

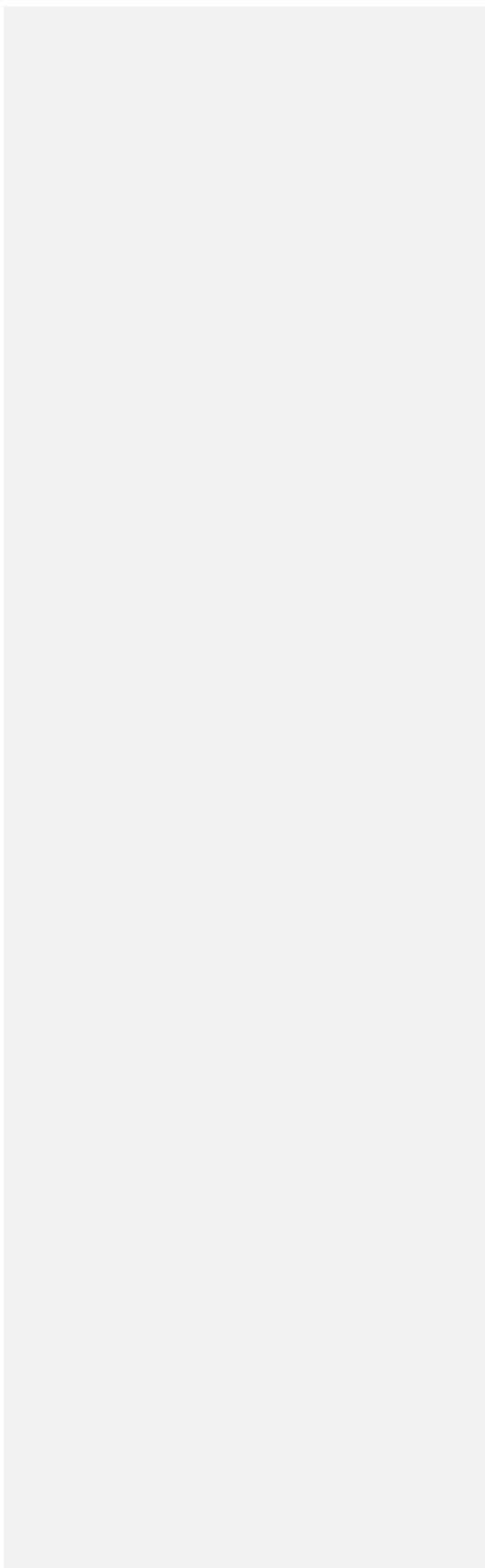
User manual for the service "LSDF Online Storage" at SCC/KIT

Scientific Computing Center, KIT

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1 Introduction

The "LSDF¹ Online Storage" service offers users of the Karlsruhe Institute of Technology (KIT) access to a data storage facility that is intended in particular for the storage of scientific measurement data and simulation results from data-intensive scientific disciplines. The LSDF Online Storage is operated by the Scientific Computing Center (SCC).

Access is guaranteed via standard protocols. Data is backed up and protected using state-of-the-art technology. The service is not suitable for storing personal data.

2 Registration

In order to use the "LSDF Online Storage" service, interested users must first register for the service. Registration is only possible if the user has previously been assigned a special Entitlement. Users usually receive this entitlement after consulting their responsible ITB or group representative or, if a project has not yet been set up, by submitting a separate [application to the service operator](#)². Technically, the entity element is represented by the membership in one or more project groups "<institution name>-<project name>-LSDF".

Registration and group updating³ is carried out via the web interface of the [bwIDM web portal](#)^{4,5}.

The following input mask will be displayed, in which you should select the Identity Provider (IDP) of your organization and click on "Continue".

¹ LSDF=Large Scale Data Facility

² <https://www.lsd.f.kit.edu/os/storagerequest>

³ For a group synchronization (e.g. if a new project group has been created), users should log in again under the bwIDM web portal (<https://bwidm.scc.kit.edu>)

⁴ <https://bwidm.scc.kit.edu/user/register-service.xhtml?ssn=lsdf>

⁵ In some cases, display problems may occur in KIT when using Internet Explorer (IE). These can be resolved by opening IE and then pressing the ALT key to display the menu bar. Then select the menu item "Compatibility view settings" in the "Extras" menu and uncheck "Show intranet sites in compatibility view".

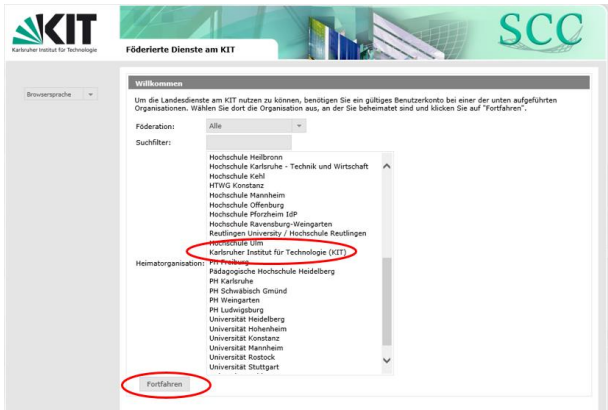


Illustration 1 Selection of the organization

You will then be redirected to the IDP page of your organization, where you must log in with your organization's access data.

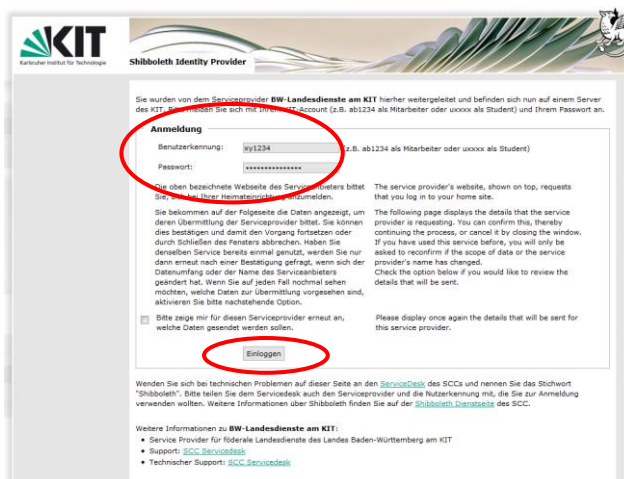


Illustration 2 Login to your organization via Shibboleth - in the KIT example

You will then be taken to the registration page for the "LSDF Online Storage" service. Before you can register for the service, you must accept the terms of use. Select "I have read and agree to the terms of use" and then click on "Register".

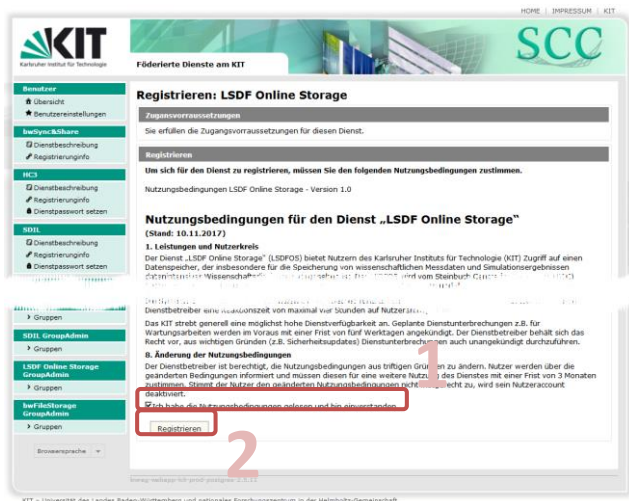


Illustration 3 Registering for the "LSDF Online Storage" service

If you receive the error message: "LSDF Online Storage Entitlement is not provided by the home organization", please contact your ITB or group representative to be included in an existing project group or, if no project has been set up yet, contact the service operator to apply for a new project. In this case, a [storage request form](https://www.lsd.f.kit.edu/os/storagerequest)⁶ should be completed first.

You can access the [terms of use](http://www.scc.kit.edu/downloads/sdm/Nutzungsbedingungen-LSDF-Online-Storage.pdf)⁷ at any time at a later date.

Users who use the CIFS protocol for data access must now set a so-called service password. Click on the "Set service password" link and select a password. Please enter this password later during authentication instead of your usual KIT password if you use CIFS.

