

Learning diary and answers

These are optional fields about your identity, leave empty if you want to remain anonymous:

Student name: Shamima Shammi

Email address: t2shsh00@students.oamk.fi

Save the final version of this document as PDF and submit it for peer reviews via Moodle's workshop tool before the deadline. Last course week is for peer reviews.

Some courses may have 5 weeks, and some may have 8 weeks of assignments. This is a generic learning diary template. Adapt and edit the document accordingly.

Learning diary and answers

Week 1

Question 1: Install Ubuntu Linux to VMWare, VirtualBox, Hyper-V or KVM.

Answer 1: I already started to using Ubuntu Linux.

Question 2: Browse this [Linux Command Line Primer](#)

Answer 2:

The screenshot shows the DigitalOcean website with the following details:

- Header:** DigitalOcean logo, navigation menu with links to Products, Solutions, Marketplace, Community, and Pricing, and buttons for Log in and Sign up.
- Breadcrumbs:** Tutorials > Questions > Tech Talks > Learning Paths > Product Docs > Social Impact.
- Search Bar:** A search bar with the placeholder "Search Community".
- Article Content:**
 - Section:** CONTENTS
 - Section:** Understanding the Terminal Window
 - Section:** Becoming Familiar with Directories
 - Section:** Listing Contents and Understanding Permissions
 - Section:** Navigating the Filesystem

Title: // Tutorial // **A Linux Command Line Primer**

Published on December 8, 2020 · Updated on June 16, 2021

Tags: Linux Basics, Spin Up, Cloud Computing, Linux Commands

By [Lisa Tagliaferri](#), Developer and author at DigitalOcean.
- Call-to-Action:** A purple sidebar with the text "Try DigitalOcean for free", "Click below to sign up and get \$200 of credit to try our products over 60 days!", and a "Sign up →" button.
- Cookie Preferences:** A small button in the bottom right corner.

Question 3: Describe the following commands and concepts:

Answer 3:

- **man, apropos**
 - man: It is the short form of manual page. This command delivers a detailed view of the command which includes NAME, SYNOPSIS, DESCRIPTION, OPTION, ERRORS, FILES, EXAMPLES and so on.
 - apropos: This command uses to find any command using its man pages. Simply, when user don't remember the accurate command but knows a few keywords connected to the command that define its users or functionality.
- **man date:** Show the current time or set the system date in manual page.
- **ls:** This command is essential and one of the most used. Through this, the list of files and sub-directories in the current directory can be seen.
- **ls --help:** this command lists all available command.
- **date:** This command shows the current date and time.
- **date --help:** It helps to print the time in different formats and calculate future and past dates.
- **cd:** It is change directory command. Through this, change into a subdirectory, move back into the parent directory.

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- cd -: It is used to change directory to the home directory.
- cd .. : It is used to move to the parent directory of current directory.
- ls -lat: It shows total number of directories and files sorted from current to previous with date and time
- ls -s aaaa*: Shows how many files this aaa name have and their size.
- pwd: This command stands for print working directory. It prints the path of the working directory and starting from the root.
- chown: It is stands for change owner.
- chmod: This command is used to change the access mode of a file and directories. It is stands for change mode.
- chgrp: This command is used to changes ownership of files to specified group.
- Chmod 644 file: It means the master of the file has read and access, while the group members and other users on the system only have read access.
- Chmod g+x myfile: This command for changing myfile permissions for group execute to everyone.
- Which: It is used to look in the path environment variable to find the executable file linked to the specified command.
- rm: It is used to delete files and directories from the command line.
- rm -r mydoc: -r means recursive. This command will repeatedly remove mydoc and its content.
- cp primary secondary: This command creates a copy of the primary file and renames the new file to secondary file.
- mv file2 file1: This command means rename or move files. Whole command stands for moves the contents of file 2 to file 1 and deletes file 2.
- Wc -l myfile: wc is used to determine the number of words, bytes, characters, and newline counts in a file supplied by the file parameters. Wc -l is prints the number of lines in myfile.
- mkdir mydata: It means create a new directory names mydata at current folder.
- rmdir mydata: It stands for remove the contents of the mydata files and then deletes the empty directory.
- more, less:
 - more: It stands for show the contents of the file one screen at a time.
 - less: It is used to read one page at a time from a text file. Because it accesses files page by page rather than the entire file if they are huge, it has faster access.
- File: This command is used to recognize the format of a file. .file format may be man-readable or MIME type. This command evaluates every argument in an effort to classify it. It has 3 sets of tests as follows: 1. Filesystem test 2. Magic test 3. Language test

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- stat: This command contains data about the file and filesystem. The stat command provides details about the file's size, access rights, user ID, group ID, and birth and access dates.
- df: Using the df command, we can see how much disk space is available for file systems.
- ln: This command is used to make both hard and soft links for files.
- which, whereis: The whereis command is used in the Linux operating system to locate the source/binary file of a command and documentation sections for a certain file.
- find: This command is a tool for navigating a file hierarchy on the command line. It can be used to look for files and folders and then operate on them in the future. It allows for searching by name, creation date, modification date, owner, and permissions for files and folders.
- touch: This command used to make, change and modify timestamps of a file without content.
- touch mynewfile: This command used to create mynewfile at a time.
- cp/tmp/test.txt ~/temp/: Copy the test.txt file from tmp to temporary folder.

Question 4: What is the difference between Linux kernel and GNU/Linux distribution?

Answer 4:

First, Linux is a family of free and open-source applications centered on the Linux Kernel, as opposed to GNU/Linux distribution, an operating system with a significant collection of computer software.

Second, in contrast to Linux kernel, which is an operating system based on GNU, GNU/Linux distribution is an operating system that includes a collection of software created under the GNU project.

Question 5: Name some very common Linux distributions?

Answer 5:

Ubuntu, Kali Linux, Fedora, Red Hat Enterprise Linux, Linux Mint and so on.

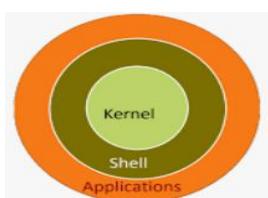
Question 6: What is GPLv2/v3 license? And BSD style license?

Answer 6:

GPL means General Public License. It is a series of broadly used free software licenses that guarantee end users the four freedoms to run, study, share and modify the software. It has 3 version. GPLv2 is an older version of GPLv3. The new GPLv3, which is twice as long as the GPLv2 was, covers topics that needed improvement and explanation in the earlier version. These include of internalization, patent indemnity, and license infringement remedies.

Open-source software that is covered by a BSD license has fewer restrictions and no restrictions on redistribution. Many freeware, shareware, and open-source programs are distributed under Berkeley Source Distribution (BSD) licenses because they have few requirements and restrictions.

Question 7: What is (operating system) shell?



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Answer 7: The operating system's shell is its topmost layer. Shells use a programming language to start and manage other applications, as well as to control processes and files. The shell controls how you and the operating system interact by asking you for input, interpreting that input for the operating system, and handling any output the operating system produces as a result.

Question 8: What are case sensitive file names?

Answer8: Case sensitive means the capitalization of the file name which are uppercase and lowercase.

Question 9: Describe common purpose of files and directories in “/etc”, “/usr/bin” and “/var”

Answer 9: “/etc”: It is the brain center of the Linux system. It holds system configuration files for all installed scripts, services and third-party programs.

“/usr/bin”: It is used to contains binary files for user programs.

“/var”: It means variable files which can find the content of the files under this directory that are anticipated to increase.

Question 10: What is shell PATH? What is the difference between absolute and relative path?

Answer 10:

Shell PATH: In Linux and other Unix-like operating systems, PATH is an environmental variable that instructs the shell where to look for executable files in response to user commands. It is regarded as the single most significant environmental variable that improves both the convenience and safety of such operating systems.

An absolute path indicates a destination from the root directory, but a relative path is connected to the current directory. This is the difference between an absolute path and a relative path. Another difference between an absolute pathway begins with a delimiting character, like “/,” but a relative pathway never does.

Question 11: What is the purpose of tilde character (~) for most Linux shells. For example, ls ~/

Answer 11: (~): It is a Linux “shortcut” that is used to represent the user’s home directory. Like \$ echo ~

ls ~/: It means to list the contents in the users' home directory.

Question 12: How do you recognise a hidden file in any common Unix/Linux file systems?

Answer 12: The simple way to recognise a hidden file in any common Unix/Linux file systems is to use ls command with “-a” or “-A” flag that means all.

Question 13: What is the meaning of “piping data between commands”?

Answer 13: A pipe transfers the output of one command as an input to the other command. Piping is used in many Linux (Unix) based variants.

In Linux, the symbol | is used for the purpose of piping.

Example: “ls | wc -l”, ‘ls’ is used to see the contents of a directory and ‘wc’ is used to count the number of lines. Combine these two commands using a pipe. Feed the output of ls as an input to wc using a pipe.

Question 14: What are set-uid (suid) and set-gid (sgid) bits for file permissions?

Answer 14:

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Set-uid (suid): Set user ID

Set-gid(sgid): Set group ID

The set-uid bit merely tells the executable to adjust its permissions to those of the owner (user who produced it) when it is run, as opposed to setting them to the user who launched it. A similar bit called set-gid accomplishes the same thing with the gid. Both files and directories are impacted by the set-gid command.

Question 15: What is a “sticky-bit”?

Answer 15:

The original purpose of the sticky bit was to "stick" the text segment of an executable program in the swap area even after the program had finished running to speed up subsequent runs of the same program. The sticky bit, though, indicates something altogether different today.

Only the file owner, directory owner, and root user can delete or rename files in a directory when the sticky bit is set. The sticky bit can be set using the command listed below.

Question 16: Use manual pages and explain what will command “uname -a” do?

Answer 16:

“uname -a” is a Linux command-line that shows basic system information of my Linux operating system computer.

```
ubuntu@linux128:~$ uname -a
Linux linux128 5.15.0-52-generic #58-Ubuntu SMP Thu Oct 13 08:03:55 UTC 2022 x86
_64 x86_64 x86_64 GNU/Linux
ubuntu@linux128:~$ █
```

Kernel name: Linux.

Host node name: Linux128

Kernel release: 5.15.0-52-generic

Kernel version and build time: #58-Ubuntu SMP Thu Oct 13 08:03:55 UTC 2022

Processor type, hardware platform and architecture of processor: x86_64 x86_64 x86_64

Operating system name: GNU/Linux.

Question 17: Use manual pages and explain what will command “wc -l” do?

Answer 17: “wc -l” count the number of lines in a text file.

```
ubuntu@linux128:~$ wc -l test.txt
0 test.txt
```

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Question 18: Linux file handling intro:

Answer 18:

- List five largest files in /usr/lib -directory:

```
du -sh /usr/lib/* | sort -h | tail -5
```

```
ubuntu@linux128:~$ du -sh /usr/lib/* | sort -h | tail -5
24M      /usr/lib/python3.10
76M      /usr/lib/python3
76M      /usr/lib/snapd
198M      /usr/lib/x86_64-linux-gnu
218M      /usr/lib/modules
ubuntu@linux128:~$ █
```

- Find out what is the group for /bin/ls file?

```
ubuntu@linux128:~$ ls -l /bin/ls
-rwxr-xr-x 1 root root 138208 Feb  7  2022 /bin/ls
ubuntu@linux128:~$ █
```

Owner: root; Group: root

- How do you change file or directory owner and group?

```
ubuntu@linux128:~$ ls -la test.txt
-rw-rw-r-- 1 root ubuntu 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ sudo chown ubuntu test.txt
ubuntu@linux128:~$ ls -la test.txt
-rw-rw-r-- 1 ubuntu ubuntu 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ sudo chgrp root test.txt
ubuntu@linux128:~$ ls -la test.txt
-rw-rw-r-- 1 ubuntu root 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ █
```

- How do you change file permissions so that file user has all rights (read, write and execute), group and others have none?

```
ubuntu@linux128:~$ ls -la test.txt
-rw-rw-r-- 1 ubuntu root 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ chmod 700 test.txt
ubuntu@linux128:~$ ls -la test.txt
-rwx----- 1 ubuntu root 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ █
```

- How do you change file permissions so that file user has read and write access (no execute), group and others have read access?

```
ubuntu@linux128:~$ chmod 644 test.txt
ubuntu@linux128:~$ ls -la test.txt
-rw-r--r-- 1 ubuntu root 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ █
```

- How do you change file permissions so that file user, group and others have only read and execute (no write) access?

```
ubuntu@linux128:~$ chmod 555 test.txt
ubuntu@linux128:~$ ls -la test.txt
-r-xr-xr-x 1 ubuntu root 0 Nov 17 23:41 test.txt
ubuntu@linux128:~$ █
```

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- Describe following file permissions and ownership:

drwxr-x--- 2 teemu root 4096 Jul 2 2002 webalizer

User: Read, Write and Execute permissions

Group: Read and Execute permissions

Others: none.

Owner: teemu.

- Create directory “exercise1” under you home directory

```
ubuntu@linux128:~$ mkdir exercise1
ubuntu@linux128:~$ ls
exercise1
ubuntu@linux128:~$
```

- Create empty file (length 0 bytes) “qwerty.txt” to that directory

```
ubuntu@linux128:~$ cd exercise1
ubuntu@linux128:~/exercise1$ touch qwerty.txt
ubuntu@linux128:~/exercise1$ ls -la qwerty.txt
-rw-rw-r-- 1 ubuntu ubuntu 0 Nov 20 21:27 qwerty.txt
ubuntu@linux128:~/exercise1$
```

- Change directory name “exercise1” to “exer2”?

```
ubuntu@linux128:~$ ls
exercise1
ubuntu@linux128:~$ mv exercise1 exer2
ubuntu@linux128:~$ ls
exer2
ubuntu@linux128:~$
```

- Change file qwerty.txt file permissions so that only you have just a read access to it and nothing else

```
ubuntu@linux128:~$ cd exer2/
ubuntu@linux128:~/exer2$ ls -la qwerty.txt
-rw-rw-r-- 1 ubuntu ubuntu 0 Nov 20 21:27 qwerty.txt
ubuntu@linux128:~/exer2$ chmod 464 qwerty.txt
ubuntu@linux128:~/exer2$ ls -la qwerty.txt
-r--rw-r-- 1 ubuntu ubuntu 0 Nov 20 21:27 qwerty.txt
ubuntu@linux128:~/exer2$
```

- Create symbolic link to you home directory “this_is_my_link” and make it point to the exer2-directory

```
ubuntu@linux128:~/exer2$ cd
ubuntu@linux128:~$ ln -s exer2 This_is_my_link
ubuntu@linux128:~$ ls -la
total 40
drwxr-x--- 5 ubuntu ubuntu 4096 Nov 20 21:36 .
drwxr-xr-x 3 root root 4096 Oct 24 08:17 ..
-rw----- 1 ubuntu ubuntu 436 Nov 20 20:15 .bash_history
-rw-r--r-- 1 ubuntu ubuntu 220 Jan 6 2022 .bash_logout
-rw-r--r-- 1 ubuntu ubuntu 3771 Jan 6 2022 .bashrc
drwx----- 2 ubuntu ubuntu 4096 Nov 14 10:19 .cache
-rw----- 1 ubuntu ubuntu 20 Nov 16 01:04 .lesshsQ
-rw-r--r-- 1 ubuntu ubuntu 807 Jan 6 2022 .profile
drwx----- 2 ubuntu ubuntu 4096 Oct 24 08:17 .ssh
-rw-r--r-- 1 ubuntu ubuntu 0 Nov 20 04:26 .sudo_as_admin_successful
lrwxrwxrwx 1 ubuntu ubuntu 5 Nov 20 21:36 This_is_my_link -> exer2
drwxrwxr-x 2 ubuntu ubuntu 4096 Nov 20 21:27 exer2
ubuntu@linux128:~$
```

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- How can you find out your current directory location and path? How far (in directories) are you from file system root?

Using pwd

```
ubuntu@linux128:~$ pwd  
/home/ubuntu  
ubuntu@linux128:~$ █
```

Far (in directories) from file system root: /home/ubuntu

Question 19: Remove files and directories which I created on this exercise.

Answer 19:

```
ubuntu@linux128:~$ ls  
This_is_my_link  exer2  
ubuntu@linux128:~$ rm -r  
rm: missing operand  
Try 'rm --help' for more information.  
ubuntu@linux128:~$ rm -r This_is_my_link  
ubuntu@linux128:~$ rm -r exer2  
rm: remove write-protected regular empty file 'exer2/qwerty.txt'? y  
ubuntu@linux128:~$ ls  
ubuntu@linux128:~$ █
```

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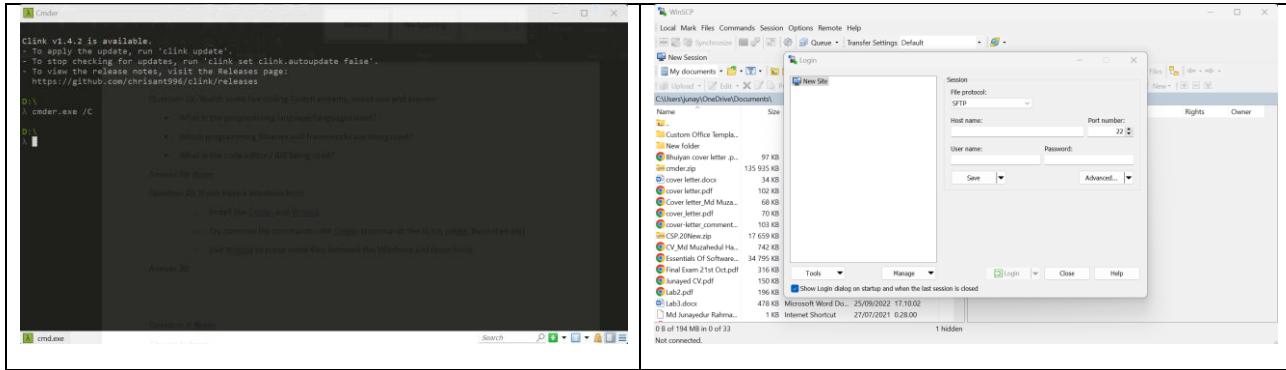
Week 2

Question 20: Watch some [live coding Twitch streams](#), select one and answer:

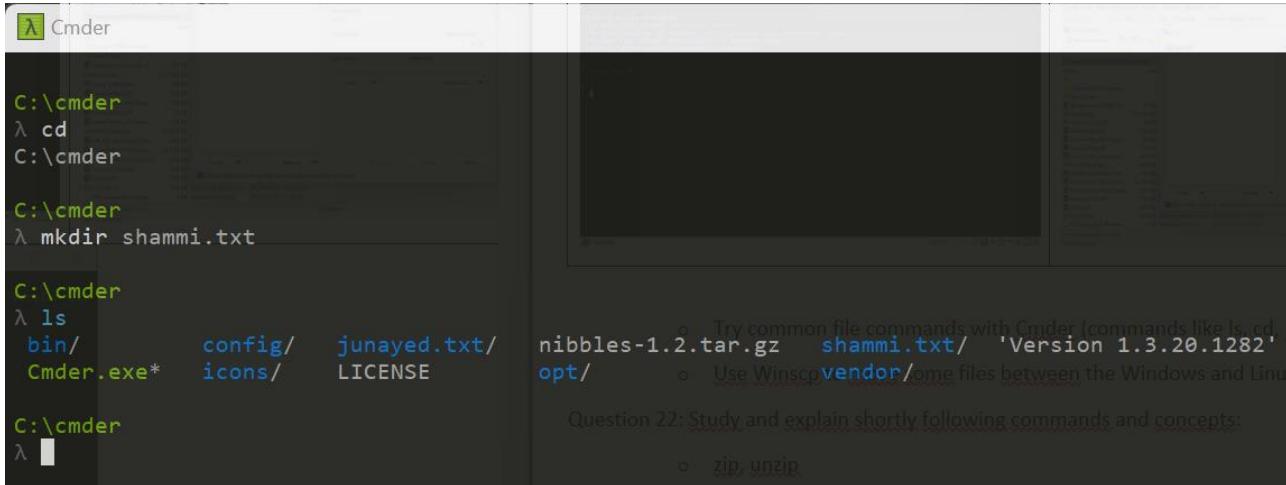
- What is the programming language/languages used?
Python
- Which programming libraries and frameworks are being used?
React Native
- What is the code editor / IDE being used?
VIM

Question 21: If you have a Windows host:

- Install the [Cmder](#) and [Winscp](#)



- Try common file commands with Cmder (commands like ls, cd, mkdir, Bash shell etc)



Question 22: Study and explain shortly following commands and concepts:

- zip, unzip

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- Use Winscp to move some files between the Windows and Linux hosts

The screenshot shows the Winscp interface with two panes. The left pane is titled 'C:\cmdr\' and shows a list of files and folders on a Windows host. The right pane is titled '/home/ubuntu/' and shows a list of files and folders on a Ubuntu host. Both panes include columns for Name, Size, Type, Changed, Rights, and Owner.

