

## Secure Linux Server Hardening & Audit

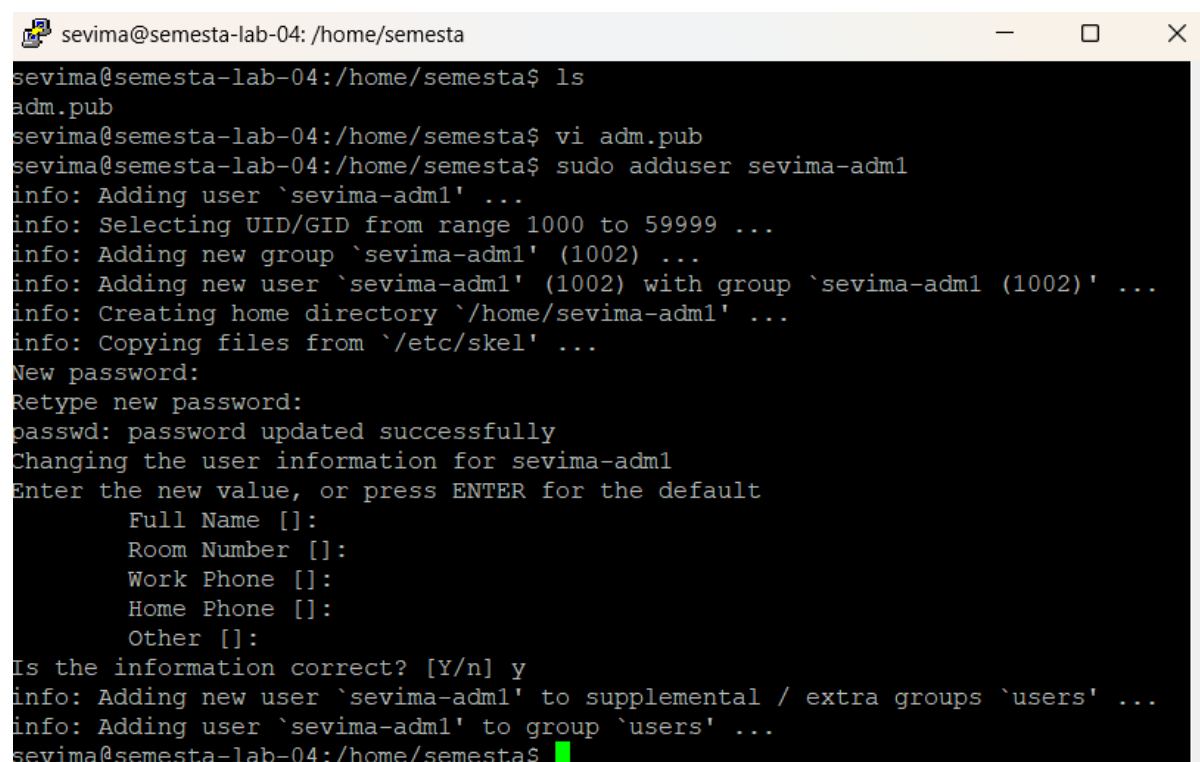
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Bidang : DevOps

### Langkah-langkah

1. Membuat user dengan akses sudo menggunakan password dan pubkey

Langkah pertama adalah membuat user baru menggunakan sudo adduser



```
sevima@semesta-lab-04: /home/semesta
sevima@semesta-lab-04:/home/semesta$ ls
adm.pub
sevima@semesta-lab-04:/home/semesta$ vi adm.pub
sevima@semesta-lab-04:/home/semesta$ sudo adduser sevima-adml
info: Adding user `sevima-adml' ...
info: Selecting UID/GID from range 1000 to 59999 ...
info: Adding new group `sevima-adml' (1002) ...
info: Adding new user `sevima-adml' (1002) with group `sevima-adml (1002)' ...
info: Creating home directory `/home/sevima-adml' ...
info: Copying files from `/etc/skel' ...
New password:
Retype new password:
passwd: password updated successfully
Changing the user information for sevima-adml
Enter the new value, or press ENTER for the default
    Full Name []:
    Room Number []:
    Work Phone []:
    Home Phone []:
    Other []:
Is the information correct? [Y/n] y
info: Adding new user `sevima-adml' to supplemental / extra groups `users' ...
info: Adding user `sevima-adml' to group `users' ...
sevima@semesta-lab-04:/home/semesta$
```