⁶ <https://www.lsd.f.kit.edu/os/storagerequest>

⁷ <http://www.scc.kit.edu/downloads/sdm/Nutzungsbedingungen-LSDF-Online-Storage.pdf>

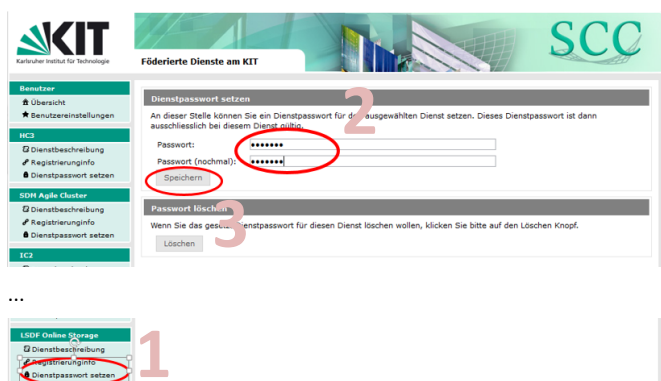
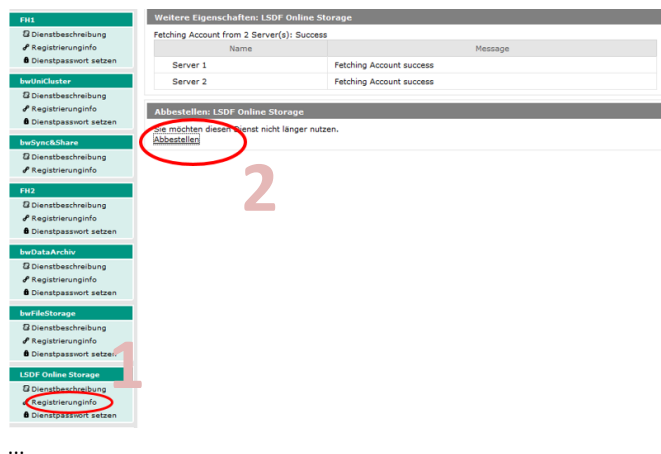


Illustration 4 Setting the service password for the LSDF Online Storage service

3 Cancellation

If you no longer wish to use the service, you can unsubscribe. To do this, go to the [bwidm web portal](https://bwidm.webportal)⁸ and select the menu item "Registration info" under "LSDF Online Storage" and then "Unsubscribe: LSDF Online Storage", select the menu item "Unsubscribe". Confirm again by clicking on "Unsubscribe". Once the service has been canceled, access to the data is blocked. In this case, what was agreed in the terms of use in the "Deprovisioning" section applies.



⁸ <https://bwidm.scc.kit.edu>

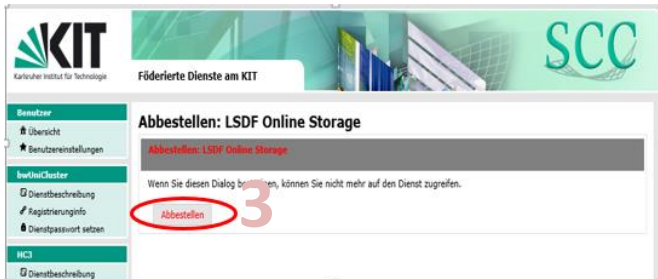


Figure 5 Unsubscribing from the service

Automatic unsubscription takes place as soon as a user loses their account at their home institution.

4 Snapshots and versioning

Snapshots make it possible to save the current state of the data in a file system. This gives users the opportunity to undo changes they have made to their data after creating a snapshot. It is also possible to easily restore files that have already been deleted. Details on restoring files that have already been deleted are described in section 9. Snapshots can be created daily, weekly or monthly for the "LSDF Online Storage". Snapshots also provide a form of version management.

5 Backup

All data is regularly backed up to tape to enable disaster recovery in an emergency. Users do not have direct access to this backup. Users can restore older versions or already deleted data independently via snapshots (see section 4).

6 Directory structure

Each user receives a directory for personal use only (**user directory**). In addition, **project directories** are set up on request for shared use by groups of users. The available storage space is limited at user or group level and is technically realized through quotas. It is generally possible to temporarily exceed the allocated quota ("soft limit") up to an upper limit ("hard limit"). An increase in the existing quotas can be requested via the [BW support portal](https://bw-support.scc.kit.edu)⁹.

Below you will find a summarized overview of the different directory types, as well as examples of directory paths.

	Backup	Quota	Directory / Location / Remark
User directory	Yes	Yes, with default values:	Directory:

⁹ <https://bw-support.scc.kit.edu>

		SL 100GiB HL ¹⁰ 400GiB	/lsdf/kit/<prim.gidName> ¹¹ /<loginName> ¹² Examples: /lsdf/kit/scc/xy1234 /lsdf/kit/ikp/ab5678
User directory snapshots	no	-	Directory: /lsdf/kit/snapshots See section 4 for details
Project directory	Yes	Yes, by arrangement ¹³	Directory: /lsdf/kit/<prim.gidName>/projects Examples: /lsdf/kit/scc/projects /lsdf/kit/ikp/projects
Project directory snapshots	Yes	-	Directory: /lsdf/kit/<prim.gidName>/projects/.snapshots See section 4 for details.
Public (with password-free access via https) ¹⁴	no	Reference to existing project directory. On request.	Directory: /lsdf/public/<prim.gidName>/projects/<projectName>/<publicName> ¹⁵

7 Access logs

Access to the data stored in the LSDF Online Storage is made possible via the standard protocols Network File System (NFS), Common Internet File System (CIFS), Hypertext Transfer Protocol Secure (HTTPS), Web Distributed Authoring and Versioning (WebDAV) and Secure Shell/Secure Copy/Secure File Transfer Protocol (SSH/SCP/SFTP). The following is an example of their use.

7.1 Overview of the available protocols

The following table shows an overview of all available protocols

Protocol (port)		Cluster	Users
SSH / SCP / SFTP (22)	Worldwide	os-login.lsd.f.kit.edu	Everyone

¹⁰ SL="soft limit"; HL="hard limit"

¹¹ <prim.gidName>: Name of the primary group, e.g. **scc**, **ikp**, **imk-asf** etc.

¹² <loginName>: Name of the account, e.g. **xy1234**, **bs_abcd**, etc.

¹³ <https://www.lsd.f.kit.edu/os/storagerequest>

¹⁴ <https://os-webdav.lsd.f.kit.edu/public>

¹⁵ <publicName>: Link to the public folder

HTTPS / WebDAV (443)	Worldwide	os-webdav.lsd.f.kit.edu	Everyone
NFS (2049)	KIT-Internal	os.lsd.f.kit.edu	root
CIFS (445)	KIT-Internal	os.lsd.f.kit.edu	Everyone

7.2 Access via Network File System (NFS)

Administrators of project directories can mount an NFS share set up for them as root from computers with specific IP addresses, i.e. mount it as a network drive. The share names and the addresses to be used are agreed individually.

Directories are exported via a group of NFS servers that can be reached at the address `os.lsd.f.kit.edu`.

```
$ mount -o nfsvers=3 os.lsd.f.kit.edu:/lsdf01/lsdf/kit/inst/projects/mnt/lsdf
```

The following example shows an entry in `/etc/fstab` for the mount of a directory.

```
os.lsd.f.kit.edu:/lsdf01/lsdf/kit/inst/projects/mnt/lsdf nfs
defaults,rw,tcp,hard,intr,rsize=32768,wsz=32768,nfsvers=3 0 0
```

We generally recommend using the `hard` and `intr` options on the NFS clients. With a hard mount and `intr`¹⁶ (interruptible), the application can ensure a successful write process. A soft mount (`-o soft`) is not recommended due to the risk of data loss or corruption.

Access via the NFS protocol is not supported for user directories.

7.3 Access via Common Internet File System (CIFS)

Access via the CIFS protocol is only possible on the KIT intranet or via KIT VPN.

In order to access data in the "LSDF Online Storage" via CIFS, users must have set a service password in the registration web interface (see section 2, Illustration 4 "Setting the service password for the LSDF Online Storage service").

Directories are shared via a group of CIFS servers that can be reached at the address `os.lsd.f.kit.edu`.