Name	Size	Type	Changed	Rights	Owner
..		Parent directory	18/12/2022 20.08.31		
bin		File folder	18/10/2022 11.44.40		
config		File folder	18/12/2022 20.08.35		
icons		File folder	26/11/2022 17.31.08		
junayed.txt		File folder	26/11/2022 17.41.51		
opt		File folder	18/10/2022 11.44.40		
shammi.txt		File folder	18/12/2022 20.08.31		
vendor		File folder	26/11/2022 17.34.30		
Cmder.exe	146 KB	Application	26/11/2022 17.31.08		
LICENSE	2 KB	File	26/11/2022 17.31.08		
nibbles-1.2.tar.gz	5 KB	GZ File	26/11/2022 18.01.30		
Version 1.3.20.1282	0 KB	1282 File	26/11/2022 17.34.30		

Name	Size	Changed	Rights	Owner
..		24/10/2022 8.17.00	rwxr-xr-x	root
dockerProject		18/12/2022 0.10.54	rwxr-xr-x	root
nct-1.4		18/04/2001 18.20.34	rwxrwxr-x	ubuntu
shammi.txt		18/12/2022 20.10.45	rwxrwxr-x	ubuntu
firstfile.txt	53 KB	19/10/2021 15.30.33	rw-rw-r--	ubuntu
irclog.txt	16 KB	19/10/2021 15.32.23	rw-rw-r--	ubuntu
lastLaunch.bash	1 KB	17/12/2022 21.15.29	rwxrwxrwx	ubuntu
nct-1.4.tar.gz	44 KB	19/10/2021 14.09.27	rw-rw-r--	ubuntu
nimipaivat.txt	10 KB	19/10/2021 15.31.30	rw-rw-r-	ubuntu
points.txt	1 KB	15/12/2022 14.53.47	rw-rw-r--	ubuntu
result.txt	13 KB	15/12/2022 14.33.23	rw-rw-r--	ubuntu
secondfile.txt	30 KB	19/10/2021 15.30.38	rw-rw-r-	ubuntu
ships.bash	1 KB	17/12/2022 21.25.15	rwxrwxrwx	ubuntu
stocks.txt	2 KB	19/10/2021 15.32.10	rw-rw-r--	ubuntu
users.txt	1 KB	15/12/2022 14.44.22	rw-rw-r-	ubuntu

Question 22: Study and explain shortly following commands and concepts:

- zip, unzip
- tar
- gzip
- xz
- zcat, zgrep
- compress
- bzip2
- 7z
- ldd
- gnu gcc / g++

Answer 22:

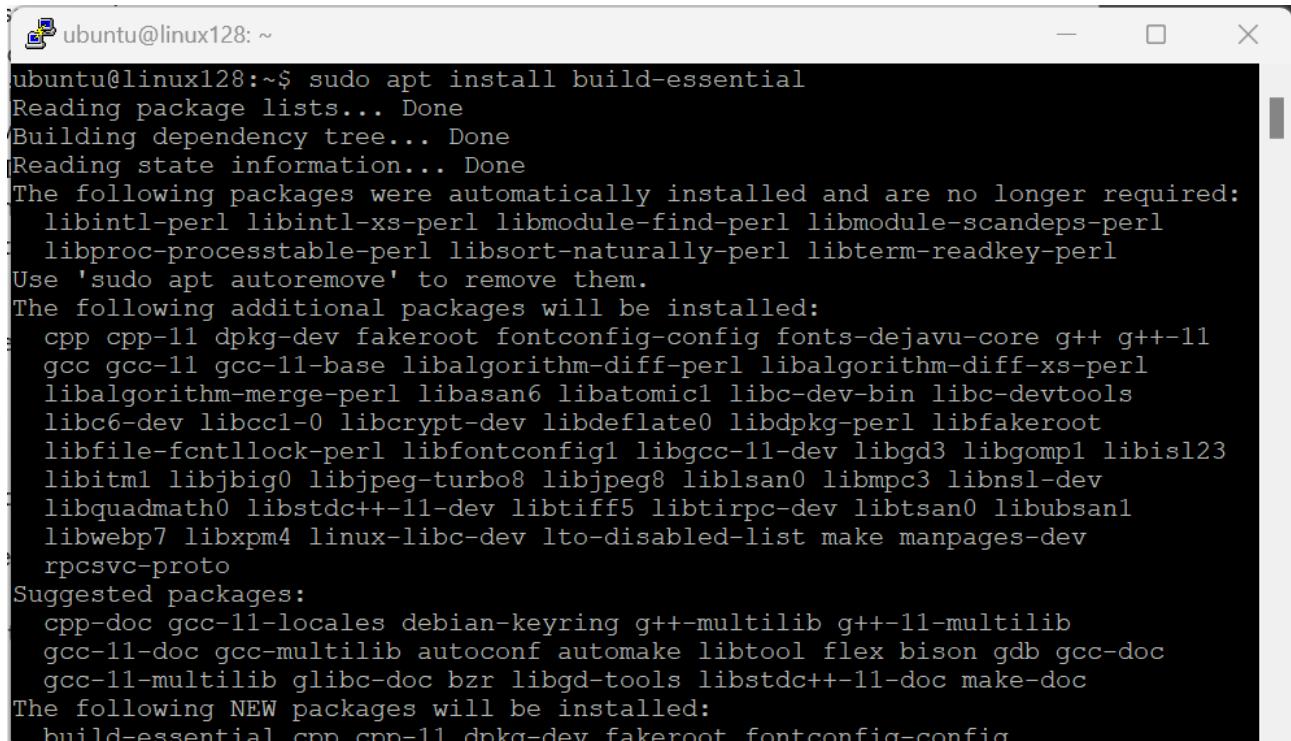
- **Zip:** Zip is used to compress the files to reduce file size and used as file package utility. zip is available in many operating systems like unix, linux, windows etc.
- **Unzip:** Unzip will list, test, or extract files from a ZIP archive, commonly found on Unix systems

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- **Tar:** The most popular archiving tool in Linux systems is the tar command, which stands for Tape Archiver. The tar command can be used to create, extract, and list archive contents straight from the terminal.
- **Gzip:** This command is used for compresses files.
- **Xz:** This command starts the x server and show server that runs on bitmapped terminals. [-a: Number], [-c: Volume], [-co: File] and so on.
- **zcat, zgrep:** zcat command is used for allows the user to expand and view a compressed file without uncompressing it.
Zgrep command is used to find the contents of a compressed file without uncompressing it.
- **Compress:** This is same as zip.
- **Bzip2:** It is use for compress and decompress the file in Linux system.
- **7z:** Data compression, encryption, and pre-processing methods are all supported by the compressed archive file format 7z.
- **Ldd:** List Dynamic Dependencies prints the shared libraries required by each program or shared object specified on the command line.
- **Gnu gcc / g++:** It stands for gnu compiler collection which is used to compile c and c++ language (binary file).

Question 23: Install build-essential meta package (containing development tools) to your server with: *sudo apt install build-essential*.

Answer 23:



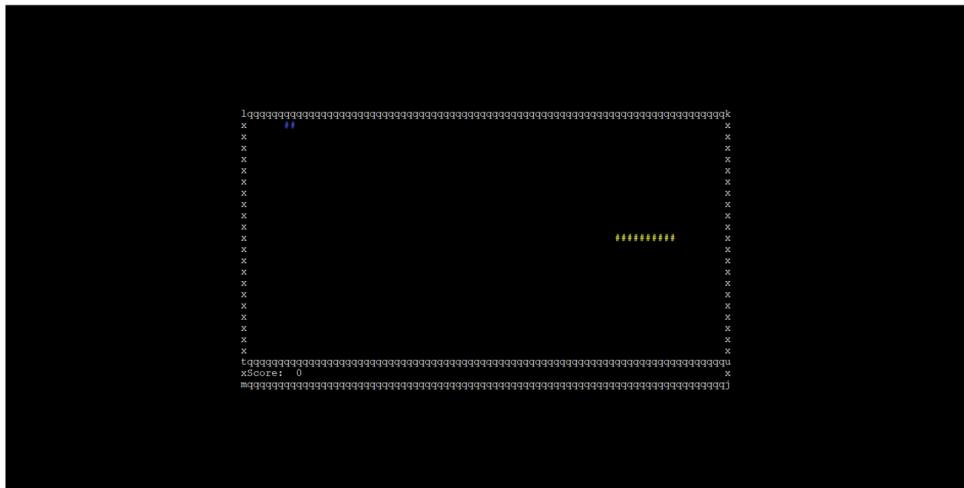
```
ubuntu@linux128:~$ sudo apt install build-essential
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libintl-perl libintl-xs-perl libmodule-find-perl libmodule-scandeps-perl
  libproc-processtable-perl libsort-naturally-perl libterm-readkey-perl
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  cpp cpp-11 dpkg-dev fakeroot fontconfig-config fonts-dejavu-core g++ g++-11
  gcc gcc-11 gcc-11-base libalgorithm-diff-perl libalgorithm-diff-xs-perl
  libalgorithm-merge-perl libasan6 libatomic1 libc-dev-bin libc-devtools
  libc6-dev libcc1-0 libcrypt-dev libdeflate0 libdpkg-perl libfakeroot
  libfile-fcntllock-perl libfontconfig1 libgcc-11-dev libgd3 libgomp1 libisl23
  libitm1 libjbig0 libjpeg-turbo8 libjpeg8 liblsan0 libmpc3 libnsl-dev
  libquadmath0 libstdc++-11-dev libtiff5 libtirpc-dev libtsan0 libubsan1
  libwebp7 libxpm4 linux-libc-dev lto-disabled-list make manpages-dev
  rpcsvc-proto
Suggested packages:
  cpp-doc gcc-11-locales debian-keyring g++-multilib g++-11-multilib
  gcc-11-doc gcc-multilib autoconf libtool flex bison gdb gcc-doc
  gcc-11-multilib glibc-doc bzr libgd-tools libstdc++-11-doc make-doc
The following NEW packages will be installed:
  build-essential cpp cpp-11 dpkg-dev fakeroot fontconfig-config
```

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Question 24: Get the source code for curses-based (“text-graphics”) worm game [nibbles-1.2.tar.gz](#)

Unpack the source package to a some temporary directory under your home directory
Compile the game and try playing it. Note: Ubuntu does not have ncursed development libraries
installed by default. Use apt install to install the missing library dependencies: *sudo apt install
libncurses-dev*

Answer 24:



Question25: Get the source code for another curses-based ("text-graphics") Tetris game [nct-1.4.tar.gz](#)

Unpack source package to temporary directory in your home directory.

Use source package's configure script to generate Makefile with installation prefix pointing to your home directory. Compile source code and install compiled files. Test if game works. Remove temporary game directory

Answer 25:



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Question 26: Download the file [harj_zip_paketti.zip](https://tl.oamk.fi/cdos/dl/harj_zip_paketti.zip). Zip-package has following hierarchy:

```
paahakemisto
  hakemisto_a
    karate_kat.jpg
    lazy.jpg

  hakemisto_b
    etherkill.jpg

  jap-inv3.jpg
  tekstia.txt
```

Answer 26:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ wget https://tl.oamk.fi/cdos/dl/harj_zip_paketti.zip
--2022-12-11 18:37:35-- https://tl.oamk.fi/cdos/dl/harj_zip_paketti.zip
Resolving tl.oamk.fi (tl.oamk.fi)... 193.167.100.28
Connecting to tl.oamk.fi (tl.oamk.fi)|193.167.100.28|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 269942 (264K) [application/zip]
Saving to: 'harj_zip_paketti.zip'

harj_zip_paketti.zip 100%[=====] 263.62K --.-KB/s   in 0.004s
2022-12-11 18:37:35 (59.6 MB/s) - 'harj_zip_paketti.zip' saved [269942/269942]

ubuntu@linux128:~$ ls
harj_zip_paketti.zip  junayed.txt  nibbles-1.2      test.txt
jubayer.txt          kkk.txt     nibbles-1.2.tar.gz
ubuntu@linux128:~$ unzip harj_zip_paketti.zip
Archive: harj_zip_paketti.zip
  creating: paahakemisto/
  creating: paahakemisto/hakemisto_a/
  inflating: paahakemisto/hakemisto_a/karate_kat.jpg
  inflating: paahakemisto/hakemisto_a/lazy.jpg
  creating: paahakemisto/hakemisto_b/
  inflating: paahakemisto/hakemisto_b/etherkill.jpg
  inflating: paahakemisto/jap-inv3.jpg
  inflating: paahakemisto/tekstia.txt
ubuntu@linux128:~$
```

Question 27 & Answer 27:

With the ZIP file:

Unpack package and all subdirectories to a temporary directory in your home directory. Create tar archive from unpacked files and directories and name it to a paketti.tar. List contents of the paketti.tar. If everything is correct, delete paahakemisto directory and all subdirectories under it. Delete also the harj_zip_paketti.zip file. Don't delete the paketti.tar -file you just created.

```
ubuntu@linux128: ~
ubuntu@linux128:~$ ls
harj_zip_paketti.zip  junayed.txt  nibbles-1.2      paahakemisto
jubayer.txt          kkk.txt     nibbles-1.2.tar.gz  test.txt
ubuntu@linux128:~$ tar -cf paketti.tar paahakemisto
ubuntu@linux128:~$ ls
harj_zip_paketti.zip  junayed.txt  nibbles-1.2      paahakemisto  test.txt
jubayer.txt          kkk.txt     nibbles-1.2.tar.gz  paketti.tar
ubuntu@linux128:~$ tar -tvf paketti.tar
drwxr-xr-x ubuntu/ubuntu 0 2004-11-21 09:07 paahakemisto/
-rw-rw-r-- ubuntu/ubuntu 154458 2004-11-21 09:07 paahakemisto/tekstia.txt
-rw-rw-r-- ubuntu/ubuntu 29991 2004-02-12 11:34 paahakemisto/jap-inv3.jpg
drwxr-xr-x ubuntu/ubuntu 0 2004-02-12 11:36 paahakemisto/hakemisto_b/
-rw-rw-r-- ubuntu/ubuntu 95051 2004-02-12 11:35 paahakemisto/hakemisto_b/etherkill.jpg
drwxr-xr-x ubuntu/ubuntu 0 2004-02-12 11:36 paahakemisto/hakemisto_a/
-rw-rw-r-- ubuntu/ubuntu 30036 2004-02-12 11:34 paahakemisto/hakemisto_a/karate_kat.jpg
-rw-rw-r-- ubuntu/ubuntu 68409 2004-02-12 11:34 paahakemisto/hakemisto_a/lazy.jpg
pg
ubuntu@linux128:~$ rm paahakemisto harj_zip_paketti.zip
rm: cannot remove 'paahakemisto': Is a directory
ubuntu@linux128:~$ rm -r paahakemisto
ubuntu@linux128:~$ ls
jubayer.txt  kkk.txt     nibbles-1.2.tar.gz  test.txt
junayed.txt  nibbles-1.2  paketti.tar
ubuntu@linux128:~$
```

Learning diary and answers

Unpack only the etherkill.jpg file from tar archive.

```
ubuntu@linux128: ~/paahakemisto/hakemisto_b
ubuntu@linux128:~$ tar -xf paketti.tar --wildcards --no-anchored 'etherkill.jpg'
ubuntu@linux128:~$ ls
jubayer.txt  kkk.txt      nibbles-1.2.tar.gz  paketti.tar
junayed.txt  nibbles-1.2  paahakemisto       test.txt
ubuntu@linux128:~$ cd paahakemisto/
ubuntu@linux128:~/paahakemisto$ ls
hakemisto_b
ubuntu@linux128:~/paahakemisto$ cd hakemisto_b/
ubuntu@linux128:~/paahakemisto/hakemisto_b$ ls
etherkill.jpg
ubuntu@linux128:~/paahakemisto/hakemisto_b$ 
```

Compress paketti.tar archive with a gzip command.

```
ubuntu@linux128: ~
ubuntu@linux128:~$ gzip paketti.tar
ubuntu@linux128:~$ ls
jubayer.txt  kkk.txt      nibbles-1.2.tar.gz  paketti.tar.gz
junayed.txt  nibbles-1.2  paahakemisto       test.txt
ubuntu@linux128:~$ 
```

What is the size of paketti.tar.gz now?

```
ubuntu@linux128:~$ ls -l paketti.tar.gz
-rw-rw-r-- 1 ubuntu ubuntu 269254 Dec 11 18:51 paketti.tar.gz
ubuntu@linux128:~$ 
```

Uncompress paketti.tar.gz and compress it again, but now with bzip2. Check the size again. Any difference?

```
ubuntu@linux128: ~
ubuntu@linux128:~$ ls
paketti.tar.gz
ubuntu@linux128:~$ gzip -d paketti.tar.gz
ubuntu@linux128:~$ ls
paketti.tar
ubuntu@linux128:~$ bzip2 paketti.tar
ubuntu@linux128:~$ ls -l
total 248
-rw-rw-r-- 1 ubuntu ubuntu 250362 Dec 11 18:51 paketti.tar.bz2
ubuntu@linux128:~$ 
```



```
ubuntu@linux128:~$ ls -l paketti.tar.gz
-rw-rw-r-- 1 ubuntu ubuntu 269254 Dec 11 18:51 paketti.tar.gz
ubuntu@linux128:~$ 
```

Learning diary and answers

Create some gzipped tar archive and use SSH (scp) to copy it to the students.oamk.fi
(students.oamk.fi is a Linux server you can use with your Oamk user account credentials)

```
t2shsh00@students: ~
ubuntu@linux128:~$ mkdir testFile
ubuntu@linux128:~$ tar -czvf testFile.tar.gz testFile
testFile/
ubuntu@linux128:~$ ls
dockerProject      nct-1.4          result.txt      stocks.txt
firstfile.txt      nct-1.4.tar.gz    secondfile.txt  testFile
irclog.txt         nimipaivat.txt   shammi.txt     testFile.tar.gz
lastLaunch.bash    points.txt      ships.bash    users.txt
ubuntu@linux128:~$ scp testFile.tar.gz t2shsh00@students.oamk.fi:
The authenticity of host 'students.oamk.fi (193.167.100.97)' can't be established.
ECDSA key fingerprint is SHA256:zQawTZRwOPe+A8skvMxhNVBHfgRppVGVvs05vB1TS3c.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'students.oamk.fi' (ECDSA) to the list of known hosts
.
t2shsh00@students.oamk.fi's password:
testFile.tar.gz                                100%   117      17.2KB/s   00:00
ubuntu@linux128:~$ ssh t2shsh00@students.oamk.fi
t2shsh00@students.oamk.fi's password:
Linux students 4.19.0-6-amd64 #1 SMP Debian 4.19.67-2+deb10u2 (2019-11-11) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

--
Kysymykset, purnaukset ja ehdotukset osoitteeseen helpdesk@oamk.fi
--

t2shsh00@students:~$ ls
testFile.tar.gz
t2shsh00@students:~$ 
```

Delete temporary files and directories created on this practice

```
ubuntu@linux128: ~
ubuntu@linux128:~$ ls
paketti.tar.bz2
ubuntu@linux128:~$ rm paketti.tar.bz2
ubuntu@linux128:~$ ls
ubuntu@linux128:~$ 
```

Learning diary and answers

Question 28: Compile this C source code with gcc and check if it works. helloworld.c source code:

```
#include <stdio.h>

int main(void) {
    printf("Hello, world!\n");
    return 0;
}
```

Answer 28:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat > helloworld.c
#include <stdio.h>

int main(void) {
    printf("Hello, world!\n");
    return 0;
}
^C
ubuntu@linux128:~$ gcc -o resulting_binary helloworld.c
ubuntu@linux128:~$ ls
helloworld.c  resulting_binary
ubuntu@linux128:~$ ./resulting_binary
Hello, world!
ubuntu@linux128:~$ 
```

Question 29: Compile this C++ source code with g++ and test it. helloworld.cpp source code:

```
#include <iostream>

using namespace std;
int main()
{
    cout << "Hello World!\n";
}
```

Answer 29:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat > helloworld.cpp
#include <iostream>

using namespace std;
int main()
{
    cout << "Hello World!\n";
}
^C
ubuntu@linux128:~$ g++ -o output helloworld.cpp
ubuntu@linux128:~$ ./output
Hello World!
ubuntu@linux128:~$ 
```

Learning diary and answers

Question 30: With previously compiled helloworld C++ binary:

- What are statically linked libraries? Why would you use them?

Answer: A static library, often known as a statically linked library, is a collection of functions that are resolved at build time and copied by a compiler into a target application. A static library, often known as a statically linked library, is a collection of functions that are resolved at build time and copied by a compiler into a target application.

- Inspect the size of ready binary file (that compiled helloworld binary). Compile it again and use some different output filename. With g++, use now statically linked libraries (with compiler's -static parameter). Compare the file sizes of statically and dynamically linked binaries

```
ubuntu@linux128: ~
ubuntu@linux128:~$ ls -l output
-rwxrwxr-x 1 ubuntu ubuntu 16384 Dec 11 20:16 output
ubuntu@linux128:~$ g++ -o output1 helloworld.cpp
ubuntu@linux128:~$ ./output1
Hello World!
ubuntu@linux128:~$ ls -l
total 56
-rw-rw-r-- 1 ubuntu ubuntu     84 Dec 11 20:01 helloworld.c
-rwxrwxrwx 1 ubuntu ubuntu    88 Dec 11 20:15 helloworld.cpp
-rwxrwxr-x 1 ubuntu ubuntu 16384 Dec 11 20:16 output
-rwxrwxr-x 1 ubuntu ubuntu 16384 Dec 11 20:34 output1
-rwxrwxr-x 1 ubuntu ubuntu 15968 Dec 11 20:03 resulting_binary
ubuntu@linux128:~$ g++ -static -o output1 helloworld.cpp
ubuntu@linux128:~$ ls -l
total 2388
-rw-rw-r-- 1 ubuntu ubuntu     84 Dec 11 20:01 helloworld.c
-rwxrwxrwx 1 ubuntu ubuntu    88 Dec 11 20:15 helloworld.cpp
-rwxrwxr-x 1 ubuntu ubuntu 16384 Dec 11 20:16 output
-rwxrwxr-x 1 ubuntu ubuntu 2403896 Dec 11 20:36 output1
-rwxrwxr-x 1 ubuntu ubuntu 15968 Dec 11 20:03 resulting_binary
```

- Use strace to inspect interiors (system calls) of ls command: "strace ls" and compare the output to a "strace chmod". Check _exit -values. Why chmod returns 1 and ls returns 0?

"strace ls" command doesnot required any parameters. But strace chmod require parameters. Without any parameter chmod doednot give correct output, thats is why it gives exit value = 1.

- Why and when Unix administrators and programmers use system call tracing programs and debuggers such as gdb and strace?

To see low level what happen in system because in the application has some errors, but user cannot see. Or library miss ... etc.

Question 31: Solve these service management assignments (Note: most assignments will require root access):

- Check what network adapters your Linux host/server has with command: ip addr or ifconfig (ifconfig is not necessary installed by default)

Learning diary and answers

