

# SAP HANA 2.0 System Administration Workshop

## House Keeping

SAP Digital Business Services  
June 2018



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# House Keeping

## Agenda

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- **House Keeping**
  - Overview
  - Freeing-up Unused Space
  - Deleting Obsolete Information
  - Configuration of Automated Housekeeping
  - HANACleaner – a Housekeeping Tool

# House Keeping

## Agenda

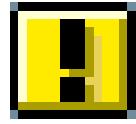
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### ➤ House Keeping

- Overview
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- HANACleaner – a Housekeeping Tool

## Categorization of Tasks

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### **Regular Activity**

Task that should be performed at regular intervals, either manually or by scheduling an appropriate clean-up procedure



### **On Demand**

Usually a reaction to alerts or other (regular) database checks

# Housekeeping Tasks

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## Freeing-up Unused Space

- Row Store Fragmentation
- Data File Fragmentation
- Empty Log Volumes

## Deleting Obsolete Information

- Diagnosis Files
- Backup Files
- Basis Tables
- Auditing Information

## Configuration of Automated Housekeeping

- Tracefiles
- Monitoring Views
- Statisticsserver Tables

## HANACleaner – a Housekeeping Tool

# House Keeping

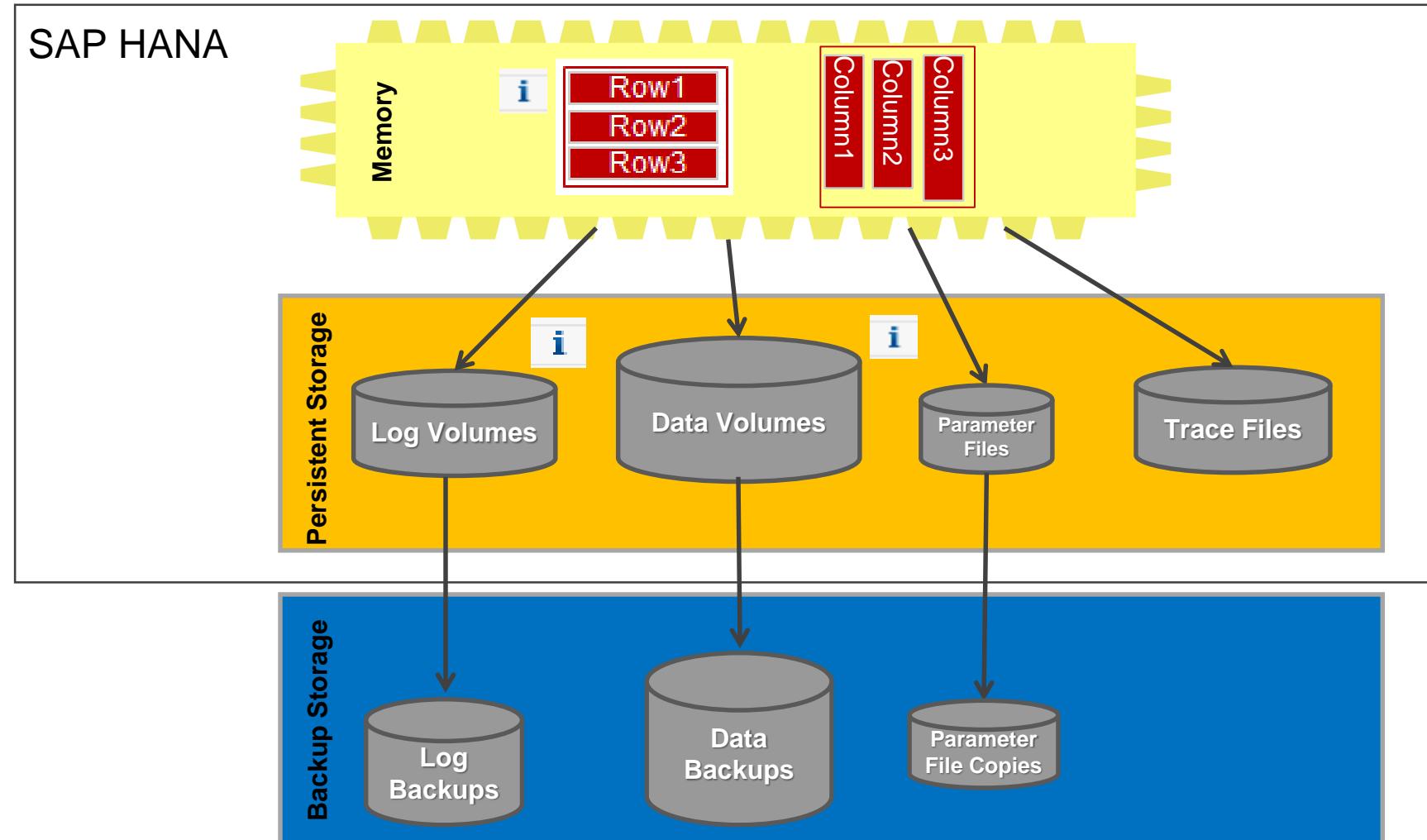
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# Freeing-Up Unused Space



# House Keeping Agenda

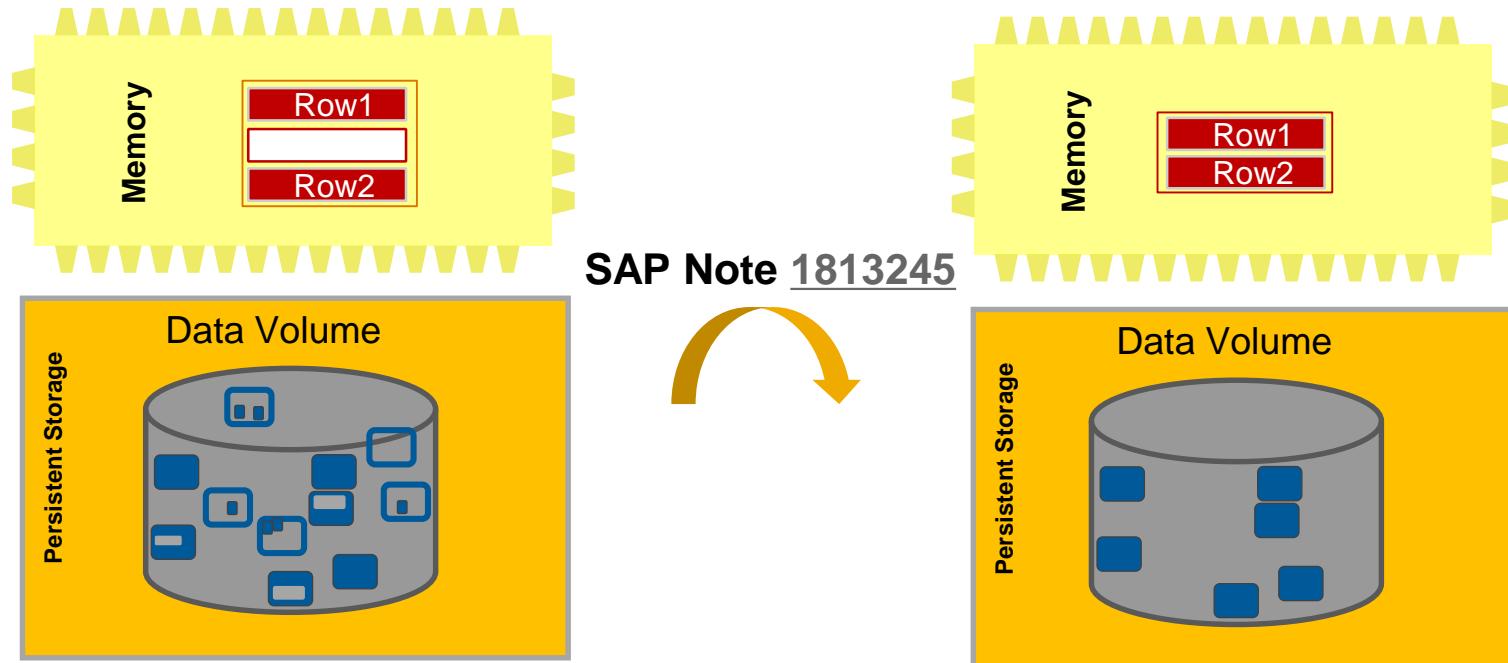
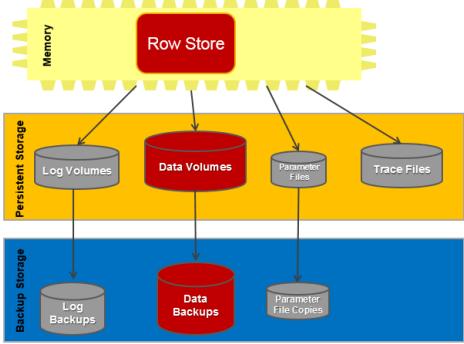
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## ➤ House Keeping

