Domino for iSeries Tuning Tips

ITSO iSeries Technical Forum
DP10

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- **Services offered include:**

  - ▶ *System and application tuning*

  - ▶ *Enterprise integration*

  - ▶ *Domino development*

  - ▶ *Customized education and training*

  - ▶ *Technical writing*

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  - ▶ *www.penumbra.org*

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- **Tuning Tips**
  - ▸ *Latest news*
- **Latest Performance Numbers**
  - ▸ *Domino 6*
  - ▸ *Sametime 3.0 and QuickPlace 3.0*
- **Tuning tools**
  - ▸ *Performance Explorer (PEX) hooks*
  - ▸ *New V5R2 Collection Services for Domino*
  - ▸ *Other tool tips to make your life easier*
- **iSeries for Domino Servers**

Tuning Tips

- **Domino 5.0.9 servers can benefit from adding this variable to notes.ini file**
  - ▸ *IOCP_DISABLE_ASYNC_NOTIFICATION=1*
- **Domino 5.0.9 fixed problem in R5 for e-mail notification after Notes client times out**
- **This "fix" added ~8% CPU**
- **Problem is fixed correctly with no performance overhead in 5.0.10**

- **Notes_SHARED_DPOOLSIZE**
  - ▶ *Dpool is memory pool used by Domino*
  - ▶ *Controls minimum memory size allocated by Domino from the pool*
  - ▶ *Program QP0ZIPCS shows size of memory being allocated*
- **Add environment variable to change size of memory segments allocated**
  - ▶ *ADDENVVAR Notes_SHARED_DPOOLSIZE 1048576*

Watch Size of Mail Files

- ## Mail file size can have dramatic impact on performance

- ## 100 MB mail file as baseline

Size of Mail File	CPU consumption
100 MB	x%
200 MB	x + 10%
300 MB	x + 20%
400 MB	x + 30%
500 MB	exponential, hit knee of curve

▶ *Additional 10% CPU for each 100 MB*

▶ *Hit knee of curve at 500 MB*

- **UDP Checksum setting**
  - ► *Change UDP checksum from *YES to *NO*
  - ► *Microsoft uses their own checksum algorithm that does not match the TCP/IP industry standard*
    - ○ Use CHGTCPA command or iSeries Navigator to change this setting
  - ► *Leave turned off until Microsoft Windows 2003*

Runtime Priority Tuning

- **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/MAILCLASS1) RUNPTY(30)

  ▶ *Tell Domino which task (or tasks) should use this class*

    ○ EDTF ('/qibm/userdata/lotus/notes/domino_classes')

DOMINO_CLASSES File

- **Contents of DOMINO_CLASSES file:**

    SERVER=Mail01

    CLASS=mailclass1

    TASKS=calconn,router

   *CLASS=mailclass2*

    TASKS=sched

    SERVER=App01

    CLASS=appclass

    TASKS=Amgr

Runtime Priority Tuning

- **All tasks can be changed except for:**
  - ► *QNNINSTS*

- **Software requirements**
  - ► *Domino for iSeries R5 or D6*
  - ► *OS/400 V4R3 or later*

Domino Memory Management

- **How Domino divides main storage**
  - ► *Use Show Stat command to find out resource utilization*
  - ► *Memory subpools are dynamically adjusted by Domino*

