Linux Fundamentals - Final Project

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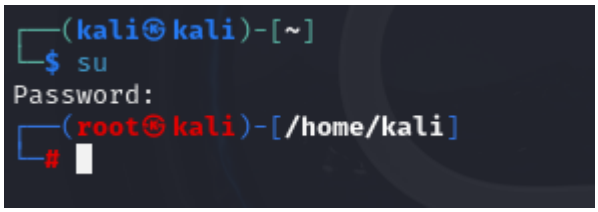
Part 1: Basic comand:

1. Log in to the SU user, navigate to the home/Desktop folder, and perform the following:

A. Create three new directories and three new files using a single command.

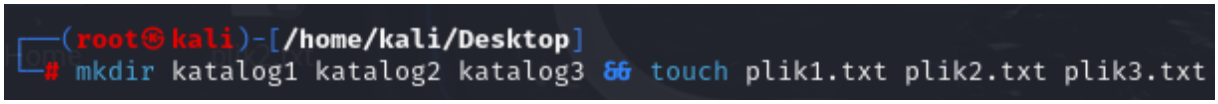
1. Aby zalogować się na SU użyłem polecenia SU w cmd.



Aby przejść do Desktop użyłem polecenia cd Desktop:

A. Create three new directories and three new files using a single command.

Aby utworzyć trzy katalogi oraz trzy pliki za pomocą jednego polecenia w CMD użyłem następującej składni:



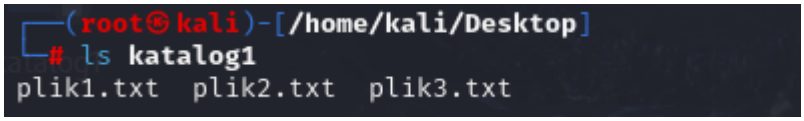
B. Move the files to one of the directories.

Aby przenieść pliki do jednego z utworzonych wcześniej katalogów użyłem polecenia:

mv plik1.txt plik2.txt plik3.txt katalog1/

a następnie aby sprawdzić czy zadanie wykonano poprawnie użyłem

ls katalog1



C. Navigate to the directory which contains the files and move the files to another directory.

Aby przenieść pliki z danego katalogu do innego użyłem polecenia

mv

```
┌──(root㉿kali)-[/home/kali/Desktop]
└─# cd katalog1

┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# mv plik1.txt katalog2

┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# mv plik2.txt katalog2

┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# mv plik3.txt katalog2
```

Sprawdzenie czy pliki znajdują się w folderze:

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog2]
└─# dir
plik1.txt  plik2.txt  plik3.txt
```

D. Delete the files from the directory.

Aby usunąć pliki z folderu musimy użyć komendy

rm * (usuwanie wszystkich plików)

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog2]
└─# rm *
zsh: sure you want to delete all 3 files in /home/kali/Desktop/katalog2 [yn]?
 y
```

2. Check the path of the current directory.

Aby sprawdzić ścieżkę bieżącego katalogu użyję komendy: pwd

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog2]
└─# pwd
/home/kali/Desktop/katalog2
```

3. Navigate to the Desktop directory and display the files and folders it contains.

Aby cofnąć się z folderu katalog2 do Desktop użyłem cd .. a następnie aby wyświetlić zawartość Desktop użyłem ls

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog2]
└─# cd ..

┌──(root㉿kali)-[/home/kali/Desktop]
└─# ls
katalog1  katalog2  katalog3

┌──(root㉿kali)-[/home/kali/Desktop]
└─#
```

4. Are there any hidden files or folders?

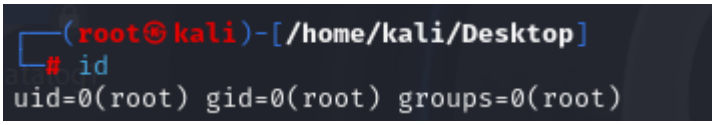
tak

```
┌──(root㉿kali)-[/home/kali/Desktop]
└─# tree -a
.
├── katalog1
│   └── katalog2
├── katalog2
└── katalog3

4 directories, 1 file

┌──(root㉿kali)-[/home/kali/Desktop]
└─#
```

5. Check through which user you are connected to the system, using two ways.

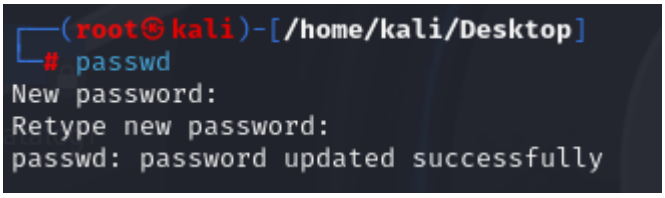
1) Przy użyciu whoami

2) Przy użyciu id



6. Change a user's password.

Aby zmienić hasło użyje polecenia passwd



7. What does the **cd** command perform?

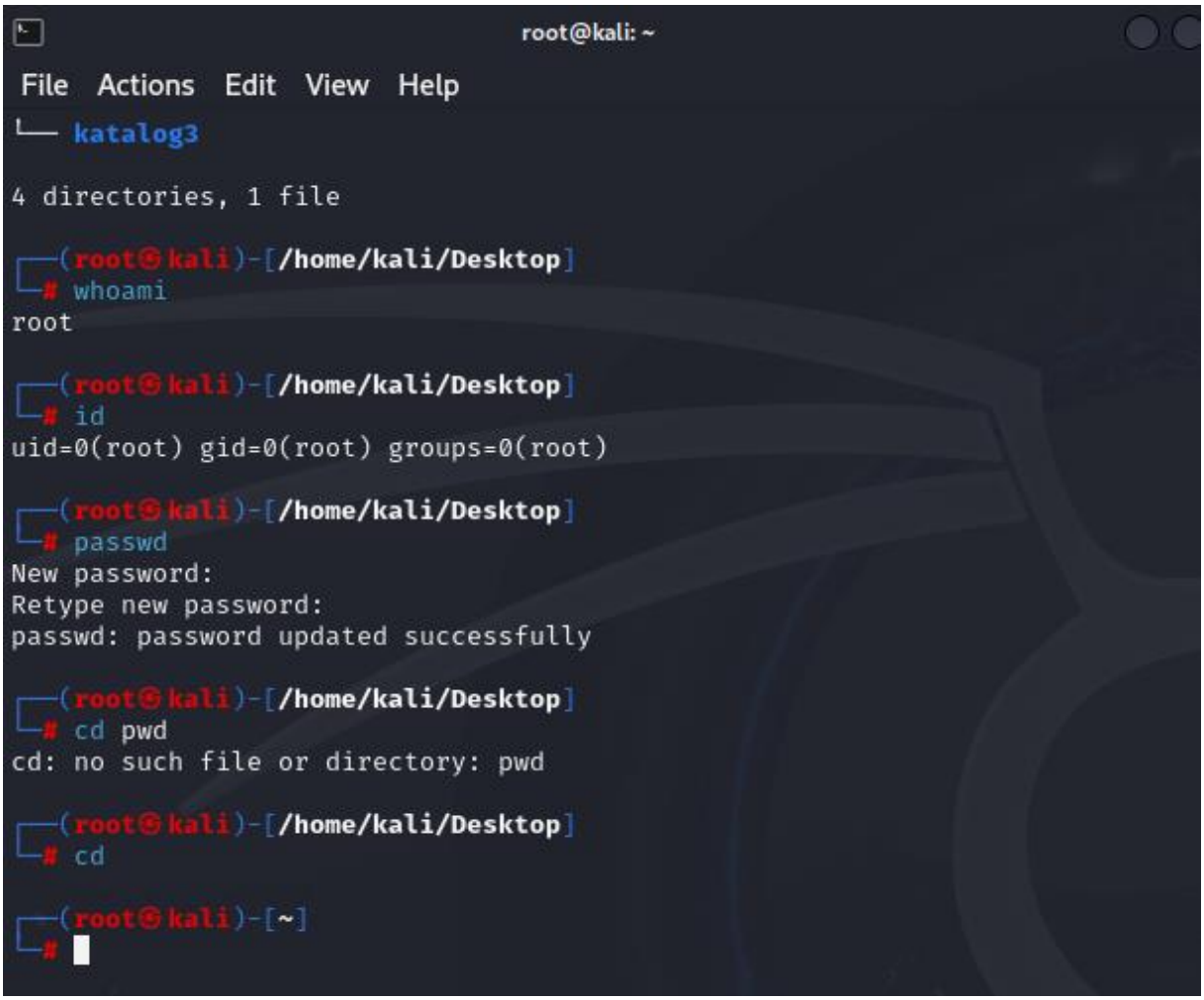
Polecenie cd w systemie linux służy do zmiany katalogu roboczego.

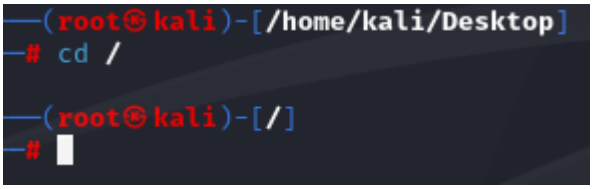
1) Umożliwia przejście do innego katalogu
   Np.:
   cd /home/użytkownik/Dokumenty
2) Powrót do katalogu nadrzędnego
3) Przejście do katalogu domowego
4) Przejście do konkretnej ścieżki
5) Powrót do poprzedniego katalogu

