

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

Scientific Computing Center, KIT

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1 Introduction

The Large Scale Data Facility (LSDF) is an online storage service provided by the Scientific Computing Center (SCC) at the Karlsruhe Institute of Technology (KIT). It offers researchers at KIT, at state-funded universities in Baden-Württemberg and within the Helmholtz Association – as well as their cooperation partners – access to a large-scale hard disk storage system specifically designed for storing research data from data-intensive scientific disciplines. Access is ensured via standard protocols. Data security and protection are implemented according to current technological standards. The service is not suitable for storing personal data.

2 registration

To use the "LSDF Online Storage" service, interested users must first register. Registration is only possible if the user has previously been assigned a specific entitlement. Users typically receive this entitlement after consulting with their responsible IT consultant or group representative, or, if no project has yet been set up, by submitting a separate [application to the service provider](#)¹. Technically, the entitlement is represented by membership in one or more project groups "<Institute Name>-<Project Name>-LSDF".

Registration and group updates are² done via the web interface of the [bwIDM web portal](#)^{3,4}

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

¹ <https://www.lsdff.kit.edu/os/storagerequest>

²For a group synchronization (e.g., when a new project group has been created), users should log in to the bwIDM web portal. (<https://bwidm.scc.kit.edu>) log in again

³ <https://bwidm.scc.kit.edu/user/register-service.xhtml?ssn=lsdf>

⁴In some cases, display problems may occur at KIT when using Internet Explorer (IE). These can be resolved by opening IE and then pressing the ALT key to display the menu bar. Next, select "Compatibility View settings" from the "Tools" menu and uncheck the box next to "Display intranet sites in Compatibility View".

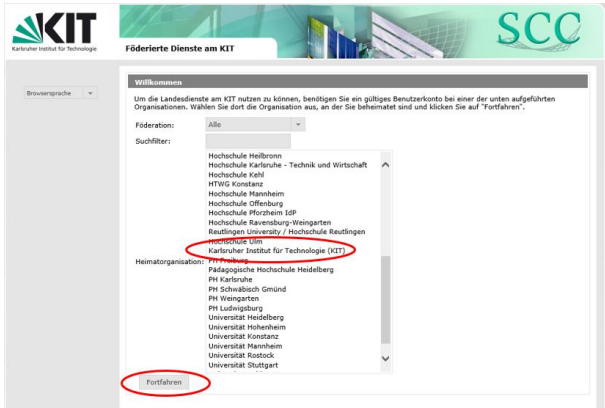


Figure 1 Selection of the organization

You will then be redirected to your organization's IDP page, where you will need to log in using your organization's access credentials.

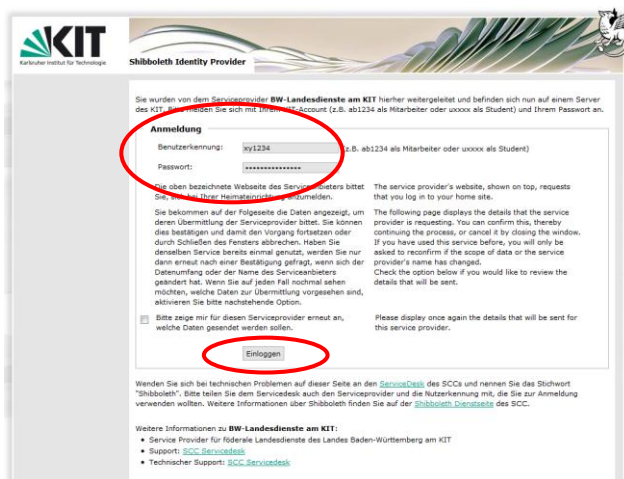


Figure 2 Registration via Shibboleth with your organization – in the example KIT

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 service. Select "I have read and agree to the terms of service" and then click "Register".

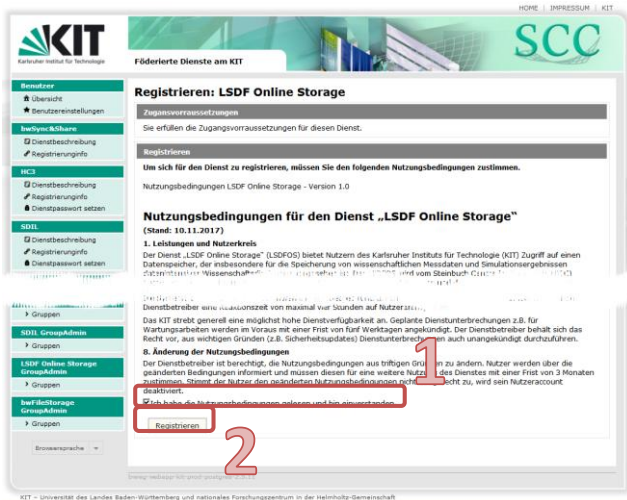


Figure 3 Register for the "LSDF Online Storage" service

Should you receive the error message: "LSDF Online Storage Entitlement is not being provided by the home organization," please contact your ITB or group representative to be added to an existing project group, or, if no project has yet been set up, contact the service provider to request a new project. In this case, a [storage request form should](https://www.lsdf.kit.edu/os/storagerequest)⁵ be completed first.

You can access the [terms of use](http://www.scc.kit.edu/downloads/sdm/Nutzungsbedingungen-LSDF-Online-Storage.pdf)⁶ at any time later.

Users who use the CIFS protocol for data access must now set a service password. Click on the "Set service password" link and choose a password. Please enter this password later during authentication instead of your usual KIT password when using CIFS.

