LAPORAN ADVANCE NETWORK SECURITY AND PROTOCOLS

Implementasi Honeypot Cowrie untuk Deteksi Pola Penyerangan Double Attack

DISUSUN OLEH

KELOMPOK 3

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PROGRAM STUDI INFORMATIKA

FAKULTAS TEKNIK

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1. Pendahuluan

Pada praktikum ini dilakukan implementasi honeypot Cowrie sebagai sistem deteksi dini terhadap serangan jaringan, khususunya serangan dengan pola penyerangan ganda *(Double Attack)*. Honeypot Cowrie dipilih karena mampu mensimulasikan layanan SSH palsu dan mencatat aktivitas penyerang secara detail tanpa membahayakan sistem asli.

Pengujian difokuskan pada kombinasi serangan port scanning, brute force, dan DdoS, yang dijalankan secara bersamaan untuk melihat bagaimana sistem honeypot merespon aktivitas penyerang pada berbagai lapisan

2. Lingkungan dan topologi pengujian

pengujian dilakukan menggunakan dua mesin virtual dengan peran yang berbeda, yaitu:

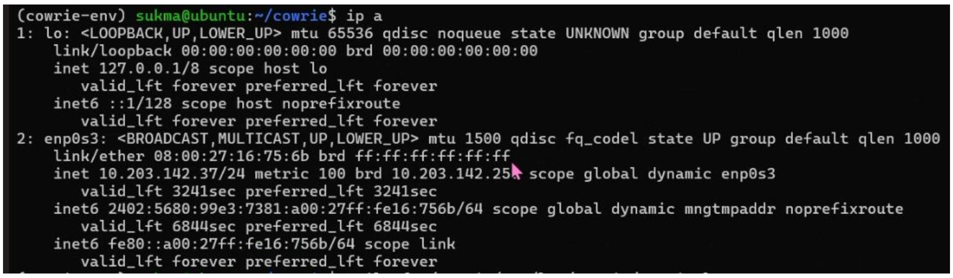
a. Mesin penyerang (attacker)
   Sistem Operasi : Kali linux
   Digunakan untuk melakukan simulasi serangan

b. Mesin Target
   Sistem Operasi : Ubuntu Server
   Digunakan sebagai server yang menjalankan honeypot Cowrie.

Kedua mesin dikonfigurasi berada dalam satu jaringan agar dapat saling berkomunikasi secara langsung. Konfigurasi jaringan dilakukan dengan menyamakan mode network adapter pada kedua mesin Virtual.

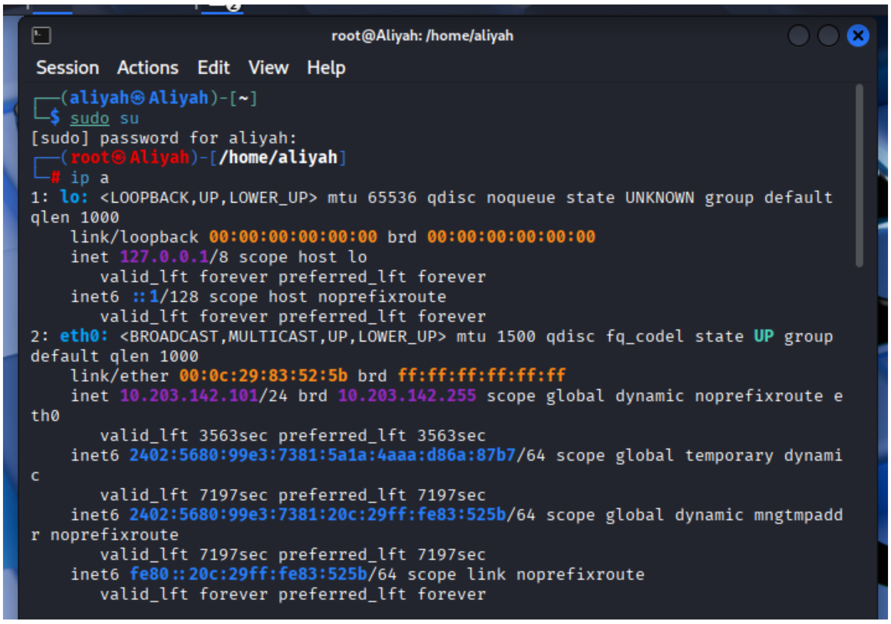
3. Konfigurasi Jaringan Awal

a. Pengecekan IP Address pada Ubuntu Server



```
(cowrie-env) sukma@ubuntu:~/cowrie$ 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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:16:75:6b brd ff:ff:ff:ff:ff:ff
    inet 10.203.142.37/24 metric 100 brd 10.203.142.25 scope global dynamic enp0s3
       valid_lft 3241sec preferred_lft 3241sec
    inet6 2402:5680:99e3:7381:a00:27ff:fe16:756b/64 scope global dynamic mngtmpaddr noprefixroute
       valid_lft 6844sec preferred_lft 6844sec
    inet6 fe80::a00:27ff:fe16:756b/64 scope link
       valid_lft forever preferred_lft forever
```

b. Pengecekan IP Address pada Kali Linux

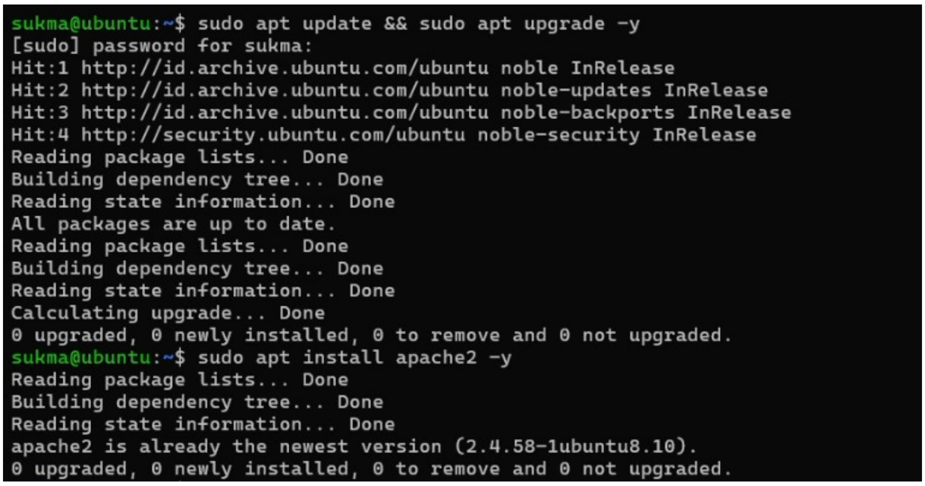


```
┌──(aliyah㉿Aliyah)-[~]
└─$ sudo su
[sudo] password for aliyah:
┌──(root㉿Aliyah)-[/home/aliyah]
└─# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft 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 00:0c:29:83:52:5b brd ff:ff:ff:ff:ff:ff
    inet 10.203.142.101/24 brd 10.203.142.255 scope global dynamic noprefixroute e
th0
       valid_lft 3563sec preferred_lft 3563sec
    inet6 2402:5680:99e3:7381:5a1a:4aaa:d86a:87b7/64 scope global temporary dynami
c
       valid_lft 7197sec preferred_lft 7197sec
    inet6 2402:5680:99e3:7381:20c:29ff:fe83:525b/64 scope global dynamic mngtmpadd
r noprefixroute
       valid_lft 7197sec preferred_lft 7197sec
    inet6 fe80::20c:29ff:fe83:525b/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
```

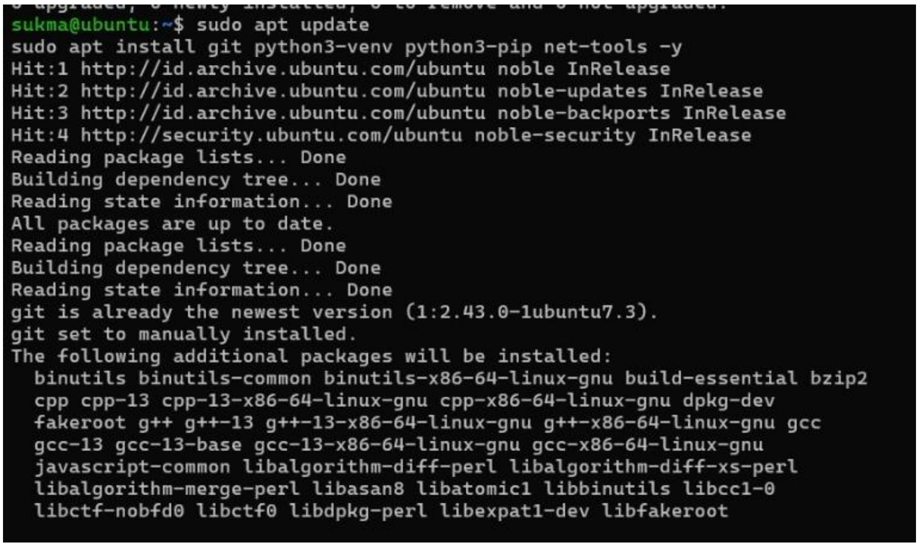
Langkah ini bertujuan untuk memastikan bahwa kedua mesin berada dalam satu subnet jaringan. Apabila mesin tidak berada dalam satu subnet, proses pengujian seperti port scanning dan serangan jaringan tidak dapat dilakukan

4. Persiapan Awal Ubuntu Server

4.1 Update Sistem



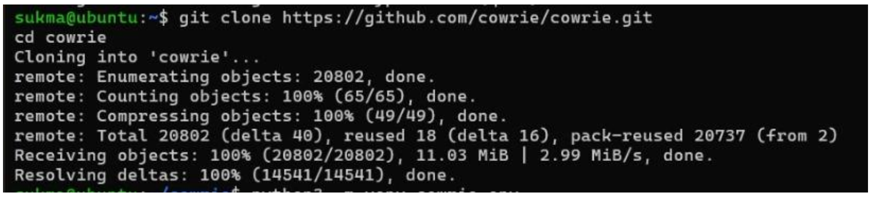
```
sukma@ubuntu:~$ sudo apt update && sudo apt upgrade -y
[sudo] password for sukma:
Hit:1 http://id.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://id.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://id.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Calculating upgrade... Done
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
sukma@ubuntu:~$ sudo apt install apache2 -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
apache2 is already the newest version (2.4.58-1ubuntu8.10).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```



