CCA Software Pty Ltd

White Paper

ADABAS Performance Analysis and Tuning with ADASIGHT

This paper discusses the performance analysis and tuning facilities available through ADASIGHT for looking inside ADABAS on Linux, UNIX and Windows servers. These facilities include:

- Traces
- Long commands
- List users
- Summary statistics

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Trademark Acknowledgements

Requirements for Confidentiality

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1. Introduction

1.2 Tuning objectives

The objective of tuning databases is to get the work done more quickly through fewer and less expensive ADABAS calls. If the amount of work the database has to do to complete application processing is reduced, this will increase efficiency by:

- enabling higher throughput, and
- reducing the load on the hardware, thus deferring the need for hardware upgrades.

By identifying the type of calls that the application is sending to the database, application tuning effort can be appropriately directed to get the biggest return.

Through its traces and 'long commands' query, ADASIGHT identifies:

- which NATURAL programs are sending what ADABAS calls to the database, and
- which NATURAL programs are sending the most expensive calls.

2. Traces

2.1 Overview

The cost of ADABAS issuing a call is the most expensive call, so the first step is to identify what NATURAL programs are issuing the most calls by:

1. Observation of traffic in the Recent commands display

   See Traces > Preset traces > Recent commands. Do this a few times in busy periods and note the NATURAL libraries and programs that appear in the display most often. These are the ones to look at first.

2. Analysis of ADASIGHT summary statistics

   The sample program SUMPGMS will produce a list of NATURAL programs in decreasing order in terms of calls and database I/O. The programs at the top of the list are the ones to look at first.

3. Observation of calls in the Long commands display

   see Traces > Preset traces > Long commands. You should adjust the threshold using Traces > Preset traces > Set long cmd threshold higher and lower until the Long commands display shows only the most expensive commands over a reasonable period, say two hours.

The application development team can focus initial efforts on these performance analysis results while more detailed analyses can be undertaken with ADASIGHT preset traces and ad-hoc traces.

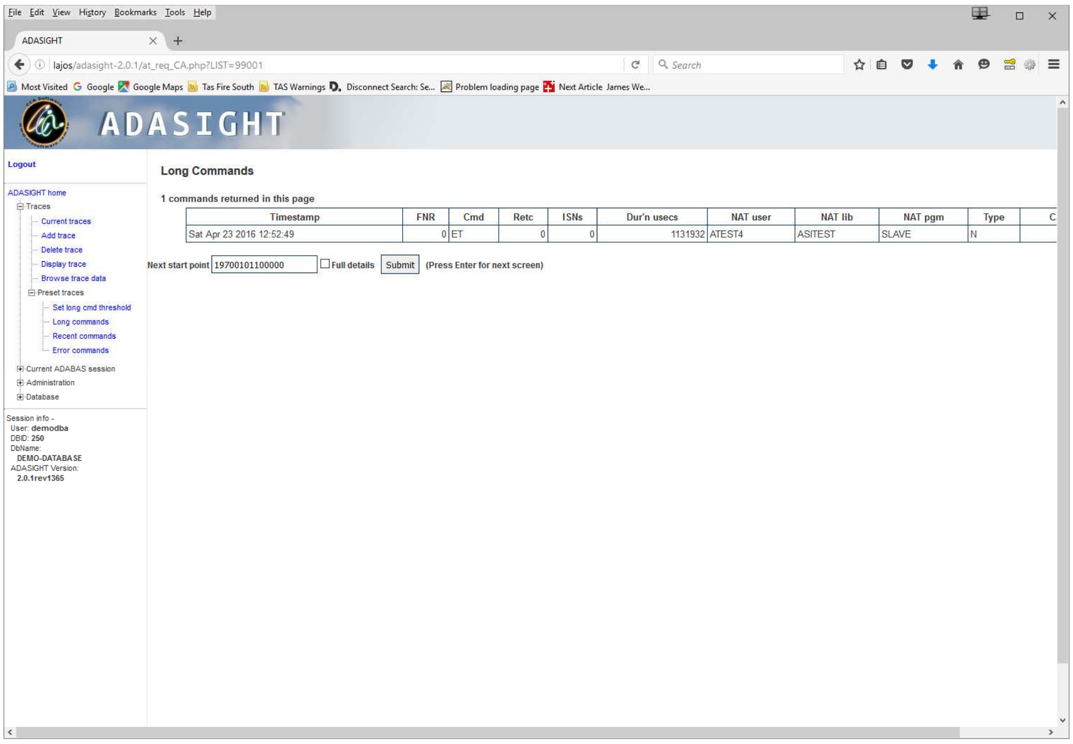
2.2. Preset traces

ADASIGHT includes three preset traces: long commands, recent commands and error commands.

Long commands

Long commands that take longer than the average elapsed time to execute may be worth investigating for use of an inefficient descriptor. Quite often a well-designed superdescriptor can reduce the cost of a FIND by a factor of ten or even a hundred. If these problem commands are only executed once a week, then there is no problem. But if these commands are executed 10 times a second, then a database will be struggling under an unnecessarily large load, creating cascading inefficiencies.

