



The Iam Lotus User Group

# 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](http://JamieMagee.com)**



# Three Things You Need to Know First

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- **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

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- **HTTP server is largely a Web wrapper around the Notes Client actions**
  - ♦ ?OpenDatabase, ?OpenView, ?OpenForm, ?OpenDocument, ?EditDocument, ?OpenAgent, and ?SaveDocument trigger server actions, just as if requested by a Notes client
  - ♦ 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 ...

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- **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”)

## Properties that improve database performance

Properly setting database properties can improve the performance of database can also improve server performance. In addition, some of

Many of these properties require knowledge of application design. D

### Display images after documents

To quickly display documents that contain images, select the Basics

# 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**



***Tradeoff***



# Writing to NotesUIDocument



**5x**

**Faster** (if there are many fields)

```
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 '...turn off
```

```
Set doc = uidoc.document  
doc.status="Closed"  
doc.lastupdated=Now  
doc.author=s.username  
doc.level="3"  
doc.priority="High"
```

```
Call uidoc.Reload '... manually reload
```

**LotusScript**

Updates UI doc only once,  
after all fields are written

# Reading Values on a Doc from a View



**Status = doc.Status(0)**

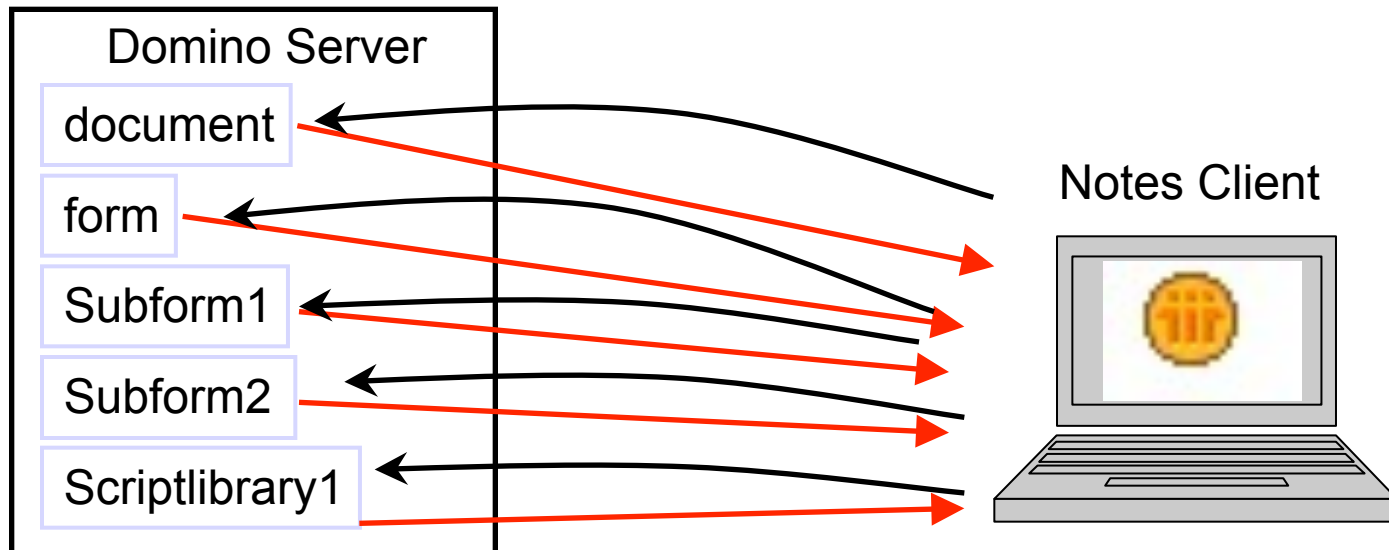
**Status = doc.ColumnValues(2)**

**Status is the third column of the view**

**LotusScript and Java**

# Shared elements with Notes Client

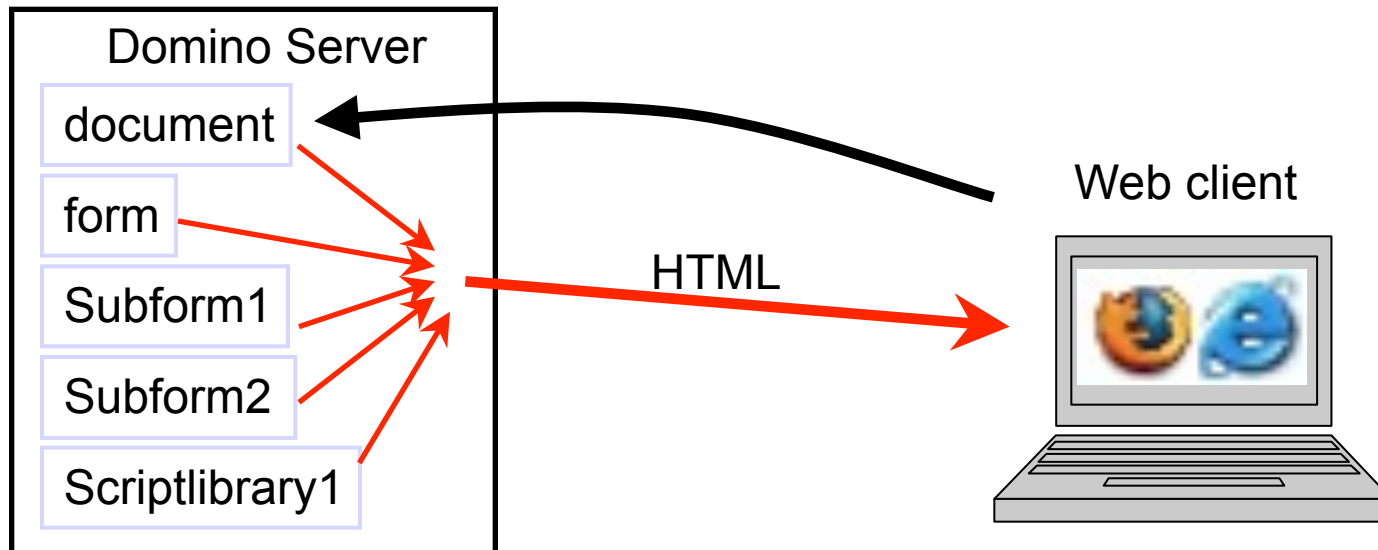
- Shared fields/actions, subforms, script libraries, etc.
- Client makes one request for each element
- If there are many shared elements and/or a slow network, performance will be slower



*Tradeoff*

# 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!



# What We'll Cover ...

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- 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

# 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...

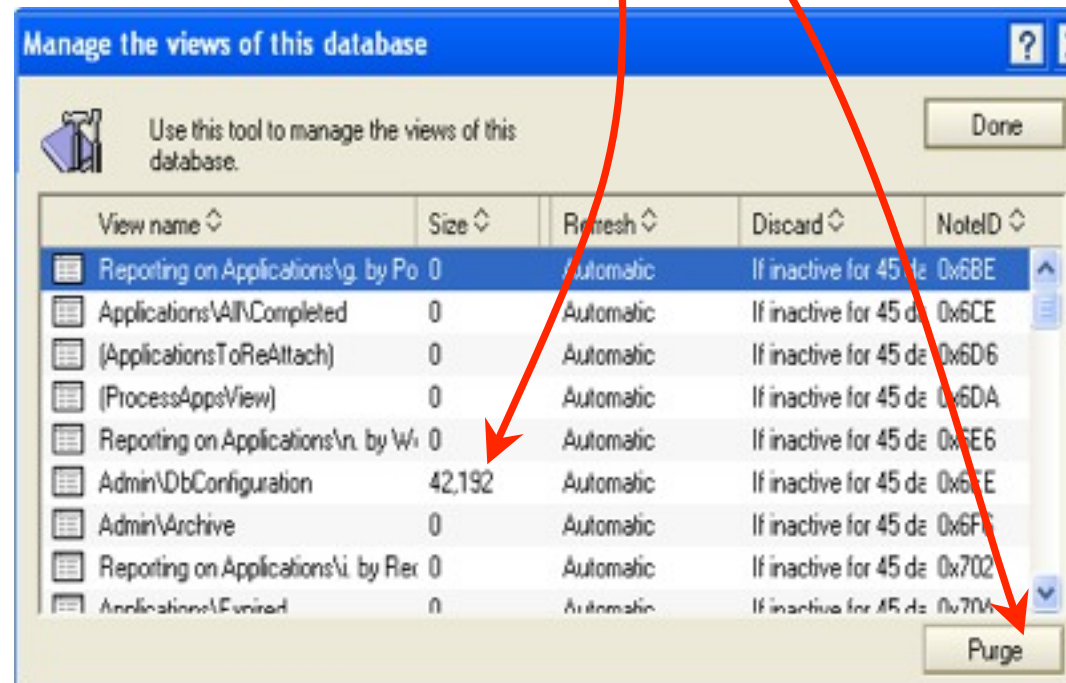
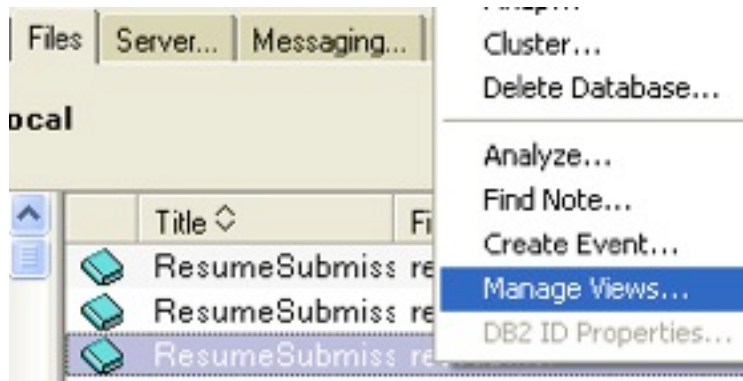
---

