::ISUG

techcast series

The ASE MDA Tables

Finding Out What Goes On Inside ASE

Rob Verschoor
Senior Evangelist
Sybase, Inc
robv@sybase.com

Peter Dorfman
Senior Staff Software Engineer
Sybase, Inc.
peter.dorfman@sybase.com

SYBASE

About Us

About Peter

- 12 years at Sybase ASE Engineering
- Designs and develops system management, monitoring and diagnostic tools for the ASE
- Leads the design and development of system management features for the ASE and other Sybase database products
- Peter.dorfman@sybase.com

About Us

About Rob

- Consultant for ASE & Replication Server
- Worked with ASE since 1989
- Based in The Netherlands
- www.sypron.nl

Published three books about Sybase:

- “The Complete Sybase Replication Server Quick Reference Guide” (new)
- “The Complete Sybase ASE Quick Reference Guide” (3rd edition, new)
- “Tips, Tricks & Recipes for Sybase ASE”

Since 1 February 2005: joined Sybase, Inc.

- Sybase Engineering, Evangelism Group

Topics

- **Quick introduction to MDA tables**
- **Possible applications of MDA tables**
  - What’s that application doing?
  - Identifying unused indexes
  - Identifying ‘hot’ tables
- **Historical MDA tables**
- **Archiving historical MDA table data**
- **Performance impact of MDA tables**
- **Counter wrap**
- **Analyzing stored procedure activity**
- **Miscellaneous topics**
- **Recent Enhancements**
- **Q&A**

Quick Introduction to MDA Tables

- **MDA tables were introduced in ASE 12.5.0.3**
  - MDA = Monitoring and Diagnostic Access
  - also called “monitoring tables”
- **35 proxy tables in ‘master’ database**
  - monSysSQLText, monObjectActivity, monCachedObject (etc.)
  - Can be accessed with regular SQL statements
  - When queried, tables are created on-the-fly from memory structures
  - No data is stored in **master** database
  - The proxy tables may also be created in a different database than **master**
- **Must be installed: ‘installmontables’ script**
- **No license needed: included in ASE base product**
- **Only small performance impact on ASE (<5%)**

Quick Introduction to MDA Tables

- **MDA tables provide access to low-level monitoring data**
  - Resource usage in ASE per table/query/entire server
  - Current activity in ASE per spid/query/procedure/table
  - Recent activity: recently completed statements, with the resources they required
- **Some examples of practically relevant information:**
  - Amount of memory occupied in the data cache by each table or index
  - Most frequently used tables/procedures
  - Top-N queries for CPU, I/O, elapsed time,...
  - Find unused indexes
  - SQL text of currently executing/recently executed statements
  - Automatically kill user processes that have been idle for more than X minutes
  - Provide server status information even when **tempdb** is full

Quick Introduction to MDA Tables

- **For more MDA basics, and a brief discussion of all tables:**
  - See Rob’s presentation from Techwave 2003 (**www.sypron.nl/mda**)

- **In this presentation:**
  - We want to go one step further than just the basics
  - Look at practical applications of MDA tables
  - Things that are useful for you as a DBA

Possible Applications of MDA Tables

What’s That Application Doing?

- **Does this sound familiar?**
  - A third-party ‘black box’ application runs on your ASE server
  - You have the feeling it sometime slows down the entire server...
  - … but you don’t know which queries it is sending to ASE
- **Classic solutions:**
  - Use “cmdtext” auditing to intercept the application’s T-SQL commands
  - Use traceflag 11202 (writes all incoming client language to the errorlog)
  - Use third-party tools to find T-SQL commands by intercepting network packets
  - dbcc sqltext()
  - …but all these methods have significant limitations or drawbacks

What’s That Application Doing?

- **Solution: MDA tables monProcessSQLText & monSysSQLText**
- **monProcessSQLText: currently executing SQL**
- **monSysSQLText: recently executed SQL, now completed**
  - Historical table
  - Lets you “look back” in time
  - By copying rows regularly into an ‘archive’ table, complete history can be preserved

What’s That Application Doing? Statement Statistics

- **Also: monSysStatement: info about completed SQL statement**
  - Number of logical I/Os
  - Number of physical I/Os
  - Number of network packets sent/received
  - Number of milliseconds of ‘waiting time’ during statement execution
  - Exact starttime & endtime of execution
  - Not the SQL Text itself; for this, see **monSysSQLText**
  - Historical table
  - Lets you “look back” in time
  - By copying rows regularly into an ‘archive’ table, complete history can be preserved

Measuring Statement I/O and CPU Time

```
select * into #ts from master..monSysStatement

select KPID, BatchID, LineNumber, LogicalReads, Elapsed = datediff(ms,
   StartTime, EndTime) from #ts where LogicalReads > 10000 order by 1,2,3
```

```
 KPID        BatchID     LineNumber  LogicalReads Elapsed
 ----------- ----------- ----------- ------------ -----------
   450298249          10           1        17844           0
   452133791           3           1        40401           0
   452790238           8           1        53003           0
   453837392          10           1        17970           0
   456197724           1           1        20585           0
   456853857           9           1        49588        2000
   457443052           8           1        66647        4000
   458622875          19           1        22402           0
   458622875          20           1        11214        1000
   459014430           8           1        53146           0
   459080255           1           1       108416        7000
   459278288          16           1        17832        2000
   460785077           9           1        55619        3000
```

