### Advanced DataTools Webcast

### Capturing Informix SQL Metrics with SQLTrace by Lester Knutsen

Webcast on September 27, 2018 at 2:00pm EDT

Advanced DataTools

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#### Lester Knutsen



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### **Webcast Guidelines**

- The Webcast is being recorded. The Webcast replay and slides may be available in a few days.
- Please Mute your Line. Background sounds will distract everyone.
- Use the Chat Button in the upper right to ask questions.

Chat

### Agenda

- How do you capture the cost of SQL statements and activity on your database server.
- We will take a look at SQL Trace, and the Sysmaster tables that enable you to save and analyze the costs of your SQL.

### Agenda

- What is SQLTrace
- Limitations of SQLTrace
- Managing SQLTrace with the SQL API and the Sysadmin tasks
- Demo How to use SQLTrace
- Managing SQLTrace with OAT
- Saving SQLTrace Data for analysis

#### What is SQLTrace

- New Feature in Informix 11 to collect:
  - Statistics
  - resource usage
  - performance measures
  - SQL Statements
- Default is OFF

#### **SQL Trace Buffer**

- When SQL Trace is turned "ON" a FIFO buffer is created in the Virtual Segment of Informix Memory
- When the Buffer is full, the oldest SQL data is discarded to make room for new data
- On a busy system, the buffer can fill up and turn over in seconds

#### **Informix Memory Structures**



### Starting SQL Trace Configuration

Onconfig value

#SQLTRACE level=low,ntraces=1000,size=2,mode=global

#### • SQL API

execute function sysadmin:task ("set sql tracing on","1000","2","low","global");

Open Admin - OAT

#### **SQL Trace Configuration**

- Level (low, medium, high)
- Number of Traces to collect Default is 1000
- Size of data to collect Default is 2KB
- Scope of Traces
  - Global Default is all users
  - User Specific user list to trace

### SQL Trace Configuration Level - Amount of data to collect

- Off Default No SQL tracing
- Low Default when On. Collects statement statistics, statement text, and statement iterators
- Medium Collects all low-level tracing, plus table names, the database name, and stored procedure stacks
- High Collects all of the information included in medium tracing, plus host variables

|     |             |                       |     | SQL Tr      | ace Setting    |     |             |                |
|-----|-------------|-----------------------|-----|-------------|----------------|-----|-------------|----------------|
|     |             | Low                   |     |             | Medium         |     |             | High           |
| sql | _id         | 3627211               | sql | _id         | 4345330        | sql | _id         | 4756333        |
| sql | _address    | 13,106,538,016        | sql | _address    | 13,022,460,376 | sql | _address    | 13,021,440,688 |
| sql | _sid        | 583                   | sql | _sid        | 89             | sql | _sid        | 312            |
| sql | _uid        | 502                   | sql | _uid        | 502            | sql | _uid        | 502            |
| sql | _stmttype   | 4                     | sql | _stmttype   | 2              | sql | _stmttype   | 4              |
| sql | _stmtname   | UPDATE                | sql | _stmtname   | SELECT         | sql | _stmtname   | UPDATE         |
| sql | _finishtime | 1372775249            | sql | _finishtime | 1372775388     | sql | _finishtime | 1372775472     |
| sql | _begintxtim | 1815720304            | sql | _begintxtim | 1816688410     | sql | _begintxtim | 1817240068     |
| sql | _runtime    | 7.58E-05              | sql | _runtime    | 2.66E-06       | sql | _runtime    | 9.21E-05       |
| sql | _pgreads    | 0                     | sql | _pgreads    | 0              | sql | _pgreads    | 0              |
| sql | _bfreads    | 4                     | sql | _bfreads    | 0              | sql | _bfreads    | 4              |
| sql | _rdcache    | 100                   | sql | _rdcache    | 0              | sql | _rdcache    | 100            |
| sql | _bfidxreads | 0                     | sql | _bfidxreads | 0              | sql | _bfidxreads | 0              |
| sql | _pgwrites   | 0                     | sql | _pgwrites   | 0              | sql | _pgwrites   | 0              |
| sql | _bfwrites   | 1                     | sql | _bfwrites   | 0              | sql | _bfwrites   | 1              |
| sql | _wrcache    | 100                   | sql | _wrcache    | 0              | sql | _wrcache    | 100            |
| sql | _lockreq    | 5                     | sql | _lockreq    | 0              | sql | _lockreq    | 5              |
| sql | lockwaits   | 0                     | sql | _lockwaits  | 0              | sql | _lockwaits  | 0              |
| sql | _lockwttime | 0                     | sql | _lockwttime | 0              | sql | _lockwttime | 0              |
| sql | _logspace   | 304                   | sql | _logspace   | 0              | sql | _logspace   | 296            |
| sql | _sorttotal  | 0                     | sql | _sorttotal  | 0              | sql | _sorttotal  | 0              |
| sql | _sortdisk   | 0                     | sql | _sortdisk   | 0              | sql | _sortdisk   | 0              |
| sql | _sortmem    | 0                     | sql | _sortmem    | 0              | sql | _sortmem    | 0              |
| sql | _executions | 1069                  | sql | _executions | 475            | sql | _executions | 504            |
| sql | _totaltime  | 0.118188146           | sql | _totaltime  | 0.002672804    | sql | _totaltime  | 0.195890748    |
| sql | _avgtime    | 0.00011056            | sql | _avgtime    | 5.63E-06       | sql | _avgtime    | 0.000388672    |
| sql | _maxtime    | 0.003268819           | sql | _maxtime    | 0.001169063    | sql | _maxtime    | 0.123698502    |
| sql | _numiowait  | 0                     | sql | _numiowait  | 0              | sql | _numiowait  | 0              |
| sql | _avgiowaits | 0                     | sql | _avgiowaits | 0              | sql | _avgiowaits | 0              |
| sql | totaliowait | 0                     | sql | totaliowait | 0              | sql | totaliowait | 0              |
| sql | _rowsperse  | 13200.98846           | sql | _rowsperse  | 376251.0913    | sql | _rowsperse  | 10862.90852    |
| sql | _estcost    | 1                     | sql | _estcost    | 2              | sql | _estcost    | 1              |
| sql | _estrows    | 1                     | sql | _estrows    | 1              | sql | _estrows    | 1              |
| sql | _actualrows | 1                     | sql | _actualrows | 0              | sql | _actualrows | 1              |
| sql | _sqlerror   | 0                     | sql | _sqlerror   | 0              | sql | _sqlerror   | 0              |
| sql | _isamerror  | 0                     | sql | _isamerror  | 0              | sql | _isamerror  | 0              |
| sql | _isollevel  | 2                     | sql | _isollevel  | 2              | sql | _isollevel  | 2              |
| sql | _sqlmemor   | 18680                 | sql | _sqlmemor   | 31064          | sql | _sqlmemor   | 18680          |
| sql | _numiterate | 1                     | sql | _numiterate | 1              | sql | _numiterate | 1              |
| sql | _database   | <none></none>         | sql | _database   | benchmark3     | sql | _database   | benchmark3     |
| sql | _numtables  | 0                     | sql | _numtables  | 0              | sql | _numtables  | 0              |
| sql | _tablelist  | None                  | sql | _tablelist  | customer       | sql | _tablelist  | district       |
| sql | _statement  | UPDATE district SET d | sql | _statement  | SELECT         | sql | _statement  | UPDATE         |
| sql | _stmtlen    | 67                    | sql | _stmtlen    | 212            | sql | _stmtlen    | 67             |
| sql | stmthash    | 1242825219            | sql | _stmthash   | 988199070      | sql | _stmthash   | 1242825219     |
| sql | _pdq        | 0                     | sql | _pdq        | 0              | sql | _pdq        | 0              |
| sql | _num_hvar   | 3                     | sql | _num_hvar   | 3              | sql | _num_hvar   | 3              |
| sql | _dbspartnu  | 11534338              | sql | _dbspartnu  | 11534338       | sql | _dbspartnu  | 11534338       |
| sql | _aqt        | None                  | sql | _aqt        | None           | sql | _aqt        | None           |
| sql | _aqtinfo    | 0                     | sql | _aqtinfo    | 0              | sql | _aqtinfo    | 0              |

