DT149G — Administration of UNIX-like systems
Laboratory Assignment:
System Administration II

Lennart Franked*

October 31, 2023

Contents

1 Introduction **1**

2 Aim **2**

3 Reading instructions **2**

4 Tasks **2**
4.1 Bootprocess 2
4.1.1 Grub 2
4.1.2 Runlevels 2
4.2 The file system 3
4.2.1 File-types and Links 3
4.3 Users, groups and permissions 4
4.3.1 User and groups 4
4.3.2 Permissions 4
4.4 Backup and file copy 5
4.5 Sharing files 5
4.5.1 File Transfer Protocol 5
4.5.2 Network File System 5
4.5.3 Samba — A Windows SMB/CIFS file server for UNIX . . 6

5 Examination **6**

1 Introduction

In this laboratory assignment you will work with basic system administration such as startup scripts, user account management, creating new file systems and examining different tools to create backups of your filesystem.

*E-post: `lennart.franked@miun.se`.

2 Aim

After completion of this assignment you will have:

- Become familiar with upstart, init and boot scripts.
- Know how to administrate user accounts.
- Knowledge how to partition and format new harddrives for your system.
- Be able to set up storage backup on your system.

3 Reading instructions

Before starting this assignment you should have read [2, chapters 2, 3, 5, 8, 21, 22]. During the lab you will also need to consult the follwing documents [1], [3]

4 Tasks

Perform the following tasks and document all the steps taken to complete the tasks.

4.1 Bootprocess

4.1.1 Grub

1. Change the amount of time that grub will wait before booting your system. This can be achieved by editing the grub configuration file.

To answer in your report *Include a screenshot showing what you modified in the grub configuration file.*

4.1.2 Runlevels

1. Even though Ubuntu no longer uses the System V runlevel system, it still uses runlevels to place the system in different states (off, singel-user, multiuser and restart). Before starting these tasks, see `telinit (8)` and `runlevel (8)`.
   - which runlevel is your system currently in?
   - Place your system in another runlevel.

To answer in your report *Explain how the links in `/etc/rc?.d` relates to the scripts in `/etc/init.d`. See `runlevel (7)` for a detailed explanation.*

4.2 The file system

Now its time to partition the unpartitioned space on your harddrive from the introduction lab. Start by familiarize yourself with `df (1)` and `du (1)` `fdisk (8)`. And then with the help of these commands, find the following information.

1. Identify your disk partitions and how much free space you have on them.
2. Find the flag to `df (1)` to show the results in powers of 1024.
3. How much disk space does your `Desktop` folder take?
4. Create a new partition that spans all the unpartitioned space on your harddrive,
5. create a new ext3 or ext4 file system on the new partition, see `mkfs (8)`,
6. check that the file system is ok, see `fsck (8)`,
7. create a new mountpoint in your system e.g. /dump,
8. mount your newly created and formatted partition to your mount point,
9. configure your system to automatically mount your new partition at boot, see `fstab (5)`.

To answer in your report

- *Which partitions did you have, and how much free space did they have in MB or GB?*
- *How large was your Desktop-folder in MB or GB?*
- *Take screenshots of what you did to create a new partition and then formatting this partition using ext3 or ext4.*
- *Include a screenshot of your fstab after you have added your newly formatted partition*
- *Explain the configuration line that you added to fstab.*

4.2.1 File-types and Links

Read the man-page for `stat (1)` and `ln (1)`, then perform the following tasks.

1. Run `stat (1)` on a file in /dev, a folder, a file in /etc/init.d/ and on the /etc/passwd file. Note the difference between the different files.
2. Create a symbolic link within a file system, and then create a symbolic link to a file located on another file system.
3. Create a hard link within a file system, and then create a hard link to a file located on another file system.

To answer in your report

- *What information can be found in an inode?*
- *What where the difference between the different files you were running stat(1) on?*
- *From a theoretical point, what is the difference between a hard link and a symbolic (soft) link? Make sure your answers include a discussion about inodes.*
- *Based on your observation from the laboratory task above, what practical difference is there between a hard and a soft link?*
- *Reflect upon different usage scenarios for the two types of links*

4.3 Users, groups and permissions

4.3.1 User and groups

Before starting with the next assignment, make sure to get aquainted with `passwd (5)`, `shadow (5)` and `group (5)`, followed by `adduser (8)`, `addgroup (8)` and `adduser.conf (5)`. Make sure to read about the purpose of `/etc/skel`.