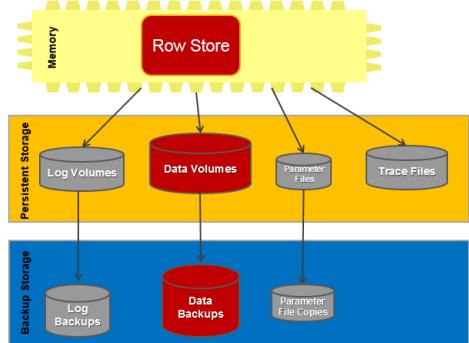
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# Row Store Defragmentation

- The row store can fragment (especially after lots of deletes)
  - "fragmentation" = used size compared to allocated size
  - this space overhead affects memory, persistent storage and backup size
- Solution: reorganize the row store to eliminate space overhead ([SAP Note 1813245](#))
- Offline (recommended) and online row store reorganization is available



# Row Store Defragmentation



## How to detect:

- Statistics server Alert 71: Row store fragmentation

Check Information		
ID	Check	Description
71	Row store fragmentation	Check for fragmentation of row store.

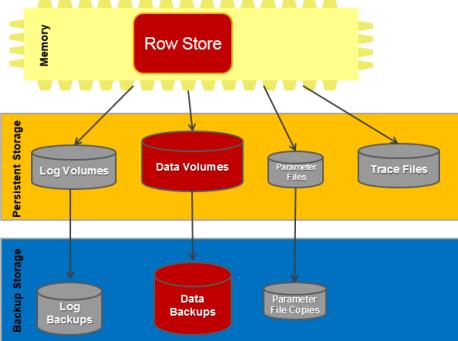
- with SQL: "*HANA\_Configuration\_MiniChecks*" (SAP Note [1969700](#))

- <i>HANA_Configuration_MiniChecks_Rev102.01+</i>						
CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE	
535	Row store (> 10 GB) fragmentation (%)	12	<= 30		1813245	

- with SQL: "*HANA\_RowStore\_Overview*" (SAP Note [1969700](#))

- <i>HANA_RowStore_Overview</i>											
HOST	PORT	SERVICE	TOTAL_GB	TABLE_GB	INDEX_GB	CATALOG_GB	FREE_GB	OTHER_GB	SHARED_GB	FRAG_SIZE_GB	FRAG_PCT
ls80010	30003	indexserver	53.57	36.02	15.92	0.71	0.00	0.90	36.74	3.31	9.00

# Row Store Defragmentation



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## Customer Examples for Offline Row Store Reorg

Information about the row store reorg is written to the indexserver trace file

### Example 1: Duration 1 hour / Reduction 120 GB

- : [RSReorg] RowStore memory reduced from 214272MB (3348 segments) to 90176MB (1409 segments) by moving 1048576 pages.
- : [RSReorg] finished in 3236.73 sec

### Example 2: Duration 5 minutes / Reduction 150 GB

- : [RSReorg] RowStore memory reduced from 230912MB (3608 segments) to 76416MB (1194 segments) by moving 398381 pages.
- : [RSReorg] finished in 293.59 sec

### Example 3: Duration 7 minutes / Reduction 235 GB

- : [RSReorg] RowStore memory reduced from 622080MB (9720 segments) to 387456MB (6054 segments) by moving 2097152 pages.
- : [RSReorg] finished in 412.47 sec

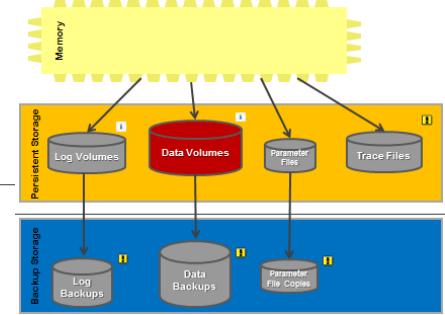
# House Keeping Agenda

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## ➤ House Keeping

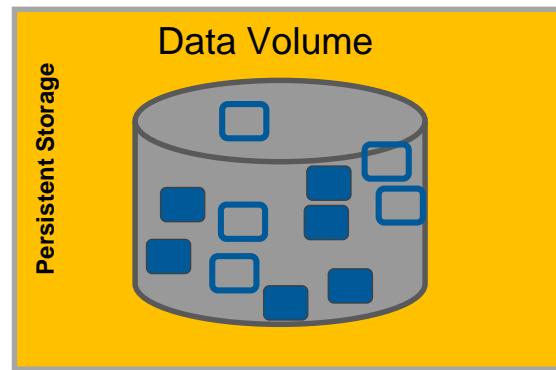
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# Data Volumes Defragmentation

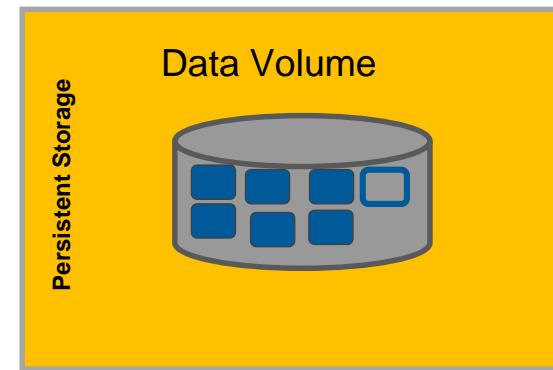


- Data volumes could become larger than the used space
  - this effects the file size on disk
  - backup size is not effected since it only saves the used pages
- Solution: defragment the data volume ([SAP Note 1870858](#)) with the statement

**`ALTER SYSTEM RECLAIM DATAVOLUME ['<host>:<port>'] 120 DEFragments`**



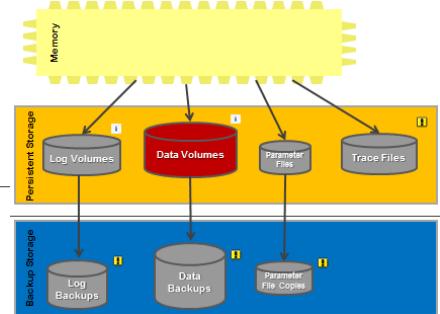
**SAP Note [1870858](#)**



Note: Reclaiming data volume cannot be done if a snapshot exist → If System Replication is used some parameters needs to be set temporarily → see SAP Note [1999880](#)

**19. How can RECLAIM DATAVOLUME be executed when system replication is active?**

# Data Volumes Defragmentation



- How to detect:**

- Monitoring View `M_VOLUME_FILES` with SAP HANA Studio:

Details for Data Storage						
Files	Volume I/O Total Statistics	Data Volume Superblock Statistics	Data Volume Page Statistics			
Name	Type	Total Size (MB)	Used Size (MB)	Used/Total Size (%)	Path	
datavolume_0000.dat	DATA	264.484	173.493	66	hana/data/OQL/mnt00001/hdb00002/	
datavolume_0000.dat	DATA	324	66	20	hana/data/OQL/mnt00001/hdb00005/	
datavolume_0000.dat	DATA	324	66	20	hana/data/OQL/mnt00001/hdb00004/	
datavolume_0000.dat	DATA	326	66	20	/hana/data/OQL/mnt00001/hdb00006/	

- with SQL: "`HANA_Configuration_MiniChecks`" (found in SAP Note 1969700)

<a href="#">HANA_Configuration_MiniChecks_Rev102.01+</a>						
CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE	
370	Unused space in data files (%)	34	<= 40		1870858	

- with SQL: "`HANA_Disks_Overview`" (found in SAP Note 1969700)