SQL Trace Level differences for Low Medium and High

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### SQL Trace Configuration Number of Traces

- Number of Traces to collect Default is 1000
- On a busy system need to calculate
  - Number SQL Statements executed per minute
  - Number of minutes between saves
- Example:
  - 40,000 transactions per minute
  - 3 SQL Statements per transaction
  - 15 minutes between exporting data
  - 40,000 x 3 x 15 = 1,800,000 Traces required
- Each Trace Requires Memory

### SQL Trace Configuration Memory – Size of Data

- Size of Data to Store SQL Trace Data -Default is 2 KB
- Each Trace Requires Memory
- Example:
  - 1,800,000 Traces x 2KB = 3,600,000 KB
  - 3 GB from Virtual Memory Pool
- To See Memory Used:

– onstat -g mem I grep sqlhistory

informix@tiger8> onstat -g mem | grep sql sqlhistory V 4cb02040 2,048.167,936 4528 20002 2

SQL Trace Configuration Scope of Traces

Scope of Traces

 Global – Default is all users
 User – Specific user list to trace

### Limitations of SQL Trace

- When the SQL Trace Buffer is full the oldest data is discarded and lost
- May not have the Memory to collect all the data you want
- Need to Save the data for later review
- Requires Virtual Memory
- Performance Impact of Memory and CPU cycles

#### SQL Trace Data

- User ID of the user who ran the command
- Session ID
- Database
- Type of SQL statement
- Duration of the SQL statement execution
- Time statement completed
- Text of the SQL statement or a function call
- Database isolation level

|     |             |                       |     | SQL Tr      | ace Setting    |     |             |                |
|-----|-------------|-----------------------|-----|-------------|----------------|-----|-------------|----------------|
|     |             | Low                   |     |             | Medium         |     |             | High           |
| sql | _id         | 3627211               | sql | _id         | 4345330        | sql | _id         | 4756333        |
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| sql | _stmttype   | 4                     | sql | _stmttype   | 2              | sql | _stmttype   | 4              |
| sql | _stmtname   | UPDATE                | sql | _stmtname   | SELECT         | sql | _stmtname   | UPDATE         |
| sql | _finishtime | 1372775249            | sql | _finishtime | 1372775388     | sql | _finishtime | 1372775472     |
| sql | _begintxtim | 1815720304            | sql | _begintxtim | 1816688410     | sql | _begintxtim | 1817240068     |
| sql | _runtime    | 7.58E-05              | sql | _runtime    | 2.66E-06       | sql | _runtime    | 9.21E-05       |
| sql | _pgreads    | 0                     | sql | _pgreads    | 0              | sql | _pgreads    | 0              |
| sql | _bfreads    | 4                     | sql | _bfreads    | 0              | sql | _bfreads    | 4              |
| sql | _rdcache    | 100                   | sql | _rdcache    | 0              | sql | _rdcache    | 100            |
| sql | _bfidxreads | 0                     | sql | _bfidxreads | 0              | sql | _bfidxreads | 0              |
| sql | _pgwrites   | 0                     | sql | _pgwrites   | 0              | sql | _pgwrites   | 0              |
| sql | _bfwrites   | 1                     | sql | _bfwrites   | 0              | sql | _bfwrites   | 1              |
| sql | _wrcache    | 100                   | sql | _wrcache    | 0              | sql | _wrcache    | 100            |
| sql | _lockreq    | 5                     | sql | _lockreq    | 0              | sql | _lockreq    | 5              |
| sql | lockwaits   | 0                     | sql | _lockwaits  | 0              | sql | _lockwaits  | 0              |
| sql | _lockwttime | 0                     | sql | _lockwttime | 0              | sql | _lockwttime | 0              |
| sql | _logspace   | 304                   | sql | _logspace   | 0              | sql | _logspace   | 296            |
| sql | _sorttotal  | 0                     | sql | _sorttotal  | 0              | sql | _sorttotal  | 0              |
| sql | _sortdisk   | 0                     | sql | _sortdisk   | 0              | sql | _sortdisk   | 0              |
| sql | _sortmem    | 0                     | sql | _sortmem    | 0              | sql | _sortmem    | 0              |
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| sql | _avgiowaits | 0                     | sql | _avgiowaits | 0              | sql | _avgiowaits | 0              |
| sql | totaliowait | 0                     | sql | totaliowait | 0              | sql | totaliowait | 0              |
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| sql | _estrows    | 1                     | sql | _estrows    | 1              | sql | _estrows    | 1              |
| sql | _actualrows | 1                     | sql | _actualrows | 0              | sql | _actualrows | 1              |
| sql | _sqlerror   | 0                     | sql | _sqlerror   | 0              | sql | _sqlerror   | 0              |
| sql | _isamerror  | 0                     | sql | _isamerror  | 0              | sql | _isamerror  | 0              |
| sql | _isollevel  | 2                     | sql | _isollevel  | 2              | sql | _isollevel  | 2              |
| sql | _sqlmemor   | 18680                 | sql | _sqlmemor   | 31064          | sql | _sqlmemor   | 18680          |
| sql | _numiterate | 1                     | sql | _numiterate | 1              | sql | _numiterate | 1              |
| sql | _database   | <none></none>         | sql | _database   | benchmark3     | sql | _database   | benchmark3     |
| sql | _numtables  | 0                     | sql | _numtables  | 0              | sql | _numtables  | 0              |
| sql | _tablelist  | None                  | sql | _tablelist  | customer       | sql | _tablelist  | district       |
| sql | _statement  | UPDATE district SET d | sql | _statement  | SELECT         | sql | _statement  | UPDATE         |
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| sql | _pdq        | 0                     | sql | _pdq        | 0              | sql | _pdq        | 0              |
| sql | _num_hvar   | 3                     | sql | _num_hvar   | 3              | sql | _num_hvar   | 3              |
| sql | _dbspartnu  | 11534338              | sql | _dbspartnu  | 11534338       | sql | _dbspartnu  | 11534338       |
| sql | _aqt        | None                  | sql | _aqt        | None           | sql | _aqt        | None           |
| sql | _aqtinfo    | 0                     | sql | _aqtinfo    | 0              | sql | _aqtinfo    | 0              |

SQL Trace Level differences for Low Medium and High

### **SQL Trace Statistics**

- Number of buffer reads and writes
- Number of page reads and writes
- Number of sorts and disk sorts
- Number of lock requests and waits
- Number of logical log records
- Number of index buffer reads
- Estimated number of rows
- Optimizer estimated cost
- Number of rows returned

## Sysmaster Tables – View into the SQL Trace Buffer

- Syssqltrace\_info information about the SQL profile trace system
- Syssqltrace detailed statistic information about a single SQL statement
- Syssqltrace\_iter lists the SQL statement iterators
- Syssqltrace\_hvar lists Host Variables