1. Make the appropriate changes so that a `.ssh` folder is created in the home folder for every new user that is added to the system.
2. Add the users *donald* and *mickey* to your system with the help of the `adduser (8)` command.
3. Create the group *disney* and add your newly created users to that group.

To answer in your report

- *Explain* UID *and* GID *and how it relates to users in the system*
- *What did you have to do, so that every time you create a new user a `.ssh` folder will be present in that users home folder?*
- Briefly explain the process of adding a new user and group to your system.
- Include a screenshot that shows that you now have created two more accounts. (Note that showing home-folders will not be enough to show this)

4.3.2 Permissions

The next part can be solved using the `ls (1)`, `chmod (1)`, `chown (1)` and `chgrp (1)` commands.

1. check the permissions for the home folders of the newly created users,
2. change the permissions on the home folder so that the owner and the group of the home folder is the only one able to access it.
3. create a new folder in e.g. `/dump` that only the users in the disney group can access.

To answer in your report

- Take a screenshot, that shows before and after you have changed the permission of the newly created folder in /dump.
- explain as much as you can about the file listed below

```
-rw-r--r-- 1 lennart lennart 5496 nov 10 17:40
    lab_assgn2.tex
```

4.4 Backup and file copy

For this part, you need to get familiar with the following programs: `cp (1)`, `tar (1)`, `cpio (1)` and `rsync (1)`.

1. Create a backup script for each of the programs listed above. The backup script will must take a backup of your home folder and place it in your newly created partition.
2. With the help of `dd (1)` create a copy of your `/etc/passwd` file where the contents of the file has been converted to upper case letters *NOTE: READ THE MAN-PAGE CAREFULLY BEFORE DOING THIS, IF PERFORMED WRONGLY YOU WILL BREAK YOUR SYSTEM.*

To answer in your report

- *Include all your four scripts in the report, along with a short explanation of how it works.*
- Take a screenshot of your modified passwd-file.

4.5 Sharing files

There are numerous ways of sharing files over the network, in this section we are going to test three popular methods of sharing files. The first method covered in this lab is also one of the earliest method, the File Transfer Protocol (FTP). The first RFC about FTP was published April 16th 1971 [1] and an updated version of FTP was published in rfc959 [3].

4.5.1 File Transfer Protocol

1. Find and install an FTP-server of your own choosing, for example `ftpd (8)`.
2. Configure your FTP-server daemon so that each user can only access the files on their home-directory. Show all the steps taken to achieve this.
3. Only the users that belong to the disney group should be able to access the partition you created in a previous lab.

4.5.2 Network File System

1. Install NFS on your system and configure it in the same way as you did with the FTP-server, that is, make sure that each user can access their home-directory and that only users that belong to the disney group can access your partition that you created in the second laboratory assignment.

4.5.3 Samba — A Windows SMB/CIFS file server for UNIX

1. Finally install and configure SAMBA the same way as for FTP and NFS

To answer in your report

- Give a short description of the installation and configuration process for FTP, NFS and Samba
- Reflect upon the different ways in FTP, NFS and SAMBA to handle permissions and users.
- Include screenshots that shows that you have a working FTP, NFS and SAMBA server.

5 Examination

Hand in a report containing all your solutions to the questions in Section 4 *Remember that you must include references to the given reading instructions, alternatively to the laboratory work you have done*

References

[1] A.K. Bhushan. *File Transfer Protocol*. rfc 114. IETF, Apr. 1971. URL: `http://tools.ietf.org/rfc/rfc0114.txt`.

[2] Evi Nemeth et al. *Unix and Linux system administration handbook*. Fifth edition. Boston: Addison-Wesley/Pearson, 2017. ISBN: 9780134277554.

[3] J. Postel and J. Reynolds. *File Transfer Protocol*. rfc 959. IETF, Oct. 1985. URL: `http://tools.ietf.org/rfc/rfc0959.txt`.