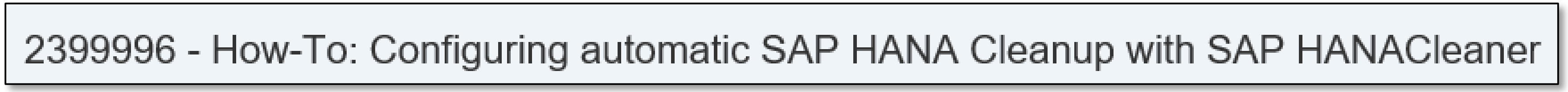
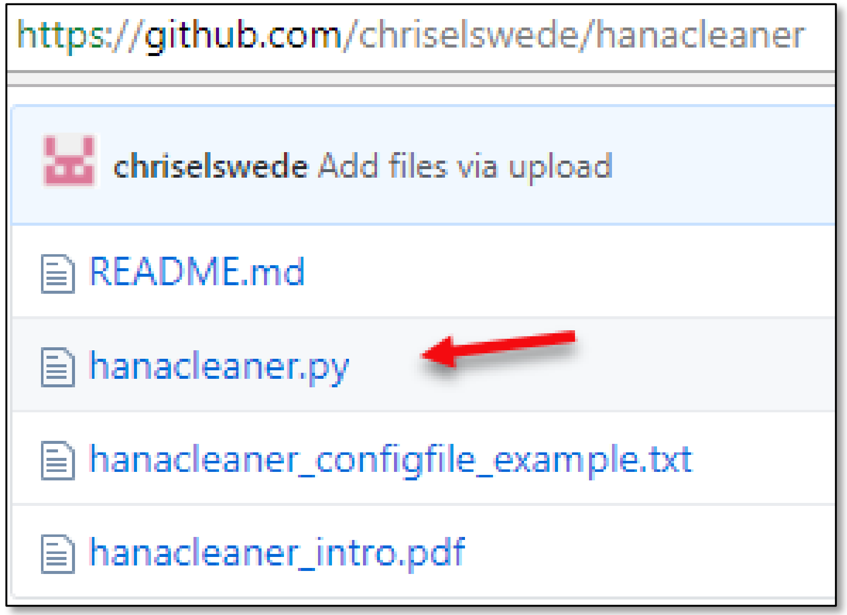
House Keeping

HANACleaner – SAP Note 2399996

SAP Note 2399996 presents a tool that can help with housekeeping tasks


2399996 - How-To: Configuring automatic SAP HANA Cleanup with SAP HANACleaner

- It is a python script to be downloaded from https://github.com/chriselswede/hanacleaner
- It is intended to be executed as <sid>adm on your SAP HANA Server (since then the proper python version is already in your path, installed together with hana)
- It connects via host, port and DB user, provided in hdbuserstore
- That DB user needs proper privileges


https://github.com/chriselswede/hanacleaner

chriselswede Add files via upload

README.md

hanacleaner.py

hanacleaner_configfile_example.txt

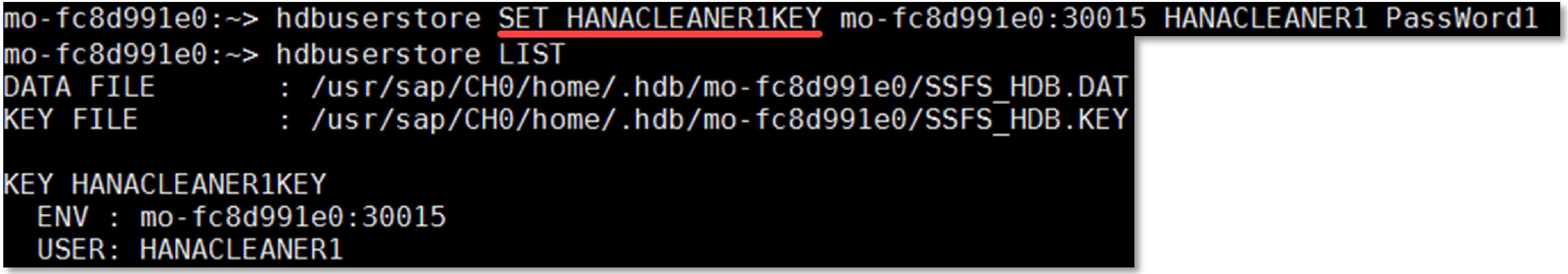
hanacleaner_intro.pdf

For more about the SAP HANACleaner see SAP Note 2399996
SAP Note 2400024 provides administration suggestions, e.g. recommendations about the hanacleaner

House Keeping

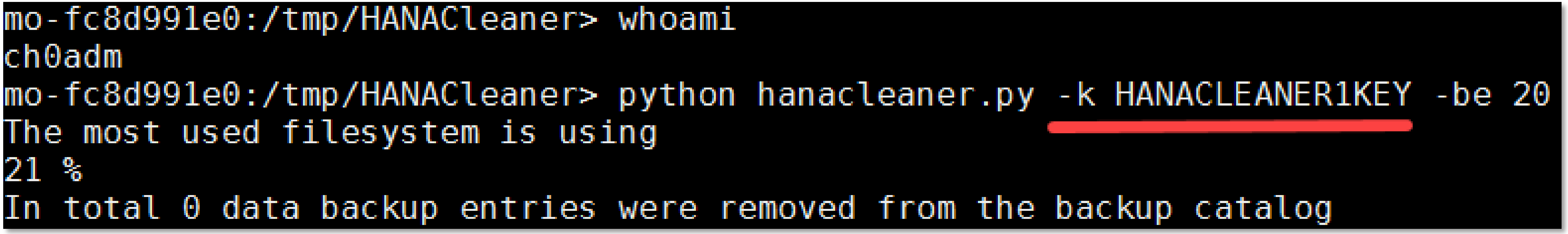
HANACleaner – using hdbuserstore

Host, port and DB user needs to be provided in the hdbuserstore:



```
mo-fc8d991e0:~> hdbuserstore SET HANACLEANER1KEY mo-fc8d991e0:30015 HANACLEANER1 PassWord1
mo-fc8d991e0:~> hdbuserstore LIST
DATA FILE       : /usr/sap/CH0/home/.hdb/mo-fc8d991e0/SSFS_HDB.DAT
KEY FILE        : /usr/sap/CH0/home/.hdb/mo-fc8d991e0/SSFS_HDB.KEY

KEY HANACLEANER1KEY
  ENV : mo-fc8d991e0:30015
  USER: HANACLEANER1
```

Then the hanacleaner can connect using the info stored in hdbuserstore:

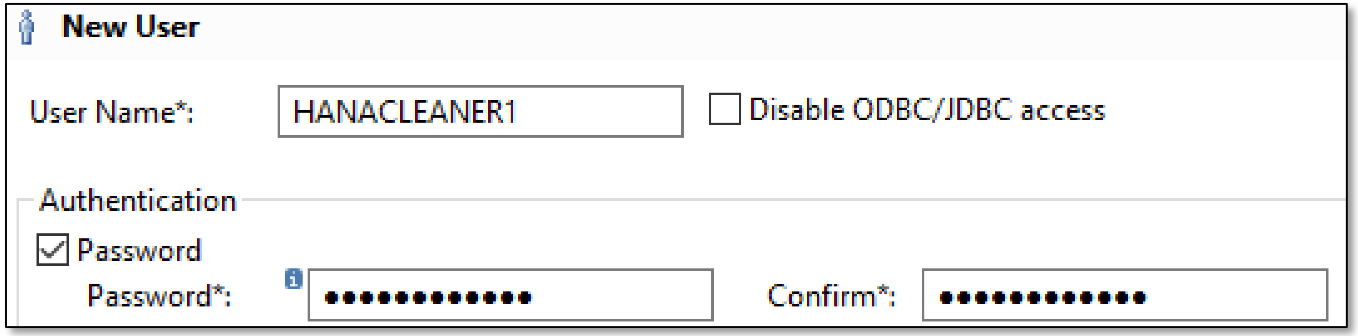


```
mo-fc8d991e0:/tmp/HANACleaner> whoami
ch0adm
mo-fc8d991e0:/tmp/HANACleaner> python hanacleaner.py -k HANACLEANER1KEY -be 20
The most used filesystem is using
21 %
In total 0 data backup entries were removed from the backup catalog
```

HANACleaner – needs privileges

The DB user that hanacleaner uses to connect needs proper privileges

Depending on what housekeeping tasks the specific hanacleaner user will do he needs specific sets of privileges, for example:



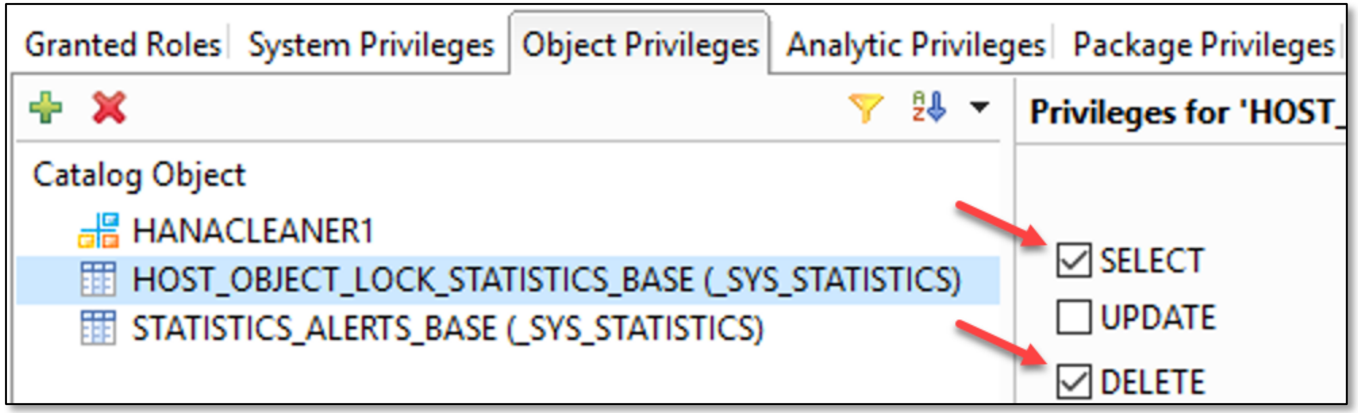
New User

User Name*: HANACLEANER1 □ Disable ODBC/JDBC access

Authentication

☑ Password

Password*: ●●●●●●●●●●●● Confirm*: ●●●●●●●●●●●●



Catalog Object

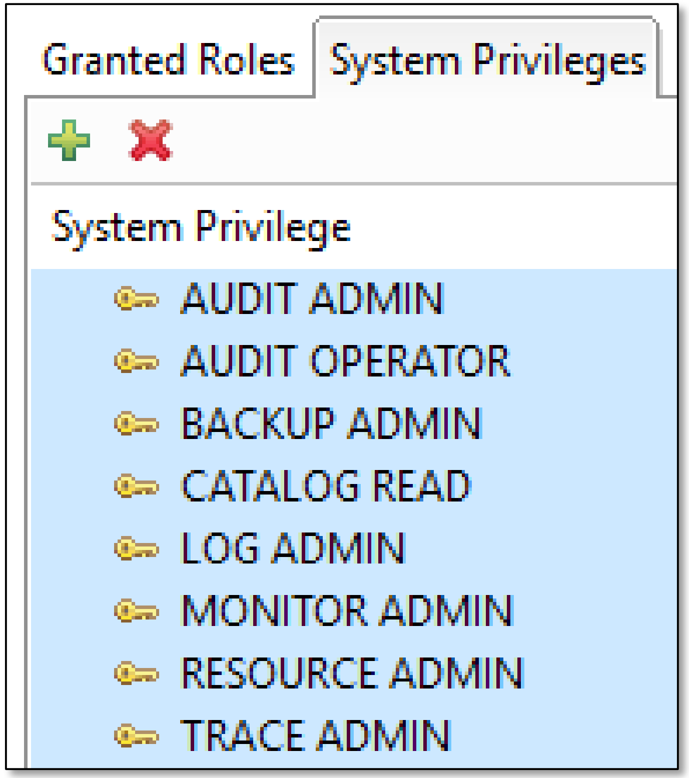
- HANACLEANER1
- HOST_OBJECT_LOCK_STATISTICS_BASE (_SYS_STATISTICS)
- STATISTICS_ALERTS_BASE (_SYS_STATISTICS)

Privileges for 'HOST_

☑ SELECT

□ UPDATE

☑ DELETE



System Privilege

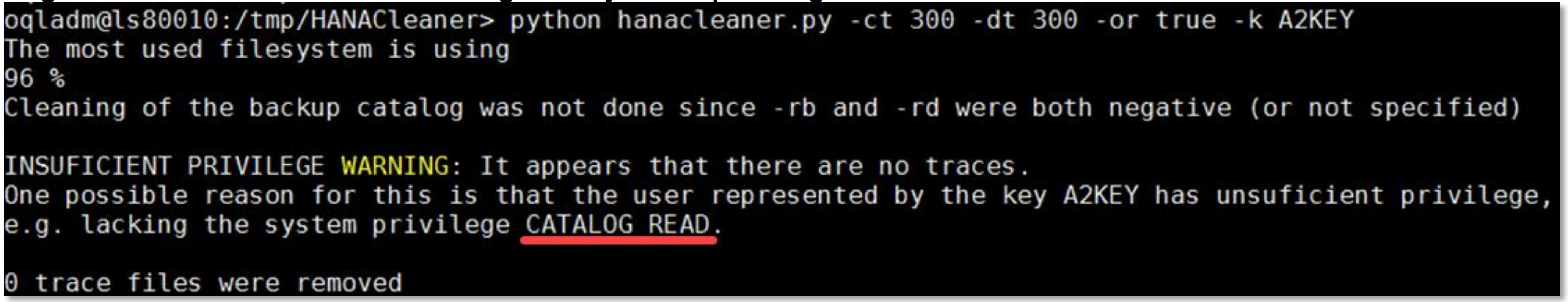
- AUDIT ADMIN
- AUDIT OPERATOR
- BACKUP ADMIN
- CATALOG READ
- LOG ADMIN
- MONITOR ADMIN
- RESOURCE ADMIN
- TRACE ADMIN

