50 Ways to Make Your Domino Apps Faster

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Who is Jamie Magee?

• Co-founder of MartinScott Consulting
  • Frequent speaker for The View, Lotusphere

• Developing Lotus apps since 1994
  • Designing large apps so they scale well
  • Speeding up slow applications

• Creator of...
  • NoteMan Toolbar for Developers/Admins
    ▶ Change any field on any doc in 5 clicks
  • WirelessMail for Domino
    ▶ “push” email to any handheld

• Blog: JamieMagee.com
Three Things You Need to Know First

• Newer/faster/bigger hardware will not properly fix a poorly designed application
  - Most Domino performance issues are best resolved in the design of the applications first
Three Things You Need to Know First

• **HTTP server is largely a Web wrapper around the Notes Client actions**
  - Most Notes Client performance tuning concepts also apply to the Web
Three Things You Need to Know First

• Rule of 2’s
  ✷ Good (functionality)
  ✷ Inexpensive (development and maintenance effort)
  ✷ Fast (performance)

You can only have two of the above!

Tradeoff
What We’ll Cover …

• Coding for performance
• Managing view indexing activity
• Exploring Web application performance techniques
• Configuring server settings for application performance
• Tracing performance problems
• Monitoring server resources
• Wrap-up
Database Properties

(See Designer Help document “Properties that improve database performance”)
Getting a Handle to a View

• `NotesDatabase.GetView(viewName)`
  - Can be 1 - 2 seconds or more
  - Fastest implementation is when parameter is the true view name – not the alias
    ▶ Using correct case!
  - Using the view alias is easier maintain, but a little slower

LotusScript and Java
Writing to NotesUIDocument

LotusScript

Dim W As New NotesUIWorkspace
Set uidoc = W.currentDocument
Set doc = uidoc.document
doc.status = "Closed"
doc.lastupdated = Now
doc.author = s.username
doc.level = "3"
doc.priority = "High"

Dim W As New NotesUIWorkspace
Set uidoc = W.currentDocument
uidoc.AutoReload = False
Set doc = uidoc.document
doc.status = "Closed"
doc.lastupdated = Now
doc.author = s.username
doc.level = "3"
doc.priority = "High"
Call uidoc.Reload

Updates UI doc only once, after all fields are written
Reading Values on a Doc from a View

Status = doc.Status(0)

Status = doc.ColumnValues(2)

Status is the third column of the view

LotusScript and Java
Shared elements with Notes Client

- Shared fields/actions, subforms, script libraries, etc.
- Client makes one request for each element
- If there are many shared elements and/or a slow network, performance will be slower

Diagram: A flowchart showing the interaction between Domino Server and Notes Client, illustrating the shared elements.
Shared elements with Web client

• In web applications, requesting and assembling shared elements is done right on the server, without network activity for each element
  • No significant effect on performance!

Domino Server

- document
- form
- Subform1
- Subform2
- Scriptlibrary1

Web client

HTML
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View Indexing

• The number one resource hog in Domino

• Every time a document is updated, Domino indexes all auto-indexed views which select the document
  - Notes Client, web submit, scheduled agent

• Performance effect is a function of...
  - # of documents
  - Document content (# of items on each doc)
  - Frequency of document updates
  - Complexity of view design
  - # of views
View Indexing - General tips...

• Use a separate physical disk for view indexing
  ▶ server notes.ini  VIEW_REBUILD_DIR = E:\
  ▶ A cheap IDE drive will do... doesn’t store documents or indexes, just the working directory for view indexing

• Delete unused views
  ▶ How to determine which views are really being used?
View Indexing: How to Know Which Views Are Being Used

• Use the Admin Client
  1. Purge all view indexes
  2. Allow user activity to resume for a week/month
  3. Later, look for re-created indexes (they are active views)
  4. Remove unused views (Size=0) from design
View Complexity

Applying Different Attributes to View Columns
Number of Minutes to Build a View with 5 Columns

