Establishing a TSM Backup for Servers / VMs

Establishing a TSM Backup for Debian 11 / 10 / 9 (Bullseye / Buster / Stretch)

(most likely also for other Debian based systems)

Download the IBM Tivoli Client Software:

- Version 8 branch:
  - Open https://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v8r1/Linux/LinuxX86_DEB/BA/
  - Navigate in the directory with the newest version and get the tarball file (e.g. `8.1.22.0-TIV-TSMBAC-LinuxX86_DEB.tar`)

- Version 7 branch:
  - Download tarball from here: ftp://ftp.software.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Linux/LinuxX86_DEB/BA/v718/7.1.8.0-TIV-TSMBAC-LinuxX86_DEB.tar
  - **or** from here: https://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Linux/LinuxX86_DEB/BA/v718/7.1.8.0-TIV-TSMBAC-LinuxX86_DEB.tar

```
# Put the tarball in a spearate directory and extract it:
# E.g., for version 8 branch:
mkdir TSMinstall; mv 8.1.22.0-TIV-TSMBAC-LinuxX86_DEB.tar TSMinstall; cd TSMinstall
tar xvf 8.1.22.0-TIV-TSMBAC-LinuxX86_DEB.tar

# Install the packages in following order:
# 1. gskcrypt64
# 2. gskssl64
# 3. tivsm-api64
# 4. tivsm-ba

# E.g., for version 8 branch:
dpkg -i gskcrypt64_8.0-55.31.linux.x86_64.deb
dpkg -i gskssl64_8.0-55.31.linux.x86_64.deb
dpkg -i tivsm-api64.amd64.deb
dpkg -i tivsm-ba.amd64.deb

# E.g., for version 7 branch:
dpkg -i gskcrypt64_8.0-50.78.linux.x86_64.deb
dpkg -i gskssl64_8.0-50.78.linux.x86_64.deb
```

```
dpkg -i tivsm-api64.amd64.deb
dpkg -i tivsm-ba.amd64.deb

# Check if Global Security Kit (GSKit) libraries are recognized by the
system:
gsk8ver_64

# If you get an 'library not found' error, e.g.
# 'gsk8ver_64: error while loading shared libraries: libgsk8cms_64.so:
cannot open shared object file: No such file or directory'
# you have to export Global Security Kit (GSKit) libraries by updating the
LD_LIBRARY_PATH:
export LD_LIBRARY_PATH=/usr/local/ibm/gsk8_64/lib64:$LD_LIBRARY_PATH
# Test it again, now you should get some reasonable output with:
gsk8ver_64
```

Now create the configuration files dms.sys, dsm.opt and inclexcl.def in `/opt/tivoli/tsm/client/ba/bin/`. Here are templates, please modify them to your corresponding servername/directories/files you want to backup/exclude.

/opt/tivoli/tsm/client/ba/bin/dsm.sys

```
SErvername  ADSM
NODENAME    #####_PUT_HERE_YOUR_NODENAME_#####
COMMMethod          TCPip
TCPPort             1500
TCPServeraddress    adsm.uibk.ac.at
TCPCLIENTADDRESS    ########.uibk.ac.at
passwordaccess      generate
* SCHEDMODE           Polling
MANAGEDServices     schedule
SCHEDLOGname        /var/log/dsmsched.log
ERRORLOGname        /var/log/dsmerror.log
Inclexcl            /opt/tivoli/tsm/client/ba/bin/inclexcl.def
schedlogmax         2047
```

The schedlogmax setting in dsm.sys sets the maximum logfile size for dsmsched.log and dsmwebcl.log to the entered value in MB and enables wrapping (similar to a ring buffer within the files). When not setting this variable or using 0 it allows the log file to grow indefinitely. To get to the point of the last entry in the log when wrapping is enabled search for **“END OF DATA”**. Use this option when you're low / limited on system storage.