8. What does **cd /** perform?

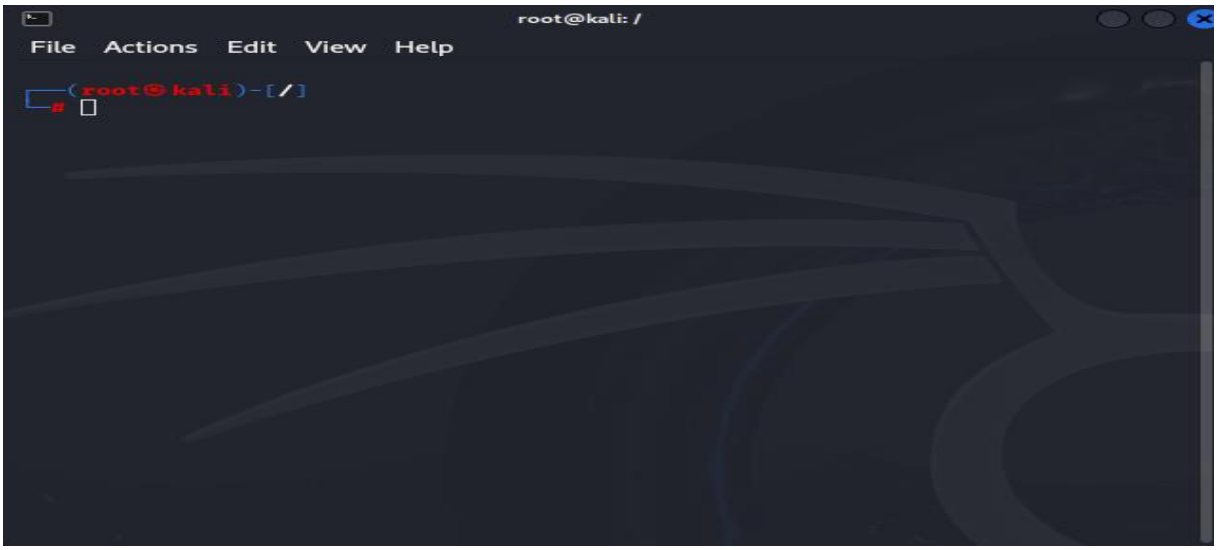
Przenosi do katalogu głównego

9. Execute **cd** and **cd /** and inspect the output.

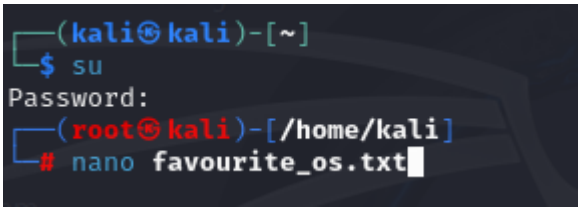


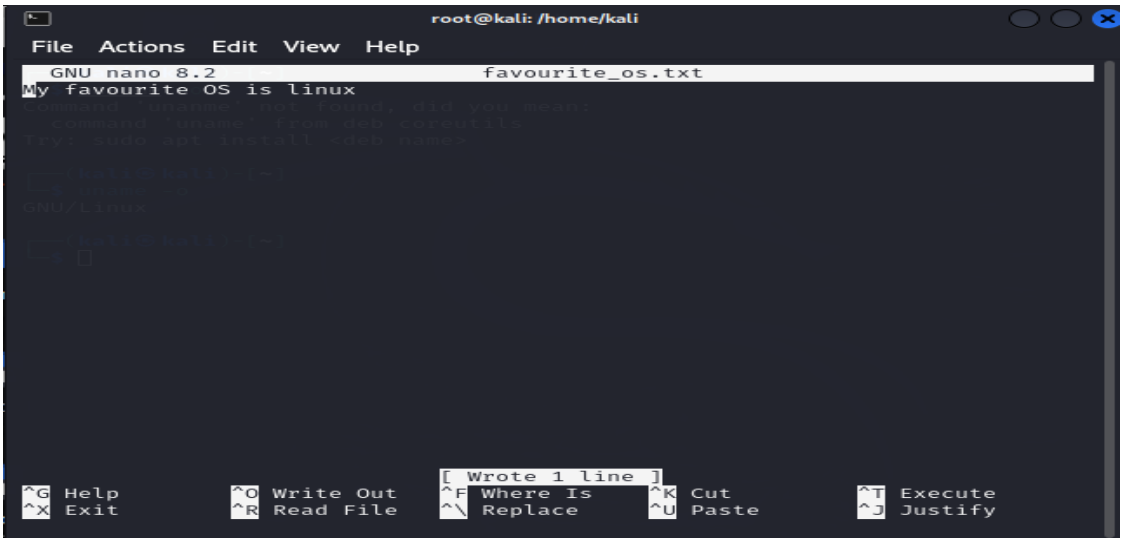


10. Clean the terminal from output.



11. Create a file using **nano** and write the name of your favorite operating system. In addition, find a way to display the type of the current operating system and add the output to the file.





12. Execute a command that will display the file's content.

```
┌──(root㉿kali)-[/home/kali]
└─# cat favourite_os.txt
My favourite OS is linux

┌──(root㉿kali)-[/home/kali]
└─#
```

13. Create three hidden files.

```
┌──(root㉿kali)-[/home/kali]
└─# touch .hidden1

┌──(root㉿kali)-[/home/kali]
└─# ls -a
.                       Pictures
..                      .profile
.bash_logout            Public
.bashrc                 .sudo_as_admin_successful
.bashrc.original        Templates
.cache                  .vboxclient-clipboard-tty7-control.pid
.config                 .vboxclient-clipboard-tty7-service.pid
Desktop                 .vboxclient-display-svga-x11-tty7-control.pid
.dmrc                   .vboxclient-display-svga-x11-tty7-service.pid
Documents               .vboxclient-draganddrop-tty7-control.pid
Downloads               .vboxclient-draganddrop-tty7-service.pid
.face                   .vboxclient-hostversion-tty7-control.pid
.face.icon              .vboxclient-seamless-tty7-control.pid
favourite_os.txt        .vboxclient-seamless-tty7-service.pid
favourite_os.txt.save   .vboxclient-vmsvga-session-tty7-control.pid
.gnupg                  Videos
.hidden1                .Xauthority
.ICEauthority           .xsession-errors
.java                   .zprofile
```

14. Execute a command that will display those files.

```
┌──(root㉿kali)-[/home/kali]
└─# cat .hidden1
To jest ukryty plik 1
```

15. Delete the hidden files that were created in step 13.

```
┌──(root㉿kali)-[/home/kali]
└─# rm .hidden1
```

```
┌──(root㉿kali)-[/home/kali]
└─# ls -a
.                       .profile
..                      Public
.bash_logout            .sudo_as_admin_successful
.bashrc                 Templates
.bashrc.original        .vboxclient-clipboard-tty7-control.pid
.cache                  .vboxclient-clipboard-tty7-service.pid
.config                 .vboxclient-display-svga-x11-tty7-control.pid
Desktop                 .vboxclient-display-svga-x11-tty7-service.pid
.dmrc                   .vboxclient-draganddrop-tty7-control.pid
Documents               .vboxclient-draganddrop-tty7-service.pid
Downloads               .vboxclient-hostversion-tty7-control.pid
.face                   .vboxclient-seamless-tty7-control.pid
.face.icon              .vboxclient-seamless-tty7-service.pid
favourite_os.txt        .vboxclient-vmsvga-session-tty7-control.pid
favourite_os.txt.save   Videos
.gnupg                  .Xauthority
.ICEauthority           .xsession-errors
.java                   .zprofile
.local                  .zsh_history
Music                   .zshrc
Pictures
```

Part 2. The find Command

16. Create files in each system directory and display the paths of those files.

```
┌──(root㉿kali)-[/home/kali]
└─# sudo touch /bin/testfile

┌──(root㉿kali)-[/home/kali]
└─# sudo touch /etc/testfile

┌──(root㉿kali)-[/home/kali]
└─# sudo touch /var/testfile

┌──(root㉿kali)-[/home/kali]
└─# sudo touch /usr/testfile

┌──(root㉿kali)-[/home/kali]
└─# sudo touch /tmp/testfile

┌──(root㉿kali)-[/home/kali]
└─#
```

17. Navigate to the root directory and display all the files that begin with three digits.

```
┌──(root㉿kali)-[/]
└─# sudo find / -type f -name "[0-9] [0-9] [0-9]*"
find: '/run/user/1000/gvfs': Permission denied

┌──(root㉿kali)-[/]
└─#
```

18. Search for all the files in the system that begin with five numbers.

```
┌──(root㉿kali)-[/]
└─# sudo find / -type f -name "[0-9] [0-9] [0-9] [0-9] [0-9]*"
find: '/run/user/1000/gvfs': Permission denied
```

19. Search for all the files in the system that start with the word “bash”.

```
┌──(root㉿kali)-[~]
└─# sudo find / -type d -name "*bash*" 2>/dev/null

/etc/bash_completion.d
/usr/lib/python3/dist-packages/virtualenv/activation/bash
/usr/lib/python3/dist-packages/argcomplete/bash_completion.d
/usr/share/texlive/texmf-dist/tex/latex/bashful
/usr/share/cmake/bash-completion
/usr/share/bash-completion
/usr/share/doc/bash
/usr/share/doc/bash-completion
```

20. Search for all the directories that are smaller than 4MB.

```
┌──(root㉿kali)-[/]
└─# sudo du -h --max-depth=1 / | awk '$1 ~ /^[0-3][.]?[0-9]*M$/ {print $2}'

/opt
/boot
du: cannot access '/proc/108732/task/108732/fd/3': No such file or directory
du: cannot access '/proc/108732/task/108732/fdinfo/3': No such file or directory
du: cannot access '/proc/108732/fd/4': No such file or directory
du: cannot access '/proc/108732/fdinfo/4': No such file or directory
du: cannot access '/run/user/1000/gvfs': Permission denied
/run
/etc
/home
/var
```

21. Search for all the files that are smaller than 3MB.

```
/home/kali/Desktop/katalog1/katalog2
/home/kali/.vboxclient-seamless-tty7-service.pid
/home/kali/.vboxclient-vmsvga-session-tty7-control.pid
/home/kali/.zshrc
/home/kali/.java/.userPrefs/burp/prefs.xml
/home/kali/.zsh_history
/home/kali/.zprofile
/home/kali/.bashrc
/home/kali/.vboxclient-seamless-tty7-control.pid
/home/kali/.dmrc
/home/kali/.xsession-errors
/home/kali/.vboxclient-clipboard-tty7-control.pid
/home/kali/.bashrc.original
/home/kali/favourite_os.txt.save
/home/kali/.ICEauthority
/home/kali/.local/share/nautilus/scripts/Terminal
/home/kali/.local/share/recently-used.xbel
/home/kali/.local/share/keyrings/login.keyring
/home/kali/.local/share/keyrings/user.keystore
/home/kali/.local/state/wireplumber/stream-properties
/home/kali/.bash_logout
/home/kali/.vboxclient-hostversion-tty7-control.pid
/home/kali/.vboxclient-draganddrop-tty7-control.pid
```

```
/home/kali/.config/qt5ct/qt5ct.conf
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xsettings.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-notifyd.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfwm4.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-desktop.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-keyboard-shortcuts.
xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-panel.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/thunar.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-power-manager.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/xfce4-taskmanager.xml
/home/kali/.config/xfce4/xfconf/xfce-perchannel-xml/displays.xml
/home/kali/.config/xfce4/desktop/icons.screen0-784×549.rc
/home/kali/.config/xfce4/desktop/icons.screen0-1904×918.rc
/home/kali/.config/xfce4/desktop/icons.screen0-1202×537.rc
/home/kali/.config/xfce4/desktop/icons.screen0-942×909.rc
/home/kali/.config/xfce4/panel/launcher-6/17354943452.desktop
/home/kali/.config/xfce4/panel/launcher-7/17354943455.desktop
/home/kali/.config/xfce4/panel/launcher-7/17354943454.desktop
/home/kali/.config/xfce4/panel/launcher-7/17354943453.desktop
/home/kali/.config/xfce4/panel/genmon-15.rc
/home/kali/.config/xfce4/panel/launcher-5/17354943451.desktop
/home/kali/.config/dconf/user
/home/kali/.config/nautilus/scripts-accels
/home/kali/.config/user-dirs.locale
/home/kali/.config/qterminal.org/qterminal.ini
/home/kali/.config/Mousepad/accels.scm
```

```
/home/kali/.config/powershell/Microsoft.PowerShell_profile.ps1
/home/kali/.config/pulse/cookie
/home/kali/.config/gtk-3.0/bookmarks
/home/kali/.profile
/home/kali/favourite_os.txt
/home/kali/.vboxclient-draganddrop-tty7-service.pid
/home/kali/.sudo_as_admin_successful
/home/kali/.face
/home/kali/.vboxclient-display-svga-x11-tty7-control.pid
/home/kali/.Xauthority
/home/kali/.vboxclient-display-svga-x11-tty7-service.pid
/home/kali/.vboxclient-clipboard-tty7-service.pid
/home/kali/.cache/gstreamer-1.0/registry.x86_64.bin
/home/kali/.cache/xfce4/notifyd/log.sqlite
/home/kali/.cache/zcompdump

┌──(kali㉿kali)-[~]
└─$
```