```
ubuntu@linux128:~$ ifconfig
enp1s0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
        inet 172.20.241.128 netmask 255.255.254.0 broadcast 172.20.241.255
              inet6 fe80::5054:ff:fe40:71e3 prefixlen 64 scopeid 0x20<link>
              inet6 2001:708:510:665::128 prefixlen 64 scopeid 0x0<global>
              inet6 2001:708:510:665:5054:ff:fe40:71e3 prefixlen 64 scopeid 0x0<global>
        ether 52:54:00:40:71:e3 txqueuelen 1000 (Ethernet)
          RX packets 6507646 bytes 1057095708 (1.0 GB)
          RX errors 0 dropped 1777563 overruns 0 frame 0
          TX packets 156715 bytes 17777010 (17.7 MB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
        inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Local Loopback)
          RX packets 2159 bytes 277029 (277.0 KB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 2159 bytes 277029 (277.0 KB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

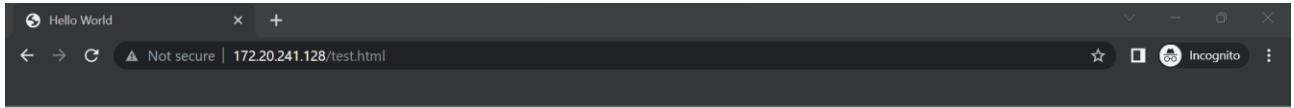
ubuntu@linux128:~$
```

- Listen inbound ICMP traffic in your server with tcpdump command line protocol analyzer and test if you can see the traffic when you ping your server: `tcpdump -n -i YOUR_NETWORK_ADAPTER_NAME_HERE icmp`

```
ubuntu@linux128:~$ sudo tcpdump -n -i enp1s0 icmp
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on enp1s0, link-type EN10MB (Ethernet), snapshot length 262144 bytes
20:49:18.771787 IP 10.2.124.81 > 172.20.241.128: ICMP echo request, id 1, seq 17, length 40
20:49:18.771956 IP 172.20.241.128 > 10.2.124.81: ICMP echo reply, id 1, seq 17, length 40
20:49:19.755588 IP 10.2.124.81 > 172.20.241.128: ICMP echo request, id 1, seq 18, length 40
20:49:19.755617 IP 172.20.241.128 > 10.2.124.81: ICMP echo reply, id 1, seq 18, length 40
20:49:20.825794 IP 10.2.124.81 > 172.20.241.128: ICMP echo request, id 1, seq 19, length 40
20:49:20.825825 IP 172.20.241.128 > 10.2.124.81: ICMP echo reply, id 1, seq 19, length 40
20:49:21.873224 IP 10.2.124.81 > 172.20.241.128: ICMP echo request, id 1, seq 20, length 40
20:49:21.873259 IP 172.20.241.128 > 10.2.124.81: ICMP echo reply, id 1, seq 20, length 40
^C
8 packets captured
8 packets received by filter
0 packets dropped by kernel
ubuntu@linux128:~$
```

- Install apache web server with `apt install apache2` and test that you can access your server with a web browser

Learning diary and answers



This is my profile.

- Listen TCP/80 (web) traffic in your server with tcpdump and test if you can see the inbound TCP SYN segments after you try to access your server with a web browser: `tcpdump -n -i YOUR_NETWORK_ADAPTER_NAME_HERE tcp port 80`

```
ubuntu@linux128:~$ sudo tcpdump -n -i enp1s0 tcp port 80
tcpdump: verbose output suppressed, use -v[v]... for full protocol decode
listening on enp1s0, link-type EN10MB (Ethernet), snapshot length 262144 bytes
21:08:51.416142 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [S], seq 3886203
723, win 64240, options [mss 1286,nop,wscale 8,nop,nop,sackOK], length 0
21:08:51.416260 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [S.], seq 210863
4157, ack 3886203724, win 64240, options [mss 1460,nop,nop,sackOK,nop,wscale 7],
length 0
21:08:51.438732 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [.], ack 1, win
1024, length 0
21:08:51.438993 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [P.], seq 1:543,
ack 1, win 1024, length 542: HTTP: GET /test.html HTTP/1.1
21:08:51.439048 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [.], ack 543, wi
n 501, length 0
21:08:51.440418 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [P.], seq 1:450,
ack 543, win 501, length 449: HTTP: HTTP/1.1 200 OK
21:08:51.514668 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [.], ack 450, wi
n 1023, length 0
21:08:56.445901 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [F.], seq 450, a
ck 543, win 501, length 0
21:08:56.528446 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [.], ack 451, wi
n 1023, length 0
21:09:41.674062 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [.], seq 542:543, ack 451, win 1023, length 1: HTTP
21:09:41.674102 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [.], ack 543, win 501, length 0
21:10:27.162416 IP 10.2.124.81.61201 > 172.20.241.128.80: Flags [.], seq 542:543, ack 451, win 1023, length 1: HTTP
21:10:27.162503 IP 172.20.241.128.80 > 10.2.124.81.61201: Flags [R], seq 2108634608, win 0, length 0
^C
13 packets captured
13 packets received by filter
0 packets dropped by kernel
ubuntu@linux128:~$
```

- Explain what is runlevel?

Answer: A runlevel is one of the modes that a Unix-based, dedicated server or a VPS server OS will run on. Each runlevel has a certain number of services stopped or started, giving the user control over the behaviour of the machine. Conventionally, seven runlevels exist, number from zero to six.

- Explain what is systemd

Answer: Systemd is contentious for several reasons, including the fact that it replaces something that many Linux users do not believe needs to be replaced and the creators' antics, which have not been well received. Contrarily, as shown in this well-known LKML thread where Linus Torvalds expelled systemd developer Kay Sievers from the Linux kernel, this is the case.

- Explain what are the files in /etc/init.d/ directory?

init.d is the sub-directory of /etc directory in Linux file system. init.d basically contains the bunch of start/stop scripts which are used to control (start,stop,reload,restart) the daemon while the system is running or during boot. If you look at /etc/init.d then you will notice all the scripts for different services of your system.

The scripts within the directory varies as per the applications installed in your system. In server system you'll find many network related scripts while in desktop there will be the only basic ones like 'networking'.

Learning diary and answers

```
ubuntu@linux128:~$ ls -la /etc/init.d
total 140
drwxr-xr-x  2 root root 4096 Dec 11 20:55 .
drwxr-xr-x  98 root root 4096 Dec 11 20:55 ..
-rw-r--r--  1 root root 2489 Sep  8 06:07 apache-htcacheclean
-rw-r--r--  1 root root 8181 Sep  8 06:07 apache2
-rw-r--r--  1 root root 3740 Feb 23 2022 apparmor
-rw-r--r--  1 root root 2915 May 10 2022 apport
-rw-r--r--  1 root root 1232 Nov 22 2021 console-setup.sh
-rw-r--r--  1 root root 3062 Mar 18 2021 cron
-rw-r--r--  1 root root 937 Jan 13 2022 cryptdisks
-rw-r--r--  1 root root 896 Jan 13 2022 cryptdisks-early
-rw-r--r--  1 root root 3152 Jun 28 2021 dbus
-rw-r--r--  1 root root 985 Apr 16 2022 grub-common
-rw-r--r--  1 root root 1748 Feb 21 2022 hwclock.sh
-rw-r--r--  1 root root 2638 Oct 30 2021 irqbalance
-rw-r--r--  1 root root 1503 Jan 19 2022 iscsid
-rw-r--r--  1 root root 1479 Jul 24 2021 keyboard-setup.sh
-rw-r--r--  1 root root 2044 Jan  8 2021 kmod
-rw-r--r--  1 root root 698 May 19 2021 lvm2
-rw-r--r--  1 root root 586 May 19 2021 lvm2-lvmpolld
-rw-r--r--  1 root root 2827 Feb 18 2022 multipath-tools
-rw-r--r--  1 root root 2433 Jan 19 2022 open-iscsi
-rw-r--r--  1 root root 1846 Jan  4 2022 open-vm-tools
-rw-r--r--  1 root root 1386 Feb 23 2022 plymouth
-rw-r--r--  1 root root 760 Feb 23 2022 plymouth-log
-rw-r--r--  1 root root 959 Feb 25 2022 procps
-rw-r--r--  1 root root 4417 Nov  2 2021 rsync
-rw-r--r--  1 root root 1222 Feb 18 2021 screen-cleanup
-rw-r--r--  1 root root 4060 Feb 26 2022 ssh
-rw-r--r--  1 root root 6871 Mar  8 2022 udev
-rw-r--r--  1 root root 2083 Sep 19 2021 ufw
-rw-r--r--  1 root root 1391 Feb 19 2021 unattended-upgrades
-rw-r--r--  1 root root 1306 Feb 21 2022 uuidd
ubuntu@linux128:~$ 
```

Question 32: Test these service management commands with your web server and use web browser to verify the operation whether the server is running or not:

Somewhat bad or at least old way of some or older distros:

```
service apache2 stop
service apache2 start
service apache2 restart
```

Answer 32:

```
root@linux128:/home/ubuntu
root@linux128:/home/ubuntu# service apache2 stop
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html
curl: (7) Failed to connect to 172.20.241.128 port 80 after 0 ms: Connection refused
root@linux128:/home/ubuntu# service apache2 start
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html
<!DOCTYPE html>
<html>
  <head>
    <title>Hello World</title>
  </head>
  <body>
    <p>This is my profile.</p>
  </body>
</html>
root@linux128:/home/ubuntu# service apache2 restart
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html
<!DOCTYPE html>
<html>
  <head>
    <title>Hello World</title>
  </head>
  <body>
    <p>This is my profile.</p>
  </body>
</html>
root@linux128:/home/ubuntu# 
```

Learning diary and answers

Question 33: Test these service management commands with your web server and use web browser to verify the operation whether the server is running or not:

```
Generic System V style, also old school:
```

```
/etc/init.d/apache2 stop  
/etc/init.d/apache2 start  
/etc/init.d/apache2 restart
```

Answer 33:

```
root@linux128:/home/ubuntu  
root@linux128:/home/ubuntu# /etc/init.d/apache2 stop  
Stopping apache2 (via systemctl): apache2.service.  
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html  
curl: (7) Failed to connect to 172.20.241.128 port 80 after 0 ms: Connection refused  
root@linux128:/home/ubuntu# /etc/init.d/apache2 start  
Starting apache2 (via systemctl): apache2.service.  
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html  
<!DOCTYPE html>  
<html>  
  <head>  
    <title>Hello World</title>  
  </head>  
  <body>  
    <p>This is my profile.</p>  
  </body>  
</html>  
root@linux128:/home/ubuntu# /etc/init.d/apache2 restart  
Restarting apache2 (via systemctl): apache2.service.  
root@linux128:/home/ubuntu# curl http://172.20.241.128/test.html  
<!DOCTYPE html>  
<html>  
  <head>  
    <title>Hello World</title>  
  </head>  
  <body>  
    <p>This is my profile.</p>  
  </body>  
</html>  
root@linux128:/home/ubuntu#
```

Question 34: Test these service management commands with your web server and use web browser to verify the operation whether the server is running or not. Try and explain:

```
Modern way for distros using systemd:
```

```
journalctl | tail -20  
systemctl restart apache2  
journalctl | tail -20  
systemctl stop apache2  
systemctl start apache2  
systemctl
```

Answer 34:

Learning diary and answers

```
root@linux128:/home/ubuntu# journalctl | tail -20
Dec 11 21:34:02 linux128 apachectl[70779]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:02 linux128 systemd[1]: apache2.service: Deactivated successfully.
Dec 11 21:34:02 linux128 systemd[1]: Stopped The Apache HTTP Server.
Dec 11 21:34:22 linux128 systemd[1]: Starting The Apache HTTP Server...
Dec 11 21:34:22 linux128 apachectl[70803]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:22 linux128 systemd[1]: Started The Apache HTTP Server.
Dec 11 21:34:33 linux128 systemd[1]: Stopping The Apache HTTP Server...
Dec 11 21:34:33 linux128 apachectl[70879]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:33 linux128 systemd[1]: apache2.service: Deactivated successfully.
Dec 11 21:34:33 linux128 systemd[1]: Stopped The Apache HTTP Server.
Dec 11 21:34:33 linux128 apachectl[70885]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:33 linux128 systemd[1]: Started The Apache HTTP Server.
Dec 11 21:34:36 linux128 systemd[1]: Stopping The Apache HTTP Server...
Dec 11 21:34:36 linux128 apachectl[70958]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:36 linux128 systemd[1]: apache2.service: Deactivated successfully.
Dec 11 21:34:36 linux128 systemd[1]: Stopped The Apache HTTP Server.
Dec 11 21:34:36 linux128 apachectl[70966]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:36 linux128 systemd[1]: Started The Apache HTTP Server.
root@linux128:/home/ubuntu#
```

```
root@linux128:/home/ubuntu# systemctl restart apache2
root@linux128:/home/ubuntu# journalctl | tail -20
Dec 11 21:34:33 linux128 apachectl[70879]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:33 linux128 systemd[1]: apache2.service: Deactivated successfully.
Dec 11 21:34:33 linux128 systemd[1]: Stopped The Apache HTTP Server.
Dec 11 21:34:33 linux128 systemd[1]: Starting The Apache HTTP Server...
Dec 11 21:34:33 linux128 apachectl[70885]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:34:33 linux128 systemd[1]: Started The Apache HTTP Server.
Dec 11 21:40:36 linux128 systemd[1]: Stopping The Apache HTTP Server...
Dec 11 21:40:36 linux128 apachectl[70958]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:40:36 linux128 systemd[1]: apache2.service: Deactivated successfully.
Dec 11 21:40:36 linux128 systemd[1]: Stopped The Apache HTTP Server.
Dec 11 21:40:36 linux128 apachectl[70966]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the
'ServerName' directive globally to suppress this message
Dec 11 21:40:36 linux128 systemd[1]: Started The Apache HTTP Server.
root@linux128:/home/ubuntu#
```

```
root@linux128:/home/ubuntu# systemctl stop apache2
root@linux128:/home/ubuntu# systemctl start apache2
root@linux128:/home/ubuntu# systemctl
 _SYSTEMD_NAMED_PIPE_ _SYSTEMD_PERSISTENT_ _SYSTEMD_PERSISTENT_TIMER_ _SYSTEMD_RELAY_ _SYSTEMD_REMOTE_ _SYSTEMD_SYSTEMD_
UNIT LOAD ACTIVE SUB DESCRIPTION
proc-sys-fs-binfmt_misc.automount loaded active running Arbitrary Executable File Formats File System Auto...
sys-devices-pci0000:00-0000:00:02.0-0000:01:00.0-virtio0-net-enp1s0.device loaded active plugged Virtual network device
sys-devices-pci0000:00-0000:00:02.2-0000:03:00.0-virtio1-block-vda-vdal1.device loaded active plugged /sys/devices/pci0000:00/0000:00:02.2/0000:03:00.0/>
sys-devices-pci0000:00-0000:00:02.2-0000:03:00.0-virtio1-block-vda-vdal4.device loaded active plugged /sys/devices/pci0000:00/0000:00:02.2/0000:03:00.0/>
sys-devices-pci0000:00-0000:00:02.2-0000:03:00.0-virtio1-block-vda-vdal5.device loaded active plugged /sys/devices/pci0000:00/0000:00:02.2/0000:03:00.0/>
sys-devices-pci0000:00-0000:00:02.2-0000:03:00.0-virtio1-block-vda.device loaded active plugged /sys/devices/pci0000:00/0000:00:02.2/0000:03:00.0/>
sys-devices-pci0000:00-0000:00:02.3-0000:04:00.0-virtio2-block-vdb.device loaded active plugged /sys/devices/pci0000:00/0000:00:02.3/0000:04:00.0/>
sys-devices-platform-serial18250-tty-ttys1.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys1
sys-devices-platform-serial18250-tty-ttys10.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys10
sys-devices-platform-serial18250-tty-ttys11.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys11
sys-devices-platform-serial18250-tty-ttys12.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys12
sys-devices-platform-serial18250-tty-ttys13.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys13
sys-devices-platform-serial18250-tty-ttys14.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys14
sys-devices-platform-serial18250-tty-ttys15.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys15
sys-devices-platform-serial18250-tty-ttys16.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys16
sys-devices-platform-serial18250-tty-ttys17.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys17
sys-devices-platform-serial18250-tty-ttys18.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys18
sys-devices-platform-serial18250-tty-ttys19.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys19
sys-devices-platform-serial18250-tty-ttys2.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys2
sys-devices-platform-serial18250-tty-ttys20.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys20
sys-devices-platform-serial18250-tty-ttys21.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys21
sys-devices-platform-serial18250-tty-ttys22.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys22
sys-devices-platform-serial18250-tty-ttys23.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys23
sys-devices-platform-serial18250-tty-ttys24.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys24
sys-devices-platform-serial18250-tty-ttys25.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys25
sys-devices-platform-serial18250-tty-ttys26.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys26
sys-devices-platform-serial18250-tty-ttys27.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys27
sys-devices-platform-serial18250-tty-ttys28.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys28
sys-devices-platform-serial18250-tty-ttys29.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys29
sys-devices-platform-serial18250-tty-ttys3.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys3
sys-devices-platform-serial18250-tty-ttys30.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys30
sys-devices-platform-serial18250-tty-ttys31.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys31
sys-devices-platform-serial18250-tty-ttys4.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys4
sys-devices-platform-serial18250-tty-ttys5.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys5
sys-devices-platform-serial18250-tty-ttys6.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys6
sys-devices-platform-serial18250-tty-ttys7.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys7
sys-devices-platform-serial18250-tty-ttys8.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys8
sys-devices-platform-serial18250-tty-ttys9.device loaded active plugged /sys/devices/platform/serial18250/tty/ttys9
sys-devices-pnp0:00-tty-ttys0.device loaded active plugged /sys/devices/pnp0:00/tty/ttys0
sys-devices-Virtual-block-loop0.device loaded active plugged /sys/devices/Virtual/block/loop0
```

Learning diary and answers

Question 35: Check Apache access.log file contents in /var/log/apache2/ directory. Can you find your connections to the web server?

Answer 35:

```
root@linux128:/home/ubuntu# cat /var/log/apache2/access.log
10.2.124.81 - - [11/Dec/2022:20:56:05 +0200] "GET / HTTP/1.1" 200 3460 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:20:56:06 +0200] "GET /icons/ubuntu-logo.png HTTP/1.1" 200 3607 "http://172.20.241.128/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:20:56:06 +0200] "GET /favicon.ico HTTP/1.1" 404 492 "http://172.20.241.128/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:20:56:06 +0200] "GET /test.html HTTP/1.1" 200 478 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:01:10 +0200] "GET /test.html HTTP/1.1" 404 492 "http://172.20.241.128/" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:02:02 +0200] "GET /test.html HTTP/1.1" 200 449 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:03:44 +0200] "GET /test.html HTTP/1.1" 200 449 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:04:32 +0200] "GET /test.html HTTP/1.1" 200 449 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:05:23 +0200] "GET /test.html HTTP/1.1" 200 449 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
10.2.124.81 - - [11/Dec/2022:21:08:51 +0200] "GET /test.html HTTP/1.1" 200 449 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
172.20.241.128 - - [11/Dec/2022:21:25:49 +0200] "GET / HTTP/1.1" 200 10926 "-" "curl/7.81.0"
172.20.241.128 - - [11/Dec/2022:21:27:06 +0200] "GET /test.html HTTP/1.1" 200 398 "-" "curl/7.81.0"
172.20.241.128 - - [11/Dec/2022:21:27:26 +0200] "GET /test.html HTTP/1.1" 200 398 "-" "curl/7.81.0"
172.20.241.128 - - [11/Dec/2022:21:34:26 +0200] "GET /test.html HTTP/1.1" 200 398 "-" "curl/7.81.0"
172.20.241.128 - - [11/Dec/2022:21:34:37 +0200] "GET /test.html HTTP/1.1" 200 398 "-" "curl/7.81.0"
root@linux128:/home/ubuntu#
```

Week 3

Question 36 & Answer 36: Study and explain shortly following commands and concepts:

- ytsh, bash, zsh

- **sh:** command invokes the default shell and uses its syntax and flags. The shell linked to the /usr/bin/sh path is the default shell. The standard configuration of the operating system links the /usr/bin/sh path to the Korn shell.

- **Bash:** is an interpreter for the sh command language that can run scripts that are read from files or the standard input. Additionally, bash integrates helpful elements from the Korn and C shells (ksh and csh).

- **zsh:** is a Unix shell that may be used as a command interpreter for shell scripting as well as an interactive login shell. Zsh is an improved version of the Bourne shell that incorporates some Bash, ksh, and tcsh features. Shell Z.

- screen and tmux

- **screen:** A single ssh session can launch and use many shell sessions thanks to the screen command in Linux. When a process is started using the command "screen," the session can be removed from the process, and it can subsequently be reattached. The process that was initially started from the screen is still running and is being controlled by the screen itself when the session is detached. The terminals are still there when the session is re-attached, exactly as it was before, thanks to the process.

- **tmux:** A terminal multiplexer called Tmux enables you to make numerous "pseudo terminals" out of a single terminal. The ability to run many programs simultaneously is a huge benefit when it comes to using the internet for business (SSH).

- ps, pgrep, pstree, pidof

- **ps:** The ps command, which stands for Process Status, is a command-line tool used to show or inspect details about the processes that are currently active in a Linux system.

- **pgrep:** The pgrep command on Unix-like operating systems looks for processes that are currently active on the system using a whole or incomplete process name or other supplied attributes.

- **pstree:** The Linux command pstree displays the active processes as a tree, which is a more practical approach to represent the processes hierarchy and improves the output's aesthetics.

- **pidof:** To determine the process IDs of a particular running program, use the pidof command. In essence, each process is given one when it is created; it serves as an identification number.

- jobs, disown

- **jobs:** In the present shell environment, the jobs command shows the status of any jobs that have been begun. If the JobID option is not used to specify a single job, all active jobs' status information is shown. When a reported job termination occurs, the shell removes the process ID of that job from the list of those that the present shell environment is aware of.

- **disown:** The Unix ksh, bash, and zsh shells all provide the disown command, which is used to remove tasks from the current shell.

Learning diary and answers

- fg, bg

-fg: A background job can be brought to the front with the fg command in Linux.

-bg: bg command in linux is used to place foreground jobs in background.

- top, htop

-top: To display the processes running on Linux, use top. It offers a dynamic, real-time perspective of the system as it operates. This command often displays the system's summary data as well as a list of the processes or threads that the Linux Kernel is currently in charge of.

-htop: The Linux system's htop command line utility enables users to interactively monitor the server's or system's critical resources in real time. htop is a more recent application than top command, and it provides several upgrades to top command.

- nice, renice

-nice: In Linux, the "nice" command facilitates the execution of a program or process with altered scheduling priority. It starts a process with a scheduling priority that the user specifies. In this, the Kernel will give a process extra CPU time if we assign it a higher priority

-renice: You can alter the scheduling priority of an active process by using the renice command. The Linux Kernel schedules each process and allots CPU time in accordance with its needs.

- su, sudo

-su: The su command is sometimes referred to as switch (-) user by a lot of Linux users since it is used to switch to another user, or change user ID, during a regular login session.

-sudo: In Linux, the sudo (Super User DO) command is frequently used as a prefix to a command that only superusers are permitted to execute. Any command that has the "sudo" prefix will run with elevated privileges, or in other words, allow a user with the necessary permissions to execute a command in the role of another user, such as the superuser. This is comparable to Windows' "run as administrator" option. We can have several administrators thanks to sudo. These users must have an entry in the "/etc/sudoers" file to be able to use the sudo command.

- Sleep

-sleep: The sleep command is used to pause the execution of any script for a predetermined period of time. This command is used with a specific time value when the programmer needs to pause the execution of a command for a specific reason.

- Xargs

-xargs: Xargs is a fantastic command that produces and executes command lines while reading streams of data from standard input. It can take the output of one command and provide it as a parameter to another command.

- Nohup

-nohup: Nohup, which stands for "no hang up," is a command that allows Linux systems to continue running programs even after closing the shell or terminal. Processes or tasks cannot receive the SIGHUP (Signal Hang UP) signal while Nohup is enabled. When a terminal is closed or exited, a signal is sent to a process.

Learning diary and answers

- Kill

-kill: The built-in command kill in Linux (found in /bin/kill) is used to manually terminate processes. A process is terminated with the kill command, which delivers a signal to the process.

- pkill, killall

-pkill: A command-line tool called pkill sends signals to a program's executing processes depending on predetermined criteria. The complete or partial names of the processes, the person who is operating them, or other details can be used to identify them.

-killall: All processes you initiated are terminated by the killall command, with the exception of those that generated the killall process. This command offers a handy way to stop any processes started by the shell you are in control of.

- w, who

-w: Administrators can obtain details about users who are currently logged in using the built-in w command. This includes their username, the computer they are using to log in, and what they are doing right now.

-who: The who command is used to get information about currently logged in user on to system.

- write, wall

-write: In Linux, the write command establishes a channel of communication between two logged-in users via the terminal. By copying text from one terminal to another, the command enables real-time messaging between users.

-wall: The wall command sends a message to every logged-in user. The wall command reads the message from standard input until it hits an end-of-file character if the Message parameter is not given. Then, all currently logged-in users receive the message.

- Aliases

-aliases: the alias command asks the shell to swap out one string for another. When we frequently need to utilize a single large command several times, we designate an alias for that command. Alias functions similarly to a shortcut command and has the same functionality as the full command.

- source, .bashrc

-source: Source is a built-in shell command in Linux operating systems that reads and executes file content in the current shell. Typically, these files include a set of commands that are sent to the TCL interpreter to read and execute.

- .bashrc: When a user logs in, a script file called .bashrc is executed. Several configurations for the terminal session are contained in the file itself. Setting up or enabling these features involves creating command aliases, coloring, completion, and shell history.

- shell build-in variables, export

-shell build-in variables: Built-in variables are frequently used in shell scripts and are automatically established by the shell. The above-described patterns of variable substitution can be used to built-in variables.

Learning diary and answers

-export: The Bash shell includes a built-in command called export. To designate variables and functions for passing to child processes, use this symbol. A variable will essentially be present in child process contexts without influencing other surroundings.

Question 37: How and when you start new shells? How to exit a shell?

Answer 37: If you want to run a program at a new environment, then you can start new shells to run.

Just use exit command, it will exit the current shell.

Question 38: Add shell alias “diskusage” to your shell startup-files (example .bashrc). Alias should print only current disk usage of your home directory

Answer 38:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ alias diskusage="du -hs"
ubuntu@linux128:~$ diskusage
52K .
ubuntu@linux128:~$ alias diskusage
alias diskusage='du -hs'
ubuntu@linux128:~$ diskusage
52K .
ubuntu@linux128:~$ 
```

Question 39: Create shell alias “pp” which requires one parameter and will print all running processes including details with that name. Usage example:

Answer 39:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ sleep 100 &
[1] 75391
ubuntu@linux128:~$ sleep 100 &
[2] 75392
ubuntu@linux128:~$ sleep 100 &
[3] 75393
ubuntu@linux128:~$ sleep 100 &
[4] 75394
ubuntu@linux128:~$ alias pp="ps auxw | grep -v grep | grep"
ubuntu@linux128:~$ pp sleep
ubuntu    75391  0.0  0.0    6188  1056 pts/0      S    13:38   0:00 sleep 100
ubuntu    75392  0.0  0.0    6188  1060 pts/0      S    13:38   0:00 sleep 100
ubuntu    75393  0.0  0.0    6188  1020 pts/0      S    13:38   0:00 sleep 100
ubuntu    75394  0.0  0.0    6188  1020 pts/0      S    13:38   0:00 sleep 100
ubuntu@linux128:~$ 
```

Question 40: Which directories are currently in you PATH variable?

Answer 40:

```
ubuntu@linux128:~$ echo $PATH
/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin:/usr/games:/usr/local/games:/snap/bin
[1] Done                      sleep 100
[2] Done                      sleep 100
[3]- Done                     sleep 100
[4]+ Done                     sleep 100
ubuntu@linux128:~$ 
```

Learning diary and answers

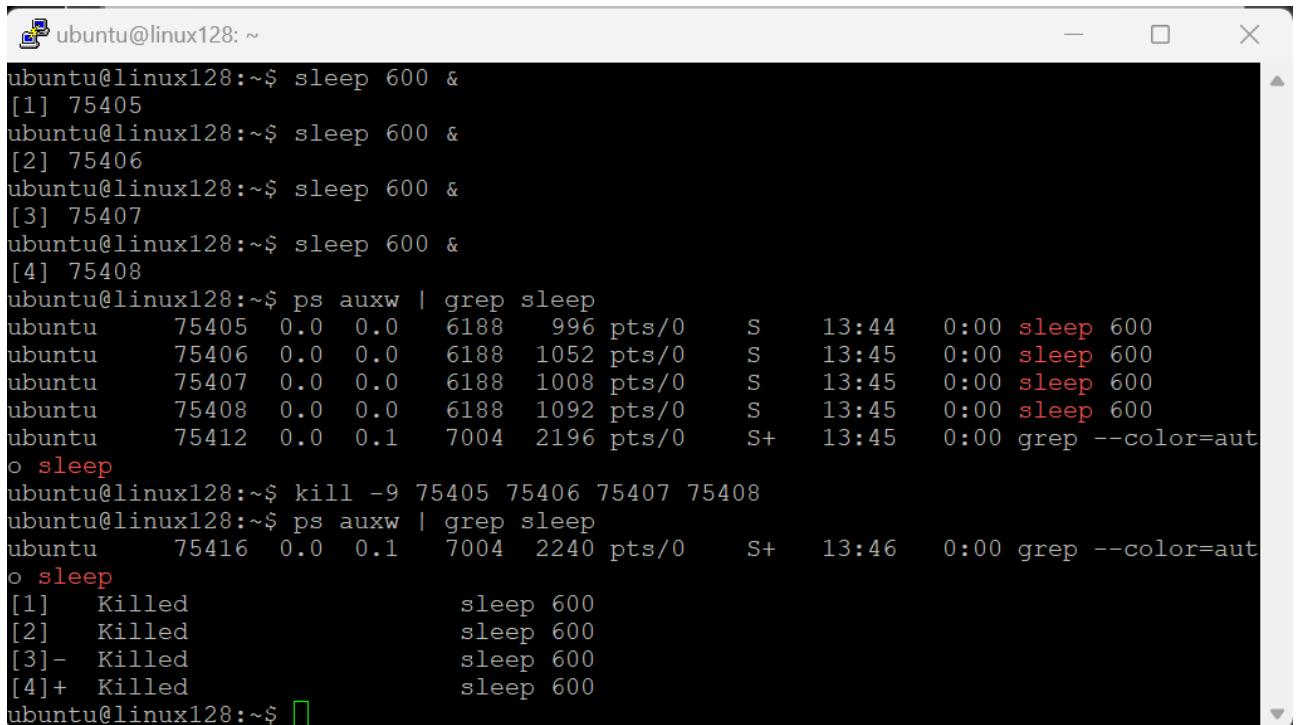
Question 41: How do you start process directly into background when entering a command?

Answer 41: A foreground process must first be put to sleep before being moved into the background to be placed there.

1. Run the specified command to start your process.
2. To put the process to sleep, press CTRL+Z.
3. Use the bg command to start and continue the process in the background.

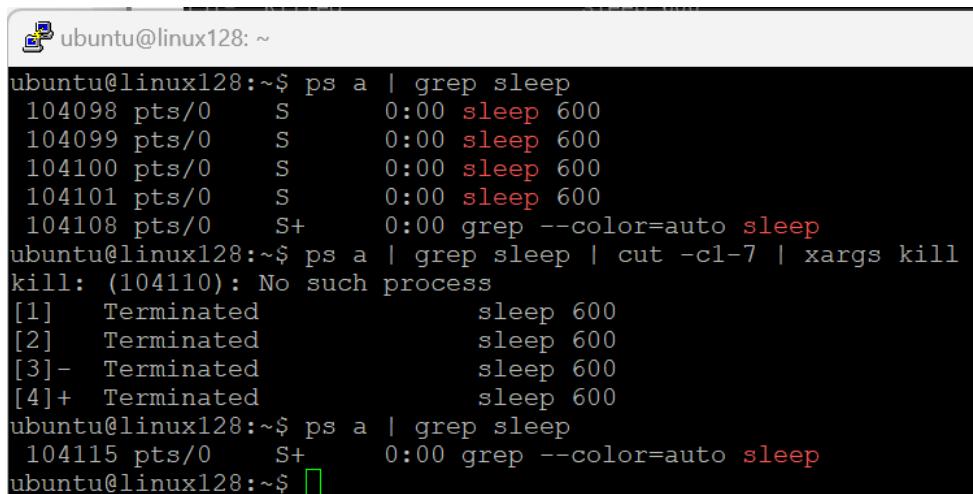
Question 42: Start few *sleep 60* processes (one minute idle loop) to the background and:

- How can you find and terminate them all with one-liner? Try not to use pkill, killall or xargs - commands.



```
ubuntu@linux128:~$ sleep 600 &
[1] 75405
ubuntu@linux128:~$ sleep 600 &
[2] 75406
ubuntu@linux128:~$ sleep 600 &
[3] 75407
ubuntu@linux128:~$ sleep 600 &
[4] 75408
ubuntu@linux128:~$ ps auxw | grep sleep
ubuntu    75405  0.0  0.0   6188   996 pts/0      S     13:44  0:00 sleep 600
ubuntu    75406  0.0  0.0   6188  1052 pts/0      S     13:45  0:00 sleep 600
ubuntu    75407  0.0  0.0   6188  1008 pts/0      S     13:45  0:00 sleep 600
ubuntu    75408  0.0  0.0   6188  1092 pts/0      S     13:45  0:00 sleep 600
ubuntu    75412  0.0  0.1   7004  2196 pts/0      S+    13:45  0:00 grep --color=auto sleep
ubuntu@linux128:~$ kill -9 75405 75406 75407 75408
ubuntu@linux128:~$ ps auxw | grep sleep
ubuntu    75416  0.0  0.1   7004  2240 pts/0      S+    13:46  0:00 grep --color=auto sleep
[1] Killed                  sleep 600
[2] Killed                  sleep 600
[3]- Killed                 sleep 600
[4]+ Killed                 sleep 600
ubuntu@linux128:~$
```

How would you do the previous killing task with xargs?



```
ubuntu@linux128:~$ ps a | grep sleep
104098 pts/0      S          0:00 sleep 600
104099 pts/0      S          0:00 sleep 600
104100 pts/0      S          0:00 sleep 600
104101 pts/0      S          0:00 sleep 600
104108 pts/0      S+         0:00 grep --color=auto sleep
ubuntu@linux128:~$ ps a | grep sleep | cut -c1-7 | xargs kill
kill: (104110): No such process
[1]  Terminated                  sleep 600
[2]  Terminated                  sleep 600
[3]- Terminated                 sleep 600
[4]+ Terminated                 sleep 600
ubuntu@linux128:~$ ps a | grep sleep
 104115 pts/0      S+         0:00 grep --color=auto sleep
ubuntu@linux128:~$
```

Learning diary and answers

Start one 1000 second sleep to the foreground.

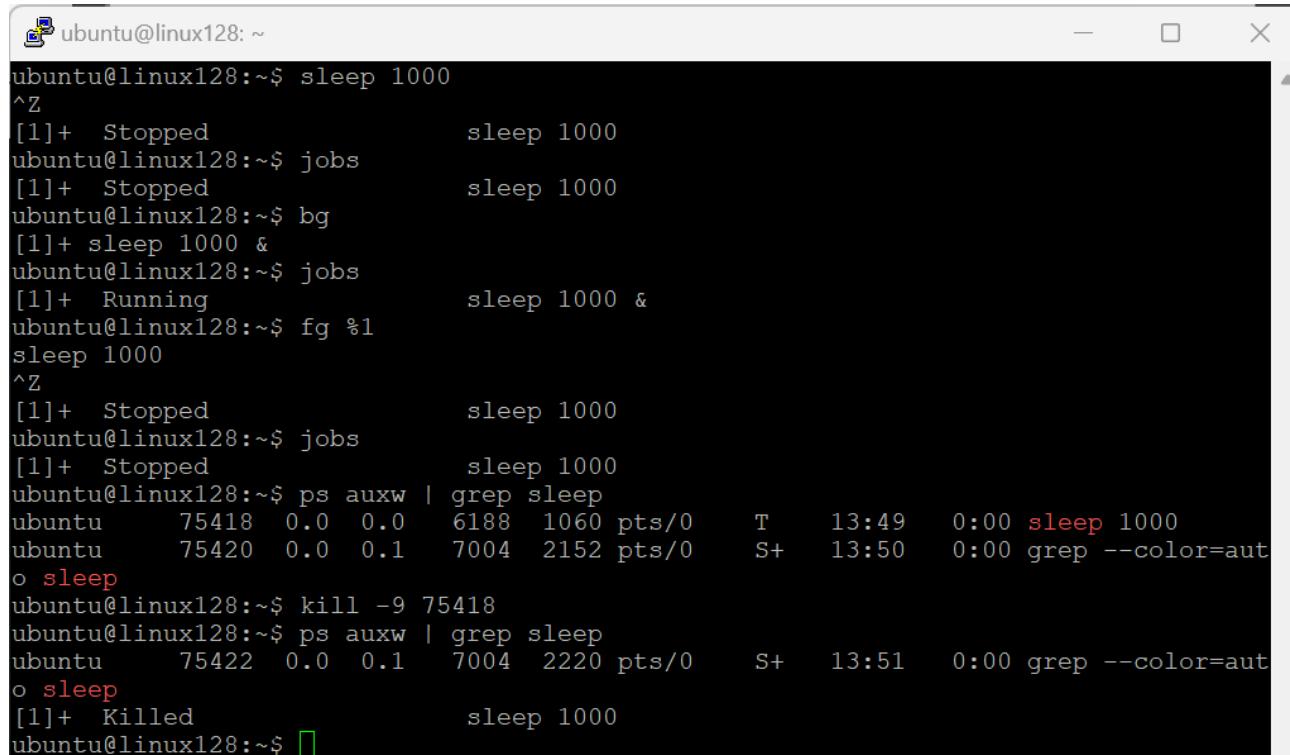
How do you suspend it?

How do you list current jobs?

How do you get previous sleep process back to foreground?

Suspend process again and send it to background.

Kill previous sleep process from background.



```
ubuntu@linux128:~$ sleep 1000
^Z
[1]+  Stopped                  sleep 1000
ubuntu@linux128:~$ jobs
[1]+  Stopped                  sleep 1000
ubuntu@linux128:~$ bg
[1]+ sleep 1000 &
ubuntu@linux128:~$ jobs
[1]+ Running                  sleep 1000 &
ubuntu@linux128:~$ fg %1
sleep 1000
^Z
[1]+  Stopped                  sleep 1000
ubuntu@linux128:~$ jobs
[1]+  Stopped                  sleep 1000
ubuntu@linux128:~$ ps auxw | grep sleep
ubuntu    75418  0.0  0.0   6188  1060 pts/0    T    13:49   0:00 sleep 1000
ubuntu    75420  0.0  0.1   7004  2152 pts/0    S+   13:50   0:00 grep --color=auto sleep
ubuntu@linux128:~$ kill -9 75418
ubuntu@linux128:~$ ps auxw | grep sleep
ubuntu    75422  0.0  0.1   7004  2220 pts/0    S+   13:51   0:00 grep --color=auto sleep
[1]+ Killed                   sleep 1000
ubuntu@linux128:~$
```

Question 43: What is the difference between kill -9 and kill -1?

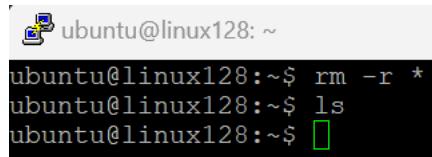
Answer 43: Both Kill -1 and Kill -9 are used to end a process to add it to the foreground. However, the difference can be seen in the behaviour of the process that received the Kill -1 or Kill -9.

To ask a process to end gracefully or liberate memory or take care of other child processes, Kill -1 will send out a SIGTERM signal. Because it was gracefully terminated, killing a process with kill will not have any negative impacts, such as unreleased memory.

Like kill -9, doesn't wait for the application to exit gracefully. Kill -9 sends out a SIGKILL signal that immediately kills the process without checking its condition.

Question 44: Delete unnecessary files created in this practice.

Answer 44:



```
ubuntu@linux128:~$ rm -r *
ubuntu@linux128:~$ ls
ubuntu@linux128:~$
```

Week 4

Question 45 & Answer 45: Study and explain shortly following commands and concepts:

- cat, tac

-cat: In Linux, the Cat (concatenate) command is often used. It extracts data from the file and outputs its contents. It aids in file creation, viewing, and concatenation.

-tac: In Linux, the tac command is used to concatenate and print files backward. The last line of each FILE will be sent to standard output first by this command. The standard input will be read when no file is specified.

- grep / egrep

-grep / egrep: The grep command on Linux operating systems reads text line by line and outputs any lines that match a predefined pattern.

The egrep command, which searches for patterns, is a member of the grep function family. It functions in the same way as grep -E. The lines that match the pattern are printed out after treating the pattern like an extended regular expression.

- Wc

-wc: The word count command in Linux is abbreviated as "wc". A text file's lines, words, bytes, and even characters and bytes can all be counted using this command.

- Sort

-sort: In Linux, the sort command is used to print a file's output in a specific order. This command organizes your data—the content of the file or the output of any program—in the form that you specify, making it easier for us to read the data quickly.

- Cut

-cut: In Linux, the cut command can be used to separate the sections from each line of files and report the results to standard output. It can be used to remove certain characters, bytes, or fields from a line. The cut command basically separates the text from a line. If an option is not specified with the command, an error will result.

- Awk

-awk: The Linux utility and programming language known as the awk command enables users to handle and manipulate data as well as create prepared reports. The tool offers a number of advanced text processing functions and makes it easier to explain complex data selections.

- Sed

-sed: The Linux sed command, which stands for stream editor, has a wide range of file-related capabilities, including searching, find-and-replace, insertion, and deletion. Although the sed command is most frequently used in Linux for substitution or find and replace.

- Tr

Learning diary and answers

-tr: A Linux command-line tool for character translation or deletion is called tr. It offers a variety of changes, such as converting letters from capital to lowercase, condensing repetitive characters, erasing characters, and simple search and replace. tr stands for translate.

- expand, unexpand

-expand: The expand command replaces the tab characters with one or more space characters before writing the named files or standard input to standard output

-unexpand: There is a command line tool called unexpand command that can turn leading spaces and tabs into tabs. Every space is automatically converted to a tab by the unexpand command when publishing the output to standard output.

- uniq

-uniq: A command-line tool in Linux called uniq reports or removes repetitive lines from a file. Simply said, Uniq is a program that both finds and removes duplicate lines that are next to each other in a line. Uniq removes the adjacent matching lines from the input file (which must be provided as an argument) and writes the filtered data to the output file.

- head

-head: The head command prints the first N numbers of data from the specified input, as the name suggests. It prints the first 10 lines of the selected files by default. Data from each file is preceded by its file name if more than one file name is given.

- tail

-tail: It is head command's complementary. The tail command prints the last N numbers of data from the specified input, as the name suggests. It prints the last 10 lines of the selected files by default. Data from each file is preceded by its file name if more than one file name is given.

- echo

-echo: Linux uses the echo command to display a line of text or string that is supplied as an argument. This built-in command is frequently used to output status text to the screen or a file in shell scripts and batch files.

- column

-column: When using Linux, the column command is used to display a file's contents in columns. The standard input or a file may be used as the source of the input. The input is essentially divided into several columns by this command. Columns are filled after rows.

- fold

-fold: In Linux, with the fold command, each line in an input file is wrapped to fit a specific width before being sent to standard output. Lines are wrapped by default at a maximum width of 80 columns, however this can be changed. Pass a file or standard input to the fold command to fold input.

join

-join: Using a common field from both files as the connection between related lines in the files, the join command enables us to combine two files. When we want to join two or more tables in a relational database, we can conceive of the Linux join command in the same way we think of SQL joins.

Learning diary and answers

- paste

-paste: One of the helpful commands in the Unix or Linux operating system is paste. By writing lines to standard output that are composed of lines from each of the given files, separated by tab as the delimiter, it is possible to connect files horizontally (parallel merging).

-tee: The tee command reads the standard input and writes it to one or more files as well as the standard output. The plumbing tool known as a T-splitter inspired the name of the command. In essence, it separates a program's output so that it can be both displayed and saved in a file. It concurrently completes both jobs, copies the outcome into the designated files or variables, and displays the outcome.

- nl

-nl: The File parameter (standard input by default) is read by the nl command, which then numbers the input lines and outputs the numbered lines to standard output. The nl command uses the flags you specify on the command line to number the lines on the left in the output. Logical pages must be used to write the input text.

Question 46: Use word counter and piping to count how many files or directories are in /usr/bin -directory?

Answer 46:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ ls /usr/bin | wc -l
1093
ubuntu@linux128:~$ 
```

Question 47: Use grep and extended regular expression syntax to list all files from /etc directory recursively which have IPv4 addresses mentioned inside.

Answer 47:

```
root@linux128:/etc
resolv.conf:nameserver 127.0.0.53
security/access.conf:#::root:192.168.200.1 192.168.200.4 192.168.200.9
security/access.conf:#::root:127.0.0.1
security/access.conf:#          The same is 192.168.201.0/24 or 192.168.201.0/255.2
55.255.0
security/access.conf:#::john:127.0.0.0/24
security/access.conf:#::john::ffff:127.0.0.0/127
ssh/sshd_config:#listenAddress 0.0.0.0
ssl/openssl.cnf:# testoidl=1.2.3.4
ssl/openssl.cnf:tsa_policy1 = 1.2.3.4.1
ssl/openssl.cnf:tsa_policy2 = 1.2.3.4.5.6
ssl/openssl.cnf:tsa_policy3 = 1.2.3.4.5.7
ssl/openssl.cnf:# proxy = # set this as far as needed, e.g., http://192.168.1.1:8080
systemd/resolved.conf:# Cloudflare: 1.1.1.1#cloudflare-dns.com 1.0.0.1#cloudflare-dns.com 2606:4700:4700::111#cloudflare-dns.com 2606:4700:4700::1001#cloudflare-dns.com
systemd/resolved.conf:# Google: 8.8.8.8#dns.google 8.8.4.4#dns.google 2001:4860:8888:8888#dns.google 2001:4860:8844#dns.google
systemd/resolved.conf:# Quad9: 9.9.9.9#dns.quad9.net 149.112.112.112#dns.quad9.net 2620:fe:fe:dnst:quad9.net 2620:fe:9:dns.quad9.net
ufw/before.rules:-A ufw-before-input -p udp -d 224.0.0.251 --dport 5353 -j ACCEPT
ufw/before.rules:-A ufw-before-input -p udp -d 239.255.255.250 --dport 1900 -j ACCE
PT
root@linux128:/etc# egrep -R '[0-9]+\.[0-9]+\.[0-9]+\.[0-9]+*' * | wc -l
grep: alternatives/netcat: binary file matches
grep: alternatives/ebtables: binary file matches
grep: alternatives/iptables-save: binary file matches
grep: alternatives/iptables-save: binary file matches
grep: alternatives/arptables-save: binary file matches
grep: alternatives/arptables-restore: binary file matches
grep: alternatives/iptables-restore: binary file matches
grep: alternatives/rsh: binary file matches
grep: alternatives/iptables: binary file matches
grep: alternatives/ebtables-restore: binary file matches
grep: alternatives/iptables-restore: binary file matches
grep: alternatives/ebtables-save: binary file matches
grep: alternatives/rlogin: binary file matches
grep: alternatives/www-browser: binary file matches
grep: alternatives/arpables: binary file matches
grep: alternatives/iptables: binary file matches
grep: alternatives/nc: binary file matches
115
root@linux128:/etc# 
```

Learning diary and answers

Question 48: Download and extract Tetris game source file [nct-1.4.tar.gz](#) and

Use grep to find which files contain string ncurses.h

Use wc command to list line counts of each file and sort the output from longest to shortest file.

Use data filtering command to remove the total amount of lines line in the beginning of sort output. Final result should be something like this:

```
2139 configure
943 nct.c
392 Makefile.in
340 COPYING
251 install-sh
195 score.c
190 missing
182 INSTALL
127 aclocal.m4
48 README
44 config.h.in
43 Makefile.am
43 configure.in
42 score.h
40 mkinstalldirs
38 nct.spec
22 NEWS
21 nct.h
17 nct.lsm
3 ChangeLog
2 acconfig.h
1 stamp-h.in
```

```
ubuntu@linux128:~/nct-1.4
ubuntu@linux128:~$ wget https://tl.oamk.fi/cdos/dl/nct-1.4.tar.gz
--2022-12-15 14:21:02-- https://tl.oamk.fi/cdos/dl/nct-1.4.tar.gz
Resolving tl.oamk.fi (tl.oamk.fi)... 193.167.100.28
Connecting to tl.oamk.fi (tl.oamk.fi)|193.167.100.28|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 44562 (44K) [application/x-gzip]
Saving to: 'nct-1.4.tar.gz'

nct-1.4.tar.gz      100%[=====] 43.52K  --.-KB/s    in 0.001s
2022-12-15 14:21:02 (56.2 MB/s) - 'nct-1.4.tar.gz' saved [44562/44562]

ubuntu@linux128:~$ ls
nct-1.4.tar.gz
ubuntu@linux128:~$ tar -xf nct-1.4.tar.gz
ubuntu@linux128:~$ ls
nct-1.4  nct-1.4.tar.gz
ubuntu@linux128:~$ cd nct-1.4/
ubuntu@linux128:~/nct-1.4$ wc -l * | sort -n -r | grep -v 'total'
2139 configure
943 nct.c
392 Makefile.in
340 COPYING
251 install-sh
195 score.c
190 missing
182 INSTALL
127 aclocal.m4
48 README
44 config.h.in
43 configure.in
43 Makefile.am
42 score.h
40 mkinstalldirs
38 nct.spec
22 NEWS
21 nct.h
17 nct.lsm
3 ChangeLog
2 acconfig.h
1 stamp-h.in
ubuntu@linux128:~/nct-1.4$
```

Learning diary and answers

Question 49: Use wget to download this [irclog.txt](#) and answers to these questions:

- How many lines are in the file?

```
ubuntu@linux128:~$ wget https://tl.oamk.fi/cdos/dl/irclog.txt
--2022-12-15 14:24:41-- https://tl.oamk.fi/cdos/dl/irclog.txt
Resolving tl.oamk.fi (tl.oamk.fi)... 193.167.100.28
Connecting to tl.oamk.fi (tl.oamk.fi)|193.167.100.28|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 16341 (16K) [text/plain]
Saving to: 'irclog.txt'

irclog.txt          100%[=====] 15.96K --.-KB/s   in 0s

2022-12-15 14:24:41 (61.2 MB/s) - 'irclog.txt' saved [16341/16341]

ubuntu@linux128:~$ ls
irclog.txt  nct-1.4  nct-1.4.tar.gz
ubuntu@linux128:~$ wc -l irclog.txt
244 irclog.txt
```

- How many characters are in the file?

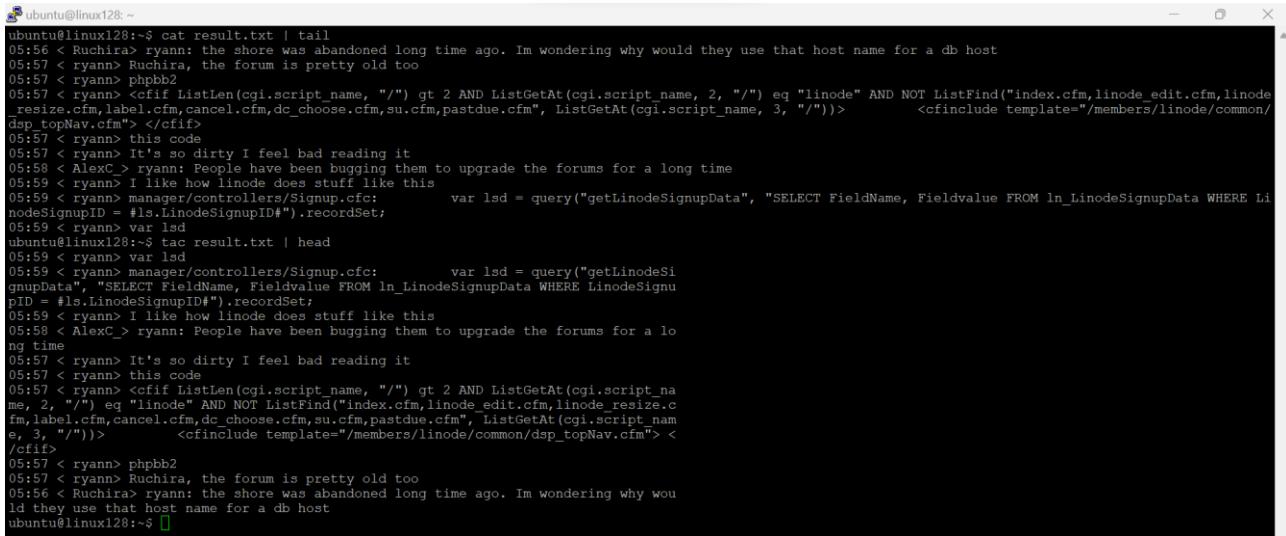
```
ubuntu@linux128:~$ wc -m irclog.txt
16341 irclog.txt
ubuntu@linux128:~$ 
```

- List only lines where the timestamp starts with 05 and save the output to a file called result.txt

```
ubuntu@linux128:~$ grep '^05:' irclog.txt >> result.txt
ubuntu@linux128:~$ ls
irclog.txt  nct-1.4  nct-1.4.tar.gz  result.txt
ubuntu@linux128:~$ cat result.txt
05:05 < ryan_> Hey I can tell you
05:05 < ryan_> exact details of the attack
05:05 < ryan_> manager.linode.com was breached with a coldfusion exploit
05:05 < ryan_> it was compromised for a couple of weeks
05:05 < kyhwana> I hope they're using bcrypt/similar, etc.
05:05 < ryan_> we made a deal with linode staff not to share it
05:05 < kyhwana> sha256crypt
05:05 < kyhwana> ryan_: god some proof?
05:05 < shmoon> "we"?
05:05 < kyhwana> s/d/t
05:05 < kyhwana> heh
05:05 < ryan_> they contacted law enforcement
05:05 < ryan_> broke the deal
05:05 < ryan_> kyhwana: the released database should serve as proof
05:06 < ryan_> We will also release the logs of the linode staff who participated in this deal
05:06 < shmoon> "WE"???
05:06 < shmoon> who is we?
05:06 < ryan_> of course they wouldn't have ever told you (customers) about it if we didn't tell them that we will release the data after we saw them contacting LE
05:06 < ryan_> does it matter who is "we"?
05:06 < ryan_> It's an entity I represent
05:07 < drclawski> of course it matters who you represent
05:07 < ryan_> you probably weren't targeted but doesn't stop us from releasing your credit card info since linode staff tried to fuck us over
05:07 < shmoon> hm
05:08 < drclawski> well, the way you talk right now I'm glad linode contacted law enforcement
05:08 < shmoon> :D
05:08 < gerryvdm_mbp> ah, could change back to my original password after intermediary one!
05:08 < Ruchira_> ryan_: got a link to that db where I can download it?
05:08 < Ruchira_> :*
05:08 < kyhwana> link 2 pastebin plz
05:09 < ryan_> Ruchira_: not yet
05:09 < mestri> this sounds so fishy
05:09 < shmoon> credit card details were leaked? :o
05:09 < chesty> full of it
05:09 < ryan_> https://twitter.com/hacktheplanet
05:09 < ryan_> you can follow there
```

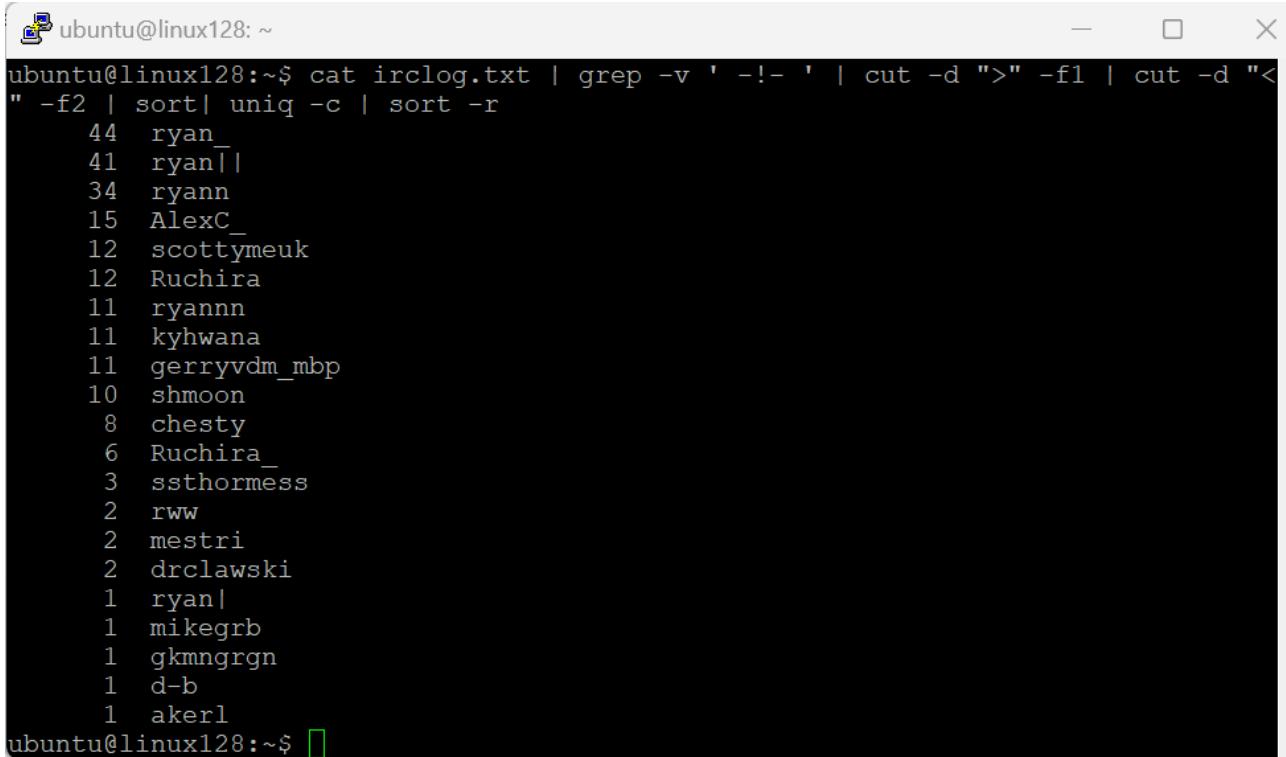
Learning diary and answers

- Print result.txt in reverse order



```
ubuntu@linux128:~$ cat result.txt | tail
05:56 < Ruchira> ryann: the shore was abandoned long time ago. Im wondering why would they use that host name for a db host
05:57 < ryann> Ruchira, the forum is pretty old too
05:57 < ryann> phpbb2
05:57 < ryann> <cfif ListLen(cgi.script_name, "/") gt 2 AND ListGetAt(cgi.script_name, 2, "") eq "linode" AND NOT ListFind("index.cfm,linode_edit.cfm,linode_resize.cfm,label.cfm,cancel.cfm,dc_choose.cfm,su.cfm,pastdue.cfm", ListGetAt(cgi.script_name, 3, "/"))> <cfinclude template="/members/linode/common/dsp_topNav.cfm">
05:57 < ryann> this code
05:57 < ryann> It's so dirty I feel bad reading it
05:58 < AlexC> ryann: People have been bugging them to upgrade the forums for a long time
05:59 < ryann> I like how linode does stuff like this
05:59 < ryann> manager/controllers/Signup.cfc: var lsd = query("getLinodeSignupData", "SELECT FieldName, Fieldvalue FROM ln_LinodeSignupData WHERE LinodeSignupID = #ls.LinodeSignupID#").recordSet;
05:59 < ryann> var lsd
ubuntu@linux128:~$ tac result.txt | head
05:59 < ryann> var lsd
05:59 < ryann> manager/controllers/Signup.cfc: var lsd = query("getLinodeSignupData", "SELECT FieldName, Fieldvalue FROM ln_LinodeSignupData WHERE LinodeSignupID = #ls.LinodeSignupID#") recordSet;
05:59 < ryann> I like how linode does stuff like this
05:58 < AlexC> ryann: People have been bugging them to upgrade the forums for a long time
05:57 < ryann> It's so dirty I feel bad reading it
05:57 < ryann> this code
05:57 < ryann> <cfif ListLen(cgi.script_name, "/") gt 2 AND ListGetAt(cgi.script_name, 2, "") eq "linode" AND NOT ListFind("index.cfm,linode_edit.cfm,linode_resize.cfm,label.cfm,cancel.cfm,dc_choose.cfm,su.cfm,pastdue.cfm", ListGetAt(cgi.script_name, 3, "/"))> <cfinclude template="/members/linode/common/dsp_topNav.cfm">
05:57 < ryann> phpbb2
05:57 < ryann> Ruchira, the forum is pretty old too
05:56 < Ruchira> ryann: the shore was abandoned long time ago. Im wondering why would they use that host name for a db host
ubuntu@linux128:~$ 
```

- Create numerical statistics from the irclog.txt file: How many lines each nickname wrote. Use only those lines where someone actually said something and ignore the all other lines



```
ubuntu@linux128:~$ cat irclog.txt | grep -v ' -!- ' | cut -d ">" -f1 | cut -d "<" -f2 | sort| uniq -c | sort -r
    44 ryan_
    41 ryan|||
    34 ryann
    15 AlexC_
    12 scottymeuk
    12 Ruchira
    11 ryannn
    11 kyhwana
    11 gerryvdm_mbp
    10 shmoon
     8 chesty
     6 Ruchira_
     3 ssthormess
     2 rww
     2 mestri
     2 drclawski
     1 ryan|
     1 mikegrb
     1 gkmngrgn
     1 d-b
     1 akerl
ubuntu@linux128:~$ 
```

Learning diary and answers

Question 50: List only 5 largest files from /usr/bin -directory. (Starting from largest file.)