/opt/tivoli/tsm/client/ba/bin/dsm.opt

```
SErvername  ADSM
* In die DOMAIN sind natürlich nur tatsächlich vorhandene Mountpoints
aufzunehmen
DOMAIN              /
```

```
FOLlowsymbolic     no
```

In `inclexcl.def` you define which directories / files should be backuped or excluded:

/opt/tivoli/tsm/client/ba/bin/inclexcl.def

```
INclude /home/.../*
INclude /etc/.../*
INclude /usr/.../*
INclude /var/.../*

 EXclude dsmsched.log

 EXclude.dir /bin
 EXclude.dir /boot
 EXclude.dir /dev
 EXclude.dir /lib
 EXclude.dir /lib64
 EXclude.dir /lost+found
 EXclude.dir /media
 EXclude.dir /mnt
 EXclude.dir /tmp

 exclude.dir /.../lost+found
 exclude.dir /.../.snapshot
 exclude.dir /.../.cache
 exclude *~
```

Now enter the dsm shell with:

```
dsmc
```

Test to log in (press RETURN when asking for Nodename, after that enter your password), then do a first incremental backup:

```
# !! These commands only work within the interactive dsmc console !!
incr

# Exit with
quit
```

After successfully testing and quitting dsmc, fix following startup script to work with Debian (10):

/opt/tivoli/tsm/client/ba/bin/rc.dsmcad

```
# 1.  At the beginning of the script, find these two lines:
DSMCAD_DIR=/opt/tivoli/tsm/client/ba/bin
DSMCAD_BIN=$DSMCAD_DIR/dsmcad
```

```
# Only needed for Version 7:
# Directly after these two lines, ADD following line to find the GSKit
libraries:
export LD_LIBRARY_PATH=/usr/local/ibm/gsk8_64/lib64:$LD_LIBRARY_PATH


# Only needed for Version 7:
# 2. Find the following line:
if [ $NAME = "Ubuntu" ]
# and REPLACE it with:

if [ "$NAME" = "Ubuntu" -o "$NAME" = "Debian GNU/Linux" ]
```

Start & check the status of the TSM scheduler (dsmcad):

```
# In case you tried to start the scheduler before modifying the script, you
have to reload units to reload the source configuration with:
# systemctl daemon-reload

systemctl start dsmcad
systemctl status dsmcad

# enable for autostart after a reboot
systemctl enable dsmcad
```

Error Debugging / Troubleshooting

Error loading shared libraries

If you see an error on the dsmcad status and investigated via `journalctl -xe`, like:

```
dsmcad[7519]: /opt/tivoli/tsm/client/ba/bin/dsmcad: error while loading
shared libraries: libgsk8ssl_64.so: cannot open shared object file: No such
file or directory
```

You can fix it by adding the location of the libgsk8ssl to the path in a file in the `/etc/ld.so.conf.d` directory:

/etc/ld.so.conf.d/TSM.conf

```
/usr/local/ibm/gsk8_64/lib64
```

Set it active with

```
ldconfig
```

You now should be able to successfully start up dsmcad without any error.

Error with TSM accessing files with special characters / umlauts

If the `dsm*.logs` show errors while trying to backup files / directories with special characters, e.g. german umlauts, most likekely you have set your default system locale to UTF8. Unfortunately, TSM does not support UTF-8, so you have to change your locale in order to backup all files including those with umlauts / special characters.

- Check your current system locale:

  ```
  localectl
  ```

  If the output is similar to `System Locale: LANG=en_US.UTF-8`, you have to change it.

- Check installed locales:

  ```
  locale -a
  ```

- If en_US (without UTF8) is missing, you have to install it - edit `/etc/locale.gen`, uncomment `en_US ISO-8859-1` and save it. Then generate locale with

  ```
  locale-gen en_US
  ```

  Re-check again installed locales with `locale -a`, now you should see en_US.

- Change locale with

  ```
  localectl set-locale LANG="en_US" LC_CTYPE="en_US"
  ```

  and verify with

  ```
  localectl
  ```

- Finally, restart dsmcad scheduler:

  ```
  systemctl restart dsmcad
  ```

  In the next run all files including those with special characters should be backed up.

Final Steps

You can go on and check, if the scheduler process is started:

```
ps aux |grep dsm
# Example Output:
# root       68303  0.0  0.2 234384 25068 ?        Sl   15:17   0:00
/usr/bin/dsmcad

ls -la /var/log |grep dsm
cat /var/log/dsmsched.log
# Example Output:
# 04/25/22   15:18:02 Session established with server ADSM: AIX
# 04/25/22   15:18:02   Server Version 8, Release 1, Level 12.100
# 04/25/22   15:18:02   Server date/time: 04/25/22   13:18:02  Last access:
04/25/22   13:17:02
#
# 04/25/22   15:18:02 --- SCHEDULEREC QUERY BEGIN
# 04/25/22   15:18:02 --- SCHEDULEREC QUERY END
# 04/25/22   15:18:02 Next operation scheduled:
# 04/25/22   15:18:02 ------------------------------------------------------
------
# 04/25/22   15:18:02 Schedule Name:         CS_INC_STD
# 04/25/22   15:18:02 Action:                Incremental
# 04/25/22   15:18:02 Objects:
# 04/25/22   15:18:02 Options:
# 04/25/22   15:18:02 Server Window Start:   22:00:00 on 04/25/22
# 04/25/22   15:18:02 ------------------------------------------------------
------
# 04/25/22   15:18:02 Scheduler has been stopped.
```

