

Assignment 6 - Unix

Obligatory assignment. Deadline: Thursday 11.04.2024.

The report should include all necessary commands to complete the tasks, printout from the system, explanation of what is done, the result and explanation of the result.

Remember to include the names of the group members on the front page of the report. The report can be in English or Norwegian. The report should be handed in via Canvas.

The assignment should be accomplished in groups of one to three students. Signing up for a group will be closed on Sunday 07.04.

You must select a group “Lab6 N” when delivering to see all the comments that you will get on this assignment.

Observe: Task two will require a minimum of two lab computers, and a minimum group size of two is necessary.

Observe: Before you modify an existing configuration file, save a copy of the original somewhere on the computer, e.g. below /root/origs.

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Task 1: LVM

In assignment 0 you were asked to keep at least 10GiB free space on the disk. You will need that free space in this task.

If the free space was assigned to a partition, the installation program will have set up a file system on the partition. You must remove the file system before you can use the partition with LVM.

If you did not leave 10GiB of free space on the disk, you must reinstall AlmaLinux on the computer, i.e. redo all of assignment 0.

- I did explicitly tell everybody present at the lab to show me the disk layout before starting the installation.

Actions to remove the file system of the partition are:

- If the partition is mounted, unmount the partition.
- If the partition is listed in the */etc/fstab* file, comment out or remove the entry from that file.
- If you have created a *systemd* mount unit for the partition, delete the mount unit file and reload the daemons.
- Use the **dd** tool to write zeros (*/dev/zero*) to the first 100MiB of the partition, e.g. */dev/sda4*.
 - If you pick the wrong partition, you will destroy your system!
 - In order to recover if you clear the wrong partition, first use the **dd** tool to dump the first 100MiB to a file, e.g. */root/orings/sda4.img*.

On the empty partition, create a logical volume group (VG), but keep 5GiB free space on the disk.

When you have setup the LVM group, create some LVs, and make the LVs available to the system. Then save some files on the VG.

After setting up LVM, increase the volume group by 5 GiB.

Describe and explain each step taken.

Task 2: NFS

For this task you will need two computes, one for the NFS server and the other as the NFS client.

Make sure that the user account exists in the LDAP (task 2 of assignment 5), and that the user can log in using SSSD (task 3 of assignment 5).

Move the user home directory to */share/home* on the NFS server. The user home directory should not exist on the client.

Set up the NFS server and export the directory */share/home* to the client. The exported directory should be mounted as */share/home* on the client. If necessary, modify the LDAP property *homeDirectory* to be consistent with a home directory below */share/home*.

Configure the NFS server to start at boot, and configure the client to mount the exported directory at boot. You can either create a **systemd** mount unit, or modify the */etc/fstab* file.

On the client, copy or make some changes to a file in the NFS mounted directory, and then check the attributes of that file on the server.

Please document all you have done for configuring the servers and clients.

Observe that you may need to adjust the firewall settings and/or configure SELinux to make NFS mount work. For SELinux, see e.g. [Adjusting the policy for sharing NFS and CIFS volumes using SELinux booleans](#).

For your information, the system can be configured to mount the home directory of a user when the user logs in, and unmount on logout. This can be very useful on a system with many users, to save resources.

Automatic mounting of home directories can be achieved e.g. through PAM by the **pam_mount(3)** module, or by an auto mounting system. Several auto mounting systems are available for Linux, e.g.

using a **systemd** *autmount* unit, or the *autofs* daemon.

Observe, you are not asked to configure your system to mount home directories on user login. It is sufficient in this task to mount all home directories at boot.

Task 3: Custom PAM profile for *pam_mount*

The *authselect* tool on AlmaLinux 9 does not provide any ready made feature that enables the PAM module *pam_mount*.

The task here is to create a *authselect* profile with a feature that will include *pam_mount* with SSSD.

Observe, the task here is not to use, nor configure *pam_mount* for logins, but only to create an *authselect* profile with a feature that adds the *pam_mount* module to the PAM system.

Do not modify PAM files below “*/etc/pam.d/*” that are managed by the *authselect* tool. You will need to modify though files below “*/etc/authselect/custom/*”. Be careful not to modify any of the files of “*/usr/share/authselect/default/*”, i.e. the files that you modify must not be soft links.

To solve this task you must create a custom profile based on the SSSD profile. Add a feature to the profile that adds the PAM module *pam_mount*. Name the feature *with-mount*.

The RPM package for the *pam_mount* module is currently not available in the official repositories for EL9. It is available though for EL8.

I have repacked the Fedora 39 version of *pam_mount* for EL9. The packages are available from the host *eple.hvl.no*. The commands below will add the repository on eple to your Alma 9 computer:

```
cat <<EOF | sudo tee /etc/yum.repos.d/eple.repo
[eple]
name=eple-alma9
baseurl=https://eple.hvl.no/repos/almalinux-9/x86_64/
enabled=0
gpgcheck=1
skip_if_unavailable=True
EOF

rpm --import https://eple.hvl.no/repos/keys/RPM-GPG-KEY-pmanager

dnf clean all
```

The repository at eple is not enabled by default. Use the switch “*--enablerepo*” with *dnf* to install the *pam_mount* package.

For help on how to create a custom *authselect* PAM profile, see e.g. the [RHEL 9 documentation](#).

The *authselect* subcommand *list* must show information also on the new profile:

```
- custom/sssd-custom      SSSD profile with added feature with-mount
```

The *authselect* subcommand *show* for the custom profile must display information also for the *with-mount* feature, e.g.:

```
with-mount:
  Enable pam_mount to mount volumes for user session
```

For help on how to add the *pam_mount* PAM module to PAM, see e.g. the manual **pam_mount(8)**.

A working example of PAM rules for a *sssd* profile that includes the *pam_mount* module is shown below. The blue lines are lines that should be added by the *with-mount* feature.

auth	required	pam_env.so
auth	required	pam_faildelay.so delay=2000000
auth	required	pam_faillock.so preauth silent
auth	[default=1 ignore=ignore success=ok]	pam_usertype.so isregular
auth	[default=1 ignore=ignore success=ok]	pam_localuser.so
auth	sufficient	pam_unix.so nullok
auth	[default=1 ignore=ignore success=ok]	pam_usertype.so isregular
auth	sufficient	pam_sss.so forward_pass
auth	required	pam_faillock.so authfail
auth	optional	pam_mount.so
auth	required	pam_deny.so
account	required	pam_faillock.so
...		
account	required	pam_permit.so
password	requisite	pam_pwquality.so local_users_only
...		
password	required	pam_deny.so
session	optional	pam_keyinit.so revoke
session	required	pam_limits.so
-session	optional	pam_systemd.so
session	[success=1 default=ignore]	pam_succeed_if.so service in ...
session	required	pam_unix.so
session	optional	pam_sss.so
session	optional	pam_mount.so

Task 4: Decoding PAM rules

In task three, PAM rules for a *sssd* profile that includes the *pam_mount* module was shown. Explain the consequences of line four in the listing of PAM rules, the yellow line with *pam_usertype.so*.