Part 3: User & Group Management

1. Create a user in two different ways.

Sposób nr.1

```
┌──(kali㉿kali)-[~]
└─$ sudo adduser nowyuzytkownik

[sudo] password for kali:
Sorry, try again.
[sudo] password for kali:
Sorry, try again.
[sudo] password for kali:
info: Adding user `nowyuzytkownik' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `nowyuzytkownik' (1001) ...
info: Adding new user `nowyuzytkownik' (1001) with group `nowyuzytkownik (100
1)' ...
info: Creating home directory `/home/nowyuzytkownik' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for nowyuzytkownik
Enter the new value, or press ENTER for the default
        Full Name []: user1
        Room Number []: 1
        Work Phone []: 1
        Home Phone []: 1
        Other []: 2
Is the information correct? [Y/n]
```

```
nfo: Adding new user `nowyuzytkownik' to supplemental / extra groups `users'
 ...
nfo: Adding user `nowyuzytkownik' to group `users' ...
```

Sposób nr.2

```
┌──(kali㉿kali)-[~]
└─$ sudo useradd -m -s /bin/bash nowyuzytkownik3

┌──(kali㉿kali)-[~]
└─$
```

2. Create a user and define the password using useradd.

```
┌──(kali㉿kali)-[~]
└─$ sudo useradd -m -s /bin/bash nowyuzytkownik3

┌──(kali㉿kali)-[~]
└─$
```

```
┌──(kali㉿kali)-[~]
└─$ sudo passwd nowyuzytkownik3

New password:
Retype new password:
passwd: password updated successfully

┌──(kali㉿kali)-[~]
└─$
```

3. Create a new group.

```
┌──(kali㉿kali)-[~]
└─$ sudo groupadd nowagrupa
```

```
nowagrupa:x:1004:

┌──(kali㉿kali)-[~]
└─$
```

4. Move a user to the newly created group.

```
┌──(kali㉿kali)-[~]
└─$ sudo usermod -aG nowagrupa nowyuzytkownik3
```

```
┌──(kali㉿kali)-[~]
└─$ groups nowyuzytkownik3

nowyuzytkownik3 : nowyuzytkownik3 nowagrupa

┌──(kali㉿kali)-[~]
└─$
```

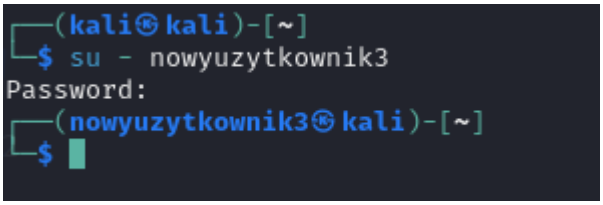
5. Which command allows you to find all users and their groups?

1) cat /etc/group – wyświetlenie wszystkich użytkowników i ich grup
2) getent group - wyświetlenie użytkowników i ich grup (czytelniej)
3) for user in $(cut -d: -f1 /etc/passwd); do echo "$user: $(id -nG $user)"; done – wyświetlenie wszystkich użytkowników i ich przynależności grupowych
4) who – wyświetlenie aktywnych użytkowników i ich grup

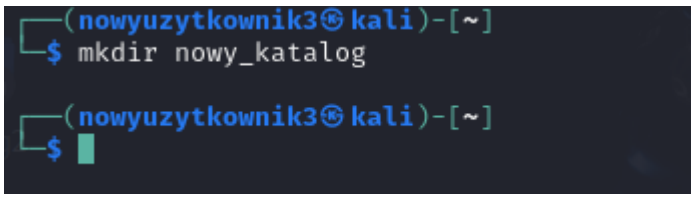
6. What is the system's location of all the user directories?

Systemowa lokalizacja katalogów wszystkich użytkowników w systemie linux jest /home

7. Switch to another user.



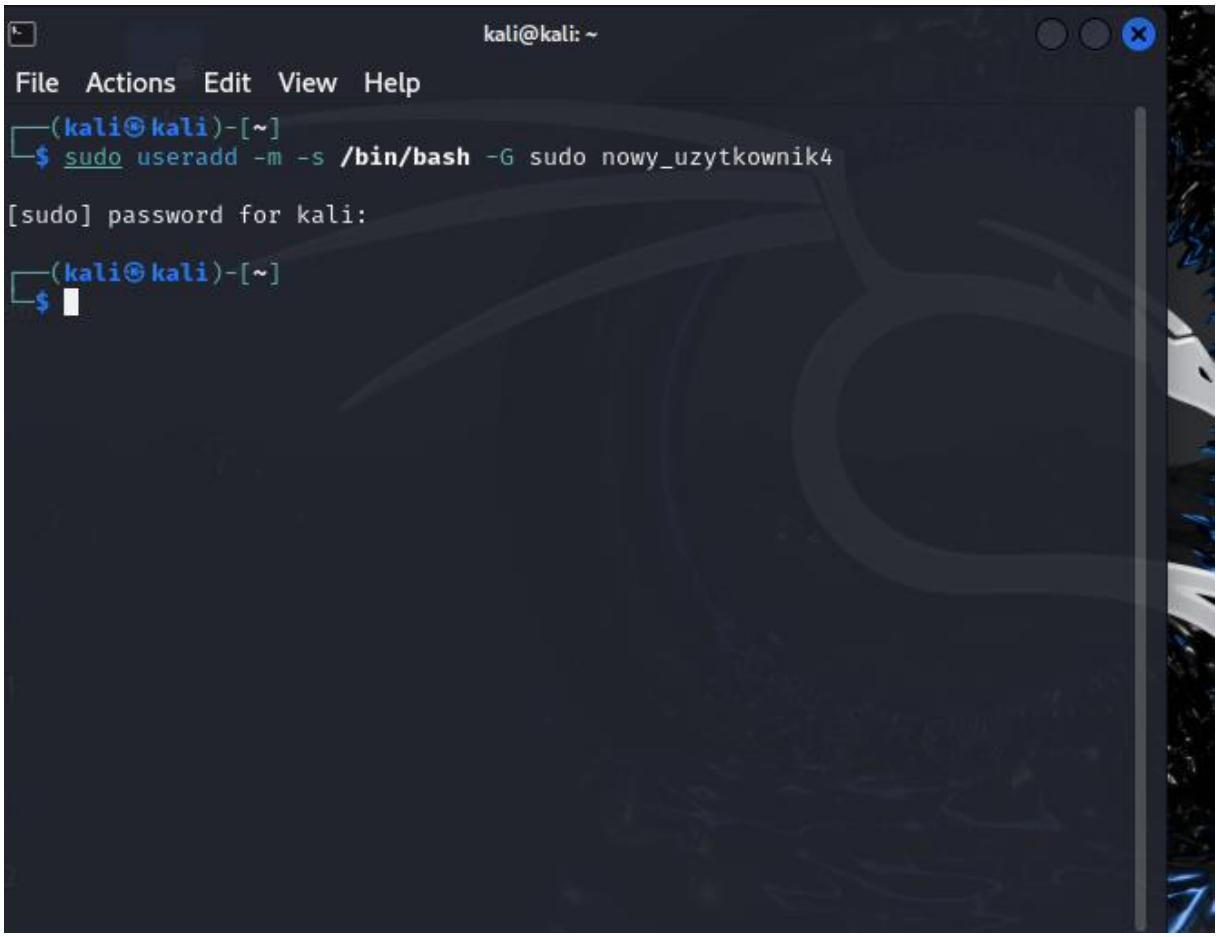
8. Create a directory with that user.



