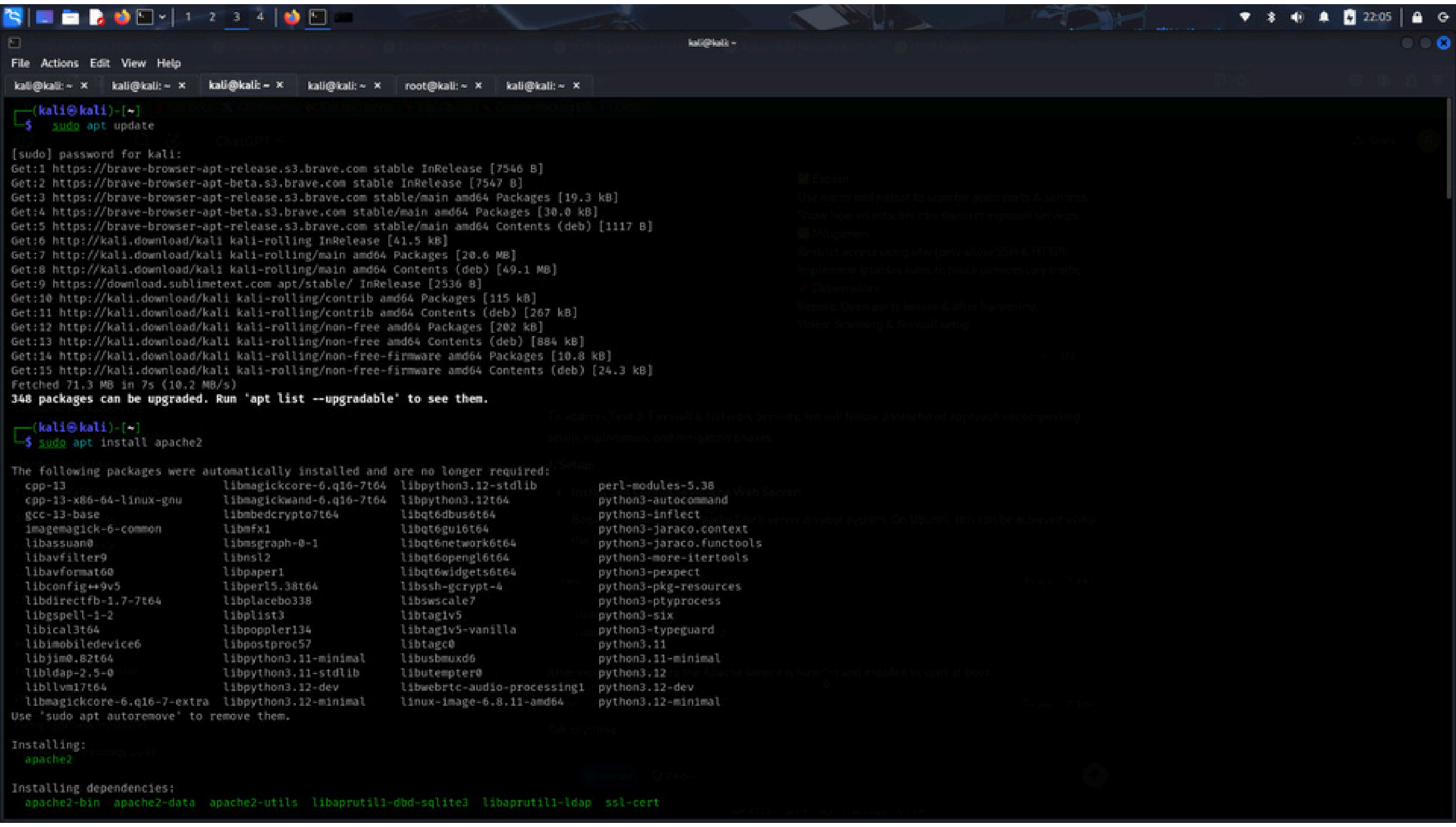
POC TASK 3

1. Setup:

- **Install and Configure Apache Web Server:**

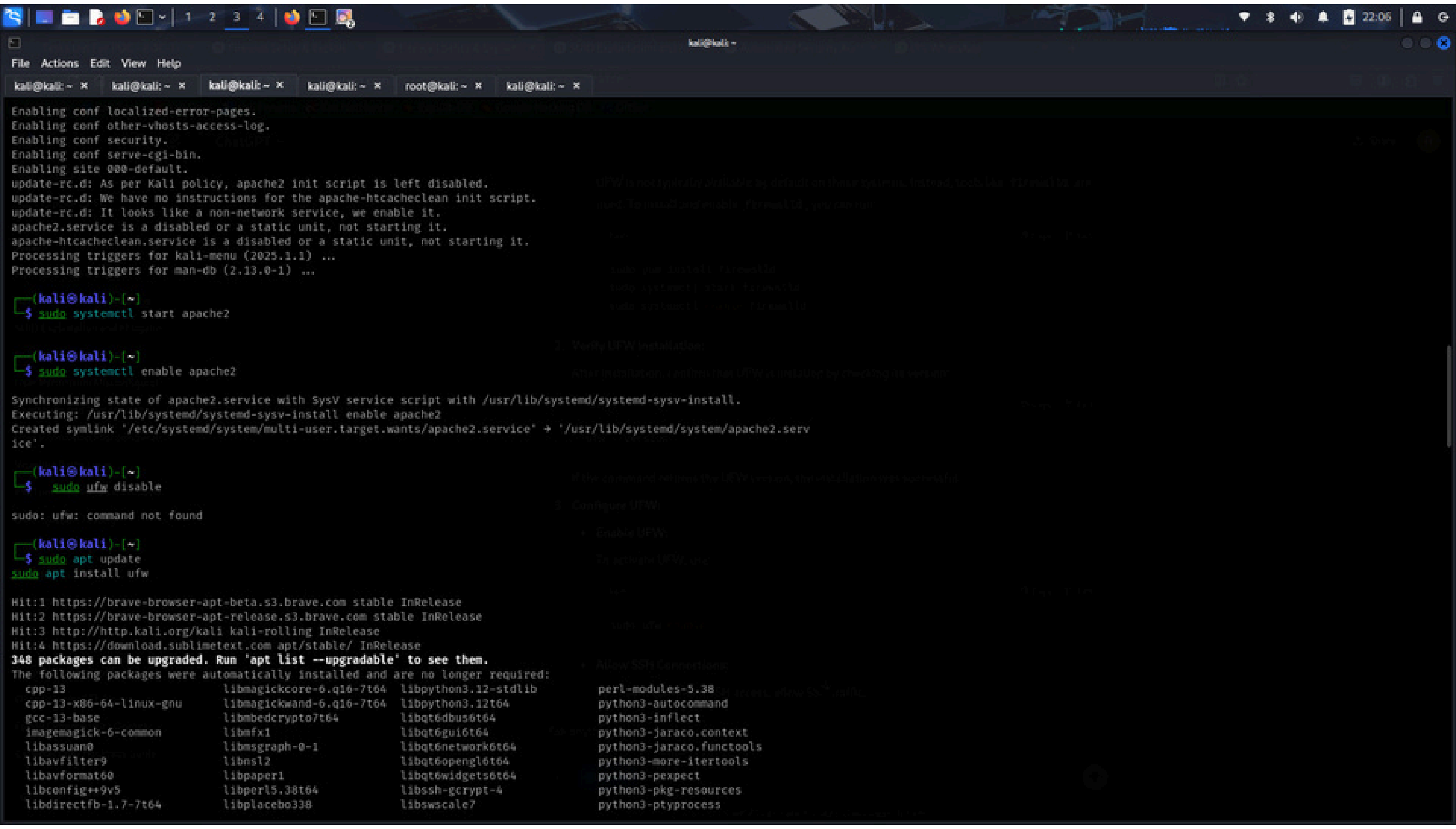


```
┌──(kali㉿kali)-[~]
└─$  sudo apt update

[sudo] password for kali:
Get:1 https://brave-browser-apt-release.s3.brave.com stable InRelease [7546 B]
Get:2 https://brave-browser-apt-beta.s3.brave.com stable InRelease [7547 B]
Get:3 https://brave-browser-apt-release.s3.brave.com stable/main amd64 Packages [19.3 kB]
Get:4 https://brave-browser-apt-beta.s3.brave.com stable/main amd64 Packages [30.0 kB]
Get:5 https://brave-browser-apt-release.s3.brave.com stable/main amd64 Contents (deb) [1117 B]
Get:6 http://kali.download/kali kali-rolling InRelease [41.5 kB]
Get:7 http://kali.download/kali kali-rolling/main amd64 Packages [20.6 MB]
Get:8 http://kali.download/kali kali-rolling/main amd64 Contents (deb) [49.1 MB]
Get:9 https://download.sublimetext.com apt/stable/ InRelease [2536 B]
Get:10 http://kali.download/kali kali-rolling/contrib amd64 Packages [115 kB]
Get:11 http://kali.download/kali kali-rolling/contrib amd64 Contents (deb) [267 kB]
Get:12 http://kali.download/kali kali-rolling/non-free amd64 Packages [202 kB]
