



Exploring the ONSTAT Utility

by Lester Knutsen

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Introduction

Provided with Informix Dynamic Server is a set of powerful command-line utilities that enable the monitoring, tuning, and configuring of the database server. This article focuses on one of these utilities, ONSTAT, and presents ways to use this utility for server performance optimization.

ONSTAT

ONSTAT is the command-line utility which is most widely used. ONSTAT reads OnLine's shared memory structures and provides much useful information about the state of a server. The utility does not place locks on the shared memory structure and uses very little overhead, so it can be used at any time. It is important to keep in mind that the information is current at the time the command is issued, and that data can change after issuing the command.

More options are available for ONSTAT than for any other Informix utility. Many options are debugging parameters, which are not well-documented and easily understood by the average database administrator (DBA). ONSTAT also provides many useful options for managing the server. This article will focus on the more useful of these options. For a complete list of the syntax and options, refer to Table 1. In Informix Dynamic Server, the ONSTAT command has been greatly enhanced with a new set of monitoring and debugging options. These options begin with `-g` and are listed in Table 2.

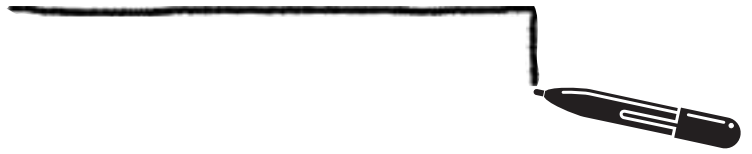
```

onstat [-abcdfghklmpstuxzBCDFRX] [-I] [-r seconds] [-o file] [infile]

-a[]      Print all information
-b[]      Print buffers
-c[]      Print configuration file
-d[]      Print DBspaces and chunks
-f[]      Print dataskip status
-g[]      New Monitoring subcommands (default: all). See Figure 2 for all options
-i[]      Interactive mode
-k[]      Print locks
-l[]      Print logging
-m[]      Print message log
-p[]      Print profile
-s[]      Print latches
-t[]      Print TBLspaces
-u[]      Print user threads
-x[]      Print transactions
-z[]      Zero profile counts
-B[]      Print all buffers
-C[]      Print btree cleaner requests
-D[]      Print DBspaces and detailed chunk stats
-F[]      Print page flushers
-R[]      Print LRU queues
-X[]      Print entire list of sharers and waiters for buffers
-r[]      Repeat options every n seconds (default: 5)
-o[]      Put shared memory into specified file (default: onstat.out)
infile[]  Use infile to obtain shared memory information
-         Displays OnLine mode

```

Table 1: ONSTAT syntax and options.



```
onstat -g [options from list below]

all[] Print all MT information
ath[] Print all threads
wai[] Print waiting threads
act[] Print active threads
rea[] Print ready threads
sle[] Print all sleeping threads
spi[] Print spin locks with long spins
sch[] Print VP scheduler statistics
lmx[] Print all locked mutexes
wmx[] Print all mutexes with waiters
con[] Print conditions with waiters
stk[] <tid> Dump the stack of a specified thread
glo[] Print MT global information
mem[] <pool name | session id> Print pool statistics
seg[] Print memory segment statistics
rbm[] Print block map for resident segment
nbm[] Print block map for non-resident segments
afr[] <pool name | session id> Print allocated pool fragments
ffr[] <pool name | session id> Print free pool fragments
ufr[] <pool name | session id> Print pool usage breakdown
iovp[] Print disk IO statistics by vp
iof[] Print disk IO statistics by chunk/file
ioq[] Print disk IO statistics by queue
iog[] Print AIO global information
iob[] Print big buffer usage by IO VP class
ppf[] [<partition number> | 0] Print partition profiles
tpf[] [<tid> | 0] Print thread profiles
ntu[] Print net user thread profile information
ntt[] Print net user thread access times
ntm[] Print net message information
ntd[] Print net dispatch information
nss[] <session id> Print net shared memory status
nsc[] <client id> Print net shared memory status
nsd[] Print net shared memory data
sts[] Print max and current stack sizes
dic[] Print dictionary cache information
qst[] Print queue statistics
wst[] Print thread wait statistics
ses[] <session id> Print session information
sql[] <session id> Print sql information
dri[] Print data replication information
pos[] Print /INFORMIXDIR/etc/.infos.DBSERVERNAME file
mgm[] Print mgm resource manager information
ddr[] Print DDR log post processing information
```

Table 2: Options for the onstat -g syntax.