Capturing SQL Text

```
select * into #tsql from master..monSysSQLText

select SQLText from #tsql where KPID= 459080255
order by  BatchID, SequenceInBatch
```

```
    SQLText
    ---------------------------------------------------------

    select  admnr = lvd.id_lm_adres,
            lvd.id_logmiddel
        from
              logmi.dbo.lm_voorraad lvd,
              ravar.dbo.adm_relatie adm
        where
               lvd.cdsys_lm_adrestype  = "A"
        and    lvd.cdsys_lm_opslagstat = "O"
        and    lvd.id_lm_adres         = adm.admnr
        and    adm.dat_ingang         <= @vandaag
        and   (adm.dat_einde          >= @vandaag
         or    adm.dat_einde           = null)
```

Monitoring Table Activity

- **Monitoring activity on a specific table**

```
select SQLText from master..monSysSQLText
where SQLText like ‘%MyTable%’
```

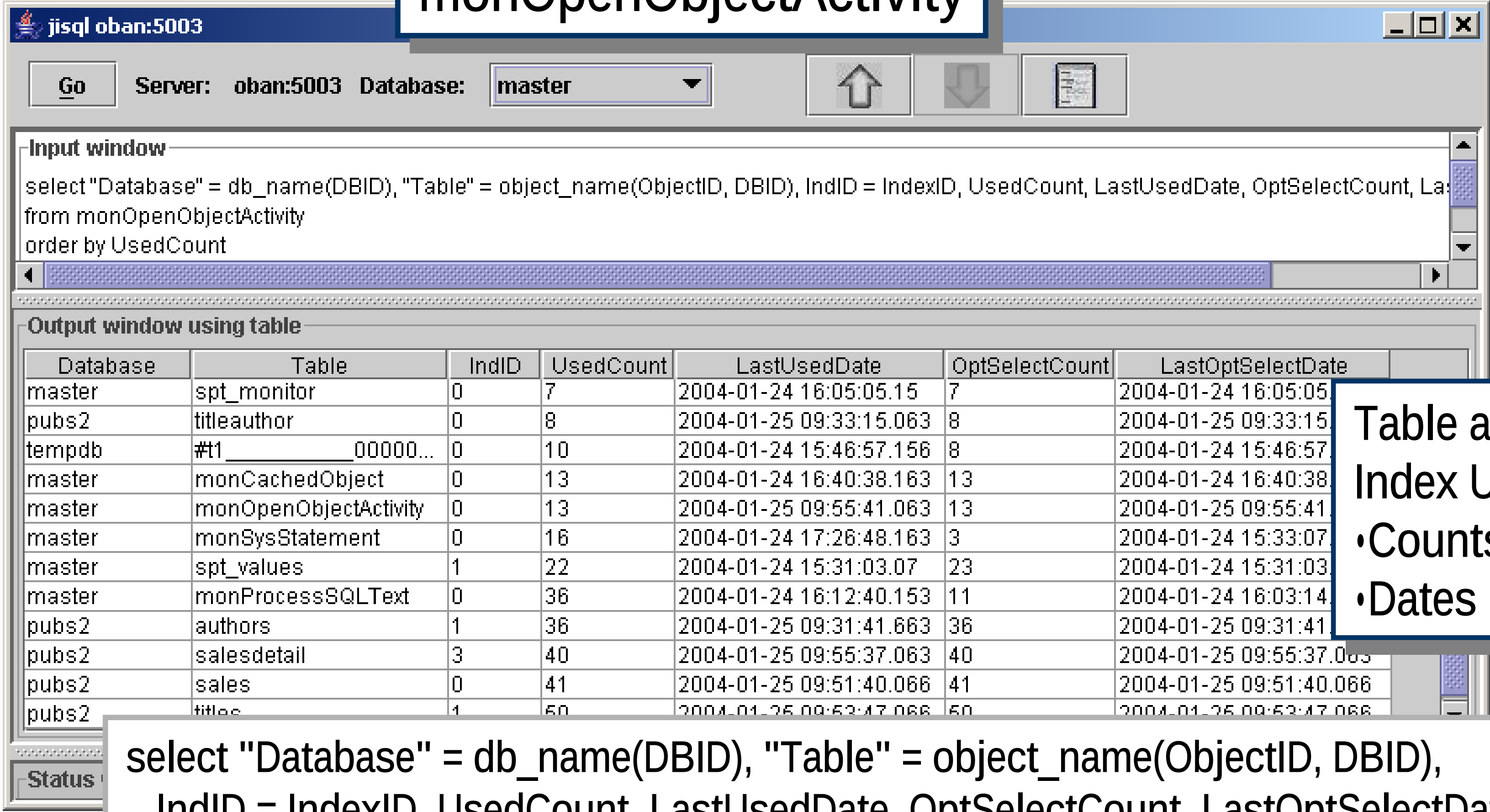
- **Also handy for RepServer DBAs:**
  - Quick way to figure out exactly which SQL is executed against your replicate DB
  - Especially handy when developing/debugging custom function strings