#### Table - Syssqltrace\_info

flags ntraces tracesize duration sqlseen starttime memoryused integer, integer, integer, int8, integer, int8 { sql trace flags }
{ Number of trace items }
{ Size of each trace item }
{ Trace buffer duration in Sec
{ sql process by trace buffer
{ start time of the trace
{ Memory used by SQL tracing }

### Table - Syssqltrace -1 of 2

sql id Unique SQL execution ID Address of the statement in the code block sql address sql sid Database session ID of the user running the SQL statement sql uid User ID of the statement running the SQL sql stmttype Statement type sql stmtname Statement type displayed as a word Time this statement completed (UNIX) sql finishtime Time this transaction started sql begintxtime sql runtime Statement execution time sql pgreads Number of disk reads for this SOL statement sql bfreads Number of buffer reads for this SOL statement sql rdcache Percentage of time the page was read from the buffer pool sql bfidxreads Number of index page buffer reads sql pgwrites Number of pages written to disk sql bfwrites Number of pages modified and returned to the buffer pool sql wrcache Percentage of time a page was written to the buffer pool sql lockreq Total number of locks required by this SQL statement sql lockwaits Number of times the SOL statement waited on locks sql lockwttime Time the system waited for locks during SQL statement sql logspace Amount of space the SQL statement used in the logical log sql sorttotal Number of sorts that ran for the statement sql sortdisk Number of sorts that ran on disk sql sortmem Number of sorts that ran in memory sql executions Number of times the SOL statement ran sql totaltime Total amount of time spent running the statement sql avqtime Average amount of time spent running the statement sql maxtime Maximum amount of time spent executing the SQL statement

### Table - Syssqltrace - 2 of 2

| sql_numiowaits   | Number of times an I/O operation had to wait                  |
|------------------|---|
| sql_avgiowaits   | Average amount of time that the SQL statement had to wait     |
| sql_totaliowaits | Amount of time that the SQL statement had to wait for I/O.    |
| sql_rowspersec   | Average number of rows (per second) produced                  |
| sql_estcost      | Cost associated with the SQL statement                        |
| sql_estrows      | Estimated number of rows returned for the SQL statement       |
| sql_actualrows   | Number of rows returned for the SQL statement                 |
| sql_sqlerror     | SQL error number  |
| sql_isamerror    | RSAM/ISAM error number  |
| sql_isollevel    | Isolation level of the SQL statement.                         |
| sql_sqlmemory    | Number of bytes needed to execute the SQL statement           |
| sql_numiterators | Number of iterators used by the statement                     |
| sql_database     | Database name   |
| sql_numtables    | Number of tables used in executing the SQL statement          |
| sql_tablelist    | List of table names directly referenced in the SQL statement. |
| sql_statement    | SQL statement that ran  |
|                  |   |

### Table - Syssqltrace\_iter

sql id int8, sql address int8, sql itr address int8, sql itr id int, sql itr left int, sql itr right int, sql itr cost int, sql itr estrows int, sql itr numrows int, sql itr type int, sql itr misc int, char(256), sql itr info sql itr time float, sql itr partnum int, sql itr sender int, sql itr nxtsender int

#### Table - Syssqltrace\_hvar

| sql_id           | int8,      |
|------------------|------------|
| sql_address      | int8,      |
| sql_hvar_id      | int,       |
| sql_hvar_flags   | int,       |
| sql_hvar_typeid  | int,       |
| sql_hvar_xtypeid | int,       |
| sql_hvar_ind     | int,       |
| sql_hvar_type    | char(128), |
| sql_hvar_data    | char(8192) |

### Display SQL Trace using Onstat –g his

- Shows current setting
- Shows SQL Statements
- Shows Statistics

Detail displayed depends on Level

### Onstat –g his

| IBM Informix   | Dynamic Se   | rver Versio   | n 12.10.FC1               | 0 On-Lin                   | e Up 1 d                         | ays 18:38:47 -                    | - 11723064 | Kbytes |
|--|--|---|---------------------------|----------------------------|----------------------------------|-----------------------------------|------------|--------|
| Statement his  | story:   |   |                           |                            |                                  |                                   |            |        |
| Trace Level<br>Trace Mode<br>Number of tra<br>Current Stmt<br>Trace Buffer<br>Duration of b<br>Trace Flags<br>Control Block<br>Statement # 2 | aces<br>ID<br>size<br>puffer<br>k<br>1782: @         | Med<br>Global<br>2000<br>1782<br>2008<br>153188<br>0x0000DF11<br>0x4f57b028<br>0x4f57e7f0 | Seconds                   |                            |                                  |                                   |            |        |
| Database:<br>Statement te<br>close datab<br>Statement in<br>Sess_id Us<br>369 10   | ext:<br>base<br>nformation:<br>ser_id Stm<br>001 CLO | t Type<br>SE DATABASE   | Finish T<br>07:57:52      | ime Run<br>0.00            | Time TX S<br>01 3827             | tamp PDQ<br>1fe 0                 |            |        |
| Statement St<br>Page<br>Read<br>Ø  | tatistics:<br>Buffer<br>Read<br>Ø                    | Read<br>% Cache<br>0.00   | Buffer<br>IDX Read<br>0   | Page<br>Write<br>0         | Buffer<br>Write<br>0             | Write<br>% Cache<br>0.00          |            |        |
| Lock<br>Requests<br>0  | Lock<br>Waits<br>Ø                                   | LK Wait<br>Time (S)<br>0.0000   | Log<br>Space<br>0.000 B   | Num<br>Sorts<br>0          | Disk<br>Sorts<br>0               | Memory<br>Sorts<br>0              |            |        |
| Total<br>Executions<br>1   | Total<br>Time (S)<br>0.0001                          | Avg<br>Time (S)<br>0.0001   | Max<br>Time (S)<br>0.0001 | Avg<br>IO Wait<br>0.000000 | I/O Wait<br>Time (S)<br>0.000000 | Avg Rows<br>Per Sec<br>16453.0052 |            |        |
| Estimated<br>Cost  | Estimated<br>Rows                                    | Actual<br>Rows  | SQL<br>Error              | ISAM<br>Error              | Isolation<br>Level               | SQL<br>Memory                     |            |        |

# Managing SQLTrace with the SQL API and the Sysadmin tasks

- execute function sysadmin:task ("set sql tracing info");
  - The task() function returns a textual message
- execute function sysadmin:admin ("set sql tracing info");
  - The admin() function returns an integer

### SQL API for SQL Trace Start SQL Trace

- To Start SQL Trace with defaults
- execute function sysadmin:task ("set sql tracing on");
- To Start SQL Trace with specific configuration
- ("set sql tracing on", "num\_traces","trace\_size","level","mode")
- execute function sysadmin:task ("set sql tracing on","1000","2","low","global");

### SQL API for SQL Trace Stop SQL Trace

- To Stop SQL Trace
- execute function sysadmin:task

("set sql tracing off");

### SQL API for SQL Trace

- "set sql tracing info"
- "set sql tracing off"
- "set sql tracing resume"
- "set sql tracing suspend"
- "set sql tracing on",

"num\_traces","trace\_size","level","mode"

### SQL API for SQL Trace

- "set sql tracing database add", "database\_name"
- "set sql tracing database clear"
- "set sql tracing database list"
- "set sql tracing database remove", "database\_name"