	NSF Buffer	DB Cache	Apps	Users
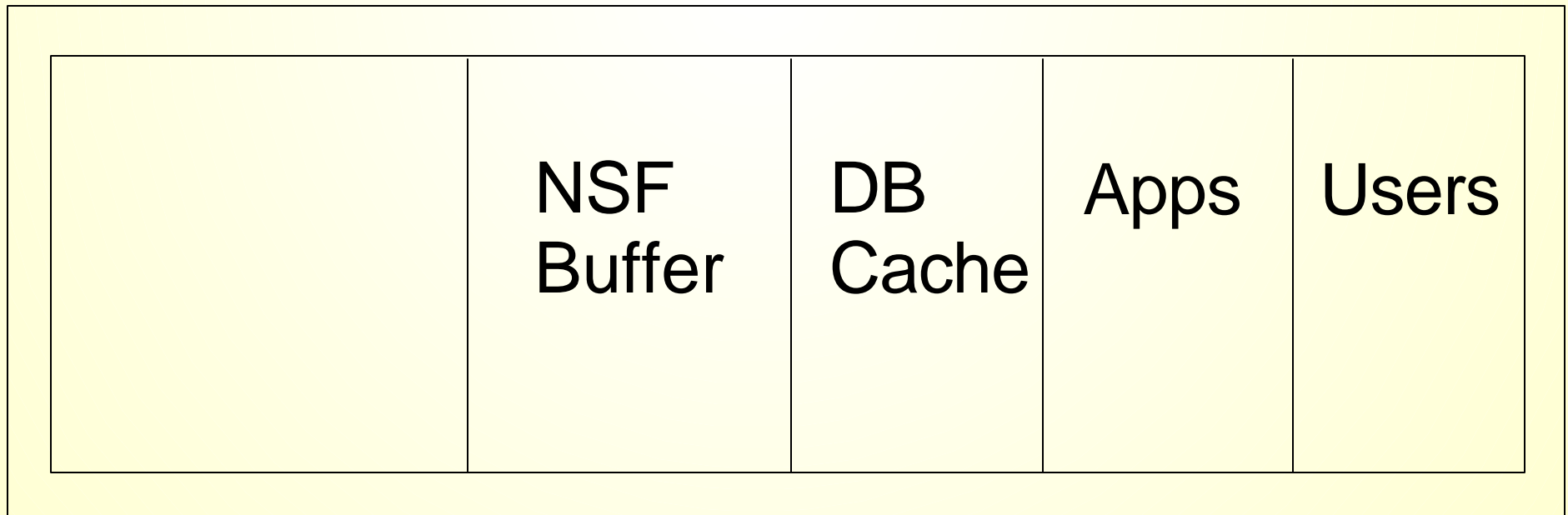
- **Two key notes.ini parameters affect Domino memory management**
  - ▶ *NSF_Buffer_Pool_Size_MB*
  - ▶ *PercentAvailSysResources*
    - ○ Introduced in R5.0.4
- **Other Domino memory buffers are allocated based on these parameters**

- ## **NSF_Buffer_Pool_Size_MB**

  - ▶ ***Pool of memory dedicated to buffering I/O between the Notes Index Facility (NIF) indexing functions and disk***

    - ○ Set to 300 MB by default on iSeries

  - ▶ ***Recommend setting based on actual server needs***

  - ▶ ***Use Show Stat Database command to view statistics affecting setting this variable***

- ## **NSF_Buffer_Pool_Size_MB**

  - ► ***Five things to monitor when fine tuning***

    1. Buffer pool peak should be < 95% of buffer pool maximum

       - ▪ *maximum (Database.BufferPool.Maximum)*

       - ▪ *peak (Database.BufferPool.Peak)*

    2. Monitor Database.BufferPool.PerCentReadsInBuffer

       - ▪ *> 97% is best*

- ## **NSF_Buffer_Pool_Size_MB**
  - ► ***Five things to monitor when fine tuning***
    - 3. Monitor non-database page faulting
      - ▪ *Want less than 2 faults per thread*
    - 4. Monitor Mail router's database cache size
      - ▪ *Defaults to NSF_Buffer_Pool_Size_MB * 3*
      - ▪ *Monitor Mail.DBCacheEntries*
      - ▪ *Compare Mail.DBCacheHits to Mail.DBCacheReads for effectiveness of caching*

- **Faulting rates**
  - ▶ *Keep faulting rates in *MACHINE pool*
    - ○ .00 faults per thread
    - ○ maximum of 10 faults per second
  - ▶ *Keep faulting rates in *BASE pool (or where Domino is running)*
    - ○ 2 faults per thread
    - ○ general guideline of maximum of 100 fault rates per second or less

- ## **NSF_Buffer_Pool_Size_MB**

  - ▶ ### *Five things to monitor when fine tuning*

    5. Monitor view sizes in Log.nsf

       - ■ *Determine size of views being accessed regularly*

       - ■ *If NSF_Buffer_Pool_Size_MB setting is smaller than size of frequently accessed views, faulting can be impacted*

       - ■ *More on this to come later!*

- **PercentAvailSysResources**
  - ► _**Introduced in R5.0.4**_
  - ► _**Controls % of memory resources available to Domino server**_
    - ○ Can assign a portion of total physical system memory to each Domino server
    - ○ Valid values = 2% to 100%

- **PercentAvailSysResources**
  - ▶ *Recommended method for setting NSF Buffer Pool Size in Domino 6*
  - ▶ *Engine to determine buffer pool size has been optimized in D6*
    - ○ Dynamically looks at memory available while server is running