⁵ <https://www.lsdf.kit.edu/os/storagerequest>

⁶ <http://www.scc.kit.edu/downloads/sdm/Nutzungsbedingungen-LSDF-Online-Storage.pdf>

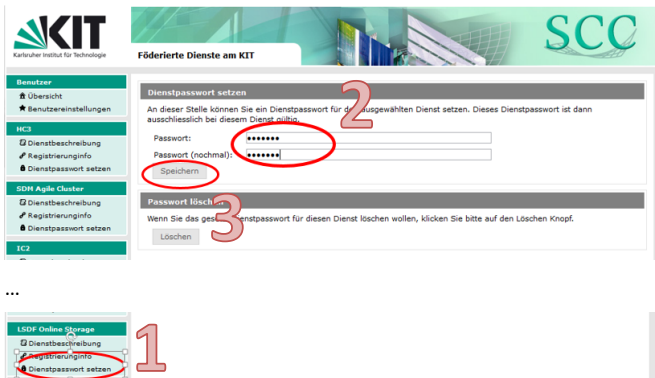
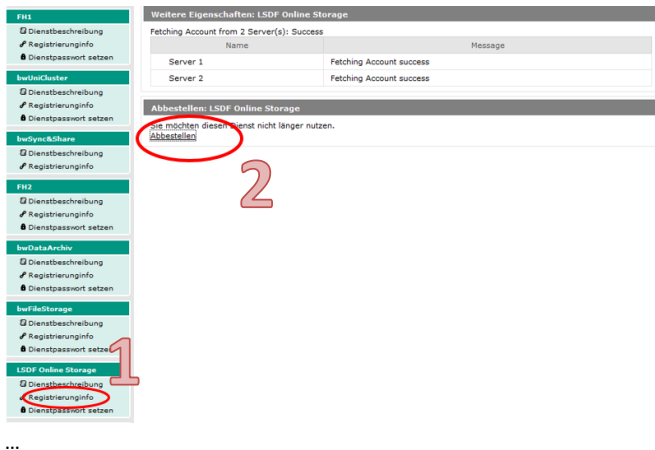


Figure 4 Set service password for the LSDF Online Storage service

3 Cancellation

If you no longer wish to use the service, you can cancel it. To do so, on the [bwIDM web portal](https://bwidm.scc.kit.edu),⁷ under "LSDF Online Storage," select "Registration Info" and then under "Cancel: LSDF Online Storage," select "Cancel." Confirm again by clicking "Cancel." After the service has been canceled, access to the data will be blocked. In this case, the terms of service under "Deprovisioning" apply.



⁷ <https://bwidm.scc.kit.edu>

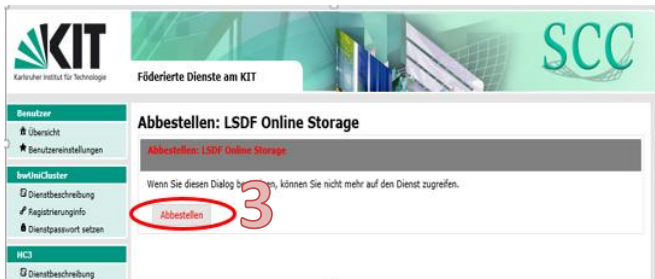


Figure 5 Unsubscribing from the service

Automatic cancellation occurs as soon as a user loses their account at their home institution.

4 Snapshots and versioning

Snapshots allow you to save the current state of data in a file system. This gives users the opportunity to undo changes they made to their data after a snapshot was created. It also makes it easy to recover files that have already been deleted. Details on recovering deleted files are described in Section 9. Snapshots can be created daily, weekly, or monthly for LSDF Online Storage. Snapshots thus also provide a form of version control.

5 Backup

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

6 Directory structure

Each user receives a directory for their personal use only (**user directory**). In addition, **project directories are** set up upon request, intended for shared use by groups of users. Available storage space is limited at the user or group level and is technically implemented through quotas. It is generally possible to temporarily exceed the allocated quota ("soft limit") up to an upper limit ("hard limit"). An increase in existing quotas can be requested via the [BW support portal](https://bw-support.scc.kit.edu).⁸

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

	Backup	Quota	Directory / Location / Remarks
User directory	Yes	Yes, with standard values:	Directory:

⁸ <https://bw-support.scc.kit.edu>

		SL 100GIB HL ⁹ 400GIB	/lsdf/kit/ <prim.gidName> ¹⁰ /<<loginName> ¹¹ 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 ¹²	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 passwordless access via https ¹³)	no	Reference to existing project directory. Upon request.	Directory: /lsdf/public/ <prim.gidName>/projects/<projectName>/<publicName> ¹⁴

7 Access logs

Access to data stored in LSDF Online Storage is enabled 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) . Their use is illustrated below.

7.1 Overview of available protocols

The following table provides an overview of all available protocols.

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

⁹ SL="soft limit"; HL="hard limit"

¹⁰ <prim.gidName>: Name of the primary group, e.g. . **scc**, **ikp**, **imk-asf** etc.

¹¹ <loginName>: Name of the account, e.g. **xy1234**, **bs_abcd** , etc.

¹² <https://www.lsd.f.kit.edu/os/storagerequest>

¹³ <https://os-webdav.lsd.f.kit.edu/public>

¹⁴ <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, meaning they can map it as a network drive. The share names and the addresses to be used are agreed upon individually.

Directories are accessed via a group of NFS servers located at `os.lsd.f.kit.edu` are reachable, exported.

```
$ 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 mounting a directory.

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

hardcoding on the NFS clients. and **intr** To use options. A hard mount and **intr** ¹⁵(interruptible) allow the application to ensure a successful write operation. A soft mount (`-o soft`) is not recommended due to the risk of data loss or damage.

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

7.3 Access via Common Internet File System (CIFS)

Access via the CIFS protocol is only possible within 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, Figure 4 “Set service password for the LSDf Online Storage service”).

Directories are shared via a group of CIFS servers accessible at the address `os.lsd.f.kit.edu`.

7.3.1 UNIX/Linux Client

To access a network share from a Unix operating system, you need a [Samba client](#) or CIFS utilities. Most CIFS packages include Samba for Linux ¹⁶.

7.3.1.1 Access via SAMBA client

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

¹⁵ The `intr` option is deprecated as of kernel 2.6.25.

¹⁶ <http://www.samba.org>

```
$ smbclient -L os.lsd.f.kit.edu -U 'os.lsd.f.kit.edu\xy1234' -m SMB2
Enter os.lsd.f.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 using an FTP-like tool in an interactive shell:

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

<share> ¹⁷here refers to the name of the share.

