IBM
ENVISION
DECISIONS
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Domino Server Performance Best Practices - BP113

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A holistic approach to Performance Management

- You need to take care about all levels
  - Hardware
    - Disk Drives, Memory, CPU, Network
  - Operating Systems
    - Parameters, Subsystems, ...
  - Notes Infrastructure
    - Server, Server settings, Transaction Log, ...
  - Databases & Database Settings
  - Applications
    - Use the right techniques designing & coding your applications

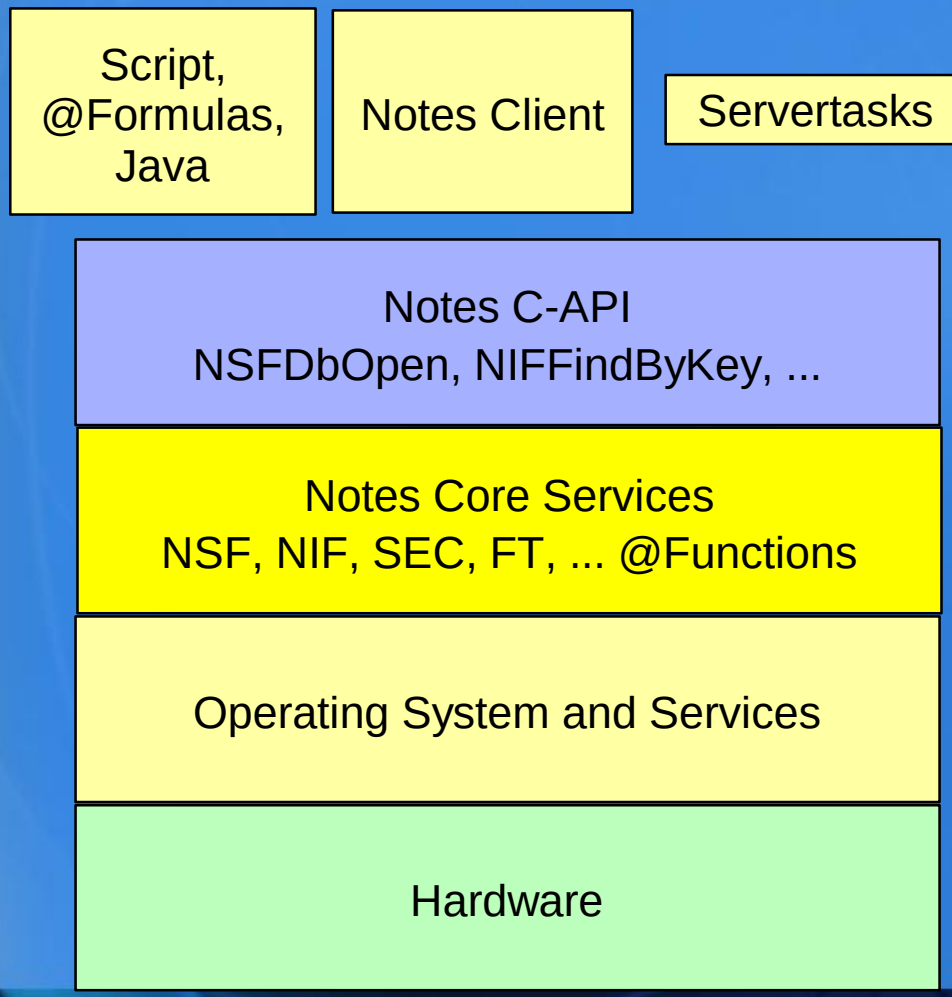
What Appears to Be the Problem?

- This is always Step #1
- Need clear understanding of performance problem
  - Are all users affected?
  - When is problem occurring?
  - What applications are running on system?
  - How long has performance problem been occurring?
  - Is the problem perceived response time problems?
  - Is the problem defined as high CPU utilization?

Do We Have a Healthy System?

- Step #2 involves determining if overall system is healthy
- A number of tools to use for this step
- Need to look at each of the following:
  - CPU
  - Memory
  - I/O
  - Network
- Some tools are "free" and some are "fee-based"

Overview Domino, OS and Hardware



Platform independent Notes C-API calls based on lower level core functions & routines

Notes Core services which encapsulate Notes and OS-specific functionality

Platform specific calls and services like NLS, memory management, TCP/IP, file services

Memory, Disk, CPU, other I/O devices

"Best platform for Domino?" really means "Which platform fits my environment?"

- Domino scales to the limit of the underlying platform
  - Linux is a good choice for small/medium workload
  - AIX, Solaris & iSeries are the right choice for larger systems
- A lot customers use Linux in DMZ for security reasons
  - (IPTables stateful packet filter in kernel, SSH, ...)
- Mixed environment with Linux for smaller servers and Unix for larger machines
  - With current Kernel 2.4 Linux is an excellent alternate platform for Windows based Intel machines
  - D7 with 2.6 kernel will really rock (IOCP support via sys-epoll)!
- AIX 5.x on Regatta Servers is great technology for consolidated server infrastructures - we have already customers using it.

Get the most out of your hardware

- Some resources within Domino are limited
  - Agent Manager, Indexer, Task Scheduler take a lot of time to go thru all databases
  - Control of concurrent access to databases needs to be coordinated (semaphores) also for backend access (NIF, ...)
- It makes sense to use partitioning to get most out of your hardware
  - In D6 Partitioning is part of the normal license
  - Use PercentSysAvailResources=n
- Even large boxes only scale if partitioned
  - Different platforms support different memory sizes
  - Don't use memory/buffer tuning if not really needed!

Memory (RAM)

- Memory is "relatively" cheap
  but can enhance performance a lot
  - Domino uses memory for internal caching/processing (e.g. NSF Buffers)
- On Unix check the security settings for resources limitations
  - e.g. AIX: /etc/security/limits
- Be aware of differences between shared memory (pools etc.) and local memory (per servertask)
- Windows can only use about 2,3 GB Memory for all partitions on a single box
  - Linux can use up to 4 GB per box on multiple partitions
    AIX and Solaris 32Bit application running on 64Bit OS
    - each partition can benefit from an own 32Bit address space

Networking

- Make sure you have the right network infrastructure
  - Check bottlenecks between different parts of the network
  - Use switched networks and maybe a backbone for your servers
  - Do not use automatic speed/duplex settings for clients and servers!!
  - Make sure you use the right networking parameters for your environment like MTU (Domino will use it see e.g. LKB #192867 for Windows and search for iSeries and Unix)
  - Remove all network services/protocols you do not use
  - netstat -an is your friend

Domino Performance "Features"

- Use transaction log and View Rebuild
  - e.g. view_rebuild_directory=c:\view_rebuild_dir\
- Disable Unread Marks for system databases and other large databases
  - this can really speed up opening databases
- Enable multiple indexers
  - notes.ini updaters=n
- Discard View indexes if you don't use them
  - DEFAULT_INDEX_LIFETIME_DAYS=days

Performance Tips

- Large numbers of deletion stubs can make databases slow
- Be careful with FT index because it can block updaters from indexing other databases
- Don't schedule agents too often
- Disable tasks you do not need
  - sched task uses a lot of resources
- Have separate connection documents for mail and replication
  - this can help to finetune replication
  - also replicate different priorities at different times

"Extremely inefficient" Search Operations

- "Warning: Agent is performing full text operations on database 'xyz' which is not full text indexed. This is extremely inefficient." (STR_AGENT_NOFULLTEXTINDEX)
- Agents with Search Queries always use FT index
  - If databases have no FT index a temporary on-the-fly FT index is creates
  - D6: FT_FLY_INDEX_OFF=1 (TN #1161983) replaces old R5 zOS platform option: OS390_508_FTFLYMODE=1
  - Causes Agents using search operations on not FT indexed databases to fail
- Happens only in agents, Notes Client UI (View Search) uses a different way to search in databases without FT (caution: returns less results)
- Work-arounds
  - Use Mail-Rules (but that could cause other limitations)
  - Add logic into Script Agents to filter documents
  - Use unprocessed documents option and also set not matching docs to processed