- **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



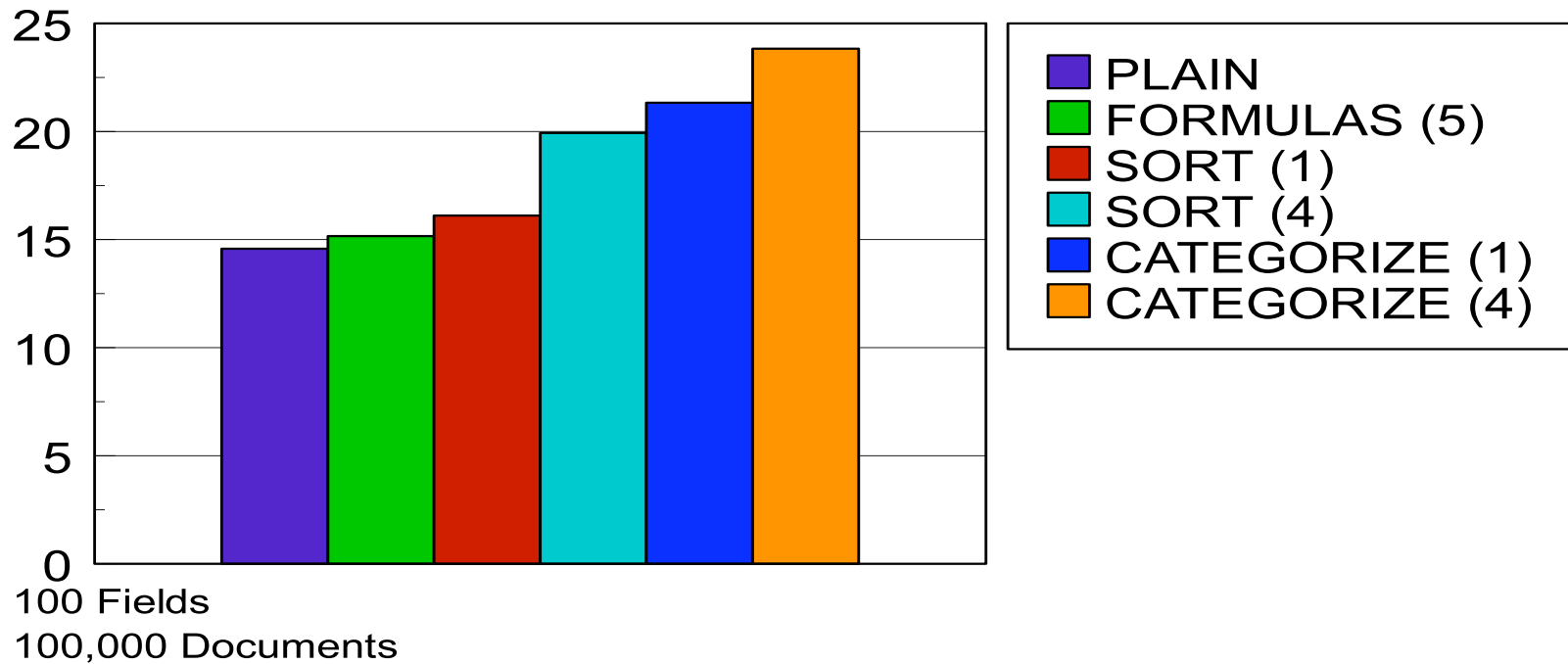


# View Complexity

## Applying Different Attributes to View Columns

Number of Minutes to Build a View with 5 Columns

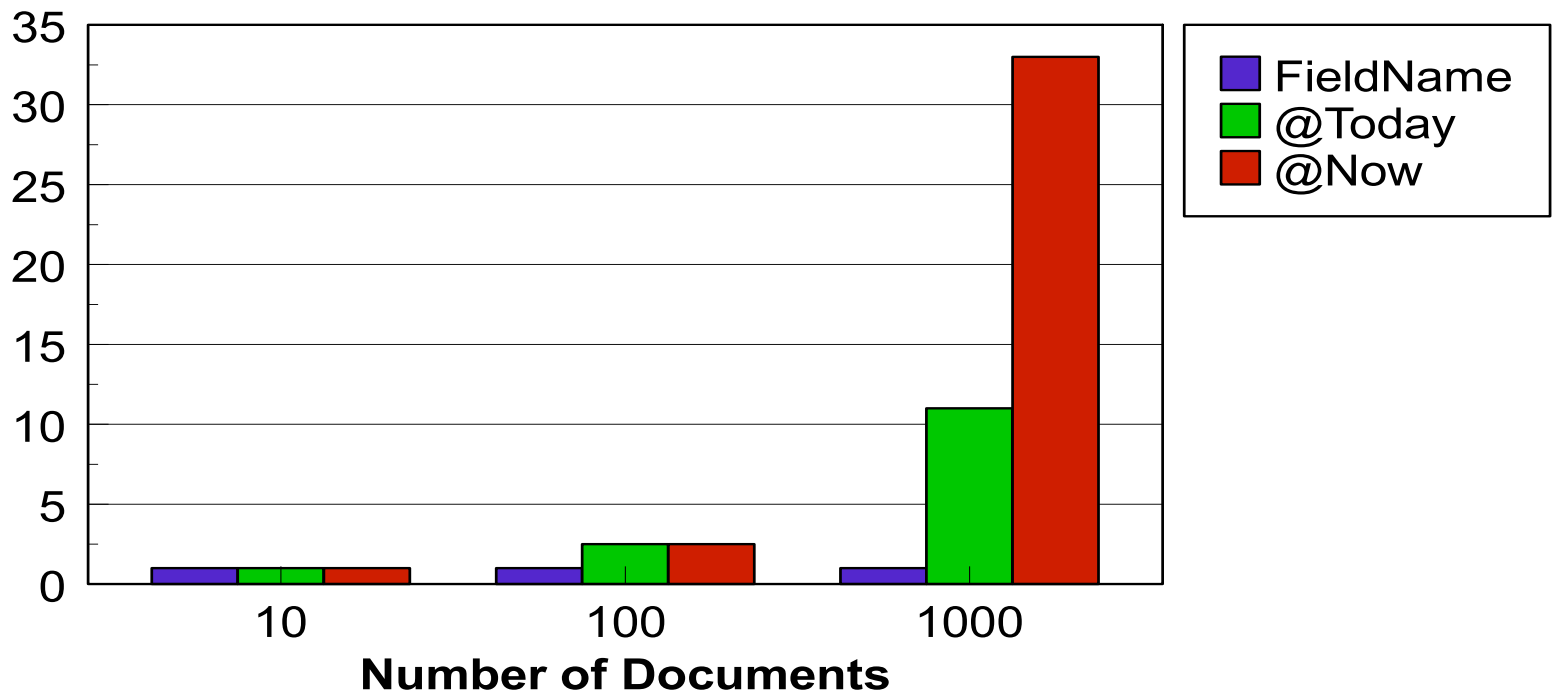
Minutes



# Views: Time @Functions

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

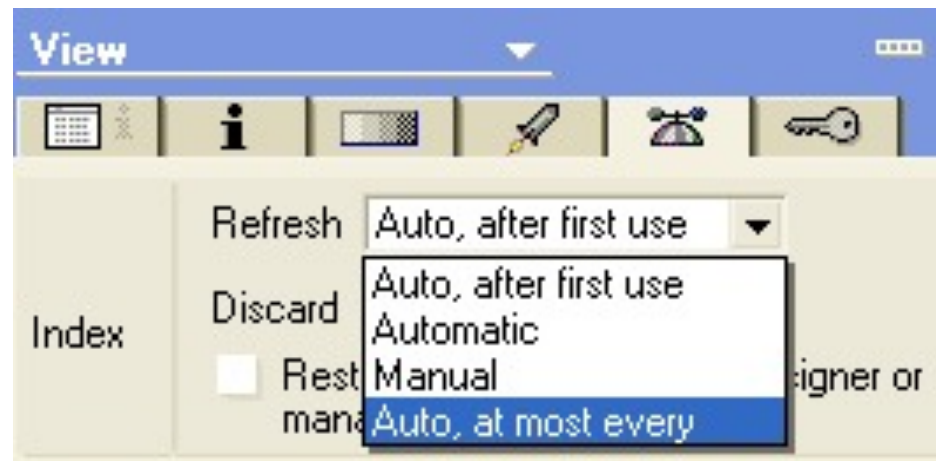
**How many seconds does it take to Index a View?**  
Seconds



These databases contain only 1 View and 1 Form  
The View has only one column, and the Selection Formula is @All



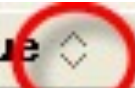
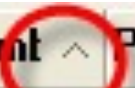




# Views: Time @Functions (cont.)

- 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

Amount 	(Pa Date 	Due 	Invoice Num 	Project 
\$0.00	 02/06/2001	03/08/2001	SONK-4TQABP	MCK00-034: Ass
\$1,720.50	 05/22/2001	 06/06/2001	JM&E-4w7P70	MOM-001: Sellin



**Warning**

R8 new column property...

Categorized is r1at version 5 or greater

Click on column header to sort

Defer index creation until first use

Secondary sort column

# 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

Action Time	Action	Database	Initiator
07/14/2003 12:09:59 AM EDT	Update	mkb.nsf	Jamie Magee/MSC
07/14/2003 12:10:51 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
07/14/2003 12:40:46 AM EDT	Update	names.nsf	Jamie Magee/MSC
07/28/2003 11:28:09 AM EDT	Update	mkb.nsf	Jamie Magee/MSC
07/28/2003 11:28:09 AM EDT	Create	mkb.nsf	Jamie Magee/MSC
07/28/2003 11:42:36 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
08/07/2003 11:49:58 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
08/07/2003 11:49:58 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
08/08/2003 01:57:42 PM EDT	Update	mkb.nsf	Jamie Magee/MSC
08/08/2003 01:57:45 PM EDT	Update	mkb.nsf	Jamie Magee/MSC
08/08/2003 01:59:22 PM EDT	Open	mkb.nsf	Bret Gaskins/MSC
08/08/2003 01:59:24 PM EDT	Open	mkb.nsf	Bret Gaskins/MSC
09/30/2003 07:01:55 PM EDT	Update	mkb.nsf	Jamie Magee/MSC
09/30/2003 09:04:45 PM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/09/2003 10:06:22 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/15/2003 11:51:38 PM EDT	Create	mkb.nsf	Jamie Magee/MSC
10/15/2003 11:55:08 PM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/16/2003 01:15:52 AM EDT	Update	mkb.nsf	Jamie Magee/MSC
10/16/2003 01:28:05 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/21/2003 02:03:21 PM EDT	Open	mkb.nsf	Dayl Rochette/MSC
10/21/2003 02:03:33 PM EDT	Open	mkb.nsf	Dayl Rochette/MSC
10/21/2003 02:06:59 PM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/21/2003 02:55:27 PM EDT	Open	mkb.nsf	Jamie Magee/MSC
10/22/2003 11:51:32 AM EDT	Update	mkb.nsf	Jamie Magee/MSC
10/22/2003 11:58:31 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/23/2003 10:24:50 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/23/2003 10:24:50 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC
10/23/2003 10:24:51 AM EDT	Open	mkb.nsf	Bret Gaskins/MSC



Action Time	Action	Database	Initiator
10/21/2003 02:03:21 PM EDT	Open	mkb.nsf	Dayl Rochette/MSC
10/21/2003 02:03:33 PM EDT	Open	mkb.nsf	Dayl Rochette/MSC

# Solution...

- For the same resulting view entries, with FAST display...
- Use embedded view, single category = @UserName (@UserNameList for roles and groups)

The screenshot shows a Lotus Notes Designer window titled "(Untitled) - Form". The main area displays a view template named "\$\$ViewTemplate for MyView" with the following data:

Initiator ^	Action Time	Action ^	Databa:
Jamie Magee/MSC	07/14/2003 12:09:59 AM EDT	Update	mkb.nsf
Bret Gaskins/MSC	07/14/2003 12:10:51 AM EDT	Open	mkb.nsf
Jamie Magee/MSC	07/14/2003 12:40:46 AM EDT	Update	names.nsf
Jamie Magee/MSC	07/28/2003 11:28:09 AM EDT	Update	mkb.nsf
Jamie Magee/MSC	07/28/2003 11:28:09 AM EDT	Create	mkb.nsf

Below the table, the "Objects" pane shows a tree view with "Embedded View" selected. The "Reference" pane shows the configuration for the "Embedded View : Show single category" object. The text "Enter text (enclosed in quotes) or a formula:" is followed by the formula "@UserName".

# What We'll Cover ...

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- Coding for performance
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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

## Web Site Rule

Basics | Comments | Administration

### Basics

Description:	Cache Rule
Type of rule:	HTTP response header
Incoming URL pattern:	*/cachePath/
HTTP response codes:	200, 206, 304
Expires header:	<input type="radio"/> Don't add header <input checked="" type="radio"/> Add header only if application did not <input type="radio"/> Always add header (override application's header)
	<input checked="" type="radio"/> Specify as number of days <input type="radio"/> Specify as date
	Expires after 90 days

304 = If-Modified-Since header variable

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



# 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

**Web Site Rule**

Basics | Comments | Administration

**Basics**

Description:

Type of rule:

Incoming URL pattern:

HTTP response codes:

Expires header:

- Don't add header
- Add header only if application did not
- Always add header (override application's head

Specify as number of days

Specify as date

Expires after  days

Custom headers:

Name: <input type="text" value="Content-Encoding"/>	Value: <input type="text" value="gzip"/>	<input checked="" type="checkbox"/> Override
Name: <input type="text"/>	Value: <input type="text"/>	<input type="checkbox"/> Override
Name: <input type="text"/>	Value: <input type="text"/>	<input type="checkbox"/> Override

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

New LotusScript Library

Name	Library
gz/LoginScripts.gzip	JavaScri
gz/WebScripts2.gzip	JavaScri
gz/WebScripts.gzip	JavaScri

