

# 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 (v7 is mandatory, v8 is not yet fully supported by the UIBK ADSM server):

- Version 8 branch:
  - Open [https://public.dhe.ibm.com/storage/tivoli-storage-management/maintenance/client/v8r1/Linux/LinuxX86\\_DEB/BA/](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. 8.1.14.0-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](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](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 separate directory and extract it:
# E.g., for version 7 branch:
mkdir TSMinstall; mv 7.1.8.0-TIV-TSMBAC-LinuxX86_DEB.tar TSMinstall; cd
TSMinstall
tar xvf 7.1.8.0-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 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
TCPSeveraddress  adsm.uibk.ac.at
TCPCLIENTADDRESS #####.uibk.ac.at
passwordaccess  generate
* SCHEDMODE    Polling
MANAGEDServices  schedule
SCHEDLOGname    /var/log/dsmsched.log
ERRORLOGname    /var/log/dsmerror.log
Incl excl      /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 backed up 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 dsmc 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.

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## 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 likely 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-locales 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:
  - gskcrypt
  - gskssl
  - TIVsm-API64
  - TIVsm-APIcit
  - TIVsm-BA
  - TIVsm-BACit

Configuration and further 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 your 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.

## Restore

I found useful [documentation](#) about that part.

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## 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:  
<http://ftp.software.ibm.com/storage/tivoli-storage-management/maintenance/client/v8r1/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 backed up files/dirs)

Examples:

```
query backup "/"
q b "/home/"
q b "/etc/*"
```

### 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 $x \geq 2$	8.1, 7.1
8.1.0	8.1, 7.1
7.1.x where $x \geq 8$	8.1, 7.1
7.1.x where $6 \geq x \geq 0$	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
```

From:

<https://ifi-wiki.uibk.ac.at/> - **IFI Wiki**

Permanent link:

<https://ifi-wiki.uibk.ac.at/public/tsm-backup?rev=1655286638>

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