7.3.1 UNIX/Linux Client

To be able to use a share from a Unix operating system, you need a [Samba client](#)¹⁷ or CIFS utils. Most CIFS packages include Samba for Linux

7.3.1.1 Access via SAMBA client

If you do not know the name of the share, you can list it with the following command:

¹⁶ `intr` option is obsolete as of kernel 2.6.25

¹⁷ <http://www.samba.org>

```
$ smbclient -L os.lsdf.kit.edu -U 'os.lsdf.kit.edu\xy1234' -m SMB2
Enter os.lsdf.kit.edu\xy1234's password:
Domain=[LSDF] OS=[] Server=[]

  Sharename Type Comment
  -----
IPC$ IPC IPC Service (LSDF Online Storage)
kit Disk kit
iai-projects Disk iai-projects
iam-cms-projects Disk iam-cms-projects
scc-projects Disk scc-projects
ikp-projects Disk ikp-projects
ioc-projects Disk ioc-projects
ifh-projects Disk ifh-projects
itg-projects Disk itg-projects
imk-tro-projects Disk imk-tro-projects
imk-asf-projects Disk imk-asf-projects
ifkm-projects Disk ifkm-projects
(...)
```

You can access the share with an FTP-like tool in an interactive shell:

```
$ smbclient //os.lsdf.kit.edu/<share> -U 'os.lsdf.kit.edu\xy1234'
```

<share>¹⁸ denotes the name of the share.

For example:

```
$ smbclient //os.lsdf.kit.edu/kit -U 'os.lsdf.kit.edu\xy1234' -m SMB2
Enter os.lsdf.kit.edu\xy1234's password:
Domain=[LSDF] OS=[] Server=[]
smb: \> ls
```

7.3.1.2 Mounting a share

You can also mount a share in a local directory (e.g. /mnt/cifs). However, you usually need `root` rights on the local system for this.

```
$ mkdir /mnt/cifs
$ mount -t cifs -o vers=2.0,username='xy1234' //os.lsdf.kit.edu/<share> /mnt/cifs
```

or

```
$ mount.cifs -o vers=2.0,username='xy1234',workgroup=os.lsdf.kit.edu
//os.lsdf.kit.edu/<share> /mnt/cifs
```

For example:

¹⁸ <share> examples:

Organizational unit: **kit**, **bs**, **hd** etc.

LSDFHOME: **kit/scc/xy1234**, **kit/imk-asf/ab3456** etc.

LSDFPROJECTS: **scc-projects**, **imk-asf-projects** etc. or **kit/scc/projects**, **kit/imk-asf/projects** etc.

```
$ mkdir /mnt/cifs
$ mount.cifs -o vers=2.0,username=' xyl234',workgroup=os.lsd.f.kit.edu
//os.lsd.f.kit.edu/kit /mnt/cifs

Password: ****
$ cd /mnt/cifs
```

Check whether the mount command was successful by entering the `mount` command without arguments:

```
$ mount | grep cifs
//os.lsd.f.kit.edu/kit on /mnt/cifs type cifs
```

The following example shows an entry in `/etc/fstab` for the CIFS mount of a user directory:

```
$ mkdir /mnt/cifs

/etc/fstab
//os.lsd.f.kit.edu/kit/inst/xyl234 /mnt/cifs cifs uid= xxxx,gid=
yyyy,credentials=/path_to_user_HOME/credentialsfile,auto 0 0
# xyl234 : LSDF Online Storage user
# xxxx/yyyy : user uid/gid

$ cat /path_to_user_HOME/credentialsfile
username=xyl234
password=*****
domain=os.lsd.f.kit.edu

$ mount /mnt/cifs
$ cd /mnt/cifs/
```

For non-root users, a CIFS mount can be organized with `sudo`.

7.3.2 Windows Client

You can connect to a CIFS share with a Microsoft operating system.

7.3.2.1 Universal Naming Convention (UNC) Syntax

Use Windows Explorer and enter the path to the share `<share>` in the address bar in UNC syntax:

```
\\os.lsd.f.kit.edu
```

or

```
\\os.lsd.f.kit.edu\<share>
```

For example:

```
\\os.lsd.f.kit.edu\kit\
```

After entering the UNC path, the following window appears:

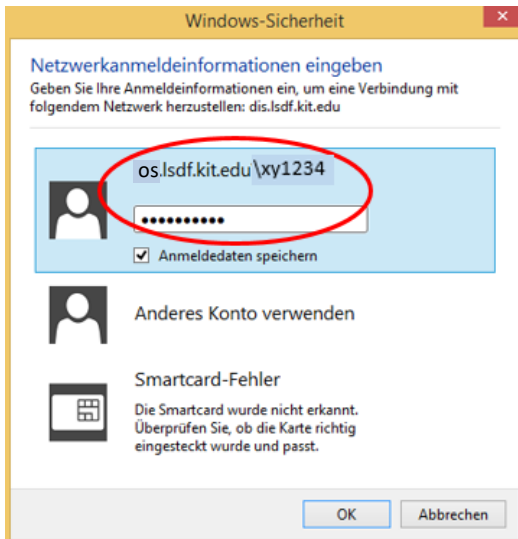


Figure 6 Windows authentication window

Instead of the usual KIT domain for the user `xy1234`, enter the following: `os.lsd.f.kit.edu\xy1234`. After authentication, a new window will open showing the content of the share. You can now navigate to and work with your data as usual.

7.3.2.2 Connecting a network drive with Windows Explorer

To connect a network drive, click on "Connect network drive" in Windows Explorer

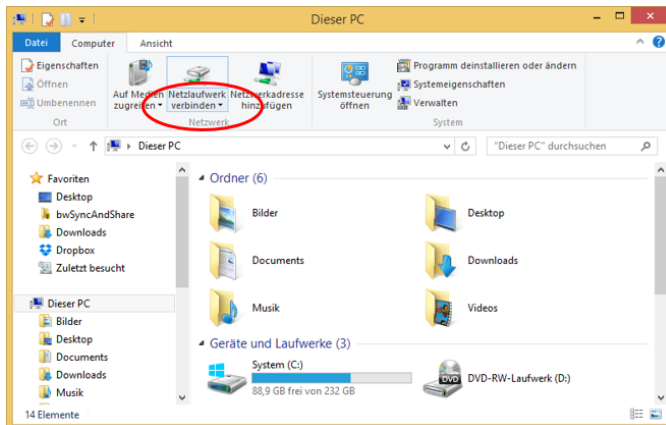


Figure 7 Explorer view of a network drive connection

Specify a drive letter to be assigned to the share and enter the network path (for example: \\os.lsd.f.kit.edu\<share>). Check the box "Connect with other credentials", as these differ from your local credentials.

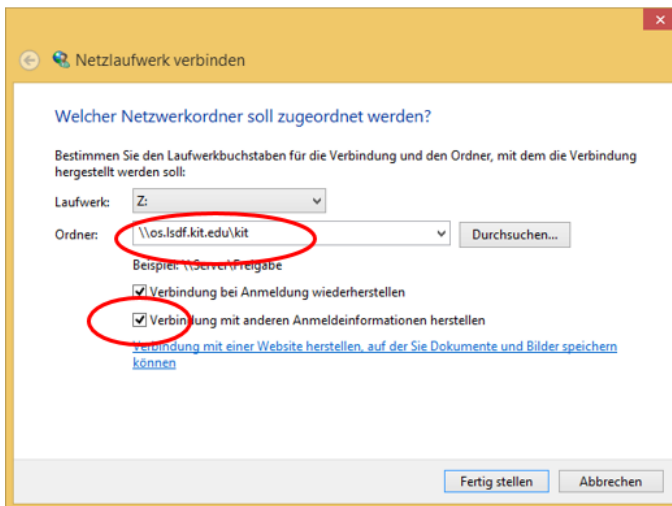


Figure 8 Explorer window: Connect network drive

Instead of the usual KIT domain for the user xy1234, enter the following, for example: os.lsd.f.kit.edu\xy1234. Use your service **password** instead of the **domain** password.