- HANA Disks Overview						
PORt	FILE_NAME	FILE_TYPE	TOTAL_SIZE_GB	USED_SIZE_GB	UNUSED_SIZE_GB	FRAGMENTATION_PCT
30003	/hana/data/OQL/mnt00001/hdb00002/datavolume_0000.dat	DATA	258.28	169.42	88.85	34.40
30004	/hana/data/OQL/mnt00001/hdb00005/datavolume_0000.dat	DATA	0.31	0.06	0.25	79.52
30007	/hana/data/OQL/mnt00001/hdb00004/datavolume_0000.dat	DATA	0.31	0.06	0.25	79.52
30011	/hana/data/OQL/mnt00001/hdb00006/datavolume_0000.dat	DATA	0.31	0.06	0.25	79.70

# House Keeping Agenda

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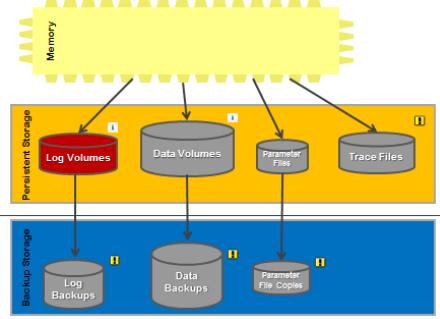
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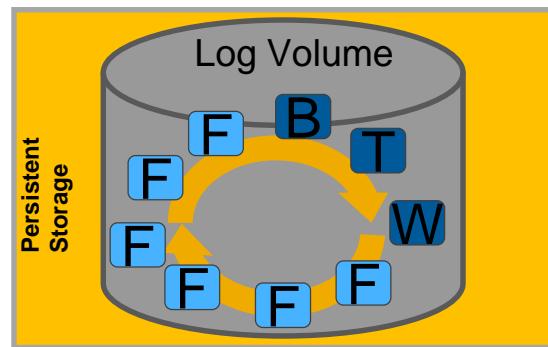
# House Keeping Log Volumes



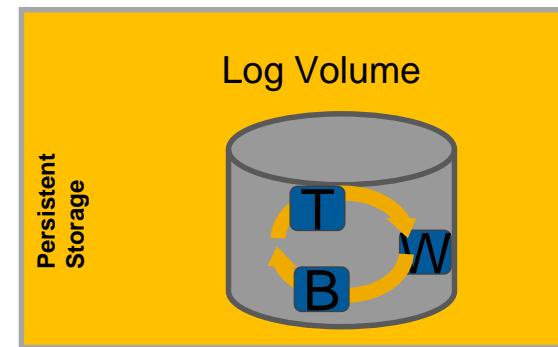
- Redo log information is stored in log segments, which are files in the file system
- Log segments are created automatically when needed
- Log segments are freed if they are not longer needed and have been backed up
- Free log segments can automatically be overwritten
- If an extensive number of log segments been created (e.g. due to temporary issues with log backups) they are not automatically deleted even after they are backed up
- Freed log segments can manually be deleted with (see SAP Note [2083715](#))



## ALTER SYSTEM RECLAIM LOG

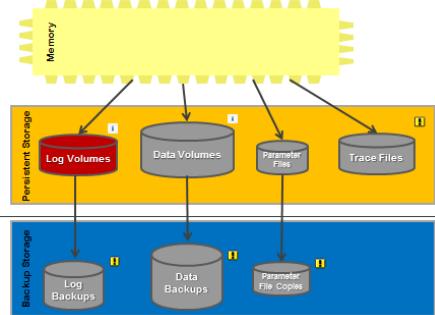


SAP Note [2083715](#)



F: Free, W: Writing, T: Truncated, B: Backed up

# House Keeping Log Volumes



## How to detect:

- Monitoring View M\_LOG\_SEGMENTS with SAP HANA Studio:

FILE_NAME	FILE_OFFSET	STATE	MIN_POSITION	MAX_POSITION
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000016.dat	0	Free	32.946.649.280	32.947.613.824
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000017.dat	0	Free	32.947.613.824	32.949.342.144
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000018.dat	0	Free	32.949.342.144	32.950.272.448
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000019.dat	0	Writi...	32.950.272.448	32.951.385.408
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000020.dat	0	Free	32.726.385.152	32.743.155.904
/hana/log/OQL/mnt00001/hdb00002/logsegment_000_00000021.dat	0	Free	32.743.155.904	32.759.925.568

- with SQL: "HANA\_Configuration\_MiniChecks" (found in SAP Note [1969700](#))

- HANA_Configuration_MiniChecks_Rev102.01+					
CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE
952	Log segments free for reuse	7	<= 250		

- with SQL: "HANA\_Logs\_LogSegments" (found in SAP Note [1969700](#))

- HANA_Logs_LogSegments						
HOST	PORT	SERVICE_NAME	STATE	BACKED_UP	USED_GB	TOTAL_GB
ls80010	30003	indexserver	Writing	FALSE	0.00	1.00
ls80010	30003	indexserver	Free	FALSE	0.01	1.00
ls80010	30003	indexserver	Free	FALSE	0.01	1.00
ls80010	30003	indexserver	Free	FALSE	0.01	1.00

# House Keeping

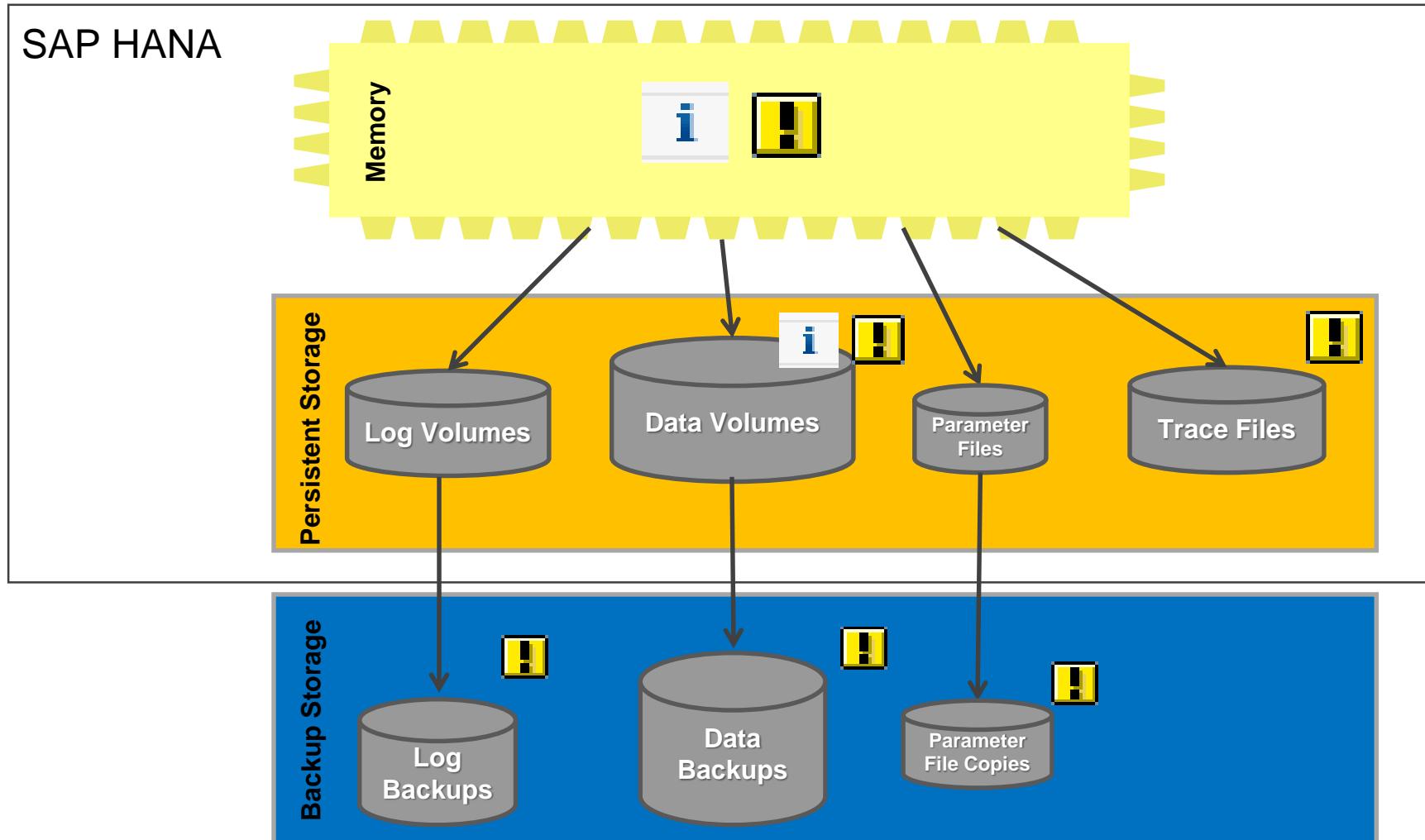
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# House Keeping Deleting Obsolete Information