### SQL API for SQL Trace

- "set sql tracing session", "clearlofflon", "session\_id"
- "set sql tracing user add","user\_name"
- "set sql tracing user clear"
- "set sql tracing user list"
- "set sql tracing user remove"
- "set sql user tracing clear", "session\_id"
- "set sql user tracing off"
- "set sql user tracing on"

### Script to Turn ON SQL Trace

## File: SQLtraceon.sh

- ## Date:12/7/2012
- ## Author: Art Kagel
- ## Description: Turns on SQL trace with parameters

```
read -p "numtrace: " num
read -p "size: " sz
read -p "level: " lvl
read -p "mode/user: " usr
dbaccess -e sysadmin - <<EOF
execute function task( "set sql tracing on", "$num",
   "$sz", "$lvl", "$usr");
EOF
```

#### **SQL** Trace Demo

Examples

### Managing SQLTrace with OAT Use SQL Explorer

| open/termin   | 001                               |                   |                     |                  |                   |                      |                  |               |             |  |  |
|---|-----------------------------------|-------------------|---------------------|------------------|-------------------|----------------------|------------------|---------------|-------------|--|--|
| Search  | Q                                 | SQL Trace Setting | <b>s</b> State: On  | Mode: Global Lev | el: High Time Per | iod : 2018-09-25 13: | 24:45 to current |               | Switch to S |  |  |
| Home  |                                   |                   |                     |                  |                   |                      |                  |               |             |  |  |
| Health Center   |                                   | Activity Su       | mmərv               | Transactions     |                   | so                   |                  | Tracing Admin |             |  |  |
| Alerts<br>Dashboard<br>Health Advisor                                     |                                   | Activity ou       | inner y             | SQL Stat         | ement Summa       | γ                    |                  |               | DATABASE    |  |  |
| Logs  |                                   | Statement         | Count               | Avg Response     | Max Response      | Avg Memory           | Rows Processed   |               | SELECT      |  |  |
| Scheduler   |                                   |                   | -                   | 0.0010           | 0.0058            | 4.94 KB              | 0                |               | TNEEDT      |  |  |
| Task Details  |                                   |                   | 140                 | 0.0019           | 0.0038            | 4.04 KB              | 721              |               |             |  |  |
| Task Runtimes   | k Runtimes<br>bace Administration |                   | 36                  | 7 9192           | 118 7795          | 108 87 KB            | 1620107          |               |             |  |  |
| Storage   |                                   |                   | 137                 | 2 9613           | 1/6 9811          | 10.67 KB             | 1233860          |               |             |  |  |
| Recovery Logs   |                                   |                   | 157                 | 0.0281           | 0 1032            | 10.99 KB             | 1255009          |               |             |  |  |
| Tenants   |                                   |                   | 4                   | 0.2745           | 1.0641            | 12.22 KB             | 0                |               | BEGIN WOR   |  |  |
| Server Administration   |                                   |                   | 1                   | 1 0.02745        | 0.0822            | 22 9.88 KB           | 0                |               |             |  |  |
| System Validation   |                                   |                   | - 6                 | 0.0000           | 0.0000            | 4.86 KB              | 0                |               |             |  |  |
| User Privileges<br>Virtual Processors                                     |                                   |                   | 33                  | 0.0000           | 0.0000            | 4.85 KB              | 0                |               |             |  |  |
| Auto Update Statistics  |                                   |                   | 33                  | 0.0066           | 0.0140            | 4.85 KB              | 0                |               |             |  |  |
| Memory Manager  |                                   | SET EXPLAIN       | 1                   | 0.0009           | 0.0009            | 4.88 KB              | 0                |               |             |  |  |
| Warehouse Accelerator   |                                   | EXEC PROCE        | 12                  | 0.0000           | 0.0001            | 84.44 KB             | 6                |               |             |  |  |
| Performance Analysis  |                                   |                   |                     |                  |                   |                      |                  |               |             |  |  |
| SQL Explorer  |                                   |                   |                     |                  |                   |                      |                  |               |             |  |  |
| Performance History<br>System Reports<br>Session Explorer                 |                                   |                   | Transaction Summary |                  |                   |                      |                  |               |             |  |  |
| SOL ToolBox   |                                   | Type Cour         | t Avg SQI           | Avg              | Max A             | vg Avg Rows          | Total Rows       |               |             |  |  |
| Schema Manager<br>TimeSeries<br>Databases<br>Schema Browser<br>SOL Editor |                                   |                   | Sunts               | Time             | Time              | liory                |                  | 1             |             |  |  |

**SQLTrac** 

### SQL Trace with OAT - Admin

|   |  | Server: informix:train1tco@tige           | r8  | . 🖓 🗖 🔊              |
|---|--|---|---|----------------------|
| OpenAdmin Tool  |  |   |   |                      |
| Search Q  | SQL Trace Settings State: On Mode: G   | obal Level: High Time Period : 2018-09-25 | 13:24:45 to current   | Switch to Saved Data |
| Health Center  Alerts Dashboard   | Activity Summary   | Transactions                              | SQL Tracing Admin   |                      |
| Logs     Task Scheduler     Scheduler     Task Details     Task Buttimes  | Number of SQL statements traced     2000       Trace size per statement     1.96 K       SQL tracing started     2018-1       Trace buffer duration     00:343 | B<br>09-25 13:25:30<br>:29                | Oldest traced statement     2018-09-25 13:24:45       SQL statements seen     402       SQL statements per second     0.19429       SQL tracing memory used     3.92 MB |                      |
| Space Administration<br>Storage<br>Recovery Logs<br>Backup<br>Tenants   | Trace state On v<br>Trace mode Global v  | SQL Tra                                   | Additional trace options  |                      |
| Server Administration<br>Configuration<br>System Validation<br>User Privileges<br>Virtual Processors<br>Auto Update Statistics<br>Trusted Context<br>Memory Manager | Database tracing Show User tracing Show  |   | ✓       Procedure stacks         ✓       Procedure stacks         □       Host variables         □       Clear trace buffer         Number of traces       2000         |                      |
| Replication     Replication     Performance Analysis     SQL Explorer     Performance History     System Reports     Session Explorer     onstat Utility            |  |   | Trace size per statement (bytes) 2008   |                      |
| SQL ToolBox<br>Schema Manager<br>TimeSeries<br>Databases<br>Schema Browser<br>SQL Editor<br>Query By Example  |  |   |   | Save                 |

### SQL Trace with OAT - Admin

| SQL Trace Settings State: On I  | Mode: Global Level: High Time Peri                 | od : 2018-09-25 13:24:45 to current                                     |   | Switch to Saved Data |
|---|--|---|---|----------------------|
| Activity Summary  | Transactions                                       | SQL   | Tracing Admin   |                      |
|   |  | SQL Trace Profile   |   |                      |
| Number of SQL statements traced<br>Trace size per statement<br>SQL tracing started<br>Trace buffer duration | 2000<br>1.96 KB<br>2018-09-25 13:25:30<br>00:34:29 | Oldest traced st<br>SQL statements<br>SQL statements<br>SQL tracing men | atement         2018-09-25 13:24:45           seen         402           per second         0.19429           nory used         3.92 MB         |                      |
|   |  | SQL Trace Settings  |   |                      |
| Trace state On V<br>Trace mode Global V<br>Database tracing S<br>User tracing S                             | Show   | Additional trace<br>Number of trace<br>Trace size per st                | options<br>✓ Table names<br>✓ Database names<br>✓ Procedure stacks<br>☐ Host variables<br>☐ Clear trace buffe<br>s 2000<br>atement (bytes) 2008 | r                    |
|   |  |   |   |                      |