For example :

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

7.3.1.2 Mounting a share

Furthermore, you can also mount a share to a local directory (e.g. , /mnt/cifs). However, this usually requires root privileges on the local system.

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

or

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

¹⁷<share> examples:

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

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

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

For example:

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

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

Verify that the mount command was successful by entering the `mount` command without any arguments:

```
$ mount | grep cifs
//os.lsdf.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.lsdf.kit.edu/kit/inst/xy1234 /mnt/cifs cifs uid= xxxx,gid=
yyyy,credentials=/path_to_user_HOME/credentialsfile,auto 0 0
# xy1234 : LSDF Online Storage user
# xxxx/yyyy : user uid/gid

$ cat /path_to_user_HOME/credentialsfile
username=xy1234
password=*****
domain=os.lsdf.kit.edu

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

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

7.3.2 Windows Client

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

7.3.2.1 Universal Naming Convention (UNC) syntax

Use Windows Explorer and enter the path to the share `<share>`. Enter the following into the address bar using UNC syntax:

```
\\os.lsdf.kit.edu
```

or

```
\\os.lsdf.kit.edu\<share>
```

For example:

```
\\os.lsdf.kit.edu\kit\
```

After entering the UNC path, the following window appears:

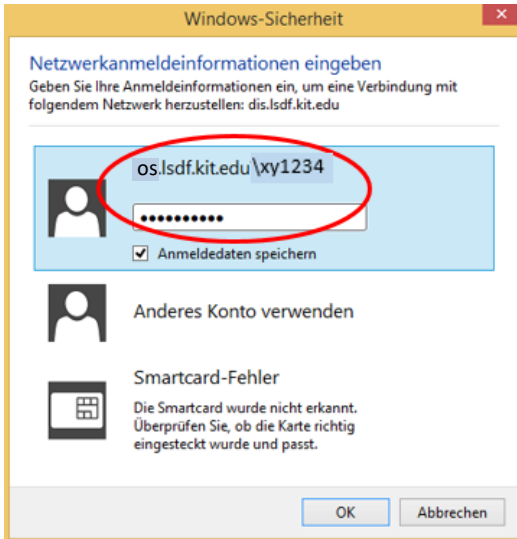


Figure 6 Windows authentication window

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

7.3.2.2 Connecting a network drive to Windows Explorer

To connect a network drive, click "Map network drive" in Windows Explorer.

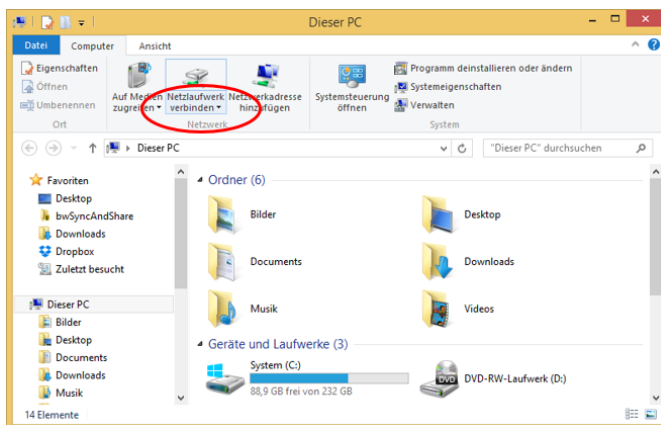


Figure 7 Explorer view of a network drive connection

Specify a drive letter to assign to the share and enter the network path (for example: `\\os.lsd.f.kit.edu\<share>`). Check the box for "Connect using different credentials" if these differ from your local credentials.

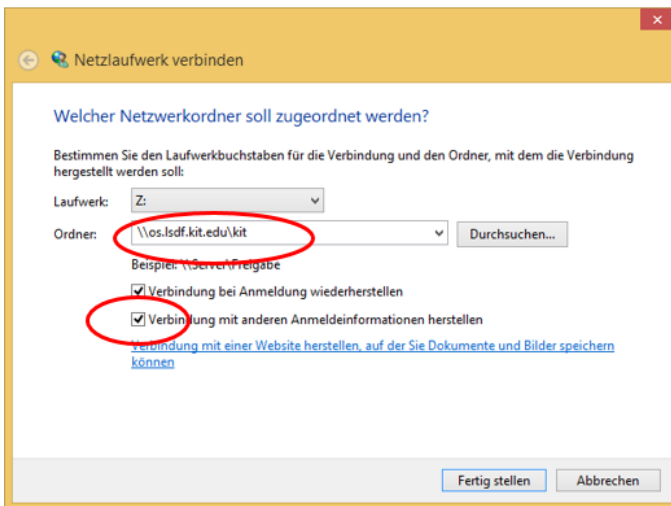


Figure 8 Explorer window: Connect network drive

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

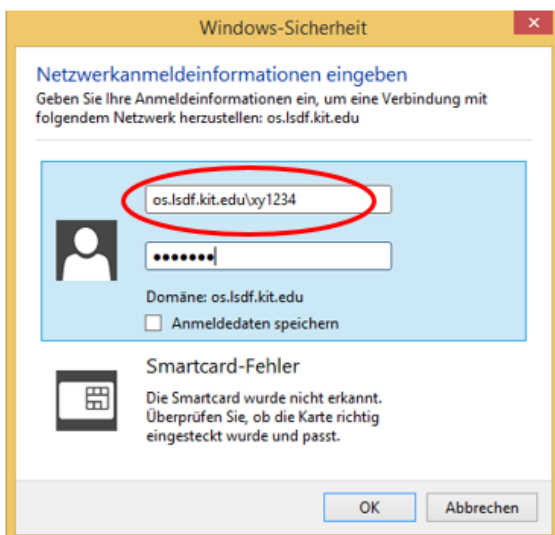


Figure 9 Windows authentication window

After successful authentication, the new drive will be displayed in Explorer.

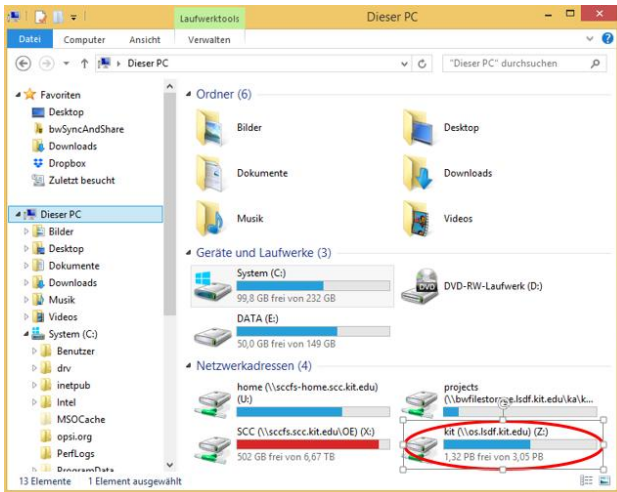


Figure 10 Network drive connected with Explorer

A new window will open, displaying the contents of the share.

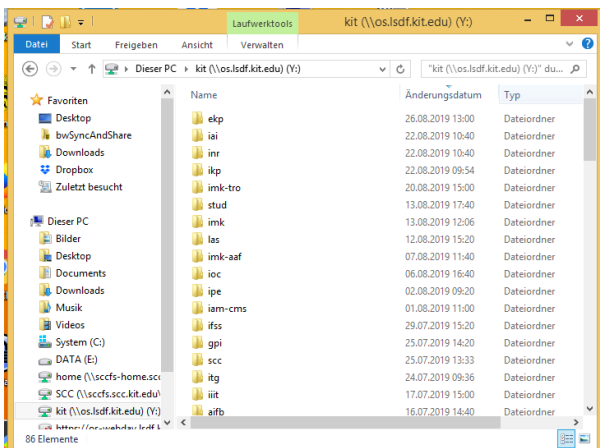


Figure 11 Network drive connected with Explorer

7.4 Access via Secure Shell (SSH)

SSH access to the data in "LSDF Online Storage" is provided. This access is also used for data transfers via `scp`, `sftp`, `sshfs` mount, and `rsync`. The CPU-intensive processes are blocked on the access computer. Access is via a cluster of servers reachable at `os-login.lsdff.kit.edu`.

7.4.1 UNIX/Linux Client

Example of access via `ssh` under Linux¹⁸:

```
$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 work computer 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 ensure you only need to enter your password once per session, execute the following command:

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

Afterwards, access to the "LSDF Online Storage" is possible without entering a 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-driven data management, the following environment variables were 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 use the SSH/SCP/SFTP protocols on a Windows computer, a suitable 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/

¹⁸Windows users can also use this, depending on the `SSH` product they are using. Please visit the relevant websites.

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

The product list is not exhaustive and represents only a selection. The following example shows how to access it using PuTTY:

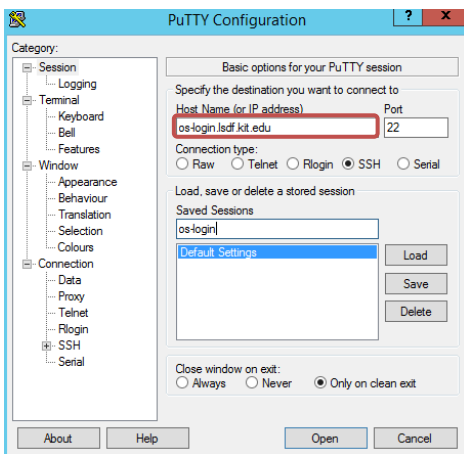


Figure 12 Using PuTTY on a Windows computer

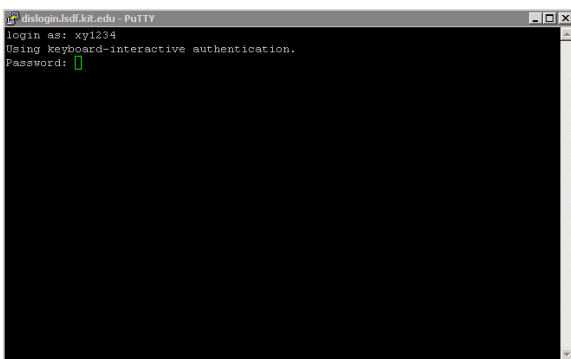


Figure 13: Using PuTTY from a Windows computer

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 data to or from 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:~/