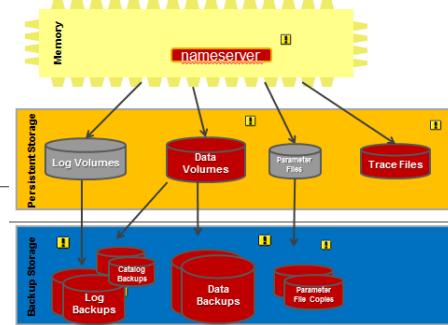
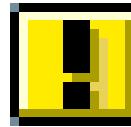
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# Housekeeping of Backup Information



## 1) Backup Files

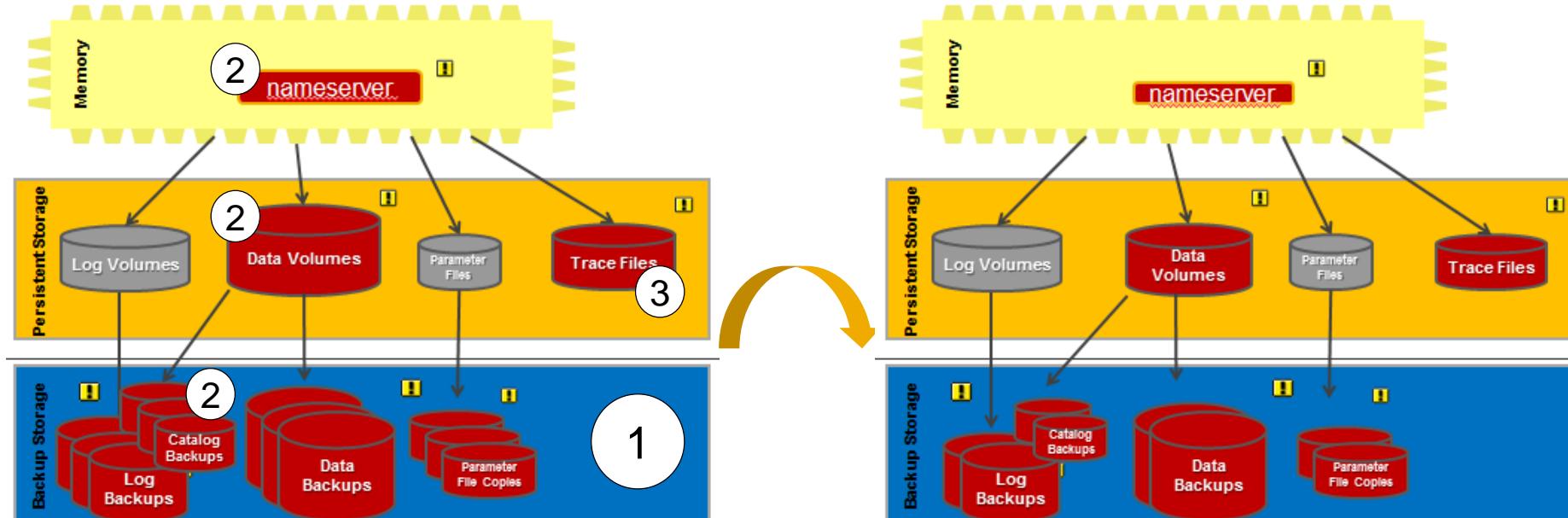
Delete according to backup retention times

## 2) Backup Catalog

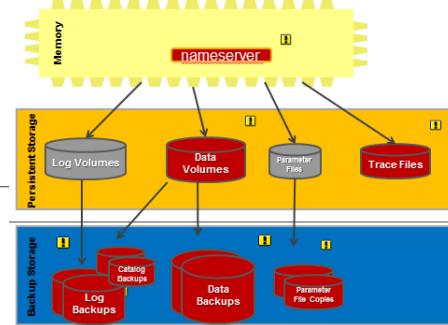
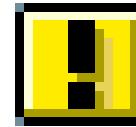
Delete old entries according to backup retention times

## 3) Trace files backup.log and backint.log

Delete old entries according to backup retention times



# Housekeeping of Backup Information



## Description:

### In-Memory:

For database operation the backup catalog is loaded into the main memory of the name server

### Persistent Storage:

Data Volume: The backup catalog is stored in the data volume of the name server

Trace Files: Backup.log & backint.log: files record information about backups

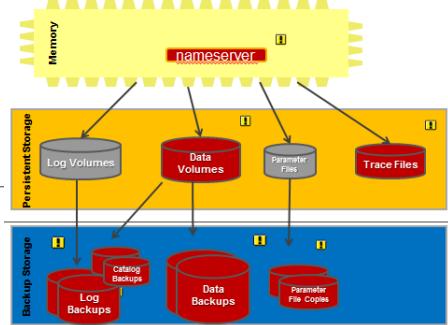
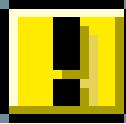
### Backup Storage

Data backup and log backup files and copies of the parameter files (ini-files)

The backup catalog for file-based backups is written as a separate backup to the location where the log backups are stored

## House Keeping

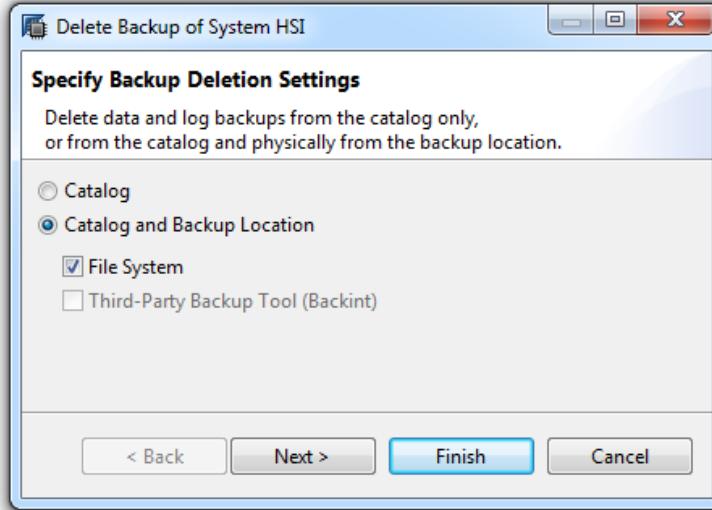
# Housekeeping of Backup Information



**Deleting data and log backups together with corresponding entries in the backup catalog**

**via SAP HANA Studio**

Status	Started	Duration	Size	Backup Type	Destinatio...
Green	26.06.2015 21:00:01	00h 31m 50s	151,63 GB	Data Backup	File
Green	23.06.2015 16:38:46	00h 37m 42s	179,52 GB	Data Backup	File
Red	19.06.2015 21:00:00	00h 38m 04s	284,84 MB	Data Backup	File
Green	12.06.2015 21:00:00	00h 31m 50s	151,63 GB	Data Backup	File
Green	05.06.2015 21:00:00	00h 37m 42s	179,52 GB	Data Backup	File
Green	02.06.2015 14:04:12	00h 31m 50s	151,63 GB	Data Backup	File
Red	22.05.2015 21:00:00	00h 38m 04s	284,84 MB	Data Backup	File
Green	19.05.2015 16:08:12	00h 31m 50s	151,63 GB	Data Backup	File
Green	19.05.2015 13:41:23	00h 46m 36s	217,59 GB	Data Backup	File
Green	08.05.2015 21:00:04	00h 45m 42s	212,44 GB	Data Backup	File
Green	01.05.2015 21:00:00	01h 54m 35s	217,61 GB	Data Backup	File