### SQL Trace with OAT -Transactions

| SQL Trace Settings State: On Mode: | Global Level: High Ti | me Period : 2018-09-2 | 5 13:24:45 to current |                   |                | Switch to Saved Data |
|------------------------------------|-----------------------|-----------------------|-----------------------|-------------------|----------------|----------------------|
| Activity Summary                   | Transactions          |                       | SOL                   | Tracing Adm       | in             |                      |
|                                    |                       |                       | -                     |                   |                |                      |
|                                    |                       | Recent                | t Transactions        |                   |                |                      |
| Transaction Stamp                  | Session ID            | Count                 | Avg Response Time     | Max Response Time | Avg Memory     | Rows Processed       |
| 58368084                           | 310                   | 1                     | 0.0000                | 0.0000            | 61.89 KB       | 1 🔺                  |
| 58368080                           | 310                   | 1                     | 0.0000                | 0.0000            | 21.47 KB       | 1                    |
| S8368076                           | 310                   | 1                     | 0.0001                | 0.0001            | 19.41 KB       | 1                    |
| S8368072                           | 310                   | 1                     | 0.0000                | 0.0000            | 12.02 KB       | 1                    |
| 58368068                           | 310                   | 1                     | 0.0000                | 0.0000            | 23.28 KB       | 1                    |
| 58368059                           | 309                   | 1                     | 0.0000                | 0.0000            | 67.48 KB       | 1                    |
| S8368050                           | 309                   | 1                     | 0.0075                | 0.0075            | 67.23 KB       | 1                    |
| S8367328                           | 309                   | 1                     | 0.0063                | 0.0063            | 37.34 КВ       | 12 🗏                 |
| S8367319                           | 308                   | 1                     | 0.0000                | 0.0000            | 52.89 KB       | 1                    |
| S8367312                           | 308                   | 2                     | 0.0001                | 0.0002            | 169.88 KB      | 2                    |
| S8367307                           | 307                   | 1                     | 0.0000                | 0.0000            | 52.94 KB       | 1                    |
| S8367295                           | 307                   | 2                     | 0.0000                | 0.0000            | 169.83 KB      | 2                    |
| S8367292                           | 307                   | 1                     | 0.0000                | 0.0000            | 55.85 KB       | 7                    |
| S8367288                           | 307                   | 1                     | 0.0000                | 0.0000            | 67.41 KB       | 1                    |
| S8367284                           | 307                   | 1                     | 0.0000                | 0.0000            | 28.02 KB       | 1                    |
| S8367280                           | 307                   | 1                     | 0.0000                | 0.0000            | 61.89 KB       | 1                    |
| S8367276                           | 307                   | 1                     | 0.0000                | 0.0000            | 21.47 КВ       | 1                    |
| S8367272                           | 307                   | 1                     | 0.0001                | 0.0001            | 19.41 KB       | 1                    |
| S8367268                           | 307                   | 1                     | 0.0000                | 0.0000            | 12.02 KB       | 1 👻                  |
| 341 total items                    |                       |                       |                       | 25 ∣ ▼            | Per Page 🚺 🚺 1 | of 14 🕨 🕅            |

### SQL Trace with OAT - SQL

| sQ         | L Trace Settings S   | itate: On Mode: C | Global Level: High | Time Period : 201 | 8-09-25 13:24:45 to current |         |  | Switch to Saved Data  |
|------------|----------------------|-------------------|--------------------|-------------------|-----------------------------|---------|--|---|
|            | Activity Summa       | ary               | Transactions       |                   | SQL                         | Trac    | ing Admin  |   |
|            |                      |                   |                    | S                 | QL Type Summary             |         |  |   |
| Sta        | atement Type Filter: | All               | •                  |                   |                             | SQL Sta | tement:  | Search Clear  |
|            | Count                | Avg Run Time      | Lock Wait Time     | Wait I/O Time     | Completion Tir              | ne      |  | SQL Statement   |
| <u>s</u>   | 108                  | 0.0000            | 0.0000             | 0.0000            | 13:49:55                    |         | insert into syscrtadt  | values ( ?, ?, ?)   |
|            | 33                   | 0.0066            | 0.0000             | 0.1307            | 13:37:44                    |         | commit work  |   |
|            | 33                   | 0.0000            | 0.0000             | 0.0000            | 13:37:32                    |         | begin work   | =   |
| <b>.</b>   | 15                   | 9.919             | 0.0000             | 136.4326          | 13:37:28                    |         | insert into benchmar<br>"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX  | k select 0, zip.*,  |
| <u>s</u>   | 11                   | 0.0003            | 0.0000             | 0.0000            | 13:58:12                    |         | SELECT CASE WHEN<br>'Suspended' WHEN b<br>WHEN bitval(flags,'0:<br>state, CASE WHEN b<br>'High' WHEN bitval(flags, '0'<br>level, CASE WHEN bi<br>ELSE 'User' END AS a<br>trc_procedures , bitv<br>bitval(flags,'0x0100') | bitval(flags,'0x0004') == 1 THEN<br>itval(flags,'0x0001') == 1 THEN 'On'<br>k0002') == 1 THEN 'Off' END AS<br>itval (flags, '0x7F00') == 1 THEN<br>ags, '0x5F00') == 1 THEN 'Med'<br>x1600') == 1 THEN 'Low' END AS<br>tval(flags,'0x0010')>0 THEN 'Global'<br>node, bitval(flags,'0x0800') as<br>al(flags,'0x4000') as trc_tabnames, |
| <u></u>    | 9                    | 0.0115            | 0.0000             | 0.1030            | 13:49:58                    |         | INSERT INTO comma<br>cmd_user, cmd_host<br>cmd_ret_status ) VA   | nd_history ( cmd_ret_msg,<br>name, cmd_executed,<br>LUES (?, ?, ?, ?, ?)  |
| <u>e</u> , | 9                    | 0.0001            | 0.0000             | 0.0000            | 13:58:12                    |         | SELECT format_uni<br>mem_total, format_<br>mem_free, os_num_<br>sysmaster:sysmachin  | ts(os_mem_total/1024,'k') as<br>units(os_mem_free/1024,'k') as<br>_procs as num_procs from<br>neinfo  |
|            | 9                    | 0.0000            | 0.0000             | 0.0000            | 13:58:12                    |         | SELECT DBINFO('ver   | sion','full') AS vers , ha_type FROM  |
| 82         | total items          |                   |                    |                   |                             | 2       | Per Page   | 1 of 4  |

