IBM Lotus Domino: A Look Ahead

Russ Holden, Domino Chief Architect, IBM Distinguished Engineer
Agenda

- IBM Lotus Domino strategy
- What’s new in IBM® Lotus® Domino® 8.0.1
- IBM Lotus Domino Next
Calendar, instant messaging, shared documents, editors, applications

Control access, encrypt data, high availability

Open, standards-based, operating system flexibility, extensible

Simple upgrade, leverage existing applications, managed desktop

Collaboration beyond Email

Protect your information

Increase business agility

Protect investments
Roadmap for IBM® Lotus Notes® & Domino®: 2008 and Beyond

- **Today**: Lotus Notes & Domino 8.0
- **Q1 2008**: Lotus Notes & Domino 8.0.1
- **2008**: Lotus Notes & Domino “Next”
- **2009**: Lotus Notes & Domino “Beyond”
- **2010**: Lotus Notes & Domino “Beyond”

*Note: Current plans. Information is subject to change*
Highlights of Domino 8.0

- Mail recall
- Improved Out of Office
- Improved mail threads, including external mail
- AdminP performance improvements
- Automatic cleanup of bookmarks on database delete and move
- Major upgrade of cluster replicator to reduce latency and overhead
- Major I/O rate reductions
- Compression of design elements
Major I/O Reductions in Domino 8.0

Total Disk I/O Operations per Second

Notes: Windows® 2003 Server results shown. Other platform results are posted on Developerworks. Improvements based on Notesbench workload tests and vary by operating system and in customer environment. Reductions require new Notes 8 mail template and ODS 48 to be enabled.
Lotus Domino 8.0 I/O Improvements

- Streaming Cluster Replicator (SCR)
- Avoid file filling when extending .NSF files
- Reduce use of design note access on servers
- UPDATE task streamlining for unchanged folders
- Optimized API for detecting databases changes
- Note: Many optimizations require use of Lotus Domino 8 ODS 48 databases
- Note: Some optimizations based on use of Notes 8 mail template
Lotus Domino 8.0 Streaming Cluster Replication

- Default cluster replicator in 8.0
- Move from per-database cluster replication to server-wide event model
- Replication changes put directly into in-memory queue for processing
- Significant source-side CPU reduction - ~10% in benchmarks
- Major update latency reduction –
  - Average latency reduced from 269 seconds to 5 seconds in 4,000 user benchmark
Lotus Domino 8.0 - Build-On-First-Use Sort Orders

Set the option "Defer index creation until first use".
Domino 8.0 - Enabling Design Note Compression

Compact
- Enable ncompact -n
- Disable ncompact –N

Database Property
Reduces disk space required by design documents ~ 70%
Notes 8 mail template - 28MB
When compressed - 11MB
Lotus® Domino® 8.0.1 Plans – due Q1 2008

- 64 bit Native Domino® version
- Document compression
- FIPS 140-2 standard Notes email encryption
- IBM Lotus Notes Traveler
- New OS platform version support
  - Windows® 2008 support (likely supported after GA due to Windows® 2008 dates)
  - AIX® 6.1 support
  - i5OS®/R6 support
Lotus Domino 8.0.1: Document Compression

