU per user | 1X | 4X |
| Memory KB per user | 360 | 310 |
| IOPs per user | 0.2 | 0.2 |
| Network Kbps per user | 3.1 (NRPC port compression enabled) | 2.5 (GZIP enabled by default) |

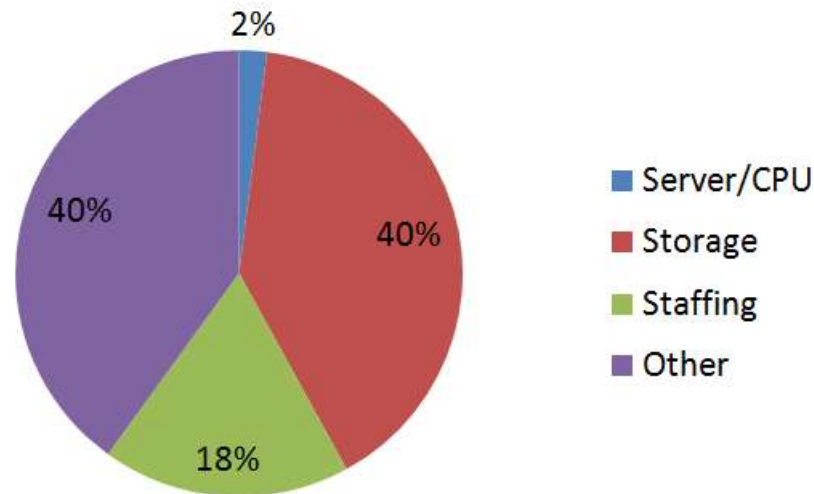
iNotes® consumes from 1.5x to 4x CPU (based on platform)

Why does iNotes® consume more Domino CPU?

- iNotes® must do this processing at the server, whereas Notes® client is able to do this at the user's workstation
 - Complex Notes® ODS structure traversal
 - MIME parsing/composition
 - Render with Form processing
 - LMBCS to desired charset conversions
 - Notes® formula evaluations
 - Name lookup coordination across multiple directories
 - Active Content Filter processing
 - Notes® or S/MIME encryption/decryption
- Notes® is able to keep some internal Notes® DB structures (like view indexes) open for an extended period of time
- Other iNotes® only processing which occur at server
 - Authentication/url validation on individual requests (stateless nature of HTTP makes this heavier)
 - Gzip compression
 - SSL encryption

CPU is a very small portion of the full email cost model

Email Cost Model: Server/CPU (2%) + Storage (40%) + Staffing (18%) + Other (40%) (*)



Deployment Tip

Server: hardware (includes CPU), operating systems, data center costs, power = 2%

Storage: redundancy, power and message archiving = 40%

Staffing: administration for hardware, software, storage and mobile = 18%

Other: message filtering, server software, client software, licenses, maintenance = 40%

(*) - Data from Forrester Research, Inc article: http://www.forrester.com/rb/Research/should_email_live_in_cloud_comparative_cost/q/id/46302/t/2

Mail Journaling overhead on Domino® 8.5.1

- Configurations
 - Local: 1 server for both Mail and Journaling
 - Remote: 2 servers, 1 for Mail, 1 for Journaling
 - 4,000 concurrent N85Mail users
 - AIX 5.3 and AIX 6.1
- Overhead on Mail Server
 - Local:
 - 15 to 20 % CPU increase
 - 10 to 15% IOPs increase
 - Remote
 - 15 to 20 % CPU increase
 - No impact on IOPs
 - CPU increased on Mail Server in both cases because encryption for Journaling done on Mail Server
- Recommendation for remote server - similar sized server as Domino® Routing Hub Server

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Domino® 8.5.1 DAOS (Domino Attachment and Object Service) new features

- In Domino® 8.5.1 DAOS new optimizations:
 - Client to server DAOS – the client checks if attachment is on server, if it is, the client does not send the attachment
 - Server to server DAOS - the server checks if attachment is on other server, if it is, the server does not send the attachment.
 - Makes replication faster when attachment already exists in DAOS on destination server
- Client to server DAOS optimization network bandwidth savings
 - 3000 concurrent N85Mail workload
 - ODS 51 mailboxes
 - with 30% duplicate 3MB attachments, ~30% reduction in network bandwidth
 - with 15% duplicate 512 KB attachments, ~10% reduction in network bandwidth
- Server to server DAOS optimization network bandwidth savings
 - with 15% duplicate 512 KB attachments, ~ 6% reduction in network bandwidth