House Keeping

HANACleaner – tells missing privileges

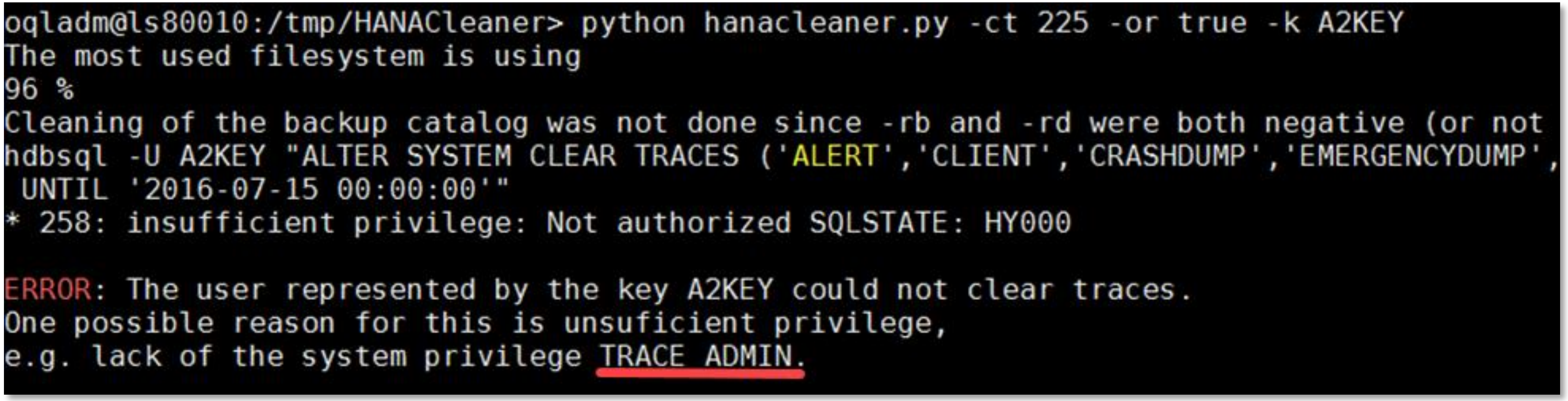
If the DB user is missing privileges, hanacleaner will indicate that

E.g. here the user A2 is missing the system privilege CATALOG READ:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -ct 300 -dt 300 -or true -k A2KEY
The most used filesystem is using
96 %
Cleaning of the backup catalog was not done since -rb and -rd were both negative (or not specified)

INSUFICIENT PRIVILEGE WARNING: It appears that there are no traces.
One possible reason for this is that the user represented by the key A2KEY has unsuficient privilege,
e.g. lacking the system privilege CATALOG READ.

0 trace files were removed
```

E.g. here the user A2 is missing the system privilege TRACE ADMIN:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -ct 225 -or true -k A2KEY
The most used filesystem is using
96 %
Cleaning of the backup catalog was not done since -rb and -rd were both negative (or not
hdbsql -U A2KEY "ALTER SYSTEM CLEAR TRACES ('ALERT','CLIENT','CRASHDUMP','EMERGENCYDUMP',
 UNTIL '2016-07-15 00:00:00'"
* 258: insufficient privilege: Not authorized SQLSTATE: HY000

ERROR: The user represented by the key A2KEY could not clear traces.
One possible reason for this is unsuficient privilege,
e.g. lack of the system privilege TRACE ADMIN.
```

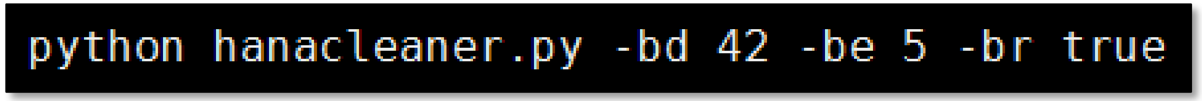
House Keeping

HANACleaner – backupcatalog cleanup (1/2)

For cleaning up the backup catalog (and possibly also backups) hanacleaner has the following input flags

Flag	Unit	Details	Explanation	Default
-be		minimum number of retained backup entries in the catalog	this number of entries of successful data backups will remain in the backup catalog	-1 (not used)
-bd	days	minimum retained days of backup entries in the catalog	the youngest successful data backup entry in the backup catalog that is older than this number of days is the oldest successful data backup entry not removed from the backup catalog	-1 (not used)
-bb	true/ false	switch to delete backups also	if set to true the backup files corresponding to the backup entries are also deteleted	false
-bo	true/ false	output the backup catalog	if set to true the backup catalog is printed before and after cleanup	false
-br	true/ false	output the deleted entries	if set to true the deleted backup entries are printed after the cleanup	false

Example:
Here backup catalog entries (i.e. not the backups themselves) older than 42 days are deleted, but at least 5 backup entries are kept, and the deleted backup entries are printed out

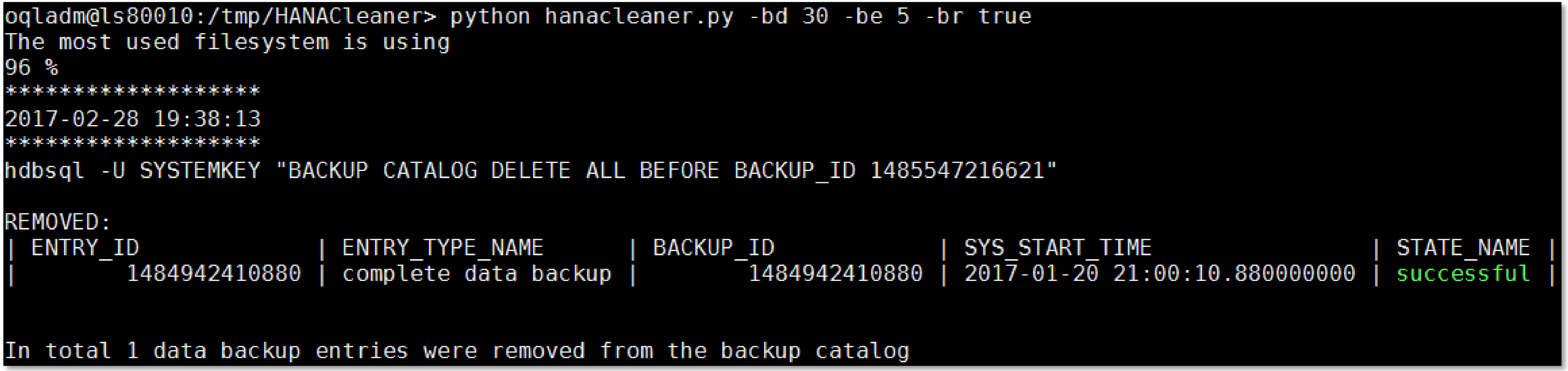


```
python hanacleaner.py -bd 42 -be 5 -br true
```

HANACleaner – backupcatalog cleanup (2/2)

Cleaning up the backup catalog can be done with the hanacleaner

Example:
Here backup catalog entries (i.e. not the backups themselves) older than 30 days are deleted, but at least 5 backup entries are kept, and the deleted backup entries are printed out:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -bd 30 -be 5 -br true
The most used filesystem is using
96 %
*******************
2017-02-28 19:38:13
*******************
hdbsql -U SYSTEMKEY "BACKUP CATALOG DELETE ALL BEFORE BACKUP_ID 1485547216621"

REMOVED:
| ENTRY_ID              | ENTRY_TYPE_NAME      | BACKUP_ID             | SYS_START_TIME                | STATE_NAME |
|         1484942410880 | complete data backup |         1484942410880 | 2017-01-20 21:00:10.880000000 | successful |


In total 1 data backup entries were removed from the backup catalog
```

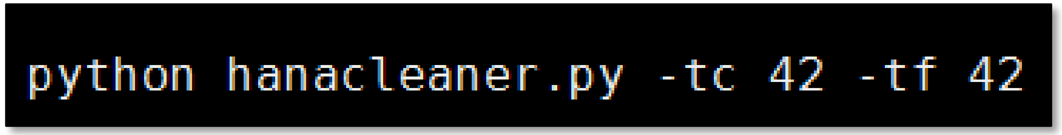
House Keeping

HANACleaner – trace cleanup (1/2)

For cleaning up the traces hanacleaner has the following input flags

Flag	Unit	Details	Explanation	Default
-tc	days	minimum retained days for trace files	trace files that are older than this number of days are removed ALTER SYSTEM CLEAR TRACES… is used (see SQL. Ref.)	-1 (not used)
-tf	days	minimum retained days for trace files	trace files that are older than this number of days are removed ALTER SYSTEM REMOVE TRACES… is used (see SQL. Ref.)	-1 (not used)
-to	true/ false	output trace files	displays trace files before and after the cleanup	false
-td	true/ false	output the deleted trace files	displays the trace files that were deleted	false

Example:
Here trace file contents older than 42 days is removed and trace files older than 42 days are deleted



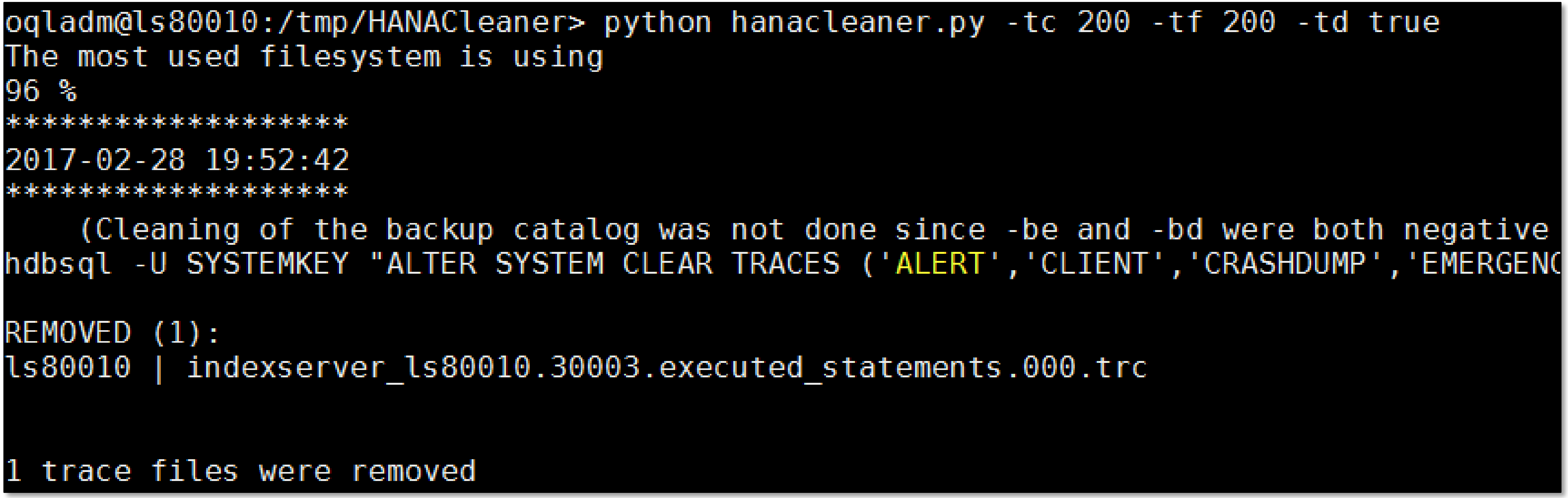
```
python hanacleaner.py -tc 42 -tf 42
```

House Keeping

HANACleaner – trace cleanup (2/2)

Cleaning of traces can be done with hanacleaner as in this example

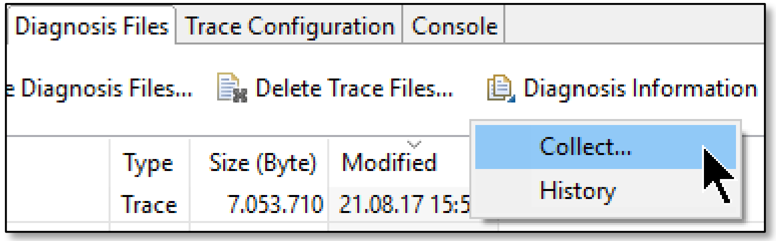
Example:
Here trace files older than 200 days are deleted and the removed trace files are displayed:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -tc 200 -tf 200 -td true
The most used filesystem is using
96 %
*******************
2017-02-28 19:52:42
*******************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative
hdbsql -U SYSTEMKEY "ALTER SYSTEM CLEAR TRACES ('ALERT','CLIENT','CRASHDUMP','EMERGENC

REMOVED (1):
ls80010 | indexserver_ls80010.30003.executed_statements.000.trc


1 trace files were removed
```

House Keeping

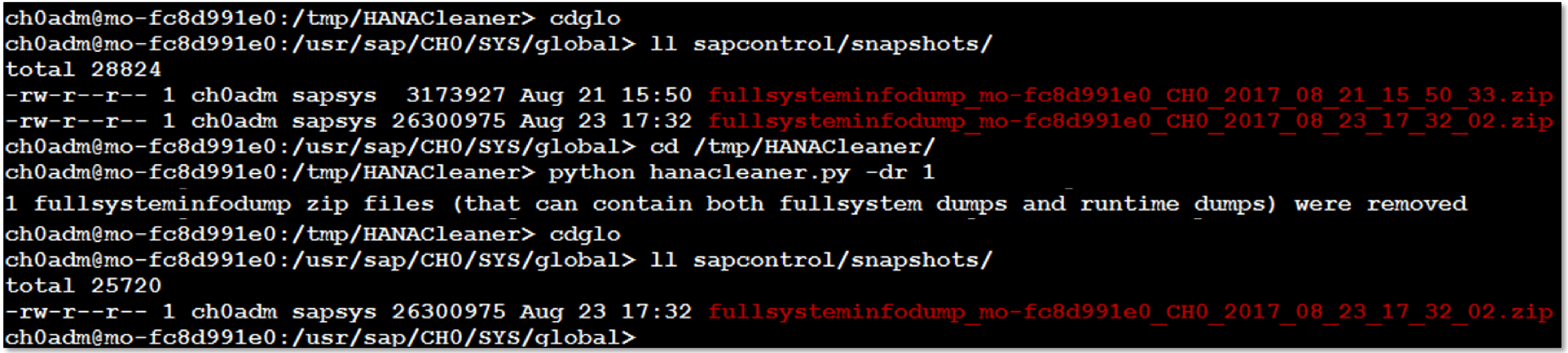
HANACleaner – dump cleanup



Manually created dump files (a.k.a. rte or fullsystem dumps) can be deleted with the following flag

Fla g	Unit	Details	Explanation	Default
-dr	days	retention days for dump files	manually created dump files (a.k.a. fullysytem dumps and runtime dumps) that are older than this number of days are removed	-1 (not used)