ONSTAT commands are too numerous to cover in one article. Instead, this article will focus on the key ONSTAT commands, which are most useful to a DBA in monitoring a server.

Current Status of the Server: onstat -

The `onstat -` command prints out a one-line message indicating the current status of a server. Figure 1 provides a sample output:

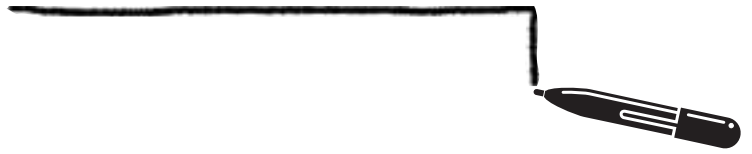
```
lester@merlin >onstat -  
  
INFORMIX-OnLine Version 7.23.UC1 -- On-Line --  
Up 7 days 11:54:44 -- 10656 Kbytes
```

Figure 1: The `onstat -` command provides current status.

The `onstat -` command displays the version number of Informix Dynamic Server, the mode that the server is in, how long it has been up and running, and how much memory it is using. If the server was down, an error message may result which indicates that “shared memory is not initialized,” as in Figure 2.

```
lester@merlin >onstat -  
  
shared memory not initialized for INFORMIXSERVER 'merlindb713'  
lester@merlin >
```

Figure 2: Current status when the server is down.



**Database
Server Profile:
onstat -p**

The `-p` option displays the basic I/O and performance profile of a system. Figure 3 provides a sample output. These statistics are current as of the last time that the server was rebooted, or the time at which the statistics were last reset with the `onstat -z` option.

```
lester@merlin >onstat -p
[
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:03:37 -- [
10656 Kbytes[
[
Profile[
dskreads pagreads bufreads %cached dskwrits pagwrits bufwrits %cached[
215537 2098656 5208789 95.86 178116 179527 2883605 93.82[
[
isamtot open start read write rewrite delete commit rollbk[
6955097 2172 2858 2312158 2305564 129 43 22238 0[
[
ovlock ovuserthread ovbuff usercpu syscpu numckpts flushes[
0 0 168 6625.92 722.70 35 4320[
[
bufwaits lokwaits lockreqs deadlks dltouts ckpwaits compress seqscans[
440 0 2331106 0 0 29 5 66[
[
ixda-RA[idx-RA da-RA RA-pgsused lchwaits[
836 0 16 833 36
```

Figure 3: The `onstat -p` command provides a server profile.

Key elements of the `onstat -z` option are listed in the following table:

<u>onstat -z Elements</u>	<u>Description</u>
Reads %cached	This value is the percentage of reads that use the server's buffers, instead of accessing disk drives (since the records are already in memory). The goal is for 95 percent of reads to be provided through the buffers. If this number is below 95 percent, it may be necessary to increase the <code>BUFFERS</code> parameter in the <code>ONCONFIG</code> file.
Writes %cached	This value is the percentage of writes that use buffers. The goal is for 85 percent or more of write activity to use the buffers. The one exception is large data loads. The <code>BUFFERS</code> parameter in the <code>ONCONFIG</code> file will affect this value. Take care when increasing the <code>BUFFERS</code> parameter: making the <code>BUFFERS</code> too large will take memory away from other processes and may slow down the entire system. When increasing <code>BUFFERS</code> , monitor the swapping and paging of your operating system.
ovlock	This value should be zero. Any other number indicates that you have run out of locks since the system was last reset. Increase the <code>LOCKS</code> parameter in the <code>ONCONFIG</code> file.
ovuserthread	This value should be zero, and is increased each time that a user tries to connect and the number of current users exceeds the maximum number of user threads set in the <code>ONCONFIG</code> file. The maximum number of user threads is the third value of the <code>NETTYPE</code> parameter in the <code>ONCONFIG</code> file.
ovbuff	This value should be zero, and is increased each time that the server tries to acquire more buffers than are set by the <code>BUFFER</code> parameter in the <code>ONCONFIG</code> file.

bufwaits	This value should be zero, and indicates the number of times that a user thread has waited for a BUFFER.
lokwaits	This value should be zero, and indicates the number of times that a user thread has waited for a LOCK.
deadlks	This value should be zero, and indicates the number of times that a deadlock was detected and prevented.
dltouts	This value should be zero, and indicates the number of times that a distributed deadlock was detected.