```
sukma@ubuntu:~$ sudo apt update
sudo apt install git python3-venv python3-pip net-tools -y
Hit:1 http://id.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://id.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://id.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
git is already the newest version (1:2.43.0-1ubuntu7.3).
git set to manually installed.
The following additional packages will be installed:
  binutils binutils-common binutils-x86-64-linux-gnu build-essential bzip2
  cpp cpp-13 cpp-13-x86-64-linux-gnu cpp-x86-64-linux-gnu dpkg-dev
  fakeroot g++ g++-13 g++-13-x86-64-linux-gnu g++-x86-64-linux-gnu gcc
  gcc-13 gcc-13-base gcc-13-x86-64-linux-gnu gcc-x86-64-linux-gnu
  javascript-common libalgorithm-diff-perl libalgorithm-diff-xs-perl
  libalgorithm-merge-perl libasan8 libatomic1 libbinutils libcc1-0
  libctf-nobfd0 libctf0 libdpkg-perl libexpat1-dev libfakeroot
```

Update dilakukan untuk memastikan sistem berada pada kondisi terbaru dan menghindari konflik dependensi. Selanjutnya dilakukan instalasi beberapa paket pendukung seperti git, python3-venc, python3-pip, dan net-tools. Paket git digunakan untuk mengunduh source code honeypot Cowrie dari repositori resmi, sedangkan python3-venv dan python3-pip digunakan untuk membuat serta mengelola virtual environment Python. Paket net-tools digunakan sebagai alat bantu dalam proses pengecekan jaringan selama tahap konfigurasi dan pengujian.

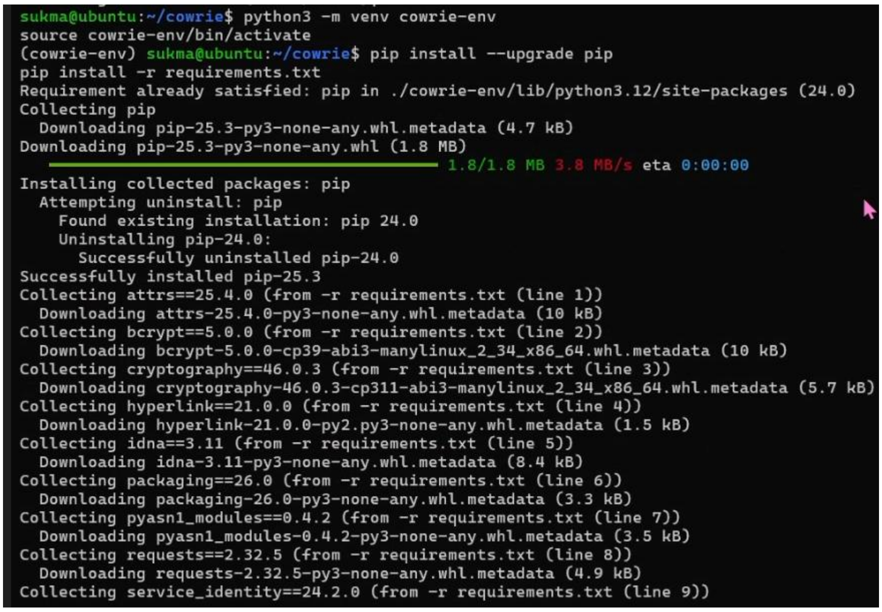
4.2 Instalasi Honeypot Cowrie



```
sukma@ubuntu:~$ git clone https://github.com/cowrie/cowrie.git
cd cowrie
Cloning into 'cowrie'...
remote: Enumerating objects: 20802, done.
remote: Counting objects: 100% (65/65), done.
remote: Compressing objects: 100% (49/49), done.
remote: Total 20802 (delta 40), reused 18 (delta 16), pack-reused 20737 (from 2)
Receiving objects: 100% (20802/20802), 11.03 MiB | 2.99 MiB/s, done.
Resolving deltas: 100% (14541/14541), done.
```

Pada tahap ini dilakukan pengunduhan source code honeypot Cowrie dari repositori resmi GitHub menggunakan perintah git clone. Setelah proses pengunduhan selesai, sistem berpindah ke direktori Cowrie untuk melanjutkan proses instalasi.

4.3 Instalasi Dependensi Python

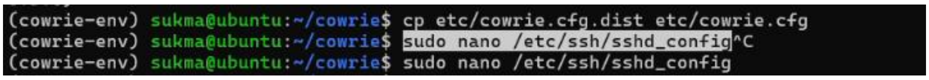


```
sukma@ubuntu:~/cowrie$ python3 -m venv cowrie-env
source cowrie-env/bin/activate
(cowrie-env) sukma@ubuntu:~/cowrie$ pip install --upgrade pip
pip install -r requirements.txt
Requirement already satisfied: pip in ./cowrie-env/lib/python3.12/site-packages (24.0)
Collecting pip
  Downloading pip-25.3-py3-none-any.whl.metadata (4.7 kB)
Downloading pip-25.3-py3-none-any.whl (1.8 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 1.8/1.8 MB 3.8 MB/s eta 0:00:00
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 24.0
    Uninstalling pip-24.0:
      Successfully uninstalled pip-24.0
Successfully installed pip-25.3
Collecting attrs==25.4.0 (from -r requirements.txt (line 1))
  Downloading attrs-25.4.0-py3-none-any.whl.metadata (10 kB)
Collecting bcrypt==5.0.0 (from -r requirements.txt (line 2))
  Downloading bcrypt-5.0.0-cp39-abi3-manylinux_2_34_x86_64.whl.metadata (10 kB)
Collecting cryptography==46.0.3 (from -r requirements.txt (line 3))
  Downloading cryptography-46.0.3-cp311-abi3-manylinux_2_34_x86_64.whl.metadata (5.7 kB)
Collecting hyperlink==21.0.0 (from -r requirements.txt (line 4))
  Downloading hyperlink-21.0.0-py2.py3-none-any.whl.metadata (1.5 kB)
Collecting idna==3.11 (from -r requirements.txt (line 5))
  Downloading idna-3.11-py3-none-any.whl.metadata (8.4 kB)
Collecting packaging==26.0 (from -r requirements.txt (line 6))
  Downloading packaging-26.0-py3-none-any.whl.metadata (3.3 kB)
Collecting pyasn1_modules==0.4.2 (from -r requirements.txt (line 7))
  Downloading pyasn1_modules-0.4.2-py3-none-any.whl.metadata (3.5 kB)
Collecting requests==2.32.5 (from -r requirements.txt (line 8))
  Downloading requests-2.32.5-py3-none-any.whl.metadata (4.9 kB)
Collecting service_identity==24.2.0 (from -r requirements.txt (line 9))
```

Melakukan pembuatan virtual environment Python menggunakan perintah python3 -m venv cowrie-env. Virtual environment ini digunakan untuk mengisolasi seluruh dependensi Cowrie agar tidak bercampur dengan paket Python pada sistem utama.

Setelah virtual environment diaktifkan, dilakukan pembaruan pip dan instalasi seluruh library Python yang dibutuhkan oleh Cowrie melalui file requirements.txt. Proses ini mencakup instalasi berbagai modul pendukung seperti twisted, cryptography, dan hyperlink yang merupakan komponen utama dalam operasi honeypot Cowrie.

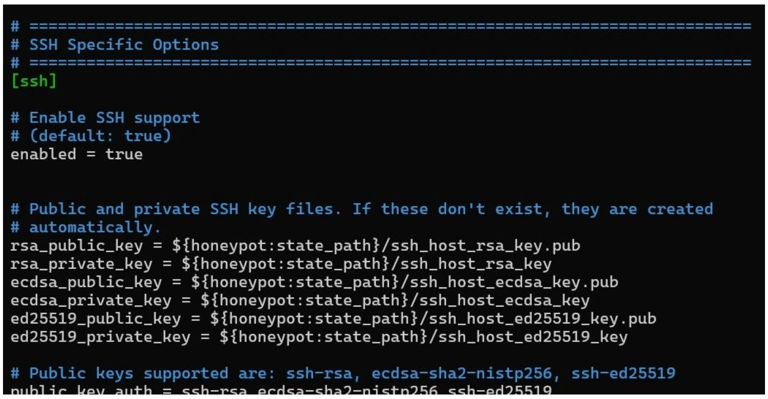
4.4 Konfigurasi Awal Cowrie



```
(cowrie-env) sukma@ubuntu:~/cowrie$ cp etc/cowrie.cfg.dist etc/cowrie.cfg
(cowrie-env) sukma@ubuntu:~/cowrie$ sudo nano /etc/ssh/sshd_config^C
(cowrie-env) sukma@ubuntu:~/cowrie$ sudo nano /etc/ssh/sshd_config
```

Pada tahap ini dilakukan penyalinan file konfigurasi bawaan Cowrie menggunakan perintah cp etc/cowrie.cfg.dist etc/cowrie.cfg. Proses ini bertujuan untuk membuat file konfigurasi aktif (cowrie.cfg) yang nantinya akan digunakan sebagai dasar pengaturan honeypot Cowrie.

Selanjutnya, dilakukan pengeditan file konfigurasi layanan SSH Ubuntu Server melalui file /etc/ssh/sshd_config. Konfigurasi ini diperlukan untuk menyesuaikan pengaturan layanan SSH asli agar tidak berbenturan dengan layanan SSH palsu yang dijalankan oleh honeypot Cowrie.

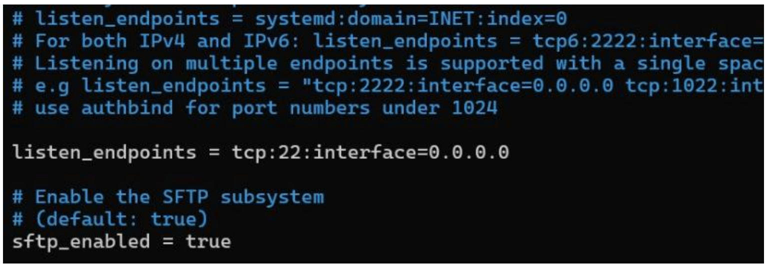


```
# ============================================================================
# SSH Specific Options
# ============================================================================
[ssh]

# Enable SSH support
# (default: true)
enabled = true


# Public and private SSH key files. If these don't exist, they are created
# automatically.
rsa_public_key = ${honeypot:state_path}/ssh_host_rsa_key.pub
rsa_private_key = ${honeypot:state_path}/ssh_host_rsa_key
ecdsa_public_key = ${honeypot:state_path}/ssh_host_ecdsa_key.pub
ecdsa_private_key = ${honeypot:state_path}/ssh_host_ecdsa_key
ed25519_public_key = ${honeypot:state_path}/ssh_host_ed25519_key.pub
ed25519_private_key = ${honeypot:state_path}/ssh_host_ed25519_key