- ## **NSF_Buffer_Pool_Size_MB vs. PercentAvailSysResources**

  - ▶ *If add memory, automatically available to Domino servers through PercentAvailSysResources in R5*

  - ▶ *Domino 6 dynamically checks for memory available*

  - ▶ *Use one or the other, not both!*

Domino Indexing

- **Indexing occurs to keep Domino views up-to-date**

- **Indexing occurs in three Domino tasks:**

  - ► *UPDATE task*

  - ► *UPDALL task*

  - ► *Notes Indexing Facility (NIF)*

- **Which task handles indexing depends on how indexing is invoked**

- ## **UPDATE task**
  - ► ***Runs at all times***
  - ► ***Works continuously from a queue, $UpdateQueue***
    - ○ Requests include updates to view indexes and full text indexes
  - ► ***UPDATE checks the queue every 5 seconds for any new requests***
    - ○ Processes queue FIFO

- ## UPDALL

  - ### *Operates from a queue like UPDATE, but functions differently*

  - ### *Runs automatically every evening (2:00 AM by default) or can be invoked from Domino console*

  - ### *Processes EVERY Domino database*

    - ○ Refreshes views and full text indexes

  - ### *Performs additional functions beyond what UPDATE does*

    - ○ Discards view indexes, ...

- **Notes Indexing Facility (NIF)**
  - ▶ *Allows Domino server to keep data ordered and current within a view*
  - ▶ *Functions the NIF performs*
    - ○ Updates indexes
    - ○ Opens and closes view collections/view indexes
    - ○ Locates index entries
  - ▶ *NIF handles majority of requests made by the server when users open/close databases*

- **Indexing has been optimized in Domino 6**
  - ▶ _Use cross reference table rather than flat table index_
    - ○ Does require some additional memory
  - ▶ _Update task consumes ~50% less CPU in D6!_

- **NIF Pool has increased in Domino 6**
  - ▶ _Pre 5.0.10 = 25MB_
  - ▶ _5.0.10 and later = 50 MB_
  - ▶ _D6 = 100 MB_

- **Detecting UPDATE task problems**
  - ► *Tip-off is continuously high CPU util for this task*
    - ○ UPDATE running at 60%+ CPU for >= 1 minute
  - ► *It is normal for UPDATE to run at 60%+ CPU for a few seconds*

- **There are ways to analyze:**
  - ► *which databases have views being rebuilt unnecessarily*
  - ► *which views take a long time to rebuild*

- **Analyzing the UPDATE task**
  1. *Add the line LOG_UPDATE=2 to NOTES.INI file*
     - Server will log information when UPDATE task updates views

- **Analyzing the UPDATE task**
  2. ***Stop and reload the UPDATE task***
     - tell update quit
     - load update
  3. ***Collect data during peak time***
     - Want time period when experiencing worst response times and highest CPU util
  4. ***Remove entry from Notes.ini file***