Table 3: Key elements of the `onstat -z` option.

Display Message Log File: `onstat -m`

The `onstat -m` option displays the last lines of the server's message log, refer to Figure 4. This is the message file that contains all messages about the server, and is a key system component to monitor. Figure 4 provides an example. Use this option to view the last 20 messages in the log file.

```
lester@merlin >onstat -m
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:41:12 -- []
10656 Kbytes[]
[]
Message Log File: /u3 / informix7 / online1.log[]
21:05:15 Checkpoint Completed: duration was 8 seconds.[]
21:05:43 Checkpoint Completed: duration was 6 seconds.[]
21:10:58 Checkpoint Completed: duration was 7 seconds.[]
21:16:06 Checkpoint Completed: duration was 7 seconds.[]
21:21:13 Checkpoint Completed: duration was 7 seconds.[]
21:26:20 Checkpoint Completed: duration was 7 seconds.[]
21:31:28 Checkpoint Completed: duration was 7 seconds.[]
21:36:36 Checkpoint Completed: duration was 8 seconds.[]
21:41:43 Checkpoint Completed: duration was 7 seconds.[]
21:46:51 Checkpoint Completed: duration was 8 seconds.[]
21:52:00 Checkpoint Completed: duration was 9 seconds.[]
21:57:09 Checkpoint Completed: duration was 8 seconds.[]
22:00:42 Logical Log 20 Complete.[]
22:00:43 Process exited with return code 1: /bin/sh /bin/sh -c[]
/u3/informix7/lo[]
g_full.sh 2 23 "Logical Log 20 Complete." "Logical Log 20 Complete."[]
22:02:17 Checkpoint Completed: duration was 8 seconds.
```

Figure 4: Using the `onstat -m` to display the message log file.

Note

It may be helpful to keep the DBA's log file always on display in a screen window. To do this, use the UNIX `tail` command with the `-f` option. This command continually reads the last lines of a file as the lines are appended. On my system, I run the following command to continually monitor this log:

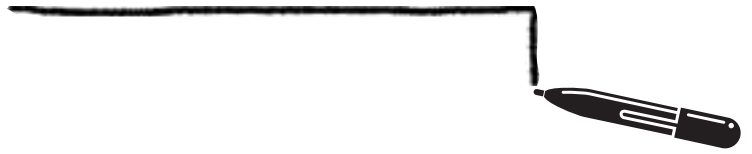
```
tail -f $INFORMIXDIR/online.log
```

**User Status:
onstat -u**

The ONSTAT option used to monitor user activity is `-u`. Figure 5 provides a sample of output from this command. The key field is `sessid` and identifies the user's session ID, which the server uses to track the user internally. This is the number used to kill a specific user's session. For more information, refer to the `onmode -z` command.

```
lester@merlin >onstat -u
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:52:40 -- []
10656 Kbytes[]
[]
Userthreads[]
address flags  sessid user      tty wait   tout locks nreads nwrites[]
a2d0018 ---P--D  1    informix -   0     0     0     84    250[]
a2d0458 ---P--F  0    informix -   0     0     0     0    177701[]
a2d0898 ---P--B  8    informix -   0     0     0     0     0[]
a2d1558 ---P--D 12    informix -   0     0     0     0     0[]
a2d2218 Y--P--- 264   lester  4   a35f190 0     1    35063 14836[]
5 active, 128 total, 17 maximum concurrent
```

Figure 5: The `onstat -u` option provides user status.