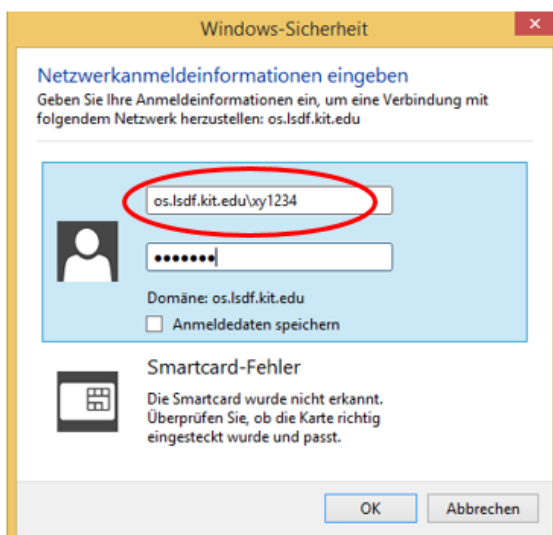


Figure 9 Windows authentication window

After successful authentication, the new drive is displayed in Explorer

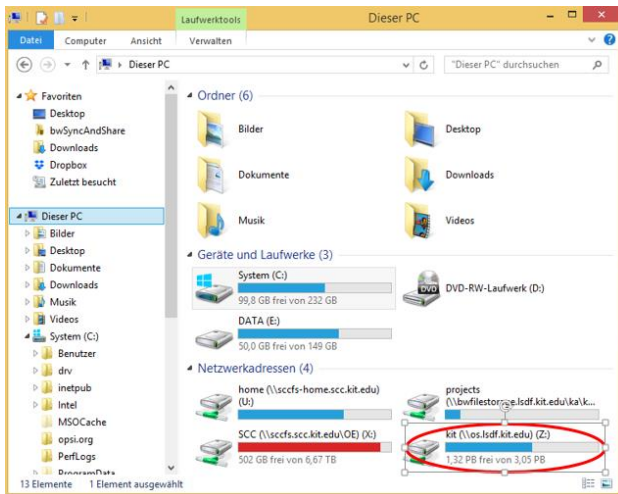


Figure 10 Network drive connected with Explorer

A new window opens showing the contents of the share.

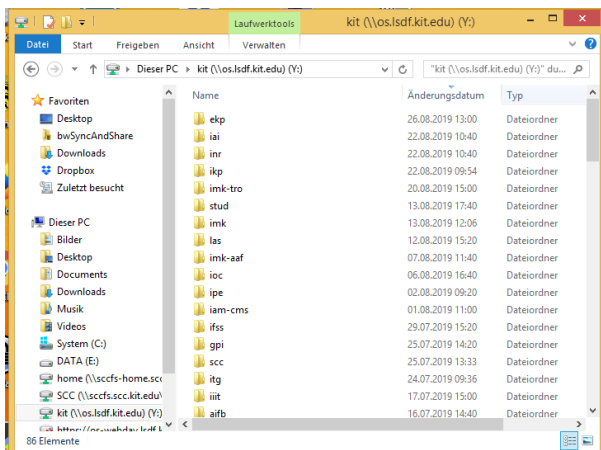


Figure 11 Network drive connected with Explorer

7.4 Access via Secure Shell (SSH)

SSH access to the data in the "LSDF Online Storage" is provided. This access is also used for data transfers via `scp`, `sftp`, `sshfs mount` and `rsync`. CPU-intensive processes are prevented on the access computer. Access is via a cluster of servers that can be reached at the address `os-login.lsd.f.kit.edu`.

7.4.1 UNIX/Linux Client

Example of access via `ssh` under Linux¹⁹:

```
$ ssh xy1234@os-login.lsd.f.kit.edu
```

Access is also possible via `ssh` keys. Please use a password to protect your ssh key from unauthorized access. To generate a new key on your workstation and copy it to the login computer, execute the following commands:

```
$ ssh-keygen -b 2048 -t rsa -C "Login first name last name"
$ ssh-copy-id -i ~/.ssh/id_rsa.pub xy1234@os-login.lsd.f.kit.edu
...
Password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'xy1234@os-login.lsd.f.kit.edu'"
and check to make sure that only the key(s) you wanted were added.
```

To enter the password only once per session, execute the following command:

```
$ ssh-add
...
Password:
```

You can then access the "LSDF Online Storage" without entering another password. If you have set up access with an ssh **key**, this can also be used for direct access via `scp/sftp/sshfs/rsync`.

To simplify script-controlled data management, the following environment variables have been set

```
$$SHELL=/bin/bash
$USER=xy1234
$LSDF=/lsdf
$LSDFHOM=/lsdf/kit/inst/xy1234
$LSDFPROJECTS=/lsdf/kit/inst/projects
$SNAPSHOTS=/lsdf/kit/snapshots
$PROJECTSNAPSHOTS=/lsdf/kit/inst/projects/.snapshots
```

7.4.2 Windows Client

To be able to use the SSH/SCP/SFTP protocols on a Windows computer, an appropriate tool must first be installed. The following products are suitable for accessing the "LSDF Online Storage" service:

WinSCP	http://winscp.net/eng/download.php
Putty	http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
FileZilla	http://sourceforge.net/projects/filezilla/
WebDrive	https://southrivertech.com/products/webdrive/download/
NetDrive	http://www.netdrive.net/
ExpandDrive	http://www.expandrive.com/expandrive

¹⁹ Windows users can also use this depending on the **ssh product** used. Please visit the relevant websites.

SFTPNetDrive	https://www.eldos.com/sftp-net-drive/comparison.php
SFTPDive	https://www.nsoftware.com/sftp/drive/
MountainDuck	https://mountainduck.io/
Cygwin	http://cygwin.com/install.html
Windows 10 subsystem for Linux	https://msdn.microsoft.com/de-de/commandline/wsl/install_guide

The list of products is of course not complete and only represents a random selection. The following example shows access with Putty:

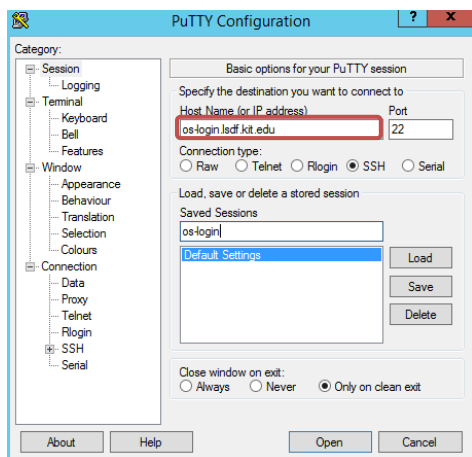


Figure 12 Using Putty on a Windows computer

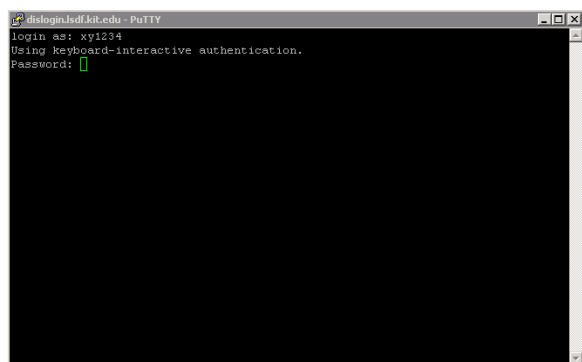


Figure 13 PuTTY use from a Windows computer

7.5 Access via Secure Copy Protocol (SCP)

7.5.1 UNIX/Linux Client

SCP is a protocol that enables secure data transfer between a local and a remote computer or between two remote computers. To copy the data to or from the "LSDF Online Storage", you can execute the following commands:

```
# Copy to LSDF Online Storage
$ scp <local path>/<file(s)> loginname@os-login.lsd.f.kit.edu:/<remote path>/

Example:
$ scp ~/myfile xy1234@os-login.lsd.f.kit.edu:~/

# Copy from LSDF Online Storage
$ scp login@os-login.lsd.f.kit.edu:/<remote path> /<local path>/<file(s)>

Example:
$ scp xy1234@os-login.lsd.f.kit.edu:~/myfile ~/
```

When using SCP, high data transfer rates can be achieved by using efficient algorithms for transport encryption during data transmission. In tests, we achieved high throughput rates using CPUs with AES²⁰ instruction set and 10 Gbit Ethernet connections.

The `-c` (cipher) option can be used to select an encryption method.

For example:

```
$ ssh -Q cipher
$ scp -c aes128-cbc testfile xy1234@os-login.lsd.f.kit.edu:~/
```

We recommend another efficient encryption algorithm:

```
$ scp -c arcfour testfile xy1234@os-login.lsd.f.kit.edu:~/
$ scp -c aes128-gcm@openssh.com testfile xy1234@os-login.lsd.f.kit.edu:~/
```

7.5.2 Windows Client

The most important settings are briefly shown in the following illustration using WinSCP as an example. The fields marked in red must be filled in accordingly.

