



IBM Software Group

Tivoli Storage Manager Technical Exchange

Performance Diagnosis

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Tivoli. software

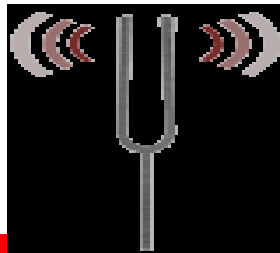


Agenda

- Performance Tuning Considerations
- Using Queries and Logs
- Client Instrumentation
- Server Instrumentation
- Case Studies

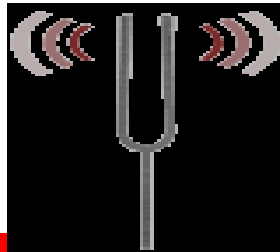
Performance Tuning Basics

- TSM performance tuning is complex because TSM supports multiple OS platforms, many different types of disk and tape hardware and several communication protocols
 - Tuning recommendations for one operating system do not always work on all operating systems
 - Disk and tape devices might behave differently on different OS platforms
- Tuning requires finding the bottleneck, relieving that bottleneck then doing it all over again
 - It's an iterative process – always look for the bottleneck
 - Repeat until you cannot or will not relieve the bottleneck or when you are satisfied with the throughput



Performance Tuning Basics

- Have a reasonable expectation
 - Understand the backup/restore data flow and the limitations of each part
 - How fast can your client read/write the data?
 - How fast can the client system process the data?
 - How fast can your network/SAN transport the data?
 - How fast can the TSM Server process the data?
 - How fast can the TSM disk/tape read/write the data?
 - Don't get hung up on how fast one component can operate
 - Just because your tape drive can write 30 MB/sec doesn't mean that you can backup at 30 MB/sec (the client has to be able to read the data at 30 MB/sec)
 - Not all hardware can live up to it's rated capabilities



Logs and Queries

- Client session messages
 - Client session statistics
 - Server queries
 - Server accounting data
 - Server SQL queries
-
- TSM provides a large number of client and server traces that can be used to solve many problems. Highly detailed traces may be needed at times, but keep in mind that they can impact performance significantly.

Client Session Messages

- Provide information about activities during the client session:
 - Detailed listing of all files backed up, restored, etc...
 - Whether any file retries occurred and why
 - Elapsed time to send server inventory data to client for incremental backup
 - Elapsed time to back up the Windows registry (if applicable)
- Client scheduler writes these messages with timestamps to the dsmsched.log file.
- Can degrade throughput because of message overhead
- Disable using the ***quiet*** option

Client Session Messages

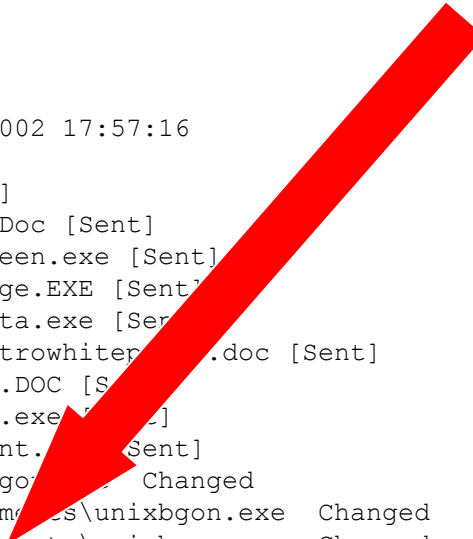
Tivoli Storage Manager
 Command Line Backup/Archive Client Interface - Version 5, Release 1, Level 0.0
 (C) Copyright IBM Corporation 1990, 2002 All Rights Reserved.

Selective Backup function invoked.

Node Name: WILDCAT
 Session established with server STGSERV2: MVS
 Server Version 5, Release 1, Level 0.0
 Server date/time: 02/03/2002 18:04:08 Last access: 02/03/2002 17:57:16

```
Directory-->          0 \\bearcat\f$\Documents [Sent]
Directory-->          0 \\bearcat\f$\Documents\IntelDoc [Sent]
Normal File-->       86,952 \\bearcat\f$\Documents\aberdeen.exe [Sent]
Normal File-->       80,905 \\bearcat\f$\Documents\storage.EXE [Sent]
Normal File-->       49,740 \\bearcat\f$\Documents\sysdata.exe [Sent]
Normal File-->      316,416 \\bearcat\f$\Documents\TCPIntrowhitepaper.doc [Sent]
Normal File-->     1,250,304 \\bearcat\f$\Documents\TCPIP.DOC [Sent]
Normal File-->       255,425 \\bearcat\f$\Documents\tcpip.exe [Sent]
Normal File-->     2,451,456 \\bearcat\f$\Documents\unix2nt.exe [Sent]
Normal File-->     31,084,544 \\bearcat\f$\Documents\unixbgon.exe Changed
Retry # 1 Normal File-->          0 \\bearcat\f$\Documents\unixbgon.exe Changed
Retry # 2 Normal File-->     2,451,456 \\bearcat\f$\Documents\unixbgon.exe Changed
Retry # 3 Normal File-->     2,451,456 \\bearcat\f$\Documents\unixbgon.exe [Sent]
Normal File-->       26,843 \\bearcat\f$\Documents\windowsnt_unix.exe [Sent]
Normal File-->     4,832,256 \\bearcat\f$\Documents\winframe.exe [Sent]
Directory-->          0 \\bearcat\f$\Documents\IntelDoc\REFDOC [Sent]
```