Kemudian menambahkan user tsb ke grup sudo

```
sevima@semesta-lab-04: /home/semesta
-l, --login NEW_LOGIN      new value of the login name
-L, --lock                 lock the user account
-m, --move-home            move contents of the home directory to the
                           new location (use only with -d)
-o, --non-unique           allow using duplicate (non-unique) UID
-p, --password PASSWORD    use encrypted password for the new password
-P, --prefix PREFIX_DIR    prefix directory where are located the /etc/* fi
les
-r, --remove               remove the user from only the supplemental GROUP
S
                           mentioned by the -G option without removing
                           the user from other groups
-R, --root CHROOT_DIR      directory to chroot into
-s, --shell SHELL          new login shell for the user account
-u, --uid UID              new UID for the user account
-U, --unlock               unlock the user account
-v, --add-subuids FIRST-LAST add range of subordinate uids
-V, --del-subuids FIRST-LAST remove range of subordinate uids
-w, --add-subgids FIRST-LAST add range of subordinate gids
-W, --del-subgids FIRST-LAST remove range of subordinate gids
-Z, --selinux-user SEUSER  new SELinux user mapping for the user account

sevima@semesta-lab-04:/home/semesta$ sudo usermod -aG sudo sevima-adml
sevima@semesta-lab-04:/home/semesta$
```

Dilanjutkan membuat direktori ssh untuk user baru dan mengcopy pubkey dan set permission untuk sudo

```
sevima@semesta-lab-04: /home/semesta
-o, --non-unique           new location (use only with -d)
                           allow using duplicate (non-unique) UID
-p, --password PASSWORD    use encrypted password for the new password
-P, --prefix PREFIX_DIR    prefix directory where are located the /etc/* fi
les
-r, --remove               remove the user from only the supplemental GROUP
S
                           mentioned by the -G option without removing
                           the user from other groups
-R, --root CHROOT_DIR      directory to chroot into
-s, --shell SHELL          new login shell for the user account
-u, --uid UID              new UID for the user account
-U, --unlock               unlock the user account
-v, --add-subuids FIRST-LAST add range of subordinate uids
-V, --del-subuids FIRST-LAST remove range of subordinate uids
-w, --add-subgids FIRST-LAST add range of subordinate gids
-W, --del-subgids FIRST-LAST remove range of subordinate gids
-Z, --selinux-user SEUSER  new SELinux user mapping for the user account

sevima@semesta-lab-04:/home/semesta$ sudo usermod -aG sudo sevima-adml
sevima@semesta-lab-04:/home/semesta$ sudo mkdir -p /home/sevima-adml/.ssh
sevima@semesta-lab-04:/home/semesta$ sudo cp /home/semesta/adm.pub /home/sevima-
adml/.ssh/authorized_keys
sevima@semesta-lab-04:/home/semesta$
```

```
sevima@semesta-lab-04: /home/semesta
-r, --remove                remove the user from only the supplemental GROUP
S
mentioned by the -G option without removing
the user from other groups
-R, --root CHROOT_DIR      directory to chroot into
-s, --shell SHELL          new login shell for the user account
-u, --uid UID              new UID for the user account
-U, --unlock               unlock the user account
-v, --add-subuids FIRST-LAST add range of subordinate uids
-V, --del-subuids FIRST-LAST remove range of subordinate uids
-w, --add-subgids FIRST-LAST add range of subordinate gids
-W, --del-subgids FIRST-LAST remove range of subordinate gids
-Z, --selinux-user SEUSER  new SELinux user mapping for the user account

sevima@semesta-lab-04:/home/semesta$ sudo usermod -aG sudo sevima-adml
sevima@semesta-lab-04:/home/semesta$ sudo mkdir -p /home/sevima-adml/.ssh
sevima@semesta-lab-04:/home/semesta$ sudo cp /home/semesta/adm.pub /home/sevima-
adml/.ssh/authorized_keys
sevima@semesta-lab-04:/home/semesta$ sudo chown -R sevima-adml:sevima-adml /home
/semesta-adml/.ssh
sevima@semesta-lab-04:/home/semesta$ sudo chmod 700 /home/sevima-adml/.ssh
sevima@semesta-lab-04:/home/semesta$ sudo chmod 600 /home/sevima-adml/.ssh/autho
rized_keys
sevima@semesta-lab-04:/home/semesta$
```