Lotus iNotes® 8.5.1- Notes ID vault synchronization

- How it works

- ID vault now works for iNotes users
- Existing IDs can be automatically vaulted
- Can place IDs in vault during new user registration
- Once vaulted, all copies of Notes IDs stay in sync
- Resolves prior administration and synchronization issues with Notes ID file used by iNotes



New Feature

- ID vault server Performance

- Remote configuration: Mail server pointing to remote ID vault server for IDs
- Both servers were Windows 2003 64 bit
- 2,000 iNotes concurrent users
- Mail server forwarded the 2,000 concurrent ID requests to ID vault server
- 1360 transactions per minute
- CPU utilization 4%, IOPs 2
- Eight 3.67 GHz CPUs, 6 GB RAM

Xpages® improvements and best practices

- Testing using Discussion and Read Only Application
- Goal: To Establish Server Capacity
 - Scenario 1
 - Establish server capacity in terms of number of concurrent users and TPS for Xpages® based discussion database application shipped with Domino 8.5x
 - This application is multiple users hitting a single database
 - Surpass the performance of old classic Notes style discussion database
- Goal: To Establish Server Throughput
 - Scenario 2
 - Establish server capacity for Xpages® based Read Only type Application
 - No Data exists in these libraries – so this is the core Xpages® runtime capacity
 - This application is multiple users hitting several thousand Xpages® based databases

Xpages® improvements and best practices

- Point we are at now:
- Scenario 1 - Establish Server Capacity – Discussion type database
 - Currently doubled the user capacity – working to go further
- Scenario 2 - Establish Server Throughput
 - Currently over double the TPS – working to go further

Xpages® improvements and best practices

- Some best practices to improve performance
 - Use one Database as the template (Shared Xpage design)
 - Enable Xpages® caching - XpageCacheSettings=1
 - Set Xpages® persistent to “ everything to disk” if a lot of Xpages® applications

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Lotus Foundations® systems

- What is a Lotus Foundation® system?
- Example of some of the Lotus Foundations® systems we tested
 - Lotus Foundations Start®
 - Lotus Foundations Start® with Run
 - Lotus Foundations Branch® Office
- Compared benefits of domino® 8.5 used in Start 1.1 to Domino® 8.0 used in Start 1.0 systems
 - Disk savings of domino® 8.5 become apparent

Lotus Foundations® systems Start performance

- Lotus Foundations Start®
 - Domino running in a virtual environment (NVA)
- Entry level system
 - Tested to 200 domino users using N85mail
- Advanced level system
 - Tested to 500 domino users using N85mail