# Public keys supported are: ssh-rsa, ecdsa-sha2-nistp256, ssh-ed25519
public_key_auth = ssh-rsa,ecdsa-sha2-nistp256,ssh-ed25519
```



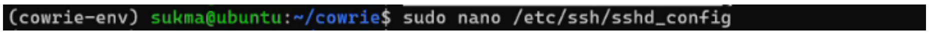
```
# listen_endpoints = systemd:domain=INET:index=0
# For both IPv4 and IPv6: listen_endpoints = tcp6:2222:interface=
# Listening on multiple endpoints is supported with a single spac
# e.g listen_endpoints = "tcp:2222:interface=0.0.0.0 tcp:1022:int
# use authbind for port numbers under 1024

listen_endpoints = tcp:22:interface=0.0.0.0

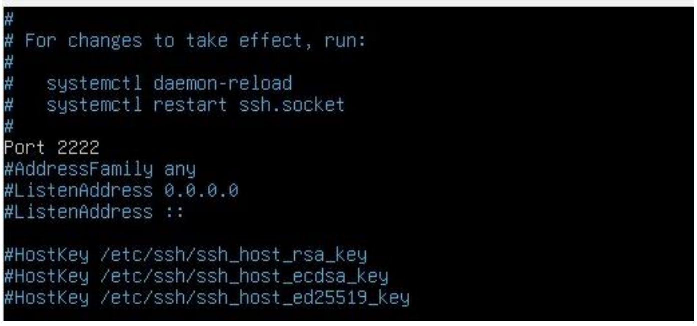
# Enable the SFTP subsystem
# (default: true)
sftp_enabled = true
```

Cowrie dikonfigurasi untuk berjalan pada port 22 sebagai server jebakan SSH.

4.5 Pengamanan SSH Asli Ubuntu Server



```
(cowrie-env) sukma@ubuntu:~/cowrie$ sudo nano /etc/ssh/sshd_config
```



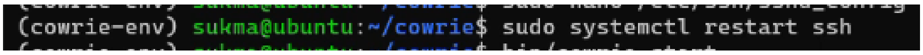
```
#
# For changes to take effect, run:
#
#   systemctl daemon-reload
#   systemctl restart ssh.socket
#
Port 2222
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key
```

Pada tahap ini dilakukan pengamanan layanan SSH asli pada Ubuntu Server. Pengamanan ini bertujuan untuk mencegah konflik antara layanan SSH asli dengan layanan SSH palsu yang dijalankan oleh honeypot Cowrie serta meminimalkan risiko serangan langsung terhadap layanan SSH asli.

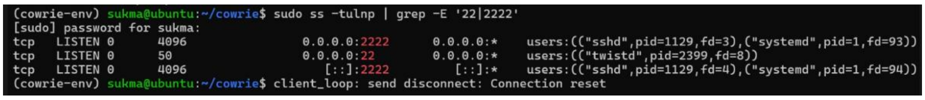
dilakukan pengeditan file konfigurasi SSH Ubuntu Server melalui file /etc/ssh/sshd_config. Pada konfigurasi ini, port SSH asli diubah dari port default menjadi port lain, yaitu **port 2222**, dengan cara mengaktifkan baris konfigurasi **port 2222.** Dengan demikian, port 22 dapat digunakan oleh honeypot Cowrie sebagai server jebakan yang akan menerima dan merekam aktivitas penyerang. Setelah di konfigurasi simpan perubahan dengan menekan CTRL + O enter dan keluar dengan CTRL + X.

setelah keluar retart SSH dengan perintah berikut:



```
(cowrie-env) sukma@ubuntu:~/cowrie$ sudo systemctl restart ssh
```

4.6 Verifikasi Port Aktif

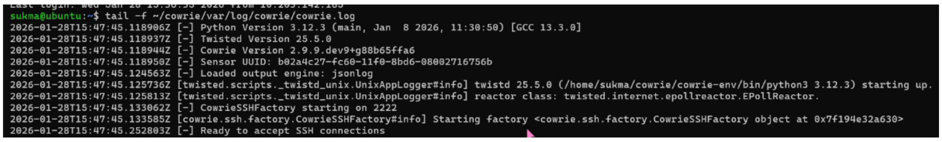


```
(cowrie-env) sukma@ubuntu:~/cowrie$ sudo ss -tulnp | grep -E '22|2222'
[sudo] password for sukma:
tcp   LISTEN 0      4096                0.0.0.0:2222      0.0.0.0:*    users:(("sshd",pid=1129,fd=3),("systemd",pid=1,fd=93))
tcp   LISTEN 0      50                  0.0.0.0:22        0.0.0.0:*    users:(("twistd",pid=2399,fd=8))
tcp   LISTEN 0      4096                   [::]:2222         [::]:*    users:(("sshd",pid=1129,fd=4),("systemd",pid=1,fd=94))
(cowrie-env) sukma@ubuntu:~/cowrie$ client_loop: send disconnect: Connection reset
```

Port 22 digunakan oleh Cowrie dan port 2222 digunakan oleh SSH asli Ubuntu server

4.7 Menjalankan Honeypot Cowrie

Cowrie dijalankan oleh user cowrie dalam mode foreground

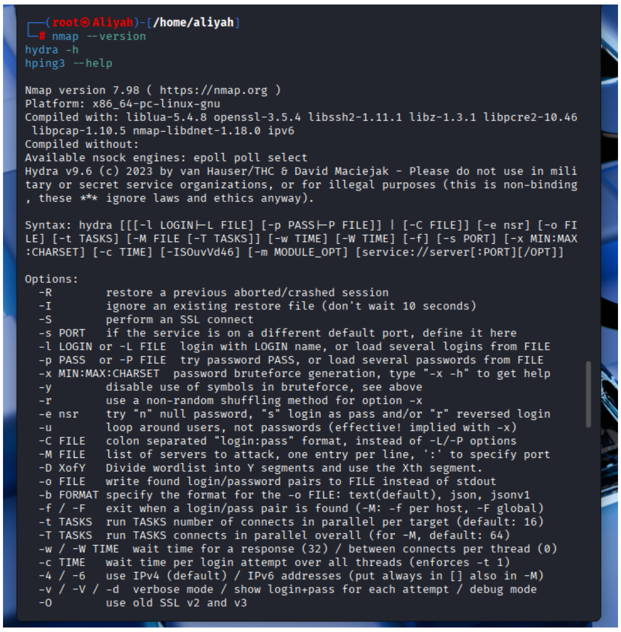


```
sukma@ubuntu:~$ tail -f ~/cowrie/var/log/cowrie/cowrie.log
2026-01-28T15:47:45.118906Z [-] Python Version 3.12.3 (main, Jan  8 2026, 11:30:50) [GCC 13.3.0]
2026-01-28T15:47:45.118937Z [-] Twisted Version 25.5.0
2026-01-28T15:47:45.118944Z [-] Cowrie Version 2.9.9.dev9+g88b65ffa6
2026-01-28T15:47:45.118950Z [-] Sensor UUID: b02a4c27-fc60-11f0-8bd6-08002716756b
2026-01-28T15:47:45.124563Z [-] Loaded output engine: jsonlog
2026-01-28T15:47:45.125736Z [twisted.scripts._twistd_unix.UnixAppLogger#info] twistd 25.5.0 (/home/sukma/cowrie/cowrie-env/bin/python3 3.12.3) starting up.
2026-01-28T15:47:45.125813Z [twisted.scripts._twistd_unix.UnixAppLogger#info] reactor class: twisted.internet.epollreactor.EPollReactor.
2026-01-28T15:47:45.133062Z [-] CowrieSSHFactory starting on 2222
2026-01-28T15:47:45.133585Z [cowrie.ssh.factory.CowrieSSHFactory#info] Starting factory <cowrie.ssh.factory.CowrieSSHFactory object at 0x7f194e32a630>
2026-01-28T15:47:45.252803Z [-] Ready to accept SSH connections
```

Ini menunjukkan bahwa cowrie telah aktif dan siap menerima koneksi SSH.

5. Simulasi Serangan dari Kali linux

Sebelum melakukan seranga pastikan terlebih dahulu bahwa tools yang digunakan sudah tersedia.



```
┌──(root㉿Aliyah)-[/home/aliyah]
└─# nmap --version
hydra -h
hping3 --help

Nmap version 7.98 ( https://nmap.org )
Platform: x86_64-pc-linux-gnu
Compiled with: liblua-5.4.8 openssl-3.5.4 libssh2-1.11.1 libz-1.3.1 libpcre2-10.46
 libpcap-1.10.5 nmap-libdnet-1.18.0 ipv6
Compiled without:
Available nsock engines: epoll poll select
Hydra v9.6 (c) 2023 by van Hauser/THC & David Maciejak - Please do not use in mili
tary or secret service organizations, or for illegal purposes (this is non-binding
, these *** ignore laws and ethics anyway).

Syntax: hydra [[[-l LOGIN|-L FILE] [-p PASS|-P FILE]] | [-C FILE]] [-e nsr] [-o FI
LE] [-t TASKS] [-M FILE [-T TASKS]] [-w TIME] [-W TIME] [-f] [-s PORT] [-x MIN:MAX
:CHARSET] [-c TIME] [-ISOuvVd46] [-m MODULE_OPT] [service://server[:PORT][/OPT]]