| OpenAdmin Tool                            |                                   | Server:    | informix:train1 | tcp@tiger8    |          | _        | _        | _        |          |          |          |  | ; 🗗 🖬 ?             |
|---|-----------------------------------|------------|-----------------|---------------|----------|----------|----------|----------|----------|----------|----------|--|---------------------|
| Search                                    | (Page 1 🗘 🔁                       |            |                 |               |          |          |          |          |          |          |          |  | 10 25 50 100 ALL    |
| Home                                      |                                   |            |                 | Task Schedule |          |          |          |          |          |          |          |  |                     |
| WHealth Center                            | Name                              | Start Time | Stop Time       | Run Frequency | м        | т        | w        | т        | F        | S        | S        | Enabled  | Next Execution      |
| Dashboard                                 | Alert Cleanup                     | 02:00:00   | NEVER           | 1 00:00:00    | ~        | ~        | ~        | ~        | ~        | ~        | ~        | <ul> <li>Image: A set of the set of the</li></ul>  | 2018-09-25 21:34:00 |
| Health Advisor                            | Auto Update Statistics Evaluation | 01:00:00   | 01:10:00        | 1 00:00:00    | <b>~</b> | ~        | ~        | ~        | ~        | ~        | ~        | <ul> <li>Image: A second s</li></ul> | 2018-09-26 01:00:00 |
| ≥Logs                                     | Auto Update Statistics Refresh    | 01:11:00   | 05:00:00        | 1 00:00:00    | ×        | ×        | ×        | ×        | ×        | ~        | <b>~</b> | <ul> <li>Image: A set of the set of the</li></ul>  | 2018-09-29 01:11:00 |
| Task Scheduler                            | Job Results Cleanup               | 03:00:00   | NEVER           | 1 00:00:00    | ~        | ~        | ~        | ~        | ~        | ~        | ~        | <ul> <li>Image: A set of the set of the</li></ul>  | 2018-09-25 21:34:00 |
| Scheduler<br>Task Details                 | Job Runner                        |            | NEVER           |               | ~        | ~        | ~        | ~        | ~        | ~        | ~        | ×  |                     |
| Task Runtimes                             | LO Cleaner Startup                |            | NEVER           | 0 00:00:10    | ~        | ~        | ~        | ~        | ~        | ~        | ~        | ×  |                     |
| Space Administration                      | LO Cleaner Task                   | 00:30:00   | NEVER           | 1 00:00:00    | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | ~        | ~        | <b>~</b> | ×  |                     |
| Storage                                   | Low Memory Reconfig               |            | NEVER           | 0 01:00:00    | ~        | ~        | ~        | ~        | ~        | ~        | ~        | <ul> <li>Image: A set of the set of the</li></ul>  |                     |
|   | Save SQL Trace                    | 06:00:00   | 18:00:00        | 0 00:15:00    | <b>~</b> | ~        | ~        | ~        | ~        | ~        | ~        | <ul> <li>Image: A second s</li></ul> | < Enable            |
|   | add_storage                       |            | NEVER           |               | <b>~</b> | ~        | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | <ul> <li>Image: A second s</li></ul> |                     |
| Configuration                             | auto_compress                     |            | NEVER           |               | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  | N                   |
| System Validation                         | auto_crsd                         | 03:00:00   | NEVER           | 7 00:00:00    | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Virtual Processors                        | auto_tune_cpu_vps                 |            | NEVER           |               | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | <b>~</b> | ×  |                     |
| Auto Update Statistics<br>Trusted Context | autoreg exe                       |            | NEVER           |               | <b>~</b> | ~        | ~        | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Memory Manager                            | autoreg migrate-console           |            | NEVER           |               | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Replication                               | autoreg vp                        |            | NEVER           |               | ~        | ~        | ~        | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Performance Analysis                      | bad_index_alert                   | 04:00:00   | NEVER           | 1 00:00:00    | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| SQL Explorer                              | bar_act_log_rotate                | 03:00:00   | 03:01:00        | 30 00:00:00   | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Performance History<br>System Reports     | bar_debug_log_rotate              | 03:00:00   | 03:01:00        | 30 00:00:00   | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | -        | ~        | ~        | ×  |                     |
| Session Explorer                          | check_backup                      | 05:00:00   | NEVER           | 1 00:00:00    | <b>~</b> | <ul> <li>Image: A second s</li></ul> | 2018-09-25 21:34:00 |
|   | check_for_ipa                     | 04:00:00   | NEVER           | 7 00:00:00    | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | <b>~</b> | ~        | ~        | ×  |                     |
| Schema Manager                            | compress_table                    |            | NEVER           | 1 00:00:00    | ~        | ~        | <b>~</b> | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| TimeSeries                                | db_purge_tables                   |            | NEVER           | 1 00:00:00    | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | <b>~</b> | ×  |                     |
| Schema Browser                            | idle_user_timeout                 |            | NEVER           | 0 02:00:00    | ~        | ~        | ~        | <b>~</b> | ~        | ~        | ~        | ×  |                     |
| Query By Example                          | ifx_ha_monitor_log_replay_task    |            | NEVER           |               | <b>~</b> | ~        | <b>~</b> | <b>~</b> | ~        | ~        | ✓        | <ul> <li>Image: A second s</li></ul> |                     |
| ≥JSON                                     | Add a New Task Delete Task        |            |                 |               |          |          |          |          |          |          |          |  |                     |
| ⊘Help                                     |                                   |            |                 |               |          |          |          |          |          |          |          |  |                     |

|     |                     | Task D                        | etails                |                               |
|-----|---------------------|-------------------------------|-----------------------|-------------------------------|
|     | Task Name           | Save SQL Trace                |                       |                               |
|     | ID                  | 46                            |                       |                               |
|     | Description         | Saves the current syssqltrace | info to table         |                               |
|     | Execution Statement | sql_showsnap                  | 4                     |                               |
|     | Result Table        | mon_syssqltrace,mon_syssqltra | ace_iter,mon_syssqlti | ace_hvar,mon_syssqltrace_info |
|     | Start Time          | <b>6 </b>                     |                       |                               |
|     | Stop Time           |                               | NEVER                 |                               |
|     | Frequency           | 0 C Days 0 C Hours            | 5 15 Minutes 0        | Seconds 🗌 NULL                |
|     | Data Delete         | 1 Cays 0 C Hours              | 6 0 Minutes 0         | \$ Seconds                    |
|     | Monday              | Enabled \$                    | Tuesday               | Enabled \$                    |
|     | Wednesday           | Enabled                       | Thursday              | Enabled \$                    |
|     | Friday              | Enabled 🗘                     |                       |                               |
| e 🔪 | Saturday            | Enabled                       | Sunday                | Enabled \$                    |
| g > | ✓ Enable Task       |                               |                       |                               |
| a / |                     | Save                          | Cancel                |                               |