# Copying 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 ~/
```

Using SCP, high data transfer rates can be achieved through the use of efficient algorithms for transport encryption during data transmission. In tests, we achieved¹⁹ high throughput rates using CPUs with the AES instruction set and 10 Gbit Ethernet connections.

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

For example:

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

We recommend the following as 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 illustrated in the following image using WinSCP as an example. The fields marked in red must be filled in accordingly.

¹⁹The Advanced Encryption Standard (AES) instruction set extension is an extension for Intel and AMD processors. This instruction set extension was designed to accelerate AES encryption and decryption.

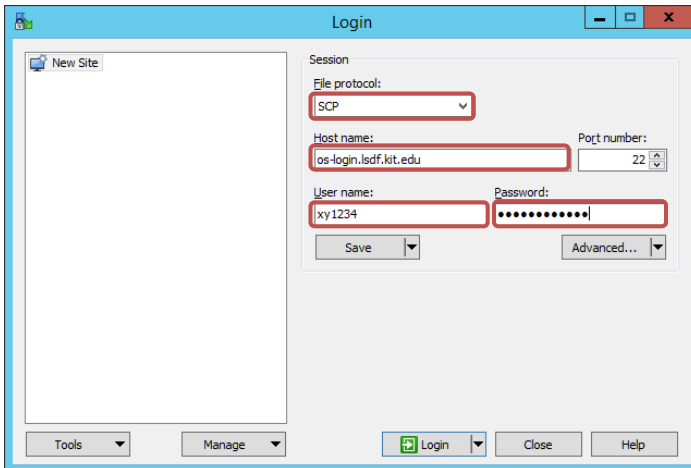


Figure 14 WinSCP usage from a Windows computer

Some of the listed programs allow you to specify the encryption method to be used for securing data transmission. The same instructions apply as already 7.5.1

7.6 Access via Secure File Transfer Protocol (SFTP)

7.6.1 UNIX/Linux Client

Using SFTP is similar to the procedure described in section 7.5.1 for SCP. The following example illustrates the use of SFTP and access to a user directory.

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

7.6.2 Windows Client

The procedure for using SFTP under Windows is the same as described in section 7.5.2. The software products listed there support SFTP in addition to WinSCP.

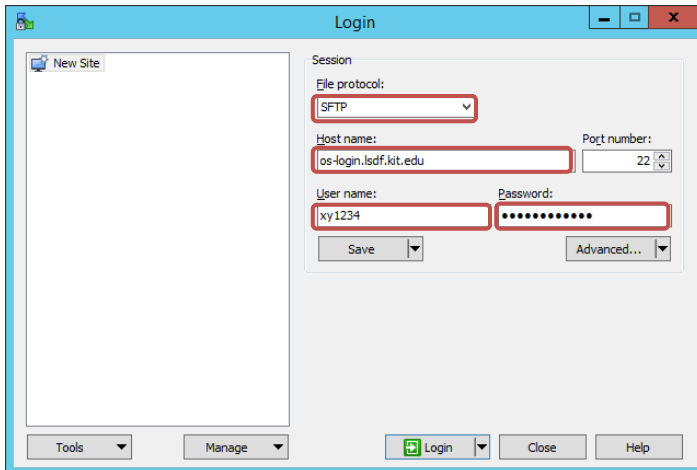


Figure 15 WinSCP usage from a Windows computer

They will then be connected.

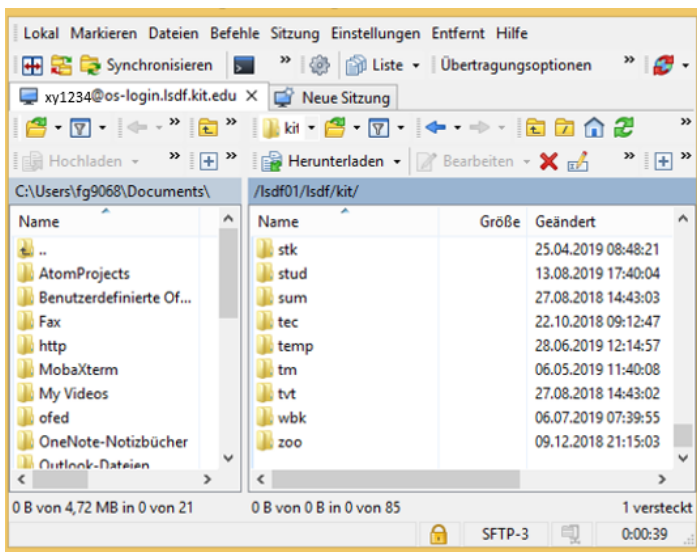


Figure 16 WinSCP usage from a Windows computer

Then, in the right-hand window, navigate to your directory and copy data, for example by dragging it from one window to the other.

7.7 Access via Secure Shell File System (SSHFS mount)

SSHFS is used to access files and directories on a remote machine as if they were local files and directories. 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 making files available over the internet. It is based on the Hypertext Transfer Protocol. WebDAV access to data stored in the LSDF is provided via a cluster of servers located at <https://os-webdav.lsd.f.kit.edu> is reachable.

7.8.1 Access via a web browser

To access data stored in the LSDF via the web, enter one of the following addresses into a web browser of your choice:

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

# LSDFHOM:
https://os-webdav.lsd.f.kit.edu/<OE> 20/<inst> 21/<USERNAME> 22/

# LSDFPROJECTS:
https://os-webdav.lsd.f.kit.edu/<OE>/<inst>/projects/<PROJECTNAME> 23/
```

You will then be asked to enter your username and password:

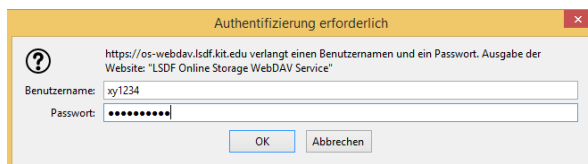


Figure 17 WebDAV authentication window

²⁰<OE> organizational unit, e.g. **scc**, **ikp**, **imk-asf** etc.

²¹<inst>-Institute name, e.g. **scc**, **ikp**, **imk-asf** etc.

²²<USERNAME> user name e.g. **xy1234**, **bs_abcd** etc.

²³<PROJRCTNAME> project name

Once a user has authenticated, they gain access to the system and can browse their data.

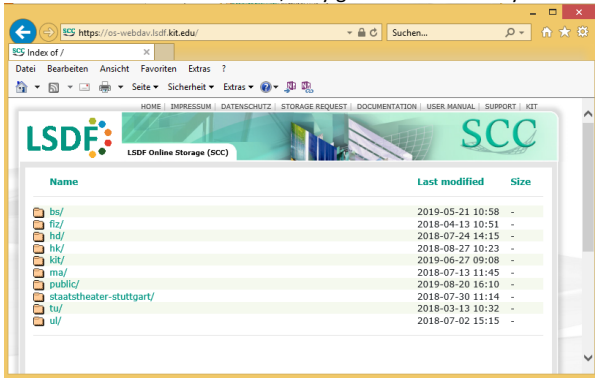


Figure 18 WebDAV usage via a web browser

7.8.2 UNIX/Linux client

7.8.2.1 Access with DaviX

The DaviX²⁴ program provides a library and a range of command-line tools for managing data over HTTP-based protocols.

On Red Hat, 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 using the following command:

```
$ davix-ls -l davs://os-webdav.lscf.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
```

This allows you to copy a file (e.g., `testfile`) from the WebDAV share to your local directory.
copy:

```
$ davix-get davs://os-webdav.lscf.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.lscf.kit.edu/kit/scc/xy1234/testfile
[=====] 100% 10MiB/10MiB 0B/s
```

The following example shows how to recursively upload files with 6 simultaneous transfers:

²⁴ <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

Several Linux file managers natively support WebDAV shares. These include:

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

To access an LSDF WebDAV share (e.g., a project directory) using Nautilus, follow these steps:

1. Open Nautilus
2. Click on 'Other Location' in the left-hand panel.
3. Enter the URL in the text field:
davs://os-webdav.lsd.f.kit.edu/<OE>/<inst>/projects/<PROJECTNAME>
4. Click Connect:
The share will be deployed to the local system and will be available in both Nautilus and 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 software package that allows users to mount WebDAV storage resources into their local file system. Access to these files then occurs as if they were stored locally, without requiring any further knowledge of HTTPS or WebDAV.

