

Linux and Networking- Linux Command Line Intro 2

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1 Packages installation

1.1 Install vim package

Used command:

```
sudo apt install vim
```

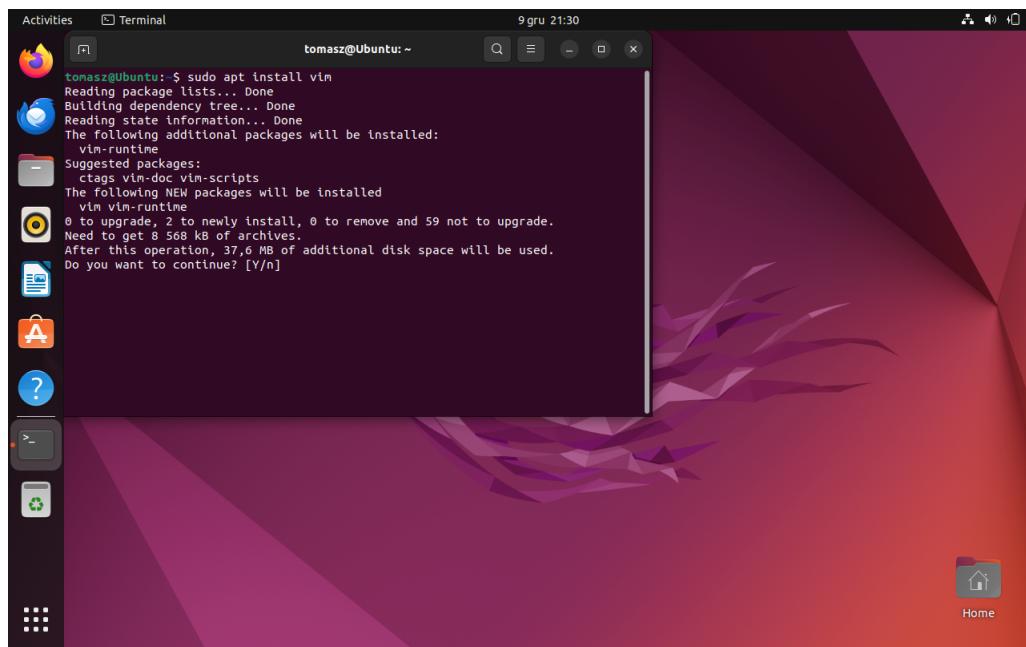


Figure 1: Vim installation

1.2 Add new APT repository from PPA and install popular “telegram” messenger: ppa:atareao/telegram

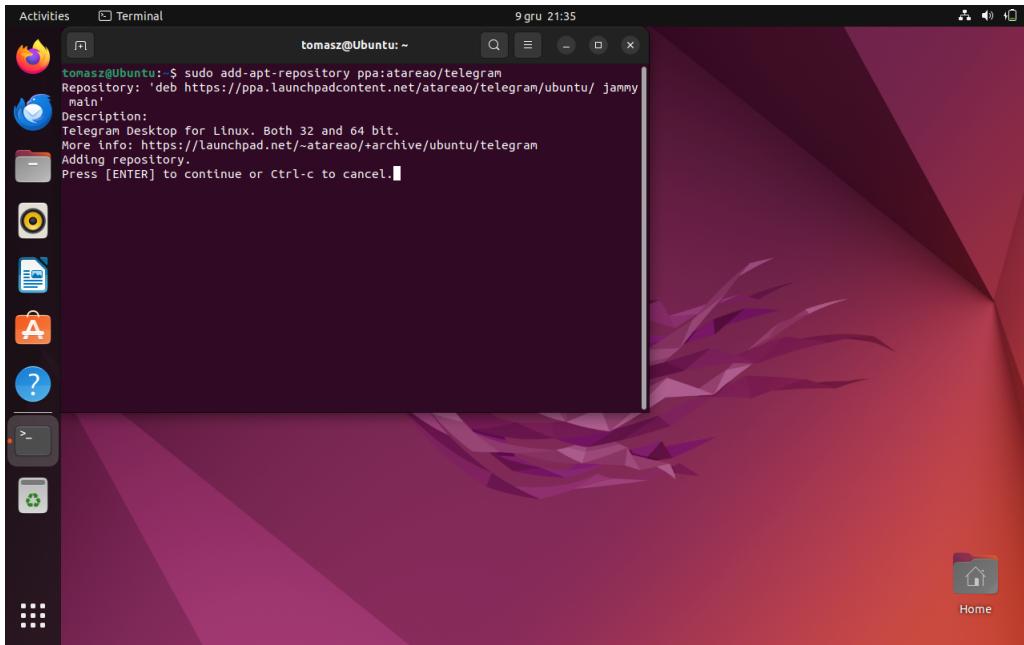


Figure 2: Adding and installing new apt repository

1.3 Investigate and find-out where new PPA was stored in the FS