Minutes

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLAIN</td>
<td>0</td>
</tr>
<tr>
<td>FORMULAS (5)</td>
<td>15</td>
</tr>
<tr>
<td>SORT (1)</td>
<td>20</td>
</tr>
<tr>
<td>SORT (4)</td>
<td>25</td>
</tr>
<tr>
<td>CATEGORIZE (1)</td>
<td>10</td>
</tr>
<tr>
<td>CATEGORIZE (4)</td>
<td>15</td>
</tr>
</tbody>
</table>

100 Fields
100,000 Documents
Views: Time @Functions

- Avoid @Today, @Now in view formulas
  - Forces the calculation to be done every time the view is opened!

How many seconds does it take to Index a View?

<table>
<thead>
<tr>
<th>Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>25</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>15</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Number of Documents

These databases contain only 1 View and 1 Form
The View has only one column, and the Selection Formula is @All
Views: Time @Functions (cont.)

• To show a “view” of documents more than N days old:
  ∙ A simple daily scheduled agent moves docs in/out of the “old documents” folder (NOT a view)
    ▶ Putting a document in a folder does not modify it -- minimizes replication activity and conflicts
  ∙ Or, daily agent modifies hard-coded date in view formula
    ▶ NotesView.SelectionFormula
  ∙ Or, set view index refresh interval to Manual or “at most every...”
Views: User sortable columns

- Each sort option is an additional view index
- This view has a total of 9 indexes

### Table Example

<table>
<thead>
<tr>
<th>Amount</th>
<th>Paid Date</th>
<th>Due Date</th>
<th>Invoice Number</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.00</td>
<td>02/06/2001</td>
<td>03/08/2001</td>
<td>SONK-4TQABP</td>
<td>MCK00-034: Ass</td>
</tr>
<tr>
<td>$1,770.50</td>
<td>05/22/2001</td>
<td>06/06/2001</td>
<td>JMAF-Aw7P70</td>
<td>MDM-001: Sellin</td>
</tr>
</tbody>
</table>

**Warning**

R8 new column property…

- Defer index creation until first use

---

*IamLUG 2010*
Reader Names can slow view display performance

• A view displays very slowly if...
  - ...there are many documents (e.g., 1,000+) AND
  - ...the user has Read access to only a small number of docs

• Domino must “scan” the view until it finds one page (usually 30) of accessible docs, or the end of the view
Solution...

- For the same resulting view entries, with FAST display...
- Use embedded view, single category = @UserName (@UserNameList for roles and groups)
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Use Server Web Site Rule to Maximize File Caching

• Drastically improve your user’s Web cache
  🡢 The user’s browser will cache many files, but it still needs to check to see if it has the current version each time
    ▶ This can cause 2-3 extra seconds to each page load
  🡢 To fix this we need to tell the user’s browser that certain files are good for “N” days

• Admin needs to set it with a Web Site Rule...
Add Web Site Rule for Date Check Caching

Files in:
Domain/…/cachePath/
will be cached

304 = If-Modified-Since header variable
GZip Will Improve Performance

- GZip is a common compression on Apache, IIS, etc.
  - can be used for CSS, JS, JPG, GIF, etc
- Any browser can handle a GZip file -- but only IF it knows the file is GZip’d
- Used internally in Domino R6.5 iNotes template
  - Not documented for general use, but there is a way...
- How do we configure Domino to tell the browser that certain files are GZip’d?
Add Web Site Rule for GZip

http://Abc.com/web.nsf/gz/LoginScripts.gzip will be served as GZip

<table>
<thead>
<tr>
<th>Basics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>gzip rule</td>
</tr>
<tr>
<td>Type of rule:</td>
<td>HTTP response headers</td>
</tr>
<tr>
<td>Incoming URL pattern:</td>
<td><em>/gz/</em></td>
</tr>
<tr>
<td>HTTP response codes:</td>
<td>200, 206</td>
</tr>
<tr>
<td>Expires header:</td>
<td>Add header only if application did not</td>
</tr>
<tr>
<td>Expires after:</td>
<td>5 days</td>
</tr>
<tr>
<td>Custom headers:</td>
<td>Content-Encoding: gzip, Override</td>
</tr>
</tbody>
</table>