The “flags” column provides an indication of user activity. Following are the critical flags, based on their position within the flag field:

<u>Flags in position 1</u>	<u>Description</u>
B	Waiting on a buffer
C	Waiting on a checkpoint
G	Waiting on a logical log buffer write
L	Waiting on a lock
S	Waiting on a mutex
T	Waiting on a transaction
Y	Waiting on a condition
X	Waiting on a transaction rollback
<u>Flags in position 2</u>	
*	Transaction active during I/O error
<u>Flags in position 3</u>	
A	DbSPACE backup thread
B	Begin work
P	Prepared for commit work
X	TP/XA prepared for commit work
C	Committing work
R	Rolling back work
H	Heuristically rolling back work
<u>Flags in position 4</u>	
P	Primary thread for a session
<u>Flags in position 5</u>	
R	Reading call
X	Transaction is committing
<u>Flags in position 6</u>	
None	
<u>Flags in position 7</u>	
B	B+Tree cleaner thread
C	Cleanup of terminated user
D	Daemon thread
F	Page flusher thread
M	ON-Monitor user thread

Table 4: Flags and their position within the flag field.

Logical Logs Status: onstat -l

The `-l` option of ONSTAT displays the current status of the logical logs. Figure 6 provides a sample display. One problem with this display is that it does not indicate which logs are ready for reuse. In versions 5.x of INFORMIX-OnLine, as soon as a log was backed up and had no open transactions, it was marked as free with an “F” in the flags column. In versions 7.x of Informix Dynamic Server, logs are not marked as free until just before their reuse. One way to use ONSTAT to indicate which logs can be reused is to use `onstat -l` with `onstat -x` to display all active sessions.

```
Physical Logging[]
Buffer  bufused  bufsize  numpages  numwrits  pages/io[]
P-1    0         16       236       60        3.93[]
      phybegin  physize  phypos    phyused   %used[]
      10003f    1000    967       0         0.00[]

[]
Logical Logging[]
Buffer  bufused  bufsize  numrecs  numpages  numwrits  recs/pages  pages/io[]
L-3    0         16       90303    1522      275       59.3        5.5[]

[]
address  number  flags    uniqid   begin    size    used    %used[]
alee3e4  1       U-B----  13      100427   500     500     100.00[]
alee400  2       U-B----  14      10061b   500     500     100.00[]
alee41c  3       U-B----  15      10080f   500     500     100.00[]
alee438  4       U-B----  16      100a03   500     500     100.00[]
alee454  5       U-B----  17      100bf7   500     432     84.40[]
alee470  6       U-B----  18      100deb   500     500     100.00[]
alee48c  7       U-B----  19      100fdf   500     500     100.00[]
alee4a8  8       U-B----  20      1011d3   500     500     100.00[]
alee4c4  9       U---C-L  21      1013c7   500     23      4.60[]
alee4e0  10      U-B----  10      1015bb   500     500     100.00[]
alee4fc  11      U-B----  11      1017af   500     500     100.00[]
alee518  12      U-B----  12      1019a3   500     500     100.00
```

Figure 6: The `onstat -l` command indicates the logical logs' status.

The flags column provides status information about each log, as follows:

<u>Flag</u>	<u>Description</u>
A	Newly added: must run an archive before use
B	Backed up to tape or “/dev/null”
C	Current logical log file
F	Free and available for use. You will rarely see this flag, as logs are not marked as free until they are needed
L	Last checkpoint is in this logical log
U	Used logical log: it may be free if it is backed up and contains no active transactions

Table 5: Flags for onstat -l.

Display Transactions: onstat -x

The `onstat -x` option displays all current transactions. The most useful column is “log begin.” This option can provide information about the logical log in which a transaction is started, and the option can be used with the `onstat -l` command to determine which logs are free and for reuse. To find out which logical log has the earliest active transaction, locate the earliest logical log number in the “log begin” column. Any logical logs that are backed up before the log with the earliest transaction will be automatically reused by the server.

```
lester@merlin >onstat -x
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 01:21:38 -- 10656 Kbytes[]
[]
Transactions[]
address  flags  userthread  locks  log begin  isolation  retrys  coordinator[]
a2f4018  A----  a2d0018    0      0          COMMIT    0[]
a2f413c  A----  a2d0458    0      0          COMMIT    0[]
a2f4260  A----  a2d0898    0      0          COMMIT    0[]
a2f4384  A----  a2d1118    0      0          NOTRANS   0[]
a2f44a8  A----  a2d1558    0      0          COMMIT    0[]
a2f45cc  A-B--  a2d1118    2      21         NOTRANS   0[]
6 active, 128 total, 7 maximum concurrent
```

Figure 7: The onstat -x option provides a status of transactions.