Keep Domino versions updated

- Later versions have better performance (in most cases)
- e.g. Domino >= R5.0.10 has some new technology from D6
  - Some customers reported big performance increase!
- Domino 6 really rocks!
  - A lot of areas are more optimized for performance
  - e.g. Network Compression, Streaming Replication, Rewritten @Formula Engine, Client Multitasking, Rewritten IMAP, full HTTP 1.1 support, Directory Changes, SCT, Optimized Logging, Enhanced Memory Management, ...
- D7 will bring even better performance -specially on Linux
  - see details in session ID116 Lotus Domino and Linux - Working Together for a Strong Future (Kenneth Brunsen, James Powers)

The Human Factor

- Check for private agents - Some users are really creative
- Control size of email messages
- Think if FT index on mailfiles is really needed
- Make sure people do shutdown their machines properly
  - hanging TCP/IP sessions can cause problems!
- Make sure power users do not have to much impact on server

ENVISION DECISIONS

Tuning your Domino Installation

- 1) Monitor your system over an extended period of time
- 2) Exercise caution when doing changes
- 3) Read and understand documentation
- 4) Keep records of all changes at any time
- 5) Only one change at a time
- 6) Be aware of potential side effects
- 7) Evaluate results over time
- 8) Apply next setting

Domino Server Statistics

- Statistics are collected automatically by different parts of the server
- There are different categories (Facilities) containing a large number of statistic values
  - Example:

```
show stat mem.*
Mem.Allocated = 68863464
Mem.Allocated.Process = 8210820
Mem.Allocated.Shared = 60652644
Mem.Availability = Plentiful
Mem.Free = 870.449.152
Mem.PhysicalRAM = 160432128
6 statistics found
```

Working with Domino Statistics

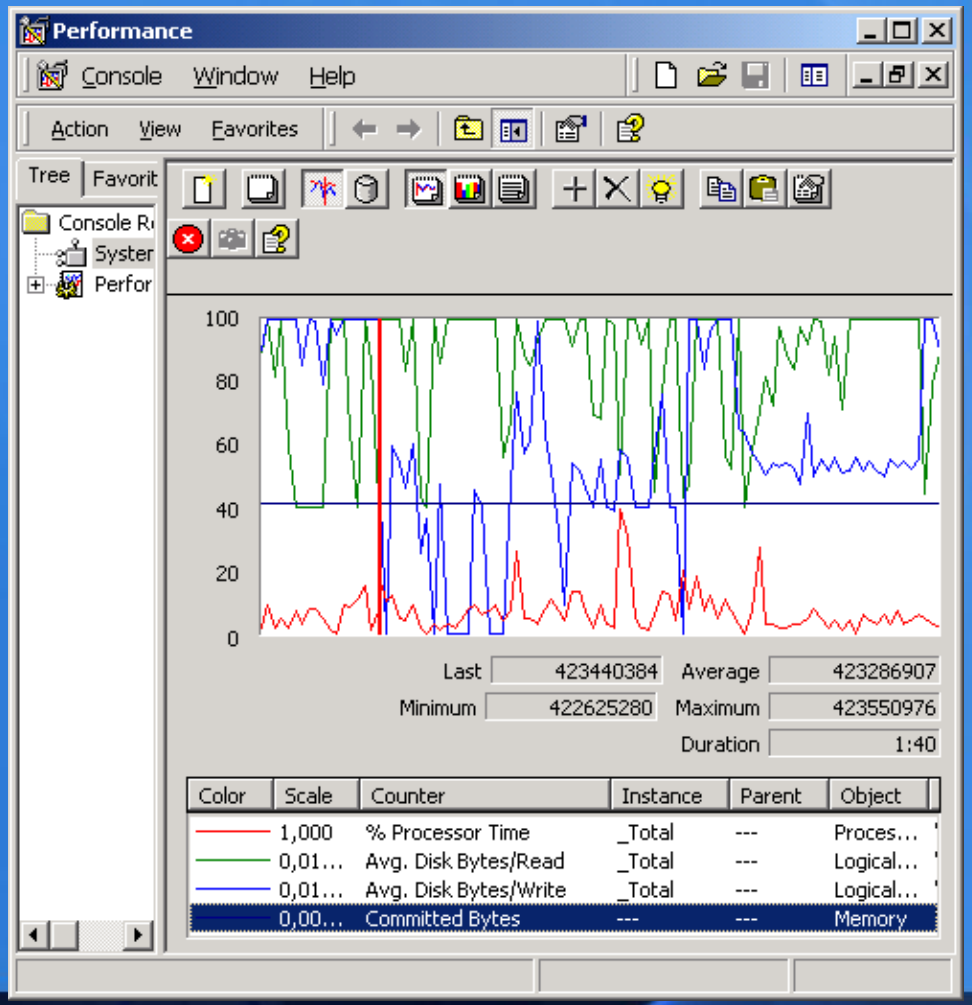
- Statistics can be collected in staprep.nsf
- Or displayed in the Admin Client (Real-time Statistic Charting)
- They are also data source for Historical Statistic Charting
- Each Servertasks/subsystem is responsible for maintaining their statistic values
  - Therefore right now there is no way to reset statistics
  - Statistics are resetted when sub-system is restarted (e.g. HTTP)

Platform Statistics

- A lot of information about system and resources
- provides comparable platform stats within Domino statistics
- Already in R5 for Win NT & Solaris
- available in Domino 6 on all platforms
- Enable via notes.ini
  - PLATFORM_STATISTICS_ENABLED=1 (R5)
  - Platform_Statistics_Disabled=1 (D6)
- show stat platform.*
- reset platform

Windows Perfmon

- Platform specific performance monitor
- Included in Windows
- has access to Notes Statistics if properly installed



Monitoring Performance on UNIX

- iostat -x io
  - statistics and activity
- vmstat
  - virtual memory activity and some CPU statistics
- mpstat
  - detailed look on CPU statistics
- netstat -i
  - summarizes network activity

UNIX - iostat

- iostat -x reports disk statistics
- Watch the %b column, values > 20 % need to be checked against high svt_t column.

extended device statistics

device	r/s	w/s	kr/s	kw/s	wait	actv	svc_t	%w	%b
sd0	0.3	10.9	4.0	141.3	0.0	0.1	9.1	0	6
sd1	0.0	0.0	0.7	0.2	0.0	0.0	12.2	0	0
sd2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0	0
sd15	0.3	10.9	3.9	141.3	0.0	0.1	9.2	0	6
sd16	0.0	0.0	0.8	0.2	0.0	0.0	11.2	0	0
ssd12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd13	42.1	4.4	3437.7	67.9	0.0	0.5	11.7	0	19
ssd14	47.7	11.1	3621.4	194.4	0.0	0.7	11.5	0	23
ssd15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd16	19.0	37.1	1162.3	3624.2	0.1	2.2	40.5	1	19
ssd17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd19	23.2	23.6	1251.2	2663.2	0.0	0.7	14.2	0	15
ssd20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd21	19.5	23.7	1354.3	2662.5	0.0	0.6	14.0	0	16
ssd22	12.5	34.0	709.3	3217.9	0.0	0.7	15.9	0	16
ssd23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
ssd25	43.6	5.7	3380.1	88.0	0.0	0.6	11.4	0	20
ssd26	47.1	9.9	3602.8	163.0	0.0	0.6	10.3	0	23
ssd27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
nfs1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0

UNIX - vmstat

- vmstat summarizes virtual memory activity and some CPU statistics.
  - Monitor the sr column to keep track of scan rate.
  - us, sy and id columns to check CPU usage
  - r column threads are contenting for CPU time
    - should not be higher then about 4x the number of CPU's
  - Watch out for a high number of Context Switches (cs)

procs			memory			page						disk				faults		cpu			
r	b	w	swap	free	re	mf	pi	po	fr	de	sr	s0	s1	s2	s3	in	sy	cs	us	sy	id
1	0	0	11051064	3121232	75	47	505	1	1	0	0	1	1	0	0	740	616	644	3	4	93