9. Which operation should be performed to create a directory?

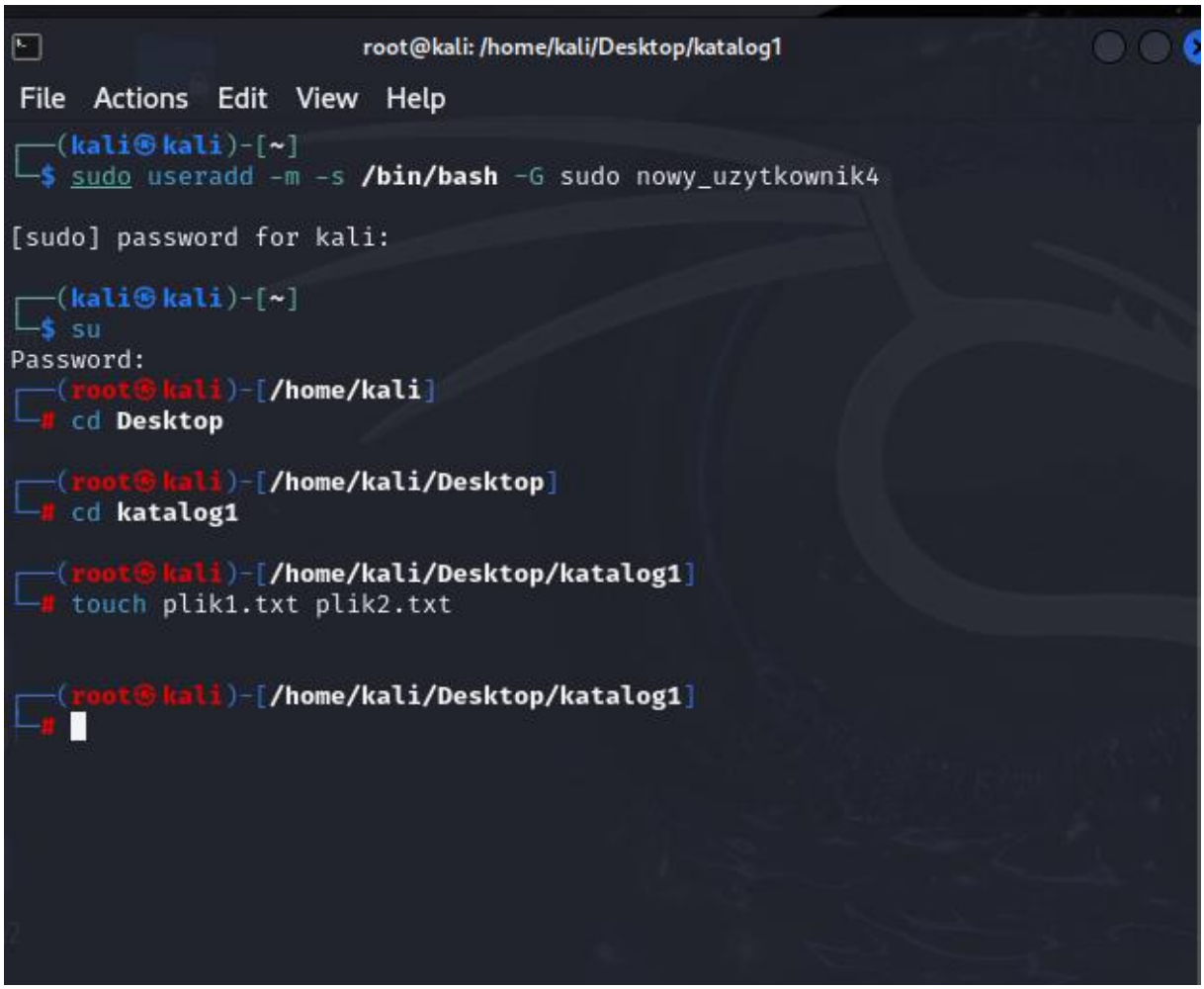
Aby utworzyć katalog w systemie linux należy wykonać operację mkdir.

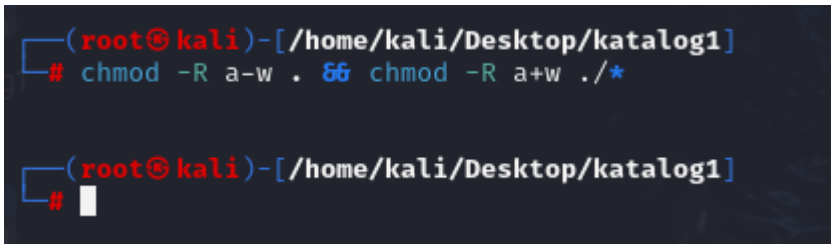
10. Switch to the root user, create a new user, and add him to the sudo group via a single command.

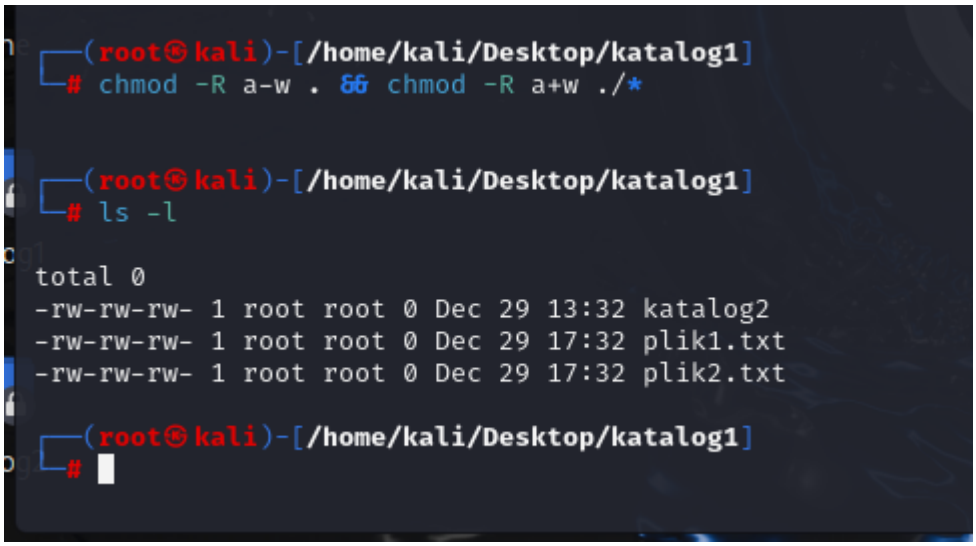


Part 4: Permissions

1. Create two new files in one of the directories you created in part 1, and grant only write permission to all files inside the directory.


root@kali: /home/kali/Desktop/katalog1
File Actions Edit View Help
(kali㉿kali)-[~]
$ sudo useradd -m -s /bin/bash -G sudo nowy_uzytkownik4
[sudo] password for kali:
(kali㉿kali)-[~]
$ su
Password:
(root㉿kali)-[/home/kali]
cd Desktop
(root㉿kali)-[/home/kali/Desktop]
cd katalog1
(root㉿kali)-[/home/kali/Desktop/katalog1]
touch plik1.txt plik2.txt
(root㉿kali)-[/home/kali/Desktop/katalog1]
#


(root㉿kali)-[/home/kali/Desktop/katalog1]
chmod -R a-w . && chmod -R a+w ./*
(root㉿kali)-[/home/kali/Desktop/katalog1]
#


(root㉿kali)-[/home/kali/Desktop/katalog1]
chmod -R a-w . && chmod -R a+w ./*
(root㉿kali)-[/home/kali/Desktop/katalog1]
ls -l
total 0
-rw-rw-rw- 1 root root 0 Dec 29 13:32 katalog2
-rw-rw-rw- 1 root root 0 Dec 29 17:32 plik1.txt
-rw-rw-rw- 1 root root 0 Dec 29 17:32 plik2.txt
(root㉿kali)-[/home/kali/Desktop/katalog1]
#

2. Grant the highest permission to files and verify the change.

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# chmod -R 777 /home/kali/Desktop/katalog1
```

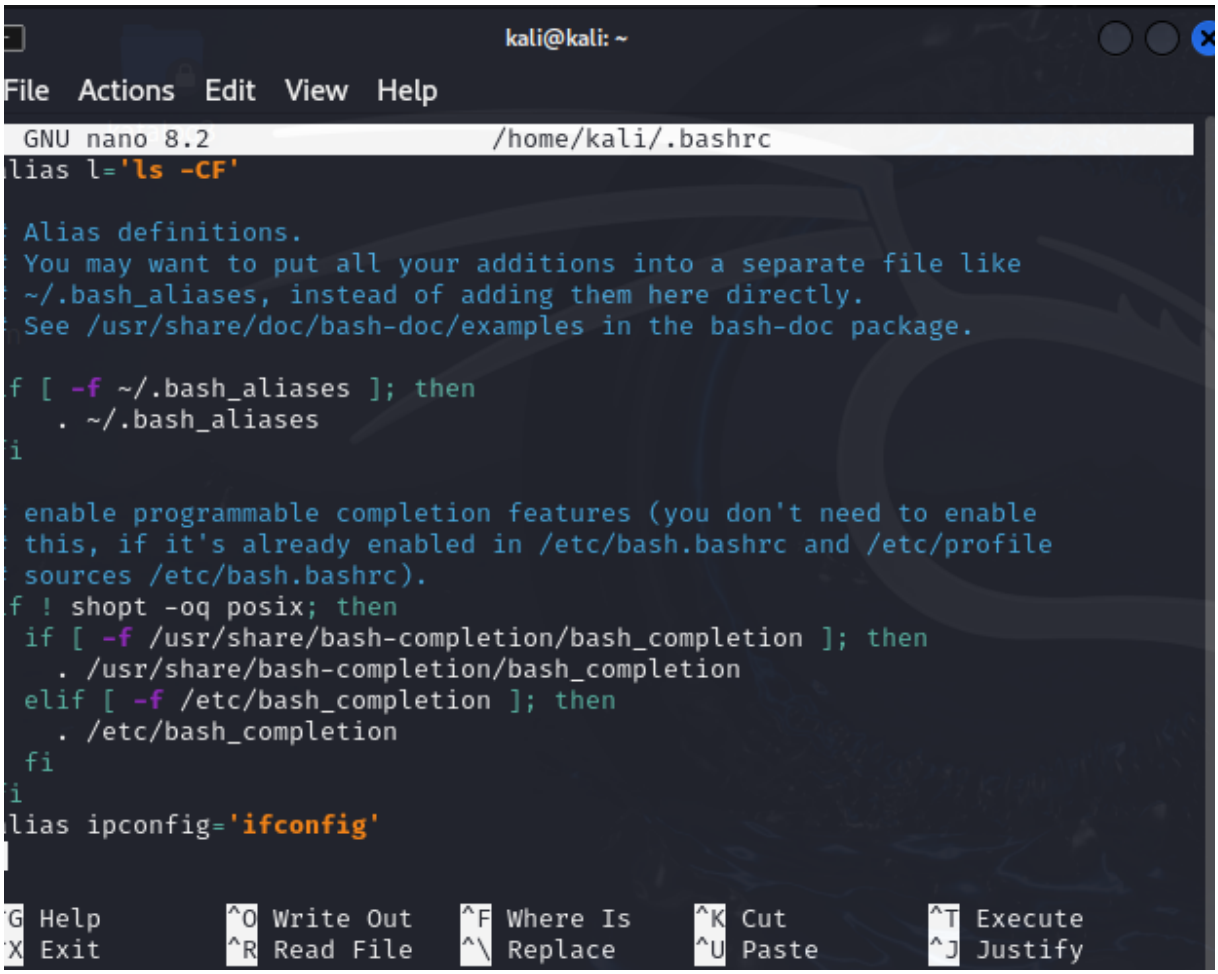
3. Choose one file and change the owner of the file.