- ## **Analyzing Domino UPDATE task**

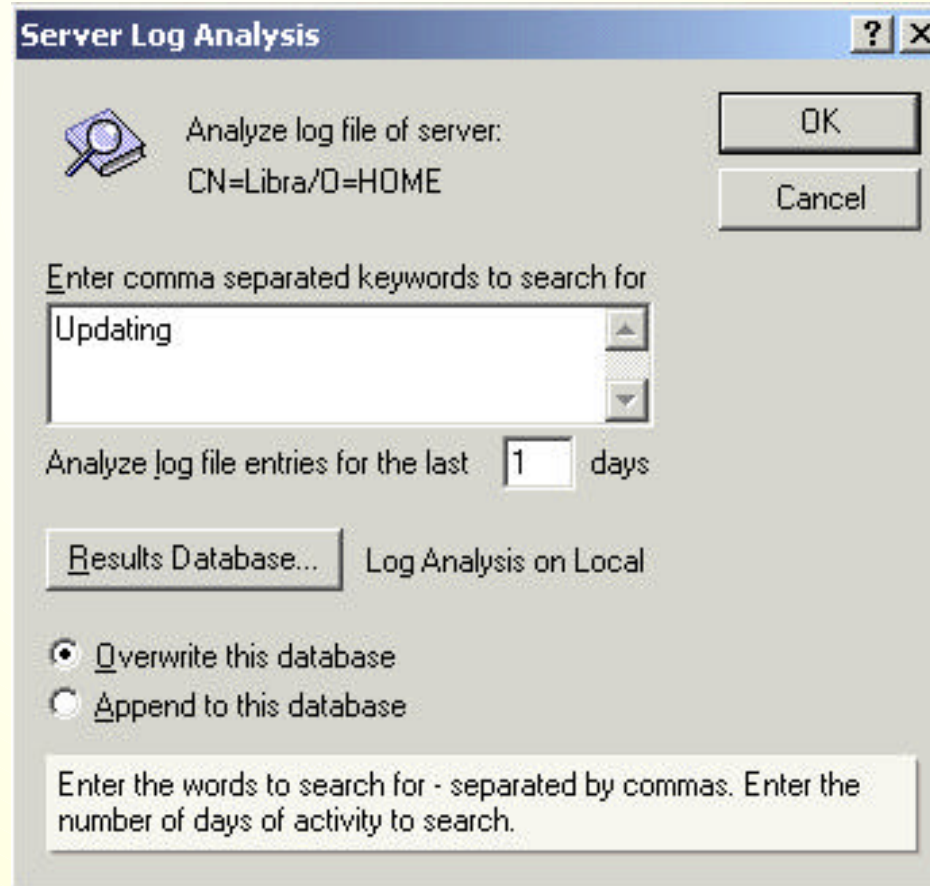 5. ### *Filter the log file (LOG.NSF)*

     ○ Select "Server" tab -> "Analysis" tab -> Click "Analyze" button -> Select "Log"
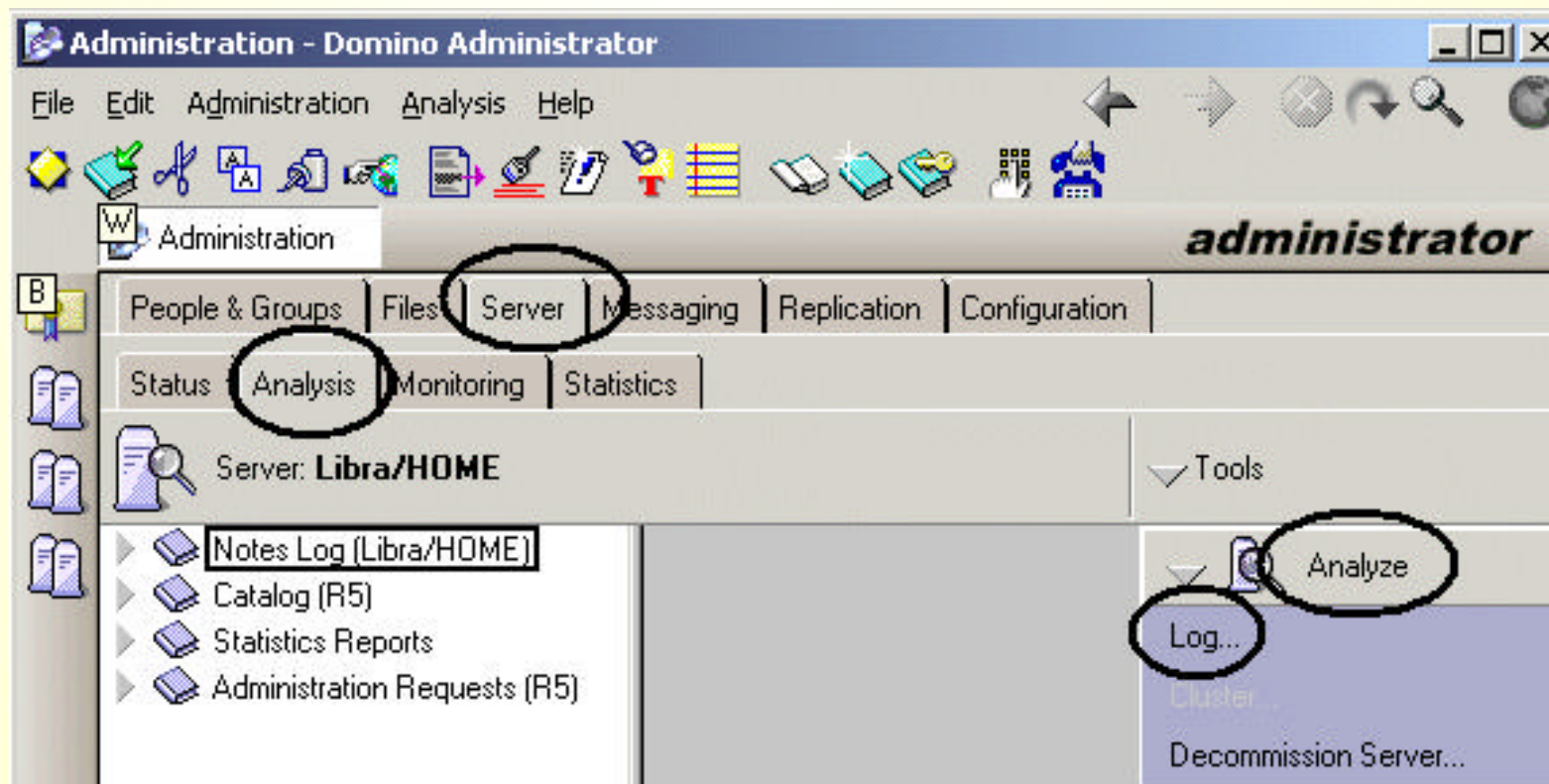
- **Analyzing the UPDATE task**