UNIX - mpstat

- mpstat 60 gives more detailed look on CPU
- watch out for high numbers in usr, sys or wt

CPU	minf	mjf	xcal	intr	ithr	csw	icsw	migr	smtx	srw	syscl	usr	sys	wt	idl
0	14	3	670	405	299	598	11	38	307	0	610	6	8	4	82
1	14	4	485	195	188	603	13	41	278	0	642	7	8	5	81
2	14	3	631	689	683	553	11	38	315	0	619	7	9	4	81
3	14	3	711	187	181	596	12	41	282	0	639	7	8	4	81
4	13	2	16	181	176	602	9	39	278	0	589	5	7	3	85
5	11	3	716	125	120	628	10	40	279	0	596	5	7	4	85
6	11	3	14	105	99	635	10	40	280	0	592	5	7	4	85
7	10	2	30	135	129	631	10	40	278	0	586	5	7	4	85
8	10	3	91	117	111	657	11	39	280	0	597	5	7	4	84
9	10	3	672	106	100	649	11	40	282	0	588	5	7	4	84
10	10	3	628	106	99	653	10	40	284	0	585	4	7	4	84
11	10	3	25	106	99	639	10	40	280	0	589	5	7	4	84
12	12	4	649	107	100	658	13	43	291	0	647	6	8	5	82
13	13	4	24	107	100	657	13	43	289	0	649	6	8	5	82
14	14	3	90	107	100	647	12	43	288	0	655	6	7	4	82
15	14	3	81	107	100	650	12	44	288	0	655	6	7	4	82

What is Happening on the Domino Server?

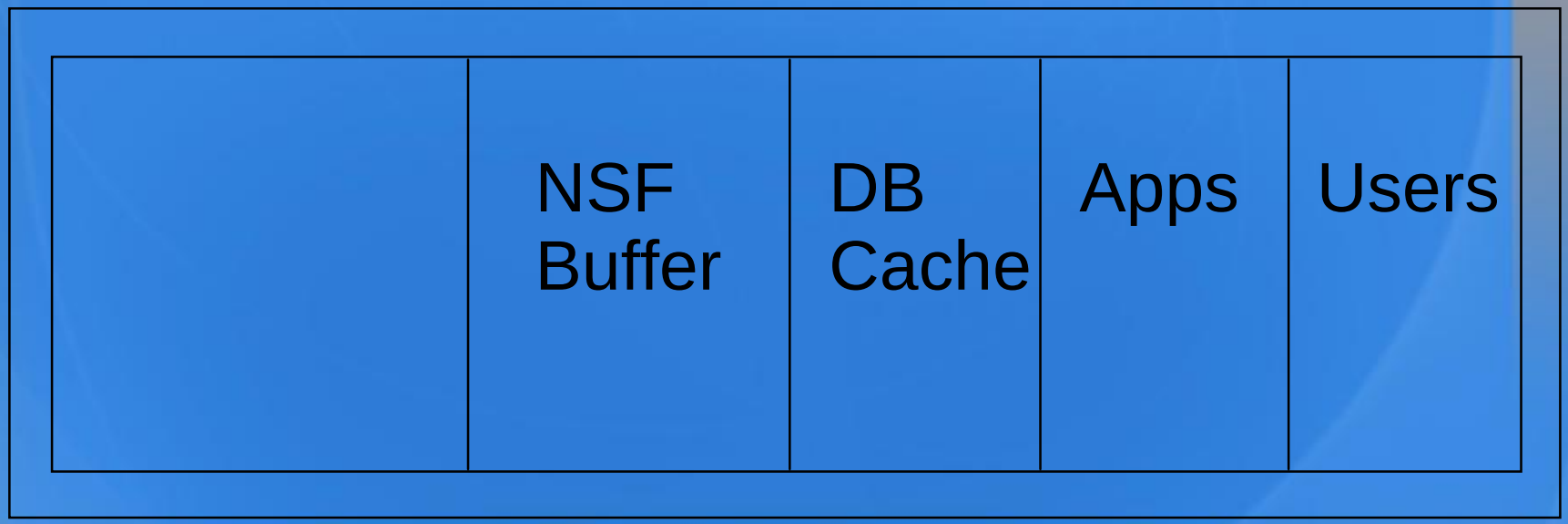
- Use Domino console commands
  - show task
    - lists which tasks are active for the Domino server
  - show task debug
    - undocumented command
    - provides job and thread number for SERVER tasks on iSeries
  - show stat
    - full set of Domino statistics for server
  - show stat domino
    - stats helpful when working with Domino Web server performance problem
  - tell http show thread state
    - shows which HTTP threads are waiting for work and which threads are currently servicing requests

What is Happening on the Domino Server?

- Use Domino console commands
  - show stat agent
    - agent stats such as:
      - scheduled runs, triggered runs, used run time, ...
  - tell amgr status
    - shows number of agents executing and agent concurrency setting
  - show stat database
    - provides key information on how Domino memory management is functioning
  - show database dir/dbname.nsf v
    - provides list of views and their sizes that are built over the database

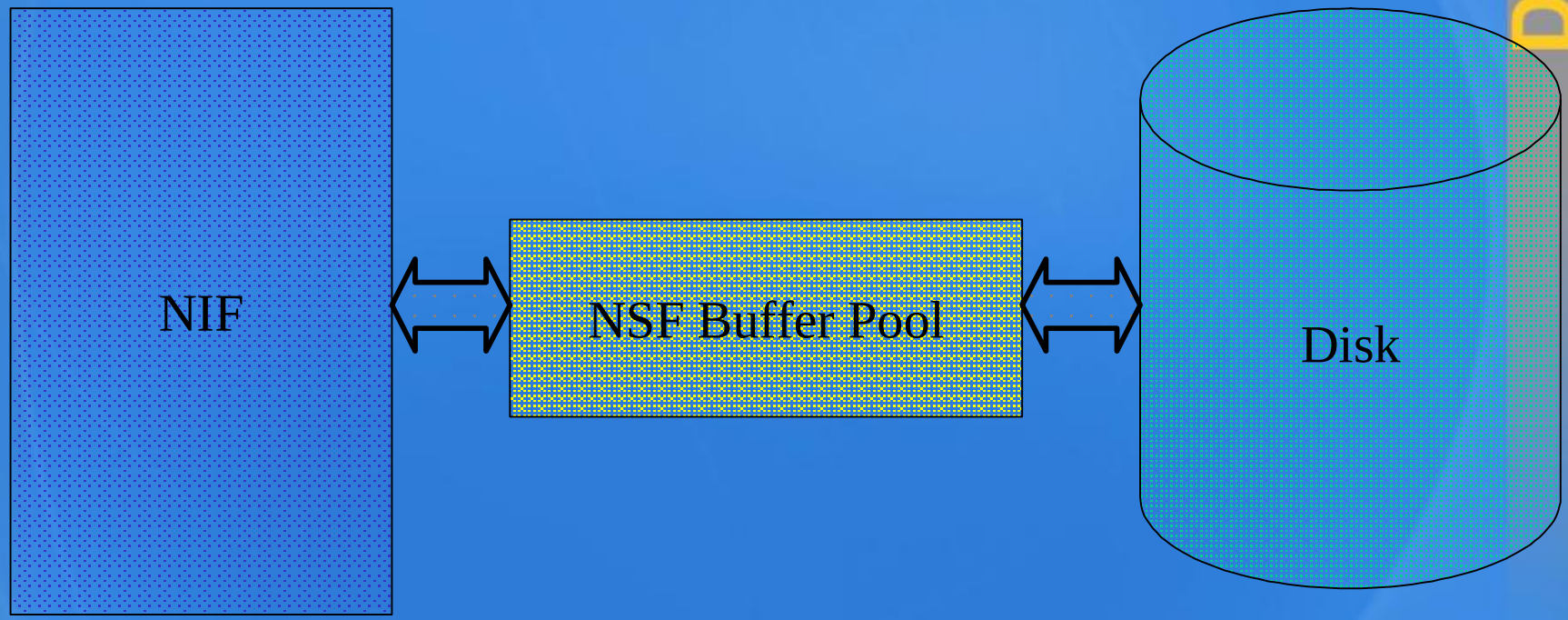
Domino Memory Management

- How Domino divides main storage
- Domino has it's own memory pools/buffers
- Memory subpools are dynamically adjusted by Domino