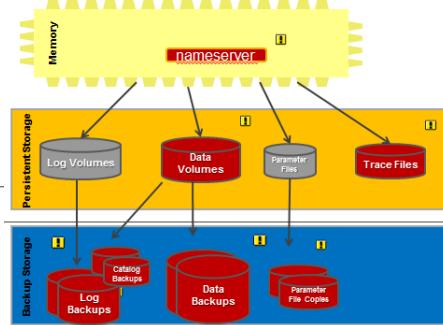
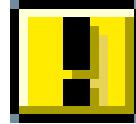
**via SQL Statement**

```
BACKUP CATALOG DELETE ALL BEFORE BACKUP_ID <Backup ID> [COMPLETE];
```

Note: Backup files can manually be deleted without cleaning up the entries from the backup catalog

Note: With MDC the SystemDB and each Tenant have their own backup catalog

# Housekeeping of Backup Information



## How to check if housekeeping of backup catalog is needed:

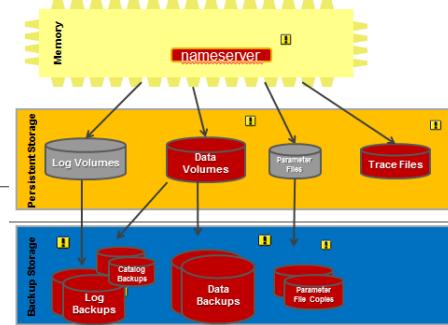
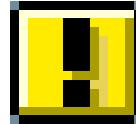
- Check number of entries in the backup catalog:

SQL	Result		
<code>select count(*) from M_BACKUP_CATALOG</code>	<table border="1"> <thead> <tr> <th>COUNT(*)</th> </tr> </thead> <tbody> <tr> <td>1 28.831</td> </tr> </tbody> </table>	COUNT(*)	1 28.831
COUNT(*)			
1 28.831			

- Check age and size of backup catalog with SQL: "HANA\_Configuration\_MiniChecks" (SAP Note [1969700](#))

- HANA_Configuration_MiniChecks_Rev102.01+					
CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE
940	Size of backup catalog (MB)	31.32	<= 50.00		
942	Catalog size share (last day, %)	86.51	<= 3.00	X	
945	Age of oldest backup in catalog (days)	151	<= 100	X	

# Housekeeping of Backup Information



## Trace Files:

Backup.log & backint.log files record information about backups

Old entries are not cleaned-up automatically

They can be one of the biggest diagnosis files:

Name	Type	Size (Byte)
backup.log	Log	11,393,620
backint.log	Log	184,294,806

→ Can be cleaned up / removed manually

Note: The backup agent from the 3rd party tool could write itself a log file, which may require additional housekeeping

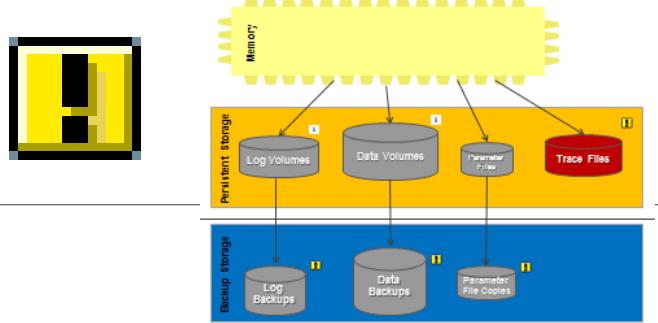
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# House Keeping Diagnosis Files

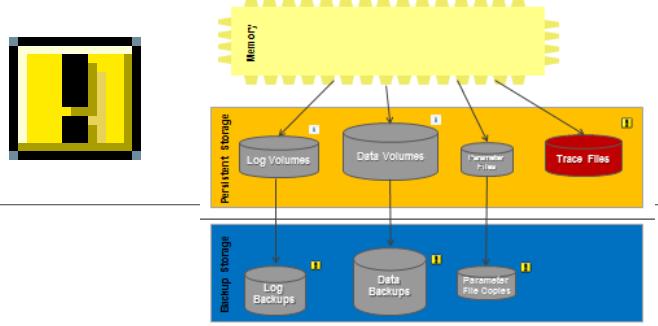


Diagnosis files that need manual deletion\*

Type	Standard Naming Convention	Examples	(list might be incomplete)
Compressed Alert Files	<servicename>*alert*.gz	indexserver_alert_host1_20150527105014.gz	
Dump Files	<servicename>*dump*.trc	indexserver_host1.30003.crashdump.20150423-131520.022083.trc xsengine_ls80010.30007.rtedump.20140708-160936.005816.oom.trc	
SQL Trace Files	*.py	sqltrace_host1_30003_000_plantrace.py	
Performance Trace Files	*.tpt	perftrace.tpt	
User specific trace files / End-to-End Traces	<servicename>_*<contextname>.trc	scriptserver_host1.30004_context.trc	
Kernel Profiler Files	CPU_<SERVICE>_<HOST>_<PORT>_<TIMESTAMP>.* CPU_<SERVICE>_<HOST>_<PORT>_<TIMESTAMP>.*	CPU_xsengine_host1_30007_20150519103823.dot WAIT_xsengine_host1_30007_20150519103823.dot	
Backup Log-Files	backup.log, backint.log		

\*Most trace files are cyclically overwritten and the number and their size is configurable via parameters (shown later).

# House Keeping Diagnosis Files



Trace files can be deleted

- by trace type and
- by time stamp ( $\geq$ SPS12)

```
ALTER SYSTEM CLEAR TRACES
(<trace_type_list>) [UNTIL <timestamp>]
[WITH BACKUP]
```

Example:

```
ALTER SYSTEM CLEAR TRACES ('ALERT', 'CLIENT')
UNTIL '2012-12-31 23:59:59';
```

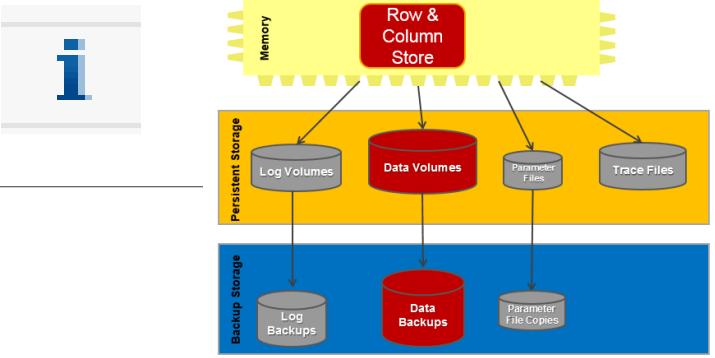
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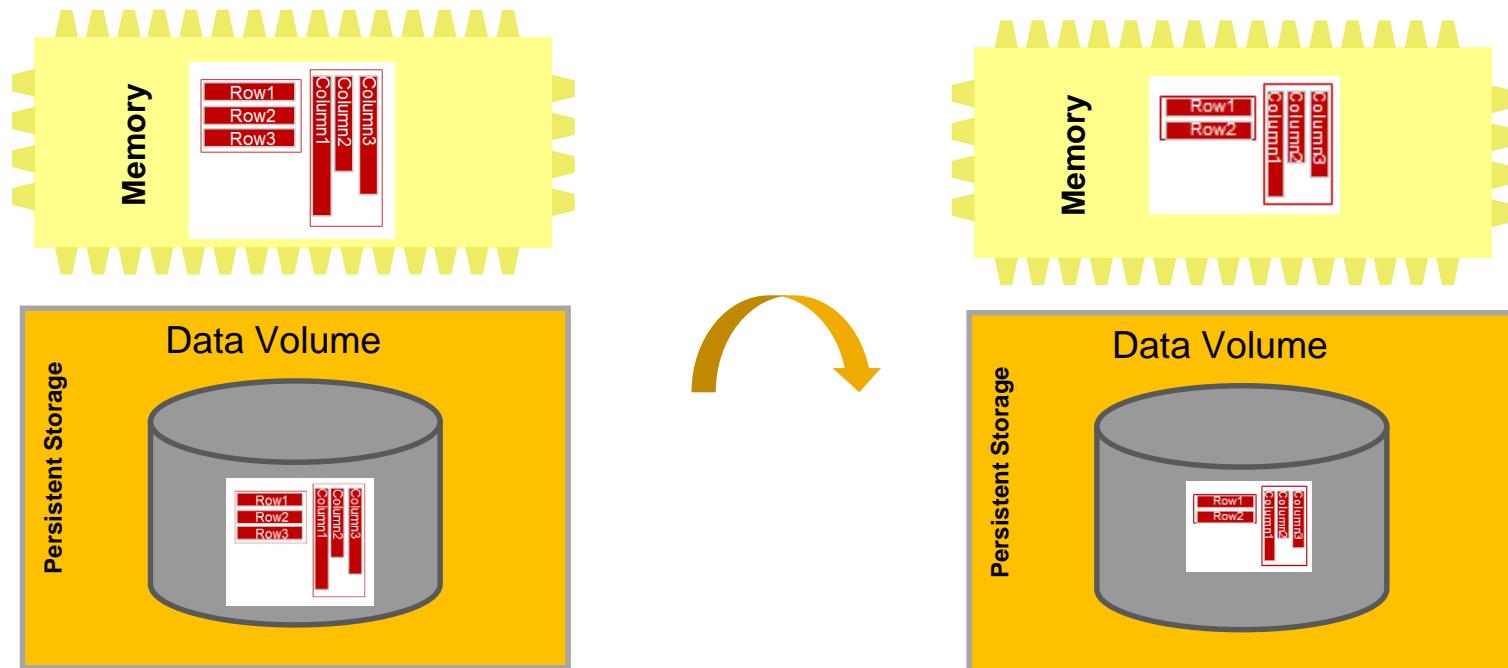
# House Keeping Basis Tables