```
┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# sudo chown nowy_uzytkownik4  plik1.txt
```

```
lc
┌──(root㉿kali)-[/home/kali/Desktop/katalog1]
└─# ls -l plik1.txt
```

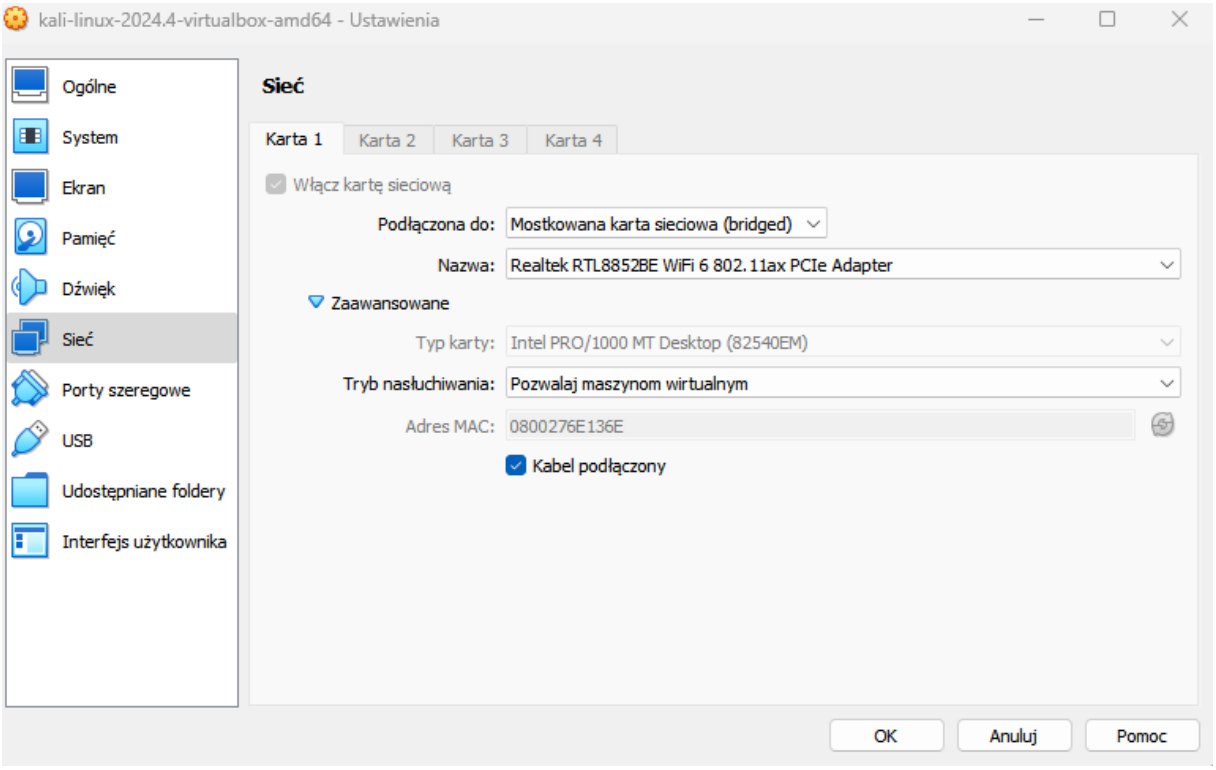
Part 5: Alias

1. Change the command **ifconfig** to **ipconfig**.

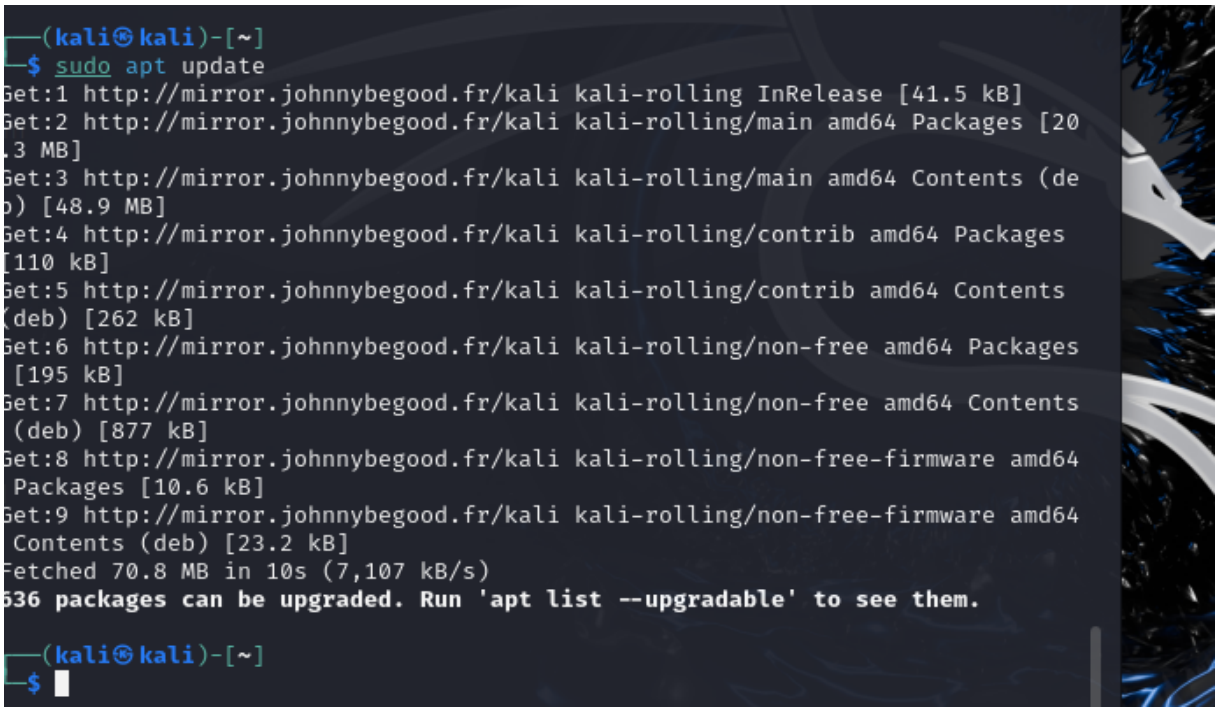


Part 6: System Update and Apt Usage

1. Make sure that the virtual machine is set on the bridge network, and update the system.

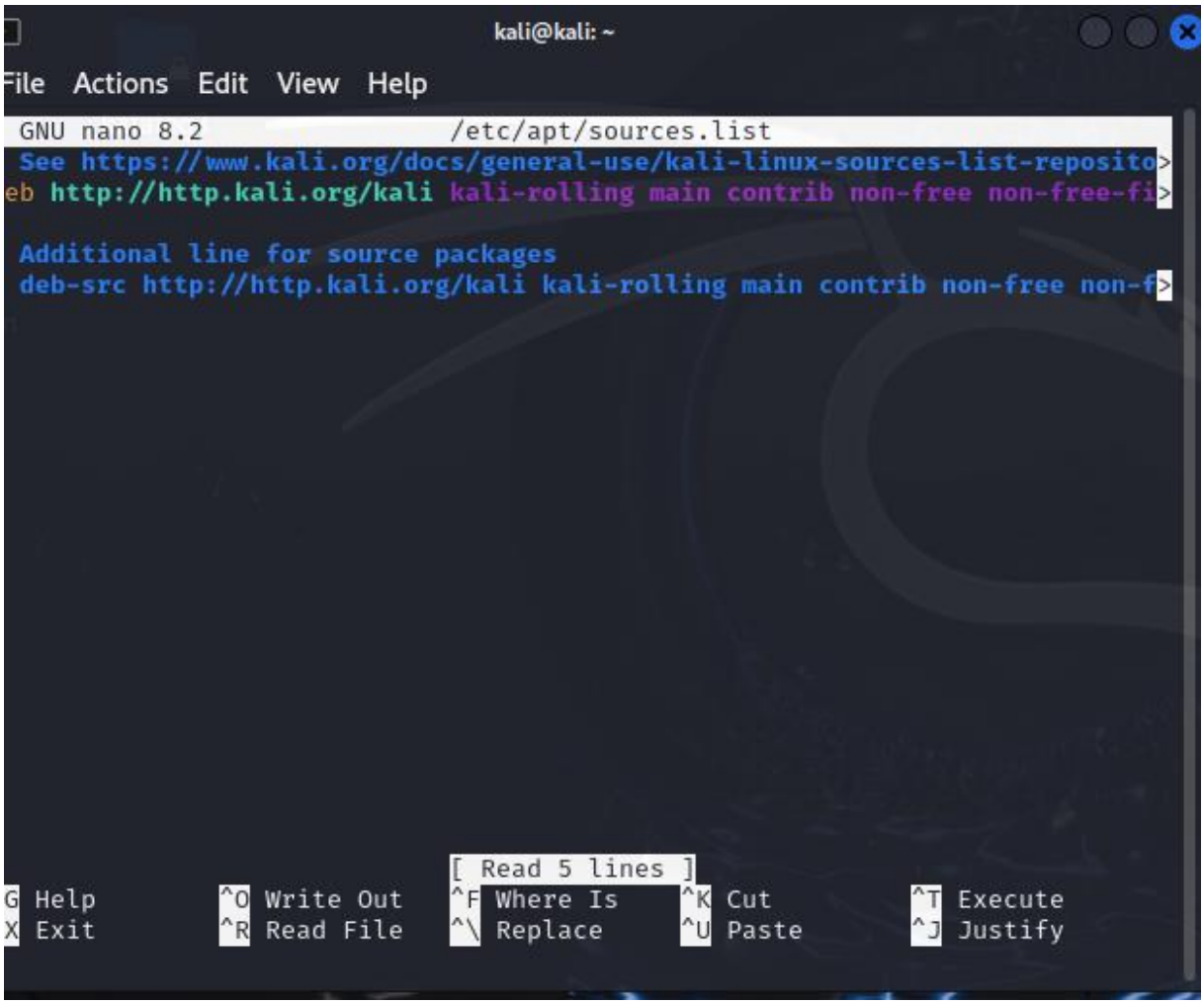