²⁰ The Advanced Encryption Standard (AES) instruction set extension is an extension for Intel and AMD processors. The instruction set extension was developed to accelerate AES encryption and decryption

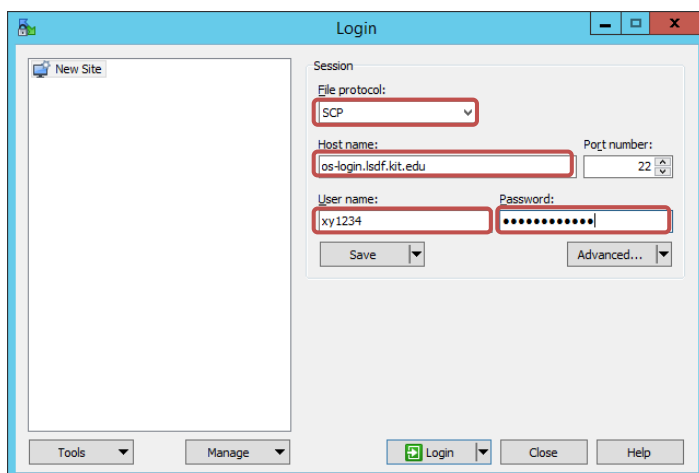


Figure 14 WinSCP usage from a Windows computer

Some of the listed programs allow you to specify the encryption method to be used to secure data transmission. The same instructions already given in section UNIX/Linux Client apply.

7.6 Access via Secure File Transfer Protocol (SFTP)

7.6.1 UNIX/Linux Client

The use of SFTP is similar to that described in section UNIX/Linux Client described for SCP. The following example illustrates the use of SFTP and access to a user directory.

Attention: Symbolic links are referenced during a data transfer via `sftp`.

7.6.2 Windows Client

The procedure for using SFTP under Windows is similar to that described in section Windows Client described in section 7.4.2. The software products listed there also support SFTP in addition to WinSCP.

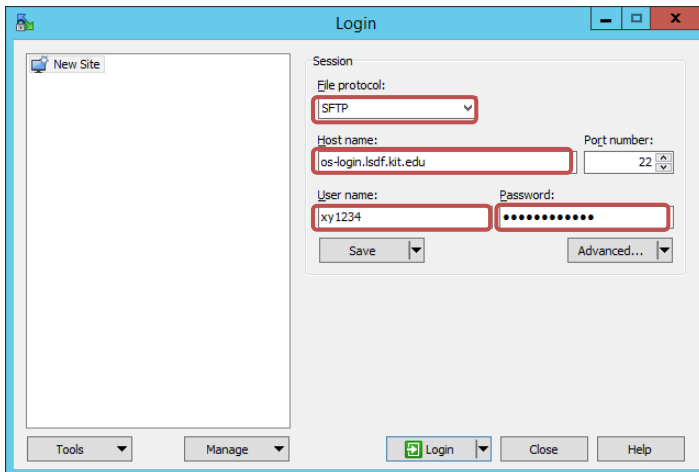


Figure 15 WinSCP usage from a Windows computer

They are then connected.

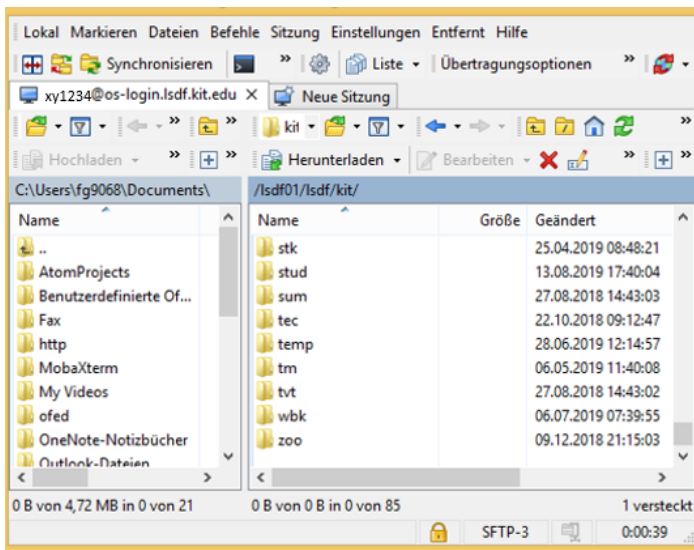


Figure 16 WinSCP usage from a Windows computer

Then navigate to your directory in the right-hand window and copy data, e.g. by dragging it from one window to another.

7.7 Access via Secure Shell FileSystem (SSHFS-Mount)

SSHFS is used to use files and directories on a remote computer like local files and directories. To be able to use an SSHFS mount from a Unix operating system, you need the software packages "**fuse-sshfs**", "**fuse**" and "**fuse-libs**".

```
$ mkdir sshfsmountpoint
$ sshfs xyl234@os-login.lsd.f.kit.edu:/lsdf/kit/scc/projects ./sshfsmountpoint
```

or

```
$ mkdir sshfsmountpoint
$ sshfs xyl234@os-login.lsd.f.kit.edu:/lsdf/kit/scc/xyl234 /mnt/sshfsmountpoint
```

7.8 Access via WebDAV

WebDAV (Web-based Distributed Authoring and Versioning) is a network protocol for providing files via the Internet. It is based on the Hypertext Transfer Protocol. WebDAV access to data stored in the LSDF takes place via a cluster of servers that can be reached at the address <https://os-webdav.lsd.f.kit.edu>.

7.8.1 Access with a web browser

For web access to data stored in the LSDF, enter one of the following addresses in a web browser of your choice:

```
# Start page:
https://os-webdav.lsd.f.kit.edu/

# LSDFHOM:
https://os-webdav.lsd.f.kit.edu/<OE>21 /<inst> /<USERNAME> /223

# LSDFPROJECTS:
https://os-webdav.lsd.f.kit.edu/<OE>/<inst>/projects/<PROJECTNAME> /24
```

You will then be asked to enter your user name and user password:

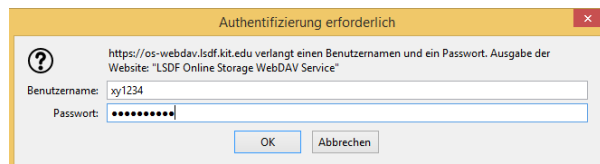


Figure 17 WebDAV authentication window

²¹ <OE> organizational unit, e.g. **scc**, **ikp**, **imk-asf** etc.

²² <inst> institute name, e.g. **scc**, **ikp**, **imk-asf** etc.

²³ <USERNAME>-User name e.g. **xyl234**, **bs_abcd** etc.

²⁴ <PROJECTNAME> Project name

Once a user has authenticated themselves, they are granted access to the system and can search their data.

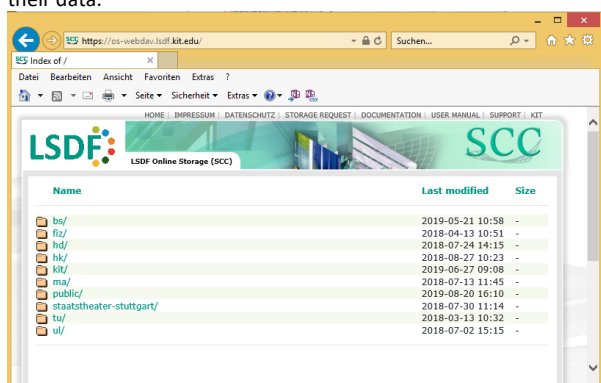


Figure 18 WebDAV use via a web browser

7.8.2 UNIX/Linux client

7.8.2.1 Access with DaviX

The DaviX²⁵ program offers a library and a range of command line tools for managing data via HTTP-based protocols.

On RedHat, CentOS or similar Linux systems, **davix** can be installed as follows:

```
$ yum install -y epel-release
$ yum install davix
```

The contents of a directory or individual files can be listed with the following command:

```
$ davix-ls -l davs://os-webdav.lsdf.kit.edu/kit/scc/xy1234
Basic authentication - server is asking for username and password:
Login: xy1234
Password:
-rwxrwxrwx 0 10485760 2019-05-20 09:29:18 testfile
```

To transfer a file (e.g. `testfile`) from the WebDAV share to your local directory copy:

```
$ davix-get davs://os-webdav.lsdf.kit.edu/kit/scc/xy1234/testfile testfile
Basic authentication - server is asking for username and password:
Login: xy1234
Password:
Performing Read operation on: davs://os-
webdav.lsdf.kit.edu/kit/scc/xy1234/testfile
[=====] 100% 10MiB/10MiB 0B/s
```

The following example shows how files with 6 transfers are uploaded recursively at the same time:

²⁵ <https://dmc.web.cern.ch/projects/davix/home>

```
$ davix-get -r6 davs://os-webdav.lsd.f.kit.edu/kit/scc/xy1234/a_new_directory
downloaded_dir
Basic authentication - server is asking for username and password:
Login: xy1234
Password:
Crawling davs://os-webdav.lsd.f.kit.edu/kit/scc/xy1234/a_new_directory/ Files
processed: 1
```

7.8.2.2 Access via a file manager

A number of different Linux file managers support WebDAV shares natively. These include, among others:

- **Nautilus** (Gnome)
- **Delphin / Konqueror** (KDE / Kubuntu)
- **Thunar** (Xfce / Xubuntu)

Perform the following steps to access an LSDF WebDAV share (e.g. a project directory) with Nautilus:

1. Open Nautilus
2. Click on 'Other Location' in the left-hand area
3. Enter the URL in the text field:
davs://os-webdav.lsd.f.kit.edu/<OE>/<inst>/projects/<PROJECTNAME>
4. Click on Connect:
The share is deployed on the local system and is available both in Nautilus and in the /run/user/<UID>/gvfs directory, where <UID> is the ID of your user account.

