# Linux Basics re-exam

Write all answers here in this document. Use screenshots to support your answers. Screenshot must include the commands you used. For example a simple **ls** from a directory is not adequate. If screenshot won't cover your answer or is missing some essential parts, you may add written answer as well in addition to screenshot.

Return the exam document before the given deadline into the Moodle return box in **PDF format**.

Maximum amount of points from the exam is 60 points. Question specific maximum points are marked after each question.

1. Create directory structure presented in the image below. [2p]
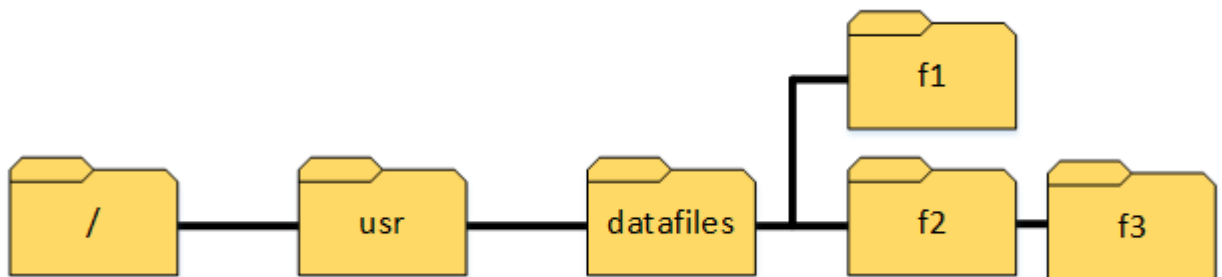
Go to Root Directory and then usr directory

```
user@AC4892-Ubuntu:~$ cd /
user@AC4892-Ubuntu:/$ cd usr
```

Create datafiles directory

```
user@AC4892-Ubuntu:/usr$ sudo mkdir datafiles
[sudo] password for user:
```

Go into datafiles directory and create f1 22 and then f3

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo mkdir f1 f2
```

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo mkdir f2/f3
```

2. Create two groups: *validators* and *confirmers*. [2p]

```
user@AC4892-Ubuntu:/$ sudo groupadd validators
user@AC4892-Ubuntu:/$ sudo groupadd confirmers
```

3. Create user *laura* with home directory and set bash as a default shell. Set new password of your choice for user *laura*. [3p]

```
user@AC4892-Ubuntu:/$ sudo useradd -m -s /bin/bash laura
```

```
user@AC4892-Ubuntu:/$ sudo passwd laura
New password:
Retype new password:
passwd: password updated successfully
```

4. Set *validators* as owner group for directory f2 so that changes will be inherited to child objects. [3p]

Go to datafiles directory

```
user@AC4892-Ubuntu:/$ cd usr/datafiles
user@AC4892-Ubuntu:/usr/datafiles$
```

Set the ownership

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo chown -R :validators f2
```

```
user@AC4892-Ubuntu:/usr/datafiles$ ls -l
total 8
drwxr-xr-x 2 root root       4096 Dec 15 08:23 f1
drwxr-xr-x 3 root validators 4096 Dec 15 08:24 f2
```

5. Give write permissions for *validators* for f2 directory so that changes will be inherited to child objects. [2p]

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo chmod -R 771 f2
user@AC4892-Ubuntu:/usr/datafiles$ ls -l
total 8
drwxr-xr-x 2 root root        4096 Dec 15 08:23 f1
drwxrwx--x 3 root validators 4096 Dec 15 08:24 f2
```

6. Set *confirmers* as owner group for directory f1 and set directory permissions using <u>numeric format</u> so that only group has permissions to directory. Group must have all permissions. [3p]

Change the ownership

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo chown -R :confirmers f1
user@AC4892-Ubuntu:/usr/datafiles$ ls -l
total 8
drwxr-xr-x 2 root confirmers 4096 Dec 15 08:23 f1
drwxrwx--x 3 root validators 4096 Dec 15 08:24 f2
```

Change permissions so that only the group has permission

```
user@AC4892-Ubuntu:/usr/datafiles$ sudo chmod -R 070 f2
user@AC4892-Ubuntu:/usr/datafiles$ ls -l
total 8
drwxr-xr-x 2 root confirmers 4096 Dec 15 08:23 f1
d---rwx--- 3 root validators 4096 Dec 15 08:24 f2
```

7. Add user *laura* to groups *validators* and *confirmers* so that *confirmers* will be user's primary group. [3p]

```
user@AC4892-Ubuntu:~$ sudo adduser laura confirmers
Adding user `laura' to group `confirmers' ...
Adding user laura to group confirmers
Done.
```