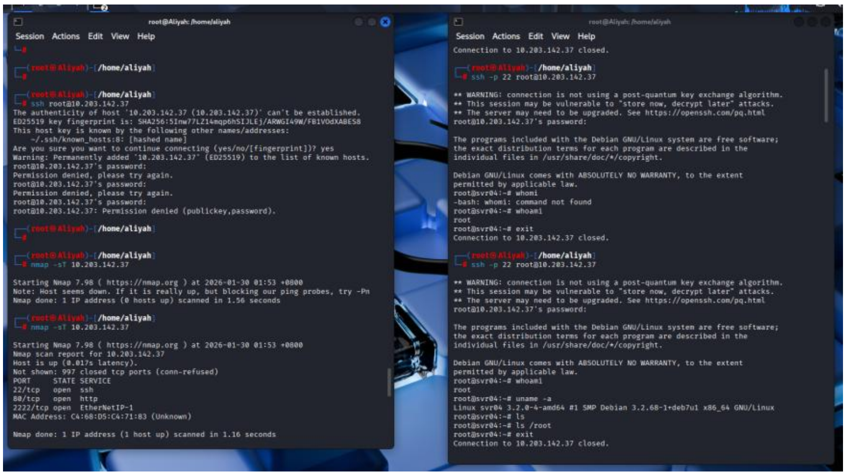
Options:
  -R        restore a previous aborted/crashed session
  -I        ignore an existing restore file (don't wait 10 seconds)
  -S        perform an SSL connect
  -s PORT   if the service is on a different default port, define it here
  -l LOGIN or -L FILE  login with LOGIN name, or load several logins from FILE
  -p PASS  or -P FILE  try password PASS, or load several passwords from FILE
  -x MIN:MAX:CHARSET  password bruteforce generation, type "-x -h" to get help
  -y        disable use of symbols in bruteforce, see above
  -r        use a non-random shuffling method for option -x
  -e nsr    try "n" null password, "s" login as pass and/or "r" reversed login
  -u        loop around users, not passwords (effective! implied with -x)
  -C FILE   colon separated "login:pass" format, instead of -L/-P options
  -M FILE   list of servers to attack, one entry per line, ':' to specify port
  -D XofY   Divide wordlist into Y segments and use the Xth segment.
  -o FILE   write found login/password pairs to FILE instead of stdout
  -b FORMAT specify the format for the -o FILE: text(default), json, jsonv1
  -f / -F   exit when a login/pass pair is found (-M: -f per host, -F global)
  -t TASKS  run TASKS number of connects in parallel per target (default: 16)
  -T TASKS  run TASKS connects in parallel overall (for -M, default: 64)
  -w / -W TIME  wait time for a response (32) / between connects per thread (0)
  -c TIME   wait time per login attempt over all threads (enforces -t 1)
  -4 / -6   use IPv4 (default) / IPv6 addresses (put always in [] also in -M)
  -v / -V / -d  verbose mode / show login+pass for each attempt / debug mode
  -O        use old SSL v2 and v3
```

Berdasarkan hasil verifikasi, tools Nmap, Hydra, dan Hping3 telah terinstal dan dapat dijalankan pada sistem Kali Linux. Nmap digunakan untuk melakukan *port scanning*, Hydra digunakan untuk simulasi serangan *brute force* pada layanan SSH, dan Hping3 digunakan untuk mensimulasikan peningkatan lalu lintas jaringan (*DDoS*).

Setelah itu kita masuk ke simulasi serangan double.

5.1 Simulasi Serangan Port Scanning Dan Brute Force

a. Kali linux (Attacker)



```
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh root@10.203.142.37
The authenticity of host '10.203.142.37 (10.203.142.37)' can't be established.
ED25519 key fingerprint is: SHA256:5Inw77LZ14mqp6hSIJLEj/ARWGI49W/FB1VOdXABES8
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:8: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.203.142.37' (ED25519) to the list of known hosts.
root@10.203.142.37's password:
Permission denied, please try again.
root@10.203.142.37's password:
Permission denied, please try again.
root@10.203.142.37's password:
root@10.203.142.37: Permission denied (publickey,password).

┌──(root㉿Aliyah)-[/home/aliyah]
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─# nmap -sT 10.203.142.37

Starting Nmap 7.98 ( https://nmap.org ) at 2026-01-30 01:53 +0800
Note: Host seems down. If it is really up, but blocking our ping probes, try -Pn
Nmap done: 1 IP address (0 hosts up) scanned in 1.56 seconds

┌──(root㉿Aliyah)-[/home/aliyah]
└─# nmap -sT 10.203.142.37

Starting Nmap 7.98 ( https://nmap.org ) at 2026-01-30 01:53 +0800
Nmap scan report for 10.203.142.37
Host is up (0.017s latency).
Not shown: 997 closed tcp ports (conn-refused)
PORT     STATE SERVICE
22/tcp   open  ssh
80/tcp   open  http
2222/tcp open  EtherNetIP-1
MAC Address: C4:68:D5:C4:71:83 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 1.16 seconds
```

```
Connection to 10.203.142.37 closed.

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh -p 22 root@10.203.142.37

** WARNING: connection is not using a post-quantum key exchange algorithm.
** This session may be vulnerable to "store now, decrypt later" attacks.
** The server may need to be upgraded. See https://openssh.com/pq.html
root@10.203.142.37's password:

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

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@svr04:~# whomi
-bash: whomi: command not found
root@svr04:~# whoami
root
root@svr04:~# exit
Connection to 10.203.142.37 closed.

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh -p 22 root@10.203.142.37

** WARNING: connection is not using a post-quantum key exchange algorithm.
** This session may be vulnerable to "store now, decrypt later" attacks.
** The server may need to be upgraded. See https://openssh.com/pq.html
root@10.203.142.37's password:

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

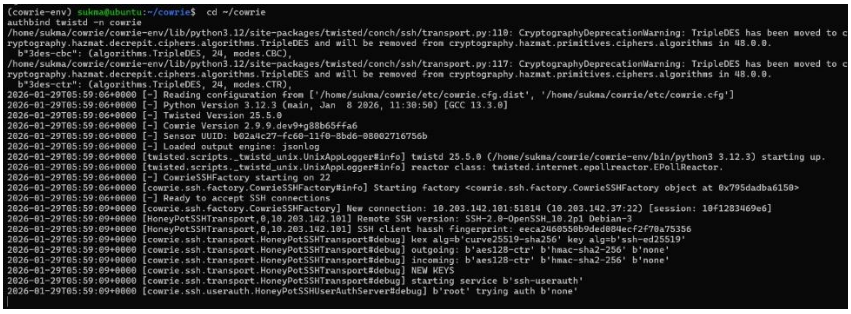
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@svr04:~# whoami
root
root@svr04:~# uname -a
Linux svr04 3.2.0-4-amd64 #1 SMP Debian 3.2.68-1+deb7u1 x86_64 GNU/Linux
root@svr04:~# ls
root@svr04:~# ls /root
root@svr04:~# exit
Connection to 10.203.142.37 closed.
```

Pada tahap ini, penyerang menggunakan Kali Linux untuk melakukan port scanning dan brute force attack terhadap server target. Pemindaian port dengan Nmap menunjukkan bahwa layanan

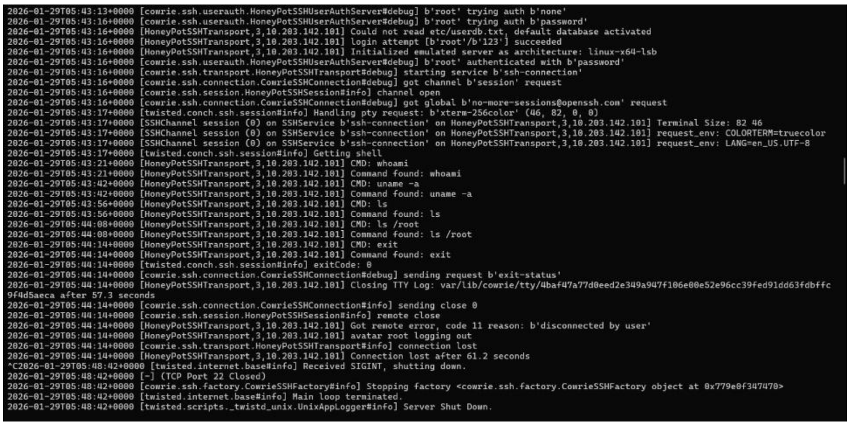
SSH aktif pada port 22 dan 2222. Setelah port target teridentifikasi, dilakukan percobaan koneksi SSH menggunakan akun root dengan berbagai kombinasi autentikasi.

Meskipun akses tidak sepenuhnya berhasil, koneksi tetap diterima oleh honeypot Cowrie dan diarahkan ke sistem palsu. Hal ini menunjukkan bahwa honeypot berhasil mendeteksi dan menangkap aktivitas serangan tanpa memberikan akses ke sistem asli.

b. Ubuntu Server (Target)



```
(cowrie-env) sukma@ubuntu:~/cowrie$  cd ~/cowrie
authbind twistd -n cowrie
/home/sukma/cowrie/cowrie-env/lib/python3.12/site-packages/twisted/conch/ssh/transport.py:110: CryptographyDeprecationWarning: TripleDES has been moved to c
ryptography.hazmat.decrepit.ciphers.algorithms.TripleDES and will be removed from cryptography.hazmat.primitives.ciphers.algorithms in 48.0.0.
  b"3des-cbc": (algorithms.TripleDES, 24, modes.CBC),
/home/sukma/cowrie/cowrie-env/lib/python3.12/site-packages/twisted/conch/ssh/transport.py:117: CryptographyDeprecationWarning: TripleDES has been moved to c
ryptography.hazmat.decrepit.ciphers.algorithms.TripleDES and will be removed from cryptography.hazmat.primitives.ciphers.algorithms in 48.0.0.
  b"3des-ctr": (algorithms.TripleDES, 24, modes.CTR),
2026-01-29T05:59:06+0000 [-] Reading configuration from ['/home/sukma/cowrie/etc/cowrie.cfg.dist', '/home/sukma/cowrie/etc/cowrie.cfg']
2026-01-29T05:59:06+0000 [-] Python Version 3.12.3 (main, Jan  8 2026, 11:30:50) [GCC 13.3.0]
2026-01-29T05:59:06+0000 [-] Twisted Version 25.5.0
2026-01-29T05:59:06+0000 [-] Cowrie Version 2.9.9.dev9+g88b65ffa6
2026-01-29T05:59:06+0000 [-] Sensor UUID: b02a4c27-fc60-11f0-8bd6-08002716756b
2026-01-29T05:59:06+0000 [-] Loaded output engine: jsonlog
2026-01-29T05:59:06+0000 [twisted.scripts._twistd_unix.UnixAppLogger#info] twistd 25.5.0 (/home/sukma/cowrie/cowrie-env/bin/python3 3.12.3) starting up.
2026-01-29T05:59:06+0000 [twisted.scripts._twistd_unix.UnixAppLogger#info] reactor class: twisted.internet.epollreactor.EPollReactor.
2026-01-29T05:59:06+0000 [-] CowrieSSHFactory starting on 22
2026-01-29T05:59:06+0000 [cowrie.ssh.factory.CowrieSSHFactory#info] Starting factory <cowrie.ssh.factory.CowrieSSHFactory object at 0x795dadba6150>
2026-01-29T05:59:06+0000 [-] Ready to accept SSH connections
2026-01-29T05:59:09+0000 [cowrie.ssh.factory.CowrieSSHFactory] New connection: 10.203.142.101:51814 (10.203.142.37:22) [session: 10f1283469e6]
2026-01-29T05:59:09+0000 [HoneyPotSSHTransport,0,10.203.142.101] Remote SSH version: SSH-2.0-OpenSSH_10.2p1 Debian-3
2026-01-29T05:59:09+0000 [HoneyPotSSHTransport,0,10.203.142.101] SSH client hassh fingerprint: eeca2460550b9ded084ecf2f70a75356
2026-01-29T05:59:09+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] kex alg=b'curve25519-sha256' key alg=b'ssh-ed25519'
2026-01-29T05:59:09+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] outgoing: b'aes128-ctr' b'hmac-sha2-256' b'none'
2026-01-29T05:59:09+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] incoming: b'aes128-ctr' b'hmac-sha2-256' b'none'
2026-01-29T05:59:09+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] NEW KEYS
2026-01-29T05:59:09+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] starting service b'ssh-userauth'
2026-01-29T05:59:09+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' trying auth b'none'
```