New LotusScript Library
- gz/LoginScripts.gzip
- gz/WebScripts2.gzip
- gz/WebScripts.gzip
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Server Document: Maximum Concurrent Agents

- For agent-intensive applications
- Allow more than two agents to run at the same time
- Monitor your resource utilization after such a change to ensure your system has the CPU and memory to deal with increased activity
Server Document: Web Maximum Concurrent Agents

• Allow more than one agent to run at the same time on the Web

- Enabled — To allow more than one agent to run on the Web server at the same time (asynchronously)
- Disabled (default) — To run only one agent at a time (serially)
NOTES.INI Application Performance Variables

• **VIEW_REBUILD_DIR=<path>**
  - Use a separate physical disk for view indexing

• **Updaters = [number]**
  - Run multiple update tasks to keep view indexes updated
  - Set [number] = number of processors

• **NSF_DbCache_Maxentries = [number]**
  - Number of databases that can be cached at one time
  - Default is 25 or NSF_Buffer_Pool_Size divided by 300 KB
  - If ratio of Database.DbCache.Hits to InitialDbOpen is low, then consider increasing [number]
  - Console command “Dbcache flush” closes cached databases
Configuring Server Settings

- Administrators own these settings, but developers must be aware of them.
- Both parties need to collaborate to determine best settings for each server.
- Make sure to monitor resource utilization before and after making such changes so that you can determine if you have enough hardware to benefit (and not make it worse!)
What We’ll Cover …

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## Performance Debugging: User’s Perspective Indications

<table>
<thead>
<tr>
<th>Performance Symptom</th>
<th>Possible Problem</th>
</tr>
</thead>
</table>
| Opening a view                                           | • Time functions in view formulas  
• Readers’ restrictions on documents  
• Index property not set to Automatic                        |
| Saving a document (submitting from a browser, agent-based saves of other docs) | • Time functions in view formulas  
• Large active views with broad selection formulas  
• Excessive view categorization                                  |
| Creating/opening/saving document                         | • Large, continuous tables on forms  
• Excessive DbLookup/DbColumn operations  
• Inefficient WebQueryOpen/WebQueryClose LotusScript events |
DDM (R7 and Later)

- Domino Domain Manager contains great agent statistical tools
  - Time to run
  - Memory used
- Wrapped in a Domino DB for easy reporting
DDM: Performance warnings

Open Event

Generated by: vienna01/msc
in Domain: MartinScott
Event class: Enhanced
For server: Vienna01/MSC
Database: SamplesiClassList.nsf
Agent: -
User: -

Thursday, August 06, 2009 - 11:46:30 AM
HTTP Server: Full text operations on database 'SamplesiClassList.nsf' which is not full text indexed. This is extremely inefficient.

Warning High

Explanation

- Reported by: HTTP Server
- Severity and type: Warning High in Database
- Probable cause: A full text search has been performed on a database that has no full text index. A temporary full text index is created and then deleted each time this happens. This is extremely inefficient.
- Possible solution: Create a full text index for SamplesiClassList.nsf database on Vienna01/MSC. This can be accomplished by either (1) using the Full Text Index tool from the File tab in the Domino Administrator; or (2) Clicking on File->Database->Properties for the database in question and creating an Index from the Index tab.