Lotus Foundations® systems Start with Run performance

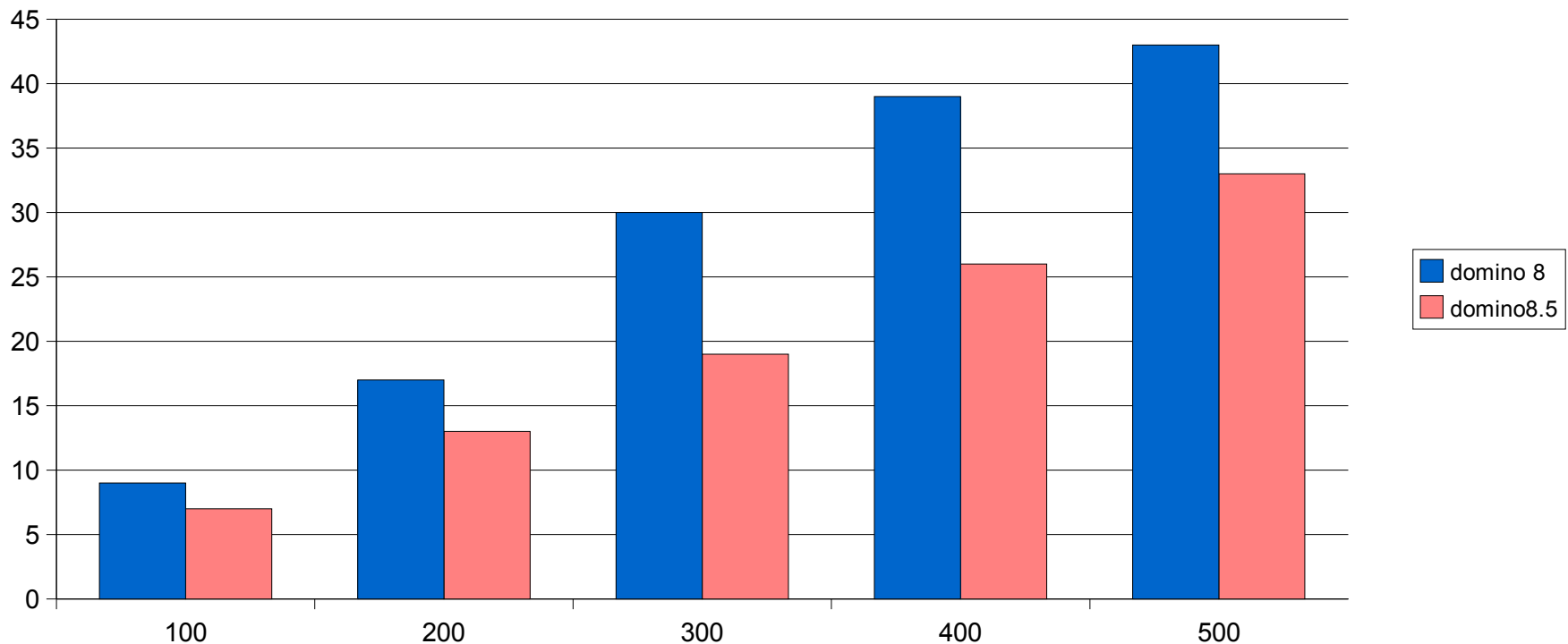
- Lotus Foundations Start® with Run
 - Comprised of domino running in a NVA and a second NVA containing VMware and Windows O/S.
 - Tested on Advanced server configuration with one system disk
 - N85mail simulating 500 users against domino
 - Iometer benchmark tool running in Windows O/S simulating disk activity
 - System could sustain the 500 domino users with response time under 1 sec along with an iometer disk load of 260 I/Os per sec.

Lotus Foundations® systems Branch Office performance

- Lotus Foundations Branch Office®
 - Designed to be installed in a branch office and controlled from the home office
 - Similar to a start configuration but local Linux users are added via the domino directory
 - Testing was done running n85mail workload of 500 simulated users while making various changes to the domino directory
 - 4000 non local users in the domino directory
 - Added 50 new local users to domino directory to test backsyc
 - Added 50,000 user extended directory

Lotus Foundations® systems I/O performance

Disk Utilization



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Lotus Notes Traveler® 8.5.1

- Provides two-way, over-the-air synchronization between Domino® servers and Microsoft Windows Mobile handheld devices
- Lotus Notes Traveler® server runs as a Domino® Server Task
- New 8.5.1 features
 - Support for Apple iPhone®
- Reports:
 - Domino® 8.5.1: 1Q10
 - D8.5: <http://www.ibm.com/developerworks/lotus/library/notes85-traveler/>

Lotus Notes Traveler® 8.5.1

- Test configuration: remote with 2 separate Lotus Domino Servers
 - Lotus Domino® Mail Server hosting the users' mail databases
 - Lotus Domino® Server with the Lotus Notes Traveler Server
 - Domino® 8.5.1 32 bit Mail Server, IBM x3850, 4 dual core 3.0 GHz processors, 12 GB RAM, 42 disk drives, Windows 2003 Server Enterprise x64®
 - Lotus Notes Traveler® 8.5.1 64 bit server, IBM x3550, 4 dual core 3.2 GHz processors, 8 GB RAM, 2 disk drives, Windows 2003® Server Enterprise x64

Lotus Notes Traveler® 8.5.1

- Domino® Mail Server workload
 - N8Mail
 - Simulated 4,000 Notes Client sending mail up to 6,000 mail users
 - Additional 2,000 users were Lotus Notes Traveler® registered mail users

Lotus Notes Traveler® 8.5.1

- Lotus Notes Traveler® server workload emulates remote devices
 - Each Lotus Notes Traveler® user does 64 iterations with a 15 minute wait between iterations
 - Open/Read 5 Inbox mails (every iteration)
 - Reply to the first mail (every 2nd iteration)
 - Send one 10 byte mail to one person (every 8th iteration)
 - Send another 10 byte mail to three people (every 8th iteration)
 - Move 1 mail from the Inbox to the Notesbench® folder (every iteration)
 - Delete 2 mails (every iteration)
 - In addition the Lotus Notes Traveler® users are listening for autosync messages from the Lotus Notes Travelerv server