Get:13 http://kali.download/kali kali-rolling/non-free amd64 Contents (deb) [884 kB]
Get:14 http://kali.download/kali kali-rolling/non-free-firmware amd64 Packages [10.8 kB]
Get:15 http://kali.download/kali kali-rolling/non-free-firmware amd64 Contents (deb) [24.3 kB]
Fetched 71.3 MB in 7s (10.2 MB/s)
348 packages can be upgraded. Run 'apt list --upgradable' to see them.

┌──(kali㉿kali)-[~]
└─$ sudo apt install apache2

The following packages were automatically installed and are no longer required:
  cpp-13                       libmagickcore-6.q16-7t64  libpython3.12-stdlib           perl-modules-5.38
  cpp-13-x86-64-linux-gnu      libmagickwand-6.q16-7t64  libpython3.12t64               python3-autocommand
  gcc-13-base                  libmbedcrypto7t64         libqt6dbus6t64                 python3-inflect
  imagemagick-6-common         libmfx1                   libqt6gui6t64                  python3-jaraco.context
  libassuan0                   libmsgraph-0-1            libqt6network6t64              python3-jaraco.functools
  libavfilter9                 libnsl2                   libqt6opengl6t64               python3-more-itertools
  libavformat60                libpaper1                 libqt6widgets6t64              python3-pexpect
  libconfig++9v5               libperl5.38t64            libssh-gcrypt-4                python3-pkg-resources
  libdirectfb-1.7-7t64         libplacebo338             libswscale7                    python3-ptyprocess
  libgspell-1-2                libplist3                 libtag1v5                      python3-six
  libical3t64                  libpoppler134             libtag1v5-vanilla              python3-typeguard
  libimobiledevice6            libpostproc57             libtagc0                       python3.11
  libjim0.82t64                libpython3.11-minimal     libusbmuxd6                    python3.11-minimal
  libldap-2.5-0                libpython3.11-stdlib      libutempter0                   python3.12
  libllvm17t64                 libpython3.12-dev         libwebrtc-audio-processing1    python3.12-dev
  libmagickcore-6.q16-7-extra  libpython3.12-minimal     linux-image-6.8.11-amd64       python3.12-minimal
Use 'sudo apt autoremove' to remove them.

Installing:
  apache2

Installing dependencies:
  apache2-bin  apache2-data  apache2-utils  libaprutil1-dbd-sqlite3  libaprutil1-ldap  ssl-cert
```