```
user@AC4892-Ubuntu:~$ sudo adduser laura validators
Adding user `laura' to group `validators' ...
Adding user laura to group validators
Done.
```

```
user@AC4892-Ubuntu:~$ sudo usermod -g confirmers laura
```

Confirm that it is added

```
user@AC4892-Ubuntu:~$ grep 'confirmers' /etc/group
confirmers:x:1006:laura
user@AC4892-Ubuntu:~$ grep 'validators' /etc/group
validators:x:1005:laura
```

8. Switch to user *laura* so that the whole environment is changed (every environment variable is loaded etc.) (**the following exercises will be done with user laura**). [3p]

```
user@AC4892-Ubuntu:/usr/datafiles$ su -l laura
Password:
```

9. Create directory *restored* to *laura*'s home directory using absolute path. Create two new files inside *restored* directory using relative path: *backup_1.txt* and *backup_2.txt*. Redirect the output of command *ls –la /tmp* to the end of the *backup_2.txt* file. [4p]

```
laura@AC4892-Ubuntu:/$ mkdir home/laura/restored
laura@AC4892-Ubuntu:/$ cd home/laura/restored

laura@AC4892-Ubuntu:~/restored$ touch backup_1.txt backup_2.txt
laura@AC4892-Ubuntu:~/restored$ ls
backup_1.txt  backup_2.txt

laura@AC4892-Ubuntu:~/restored$ ls -la /tmp > backup_2.txt
```

10. Copy the directory *restored* to previously created directory *f1*. [2p]

```
laura@AC4892-Ubuntu:/$ cp -R home/laura/restored usr/datafiles/f1
```

11. Download the package from the link below and move the package to directory *f3* with a new name *downloaded_data.tar.gz*. [3p]
http://student.labranet.jamk.fi/~hantt/exam/examdata.tar.gz

Download the file

```
laura@AC4892-Ubuntu:~$ wget http://student.labranet.jamk.fi/~hantt/exam/examdata.tar.gz
```

```
--2022-12-15 09:13:29--  http://student.labranet.jamk.fi/~hantt/exam/examdata.tar.gz
Resolving student.labranet.jamk.fi (student.labranet.jamk.fi)... 192.168.20.20
Connecting to student.labranet.jamk.fi (student.labranet.jamk.fi)|192.168.20.20|:80... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://student.labranet.jamk.fi/~hantt/exam/examdata.tar.gz [following]
--2022-12-15 09:13:29--  https://student.labranet.jamk.fi/~hantt/exam/examdata.tar.gz
Connecting to student.labranet.jamk.fi (student.labranet.jamk.fi)|192.168.20.20|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1248 (1.2K) [application/x-gzip]
Saving to: 'examdata.tar.gz'

examdata.tar.gz           100%[=================================================>]   1.22K  --.-KB/s

2022-12-15 09:13:29 (433 MB/s) - 'examdata.tar.gz' saved [1248/1248]
```

Move File

```
laura@AC4892-Ubuntu:~$ mv examdata.tar.gz /usr/datafiles/f2/f3/downloaded_data.tar.gz
```

12. Extract *downloaded_data.tar.gz* package using only one command. Move *data1.txt* file
    from extracted directory to user's home directory. Print the content of the file *data1.txt* to
    the command line. [3p]

Extract File

```
laura@AC4892-Ubuntu:/usr/datafiles/f2/f3$ sudo tar -xvpzf downloaded_data.tar.gz
data1.txt
data2.txt
```

Move File

```
laura@AC4892-Ubuntu:/usr/datafiles/f2/f3$ mv data1.txt /home/laura
laura@AC4892-Ubuntu:/usr/datafiles/f2/f3$ cd /
laura@AC4892-Ubuntu:/$ cd home/laura
laura@AC4892-Ubuntu:~$ ls
data1.txt   restored
```

Print the content of the file

```
laura@AC4892-Ubuntu:~$ cat data1.txt
Spicy jalapeno bacon ipsum dolor amet burgdoggen chicken jowl, biltong beef shank cow doner ham hock ball
 belly chuck turducken. Hamburger filet mignon bresaola, tenderloin corned beef sausage swine drumstick p
 chop chuck brisket buffalo. Tail fatback kielbasa chislic pork chop doner cow porchetta leberkas ground
shank tenderloin pork belly. Meatloaf chicken ribeye pancetta flank pork chop corned beef kielbasa ham ho
ta turkey shank swine prosciutto cow. Bacon pastrami shoulder landjaeger doner.