~~(a bit outdated) Docu for installing on Debian:~~
https://wiki.uibk.ac.at/display/~c102mr/2011/05/15/Ubuntu+TSM+Server+Sicherung

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TSM Backup for systemd Red Hat based Linux Servers (e.g. RHEL / CentOS / Rocky Linux / Fedora)

For a backup via TSM please follow these steps:

- Go to
  - ~~for branch 7:~~ https://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Linux/LinuxX86/BA/
  - for branch 8: https://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v8r1/Linux/LinuxX86/BA/
- Select the newest version and download the .tar file
- Extract the files in a temporary folder
- With rpm -ivh install the packages in the **following** order:

1. gskcrypt
2. gskssl
3. TIVsm-API64
4. TIVsm-APIcit
5. TIVsm-BA
6. TIVsm-BAcit

Configuration and futher steps are details in the ZID Unix-Docu, archived version ***some parts there are outdated!***.

The software does not support UTF-8. It will skip files that have german umlauts in their path. To solve this set you locale to something without utf-8. source Changing the locale systemwide is possible with `localectl set-locale LANG="en_US" LC_CTYPE="en_US"`

To (auto)start the scheduler:
```
systemctl enable dsmcad
systemctl start dsmcad
```

If you are behind a firewall you should set the option webports to specific values and forward those ports on your firewall for the TSM server to be able to reach you.

Upgrading a working TSM instance to the latest package

Use `rpm -Uvh` to upgrade the packages. TIV packages need to be updated with one single command, e.g.:

```
rpm -Uvh gskcrypt64-8.0.55.31.linux.x86_64.rpm
gskssl64-8.0.55.31.linux.x86_64.rpm TIVsm-API64.x86_64.rpm TIVsm-
APIcit.x86_64.rpm TIVsm-BA.x86_64.rpm TIVsm-BAcit.x86_64.rpm
```

Debugging

On older RedHat based systems you may get some errors while updating, e.g.

```
error: Failed dependencies:
        libc.so.6(GLIBC_2.14)(64bit) is needed by TIVsm-
API64-8.1.20-0.x86_64
        libstdc++.so.6(GLIBCXX_3.4.15)(64bit) is needed by TIVsm-
API64-8.1.20-0.x86_64
        libc.so.6(GLIBC_2.14)(64bit) is needed by TIVsm-BA-8.1.20-0.x86_64
        libstdc++.so.6(GLIBCXX_3.4.15)(64bit) is needed by TIVsm-
BA-8.1.20-0.x86_64
```

You have to update glibc to minimum version v2.14 AND libstdc (GLIBCXX) to minimum version v3.4.15.

Beginning with IBM Spectrum Protect backup-archive client level 8.1.19, the operating system RHEL 6

and SLES 11 are no longer supported, as stated here:
https://www.ibm.com/support/pages/apar/IT44180