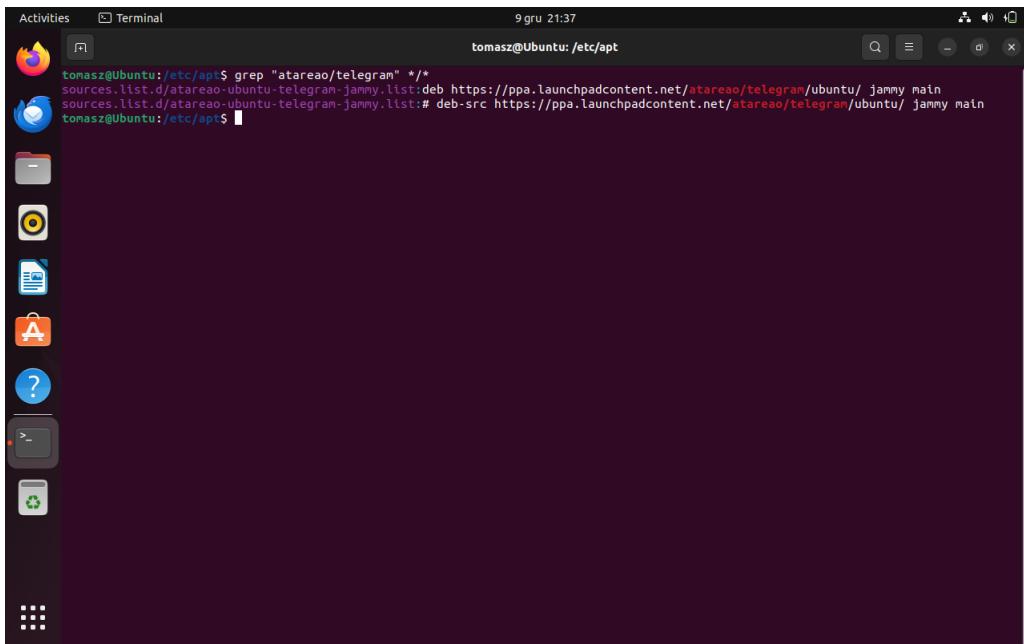
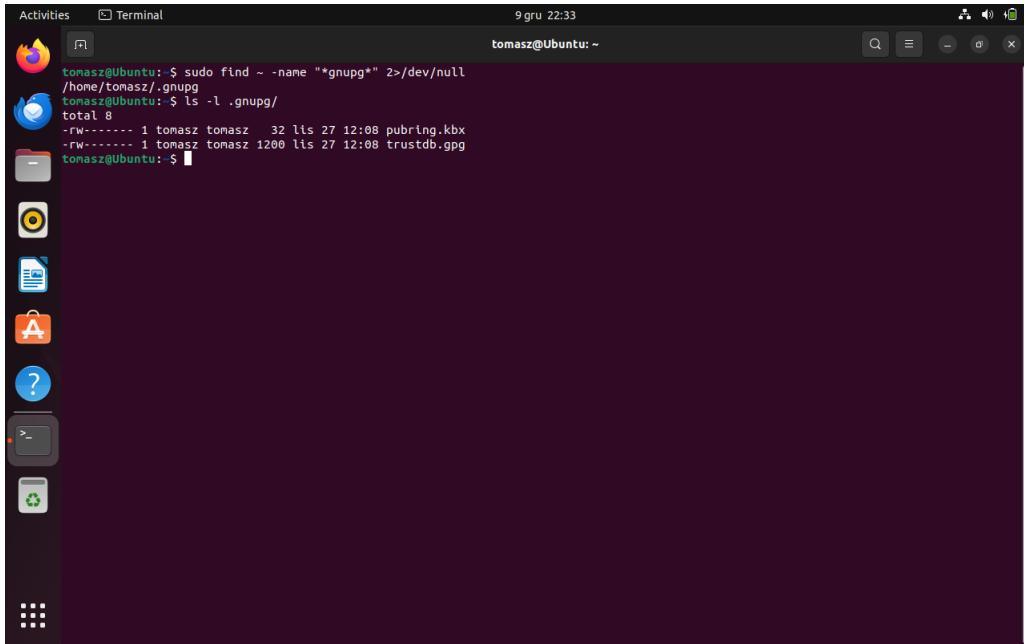


Figure 3: Place of new repository

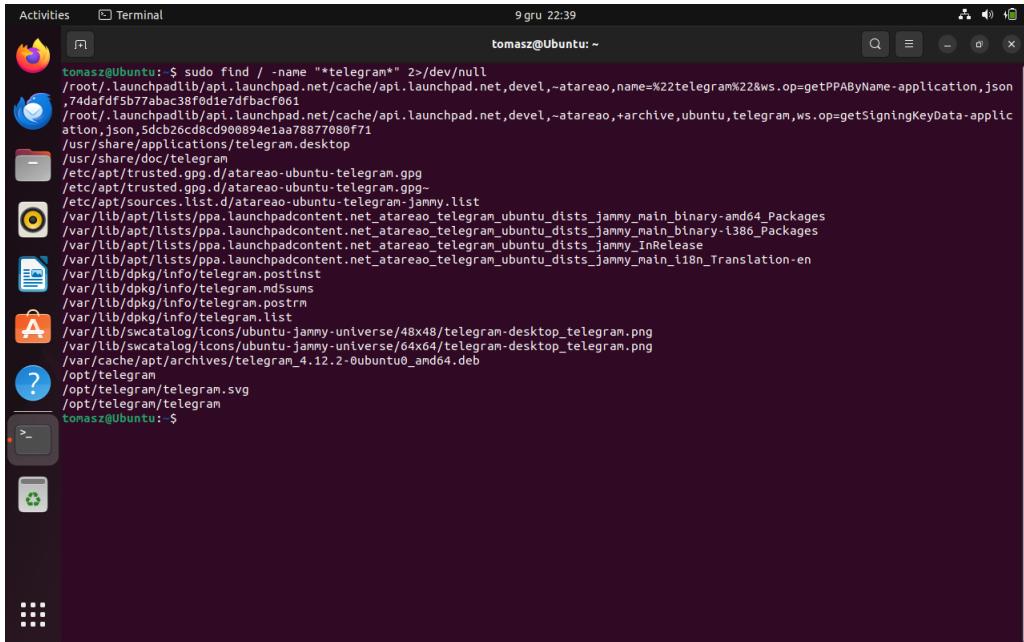
1.4 Investigate where GPG key was stored and how it was verified



```
Activities Terminal 9 gru 22:33
tomasz@Ubuntu:~$ sudo find ~ -name "*gnupg*" 2>/dev/null
/home/tomasz/.gnupg
tomasz@Ubuntu:~$ ls -l .gnupg/
total 8
-rw----- 1 tomasz tomasz 32 lis 27 12:08 pubring.kbx
-rw----- 1 tomasz tomasz 1200 lis 27 12:08 trustdb.gpg
tomasz@Ubuntu:~$
```