Example:
Here dump files older than 1 day are deleted



```
ch0adm@mo-fc8d991e0:/tmp/HANACleaner> cdglo
ch0adm@mo-fc8d991e0:/usr/sap/CH0/SYS/global> ll sapcontrol/snapshots/
total 28824
-rw-r--r-- 1 ch0adm sapsys  3173927 Aug 21 15:50 fullsysteminfodump_mo-fc8d991e0_CH0_2017_08_21_15_50_33.zip
-rw-r--r-- 1 ch0adm sapsys 26300975 Aug 23 17:32 fullsysteminfodump_mo-fc8d991e0_CH0_2017_08_23_17_32_02.zip
ch0adm@mo-fc8d991e0:/usr/sap/CH0/SYS/global> cd /tmp/HANACleaner/
ch0adm@mo-fc8d991e0:/tmp/HANACleaner> python hanacleaner.py -dr 1
1 fullsysteminfodump zip files (that can contain both fullsystem dumps and runtime dumps) were removed
ch0adm@mo-fc8d991e0:/tmp/HANACleaner> cdglo
ch0adm@mo-fc8d991e0:/usr/sap/CH0/SYS/global> ll sapcontrol/snapshots/
total 25720
-rw-r--r-- 1 ch0adm sapsys 26300975 Aug 23 17:32 fullsysteminfodump_mo-fc8d991e0_CH0_2017_08_23_17_32_02.zip
ch0adm@mo-fc8d991e0:/usr/sap/CH0/SYS/global>
```

House Keeping

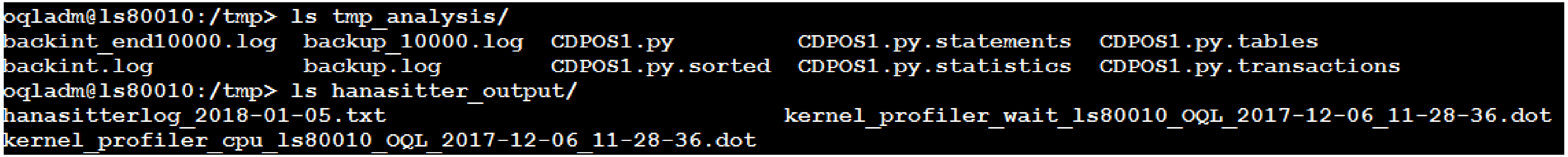
HANACleaner – General File Clean Up

Any folder with files including any word in their file names can be cleaned:

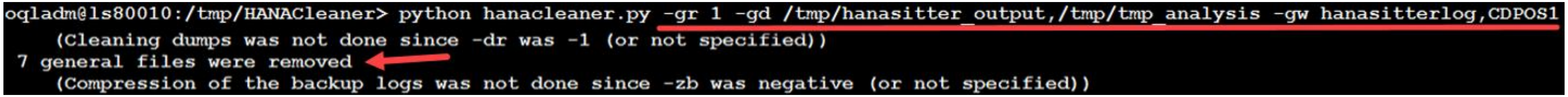
Flag	Unit	Details	Explanation	Default
-gr	days	retention days for any general file	files in the directory specified with -gd and with the file names including the word specified with -gw are only saved for this number of days Note: -gd and -gw can also be same length lists with a commas as delimiter	-1 (not used)
-gd		directories	a comma separated list with full paths of directories with files to be deleted according to -gr (entries pairs with entries in -gw)	default "" (not used)
-gw		filename parts	a comma separated list with words that files should have in their names to be deleted according to -gr (entries pairs with entries in -gd)	default "" (not used)

Example:

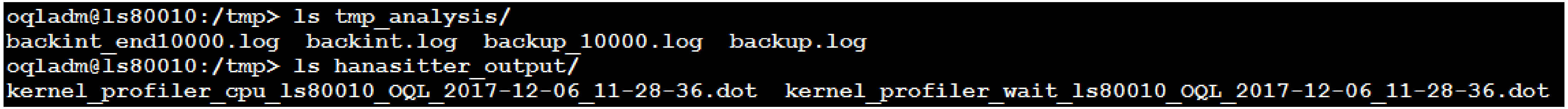
Here files with CDPOS1 & hansitter_output in their file names, in the folders /tmp/tmp_analysis/ & /tmp/hanasitter_output older than one day are deleted



```
oqladm@ls80010:/tmp> ls tmp_analysis/
backint_end10000.log  backup_10000.log  CDPOS1.py         CDPOS1.py.statements  CDPOS1.py.tables
backint.log           backup.log        CDPOS1.py.sorted  CDPOS1.py.statistics  CDPOS1.py.transactions
oqladm@ls80010:/tmp> ls hanasitter_output/
hanasitterlog_2018-01-05.txt                            kernel_profiler_wait_ls80010_OQL_2017-12-06_11-28-36.dot
kernel_profiler_cpu_ls80010_OQL_2017-12-06_11-28-36.dot
```



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -gr 1 -gd /tmp/hanasitter_output,/tmp/tmp_analysis -gw hanasitterlog,CDPOS1
    (Cleaning dumps was not done since -dr was -1 (or not specified))
 7 general files were removed
    (Compression of the backup logs was not done since -zb was negative (or not specified))
```



```
oqladm@ls80010:/tmp> ls tmp_analysis/
backint_end10000.log  backint.log  backup_10000.log  backup.log
oqladm@ls80010:/tmp> ls hanasitter_output/
kernel_profiler_cpu_ls80010_OQL_2017-12-06_11-28-36.dot  kernel_profiler_wait_ls80010_OQL_2017-12-06_11-28-36.dot
```

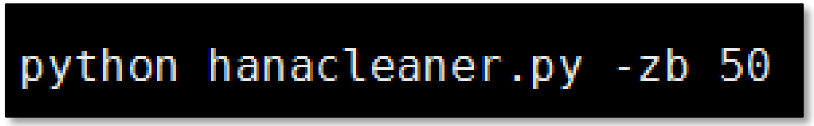
House Keeping

HANACleaner – backuplogs (1/2)

For compressing and renaming backup logs and backint logs hanacleaner has the following input flags

Flag	Unit	Details	Explanation	Default
-zb	mb	backup logs compression size limit	if there are any backup.log or backint.log file that is bigger than this size limit, then it is compressed and renamed	-1 (not used)
-zp		zip path	specifies the path of the folder (and all subfolders) where to look for the backup.log and backint.log files	the directory specified by the alias cdtrace
-zl	true/ false	zip links	specifies if symbolic links should be followed searching for backup logs	false
-zk	true/ false	keep zip file	if this is set to false the zipped file will be deleted (use with care!)	true

Example:
Here any backup.log or backint.log found in the trace folder and is larger than 50 MB will be compressed and renamed:



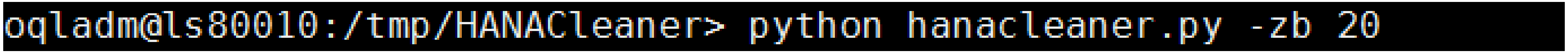
```
python hanacleaner.py -zb 50
```

House Keeping

HANACleaner – backuplogs (2/2)

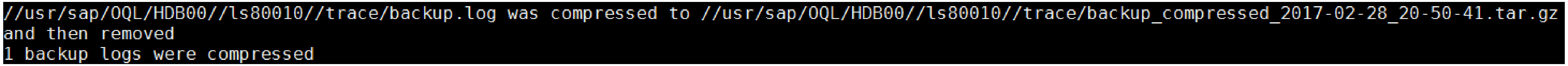
Compressing backup and backint logs can be done with hanacleaner

Example:
Here any backup.log or backint.log found in the trace folder and that is larger than 20 MB will be compressed and renamed:

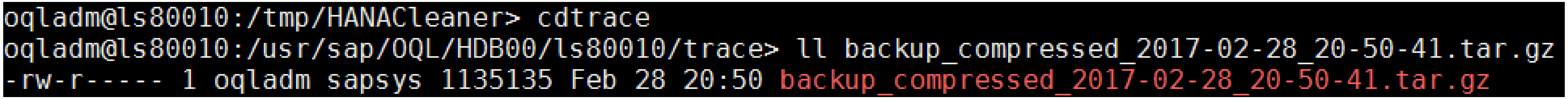


```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -zb 20
```

And it worked:



```
//usr/sap/OQL/HDB00//ls80010//trace/backup.log was compressed to //usr/sap/OQL/HDB00//ls80010//trace/backup_compressed_2017-02-28_20-50-41.tar.gz
and then removed
1 backup logs were compressed
```



```
oqladm@ls80010:/tmp/HANACleaner> cdtrace
oqladm@ls80010:/usr/sap/OQL/HDB00/ls80010/trace> ll backup_compressed_2017-02-28_20-50-41.tar.gz
-rw-r----- 1 oqladm sapsys 1135135 Feb 28 20:50 backup_compressed_2017-02-28_20-50-41.tar.gz
```

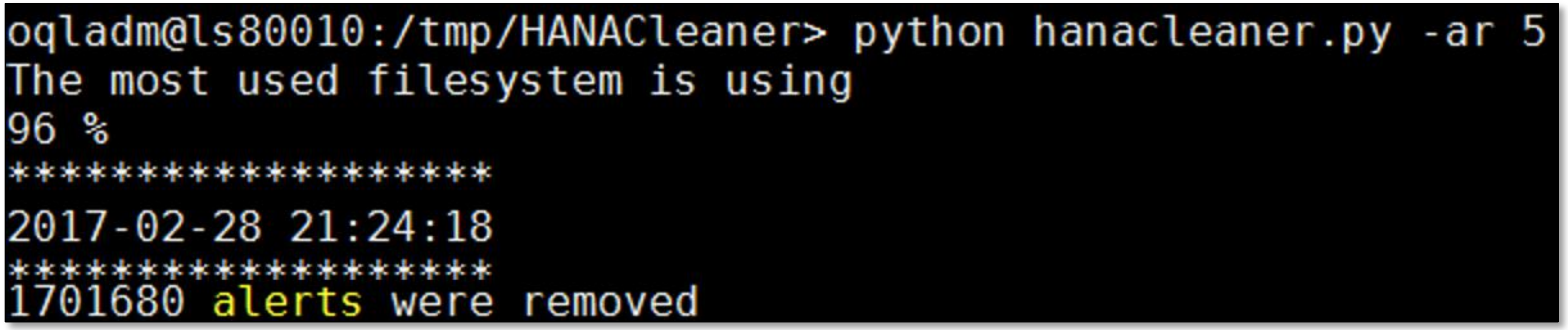
House Keeping

HANACleaner – alerts

For deleting old alerts from the alert table (filled by the statistics service) hanacleaner has the following input flags

Flag	Unit	Details	Explanation	Default
-ar	days	minimum number retained days of the alerts	minimum retained age of statistics server alerts	-1 (not used)
-ao	true/ false	output alerts	if true, then all alerts will be displayed before and after the cleanup (if number of alerts are more than 10 thousand, hanacleaner will not do this output)	false
-ad	true/ false	output deleted alerts	if true, then deleted alerts will be displaye after the cleanup (if number of alerts are more than 10 thousand, hanacleaner will not do this output)	false

Example:
Here alerts older than 5 days are removed from the statistics server alert table:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -ar 5
The most used filesystem is using
96 %
*******************
2017-02-28 21:24:18
*******************
1701680 alerts were removed
```

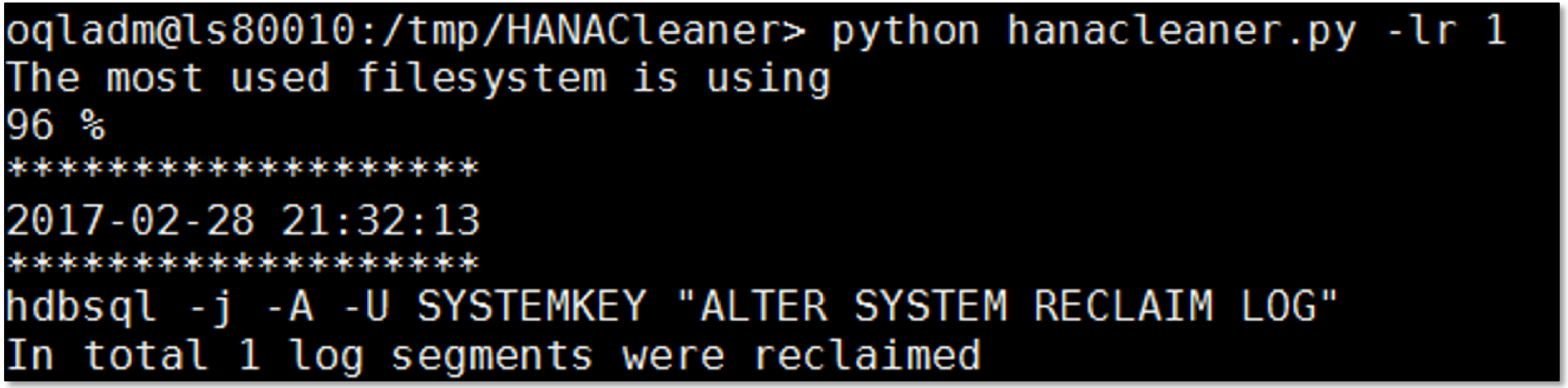
House Keeping

HANACleaner – log segments

For reclaiming free log segments hanacleaner has the following input flag

Flag	Unit	Details	Explanation	Default
-lr		maximum number of free log segments per service	if there are more free log segments for a service that this number then ALTER SYSTEM RECLAIM LOG will be executed	-1 (not used)