Event Change History:
08/06/2009 10:36 AM : Vienna01/MSC - changed state to Open
Agent Profiler (R7 and Later)

- Profile an agent to get detailed performance information
  - Step 1 — Mark the agent to be profiled
  - Step 2 — Run the agent
  - Step 3 — View profile results
Agent Profiler — Sample Output

**Form\Home QOA Profile**

12/13/2007 05:11:46 PM CST  
Elapsed time: 640 msec  
Methods profiled: 18  
Total measured time: 546 msec

<table>
<thead>
<tr>
<th>Class</th>
<th>Method</th>
<th>Operation</th>
<th>Calls</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>View</td>
<td>GetAllDocumentsByKey</td>
<td>Get</td>
<td>7</td>
<td>265</td>
</tr>
<tr>
<td>View</td>
<td>GetDocumentByKey</td>
<td></td>
<td>28</td>
<td>157</td>
</tr>
<tr>
<td>DocumentCollection</td>
<td>GetFirstDocument</td>
<td></td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Document</td>
<td>GetFirstItem</td>
<td></td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Database</td>
<td>GetView</td>
<td></td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>DocumentCollection</td>
<td>GetNextDocument</td>
<td></td>
<td>26</td>
<td>16</td>
</tr>
<tr>
<td>Document</td>
<td>[expandedname]</td>
<td>Get</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td>Document</td>
<td>[expandedname]</td>
<td>Set</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Document</td>
<td>GetItemValue</td>
<td></td>
<td>47</td>
<td>0</td>
</tr>
<tr>
<td>Item</td>
<td>Type</td>
<td>Get</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Document</td>
<td>UniversalID</td>
<td>Get</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Session</td>
<td>CurrentDatabase</td>
<td>Get</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Database</td>
<td></td>
<td>Get</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
**Fiddler Example Output**

### Fiddler - HTTP Debugging Proxy

<table>
<thead>
<tr>
<th>#</th>
<th>Result</th>
<th>Protocol</th>
<th>Host</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.fiddler2.com">www.fiddler2.com</a></td>
<td>/fiddler2/updatecheck.as</td>
</tr>
<tr>
<td>1</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/</td>
</tr>
<tr>
<td>2</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/global.js</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
<td>HTTP</td>
<td>toolbarqueries.goo</td>
<td>/search?client=navclient-1d</td>
</tr>
<tr>
<td>4</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/swfobject.js</td>
</tr>
<tr>
<td>5</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/frontmen</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/stylemain</td>
</tr>
<tr>
<td>7</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/main1.jpg</td>
</tr>
<tr>
<td>8</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/shim.gif</td>
</tr>
<tr>
<td>9</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/3/shim.gif</td>
</tr>
<tr>
<td>10</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/blue_page</td>
</tr>
<tr>
<td>11</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/2/page5.html</td>
</tr>
<tr>
<td>12</td>
<td>200</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/kc/kc_tnsf/0/7675C82</td>
</tr>
<tr>
<td>13</td>
<td>304</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/icons/expand.gif</td>
</tr>
<tr>
<td>14</td>
<td>304</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/icons/lookblank.gif</td>
</tr>
<tr>
<td>15</td>
<td>304</td>
<td>HTTP</td>
<td><a href="http://www.kaplanconnect">www.kaplanconnect</a></td>
<td>/icons/collapse.gif</td>
</tr>
</tbody>
</table>

**Performance Statistics**

- **Request Count:** 12
- **Bytes Sent:** 6,461
- **Bytes Received:** 73,077
- **ACTUAL PERFORMANCE**
  - Requests started at: 16:49:43:8238
  - Responses completed at: 16:49:45:4801
  - Total Sequence time: 00:00:01.6563454

**RESPONSE CODES**

- **HTTP/200:** 12

**RESPONSE BYTES (by Content-Type)**

- image/jpeg: 33,651
- text/css: 7,477
- image/gif: 678
- text/html: 15,759
- application/x-javascript: 12,434

**ESTIMATED WORLDWIDE PERFORMANCE**

The following are VERY rough estimates of downloads.
Undocumented Notes Feature: Uncover Performance Bottlenecks