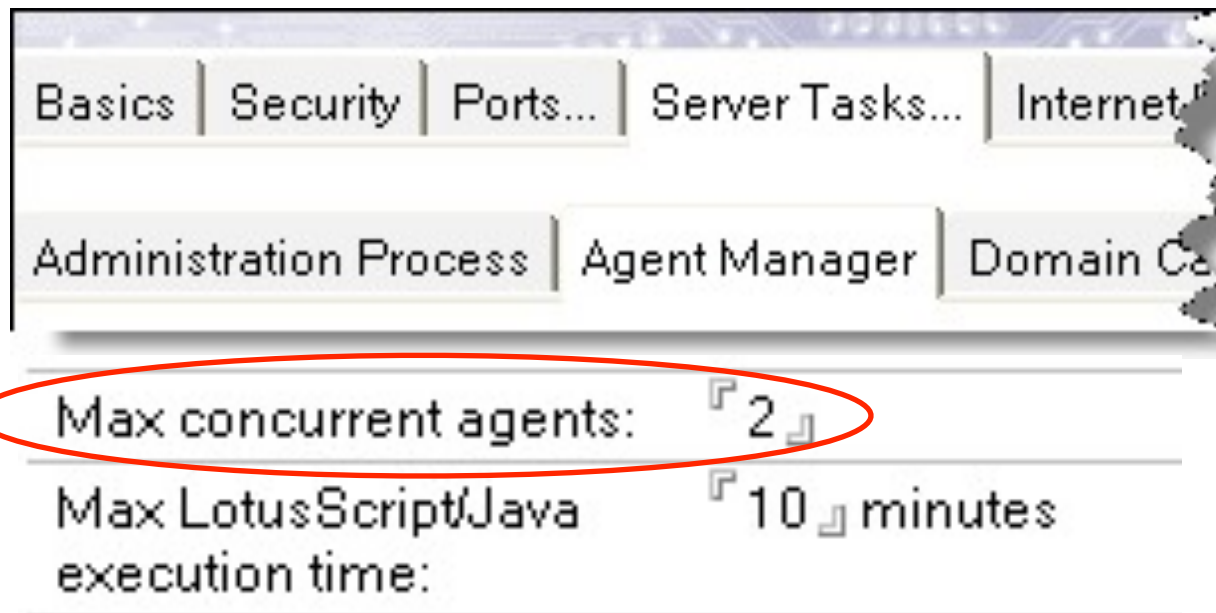
# What We'll Cover ...

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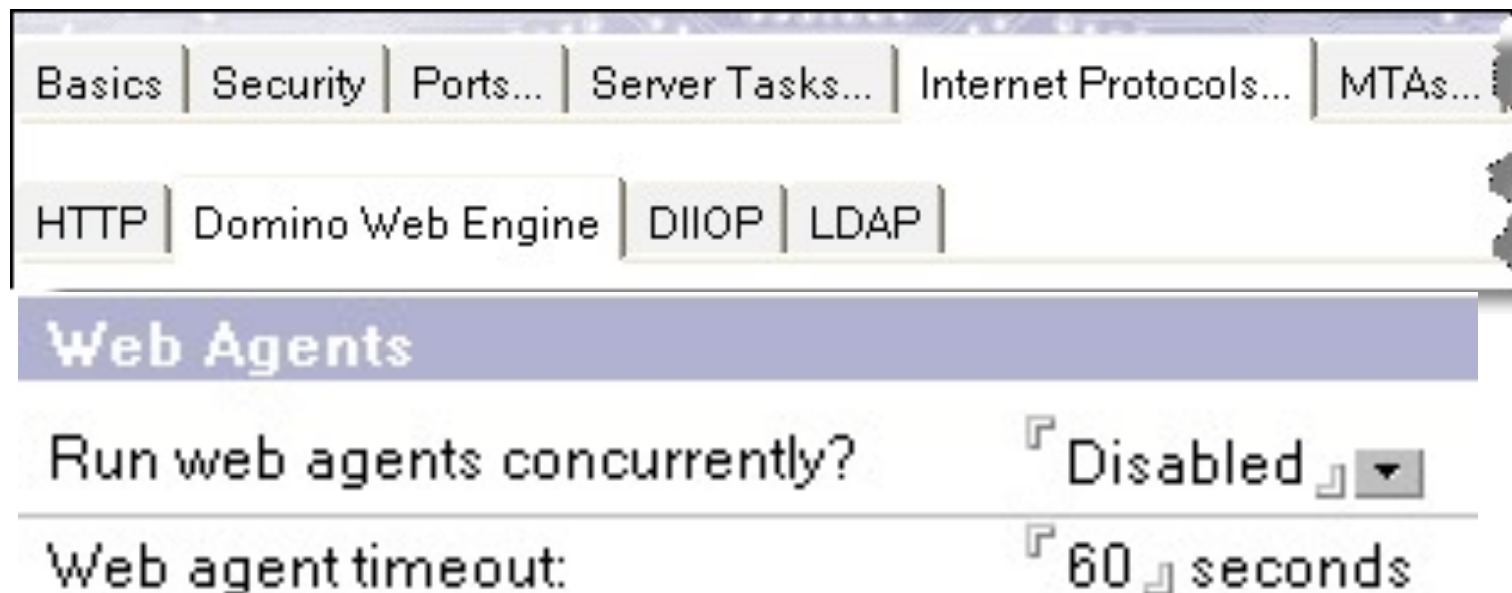
# Server Document: Maximum Concurrent Agents

- 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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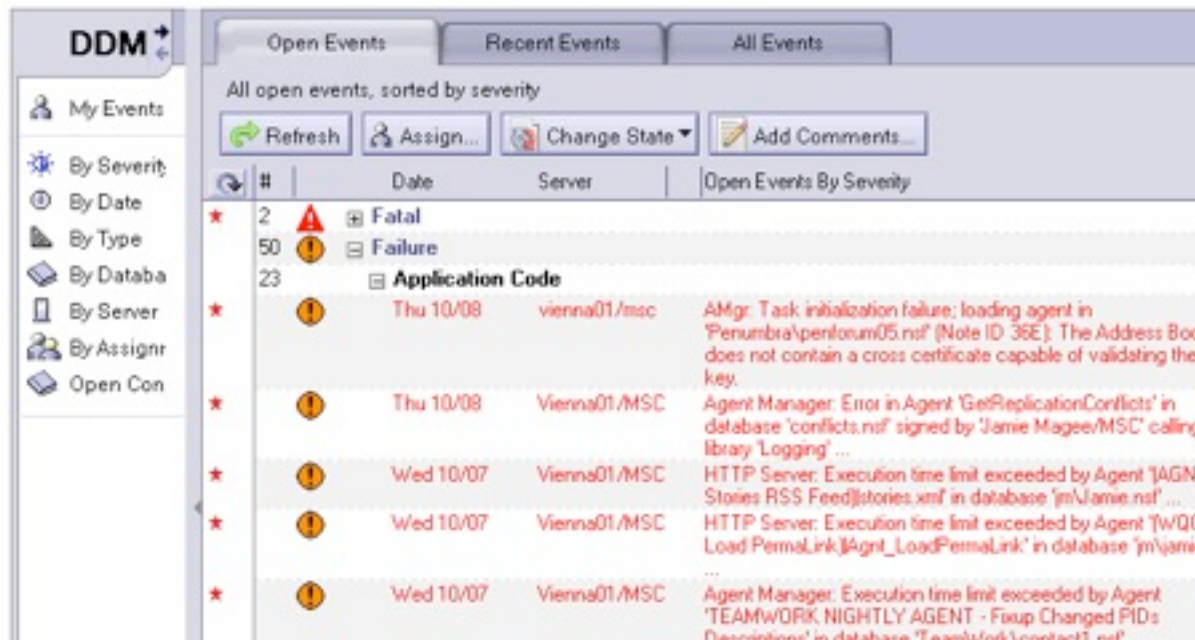
- **Coding for performance**
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# Performance Debugging: User's Perspective Indications

<b>Performance Symptom</b>	<b>Possible Problem</b>
Opening a view	<ul style="list-style-type: none"><li>• Time functions in view formulas</li><li>• Readers' restrictions on documents</li><li>• Index property not set to Automatic</li></ul>
Saving a document (submitting from a browser, agent-based saves of other docs)	<ul style="list-style-type: none"><li>• Time functions in view formulas</li><li>• Large active views with broad selection formulas</li><li>• Excessive view categorization</li></ul>
Creating/opening/saving document	<ul style="list-style-type: none"><li>• Large, continuous tables on forms</li><li>• Excessive DbLookup/DbColumn operations</li><li>• Inefficient WebQueryOpen/WebQueryClose LotusScript events</li></ul>

# 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**



The screenshot displays the Domino Domain Manager (DDM) interface. On the left is a navigation pane with options: My Events, By Severity, By Date, By Type, By Database, By Server, By Assigner, and Open Con. The main area shows a table of open events, sorted by severity. The table has columns for #, Date, Server, and Open Events By Severity. The events listed include:

#	Date	Server	Open Events By Severity
2			Fatal
50			Failure
23			Application Code
*	Thu 10/08	vienna01/msc	AMgr: Task initialization failure; loading agent in 'Penumbra\penforum05.nsf' (Note ID 35E). The Address Book does not contain a cross certificate capable of validating the key.
*	Thu 10/08	Vienna01/MSC	Agent Manager: Error in Agent 'GetReplicationConflicts' in database 'conflicts.nsf' signed by 'Jamie Mageev/MSC' calling library 'Logging' ...
*	Wed 10/07	Vienna01/MSC	HTTP Server: Execution time limit exceeded by Agent '[AGN Stories RSS Feed]stories.xml' in database 'jm\Jamie.nsf' ...
*	Wed 10/07	Vienna01/MSC	HTTP Server: Execution time limit exceeded by Agent '[WQC Load PermaLink]Agn_LoadPermaLink' in database 'jm\jamie ...
*	Wed 10/07	Vienna01/MSC	Agent Manager: Execution time limit exceeded by Agent 'TEAMWORK NIGHTLY AGENT - Fixup Changed PIDs Description' in database 'Teamw\wik\contact1.nsf'

# DDM: Performance warnings

Assign... Change State Add Comments...