```
┌──(kali㉿kali)-[~]
└─$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
From 10.0.2.15 icmp_seq=1 Destination Host Unreachable
From 10.0.2.15 icmp_seq=2 Destination Host Unreachable
From 10.0.2.15 icmp_seq=3 Destination Host Unreachable
64 bytes from 8.8.8.8: icmp_seq=5 ttl=115 time=12.4 ms
64 bytes from 8.8.8.8: icmp_seq=6 ttl=115 time=23.4 ms
64 bytes from 8.8.8.8: icmp_seq=7 ttl=115 time=14.5 ms
64 bytes from 8.8.8.8: icmp_seq=8 ttl=115 time=36.7 ms
64 bytes from 8.8.8.8: icmp_seq=9 ttl=115 time=11.7 ms
64 bytes from 8.8.8.8: icmp_seq=10 ttl=115 time=11.6 ms
64 bytes from 8.8.8.8: icmp_seq=11 ttl=115 time=12.0 ms
64 bytes from 8.8.8.8: icmp_seq=12 ttl=115 time=12.0 ms
64 bytes from 8.8.8.8: icmp_seq=13 ttl=115 time=15.8 ms
64 bytes from 8.8.8.8: icmp_seq=14 ttl=115 time=10.9 ms
64 bytes from 8.8.8.8: icmp_seq=15 ttl=115 time=11.4 ms
```

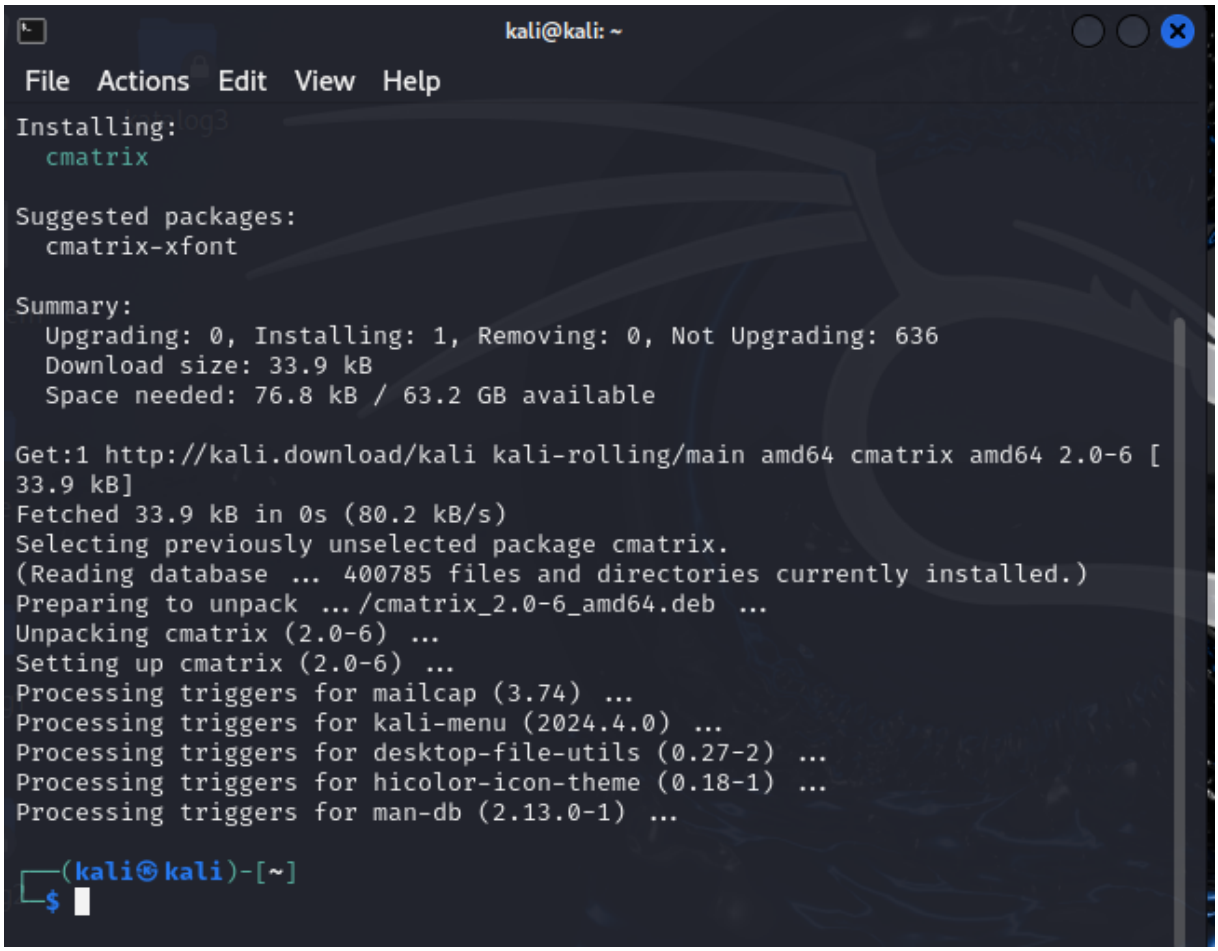


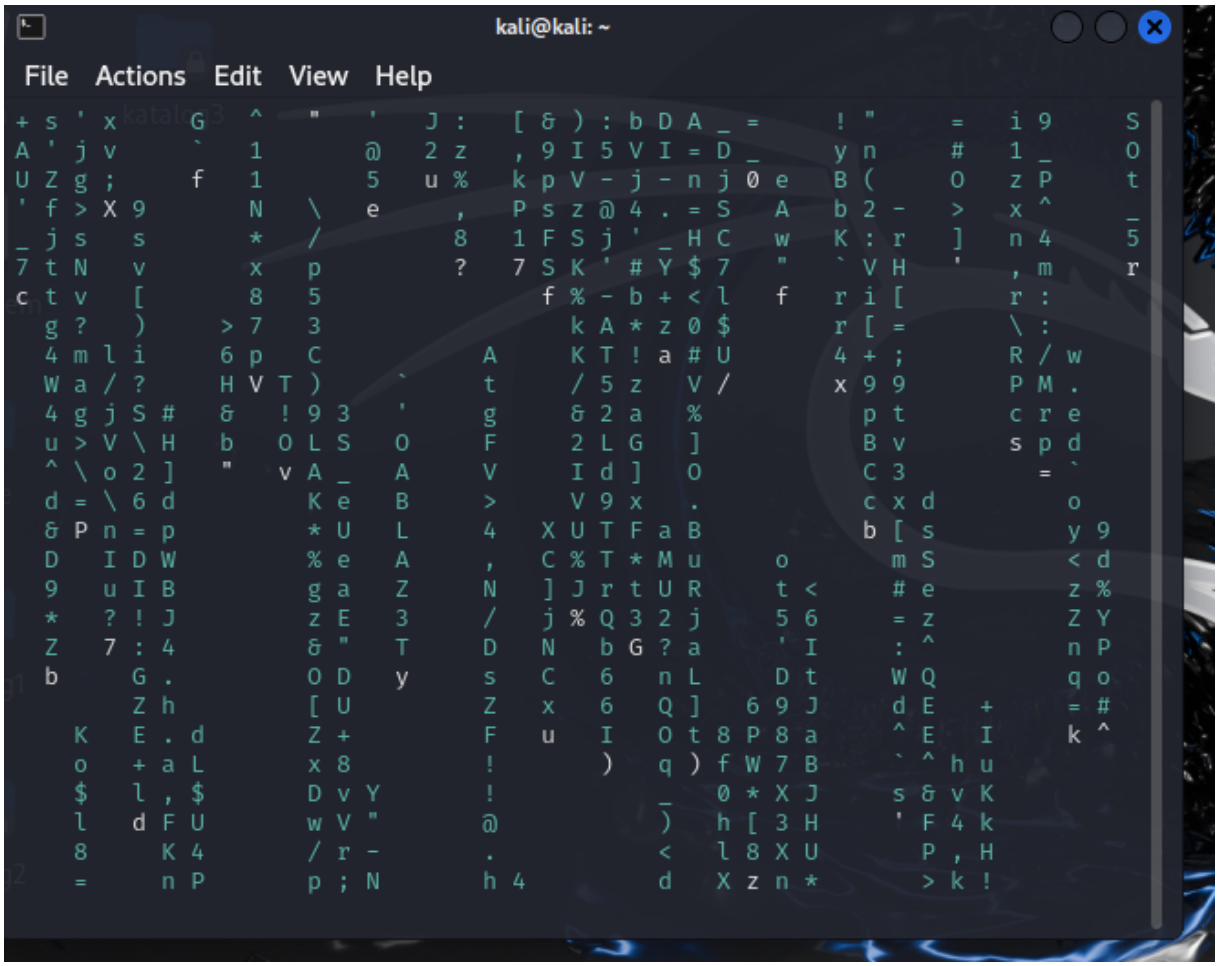
Instalacja aktualizacji:

2. Verify that the sources in the **sources.list** are updated. If they aren't, update them.



3. Download a package called **cmatrix** and execute it.


kali@kali: ~
File Actions Edit View Help
Installing:
cmatrix
Suggested packages:
cmatrix-xfont
Summary:
Upgrading: 0, Installing: 1, Removing: 0, Not Upgrading: 636
Download size: 33.9 kB
Space needed: 76.8 kB / 63.2 GB available
Get:1 http://kali.download/kali kali-rolling/main amd64 cmatrix amd64 2.0-6 [
33.9 kB]
Fetched 33.9 kB in 0s (80.2 kB/s)
Selecting previously unselected package cmatrix.
(Reading database ... 400785 files and directories currently installed.)
Preparing to unpack .../cmatrix_2.0-6_amd64.deb ...
Unpacking cmatrix (2.0-6) ...
Setting up cmatrix (2.0-6) ...
Processing triggers for mailcap (3.74) ...
Processing triggers for kali-menu (2024.4.0) ...
Processing triggers for desktop-file-utils (0.27-2) ...
Processing triggers for hicolor-icon-theme (0.18-1) ...
Processing triggers for man-db (2.13.0-1) ...
┌──(kali㉿kali)-[~]
└─$



4. Permanently delete **cmatrix**.

```
┌──(kali㉿kali)-[~]
└─$ sudo apt remove cmatrix -y

REMOVING:
  cmatrix

Summary:
  Upgrading: 0, Installing: 0, Removing: 1, Not Upgrading: 636
  Freed space: 76.8 kB

(Reading database ... 400797 files and directories currently installed.)
Removing cmatrix (2.0-6) ...
Processing triggers for desktop-file-utils (0.27-2) ...
Processing triggers for hicolor-icon-theme (0.18-1) ...
Processing triggers for man-db (2.13.0-1) ...
Processing triggers for mailcap (3.74) ...
Processing triggers for kali-menu (2024.4.0) ...

┌──(kali㉿kali)-[~]
└─$
```

Part 7: Ifconfig and Address Settings

1. Execute the **ifconfig** command.

```
┌──(kali㉿kali)-[~]
└─$ ifconfig
th0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 10.0.2.15  netmask 255.255.255.0  broadcast 10.0.2.255
        inet6 fe80::48e3:6217:2a0a:d9d0  prefixlen 64  scopeid 0×20<link>
        ether 08:00:27:6e:13:6e  txqueuelen 1000  (Ethernet)
        RX packets 495248  bytes 719510050 (686.1 MiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 32425  bytes 2093253 (1.9 MiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0

o: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0×10<host>
        loop  txqueuelen 1000  (Local Loopback)
        RX packets 8  bytes 480 (480.0 B)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 8  bytes 480 (480.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0


┌──(kali㉿kali)-[~]
└─$
```

2. Change the output of the command to uppercase letters.