```
2026-01-29T05:43:13+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' trying auth b'none'
2026-01-29T05:43:16+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' trying auth b'password'
2026-01-29T05:43:16+0000 [HoneyPotSSHTransport,3,10.203.142.101] Could not read etc/userdb.txt, default database activated
2026-01-29T05:43:16+0000 [HoneyPotSSHTransport,3,10.203.142.101] login attempt [b'root'/b'123'] succeeded
2026-01-29T05:43:16+0000 [HoneyPotSSHTransport,3,10.203.142.101] Initialized emulated server as architecture: linux-x64-lsb
2026-01-29T05:43:16+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' authenticated with b'password'
2026-01-29T05:43:16+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] starting service b'ssh-connection'
2026-01-29T05:43:16+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] got channel b'session' request
2026-01-29T05:43:16+0000 [cowrie.ssh.session.HoneyPotSSHSession#info] channel open
2026-01-29T05:43:16+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] got global b'no-more-sessions@openssh.com' request
2026-01-29T05:43:17+0000 [twisted.conch.ssh.session#info] Handling pty request: b'xterm-256color' (46, 82, 0, 0)
2026-01-29T05:43:17+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,3,10.203.142.101] Terminal Size: 82 46
2026-01-29T05:43:17+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,3,10.203.142.101] request_env: COLORTERM=truecolor
2026-01-29T05:43:17+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,3,10.203.142.101] request_env: LANG=en_US.UTF-8
2026-01-29T05:43:17+0000 [twisted.conch.ssh.session#info] Getting shell
2026-01-29T05:43:21+0000 [HoneyPotSSHTransport,3,10.203.142.101] CMD: whoami
2026-01-29T05:43:21+0000 [HoneyPotSSHTransport,3,10.203.142.101] Command found: whoami
2026-01-29T05:43:42+0000 [HoneyPotSSHTransport,3,10.203.142.101] CMD: uname -a
2026-01-29T05:43:42+0000 [HoneyPotSSHTransport,3,10.203.142.101] Command found: uname -a
2026-01-29T05:43:56+0000 [HoneyPotSSHTransport,3,10.203.142.101] CMD: ls
2026-01-29T05:43:56+0000 [HoneyPotSSHTransport,3,10.203.142.101] Command found: ls
2026-01-29T05:44:08+0000 [HoneyPotSSHTransport,3,10.203.142.101] CMD: ls /root
2026-01-29T05:44:08+0000 [HoneyPotSSHTransport,3,10.203.142.101] Command found: ls /root
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] CMD: exit
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] Command found: exit
2026-01-29T05:44:14+0000 [twisted.conch.ssh.session#info] exitCode: 0
2026-01-29T05:44:14+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] sending request b'exit-status'
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] Closing TTY Log: var/lib/cowrie/tty/4baf47a77d0eed2e349a947f106e00e52e96cc39fed91dd63fdbffc
9f4d5aeca after 57.3 seconds
2026-01-29T05:44:14+0000 [cowrie.ssh.connection.CowrieSSHConnection#info] sending close 0
2026-01-29T05:44:14+0000 [cowrie.ssh.session.HoneyPotSSHSession#info] remote close
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] Got remote error, code 11 reason: b'disconnected by user'
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] avatar root logging out
2026-01-29T05:44:14+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#info] connection lost
2026-01-29T05:44:14+0000 [HoneyPotSSHTransport,3,10.203.142.101] Connection lost after 61.2 seconds
^C2026-01-29T05:48:42+0000 [twisted.internet.base#info] Received SIGINT, shutting down.
2026-01-29T05:48:42+0000 [-] (TCP Port 22 Closed)
2026-01-29T05:48:42+0000 [cowrie.ssh.factory.CowrieSSHFactory#info] Stopping factory <cowrie.ssh.factory.CowrieSSHFactory object at 0x779e0f347470>
2026-01-29T05:48:42+0000 [twisted.internet.base#info] Main loop terminated.
2026-01-29T05:48:42+0000 [twisted.scripts._twistd_unix.UnixAppLogger#info] Server Shut Down.
```

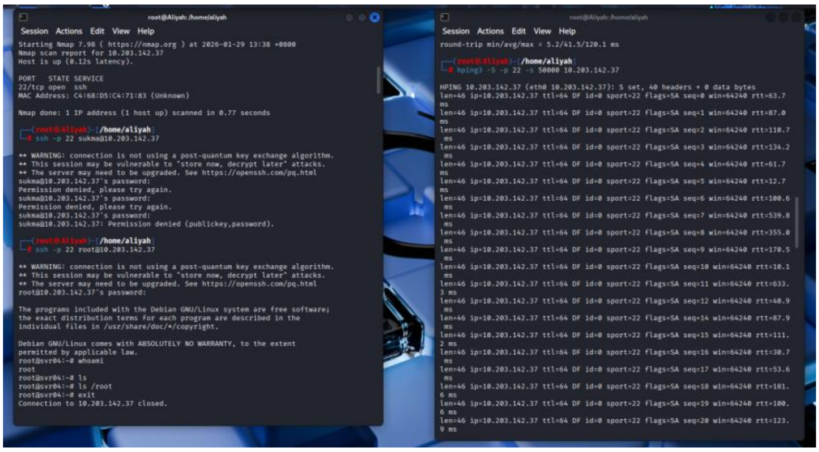
Berdasarkan hasil pengujian pada sisi target, honeypot Cowrie berhasil mendeteksi dan merekam seluruh aktivitas serangan yang masuk melalui layanan SSH. Setiap koneksi dari penyerang tercatat secara detail, mulai dari alamat IP sumber, metode autentikasi yang digunakan, hingga percobaan login menggunakan akun root.

Setelah autentikasi diterima oleh sistem palsu, aktivitas penyerang seperti identifikasi pengguna, pengecekan sistem operasi, serta perintah dasar lainnya terekam sepenuhnya dalam log Cowrie. Hal ini menunjukkan bahwa honeypot mampu menipu penyerang dengan menyediakan lingkungan tiruan tanpa memberikan akses ke server asli.

Data yang diperoleh dari proses ini berupa log aktivitas lengkap yang dapat digunakan untuk analisis pola serangan, perilaku penyerang, serta efektivitas mekanisme deteksi honeypot terhadap serangan port scanning dan brute force.

5.2 Simulasi Serangan Brute Force Dan Ddos

a. Kali linux (Attacker)



```
Starting Nmap 7.98 ( https://nmap.org ) at 2026-01-29 13:38 +0800
Nmap scan report for 10.203.142.37
Host is up (0.12s latency).

PORT   STATE SERVICE
22/tcp open  ssh
MAC Address: C4:68:D5:C4:71:83 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 0.77 seconds

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh -p 22 sukma@10.203.142.37

** WARNING: connection is not using a post-quantum key exchange algorithm.
** This session may be vulnerable to "store now, decrypt later" attacks.
** The server may need to be upgraded. See https://openssh.com/pq.html
sukma@10.203.142.37's password:
Permission denied, please try again.
sukma@10.203.142.37's password:
Permission denied, please try again.
sukma@10.203.142.37's password:
sukma@10.203.142.37: Permission denied (publickey,password).

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh -p 22 root@10.203.142.37

** WARNING: connection is not using a post-quantum key exchange algorithm.
** This session may be vulnerable to "store now, decrypt later" attacks.
** The server may need to be upgraded. See https://openssh.com/pq.html
root@10.203.142.37's password:

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

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@svr04:~# whoami
root
root@svr04:~# ls
root@svr04:~# ls /root
root@svr04:~# exit
Connection to 10.203.142.37 closed.
```

```
round-trip min/avg/max = 5.2/41.5/120.1 ms

┌──(root㉿Aliyah)-[/home/aliyah]
└─# hping3 -S -p 22 -s 50000 10.203.142.37

HPING 10.203.142.37 (eth0 10.203.142.37): S set, 40 headers + 0 data bytes
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=0 win=64240 rtt=63.7
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=1 win=64240 rtt=87.0
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=2 win=64240 rtt=110.7
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=3 win=64240 rtt=134.2
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=4 win=64240 rtt=61.7
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=5 win=64240 rtt=12.7
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=6 win=64240 rtt=100.6
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=7 win=64240 rtt=539.8
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=8 win=64240 rtt=355.0
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=9 win=64240 rtt=170.5
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=10 win=64240 rtt=10.1
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=11 win=64240 rtt=633.
3 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=12 win=64240 rtt=40.9
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=14 win=64240 rtt=87.9
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=15 win=64240 rtt=111.
2 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=16 win=64240 rtt=30.7
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=17 win=64240 rtt=53.6
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=18 win=64240 rtt=181.
6 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=19 win=64240 rtt=100.
6 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=20 win=64240 rtt=123.
9 ms
```

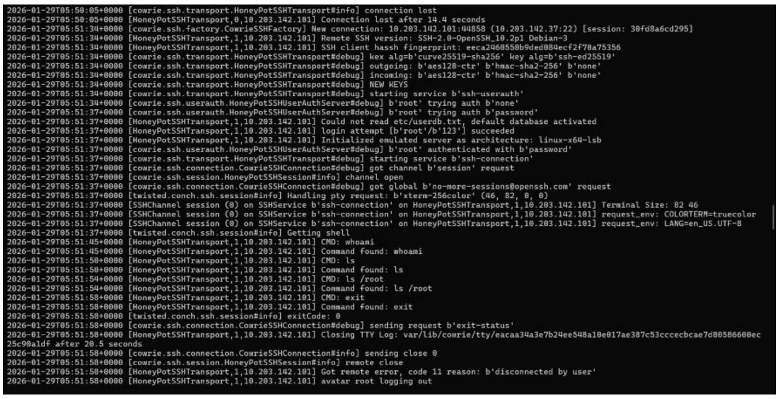
Pada tahap ini, penyerang melakukan dua jenis serangan secara berurutan, yaitu brute force SSH dan DDoS (SYN flood) terhadap server target. Serangan brute force dilakukan dengan mencoba beberapa kombinasi kata sandi pada akun root untuk menguji kerentanan autentikasi layanan SSH.

Setelah itu, serangan DDoS dilakukan menggunakan teknik SYN flood untuk mengirimkan paket dalam jumlah besar ke port SSH target. Tujuan dari serangan ini adalah untuk meningkatkan beban jaringan dan mengganggu ketersediaan layanan.

Dari sisi penyerang, sistem target tetap dapat dijangkau, namun menerima lonjakan trafik yang signifikan. Aktivitas ini digunakan untuk mengamati respons dan pencatatan serangan oleh honeypot pada sisi server target.

b. **Ubuntu server (Target)**

- **Brute force**

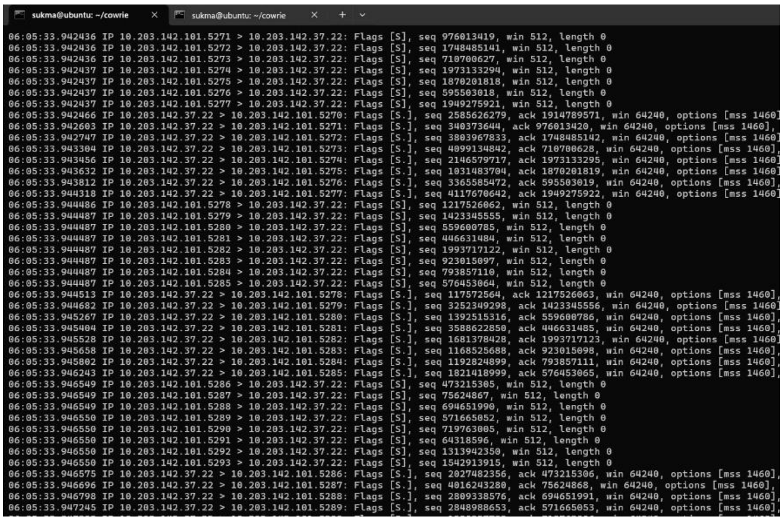