Retries here could be a problem



Client Session Statistics

- Provided regardless of **quiet** option use ...

```
Total number of objects inspected:      80
Total number of objects backed up:      80
Total number of objects updated:        0
Total number of objects rebound:       0
Total number of objects deleted:        0
Total number of objects failed:         0
Total number of bytes transferred:      57.14 MB
Data transfer time:                     2.76 sec
Network data transfer rate:             21,172.75 KB/sec
Aggregate data transfer rate:           5,223.73 KB/sec
Objects compressed by:                  0%
Elapsed processing time:                 00:00:11
```

- Data transfer time is the total session time required to execute the send() or recv() calls.
- Network data transfer rate is the Total number of bytes transferred divided by the Data transfer time. Look for network data transfer time to fall in line with your network throughput expectations. Low numbers here indicate a problem with the network or the TSM server.
- Aggregate data transfer rate is the Total number of bytes transferred divided by the Elapsed processing time.

Server Queries

- Server queries can be used to obtain specific information to help solve performance problems
- Some useful queries include:
 - query node nodename f=d
 - query session f=d
 - query process
 - query actlog ...
 - query option
 - query status
 - query db f=d
 - query log f=d
 - query system

Query Node

```
tsm> q node V06309070101_1 f=d
```

```
Node Name: V06309070101_1
Platform: WinNT
Client OS Level: 4.00
Client Version: Version 3, Release 1, Level 0.6
Policy Domain Name: DISK
Last Access Date/Time: 03/04/1999 09:07:23
Days Since Last Access: 1
Password Set Date/Time: 03/04/1999 09:06:12
Days Since Password Set: 1
Invalid Sign-on Count: 0
Locked?: No
Contact:
Compression: Client's Choice
Archive Delete Allowed?: Yes
Backup Delete Allowed?: No
Registration Date/Time: 03/04/1999 09:06:12
Registering Administrator: A
Last Communication Method Used: Tcp/Ip
Bytes Received Last Session: 256.03 M
Bytes Sent Last Session: 890
Duration of Last Session (sec): 46.00
Pct. Idle Wait Last Session: 0.00
Pct. Comm. Wait Last Session: 26.09
Pct. Media Wait Last Session: 0.00
Optionset:
URL:
Node Type: Client
```

Look for abnormal wait times



Query Session and Query Process

- Useful for determining what the server workload is at any particular point in time
- Collect both query session and query process
- Collect before and after a performance test to determine the additional server workload
- Automate using an administrative client to collect both queries at specified interval (every 15 minutes).
- Differences between byte counts for successive queries can be used to calculate total server throughput during the interval.
- Can be confused by sessions or processes starting or ending during the interval
- Very useful if you are getting erratic throughput – helps to pinpoint when the slowdown occurs which can help to identify an outside influence

Query Session

```
tsm> q sess f=d
```

```
    Sess Number: 31
    Comm. Method: Named Pipe
    Sess State: Run
    Wait Time: 0 S
    Bytes Sent: 1.9 K
    Bytes Recvd: 177
    Sess Type: Admin
    Platform: WinNT
    Client Name: A
Media Access Status:
    User Name:
```

```
    Sess Number: 34
    Comm. Method: Tcp/Ip
    Sess State: RecvW
    Wait Time: 0 S
    Bytes Sent: 902
    Bytes Recvd: 116.4 M
    Sess Type: Node
    Platform: WinNT
    Client Name: ZUZANNA
Media Access Status:
    User Name:
```

Query Session

Sess State

Specifies the current communications state of the server. Possible states are:

End	The session is ending.
IdleW	Waiting for client's next request.
MediaW	The session is waiting for access to a sequential media volume.
RecvW	Waiting to receive an expected message from the client.
Run	The server is executing a client request.
SendW	The server is waiting to send data to the client.
Start	The session is starting (authentication is in progress).