Figure 4: Where GPG keys are stored

1.5 Investigate where telegram APP files were placed to the FS



```
Activities Terminal 9 gru 22:39
tomasz@Ubuntu:~$ sudo find / -name "*telegram*" 2>/dev/null
/root/.lauchpadlib/api.launchpad.net/cache/api.launchpad.net-devel,-atareao,name=%22telegram%22&ws.op=getPPAByName-application.json
./74da7df5b77abac38f0d1e7dfbacf661
/root/.lauchpadlib/api.launchpad.net/cache/api.launchpad.net-devel,-atareao,+archive,ubuntu,telegram,ws.op=getSigningKeyData-application.json,5dc26cd8cd900894e1aa78877080f71
/usr/share/applications/telegram.desktop
/usr/share/doc/telegram
/etc/apt/trusted.gpg.d/atareao-ubuntu-telegram.gpg
/etc/apt/trusted.gpg.d/atareao-ubuntu-telegram.gpg-
/etc/apt/sources.list.d/atareao-ubuntu-telegram-jammy.list
/var/lib/apt/lists/ppa.launchpadcontent.net_atareao_telegram_ubuntu_dists_jammy_main_binary-amd64_Packages
/var/lib/apt/lists/ppa.launchpadcontent.net_atareao_telegram_ubuntu_dists_jammy_main_binary-i386_Packages
/var/lib/apt/lists/ppa.launchpadcontent.net_atareao_telegram_ubuntu_dists_jammy_i18n_Release
/var/lib/dpkg/info/telegram.postinst
/var/lib/dpkg/info/telegram.1d
/var/lib/dpkg/info/telegram.list
/var/lib/swcatalog/icons/ubuntu-jammy-universe/48x48/telegram-desktop_telegram.png
/var/lib/swcatalog/icons/ubuntu-jammy-universe/64x64/telegram-desktop_telegram.png
/var/cache/apt/archives/telegram_4.12.2-0ubuntu0_amd64.deb
/opt/telegram
/opt/telegram/telegram.svg
/opt/telegram/telegram
tomasz@Ubuntu:~$
```

Figure 5: The storage places for telegram APP files

Telegram APP file is stored in /opt/telegram directory. Last line of output of find command used on figure 5.

1.6 Run telegram APP from Ubuntu GUI

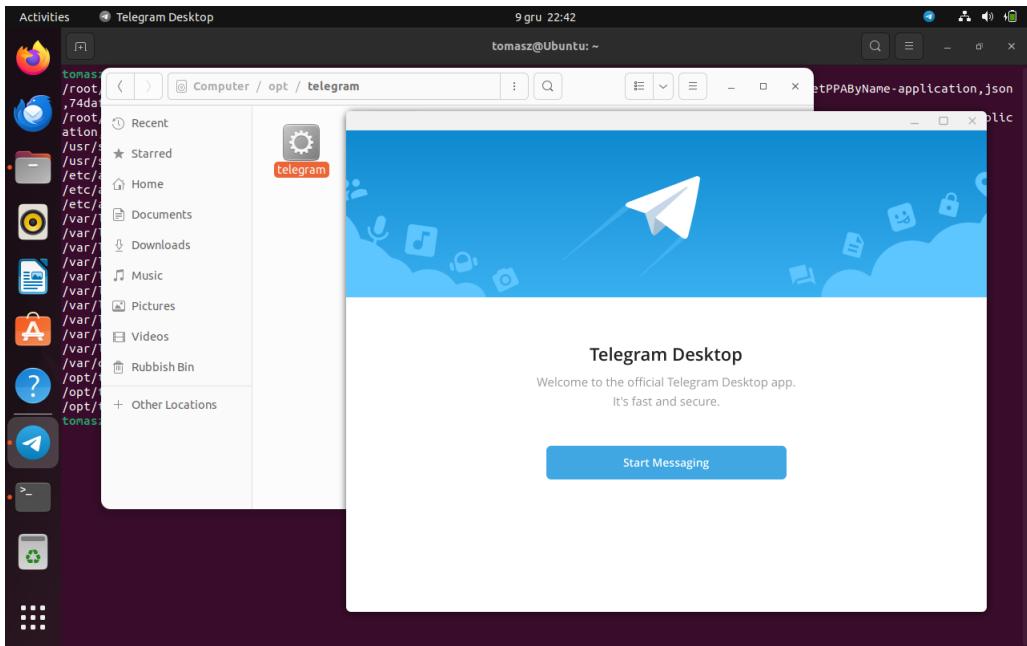


Figure 6: Starting telegram from GUI

1.7 Find-out “telegram” app PID, process entry and parameters (use appropriate CLI app)

Used command:

```
ps -C telegram -O cmd,args
```

Meaning of flags:

- -C, select process by command name
- -O cmd,args, add to predefined set of columns, command name of process (cmd)

```
tomasz@Ubuntu:~$ ps -C telegram -o cmd,args
PID CMD          COMMAND
8667 /opt/telegram/telegram      /opt/telegram/telegram
tomasz@Ubuntu:~$
```

Figure 7: Find out telegram process' data

Data have been listed on table 1.

PID	CMD	ARGS
8867	/opt/telegram/telegram	none

Table 1: Telegram process's data

1.8 Remove telegram APP using “apt-get” application from CLI

```
tomasz@Ubuntu:~$ sudo apt-get remove telegram
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
0 to upgrade, 0 to newly install, 1 to remove and 45 not to upgrade.
After this operation, 52,8 MB disk space will be freed.
Do you want to continue? [Y/n] ■
```

Figure 8: Removing telegram using apt-get

1.9 Remove telegram PPA repo from the system using CLI

Using command apt-add repository:

- with option `-list`, all repositories are listed,
- with option `-remove`, remove repository of given name
- with option `-list`, see whether changes has taken place