## 2. Membuat lvm dari sdb dan dienkripsi

Encrypt menggunakan luksformat dan volume nya diberi nama hackthon-syamd7

```
sevima@semesta-lab-04: ~
MOUNTPOINTS all locations where device is mounted
TRAN device transport type
TYPE device type
UUID filesystem UUID
VENDOR device vendor
WSAME write same max bytes
WWN unique storage identifier
ZONED zone model
ZONE-SZ zone size
ZONE-WGRAN zone write granularity
ZONE-APP zone append max bytes
ZONE-NR number of zones
ZONE-OMAX maximum number of open zones
ZONE-AMAX maximum number of active zones

For more details see lsblk(8).
sevima@semesta-lab-04:~$ sudo pvcreate /dev/mapper/luks_sdb
Physical volume "/dev/mapper/luks_sdb" successfully created.
sevima@semesta-lab-04:~$ sudo vgcreate hackathon-syamd7 /dev/mapper/luks_sdb
Volume group "hackathon-syamd7" successfully created
sevima@semesta-lab-04:~$ sudo lvcreate -l 100%FREE -n securevol hackathon-syamd
7
Logical volume "securevol" created.
sevima@semesta-lab-04:~$
```

Kemudian membuat mount point/nfs source dengan nama folder nfs-semesta7

```
sevima@semesta-lab-04: ~  
running kernel seems to be up-to-date.  
No services need to be restarted.  
No containers need to be restarted.  
No user sessions are running outdated binaries.  
No VM guests are running outdated hypervisor (qemu) binaries on this host.  
sevima@semesta-lab-04:~$ sudo mkdir -p /mnt/nfs-semesta7  
sevima@semesta-lab-04:~$ sudo mount -t nfs 192.168.99.3:/nfs-semesta7 /mnt/nfs-s  
semesta7  
sevima@semesta-lab-04:~$ df -h  
Filesystem                Size      Used Avail Use% Mounted on  
tmpfs                      392M      1.1M   391M    1% /run  
dev/mapper/ubuntu--vg-ubuntu--lv 24G       7.0G    16G   32% /  
tmpfs                      2.0G       0      2.0G    0% /dev/shm  
tmpfs                      5.0M       0      5.0M    0% /run/lock  
dev/sda2                   2.0G     100M    1.7G    6% /boot  
tmpfs                      392M      12K    392M    1% /run/user/1000  
dev/mapper/hackathon--syamd7-securevol 2.0G      24K    1.8G    1% /mnt/secure  
192.168.99.3:/nfs-semesta7 24G       6.4G    16G   29% /mnt/nfs-semesta7  
sevima@semesta-lab-04:~$
```

Kemudian menambahkan ke /etc/fstab agar auto-mpoint saat ter-restart dengan mengedit file /etc/fstab

```
sevima@semesta-lab-04: ~  
# /etc/fstab: static file system information.  
#  
# Use 'blkid' to print the universally unique identifier for a  
# device; this may be used with UUID= as a more robust way to name devices  
# that works even if disks are added and removed. See fstab(5).  
#  
# <file system> <mount point> <type> <options> <dump> <pass>  
# / was on /dev/ubuntu-vg/ubuntu-lv during curtin installation  
/dev/disk/by-id/dm-uuid-LVM-3OLoHWR73WuNyKTA7xWHGaITySwUKBhr9zwejb9lfUoRwB1x2W2xTEe9VVC1Jt18 / ext4 defaults 0 1  
# /boot was on /dev/sda2 during curtin installation  
/dev/disk/by-uuid/25942eb5-8be7-432d-9fe4-9af6b9e9a248 /boot ext4 defaults 0 1  
/swap.img none swap sw 0 0  
  
192.168.99.3:/nfs-semesta7 /mnt/nfs-semesta7 nfs defaults,_netdev,auto 0 0  
~  
~  
~  
~  
~  
~  
-- INSERT -- 14,75 All
```