Wait Time

Specifies the amount of time the server has been in the current state shown.

Media Access Status

Specifies the type of media wait state. This information is only provided when the session state equals MediaW.

Query Database

Useful for determining if the database buffer pool is large enough to handle the workload.

1. Execute the following command:

```
reset bufpool
```

2. Execute the workload
3. Execute the following command:

```
query db f=d
```

4. If Cache Hit Pct. is less than 99%, consider increasing the server database buffer pool. However, do not increase if it would increase paging on the server.

Note: Cache Wait Pct. should be 0.

Query Database

```
tsm> q db f=d
```

```
...
```

```
                Pct Util: 88.0  
            Max. Pct Util: 88.0  
        Physical Volumes: 3  
    Buffer Pool Pages: 2,048  
Total Buffer Requests: 10,206  
    Cache Hit Pct.: 95.87  
    Cache Wait Pct.: 0.00  
Backup in Progress?: No
```

Should be 99 or higher

```
...
```

Accounting Records

- Server can write accounting records
- Written when a client session ends
- Records information from the client session statistics
- SMF records for z/OS
- dsmacct.log file in the server install directory
- CSV (comma separated variable) format
- Fields described in the TSM Administrator's Guide
- Enable accounting by executing the following Server command:

set accounting on

- Useful for calculating throughput, average file size, or for finding media wait or other wait times

SQL Queries

- Tivoli Storage Manager server queries using the SQL language can be used to obtain much of the data stored in the Tivoli Storage Manager database.
- In particular, this is useful for certain queries regarding the object inventory data, for example, determining the number of versions currently stored for a specific file.
- Execute the SQL commands using the administrative client. For example:
 - `select * from adsm.backups where node_name='DOGBERT2'-`
 - `and LL_NAME='Z100K.F1'`
- SQL queries cannot be executed at the server console.
- Be careful about the amount of data you request.

SQL Queries

- This query shows the number of versions of a file that are currently in the Tivoli Storage Manager server's inventory.

```
tsm> select ll_name, state, backup_date, deactivate_date from adsm.backups where -
cont> NODE_NAME='DOGBERT2' and LL_NAME='Z100K.F1'
ANR2963W This SQL query may produce a very large result table, or may require a significant
amount of time to compute.
```

Do you wish to proceed?y

LL_NAME	STATE	BACKUP_DATE	DEACTIVATE_DATE
Z100K.F1	ACTIVE_VERSION	1999-02-26 10:15:27.000000	
Z100K.F1	INACTIVE_VERSION	1999-02-26 10:11:17.000000	1999-02-26 10:11:35.000000
Z100K.F1	INACTIVE_VERSION	1999-02-26 10:11:35.000000	1999-02-26 10:11:53.000000
Z100K.F1	INACTIVE_VERSION	1999-02-26 10:11:53.000000	1999-02-26 10:12:11.000000
Z100K.F1	INACTIVE_VERSION	1999-02-26 10:12:11.000000	1999-02-26 10:15:27.000000

- 5 versions! .

SQL Queries

- The Activity Summary Table

```
tsm> select start_time,end_time,activity,entity,examined,affected  
from summary where activity='BACKUP'
```

```
START_TIME: 2003-10-06 13:15:03.000000  
END_TIME: 2003-10-06 13:38:16.000000  
ACTIVITY: BACKUP  
ENTITY: GERMAIN  
EXAMINED: 118681  
AFFECTED: 2141
```

```
START_TIME: 2003-10-06 21:49:49.000000  
END_TIME: 2003-10-06 21:49:50.000000  
ACTIVITY: BACKUP  
ENTITY: HAGEN  
EXAMINED: 84988  
AFFECTED: 52
```

```
START_TIME: 2003-10-07 13:15:02.000000  
END_TIME: 2003-10-07 13:26:44.000000  
ACTIVITY: BACKUP  
ENTITY: GERMAIN  
EXAMINED: 118860  
AFFECTED: 1948
```

SQL Queries

- This query shows the number of volumes that a filespace has data stored on in a primary storage pool.

```
tsm> select count(*) from volumeusage where  
node_name='SNOA1F-0675' -  
and stgpool_name='BACKMAG1' and filespace_id=2
```

```
Column_1  
-----  
242
```

- 242 volumes (this includes active and inactive versions)

Instrumentation

- Instrumentation identifies elapsed time spent performing certain activities
- Minimal performance impact
- The most useful tool for understanding TSM performance bottlenecks
- Version 5.1.5 client included new instrumentation function
- Version 5.2.0 server includes instrumentation for the first time