Print largest files first. Try to not use the ls command's -S option but use use sort command (and related text processing commands if necessary)

Answer 50:

```
ubuntu@linux128:~$ ls -l /usr/bin/ | awk '{print $5 " " $9}' | sort -nr | head -5
24879104 x86_64-linux-gnu-lto-dump-11
16075992 snap
5921160 python3.10
3798008 perl5.34.0
3798008 perl
ubuntu@linux128:~$
```

Question 51: Print only usernames, UID and GID numbers from /etc/passwd -file. Replace all colons with a whitespace. Redirect output to file a “users.txt” in your home directory. Tip: In this example line from /etc/passwd the UID = 101 and GID = 50:

username:x:101:50:Teemu Korpela:/home/tkorpela:/bin/bash

Answer 51:

```
ubuntu@linux128:~$ cat /etc/passwd | cut -d":" -f1,2,3 | tr ":" " " >> users.
ubuntu@linux128:~$ cat /etc/passwd | cut -d":" -f1,2,3 | tr ":" " " >> users.txt
ubuntu@linux128:~$ ls
irclog.txt  nct-1.4  nct-1.4.tar.gz  result.txt  users.  users.txt
ubuntu@linux128:~$ rm users.
ubuntu@linux128:~$ cat users.txt
root x 0
daemon x 1
bin x 2
sys x 3
sync x 4
games x 5
man x 6
lp x 7
mail x 8
news x 9
uucp x 10
proxy x 13
www-data x 33
backup x 34
list x 38
irc x 39
gnats x 41
nobody x 65534
systemd-network x 100
systemd-resolve x 101
messagebus x 102
systemd-timesync x 103
syslog x 104
_apt x 105
tss x 106
uiddd x 107
tcpdump x 108
sshd x 109
pollinate x 110
landscape x 111
ubuntu x 1000
lxr x 999
ubuntu@linux128:~$
```

Learning diary and answers

Question 52: Use text editor nano to create a points.txt file to your home directory with following content. This list presents first names and some game scores. Who has most points, wins

points.txt file:

```
Teemu:4
Matti:8
Juha-Pekka:6
Timo:1
Mika:3
Esko:2
Jaska:5
Erkki:7
```

- List contents of points.txt in alphabetic order to STDOUT

```
ubuntu@linux128: ~
ubuntu@linux128:~$ nano points.txt
ubuntu@linux128:~$ ls
irclog.txt  nct-1.4  nct-1.4.tar.gz  points.txt  result.txt  users.txt
ubuntu@linux128:~$ sort points.txt

Erkki:7
Esko:2
Jaska:5
Juha-Pekka:6
Matti:8
Mika:3
Teemu:4
Timo:1
ubuntu@linux128:~$
```

- List contents of file on to STDOUT, but now order is score based. List only best three players with most points

```
ubuntu@linux128: ~
ubuntu@linux128:~$ sort -n -t ":" -k 2 points.txt -r | head -3
Matti:8
Erkki:7
Juha-Pekka:6
ubuntu@linux128:~$
```

- How do you list only player names and filter all other data

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat points.txt | cut -d ":" -f1
Teemu
Matti
Juha-Pekka
Timo
Mika
Esko
Jaska
Erkki
ubuntu@linux128:~$
```

Learning diary and answers

- List only first three characters from the beginning of each line of points.txt

```
ubuntu@linux128:~$ cat points.txt | cut -c1-3
Tee
Mat
Juh
Tim
Mik
Esk
Jas
Erk
ubuntu@linux128:~$ 
```

- List points.txt but translate all characters to upper-case

```
ubuntu@linux128:~$ cat points.txt | tr [:lower:] [:upper:]
TEEMU:4
MATTI:8
JUHA-PEKKA:6
TIMO:1
MIKA:3
ESKO:2
JASKA:5
ERKKI:7
ubuntu@linux128:~$ 
```

List points.txt so that points are printed before names

```
ubuntu@linux128:~$ cat points.txt | sed 's/:/ /' | awk '{print $2 ":" $1}'
4:Teemu
8:Matti
6:Juha-Pekka
1:Timo
3:Mika
2:Esko
5:Jaska
7:Erkki
ubuntu@linux128:~$ 
```

- Sort points.txt in alphabetic order and add line numbers in front of lines

```
ubuntu@linux128:~$ sort points.txt | nl
    1   Erkki:7
    2   Esko:2
    3   Jaska:5
    4   Juha-Pekka:6
    5   Matti:8
    6   Mika:3
    7   Teemu:4
    8   Timo:1
ubuntu@linux128:~$ 
```

Learning diary and answers

Question 53: How do you list last 5 lines from the /etc/passwd file?

Answer 53:

```
ubuntu@linux128:~$ cat /etc/passwd | tail -5
sshd:x:109:65534::/run/sshd:/usr/sbin/nologin
pollinate:x:110:1::/var/cache/pollinate:/bin/false
landscape:x:111:116::/var/lib/landscape:/usr/sbin/nologin
ubuntu:x:1000:1000:Ubuntu:/home/ubuntu:/bin/bash
lxd:x:999:100::/var/snap/lxd/common/lxd:/bin/false
ubuntu@linux128:~$ █
```

Question 54: How do you list first 5 lines from the /etc/passwd file?

Answer 54:

```
ubuntu@linux128:~$ cat /etc/passwd | head -5
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/usr/sbin/nologin
sys:x:3:3:sys:/dev:/usr/sbin/nologin
sync:x:4:65534:sync:/bin:/bin/sync
ubuntu@linux128:~$ █
```

Question 55: What does tail -f filename command do?

Answer 55:

With --follow (-f), tail defaults to following the file descriptor, which means that even if a tail'ed file is renamed, tail will continue to track its end. This default behaviour is not desirable when I really want to track the actual name of the file, not the file descriptor (e.g., log rotation). Use --follow=name in that case. That causes tail to track the named file in a way that accommodates renaming, removal and creation.

```
ubuntu@linux128:~$ tail -f points.txt
Teemu:4
Matti:8
Juha-Pekka:6
Timo:1
Mika:3
Esko:2
Jaska:5
Erkki:7
^C
ubuntu@linux128:~$ tail --help
Usage: tail [OPTION]... [FILE]...
Print the last 10 lines of each FILE to standard output.
With more than one FILE, precede each with a header giving the file name.

With no FILE, or when FILE is -, read standard input.

Mandatory arguments to long options are mandatory for short options too.
  -c, --bytes=[+]NUM          output the last NUM bytes; or use -c +NUM to
                             output starting with byte NUM of each file
  -f, --follow[={name|descriptor}]    output appended data as the file grows;
                                      an absent option argument means 'descriptor'
  -F                                same as --follow=name --retry
```

Learning diary and answers

Question 56: Fetch current weather in Oulu with lynx (TIP: if there is no lynx, install it with: `sudo apt install lynx`). The command to download Oulu's weather data is: `lynx -dump http://weather.willab.fi/weather.html`

- Filter the output so that only temperature is displayed and nothing else

Answer 56:

```
ubuntu@linux128: ~
ubuntu@linux128:~$ lynx -dump http://weather.willab.fi/weather.html | sed '5!d'
-15.1 °C
ubuntu@linux128:~$ 
```

Question 57 & Answer 57: Use wget to download [this stock market textfile](#)

Example line and explanation from file:

Name	code	change	buy	sell	lowest	highest	last
Fiskars Corporation	:FISAS:	-0,36%	8,35	8,39	8,44	8,37	8,37

- Use grep (or egrep) and regular expressions to list only companies with “I” anywhere in code part.

```
ubuntu@linux128: ~
ubuntu@linux128:~$ wget https://tl.oamk.fi/cdos/dl/stocks.txt
--2022-12-15 15:26:33-- https://tl.oamk.fi/cdos/dl/stocks.txt
Resolving tl.oamk.fi (tl.oamk.fi)... 193.167.100.28
Connecting to tl.oamk.fi (tl.oamk.fi)|193.167.100.28|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1239 (1.2K) [text/plain]
Saving to: 'stocks.txt'

stocks.txt          100%[=====]    1.21K  --.-KB/s   in 0s

2022-12-15 15:26:33 (319 MB/s) - 'stocks.txt' saved [1239/1239]

ubuntu@linux128:~$ cat stocks.txt | grep 'I'
Fiskars Corporation :FISAS: -0,36% 8,35 8,39 8,44 8,37 8,37
KCI Konecranes Plc :KCI1V: +0,06% 34,10 34,16 34,20 34,05 34,17
ubuntu@linux128:~$ 
```

- List (only) company names and stock values starting with character “M”.

Output should be:

Metso Corporation	:MEO1V:	-0,08%	11,77	11,79	11,80	11,73	11,79
M-real Corporation A	:MRLAV:	-0,42%	4,64	4,83	4,75	4,75	4,75
M-real Corporation B	:MRLBV:	-1,06%	4,65	4,67	4,75	4,64	4,67

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat stocks.txt | egrep '^M.*:'
Metso Corporation :MEO1V: -0,08% 11,77 11,79 11,80 11,73 11,79
M-real Corporation A :MRLAV: -0,42% 4,64 4,83 4,75 4,75 4,75
M-real Corporation B :MRLBV: -1,06% 4,65 4,67 4,75 4,64 4,67
ubuntu@linux128:~$ 
```

- Print line only if the company name begins with a character “R” and last stock value is 8,xx

Learning diary and answers

Output should be:

```
Rautaruukki Corporation :RTRKS: +0,24% 8,46 8,50 8,52 8,42
Rocla Oyj :ROC1V: -0,60% 8,20 8,25 8,25 8,20 8,25
```

```
ubuntu@linux128:~$ cat stocks.txt | grep '^R' | grep '8,..$'
Rautaruukki Corporation :RTRKS: +0,24% 8,46 8,50 8,52 8,42
Rocla Oyj :ROC1V: -0,60% 8,20 8,25 8,25 8,20 8,25
ubuntu@linux128:~$
```

- List all companies except the names starting with characters “R” or “W”

```
ubuntu@linux128:~$ cat stocks.txt | egrep -v '^R|W|M metalliteollisuus|Metsäteollisuus'
Componenta Corporation :CTH1V: +2,06% 5,90 5,99 5,95 5,89 5,95
Fiskars Corporation :FISAS: -0,36% 8,35 8,39 8,44 8,37 8,37
KCI Konecranes Plc :KCI1V: +0,06% 34,10 34,16 34,20 34,05 34,17
Kone Corporation B :KONBS: -0,67% 60,92 61,00 62,01 60,73 60,99
Metso Corporation :MEO1V: -0,08% 11,77 11,79 11,80 11,73 11,79
Nordic Aluminium Plc :NOA1V: -0,04% 9,32 9,49 0,00 0,00 9,49
Outokumpu Oyj :OUT1V: +0,98% 13,36 13,37 13,42 13,27 13,36
Ponsse Oyj 1 :PON1V: +0,66% 15,16 15,20 15,25 15,13 15,20

M-real Corporation A :MRLAV: -0,42% 4,64 4,83 4,75 4,75 4,75
M-real Corporation B :MRLBV: -1,06% 4,65 4,67 4,75 4,64 4,67
Stora Enso Oyj A :STEAV: +1,31% 11,50 11,58 11,58 11,53 11,58
Stora Enso Oyj R :STERV: -1,04% 11,37 11,38 11,49 11,34 11,38
Stromsdal Corporation B :STMBS: +0,43% 2,00 2,06 0,00 0,00 2,10
UPM-Kymmene Corporation :UPM1V: -0,66% 16,59 16,60 16,80 16,54 16,59
ubuntu@linux128:~$
```

- List only those stocks which have positive change value (i.e. +xx,xx%) in the list

```
ubuntu@linux128:~$ cat stocks.txt | grep "+,..%"
Componenta Corporation :CTH1V: +2,06% 5,90 5,99 5,95 5,89 5,95
KCI Konecranes Plc :KCI1V: +0,06% 34,10 34,16 34,20 34,05 34,17
Outokumpu Oyj :OUT1V: +0,98% 13,36 13,37 13,42 13,27 13,36
Ponsse Oyj 1 :PON1V: +0,66% 15,16 15,20 15,25 15,13 15,20
Rautaruukki Corporation :RTRKS: +0,24% 8,46 8,50 8,52 8,42
Wärtsilä Corporation A :WRTAV: +3,47% 16,82 17,00 17,00 16,74 17,00
Wärtsilä Corporation B :WRTBV: +1,59% 17,20 17,21 17,29 16,93 17,21
Stora Enso Oyj A :STEAV: +1,31% 11,50 11,58 11,58 11,53 11,58
Stromsdal Corporation B :STMBS: +0,43% 2,00 2,06 0,00 0,00 2,10
ubuntu@linux128:~$
```

Learning diary and answers

Question 58 & Answer 58: Get nimipaivat.txt (Finnish name days) textfile from here [nimipaivat.txt](#)

- From nimipaivat.txt, find out how many names start with a letter A and end to a letter i?

```
ubuntu@linux128:~$ cat nimipaivat.txt | grep 'A.*i '
Aili 17.9.
Aini 10.5.
Ainikki 10.5.
Airi 4.12.
Alli 31.1.
Anneli 9.12.
Anni 9.12.
Annikki 9.12.
Armi 4.2.
Auli 16.12.
Aulikki 16.12.
Auni 21.1.
Auri 10.3.
Aapeli 2.1.
Aarni 16.11.
Aatami 24.12.
Ahti 21.6.
Aki 20.3.
Akseli 23.3.
Aleksanteri 11.9.
Aleksi 10.10.
Ali 11.9.
Alpi 1.3.
Altti 24.4.
Alvi 1.3.
Anselmi 21.4.
Anssi 21.4.
Antti 30.11.
Anttoni 17.1.
Ari 4.3.
Arsi 4.3.
Artturi 31.10.
Arvi 31.8.
Aukusti 7.1.
ubuntu@linux128:~$ 
```

- How can you convert previous names to lower-case?

```
ubuntu@linux128:~$ cat nimipaivat.txt | grep 'A.*i ' | tr [:upper:] [:lower:]
aili 17.9.
aini 10.5.
ainikki 10.5.
airi 4.12.
alli 31.1.
anneli 9.12.
anni 9.12.
annikki 9.12.
armi 4.2.
auli 16.12.
aulikki 16.12.
auni 21.1.
auri 10.3.
aapeli 2.1.
aarni 16.11.
aatami 24.12.
ahti 21.6.
aki 20.3.
akseli 23.3.
aleksanteri 11.9.
aleksi 10.10.
ali 11.9.
alpi 1.3.
altti 24.4.
alvi 1.3.
anselmi 21.4.
anssi 21.4.
antti 30.11.
anttoni 17.1.
ari 4.3.
arsi 4.3.
artturi 31.10.
arvi 31.8.
aukusti 7.1.
ubuntu@linux128:~$ 
```

Learning diary and answers

- From previous names, who are celebrating in December?

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat nimipaivat.txt | grep 'A.*i ' | grep '12.$'
Airi 4.12.
Anneli 9.12.
Anni 9.12.
Anniki 9.12.
Auli 16.12.
Aulikki 16.12.
Aatami 24.12.
ubuntu@linux128:~$
```

- From all names in nimipaivat.txt, search those who celebrate either 1st, 2nd or 3rd day in any month.

```
ubuntu@linux128: ~
ubuntu@linux128:~$ cat nimipaivat.txt | egrep " 1\.\| 2\.\| 3\."
Aamu 2.2.
Anelma 2.12.
Jemina 2.2.
Kukka-Maaria 2.7.
Linnea 3.8.
Maaria 2.7.
Maija 2.7.
Maiju 2.7.
Maikki 2.7.
Maire 1.8.
Mari 2.7.
Maria 2.7.
Marika 2.7.
Meeri 2.7.
Meri 3.12.
Nea 3.8.
Orvokki 3.6.
Outi 3.5.
Pulmu 1.4.
Raita 1.4.
Riitta 1.2.
Sini 2.9.
Sinikka 2.9.
Soila 3.9.
Soile 3.9.
Soili 3.9.
Unelma 2.12.
Valpuri 1.5.
Vanamo 3.8.
Vappu 1.5.
Vellamo 3.12.
Venla 2.6.
Viivi 2.5.
Viola 3.6.
Virva 2.3.
Virve 2.3.
Vuokko 2.5.
Aapeli 2.1.
Aaro 1.7.
Aaron 1.7.
Alpi 1.3.
Alpo 1.3.
Alvi 1.3.
```

Learning diary and answers

Question 59 & Answer 59: Use `lynx -dump "url"` to print webpage to STDOUT

Filter output so that you will get only the current Lotto numbers, but nothing else from the webpage

Lotto numbers are available here: https://yle.fi/tekstitv/txt/471_0001.htm

```
ubuntu@linux128: ~
ubuntu@linux128:~$ lynx -dump https://yle.fi/tekstitv/txt/471_0001.htm | grep 'OIK'
| cut -c19-80
1,13,19,28,30,33,35
```

Question 60 & Answer 60: HTTP access to XML:

Use Gnu tools or Cmder's Curl and Grep (and maybe other command line tools) to create a one-liner, which downloads the XML file and parses current temperature from VTT's weather station. One-liner must print only the current temperature in Oulu and nothing else. Command line one-liner and output should look something like this:

```
curl -s -L http://weather.willab.fi/weather.xml | _replace_with_your_commands_options_and_code_12.3
```

```
ubuntu@linux128: ~
ubuntu@linux128:~$ curl -s -L http://weather.willab.fi/weather.xml
<?xml version="1.0"?>
<weatherpage>
<weather>
<location value="(65 3 44 N 25 27 36 E)" />
<time>2022-12-12 11:13 EET</time>
<tempnow unit="C">-15.1</tempnow>
<temphi unit="C">-6.4</temphi>
<templo unit="C">-15.4</templo>
<dewpoint unit="C">-17.3</dewpoint>
<humidity unit="%">84</humidity>
<airpressure unit="hPa">1023.3</airpressure>
<windspeed unit="m/s">1.5</windspeed>
<windspeedmax unit="m/s">4.9</windspeedmax>
<winddir unit="degrees">56</winddir>
<precipitation unit="mm" time="1d">0.0</precipitation>
<precipitation unit="mm" time="1h">0.0</precipitation>
<solarrad unit="???">626</solarrad>
<windchill unit="C">-19.0</windchill>
</weather>
</weatherpage>
ubuntu@linux128:~$ curl -s -L http://weather.willab.fi/weather.xml | grep
'tempnow' | sed -r 's/.*/>(.*)<\te.*\1/' 
-15.1
ubuntu@linux128:~$
```

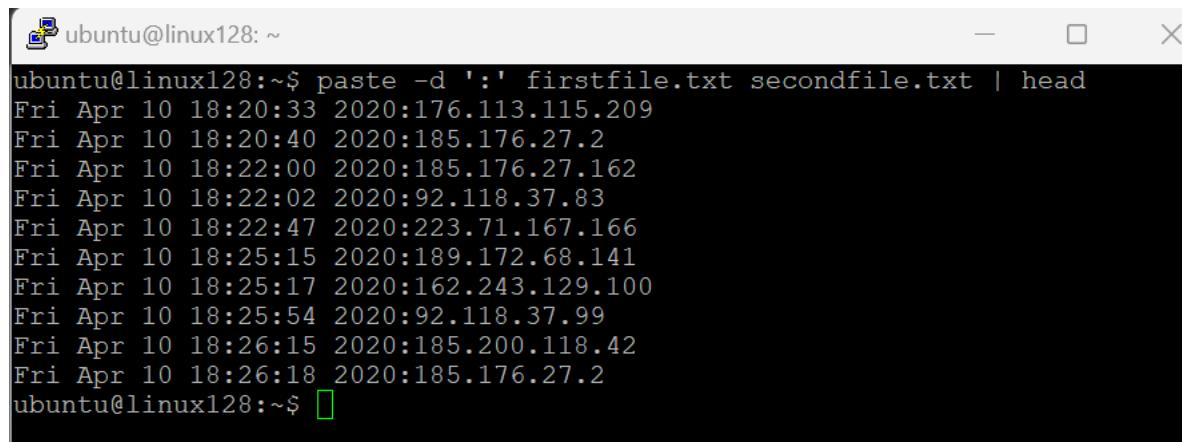
Learning diary and answers

Question 61 & Answer 61: Combine these two files to a single file with command line Gnu text tools

The [first file](#) has timestamps and the [second file](#) has IP addresses

Use : as delimiter between columns. Output should look something like this:

```
...
Sat Apr 11 11:03:42 2020:185.176.27.26
Sat Apr 11 11:03:43 2020:188.26.0.66
Sat Apr 11 11:04:15 2020:185.176.27.34
Sat Apr 11 11:04:57 2020:87.251.74.250
Sat Apr 11 11:05:00 2020:94.102.52.57
...
```



```
ubuntu@linux128:~$ paste -d ':' firstfile.txt secondfile.txt | head
Fri Apr 10 18:20:33 2020:176.113.115.209
Fri Apr 10 18:20:40 2020:185.176.27.2
Fri Apr 10 18:22:00 2020:185.176.27.162
Fri Apr 10 18:22:02 2020:92.118.37.83
Fri Apr 10 18:22:47 2020:223.71.167.166
Fri Apr 10 18:25:15 2020:189.172.68.141
Fri Apr 10 18:25:17 2020:162.243.129.100
Fri Apr 10 18:25:54 2020:92.118.37.99
Fri Apr 10 18:26:15 2020:185.200.118.42
Fri Apr 10 18:26:18 2020:185.176.27.2
ubuntu@linux128:~$
```

Question 62 & Answer 62: Delete unnecessary files created in this practice

Using **rm -r *** deleted all unnecessary files created in this practice.

Week 5

Question 63: Study this [Telegram bot game version 0.1](#), this [improved version 0.2](#) and even more [improved version 0.3](#)

Output should look like this:

```
$ ./telegram_wordgame_v3.bash 11
01 ____M_____
02 __O_M_____
03 __ORM_____
04 A__ORM_____
05 A__ORM_I___
06 A__ORM_I_Y
07 A__ORM_LI_Y
08 A_NORM_LI_Y
09 A_NORM_LITY
10 ABNORM_LITY
11 ABNORMALITY
```

- Compare all three scripts
- Download the 3rd script (version 0.3) and related word list files (Github addresses are listed in the beginning of the script) with wget and run the script

```
ubuntu@linux128:~$ ./telegram_wordgame_v3.txt 11
t_____
o_t_____
o_t_e_____
o_t_es_____
ho_t_es_____
gho_t_es_____
ghost_es_____
ghost_i_es_____
ghost_i_ess_____
ghostli_ess_____
ghostliness_____
ubuntu@linux128:~$ █
```

- Modify the script to output all characters UPPER CASE

```
ubuntu@linux128:~$ ./telegram_wordgame_v3.txt 11
E_____
T_E_____
T_E_O_____
NT_E_O_____
NT_ES_O_____
NTE_ES_O_____
NTE_CES_O_____
NTE_CES_OR_____
NTERCES_OR_____
INTERCESSOR_____
INTERCESSOR_____
ubuntu@linux128:~$ █
```

Learning diary and answers

- Modify the script to add zero padded line numbers into the beginning of each line

```
ubuntu@linux128:~$ ./telegram_wordgame_v3.txt 11
01 _____I_____
02 _____R_____I_____
03 _____N_____R_____I_____
04 UN_____R_____I_____
05 UND_____R_____I_____
06 UND_____R_____KI_____
07 UND_____R_____KIN_____
08 UNDER____KIN_____
09 UNDER____KING_____
10 UNDERT____KING_____
11 UNDERTAKING_____
ubuntu@linux128:~$ █
```

Week 6

Question 72 & Answer 72: Install Apache web server to your Linux server if it isn't installed already

Ignore/skip possible ufw (firewall) parts. Ufw has been disabled intentionally on student virtual servers

Add PHP support to your Apache web server. See the [MySQL example with PHP](#) for required software packages

I added PHP SUPPORT to my Apache web server.

Create following PHP script under the web server document root (/var/www/html) and test that your server is executing the PHP script when requesting it with a web browser (address is: <http://server/scriptname.php>):

```
<?php  
date_default_timezone_set('UTC');  
echo date("l");  
echo ("<br>");  
echo date('l jS \of F Y h:i:s A');  
echo ("<br>");  
echo date(DATE_RFC2822);  
?>
```

A terminal window showing the creation and execution of a PHP file. The user is in the /var/www/html directory as root. They nano edit index.php, list files (index.html, index.php, test.html), cat the contents of index.php, and then run the file. The output shows the PHP code being executed.