Example:
Here the ALTER SYSTEM RECLAIM LOG command is executed since there was a hana process that had more than one free log segment:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -lr 1
The most used filesystem is using
96 %
*******************
2017-02-28 21:32:13
*******************
hdbsql -j -A -U SYSTEMKEY "ALTER SYSTEM RECLAIM LOG"
In total 1 log segments were reclaimed
```

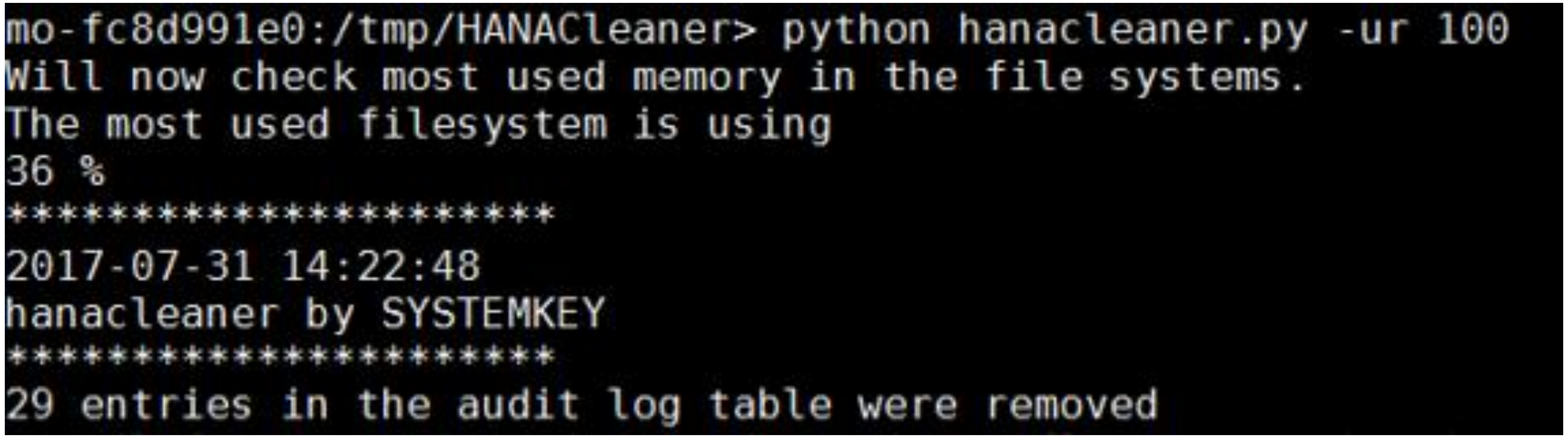
House Keeping

HANACleaner – Audit Log Table

To clear the audit log database table hanacleaner has the following input flag

Flag	Unit	Details	Explanation	Default
-ur		retention time [days] of the audit log table	if the audit log database table has audit log older than these number days ALTER SYSTEM CLEAR AUDIT LOG UNTIL will be executed	-1 (not used)

Example:
Here the ALTER SYSTEM CLEAR AUDIT LOG UNTIL is executed and 29 entries in the audit log table were removed:



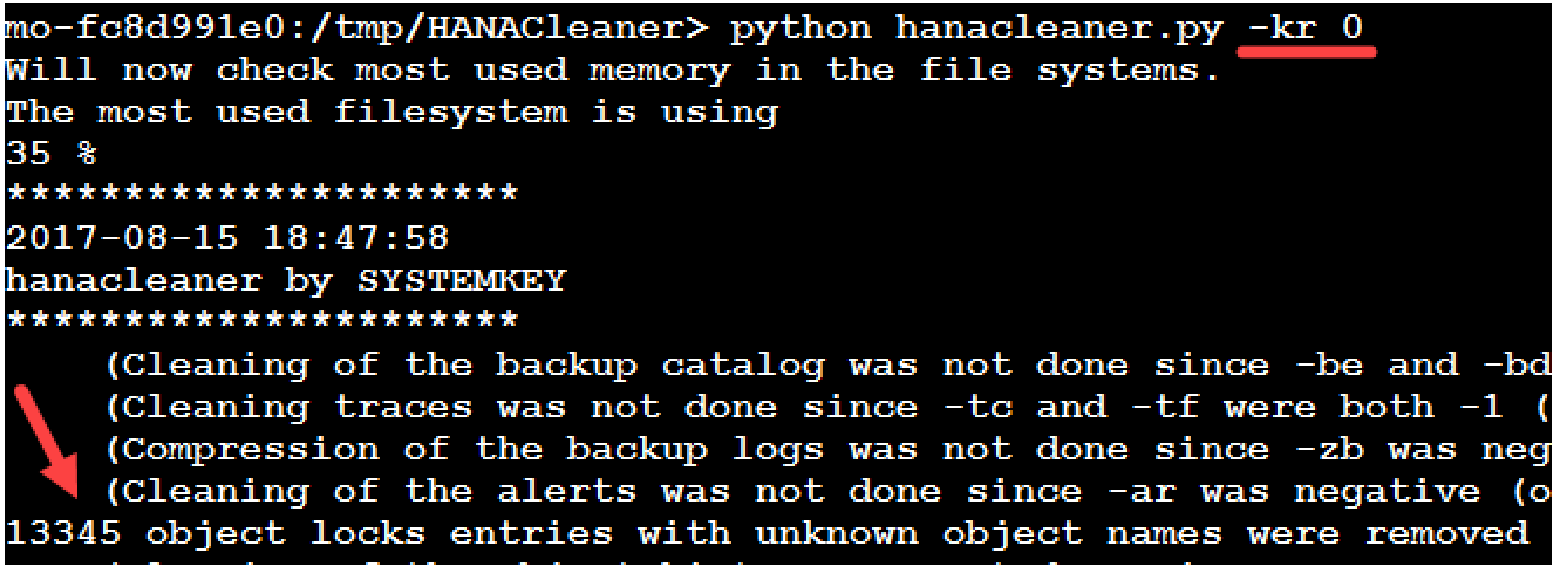
```
mo-fc8d991e0:/tmp/HANACleaner> python hanacleaner.py -ur 100
Will now check most used memory in the file systems.
The most used filesystem is using
36 %
**********************
2017-07-31 14:22:48
hanacleaner by SYSTEMKEY
**********************
29 entries in the audit log table were removed
```

HANACleaner – Unknown Object Lock Entries

The transactional lock history in HOST_OBJECT_LOCK_STATISTICS may have unknown object entries that refer to dropped temporary tables (as per SAP Note 2147247)
These entries can be removed by the hanacleaner with following input flag

Flag	Unit	Details	Explanation	Default
-kr	days	min retained unknown object lock days	min age (today not included) of retained object lock entries with OBJECT_NAME = ‘(unknown)’, see SAP Note 2147247	-1 (not used)

Example:
Here all transactional lock history entries with OBJECT_NAME = ‘(unknown)’ are removed:



```
mo-fc8d991e0:/tmp/HANACleaner> python hanacleaner.py -kr 0
Will now check most used memory in the file systems.
The most used filesystem is using
35 %
**********************
2017-08-15 18:47:58
hanacleaner by SYSTEMKEY
**********************
    (Cleaning of the backup catalog was not done since -be and -bd
    (Cleaning traces was not done since -tc and -tf were both -1 (
    (Compression of the backup logs was not done since -zb was neg
    (Cleaning of the alerts was not done since -ar was negative (o
13345 object locks entries with unknown object names were removed
```

House Keeping

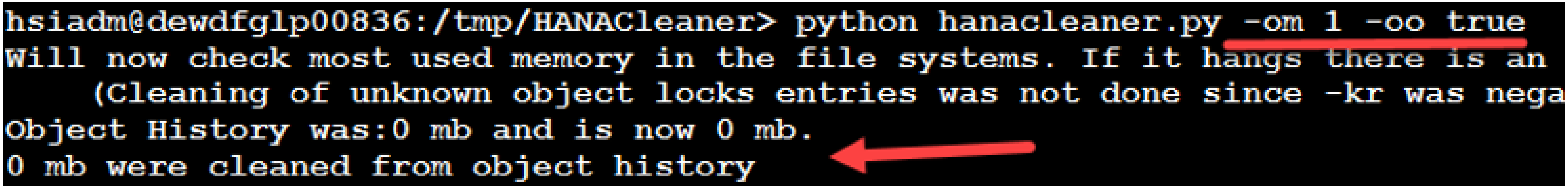
HANACleaner – Object History

Object history can be cleaned (as per SAP Note 2479702) using these flags:

Flag	Unit	Details	Explanation	Default
-om	mb	object history table max size	if the table _SYS_REPO.OBJECT_HISTORY is bigger than this threshold this table will be cleaned up according to SAP Note 2479702	-1 (not used)
-oo	true/ false	output cleaned memory from object table	displays how much memory was cleaned up from object history table	-1 (not used)

Example:

In this example there was nothing to clean up from the object history:



```
hsiadm@dewdfglp00836:/tmp/HANACleaner> python hanacleaner.py -om 1 -oo true
Will now check most used memory in the file systems. If it hangs there is an
    (Cleaning of unknown object locks entries was not done since -kr was nega
Object History was:0 mb and is now 0 mb.
0 mb were cleaned from object history
```

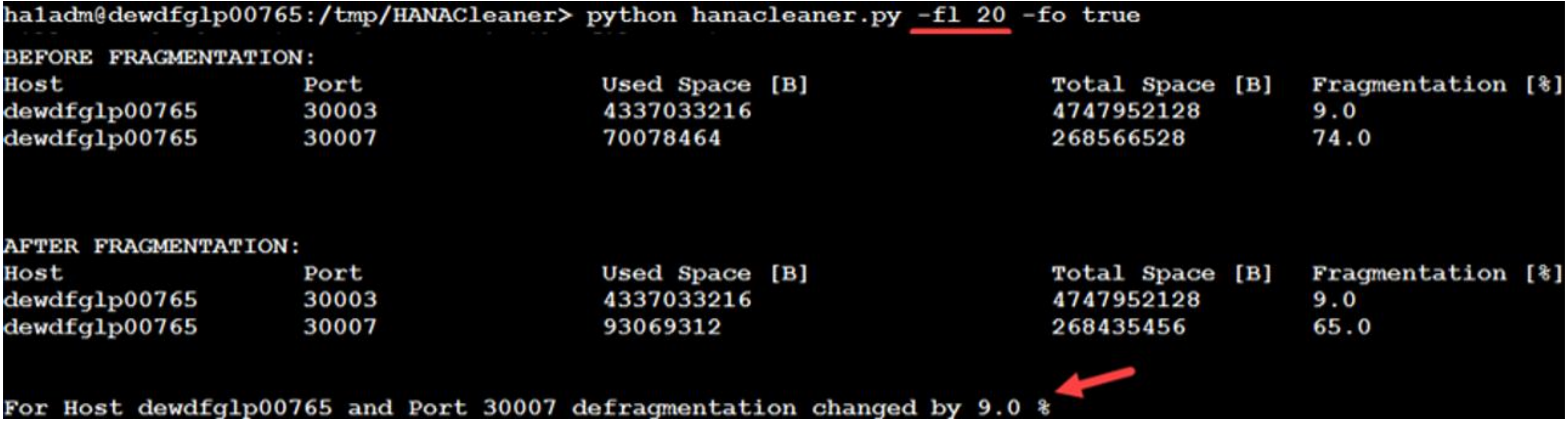
HANACleaner – Disk Fragmentation (1/2)

Unused space in the disk volumes can be fixed with the flag –fl

Flag	Unit	Details	Explanation	Default
-fl	%	fragmentation limit	maximum fragmentation of data volume files, of any service, before defragmentation of that service is started: ALTER SYSTEM RECLAIM DATAVOLUME '<host>:<port>' 120 DEFRAGMENT Note: If you use HSR see next slide	-1 (not used)
-fo	true/false	output fragmentation	displays data volume statistics before and after defragmentation	false

Example:

Here defragmentation will be done of all ports if fragmentation is more than 20% for any port:



```
haladm@dewdfglp00765:/tmp/HANACleaner> python hanacleaner.py -fl 20 -fo true

BEFORE FRAGMENTATION:
Host               Port               Used Space [B]              Total Space [B]   Fragmentation [%]
dewdfglp00765      30003              4337033216                  4747952128        9.0
dewdfglp00765      30007              70078464                    268566528         74.0



AFTER FRAGMENTATION:
Host               Port               Used Space [B]              Total Space [B]   Fragmentation [%]
dewdfglp00765      30003              4337033216                  4747952128        9.0
dewdfglp00765      30007              93069312                    268435456         65.0


For Host dewdfglp00765 and Port 30007 defragmentation changed by 9.0 %
```

House Keeping

HANACleaner – Disk Fragmentation (2/2)

If SAP HANA has snapshots preserved RECLAIM DATAVOLUME fails with

```
        general error: Shrink canceled, probably because of snapshot pages
```

This situation is normal if you use SAP HANA System Replication (HSR) (see SAP Note 1999880 Q19)

SAP Note 2332284 explains that to make RECLAIM DATAVOLUME work if you have HSR you have to <u>temporarily</u> change some parameters

This is not, and will not be, implemented in SAP HANACleaner!

Why?

- **HANACleaner is an automatic house-keeper → dangerous if it starts to automatically change SAP HANA parameters**
- **Additionally, from security point of view, the technical user used to execute SAP HANACleaner should not have INIFILE ADMIN**

HANACleaner – Table Compression (1/2)

Compression re-optimization of column store tables can be automated

Flag	Unit	Details	Explanation	Default
1. Both following two flags, -cc, and -ce, must be > 0 to control the force compression optimization on tables that never was compression re-optimized (i.e. last_compressed_record_count = 0):				
-cc		Max allowed raw main records	If number raw main rows are larger this could be compression optimized if compressed rows = 0 and -ce indicates it also	-1 (not used) *e.g. 10000000*
-ce	[GB]	Max allowed estimated size	If estimated size is larger this could be compression optimized if compressed rows = 0 and -cc indicates it also	-1 (not used) *e.g. 1*
2. All following three flags, -cr, -cs, and -cd, must be > 0 to control the force compression optimization on tables with columns with compression type 'DEFAULT' (i.e. no additional compression algorithm in main)				
-cr		Max allowed rows	If a column has more rows and compression = 'DEFAULT' this table could be re-compressed if -cs and -cd indicate it also	-1 (not used) *e.g. 10000000*
-cs	[MB]	Max allowed size	If a column is larger and compression = 'DEFAULT' this table could be re-compressed if -cr and -cd indicate it also	-1 (not used) *e.g. 500*
-cd	[%]	Min allowed distinct count	If a column has smaller distinct row quota this table could be re-compressed if -cr and -cs indicate it also	-1 (not used) *e.g. 5*
3. Both following two flags, -cq and -cu, must be > 0 to control the force compression optimization on tables whose UDIV quota is too large, i.e. #UDIVs/(#raw main + #raw delta)				
-cq	[%]	Max allowed UDIV quota	If a column's UDIV quota is larger this table could be re-compressed if -cu indicates it also	-1 (not used) *e.g. 150*
-cu		Max allowed UDIVs	If a column has more UDIVs → compress if –cq indicates it also	-1 (not used) *e.g. 10000000*

House Keeping

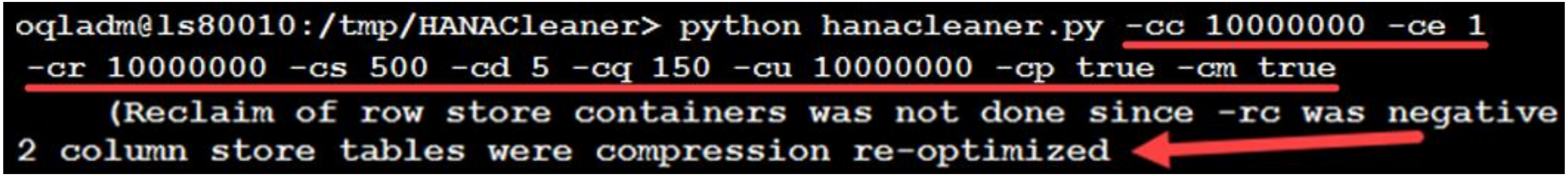
HANACleaner – Table Compression (2/2)

Some column store tables might have to have its compression re-optimized

This can be atomized with the following flags:

Flag	Unit	Details	Explanation	Default
4. Flag -cb must be > 0 to control the force compression optimization on tables with columns with SPARSE (<122.02) or PREFIXED and a BLOCK index				
-cb		Max allowed rows	If more rows → compress if BLOCK and PREFIXED	-1 (not used) *e.g. 100000*
Following three flags are general; they control all three, 1., 2., 3., and 4. compression optimization possibilities above				
-cp	[true/false]	Per partition	Switch to consider above flags per partition	false
-cm	[true/false]	Merge before	Switch to perform a delta merge before compression	false
-co	[true/false]	Output	Switch to print out tables selected for compression optimization	false

Example: Here (1.) tables that were never compressed with more than 10 million raw records and more than 1 GB of estimated size or (2.) tables with columns only default compressed with more than 10 million rows and size more than 500 MB or (3.) tables with UDIV quota larger than 150% and more than 10 million UDIVs, will be compression re-optimized:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -cc 10000000 -ce 1
 -cr 10000000 -cs 500 -cd 5 -cq 150 -cu 10000000 -cp true -cm true
      (Reclaim of row store containers was not done since -rc was negative
2 column store tables were compression re-optimized
```