TSM Client Instrumentation 5.1.0 and Earlier

- Enabled using:
 - `-traceflag=instr_client_detail` (command line)
 - `-tracefile=<your_trace_file`

 - `traceflag instr_client_detail` (options file)
 - `tracefile <your_trace_file>`

- Backup/archive client only (not in API or TDPs)
- Command line client and scheduler only (not in GUI, web client)
- Scheduler may need to be restarted after editing the options file
- Cancel the client sessions from the server to get results without waiting for command completion

TSM Client Instrumentation 5.1.5 and Later

- New function in version 5.1.5
- Replaces ***instr_client_detail*** client trace
- ***instr_client_detail*** and ***perform*** traces do not work anymore
- Provides client performance instrumentation statistics by thread
- Only shows threads with instrumented activities
- Also includes client command, options, summary statistics
- Enabled using:
 - -testflag=instrument:detail (command line)
 - testflag instrument:detail (options file)
- Output is appended to the dsminstr.report file
- Backup/archive client only (not in API or TDPs)
- Command line client and scheduler only (not in GUI, web client)
- Scheduler may need to be restarted after editing the options file
- Cancel the client sessions from the server to get results without waiting for command completion

TSM Client Instrumentation

 TSM Client final instrumentation statistics: Wed Jul 10 10:26:49 2002

Instrumentation class: Client detail

Completion status: Success

Detailed Instrumentation statistics for

Thread: 118 Elapsed time 342.332 sec

Section Actual (sec) Average(msec) Frequency used

Process Dirs	0.000	0.0	0
Solve Tree	0.000	0.0	0
Compute	0.673	0.0	47104
BeginTxn Verb	0.000	0.0	70
Transaction	59.315	847.4	70
File I/O	250.087	3.8	64968
Compression	0.000	0.0	0
Encryption	0.000	0.0	0
CRC	0.000	0.0	0
Delta	0.000	0.0	0
Data Verb	19.004	0.4	47104
Confirm Verb	0.000	0.0	0
EndTxn Verb	12.443	177.8	70
Other	0.810	0.0	0

TSM Client Instrumentation

Client Setup

Initial processing including signon, authorization, and queries for policy set and file system information.

Process Dirs

Processing directory and file information before backing up or restoring any files. For incremental backup, it includes querying the server for backup status information. For classic restore, it includes retrieving the file list. For no-query-restore, this is not used.

Solve Tree

For selective backup, determining if there are any new directories in the path that need to be backed up. This involves querying the server for backup status information on directories. This can be large if there are a large number of directories.

Compute

Computing throughput and transfer sizes.



TSM Client Instrumentation

Transaction

A general category to capture all time not accounted for in the other sections. Includes file open/close time, which can be large, especially during restore of many small files. Also includes message display time which can be large if running without the quiet option, or with detailed traces enabled. Average time for this section is not meaningful.

BeginTxn Verb

Frequency used indicates the number of transactions that were used during the session.

File I/O

Requesting data to be read or written on the client file system.

Compression

Compressing or uncompressing data.

Encryption

Encrypting or decrypting data.

TSM Client Instrumentation

CRC

Computing or comparing CRC values.

Delta

Adaptive subfile backup processing, including determining the changed file bytes or blocks.

Data Verb

Sending or receiving data to/from the communication layer. High data verb time prompts an investigation of server performance and the communication layer (which includes elements of both the client and server).

Confirm Verb

During backup, sending a confirm verb and waiting for a response to confirm that the data is being received by the server.

EndTxn Verb

During backup, waiting for the server to commit the transaction. This includes updating the database pages in memory, and writing the recovery log data. For backup direct to tape, this includes flushing the tape buffers.



TSM Server Instrumentation

- New in version 5.2.0
- Provides server or storage agent performance instrumentation statistics by thread
- Shows threads with disk, tape, or network IO operations
- Data is stored in memory, and lost when server/stagent is halted

- To start: `INSTrumentation Begin [Maxthread=number]`
- By default, a maximum of 1024 threads can be instrumented

- To end: `INSTrumentation End [File=filename]`
- By default, output is sent to the console or admin display

- When looking for bottlenecks, look for threads with most of their time in areas other than 'Thread Wait'
- Designed to be run for periods less than 24 hours at a time
- Use this as a problem solving guide