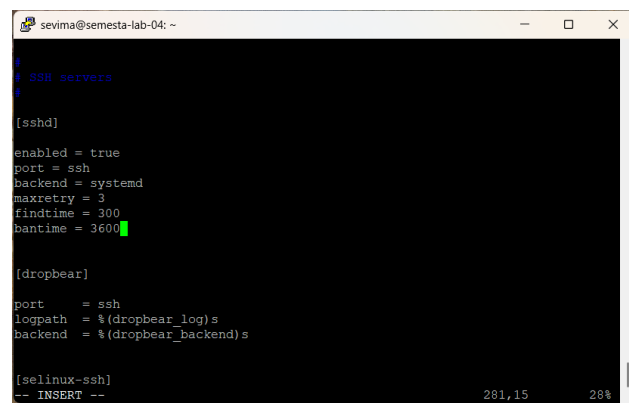
### 3. awdawdawd

### 4. Root login masih diizinkan

Permasalahan ini terdapat di konfigurasi ssh daemon yang Dimana root user dapat login melalui ssh. Untuk merubahnya, yang harus dilakukan adalah merubah PermitLoginRoot yes menjadi PermitLoginRoot no.

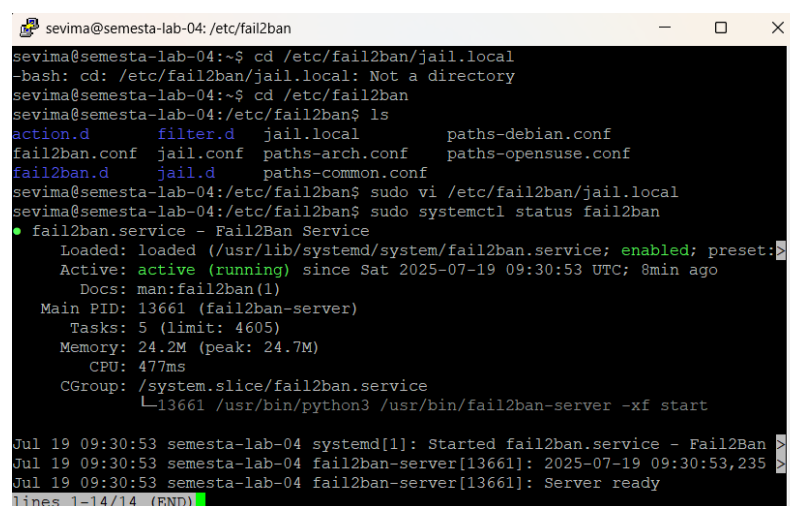
### 5. Pembatasan terhadap login gagal

Untuk permasalahan ini dapat menggunakan tool tambahan, yakni fail2ban yang akan meng-ban Alamat IP jika ada aktivitas mencurigakan seperti login gagal berulang. Fail2ban akan berjalan secara otomatis setelah mengatur konfigurasi nya. Buat konfigurasi seperti ini:



```
sevima@semesta-lab-04: ~  
# SSH servers  
[sshd]  
enabled = true  
port = ssh  
backend = systemd  
maxretry = 3  
findtime = 300  
bantime = 3600  
[dropbear]  
port = ssh  
logpath = $(dropbear_log)s  
backend = $(dropbear_backend)s  
[selinux-ssh]  
-- INSERT --
```