• Watch behind-the-scenes rendering of forms, subforms, and views (not just code)
  ◆ Remote Procedure Calls (RPCs) = Notes-to-Domino talk
  ◆ See http://MartinScott.com → Resources → Technical Articles
Watching Notes RPCs

- Enable RPC watching on Notes client
  - NOTES.INI file on Notes Client
    - Client_Clock=1
    - Debug_Console=1
    - Debug_Outfile=<path to filename> (optional)
  - Restart Notes client
  - (to DISABLE, remove from NOTES.INI and restart Notes)
Watching Notes RPCs
Understanding RPCs

• Common RPCs and what they indicate

(20-121) OPEN_NOTE: 1045 ms. [28+3906=3934]
(Seq. #), RPC_NAME, time, [bytes_sent+bytes_received=total]

<table>
<thead>
<tr>
<th>RPC_Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open_Session</td>
<td>Authenticate with the server and establish a session</td>
</tr>
<tr>
<td>Open_Database</td>
<td>Find and open a database</td>
</tr>
<tr>
<td>Open_Note</td>
<td>Get the contents of a note (data document, design element, or ACL info)</td>
</tr>
<tr>
<td>Update_Note</td>
<td>Save a document</td>
</tr>
<tr>
<td>Open_Collection</td>
<td>Open a view</td>
</tr>
<tr>
<td>Read_Entries</td>
<td>Get a list of document information from a view or search</td>
</tr>
<tr>
<td>Find_By_Key</td>
<td>Find a document via DBLookup or LotusScript GetDocumentByKey</td>
</tr>
<tr>
<td>Get_Special_Note_ID</td>
<td>Get ACL information</td>
</tr>
<tr>
<td>Close_dB</td>
<td>Close database session</td>
</tr>
</tbody>
</table>
(1-14 [1]) OPEN_DB(CN=Vienna01/O=MSC!!mail\magee2.nsf): (Connect to Vienna01/MSC: 0 ms) (Exch names: 0 ms)
(OPEN_SESSION: 561 ms)
(2-16 [3]) GET_UNREAD_NOTE_TABLE: 571 ms. [134+290=424]
(2-17 [4]) DBGETREPLICAMATCHES: 1692 ms. [290+17452=17742]
(3-17 [5]) OPEN_NOTE(REP85257246:005DD81C-NTFFFF0010,03000400): 841 ms. [176+780=956]
(3-18 [6]) OPEN_DB(CN=Vienna01/O=MSC!!mail\magee2.nsf): 621 ms. [48+1886=1934]
(4-18 [7]) GET_NAMED_OBJECT_ID($profile_015calendarprofile_): 641 ms. [134+290=424]
(4-18 [8]) READ REPLICATION HISTORY: 541 ms. [54+24=78]
(5-18 [9]) OPEN_NOTE(REP85257246:005DD81C-NT00002FE6,00400020): (6-19 [10])
POLL_DEL_SEQNUM: 571 ms. [60+64=12]
4] (Cache entry not found)
(5-19 [10]) DB_REPLINFO_GET: 821 ms. [14+32=46]
1342 ms. [48+9050=9098]
(7-20 [11]) GET_NAMED_OBJECT_ID($profile_024archive database profile_): (6-20 [12]) SEARCH: (Connect to Vienna
01/MSC: 1382 ms) 581 ms. [64+24=88]
(8-20 [13]) OPEN_NOTE(REP85257246:005DD81C-NT000010F2,00400020): (OPEN_SESSION: 531 ms)
520 ms. [48+214=262]
(9-21 [15]) OPEN_COLLECTION(REP85257246:005DD81C-NT0000073E,0040,4008): 1292 ms.
[70+782=852]
(7-21 [16]) OPEN_NOTE(REP85257246:005DD81C-NTFFFF0040,03000400): 551 ms. [110+28=138]
1061 ms. [48+1534=1582]
NRPC Parser Open Source Tool

