

# Sisteme de operare

## Tema 1

### Exercițiul 1

Începeți prin a vă instala Fedora Linux pe mașina locală. Parcurgeți tot laboratorul și verificați introducând toate comenzile prezentate. Pe acest sistem funcțional, găsiți care sunt dispozitivele de I/O de tip caracter din `/dev` care încep cu `"t"`.



- ❖ Virtualbox și Fedora Linux sunt instalate pe mașina locală.
- ❖ Mai jos am pus cum am introdus toate comenzile prezentate în fișa de laborator:

```
[user@desktop-5p6viv2 ~]# sudo poweroff  
[sudo] password for user: _
```

Am închis mașinăria virtuală cu comanda `sudo poweroff`.

```
[user@desktop-5p6viv2 ~]# sudo su -  
[root@desktop-5p6viv2 ~]# exit  
logout  
[user@desktop-5p6viv2 ~]#
```

Am intrat să lucrez ca root cu comanda `sudo su -` și după am ieșit din acest mod cu comanda `exit`.

```
[user@desktop-5p6viv2 ~]# sudo dnf update
```

Am dat update la sistemul de operare cu comanda `sudo dnf update`.

```
[user@desktop-5p6viv2 ~]# sudo reboot
```

După actualizare i-am dat reboot sistemului prin comanda `sudo reboot`.

```
[user@desktop-5p6viv2 ~]# sudo rpm -q kernel-core  
[sudo] password for user:  
kernel-core-5.17.5-300.fc36.x86_64  
kernel-core-6.1.13-100.fc36.x86_64  
[user@desktop-5p6viv2 ~]# sudo dnf remove kernel-core-5.17.5-300.fc36.x86_64  
Removing: kernel-core-5.17.5-300.fc36.x86_64
```

După aceea am folosit comanda `sudo rpm -q kernel-core` pentru a verifica câte kernele avem instalate și după ce am văzut că am mai multe l-am șters pe cel vechi prin comanda `sudo dnf remove` numele kernel-ului.

```
[user@desktop-5p6vov2 ~]$ sudo ls -la
total 16
drwx----- 2 user user 83 Feb 26 18:28 .
drwxr-xr-x 3 root root 18 Aug 9 2022 ..
-rw----- 1 user user 161 Feb 28 12:52 .bash_history
-rw-r--r-- 1 user user 18 Jan 20 2022 .bash_logout
-rw-r--r-- 1 user user 141 Jan 20 2022 .bash_profile
-rw-r--r-- 1 user user 492 Jan 20 2022 .bashrc
```

Am folosit comanda `ls -la` pentru a afișa toate fișierele din folderul curent cu detalii despre acestea.

```
[user@desktop-5p6vov2 ~]$ passwd
Changing password for user user.
Current password:
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
```

Am schimbat parola folosind comanda `passwd`.

```
[user@desktop-5p6vov2 ~]$ pwd
/home/user
```

Am folosit comanda `pwd` pentru a afișa directorul curent.

```
LS(1)                                User Commands                                LS(1)
NAME
  ls - list directory contents
SYNOPSIS
  ls [OPTION]... [FILE]...
DESCRIPTION
  List information about the FILES (the current directory by default). Sort entries alpha-
  betically if none of -cfwvSUX nor --sort is specified.
  Mandatory arguments to long options are mandatory for short options too.
  -a, --all
    do not ignore entries starting with .
  -A, --almost-all
    do not list implied . and ..
  --author
    with -l, print the author of each file
  -b, --escape
    print C-style escapes for nongraphic characters
  --block-size=SIZE
    with -l, scale sizes by SIZE when printing them; e.g., '--block-size=M'; see SIZE
    format below
  -B, --ignore-backups
    do not list implied entries ending with ~
  -C
    with -lt: sort by, and show, ctime (time of last modification of file status infor-
    mation); with -l: show ctime and sort by name; otherwise: sort by ctime, newest
    first
Manual page ls(1) line 1 (press h for help or q to quit)
```