- Begin by installing the Apache2 web server on your system. On Ubuntu, this can be achieved using the following commands:

```
sudo apt update

sudo apt install apache2
```

After installation, ensure the Apache service is running and enabled to start at boot:



```
Enabling conf localized-error-pages.
Enabling conf other-vhosts-access-log.
Enabling conf security.
Enabling conf serve-cgi-bin.
Enabling site 000-default.
update-rc.d: As per Kali policy, apache2 init script is left disabled.
update-rc.d: We have no instructions for the apache-htcacheclean init script.
update-rc.d: It looks like a non-network service, we enable it.
apache2.service is a disabled or a static unit, not starting it.
apache-htcacheclean.service is a disabled or a static unit, not starting it.
Processing triggers for kali-menu (2025.1.1) ...
Processing triggers for man-db (2.13.0-1) ...

┌──(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.serv
ice'.

┌──(kali㉿kali)-[~]
└─$   sudo ufw disable

sudo: ufw: command not found

┌──(kali㉿kali)-[~]
└─$ sudo apt update
sudo apt install ufw

Hit:1 https://brave-browser-apt-beta.s3.brave.com stable InRelease
Hit:2 https://brave-browser-apt-release.s3.brave.com stable InRelease
Hit:3 http://http.kali.org/kali kali-rolling InRelease
Hit:4 https://download.sublimetext.com apt/stable/ InRelease
348 packages can be upgraded. Run 'apt list --upgradable' to see them.
The following packages were automatically installed and are no longer required:
  cpp-13                    libmagickcore-6.q16-7t64  libpython3.12-stdlib        perl-modules-5.38
  cpp-13-x86-64-linux-gnu   libmagickwand-6.q16-7t64  libpython3.12t64            python3-autocommand
  gcc-13-base               libmbedcrypto7t64         libqt6dbus6t64              python3-inflect
  imagemagick-6-common      libmfx1                   libqt6gui6t64               python3-jaraco.context
  libassuan0                libmsgraph-0-1            libqt6network6t64           python3-jaraco.functools
  libavfilter9              libnsl2                   libqt6opengl6t64            python3-more-itertools
  libavformat60             libpaper1                 libqt6widgets6t64           python3-pexpect
  libconfig++9v5            libperl5.38t64            libssh-gcrypt-4             python3-pkg-resources
  libdirectfb-1.7-7t64      libplacebo338             libswscale7                 python3-ptyprocess
```

```
sudo systemctl start apache2

sudo systemctl enable apache2
```

Disable UFW to Allow All Traffic:

To permit all incoming and outgoing traffic temporarily, disable the Uncomplicated Firewall (UFW):

```
sudo ufw disable
```

2. Exploit:

Scan for Open Ports and Services Using Nmap and Netcat:

With the firewall disabled, an attacker can utilize tools like Nmap and Netcat to identify open ports and running services:

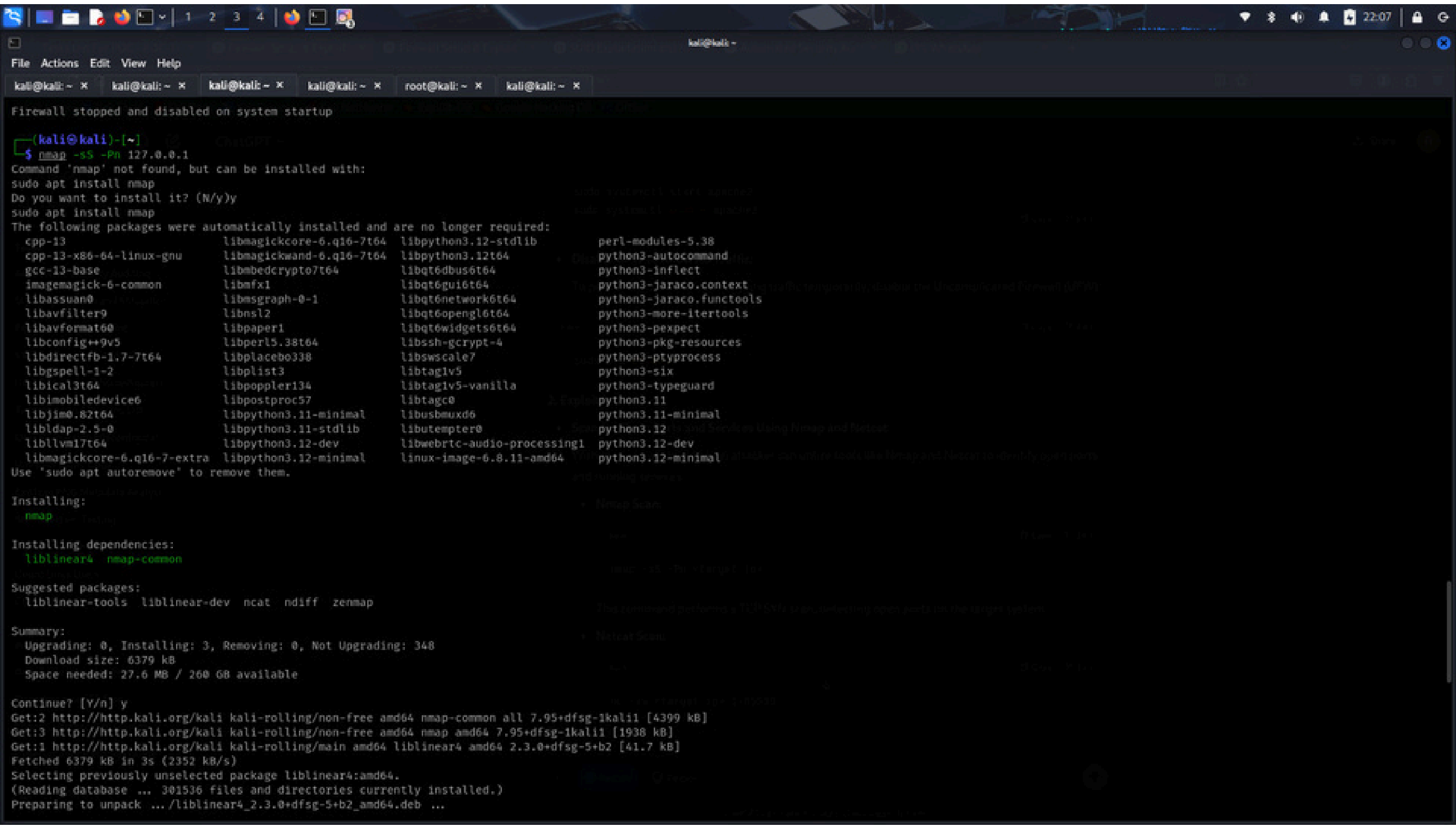
Nmap Scan:

```
nmap -sS -Pn <target_ip>
```