## Open Event

(This event is not assigned to anyone)

Generated by: vienna01/msc For server: Vienna01/MSK  
in Domain: MartinScott Database: Samples\ClassList.nsf  
Event class: Enhanced Agent: -  
User: -

**?** Thursday, August 06, 2009 - 11:46:30 AM (6 occurrences, first seen at 11:36:07 AM that d

Warning High

HTTP Server: Full text operations on database 'Samples\ClassList.nsf' which is not full text indexed. This is extremely inefficient.

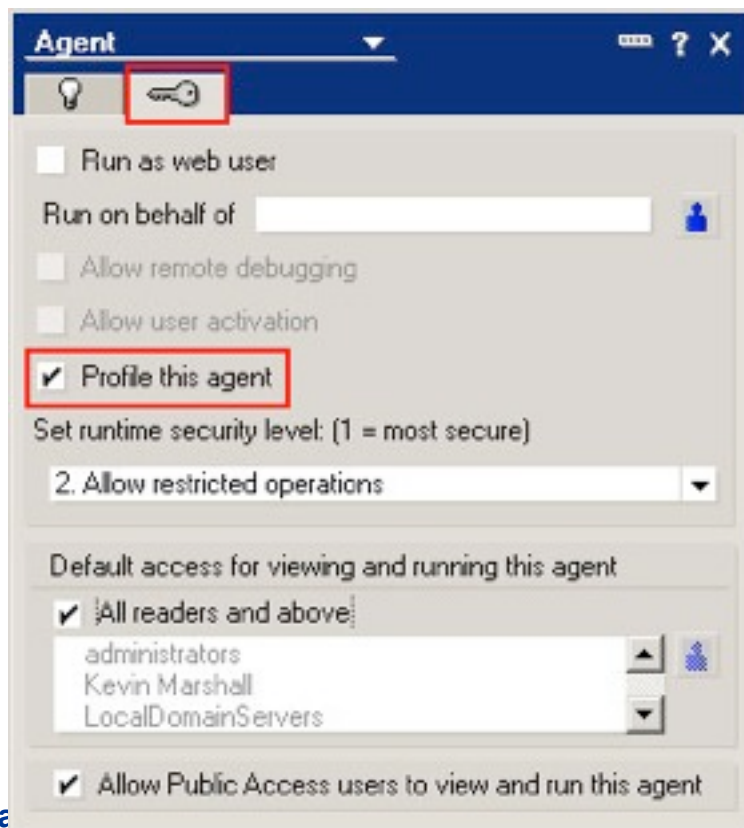
Explanation

- 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 Samples\ClassList.nsf database on Vienna01/MSK. 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/MSK - 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

Class	Method	Operation	Calls	Time
View	GetAllDocumentsByKey		7	265
View	GetDocumentByKey		28	157
DocumentCollection	GetFirstDocument		7	32
Document	GetFirstItem		25	30
Database	GetView		5	16
DocumentCollection	GetNextDocument		26	16
Document	[expandedname]	Get	55	15
Document	[expandedname]	Set	6	15
Document	GetItemValue		47	0
Item	Type	Get	25	0
Document	UniversalID	Get	22	0
Session	CurrentDatabase	Get	4	0
Database	Get	Get	2	0



# Fiddler Example Output

**Fiddler - HTTP Debugging Proxy**

File Edit Rules Tools View Help

Web Sessions

#	Result	Protocol	Host	URL
0	200	HTTP	www.fiddler2.com	/fiddler2/updatecheck.as
1	200	HTTP	www.kaplanconnec...	/
2	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/global.js
3	200	HTTP	toolbarqueries.goo...	/search?client=navclient-
4	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/swfobject.j
5	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/FrontMer
6	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/styleair
7	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/main1.jp
8	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/shim.gif
9	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/shim.gif
10	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/blue_pag
11	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/2/pageSha
12	200	HTTP	www.kaplanconnec...	/kc/kc_tx.nsf/0/7675C82
13	304	HTTP	www.kaplanconnec...	/icons/expand.gif
14	304	HTTP	www.kaplanconnec...	/icons/ecblank.gif
15	304	HTTP	www.kaplanconnec...	/icons/collapse.gif

Performance Statistics | Session Inspector | AutoResponder | R...

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

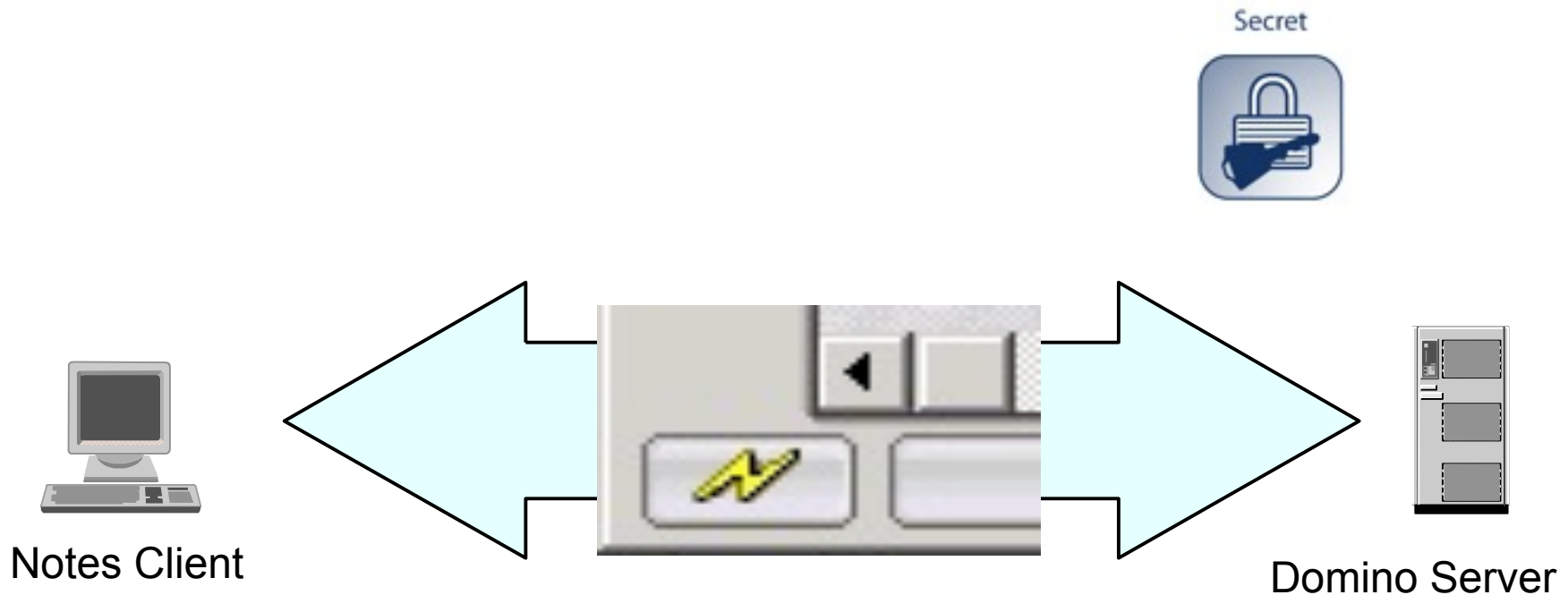
RESPONSE CODES  
-----  
HTTP/200: 12

RESPONSE BYTES (by Content-Type)  
-----  
image/jpeg: 33,651  
text/css: 7,477  
image/gif: 678  
~headers: 3,078  
text/html: 15,759  
application/x-javascript: 12,434