```
┌──(kali㉿kali)-[~]
└─$ ifconfig | tr '[:lower:]' '[:upper:]'

ETH0: FLAGS=4163<UP,BROADCAST,RUNNING,MULTICAST>  MTU 1500
        INET 10.0.2.15  NETMASK 255.255.255.0  BROADCAST 10.0.2.255
        INET6 FE80::48E3:6217:2A0A:D9D0  PREFIXLEN 64  SCOPEID 0X20<LINK
        ETHER 08:00:27:6E:13:6E  TXQUEUELEN 1000  (ETHERNET)
        RX PACKETS 495248  BYTES 719510050 (686.1 MIB)
        RX ERRORS 0  DROPPED 0  OVERRUNS 0  FRAME 0
        TX PACKETS 32425  BYTES 2093253 (1.9 MIB)
        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 8  BYTES 480 (480.0 B)
        RX ERRORS 0  DROPPED 0  OVERRUNS 0  FRAME 0
        TX PACKETS 8  BYTES 480 (480.0 B)
        TX ERRORS 0  DROPPED 0 OVERRUNS 0  CARRIER 0  COLLISIONS 0


┌──(kali㉿kali)-[~]
└─$
```

3. Filter the command to display only the IP and subnet mask.

```
┌──(kali㉿kali)-[~]
└─$ ifconfig | grep -E 'inet' | awk '{print $2, $4}'
10.0.2.15 255.255.255.0
fe80::48e3:6217:2a0a:d9d0 64
127.0.0.1 255.0.0.0
::1 128
```

4. Write the output to a file called “ip.log”.

```
┌──(kali㉿kali)-[~]
└─$ ifconfig | grep -E 'inet ' | awk '{print $2, $4}' > ip.log
```

```
┌──(kali㉿kali)-[~]
└─$ cat ip.log
10.0.2.15 255.255.255.0
127.0.0.1 255.0.0.0
```

5. Add the following to the “ip.log” file: whoami, last, and hostname.

```
┌──(kali㉿kali)-[~]
└─$ whoami >> ip.log
last >> ip.log
hostname >> ip.log
```

```
┌──(kali㉿kali)-[~]
└─$ cat ip.log
10.0.2.15 255.255.255.0
127.0.0.1 255.0.0.0
kali
kali     tty7         :0               Sun Dec 29 18:10 - still logged in
lightdm  tty7         :0               Sun Dec 29 18:09 - 18:10  (00:00)
root     pts/0                         Sun Dec 29 17:32 - 17:50  (00:17)
nowyuzyt pts/0                         Sun Dec 29 17:12 - 17:28  (00:16)
lightdm  tty8         :1               Sun Dec 29 17:06 - 17:11  (00:04)
root     pts/0                         Sun Dec 29 15:47 - 16:31  (00:44)
lightdm  tty8         :1               Sun Dec 29 15:39 - 15:42  (00:02)
root     pts/0                         Sun Dec 29 15:06 - 15:46  (00:40)
root     pts/0                         Sun Dec 29 15:00 - 15:02  (00:01)
root     pts/0                         Sun Dec 29 14:57 - 15:00  (00:02)
root     pts/0                         Sun Dec 29 14:52 - 14:57  (00:04)
root     pts/0                         Sun Dec 29 14:51 - 14:52  (00:00)
lightdm  tty8         :1               Sun Dec 29 14:39 - 14:45  (00:05)
root     pts/0                         Sun Dec 29 13:58 - 14:51  (00:52)
root     pts/0                         Sun Dec 29 13:46 - 13:58  (00:11)
root     pts/0                         Sun Dec 29 13:45 - 13:45  (00:00)
root     pts/0                         Sun Dec 29 13:29 - 13:45  (00:16)
lightdm  tty8         :1               Sun Dec 29 12:56 - 13:27  (00:31)
kali     tty7         :0               Sun Dec 29 12:45 - still logged in
lightdm  tty7         :0               Sun Dec 29 12:45 - 12:45  (00:00)
postgres                               Sat Nov 30 07:31 - 07:31  (00:00)

/var/lib/wtmpdb/wtmp.db begins Sat Nov 30 07:31:49 2024
kali
```

6. Set a static IP in the terminal.

```
┌──(kali㉿kali)-[~]
└─$ ip a

1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host noprefixroute
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:6e:13:6e brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute eth0
       valid_lft 84902sec preferred_lft 84902sec
    inet6 fe80::48e3:6217:2a0a:d9d0/64 scope link noprefixroute
       valid_lft forever preferred_lft forever

┌──(kali㉿kali)-[~]
└─$ sudo ip addr add 192.168.1.100/24 dev eth0
sudo ip route add default via 192.168.1.1

[sudo] password for kali:
```

Part 8: Remote Control and SSH Connection

1. Install/Start the SSH service and verify that the service runs.

```
┌──(kali㉿kali)-[~]
└─$ sudo apt install openssh-server -y
openssh-server is already the newest version (1:9.9p1-3).
openssh-server set to manually installed.
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 636

┌──(kali㉿kali)-[~]
└─$
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl start ssh
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl enable ssh
Synchronizing state of ssh.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable ssh
Created symlink '/etc/systemd/system/sshd.service' → '/usr/lib/systemd/system/ssh.service'.
Created symlink '/etc/systemd/system/multi-user.target.wants/ssh.service' → '/usr/lib/systemd/system/ssh.service'.

┌──(kali㉿kali)-[~]
└─$
```

2. Connect via puTTY to the Linux machine.

3. Connect to Kali Linux with MOBA.

4. Optional: Connect to the Kali Machine from your phone.

Part 9: Apache Webserver

1. Start the Apache service and verify that the service runs and the web is accessible

```
┌──(kali㉿kali)-[~]
└─$ sudo apt install apache2 -y
apache2 is already the newest version (2.4.62-3).
apache2 set to manually installed.
Summary:
  Upgrading: 0, Installing: 0, Removing: 0, Not Upgrading: 636

┌──(kali㉿kali)-[~]
└─$
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl start apache2
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
Created symlink '/etc/systemd/system/multi-user.target.wants/apache2.service' → '/usr/lib/systemd/system/apache2.service'.
```

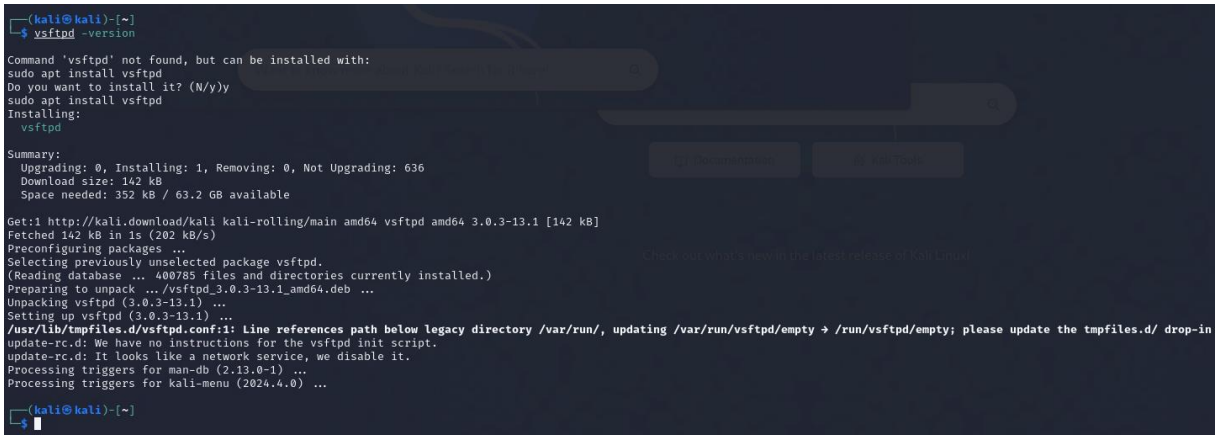
```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl enable apache2
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2
Created symlink '/etc/systemd/system/multi-user.target.wants/apache2.service' → '/usr/lib/systemd/system/apache2.service'.

┌──(kali㉿kali)-[~]
└─$ sudo systemctl status apache2
● apache2.service - The Apache HTTP Server
     Loaded: loaded (/usr/lib/systemd/system/apache2.service; enabled; preset: disabled)
     Active: active (running) since Sun 2024-12-29 19:03:09 EST; 1min 20s ago
 Invocation: 107128de86774b6d9d424d2739ca3aff
       Docs: https://httpd.apache.org/docs/2.4/
   Main PID: 28221 (apache2)
      Tasks: 6 (limit: 2219)
     Memory: 20.4M (peak: 20.8M)
        CPU: 95ms
     CGroup: /system.slice/apache2.service
             ├─28221 /usr/sbin/apache2 -k start
             ├─28224 /usr/sbin/apache2 -k start
             ├─28225 /usr/sbin/apache2 -k start
             ├─28226 /usr/sbin/apache2 -k start
             ├─28227 /usr/sbin/apache2 -k start
             └─28228 /usr/sbin/apache2 -k start