Domino Memory Management

- **NSF Buffer Pool – what it does**



Domino Memory Management

- Domino database statistics
  - Database.Database.BufferPool.Maximum.Megabytes
  - Database.Database.BufferPool.Peak.Megabytes
  - Database.Database.BufferPool.PercentReadsInBuffer
    - Want >= 95%
  - Database.DbCache.CurrentEntries
    - Number of entries in the database cache
  - Database.DbCache.HighWaterMark
    - Peak number of entries in db cache since Domino server was started
  - Database.DbCache.MaxEntries
    - Number of databases that can be cached
  - Database.DbCache.OvercrowdingRejections

Domino Memory Management

- Customer example – looking good
  - Database.Database.BufferPool.Maximum.Megabytes = 710
  - Database.Database.BufferPool.Peak.Megabytes = 708
  - Database.Database.BufferPool.PercentReadsInBuffer = 98.12
  - Database.DbCache.CurrentEntries = 71
  - Database.DbCache.HighWaterMark = 256
  - Database.DbCache.MaxEntries = 300
  - Database.DbCache.OvercrowdingRejections = 0

Domino Memory Management

- Customer example – looking very bad
  - Database.Database.BufferPool.Maximum.Megabytes = 170
  - Database.Database.BufferPool.Peak.Megabytes = 168
  - Database.Database.BufferPool.PercentReadsInBuffer = 95.44
  - Database.DbCache.CurrentEntries = 510
  - Database.DbCache.MaxEntries = 510
  - Database.DbCache.OvercrowdingRejections = 8385
    - Huge problem!
    - Options:
      - Increase NSF buffer pool size
      - Set NSF_DbCache_MaxEntries

Domino Memory Management

- Two key notes.ini parameters affect Domino memory management
  - NSF_Buffer_Pool_Size_MB
  - PercentAvailSysResources
- Other Domino memory buffers are allocated based on these parameters

Domino Memory Management

- PercentAvailSysResources
  - Introduced in R5.0.4
  - Controls % of memory resources available to Domino server
  - Valid values = 2% to 100%
  - Memory available depends on where Domino server is executing
  - Allows dynamic adjustment of buffer sizes

Domino Memory Management

- NSF_Buffer_Pool_Size_MB
  - Static setting of NSF buffer pool
  - Use in combination with PercentAvailSysResources
  - PercentAvailSysResources won't override NSF_Buffer_Pool_Size_MB setting

Domino Tuning - Overall Server Settings

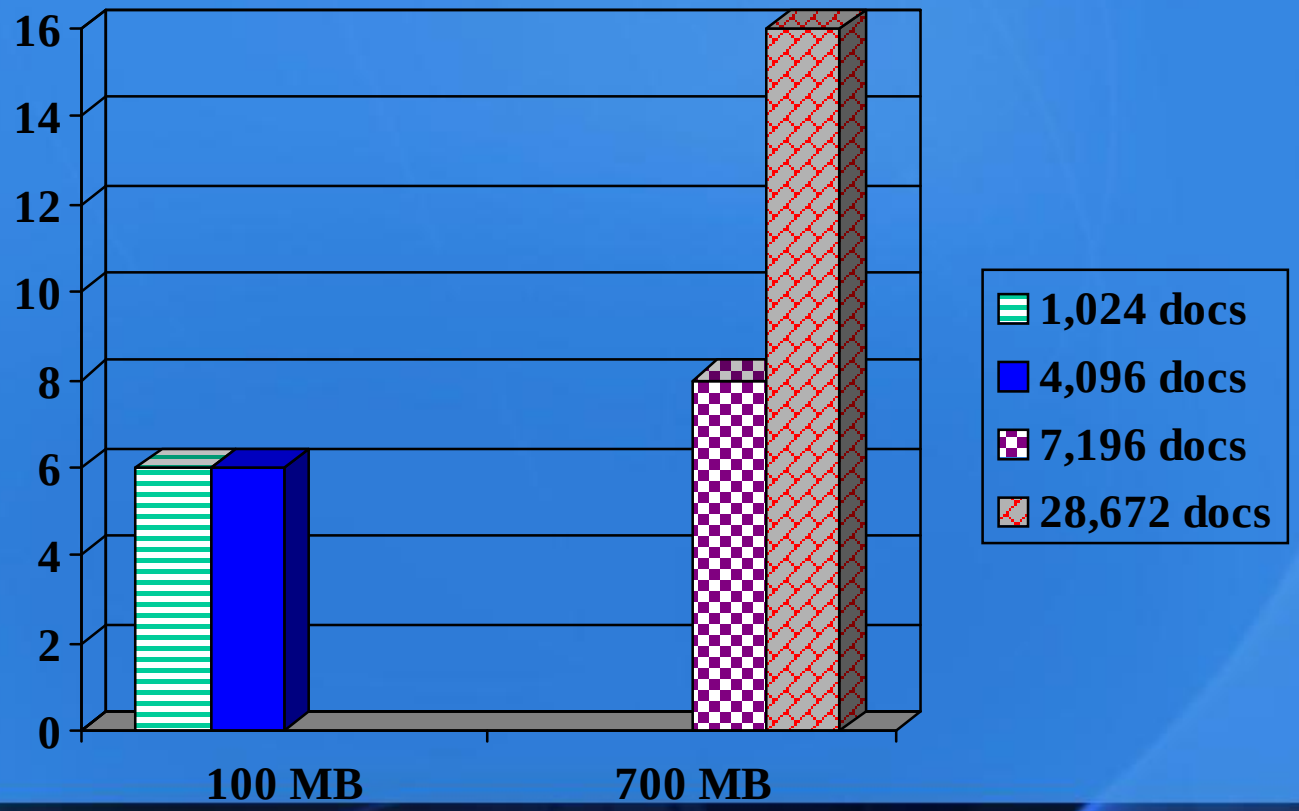
- PercentAvailSysResources (notes.ini)
  - Per partition memory size in % of total system memory.
  - Example: PercentAvailSysResources=50
- NSF_BUFFER_POOL_SIZE(_MB)
  - Buffer pool allocation per partition Domino server. Might be required if high number of memory > 4 GB RAM or old Domino release < 5.07. Can be 2000 MB at most per partition.
  - E.g. NSF_BUFFER_POOL_SIZE=2000
- Don't use Buffer Pool Size if not really needed
- Use PercentAvailSysResources ONLY!!!