On Red Hat, 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: `mount -t davfs2` is also normally 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/<PROJECCNAME> <MOUNTPOINT>25
or
$ mount -t davfs -o username=xy1234 https://os-webdav.lsd.f.kit.edu/ <OE>
/<inst>/<LSDFHOME> <MOUNTPOINT>
```

For example :

²⁵<MOUNTPOINT> mount point e.g. /mnt/webdav

```

$ mkdir /mnt/webdav
#LSDF
$ mount.davfs https://os-webdav.lsdf.kit.edu/kit/scc/xy1234/mnt/webdav
Please enter the username to authenticate with server
https://os-webdav.lsdf.kit.edu/ or hit enter for none.
Username: xy1234
Please enter the password to authenticate user xy1234 with server
https://os-webdav.lsdf.kit.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.lsdf.kit.edu/kit/scc/projects
/mnt/webdav >/dev/null 2>&1

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

```

You can verify successful **davfs** mounts with the following command:

```

mount | grep webdav
https://os-webdav.lsdf.kit.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 This feature can be used by non-privileged users. These users must belong to the group **davfs2** .

```

$ 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` .

WebDAV mounting can be performed using an entry in the `/etc/fstab` file:

```

$ cat /etc/fstab | grep webdav
https://os-webdav.lsdf.kit.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.lsdf.kit.edu/kit/scc/projects xy1234 ***

mount /mnt/webdav

```

To unprovision, run the following command:

```

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

```

7.8.2.4 Access via *cadaver*

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

On Red Hat, 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 rmcol copy
move lock unlock discover steal showlocks version
checkin checkout uncheckout history label proppnames 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
```

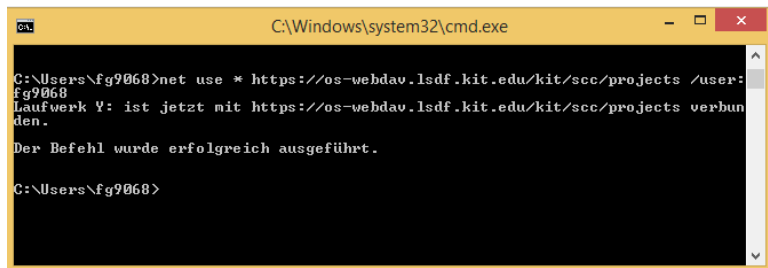
7.8.3 Windows Client

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

7.8.3.1 Connecting a network drive using the net command

to mount a storage project as a network drive using the WebDAV protocol and 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

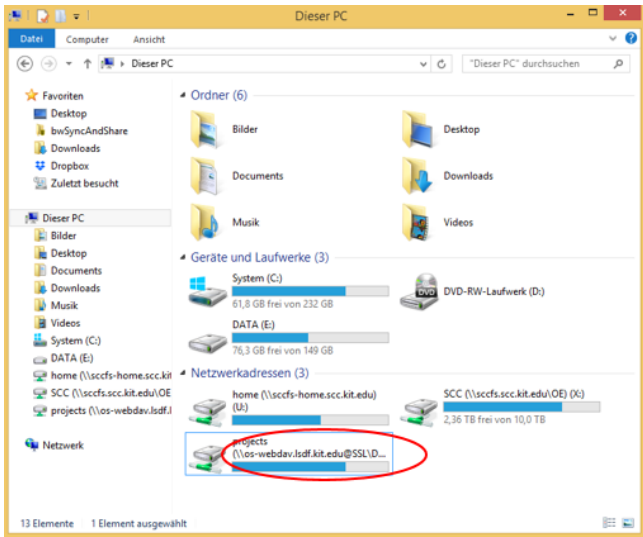


Figure 20 Explorer view of a network drive connection

7.8.3.2 Connecting a network drive to Windows Explorer

To connect a network drive, click "Map network drive" in Windows Explorer.