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| OpenAdmin Tool                               |                                   |             | Server: informix:train1tcp@tiger8  | ÷ 🗠              |             |  |  |  |  |  |
|--|-----------------------------------|-------------|--|------------------|-------------|--|--|--|--|--|
| Search                                       |                                   |             | Group to View ALL +  |                  |             |  |  |  |  |  |
| Home   | Page 1 🗧 🔁                        |             |  | 10 2             | 50 100 AL   |  |  |  |  |  |
| Alerts                                       | Cron Task List                    |             |  |                  |             |  |  |  |  |  |
| Dashboard<br>Health Advisor                  | Name                              | Group       | Description  | Next Execution   | Frequency   |  |  |  |  |  |
| Logs   |                                   | server      | Remove all old alert entries from the system   | 2018-09-25 21:34 | 1 00.00.00  |  |  |  |  |  |
| Task Scheduler                               | Auto Update Statistics Evaluation | performance | To Evaluate which columns and tables should have the statistics and distributions refreshed. | 2018-09-26 01:00 | 1 00:00:00  |  |  |  |  |  |
| Scheduler                                    | Auto Update Statistics Refresh    | performance | Refreshes the statistics and distributions which were recommended by the evaluator           | 2018-09-29 01:11 | 1 00:00:00  |  |  |  |  |  |
| Task Details                                 | Job Results Cleanup               | tables      | Remove all old job results entries from the system   | 2018-09-25 21:34 | 1 00.00.00  |  |  |  |  |  |
| Task Runtimes                                | Job Runner                        | server      | Run server tasks in background with a private dbWorker thread                                | 2010 09 20 21.01 | 1 00.00.00  |  |  |  |  |  |
| Space Administration                         |                                   | server      | Start LO Cleaner on startun  | 2018-09-25 13:22 | 0.00.00.10  |  |  |  |  |  |
| Storage<br>Recovery Logs                     |                                   | server      | I O Cleaner Task that can be scheduled   | 2010 09 20 15.22 | 1 00.00.00  |  |  |  |  |  |
| Backup                                       | Low Memory Manager                | server      | I ow memory condition has been detected so reconfigure the system accordingly                | 2018-09-24 21:34 | 1 00.00.00  |  |  |  |  |  |
| Tenants                                      | Low Memory Reconfig               | server      | Check for change in available memory and reconfigure the system                              | 2018-09-25 14:34 | 0.01.00.00  |  |  |  |  |  |
|  | Save SOL Trace                    | performance | Saves the current syssoltrace info to table  | 2018-09-25 14:10 | 0.00.15.00  |  |  |  |  |  |
|  | add storage                       | disk        |  | 2010 09 23 14.10 | 0 00.15.00  |  |  |  |  |  |
| User Privileges                              | auto compress                     | server      |  |                  |             |  |  |  |  |  |
| Virtual Processors<br>Auto Undate Statistics | auto_compress                     | server      | Automatic Compress/Repack/Shrink and Defrag  |                  | 7 00.00.00  |  |  |  |  |  |
| Trusted Context                              |                                   | server      | Automatically allocate additional courves at system start                                    | 2018-00-25 13:23 | 7 00.00.00  |  |  |  |  |  |
| Memory Manager                               | auto_cune_cpu_vps                 | server      | Pagister a database extension on-first-use   | 2018-09-23 13.23 |             |  |  |  |  |  |
| Realization                                  | autoreg exe                       | mice        |  | 2018-09-24 21.34 |             |  |  |  |  |  |
| Replication                                  | autoreg vin                       | sonior      | Create a VR on-first-use   | 2018-09-23 13.23 |             |  |  |  |  |  |
| Performance Analysis                         | bad index alort                   | server      | Find indices marked as had and create alert  | 2010-09-24 21.34 | 1.00.00.00  |  |  |  |  |  |
| Performance History                          | har act log rotate                | server      | Patata the BAR ACT Log   |                  | 20.00.00.00 |  |  |  |  |  |
| System Reports                               | bar_dobug_log_rotate              | server      | Rolate the Bax Debug Leg   |                  | 30 00:00:0  |  |  |  |  |  |
| Session Explorer                             | bar_debug_log_rotate              | backup      | Rotate the Bar Debug Log   | 2018 00 25 21,24 | 1 00.00.00  |  |  |  |  |  |
|  |                                   | раскир      | Checks to ensure a backup has been taken of the data server.                                 | 2016-09-25 21:54 | 7 00:00:00  |  |  |  |  |  |
| Schema Manager                               |                                   | tables      | rinu lables with outstanding in place diters   | 2018-00-24 21:24 | 1 00:00:00  |  |  |  |  |  |
| TimeSeries                                   | dh purga tablas                   | tables      | Task to be kicked on when loading a lable to ensure data is compressed                       | 2010-09-24 21:34 | 1 00:00:00  |  |  |  |  |  |
| Databases<br>Schema Browser                  | db_purge_tables                   | convor      | lask to ensure that rolling window tables stay within limits for a database                  | 2018-09-24 21:34 | 1 00:00:00  |  |  |  |  |  |
| SQL Editor                                   | luie_user_timeout                 | server      |  | I                | 0 02:00:00  |  |  |  |  |  |
| Query By Example                             |                                   |             |  |                  |             |  |  |  |  |  |

| OpenAdmin Tool               |                                   | Server: informix:t   | rain1tcp@tiger8  |                |                     | ÷ 🔄 🖬                 |  |  |  |
|------------------------------|-----------------------------------|----------------------|------------------|----------------|---------------------|-----------------------|--|--|--|
| Search                       |                                   | Gr                   | oup to View ALL  | \$             |                     |                       |  |  |  |
| Home                         | Page 1 A                          |                      |                  |                |                     | 10 25 50 100 4        |  |  |  |
| Health Center                |                                   |                      |                  |                |                     | 10 🔤 30 100 A         |  |  |  |
| Alerts<br>Dashboard          | Task Run List                     |                      |                  |                |                     |                       |  |  |  |
| Health Advisor               | Name                              | Number of Executions | Average Time (s) | Total Time (s) | Last Run Time       | Last Execution Status |  |  |  |
| Logs                         | Alert Cleanup                     | 1                    | 0.00             | 0.00           | 2018-09-24 21:34:01 | ✓                     |  |  |  |
| Task Scheduler               | Auto Update Statistics Evaluation | 1                    | 9.81             | 9.81           | 2018-09-25 01:00:09 | ✓                     |  |  |  |
| Scheduler                    | Auto Update Statistics Refresh    | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Task Details                 | Job Results Cleanup               | 1                    | 0.00             | 0.00           | 2018-09-24 21:34:02 | ✓                     |  |  |  |
| Coase Administration         | Job Runner                        | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Storage                      | LO Cleaner Startup                | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Recovery Logs                | LO Cleaner Task                   | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Backup                       | Low Memory Manager                | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Tenancs                      | Low Memory Reconfig               | 16                   | 0.00             | 0.03           | 2018-09-25 13:34:01 | ~                     |  |  |  |
|                              | Save SQL Trace                    | 2                    | 0.02             | 0.05           | 2018-09-25 13:55:56 | ✓                     |  |  |  |
|                              | add_storage                       | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| User Privileges              | auto_compress                     | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Auto Update Statistics       | auto_crsd                         | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Trusted Context              | auto tune cpu vps                 | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Warehouse Accelerator        | autoreg exe                       | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Replication                  | autoreg migrate-console           | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Performance Analysis         | autoreg vp                        | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| SOL Explorer                 | bad index alert                   | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Performance History          | bar act log rotate                | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| System Reports               | bar debug log rotate              | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| onstat Utility               | check backup                      | 1                    | 0.02             | 0.02           | 2018-09-24 21:34:01 | ✓                     |  |  |  |
| SQL ToolBox                  | check for ipa                     | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| Schema Manager               | compress table                    | 0                    | 0.00             | 0.00           |                     |                       |  |  |  |
| TimeSeries<br>Databases      | db purge tables                   | 11                   | 0.00             | 0.03           | 2018-09-25 00:45:00 | ✓                     |  |  |  |
| Schema Browser<br>SOL Editor | db_purge_tables                   | 11                   | 0.00             | 0.03           | 2018-09-25 00:45:00 | ×                     |  |  |  |

### Saving SQL Trace Data

- Informix 12.10 Task ships with the Scheduler called "Save SQL Trace"
- Copies SQL Trace data to the Sysadmin database
- Need to enable this task in the Sysadmin database
  - update ph\_task set tk\_enable = "f" where tk\_name = "Save SQL Trace";

### Saving SQL Trace Data

- Informix 12.10 Task ships with the Scheduler called "Save SQL Trace"
- See:
  - \$INFORMIXDIR/etc/sysadmin/sch\_sqlcap. sql

#### Saving SQL Trace Data

select \* from sysadmin:mon\_syssqltrace

 See sch\_sqlcap.sql script in \$INFORMIXDIR/etc/sysadmin

#### Analysis of SQL Trace Data

 Best Practice – Export the data to another system for review and analysis (Not on the production system)