7.8.2.3 Access via the file system (davfs2 mount)

davfs2 is a program package that allows users to mount WebDAV storage resources in the local file system. Files can then be accessed as if they were stored locally, without the need for further knowledge of HTTPS or WebDAV.

On RedHat, CentOS or similar Linux systems, davfs2 can be installed as follows:

```
$ yum install -y epel-release
$ yum install davfs2
```

To mount an LSDFOS storage project via WebDAV, enter the following command as the root user. The command `mount.favfs2` is normally also called by the `mount program` if the parameter `'-t davfs'` has been specified:

```
$ mount.davfs -o username=xy1234 https://os-
webdav.lsd.f.kit.edu/<OE>/<inst>/projects/<PROJECTNAME> <MOUNTPOINT>26
or
$ mount -t davfs -o username=xy1234 https://os-
webdav.lsd.f.kit.edu/<OE>/<inst>/<LSDFHOMES> <MOUNTPOINT>
```

For example:

```
26 <MOUNTPOINT> mount point e.g. /mnt/webdav
```

```

$ mkdir /mnt/webdav
#LSDF
$ mount.davfs https://os-webdav.lsd.fkit.edu/kit/scc/xy1234 /mnt/webdav
Please enter the username to authenticate with server
https://os-webdav.lsd.fkit.edu/ or hit enter for none.
Username: xy1234
Please enter the password to authenticate user xy1234 with server
https://os-webdav.lsd.fkit.edu/kit/scc/xy1234 or hit enter for none.
Password: xxxx
mount.davfs: Warning: can't write entry into mtab, but will mount the file system
anyway
$ cd /mnt/webdav

#LSDFPROJECTS
$ mount.davfs -o username=xy1234 https://os-webdav.lsd.fkit.edu/kit/scc/projects
/mnt/webdav >/dev/null 2>&1

#LSDFHOME
$ mount.davfs -o username=xy1234 https://os-webdav.lsd.fkit.edu/kit/scc/xy1234
/mnt/webdav >/dev/null 2>&1

```

Successful davfs mounts can be checked with the following command:

```

$ mount | grep webdav
https://os-webdav.lsd.fkit.edu/kit/scc/xy1234 on /mnt/webdav type fuse
(rw,nosuid,nodev,relatime,user_id=0,group_id=0,allow_other,max_read=16384)

```

davfs2 can also be used by non-privileged users. To do so, they must belong to the **davfs2** group:

```

$ usermod -a -G davfs2 xy1234
$ grep davfs2 /etc/group

```

User-specific login information can be provided in the file `/etc/davfs2/secrets` or `~/.davfs2/secrets`.

The WebDAV mount can be carried out with the help of an entry in the `/etc/fstab` file:

```

$ cat /etc/fstab | grep webdav
https://os-webdav.lsd.fkit.edu/kit/scc/projects /mnt/webdav davfs
rw,noauto,user,uid=xy1234 0 0

$ chmod 600 ~/.davfs2/secrets

$ cat ~/.davfs2/secrets | grep os-webdav
https://os-webdav.lsd.fkit.edu/kit/scc/projects xy1234 ***

$ mount /mnt/webdav

```

Execute the following command to cancel a deployment:

```

$ umount.davfs /mnt/webdav
umount.davfs: waiting while mount.davfs (pid 23822) synchronizes the cache ... OK

```

7.8.2.4 Access via cadaver

cadaver is a WebDAV command line client. **cadaver** allows you to access the LSDF with an FTP-like tool in an interactive shell.

On RedHat, CentOS or similar Linux systems, **cadaver** can be installed as follows:

```
$ yum install cadaver
```

For example:

```
$ cadaver https://os-webdav.lsd.f.kit.edu/kit/inst/xy1234
dav:/kit/inst/xy1234/> help
Available commands:
ls cd pwd put get mget mput
edit less mkcol cat delete rmdir copy
move lock unlock discover steal showlocks version
checkin checkout uncheckout history label propnames chexec
propget propdel propset search set open close
echo quit unset lcd lls lpwd logout
help describe about
Aliases: rm=delete, mkdir=mkcol, mv=move, cp=copy, more=less, quit=exit=bye
```

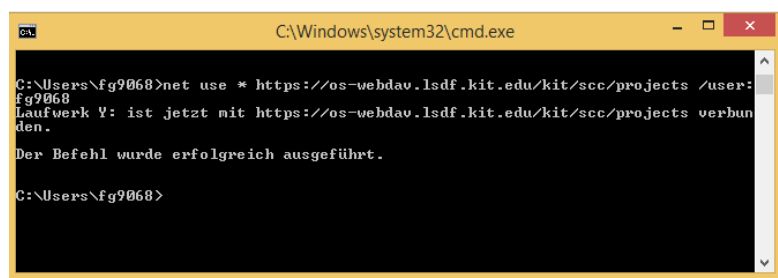
7.8.3 Windows Client

The following describes how you can use LSDF storage projects via the WebDAV protocol on Windows operating systems.

7.8.3.1 Connecting a network drive with the net command

The following example shows how you can integrate a storage project as a network drive using the WebDAV protocol with the **net** command:

```
$ net use * \\os-webdav.lsd.f.kit.edu@SSL\kit/scc/projects/ /user:xy1234
or
$ net use * https://os-webdav.lsd.f.kit.edu/kit/scc/projects /user:xy1234
```



```
C:\Windows\system32\cmd.exe
C:\Users\fg9068>net use * https://os-webdav.lsd.f.kit.edu/kit/scc/projects /user:fg9068
Laufwerk Y: ist jetzt mit https://os-webdav.lsd.f.kit.edu/kit/scc/projects verbunden.
Der Befehl wurde erfolgreich ausgeführt.
C:\Users\fg9068>
```

Figure 19 cmd window: Network drive connection via net-Command

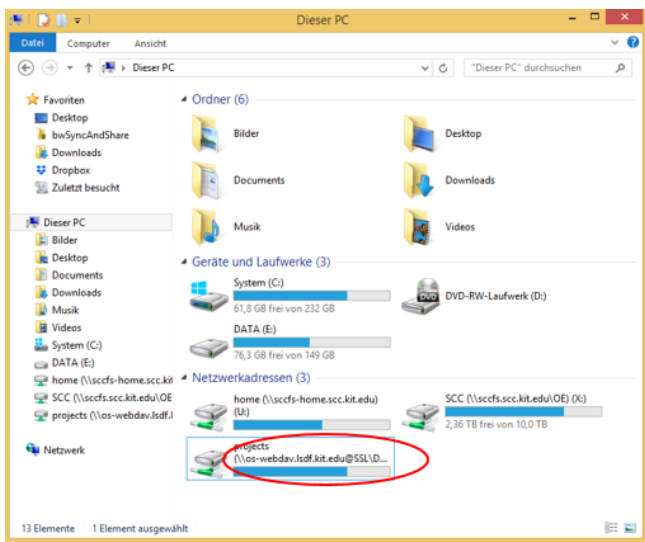


Figure 20 Explorer view of a network drive connection

7.8.3.2 Connecting a network drive with Windows Explorer

To connect a network drive, click on "Connect network drive" in Windows Explorer

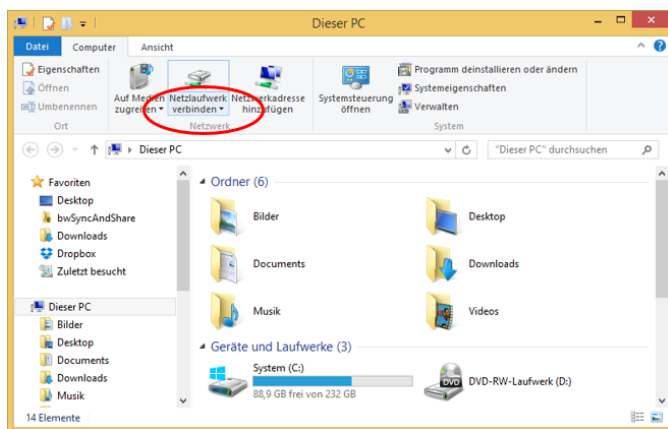


Figure 21 Explorer view of a network drive connection

Click on "Connect to a website where you can save documents and images"