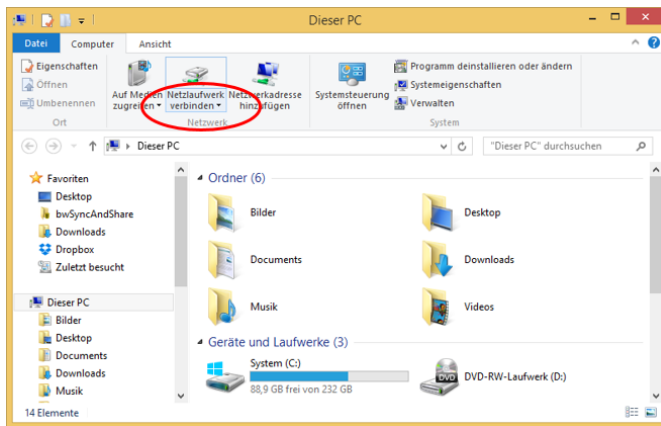


Figure 21 Explorer view of a network drive connection

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

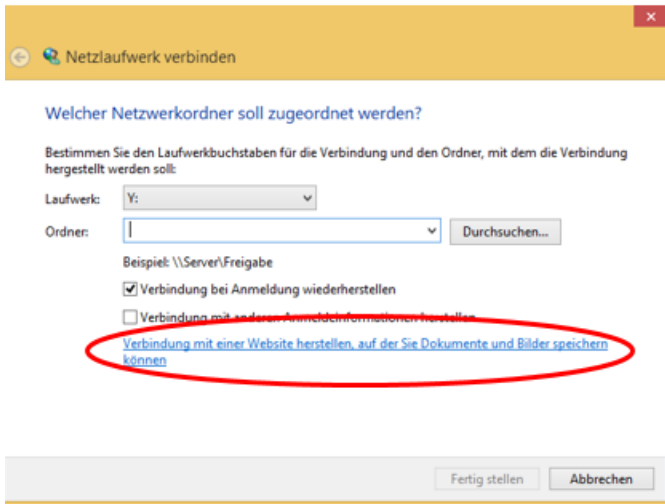


Figure 22 Explorer window Connect network drive

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

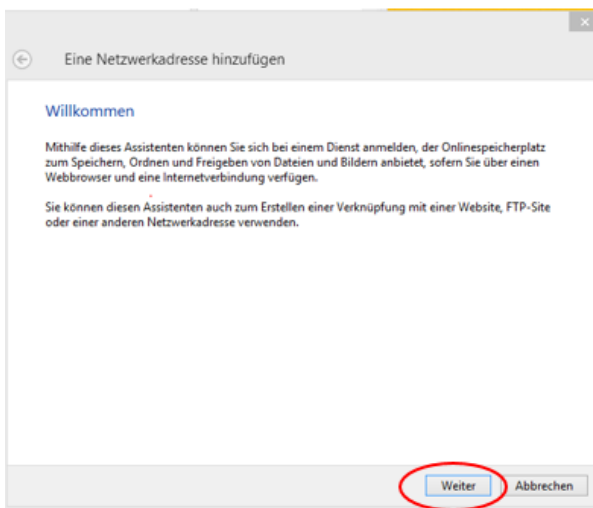


Figure 23 Explorer window: Adding a network address

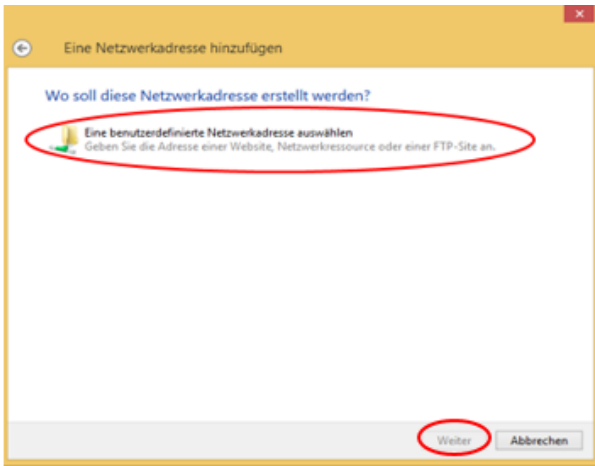


Figure 24 Explorer window: Adding a network address

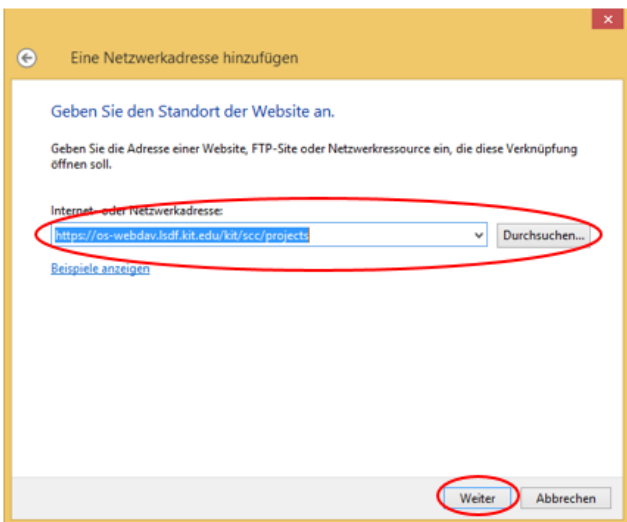


Figure 25 Explorer window: Adding a network address

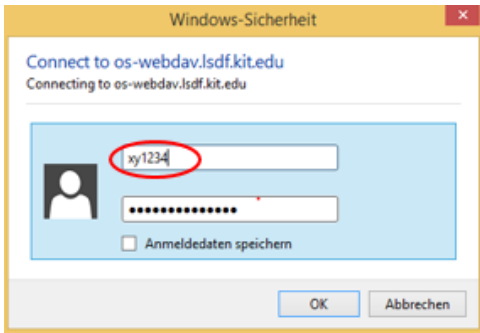


Figure 26 Windows authentication window

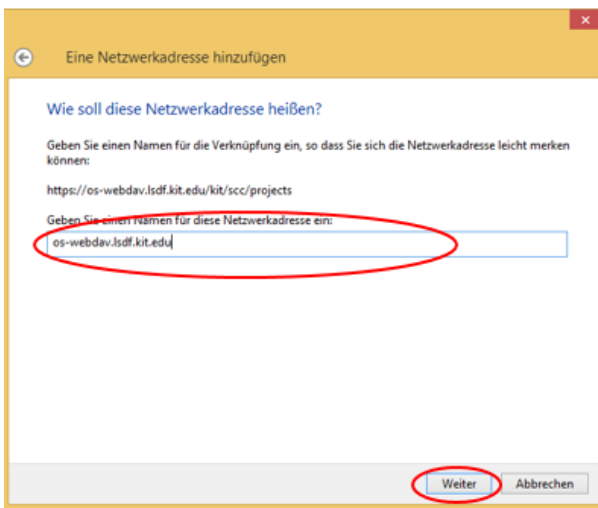


Figure 27 Explorer window: Adding a network address

Then select "Finish":