Display Locks: onstat -k

The `onstat -k` option will display all active locks. However, be aware that this display can be lengthy. If a large number of LOCKS are defined in the ONCONFIG file and there are many users, it is possible that thousands of rows will be displayed by this command. Figure 8 provides an example of the display.

```
lester@merlin >onstat -k
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:53:31 -- 
10656 Kbytes
Locks
address  wtlst  owner    lklist  type   tblsnum rowid key#/bsiz
a103e74  0      a2d2218  0       HDR+S  100002  20a   0
1 active, 20000 total, 16384 hash buckets
```

Figure 8: The `onstat -k` option displays all locks.

Who Owns a Lock?

The “owner” column lists the address in shared memory of the user who owns a lock. Use this column with the `onstat -u` option to view all users, and compare this output with the “address” column to identify the username of owners.

What Table is Locked?

The “tblsnum” column identifies the table that is being locked. Compare this output with that of the following SQL statement to convert a table’s partnum to hex. The output of this statement will identify which table is locked.

```
select tabname, hex(partnum) tblsnum from systables where tabid > 99;
```

This SQL statement will also provide a list of tables and their associated `tblsnum` to identify which table has a lock placed on it. Figure 9 provides an example for identifying which table is locked.

```

1. Find a list of tblsnum
dbaccess database - <<EOF
  select tabname, hex(partnum) tblsnum
  from systables where tabid > 99;
EOF
database selected
tabname      tblsnum
genjournal   0x0010009E
gjsum        0x0010009F
2. Find what is locked
onstat -k
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 01:47:38 -- 
10656 Kbytes
Locks
address  wtlst  owner   lklist  type   tblsnum  rowid  key#/bsiz
a103e44  0       a2d1118 a103de4 HDR+X  10009f  0       0
3 active, 20000 total, 16384 hash buckets
3. Compare tblsnum from step 1 and step 2. This identifies the 
table gjsum as the one that is locked.

```

Figure 9: Output to determine what table is locked.

The `tblsnum 100002` indicates a database lock. Each user who opens a database will place a shared lock on the database.

Types of Locks

Following is a list of the types of locks available and information regarding the identification of locks:

<u>Lock Type</u>	<u>Description</u>
Database	Lock is placed on tablespace 1000002
Table	Lock is placed on actual tablespace with rowid of 0
Page	Lock is placed on tablespace with rowid ending in 00
Row	Lock is placed on tablespace with actual rowid (not 00)
Byte	Lock is placed on tablespace/page with size of bytes
Key	Lock is placed on tablespace hex rowid (starting with f)

Table 6: Locks for onstat -k.

Lock-Type Flags

Following is a list of the lock flags in the “flags” column of onstat -k:

<u>Lock Flag</u>	<u>Description</u>
HDR	Header
B	Bytes lock
S	Shared lock
X	Exclusive
I	Intent
U	Update
IX	Intent-exclusive
IS	Intent-shared
SIX	Shared, intent-exclusive

Table 7: Lock flags for onstat -k.