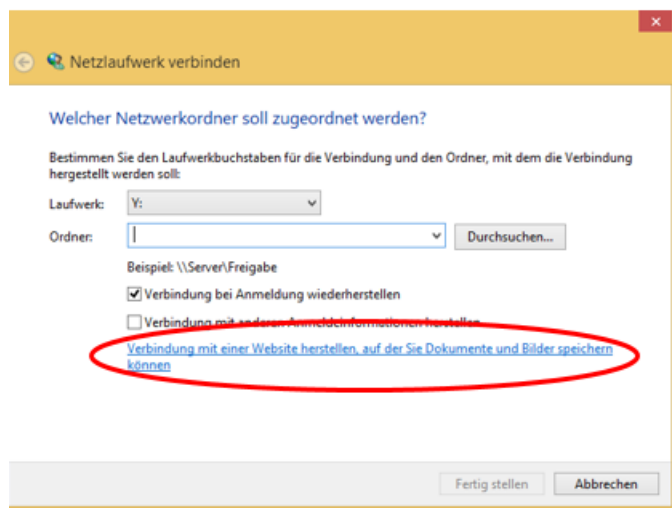


Figure 22 Explorer window Connect network drive

In the next step, select "Add a network address", "Select a user-defined network address", enter the WebDAV address of your storage project and authenticate yourself:

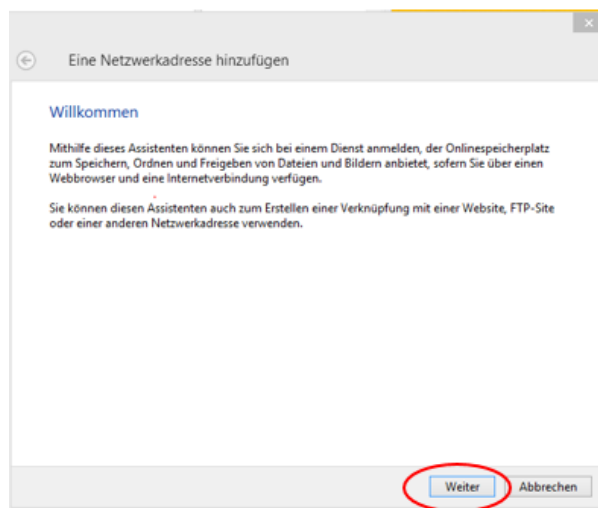


Figure 23 Explorer window: Add a network address

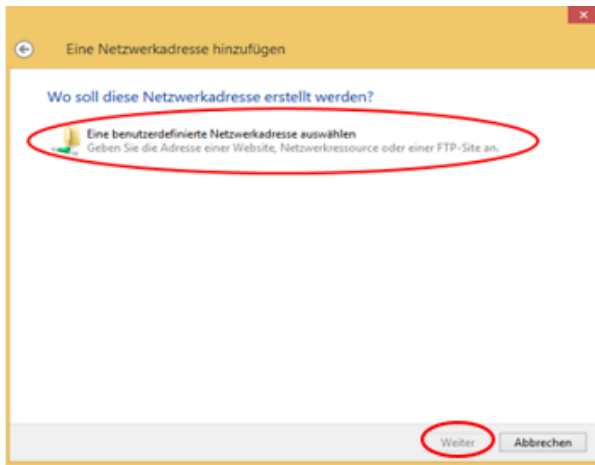


Figure 24 Explorer window: Add a network address

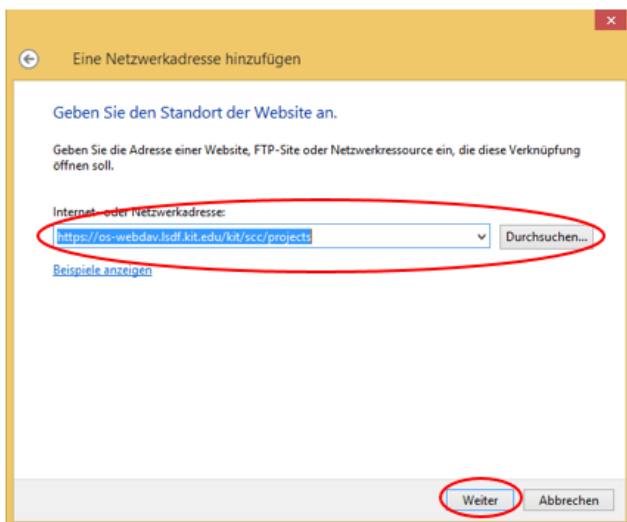


Figure 25 Explorer window: Add a network address

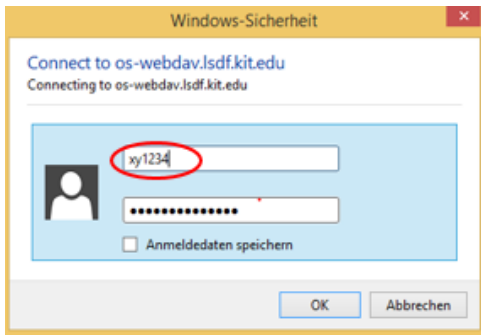


Figure 26 Windows authentication window

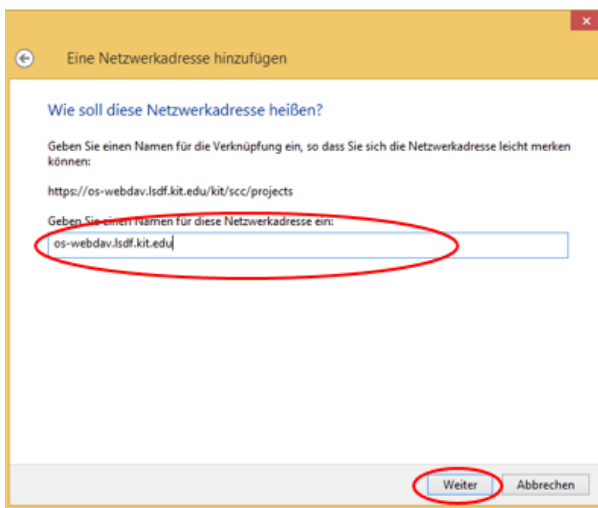


Figure 27 Explorer window: Add a network address

Then select "Finish":

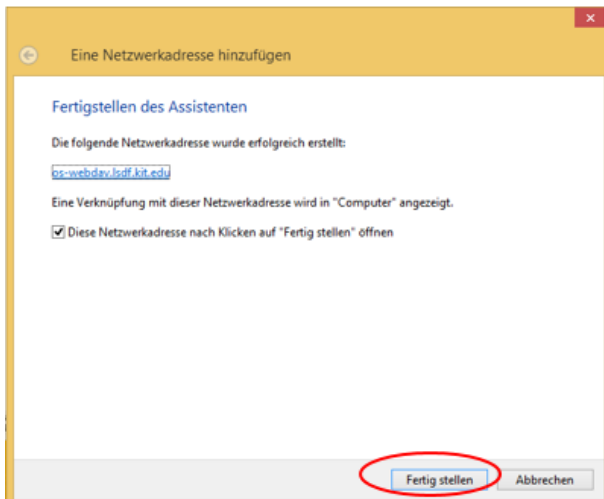


Figure 28 Explorer window: Add a network address

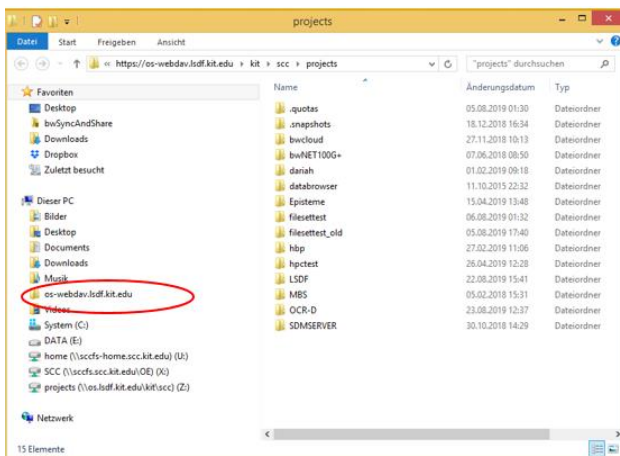


Figure 29 Explorer window: Network address os-webdav.lsdff.kit.edu

A new window opens showing the contents of the share.