Am folosit comanda `man ls` pentru a îmi arăta pagina de manual despre comanda `ls`.

```

Next: dir invocation, Up: Directory listing
10.1 'ls': List directory contents
=====

The 'ls' program lists information about files (of any type, including
directories). Options and file arguments can be intermixed arbitrarily,
as usual. Later options override earlier options that are incompatible.

For non-option command-line arguments that are directories, by
default 'ls' lists the contents of directories, not recursively, and
omitting files with names beginning with '.'. For other non-option
arguments, by default 'ls' lists just the file name. If no non-option
argument is specified, 'ls' operates on the current directory, acting as
if it had been invoked with a single argument of '.'.

By default, the output is sorted alphabetically, according to the
locale settings in effect.(1) If standard output is a terminal, the
output is in columns (sorted vertically) and control characters are
output as question marks; otherwise, the output is listed one per line
and control characters are output as-is.

Because 'ls' is such a fundamental program, it has accumulated many
options over the years. They are described in the subsections below;
within each section, options are listed alphabetically (ignoring case).
The division of options into the subsections is not absolute, since some
options affect more than one aspect of 'ls''s operation.

Exit status:

 0 success
 1 minor problems (e.g., failure to access a file or directory not
   specified as a command-line argument. This happens when listing a
   directory in which entries are actively being removed or renamed.)
 2 serious trouble (e.g., memory exhausted, invalid option, failure
   to read (convert) file invocation, etc.)

Info (convert) file invocation, etc.
=====
Welcome to Info version 6.8. Type h for help, h for tutorial.

```

Am folosit comanda *info ls* pentru a îmi arăta pagina de informații pentru comanda *ls*.

```

user@desktop-5p6v1v2 ~]$ whatis ls
ls (1)
      - list directory contents

```

Am folosit comanda *whatis ls* pentru a căuta textul *ls* în paginile manualului și listează potrivirile.

```

HIER(??)                                Linux Programmer's Manual                                HIER(??)
NAME
  hier - description of the filesystem hierarchy
DESCRIPTION
  A typical Linux system has, among others, the following directories:

  ✓ This is the root directory. This is where the whole tree starts.

  /bin This directory contains executable programs which are needed in single user mode
        and to bring the system up or repair it.

  /boot Contains static files for the boot loader. This directory holds only the files
        which are needed during the boot process. The map installer and configuration
        files should go to /sbin and /etc. The operating system kernel (initrd for exam-
        ple) must be located in either / or /boot.

  /dev Special or device files, which refer to physical devices. See mknod(1).

  /etc Contains configuration files which are local to the machine. Some larger software
        packages, like X11, can have their own subdirectories below etc. Site-wide con-
        figuration files may be placed here or in /usr/etc. Nevertheless, programs should
        always look for these files in /etc and you may have links for these files to
        /usr/etc.

  /etc/opt Host-specific configuration files for add-on applications installed in /opt.

  /etc/sgml This directory contains the configuration files for SGML (optional).

  /etc/skel When a new user account is created, files from this directory are usually copied
        into the user's home directory.

Manual page hier(??) line 1 (press h for help or q to quit)

```

Am folosit comanda *man hier* pentru a-mi arăta organizarea ierarhică a directoarelor care pornesc din directorul *root* ; i ce conține fiecare folder.

```

total 76
drwxr-xr-x. 2 root root    6 Feb 2 14:25 binfmt.d
drwxr-xr-x. 4 root root   76 Aug 9 2022 debag
drwxr-xr-x. 4 root root 4096 Feb 20 12:49 dracut
drwxr-xr-x. 2 root root   33 Feb 20 12:49 environment.d
-rw-r--r--. 1 root root   31 Dec 2 02:26 fedora-release
drwxr-xr-x. 8 root root   97 Jan 5 19:00 firmadi
drwxr-xr-x. 16 root root 24576 Feb 20 12:58 firmware
drwxr-xr-x. 2 root root    6 Aug 9 2022 games
drwxr-xr-x. 3 root root   24 Jan 4 19:35 grub
-rw-r--r--. 1 root root   20 Dec 2 02:26 issue
-rw-r--r--. 1 root root   27 Dec 2 02:26 issue.net
drwxr-xr-x. 6 root root   76 Jan 20 2022 kbd
drwxr-xr-x. 2 root root   79 Feb 20 12:58 kdump
drwxr-xr-x. 3 root root   43 Feb 20 12:49 kernel
drwxr-xr-x. 30 root root 4096 Jan 11 12:16 locale
drwxr-xr-x. 2 root root 107 Feb 20 12:58 modprobe.d
drwxr-xr-x. 3 root root   36 Feb 20 12:05 modules
drwxr-xr-x. 2 root root   20 Feb 20 12:58 modules-load.d
-rw-r--r--. 1 root root    6 Jul 20 2022 mold
drwxr-xr-x. 2 root root   6 Jul 20 2022 mold.d
drwxr-xr-x. 6 root root   72 Oct 12 13:18 NetworkManager
-rw-r--r--. 1 root root 761 Dec 2 02:26 os-release
drwxr-xr-x. 2 root root   26 Feb 20 12:49 pam.d
drwxr-xr-x. 2 root root   58 Feb 20 10:22 polkit-1
drwxr-xr-x. 3 root root   27 Dec 0 10:15 python3.10
drwxr-xr-x. 2 root root   68 Feb 20 10:23 readlink
drwxr-xr-x. 6 root root 4096 Feb 20 12:58 rpm
drwxr-xr-x. 3 root root   31 Feb 20 10:22 sddmlog
drwxr-xr-x. 2 root root 159 Feb 20 12:49 sssd1.d
drwxr-xr-x. 3 root root   17 Aug 9 2022 systemd
drwxr-xr-x. 17 root root 4096 Feb 20 12:49 systemd
-rw-r--r--. 1 root root   31 Dec 2 02:26 system-release-cpe
drwxr-xr-x. 2 root root 4096 Feb 20 12:58 sysusers.d
drwxr-xr-x. 2 root root 4096 Feb 20 12:58 tagfiles.d
drwxr-xr-x. 4 root root 4096 Feb 20 12:58 udev