Dbspaces and Chunks Status: onstat -d

The `onstat -d` command provides important information about the layout of dbspaces and disk chunks, and the status of each chunk and dspace. Print the output of this command and save it. If a restore must be performed, this output will be necessary. The output identifies each dspace and chunk needed to rebuild the system. Figure 10 contains an example output.

```
lester@merlin >onstat -d
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:54:44 -- []
10656 Kbytes[]
[]
Dbspaces[]
address  number  flags  fchunk  nchunks  flags  owner  name[]
a2ce100  1      1      1       1        N      informix  rootdbs[]
a2ce508  2      1      2       1        N      informix  dbspace1[]
a2ce578  3      1      3       1        N      informix  dbspace2[]
a2ce5e8  4      1      4       1        N      informix  dbspace3[]
4 active, 2047 maximum[]
[]
Chunks[]
address  chk/dbs  offset  size  free  bpages  flags  pathname[]
a2ce170  1 1 0 250000 62047  PO-  /u3/dev/rootdbs1[]
a2ce280  2 2 0 10000 9587  PO-  /u3/dev/dbspace1[]
a2ce358  3 3 0 10000 9947  PO-  /u3/dev/dbspace2[]
a2ce430  4 4 0 10000 9947  PO-  /u3/dev/dbspace3[]
4 active, 2047 maximum[]
[]
```

Figure 10: The `onstat -d` output provides dbspaces and chunk status.

The output of the `onstat -d` command also indicates how much free space each chunk has, and the status of each chunk.

The “flags” for Dbspaces are:

Position 1

M - Mirrored Dbpace

N - Not Mirrored Dbpace

Position 2

X - Newly mirrored

P - Physical recovery underway

L - Logical recovery underway

R - Recovery underway

Position 3

B - Blobspace

The “flags” for Chunks are:

Position 1

P - Primary

M - Mirror

Position 2

O - On-line

D - Down

X - Newly mirrored

I - Inconsistent

Position 3

B - Blobspace

- - Dbpace

T - Temporary Dbpace

Table 8: Flags for `onstat -d`.

Dbspaces and Chunks I/O: onstat -D

The `onstat -D` option displays I/O by chunk. This option is very helpful in performance tuning. The goal is to spread reads and writes evenly across all chunks. Figure 11 provides an example wherein one chunk is utilized for all I/O, and all other chunks are inactive. The I/O is not spread out among chunks, which is not an effective use of disk space.

```
lester@merlin >onstat -D
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:55:09 --
10656 Kbytes
[]
Dbspaces[]
address  number  flags    fchunk  nchunks  flags  owner    name[]
a2ce100  1        1        1        1        N      informix rootdbs[]
a2ce508  2        1        2        1        N      informix dbspace1[]
a2ce578  3        1        3        1        N      informix dbspace2[]
a2ce5e8  4        1        4        1        N      informix dbspace3[]
  4 active, 2047 maximum[]
[]
Chunks[]
address  chk/dbs  offset  page Rd  page Wr  pathname[]
a2ce170  1  1  0    36563   179558  /u3/dev/rootdbs1[]
a2ce280  2  2  0     3      0      /u3/dev/dbspace1[]
a2ce358  3  3  0     2      0      /u3/dev/dbspace2[]
a2ce430  4  4  0     2      0      /u3/dev/dbspace3[]
  4 active, 2047 maximum[]
[]
```

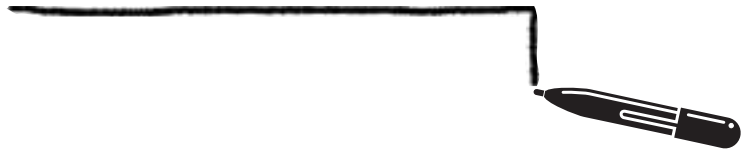
Figure 11: The `onstat -D` option displays the I/O utilization of dbspaces and chunks.

**Page
Write Status:
onstat -F**

There are three ways that the server writes pages from shared memory buffers to disk. Foreground writes occur when the server needs a buffer and must interrupt processing to flush buffers to disk in order to free a buffer. These are the least desirable types of writes. Background writes (LRU Writes) occur when a set percentage of the buffers are dirty. This is controlled by the LRU parameters in the ONCONFIG file. These writes do not interrupt user processing and are best for interactive systems. Chunk writes occur at checkpoints, and all dirty buffer pages are written to disk. With more dirty pages, the checkpoint takes longer to complete. Checkpoint writes are sorted and optimized; however, the longer the checkpoint, the longer it will block user activity. Checkpoint writes are best for batch systems. The ONSTAT option to monitor this activity is `-F`. The goal should be to see zero foreground writes (Fg Writes). Figure 12 provides an example.

```
lester@merlin >onstat -F
[
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- [
Up 7 days 12:55:32 -- 10656 Kbytes[
[
Fg Writes  LRU Writes  Chunk Writes[
168        172280      5277[
[
address  flusher  state  data[
a2d0458  0          I      0      = 0X0[
          states: Exit Idle Chunk Lru
```

Figure 12: The `onstat -D` option provides a status of page writes.