Domino Tuning - Overall Server Settings

- Server_Max_Concurrent_Trans (notes.ini)
  - Server_Pool_Tasks (notes.ini)
  - For high number of NRPC connections increase the number of Server_Max_Concurrent_Trans to a high value (500-1000) and Server_Pool_Tasks parameter to 50 - 100 (number of server) threads.
- NSF_DbCache_MaxEntries
  - In case of high statistical value DbCache.OvercrowdingRejections set this to maximum number of concurrent users or the maximum number of databases open (whatever is higher)
  - e.g. NSF_DbCache_MaxEntries=10000

Mail Performance

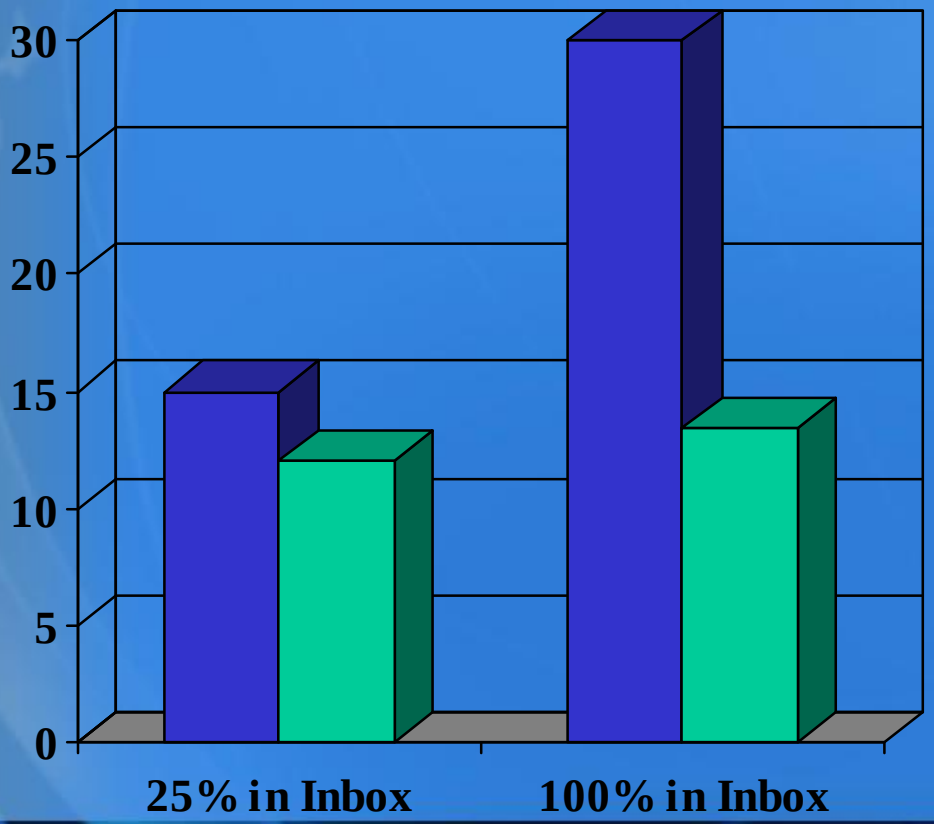
- Impact of number of documents
  - Number of documents has greater impact as file size grows



Mail Performance

- File those documents!
  - Inbox is most expensive container in a mail file
    - Updated each time user opens mail
    - Updated each time user clicks Refresh button
  - Reducing number of documents in Inbox reduces:
    - CPU utilization
    - Main storage required to update the view

Mail Performance



- Reducing number of documents stored in Inbox
  - Mail file open performance improved 50%
  - Steady state performance improved 12%

Mail File Performance Best Practices

- For optimal performance
  - Reduce overall document count in the file
    - Up to 2X CPU reduction
  - Keep number of documents stored in Inbox to a minimum
- Full text indexing and searching
  - Full text indexing is cheap
    - CPU usage increase < 0.5%
  - Searches are expensive
    - 20% extra CPU
  - Moral of the story
    - Create permanent indexes if using FTI function

Mail File Performance

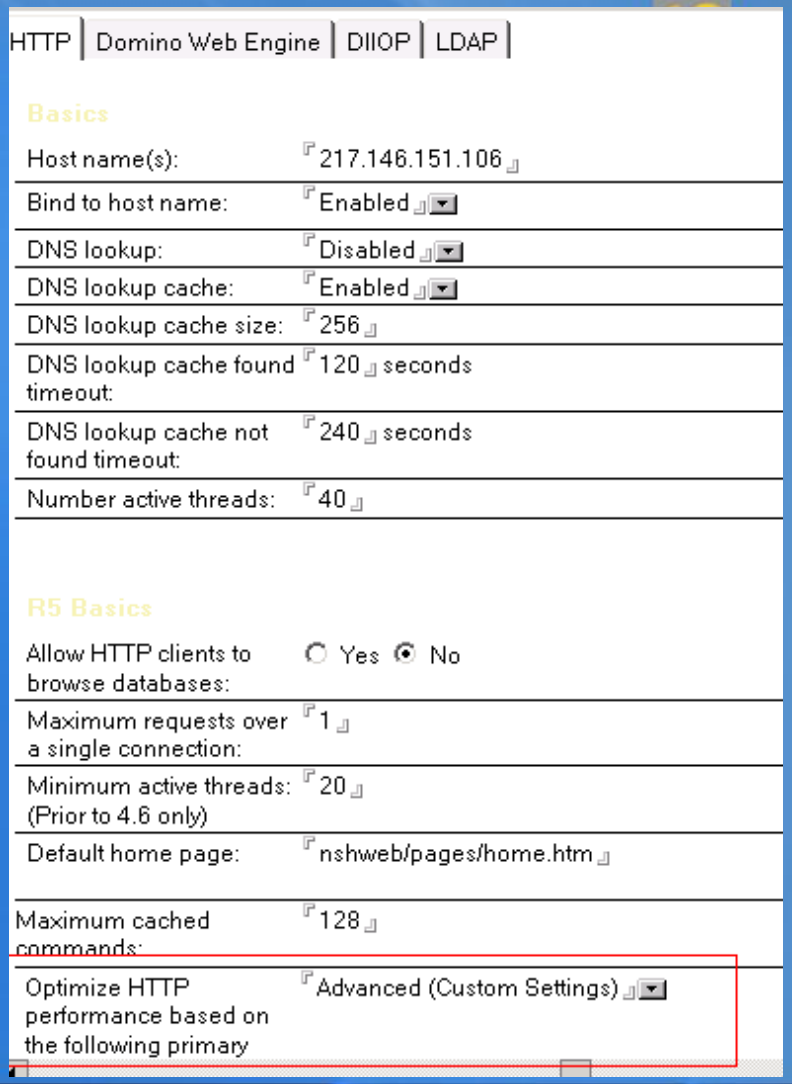
- Mail statistics to watch
  - Mail.Waiting
    - Indicator of ROUTER performance
    - Number of mail items waiting to be delivered in all MAIL.BOX files
    - May indicate need additional files
  - Mail.TotalPending
    - Number of mail messages resident in all MAIL.BOX files
    - Includes all dead, held, and pending mail

HTTP Stastistics

- Some Important statistic values
  - Http.Worker.Total.BytesRead = 27.366
  - Http.Worker.Total.BytesWritten = 368.333
  - Http.Worker.Total.File.Requests = 13
  - Http.Worker.Total.File.RequestTime = 971
  - Http.Worker.Total.Notes.Requests = 70
  - Http.Worker.Total.Notes.RequestTime = 18.490
  - Http.Worker.Total.TotalRequestTime = 19.46

D6 HTTP Cache Settings

- General Setting is still there but moved
- Cache settings are still on Domino Web Engine Tab



Domino Platform Tuning AIX - 1

- AIX Kernel Settings
  - MaxUProc - maximum number of processes that a single user account can run. set this to at least 128.
  - check the current value with: lsattr -E1 sys0 -a maxuproc
- AIX Domino Server Account Settings
  - AIXTHREAD_SCOPE=S (default in Domino 6)

Domino Platform Tuning AIX - 2

- AIX Domino Server Account Settings
  - /etc/security/limits
    data = (min 3 x default value)
    stack = (min 3x default value)
    rss = (min 3 x default value)
    nofiles = (min 3 x default value) - don't set it to unlimited
- Page Space adjustments
  - /etc/inittab/vmtune (best is to have no paging)
  - Page space 2x the amount of RAM
  - if server uses > 20% paging space (check via lsps -a) us
  - /usr/samples/kernel/vmtune -P 50 (down to 20)