```

Am folosit comanda *ls -l /usr/lib* pentru a-mi arăta ce fișiere se află în directorul */usr/lib*.

```

[user@desktop-5p6viv2 ~]$ ls -l /dev/* | grep ^b
brw-rw----. 1 root disk 253, 0 Feb 28 13:13 /dev/dm-0
brw-rw----. 1 root disk 8, 0 Feb 28 13:13 /dev/sda
brw-rw----. 1 root disk 8, 1 Feb 28 13:13 /dev/sda1
brw-rw----. 1 root disk 8, 2 Feb 28 13:13 /dev/sda2
brw-rw----+ 1 root cdrom 11, 0 Feb 28 13:13 /dev/sr0
brw-rw----. 1 root disk 252, 0 Feb 28 13:13 /dev/zram0

```

Am folosit comanda `ls -l /dev/* | grep ^b` pentru a afla fişierele de tip block din folder-ul /dev.

**anchoring**  
The caret ^ and the dollar sign \$ are meta-characters that respectively match the empty string at the beginning and end of a line.

Am folosit comanda `man grep`, după am apăsas / şi am scris anchoring pentru a găsi cum funcţionează “^” şi “\$”. Ambele sunt meta-caractere, dar “^” reprezintă începutul unei linii şi “\$” reprezintă sfârşitul unei linii.

```

[user@desktop-5p6viv2 ~]$ touch file1.txt
[user@desktop-5p6viv2 ~]$ ls -al file1.txt
-rw-r--r--. 1 user user 0 Feb 28 14:24 file1.txt
[user@desktop-5p6viv2 ~]$ chmod 400 file1.txt
[user@desktop-5p6viv2 ~]$ ls -al file1.txt
-r-----. 1 user user 0 Feb 28 14:24 file1.txt

```

Am folosit comanda `touch file1.txt` pentru a creat fişierul file1.txt şi după am folosit comanda `chmod 400 file1.txt` pentru a îi schimba drepturile.

```

[user@desktop-5p6viv2 ~]$ mkdir dir1
[user@desktop-5p6viv2 ~]$ touch dir1/file2.txt
[user@desktop-5p6viv2 ~]$ ls -al dir1/
total 0
drwxr-xr-x. 2 user user 23 Feb 28 14:30 .
drwx-----. 3 user user 128 Feb 28 14:30 ..
-rw-r--r--. 1 user user 0 Feb 28 14:30 file2.txt
[user@desktop-5p6viv2 ~]$ chmod 100 dir1
[user@desktop-5p6viv2 ~]$ ls -al dir1/
ls: cannot open directory 'dir1/': Permission denied
[user@desktop-5p6viv2 ~]$ cat dir1/file2.txt
[user@desktop-5p6viv2 ~]$ ls -ald dir1/
d-x-----. 2 user user 23 Feb 28 14:30 dir1/