Documents compressed one at a time

Completely transparent to Lotus Notes® APIs

Attachments compressed separately

Mail Quota

Samantha.nsf Uncompressed

14-70% less storage used

Samantha.nsf Compressed
Lotus Domino 8.0.1 Compression Test Results

<table>
<thead>
<tr>
<th>Database Name</th>
<th>Size no compression (original size)</th>
<th>Non-Summary Compression</th>
<th>Percent compacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>xyz1.nsf</td>
<td>136,089,600</td>
<td>104,333,312</td>
<td>23.33%</td>
</tr>
<tr>
<td>xyz2.nsf</td>
<td>237,240,320</td>
<td>110,886,912</td>
<td>53.26%</td>
</tr>
<tr>
<td>xyz3.nsf</td>
<td>1,260,699,648</td>
<td>708,575,232</td>
<td>43.80%</td>
</tr>
<tr>
<td>xyz4.nsf</td>
<td>352,321,536</td>
<td>168,558,592</td>
<td>52.16%</td>
</tr>
<tr>
<td>xyz5.nsf</td>
<td>133,169,152</td>
<td>93,061,120</td>
<td>30.12%</td>
</tr>
<tr>
<td>xyz6.nsf</td>
<td>1,163,395,072</td>
<td>692,584,448</td>
<td>40.47%</td>
</tr>
<tr>
<td>xyz7.nsf</td>
<td>202,637,312</td>
<td>93,323,264</td>
<td>53.95%</td>
</tr>
<tr>
<td>xyz8.nsf</td>
<td>145,227,776</td>
<td>102,236,160</td>
<td>59.60%</td>
</tr>
<tr>
<td>xyz9.nsf</td>
<td>334,495,744</td>
<td>139,198,464</td>
<td>58.39%</td>
</tr>
<tr>
<td>xyz0.nsf</td>
<td>311,689,216</td>
<td>266,862,592</td>
<td>14.38%</td>
</tr>
<tr>
<td>xyz11.nsf</td>
<td>222,298,112</td>
<td>155,713,536</td>
<td>29.95%</td>
</tr>
<tr>
<td>xyz12.nsf</td>
<td>218,103,808</td>
<td>109,838,336</td>
<td>49.64%</td>
</tr>
<tr>
<td>xyz13.nsf</td>
<td>299,892,736</td>
<td>223,870,976</td>
<td>25.35%</td>
</tr>
<tr>
<td>xyz14.nsf</td>
<td>83,361,792</td>
<td>50,855,936</td>
<td>38.99%</td>
</tr>
<tr>
<td>xyz15.nsf</td>
<td>72,613,888</td>
<td>20,709,376</td>
<td>71.48%</td>
</tr>
<tr>
<td>xyz16.nsf</td>
<td>161,218,560</td>
<td>95,158,272</td>
<td>40.98%</td>
</tr>
<tr>
<td>xyz17.nsf</td>
<td>648,544,256</td>
<td>334,495,744</td>
<td>48.42%</td>
</tr>
<tr>
<td>xyz18.nsf</td>
<td>1,078,984,704</td>
<td>848,035,840</td>
<td>21.40%</td>
</tr>
<tr>
<td>xyz19.nsf</td>
<td>404,488,192</td>
<td>192,413,696</td>
<td>52.43%</td>
</tr>
<tr>
<td>xyz20.nsf</td>
<td>133,693,440</td>
<td>64,749,568</td>
<td>51.57%</td>
</tr>
</tbody>
</table>

**Total (20 files):** 7,600,164,864 4,575,461,376 39.80%

Test run on IBM production mail files
### Lotus Domino 8.0.1 Compression – I/O Reduction

#### Performance Test Results

<table>
<thead>
<tr>
<th>User Txn/Min</th>
<th>Response Time (sec)</th>
<th>CPU Busy</th>
<th>Disk Ops /Sec</th>
<th>Disk Kbytes /Sec</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>9612</td>
<td>0.044</td>
<td>13.80%</td>
<td>515.7</td>
<td>5679</td>
<td>No Comp</td>
</tr>
<tr>
<td>9600</td>
<td>0.045</td>
<td>13.80%</td>
<td>398.7</td>
<td>4588</td>
<td>Comp</td>
</tr>
</tbody>
</table>

- I/O utilization with and without Compression
- Transaction Log Enabled

- **23% lower using compression**
- **20% lower using compression**
Lotus Domino® 8.0.1: Native 64-Bit Support

- Native 64-bit Domino
  - Large memory address space
  - Improved I/O
  - Design Partner and ISV beta has started – seeking additional test sites
  - Windows 2003 x64 and AIX supported in 8.0.1
  - Other platforms are planned to follow

- 32-bit platforms continue to be supported
  - Implement 64-bit hardware now with Domino 7.0.2 or Domino 8.0.1 when new servers are purchased
Introducing IBM Lotus Notes Traveler
Out of the box mobile access planned for Lotus Notes & Domino® 8.0.1