  6. ***Make Server Log Analysis selections***

     ○ Enter text "Updating" for the search results

- **Analyzing the UPDATE task**

  7. _Analyze the log and look for problem views_

     ○ Time to update a view is more than twice the time to update most other views _in the same database_

     ○ Here have two problem views: "Manager Reports\NotSubmitted" & "Payroll\HR No Authority"

```
12/15/2000 09:10:23 AM  Updating tech/TimeTrak.nsf view 'Time Log\Customers'
12/15/2000 09:10:25 AM  Updating tech/TimeTrak.nsf view 'Time Log\Lookup Start Time'
12/15/2000 09:10:26 AM  Updating tech/TimeTrak.nsf view 'Time Log\Lookup'
12/15/2000 09:10:26 AM  Updating tech/TimeTrak.nsf view 'Time Log\Manager Reports\Not Submitted'
12/15/2000 09:24:40 AM  Updating tech/TimeTrak.nsf view 'Time Log\Payroll\HR No Authority'
12/15/2000 09:31:07 AM  Updating tech/TimeTrak.nsf view (Payroll\HR Appr)'
12/15/2000 09:31:08 AM  Finished updating views in tech/TimeTrak.nsf
12/15/2000 09:31:14 AM  Updating views in names.nsf
12/15/2000 09:31:14 AM  Updating names.nsf view 'Locations'
12/15/2000 09:31:14 AM  Updating names.nsf view 'People\By Employee ID'
12/15/2000 09:31:14 AM  Updating names.nsf view 'People\By Employee Standard Name'
```

- **Analyzing the UPDATE task**
  8. *Examine the design of problem views*
     - Any time sensitive formulas?
     - What are index refresh and discard options
     - Work with developer to optimize these view properties and formulas

A Look at Domino 6 iSeries Performance

- **Most environments get performance boost going to Domino 6!**

- **Domino 6 mail compared to R5**
  - ► *~40% drop in CPU*
  - ► *~30% improvement in RT*

- **iNotes Web access, D6 vs. R5**
  - ► *~45% drop in CPU*
  - ► *~35% improvement in RT*

- **Custom written applications**
  - ► *Up to ~30-40% drop in CPU*

**Sametime 3.0 and
QuickPlace 3.0
Performance**

- **QuickPlace 3.0 and Sametime 3.0 also show substantial improvements over previous versions**

- **QuickPlace 3.0 vs. 2.0.8**
  - *~45% drop in CPU*
  - *~55% improvement in RT*

- **Sametime 3.0 vs. 2.5**
  - *~45% drop in CPU for chat*

- ## **Sametime**

  ► ***More improvements coming with Sametime 3.0.1a***

  ► ***iSeries will be first platform to support Sametime on Domino 6!***

    ○ Sametime 3.0.1a on Domino 6.0.1

Tuning Tools

Performance Explorer (PEX)

- **Allows you to collect many details about system and application performance**
- **PEX trace points were added to Domino for iSeries in R5.0.6a**
  - ▸ *Requires OS/400 V4R4 or later*
- **Can find out what is happening in the Domino application**
  - ▸ *Six new trace points*

- **PEX trace point collection details for Domino:**
  - ▶ *database opens and closes*
    - ○ user driven opens/closes
  - ▶ *view opens and closes*
    - ○ track if view open or close triggered an update
  - ▶ *agent function calls*
    - ○ how many CPU seconds an agent consumes
    - ○ how many times an agent is invoked
    - ○ which agent is consuming most CPU