Beef landjaeger doner leberkas, jowl jerky tri-tip cupim tongue chicken pig chislic. Alcatra filet mignon
g ribeye shank pork loin. Ham hock jerky beef porchetta pastrami turkey chislic pork belly prosciutto sho
. Drumstick prosciutto shoulder short ribs. Beef ribs burgdoggen buffalo hamburger pastrami, short loin r
chetta spare ribs meatloaf shank leberkas. Andouille fatback brisket meatball bacon.

Pork chicken shankle short loin corned beef. Kielbasa shankle kevin sausage, flank porchetta meatball. Sh
rk loin, chicken kevin shankle boudin turducken drumstick t-bone cow venison hamburger. Turducken meatbal
 tri-tip swine sirloin picanha corned beef capicola jerky tongue filet mignon shoulder. Pork chop picanha
y. Ball tip swine frankfurter, brisket shankle buffalo ham shank sausage tenderloin cow.
```

13. Search string *franela* with apt package management tool and redirect the output of the command to the file called *apt-search-results.txt* inside the directory *f2* using absolute path. [3p]

```
laura@AC4892-Ubuntu:~$ apt-cache search --names-only franela > /usr/datafiles/f2/apt-search-results.txt
```

Confirm the output

```
laura@AC4892-Ubuntu:/usr/datafiles/f2$ ls
apt-search-results.txt   f3
laura@AC4892-Ubuntu:/usr/datafiles/f2$ cat apt-search-results.txt
golang-github-franela-goblin-dev - minimal and beautiful Go testing framework
golang-github-franela-goreq-dev - minimal and simple request library for Go language
```

14. List the content of laura's home directory using <u>ls long listing format</u>. Show only objects modified during this month (ls command). [4p]

```
laura@AC4892-Ubuntu:~$ find . -type f -newerat 2022-12-01 ! -newerat 2022-12-31|ls -la
total 28
drwxr-xr-x 3 laura confirmers 4096 Dec 15 09:34 .
drwxr-xr-x 6 root  root       4096 Dec 15 08:28 ..
-rw-r--r-- 1 laura confirmers  220 Feb 25  2020 .bash_logout
-rw-r--r-- 1 laura confirmers 3771 Feb 25  2020 .bashrc
-rw-r--r-- 1 laura confirmers  807 Feb 25  2020 .profile
-rw-r--r-- 1 laura confirmers    0 Dec 15 09:09 .sudo_as_admin_successful
-rw-r--r-- 1 root  root       1456 Jun 20  1994 data1.txt
drwxrwxr-x 2 laura confirmers 4096 Dec 15 08:46 restored
```

15. **Return to your previous user**. Find <u>files</u> with file name including the string *cloud* from */var/log* directory using administrative privileges (find command). [3p]

Returning to previous user

```
laura@AC4892-Ubuntu:~$ su -l user
Password:
```

```
user@AC4892-Ubuntu:~$ sudo grep -r 'cloud' /var/log
```

Screen shot of a section of the output