```
2026-01-29T05:50:05+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#info] connection lost
2026-01-29T05:50:05+0000 [HoneyPotSSHTransport,0,10.203.142.101] Connection lost after 14.4 seconds
2026-01-29T05:51:34+0000 [cowrie.ssh.factory.CowrieSSHFactory] New connection: 10.203.142.101:44858 (10.203.142.37:22) [session: 30fd8a6cd295]
2026-01-29T05:51:34+0000 [HoneyPotSSHTransport,1,10.203.142.101] Remote SSH version: SSH-2.0-OpenSSH_10.2p1 Debian-3
2026-01-29T05:51:34+0000 [HoneyPotSSHTransport,1,10.203.142.101] SSH client hassh fingerprint: eeca2460550b9ded084ecf2f70a75356
2026-01-29T05:51:34+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] kex alg=b'curve25519-sha256' key alg=b'ssh-ed25519'
2026-01-29T05:51:34+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] outgoing: b'aes128-ctr' b'hmac-sha2-256' b'none'
2026-01-29T05:51:34+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] incoming: b'aes128-ctr' b'hmac-sha2-256' b'none'
2026-01-29T05:51:34+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] NEW KEYS
2026-01-29T05:51:34+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] starting service b'ssh-userauth'
2026-01-29T05:51:34+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' trying auth b'none'
2026-01-29T05:51:37+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' trying auth b'password'
2026-01-29T05:51:37+0000 [HoneyPotSSHTransport,1,10.203.142.101] Could not read etc/userdb.txt, default database activated
2026-01-29T05:51:37+0000 [HoneyPotSSHTransport,1,10.203.142.101] login attempt [b'root'/b'123'] succeeded
2026-01-29T05:51:37+0000 [HoneyPotSSHTransport,1,10.203.142.101] Initialized emulated server as architecture: linux-x64-lsb
2026-01-29T05:51:37+0000 [cowrie.ssh.userauth.HoneyPotSSHUserAuthServer#debug] b'root' authenticated with b'password'
2026-01-29T05:51:37+0000 [cowrie.ssh.transport.HoneyPotSSHTransport#debug] starting service b'ssh-connection'
2026-01-29T05:51:37+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] got channel b'session' request
2026-01-29T05:51:37+0000 [cowrie.ssh.session.HoneyPotSSHSession#info] channel open
2026-01-29T05:51:37+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] got global b'no-more-sessions@openssh.com' request
2026-01-29T05:51:37+0000 [twisted.conch.ssh.session#info] Handling pty request: b'xterm-256color' (46, 82, 0, 0)
2026-01-29T05:51:37+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,1,10.203.142.101] Terminal Size: 82 46
2026-01-29T05:51:37+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,1,10.203.142.101] request_env: COLORTERM=truecolor
2026-01-29T05:51:37+0000 [SSHChannel session (0) on SSHService b'ssh-connection' on HoneyPotSSHTransport,1,10.203.142.101] request_env: LANG=en_US.UTF-8
2026-01-29T05:51:37+0000 [twisted.conch.ssh.session#info] Getting shell
2026-01-29T05:51:45+0000 [HoneyPotSSHTransport,1,10.203.142.101] CMD: whoami
2026-01-29T05:51:45+0000 [HoneyPotSSHTransport,1,10.203.142.101] Command found: whoami
2026-01-29T05:51:50+0000 [HoneyPotSSHTransport,1,10.203.142.101] CMD: ls
2026-01-29T05:51:50+0000 [HoneyPotSSHTransport,1,10.203.142.101] Command found: ls
2026-01-29T05:51:54+0000 [HoneyPotSSHTransport,1,10.203.142.101] CMD: ls /root
2026-01-29T05:51:54+0000 [HoneyPotSSHTransport,1,10.203.142.101] Command found: ls /root
2026-01-29T05:51:58+0000 [HoneyPotSSHTransport,1,10.203.142.101] CMD: exit
2026-01-29T05:51:58+0000 [HoneyPotSSHTransport,1,10.203.142.101] Command found: exit
2026-01-29T05:51:58+0000 [twisted.conch.ssh.session#info] exitCode: 0
2026-01-29T05:51:58+0000 [cowrie.ssh.connection.CowrieSSHConnection#debug] sending request b'exit-status'
2026-01-29T05:51:58+0000 [HoneyPotSSHTransport,1,10.203.142.101] Closing TTY Log: var/lib/cowrie/tty/eacaa34a3e7b24ee548a10e017ae387c53cccecbcae7d80586600ec
25c90a1df after 20.5 seconds
2026-01-29T05:51:58+0000 [cowrie.ssh.connection.CowrieSSHConnection#info] sending close 0
2026-01-29T05:51:58+0000 [cowrie.ssh.session.HoneyPotSSHSession#info] remote close
2026-01-29T05:51:58+0000 [HoneyPotSSHTransport,1,10.203.142.101] Got remote error, code 11 reason: b'disconnected by user'
2026-01-29T05:51:58+0000 [HoneyPotSSHTransport,1,10.203.142.101] avatar root logging out
```

Pada sisi Ubuntu Server, honeypot Cowrie berhasil mendeteksi percobaan brute force pada layanan SSH. Log menunjukkan adanya upaya autentikasi berulang menggunakan akun root hingga salah satu percobaan berhasil.

Setelah berhasil login, seluruh aktivitas penyerang di dalam sistem palsu terekam dengan baik, termasuk perintah dasar seperti whoami, pwd, dan ls. Hal ini menunjukkan bahwa Cowrie mampu mencatat proses serangan brute force beserta aktivitas lanjutan penyerang setelah memperoleh akses ke honeypot.

- **DDos**



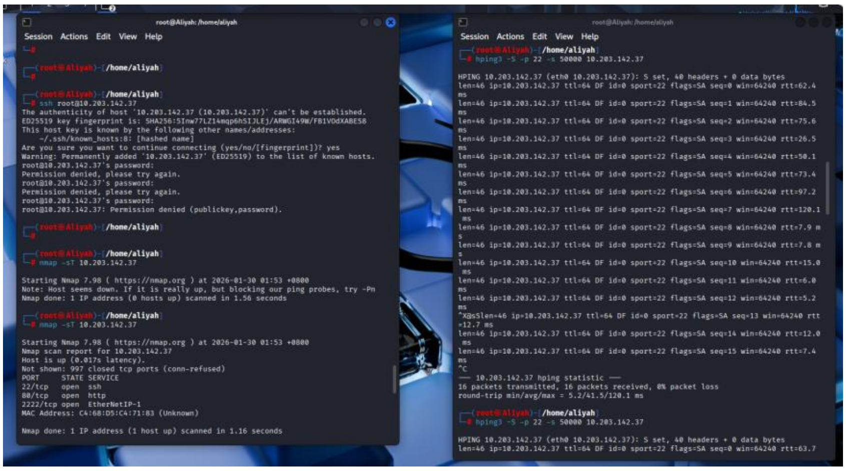
```
06:05:33.942436 IP 10.203.142.101.5271 > 10.203.142.37.22: Flags [S], seq 976013419, win 512, length 0
06:05:33.942436 IP 10.203.142.101.5272 > 10.203.142.37.22: Flags [S], seq 1748485141, win 512, length 0
06:05:33.942436 IP 10.203.142.101.5273 > 10.203.142.37.22: Flags [S], seq 710700627, win 512, length 0
06:05:33.942437 IP 10.203.142.101.5274 > 10.203.142.37.22: Flags [S], seq 1973133294, win 512, length 0
06:05:33.942437 IP 10.203.142.101.5275 > 10.203.142.37.22: Flags [S], seq 1870201818, win 512, length 0
06:05:33.942437 IP 10.203.142.101.5276 > 10.203.142.37.22: Flags [S], seq 595503018, win 512, length 0
06:05:33.942437 IP 10.203.142.101.5277 > 10.203.142.37.22: Flags [S], seq 1949275921, win 512, length 0
06:05:33.942466 IP 10.203.142.37.22 > 10.203.142.101.5270: Flags [S.], seq 2585626279, ack 1914789571, win 64240, options [mss 1460]
06:05:33.942603 IP 10.203.142.37.22 > 10.203.142.101.5271: Flags [S.], seq 340373644, ack 976013420, win 64240, options [mss 1460],
06:05:33.942747 IP 10.203.142.37.22 > 10.203.142.101.5272: Flags [S.], seq 3803967833, ack 1748485142, win 64240, options [mss 1460]
06:05:33.943304 IP 10.203.142.37.22 > 10.203.142.101.5273: Flags [S.], seq 4099134842, ack 710700628, win 64240, options [mss 1460],
06:05:33.943456 IP 10.203.142.37.22 > 10.203.142.101.5274: Flags [S.], seq 2146579717, ack 1973133295, win 64240, options [mss 1460]
06:05:33.943632 IP 10.203.142.37.22 > 10.203.142.101.5275: Flags [S.], seq 1031483704, ack 1870201819, win 64240, options [mss 1460]
06:05:33.943812 IP 10.203.142.37.22 > 10.203.142.101.5276: Flags [S.], seq 3365585472, ack 595503019, win 64240, options [mss 1460],
06:05:33.944318 IP 10.203.142.37.22 > 10.203.142.101.5277: Flags [S.], seq 4117670642, ack 1949275922, win 64240, options [mss 1460]
06:05:33.944486 IP 10.203.142.101.5278 > 10.203.142.37.22: Flags [S], seq 1217526062, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5279 > 10.203.142.37.22: Flags [S], seq 1423345555, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5280 > 10.203.142.37.22: Flags [S], seq 559600785, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5281 > 10.203.142.37.22: Flags [S], seq 446631484, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5282 > 10.203.142.37.22: Flags [S], seq 1993717122, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5283 > 10.203.142.37.22: Flags [S], seq 923015097, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5284 > 10.203.142.37.22: Flags [S], seq 793857110, win 512, length 0
06:05:33.944487 IP 10.203.142.101.5285 > 10.203.142.37.22: Flags [S], seq 576453064, win 512, length 0
06:05:33.944513 IP 10.203.142.37.22 > 10.203.142.101.5278: Flags [S.], seq 117572564, ack 1217526063, win 64240, options [mss 1460],
06:05:33.944682 IP 10.203.142.37.22 > 10.203.142.101.5279: Flags [S.], seq 3252349298, ack 1423345556, win 64240, options [mss 1460]
06:05:33.945267 IP 10.203.142.37.22 > 10.203.142.101.5280: Flags [S.], seq 1392515316, ack 559600786, win 64240, options [mss 1460],
06:05:33.945404 IP 10.203.142.37.22 > 10.203.142.101.5281: Flags [S.], seq 3588622850, ack 446631485, win 64240, options [mss 1460],
06:05:33.945528 IP 10.203.142.37.22 > 10.203.142.101.5282: Flags [S.], seq 1681378428, ack 1993717123, win 64240, options [mss 1460]
06:05:33.945658 IP 10.203.142.37.22 > 10.203.142.101.5283: Flags [S.], seq 1168525688, ack 923015098, win 64240, options [mss 1460],
06:05:33.945802 IP 10.203.142.37.22 > 10.203.142.101.5284: Flags [S.], seq 1192824899, ack 793857111, win 64240, options [mss 1460],
06:05:33.946243 IP 10.203.142.37.22 > 10.203.142.101.5285: Flags [S.], seq 1821418999, ack 576453065, win 64240, options [mss 1460],
06:05:33.946549 IP 10.203.142.101.5286 > 10.203.142.37.22: Flags [S], seq 473215305, win 512, length 0
06:05:33.946549 IP 10.203.142.101.5287 > 10.203.142.37.22: Flags [S], seq 75624867, win 512, length 0
06:05:33.946549 IP 10.203.142.101.5288 > 10.203.142.37.22: Flags [S], seq 694651990, win 512, length 0
06:05:33.946550 IP 10.203.142.101.5289 > 10.203.142.37.22: Flags [S], seq 571665052, win 512, length 0
06:05:33.946550 IP 10.203.142.101.5290 > 10.203.142.37.22: Flags [S], seq 719763005, win 512, length 0
06:05:33.946550 IP 10.203.142.101.5291 > 10.203.142.37.22: Flags [S], seq 64318596, win 512, length 0
06:05:33.946550 IP 10.203.142.101.5292 > 10.203.142.37.22: Flags [S], seq 1313942350, win 512, length 0
06:05:33.946550 IP 10.203.142.101.5293 > 10.203.142.37.22: Flags [S], seq 1542913915, win 512, length 0
06:05:33.946575 IP 10.203.142.37.22 > 10.203.142.101.5286: Flags [S.], seq 2027482356, ack 473215306, win 64240, options [mss 1460],
06:05:33.946696 IP 10.203.142.37.22 > 10.203.142.101.5287: Flags [S.], seq 4016243280, ack 75624868, win 64240, options [mss 1460],
06:05:33.946798 IP 10.203.142.37.22 > 10.203.142.101.5288: Flags [S.], seq 2809338576, ack 694651991, win 64240, options [mss 1460],
06:05:33.947245 IP 10.203.142.37.22 > 10.203.142.101.5289: Flags [S.], seq 2848988653, ack 571665053, win 64240, options [mss 1460],
```

Pada tahap ini, Ubuntu Server menerima serangan DDoS berupa pengiriman paket SYN secara masif ke port SSH. Hal ini terlihat dari log jaringan yang menunjukkan banyak paket dengan flag [S] yang datang secara terus-menerus dari alamat IP penyerang dalam waktu singkat.

Serangan ini menyebabkan peningkatan trafik jaringan yang signifikan pada port target. Meskipun layanan SSH masih merespons paket SYN, pola trafik yang terekam menunjukkan adanya upaya pembanjiran jaringan. Data ini membuktikan bahwa sistem berhasil mendeteksi aktivitas DDoS dan dapat digunakan untuk menganalisis karakteristik serangan berbasis flood terhadap layanan SSH.

5.3 Simulasi Serangan Port Scanning Dan Ddos

a. Kali linux (Attacker)