The screenshot shows a terminal window titled "Terminal" with the command line interface. The user runs the command `sudo apt-add-repository --list` to view the current repositories. Then, they run `sudo apt-add-repository --remove https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/`. This command fails because it cannot handle the repository shortcut. The user then runs `sudo apt-add-repository --remove deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/`. The terminal shows the removal of the repository entry from the sources.list.d directory. Finally, the user runs `sudo apt-add-repository --list` again to verify that the repository has been removed.

```
tomasz@Ubuntu:~$ sudo apt-add-repository --list
deb http://gb.archive.ubuntu.com/ubuntu/ jammy universe multiverse main restricted
deb http://gb.archive.ubuntu.com/ubuntu/ jammy-updates universe multiverse main restricted
deb http://gb.archive.ubuntu.com/ubuntu/ jammy-backports universe multiverse main restricted
deb http://security.ubuntu.com/ubuntu jammy-security universe multiverse main restricted
deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/ jammy main
tomasz@Ubuntu:~$ sudo apt-add-repository --remove deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/
Unable to handle repository shortcut 'deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/'
tomasz@Ubuntu:~$ sudo apt-add-repository --remove deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/ jammy main
Repository: 'deb https://ppa.launchpadcontent.net/atareao/telegram/ubuntu/ jammy main'
Description:
Telegram Desktop for Linux. Both 32 and 64 bit.
More info: https://launchpad.net/~atareao/+archive/ubuntu/telegram
Removing repository
Press [ENTER] to continue or Ctrl-c to cancel.
Disabling deb entry in /etc/apt/sources.list
Removing disabled deb entry from /etc/apt/sources.list.d/atareao-ubuntu-telegram-jammy.list
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Hit:2 http://gb.archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://gb.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Hit:4 http://gb.archive.ubuntu.com/ubuntu jammy-backports InRelease
Fetched 229 kB in 1s (206 kB/s)
Reading package lists... Done
tomasz@Ubuntu:~$ sudo apt-add-repository --list
deb http://gb.archive.ubuntu.com/ubuntu/ jammy restricted multiverse universe main
deb http://gb.archive.ubuntu.com/ubuntu/ jammy-updates restricted multiverse universe main
deb http://gb.archive.ubuntu.com/ubuntu/ jammy-backports restricted multiverse universe main
deb http://security.ubuntu.com/ubuntu jammy-security restricted multiverse universe main
tomasz@Ubuntu:~$
```

Figure 9: Removing repository from repositories list

Repository with telegram has been removed sucessfully.

2 Additional find task

With use of find command following task has been done:

- search for files bigger than 1Gb in size across the whole FS,
- search for empty files and directories in the system temp directory,
- search for files and directories changed within the last hour in the user's home directory,
- search for files and directories accessed within the last hour in the user's home directory,
- search for all files with permissions for reading, writing and executing for the owner, group and others in the user's home directory. The list of such files is provided if found,

2.1 Search for files bigger than 1Gb in size across the whole FS

Used command:

```
find / -size +1G | xargs ls -ls
```

- `-size +1G`, search for files of size greater than 1Gb
- `xargs ls -ls`, found files are piped to input of `ls` command with option `-l` to list files with size

```
tomasz@Ubuntu:~$ sudo find / -size +1G | xargs ls -ls
[sudo] password for tomasz:
find: '/proc/9903/task/9903/fd/6': No such file or directory
find: '/proc/9903/task/9903/fdinfo/6': No such file or directory
find: '/proc/9903/fd/5': No such file or directory
find: '/proc/9903/fdinfo/5': No such file or directory
find: '/run/user/1000/doc': Permission denied
find: '/run/user/1000/gvfs': Permission denied
    0 -r----- 1 root root 140737471590400 gru 10 14:43 /proc/kcore
2191364 -rw----- 1 root root 2243952640 lls 27 11:40 /swapfile
tomasz@Ubuntu:~$
```

Figure 10: Search for files greater than 1Gb

2.2 Search for empty files and directories in the system tmp directory

Used command:

```
sudo find /tmp -empty | xargs sudo ls -ls
```

- -empty
- xargs ls -ls, found files are piped to input of ls command with option -l to list files with size

```
/tmp/.XIM-unix:
total 0
tomasz@Ubuntu:~$ sudo find /tmp -empty | xargs sudo ls -ls
/tmp/.font-unix:
total 0

/tmp/snap-private-tmp/snap.snapd-desktop-integration/tmp/.snap/snap/snapd-desktop-integration:
total 0

/tmp/snap-private-tmp/snap.snapd-desktop-integration/tmp/.snap/usr/lib:
total 0

/tmp/snap-private-tmp/snap.snapd-desktop-integration/tmp/.X11-unix:
total 0

/tmp/snap-private-tmp/snap.snap-store/tmp/.snap/snap/snap-store:
total 0

/tmp/snap-private-tmp/snap.snap-store/tmp/.snap/usr/lib:
total 0

/tmp/snap-private-tmp/snap.snap-store/tmp/.snap/var:
total 0

/tmp/snap-private-tmp/snap.snap-store/tmp/.X11-unix:
total 0

/tmp/systemd-private-4235542ecad04a46aed4a4894401a976-colord.service-q02oLF/tmp:
total 0

/tmp/systemd-private-4235542ecad04a46aed4a4894401a976-fwupd.service-la9V3t/tmp:
total 0

/tmp/systemd-private-4235542ecad04a46aed4a4894401a976-ModemManager.service-5jCtPx/tmp:
total 0

/tmp/systemd-private-4235542ecad04a46aed4a4894401a976-power-profiles-daemon.service-3u3Qo9/tmp:
total 0

/tmp/systemd-private-4235542ecad04a46aed4a4894401a976-switcheroo-control.service-Yl9oPV/tmp:
```