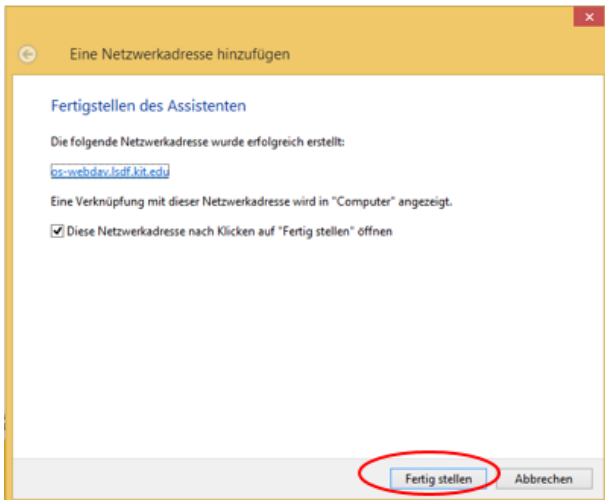


Figure 28 Explorer window: Adding a network address

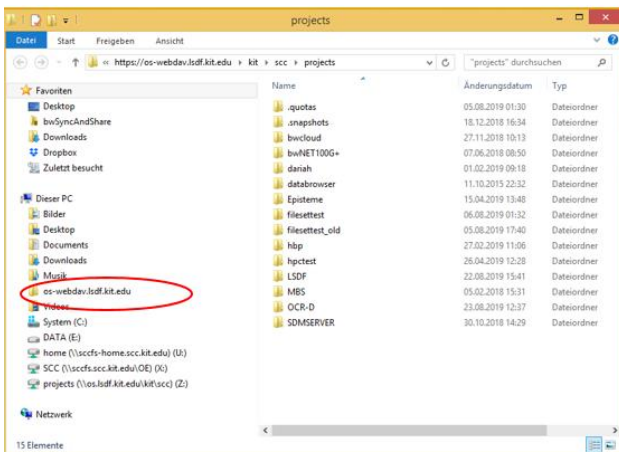


Figure 29 Explorer window: Network address os-webdav.lsdff.kit.edu

A new window will open, displaying the contents of the share.

Commented [A1]: Change hostname

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 KIT have the ability to easily exchange data between the “LSDF Online Storage” and the home and work directories of the HPC clusters, to directly read data stored in the “LSDF Online Storage”, and to save data directly in the “LSDF Online Storage”.

The `rdata tool` can be used to exchange data between the LSDF online storage and the respective home and work directories of the HPC clusters. `rdata` executes transfer commands asynchronously, remotely, and with load balancing across specially equipped "mover nodes." For the exact command set and syntax of the `rdata tool`, please refer to the man page (`man rdata`).

Direct access to LSDF online storage is available on the ForHLR I + II. This access is ²⁶permanently mounted on the login nodes and data movers. On the compute nodes, LSDF usage is specified to the [batch system](#) via "`#SBATCH --constraint=LSDF`" ²⁷. For both interactive and batch usage, the environment variables `$LSDF`, `$LSDFHOME`, and `$LSDFPROJECTS` are set upon login.

8 rsync and cp usage

`rsync` is a program for synchronizing data, usually over a computer network. Synchronization takes place when... `rsync` from a source directory to a target directory.

An important feature of `rsync` The advantage is that it can copy not only entire files, but also parts of files. If a file has been modified on the source disk, only the modified parts of that file are transferred to the target system to save time.

`rsync` Transfers a file from a server to a target file on a client. If this target file already exists, it checks. `rsync checks` if the target file has been changed compared to the source file and then adjusts the target file to match the source.

After each The return values of the `rsync` operation should be checked with the command (`echo $?`).

For example:

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

You can use `rsync` over the SSH protocol with the LSDF login cluster `os-login.lsd.f.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 /lsdf_path/
```

Caution: If you use the commands "`cp -a`", "`cp -p`" (or `--preserve=all`), or "`rsync -a`" (or `--group`) for a data transfer to `$LSDFPROJECTS`, the original groups (e.g., HPC GIDs) will

²⁶ There are some limits set on the HPC login nodes.

e.g. CPU time limit: 3600s

Virtual memory limit: 8GB

²⁷ https://wiki.scc.kit.edu/hpc/index.php/ForHLR_-_SLURM_Batch_Jobs#LSDF_Online_Storage

be retained. We therefore recommend avoiding the "-a" option and using LSF project groups (or GIDs) in the LSF area. The options in the following example correspond to the option "-a" without "-group". A sticky bit (s-bit) is automatically set for all subfolders.

```
Set the #s-bit (or sticky bit) for the target folder if it is missing.
#Correct GID if incorrect:
$ssh xy1234@os-login.lsf.kit.edu
$ chmod -g+s /lsf_path/
$ chgrp lsf-project-group /lsf_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:/lsf_path/target_dir/
1>/tmp/xy1234.msg 2>/tmp/xy1234.err
xy1234@os-login.lsf.kit.edu's password:
$ echo $?
```

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

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

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

9 File recovery

Section 4 already mentioned the regularly created snapshots. The following describes how these 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 first example, we assume that the user has the `tests.txt` file in their own has deleted the user directory.

The user `xy1234` logs onto the SSH access server `os-login.lsf.kit.edu`. The user navigates to the directory `/lsf/kit/snapshots`. This directory contains user directory snapshots from the last few days. The user then navigates to the directory from, for example, August 18, 2017, and copies the previously deleted file `tests.txt` 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 second example, we assume that the user deleted the file `tests.txt` in a project directory.

The user `xy1234` logs in to an SSH access server `os-login.lsd.f.kit.edu`. The user navigates to the directory `/lsdf/kit/inst/projects/.snapshots`. This directory contains snapshots of the institute's project directories from the last few days. The user then navigates to the directory from, for example, August 18, 2017, and copies the previously deleted file `tests.txt` 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/)²⁸ offers a solution for long-term data archiving. This data archiving includes the reliable storage of even large datasets for a period of ten years or more. The service enables the qualified implementation of the German Research Foundation's (DFG) recommendations for securing and preserving research data.

²⁸ <https://www.rda.kit.edu/>

Further information regarding the bwDataArchive service can be found on the [FAQ pages](#).²⁹

11 User support

We are happy to assist you with using "LSDF Online Storage". If you have any questions, comments or requests, please contact the "LSDF Online Storage" team via the [BW support portal](#).³⁰

Further information can be found on the LSDF Online Storage [Wiki pages](#).³¹

²⁹ http://wiki.scc.kit.edu/lsdf/index.php/BwDataArchiv_FAQs

³⁰ <https://bw-support.scc.kit.edu>

³¹ http://wiki.scc.kit.edu/lsdf/index.php/Category:LSDF_Online_Storage