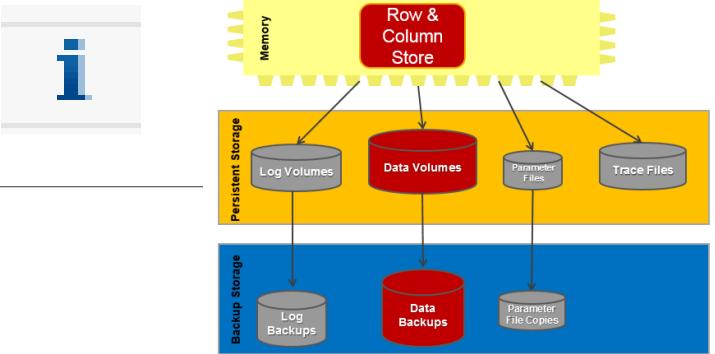
Basis tables can grow with time

Large basis tables cause database growth, performance degradation, and longer restart times

See SAP Note [2388483](#) (replaces SAP Note [706478](#)) and check to what extent you can delete or archive data in these tables



# House Keeping Basis Tables



- **How to detect:**

- with SQL: "*HANA\_Configuration\_MiniChecks*" (SAP Note [1969700](#))

- <i>HANA_Configuration_MiniChecks_1.00.120+</i>						
CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE	
M1360	Size of audit log table (GB)	0.11	<= 10.00		2388483	
M2040	Temporary BW tables	0	<= 1000		2388483	

- with SQL: "*HANA\_Tables\_LargestTables*" (found in SAP Note [1969700](#)) with ONLY\_BASIS\_TABLES = 'X'

- <i>HANA_Tables_LargestTables</i>											
OWNER	TABLE_NAME	S	L	HOST	B	U	COLS	RECORDS	DISK_GB	MAX_MEM_GB	CUR_MEM_GB
SAPQH1	REPOSRC	C	P	ls80010	X	X	34	4872748	9.13	1.92	1.90
SAPQH1	REPOLOAD	R	Y	ls80010	X	X	14	235741	7.80	0.06	
SAPQH1	DYNPSOURCE	R	Y	ls80010	X	X	7	257386	5.48	0.17	
SAPQH1	D010TAB	R	Y	ls80010	X	X	3	474723...	2.83	5.31	
DIRK	REPOLOAD	C	P	ls80010	X	X	14	183682	2.60	2.57	

```
SELECT
  '%' SCHEMA_NAME,
  '%' TABLE_NAME,
  '%' STORE,
  'X' ONLY_BASIS_TABLES,
  10 RESULT_ROWS,
  'TOTAL DISK' ORDER BY
```

# House Keeping Agenda

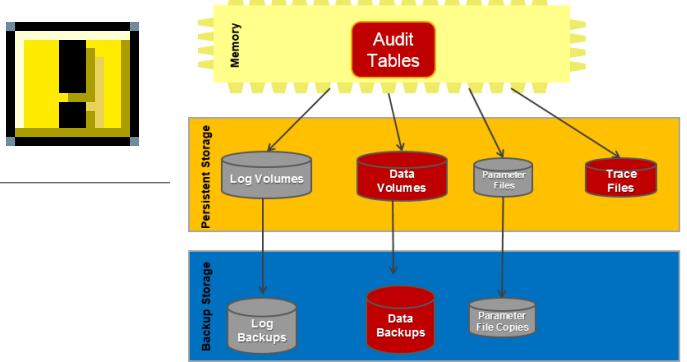
---

## ➤ House Keeping

- Overview
- Freeing-up Unused Space
- **Deleting Obsolete Information**
  - Backup Files
  - Diagnosis Files
  - Basis Tables
  - Auditing Information
- Configuration of Automated Housekeeping
- HANACleaner – a Housekeeping Tool

## House Keeping

# Housekeeping of Auditing Records



## 1) Database Table

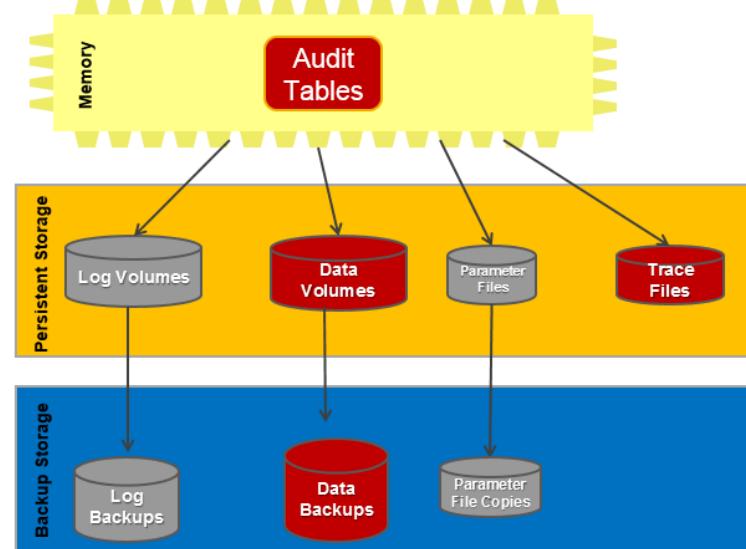
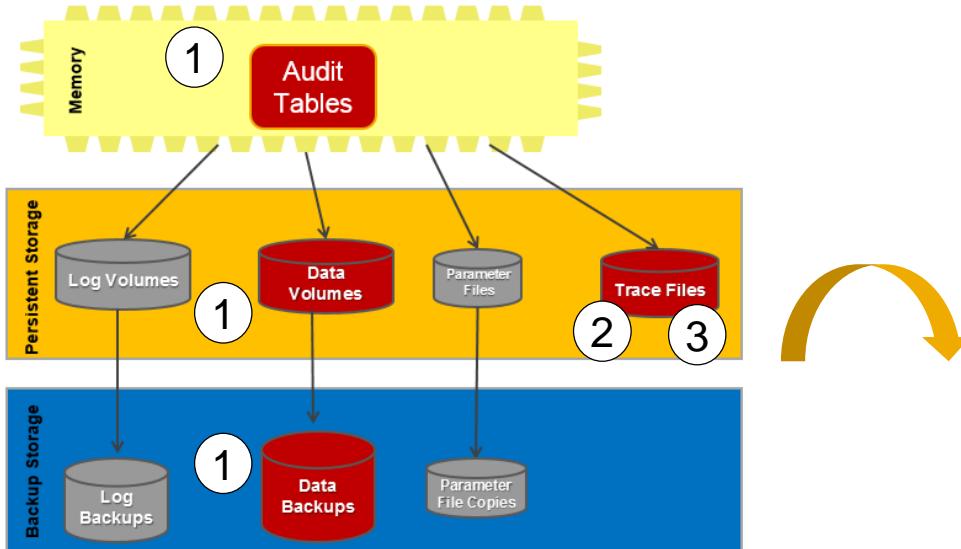
- delete old audit entries by truncating the table (SAP Note [2081869](#))