TSM Server Instrumentation

- Example: selective backup to tape

Instrumentation began 11:09:37.024 ended 11:14:27.280 elapsed 290.255

Thread 33 AgentThread	parent=0	(AIX TID 37443)	11:09:37.024-->11:14:27.280				
Operation	Count	Tottime	Avgtime	Mintime	Maxtime	InstTput	Total KB
Tape Write	2125	6.191	0.003	0.000	0.010	87556.7	542117
Tape Commit	15	25.505	1.700	0.000	1.764		
Tape Data Copy	2123	1.830	0.001	0.000	0.001		
Thread Wait	2175	256.671	0.118	0.000	42.869		
Unknown		0.057					
Total		290.255				1867.7	542117

Thread 32 SessionThread	parent=24	(AIX TID 27949)	11:10:19.630-->11:14:13.603				
Operation	Count	Tottime	Avgtime	Mintime	Maxtime	InstTput	Total KB
Network Recv	127329	189.952	0.001	0.000	0.415	2865.9	544385
Network Send	36	0.001	0.000	0.000	0.000	0.0	0
Thread Wait	2187	25.552	0.012	0.000	1.766		
Unknown		18.466					
Total		233.972				2326.7	544386

- By matching the threads reading and writing data for a single session, the bottleneck can be seen. Here it is the network (including the client).

TSM Server Instrumentation

- Example: selective backup to disk

Instrumentation began 09:35:56.687 ended 09:36:23.015 elapsed 26.328

```
Thread 3 LvmDiskServer (Win Thread ID 2888) 09:35:56.687-->09:36:23.015
Operation      Count  Tottime  Avgtime  Mintime  Maxtime  InstTput  Total KB
-----
Disk Write     6      0.000   0.000   0.000   0.000           420
Thread Wait    6     26.328   4.388   0.000   14.594
Unknown                0.000
-----
Total                        26.328                               16.0      420
```

```
Thread 36 SessionThread (Win Thread ID 3748) 09:35:56.687-->09:36:23.015
Operation      Count  Tottime  Avgtime  Mintime  Maxtime  InstTput  Total KB
-----
Network Recv  15437   3.447   0.000   0.000   0.016  53110.5   183072
Network Send    1     0.000   0.000   0.000   0.000           0
Thread Wait    719   22.742   0.032   0.000   0.047
Unknown                0.139
-----
Total                        26.328                               6953.7   183076
```

```
Thread 37 SsAuxThread (Win Thread ID 3056) 09:35:56.687-->09:36:23.015
Operation      Count  Tottime  Avgtime  Mintime  Maxtime  InstTput  Total KB
-----
Disk Write     717   26.203   0.037   0.015   0.062   6986.7   183072
Thread Wait    718    0.047   0.000   0.000   0.016
Unknown                0.078
-----
Total                        26.328                               6953.5   183072
```

Diagnosing the Problem

- Find the bottleneck
 - Collect TSM instrumentation data to isolate the cause to:
 - client
 - server
 - network
 - Collect resource usage data to find high use component
 - SMF, RMF, vmstat, iostat, netstat, Performance Monitor
- Change how component is used, or ...
- Add more of the high use component (CPUs, memory, disks)
- Retest and repeat if necessary
- There is always a bottleneck!

Case Study 1

- WinNT client, Win2000 server (2-way), Gb Ethernet
- Incremental backup to disk seems slow ...

Session stats

```

Total number of objects inspected: 17,864
Total number of objects backed up: 16,040
Total number of objects updated: 0
Total number of objects rebound: 0
Total number of objects deleted: 0
Total number of objects expired: 0
Total number of objects failed: 0
Total number of bytes transferred: 1,003.18 MB
Data transfer time: 1,159.17 sec
Network data transfer rate: 886.20 KB/sec
Aggregate data transfer rate: 322.01 KB/sec
Objects compressed by: 0%
Elapsed processing time: 00:53:10
  
```

Server options

```

txngroupmax 256
movebatchsize 256
movesizethresh 500
bufpoolsize 2048
expinterval 0
uselargebuffers yes
tcpwindowsize 63
tcpnodelay no
  
```

Client options

```

txnbytelimit 25600
resourceutilization (default)
largecommbuffers no
tcpwindowsize 63
tcpnodelay yes
compression no
  
```


Case Study 1

`instr_client_detail trace`

Final Detailed Instrumentation statistics

Elapsed time: 3190.217 sec

Section	Total Time(sec)	Average Time(msec)	Frequency used
---------	-----------------	--------------------	----------------

Client Setup	0.180	180.0	1
Process Dirs	65.272	35.8	1825
Solve Tree	0.000	0.0	1
Compute	0.512	0.0	45280
Transaction	333.182	2.2	153840
BeginTxn Verb	0.010	0.2	65
File I/O	171.773	2.8	61320
Compression	0.000	0.0	0
Encryption	0.000	0.0	0
CRC	0.000	0.0	0
Delta	0.000	0.0	0
Data Verb	1159.082	25.6	45280
Confirm Verb	0.461	92.2	5
EndTxn Verb	1793.148	27586.9	65

High "Data Verb" and "EndTxn" times point to the server as a problem..