```
┌──(root㉿Aliyah)-[/home/aliyah]
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─# ssh root@10.203.142.37
The authenticity of host '10.203.142.37 (10.203.142.37)' can't be established.
ED25519 key fingerprint is: SHA256:SInw77LZ14mqp6hSIJLEj/ARWGI49W/FB1VOdXABES8
This host key is known by the following other names/addresses:
    ~/.ssh/known_hosts:8: [hashed name]
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.203.142.37' (ED25519) to the list of known hosts.
root@10.203.142.37's password:
Permission denied, please try again.
root@10.203.142.37's password:
Permission denied, please try again.
root@10.203.142.37's password:
root@10.203.142.37: Permission denied (publickey,password).

┌──(root㉿Aliyah)-[/home/aliyah]
└─#

┌──(root㉿Aliyah)-[/home/aliyah]
└─# nmap -sT 10.203.142.37

Starting Nmap 7.98 ( https://nmap.org ) at 2026-01-30 01:53 +0800
Note: Host seems down. If it is really up, but blocking our ping probes, try -Pn
Nmap done: 1 IP address (0 hosts up) scanned in 1.56 seconds

┌──(root㉿Aliyah)-[/home/aliyah]
└─# nmap -sT 10.203.142.37

Starting Nmap 7.98 ( https://nmap.org ) at 2026-01-30 01:53 +0800
Nmap scan report for 10.203.142.37
Host is up (0.017s latency).
Not shown: 997 closed tcp ports (conn-refused)
PORT     STATE SERVICE
22/tcp   open  ssh
80/tcp   open  http
2222/tcp open  EtherNetIP-1
MAC Address: C4:68:D5:C4:71:83 (Unknown)

Nmap done: 1 IP address (1 host up) scanned in 1.16 seconds
```

```
┌──(root㉿Aliyah)-[/home/aliyah]
└─# hping3 -S -p 22 -s 50000 10.203.142.37

HPING 10.203.142.37 (eth0 10.203.142.37): S set, 40 headers + 0 data bytes
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=0 win=64240 rtt=62.4
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=1 win=64240 rtt=84.5
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=2 win=64240 rtt=75.6
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=3 win=64240 rtt=26.5
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=4 win=64240 rtt=50.1
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=5 win=64240 rtt=73.4
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=6 win=64240 rtt=97.2
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=7 win=64240 rtt=120.1
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=8 win=64240 rtt=7.9 m
s
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=9 win=64240 rtt=7.8 m
s
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=10 win=64240 rtt=15.0
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=11 win=64240 rtt=6.0
ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=12 win=64240 rtt=5.2
ms
^X@sSlen=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=13 win=64240 rtt
=12.7 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=14 win=64240 rtt=12.0
 ms
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=15 win=64240 rtt=7.4
ms
^C
--- 10.203.142.37 hping statistic ---
16 packets transmitted, 16 packets received, 0% packet loss
round-trip min/avg/max = 5.2/41.5/120.1 ms

┌──(root㉿Aliyah)-[/home/aliyah]
└─# hping3 -S -p 22 -s 50000 10.203.142.37

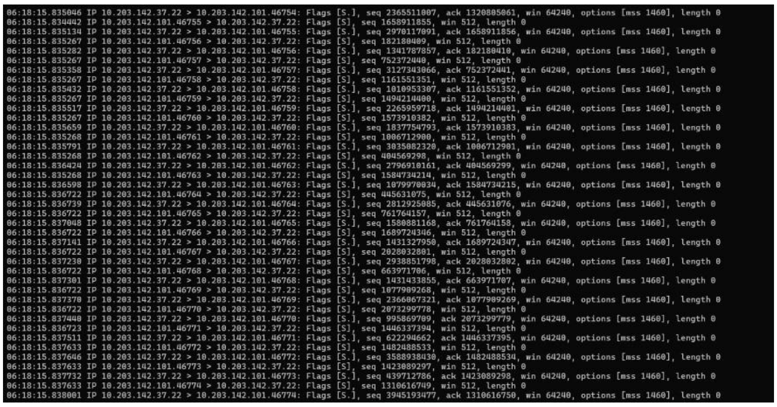
HPING 10.203.142.37 (eth0 10.203.142.37): S set, 40 headers + 0 data bytes
len=46 ip=10.203.142.37 ttl=64 DF id=0 sport=22 flags=SA seq=0 win=64240 rtt=63.7
```

Pada tahap ini, penyerang melakukan kombinasi serangan port scanning dan DDoS terhadap server target. Serangan diawali dengan port scanning menggunakan nmap untuk mengidentifikasi port yang terbuka dan layanan yang aktif pada target. Hasil pemindaian menunjukkan bahwa layanan SSH pada port 22 dalam keadaan terbuka dan dapat diakses.

Setelah port target berhasil diidentifikasi, penyerang melanjutkan dengan serangan DDoS menggunakan teknik SYN flood. Serangan ini dilakukan dengan mengirimkan paket SYN secara terus-menerus ke port SSH untuk membanjiri layanan dan meningkatkan beban jaringan.

Dari sisi penyerang, target tetap dapat dijangkau namun menerima trafik yang sangat tinggi. Kombinasi serangan ini digunakan untuk menguji kemampuan sistem target, khususnya honeypot, dalam mendeteksi pola serangan berlapis yang dimulai dari pengintaian port hingga pembanjiran layanan.

b. Ubuntu Server (Target)