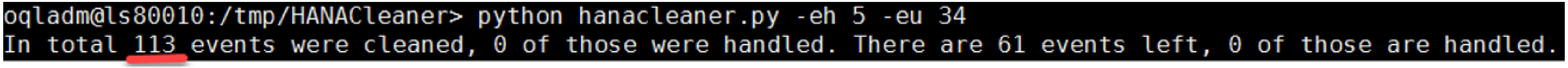
House Keeping

HANACleaner – events (handled/unhandled)

Events can be acknowledged and handled (in case of unhandled events) with the following input flags

Flag	Unit	Details	Explanation	Default
-eh	day	minimum retained days for handled events	handled events that are older that this number of days will be acknowledged and then deleted	-1 (not used)
-eu	day	minimum retained days for unhandled events	unhandled events that are older that this number of days will be handled, acknowledged and then deleted	-1 (not used)

Example:
Here handled events older than 5 days and unhandled events older than 34 days were deleted.
It turned out the 113 unhandled events were deleted:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -eh 5 -eu 34
In total 113 events were cleaned, 0 of those were handled. There are 61 events left, 0 of those are handled.
```

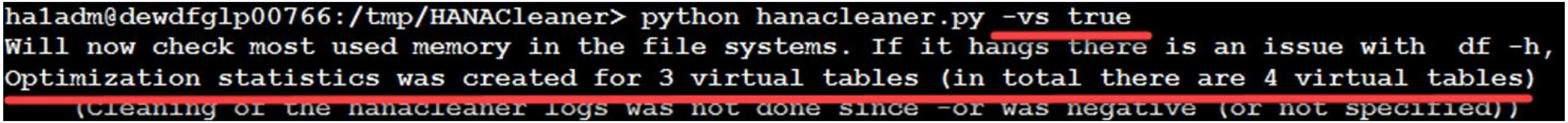
House Keeping

HANACleaner – Virtual Tables‘ Statistics

Smart Data Access Virtual Tables can get their statistics created, according to SAP Note 1872652, with the -vs flag

Flag	Unit	Details	Explanation	Default
-vs	true / false	create statistics for virtual tables	Switch to create optimization statistics for those virtual tables that are missing statistics (Note: could cause expensive operations!)	false

Example:
Here statistics optimization was created for 3 out of 4 virtual tables (the 4th already had statistics):



```
ha1adm@dewdfglp00766:/tmp/HANACleaner> python hanacleaner.py -vs true
Will now check most used memory in the file systems. If it hangs there is an issue with  df -h,
Optimization statistics was created for 3 virtual tables (in total there are 4 virtual tables)
    (Cleaning of the hanacleaner logs was not done since -or was negative (or not specified))
```

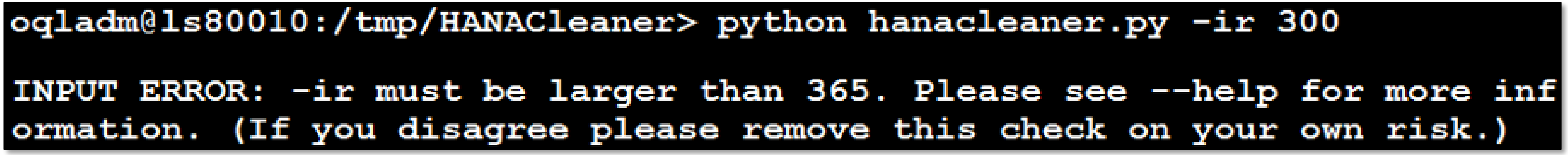
House Keeping

HANACleaner – INI File History (≥H2SPS03) (1/2)

To remove old inifile content history hanacleaner has the following input flag

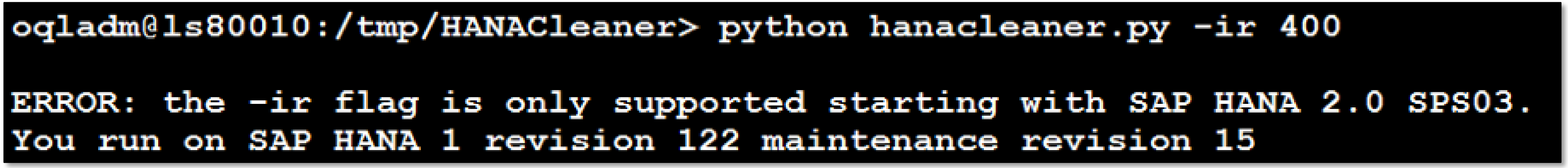
Flag	Unit	Details	Explanation	Default
-ir	days	inifile content history retention	deletes older inifile content history (should be more than 1 year)	-1 (not used)

Example:



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -ir 300

INPUT ERROR: -ir must be larger than 365. Please see --help for more inf
ormation. (If you disagree please remove this check on your own risk.)
```

Example:



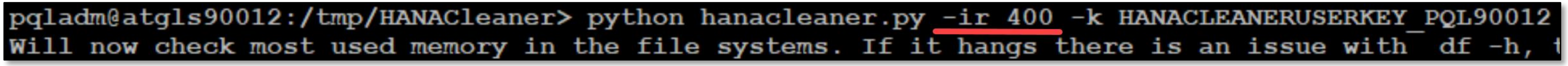
```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -ir 400

ERROR: the -ir flag is only supported starting with SAP HANA 2.0 SPS03.
You run on SAP HANA 1 revision 122 maintenance revision 15
```

HANACleaner – INI File History (≥H2SPS03) (2/2)

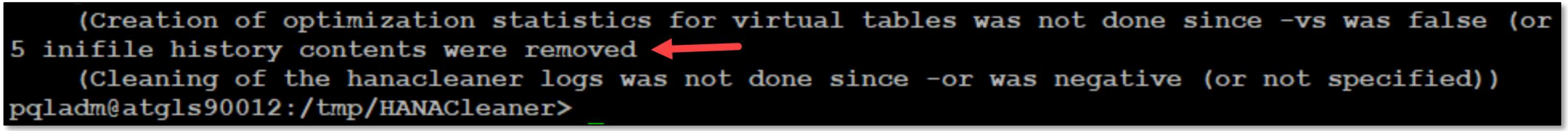
To remove old inifile content history hanacleaner has the following input flag

Flag	Unit	Details	Explanation	Default
-ir	days	inifile content history retention	deletes older inifile content history (should be more than 1 year)	-1 (not used)

Example:



```
pqladm@atgls90012:/tmp/HANACleaner> python hanacleaner.py -ir 400 -k HANACLEANERUSERKEY_PQL90012
Will now check most used memory in the file systems. If it hangs there is an issue with  df -h, t
```



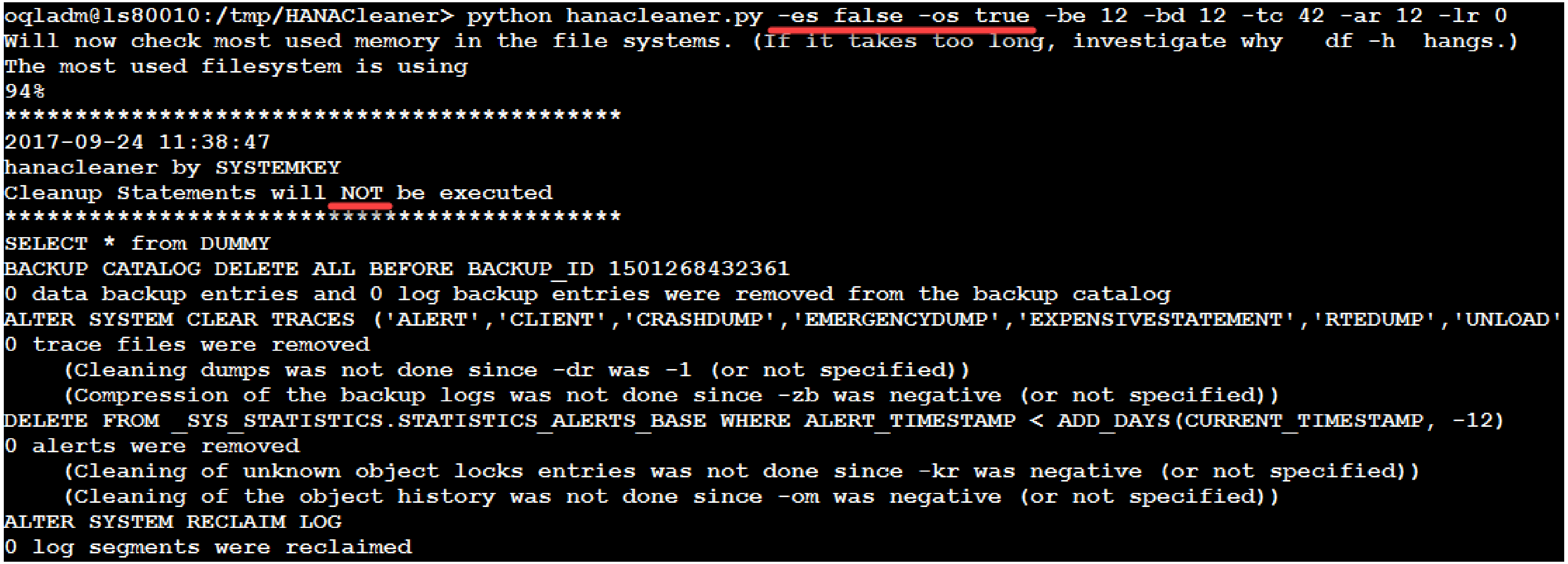
```
    (Creation of optimization statistics for virtual tables was not done since -vs was false (or
5 inifile history contents were removed
    (Cleaning of the hanacleaner logs was not done since -or was negative (or not specified))
pqladm@atgls90012:/tmp/HANACleaner>
```

House Keeping

HANACleaner – No Execute

HANACleaner questions are normally HANA questions! With these flags it is possible to let HANACleaner print out the crucial SQLs without actually executing them → useful for debugging

Flag	Unit	Details	Explanation	Default
-es	true/false	execute sql	Execute all crucial housekeeping tasks (useful to turn off for investigations with –os=true)	True
-os	true/false	output sql	Prints all crucial housekeeping tasks (useful for debugging with –es=false)	False



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -es false -os true -be 12 -bd 12 -tc 42 -ar 12 -lr 0
Will now check most used memory in the file systems. (If it takes too long, investigate why   df -h  hangs.)
The most used filesystem is using
94%
*******************************************
2017-09-24 11:38:47
hanacleaner by SYSTEMKEY
Cleanup Statements will NOT be executed
*******************************************
SELECT * from DUMMY
BACKUP CATALOG DELETE ALL BEFORE BACKUP_ID 1501268432361
0 data backup entries and 0 log backup entries were removed from the backup catalog
ALTER SYSTEM CLEAR TRACES ('ALERT','CLIENT','CRASHDUMP','EMERGENCYDUMP','EXPENSIVESTATEMENT','RTEDUMP','UNLOAD'
0 trace files were removed
    (Cleaning dumps was not done since -dr was -1 (or not specified))
    (Compression of the backup logs was not done since -zb was negative (or not specified))
DELETE FROM _SYS_STATISTICS.STATISTICS_ALERTS_BASE WHERE ALERT_TIMESTAMP < ADD_DAYS(CURRENT_TIMESTAMP, -12)
0 alerts were removed
    (Cleaning of unknown object locks entries was not done since -kr was negative (or not specified))
    (Cleaning of the object history was not done since -om was negative (or not specified))
ALTER SYSTEM RECLAIM LOG
0 log segments were reclaimed
```

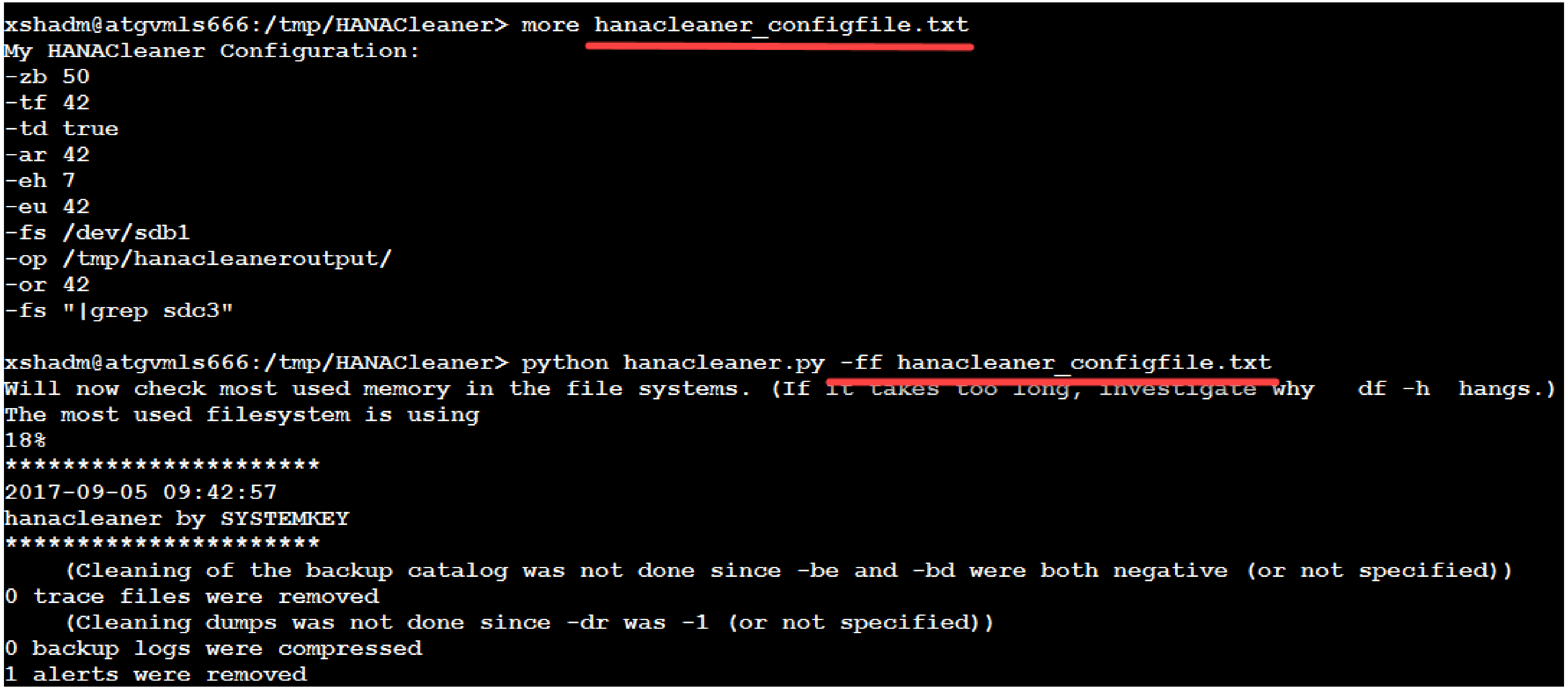
House Keeping

HANACleaner – Configuration File

HANACleaner can be controlled with a configuration file (additional flags will overwrite the config file)

Flag	Unit	Details	Explanation	Default
-ff		flag file	full path to the configuration file	

Example:



```
xshadm@atgvmls666:/tmp/HANACleaner> more hanacleaner_configfile.txt
My HANACleaner Configuration:
-zb 50
-tf 42
-td true
-ar 42
-eh 7
-eu 42
-fs /dev/sdb1
-op /tmp/hanacleaneroutput/
-or 42
-fs "|grep sdc3"

xshadm@atgvmls666:/tmp/HANACleaner> python hanacleaner.py -ff hanacleaner_configfile.txt
Will now check most used memory in the file systems. (If it takes too long, investigate why   df -h  hangs.)
The most used filesystem is using
18%
**********************
2017-09-05 09:42:57
hanacleaner by SYSTEMKEY
**********************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative (or not specified))
0 trace files were removed
    (Cleaning dumps was not done since -dr was -1 (or not specified))
0 backup logs were compressed
1 alerts were removed
```

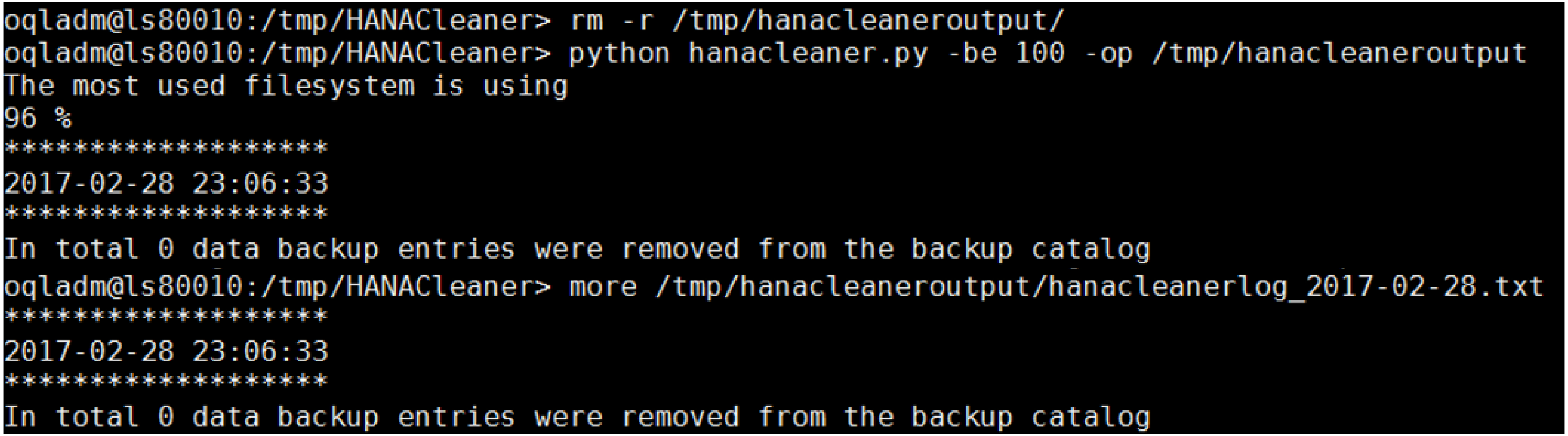
House Keeping

HANACleaner – output

To control the output of the hanacleaner there are these flags

Flag	Unit	Details	Explanation	Default
-op		output path	full path of the folder where the hanacleaner logs are written	(not used)
-so		standard out switch	1: write to std out, 0: do not write to std out	1

Example:
Here a output folder is deleted and then automatically created again by hanacleaner and the daily log file written into it:



```
oqladm@ls80010:/tmp/HANACleaner> rm -r /tmp/hanacleaneroutput/
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -be 100 -op /tmp/hanacleaneroutput
The most used filesystem is using
96 %
*******************
2017-02-28 23:06:33
*******************
In total 0 data backup entries were removed from the backup catalog
oqladm@ls80010:/tmp/HANACleaner> more /tmp/hanacleaneroutput/hanacleanerlog_2017-02-28.txt
*******************
2017-02-28 23:06:33
*******************
In total 0 data backup entries were removed from the backup catalog
```

House Keeping

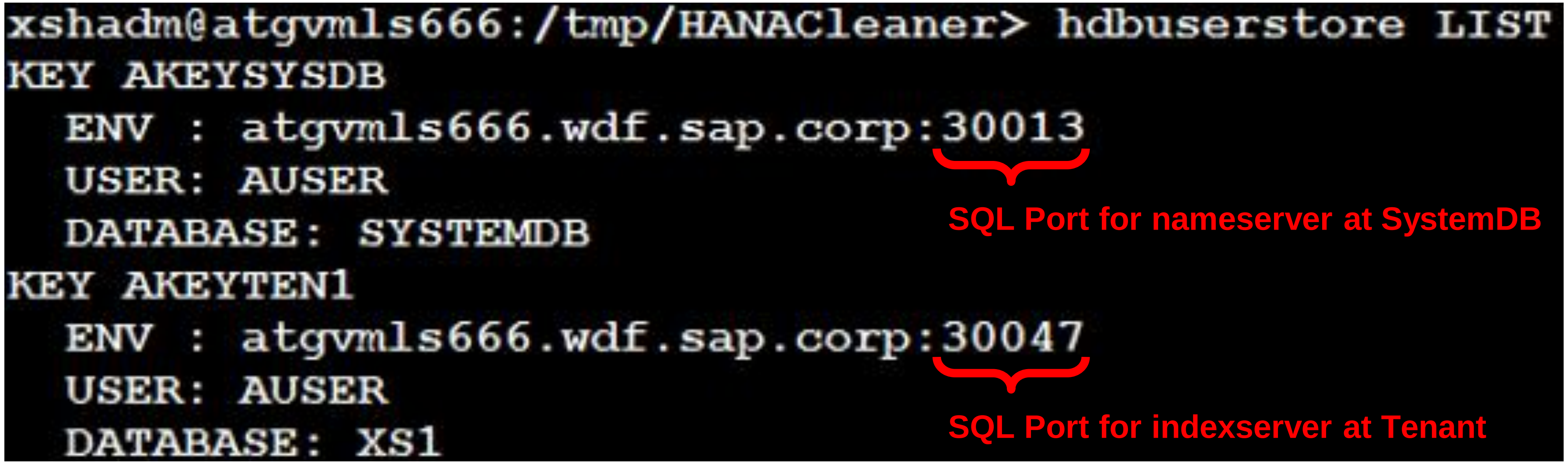
HANACleaner – MDC (1/4)

In a MDC system the hanacleaner can clean the SystemDB and multiple Tenants in one execution

List the DB users for the system and the tenants in hdbuserstore and list them with the –k flag

Flag	Unit	Details	Explanation	Default
-k		DB user key(s)	This is the DB user key saved in the hdbuserstore, it could also be a list of comma separated userkeys (useful in MDC environments)	SYSTEMKEY

Example:
Here two keys are stored; one for SystemDB and one for a Tenant:



```
xshadm@atgvmls666:/tmp/HANACleaner> hdbuserstore LIST
KEY AKEYSYSDB
  ENV : atgvmls666.wdf.sap.corp:30013
  USER: AUSER
  DATABASE: SYSTEMDB
KEY AKEYTEN1
  ENV : atgvmls666.wdf.sap.corp:30047
  USER: AUSER
  DATABASE: XS1
```

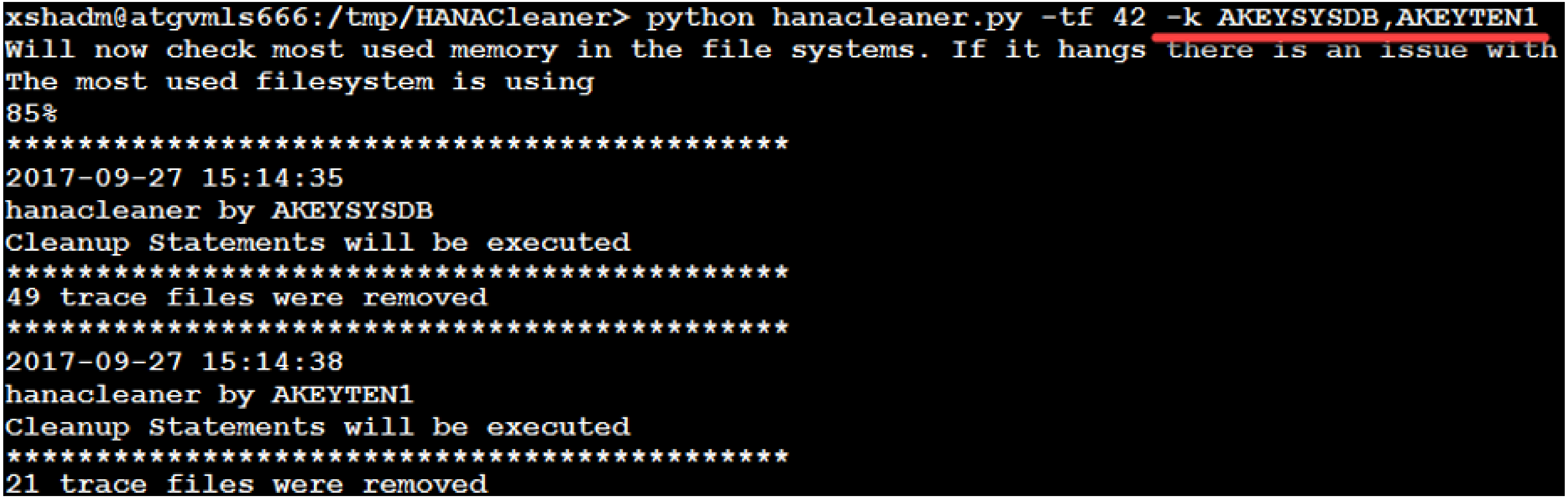
SQL Port for nameserver at SystemDB

SQL Port for indexserver at Tenant

House Keeping

HANACleaner – MDC (2/4)

Example:
Here trace files older than 42 days are deleted from the SystemDB and from a Tenant:



```
xshadm@atgvmls666:/tmp/HANACleaner> python hanacleaner.py -tf 42 -k AKEYSYSDB,AKEYTEN1
Will now check most used memory in the file systems. If it hangs there is an issue with
The most used filesystem is using
85%
********************************************
2017-09-27 15:14:35
hanacleaner by AKEYSYSDB
Cleanup Statements will be executed
********************************************
49 trace files were removed
********************************************
2017-09-27 15:14:38
hanacleaner by AKEYTEN1
Cleanup Statements will be executed
********************************************
21 trace files were removed
```

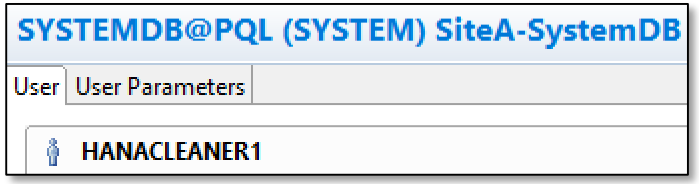
House Keeping

HANACleaner – MDC (3/4)

In a MDC system the hanacleaner can clean the SystemDB and multiple Tenants with one key

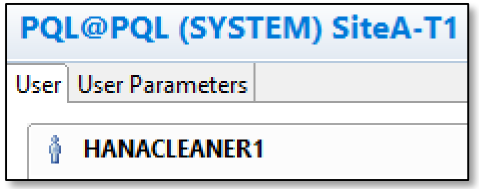
Maintain a user with same user name and same password in multiple DBs in one HANA System

Example:
Here the user HANACLEANER1 with same password was created in both SystemDB and in a Tenant



SYSTEMDB@PQL (SYSTEM) SiteA-SystemDB

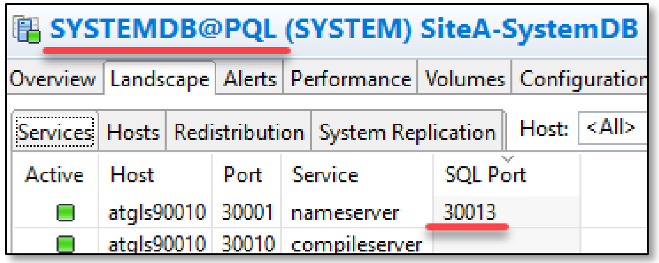
HANACLEANER1



PQL@PQL (SYSTEM) SiteA-T1

HANACLEANER1

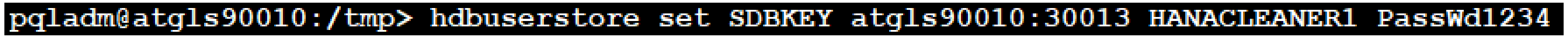
(for privileges,
see earlier slides)



SYSTEMDB@PQL (SYSTEM) SiteA-SystemDB

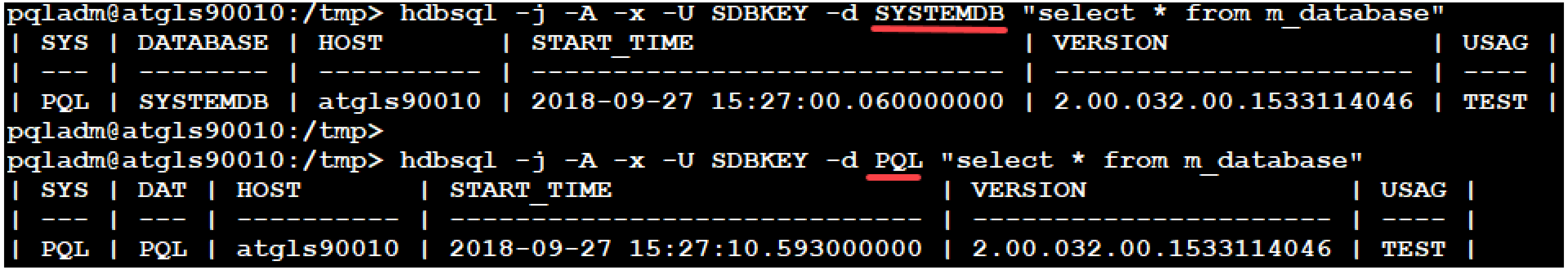
Active	Host	Port	Service	SQL Port
🟩	atgls90010	30001	nameserver	30013
🟩	atgls90010	30010	compileserver	

Then only one key, for the SystemDB, was provided in hdbuserstore