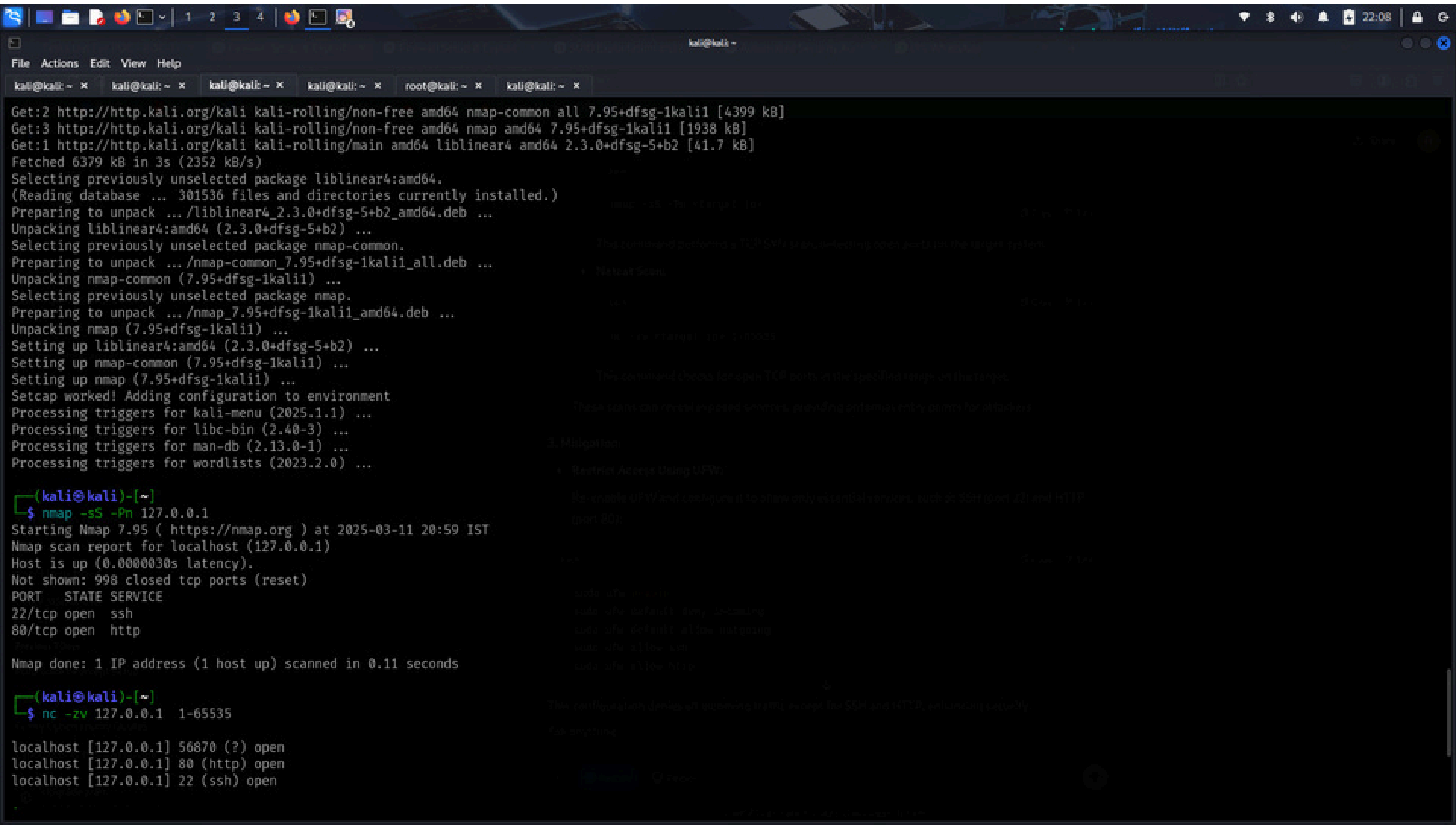
- This command performs a TCP SYN scan, detecting open ports on the target system.