```
/var/log/auth.log:Dec 15 09:54:46 AC4892-Ubuntu sudo:     user : TTY=pts/0 ; PWD=/home/user ; USER=root ; COMMAND=/usr/b
in/grep cloud /var/log
/var/log/auth.log:Dec 15 09:55:57 AC4892-Ubuntu sudo:     user : TTY=pts/0 ; PWD=/home/user ; USER=root ; COMMAND=/usr/b
in/grep -r cloud /var/log
/var/log/dpkg.log.1:2022-08-25 11:11:23 upgrade cloud-init:all 21.4-0ubuntu1~20.04.1 22.2-0ubuntu1~20.04.3
/var/log/dpkg.log.1:2022-08-25 11:11:23 status half-configured cloud-init:all 21.4-0ubuntu1~20.04.1
/var/log/dpkg.log.1:2022-08-25 11:11:23 status unpacked cloud-init:all 21.4-0ubuntu1~20.04.1
/var/log/dpkg.log.1:2022-08-25 11:11:23 status half-installed cloud-init:all 21.4-0ubuntu1~20.04.1
/var/log/dpkg.log.1:2022-08-25 11:11:24 status unpacked cloud-init:all 22.2-0ubuntu1~20.04.3
/var/log/dpkg.log.1:2022-08-25 11:13:10 configure cloud-init:all 22.2-0ubuntu1~20.04.3 <none>
/var/log/dpkg.log.1:2022-08-25 11:13:10 status unpacked cloud-init:all 22.2-0ubuntu1~20.04.3
/var/log/dpkg.log.1:2022-08-25 11:13:20 conffile /etc/cloud/cloud.cfg keep
/var/log/dpkg.log.1:2022-08-25 11:13:20 status half-configured cloud-init:all 22.2-0ubuntu1~20.04.3
/var/log/dpkg.log.1:2022-08-25 11:13:21 status installed cloud-init:all 22.2-0ubuntu1~20.04.3
/var/log/cloud-init.log:2021-05-03 07:22:45,261 - util.py[DEBUG]: Writing to /var/log/cloud-init.log - ab: [644] 0 bytes
/var/log/cloud-init.log:2021-05-03 07:22:45,261 - util.py[DEBUG]: Changing the ownership of /var/log/cloud-init.log to 1
04:4
/var/log/cloud-init.log:2021-05-03 07:22:45,262 - util.py[DEBUG]: Attempting to remove /var/lib/cloud/instance/boot-fini
shed
/var/log/cloud-init.log:2021-05-03 07:22:45,262 - util.py[DEBUG]: Attempting to remove /var/lib/cloud/data/no-net
/var/log/cloud-init.log:2021-05-03 07:22:45,262 - util.py[DEBUG]: Reading from /var/lib/cloud/instance/obj.pkl (quiet=Fa
lse)
/var/log/cloud-init.log:2021-05-03 07:22:45,262 - util.py[DEBUG]: Attempting to remove /var/lib/cloud/instance
/var/log/cloud-init.log:2021-05-03 07:22:45,264 - stages.py[DEBUG]: Using distro class <class 'cloudinit.distros.ubuntu.
Distro'>
/var/log/cloud-init.log:2021-05-03 07:22:45,265 - __init__.py[DEBUG]: Looking for data source in: ['OVF'], via packages
['', 'cloudinit.sources'] that matches dependencies ['FILESYSTEM']
/var/log/cloud-init.log:2021-05-03 07:22:45,284 - __init__.py[DEBUG]: Seeing if we can get any data from <class 'cloudin
```

16. Create a new <u>permanent</u> alias for <u>all users</u>, which prints the content of user's home directory. Verify that alias works on user *laura*. **Important:** command must work regardless where you run it in the file system! [5p]

To create a permanent alias for all users we need to create in /etc/bash.bashrc

```
user@AC4892-Ubuntu:~$ sudo nano /etc/bash.bashrc
```

Create the alias

```
#create permanent alias to view content on home director for all users
alias vc='ls -la /home/'
```

Then press ctrl+s and ctrl+x

Exit the current session and log in again

```
user@AC4892-Ubuntu:~$ exit
logout
laura@AC4892-Ubuntu:~$ su -l user
Password:
```

Check it works for the current user

```
user@AC4892-Ubuntu:~$ vc
total 24
drwxr-xr-x  6 root    root         4096 Dec 15 08:28 .
drwxr-xr-x 20 root    root         4096 Dec 15 10:03 ..
drwxr-xr-x  3 laura   confirmers   4096 Dec 15 09:34 laura
drwxr-xr-x  2 sand    sand         4096 Dec 14 19:25 sand
drwxr-xr-x  3 ubuntu  ubuntu       4096 Dec 14 14:21 ubuntu
drwxr-xr-x  6 user    user         4096 Dec 15 10:18 user
```

Log in with laura and check

```
user@AC4892-Ubuntu:~$ su -l laura
Password:
laura@AC4892-Ubuntu:~$ vc
total 24
drwxr-xr-x  6 root    root         4096 Dec 15 08:28 .
drwxr-xr-x 20 root    root         4096 Dec 15 10:03 ..
drwxr-xr-x  3 laura   confirmers   4096 Dec 15 09:34 laura
drwxr-xr-x  2 sand    sand         4096 Dec 14 19:25 sand
drwxr-xr-x  3 ubuntu  ubuntu       4096 Dec 14 14:21 ubuntu
drwxr-xr-x  6 user    user         4096 Dec 15 10:18 user
```

17. Delete *datafiles* directory using one command. [2p]

```
user@AC4892-Ubuntu:/usr$ sudo rm -rf datafiles
```

18. Use system to create a scheduled job that writes the following message into the file called *one-day-event.txt* in your user's home directory: "***This message has been recorded in the Dec 2022***" (hint: echo command). This event will only occur once in 24.12.2022 at 6.30 PM. [5p]

Open Crontab

```
user@AC4892-Ubuntu:/usr$ sudo crontab -e
no crontab for root - using an empty one