Monitoring Index Utilization

- **Have you ever wanted to see**
  - Which indexes are never used?
  - How frequently they are used?
  - How many inserts, deletes, updates, physical or logical I/O they incur?
- **monOpenObjectActivity table provides:**
  - Table usage count
  - Index usage count
  - Last used dates
  - Physical, logical I/O
  - Row-level insert/delete/update counts
  - Lock wait counts for tables and indexes
- **NOTE: Statistics are reset when server is booted or object descriptor is reused in memory.**

Monitoring Index Utilization

monOpenObjectActivity



```
select "Database" = db_name(DBID), "Table" = object_name(ObjectID, DBID), IndID = IndexID, UsedCount, LastUsedDate, OptSelectCount, La
from monOpenObjectActivity
order by UsedCount
```

Database	Table	IndID	UsedCount	LastUsedDate	OptSelectCount	LastOptSelectDate
master	spt_monitor	0	7	2004-01-24 16:05:05.15	7	2004-01-24 16:05:05
pubs2	titleauthor	0	8	2004-01-25 09:33:15.063	8	2004-01-25 09:33:15
tempdb	#t1___________00000...	0	10	2004-01-24 15:46:57.156	8	2004-01-24 15:46:57
master	monCachedObject	0	13	2004-01-24 16:40:38.163	13	2004-01-24 16:40:38
master	monOpenObjectActivity	0	13	2004-01-25 09:55:41.063	13	2004-01-25 09:55:41
master	monSysStatement	0	16	2004-01-24 17:26:48.163	3	2004-01-24 15:33:07
master	spt_values	1	22	2004-01-24 15:31:03.07	23	2004-01-24 15:31:03
master	monProcessSQLText	0	36	2004-01-24 16:12:40.153	11	2004-01-24 16:03:14
pubs2	authors	1	36	2004-01-25 09:31:41.663	36	2004-01-25 09:31:41
pubs2	salesdetail	3	40	2004-01-25 09:55:37.063	40	2004-01-25 09:55:37.063
pubs2	sales	0	41	2004-01-25 09:51:40.066	41	2004-01-25 09:51:40.066
pubs2	titles	1	50	2004-01-25 09:53:47.066	50	2004-01-25 09:53:47.066