Dec 29 19:03:09 kali systemd[1]: Starting apache2.service - The Apache HTTP Server...
Dec 29 19:03:09 kali apachectl[28220]: AH00558: apache2: Could not reliably determine the server's fully qualified domain nam
Dec 29 19:03:09 kali systemd[1]: Started apache2.service - The Apache HTTP Server.
lines 1-20/20 (END)
```

2. Change the index file to a website of your choice.

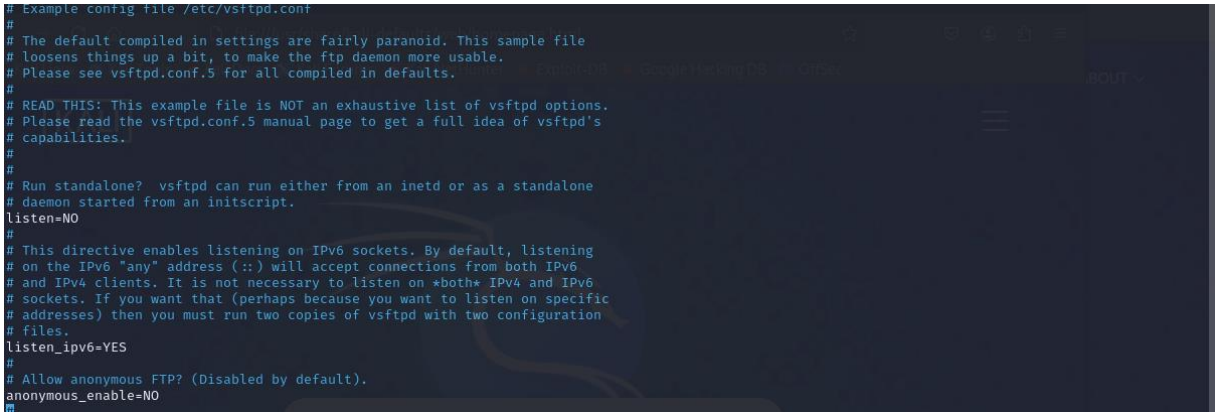

┌──(kali㉿kali)-[~]
└─$ ls /var/www/index.html
ls: cannot access '/var/www/index.html': No such file or directory
┌──(kali㉿kali)-[~]
└─$ sudo mkdir -p /var/www/html
[sudo] password for kali:
┌──(kali㉿kali)-[~]
└─$ sudo chown www-data:www-data /var/www/html -R
sudo chmod 755 /var/www/html
┌──(kali㉿kali)-[~]
└─$ sudo nano /var/www/html/index.html

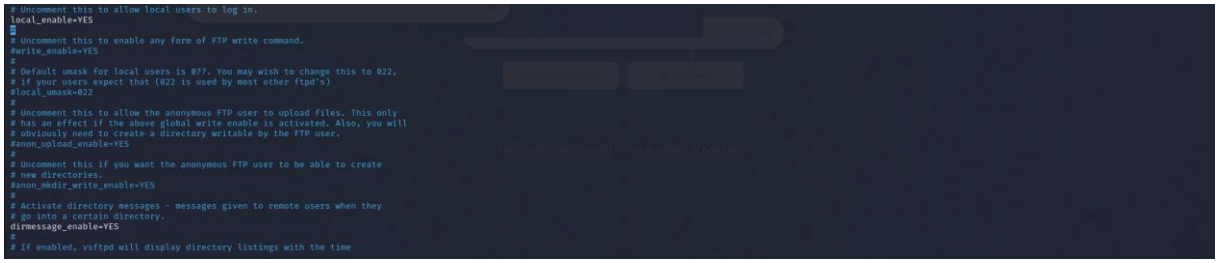
Part 10: VSFTPD

1. Download the latest version of VSFTPD.



2. Configure VSFTPD and run the service.






```
┌──(kali㉿kali)-[~]
└─$ sudo mkdir -p /home/ftp/shared
```

```
┌──(kali㉿kali)-[~]
└─$ sudo chown ftp:ftp /home/ftp/shared
sudo chmod 755 /home/ftp/shared
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl start vsftpd
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl enable vsftpd

Synchronizing state of vsftpd.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable vsftpd
Created symlink '/etc/systemd/system/multi-user.target.wants/vsftpd.service' → '/usr/lib/systemd/system/vsftpd.service'.
```

```
┌──(kali㉿kali)-[~]
└─$ sudo systemctl status vsftpd

● vsftpd.service - vsftpd FTP server
     Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; preset: disabled)
     Active: active (running) since Sun 2024-12-29 19:25:35 EST; 1min 3s ago
 Invocation: b065d67ef4e9411f94994de85a0b474a
   Main PID: 40552 (vsftpd)
      Tasks: 1 (limit: 2219)
     Memory: 1.2M (peak: 2M)
        CPU: 15ms
     CGroup: /system.slice/vsftpd.service
             └─40552 /usr/sbin/vsftpd /etc/vsftpd.conf

Dec 29 19:25:35 kali systemd[1]: Starting vsftpd.service - vsftpd FTP server...
Dec 29 19:25:35 kali systemd[1]: Started vsftpd.service - vsftpd FTP server.
```

Part 11: Gzip

1. Locate a gzip file on the file system (gz extension).

```
┌──(kali㉿kali)-[~]
└─$ sudo find /var -type f -name "*.gz"

/var/lib/dpkg/alternatives/psql.1.gz
/var/lib/dpkg/alternatives/builtins.7.gz

┌──(kali㉿kali)-[~]
└─$
```

Part 12: Questions (Optional)

1. What are root folders? Choose three and explain about them.

W systemach Linux root folders (katalogi główne) to katalogi znajdujące się w głównym katalogu systemu plików **/** (root). Są one kluczowe dla struktury systemu operacyjnego, ponieważ przechowują różne rodzaje danych i zasobów systemowych.

Przykładowe zastosowanie:

1. /root:

- Jest to katalog domowy użytkownika **root** (administratora systemu).
- Tylko użytkownik root ma do niego pełny dostęp.
- Przykładowe zastosowanie: przechowywanie plików konfiguracyjnych i skryptów należących do superużytkownika.

2. /etc:

- Zawiera pliki konfiguracyjne systemu oraz aplikacji.
- Każdy plik w tym katalogu ma swoje specyficzne przeznaczenie, np.:
  - **/etc/passwd**: Przechowuje informacje o użytkownikach systemu.
  - **/etc/hosts**: Mapowanie nazw hostów na adresy IP.
- Przykładowe zastosowanie: edytowanie konfiguracji sieci, użytkowników, aplikacji.

3. /var:

- Przechowuje zmienne dane generowane przez system i aplikacje, takie jak logi, pliki tymczasowe i dane bufora.
- Przykładowe podkatalogi:
  - **/var/log**: Logi systemowe i aplikacyjne.
  - **/var/www**: Pliki stron internetowych dla serwera Apache/Nginx.
- Przykładowe zastosowanie: monitorowanie logów systemowych w celu diagnozowania problemów.

2. When enabling SSH, usually, the configuration file needs to be changed.

- Why?
- What is the usage of SSH?
- Is SSH encrypted?

Why does the configuration file need to be changed when enabling SSH?

- **Reason:**
    - The SSH configuration file (/etc/ssh/sshd_config) contains settings that determine how the SSH server behaves. Modifications may be needed to:
        - Allow or restrict specific features (e.g., root login).
        - Change the default port (default is 22) for security reasons.
        - Enable or disable specific authentication methods (e.g., password-based or key-based authentication).
        - Set custom security policies like restricting access to certain IP ranges.
    - Default settings might not meet specific security or operational requirements, requiring customization.

What is the usage of SSH?

- **Secure Remote Access:** Allows users to securely connect to a remote machine to execute commands and manage files.
- **Encrypted File Transfers:** Tools like scp and rsync use SSH for secure file transfers between systems.
- **Port Forwarding:** Enables secure tunneling of network traffic, protecting it from eavesdropping.
- **Automation:** Used in scripts and tools for automating administrative tasks across multiple servers.
- **Secure Tunneling for Other Protocols:** Provides encryption for otherwise insecure protocols (e.g., X11 forwarding, VNC, or RDP).

Is SSH encrypted?

- **Yes, SSH is encrypted.**
    - SSH uses strong encryption algorithms (e.g., AES) to secure the communication between the client and the server.
    - It also employs public-key cryptography (e.g., RSA, ECDSA) for authentication and establishing a secure connection.

- All data transferred through SSH is encrypted, ensuring confidentiality and protecting against man-in-the-middle attacks.

3. What is the kernel?

The kernel is the **core component** of an operating system that acts as a bridge between hardware and software. It manages hardware resources and provides essential services to applications.

4. What is ping?

Ping is a network diagnostic utility used to test the connectivity between two devices on a network. It measures the time it takes for a data packet to travel from the source device to a destination device and back, known as the **round-trip time (RTT)**.

5. When granting permissions over files and folders, we use three numbers. What are the numbers and what do they mean? Why do we write them three times (777)?

In Linux, file permissions are represented using three numbers (e.g., **777**), and each digit specifies permissions for a different group of users. The three numbers correspond to:

Meaning of Each Digit

- **First Number:** Permissions for the **owner** of the file.
- **Second Number:** Permissions for the **group** associated with the file.
- **Third Number:** Permissions for **others** (everyone else).

For example, in 777:

- **The first 7 applies to the owner.**
- **The second 7 applies to the group.**
- **The third 7 applies to others.**

6. Can we create two folders with the same name, one in lowercase letters and the other in uppercase letters?

Yes, you can create two folders with the same name but different cases (e.g., folder and FOLDER) on Linux because most Linux file systems (e.g., ext4) are **case-sensitive**.

7. Define the following concepts.

- telnet
- SSH
- Crontab
- FTP
- SFTP
- gzip tar
- bash
- Apache

Telnet

- **Definition**: A network protocol used to provide text-based communication between two computers over a network.
- **Key Points**:
  - Used for remote access to servers or devices.
  - **Insecure** because it transmits data, including passwords, in plain text.

SSH (Secure Shell)

- **Definition: A secure protocol for accessing and managing devices or servers remotely over an encrypted connection.**
- **Key Points:**
  - **Encrypts data transfer to protect against eavesdropping.**
  - **Replaces Telnet in modern systems for security.**
  - **Provides secure file transfers (e.g., scp and rsync).**

Crontab

- **Definition**: A configuration file used to schedule tasks or commands to run automatically at specified intervals in Unix/Linux systems.
- **Key Points**:
  - Uses the **cron** daemon to execute jobs.
  - Common format: minute hour day month weekday command.

- Example: 0 3 * * * /backup.sh runs the backup script daily at 3:00 AM.

FTP (File Transfer Protocol)

- **Definition**: A standard network protocol used to transfer files between a client and server over the internet or a network.
- **Key Points**:
  - Supports uploading and downloading files.
  - **Insecure** because it transmits data, including credentials, in plain text.

SFTP (Secure File Transfer Protocol)

- **Definition**: A secure version of FTP that uses SSH to encrypt file transfers.
- **Key Points**:
  - Provides secure data transfer.
  - Authentication and encryption are handled via SSH.

gzip tar

- **gzip**:
  - **Definition**: A compression tool used to reduce the size of files in Linux.
  - **Example**: Compressing a file: gzip file.txt creates file.txt.gz.
- **tar**:
  - **Definition**: A tool used to archive multiple files into one.
  - **Example**: Creating an archive: tar -cvf archive.tar file1 file2.
- **Combined Use**:
  - To create a compressed archive: tar -czvf archive.tar.gz file1 file2.

bash (Bourne Again SHell)

- **Definition**: A Unix/Linux shell and command language used to interact with the operating system.
- **Key Points**:
  - Allows users to execute commands, write scripts, and automate tasks.
  - Default shell in most Linux distributions.

Apache

- **Definition**: An open-source HTTP server used to host websites and web applications.
- **Key Points**:
    - Highly configurable with modules (e.g., PHP, SSL).
    - Default web server in many Linux distributions.
    - Configuration files are typically located in /etc/apache2/.