```
root@linux128:/var/www/html  
root@linux128:/var/www/html# nano index.php  
root@linux128:/var/www/html# ls  
index.html index.php test.html  
root@linux128:/var/www/html# cat index.php  
<?php  
date_default_timezone_set('UTC');  
echo date("l");  
echo ("<br>");  
echo date('l jS \of F Y h:i:s A');  
echo ("<br>");  
echo date(DATE_RFC2822);  
?>  
root@linux128:/var/www/html#
```



Friday
Friday 16th of December 2022 12:32:10 AM
Fri, 16 Dec 2022 00:32:10 +0000

Learning diary and answers

Question 73 & Answer 73: Modify the Apache web server configuration to redirect HTTP GET requests to the directory /weather/ to <https://wttr.in/>. You will most likely need to enable the redirect module for Apache

- So, visiting your server http://IP_or_DNSname/weather/ takes the browser to wttr.in.
Check with web browser that the redirect works as intended

```
root@linux128:/etc/apache2/sites-enabled# cd /etc/apache2/sites-enabled/
root@linux128:/etc/apache2/sites-enabled# nano 000-default.conf
root@linux128:/etc/apache2/sites-enabled# cat 000-default.conf
<VirtualHost *:80>
    # The ServerName directive sets the request scheme, hostname and port that
    # the server uses to identify itself. This is used when creating
    # redirection URLs. In the context of virtual hosts, the ServerName
    # specifies what hostname must appear in the request's Host: header
    # to match this virtual host. For the default virtual host (this file
) this
    # value is not decisive as it is used as a last resort host regardless.
    # However, you must set it for any further virtual host explicitly
    #
    #ServerName www.example.com

    ServerAdmin webmaster@localhost
    DocumentRoot /var/www/html

    # Available loglevels: trace8, ..., trace1, debug, info, notice, warn,
    # error, crit, alert, emerg.
    # It is also possible to configure the loglevel for particular
    # modules, e.g.
    #LogLevel info ssl:warn

    ErrorLog ${APACHE_LOG_DIR}/error.log
    CustomLog ${APACHE_LOG_DIR}/access.log combined

    # For most configuration files from conf-available/, which are
    # enabled or disabled at a global level, it is possible to
    # include a line for only one particular virtual host. For example
the
    # following line enables the CGI configuration for this host only
    # after it has been globally disabled with "a2disconf".
    #Include conf-available/serve-cgi-bin.conf
</VirtualHost>

# vim: syntax=apache ts=4 sw=4 sts=4 sr noet
Redirect 301 /weather/ https://wttr.in/
root@linux128:/etc/apache2/sites-enabled# 
```

```
root@linux128:/etc/apache2/sites-enabled# curl 172.20.241.128/weather/
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>301 Moved Permanently</title>
</head><body>
<h1>Moved Permanently</h1>
<p>The document has moved <a href="https://wttr.in/">here</a>.</p>
<hr>
<address>Apache/2.4.52 (Ubuntu) Server at 172.20.241.128 Port 80</address>
</body></html>
root@linux128:/etc/apache2/sites-enabled# 
```

Learning diary and answers

Question 74 & Answer 74: Check last entries in Apache access and error log files in /var/log/apache2/

```
root@linux128:/etc/apache2/sites-enabled# cd /var/log/apache2/
root@linux128:/var/log/apache2# ls
access.log      error.log      error.log.2.gz  error.log.4.gz
access.log.1    error.log.1    error.log.3.gz  other_vhosts.access.log
root@linux128:/var/log/apache2# cat access.log | tail -5
172.20.241.128 -- [16/Dec/2022:04:03:28 +0200] "GET / HTTP/1.1" 200 10926
 "-" "curl/7.81.0"
172.20.241.128 -- [16/Dec/2022:04:03:46 +0200] "GET /weather HTTP/1.1" 40
4 437 "-" "curl/7.81.0"
172.20.241.128 -- [16/Dec/2022:04:04:39 +0200] "GET /weather HTTP/1.1" 40
4 437 "-" "curl/7.81.0"
172.20.241.128 -- [16/Dec/2022:04:05:22 +0200] "GET /weather/ HTTP/1.1" 3
01 501 "-" "curl/7.81.0"
10.2.124.81 -- [16/Dec/2022:04:05:41 +0200] "GET /weather/ HTTP/1.1" 301
557 "-" "Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML
ML, like Gecko) Chrome/108.0.0.0 Safari/537.36"
root@linux128:/var/log/apache2# 
```

```
root@linux128:/var/log/apache2# cat error.log | tail -5
[Fri Dec 16 04:02:40.987923 2022] [mpm_prefork:notice] [pid 84254] AH00163
: Apache/2.4.52 (Ubuntu) configured -- resuming normal operations
[Fri Dec 16 04:02:40.988007 2022] [core:notice] [pid 84254] AH00094: Comma
nd line: '/usr/sbin/apache2'
[Fri Dec 16 04:04:35.138332 2022] [mpm_prefork:notice] [pid 84254] AH00170
: caught SIGWINCH, shutting down gracefully
[Fri Dec 16 04:04:35.276384 2022] [mpm_prefork:notice] [pid 84282] AH00163
: Apache/2.4.52 (Ubuntu) configured -- resuming normal operations
[Fri Dec 16 04:04:35.276471 2022] [core:notice] [pid 84282] AH00094: Comma
nd line: '/usr/sbin/apache2'
root@linux128:/var/log/apache2# 
```

Question 75 & Answer 75: Install MySQL server and create some basic database there with one or more tables and insert some data into the table(s). See the basic MySQL example with PHP

```
mysql> DESCRIBE rawdata;
+-----+-----+-----+-----+-----+
| Field | Type   | Null | Key | Default | Extra       |
+-----+-----+-----+-----+-----+
| id    | int    | NO   | PRI | NULL    | auto_increment |
| timestamp | timestamp | NO   |     | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
| watts | int    | NO   |     | 0        |               |
| sensor | int    | NO   |     | 0        |               |
| temperature | float  | NO   |     | 0        |               |
| location | varchar(256) | NO   |     | 0        |               |
+-----+-----+-----+-----+-----+
6 rows in set (0.00 sec)

mysql> INSERT INTO rawdata (watts, sensor, temperature, location) VALUES ('1000', '1', '23', 'Oamk kotkantie 1');
Query OK, 1 row affected (0.09 sec)

mysql> INSERT INTO rawdata (watts, sensor, temperature, location) VALUES ('800', '2', '21', 'Oamk kotkantie 1');
Query OK, 1 row affected (0.06 sec)

mysql> INSERT INTO rawdata (watts, sensor, temperature, location) VALUES ('1100', '1', '22', 'Oamk kotkantie 1');
Query OK, 1 row affected (0.03 sec)

mysql> select * from rawdata
-> select * from rawdata;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MySQL server version for the right syntax to use near 'se
lect * from rawdata' at line 2
mysql> select * from rawdata;
+-----+-----+-----+-----+
| id    | timestamp | watts | sensor | temperature | location       |
+-----+-----+-----+-----+
| 1 | 2022-12-16 04:19:48 | 1000 | 1 | 23 | Oamk kotkantie 1 |
| 2 | 2022-12-16 04:19:48 | 800 | 2 | 21 | Oamk kotkantie 1 |
| 3 | 2022-12-16 04:19:51 | 1100 | 1 | 22 | Oamk kotkantie 1 |
+-----+-----+-----+-----+
3 rows in set (0.00 sec)

mysql> 
```

Learning diary and answers

Question 76 & Answer 76: Create a Bash script which will fetch and process data from [marine traffic API](#)

- Script must download the JSON-file from marine traffic port call API and print how many ships are currently there? (Search vesselName from the JSON)
- Command line example with curl to get things started:
`curl --compressed -L https://meri.digitraffic.fi/api/v1/port-calls -o /tmp/result.json`
- Filter the /tmp/result.json file data with jq or with GNU text utilities such as sed, awk, cut, grep etc. to only show how many ships are currently there? (Search vesselName from the JSON)

```
[ubuntu@linux128: ~
ubuntu@linux128:~$ nano ships.bash
ubuntu@linux128:~$ chmod 777 ships.bash
ubuntu@linux128:~$ cat ships.bash
curl --compressed -L https://meri.digitraffic.fi/api/v1/port-calls -o /tmp/result.json
cat /tmp/result.json | grep -w "vesselName" | wc -l
ubuntu@linux128:~$ ./ships.bash
% Total    % Received % Xferd  Average Speed   Time     Time      Time  Current
               Dload  Upload Total Spent   Left Speed
100 56619     0 56619     0    104k      0 --::-- --::-- --::-- 104k
270
ubuntu@linux128:~$ ]
```

Question 77 & Answer 77: Create a Bash script which checks [spaceX launch schedule API](#) and tells how many days ago was the last launch. Result should be something like this:

ubuntu@linux100:/tmp\$./whenwasthelaunch.bash

4 days ago

- Tip: Use unix epoch timestamp from the API reply and current Unix epoch time from date command to calculate and show the time difference

```
[ubuntu@linux128: ~
ubuntu@linux128:~$ nano lastLaunch.bash
ubuntu@linux128:~$ cat lastLaunch.bash
UnixDay=$(curl -L https://api.spacexdata.com/v4/launches/latest | jq .date_unix)
Time=$(date '+%s')
TimeSecond=$((Time - UnixDay))
Days=$((TimeSecond / 86400))
echo $Days days ago

ubuntu@linux128:~$ chmod 777 lastLaunch.bash
ubuntu@linux128:~$ ./lastLaunch.bash
% Total    % Received % Xferd  Average Speed   Time     Time      Time  Current
               Dload  Upload Total Spent   Left Speed
100 1427     0 1427     0    4171      0 --::-- --::-- --::-- 4184
73 days ago
ubuntu@linux128:~$ ]
```

Learning diary and answers

Question 78: Create this Bash script to /usr/local/bin directory. Name it to justtimestamps.bash and set the file permissions to 700 (root user has full access, others none). Check that the root is the file owner:

```
#!/bin/bash

while true; do # this is endless loop
    date >> /root/timestamps.txt # writing timestamp to a file
    sleep 60 # 60 second delay
done
```

- Create a new systemd service configuration file *timestampdemo.service* to the /etc/systemd/system directory with contents:

```
[Unit]
Description=My automatic service writing timestamps to a file in
/tmp
After=network.target

[Service]
Type=simple
User=root
Group=root
ExecStart=/usr/local/bin/justtimestamps.bash
WorkingDirectory=/tmp
Restart=on-failure

[Install]
WantedBy=multi-user.target
```

The terminal window shows the following steps:

- cd /usr/local/bin/
- ls
- nano justtimestamps.bash
- sudo bash
- chmod 700 justtimestamps.bash
- ls
- cd /etc/systemd/system/
- nano timestampdemo.service
- chmod 777 timestampdemo.service
- ls

The terminal output shows the contents of the justtimestamps.bash script and the timestampdemo.service file.

```
root@linux128:/etc/systemd/system
ubuntu@linux128:~$ cd /usr/local/bin/
ubuntu@linux128:/usr/local/bin$ ls
__pycache__  rst2html.py  rst2odt.py          rst2xml.py
docutils     rst2html4.py  rst2odt_prepstyles.py  rstpep2html.py
libdoc       rst2html5.py  rst2pseudoxml.py
rebot        rst2latex.py  rst2s5.py
robot        rst2man.py   rst2xetex.py
ubuntu@linux128:/usr/local/bin$ nano justtimestamps.bash
ubuntu@linux128:/usr/local/bin$ sudo bash
root@linux128:/usr/local/bin# nano justtimestamps.bash
root@linux128:/usr/local/bin# chmod 700 justtimestamps.bash
root@linux128:/usr/local/bin# ls
__pycache__  robot      rst2man.py   rst2xetex.py
docutils     rst2html.py  rst2odt.py   rst2xml.py
justtimestamps.bash  rst2html4.py  rst2odt_prepstyles.py  rstpep2html.py
libdoc       rst2html5.py  rst2pseudoxml.py
rebot        rst2latex.py  rst2s5.py
root@linux128:/usr/local/bin# cd /etc/systemd/system/
root@linux128:/etc/systemd/system# nano timestampdemo.service
root@linux128:/etc/systemd/system# chmod 777 timestampdemo.service
root@linux128:/etc/systemd/system# ls
cloud-final.service.wants           snap-core20-1695.mount
cloud-init.target.wants              snap-core20-1738.mount
dbus-org.freedesktop.ModemManager1.service  snap-docker-2285.mount
dbus-org.freedesktop.resolvev1.service  snap-lxd-23541.mount
dbus-org.freedesktop.timesync1.service  snap-snapd-17883.mount
default.target.wants                 snap.docker.dockerd.service
emergency.target.wants               snap.lxd.activate.service
final.target.wants                   snap.lxd.daemon.service
getty.target.wants                  snap.lxd.daemon_unix.socket
graphical.target.wants              snap.lxd.user-daemon.service
iscsi.service                       snap.lxd.user-daemon_unix.socket
mdmonitor.service.wants             sockets.target.wants
multi-user.target.wants              sshd-keygen@.service.d
multipath-tools.service.wants       sshd.service
network-online.target.wants         sudo.service
open-vm-tools.service.requires     sysinit.target.wants
paths.target.wants                  syslog.service
rescue.target.wants                timers.target.wants
sleep.target.wants                 timestampdemo.service
snap-core18-2654.mount             vmtoolsd.service
```

Learning diary and answers

- Manage the service:

Reload service files with: `systemctl daemon-reload`

Start the service with: `systemctl start timestampdemo`

```
root@linux128:/etc/systemd/system
root@linux128:/etc/systemd/system# systemctl daemon-reload
root@linux128:/etc/systemd/system# systemctl start timestampdemo
root@linux128:/etc/systemd/system#
```

Check that `/root/timestamp.txt` file was created with the timestamp content (that date command should be running once per minute)

```
root@linux128:/etc/systemd/system# cat /root/timestamps.txt
Sun Dec 18 21:24:07 EET 2022
Sun Dec 18 21:25:07 EET 2022
root@linux128:/etc/systemd/system#
```

Check the process list to verify that the script is running

```
root@linux128:/etc/systemd/system
root@linux128:/etc/systemd/system# ps aux | grep timestampdemo.service
root      104991  0.0  0.1    7016  2196 pts/1      S+   21:27   0:00 grep --color=
auto timestampdemo.service
root@linux128:/etc/systemd/system#
```

- Use command: `systemctl status timestampdemo` to check the service status

```
root@linux128:/etc/systemd/system# systemctl status timestampdemo
● timestampdemo.service - My automatic service writing timestamps to a file in >
   Loaded: loaded (/etc/systemd/system/timestampdemo.service; disabled; vendor>
   Active: active (running) since Sun 2022-12-18 21:24:07 EET; 4min 35s ago
     Main PID: 104978 (justtimestamps.)
        Tasks: 2 (limit: 2324)
       Memory: 560.0K
         CPU: 38ms
      CGroup: /system.slice/timestampdemo.service
              └─104978 /bin/bash /usr/local/bin/justtimestamps.bash
                  ├─104993 sleep 60

Dec 18 21:24:07 linux128 systemd[1]: Started My automatic service writing times>
lines 1-12/12 (END)
```

Stop the script with: `systemctl stop timestampdemo`

```
root@linux128:/etc/systemd/system# systemctl stop timestampdemo
```

Verify from process list that service is not running anymore

```
root@linux128:/etc/systemd/system# ps aux | grep timestampdemo.service
root      105003  0.0  0.1    7016  2236 pts/1      S+   21:30   0:00 grep --color=
auto timestampdemo.service
root@linux128:/etc/systemd/system#
```

Learning diary and answers

Use `systemctl status timestampdemo` to check the service status

```
root@linux128: /etc/systemd/system
○ timestampdemo.service - My automatic service writing timestamps to a file in /tmp
    Loaded: loaded (/etc/systemd/system/timestampdemo.service; disabled; vendor preset: enabled)
      Active: inactive (dead)

Dec 18 21:24:07 linux128 systemd[1]: Started My automatic service writing timestamps to a file in /tmp.
Dec 18 21:29:47 linux128 systemd[1]: Stopping My automatic service writing timestamps to a file in /tmp...
Dec 18 21:29:48 linux128 systemd[1]: timestampdemo.service: Deactivated successfully.
Dec 18 21:29:48 linux128 systemd[1]: Stopped My automatic service writing timestamps to a file in /tmp.
~
```

Try running `systemctl enable timestampdemo` and `systemctl disable timestampdemo` (enables/disables the service during the server startup)