Note that the "Set long cmd threshold" function just above "Long commands" allows the threshold for calls to be classified as "long" to be adjusted.



Session info -
User: demodba
DBID: 250
DbName:
DEMO-DATABASE
ADASIGHT Version:
2.0.1rev1365

Long Commands

1 commands returned in this page

Timestamp	FNR	Cmd	Retc	ISNs	Dur'n usecs	NAT user	NAT lib	NAT pgm	Type	C
Sat Apr 23 2016 12:52:49	0	ET	0	0	1131932	ATEST4	ASITEST	SLAVE	N	

Next start point 19700101100000 ☐ Full details Submit (Press Enter for next screen)

Recent commands

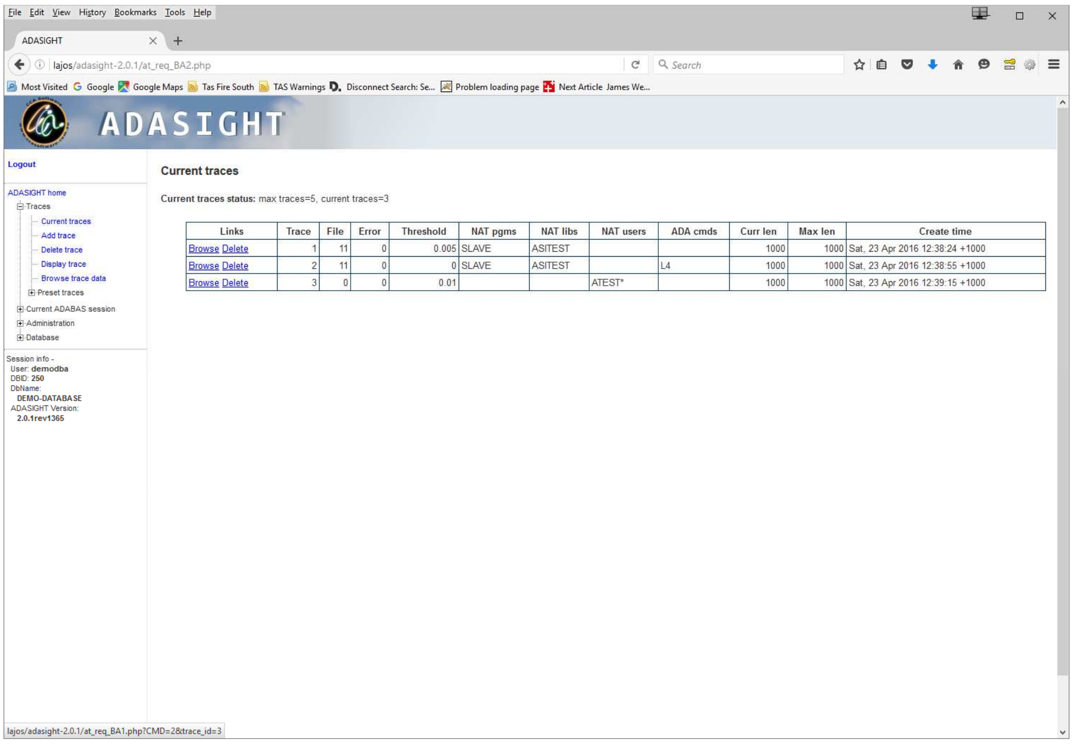
Recent commands provide a view of what is happening right now from all applications, enabling identification of NATURAL programs that issue too many L1's, possibly indicating they are reading the whole file to get one or two records, or their transactions are too short. Inspection of traffic as it happens can be useful for spotting many things.

Error commands

It is reasonable to expect error rates to be low except when hardware failures occur, so an error trace of the default 1,000 ADABAS commands should cover an extended period of time. It is worth checking this trace once a day during the initial performance analysis effort to see if programs are getting unexpected errors, for example, due to poor arithmetic structure. Whatever the cause, if they happen often at all, they should be investigated.

2.3. Ad-hoc traces

Ad-hoc traces are any traces that can be created as required.


File Edit View History Bookmarks Tools Help
ADASIGHT
lajos/adasight-2.0.1/at_req_BA2.php
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current traces
Add trace
Delete trace
Display trace
Browse trace data
Preset traces
Current ADABAS session
Administration
Database
lajos/adasight-2.0.1/at_req_BA1.php?CMD=2&trace_id=3