## 2) Syslog

- ensure automatic housekeeping of /var/log/messages

## 3) CSV-File

- delete entries that are no longer required



# Housekeeping of Auditing Records

## 1) Database Table

- **How to detect:**
  - Statisticsserver Alert 64: Total memory usage of table-based audit log

Check Information		
ID	Check	Description
64	Total memory usage of table-based audit log	Determines what percentage of the effective allocation limit is being consumed by the database table us

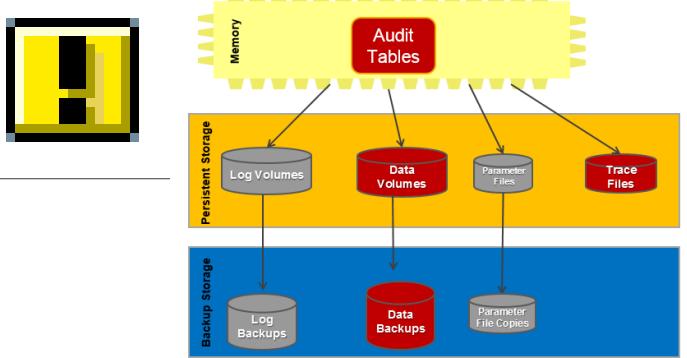
- with SQL: "*HANA\_Configuration\_MiniChecks*" (found in SAP Note [1969700](#))
  - [\*HANA\\_Configuration\\_MiniChecks\\_Rev102.01\*](#)

CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE
1360	Size of audit log table (GB)	0.03	<= 10.00		706478

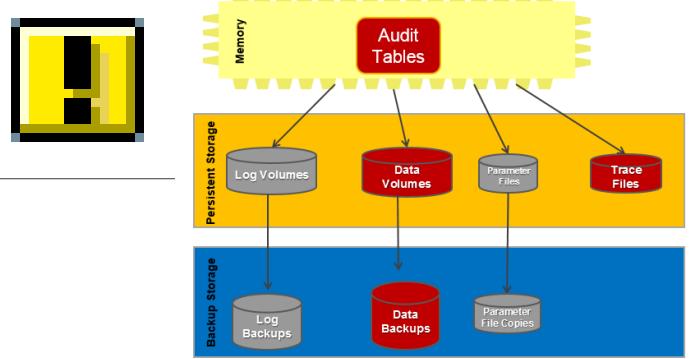
- Statisticsserver Alert 64: Total memory usage of table-based audit log

- **How to delete:** ALTER SYSTEM CLEAR AUDIT LOG UNTIL <timestamp>

(see SAP Note [2081869](#))



# Housekeeping of Auditing Records



## 2) Syslog

Clean up /var/log/messages (ensure that the syslog is properly configured and that the audit trail target is accessible and has sufficient space available)

## 3) CSV-File

HANA Studio: Diagnosis Files: Delete entries that are no longer required

Overview	Landscape	Alerts	Performance	Volumes	Configuration	System Information	Diagnosis Files	Trace Configuration	Console
Filter: <input type="text" value="csv"/> <span style="margin-left: 10px;">✖</span>				Host: <All> <span style="margin-left: 10px;">▼</span>			<a href="#">Merge Diagnosis Files...</a>	<a href="#">Delete Trace Files...</a>	<span style="font-size: 2em;">≡</span>
Host	Name						Type	Size (Byte)	Modified
ls80010	statisticsserver_ls80010.30005.audit_trail.csv							2.134.651	13.11.14 05:51

# House Keeping

## Agenda

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### ➤ House Keeping

- Overview
- Freeing-up Unused Space
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- Configuration of Automated Housekeeping
  - Tracefiles
  - Monitoring Views
  - Statisticsserver Tables
- HANACleaner – a Housekeeping Tool

# House Keeping

## Agenda

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### ➤ House Keeping

- Overview
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# Automated House Keeping - Trace & Alert Files

## Size and number of trace files

Standard trace files are cyclically overwritten

The number and their size is configurable via parameters

▲ [ ] trace	
maxfiles	10
maxfilesize	10000000

## Size of alert files

Alert files are compressed if they reach a certain size

Name	Default
▲ global.ini	
▲ [ ] trace	
maxalertfilesize	50000000

# House Keeping

## Agenda

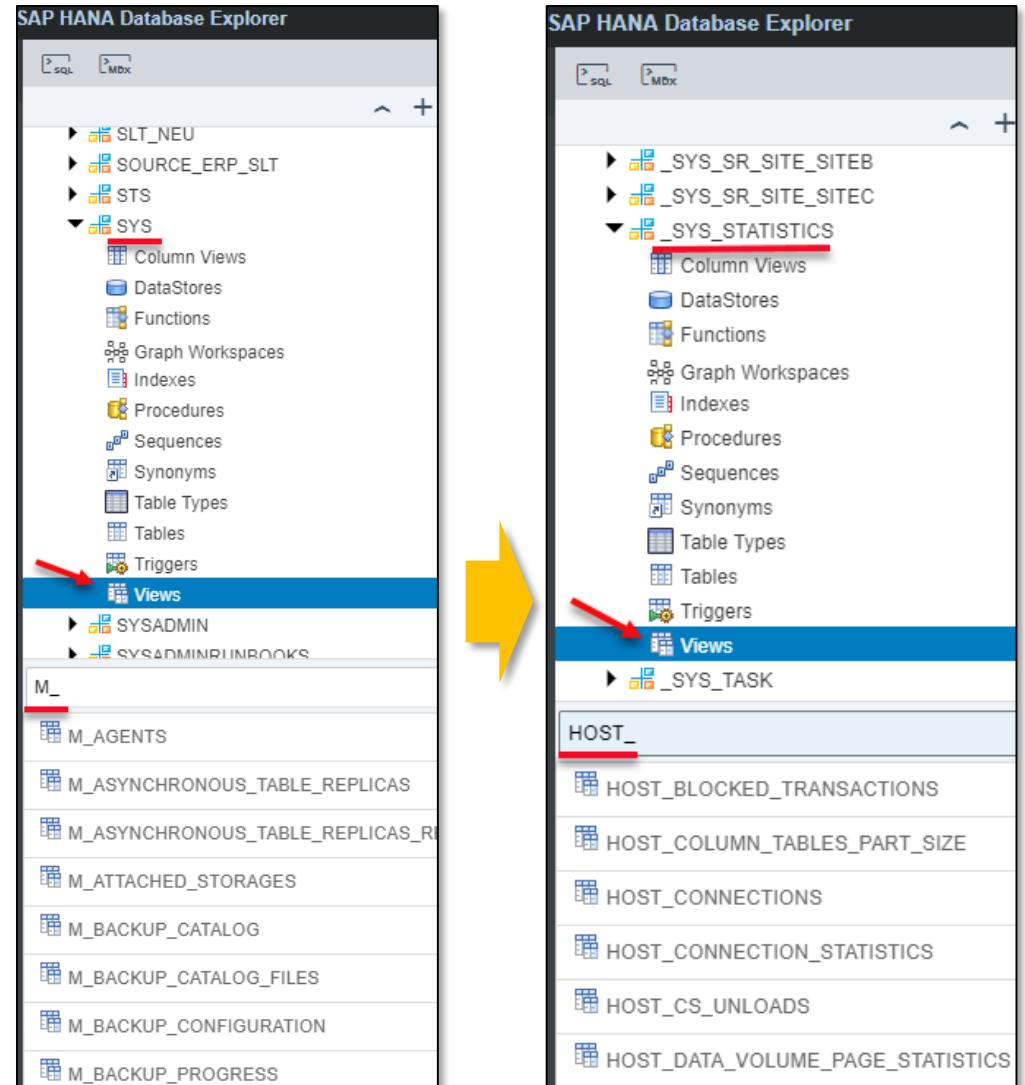
---

### ➤ House Keeping

- Overview
- Freeing-up Unused Space
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  - Tracefiles
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# Automated House Keeping - Monitoring Views