However, you can manually update the required libraries. This is not a clean way of updating, but tested working in several machines running CentOS 6:

```
cd /tmp/TSMinstall
mkdir glibc; cd glibc

# Check installed version(s) of glibc
ldconfig  -p | grep libc.so
strings /lib64/libc.so.6 | grep GLIBC

# Download glibc v2.17 libraries compiled to work for CentOS 6 Systems
# Source: https://gist.github.com/harv/f86690fcad94f655906ee9e37c85b174
wget http://copr-be.cloud.fedoraproject.org/results/mosquito/myrepo-
el6/epel-6-x86_64/glibc-2.17-55.fc20/glibc-2.17-55.el6.x86_64.rpm
wget http://copr-be.cloud.fedoraproject.org/results/mosquito/myrepo-
el6/epel-6-x86_64/glibc-2.17-55.fc20/glibc-common-2.17-55.el6.x86_64.rpm
wget http://copr-be.cloud.fedoraproject.org/results/mosquito/myrepo-
el6/epel-6-x86_64/glibc-2.17-55.fc20/glibc-devel-2.17-55.el6.x86_64.rpm
wget http://copr-be.cloud.fedoraproject.org/results/mosquito/myrepo-
el6/epel-6-x86_64/glibc-2.17-55.fc20/glibc-headers-2.17-55.el6.x86_64.rpm

# You might have to install missing packet glibc-common and/or remove i686
version of glibc on 64bit systems:
# yum install glibc-common
# yum remove glibc.i686

# Update glibc to v2.17
rpm -Uvh glibc-2.17-55.el6.x86_64.rpm glibc-common-2.17-55.el6.x86_64.rpm
glibc-devel-2.17-55.el6.x86_64.rpm glibc-headers-2.17-55.el6.x86_64.rpm

# Check again installed version(s) of glibc, you should now have v2.17
strings /lib64/libc.so.6 | grep GLIBC


# now update libstdc++ (GLIBCXX):

# check GLIBCXX-Version
strings /usr/lib64/libstdc++.so.6 |grep LIBCXX

# Download libstdc++ v4.8.5 libraries
cd /tmp/TSMinstall
mkdir libstdc; cd libstdc
wget
https://rpmfind.net/linux/centos/7.9.2009/os/x86_64/Packages/libstdc++-4.8.5
-44.el7.x86_64.rpm

# Update libstdc++ to v4.8.5
rpm -Uvh libstdc++-4.8.5-44.el7.x86_64.rpm
```

```
# check GLIBCXX-Version again, should now be > the required GLIBCXX_3.4.15
strings /usr/lib64/libstdc++.so.6 |grep LIBCXX

# all dependencies should now be fixed, so you can finally install TSM 8:
cd ..
rpm -Uvh gskssl64-8.0.55.31.linux.x86_64.rpm
gskcrypt64-8.0.55.31.linux.x86_64.rpm TIVsm-API64.x86_64.rpm TIVsm-
APIcit.x86_64.rpm TIVsm-BA.x86_64.rpm TIVsm-BAcit.x86_64.rpm
```

Restore

I found useful documentation about that part.

Example:

```
dsmc restore <sourcedir> <destdir> -latest
```

Autostart & respawn the scheduler in RHEL / CentOS 6 & 7

Add in `/etc/inittab`

```
ad:2345:respawn:/bin/env LC_ALL=en_US /opt/tivoli/tsm/client/ba/bin/dsmc
sched >/dev/null 2>&1
```

Attention: Beginning with RHEL/Centos 6 the /etc/inittab is deprecated in favor of new init system “Upstart”!

Auto-Start & respawn TSM in RHEL/Centos 6:

Go to `/etc/init` and create/edit a file `dsmc-respawn.conf`:

```
cd /etc/init/
vim dsmc-respawn.conf
```

dsmc-respawn.conf

```
start on stopped rc RUNLEVEL=[2345]
stop on runlevel [!2345]
respawn
exec /bin/env LANG=en_US /opt/tivoli/tsm/client/ba/bin/dsmc sched
>/dev/null 2>&1
```

To autostart the dsm scheduler, use

```
initctl start dsmc-respawn
```

Check if the DSM scheduler is running:

```
ps aux |grep dsm
tail /var/log/dsmsched.log
```

[ALPHA] Quick & Dirty How-To:

- **von ZID-Operating**: Tivoli DSM-Sicherung TSM01C-serverseitig einrichten lassen (NODEname, username, System, Sicherungsart)
- Config anpassen: in `/opt/tivoli/tsm/client/ba/bin/dsm.sys`
- evtl. in TSM-Client Passwort ändern bzw. setzen (`dsmc set password` → schreibt TSM-Paßwort verschlüsselt nach `/etc/adsm/TSM.PWD`)
- manuelles TSM Backup starten (`dsmc incr`)
- nach yum-Updates von TSM über Repo uibk-zid-tools-rhel-6.4 TSM-Prozeß neu starten (stop tsm / start tsm / status tsm)

newest v7 Client is here (v8 is not supported by the server):
ftp://ftp.software.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Linux/LinuxX86/BA/
or here:
ftp://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Linux/LinuxX86/BA/

Establishing a TSM Backup for Clients / PCs (Windows)

- Register your client PC at ZID-Operating. They will need information about:
  - NODEname (=Hostname)
  - Username (c703nnn) - will be set up with your initial password (“Anfangspasswort”)
  - System
  - “Sicherungsart”
- Download TSM-Client for Windows (Attention: TSM Client v8 doesn't work for Windows 7):
  - for branch 7:
    http://ftp.software.ibm.com/storage/tivoli-storage-management/maintenance/client/v7r1/Windows/x64/
  - for branch 8:
    https://www3.software.ibm.com/storage/tivoli-storage-management/maintenance/client/v