- **PEX trace point collection**
  - ▶ *Enable in notes.ini file*
  - ▶ *DEBUG_OS400_PEX=X*
    - ○ x = 1 to 4
  - ▶ *Also requires PTFs:*

OS400 Release	PTF
V4R4	SF64028
V4R5	SF64108
V5R1 and V5R2	No PTF required

Performance Explorer (PEX) Hooks

Trace point name	Level	Type of Information collected
QIBM_QLNT_OPENDB	1	Databases opened from the Notes client. Logs database name, user name, and user's IP address.
QIBM_QLNT_OPENCOLL	1	Collection (view) opened from Notes client. Logs database name, view name, user name, and user's IP address.
QIBM_QLNT_UPDATECOLL	1	Collection (view) refreshed or updated from Notes client. Logs database name, view name, user name, and user's IP address.
QIBM_QLNT_HTTP_URL	2	URLs received by HTTP server. Includes HTML pages, images, etc. Logs URL requested.
QIBM_QLNT_SVR_AGENT	3	Scheduled server agents that ran through AMGR. Logs database name, Agent name, time agent took to complete.
QIBM_QLNT_OPENDBALL	4	Database opens internally in Domino. Use to see what databases web clients or agents are accessing. Logs database name.

- **Create PEX definition for Domino collection**

OS/400 Release	ADDPEXDFN Command
V5R1 and V5R2	ADDPEXDFN DFN(DOMINO) TYPE(*TRACE) JOB(*ALL) MAXSTG(100000) TRCTYPE(*SLTEVT) SLTEVT(*YES) OSEVT(*DOMTRCDTA)
V4R5	ADDPEXDFN DFN(DOMINO) TYPE(*TRACE) JOB(*ALL) MAXSTG(100000) TRCTYPE(*SLTEVT) SLTEVT(*YES) OSEVT(*MIEV12)
V4R4	ADDPEXDFN DFN(DOMINO) TYPE(*TRACE) JOB(*ALL) MAXSTG(100000) TRCTYPE(*SLTEVT) SLTEVT(*YES) OSEVT(*MIEV12)

V5R2 Collection Services

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- **Domino statistics integrated with iSeries Collection Services**

- **Server add-in task: COLSRV400**

- **Data collected similar to 'show stat'**

  - *Database buffer pool stats*

  - *Database cache hit rates*

  - *Server transaction stats*

  - *Number of users, ...*

- **** Requires Domino 6 ****

Other Tool Tips

- **show task debug**

  - ▶ *Undocumented debug parameter for iSeries*

  - ▶ *Shows job and thread number for SERVER task*

  - ▶ *Helpful for isolating performance problems*

- **Panel group for displaying long Procedure names**
  - ▸ *Specific to Domino, ships with product*
  - ▸ *Require R5.03 or higher*
  - ▸ *New panel group GWVJOB in library QNOTES*
  - ▸ *Replace GWVJOB in library QSYS*
    - ○ CRTLIB GWVLIB TEXT('Panel group for Domino')
    - ○ CRTDUPOBJ GWVJOB QNOTES *PNLGRP GWVLIB/GWVJOB
    - ○ CHGSYSLIBL GWVLIB

- **When using show stat, statistics are cumulative**
  - ▶ *only get reset when Domino server restarts*
- **To reset manually**
  - ▶ *set stat statisticname*
    - ○ set stat server.trans.total
    - ○ set stat server.*
      - ▪ *Not valid, can't use wildcard*

- **To view open database statistics**
  - ► *show dbs*
  - ► *Shows:*
    - ○ database name
    - ○ how often opened, whether modified
    - ○ lock waits and average waits
    - ○ number of waits and max # of waiters
  - ► *Add COLLECT_DB_LOCK_WAITS=1 to Notes.ini to collect LockWaits and AvgWaits values*

iSeries for Domino
Servers

- **New servers recently announced**
- **Think of as a "DSD Plus"**
  - ▶ *Unrestricted DB2 access*
  - ▶ *Full performance for other workloads*
    - ○ Even when Domino is not active
  - ▶ *Only requires proof of a Lotus Domino license*

- **Five new models**
  - ▶ *i810 (1 and 2-way configurations)*
  - ▶ *i825 (4 and 6-way configurations*

- **Available for order on March 10, 2003**

- **Require V5R2 (plus PTFs)**

References

- **Domino for iSeries Sizing and Performance Tuning on the IBM eServer iSeries Server**

  ► **_www.ibm.com/redbooks_**

    ○ SG24-5162-01

  ► **_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*

Questions?