- The monitoring views are located in the SYS schema with a name typically starting with "M\_"
- They are used to monitor load, functionality, configuration and performance of the SAP HANA database
- On a regular basis (based on the M\_ view) the granular information in the M\_ views are automatically cleaned up and only a smaller subset of the information moved to corresponding HOST tables in the \_SYS\_STATISTICS tables
- It is normally not required to interfere with the data collection of these views
- For exceptional cases some settings can be done (e.g. next slide)  
→ SAP Note: [2088971 - How-to: Control the Amount of Records in SAP HANA Monitoring Views](#)



## Automated House Keeping - Monitoring Views

- M\_SERVICE\_THREAD\_SAMPLES collects information about recent thread activities
- This information is overwritten when one of these limits are reached:
  - Default retention time (a.k.a. “max sample lifetime”) is 2 hours
  - Default number samples limit is 1500000

These limits can be set with the following parameters (but only change if you know what you doing):

global.ini → [resource\_tracking] → service\_thread\_sampling\_monitor\_max\_sample\_lifetime  
(default: 7200 seconds, i.e. 2 hours)

global.ini -> [resource\_tracking] -> service\_thread\_sampling\_monitor\_max\_samples  
(default: 1,500,000 samples)

For more information see SAP Note [2088971](#)

# House Keeping

## Agenda

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### ➤ House Keeping

- Overview
- Freeing-up Unused Space
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## Statistics Server Retention Times

Retention times define the duration how long historical data is kept in statisticsserver tables

Recommended value is 42 days (see SAP Note [2147247](#) for details)

- **How to detect:**

- with SQL: "*HANA\_Configuration\_MiniChecks*" (SAP Note [1969700](#))

– [HANA\\_Configuration\\_MiniChecks\\_Rev102.01+](#)

CHID	DESCRIPTION	VALUE	EXPECTED_VALUE	C	SAP_NOTE
750	Stat. server tables with retention < 42 days	0	0		<a href="#">2147247</a>

You can adjust the retention time to 42 days for a statistics server schedule with id number <X> like this:

```
UPDATE _SYS_STATISTICS.STATISTICS_SCHEDULE SET RETENTION_DAYS_CURRENT = 42 WHERE ID = <X>
```

# House Keeping

## Agenda

---

### ➤ **House Keeping**

- Overview
- Freeing-up Unused Space
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- Configuration of Automated Housekeeping
- **HANACleaner – a Housekeeping Tool**

# 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

A screenshot of a GitHub repository page for 'chriselswede/hanacleaner'. The page lists several files: README.md, hanacleaner.py, hanacleaner\_configfile\_example.txt, and hanacleaner\_intro.pdf. A red arrow points to the 'hanacleaner.py' file.

For more about the SAP HANACleaner see SAP Note [2399996](#)

SAP Note [2400024](#) provides administration suggestions, e.g. recommendations about the hanacleaner

# 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:

The screenshot shows the SAP Fiori interface for creating a new user. The user name is set to "HANACLEANER1". Under the "Object Privileges" tab, the "HOST\_OBJECT\_LOCK\_STATISTICS\_BASE (\_SYS\_STATISTICS)" catalog object is selected. Red arrows point from the "SELECT", "UPDATE", and "DELETE" checkboxes in the privilege list to the corresponding checkboxes in the screenshot below.

Granted Roles	System Privileges
System Privilege	
AUDIT ADMIN	
AUDIT OPERATOR	
BACKUP ADMIN	
CATALOG READ	
LOG ADMIN	
MONITOR ADMIN	
RESOURCE ADMIN	
TRACE ADMIN	

This screenshot shows the list of system privileges available for granting. The privileges listed are: AUDIT ADMIN, AUDIT OPERATOR, BACKUP ADMIN, CATALOG READ, LOG ADMIN, MONITOR ADMIN, RESOURCE ADMIN, and TRACE ADMIN.

# 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)

INSUFFICIENT PRIVILEGE WARNING: It appears that there are no traces.
One possible reason for this is that the user represented by the key A2KEY has unsufficient 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 unsufficient privilege,
e.g. lack of the system privilege TRACE ADMIN.
```

# 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 deleted	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

# 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
```

# 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

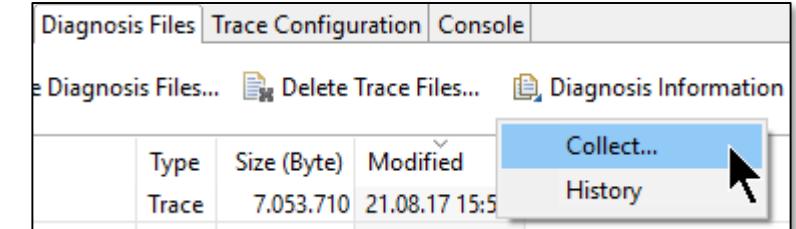
1 trace files were removed
```

# HANACleaner – dump cleanup



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

Flag	Unit	Details	Explanation	Default
-dr	days	retention days for dump files	manually created dump files (a.k.a. fullsystem 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>
```

# HANACleaner – General File Clean Up



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

Flag	Unit	Details	Explanation	Default
<b>-gr</b>	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 <u>Note:</u> -gd and -gw can also be same length lists with a commas as delimiter	-1 (not used)
<b>-gd</b>	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)
<b>-gw</b>	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/hansitter\_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

```

# 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

**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
```

## 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
```

**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
```

# 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 than 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
```

# 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 (
13345 object locks entries with unknown object names were removed
```

# 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 DEFragments 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 %
```



## 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 temporarily 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

# 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 SPARSE (<122.02) or		PREFIXED and a BLOCK index	
<b>-cb</b>	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				
<b>-cp</b>	[true/false]	Per partition	Switch to consider above flags per partition	false
<b>-cm</b>	[true/false]	Merge before	Switch to perform a delta merge before compression	false
<b>-co</b>	[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 ←
```

# 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 than 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 than 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.
```

# 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 4<sup>th</sup> already had statistics):

```
haladm@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))
```

# HANACleaner – INI File History ( $\geq$ H2SPS03)

To remove old ini file content history hanacleaner has the following input flag

Flag	Unit	Details	Explanation	Default
-ir	days	ini file content history retention	deletes older ini file 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 information. (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 – 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
<b>-es</b>	true/false	execute sql	Execute all crucial housekeeping tasks (useful to turn off for investigations with -os=true)	True
<b>-os</b>	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

```

# 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@atgvm1s666:/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@atgvm1s666:/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
```



## 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

```

# 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@atgvm1s666:/tmp/HANACleaner> hdbuserstore LIST  
KEY AKEYSYSDB  
  ENV : atgvm1s666.wdf.sap.corp:30013  
  USER: AUSER  
  DATABASE: SYSTEMDB  
KEY AKEYTEN1  
  ENV : atgvm1s666.wdf.sap.corp:30047  
  USER: AUSER  
  DATABASE: XS1
```

SQL Port for nameserver at SystemDB

SQL Port for indexserver at Tenant

# HANACleaner – MDC (2/4)



## Example:

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

```
xshadm@atgvm1s666:/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
```

# 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	
User	User Parameters
HANACLEANER1	

PQL@PQL (SYSTEM) SiteA-T1	
User	User Parameters
HANACLEANER1	

(for privileges,  
see earlier slides)

SYSTEMDB@PQL (SYSTEM) SiteA-SystemDB					
<a href="#">Overview</a> <a href="#">Landscape</a> <a href="#">Alerts</a> <a href="#">Performance</a> <a href="#">Volumes</a> <a href="#">Configuration</a>					
<a href="#">Services</a> <a href="#">Hosts</a> <a href="#">Redistribution</a> <a href="#">System Replication</a> Host: <All>					
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   |
```

**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))
```

# 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))

```

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
```



# Thank You!

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