- Runs on NRPC output files to translate ReplicaIDs, NoteIDs, and commands
  - Much easier to find and understand problems
  - Download for free from www.OpenNTF.org
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- Managing view indexing activity
- Exploring Web application performance techniques
- Configuring server settings for application performance
- Tracing performance problems
- Monitoring server resources
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Resource Monitoring

• Use native Domino Server - Performance tools
  ◦ Activity Logging and Activity Trend analysis
  ◦ Works with historical and current information

• Use operating system tools
  ◦ PerfMon (Windows)
    ▶ Start \ Control Panel \ Administrative Tools \ Performance
  ◦ PerfMeter (UNIX)
  ◦ PerfMon/PEX (AS/400)

• Use during **live** testing to see bottlenecks
How to Open PerfMon
Resource Monitoring

- Example: Agent is bound by CPU, more RAM would not help

![System Monitor graph](image)

Limited by Processor
Resource Monitoring (cont.)

- Example: View index rebuild showing that more RAM and faster drive would help, but more CPU would not.
## Resource Monitoring: Identifying Areas to Improve

<table>
<thead>
<tr>
<th>Limiting Resource</th>
<th>Area of Focus</th>
<th>Improvement Potential</th>
</tr>
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<tbody>
<tr>
<td>Disk Access</td>
<td>• Reduce view complexity, number, and size</td>
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<tr>
<td></td>
<td>• Optimize cache settings in .INI file</td>
<td>♔ ★ ★ ★</td>
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<tr>
<td></td>
<td>• Take advantage of browser caching</td>
<td>★ ★ ★ ★</td>
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<tr>
<td>Processor</td>
<td>• Reduce view complexity, number, and size</td>
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<tr>
<td></td>
<td>• Optimize code implementation</td>
<td>♔ ★ ★ ★</td>
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<tr>
<td></td>
<td>• Optimize server .INI file settings</td>
<td>★ ★ ★ ★</td>
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<tr>
<td></td>
<td>• Disable server screen saver</td>
<td>★ ★ ★ ★</td>
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<td></td>
<td>• Take advantage of browser caching</td>
<td>★ ★ ★ ★</td>
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<tr>
<td>Memory</td>
<td>• Increase server RAM</td>
<td>★ ★ ★ ★ ★</td>
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<tr>
<td></td>
<td>• Optimize .INI file memory settings</td>
<td>★ ★ ★ ★ ★</td>
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<tr>
<td>Network</td>
<td>• Increase network capacity</td>
<td>★ ★ ★ ★ ★</td>
</tr>
<tr>
<td></td>
<td>• Take advantage of browser caching</td>
<td>★ ★ ★ ★ ★</td>
</tr>
</tbody>
</table>
What We’ll Cover …

• Coding for performance
• Managing view indexing activity
• Exploring Web application performance techniques
• Configuring server settings for application performance
• Tracing performance problems
• Monitoring server resources

• Wrap-up
Resources

• **Lotus developerWorks performance zone:**
    ▶ Index to all IBM performance articles

• **www.redbooks.ibm.com**
  - Any Domino book with “Performance” in the name
  - Several other good ones

• **MartinScott.com 30-page performance article:**
  - http://MartinScott.com → Resources → Technical Articles

• **Andre Guirard’s blog: Best Practice Makes Perfect**
  - www-10.lotus.com/ldd/bpmpblog.nsf

• **IBM technote #1234550, “Domino Server Performance Troubleshooting Cookbook”**
7 Key Points to Take Home

• Some LotusScript/Java methods are relatively slow
• Refine and minimize view indexing; remove unused views
• Take advantage of caching and zipping
• Developers and admins should collaborate on server configuration settings that affect application performance
7 Key Points to Take Home (cont.)

• Get familiar with DDM for application performance monitoring
• Agent profiling and NRPC monitoring can tell you a lot about your application design
• Resource monitoring reveals the “pulse” of the server and indicates hardware needs
Your Turn!

Questions

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