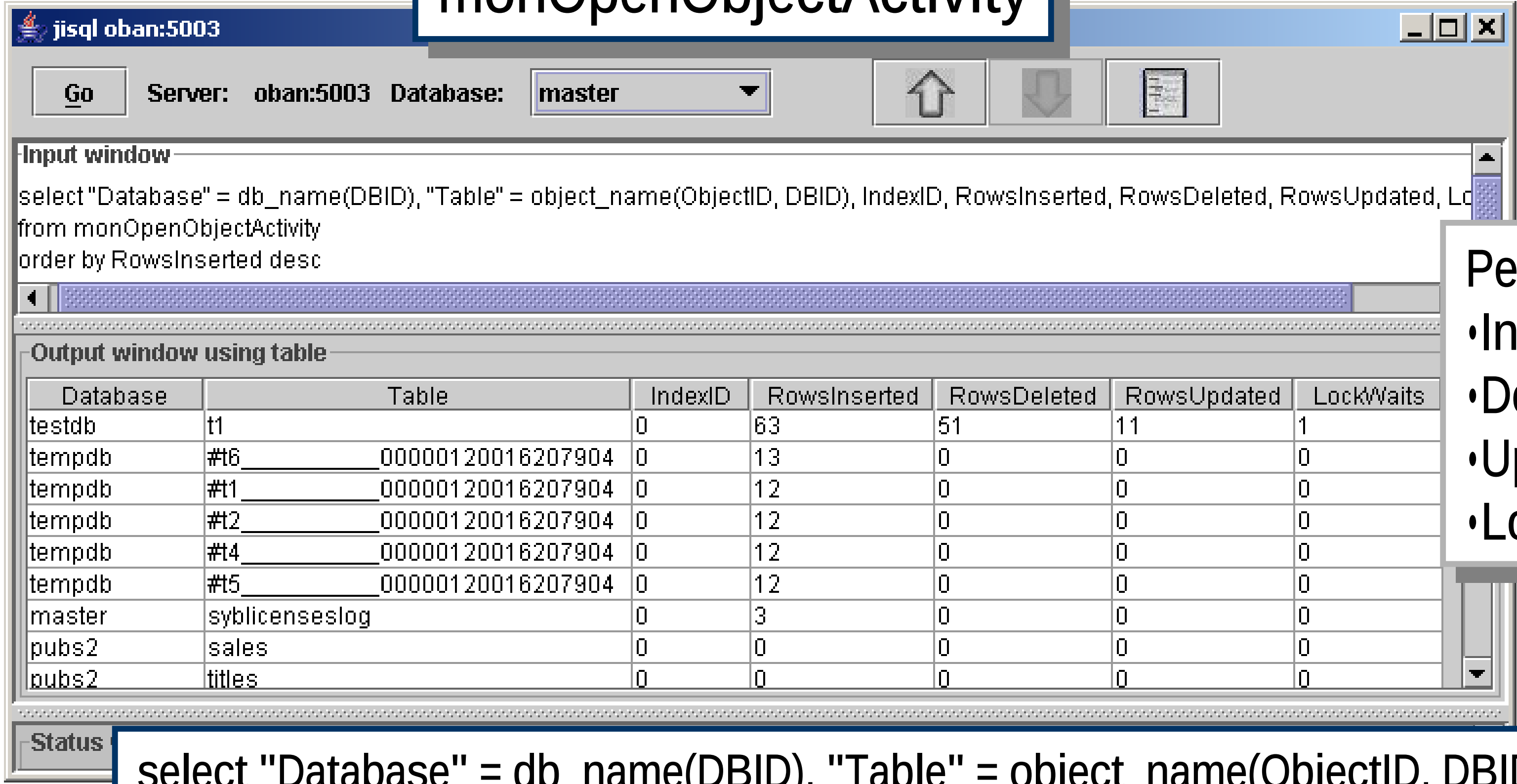
Table and Index Usage

- Counts
- Dates

```
select "Database" = db_name(DBID), "Table" = object_name(ObjectID, DBID),
  IndID = IndexID, UsedCount, LastUsedDate, OptSelectCount, LastOptSelectDate
from master..monOpenObjectActivity
order by UsedCount
```

Monitoring Table Usage

monOpenObjectActivity



```
select "Database" = db_name(DBID), "Table" = object_name(ObjectID, DBID), IndexID, RowsInserted, RowsDeleted, RowsUpdated, Lo
from monOpenObjectActivity
order by RowsInserted desc
```

Database	Table	IndexID	RowsInserted	RowsDeleted	RowsUpdated	LockWaits
testdb	t1	0	63	51	11	1
tempdb	#t6___________00000120016207904	0	13	0	0	0
tempdb	#t1___________00000120016207904	0	12	0	0	0
tempdb	#t2___________00000120016207904	0	12	0	0	0
tempdb	#t4___________00000120016207904	0	12	0	0	0
tempdb	#t5___________00000120016207904	0	12	0	0	0
master	syblicenseslog	0	3	0	0	0
pubs2	sales	0	0	0	0	0
pubs2	titles	0	0	0	0	0

Per Table
- Inserts
- Deletes
- Updates
- Lock Waits

```
select "Database" = db_name(DBID), "Table" = object_name(ObjectID, DBID),
    IndexID, RowsInserted, RowsDeleted, RowsUpdated, LockWaits
from monOpenObjectActivity
order by RowsInserted desc
```

Identifying ‘Hot’ Tables

- **What makes a table “hot”?**
  - Logical reads?
  - Physical reads?
  - Number of queries?
  - Lock usage?
- **monOpenObjectActivity reports a number of measures of table and index activity**
- **Example**

```
select * into #t
from  master..monOpenObjectActivity
go

select TableName = object_name(ObjectID, DBID), IndexID,
   LogicalReads, PhysicalReads, Operations, LockWaits
from #t
order by 3, 4
go
```

Identifying ‘Hot’ Tables

```
TableName                      IndexID LogReads PhysReads Operations LockWaits
------------------------------ ------- -------- --------- ---------- ---------
products_tb                          0   282294      9043        609        97
products_tb                          2    36450         0          0         0
cust_tab                             0    12315         0         17         2
cust_tab                             2      239         0          0         0
```

Understanding and Using Historical Tables

Using Historical Tables

- Which MDA tables are “historical” tables?
- What are Historical Tables?
- How do they work?
- What is the correct size to configure them?
- Archiving historical table data
- Tips on using historical tables

Which Tables are Historical Tables?