Domino Platform Tuning AIX - 3

- Network Tuning
  - tune to ensure large amounts of data can be transferred and received. Minimum of tx_queues should be 512.
  - To view current settings :
  - lsdev -Cc adapter -s available (list adapters)
  - lsattr -e1 <adapter> ¦grep size (list queue sizes)
- Default Socket Buffers
  - Set send/receive window size to 16384 Bytes.
  - check via no -a command.
  - tcp_sendspace=16384
  - tcp_recvspace=16384
  - sb_max=65536

Domino Platform Tuning Solaris - 1

- File descriptors limits
  - increase number of file descriptorsin /etc/system
  - set rlim_fd_max=65536 (mandatory)
  - Memory tuning improves system response for heavily used filesystems. Cachefree settings should be 1/16 (up to 1/6) of physical memory divided by 8192 to get 8 KB pages.
  - set priority_paging=1 and cachefree=8192 (for a 1GB) (only for Solaris 6 and 7)
- High filesystem page (RunFaster=1)
  - To avoid high file system page in rates adjusts % of memory kernel will map into address space for file system cache.
  - set segmap_percent=20 (default 12 up to 60)

Domino Platform Tuning Solaris - 2

- Excessive filesystem flush daemon overhead
  - On very busy Domino servers with a lot of I/O limit the CPU cycles that the file system flush daemon can use.
  - set autoup=600
  - set tune_t_fsflushr=1
  - this wakes up the fsflush daemon once a second and allows older pages to remain in memory before being flushes to disk
- Throtted page daemon I/O
  - For multiple swap disks or 10'000 RPS disk you should increase the I/O rate of the page daemon.
  - set maxpgio=16384

Domino Platform Tuning Linux - 1

- Kernel Parameter
  - Two ways to set kernel parameters
  - Example SuSE: echo "8192" >/proc/sys/fs/file-max
  - Example RedHat: file /etc/sysctl.conf: fs.file-max=49152
- Number of open files
  - fs.file-max=49152
  - fs.inode-max = 3*fs.file-max
  - check actual values: echo /proc/sys/fs/file-no; inode-nr & inode-state

Domino Platform Tuning Linux - 2

- Increase maximum number of shared memory segments
  - kernel.shmmni=8192
- Increase maximum number of system-wide semaphores
  - kernel.sem=250 18432 32 1024
- Increase maximum number of threads
  - /proc/sys/kernel/threads-max

Domino Platform Tuning Linux - 3

- Limits
  - you need the following line in all /etc/pam.d/* control files like /etc/pam.d/login,su,... to ensure limits can be set
  - session required /lib/security/pam_limits.so
- Number of open files for notes
  - user/etc/security/limits.conf
  - notes soft nofile 49152
  - notes hard nofile 49152
- Number of processes/threads notes
  - user/etc/security/limits.conf
  - notes soft nproc 12500
  - notes hard nproc 12500

Domino Platform Tuning Linux - 4

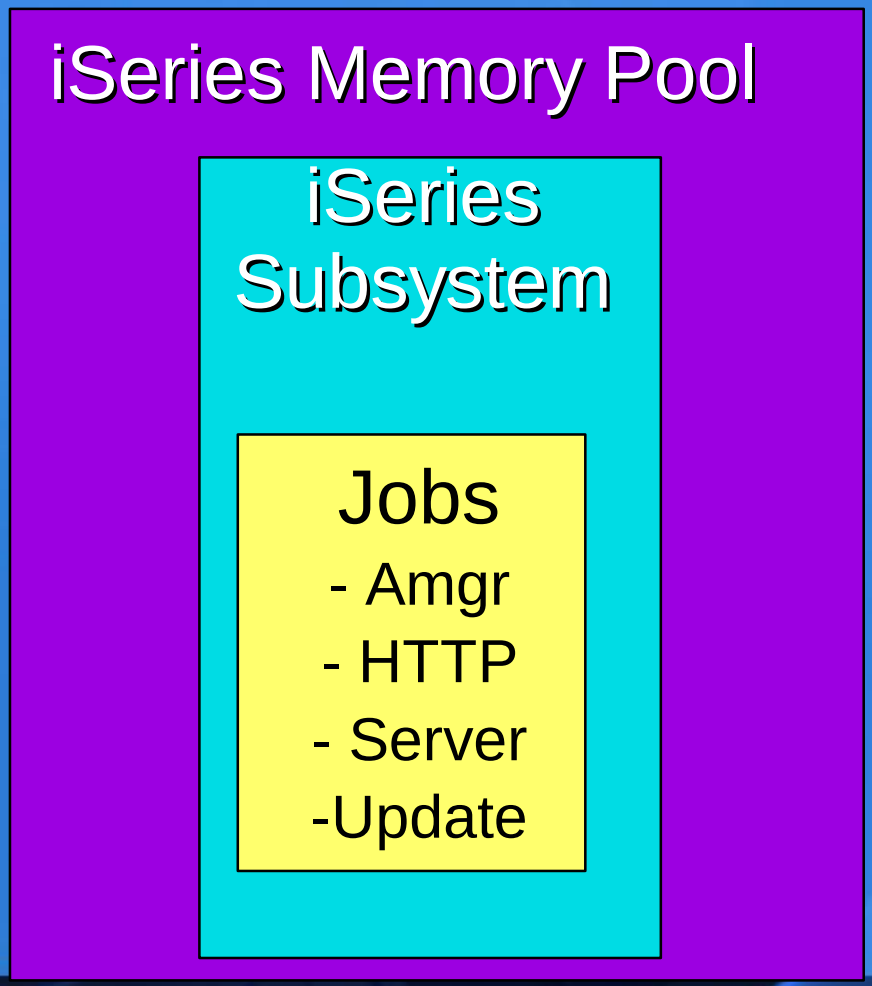
- IPC/Shared Memory (Domino specific)
- export Notes_SHARED_DPOOLSIZE=20000000 to enalarge the shared memory segments allocated
- Set the "noatime" attribute flag to disable the file access modified timestamp on all filesystems for Domino, /var, /tmp in /etc/fstab

- Some additional paramters to check
  - /proc/sys/vm/buffermem
  - /proc/sys/vm/bdflush
  - There is a lot stuff to tune on Linux