ESTIMATED WORLDWIDE PERFORMANCE  
-----  
The following are VERY rough estimates of dow

# Undocumented Notes Feature: Uncover Performance Bottlenecks

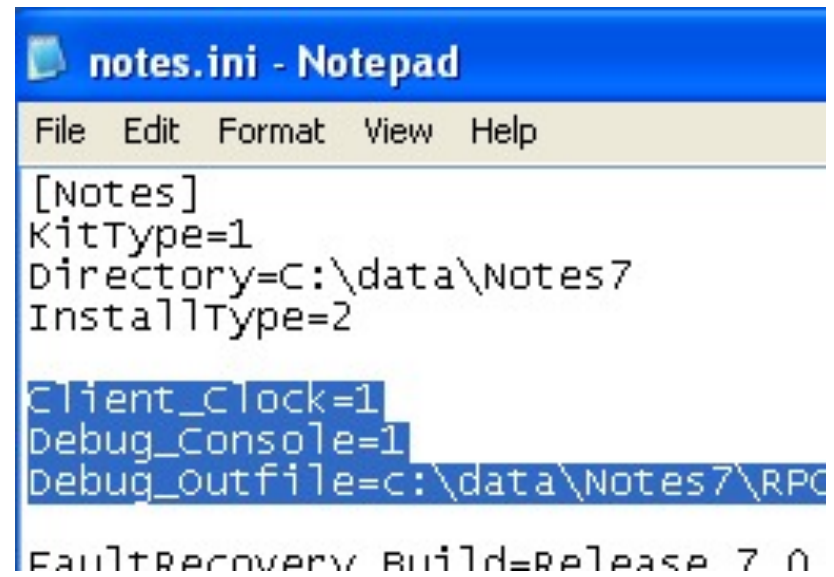
- **Watch behind-the-scenes rendering of forms, subforms, and views (not just code)**
  - ♦ Remote Procedure Calls (RPCs) = Notes-to-Domino talk
  - ♦ See <http://MartinScott.com> → Resources → Technical Articles





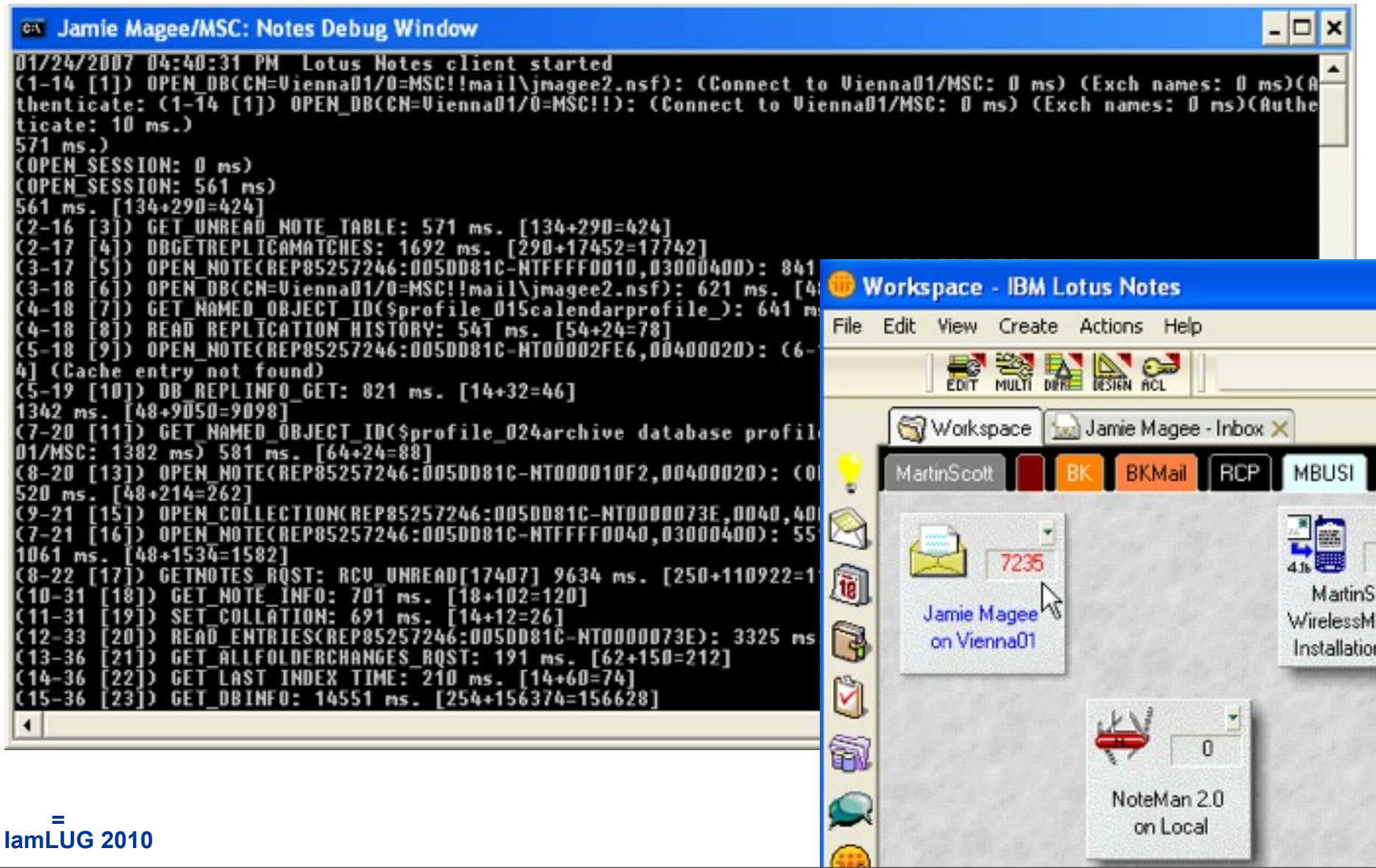
# Watching Notes RPCs

- **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)**



```
notes.ini - Notepad
File Edit Format View Help
[Notes]
KitType=1
Directory=C:\data\Notes7
InstallType=2
Client_Clock=1
Debug_Console=1
Debug_Outfile=c:\data\Notes7\RPC
FaultRecovery Build=Release 7 0
```

# Watching Notes RPCs



The image shows a Windows desktop with two overlapping windows. The background window is the IBM Lotus Notes client, titled "Workspace - IBM Lotus Notes". It features a menu bar (File, Edit, View, Create, Actions, Help) and a toolbar with icons for EDIT, MULTI, DIFF, DESIGN, and ACL. Below the toolbar, there are tabs for "Workspace" and "Jamie Magee - Inbox". A row of buttons includes "MartinScott", "BK", "BKMail", "RCP", and "MBUSI". The main content area displays a list of items, with one item highlighted: a yellow envelope icon, a red number "7235", and the text "Jamie Magee on Vienna01". Other items include a calendar icon with "18", a mobile phone icon with "4.1b" and "MartinS WirelessM Installation", and a red Swiss Army knife icon with "0" and "NoteMan 2.0 on Local".