New Monitoring and Debugging Commands (Informix Dynamic Server, versions 7.x): `onstat -g`

The `-g` commands are a new subset of commands available beginning with versions 7.x of Informix Dynamic Server. Table 2 displays a list of the `-g` commands. This section will discuss some of these `-g` commands.

List all Threads: `onstat -g ath`

The `onstat -g ath` option lists all active threads. Figure 13 provides an example.

```
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- Up 7 days 12:56:09 -- [
10656 Kbytes[
[
Threads[
tid  tcb      rstcb  prty  status                vp-class  name[
2    a336b70  0      2     sleeping(Forever)    3lio     lio vp 0[
3    a336dd0  0      2     sleeping(Forever)    4pio     pio vp 0[
4    a337088  0      2     sleeping(Forever)    5aio     aio vp 0[
5    a337340  0      2     sleeping(Forever)    6msc     msc vp 0[
6    a337af8  0      2     sleeping(Forever)    7aio     aio vp 1[
7    a337e00  a2d0018 4     sleeping(secs: 1)    1cpu     main_loop()[
8    a34ab48  0      2     running              1cpu     sm_poll[
9    a34b770  0      2     running              8tli     tlitcpoll[
10   a34bce0  0      2     sleeping(Forever)    1cpu     sm_listen[
11   a3c4a28  0      2     sleeping(secs: 2)    1cpu     sm_discon[
12   a3c4e58  0      3     sleeping(Forever)    1cpu     tlitcplst[
13   a3d0680  a2d0458 2     sleeping(Forever)    1cpu     flush_sub(0)[
14   a3d0e40  a2d0898 2     sleeping(secs: 8)    1cpu     btclean[
30   a35ea58  a2d1558 4     sleeping(secs: 1)    1cpu     onmode_mon[
283  a39ef38  a2d2218 2     cond wait (sm_read) 1cpu     sqlexec
```

Figure 13: The `onstat -g ath` command lists all active threads.

**List Virtual
Processor Status:
onstat -g sch**

The `onstat -g sch` option provides a means to identify which `oninit` UNIX process corresponds to which server virtual processor (VP). When performing a `ps -ef` command in UNIX, it is possible to see many `oninit` processes running. Each one performs a specific task for the database server. Use the UNIX “pid” column from `ps -ef` to correlate a process to the “pid” column from `onstat -g sch`. Figure 14 provides an example output of this command.

```
lester@merlin >onstat -g sch
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- []
Up 7 days 12:56:46 -- 10656 Kbytes[]
[]
VP Scheduler Statistics:[]
[]
vp  pid  class   semops  busy waits  spins/wait[]
1   230  cpu     21      0      0      0[]
2   231  adm     0       0      0      0[]
3   232  lio    277     0      0      0[]
4   233  pio     62     0      0      0[]
5   234  aio  144794  0      0      0[]
6   235  msc     756    0      0      0[]
7   236  aio  64028  0      0      0[]
8   237  tli     3       0      0      0
```

Figure 14: The `onstat -g sch` command provides the status of virtual processors.

**List SQL
Statement Types:
onstat -g sql**

This is the most interesting of the new options. This option can be used to drill down and see the actual SQL statement that a user is executing. The example in Figure 15 provides a summary of all the SQL statements which are running. By using the `session id`, it is possible to see the details and actual SQL statements being run. Figure 16 provides an example of this detail.

```
lester@merlin >onstat -g sql
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- []
Up 7 days 12:52:02 -- 10656 Kbytes[]
[]
Sess  SQL          Current   Iso   Lock      SQL   ISAM   F.E.[]
ID    Stmt type  Database  Lvl  Mode      ERR  ERR   Vers[]
264   INSERT      ffsdw    NL   Not Wait  -264  0     7.23
```

Figure 15: The `onstat -g sql` command lists all SQL statements.