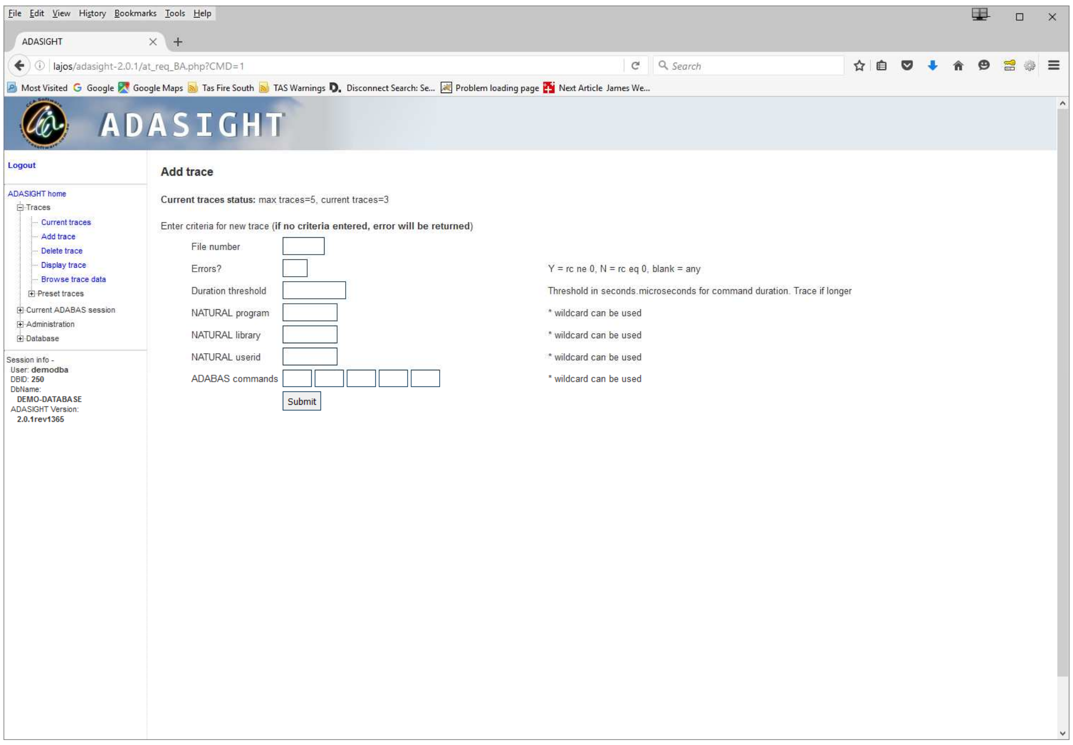
Session info -
User: **demodba**
DBID: **250**
DbName:
DEMO-DATABASE
ADASIGHT Version:
2.0.1rev1365

Current traces

Current traces status: max traces=5, current traces=3

Links	Trace	File	Error	Threshold	NAT pgms	NAT libs	NAT users	ADA cmds	Curr len	Max len	Create time
Browse Delete	1	11	0	0.005	SLAVE	ASITEST			1000	1000	Sat, 23 Apr 2016 12:38:24 +1000
Browse Delete	2	11	0	0	SLAVE	ASITEST		L4	1000	1000	Sat, 23 Apr 2016 12:38:55 +1000
Browse Delete	3	0	0	0.01			ATEST*		1000	1000	Sat, 23 Apr 2016 12:39:15 +1000

These are created using the range of selection criteria in the Traces>Add trace function.


File Edit View History Bookmarks Tools Help
ADASIGHT
lajos/adasight-2.0.1/at_req_BA.php?CMD=1
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current traces
Add trace
Delete trace
Display trace
Browse trace data
Preset traces
Current ADABAS session
Administration
Database
Submit

Session info -
User: **demodba**
DBID: **250**
DbName:
DEMO-DATABASE
ADASIGHT Version:
2.0.1rev1365

Add trace

Current traces status: max traces=5, current traces=3

Enter criteria for new trace (**if no criteria entered, error will be returned**)

File number		
Errors?		Y = rc ne 0, N = rc eq 0, blank = any
Duration threshold		Threshold in seconds.microseconds for command duration. Trace if longer
NATURAL program		* wildcard can be used
NATURAL library		* wildcard can be used
NATURAL userid		* wildcard can be used
ADABAS commands		* wildcard can be used

Available search criteria

- File number – any specific ADABAS file number in the target database
- Errors? – whether to select calls that have or have not ended in error. If blank, select all calls
- Duration threshold – this allows the user to specify a value for the minimum duration to be included in the trace. If the call takes longer than this period, then it is a candidate. The value is in seconds and microseconds, separated by a decimal point, for example 0.0005 means 0 seconds, 500 microseconds
- NATURAL program – a * wildcard can be used, e.g. PG8* will select all programs with names starting with “PG8”
- NATURAL library – as with programs, a * wildcard can be used
- NATURAL userid – again, * can be used
- ADABAS calls - Up to five two-character ADABAS command codes can be entered, and again, wild cards can be used, so “L*” could be used to specify all READ calls.

2.4. Traces for expensive commands

Consider setting up two traces to capture a range of expensive commands. For example, in a test system, two traces were set up with duration set to 0.01 and 0.1 seconds. Within a few minutes the first trace filled the buffer of 1000 records, but the second buffer had only two – but they were ETs, not read or update commands.

Traces to gradually reduce the threshold to 0.05, then to 0.03 were then tried. At 0.03 records showed L3 commands (five times more expensive than the average) being generated from a particular program, thus identifying that program as a priority for investigation.

3. Current session

3.1. Overview

File and thread commands are two related functions available in the Current ADABAS session to facilitate identification of file usage, and the User Activity feature provides information on usage and resources.