- Basic wireless mobile replication solution for Lotus Domino email/PIM data
  - Automatic, real-time replication of email (including attachments), calendar, address book, journal, and to do
  - Integrates with existing email / PIM applications on device
  - Works over wired / wireless connections (GPRS, WiFi, etc)
  - Communicates over Secure Socket Layer (SSL) connection offering 128 bit encryption *
- Runs directly in the Domino as a server task
  - Integrates with Domino administration and policies
  - Over the air device installation
- Initial support will be for Microsoft Windows Mobile 5 and 6 (Professional and Smartphone)

* Advanced encryption (beyond 128 bit) could be added via additional mobile VPN solution (e.g. IBM Lotus Mobile Connect)
Note: Screenshots are planned only. Final user interface may have different appearance.

Note: Current plans. Information is subject to change
What’s next for Lotus Notes & Domino?

**For Users**
- Continued user innovations
- Extended access options
- Integrated collaboration tools

**For IT**
- Reduce running costs
- Higher quality of service
- New platform exploitation

**For Developers**
- Domino Web 2.0 applications
- Expanded business mashups
- Modernize development tools

Note: Current plans. Information is subject to change
Goals of Lotus Domino “Next”

- Simplify Notes Identity management and authentication
- Reduce storage costs
- Improve quality of service
- Modernize Domino application development
Lotus Domino “Next” Goals

- Simplify Notes Identity management and authentication
  - Eliminate need for Lotus Notes password for authentication
  - Simplify Notes ID management
  - Option to replace Domino Directory with alternative LDAP directories eg: Active Directory

- Reduce storage costs
  - Reduce database size via new compression algorithms – now coming in 8.0.1!
  - Optimize and reduce attachment storage
  - Further reduce I/O bandwidth

- Improve quality of service
  - Domino Configuration Tuner (DCT)
  - Dynamic Group Policies
  - Reliability initiatives

- Modernize Domino application development
  - Deliver major improvements in Domino web application server and development
  - Domino Designer in Eclipse

Note: Current plans. Information is subject to change
IBM Lotus Notes “Next”: Improved Shared Sign-on

- Windows® authentication used in place of Notes user name/password
  - User signs on in Windows
  - Windows provides access to encrypted key to unlock Notes ID
  - No Lotus Notes password is required to start Notes
  - No passwords to sync
- Unlocked Lotus Notes ID still manages Notes security from that PC
- Password changes are only required in Windows
Lotus Domino “Next” – Simplifying Identify Management

For Users:
- Eliminate need to enter Notes password
- Simplify “forgotten password” and “lost ID file” recovery
- Eliminate need to manually keep multiple ID files consistent

For IT:
- Allow Notes user and group information to be stored and managed in non-Domino LDAP directories
- Greatly simplify Notes ID management: manage, update and distribute ID’s
Lotus Domino “Next”: Central Notes ID Vault

- Key idea: Store ID files in secure server-side vault database with protocol-level integration to Notes client
- Can have 1 or more vaults per domain
- Vaults can be replicated
- Policy-based configuration of user/vault mapping
- Audit logging of all vault operations
- Methods to prevent vault spoofing
Lotus Domino “Next”: Vault Use Cases

- Existing Users: Notes IDs automatically captured during client authentication
- New Users: Notes IDs provisioned into vault and automatically downloaded to client
- During Authentication:
  - Notes Next automatically uploads any ID updates to vault
  - Notes Next automatically downloads any ID updates to client
- Coordinates ID files on multiple clients automatically!
- Vault allows secure administrator and programmatic password resets
Lotus Domino “Next”: Central Notes ID Vault

- Eliminates expensive error-prone manual operations
- Automates Lotus Notes ID file provisioning to Notes desktops
Lotus Domino “Next”: LDAP Directory Options