Case Study 1

Server query session and query process data

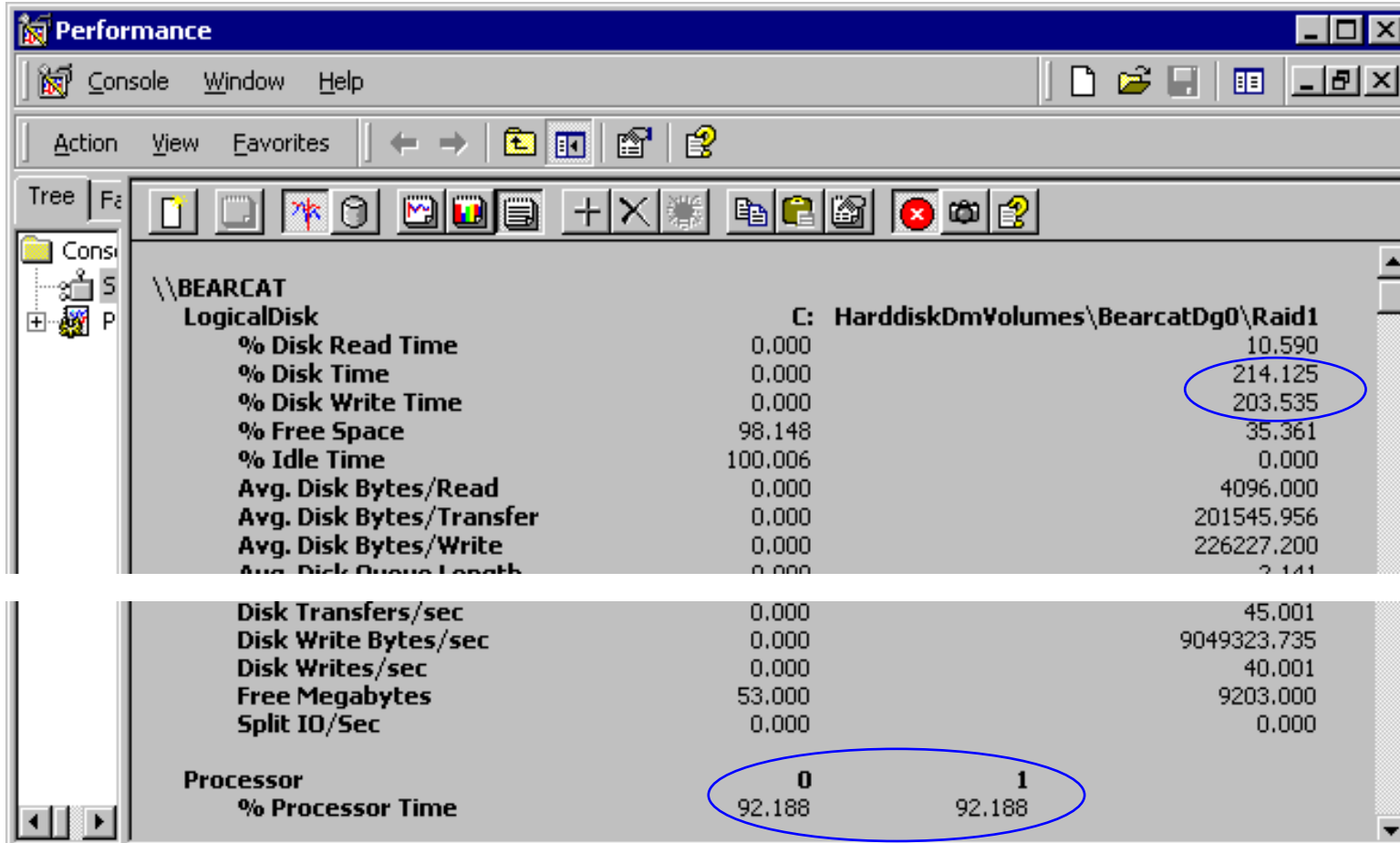
TSM:BEARCAT> q sess

Sess Number	Comm. Method	Sess State	Wait Time	Bytes Sent	Bytes Recvd	Sess Type	Platform	Client Name
24	Named Pipe	Run	0 S	1.8 K	106	Admin	WinNT	SERVER_CONSOLE
25	Tcp/Ip	IdleW	25 S	733	458	Node	WinNT	X9923
26	Tcp/Ip	IdleW	4 S	737	462	Node	WinNT	JABBOTT
27	Tcp/Ip	IdleW	10 S	741	466	Node	WinNT	Y989894
28	Tcp/Ip	IdleW	35 S	733	458	Node	WinNT	DFDIST
29	Tcp/Ip	IdleW	19 S	745	470	Node	WinNT	ACCOUNT50
30	Tcp/Ip	IdleW	1 S	737	462	Node	WinNT	815080
31	Tcp/Ip	IdleW	4 S	741	466	Node	WinNT	815334
32	Tcp/Ip	IdleW	0 S	452	240.5 M	Node	WinNT	Y50801_1
33	Tcp/Ip	Run	0 S	462	270.3 M	Node	WinNT	X9923
34	Tcp/Ip	Run	0 S	432	223.5 M	Node	WinNT	JABBOTT
35	Tcp/Ip	Run	0 S	432	224.7 M	Node	WinNT	ACCOUNT50
36	Tcp/Ip	RecvW	0 S	442	235.9 M	Node	WinNT	Y989894
37	Tcp/Ip	Run	0 S	492	308.1 M	Node	WinNT	DFDIST
38	Tcp/Ip	Run	0 S	462	266.8 M	Node	WinNT	815080
39	Tcp/Ip	IdleW	11 S	741	466	Node	WinNT	815334
40	Tcp/Ip	Run	0 S	462	271.3 M	Node	WinNT	Y50801_1

TSM:BEARCAT> q proc

ANR0944E QUERY PROCESS: No active processes found.

Case Study 1



- Processors and Disk are the bottleneck

Case Study 2

Windows 2000 client, AIX server (4-way), Gb Ethernet
Incremental backup to disk seems slow ...

Session stats

```
Total number of objects inspected: 44,696
Total number of objects backed up: 8,822
Total number of objects updated: 0
Total number of objects rebound: 0
Total number of objects deleted: 0
Total number of objects expired: 0
Total number of objects failed: 0
Total number of bytes transferred: 522.00 MB
Data transfer time: 21.11 sec
Network data transfer rate: 25,311.83 KB/sec
Aggregate data transfer rate: 634.60 KB/sec
Objects compressed by: 0%
Elapsed processing time: 00:14:02
```

Server options

```
txngroupmax 256
movebatchsize 256
movesizethresh 500
bufpoolsize 65536
expinterval 0
uselargebuffers yes
tcpwindowsize 64
tcpnodelay yes
```

Client options

```
txnbytelimit 25600
resourceutilization (default)
largecommbuffers no
tcpwindowsize 63
tcpnodelay yes
compression no
```