Netcat Scan:

```
nc -zv <target_ip> 1-65535
```



```
Firewall stopped and disabled on system startup

┌──(kali㉿kali)-[~]
└─$ nmap -sS -Pn 127.0.0.1
Command 'nmap' not found, but can be installed with:
sudo apt install nmap
Do you want to install it? (N/y)y
sudo apt install nmap
The following packages were automatically installed and are no longer required:
  cpp-13                        libmagickcore-6.q16-7t64  libpython3.12-stdlib          perl-modules-5.38
  cpp-13-x86-64-linux-gnu       libmagickwand-6.q16-7t64  libpython3.12t64              python3-autocommand
  gcc-13-base                   libmbedcrypto7t64         libqt6dbus6t64                python3-inflect
  imagemagick-6-common          libmfx1                   libqt6gui6t64                 python3-jaraco.context
  libassuan0                    libmsgraph-0-1            libqt6network6t64             python3-jaraco.functools
  libavfilter9                  libnsl2                   libqt6opengl6t64              python3-more-itertools
  libavformat60                 libpaper1                 libqt6widgets6t64             python3-pexpect
  libconfig++9v5                libperl5.38t64            libssh-gcrypt-4               python3-pkg-resources
  libdirectfb-1.7-7t64          libplacebo338             libswscale7                   python3-ptyprocess
  libgspell-1-2                 libplist3                 libtag1v5                     python3-six
  libical3t64                   libpoppler134             libtag1v5-vanilla             python3-typeguard
  libimobiledevice6             libpostproc57             libtagc0                      python3.11
  libjim0.82t64                 libpython3.11-minimal     libusbmuxd6                   python3.11-minimal
  libldap-2.5-0                 libpython3.11-stdlib      libutempter0                  python3.12
  libllvm17t64                  libpython3.12-dev         libwebrtc-audio-processing1   python3.12-dev
  libmagickcore-6.q16-7-extra   libpython3.12-minimal     linux-image-6.8.11-amd64      python3.12-minimal
Use 'sudo apt autoremove' to remove them.

Installing:
  nmap

Installing dependencies:
  liblinear4  nmap-common

Suggested packages:
  liblinear-tools  liblinear-dev  ncat  ndiff  zenmap

Summary:
  Upgrading: 0, Installing: 3, Removing: 0, Not Upgrading: 348
  Download size: 6379 kB
  Space needed: 27.6 MB / 260 GB available

Continue? [Y/n] y
Get:2 http://http.kali.org/kali kali-rolling/non-free amd64 nmap-common all 7.95+dfsg-1kali1 [4399 kB]
Get:3 http://http.kali.org/kali kali-rolling/non-free amd64 nmap amd64 7.95+dfsg-1kali1 [1938 kB]
Get:1 http://http.kali.org/kali kali-rolling/main amd64 liblinear4 amd64 2.3.0+dfsg-5+b2 [41.7 kB]
Fetched 6379 kB in 3s (2352 kB/s)
Selecting previously unselected package liblinear4:amd64.
(Reading database ... 301536 files and directories currently installed.)
Preparing to unpack .../liblinear4_2.3.0+dfsg-5+b2_amd64.deb ...
```



```
Get:2 http://http.kali.org/kali kali-rolling/non-free amd64 nmap-common all 7.95+dfsg-1kali1 [4399 kB]
Get:3 http://http.kali.org/kali kali-rolling/non-free amd64 nmap amd64 7.95+dfsg-1kali1 [1938 kB]
Get:1 http://http.kali.org/kali kali-rolling/main amd64 liblinear4 amd64 2.3.0+dfsg-5+b2 [41.7 kB]
Fetched 6379 kB in 3s (2352 kB/s)
Selecting previously unselected package liblinear4:amd64.
(Reading database ... 301536 files and directories currently installed.)
Preparing to unpack .../liblinear4_2.3.0+dfsg-5+b2_amd64.deb ...
Unpacking liblinear4:amd64 (2.3.0+dfsg-5+b2) ...
Selecting previously unselected package nmap-common.
Preparing to unpack .../nmap-common_7.95+dfsg-1kali1_all.deb ...
Unpacking nmap-common (7.95+dfsg-1kali1) ...
Selecting previously unselected package nmap.
Preparing to unpack .../nmap_7.95+dfsg-1kali1_amd64.deb ...
Unpacking nmap (7.95+dfsg-1kali1) ...
Setting up liblinear4:amd64 (2.3.0+dfsg-5+b2) ...
Setting up nmap-common (7.95+dfsg-1kali1) ...
Setting up nmap (7.95+dfsg-1kali1) ...
Setcap worked! Adding configuration to environment
Processing triggers for kali-menu (2025.1.1) ...
Processing triggers for libc-bin (2.40-3) ...
Processing triggers for man-db (2.13.0-1) ...
Processing triggers for wordlists (2023.2.0) ...

┌──(kali㉿kali)-[~]
└─$ nmap -sS -Pn 127.0.0.1
Starting Nmap 7.95 ( https://nmap.org ) at 2025-03-11 20:59 IST
Nmap scan report for localhost (127.0.0.1)
Host is up (0.0000030s latency).
Not shown: 998 closed tcp ports (reset)
PORT   STATE SERVICE
22/tcp open  ssh
80/tcp open  http

Nmap done: 1 IP address (1 host up) scanned in 0.11 seconds

┌──(kali㉿kali)-[~]
└─$ nc -zv 127.0.0.1  1-65535

localhost [127.0.0.1] 56870 (?) open
localhost [127.0.0.1] 80 (http) open
localhost [127.0.0.1] 22 (ssh) open
```