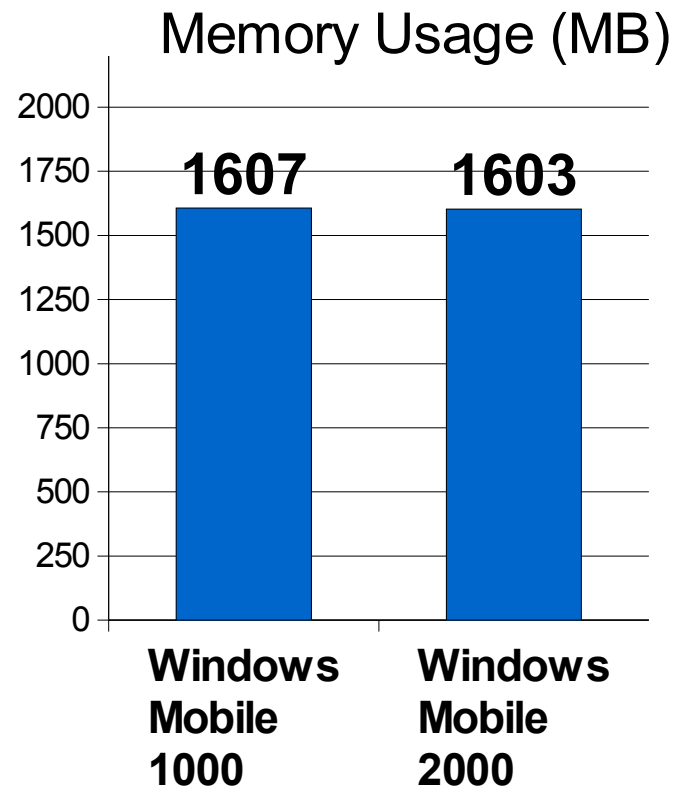
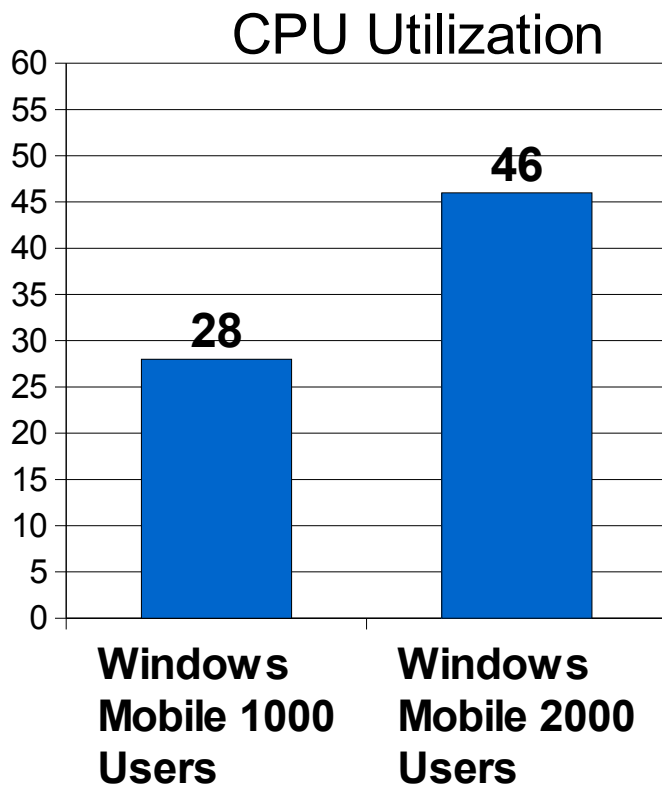
Lotus Notes Traveler® Users Overhead on Domino® Mail Server on Windows 2003®

| | Notes® Client User | Lotus Notes Traveler® iPhone® User | Lotus Notes Traveler® Nokia® User | Lotus Notes Traveler® Windows Mobile® User |
|-----------------------|-------------------------------------|------------------------------------|-----------------------------------|--|
| CPU per user | 1X | 3X | 3X | 3X |
| Memory KB per user | 360 | 310 | 200 | 200 |
| IOPs per user | 0.2 | 0.1 | 0.15 | 0.15 |
| Network Kbps per user | 3.1 (NRPC port compression enabled) | 11 | 2.5 | 2.5 |