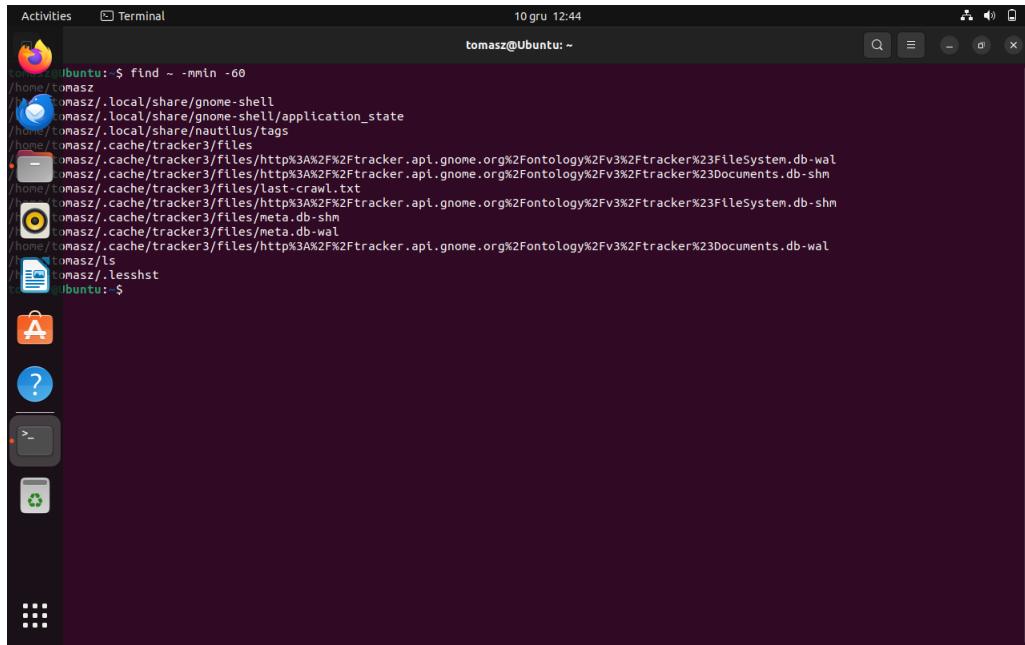
Figure 11: Search for empty files in /tmp directory

2.3 Search for files and directories changed within the last hour in the user's home directory

Used command:

```
sudo find ~ -mmin -60
```

- -mmin -60, search for files modified less than 60 minutes ago



```
tomasz@Ubuntu:~$ find ~ -mmin -60
/home/tomasz/.local/share/gnome-shell
/home/tomasz/.local/share/gnome-shell/application_state
/home/tomasz/.local/share/nautilus/tags
/home/tomasz/.cache/tracker3/files
  • /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontology%2Fv3%2Ftracker%23FileSystem.db-wal
  • /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontology%2Fv3%2Ftracker%23Documents.db-shm
  • /home/tomasz/.cache/tracker3/files/last-crawl.txt
  • /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontology%2Fv3%2Ftracker%23FileSystem.db-shm
  • /home/tomasz/.cache/tracker3/files/meta.db-wal
  • /home/tomasz/.cache/tracker3/files/meta.db-wal
/home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontology%2Fv3%2Ftracker%23Documents.db-wal
/home/tomasz/.lessht
/home/tomasz/ls
/home/tomasz/lessht
tomasz@Ubuntu:~$
```

Figure 12: Search for files modified less than hour ago

2.4 Search for files and directories accessed within the last hour in the user's home directory

Used command:

```
find ~ -type d,f -amin -60 | xargs ls -lsd
```

- -type d,f search for directories and regular files,
- -amin -60, search for files accessed less than 60 minutes ago

Output of find command are piped to xargs, and listed with size. Flag -d indicates that content of found directories won't be listed.

```
tomasz@Ubuntu:~$ find ~ -type d,f -amin -60 | xargs ls -ls
4 drwxr-x--- 16 tomasz tomasz 4096 gru 10 15:56 /home/tomasz
4 drwxr-xr-x 128 tomasz tomasz 4096 gru 10 14:45 /home/tomasz/.cache/mesa_shader_cache
4 drwxr-xr-x 2 tomasz tomasz 4096 gru 10 14:45 /home/tomasz/.cache/mesa_shader_cache/61
4 drwx----- 3 tomasz tomasz 4096 gru 10 15:56 /home/tomasz/.cache/tracker3/files
24 -rw-r--r-- 1 tomasz tomasz 20632 gru 10 14:44 /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontolog
y2Fv%32Ftracker%23Audio.db-wal
212 -rw-r--r-- 1 tomasz tomasz 585072 gru 10 15:12 /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontolog
y2Fv%32Ftracker%23Documents.db-wal
572 -rw-r--r-- 1 tomasz tomasz 585072 gru 10 15:12 /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontolog
y2Fv%32Ftracker%23Filesystem.db-wal
24 -rw-r--r-- 1 tomasz tomasz 20632 gru 10 14:44 /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontolog
y2Fv%32Ftracker%23Pictures.db-wal
24 -rw-r--r-- 1 tomasz tomasz 20632 gru 10 14:44 /home/tomasz/.cache/tracker3/files/http%3A%2F%2Ftracker.api.gnome.org%2Fontolog
y2Fv%32Ftracker%23Video.db-wal
52 -rw-r--r-- 1 tomasz tomasz 10 gru 10 15:56 /home/tomasz/.cache/tracker3/files/lastcrawl.txt
4 drwx----- 2 tomasz tomasz 4096 gru 10 15:12 /home/tomasz/.cache/tracker3/files/neta.db-wal
4 drwx----- 2 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.config/gtk-3.0
4 -rw-rw-r-- 1 tomasz tomasz 71 gru 10 15:12 /home/tomasz/example_file.txt
4 drwx----- 3 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.local/share/evolution/addressbook/system
4 drwx----- 2 tomasz tomasz 4096 gru 10 15:43 /home/tomasz/.local/share/gnome-shell
4 -rw-rw-r-- 1 tomasz tomasz 594 gru 10 15:43 /home/tomasz/.local/share/gnome-shell/application_state
4 drwx----- 2 tomasz tomasz 4096 gru 10 14:46 /home/tomasz/.local/share/gvfs-metadata
4 drwx----- 2 tomasz tomasz 4096 gru 10 14:43 /home/tomasz/.local/share/nano
4 drwxr-xr-x 2 tomasz tomasz 4096 gru 10 15:38 /home/tomasz/.local/share/nautilus/tags
4 drwx----- 5 tomasz tomasz 4096 lls 27 11:53 /home/tomasz/.snap
4 drwxrwxr-x 2 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.snap/snapd-desktop-integration/83/.config/ibus
4 drwxrwxr-x 8 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.snap/snap-store/959/.config
4 drwxrwxr-x 2 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.snap/snap-store/959/.config/autostart
12 drwxr-xr-x 2 tomasz tomasz 12288 gru 10 14:45 /home/tomasz/.snap/snap-store/959/.config/ibus
4 drwxr-xr-x 2 tomasz tomasz 4096 gru 10 14:44 /home/tomasz/.snap/snap-store/common/.cache/gnome-software/icons
8 -rw----- 1 tomasz tomasz 5644 gru 10 15:56 /home/tomasz/.viminfo
tomasz@Ubuntu:~$
```