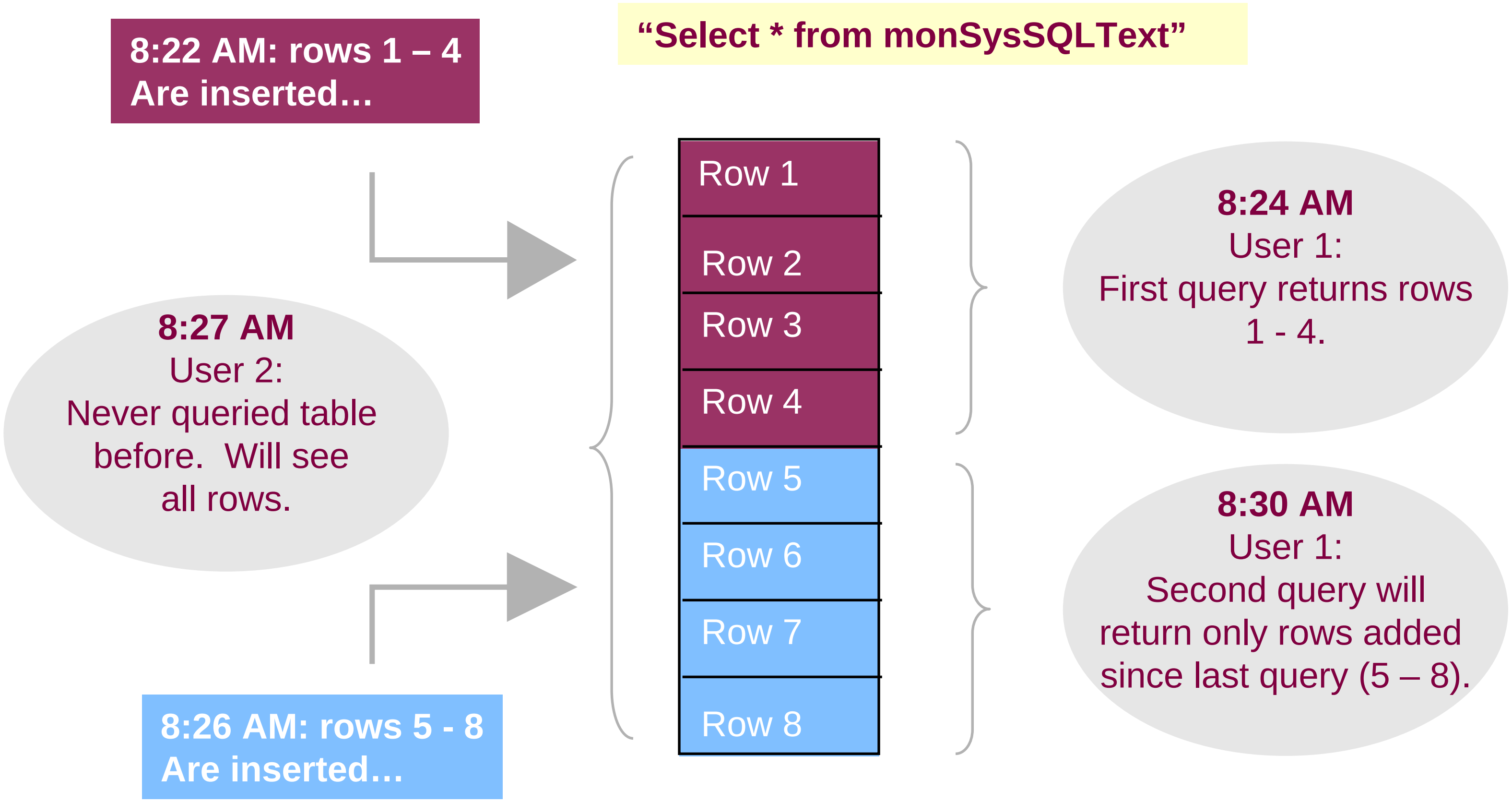
- **monSysSQLText**
  - Records every SQL command executed on the server
- **monSysPlanText**
  - Records the Query Plan for every SQL command executed on the server
- **monSysStatement**
  - Reports the statistics for every statement within every query, batch, stored procedure, trigger, etc. executed on the server
- **monErrorLog**
  - Records every row written to the server errorlog
- **monDeadLock**
  - Records information on every deadlock that occurs on the server

What are Historical Tables?

- **The historical MDA tables contain a record of “events” within the ASE**
  - E.g., SQL submitted for a query, a statement executed within a batch, error message added to the errorlog
- **The data for these tables is stored in memory in fixed-sized arrays**
  - Size is configurable using sp_configure
- **Data in Historical tables is transient**
  - The arrays are managed as “ring buffers”: After the last entry in the array is written the first entry will be overwritten
- **Historical tables are “stateful.”**
  - The ASE remembers which records a process has already seen
  - Subsequent queries on same table will return only new records
- **Why are they stateful?**
  - This allows applications to accurately collect or “drain” the rows in these tables without finding duplicates.

Queries on Historical Tables

- The ASE maintains the connection’s *currency* in the MDA table
- Currency is reset for each new connection



8:22 AM: rows 1 – 4
Are inserted…

“Select * from monSysSQLText”

Row 1
Row 2
Row 3
Row 4
Row 5
Row 6
Row 7
Row 8

8:24 AM
User 1:
First query returns rows
1 - 4.

8:27 AM
User 2:
Never queried table
before. Will see
all rows.

8:30 AM
User 1:
Second query will
return only rows added
since last query (5 – 8).

8:26 AM: rows 5 - 8
Are inserted…

Setting the Size of Historical Tables

- **These sp_configure parameters determine the number of rows in the historical tables**
  - `errorlog pipe max messages`
  - `plan text pipe max messages`
  - `sql text pipe max messages`
  - `statement pipe max messages`
  - `deadlock pipe max messages`
- **The value of the parameter is the number of rows *per engine***
- **Correct size depends on**
  - Rate at which rows are written to table
  - Frequency with which queries will be run against the table

Rate x Frequency = Size
E.g.: 5000/min x 5 min = 25000

- **For example:**
  - 2 engines
  - 5000 rows per minute per engine
  - Select * from monSysStatement every 5 minutes
  - Statement pipe max messages should be greater than or equal to 25000
  - Result set size??? (50000 rows!)