Total overhead = Notes + Traveler

Lotus Notes Traveler® 8.5.1 with Windows Mobile® Devices

- Windows Mobile® workload simulates 60% mail formatted as rich text (Windows Mobile 6) and 40% mail formatted as plain text (Windows Mobile 5)

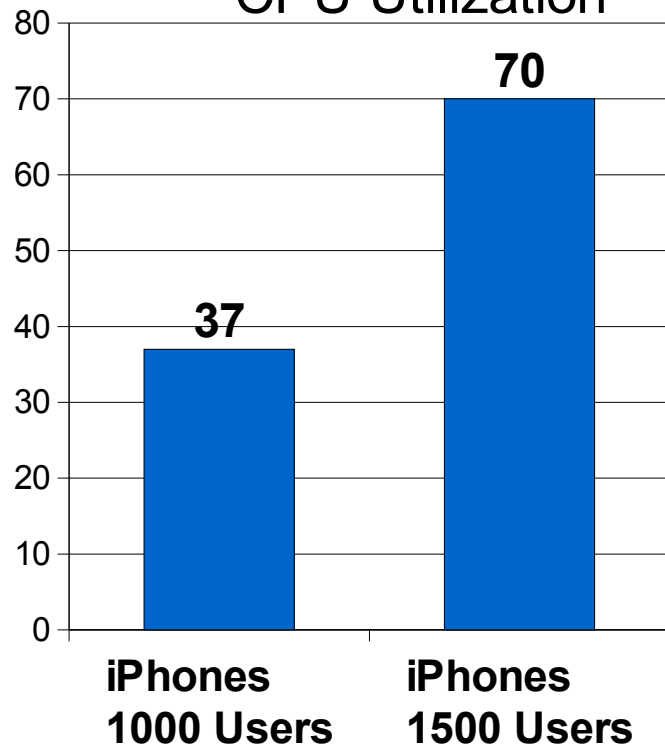


Lotus Notes Traveler® 8.5.1 with iPhones® Using Active Sync

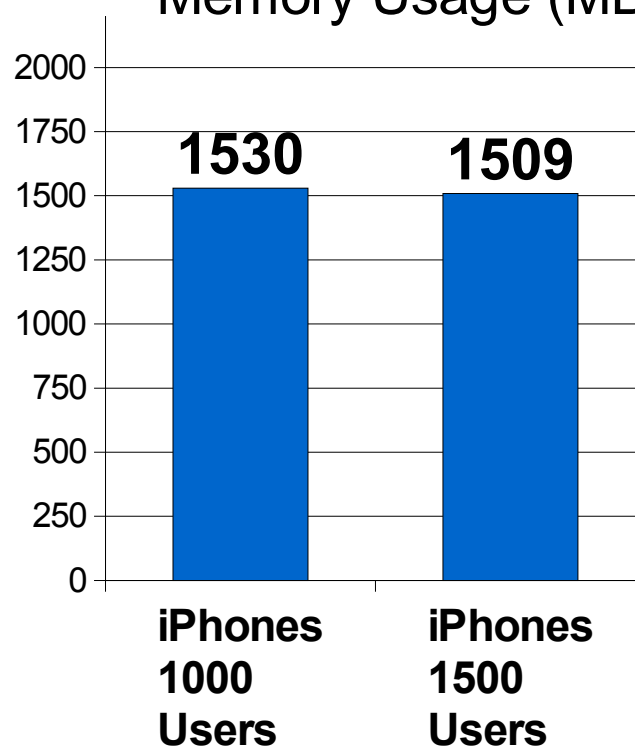
- Lotus Notes Travel 8.5.1 resource utilization

New Feature

CPU Utilization



Memory Usage (MB)



Please fill out the questionnaires

Q&A

We are in Meet the Developer Lab

Related Sessions

- ID101 Deploying IBM Lotus Notes Traveler
- ID102 Enterprise IBM Lotus Notes Client Deployments
- ID202 Dramatically Lower Your IBM Lotus Domino TCO using DAOS and Compression Technologies in IBM Lotus Domino 8.5
- ID307 Deployment and Performance Considerations for IBM Lotus Quickr Domino Services
- ID607 Lotus Foundations Start: What's New and What's in it For You
- ID615 Best Practices for Upgrading to IBM Lotus Notes and Domino 8.5.x

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