Figure 13: Search for files accessed less than hour ago

2.5 Search for all files with permissions for reading, writing and executing for the owner, group and others in the user's home directory. The list of such files is provided if found

Following steps have been taken:

- in user's home directory created file example_777_file.txt
- with chmod permission has been changed to 777
- used find command to found files with permission mask set to 777

```
find ~ -type d,f -perm 0777 | xargs ls -ls
```

Used -perm 0777 option specified access permissions condition.

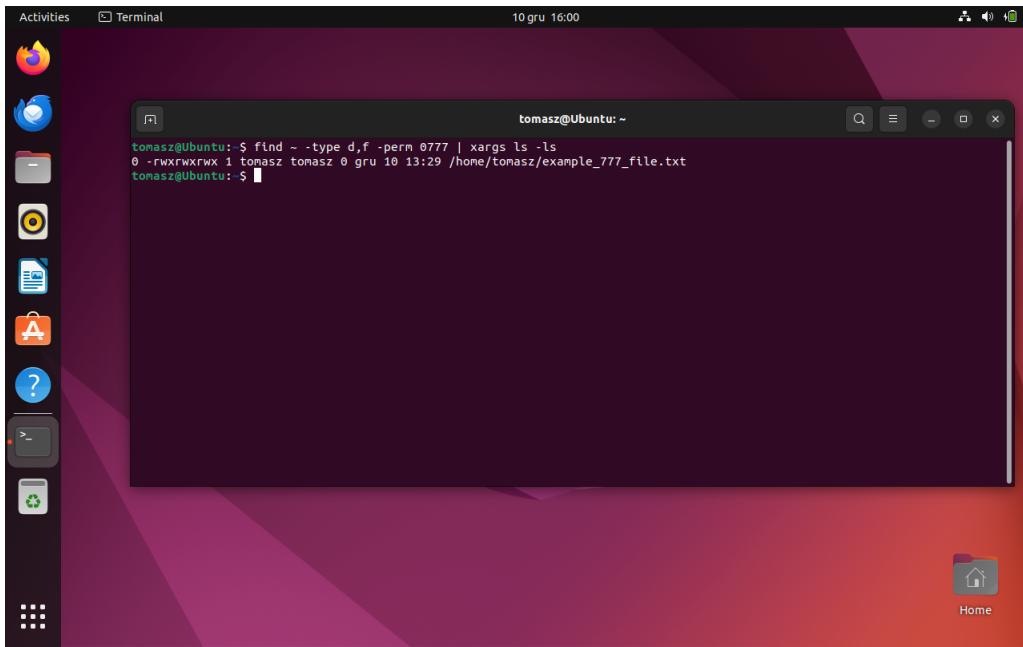


Figure 14: Search for files with permissions for reading, writing and executing for the owner, group and others

3 Vimtutor

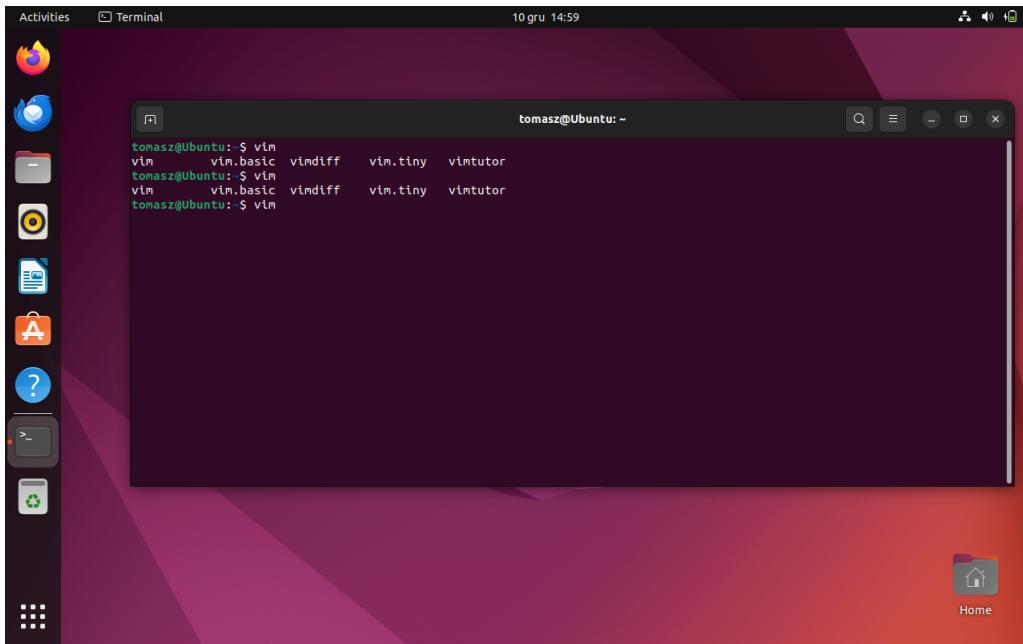


Figure 15: Check whether vimtutor is already installed

After checking, whether vimtutor has been installed, excercises have been done. Example:

- moving cursor using different possibilities,
- saving files,
- deleting word with different options