Reasonable size on busy system??
Could be >> 100000

- **Errorlog and deadlock pipes are usually much smaller than plan text, sql text and statement pipes**

Tips on Using Historical Tables

- **Do not use in subqueries or joins**
- **Save contents of tables to an archive table or database for analysis**
- **When collecting long-term data, archive data on a regular basis and size tables to avoid data loss**
- **How do you know whether the table for the buffer has wrapped?**
  - If # of rows returned = size of buffer * # of engines
  - In other words, if you get the entire size of the buffer, some rows were probably lost
  - Only a “rule of thumb”
  - Currently, it is not possible to determine how many rows were lost

Archiving Historical Table Data

Archiving Historical Table Data

- **Why is an historical archive useful?**
- **Because data in historical tables is transient**
  - Capture data for later or detailed analysis
- **Because repeated queries on historical tables will not return the same rows**
  - Even in subqueries or joins
  - Makes analytical queries directly against MDA tables difficult
- **Solution**
- **Data from historical tables should be moved to separate storage for analysis**
- **Create a monitoring data repository for historical diagnostics or capacity planning**

Archiving Historical Table Data

- **A possible approach: a ‘collector’ stored proc which frequently extracts data from the MDA tables**
  - ‘sp_mda_collect‘
    - sp_mda_collect ‘start’ **[**, ‘hh:mm:ss’ **] -- runs in a loop (default interval = 30 sec.)**
    - sp_mda_collect ‘stop’ **-- run from a different session, stops the original procedure**
    - sp_mda_collect ‘status’ **-- displays #rows saved in archive tables**
    - **(download from** www.sypron.nl/mda)
  - Uses a separate database to collect the historical data in permanent tables
  - The permanent tables have the same layout as the historical MDA tables
  - Added a composite unique index **with ignore_dup_key** on key columns (SPID, KPID, etc.) to filter out duplicates (in case the proc needs to be restarted…)

Enterprise Monitoring Repository and Center

- **To access MDA tables from a remote server**
  - Create the MDA proxy tables on a central server
  - Map MDA proxy tables to each monitored server
- **Reduces load on monitored ASE servers**
- **Provides central source of monitoring data for your enterprise**
- **Allows easy archiving of enterprise data to permanent storage in database on repository server**

Creating an Enterprise Monitoring Center

- **Create monitoring database on central server**
- **Copy and edit installmontables script**
  - Two options:
    - Create separate monitoring database for each monitored server
    - Add server name to MDA table names to create unique table names for each server within a single database
- **Set the use database command to use the correct database**
- **Change the “loopback” server name to the remote server name of the monitored server in your central server**

Modifying installmontables Script

- **Creating MDA proxy tables in a separate database for each monitored server**

```
…
…
use monitor_svrtest1
go
…
…

create existing table
monProcedureCache (
        Requests          int,
        Loads             int,
        Writes            int,
        Stalls            int,
)
external procedure
at “svrtest1...$monProcedureCache"
go
```

Use a separate database for each Monitored server

Proxy table points to monitored server

Modifying installmontables Script

- **Creating MDA proxy tables in a single database for all monitored server**

```
…
…
use monitordb
go
…
…

create existing table
monProcedureCache_svrtest1 (
         Requests         int,
         Loads            int,
         Writes           int,
         Stalls           int,
)
external procedure
at “svrtest1...$monProcedureCache"
go
```

Database in which all proxy tables
Will be created

Unique table name constructed by a
Appending server name

Proxy table points to monitored
server

Performance Impact of MDA Tables

Performance Impact of MDA Tables

- **Two questions**
  - Impact of data collection?
  - Impact of querying MDA tables?
- **General performance impact: 5% or less**
- **Depends on a number of factors**
  - Configuration of server (e.g., number of engines, memory size, processor speed)
  - Load on server
  - Configuration of Monitoring parameters
- **Different monitoring configuration settings have different performance impacts**
- **Fully enabling all options will have greatest impact**

Performance Impact: Configuration Settings

- **Lowest impact**
  - Enable monitoring with no other options
- **Tables enabled**
  - monEngine, monDataCache, monProcedureCache, monOpenDatabases, monSysWorkerThread, monNetworkIO, monLocks, monCachePool, monIOQueue, monDeviceIO, monProcessWorkerThread, monProcessNetIO
- **Low Impact Parameters**
  - wait event timing
  - plan text pipe active
  - sql text pipe active
  - errorlog pipe active
  - deadlock pipe active
- **Greatest impact**
  - Per Object Statistics
  - Statement Historical table and Process Statements
- **Tables enabled**
  - monOpenObjectActivity, monProcessObject, monProcessActivity, monSysStatement, monProcessStatement
- **High Impact Parameters**
    - statement pipe active
    - statement statistics active
    - per object statistics
    - statement pipe active

Understanding and Handling Counter Wrap

What is Counter Wrap?