### Analysis of SQL Trace Data

| elec | t                          |     |   |
|------|----------------------------|-----|---|
|      | sql_id,                    |     | Unique SQL execution ID                                       |
|      | sql_sid,                   |     | Database session ID of the user running the SQL statement     |
|      | sql_stmtname,              |     | Statement type displayed as a word                            |
|      | <pre>sql_finishtime,</pre> |     | Time this statement completed (UNIX)                          |
|      | sql_begintxtime            | ,   | Time this transaction started                                 |
|      | sql_runtime,               |     | Statement execution time                                      |
|      | sql_pgreads,               |     | Number of disk reads for this SQL statement                   |
|      | sql_bfreads,               |     | Number of buffer reads for this SQL statement                 |
|      | sql_pgwrites,              |     | Number of pages written to disk                               |
|      | sql_bfwrites,              |     | Number of pages modified and returned to the buffer pool      |
|      | sql_lockreq,               |     | Total number of locks required by this SQL statement          |
|      | sql_lockwaits,             |     | Number of times the SQL statement waited on locks             |
|      | <pre>sql_lockwttime,</pre> |     | Time the system waited for locks during SQL statement         |
|      | sql_sorttotal,             |     | Number of sorts that ran for the statement                    |
|      | sql_sortdisk,              |     | Number of sorts that ran on disk                              |
|      | sql_sortmem,               |     | Number of sorts that ran in memory                            |
|      | sql_numiowaits,            |     | Number of times an I/O operation had to wait                  |
|      | sql_totaliowait            | s,  | - Amount of time that the SQL statement had to wait for I/O.  |
|      | sql_estcost,               |     | Cost associated with the SQL statement                        |
|      | sql_estrows,               |     | Estimated number of rows returned for the SQL statement       |
|      | <pre>sql_actualrows,</pre> |     | Number of rows returned for the SQL statement                 |
|      | sql_sqlerror,              |     | SQL error number  |
|      | sql_sqlmemory,             |     | Number of bytes needed to execute the SQL statement           |
|      | sql_database,              |     | Database name   |
|      | sql_numtables,             |     | Number of tables used in executing the SQL statement          |
|      | sql_tablelist,             |     | List of table names directly referenced in the SQL statement. |
|      | sql_statement,             |     | SQL statement that ran  |
|      | sql_stmtlen                |     | Length of SQL Statement                                       |
| rom  | evemaeter eveed tr         | 200 |   |

### Analysis of SQL Trace: Which Type of Statements Cost the most?

#### select

sql\_database,

- sql\_stmtname, count(\*) as count\_sql\_stmts, sum( sql\_runtime) as sum\_runtime, sum( sql\_pgreads) as sum\_pgreads,
- sum( sql\_bfreads) as sum\_bfreads,
- sum( sql\_pgwrites) as sum\_pgwrites,
- sum( sql\_bfwrites) as sum\_bfwrites,
- sum( sql\_lockreg) as sum\_lockreg,
- sum( sql\_lockwaits) as sum\_lockwaits,

- sum( sql\_sortdisk) as sum\_sortdisk,

from sysmaster:syssqltrace

group by 1, 2;

- -- Database name
- -- Statement type displayed as a word
- -- Count SQL Statements
- -- Statement execution time
- -- Number of disk reads for this SQL statement
- -- Number of buffer reads for this SQL statement
- -- Number of pages written to disk
- -- Number of pages modified and returned to the buffer pool
- -- Total number of locks required by this SQL statement
- -- Number of times the SQL statement waited on locks
- sum( sql\_lockwttime) as sum\_lockwttime, -- Time the system waited for locks during SQL statement
- sum( sql\_sorttotal) as sum\_sorttotal, -- Number of sorts that ran for the statement
  - -- Number of sorts that ran on disk
- sum( sql\_sortmem) as sum\_sortmem, -- Number of sorts that ran in memory
- sum( sql\_numiowaits) as sum\_numiowaits, -- Number of times an I/O operation had to wait
- sum( sql\_totaliowaits) as sum\_totaliowaits -- Amount of time that the SQL statement had to wait for I/O.

### Analysis of SQL Trace: Which statements take the longest to run?

#### select sql\_database, --Database name -- Statement type displayed as a word sql\_stmtname, -- SQL statement that ran sql\_statement, count(\*) as count\_sql\_stmts, -- Count SQL Statements sum( sql\_runtime) as sum\_runtime, -- Statement execution time sum( sql estcost) as sum estcost, -- Cost associated with the SQL statement sum( sql\_bfreads) as sum\_bfreads, -- Number of buffer reads for this SQL statement sum( sql\_bfwrites) as sum\_bfwrites, -- Number of pages modified and returned to the buffer pool sum( sql\_lockreq) as sum\_lockreq, -- Total number of locks required by this SQL statement sum( sql\_lockwaits) as sum\_lockwaits, -- Number of times the SQL statement waited on locks sum( sql\_lockwttime) as sum\_lockwttime, -- Time the system waited for locks during SQL statement sum( sql\_sorttotal) as sum\_sorttotal, -- Number of sorts that ran for the statement sum( sql\_sortdisk) as sum\_sortdisk, -- Number of sorts that ran on disk sum( sql\_sortmem) as sum\_sortmem, -- Number of sorts that ran in memory sum( sql numiowaits) as sum numiowaits, -- Number of times an I/O operation had to wait sum( sql totaliowaits) as sum totaliowaits -- Amount of time that the SQL statement had to wait for I/O. from sysmaster:syssqltrace group by 1, 2, 3 order by sum\_runtime desc;

#### Recommendations

- The Sysadmin task to turn on and off SQL trace is more flexible than the ONCONFIG
- Keep the number and size of the SQL Trace buffer small – making the buffer too big will effect Virtual Memory
- Focus on a database or a user
- Save the data for later analysis

### **Questions?**



#### Send follow-up questions to Lester@advancedatatools.com

### **Next Webcast**

#### Informix External Tables

- > by Mike Walker November 15, 2018 at 2:00pm EST
- An overview of using Informix External Tables for unloading and loading data and the benefits that they offer.

#### Dostats and Informix Update Statistics

#### > by Art Kagel December 6, 2018 at 2:00pm EST

Art Kagel developed and maintains the popular open source utility dostats to enable you to automate and keep up to date catalog statistics and data distributions that the Informix Optimizer needs in order to select the best method of running your SQL statements. He will describe how it works, how to compile it on several platforms, and why you should upgrade to the latest version. He will also discuss the Informix Automated Update Statistics (AUS) and how that compares to dostats.

Please register for each webcast here at: <u>http://advancedatatools.com/Informix/NextWebcast.html</u>

### **Eight New Training Servers**



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#### March 11-14, 2019 - Advanced Informix Performance Tuning

This course is for database administrators and application developers who will be responsible for managing, optimizing, and tuning an Informix database server. The focus is on skills, procedures, and scripts to improve the performance of your database server. The course will provide a toolkit of scripts and utilities to start monitoring and optimizing your Informix database server. Our advanced course is taught together by Lester Knutsen and Art Kagel, two of the most experienced Informix DBA consultants in the world.

#### April 22-25, 2019 - Informix for Database Administrators

This course is for new database administrators, programmers, and technical support personnel who will be setting up, managing, and tuning IBM Informix databases.

#### September 16-19, 2019 - Informix for Database Administrators

This course is for new database administrators, programmers, and technical support personnel who will be setting up, managing, and tuning IBM Informix databases.

#### More Information and Registration at:

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#### Thank You Advanced DataTools Corporation



#### For more information:

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http://www.advancedatatools.com