Lotus Notes

Lotus Domino

Domino Directory

OR

Lotus Notes

Lotus Domino

LDAP Directory

Domino Config DB

Domino Next

Lotusphere 2008
Lotus Domino “Next” - Alternative Directory Overview

- Option to replace Domino Directory with alternative LDAP directories
  - Optional deployment choice
  - Domino Directory continues to be supported
- Store Domino person attributes in LDAP
  - Other information will be stored in a Domino Configuration DB
- Tools will be provided to migrate Domino person attributes into LDAP
  - Allows for phased migration to new directory
- New Domino directory APIs for applications integration

- Active Directory will be first implementation planned for Domino Next
- Future: support additional LDAP directories
Lotus Domino Storage Reduction Features

- LZ1 compression for attachments – now available via SMTP in 8.0
- Design document compression - 8.0
- Data document compression - 8.0.1
- Single-copy attachment storage – Domino Next
- Single-copy mail message storage – Domino Next.x
- Single-copy mail message signature storage – Domino Next.x
Lotus Domino “Next” - Domino Attachment and Object Store

Domino 7

Domino Next

Samantha.nsf
Mike.nsf
Ted.nsf
Lotus Domino “Next” – “DAOS”

- Logically replaces Single-Copy Object Store (SCOS) feature
- Provides efficient, file-system storage of large objects
- Automatically removes redundant storage of objects via efficient content comparison.

Result:
- Databases greatly reduced in size
- Substantial disk space savings
- I/O bandwidth savings
- Huge reductions in backup cost and database maintenance cost
Lotus Domino “Next” – DAOS Planned Benefits

- Simple – Attachments are placed in DAOS based on database setting and size criteria
- Reduce disk space – depending on degree of content overlap
- Improve mail performance
  - Attachments are written once per server
  - additional users just get a copy of the reference
- Improve compact performance
  - Avoids need to move large objects (attachments) during compaction process – only small reference is moved.
- Enable large reduction in incremental backup costs
  - DAOS repository isolates large blocks of data into separate, unchanging files.
- Resilient – No single point of failure
DAOS is local to the Domino server – not cross server
DAOS requires transaction logging to be enabled on the Domino server and for participating databases
DAOS requires a new database ODS version
DAOS is API transparent
DAOS objects count against quotas and are reported in the file size
Lotus Domino “Next” – Further Reduction in I/O Rates

- Goal – Further 50% reduction in I/O rates for operations and bytes moved over 8.0
- Further improvements made or in progress so far:
  - Document compression
  - Per-database control for Update task
  - Very large reduction in cost of Schedule and Design tasks
  - Mail.Box-specific optimizations to minimize or avoid disk writes
  - Large set of transaction log I/O rate reductions
  - Better grouping of I/O on smaller set of database pages
Lotus Domino “Next” Reduced I/O – Update Task

- Update Task
  - Target of previous optimizations but...
  - Typically very unfavourable cost/benefit ratio for mail files
  - Per-database option to opt-out of view refresh
  - Inheritable from template
Lotus Domino “Next” Reduced I/O – Mail.Box Optimizations

- Optimize for transient nature of messages in mail.box
  - Messages generally deleted shortly after arrival
- Persistent queue mechanism being implemented on top of NSF
  - Avoid writing to and reading from mail.box during steady state
  - Leverage transaction log for persistence
  - Event queue mechanism to avoid searching mail.box for new/modified messages
- Optimize transaction logging operations for Delete operation
  - Reduce transaction log I/O activity
Lotus Domino “Next” – Planned QoS Improvements

- Significantly enhance NSF quality & recovery

- Improve Domino router
  - Reduce latency of delivery
  - Better parallelization
  - Avoid potential stalls due to external products/processes
  - Handle very large mail throughput

- Transaction Log improvements
  - Reduce CPU impact of transaction logging by 50%
  - Improve throughput of a transaction logged servers
Lotus Domino “Next” – Domino Configuration Tuner (DCT)

- Detect misconfigurations
  - Mistaken settings
  - Incorrectly published values, like RouterMaxConcurrentDeliverySize is in bytes, not Kbytes!