- **All MDA counter columns are 32-bit signed integers**
  - Maximum value is 2147483647
- **When signed integers are incremented above maximum value they become negative**
  - 2147483647 + 1 => - 2147483646
- **Internal adjustments prevent MDA counter values from becoming negative**
  - Therefore counter ranges are from 0 to 2147483647
- **When the ASE increments an MDA counter past the maximum value it will return to 0 and start increasing again**

Handling Counter Wrap with Delta Values

- **If counter has wrapped, add difference between start value and maximum value + 1 to the current value of the counter**

```
Select CacheName,
    CacheSearches =
    case
      when e.CacheSearches < s.CacheSeaches
      then
        (2147483648 - s.CacheSearches) + e.CacheSearches)
      else
        (e.CacheSearches – s.CacheSearches)
    end
    from #cacheStart s, #cacheEnd e
    where s.CacheID = e.CacheID
```

- **Again: As long as change in counter values is <= 2147483647, delta values will be accurate**

Which MDA Table Columns Can Wrap?

- **Not all MDA columns are likely to wrap**
  - Some counter values increment slowly
  - Some numeric columns are not counters
- **Columns that can wrap pretty quickly**
  - **monDataCache**
    - **CacheSearches**
    - **LogicalReads**
  - **monNetworkIO**
    - **BytesSent**
    - **BytesReceived**
  - **monSysWaits**
    - **Waits**
- **Others wrap less quickly**
  - monEngine.ContextSwitches
  - monNetworkIO.PacketsSent

sp_sysmon, subqueries, joins…

Using MDA Tables and sp_sysmon

- **Monitor Counters are a set of counters used by sp_sysmon and Monitor Server**
- **Some MDA table columns are derived from Monitor Counters**
- **sp_sysmon resets the value of Monitor Counters when it starts**
- **This can have an impact on applications using MDA tables or Monitor Server**
- **MDA table columns that come from Monitor Counters are documented.**
  - Attributes column = “counter, reset”

Using MDA Tables and sp_sysmon

- **The ASE 12.5.3 release introduced changes to sp_sysmon that allow it to run without clearing monitor counters**
- **Also enhanced so that when multiple applications are using monitor counters the collection of monitor data will not be terminated until all applications are finished**
- **It is safe to run sp_sysmon when using the MDA tables as long as sp_sysmon is run with the ‘noclear’ option.**

Subqueries, Joins and Self-Joins

- **Rule of thumb: Don’t use joins or subqueries when querying the MDA tables**
- **Why? Because the MDA table data is transient and reflects the ASE’s instantaneous state, joins and subqueries may not give the expected result.**
  - Sequential queries on same table can give different results
- **Because of the currency mechanism, self-joins or subqueries involving one of the historical tables more than once *__will not__* work.**
  - Currency is reset by first query and the same rows will not be seen by the subquery or inner join table
- **Solution: Copy MDA table data to a work table or permanent repository when complex analysis is required.**

Analyzing Stored Procedure Performance

Analyzing Stored Procedure Performance

- **Historical Server provides stored procedure performance information**
- **MDA tables do not provide a table with historical stored procedure statistics**
- **The monSysStatement table can be used to report this information**

```
select ProcName =
  isnull(object_name(ProcedureID, DBID),
  "UNKNOWN"),
  DBName = isnull(db_name(DBID), "UNKNOWN"),
  ElapsedTime = datediff(ms, min(StartTime),
  max(EndTime))
from master..monSysStatement
group by SPID, DBID, ProcedureID, BatchID
having ProcedureID != 0
```

Stored Procedure Statistics

```
1> select ProcName = isnull(object_name(ProcedureID, DBID), "UNKNOWN"),
2> DBName = isnull(db_name(DBID), "UNKNOWN"),
3> ElapsedTime = datediff(ms, min(StartTime), max(EndTime))
4> from master..monSysStatement
5> group by SPID, DBID, ProcedureID, BatchID
6> having ProcedureID != 0
7> order by 3
8> go

 ProcName                       DBName                         ElapsedTime
 ------------------------------ ------------------------------ -----------
 p_sybbugstatus                 engcomdb                              1096
 sybrev_fetch_revstatus         engcomdb                               983
 p_sybbugstatus                 engcomdb                               923
 p_sybbugstatus                 engcomdb                               836
 p_sybbugstatus                 engcomdb                               683
 p_sybbugstatus                 engcomdb                               620
 p_sybbugstatus                 engcomdb                               586
 p_sybbugstatus                 engcomdb                               543
 p_sybbugstatus                 engcomdb                               533
 p_sybbugstatus                 engcomdb                               526
….
….

0
```

Stored Procedure Performance Averages

- **Aggregate performance statistics can be derived from the output of the previous query**

```
/*
** Build a detail table
*/
select ProcName = isnull(object_name(ProcedureID, DBID),
   "UNKNOWN"),
  DBName = isnull(db_name(DBID), "UNKNOWN"),
  ElapsedTime = datediff(ms, min(StartTime), max(EndTime))
into #t1
from master..monSysStatement
group by SPID, DBID, ProcedureID, BatchID
having ProcedureID != 0

/*
** Calculate aggregate values
*/
select ProcName, DBName, "Avg" = avg(ElapsedTime),
  NumExecs = count(*)
from #t1
group by ProcName, DBName
order by 3 desc
```