- replacing letters,
- inserting letters

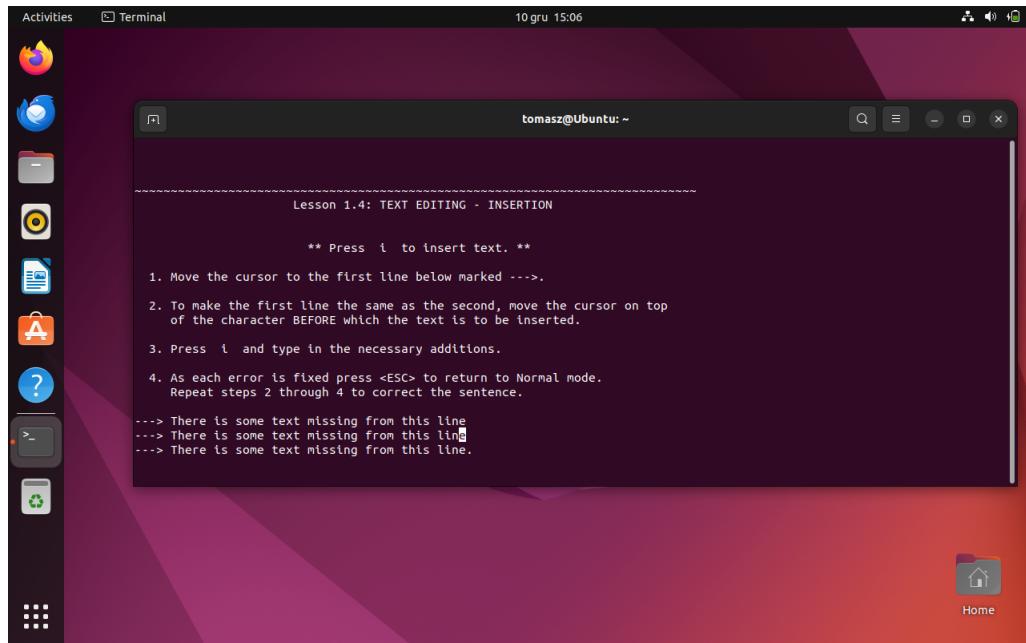


Figure 16: Insert letters in vimtutor, task

4 Extending user's BASH profile

4.1 Define and add alias “psw” which will display all processes for all users with wide output to the user’s bash profile

Following steps has been taken:

- with alias psw='ps -A w -O user' created new alias,
- to make changes permanent, in .bashrc added alias definition. See figure 18,
- system has been rebooted, to test whether psw alias would still exist

Activities Terminal 10 gru 14:41 tomasz@Ubuntu: ~

```
tomasz@Ubuntu: $ alias psw='ps -A w -o user'
tomasz@Ubuntu: $ nano .bashrc
tomasz@Ubuntu: $ psw
PID USER      S TTY          TIME COMMAND
 1 root      S ?        00:00:03 /lib/systemd/systemd --system --deserialize 39 splash
 2 root      S ?        00:00:00 [kthreadd]
 3 root      I ?        00:00:00 [rcu_gp]
 4 root      I ?        00:00:00 [rcu_par_gp]
 5 root      I ?        00:00:00 [slub_flushhwq]
 6 root      I ?        00:00:00 [netns]
 8 root      I ?        00:00:00 [kworker:0:0:kblockd]
10 root      I ?        00:00:00 [mm_percpu_wq]
11 root      I ?        00:00:00 [rcu_tasks_kthread]
12 root      I ?        00:00:00 [rcu_tasks_rude_kthread]
13 root      I ?        00:00:00 [rcu_tasks_trace_kthread]
14 root      S ?        00:00:01 [ksoftirqd/0]
15 root      I ?        00:00:04 [rcu_preempt]
16 root      S ?        00:00:00 [migration/0]
17 root      S ?        00:00:00 [idle_inject/0]
19 root      S ?        00:00:00 [cpuhp/0]
20 root      S ?        00:00:00 [kdevtmpfs]
21 root      I ?        00:00:00 [inet_fq_wwq]
22 root      S ?        00:00:00 [kauditctl]
23 root      S ?        00:00:00 [khungtaskd]
24 root      S ?        00:00:00 [oom_reaper]
27 root      I ?        00:00:00 [writeback]
28 root      S ?        00:00:02 [kcompactd0]
29 root      S ?        00:00:00 [ksmd]
30 root      S ?        00:00:00 [khugepaged]
31 root      I ?        00:00:00 [kintegritytd]
32 root      I ?        00:00:00 [kblockd]
33 root      I ?        00:00:00 [blkcg_punt_bio]
34 root      I ?        00:00:00 [tpm_dev_wq]
35 root      I ?        00:00:00 [ata_sff]
36 root      I ?        00:00:00 [md]
37 root      I ?        00:00:00 [edac-poller]
38 root      I ?        00:00:00 [devfreq_wq]
39 root      S ?        00:00:00 [watchdogd]
41 root      S ?        00:00:02 [kswapd0]
42 root      S ?        00:00:00 [cryptofs-kthread]
```

Figure 17: Insert letters in vimtutor, task

```
Activities Terminal 10 gru 14:43
tomasz@Ubuntu: ~
GNU nano 6.2
.bashrc *
test -r ~/.dircolors && eval "$(dircolors -b ~/.dircolors)" || eval "$(dircolors -b)"
alias ls='ls --color=auto'
alias dir='dir --color=auto'
alias vdir='vdir --color=auto'

alias grep='grep --color=auto'
alias fgrep='fgrep --color=auto'
alias egrep='egrep --color=auto'
fl

# colored GCC warnings and errors
#export GCC_COLORS='error=01;31:warning=01;35:note=01;36:caret=01;32:locus=01:quote=01'

# some more ls aliases
alias ll='ls -alF'
alias la='ls -A'
alias l='ls -CF'

# alias created by TOMASZ
# in order to see that all user's processes are shown
# an -o user option has been added
alias psw='ps -A w -0 user'

# Add an "alert" alias for long running commands. Use like so:
# sleep 10; alert
alias alert="notify-send --urgency=low -t "$(( $? = 0 ) && echo terminal || echo error)" "$(history|tail -n1|sed -e '\\'$'\s*\^$'\b[0-9]\b')"

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases, instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
. ~/.bash_aliases
fl

[ Cancelled ]
```