8r1/Windows/x64/

- Go to the newest version, download the EXE file (e.g. 8.1.13.0-TIV-TSMBAC-WinX64.exe); run it to decompress the installation files
- Install it and if needed, copy missing DLL files to `%SystemRoot%\system32`
- Edit dsm.opt

TSM (ADSM) Knowledge Base

- TSM (ADSM) uses Ports 1500, 1501 - make sure these are not blocked.
- TSM (ADSM) Forum :https://adsm.org/forum/index.php

TSM Node-Passwörter

Passwort am Client-Node

wird für den jeweiligen Node erstellt, lokal obfuskiert (nicht verschlüsselt) gespeichert und übermittelt über Option `passwordaccess generate` in dsm.opt bzw. dsm.sys .

Passwort-Speicherort am Client-Node

- Windows: in Registry unter `HKLM\Software\IBK\ADSM\CurrentVersion\Nodes\{nodename}\{servername}`
- Linux: `/etc/adsm/TSM.PWD` bzw. `/etc/adsm/TSM.sth`

Passwort zurücksetzen lassen

auf Anfangspasswort des persönlichen c-Accounts des Admins kann Gregor Danler (507-23418) vom ZID-Operating machen.
(Als Login wird vom TSM-Client allerdings **nicht** die c-Benutzerkennung verwendet, sondern der Node-Name!)

Passwort ändern

```
dsmc set password
```

Security-Infos

Von nicht aktuellen TSM-Clients obfuskiert gespeichertes Passwort kann auf Windows-Rechnern problemlos von jedem User ausgelesen werden:
https://improsec.com/tech-blog/vulnerability-in-tsm

TSM (ADSM) Commands

All TSM commands can be entered on the command line with
`/opt/tivoli/tsm/client/ba/bin/dsmc <options>`
Interactive commands can be entered directly inside the “tsm> ” console (just enter `/opt/tivoli/tsm/client/ba/bin/dsmc` to get into TSMinteractive mode).

Query Backup (list backuped files/dirs)

Examples:

```
query backup "/"
q b "/home/"
q b "/etc/*"
q b "C:\*"
```

Create manual incremental backup:

```
incr
```

Restore single file (latest version)

Examples:

```
restore /home/bla/test.txt -latest
restore '/home/bla/!_crude_dir/Umlautää.txt' -latest
```

Deleting specific files in TSM backup

Your node does not have permission to delete backup files

~~del backup /home/bla/test.txt~~
~~del backup /home/bla/*~~
~~del backup “/home/bla/*.bak” all~~

ZID TSM-Server Infos

Installed TSM-Server-Version (Feb/2022):

```
IBM Spectrum Protect Server for AIX - Version 8, Release 1, Level 12.100
```

Supportmatrix (https://www.ibm.com/support/pages/ibm-spectrum-protect-server-client-compatibility-and-upgrade-considerations) :

IBM SPECTRUM PROTECT CLIENT SUPPORT **includes the Backup-Archive, API, UNIX HSM, and Web clients that are compatible with, and currently supported with, IBM Spectrum Protect Servers and Storage Agents.** **—**	
IBM Spectrum Protect Client Version	**Supported IBM Spectrum Protect Server and Storage Agent Versions**
8.1.x where x>=2	8.1, 7.1
8.1.0	8.1, 7.1
7.1.x where x>=8	8.1, 7.1
7.1.x where 6>=x>=0	8.1, 7.1

Debugging

Known Issue with unknown libraries

DSMC not starting

```
/bin/env LC_ALL=en_US /opt/tivoli/tsm/client/ba/bin/dsmc sched
/opt/tivoli/tsm/client/ba/bin/dsmc: error while loading shared libraries:
libgsk8ssl_64.so: cannot open shared object file: No such file or directory
```

Check if Library is found and installed:

```
ldconfig  -p | grep ssl
    libssl.so.1.1 (libc6,x86-64) => /lib/x86_64-linux-gnu/libssl.so.1.1
    libssl.so (libc6,x86-64) => /lib/x86_64-linux-gnu/libssl.so
```

```
dpkg -L gskssl64
/.
/usr
/usr/local
/usr/local/ibm
/usr/local/ibm/gsk8_64
```

```
...
```

Create

/etc/ld.so.conf.d/tsm.conf

```
/usr/local/ibm/gsk8_64/lib64
```

and rebuild the ld database:

```
ldconfig
```