- Detect performance and security issues
  - Recommend best practice performance settings like “Don’t overwrite free space”

- Reduce support costs
  - Support can use QuickTune as initial assessment
  - Administrators can perform self-assessment
  - Administrators can choose to implement recommended corrections
Results For Server: **Ace/Iris**
Total Tests Run: **4**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>Failure</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>Warning (High)</td>
<td>2</td>
<td>50 %</td>
</tr>
<tr>
<td>Warning (Low)</td>
<td>2</td>
<td>50 %</td>
</tr>
<tr>
<td>Normal</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>Exception</td>
<td>0</td>
<td>0 %</td>
</tr>
</tbody>
</table>

Note: Tests with exceptions may not have run to completion

**Rule:** Allowing 'RM_NO_LOG_OBJECTS_IN_MAILBOX' in NOTES.INI to remain absent or set to '0' will cause unnecessarily disk activity.

**Server:** Ace/Iris
**Severity:** Warning (High)

**Explanation**

The RM_NO_LOG_OBJECTS_IN_MAILBOX=1 setting in NOTES.INI will disable transaction logging of objects in mailbox, resulting in improved router performance when large emails are being sent. Notice that if a server goes down during the routing of a large email then that email won't be in the transaction log for recovery. While RM_NO_LOG_OBJECTS_IN_MAILBOX=1 is the recommended configuration, any variation of this setting other than RM_NO_LOG_OBJECTS_IN_MAILBOX=0 should successfully disable the logging. Default: When transaction logging is enabled, then mailbox objects are logged. Technote 1181983 'Transactional Logger Backing up Mail in Mailbox'
http://www-1.ibm.com/support/docview.wss?rs=899&uid=swg21181983

**Recommendations**

Set RM_NO_LOG_OBJECTS_IN_MAILBOX=1 in NOTES.INI to reduce disk activity.

**Links & References**

Technote 1227246 'Server crash results in only one request processed when two requests are sent' (IBM/Lotus Technote)
DCT Requirements and Constraints

- Easy to acquire, update and use
- Updates outside of Domino releases
- Assess existing Domino deployments
- Requires no change to existing Domino servers
  - Client-based tool packaged as self-contained Notes application
  - Data extracted from servers remotely
- Evaluation can be initiated manually or as scheduled
- Easy to expand rule catalog
Easily Modernize Lotus Domino Web Applications
After upgrading to Lotus Domino “Next”...
Lotus Domino “Next” - Major Web Application Enhancements

- Better Looking Domino Web Applications
  - Improvements for existing Domino Web applications
  - Domino Designer additions to better control HTML generation (e.g., CSS, Dojo Widgets)

- Integrate Lotus Component Designer technology
  - Integrate into Domino Designer and Domino Web Server
  - Web Page and Custom Control design elements
  - Ability to completely control look and feel of Web Pages

- Ability to use mashup technologies
Lotus Domino “Next” - Domino Designer in Eclipse!
Lotus Domino “Next” – State of the Art Editors

HTML
Javascript/CSS
Lotuscript
Java
Lotus Notes + Lotus Domino

- Collaboration beyond Email
- Protect your information
- Increase business agility
- Protect investments
Helpful References

Main product page
www.ibm.com/lotus/nd8


“Deploying Lotus Notes and Domino 8” Redbook at
http://www.redbooks.ibm.com/redpieces/abstracts/sg247506.html
The information contained in this publication is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this publication, it is provided AS IS without warranty of any kind, express or implied. In addition, this information is based on IBM’s current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this publication or any other materials. Nothing contained in this publication is intended to, nor shall have the effect of, creating any warranties or representations from IBM or its suppliers or licensors, or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

References in this presentation to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in this presentation may change at any time at IBM’s sole discretion based on market opportunities or other factors, and are not intended to be a commitment to future product or feature availability in any way. Nothing contained in these materials is intended to, nor shall have the effect of, stating or implying that any activities undertaken by you will result in any specific sales, revenue growth or other results.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

IBM, the IBM logo, Lotus, Lotus Notes, Notes, Domino, Quickr, Sametime, WebSphere, UC², PartnerWorld and Lotusphere are trademarks of International Business Machines Corporation in the United States, other countries, or both. Unyte is a trademark of WebDialogs, Inc., in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.
Intel, Intel Centrino, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.
Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.