Stored Procedure Performance Averages

- **Determine average elapsed time and total executions for stored procedures**

```
1> select ProcName, DBName, "AvgElapsed" = avg(ElapsedTime),
2> NumExecs = count(*)
3> from #t1
4> group by ProcName, DBName
5> order by 3 desc
6> go
 ProcName                        Database     AvgElapsed   NumExecs
 ------------------------------ ------------ ----------- -----------
 p_sybbugstatus                 engcomdb             483          32
 sn_temp_filters_qts1           qts_db               330          26
 sy_resolution_insert           qts_db               260          44
 p_sybbugreleasematrix          engcomdb             186          21
 create_sn_subscriptions        qts_db               108           9
 p_sybbugsrelease               engcomdb              91          37
 sn_temp_filters_qts2           qts_db                83           2
 sn_temp_filters_qts4           qts_db                73          11
 sn_get_next_key                qts_db                69           5
 create_sn_filters              qts_db                65           5
…
…
```

Identifying Poorly Performing Statements

- Identify statements within stored procedures consuming greater than average elapsed time

```
/*
** Build work table
*/
select ProcName = isnull(object_name(ProcedureID, DBID), "UNKNOWN"),
   DBName = convert(char(15), isnull(db_name(DBID), "UNKNOWN")),
   LineNumber,
   ElapsedTime = datediff(ms, StartTime, EndTime)
into #t1
from master..monSysStatement
where ProcedureID != 0
/*
** Calculate aggregate values and find problematic statements
*/
select ProcName, DBName, LineNumber, "AvgElapsed" = avg(ElapsedTime)
from #t1
group by DBName, ProcName, LineNumber
having avg(ElapsedTime) > (select avg(ElapsedTime) from #t1)
order by 4 desc
```

Statements with > Average CPU Time

```
…
…
  ProcName                       DBName          LineNumber  AvgElapsed
 ------------------------------ --------------- ----------- -----------
 row_update                     qts_db                  614        2160
 p_sybbugstatus                 engcomdb                 60         240
 row_update                     qts_db                  147          98
 row_insert                     qts_db                  308          98
 e2_CiMember                    qts_db                   71          77
 p_sybbugstatus                 engcomdb                 56          76
 sy_addl_case_update            qts_db                  138          70
 p_sybbugstatus                 engcomdb                125          69
 sybrev_report_newcrs           engcomdb                 48          30
 log_activity                   qts_db                  155          18
 p_sybbugstatus                 engcomdb                 29          16
 p_sybbugstatus                 engcomdb                145          15
 log_activity                   qts_db                   90          14

….
….
```

Most Frequently Used Stored Procedures

```
1> select * into #t1 from master..monSysStatement
2> go
1> select ProcedureName = isnull(object_name(ProcedureID, DBID), "UNKNOWN"),
2> "Database" = db_name(DBID),
3> "Execs" = count(*)
4> from #t1
5> where ProcedureID != 0
6> group by DBID, ProcedureID
7> order by 3 desc
8> go
 ProcedureName                  Database                       Execs
 ------------------------------ ------------------------------ -----------
 sp_mltypeset                   empdb                                 8138
 p_sybbugstatus                 engcomdb                               888
 sp_help_rep_agent              sybsystemprocs                         462
 p_sybbugsrelease               engcomdb                               205
 sn_get_next_key                qts_db                                 176
 create_sn_filter_criteria      qts_db                                 162
 create_sn_subscriptions        qts_db                                 136
 create_sn_filters              qts_db                                 120
….
….
```

Recent Enhancements

Enhancements in 12.5.1

- **360 columns in 12.5.0.3 (first version of MDA tables)**
- **5 new columns in 12.5.1**
  - **monErrorLog.State** - state of error
  - **monOpenDatabases.QuiesceTag** - tag specified with quiesce database (if any)
  - **monOpenDatabases.SuspendedProcesses** - number of currently suspended processes due to log-full condition in this database
  - **monProcessWorkerThread.FamilyID** - spid of parent process
  - **monProcessWorkerThread.ParallelQueries** - total # parallel queries attempted

Enhancements in 12.5.2

- **2 new columns in 12.5.2**
  - **monProcessObject.TableSize** - table size in Kb
  - **monProcessActivity.WorkTables** - total number of work tables created by the process

- **Fixes:**
  - milliseconds fixed in **monSysStatement.StartTime** / **EndTime**
  - can be used to determine the exact duration of each statement (resolution = 3 milliseconds)

Enhancements in 12.5.3

- **4 new columns in 12.5.3**
  - **monProcessActivity.ServerUserID** - Login ID (suid)
  - **monProcessSQLText.ServerUserID** - Login ID (suid)
  - **monSysSQLText.ServerUserID** - Login ID (suid)
  - **monProcessProcedures.LineNumber** – Line number in a stored procedure

- **Fixes:**
  - Various small bugs were fixed

Q&A

Your Questions are Welcome

Thanks!

robv@sybase.com

peter.dorfman@sybase.com