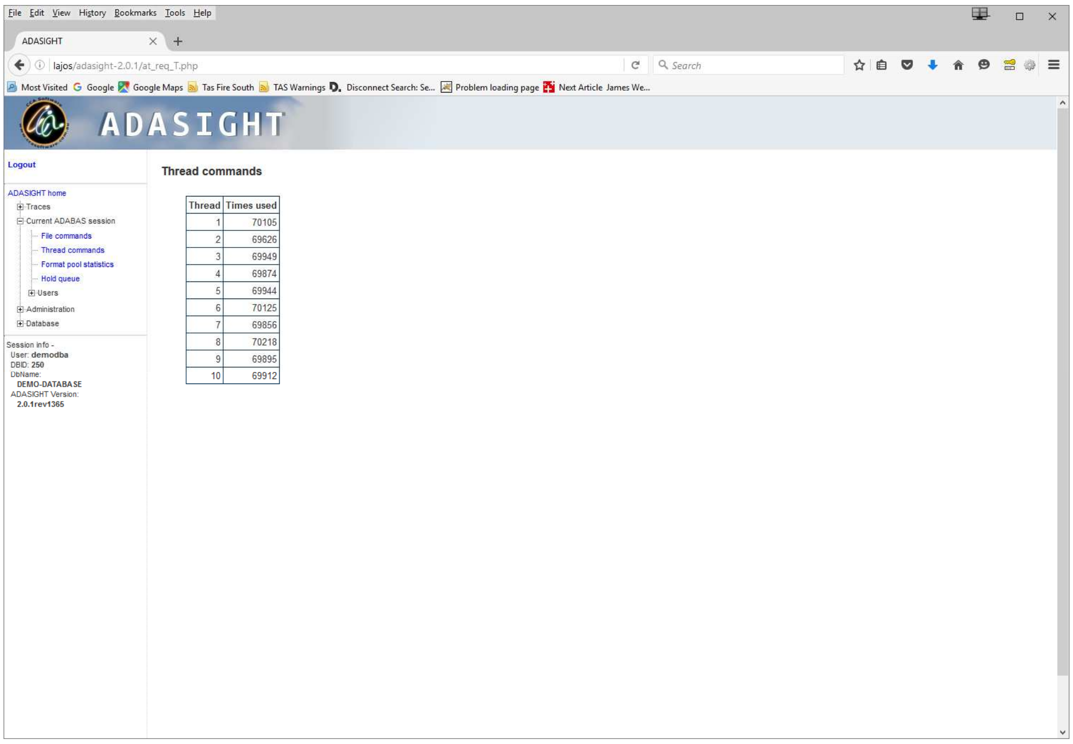
3.2. File and thread commands

These are two related functions which display total calls since the start of the current ADABAS session, summarised either by ADABAS file, or by ADABAS thread.

The File commands allows you to see which ADABAS files are the most heavily used, and therefore which might benefit from tuning the applications that use them.

In days gone by this could identify candidates for moving to less heavily used disks, or for placing closer to the start of a disk, but this approach is usually obsolete now, given widespread use of RAID and massive caching.

Thread commands should show calls roughly evenly distributed between ADABAS threads. If the database has only a very small number of threads, then this might indicate an opportunity to increase the number of threads in the database.



Session info -
User: demodba
DBID: 250
DbName:
DEMO-DATABASE
ADASIGHT Version:
2.0.1rev1365