```
06:18:15.835046 IP 10.203.142.37.22 > 10.203.142.101.46754: Flags [S.], seq 2365511007, ack 1320805061, win 64240, options [mss 1460], length 0
06:18:15.834442 IP 10.203.142.101.46755 > 10.203.142.37.22: Flags [S], seq 1658911855, win 512, length 0
06:18:15.835134 IP 10.203.142.37.22 > 10.203.142.101.46755: Flags [S.], seq 2970117091, ack 1658911856, win 64240, options [mss 1460], length 0
06:18:15.835267 IP 10.203.142.101.46756 > 10.203.142.37.22: Flags [S], seq 182180409, win 512, length 0
06:18:15.835282 IP 10.203.142.37.22 > 10.203.142.101.46756: Flags [S.], seq 1341787857, ack 182180410, win 64240, options [mss 1460], length 0
06:18:15.835267 IP 10.203.142.101.46757 > 10.203.142.37.22: Flags [S], seq 752372440, win 512, length 0
06:18:15.835358 IP 10.203.142.37.22 > 10.203.142.101.46757: Flags [S.], seq 3127343066, ack 752372441, win 64240, options [mss 1460], length 0
06:18:15.835267 IP 10.203.142.101.46758 > 10.203.142.37.22: Flags [S], seq 1161551351, win 512, length 0
06:18:15.835432 IP 10.203.142.37.22 > 10.203.142.101.46758: Flags [S.], seq 1010953307, ack 1161551352, win 64240, options [mss 1460], length 0
06:18:15.835267 IP 10.203.142.101.46759 > 10.203.142.37.22: Flags [S], seq 1494214400, win 512, length 0
06:18:15.835517 IP 10.203.142.37.22 > 10.203.142.101.46759: Flags [S.], seq 2265959718, ack 1494214401, win 64240, options [mss 1460], length 0
06:18:15.835267 IP 10.203.142.101.46760 > 10.203.142.37.22: Flags [S], seq 1573910382, win 512, length 0
06:18:15.835659 IP 10.203.142.37.22 > 10.203.142.101.46760: Flags [S.], seq 1837754793, ack 1573910383, win 64240, options [mss 1460], length 0
06:18:15.835268 IP 10.203.142.101.46761 > 10.203.142.37.22: Flags [S], seq 1006712900, win 512, length 0
06:18:15.835791 IP 10.203.142.37.22 > 10.203.142.101.46761: Flags [S.], seq 3035082320, ack 1006712901, win 64240, options [mss 1460], length 0
06:18:15.835268 IP 10.203.142.101.46762 > 10.203.142.37.22: Flags [S], seq 404569298, win 512, length 0
06:18:15.836424 IP 10.203.142.37.22 > 10.203.142.101.46762: Flags [S.], seq 2796910161, ack 404569299, win 64240, options [mss 1460], length 0
06:18:15.835268 IP 10.203.142.101.46763 > 10.203.142.37.22: Flags [S], seq 1584734214, win 512, length 0
06:18:15.836598 IP 10.203.142.37.22 > 10.203.142.101.46763: Flags [S.], seq 1079970034, ack 1584734215, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46764 > 10.203.142.37.22: Flags [S], seq 445631075, win 512, length 0
06:18:15.836739 IP 10.203.142.37.22 > 10.203.142.101.46764: Flags [S.], seq 2812925085, ack 445631076, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46765 > 10.203.142.37.22: Flags [S], seq 761764157, win 512, length 0
06:18:15.837048 IP 10.203.142.37.22 > 10.203.142.101.46765: Flags [S.], seq 1580881168, ack 761764158, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46766 > 10.203.142.37.22: Flags [S], seq 1689724346, win 512, length 0
06:18:15.837141 IP 10.203.142.37.22 > 10.203.142.101.46766: Flags [S.], seq 1431327950, ack 1689724347, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46767 > 10.203.142.37.22: Flags [S], seq 2028032801, win 512, length 0
06:18:15.837230 IP 10.203.142.37.22 > 10.203.142.101.46767: Flags [S.], seq 2938851798, ack 2028032802, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46768 > 10.203.142.37.22: Flags [S], seq 663971706, win 512, length 0
06:18:15.837301 IP 10.203.142.37.22 > 10.203.142.101.46768: Flags [S.], seq 1431433855, ack 663971707, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46769 > 10.203.142.37.22: Flags [S], seq 1077909268, win 512, length 0
06:18:15.837370 IP 10.203.142.37.22 > 10.203.142.101.46769: Flags [S.], seq 2366067321, ack 1077909269, win 64240, options [mss 1460], length 0
06:18:15.836722 IP 10.203.142.101.46770 > 10.203.142.37.22: Flags [S], seq 2073299778, win 512, length 0
06:18:15.837440 IP 10.203.142.37.22 > 10.203.142.101.46770: Flags [S.], seq 995869709, ack 2073299779, win 64240, options [mss 1460], length 0
06:18:15.836723 IP 10.203.142.101.46771 > 10.203.142.37.22: Flags [S], seq 1446337394, win 512, length 0
06:18:15.837511 IP 10.203.142.37.22 > 10.203.142.101.46771: Flags [S.], seq 622294662, ack 1446337395, win 64240, options [mss 1460], length 0
06:18:15.837633 IP 10.203.142.101.46772 > 10.203.142.37.22: Flags [S], seq 1482488533, win 512, length 0
06:18:15.837646 IP 10.203.142.37.22 > 10.203.142.101.46772: Flags [S.], seq 3588938430, ack 1482488534, win 64240, options [mss 1460], length 0
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06:18:15.837732 IP 10.203.142.37.22 > 10.203.142.101.46773: Flags [S.], seq 439712786, ack 1423089298, win 64240, options [mss 1460], length 0
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06:18:15.838001 IP 10.203.142.37.22 > 10.203.142.101.46774: Flags [S.], seq 3945193477, ack 1310616750, win 64240, options [mss 1460], length 0
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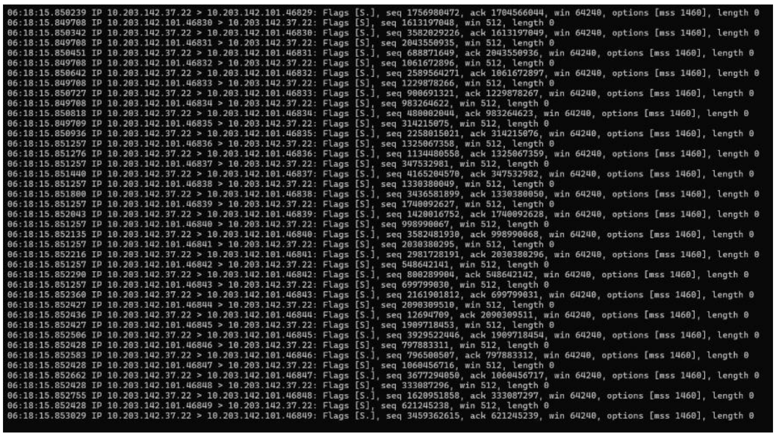

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06:18:15.849708 IP 10.203.142.101.46830 > 10.203.142.37.22: Flags [S], seq 1613197048, win 512, length 0
06:18:15.850342 IP 10.203.142.37.22 > 10.203.142.101.46830: Flags [S.], seq 3582029226, ack 1613197049, win 64240, options [mss 1460], length 0
06:18:15.849708 IP 10.203.142.101.46831 > 10.203.142.37.22: Flags [S], seq 2043550935, win 512, length 0
06:18:15.850451 IP 10.203.142.37.22 > 10.203.142.101.46831: Flags [S.], seq 688871649, ack 2043550936, win 64240, options [mss 1460], length 0
06:18:15.849708 IP 10.203.142.101.46832 > 10.203.142.37.22: Flags [S], seq 1061672896, win 512, length 0
06:18:15.850642 IP 10.203.142.37.22 > 10.203.142.101.46832: Flags [S.], seq 2589564271, ack 1061672897, win 64240, options [mss 1460], length 0
06:18:15.849708 IP 10.203.142.101.46833 > 10.203.142.37.22: Flags [S], seq 1229878266, win 512, length 0
06:18:15.850727 IP 10.203.142.37.22 > 10.203.142.101.46833: Flags [S.], seq 900691321, ack 1229878267, win 64240, options [mss 1460], length 0
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06:18:15.849709 IP 10.203.142.101.46835 > 10.203.142.37.22: Flags [S], seq 314215075, win 512, length 0
06:18:15.850936 IP 10.203.142.37.22 > 10.203.142.101.46835: Flags [S.], seq 2258015021, ack 314215076, win 64240, options [mss 1460], length 0
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06:18:15.851276 IP 10.203.142.37.22 > 10.203.142.101.46836: Flags [S.], seq 1134480558, ack 1325067359, win 64240, options [mss 1460], length 0
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06:18:15.851800 IP 10.203.142.37.22 > 10.203.142.101.46838: Flags [S.], seq 3436581899, ack 1330380050, win 64240, options [mss 1460], length 0
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06:18:15.852583 IP 10.203.142.37.22 > 10.203.142.101.46846: Flags [S.], seq 796500507, ack 797883312, win 64240, options [mss 1460], length 0
06:18:15.852428 IP 10.203.142.101.46847 > 10.203.142.37.22: Flags [S], seq 1060456716, win 512, length 0
06:18:15.852662 IP 10.203.142.37.22 > 10.203.142.101.46847: Flags [S.], seq 3677294050, ack 1060456717, win 64240, options [mss 1460], length 0
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06:18:15.852755 IP 10.203.142.37.22 > 10.203.142.101.46848: Flags [S.], seq 1620951858, ack 333087297, win 64240, options [mss 1460], length 0
06:18:15.852428 IP 10.203.142.101.46849 > 10.203.142.37.22: Flags [S], seq 621245238, win 512, length 0
06:18:15.853029 IP 10.203.142.37.22 > 10.203.142.101.46849: Flags [S.], seq 3459362615, ack 621245239, win 64240, options [mss 1460], length 0
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Pada sisi Ubuntu Server, serangan port scanning dan DDoS terdeteksi melalui log jaringan yang menunjukkan lonjakan paket SYN secara masif ke port SSH. Log memperlihatkan banyak koneksi masuk dengan flag [S] dalam waktu yang sangat singkat, yang menandakan adanya upaya pembanjiran trafik ke layanan target.

Aktivitas ini menunjukkan bahwa setelah tahap pengintaian port dilakukan oleh penyerang, serangan dilanjutkan dengan DDoS untuk mengganggu ketersediaan layanan. Meskipun layanan masih merespons sebagian permintaan, pola trafik yang terekam mencerminkan tekanan jaringan yang tinggi akibat serangan flood.

Hasil ini membuktikan bahwa sistem target, khususnya honeypot yang diimplementasikan, mampu mendeteksi dan mencatat serangan berlapis yang dimulai dari port scanning hingga serangan DDoS. Data log yang dihasilkan dapat digunakan untuk analisis karakteristik serangan serta sebagai dasar evaluasi keamanan layanan SSH.