Lalu cek status fail2ban apakah sudah berjalan.



```
sevima@semesta-lab-04: /etc/fail2ban  
sevima@semesta-lab-04:~$ cd /etc/fail2ban/jail.local  
-bash: cd: /etc/fail2ban/jail.local: Not a directory  
sevima@semesta-lab-04:~$ cd /etc/fail2ban  
sevima@semesta-lab-04:/etc/fail2ban$ ls  
action.d      filter.d      jail.local    paths-debian.conf  
fail2ban.conf jail.conf     paths-arch.conf paths-opensuse.conf  
fail2ban.d    jail.d        paths-common.conf  
sevima@semesta-lab-04:/etc/fail2ban$ sudo vi /etc/fail2ban/jail.local  
sevima@semesta-lab-04:/etc/fail2ban$ sudo systemctl status fail2ban  
● fail2ban.service - Fail2Ban Service  
   Loaded: loaded (/usr/lib/systemd/system/fail2ban.service; enabled; preset: enabled)  
   Active: active (running) since Sat 2025-07-19 09:30:53 UTC; 8min ago  
     Docs: man:fail2ban(1)  
   Main PID: 13661 (fail2ban-server)  
     Tasks: 5 (limit: 4605)  
    Memory: 24.2M (peak: 24.7M)  
       CPU: 477ms  
    CGroup: /system.slice/fail2ban.service  
            └─13661 /usr/bin/python3 /usr/bin/fail2ban-server -xf start  
Jul 19 09:30:53 semesta-lab-04 systemd[1]: Started fail2ban.service - Fail2Ban  
Jul 19 09:30:53 semesta-lab-04 fail2ban-server[13661]: 2025-07-19 09:30:53,235  
Jul 19 09:30:53 semesta-lab-04 fail2ban-server[13661]: Server ready  
lines 1-14/14 (END)
```

```
sevima@semesta-lab-04: /etc/fail2ban
Memory: 24.2M (peak: 24.7M)
CPU: 477ms
CGroup: /system.slice/fail2ban.service
└─13661 /usr/bin/python3 /usr/bin/fail2ban-server -xf start

Jul 19 09:30:53 semesta-lab-04 systemd[1]: Started fail2ban.service - Fail2Ban
Jul 19 09:30:53 semesta-lab-04 fail2ban-server[13661]: 2025-07-19 09:30:53,235
Jul 19 09:30:53 semesta-lab-04 fail2ban-server[13661]: Server ready
lines 1-14/14 (END)
[3]+ Stopped sudo systemctl status fail2ban
sevima@semesta-lab-04:/etc/fail2ban$ fail2ban-client status sshd
2025-07-19 09:40:37,502 fail2ban (13818): ERROR Permission denied to socket: /var/run/fail2ban/fail2ban.sock, (you must be root)
sevima@semesta-lab-04:/etc/fail2ban$ sudo fail2ban-client status sshd
Status for the jail: sshd
|- Filter
| |- Currently failed: 0
| |- Total failed: 0
| `-- Journal matches: _SYSTEMD_UNIT=sshd.service + _COMM=sshd
`- Actions
  |- Currently banned: 0
  |- Total banned: 0
  `-- Banned IP list:
sevima@semesta-lab-04:/etc/fail2ban$
```

Seperti di gambar, status fail2ban sudah aktif. Jadi jika ada yang mencoba login dan gagal 3 kali, akan ter-ban selama 1 jam.

## 6. Konfigurasi firewall

Untuk mengonfigurasi firewall, bisa menggunakan ufw (uncomplicated firewall). Langkah pertama adalah mengizinkan akses melalui ssh.

```
sevima@semesta-lab-04: /etc/fail2ban
|- Currently banned: 0
|- Total banned: 0
`-- Banned IP list:
sevima@semesta-lab-04:/etc/fail2ban$ sudo apt install ufw-y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package ufw-y
sevima@semesta-lab-04:/etc/fail2ban$ sudo apt install ufw -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ufw is already the newest version (0.36.2-6).
ufw set to manually installed.
The following packages were automatically installed and are no longer required:
  apache2-data apache2-utils ssl-cert
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 82 not upgraded.
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw status verbose
Status: inactive
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow OpenSSH
Rules updated
Rules updated (v6)
sevima@semesta-lab-04:/etc/fail2ban$
```

Kemudian mengizinkan akses http, https, dan nfs yang sudah disediakan.

```
sevima@semesta-lab-04: /etc/fail2ban
sevima@semesta-lab-04:/etc/fail2ban$ sudo apt install ufw -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ufw is already the newest version (0.36.2-6).
ufw set to manually installed.
The following packages were automatically installed and are no longer required:
  apache2-data apache2-utils ssl-cert
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 82 not upgraded.
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw status verbose
Status: inactive
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow OpenSSH
Rules updated
Rules updated (v6)
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow 80/tcp
Rules updated
Rules updated (v6)
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow 443/tcp
Rules updated
Rules updated (v6)
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow from 192.168.99.3
Rules updated
sevima@semesta-lab-04:/etc/fail2ban$
```