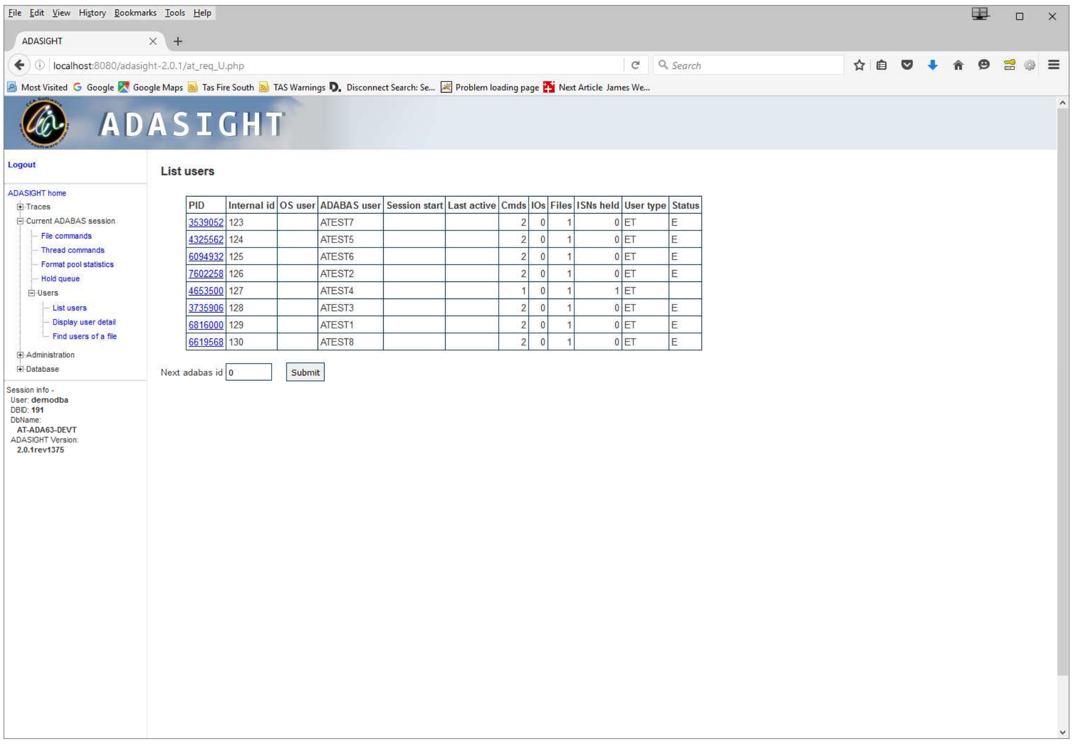
Thread commands

Thread	Times used
1	70105
2	69626
3	69949
4	69874
5	69944
6	70125
7	69856
8	70218
9	69895
10	69912

3.3. User activity

ADASIGHT provides functions “List users”, “Display user detail” and “Find users of a file”. All the information available here is also available via the ADABAS adaopr utility – but in ADASIGHT it is available anywhere in the corporate network, it is not limited to users with shell access to the database server.

List users will show you all current users in a display with PID as the key as shown below.


File Edit View History Bookmarks Tools Help
ADASIGHT
localhost:8080/adasight-2.0.1/at_req_U.php
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current ADABAS session
File commands
Thread commands
Format pool statistics
Hold queue
Users
List users
Display user detail
Find users of a file
Administration
Database
Submit

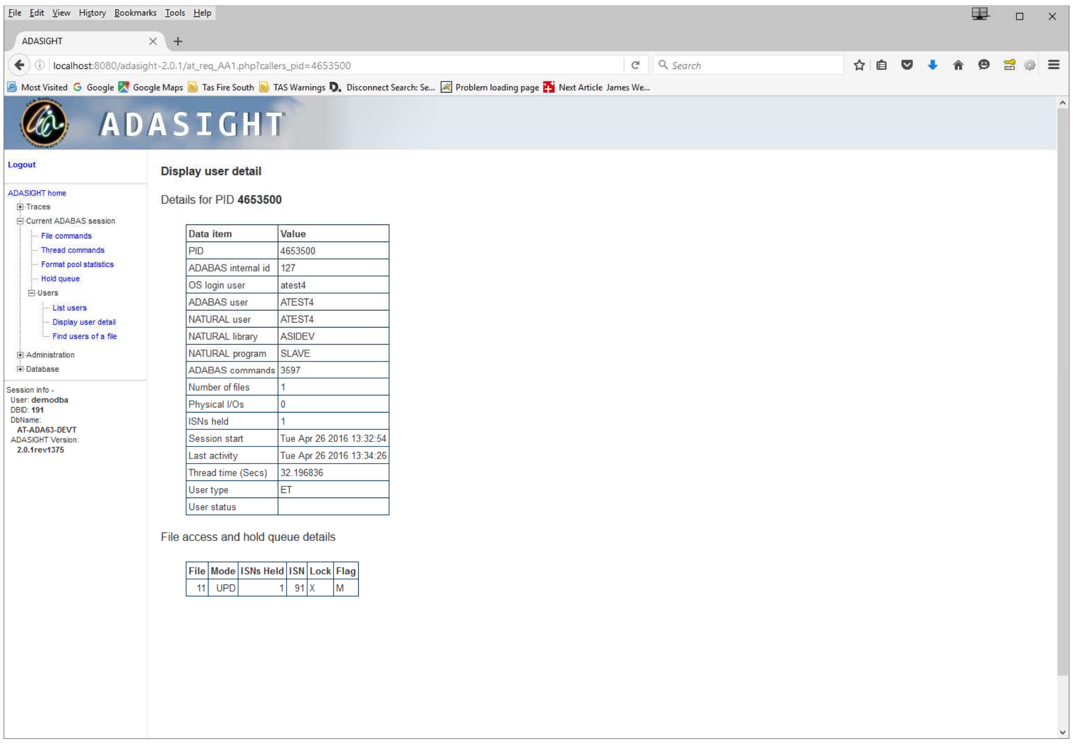
List users

PID	Internal id	OS user	ADABAS user	Session start	Last active	Cmds	IOs	Files	ISNs held	User type	Status
3539052	123		ATEST7			2	0	1	0	ET	E
4325562	124		ATEST5			2	0	1	0	ET	E
6094932	125		ATEST6			2	0	1	0	ET	E
7602258	126		ATEST2			2	0	1	0	ET	E
4653500	127		ATEST4			1	0	1	1	ET	
3735906	128		ATEST3			2	0	1	0	ET	E
6816000	129		ATEST1			2	0	1	0	ET	E
6619568	130		ATEST8			2	0	1	0	ET	E

Next adabas id 0

Session info -
User: **demodba**
DBID: **191**
DbName:
AT-ADA63-DEVT
ADASIGHT Version:
2.0.1rev1375

Clicking on the PID link for a user will display details for that user. For example, in the above list, I clicked on PID 4353500 for user ATEST4:


File Edit View History Bookmarks Tools Help
ADASIGHT
localhost:8080/adasight-2.0.1/at_req_AA1.php?callers_pid=4653500
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current ADABAS session
File commands
Thread commands
Format pool statistics
Hold queue
Users
List users
Display user detail
Find users of a file
Administration
Database

Display user detail

Details for PID **4653500**

Data item	Value
PID	4653500
ADABAS internal id	127
OS login user	atest4
ADABAS user	ATEST4
NATURAL user	ATEST4
NATURAL library	ASIDEV
NATURAL program	SLAVE
ADABAS commands	3597
Number of files	1
Physical I/Os	0
ISNs held	1
Session start	Tue Apr 26 2016 13:32:54
Last activity	Tue Apr 26 2016 13:34:26
Thread time (Secs)	32.196836
User type	ET
User status	

File access and hold queue details

File	Mode	ISNs Held	ISN	Lock	Flag
11	UPD	1	91	X	M

Session info -
User: **demodba**
DBID: **191**
DbName:
AT-ADA63-DEVT
ADASIGHT Version:
2.0.1rev1375

This shows the following information:

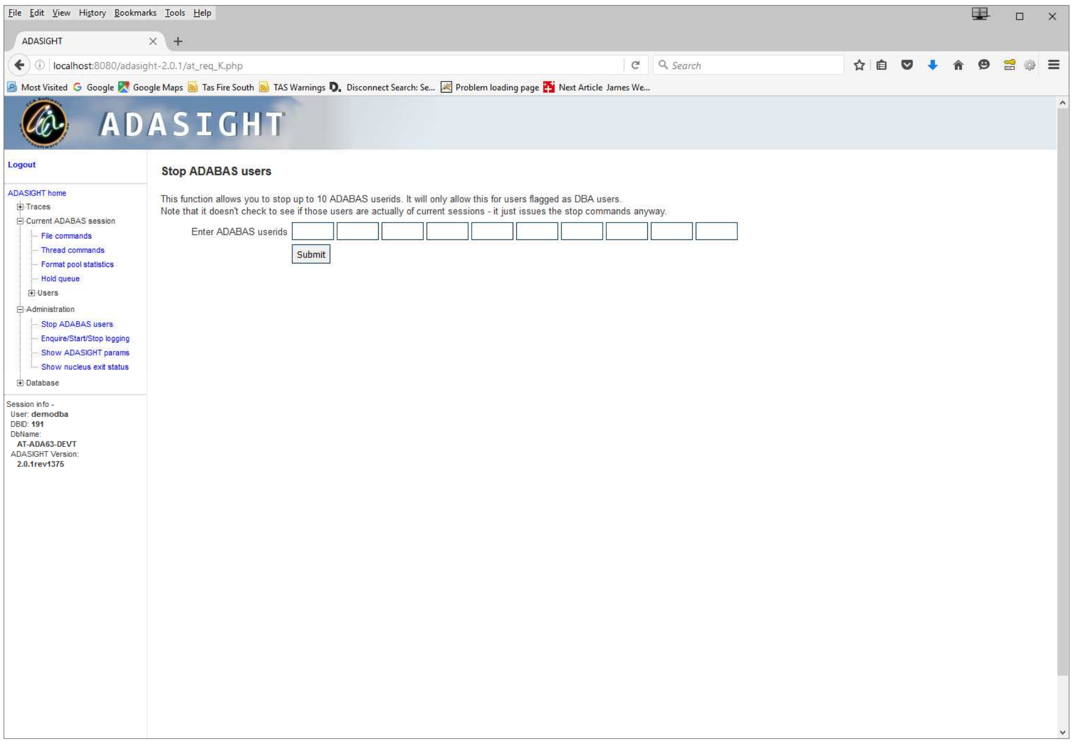
- The application the user is running - in this case ASIDEV
- The NATURAL program being executed at the time of the display – in this case SLAVE
- The number of commands issued by this user during this NATURAL session – in this case 3,597. By noting which users appear more often in this list and with higher command counts, heavy users can be identified.
- How long the session has been running – if the session has been running for a long time and is still active, does that mean it is running long batch jobs that warrant investigation?
- Thread time in seconds – another indication of the resources this user might be consuming
- File access and hold queue details – repeated displays will show if many records are being held.

4. DBA functions

4.1. Stop ADABAS users

This is another function that is available via the ADABAS adaopr utility, but with ADASIGHT it is a lot easier to issue the command. There is no need to remember the syntax for the adaopr stop command. Instead, enter ADABAS internal userids, available from the ADASIGHT List users display.

Note that this function is restricted to ADASIGHT DBA users.