7.9 Connection to the HPC clusters at KIT

Users who have access to both the "LSDF Online Storage" service and the HPC clusters of the KIT can easily exchange data between the "LSDF Online Storage" and the home and work directories of the HPC clusters, have direct read access to data stored in the "LSDF Online Storage" and store data directly in the "LSDF Online Storage".

Commented [Author1]: Change hostname

The `rdata tool` can be used to exchange data between the LSF Online Storage and the respective home and work directories of the HPC clusters. The `rdata tool` executes the transfer commands asynchronously, remotely and with load balancing on "mover nodes" specially equipped for this task. Please refer to the man page (`man rdata`) for the exact command scope and syntax of the `rdata tool`.

Direct access to the LSF online storage is available on the ForHLR I + II. This is permanently mounted on the login nodes²⁷ and the datamovers. On the compute nodes, LSF usage is specified to the [batch system](#) via "`#SBATCH --constraint=LSDF`"²⁸. The environment variables `$LSDF`, `$LSDFHOME` and `$LSDFPROJECTS` are set at login for both interactive and batch use.

8 rsync and cp use

`rsync` is a program for synchronizing data, usually via a computer network. With `rsync`, synchronization takes place from a source directory to a target directory.

An important feature of `rsync` is that it can not only copy entire files, but also parts of files. If a file has been changed on the source data carrier, only the changed parts of this file are transferred to the target system in order to save time.

`rsync` transfers a file from a server to a target file on a client. If this target file already exists, `rsync` checks whether it has changed compared to the source file and then synchronizes the target file with the source.

After each `rsync process`, the return values should be checked with the command (`echo $?`).

For example:

```
#!/bin/bash
rsync -r -z -c /source_path/source_dir/ /mountpoint/lcdf_path/target_dir/
if [ "$?" -eq "0" ]
  echo "rsync was successful"
fi
```

You can use `rsync` via the SSH protocol with the LSF login cluster `os-login.lcdf.kit.edu`. `rsync` can also synchronize data directly via a mount point (e.g. `sshfs`, `davfs2` or `cifs mount`) or a network drive.

`cp` (for copy) is a command in a Unix shell for copying files:

```
$ cp -rd /source_path/source_dir /lcdf_path/
```

Attention: If you use the commands "`cp -a`", "`cp -p`" (or `--preserve=all`) or "`rsync -a`" (or `--group`) for a data transfer towards `$LSDFPROJECTS`, the original groups (e.g. HPC GIDs) are transferred. We therefore recommend avoiding the "`-a`" option and using LSF project groups (or

²⁷ Some limits are set on the HPC login nodes

e.g. Cpu time limit: 3600s

Virtual memory limit: 8GB

²⁸ https://wiki.scc.kit.edu/hpc/index.php/ForHLR_-_SLURM_Batch_Jobs#LSDF_Online_Storage

GIDs) in the LSF area. The options in the following example correspond to the '-a' option without '-group'. An s-bit (sticky bit) is automatically set for all subfolders:

```
Set #s-bit (or sticky bit) for the destination folder if missing,
Correct #GID if incorrect:
$ ssh xy1234@os-login.lsf.kit.edu
$ chmod -g+s /lsdf_path/
$ chgrp lsf-project-group /lsdf_path

#rsync via ssh
$ rsync -uva --no-g --chmod=Dg+s --rsh="ssh -c es128-gcm@openssh.com -p 22"
/source_path/source_dir/ xy1234@os-login.lsf.kit.edu:/lsdf_path/target_dir/
1>/tmp/xy1234.msg 2>/tmp/xy1234.err
xy1234@os-login.lsf.kit.edu's password:
$ echo $?
```

Below is an example in which `cp` is called with the options "`--preserve=mode,timestamps`":

```
Set #s-bit (or sticky bit) for the destination folder, if missing
Correct #GID if incorrect:
$ ssh xy1234@os-login.lsf.kit.edu
$ chmod -g+s /lsdf_path/
$ chgrp lsf-project-group /lsdf_path

$ cp -r --preserve=mode,timestamps /source_path/source_dir /lsdf_path/
```

9 File recovery

Section 4 already referred to the regularly created snapshots. The following section describes how the snapshots can be used to restore older files or files that may have been accidentally deleted.

9.1 Recovery on the login cluster

The following procedure can be used to restore older file versions or deleted files via an SSH access computer.

In our 1st example, we assume that the user has deleted the `tests.txt` file in their own user directory.

The user `xy1234` logs onto the SSH access computer `os-login.lsf.kit.edu` and changes to the directory `/lsdf/kit/snapshots`. The user directory snapshots from the last few days are available there. The user changes to the directory from e.g. `18.08.2017` and copies the previously deleted `tests.txt` file to their personal storage area.


```

$ ssh xy1234@os-login.lsd.f.kit.edu
$ cd $SNAPSHOTS
$ ls
daily-2017.08.12-02.00.12      monthly-2017.05.31-22.00.12
daily-2017.08.13-02.00.12      monthly-2017.06.30-22.00.12
daily-2017.08.14-02.00.12      monthly-2017.07.31-22.00.12
daily-2017.08.15-02.00.12 weekly-2017.07.23-13.30.12
daily-2017.08.16-02.00.12 weekly-2017.07.30-13.30.12
daily-2017.08.17-02.00.12 weekly-2017.08.06-13.30.12
daily-2017.08.18-02.00.12 weekly-2017.08.13-13.30.12
$ cd daily-2017.08.18-02.00.12/ka_scc/ka_xy1234
$ ls
snapshots temp tests.txt
$ cp tests.txt $LSDF/

```

In our 2nd example, we assume that the user has deleted the `tests.txt` file in a project directory.

The user `xy1234` logs in on an SSH access computer `os-login.lsd.f.kit.edu` and changes to the directory `/lsdf/kit/inst/projects/.snapshots`. The snapshots of the institute's project directories from the last few days are available there. The user changes to the directory from e.g. `18.08.2017` and copies the previously deleted `tests.txt` file to their personal storage area.

```

$ ssh xy1234@os-login.lsd.f.kit.edu
$ cd $PROJECTSNAPSHOTS
$ ls
daily-2017.08.12-02.00.12      monthly-2017.05.31-22.00.12
daily-2017.08.13-02.00.12      monthly-2017.06.30-22.00.12
daily-2017.08.14-02.00.12      monthly-2017.07.31-22.00.12
daily-2017.08.15-02.00.12 weekly-2017.07.23-13.30.12
daily-2017.08.16-02.00.12 weekly-2017.07.30-13.30.12
daily-2017.08.17-02.00.12 weekly-2017.08.06-13.30.12
daily-2017.08.18-02.00.12 weekly-2017.08.13-13.30.12
$ cd daily-2017.08.18-02.00.12/ka_scc/ka_xy1234
$ ls
snapshots temp tests.txt
$ cp tests.txt $LSDFPROJECTS/Path

```

10 Archiving

The state service [bwDataArchive](https://www.rda.kit.edu/)²⁹ offers a solution for long-term data archiving. Data archiving includes the reliable storage of large data sets for a period of ten years or more. The service enables qualified implementation of the recommendations of the German Research Foundation (DFG) for securing and storing research data.

Further information on the `bwDataArchive` service can be found on the [FAQ pages](#).³⁰

²⁹ <https://www.rda.kit.edu/>

³⁰ http://wiki.scc.kit.edu/lsdf/index.php/BwDataArchiv_FAQs

11 User support

We are happy to support you with the use of "LSDF Online Storage". If you have any questions, comments or requests, please contact the "LSDF Online Storage" team via the [BW support portal](#).³¹

Further information can be found on the LSDF Online Storage [Wiki pages](#).³²

³¹ <https://bw-support.scc.kit.edu>

³² http://wiki.scc.kit.edu/lsdf/index.php/Category:LSDF_Online_Storage