The foreground window is titled "C:\ Jamie Magee/MSC: Notes Debug Window". It displays a log of Lotus Notes client activity, including connection attempts, session openings, and data retrieval operations. The log entries are as follows:

```
01/24/2007 04:40:31 PM Lotus Notes client started
(1-14 [1]) OPEN_DB(CN=Vienna01/0=MSC!!mail\jmagee2.nsf): (Connect to Vienna01/MSC: 0 ms) (Exch names: 0 ms)(A
thenticate: (1-14 [1]) OPEN_DB(CN=Vienna01/0=MSC!!): (Connect to Vienna01/MSC: 0 ms) (Exch names: 0 ms)(Authe
ticate: 10 ms.)
571 ms.)
(OPEN_SESSION: 0 ms)
(OPEN_SESSION: 561 ms)
561 ms. [134+290=424]
(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(REP85257246:0050081C-NTFFFF0010,03000400): 841
(3-18 [6]) OPEN_DB(CN=Vienna01/0=MSC!!mail\jmagee2.nsf): 621 ms. [4
(4-18 [7]) GET_NAMED_OBJECT_ID($profile_015calendarprofile_): 641 m
(4-18 [8]) READ_REPLICATION_HISTORY: 541 ms. [54+24=78]
(5-18 [9]) OPEN_NOTE(REP85257246:0050081C-NT00002FE6,00400020): (6-
4) (Cache entry not found)
(5-19 [10]) DB REPLINFO GET: 821 ms. [14+32=46]
1342 ms. [48+9050=9098]
(7-20 [11]) GET_NAMED_OBJECT_ID($profile_024archive database profil
01/MSC: 1382 ms) 581 ms. [64+24=88]
(8-20 [13]) OPEN_NOTE(REP85257246:0050081C-NT000010F2,00400020): (0
520 ms. [48+214=262]
(9-21 [15]) OPEN_COLLECTION(REP85257246:0050081C-NT0000073E,0040,40
(7-21 [16]) OPEN_NOTE(REP85257246:0050081C-NTFFFF0040,03000400): 55
1061 ms. [48+1534=1582]
(8-22 [17]) GETNOTES RQST: RCU UNREAD[17407] 9634 ms. [250+110922=1
(10-31 [18]) GET_NOTE_INFO: 701 ms. [18+102=120]
(11-31 [19]) SET_COLLATION: 691 ms. [14+12=26]
(12-33 [20]) READ_ENTRIES(REP85257246:0050081C-NT0000073E): 3325 ms
(13-36 [21]) GET_ALLFOLDERCHANGES_RQST: 191 ms. [62+150=212]
(14-36 [22]) GET_LAST_INDEX_TIME: 210 ms. [14+60=74]
(15-36 [23]) GET_DBINFO: 14551 ms. [254+156374=156628]
```

# 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]

RPC Name	Description
Open_Session	Authenticate with the server and establish a session
Open_Database	Find and open a database
Open_Note	Get the contents of a note (data document, design element, or ACL info)
Update_Note	Save a document
Open_Collection	Open a view
Read_Entries	Get a list of document information from a view or search
Find_By_Key	Find a document via DBLookup or LotusScript GetDocumentByKey
Get_Special_Note_ID	Get ACL information
Close_dB	Close database session

# RPC monitor output

(1-14 [1]) OPEN\_DB(CN=Vienna01/O=MSC!!mail\jimagee2.nsf): (Connect to Vienna01/MSC: 0 ms) (Exchange 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\jimagee2.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=124]  
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 ReplicalDs, NoteIDs, and commands**
  - ♦ **Much easier to find and understand problems**
  - ♦ **Download for free from [www.OpenNTF.org](http://www.OpenNTF.org)**

Seq	Command	ms	Sent	Rec'd
23	Retrieves the content of a document from database Andrew Magerman	391	48	11744
24	Retrieves the profile document \$profile_024archive database profile_	150	64	24
25	Retrieves the content of a document from database Andrew Magerman	140	48	234
26	Open View (\$Inbox) from database Andrew Magerman	140	130	52
27	Retrieves some note info, we think from a view note but are not sure...	161	18	102
28	Gets the collation for the view. A collation is a set of columns and sort specifications that determines how the view or folder will be sorted.	130	12	14
29	Reads entries (sends data) from view (\$Inbox) from database Andrew Magerman	331	76	5012
30	GET_ALLFOLDERCHANGES_RQST	150	62	64
31	FINDDESIGN_NOTES	281	44	16
32	Retrieves the content of design element named (MailPolicy)\MailPolicy from database Andrew Magerman	1001	48	44988
33	Retrieves the content of a document from database Andrew Magerman	420	48	6446
34	Retrieves the content of a document from database Andrew Magerman	801	48	12134
35	Retrieves the content of a document from database Andrew Magerman	611	48	21206
36	Open View (\$Drafts) from database Andrew Magerman	831	130	52
37	Close View (\$Inbox) from database Andrew Magerman	0	12	0
		8041	2272	107300

# What We'll Cover ...

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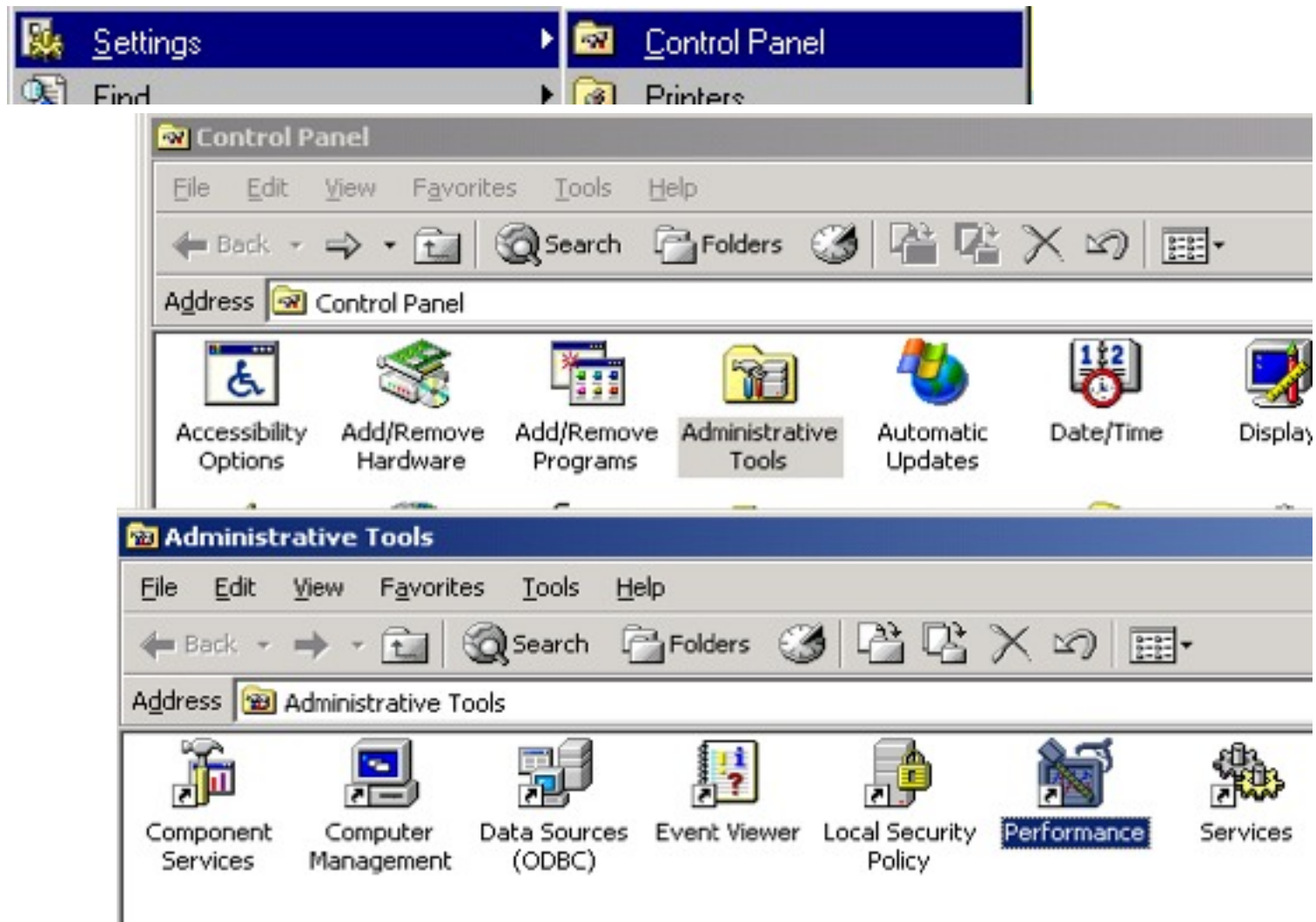
- Coding for performance
- Managing view indexing activity
- Exploring Web application performance techniques
- Configuring server settings for application performance
- Tracing performance problems
- **Monitoring server resources**
- Wrap-up