This command checks for open TCP ports in the specified range on the target.

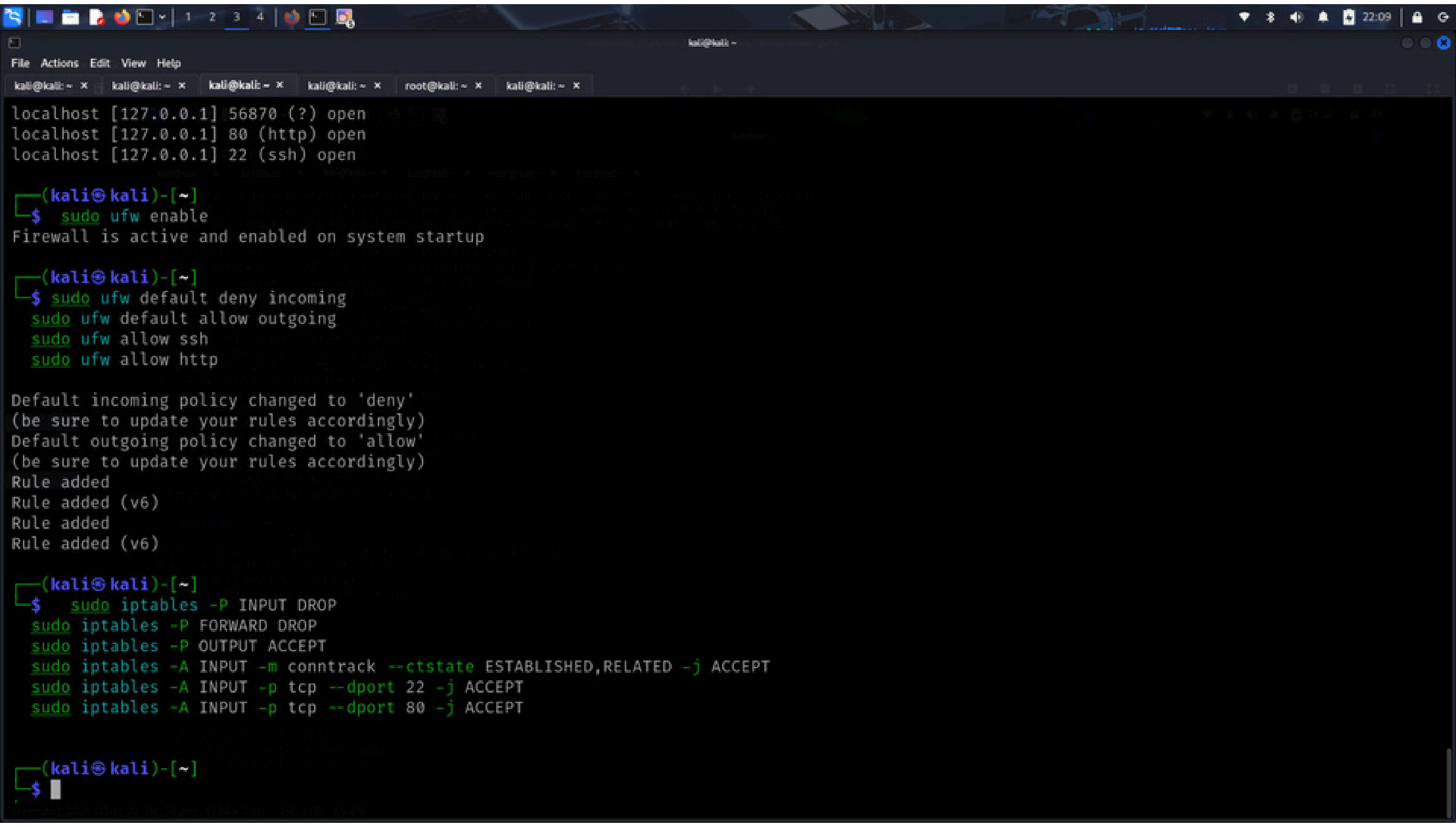
These scans can reveal exposed services, providing potential entry points for attackers.

3. Mitigation:

- **Restrict Access Using UFW:**
- Re-enable UFW and configure it to allow only essential services, such as SSH (port 22) and HTTP (port 80):

```
sudo ufw enable

sudo ufw default deny incoming

sudo ufw default allow outgoing

sudo ufw allow ssh

sudo ufw allow http
```

This configuration denies all incoming traffic except for SSH and HTTP, enhancing security.



```
localhost [127.0.0.1] 56870 (?) open
localhost [127.0.0.1] 80 (http) open
localhost [127.0.0.1] 22 (ssh) open

┌──(kali㉿kali)-[~]
└─$  sudo ufw enable
Firewall is active and enabled on system startup

┌──(kali㉿kali)-[~]
└─$ sudo ufw default deny incoming
  sudo ufw default allow outgoing
  sudo ufw allow ssh
  sudo ufw allow http

Default incoming policy changed to 'deny'
(be sure to update your rules accordingly)
Default outgoing policy changed to 'allow'
(be sure to update your rules accordingly)
Rule added
Rule added (v6)
Rule added
Rule added (v6)

┌──(kali㉿kali)-[~]
└─$   sudo iptables -P INPUT DROP
  sudo iptables -P FORWARD DROP
  sudo iptables -P OUTPUT ACCEPT
  sudo iptables -A INPUT -m conntrack --ctstate ESTABLISHED,RELATED -j ACCEPT
  sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT
  sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT


┌──(kali㉿kali)-[~]
└─$ 
```

- **Implement iptables Rules to Block Unnecessary Traffic:**
- For more granular control, iptables can be used to define specific rules:

```
sudo iptables -P INPUT DROP

sudo iptables -P FORWARD DROP

sudo iptables -P OUTPUT ACCEPT

sudo iptables -A INPUT -m conntrack --ctstate ESTABLISHED,RELATED -j ACCEPT

sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT

sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT
```

These commands set default policies to drop incoming and forwarding traffic, accept outgoing traffic, and allow established connections along with SSH and HTTP traffic.