```
pqladm@atgls90010:/tmp> hdbuserstore set SDBKEY atgls90010:30013 HANACLEANER1 PassWd1234
```

Test that this single key can be used to access both databases:



```
pqladm@atgls90010:/tmp> hdbsql -j -A -x -U SDBKEY -d SYSTEMDB "select * from m_database"
| SYS | DATABASE | HOST       | START_TIME                    | VERSION                | USAG |
| --- | -------- | ---------- | ----------------------------- | ---------------------- | ---- |
| PQL | SYSTEMDB | atgls90010 | 2018-09-27 15:27:00.060000000 | 2.00.032.00.1533114046 | TEST |
pqladm@atgls90010:/tmp>
pqladm@atgls90010:/tmp> hdbsql -j -A -x -U SDBKEY -d PQL "select * from m_database"
| SYS | DAT | HOST       | START_TIME                    | VERSION                | USAG |
| --- | --- | ---------- | ----------------------------- | ---------------------- | ---- |
| PQL | PQL | atgls90010 | 2018-09-27 15:27:10.593000000 | 2.00.032.00.1533114046 | TEST |
```

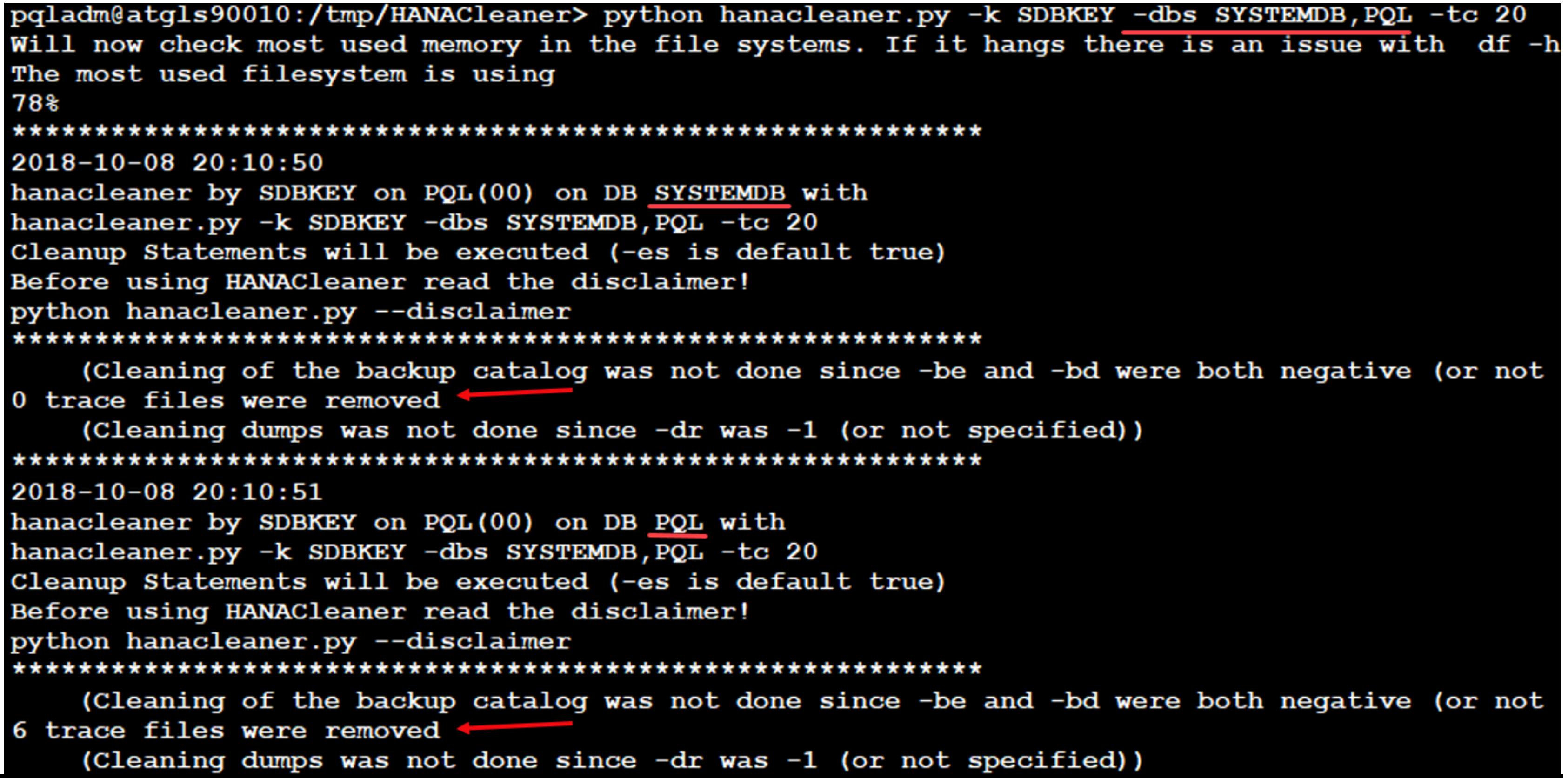
House Keeping

HANACleaner – MDC (4/4)

In a MDC system the hanacleaner can clean the SystemDB and multiple Tenants with one key

Flag	Unit	Details	Explanation	Default
-dbs		DB key(s)	this can be a list of databases accessed from the system defined by -k (-k can only be one key if -dbs is used)	"

Example:
Here the key SDBKEY is used to access the system, then it is specified with -dbs that two databases, SYSTEMDB and PQL, will be cleaned up on their old trace files



```
pqladm@atgls90010:/tmp/HANACleaner> python hanacleaner.py -k SDBKEY -dbs SYSTEMDB,PQL -tc 20
Will now check most used memory in the file systems. If it hangs there is an issue with  df -h
The most used filesystem is using
78%
***********************************************************
2018-10-08 20:10:50
hanacleaner by SDBKEY on PQL(00) on DB SYSTEMDB with
hanacleaner.py -k SDBKEY -dbs SYSTEMDB,PQL -tc 20
Cleanup Statements will be executed (-es is default true)
Before using HANACleaner read the disclaimer!
python hanacleaner.py --disclaimer
***********************************************************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative (or not
0 trace files were removed
    (Cleaning dumps was not done since -dr was -1 (or not specified))
***********************************************************
2018-10-08 20:10:51
hanacleaner by SDBKEY on PQL(00) on DB PQL with
hanacleaner.py -k SDBKEY -dbs SYSTEMDB,PQL -tc 20
Cleanup Statements will be executed (-es is default true)
Before using HANACleaner read the disclaimer!
python hanacleaner.py --disclaimer
***********************************************************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative (or not
6 trace files were removed
    (Cleaning dumps was not done since -dr was -1 (or not specified))
```

House Keeping

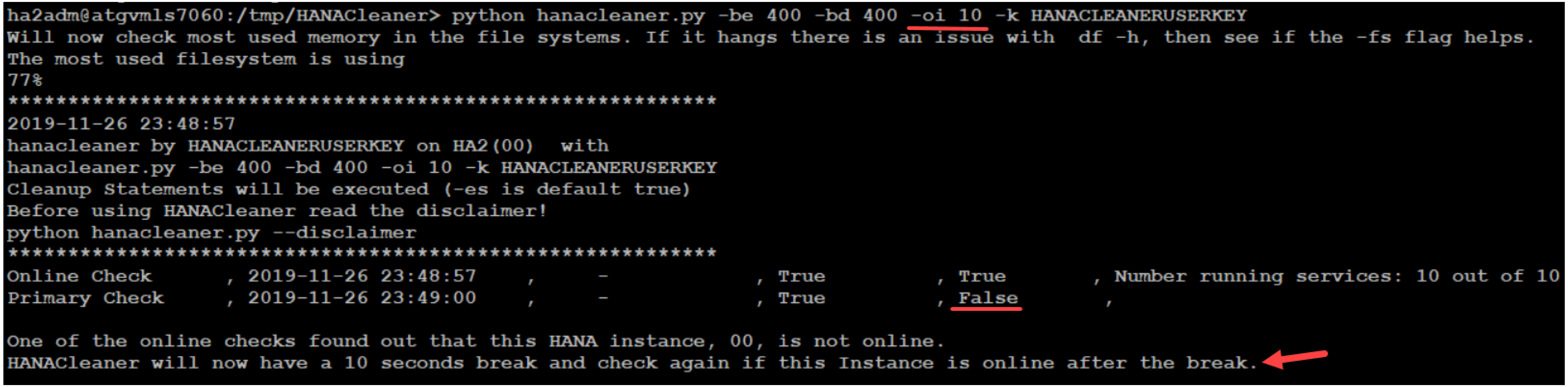
HANACleaner – HANA System Replication, HSR (1/2)

On a Secondary in a HSR setup one can use -oi to let HANACleaner wait for a takeover

Flag	Unit	Details	Explanation	Default
-oi	seconds	Online Check Interval (s)	< 0: HANACleaner does not check if online or secondary = 0: if not online or not primary HANACleaner will abort > 0: time it waits before it checks if DB is online and primary again Note: For > 0, you might have to use cron with a lock (see the HANASitter pdf, "HANASitter & CRON" slide)	-1 (not used)

Example:

Here the HANACleaner is started on a system that is a Secondary in a HSR setup, with online check interval 10 seconds:



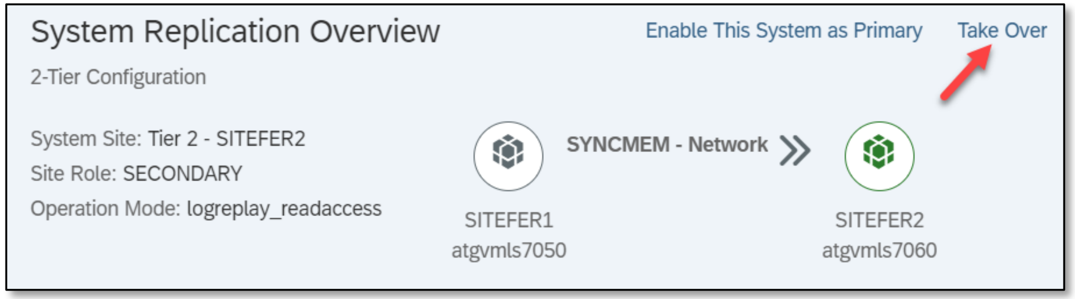
```
ha2adm@atgvmls7060:/tmp/HANACleaner> python hanacleaner.py -be 400 -bd 400 -oi 10 -k HANACLEANERUSERKEY
Will now check most used memory in the file systems. If it hangs there is an issue with  df -h, then see if the -fs flag helps.
The most used filesystem is using
77%
***********************************************************
2019-11-26 23:48:57
hanacleaner by HANACLEANERUSERKEY on HA2(00)  with
hanacleaner.py -be 400 -bd 400 -oi 10 -k HANACLEANERUSERKEY
Cleanup Statements will be executed (-es is default true)
Before using HANACleaner read the disclaimer!
python hanacleaner.py --disclaimer
***********************************************************
Online Check      , 2019-11-26 23:48:57    ,     -            , True          , True        , Number running services: 10 out of 10
Primary Check     , 2019-11-26 23:49:00    ,     -            , True          , False       ,