# 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**

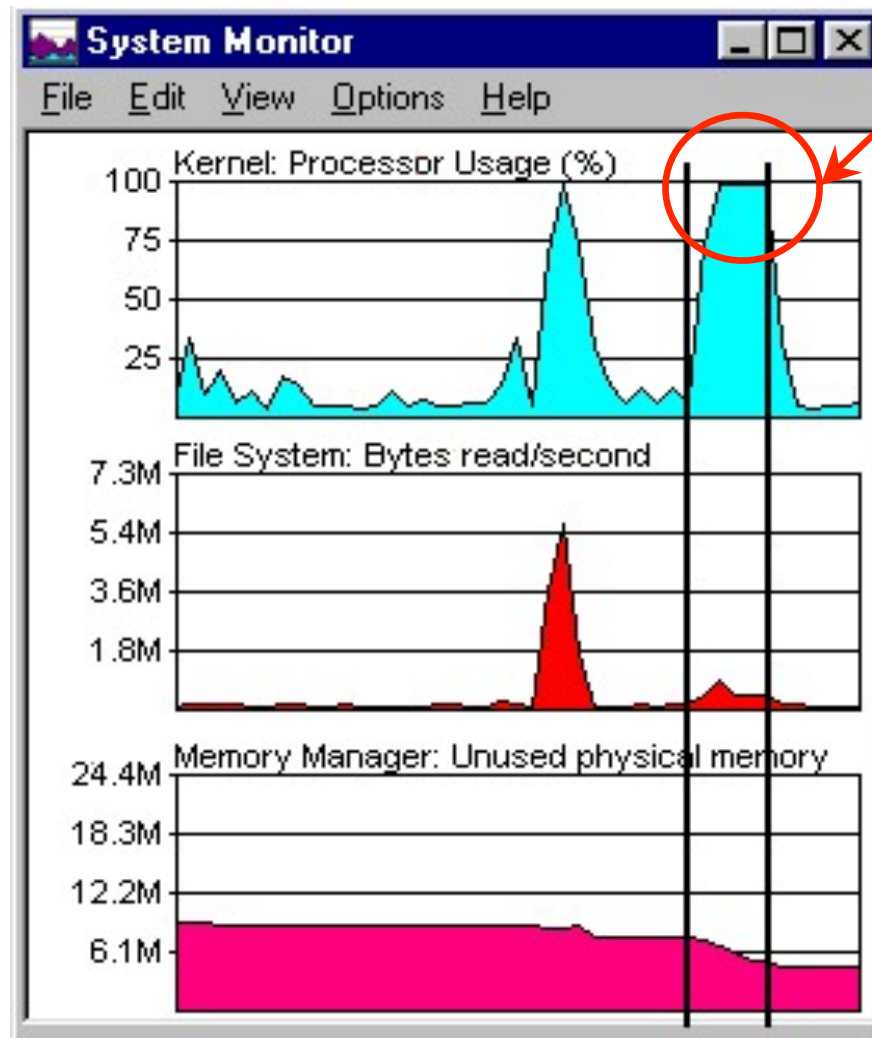
# How to Open PerfMon





# Resource Monitoring

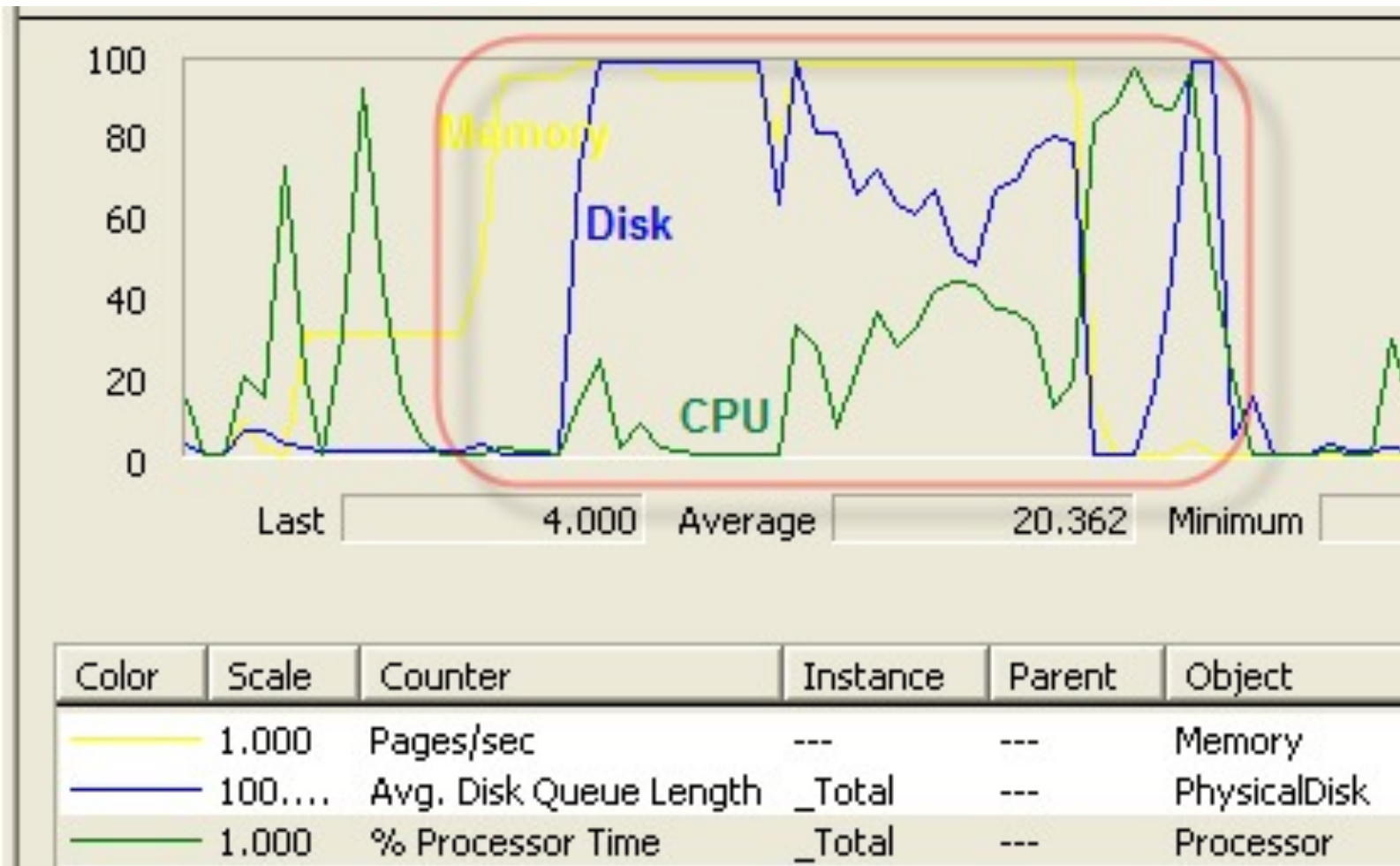
- Example: Agent is bound by CPU, more RAM would not help



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

Limiting Resource	Area of Focus	Improvement Potential
<b>Disk Access</b>	<ul style="list-style-type: none"> <li>•Reduce view complexity, number, and size</li> <li>•Optimize cache settings in .INI file</li> <li>•Take advantage of browser caching</li> </ul>	★ ★ ★ ★ ★ ★
<b>Processor</b>	<ul style="list-style-type: none"> <li>•Reduce view complexity, number, and size</li> <li>•Optimize code implementation</li> <li>•Optimize server .INI file settings</li> <li>•Disable server screen saver</li> <li>•Take advantage of browser caching</li> </ul>	★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★
<b>Memory</b>	<ul style="list-style-type: none"> <li>•Increase server RAM</li> <li>•Optimize .INI file memory settings</li> </ul>	★ ★ ★ ★ ★
<b>Network</b>	<ul style="list-style-type: none"> <li>•Increase network capacity</li> <li>•Take advantage of browser caching</li> </ul>	★ ★ ★ ★ ★

# What We'll Cover ...

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- **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:**
  - ◆ [www.ibm.com/developerworks/lotus/performance](http://www.ibm.com/developerworks/lotus/performance)
    - ▶ **Index to all IBM performance articles**
- **[www.redbooks.ibm.com](http://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](http://www-10.lotus.com/ldd/bpmpblog.nsf)
- **IBM technote #1234550, “Domino Server Performance Troubleshooting Cookbook”**

# 7 Key Points to Take Home

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- **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.)

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- **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!

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Questions



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