**List SQL
Statement for a
Specific User:
onstat -g sql
sid**

```
lester@merlin >onstat -g sql 264[]
[]
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- []
Up 7 days 12:51:10 -- 10656 Kbytes[]
[]
VP Scheduler Statistics:[]
[]
Sess  SQL          Current   Iso   Lock      SQL   ISAM   F.E.[]
ID    Stmt type  Database  Lvl  Mode      ERR  ERR   Vers[]
264   INSERT      ffsdw    NL   Not Wait  -264  0     7.23[]
[]
Current SQL statement :[]
insert into gjsum select exp_org, exp_prog, bud_obj_code, job_num,[]
sum (exp_amount) from genjournal group by 1, 2, 3, 4[]
[]
Last parsed SQL statement :[]
insert into gjsum select exp_org, exp_prog, bud_obj_code, job_num,[]
sum (exp_amount) from genjournal group by 1, 2, 3, 4
```

Figure 16: The `onstat -g sid` command provides an SQL statement for a specific user.

This option can be very useful in a couple of cases, such as when access to the SQL code is not available and it is necessary to optimize the database tables and indexes. By running this command repeatedly, it is possible to see the SQL statements that are being processed. Then, by collecting and examining the SQL, you can determine where to add indexes to improve the overall performance of the system.

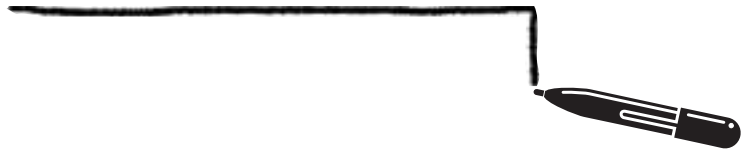
A second use for this option is in debugging program transactions. I used this option to help a programmer debug a program by running `onstat -g sql sid` while the program was operating. Error conditions and SQL errors that the programmer was not catching in the program were available thusly.

**List Users
Sessions:
onstat -g ses**

The `onstat -g ses` option provides additional information about users' sessions, including how much memory each session uses. Figure 17 provides an example. This option can also be used to display detailed information about a session.

```
lester@merlin >onstat -g ses
[
INFORMIX-OnLine Version 7.23.UC1 -- On-Line -- [
Up 7 days 12:57:48 -- 10656 Kbytes[
[
session
id  user      tty  pid  hostname  #RAM  total  used[
265 informix  -    0    -         0      8192  4680[
264 lester    4    4249 merlin    1     106496 97840[
10  informix  -    0    -         0      8192  4680[
7   informix  -    0    -         0     16384 13144[
6   informix  -    0    -         0      8192  4680[
4   informix  -    0    -         0     16384 13144[
3   informix  -    0    -         0      8192  4680[
2   informix  -    0    -         0      8192  4680
```

Figure 17: The `onstat -g ses` command provides a list of users' sessions.



Repeat ONSTAT Commands: -r

To continually repeat an ONSTAT command, use the `-r # of seconds` option. This option is very useful when you need to monitor a situation. The following example displays the status of the logical logs every ten seconds.

```
onstat -l -r 10
```

Clear ONSTAT Shared Memory Statistics: onstat -z

The server statistics are reset each time that the server is restarted. To reset all statistics while the server is running (without shutting it down), use the following command:

```
onstat -z
```

The above command will clear all statistics for the ONSTAT and the SMI tables.

Conclusion

The ONSTAT utility provides a powerful toolkit for the DBA to care for and monitor a database server. It is hoped that this article provides a starting point for the use of the ONSTAT utility.

About the Author

Lester Knutsen is a database consultant and trainer, and is president of Advanced DataTools Corporation. Knutsen is also president of the Washington Area Informix User Group and was one of the founding board members of the International Informix Users Group.

About Advanced DataTools

Advanced DataTools can be contacted via phone at 703 256 0267; via the Web at www.advanceddatatools.com; or via email at lester@advanceddatatools.com. 