Case Study 2

instr_client_detail trace

Final Detailed Instrumentation statistics

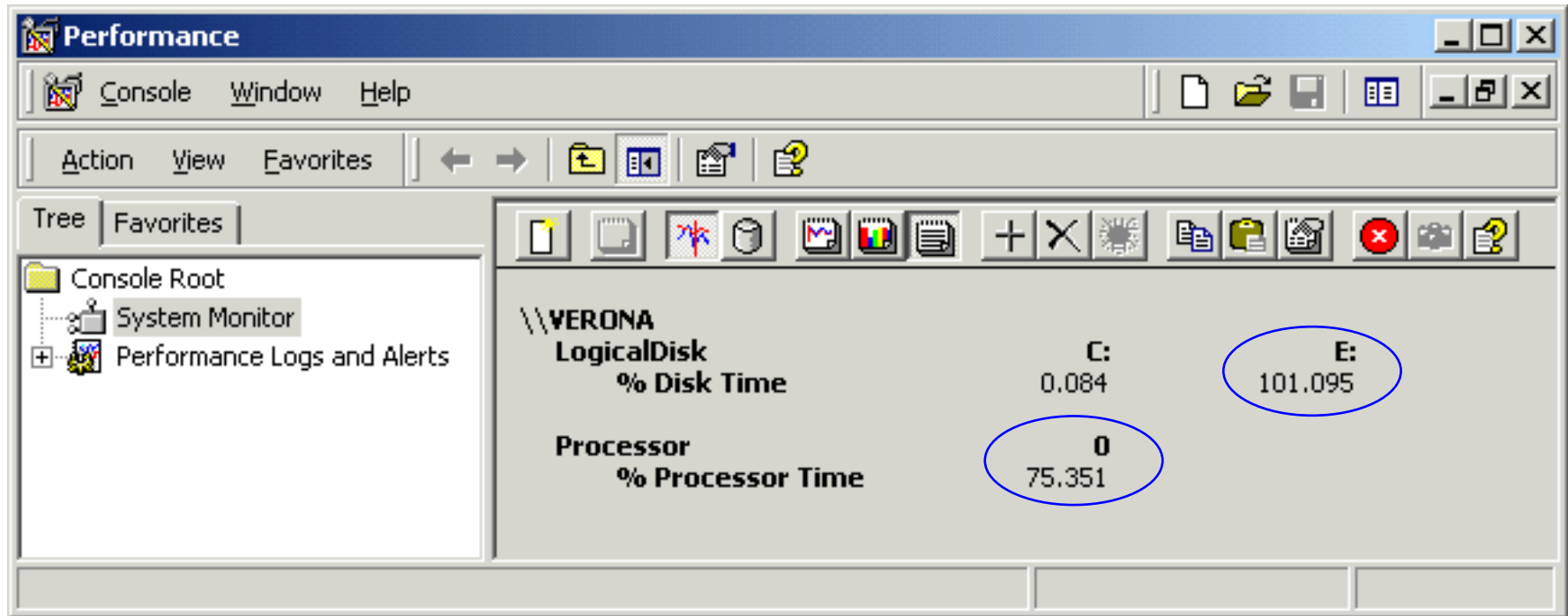
Elapsed time: 844.294 sec

Section	Total Time(sec)	Average Time(msec)	Frequency used
---------	-----------------	--------------------	----------------

Client Setup	1.562	1562.0	1
Process Dirs	566.176	123.2	4597
Solve Tree	0.000	0.0	1
Compute	2.283	0.1	23982
Transaction	194.696	2.3	85438
BeginTxn Verb	0.000	0.0	36
File I/O	633.600	19.3	32804
Compression	0.000	0.0	0
Encryption	0.000	0.0	0
CRC	0.000	0.0	0
Delta	0.000	0.0	0
Data Verb	21.048	0.9	23982
Confirm Verb	0.010	10.0	1
EndTxn Verb	18.103	502.9	36

High time in "Process Dirs" and "File I/O" indicates a client problem...

Case Study 2



High client CPU and disk utilization ...

Are there any other processes using the CPU heavily?

Case Study 2

Windows Task Manager

File Options View Help

Applications Processes Performance

Image Name	PID	CPU	CPU Time	Mem Usage	VM Size	I/O Reads	I/O Writes	I/O Other
dsmc.exe	688	42	0:01:26	11,532 K	9,972 K	31,276	18	720,816
rtvscan.exe	520	40	0:11:53	4,988 K	8,532 K	2,141,114	941	5,170,608
System Idle Process	0	14	21:04:06	16 K	0 K	0	0	0
WINLOGON.EXE	156	01	0:00:18	3,064 K	5,628 K	131,942	130,337	15,237
System	8	01	0:02:24	212 K	24 K	4	10,848	10,811
os2ss.exe	1312	00	0:00:00	232 K	80 K	0	0	4
os2srv.exe	1288	00	0:00:00	1,064 K	448 K	61	1	15
CMD.EXE	1208	00	0:00:00	956 K	320 K	129	0	547
vpc32.exe	1132	00	0:00:01	5,948 K	3,364 K	239	69	2,165
explorer.exe	1076	00	0:00:32	2,884 K	3,460 K	13,500	269	510,913
MSGSYS.EXE	1000	00	0:00:00	2,728 K	1,124 K	2,130	12	558
mmc.exe	984	00	0:00:03	6,984 K	2,888 K	4,530	25	5,132
vp tray.exe	880	00	0:00:02	1,644 K	2,176 K	504,289	3	409,023
inetinfo.exe	708	00	0:00:01	4,496 K	3,316 K	153	23	7,928
WinMgmt.exe	668	00	0:00:42	512 K	1,156 K	34,324	22,387	42,122
mstask.exe	612	00	0:00:00	2,904 K	1,032 K	47	24	426
regsvc.exe	592	00	0:00:00	760 K	236 K	9	8	48
svchost.exe	492	00	0:00:01	2,788 K	2,940 K	7,250	456	4,730
defwatch.exe	476	00	0:00:00	988 K	268 K	6	4	46

Virus Scanner!

End Process

Processes: 28 CPU Usage: 86% Mem Usage: 101316K / 310960K

References

- **IBM TSM Performance Tuning Guide -**
<http://publib.boulder.ibm.com/tividd/td/IBMTivoliStorageManagerClient5.2.html>
 - New Tuning Guide due out soon!
- **IBM TSM Implementation Guide –**
<http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg245416.html?Open>
- **Tivoli Storage Manager Version 5.1 Technical Guide –**
<http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg246554.html?Open>
- **Tivoli Storage Manager Version 4.2 Technical Guide –**
<http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg246277.html?Open>