File Edit View History Bookmarks Tools Help
ADASIGHT
localhost:8080/adasight-2.0.1/at_req_K.php
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current ADABAS session
File commands
Thread commands
Format pool statistics
Hold queue
Users
Administration
Stop ADABAS users
Enquire/Start/Stop logging
Show ADASIGHT params
Show nucleus exit status
Database
Submit

Stop ADABAS users

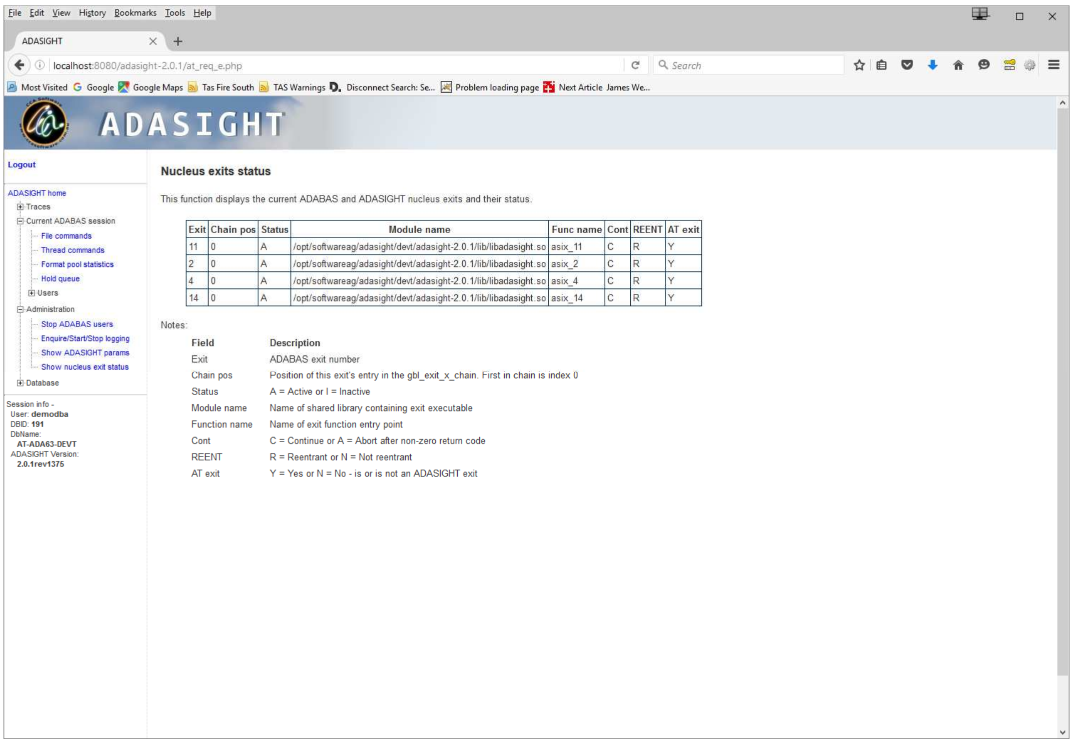
This function allows you to stop up to 10 ADABAS userids. It will only allow this for users flagged as DBA users.
Note that it doesn't check to see if those users are actually of current sessions - it just issues the stop commands anyway.

Enter ADABAS userids

Session info -
User: **demodba**
DBID: **191**
DbName:
AT-ADA63-DEVT
ADASIGHT Version:
2.0.1rev1375

5. Display exit status

Exist status is used to verify that all ADASIGHT exists are still active.


File Edit View History Bookmarks Tools Help
ADASIGHT
localhost:8080/adasight-2.0.1/at_req_e.php
Search
Most Visited Google Google Maps Tas Fire South TAS Warnings Disconnect Search: Se... Problem loading page Next Article James We...
ADASIGHT
Logout
ADASIGHT home
Traces
Current ADABAS session
File commands
Thread commands
Format pool statistics
Hold queue
Users
Administration
Stop ADABAS users
Enquire/Start/Stop logging
Show ADASIGHT params
Show nucleus exit status
Database

Session info -
User: **demodba**
DBID: **191**
DbName:
AT-ADA63-DEVT
ADASIGHT Version:
2.0.1rev1375

Nucleus exits status

This function displays the current ADABAS and ADASIGHT nucleus exits and their status.

Exit	Chain pos	Status	Module name	Func name	Cont	REENT	AT exit
11	0	A	/opt/softwareag/adasight/devt/adasight-2.0.1/lib/libadasight.so	asix_11	C	R	Y
2	0	A	/opt/softwareag/adasight/devt/adasight-2.0.1/lib/libadasight.so	asix_2	C	R	Y
4	0	A	/opt/softwareag/adasight/devt/adasight-2.0.1/lib/libadasight.so	asix_4	C	R	Y
14	0	A	/opt/softwareag/adasight/devt/adasight-2.0.1/lib/libadasight.so	asix_14	C	R	Y

Notes:

Field	Description
Exit	ADABAS exit number
Chain pos	Position of this exit's entry in the gbl_exit_x_chain. First in chain is index 0
Status	A = Active or I = Inactive
Module name	Name of shared library containing exit executable
Function name	Name of exit function entry point
Cont	C = Continue or A = Abort after non-zero return code
REENT	R = Reentrant or N = Not reentrant
AT exit	Y = Yes or N = No - is or is not an ADASIGHT exit