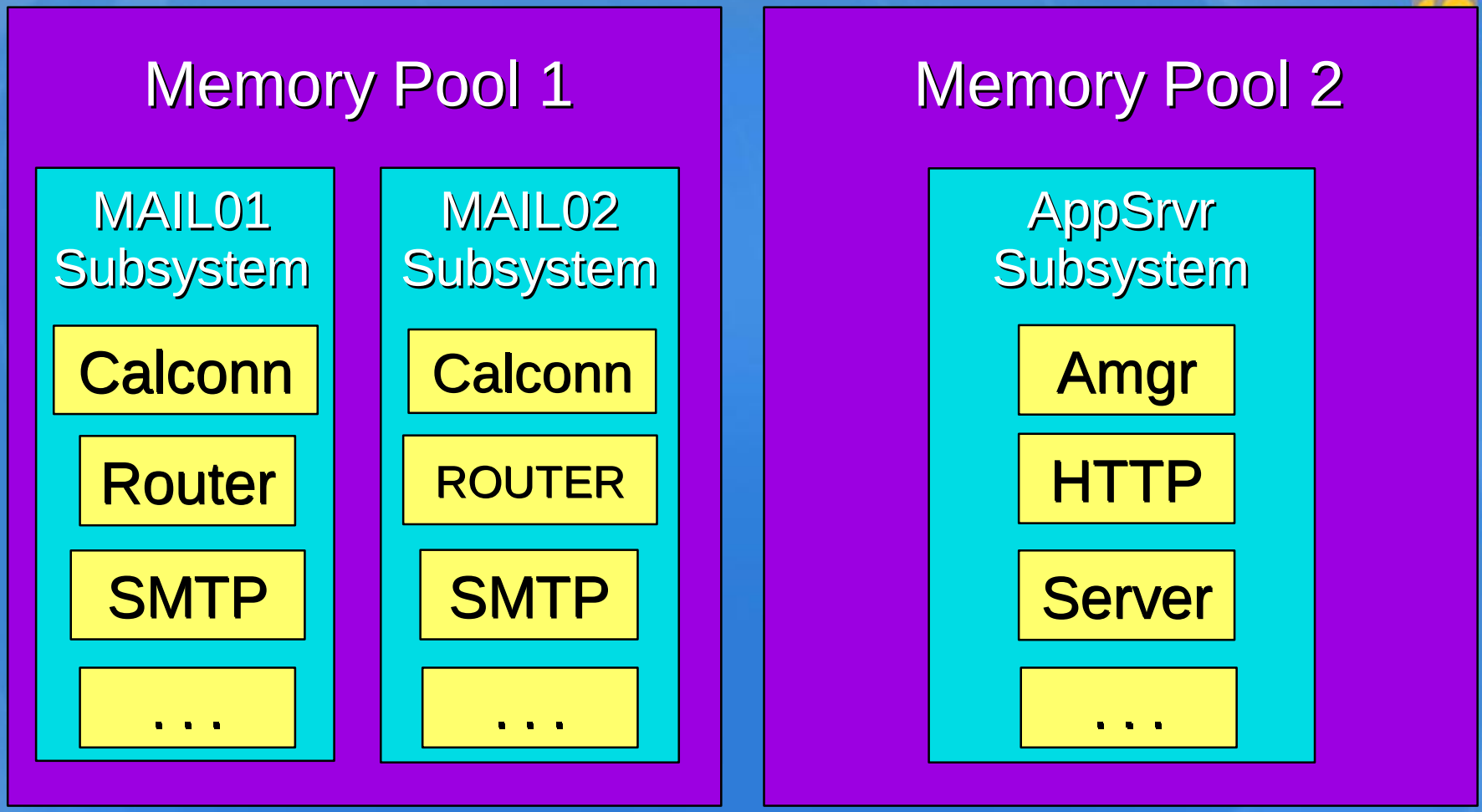
Domino for Linux Hard Disks Tuning

- Default settings for disks are very conservative
  - Tune settings with hadparm
  - hdparm -A1 -a8 -c3 -d1 -Xnn -W1 devicename
    - (-A) sets drive read lookahead flag
    - (-a) sets FS read ahead. 8 sectors (4KB) to 12 sectors (6KB)
    - (-c) sets EIDE 32bit I/O support
    - (-d) enables DMA
    - (-X) sets the DMA mode (see man page for details)
    - (-W) IDE write caching mode (possible data lost when crash!)
  - Example: hdparm -A1 -a8 -c3 -d1 -Xnn -W1 devicename
  - Test Performance before and after with
    - (-t) perform device read timings
    - (-T) perform cache read timings