```

Am creat un directorul dir1 cu comanda `mkdir dir1` şi după aceea am creat şi un fişier. După am folosit comanda `chmod 100 dir1` pentru a îi schimba drepturile. După aceea putem observa că nu avem permisiune asupra directorului şi nu putem vedea conţinutul, dar putem folosi fişierele din acesta dacă ştim de existenţa lor.

```

[user@desktop-5p6viv2 ~]$ chmod 000 dir1/
[user@desktop-5p6viv2 ~]$ ls -ald dir1/
d-----. 2 user user 23 Feb 28 14:30 dir1/
[user@desktop-5p6viv2 ~]$ ls -al dir1/
ls: cannot open directory 'dir1/': Permission denied
[user@desktop-5p6viv2 ~]$ cat dir1/file2.txt
cat: dir1/file2.txt: Permission denied

```

Am reuşit să listăm dir1 prin comanda `ls -ald dir1/`, dar tot nu avem acces la director şi nici la fişierele din acesta.

```

[user@desktop-5p6viov2 ~]$ chmod 400 dir1/
[user@desktop-5p6viov2 ~]$ ls -ld dir1/
dr----- 2 user user 23 Feb 28 14:30 dir1/
[user@desktop-5p6viov2 ~]$ ls dir1/
ls: cannot access 'dir1/file2.txt': Permission denied
file2.txt
[user@desktop-5p6viov2 ~]$ cat dir1/file2.txt
cat: dir1/file2.txt: Permission denied

```

```

[user@desktop-5p6viov2 ~]$ ls -l dir1/
ls: cannot access 'dir1/file2.txt': Permission denied
total 0
-rw-r--r-- 1 user user 0 Feb 28 14:30 file2.txt

```

Am dat directorului dir1 dreptul de citire prin comanda *chmod 400 dir1/*, putem vedea conținutul acestuia, dar nu putem accesa conținutul acestuia și nici să vedem ce drepturi are.

```

[user@desktop-5p6viov2 ~]$ chmod 500 dir1/
[user@desktop-5p6viov2 ~]$ ls -l dir1/
total 0
-rw-r--r-- 1 user user 0 Feb 28 14:30 file2.txt
[user@desktop-5p6viov2 ~]$ touch dir1/file3.txt
touch: cannot touch 'dir1/file3.txt': Permission denied

```

Am dat drepturi directorului dir1 prin comanda *chmod 500 dir1/*, dar nu cel de scriere, astfel că nu putem scrie în directorul dir1.

```

[user@desktop-5p6viov2 ~]$ chmod +w dir1/
[user@desktop-5p6viov2 ~]$ ls -l dir1/
total 0
-rw-r--r-- 1 user user 0 Feb 28 14:30 file2.txt
[user@desktop-5p6viov2 ~]$ rm dir1/file2.txt
[user@desktop-5p6viov2 ~]$ ls -l dir1/
total 0

```

Am dat dreptul de citire directorului dir1 cu comanda *chmod +w dir1/* și după am șters fișierul file2.txt prin comanda *rm dir1/file2.txt*.

```

[user@desktop-5p6viov2 ~]$ rm dir1/
rm: cannot remove 'dir1/': Is a directory
[user@desktop-5p6viov2 ~]$ rm -r dir1/

```

Ștergem directorul dir1 cu comanda *rm -r dir1/*.

```

[user@desktop-5p6viov2 ~]$ echo $PATH
/home/user/.local/bin:/home/user/bin:/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin
[user@desktop-5p6viov2 ~]$ export PATH=$PATH:/home/user/comenzi
[user@desktop-5p6viov2 ~]$ echo $PATH
/home/user/.local/bin:/home/user/bin:/usr/local/bin:/usr/bin:/usr/local/sbin:/usr/sbin:/home/user/comenzi

```

Cu comanda *echo \$PATH* am văzut ce directoare avem în sesiunea curentă și cu comanda *export PATH=\$PATH:/home/user/comenzi* am putut include calea comenzi printre celelalte căi.

```

[user@desktop-5p6viov2 ~]$ sudo dnf -y install nano
[sudo] password for user:
Last metadata expiration check: 2:43:39 ago on Tue 28 Feb 2023 01:36:35 PM EET.
Dependencies resolved.
=====
Package                Architecture      Version           Repository        Size
-----
Installing:
 nano                 x86_64            6.0-2.fc36        fedora            694 k
Transaction Summary
-----
Install 1 Package

Total download size: 694 k
Installed size: 2.0 M
Downloading Packages:
 nano-6.0-2.fc36.x86_64.rpm                                860 kB/s | 694 kB | 00:00
-----
Total:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing                :
  Installing               : nano-6.0-2.fc36.x86_64
  Running scriptlet        : nano-6.0-2.fc36.x86_64
  Verifying                : nano-6.0-2.fc36.x86_64
Installed:
 nano-6.0-2.fc36.x86_64