Figure 18: Permanent psw alias definition

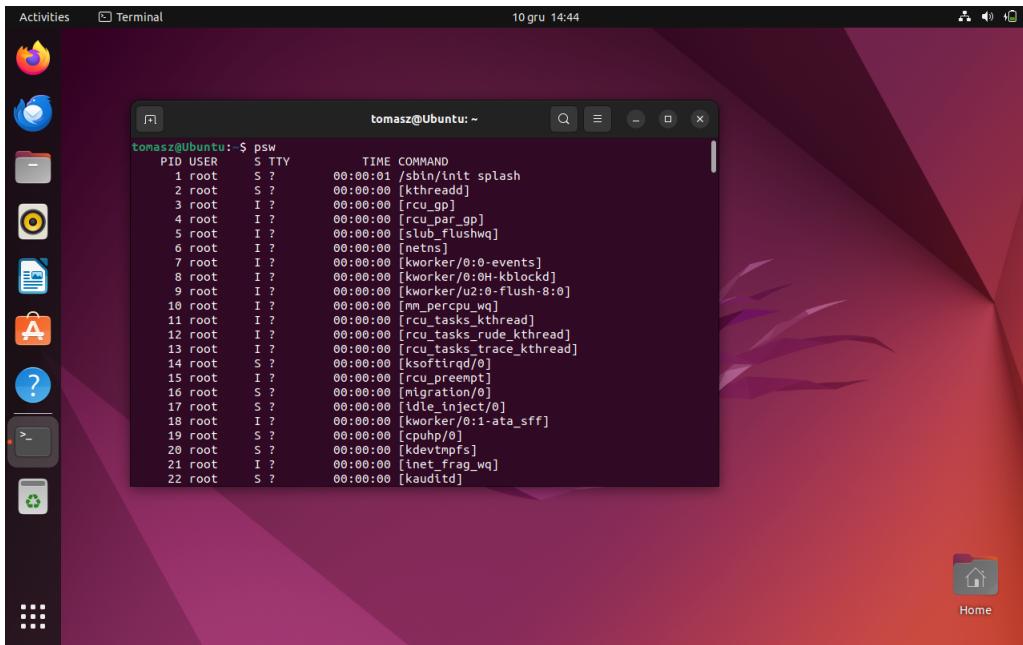


Figure 19: Permanent psw alias definition

After reboot psw alias still exist, see figure 19.

4.2 Add shell function “arps” displaying ARP table from the /proc/net/arp node

First in .bashrc file in user’s home directory function definition of arps has been added. See figure 20.

```

GNU nano 6.2
# alias created by TOMASZ
# in order to see that all user's processses are shown
# an -o user option has been added
alias psw='ps -A w -o user'

# Add an "alert" alias for long running commands. Use like so:
# sleep 10; alert
alias alert="notify-send --urgency=low -i "$([ $? = 0 ] && echo terminal || echo error)" "$(history|tail -n1|sed -e 's/\^\s*[0-9]\>/./;s/\^M//')"

# Function for listing ARP table
arps () {
    cat /proc/net/arp
}

# Alias definitions.
# You may want to put all your additions into a separate file like
# ~/.bash_aliases. Instead of adding them here directly.
# See /usr/share/doc/bash-doc/examples in the bash-doc package.

if [ -f ~/.bash_aliases ]; then
    . ~/.bash_aliases
fi

# enable programmable completion features (you don't need to enable
# this, if it's already enabled in /etc/bash.bashrc and /etc/profile
# # sources /etc/bash.bashrc).
if ! shopt -q postx; then
    if [ -f /usr/share/bash-completion/bash_completion ]; then
        . /usr/share/bash-completion/bash_completion
    elif [ -f /etc/bash_completion ]; then
        . /etc/bash_completion
    fi
fi

```

Figure 20: Arps function definition

To enable using of arps function in shell, operating system has been rebooted. Then arps has been typed in CLi. Output shown on figure 21.

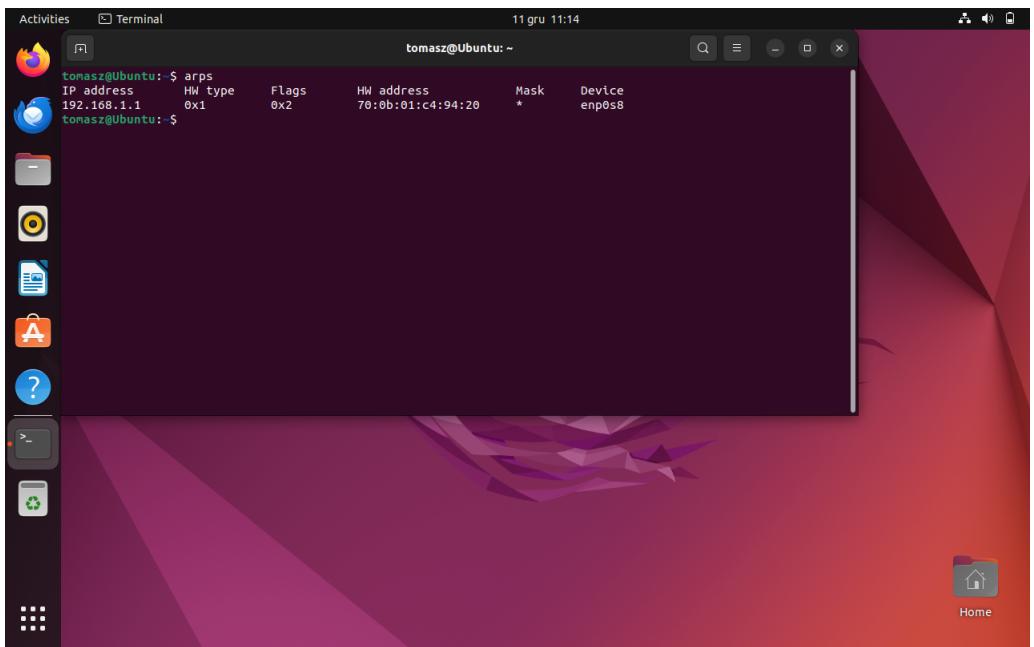


Figure 21: Arps function usage

After typing in arps, the content of arp table from /proc/net/arp node has been displayed.