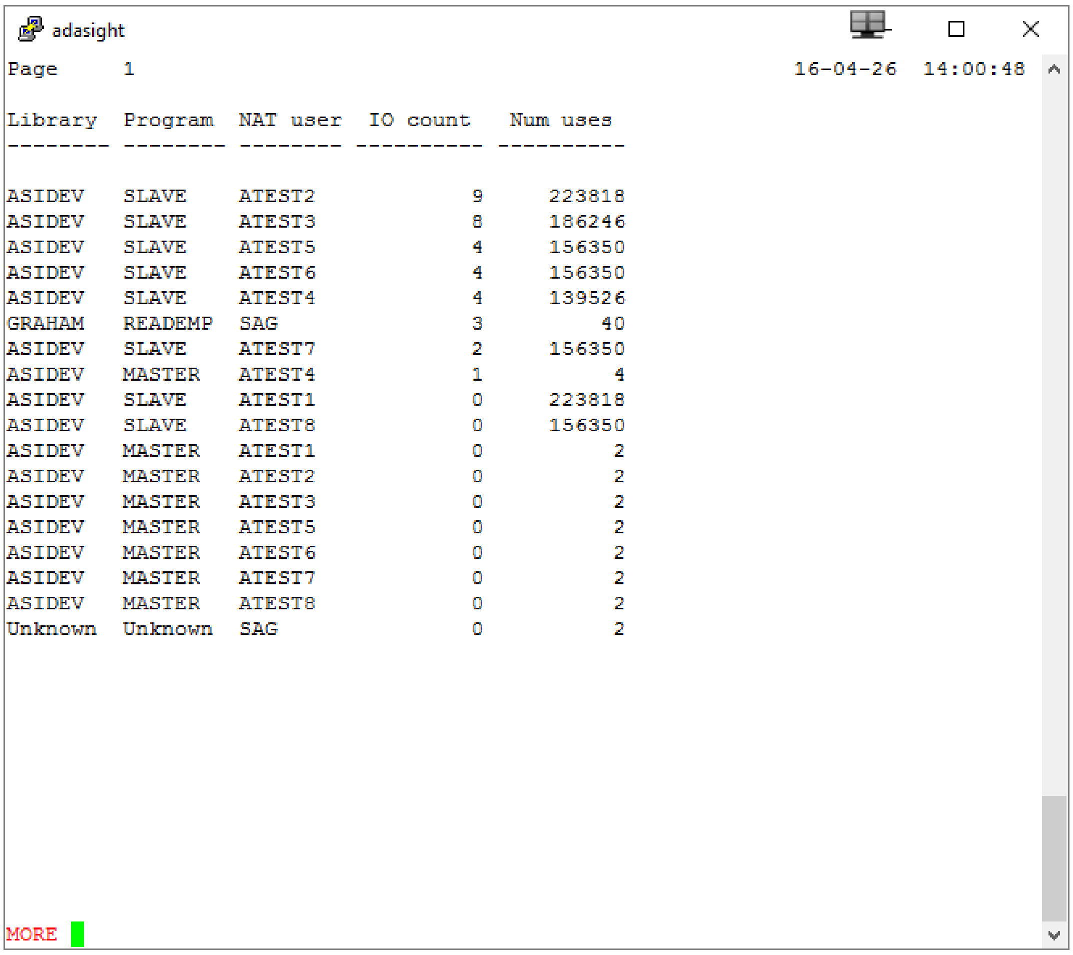
6. Summary statistics

6.1. Collection

ADASIGHT statistics collection is enabled by setting the ADASIGHT environment variable parameter ASIX_SUMMFNR to the ADABAS file number containing the ADASIGHT summary statistics FDT. If set to -1, statistics are not collected.

6.2. Analysis

Sample summary statistics NATURAL programs provided with ADASIGHT provide a quick and easy way to see which applications and programs and users are the most expensive in terms of ADABAS calls issued. Here is an example from our test system:



```
Page      1                                                                   16-04-26   14:00:48

Library   Program   NAT user   IO count    Num uses
--------  --------  --------  ----------  ----------

ASIDEV    SLAVE     ATEST2             9      223818
ASIDEV    SLAVE     ATEST3             8      186246
ASIDEV    SLAVE     ATEST5             4      156350
ASIDEV    SLAVE     ATEST6             4      156350
ASIDEV    SLAVE     ATEST4             4      139526
GRAHAM    READEMP   SAG                3          40
ASIDEV    SLAVE     ATEST7             2      156350
ASIDEV    MASTER    ATEST4             1           4
ASIDEV    SLAVE     ATEST1             0      223818
ASIDEV    SLAVE     ATEST8             0      156350
ASIDEV    MASTER    ATEST1             0           2
ASIDEV    MASTER    ATEST2             0           2
ASIDEV    MASTER    ATEST3             0           2
ASIDEV    MASTER    ATEST5             0           2
ASIDEV    MASTER    ATEST6             0           2
ASIDEV    MASTER    ATEST7             0           2
ASIDEV    MASTER    ATEST8             0           2
Unknown   Unknown   SAG                0           2




MORE
```

Note that this is not a realistic display, in that all calls are issued by a load test facility, but it serves to illustrate that here the SLAVE program is clearly the heaviest user and should be investigated.

6.3. Raw data

The SUMSTATS program supplied with ADASIGHT can be used to browse the raw data. The ASI-SUMMARY DDM supplied with ADASIGHT together with the sample SUMSTATS program make it easy to produce customised analyses of the succinct but comprehensive set of raw data generated by ADASIGHT.