```

```

[user@desktop-5p6viov2 ~]$ nano ~/.bashrc

```

Am instalat un editor de text minimal prin comanda `sudo dnf -y install nano` și după am folosit comanda `nano ~/.bashrc` ca să am accesul să modific fișierul `.bashrc` ca modificările anterioare să rămână permanente.

```

[user@desktop-5p6viov2 ~]$ cat > file1.txt
salut amice
^D

```

```

[user@desktop-5p6viov2 ~]$ cat file1.txt
salut amice

```

Cu comanda `cat > file1.txt` am creat fișierul cu textul `salut amice` și după l-am afișat prin comanda `cat file1.txt`.

```

[user@desktop-5p6viov2 ~]$ wc < file1.txt
3 3 16

```

Am folosit comanda `wc < file1.txt` pentru a arătat câte linii, câte cuvinte și câte caractere are fișierul.

```

[user@desktop-5p6viov2 ~]$ od -t x1a file1.txt
0000000  73  61  6c  75  74  20  61  6d  69  63  65  0a  0a  5e  44  0a
0000020  s a l u t   s p a m i c e  nl nl ^  D  nl
0000040

```

Prin comanda `od -t x1a file1.txt` pentru a vedea reprezentarea fișierului în hexazecimal.

```

find: '/var/lib/containers': Permission denied
find: '/var/lib/containers2': Permission denied
find: '/var/lib/containers3': Permission denied
find: '/var/lib/containers4': Permission denied
find: '/var/lib/containers5': Permission denied
find: '/var/lib/containers6': Permission denied
find: '/var/lib/containers7': Permission denied
find: '/var/lib/containers8': Permission denied
find: '/var/lib/containers9': Permission denied
find: '/var/lib/containers10': Permission denied
find: '/var/lib/containers11': Permission denied
find: '/var/lib/containers12': Permission denied
find: '/var/lib/containers13': Permission denied
find: '/var/lib/containers14': Permission denied
find: '/var/lib/containers15': Permission denied
find: '/var/lib/containers16': Permission denied
find: '/var/lib/containers17': Permission denied
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find: '/var/lib/containers40': Permission denied
find: '/var/lib/containers41': Permission denied
find: '/var/lib/containers42': Permission denied
find: '/var/lib/containers43': Permission denied
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find: '/var/lib/containers67': Permission denied
find: '/var/lib/containers68': Permission denied
find: '/var/lib/containers69': Permission denied
find: '/var/lib/containers70': Permission denied
find: '/var/lib/containers71': Permission denied
find: '/var/lib/containers72': Permission denied
find: '/var/lib/containers73': Permission denied
find: '/var/lib/containers74': Permission denied
find: '/var/lib/containers75': Permission denied
find: '/var/lib/containers76': Permission denied
find: '/var/lib/containers77': Permission denied
find: '/var/lib/containers78': Permission denied
find: '/var/lib/containers79': Permission denied
find: '/var/lib/containers80': Permission denied
find: '/var/lib/containers81': Permission denied
find: '/var/lib/containers82': Permission denied
find: '/var/lib/containers83': Permission denied
find: '/var/lib/containers84': Permission denied
find: '/var/lib/containers85': Permission denied
find: '/var/lib/containers86': Permission denied
find: '/var/lib/containers87': Permission denied
find: '/var/lib/containers88': Permission denied
find: '/var/lib/containers89': Permission denied
find: '/var/lib/containers90': Permission denied
find: '/var/lib/containers91': Permission denied
find: '/var/lib/containers92': Permission denied
find: '/var/lib/containers93': Permission denied
find: '/var/lib/containers94': Permission denied
find: '/var/lib/containers95': Permission denied
find: '/var/lib/containers96': Permission denied
find: '/var/lib/containers97': Permission denied
find: '/var/lib/containers98': Permission denied
find: '/var/lib/containers99': Permission denied
find: '/var/lib/containers100': Permission denied

```

Am folosit comanda *find / -name nano > results* pentru a căuta unde este comanda nano și după am afișat rezultatele căutării cu comanda *cat results*.

```
[user@desktop-5p6viov2 ~]# which nano
/usr/bin/nano
```