iSeries Memory Pools

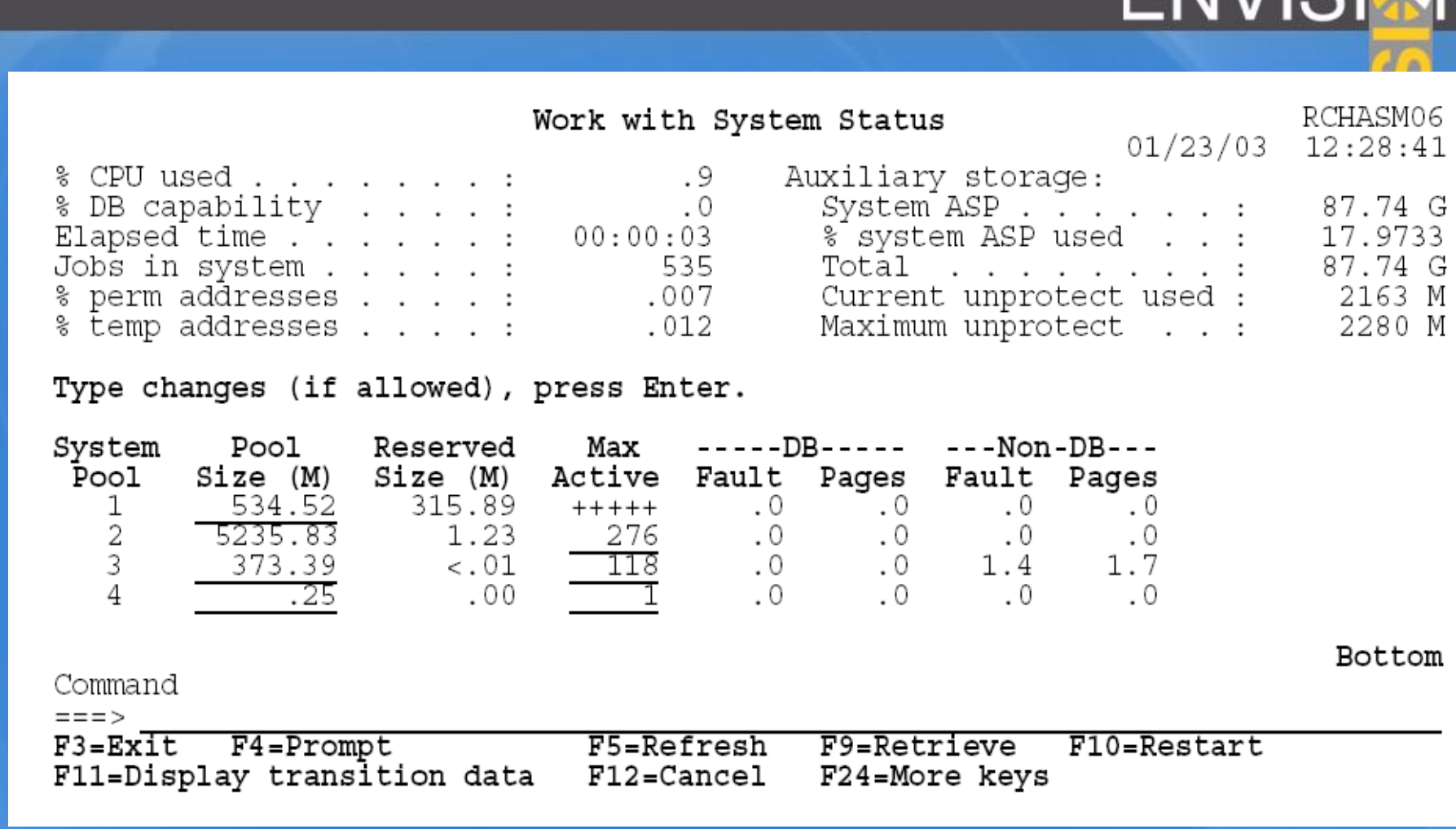


iSeries Memory Pools



WRKSYSSTS

ENVISION



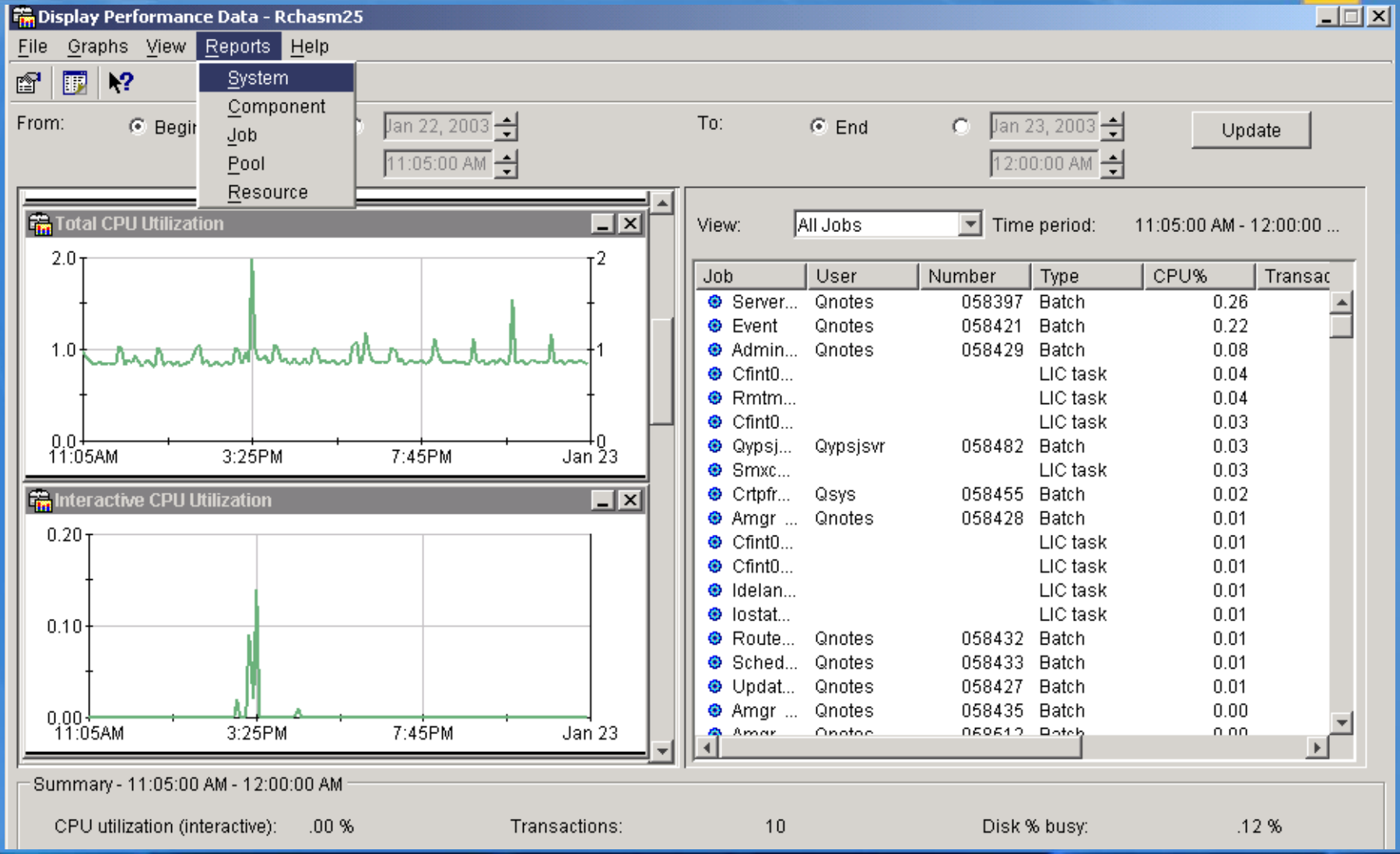
```
                          Work with System Status                    RCHASM06
                                                          01/23/03   12:28:41
% CPU used . . . . . . . . :          .9    Auxiliary storage:
% DB capability  . . . . . :          .0      System ASP . . . . . . . :    87.74 G
Elapsed time . . . . . . . :    00:00:03      % system ASP used  . . :    17.9733
Jobs in system . . . . . . :         535      Total  . . . . . . . . . :    87.74 G
% perm addresses . . . . . :        .007      Current unprotect used :     2163 M
% temp addresses . . . . . :        .012      Maximum unprotect  . . :     2280 M

Type changes (if allowed), press Enter.

System    Pool     Reserved    Max    -----DB-----   ---Non-DB---
 Pool   Size (M)   Size (M)  Active  Fault  Pages   Fault  Pages
   1     534.52     315.89   +++++     .0     .0      .0     .0
   2    5235.83       1.23     276     .0     .0      .0     .0
   3     373.39       <.01     118     .0     .0     1.4    1.7
   4        .25        .00       1     .0     .0      .0     .0

                                                                    Bottom
Command
===>
F3=Exit   F4=Prompt            F5=Refresh   F9=Retrieve   F10=Restart
F11=Display transition data    F12=Cancel   F24=More keys
```

iSeries Constantly Strives for Balanced Performance

Unit	Type	Size (M)	% Used	I/O Reqs	Req Size	Read Reqs	Write Reqs	Read (K)	Write (K)	% Busy
1	6607	4194	71.7	3.7	5.5	3.3	.3	4.3	15.2	15
2	6607	4194	71.6	3.6	9.3	2.9	.6	7.5	17.6	17
3	6607	4194	72.8	3.5	8.3	2.7	.8	6.6	13.7	13
4	6607	4194	67.8	3.2	8.2	2.8	.4	8.0	9.3	12
5	6607	4194	71.4	3.1	8.3	2.4	.6	7.2	15.1	14
6	6607	4194	71.3	3.5	9.0	2.3	1.1	7.4	15.3	16
7	6607	4194	71.4	3.5	8.9	4.3	.8	6.9	21.2	17
8	6607	4194	71.6	3.8	11.0	1.9	.9	8.0	17.4	14

The operating system does this automatically...

Collection Services



Domino Subsystem Tuning - iSeries

- Change individual job priority permanently
  - Very useful when specific task is consuming large amounts of CPU
  - Helpful when have Domino running on same system as interactive applications
- Steps to follow:
  - Create a class in library QUSRNOTES
    - CRTCLS CLS(QUSRNOTES/MAILCLASS) RUNPTY(30)
  - Tell Domino which task (or tasks) should use this class
    - EDTF ('/qibm/userdata/lotus/notes/domino_classes')

Domin Subsystem Tuning - iSeries

- **Contents of domino_classes file:**

```
SERVER=Mail01
CLASS=mailclass
TASKS=calconn,router
CLASS=mailclass2
TASKS=sched
SERVER=App01
CLASS=appclass
TASKS=Amgr
```

Domino Subsystem Tuning - iSeries

- All tasks can be changed except for:
  - QNNINSTS
- Software requirements
  - Domino for iSeries R5 or D6
  - OS/400 V4R3 or later

Domino Performance Redpapers

- Domino 6 for iSeries Best Practices Guide, SG24-6937
  - www.redbooks.ibm.com/redpieces/pdfs/sg246937.pdf
- Sizing Large-Scale Domino Workloads on iSeries
  - publib-b.boulder.ibm.com/Redbooks.nsf/RedpaperAbstracts/redp3802.html?Open
- IBM Lotus Domino for iSeries Performance and Tuning, REDP3843
  - www.redbooks.ibm.com/redpapers/pdfs/redp2843.pdf

Additional Resources

- Notes.Net Inside Notes Database
- Notes.Net articles
- Domino Performance Zone
- Lotus & Microsoft Knowledge Base
- Readme of each QMU release

- mailto: nsh@nashcom.de

Performance References

- iSeries Domino Performance
  - http://www.ibm.com/servers/enable/site/domino/perform.html
- Performance Zone
  - www.lotus.com/performance
- Lotus Developer Domain
  - www.lotus.com/ldd
- Ask Professor INI
  - www.lotus.com/ldd/today.nsf/profini?OpenView
- IBM Workload Estimator
  - www-912.ibm.com/servlet/EstimatorServlet

Where To Go For More Information

- Domino for iSeries Sizing and Performance Tuning on the IBM eServer iSeries Server, SG24-5162-01
  - www.redbooks.ibm.com
  - Authors: Wilfried Blankertz, Christina Fasth, Kim Greene, Brandon Rau, Colin Stamp, Deb Landon
- iSeries Domino Performance
  - www.iseries.ibm.com/developer/domino/perform/index.html
- Performance Zone
  - www.lotus.com/performance
- Lotus Developer Domain
  - www.lotus.com/ldd
- Ask Professor INI
  - www.lotus.com/ldd/today.nsf/profini?OpenView
- IBM Workload Estimator
  - www-912.ibm.com/servlet/EstimatorServlet