Jika sudah, jalankan firewall dan cek status firewall. Gambar dibawah adalah contoh jika firewall sudah berjalan.

```
sevima@semesta-lab-04: /etc/fail2ban
[ 3] 443/tcp                ALLOW IN    Anywhere
[ 4] Anywhere               ALLOW IN    192.168.99.3
[ 5] OpenSSH (v6)           ALLOW IN    Anywhere (v6)
[ 6] 80/tcp (v6)            ALLOW IN    Anywhere (v6)
[ 7] 443/tcp (v6)           ALLOW IN    Anywhere (v6)

sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw allow from 192.168.99.3 to any port nfs
Rule added
sevima@semesta-lab-04:/etc/fail2ban$ sudo ufw status numbered
Status: active

      To Action From
      --
[ 1] OpenSSH        ALLOW IN Anywhere
[ 2] 80/tcp          ALLOW IN Anywhere
[ 3] 443/tcp         ALLOW IN Anywhere
[ 4] Anywhere        ALLOW IN 192.168.99.3
[ 5] 2049            ALLOW IN 192.168.99.3
[ 6] OpenSSH (v6)    ALLOW IN Anywhere (v6)
[ 7] 80/tcp (v6)     ALLOW IN Anywhere (v6)
[ 8] 443/tcp (v6)    ALLOW IN Anywhere (v6)

sevima@semesta-lab-04:/etc/fail2ban$
```

## 7. Service yang tidak digunakan masih berjalan

Untuk mengecek service yang sedang berjalan, bisa menggunakan command `systemctl list-units --type=service --state=running`, lalu akan muncul list seperti dibawah:



```
sevima@semesta-lab-04: /etc/fail2ban
```

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION
cron.service	loaded	active	running	Regular background program
dbus.service	loaded	active	running	D-Bus System Message Bus
fail2ban.service	loaded	active	running	Fail2Ban Service
fwupd.service	loaded	active	running	Firmware update daemon
getty@tty1.service	loaded	active	running	Getty on tty1
ModemManager.service	loaded	active	running	Modem Manager
multipathd.service	loaded	active	running	Device-Mapper Multipath Dev
mysql.service	loaded	active	running	MySQL Community Server
polkit.service	loaded	active	running	Authorization Manager
rsyslog.service	loaded	active	running	System Logging Service
ssh.service	loaded	active	running	OpenBSD Secure Shell server
systemd-journald.service	loaded	active	running	Journal Service
systemd-logind.service	loaded	active	running	User Login Management
systemd-networkd.service	loaded	active	running	Network Configuration
systemd-resolved.service	loaded	active	running	Network Name Resolution
systemd-timesyncd.service	loaded	active	running	Network Time Synchronization
systemd-udevd.service	loaded	active	running	Rule-based Manager for Devi
udisks2.service	loaded	active	running	Disk Manager
unattended-upgrades.service	loaded	active	running	Unattended Upgrades Shutdown
upower.service	loaded	active	running	Daemon for power management
user@1000.service	loaded	active	running	User Manager for UID 1000

```
lines 1-23/28 85%
```

Jika sudah muncul, pengguna dapat menentukan service trivial mana saja yang ingin di-stop. Fwupd dapat distop karena kita tidak perlu untuk mengupdate firmware otomatis, jadi bukan service penting sehingga bisa di-stop.

```
sevima@semesta-lab-04: /etc/fail2ban
```

systemd-resolved.service	loaded	active	running	Network Name Resolution
systemd-timesyncd.service	loaded	active	running	Network Time Synchronization
systemd-udevd.service	loaded	active	running	Rule-based Manager for Devi
udisks2.service	loaded	active	running	Disk Manager
unattended-upgrades.service	loaded	active	running	Unattended Upgrades Shutdown
upower.service	loaded	active	running	Daemon for power management
user@1000.service	loaded	active	running	User Manager for UID 1000

```
sevima@semesta-lab-04:/etc/fail2ban$ sudo systemctl stop fwupd
sevima@semesta-lab-04:/etc/fail2ban$ systemctl list-units --type=service --state=running
```

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION
cron.service	loaded	active	running	Regular background program
dbus.service	loaded	active	running	D-Bus System Message Bus
fail2ban.service	loaded	active	running	Fail2Ban Service
getty@tty1.service	loaded	active	running	Getty on tty1
ModemManager.service	loaded	active	running	Modem Manager
multipathd.service	loaded	active	running	Device-Mapper Multipath Dev
mysql.service	loaded	active	running	MySQL Community Server
polkit.service	loaded	active	running	Authorization Manager
rsyslog.service	loaded	active	running	System Logging Service
ssh.service	loaded	active	running	OpenBSD Secure Shell server
systemd-journald.service	loaded	active	running	Journal Service

8. Sistem log tersentralisasi dan aturan audit aktif

9. Konfigurasi NFS

10. Pembatasan penggunaan resource