Am folosit comanda *which nano* pentru a găsi mai ușor unde este instalată comanda nano.

```
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
adm:x:3:4:adm:/var/adm:/sbin/nologin
```

Cu comanda *cat /etc/passwd* am aflat care sunt utilizatorii din sistem.

```
[user@desktop-5p6viov2 ~]# cat /etc/passwd | cut -d : -f 1,7
root:/bin/bash
bin:/sbin/nologin
daemon:/sbin/nologin
adm:/sbin/nologin
lp:/sbin/nologin
sync:/bin/sync
shutdown:/sbin/shutdown
halt:/sbin/halt
mail:/sbin/nologin
operator:/sbin/nologin
games:/sbin/nologin
ftp:/sbin/nologin
nobody:/sbin/nologin
dbus:/sbin/nologin
tss:/sbin/nologin
systemd-network:/usr/sbin/nologin
systemd-con:/usr/sbin/nologin
systemd-resolve:/usr/sbin/nologin
polkitd:/sbin/nologin
rpc:/sbin/nologin
abrt:/sbin/nologin
setroubleshoot:/sbin/nologin
cockpit-ws:/sbin/nologin
cockpit-ws-instance:/sbin/nologin
pcuser:/sbin/nologin
sshd:/sbin/nologin
chrony:/sbin/nologin
dnsmasq:/sbin/nologin
tcpdump:/sbin/nologin
systemd-coredump:/usr/sbin/nologin
systemd-timesync:/usr/sbin/nologin
user:/bin/bash
```

Prin comanda *cat /etc/passwd | cut -d : -f 1,7* am arătat utilizatorii din sistem filtrați doar prin numele de utilizator și ce shell folosește.

❖ Dispozitivele de I/O de tip caracter din */dev/* care încep cu *"t"* sunt:

```
[user@desktop-5p6viov2 ~]# ls -l /dev/* | grep ^c | grep ^t > results
[user@desktop-5p6viov2 ~]# cat results
```

Am folosit comanda *ls -l /dev/\** pentru a lista fișierele din directorul */dev*. Pe urmă am pus comanda *grep ^c* pentru a căuta fișierele special asociate dispozitivelor de I/O de tip caracter. După am pus comanda *grep ^t* ca să caute fișierele care încep cu *t*. Am folosit *|* (pipe) pentru a le lega între ele comenzile, astfel căutat ceea ce avem nevoie. Pe urmă am folosit și comanda *> results* pentru a salva ieșirea comenzii anterioare și după am afișat cu comanda *cat results* ce conține fișierul.





```
[user@desktop-5p6viov2 ~]# ls -ald director/
d--x-----. 2 user user 26 Mar  4 16:21 director/
```

Cu comanda `cat director/fisier1.txt` am făcut ca să putem afișa conținutul fișierului și cu comanda `ls -ald director/` am demonstrat că putem folosi fișierele din el dacă știm că sunt acolo, dar nu putem vedea conținutul directorului.

#### Exercițiul 4

Cum arată în hexa și ASCII imaginea binară a comenzii `nano`? Ce string identificăm la offset-ul 1205360?

- ❖ Am folosit comanda `od -t x1a -N 16 $(which nano)` pentru a afișa imaginea binară a comenzii `nano` în ASCII și hexa. Am pus -N 16 pentru a afișa pe 16 octeți.

```
[user@desktop-5p6viov2 ~]# od -t x1a -N 16 $(which nano)
00000000  7f 45 4c 46 02 01 01 00 00 00 00 00 00 00 00
          del E L F stx soh soh nul nul nul nul nul nul nul nul
00000020
```

- ❖ Am folosit comanda `hexdump -C -s 1205360 -n 16 $(which nano)` pentru a identifica la offset-ul 1205360.

```
[user@desktop-5p6viov2 ~]# hexdump -C -s 1205360 -n 16 $(which nano)
000469d8
```

#### Exercițiul 5

Găsiți toate fișierele din folder-ul `/etc` care conțin numere în numele lor de fișier.

```
[user@desktop-5p6viov2 ~]# ls /etc | grep '[0-9]'
```

```
dbus-1
grub2.cfg
iproute2
krb5.conf
krb5.conf.d
mke2fs.conf
opensc-x86_64.conf
pkcs11
polkit-1
sas12
tpm2-tss
udisks2
x11
```

Am folosit comanda `ls /etc | grep '[0-9]'` pentru a lista fișierele din folder-ul `/etc` care au în nume numere.