Select an editor.  To change later, run 'select-editor'.
  1. /bin/nano        <---- easiest
  2. /usr/bin/vim.basic
  3. /usr/bin/vim.tiny
  4. /bin/ed
```

I used Nano to edit

According to crontab.guru website this is ok

```
# m h  dom mon dow    command
30 18 24 2022/12 * echo "This message has been recorded in the Dec 2022" > /home/one-day-event.txt
```

Eg:

But once I try save it give an error on month value so I did the following

```
# m h  dom mon dow    command
30 18 24 12 * echo "This message has been recorded in the Dec 2022" > /home/one-day-event.txt
```

```
crontab: installing new crontab
```

And we need to write a script to run this only once

19. Install *mariadb-server*, check the status of the service after the installation, stop the service if it is running and lastly disable unit from the boot. **Important:** If you receive the following error, please remove the ***mysql-common*** package from your system before the installation: ***mariadb-server : Depends: mariadb-server-10.3 (>= …)*** [5p]

Installing mariadb

```
user@AC4892-Ubuntu:/usr$ sudo apt install mariadb-server
[sudo] password for user:
```

Screenshot of a section output

```
[sudo] password for user:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following package was automatically installed and is no longer required:
  libfwupdplugin1
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  galera-3 libcgi-fast-perl libcgi-pm-perl libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libencode
  libfcgi-perl libhtml-parser-perl libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-mess
  libio-html-perl liblwp-mediatypes-perl libmysqlclient21 libsnappy1v5 libterm-readkey-perl libtimedate-pe
  liburi-perl mariadb-client-10.3 mariadb-client-core-10.3 mariadb-common mariadb-server-10.3 mariadb-serv
  mysql-common socat
Suggested packages:
  libclone-perl libmldbm-perl libnet-daemon-perl libsql-statement-perl libdata-dump-perl libipc-sharedcach
  libwww-perl mailx mariadb-test tinyca
The following NEW packages will be installed:
  galera-3 libcgi-fast-perl libcgi-pm-perl libconfig-inifiles-perl libdbd-mysql-perl libdbi-perl libencode
  libfcgi-perl libhtml-parser-perl libhtml-tagset-perl libhtml-template-perl libhttp-date-perl libhttp-mess
  libio-html-perl liblwp-mediatypes-perl libmysqlclient21 libsnappy1v5 libterm-readkey-perl libtimedate-pe
  liburi-perl mariadb-client-10.3 mariadb-client-core-10.3 mariadb-common mariadb-server mariadb-server-10
  mariadb-server-core-10.3 mysql-common socat
0 upgraded, 28 newly installed, 0 to remove and 22 not upgraded.
Need to get 21.5 MB of archives.
After this operation, 175 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

Check the status

```
user@AC4892-Ubuntu:/usr$ systemctl status mariadb
● mariadb.service - MariaDB 10.3.37 database server
     Loaded: loaded (/lib/systemd/system/mariadb.service; enabled; vendor preset: enabled)
     Active: active (running) since Thu 2022-12-15 10:55:51 EET; 3min 6s ago
       Docs: man:mysqld(8)
             https://mariadb.com/kb/en/library/systemd/
   Main PID: 87555 (mysqld)
     Status: "Taking your SQL requests now..."
      Tasks: 31 (limit: 1066)
     Memory: 67.1M
     CGroup: /system.slice/mariadb.service
             └─87555 /usr/sbin/mysqld

Dec 15 10:55:50 AC4892-Ubuntu mysqld[87555]: 2022-12-15 10:55:50 0 [Note] /usr/sbin/mysqld (mysqld 10.3.37-M
Dec 15 10:55:51 AC4892-Ubuntu systemd[1]: Started MariaDB 10.3.37 database server.
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87596]: Upgrading MySQL tables if necessary.
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87599]: Looking for 'mysql' as: /usr/bin/mysql
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87599]: Looking for 'mysqlcheck' as: /usr/bin/mysqlche
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87599]: This installation of MariaDB is already upgrad
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87599]: There is no need to run mysql_upgrade again fo
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87599]: You can use --force if you still want to run m
Dec 15 10:55:51 AC4892-Ubuntu /etc/mysql/debian-start[87607]: Checking for insecure root accounts.
```

Stop Mariadb

```
user@AC4892-Ubuntu:/usr$ sudo systemctl stop mariadb
```

Disable mariadb from boot

```
user@AC4892-Ubuntu:/usr$ sudo systemctl disable mariadb
Removed /etc/systemd/system/multi-user.target.wants/mariadb.service.
Removed /etc/systemd/system/mysqld.service.
Removed /etc/systemd/system/mysql.service.
```