One of the online checks found out that this HANA instance, 00, is not online.
HANACleaner will now have a 10 seconds break and check again if this Instance is online after the break.
```

(example continues on next slide)

House Keeping

HANACleaner – HANA System Replication, HSR (2/2)

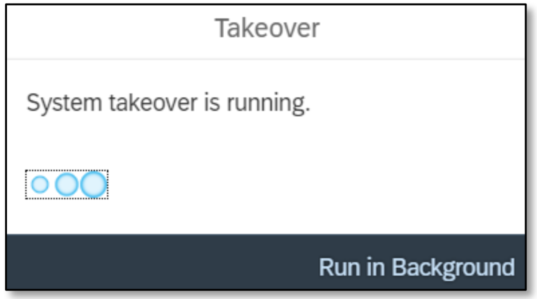
Example (continued from previous slide):
A take over is performed:



System Replication Overview

2-Tier Configuration

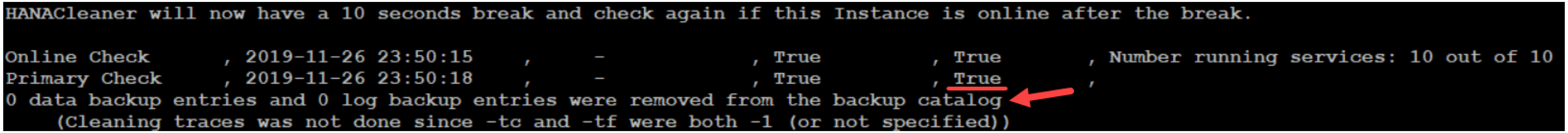
System Site: Tier 2 - SITEFER2
Site Role: SECONDARY
Operation Mode: logreplay_readaccess



Takeover

System takeover is running.

Then the HANACleaner that runs on the previous Secondary can now start with the cleanup tasks:

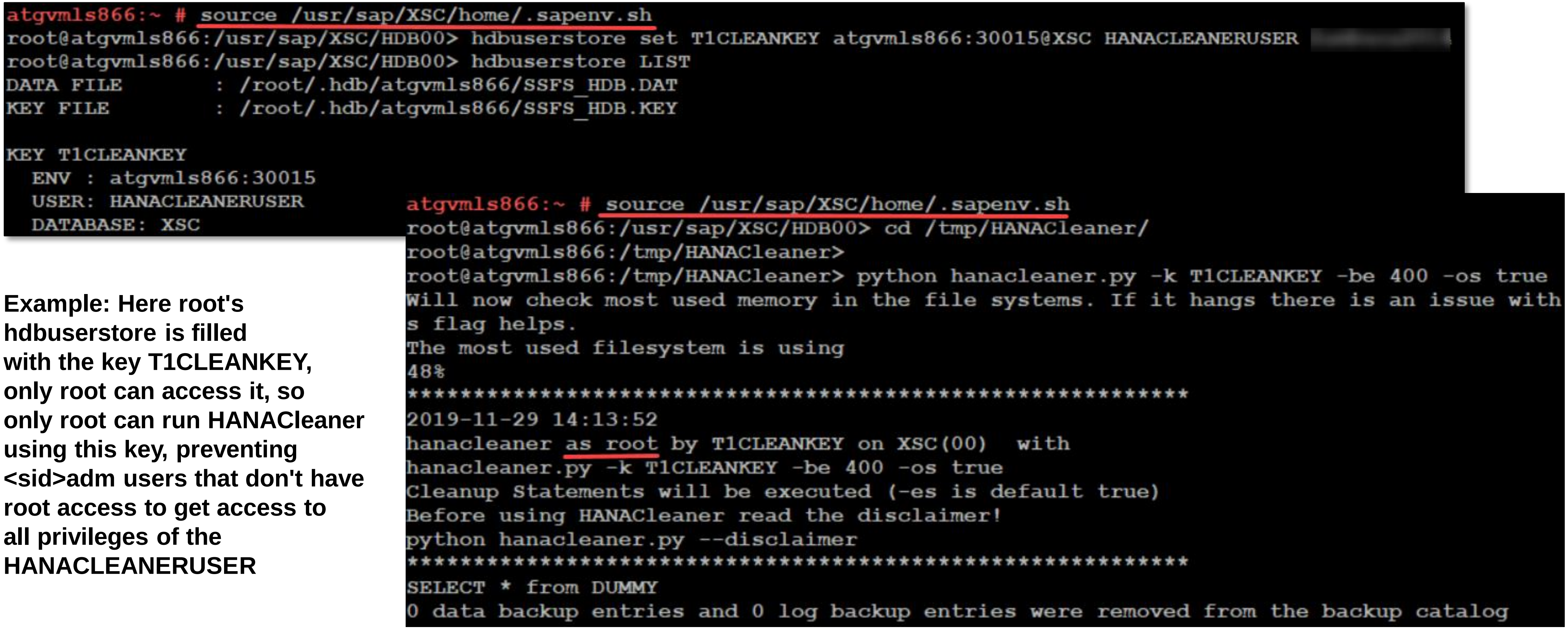


```
HANACleaner will now have a 10 seconds break and check again if this Instance is online after the break.

Online Check       , 2019-11-26 23:50:15    ,     -              , True          , True          , Number running services: 10 out of 10
Primary Check      , 2019-11-26 23:50:18    ,     -              , True          , True          ,
0 data backup entries and 0 log backup entries were removed from the backup catalog
    (Cleaning traces was not done since -tc and -tf were both -1 (or not specified))
```

House Keeping

HANACleaner – Run as ROOT

To restrict the access to the HANACLEANER user it is possible to run HANACleaner as root, i.e. using the hdbuserstore of root, for that one must set the key also in root's hdbuserstore



```
atgvmls866:~ # source /usr/sap/XSC/home/.sapenv.sh
root@atgvmls866:/usr/sap/XSC/HDB00> hdbuserstore set T1CLEANKEY atgvmls866:30015@XSC HANACLEANERUSER [redacted]
root@atgvmls866:/usr/sap/XSC/HDB00> hdbuserstore LIST
DATA FILE       : /root/.hdb/atgvmls866/SSFS_HDB.DAT
KEY FILE        : /root/.hdb/atgvmls866/SSFS_HDB.KEY

KEY T1CLEANKEY
  ENV : atgvmls866:30015
  USER: HANACLEANERUSER
  DATABASE: XSC
```

```
atgvmls866:~ # source /usr/sap/XSC/home/.sapenv.sh
root@atgvmls866:/usr/sap/XSC/HDB00> cd /tmp/HANACleaner/
root@atgvmls866:/tmp/HANACleaner>
root@atgvmls866:/tmp/HANACleaner> python hanacleaner.py -k T1CLEANKEY -be 400 -os true
Will now check most used memory in the file systems. If it hangs there is an issue with
s flag helps.
The most used filesystem is using
48%
************************************************************
2019-11-29 14:13:52
hanacleaner as root by T1CLEANKEY on XSC(00)  with
hanacleaner.py -k T1CLEANKEY -be 400 -os true
Cleanup Statements will be executed (-es is default true)
Before using HANACleaner read the disclaimer!
python hanacleaner.py --disclaimer
************************************************************
SELECT * from DUMMY
0 data backup entries and 0 log backup entries were removed from the backup catalog
```

Example: Here root's hdbuserstore is filled with the key T1CLEANKEY, only root can access it, so only root can run HANACleaner using this key, preventing <sid>adm users that don't have root access to get access to all privileges of the HANACLEANERUSER

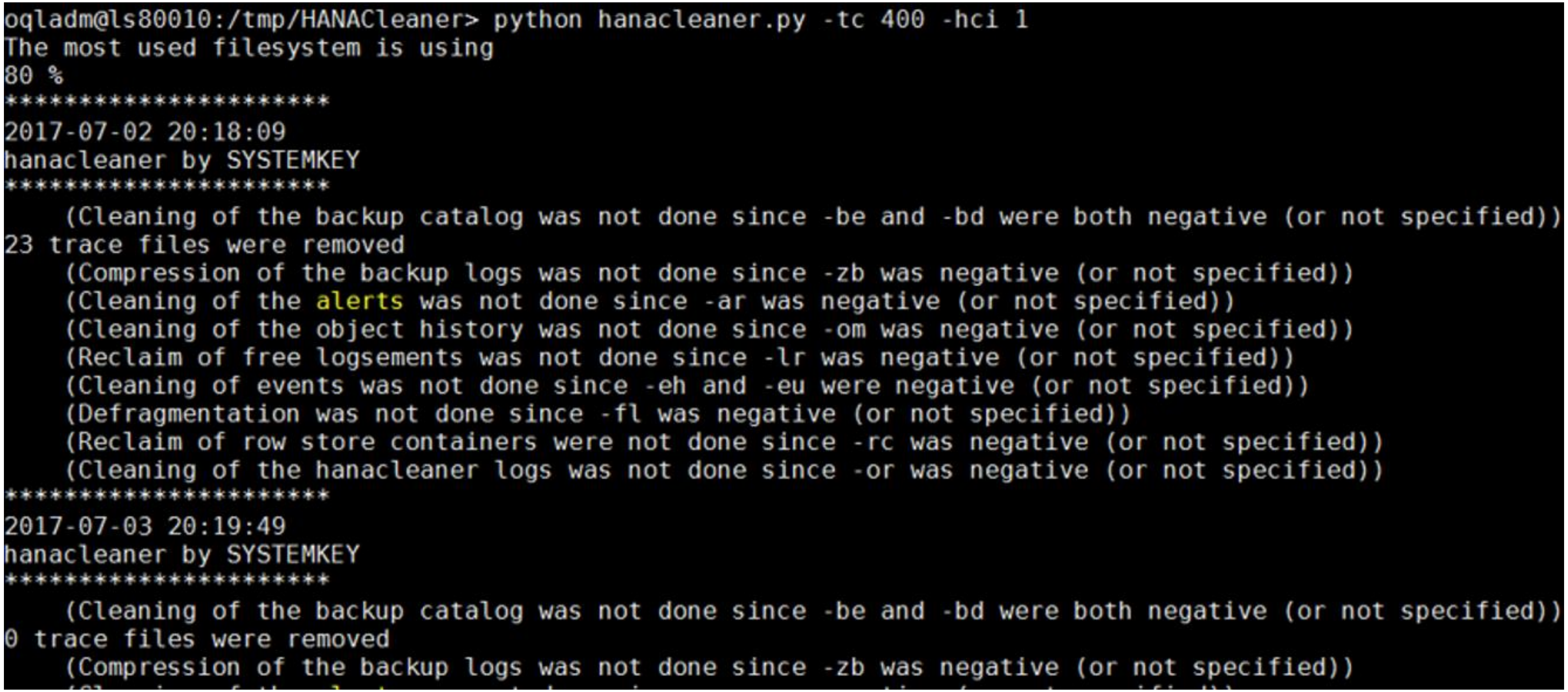
House Keeping

HANACleaner – Interval

Run hanacleaner “forever” with the –hci flag

Flag	Unit	Details	Explanation	Default
-hci	Days	hanacleaner interval	After these number days hanacleaner will restart	-1 (exits)

Example:
(tries to clean trace files older than 400 days again after 1 day):



```
oqladm@ls80010:/tmp/HANACleaner> python hanacleaner.py -tc 400 -hci 1
The most used filesystem is using
80 %
**********************
2017-07-02 20:18:09
hanacleaner by SYSTEMKEY
**********************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative (or not specified))
23 trace files were removed
    (Compression of the backup logs was not done since -zb was negative (or not specified))
    (Cleaning of the alerts was not done since -ar was negative (or not specified))
    (Cleaning of the object history was not done since -om was negative (or not specified))
    (Reclaim of free logsements was not done since -lr was negative (or not specified))
    (Cleaning of events was not done since -eh and -eu were negative (or not specified))
    (Defragmentation was not done since -fl was negative (or not specified))
    (Reclaim of row store containers were not done since -rc was negative (or not specified))
    (Cleaning of the hanacleaner logs was not done since -or was negative (or not specified))
**********************
2017-07-03 20:19:49
hanacleaner by SYSTEMKEY
**********************
    (Cleaning of the backup catalog was not done since -be and -bd were both negative (or not specified))
0 trace files were removed
    (Compression of the backup logs was not done since -zb was negative (or not specified))
```

House Keeping

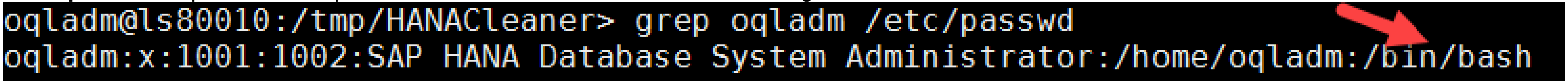
HANACleaner & CRON

Do not use together with -hci flag!

HANACleaner can be scheduled with CRON to do cleanup e.g once per day

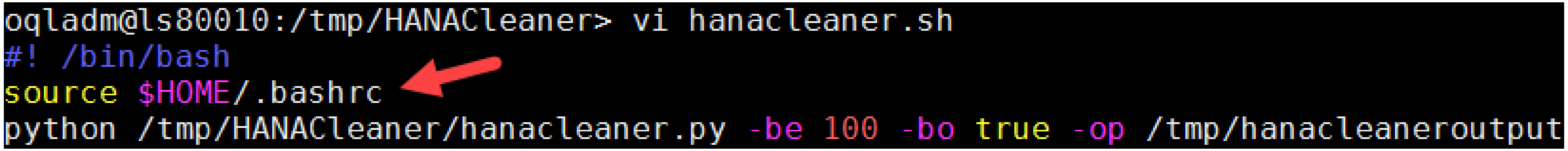
Note: hanacleaner expects the environment of <sid>adm → same environment as <sid>adm has to be provided to use CRON

Example: In /etc/passwd it is specified what environment <sid>adm is using, here bash:



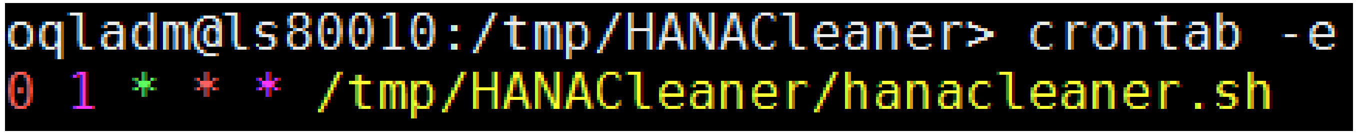
```
oqladm@ls80010:/tmp/HANACleaner> grep oqladm /etc/passwd
oqladm:x:1001:1002:SAP HANA Database System Administrator:/home/oqladm:/bin/bash
```

This shell script, hanacleaner.sh, provides the <sid>adm environment, with `source $HOME/.bashrc` and then executes the hanacleaner command:



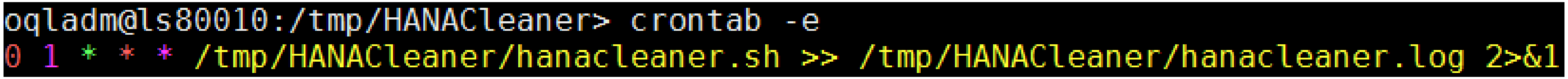
```
oqladm@ls80010:/tmp/HANACleaner> vi hanacleaner.sh
#! /bin/bash
source $HOME/.bashrc
python /tmp/HANACleaner/hanacleaner.py -be 100 -bo true -op /tmp/hanacleaneroutput
```

Then a new crontab can be created, calling this shell script, e.g. once every night at 1 o'clock:



```
oqladm@ls80010:/tmp/HANACleaner> crontab -e
0 1 * * * /tmp/HANACleaner/hanacleaner.sh
```

Note: if you want to log the output to std_out set up the crontab like this:



```
oqladm@ls80010:/tmp/HANACleaner> crontab -e
0 1 * * * /tmp/HANACleaner/hanacleaner.sh >> /tmp/HANACleaner/hanacleaner.log 2>&1
```