```
root@linux128:/etc/systemd/system# systemctl enable timestampdemo
Created symlink /etc/systemd/system/multi-user.target.wants/timestampdemo.service → /etc/systemd/system/timestampdemo.service.
root@linux128:/etc/systemd/system# systemctl disable timestampdemo
Removed /etc/systemd/system/multi-user.target.wants/timestampdemo.service.
root@linux128:/etc/systemd/system#
```

Week 7

Question 79: What is a Linux container? (With any technology such as LXC/LXD, Docker, Podman). Generic description what is a Linux container is enough.

Answer 79: A Linux container is a set of 1 or more processes that are isolated from the rest of the system. All the files necessary to run them are provided from a distinct image, meaning Linux containers are portable and consistent as they move from development, to testing, and finally to production.

A virtual machine and system container manager of the future is called LXD. It provides a uniform user interface for entire Linux systems running in virtual or containerized environments.

LXD is an image-based system that offers images for many different Linux distributions. With support for numerous storage backends and network types as well as the opportunity to deploy on hardware ranging from a single laptop or cloud instance to a whole server rack, it offers flexibility and scalability for a variety of use scenarios.

Question 80: What is the difference between chroot, containers and full operating system virtualization (like Virtualbox, VMware, Hyper-V etc.)?

Answer 80: While containerization runs a single OS instance with several user spaces to isolate processes from one another, virtualization tries to operate multiple OS instances on a single server. Therefore, containerization makes sense for a single AWS cloud customer who want to execute several tasks at once.

Question 81: What is Kubernetes?

Answer 81: An open-source container orchestration technology called Kubernetes (sometimes referred to as k8s or "kube") automates a lot of the labor-intensive steps needed in setting up, running, and scaling containerized systems.

Question 82: What is Ansible?

Answer 82: Ansible is an open-source IT automation platform that automates numerous manual IT activities, including provisioning, configuration management, application deployment, orchestration, and many more. Contrary to more straightforward management tools, Ansible users (such as system administrators, developers, and architects) can use Ansible automation to deploy software, automate routine tasks, provision infrastructure, enhance security and compliance, patch systems, and distribute automation throughout the entire company.

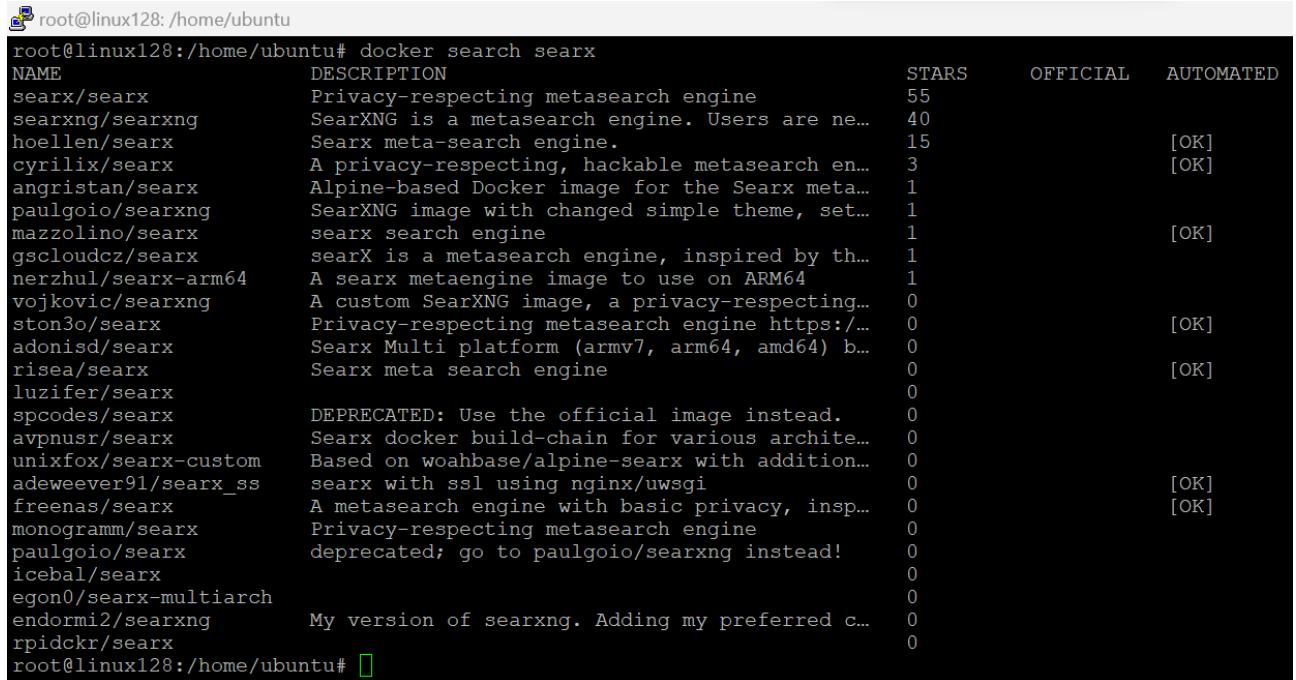
Question 83: What is Terraform?

Answer 83: In order to automate numerous infrastructure activities, DevOps teams frequently use the IAC tool Terraform. One of the primary use cases for Terraform is the provisioning of cloud resources, for example. It is an open-source, cloud-independent provisioning tool made by HashiCorp in the Go programming language.

Learning diary and answers

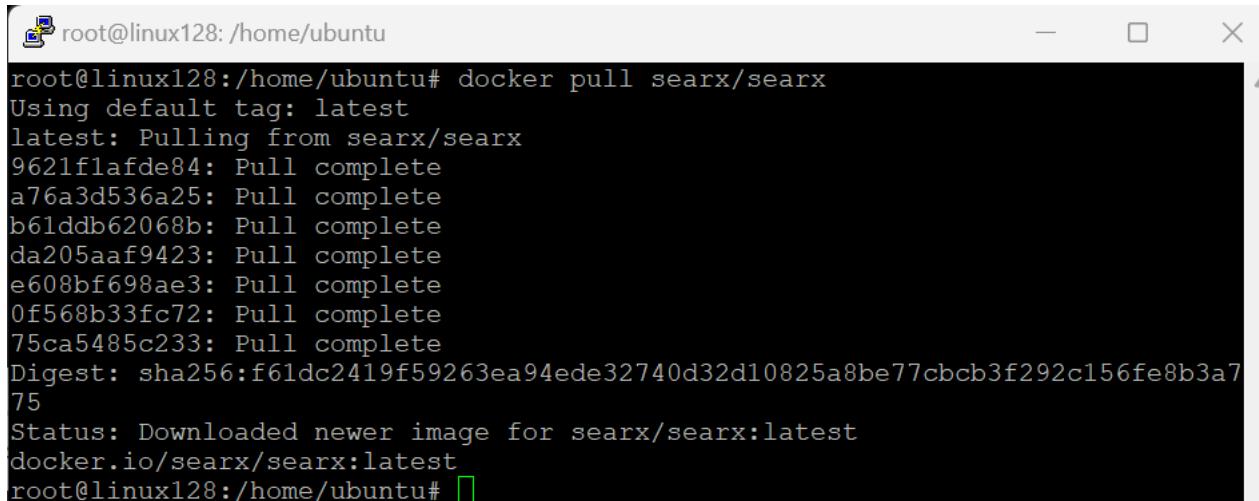
Question 84 & Answer 84: Install Docker engine (docker.io) package to your server from standard package repository or from the [Docker official repository](#)

- Use *docker* CLI command to search package *searx* with most stars



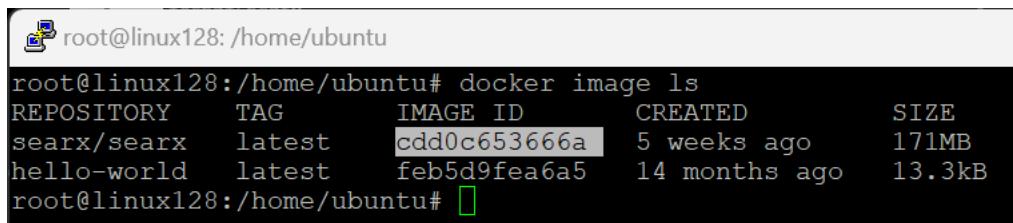
```
root@linux128:/home/ubuntu# docker search searx
NAME                  DESCRIPTION          STARS      OFFICIAL      AUTOMATED
searx/searx            Privacy-respecting metasearch engine   55
searxng/searxng        SearXNG is a metasearch engine. Users are ne...  40
hoellen/searx          Searx meta-search engine.               15
cyrilix/searx          A privacy-respecting, hackable metasearch en...  3
angristan/searx        Alpine-based Docker image for the Searx meta...  1
paulgoio/searxng       SearXNG image with changed simple theme, set...  1
mazzolino/searx        searx search engine                   1
gscloudcz/searx        searX is a metasearch engine, inspired by th...  1
nerzhul/searx-arm64    A searx metaengine image to use on ARM64           1
vojkovic/searxng       A custom SearXNG image, a privacy-respecting...  0
ston3o/searx           Privacy-respecting metasearch engine https://...  0
adonisd/searx          Searx Multi platform (armv7, arm64, amd64) b...  0
risea/searx             Searx meta search engine                   0
luzifer/searx          DEPRECATED: Use the official image instead.  0
spcodes/searx          Seaxr docker build-chain for various archite...  0
avpnusr/searx          Based on woahbase/alpine-searx with addition...  0
unixfox/searx-custom   searx with ssl using nginx/uwsgi           0
adeweever91/searx_ss   A metasearch engine with basic privacy, insp...  0
freenas/searx          Privacy-respecting metasearch engine           0
monogramm/searx        Paulgoio's searx image, deprecated; go to paulgoio/searxng instead!  0
paulgoio/searx         deprecated; go to paulgoio/searxng instead!  0
icebal/searx           0
egon0/searx-multiarch  0
endormi2/searxng       My version of searxng. Adding my preferred c...  0
rpidckr/searx          0
root@linux128:/home/ubuntu#
```

- Use *docker* CLI to pull *searx/searx* Docker container image from Docker repository (*Searx* is a self-hosted metasearch engine, combining multiple web search engine results)



```
root@linux128:/home/ubuntu# docker pull searx/searx
Using default tag: latest
latest: Pulling from searx/searx
9621f1afde84: Pull complete
a76a3d536a25: Pull complete
b61ddb62068b: Pull complete
da205aaf9423: Pull complete
e608bf698ae3: Pull complete
0f568b33fc72: Pull complete
75ca5485c233: Pull complete
Digest: sha256:f61dc2419f59263ea94ede32740d32d10825a8be77cbcb3f292c156fe8b3a7
75
Status: Downloaded newer image for searx/searx:latest
docker.io/searx/searx:latest
root@linux128:/home/ubuntu#
```

- List local Docker images with *docker images* command. What is the image id of Searx?



```
root@linux128:/home/ubuntu# docker image ls
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
searx/searx      latest   cdd0c653666a  5 weeks ago   171MB
hello-world     latest   feb5d9fea6a5  14 months ago  13.3kB
root@linux128:/home/ubuntu#
```

The image id of Searx is: `cdd0c653666a`

Learning diary and answers

- Start the Searx container and redirect inbound TCP 8080 port traffic to the Searx container:

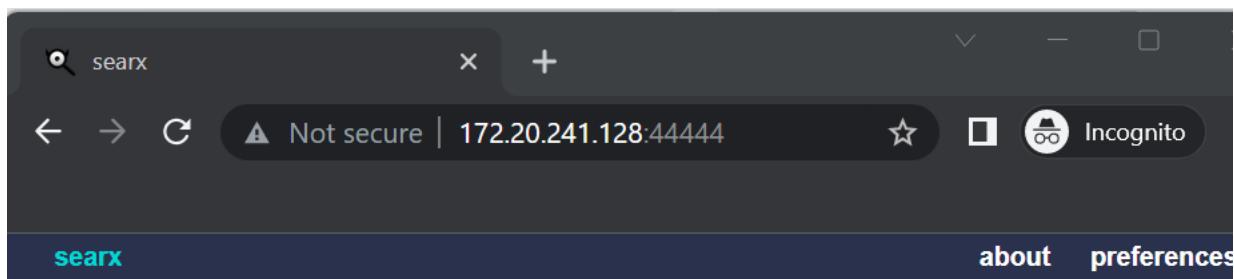
```
docker run --rm -d -v /opt/docker/searx/searx:/etc/searx -p 44444:8080 -e  
BASE_URL=http://localhost:44444/ searx/searx
```

```
root@linux128:/home/ubuntu# docker run --rm -d -v /opt/docker/searx/searx:/etc/searx -p 44444:8080 -e BASE_URL=http://localhost:44444/ searx/searx  
f47ec48fdfbeb8f654afdb034cdc0e63763aaa0c301f8b73604160b91135ac9  
root@linux128:/home/ubuntu#
```

- Use *docker ps* to verify that Searx container is running

```
root@linux128:/home/ubuntu# docker ps  
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES  
f47ec48fdfbeb8f654afdb034cdc0e63763aaa0c301f8b73604160b91135ac9 musing_goodall  
root@linux128:/home/ubuntu#
```

- Verify that you can access your container with your web browser: http://your_server_ip:44444/ (open TCP/44444 port in your host firewall if you are filtering traffic with Netfilter)



- Check container stats with interactive docker stats command

```
root@linux128:/home/ubuntu# docker stats  
CONTAINER ID NAME CPU % MEM USAGE / LIMIT MEM % NET I/O BLOCK I/O PIDS  
f47ec48fdfbeb8f654afdb034cdc0e63763aaa0c301f8b73604160b91135ac9 musing_goodall 0.02% 255.6MiB / 1.929GiB 12.93% 3.15MB / 339kB 5.57MB / 65.5kB 15
```

- Check Searx default settings in */opt/docker/searx/searx/settings.yml* file.
See <https://docs.docker.com/engine/swarm/configs/> and variables like *BASE_URL*

Learning diary and answers

```
root@linux128:/home/ubuntu# cat /opt/docker/searx/searx/settings.yml | grep base_url
  base_url : http://localhost:44444/ # Set custom base_url. Possible values
: False or "https://your.custom.host/location/"
  base_url : 'https://{{language}}.wikipedia.org/'
#  base_url : http://localhost:9200
  base_url : https://directory.fsf.org/
  base_url :
#  base_url : http://localhost:7700
#  base_url : 'http://localhost:8983/solr/opensemanticsearch/'
#  base_url: http://localhost:9696/api/v1/search?
#  base_url: 'https://recoll.example.org/'
#  base_url: 'https://recoll.example.org/'
#  base_url : http://localhost:8983
#  base_url : https://uncyclopedia.wikia.com/
  base_url : "https://{{language}}.wikibooks.org/"
  base_url : "https://{{language}}.wikinews.org/"
  base_url : "https://{{language}}.wikiquote.org/"
  base_url : "https://{{language}}.wikisource.org/"
  base_url : "https://{{language}}.wiktionary.org/"
  base_url : "https://{{language}}.wikiversity.org/"
  base_url : "https://{{language}}.wikivoyage.org/"
  base_url : https://peer.tube/
#  base_url : 'http://localhost:8090'
  base_url : https://rumble.com/
  base_url: https://www.wordnik.com/
  base_url: https://sjp.pwn.pl/
#  base_url : 'http://your.omnom.host/'
#  base_url : 'https://doc.ubuntu-fr.org'
root@linux128:/home/ubuntu#
```

- Use [docker exec to list and explore](#) Searx container filesystem and files. Note: Searx container does not have bash shell but Busybox has SH shell (From CLI: `docker exec -t -i your_containerID sh`)

```
root@linux128:/home/ubuntu# docker exec -it musing_goodall sh
/usr/local/searx # printenv
BASE_URL=http://localhost:44444/
HOSTNAME=f47ec48fdfeb
INSTANCE_NAME=searx
AUTOCOMPLETE=
SHLVL=1
HOME=/root
TERM=xterm
PATH=/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/sbin:/bin
MORTY_KEY=
SEARX_SETTINGS_PATH=/etc/searx/settings.yml
UWSGI_SETTINGS_PATH=/etc/searx/uwsgi.ini
MORTY_URL=
PWD=/usr/local/searx
/usr/local/searx #
```

- Stop the container and verify that it has been stopped. Remove the container image if using it anymore

Learning diary and answers

```
root@linux128:/home/ubuntu
root@linux128:/home/ubuntu# docker stop musing_goodall
musing_goodall
root@linux128:/home/ubuntu# docker ps
CONTAINER ID   IMAGE      COMMAND   CREATED     STATUS      PORTS     NAMES
root@linux128:/home/ubuntu# docker container ls
CONTAINER ID   IMAGE      COMMAND   CREATED     STATUS      PORTS     NAMES
root@linux128:/home/ubuntu# docker image ls
REPOSITORY      TAG      IMAGE ID      CREATED        SIZE
searx/searx    latest    cdd0c653666a   5 weeks ago   171MB
hello-world    latest    feb5d9fea6a5  14 months ago  13.3kB
root@linux128:/home/ubuntu# docker rmi searx/searx
Untagged: searx/searx:latest
Untagged: searx/searx@sha256:f61dc2419f59263ea94ede32740d32d10825a8be77cbcb3f
292c156fe8b3a775
Deleted: sha256:cdd0c653666ab2de83635f03807093e2042e26b43409259a3e5dcff1a7cc9
8e1
Deleted: sha256:d3c5625aeb4b5aa914c3889cdb9f75d26d04bd192d2fe6c200faaa9116f02
e06
Deleted: sha256:ff02090c704c4f985e86e006dea168bc5453c36cdf633c1fedc93e550fc当地
c70
Deleted: sha256:a346ae2d17ded99b91606ef847f8ee38fb24de29dba23506f7319f40dc928
7b5
Deleted: sha256:311cc744826fb27c49bd0c4433363d1bc3b659175c003b186449fc1ddb94d
114
Deleted: sha256:1b01190a6c21cf8c77e9ec2fdc8eb0a597d5f026757f34e5f704ae49da4b8
b42
Deleted: sha256:de49e2d475524c064d39ac11e693d49aaaeeb634b6ba731dfdf32293ad4e
8e4
Deleted: sha256:34d5ebaa5410d2ab4154bbd7c3c99c385ec509eb9c1d03d5486aff01bbd61
8c5
root@linux128:/home/ubuntu# docker image ls
REPOSITORY      TAG      IMAGE ID      CREATED        SIZE
hello-world    latest    feb5d9fea6a5  14 months ago  13.3kB
root@linux128:/home/ubuntu#
```

Question 85 & Answer 85: Browse these container building tutorials: [Create a Docker image running Robot Framework](#) and [Docker Build: A Beginner's Guide to Building Docker Images](#)

```
root@linux128:/home/ubuntu/dockerProject
root@linux128:/home/ubuntu/dockerProject# docker-compose up
Starting dockerproject_test_1 ... done
Attaching to dockerproject_test_1
test_1  | robot --console verbose --outputdir /reports /suites/
test_1  |
test_1  | Suites
test_1  | -----
test_1  | Suites.Website Jdriven
test_1  | -----
test_1  | Get Request TestWebsite
test_1  |   /usr/local/lib/python3.10/site-packages/urllib3/connectionpool.py:1045: Insec
ureRequestWarning: Unverified HTTPS request is being made to host 'www.jdriven.com'. Adding certificate verification is strongly advised. See: https://urllib3.readthedocs.io/en/1.26.x/advanced-usage.html#ssl-warnings
test_1  |   warnings.warn(
test_1  |   /usr/local/lib/python3.10/site-packages/urllib3/connectionpool.py:1045: InsecureRequestWarning: Unverified HTTPS request is being made to host 'jdriven.com'. Adding certificate verification is strongly advised. See: https://urllib3.readthedocs.io/en/1.26.x/advanced-usage.html#ssl-warnings
test_1  |   warnings.warn(
test_1  |   |
test_1  |   | PASS |
test_1  |   |
test_1  | Suites.Website Jdriven
test_1  |   1 test, 1 passed, 0 failed
test_1  |   |
test_1  | Suites
test_1  |   1 test, 1 passed, 0 failed
test_1  |   |
test_1  |   | PASS |
test_1  |   |
test_1  | Output: /reports/output.xml
test_1  | Log: /reports/log.html
test_1  | Report: /reports/report.html
dockerproject_test_1 exited with code 0
root@linux128:/home/ubuntu/dockerProject#
```

Learning diary and answers

```
root@linux128:/home/ubuntu/dockerProject/reports
root@linux128:/home/ubuntu/dockerProject/reports# ll
total 484
drwxr-xr-x 2 root root 4096 Dec 17 23:52 .
drwxr-xr-x 5 root root 4096 Dec 17 23:43 ..
-rw-r--r-- 1 root root 233723 Dec 17 23:52 log.html
-rw-r--r-- 1 root root 15898 Dec 17 23:52 output.xml
-rw-r--r-- 1 root root 232415 Dec 17 23:52 report.html
root@linux128:/home/ubuntu/dockerProject/reports# 
```

```
root@linux128:/home/ubuntu/dockerProject/reports# cp log.html output.xml report.html /var/www/html/
root@linux128:/home/ubuntu/dockerProject/reports# ll /var/www/html/
total 516
drwxr-xr-x 2 root root 4096 Dec 17 23:55 .
drwxr-xr-x 3 root root 4096 Dec 11 20:55 ..
-rw-r--r-- 1 root root 10671 Dec 11 20:55 index.html
-rw-r--r-- 1 root root 8659 Dec 16 02:42 index.html.1
-rwxrwxrwx 1 root root 149 Dec 16 02:12 index.php*
-rw-r--r-- 1 root root 233723 Dec 17 23:55 log.html
-rw-r--r-- 1 root root 15898 Dec 17 23:55 output.xml
-rw-r--r-- 1 root root 232415 Dec 17 23:55 report.html
-rw-r--r-- 1 root root 147 Dec 11 21:02 test.html
root@linux128:/home/ubuntu/dockerProject/reports# 
```

The screenshot shows a web browser displaying a test report. The title bar indicates the URL is 172.20.241.128/report.html. The page header includes a back arrow, forward arrow, and a 'C' icon, followed by a warning message: 'Not secure | 172.20.241.128/report.html'. The main content area has a green header with the title 'Suites Report' and a timestamp 'Generated 20221217 23:52:23 UTC+02:00 4 minutes 48 seconds ago'. Below the header is a section titled 'Summary Information' containing status details:

Status:	All tests passed
Start Time:	20221217 23:52:22.748
End Time:	20221217 23:52:23.768
Elapsed Time:	00:00:01.020
Log File:	log.html

Below this is a section titled 'Test Statistics' with three tables:

Total Statistics		Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
All Tests		1	1	0	0	00:00:01	<div style="width: 100%; background-color: #6aa84f;"></div>

Statistics by Tag		Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
No Tags							<div style="width: 0%; background-color: #e0e0e0;"></div>

Statistics by Suite		Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
Suites		1	1	0	0	00:00:01	<div style="width: 100%; background-color: #6aa84f;"></div>
Suites.Website JDriven		1	1	0	0	00:00:01	<div style="width: 100%; background-color: #6aa84f;"></div>

Finally, there is a 'Test Details' section with tabs for 'All', 'Tags', 'Suites' (which is selected), and 'Search'. It contains fields for 'Suite:' and 'Test:'.

Learning diary and answers

← → C Not secure | 172.20.241.128/log.html

Suites Log

Generated
20221217 23:52:23 UTC+02:00
5 minutes 43 seconds ago

Test Statistics

Total Statistics	Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
All Tests	1	1	0	0	00:00:01	<div style="width: 100%; background-color: #2e7131;"></div>
Statistics by Tag	Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
No Tags						<div style="width: 0%; background-color: #d9e1f2;"></div>
Statistics by Suite	Total	Pass	Fail	Skip	Elapsed	Pass / Fail / Skip
Suites	1	1	0	0	00:00:01	<div style="width: 100%; background-color: #2e7131;"></div>
Suites.Website Jdriven	1	1	0	0	00:00:01	<div style="width: 100%; background-color: #2e7131;"></div>

Test Execution Log

-	SUITE	Suites
Full Name:		Suites
Source:		/suites
Start / End / Elapsed:		20221217 23:52:22.748 / 20221217 23:52:23.768 / 00:00:01.020
Status:		1 test total, 1 passed, 0 failed, 0 skipped
+	SUITE	Website Jdriven