



Lab 9

CS 5-1 - BSCS – Operating System Lab

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Task 1:

A screenshot of a Kali Linux terminal window. The terminal shows a series of commands and their outputs. The user 'sharaiz' is created with 'sudo useradd -m sharaiz'. The password is set with 'sudo passwd sharaiz'. The group 'developers' is created with 'sudo groupadd developers'. The user 'sharaiz' is added to the 'developers' group with 'sudo usermod -aG developers sharaiz'. Finally, the 'groups' command is run, showing that 'sharaiz' is a member of the 'developers' group.

```
(kali@kali)-[~]
$ sudo useradd -m sharaiz
useradd: warning: the home directory /home/sharaiz already exists.
useradd: Not copying any file from skel directory into it.

(kali@kali)-[~]
$ su sharaiz
Password:
su: Authentication failure

(kali@kali)-[~]
$ sudo passwd sharaiz
New password:
Retype new password:
passwd: password updated successfully

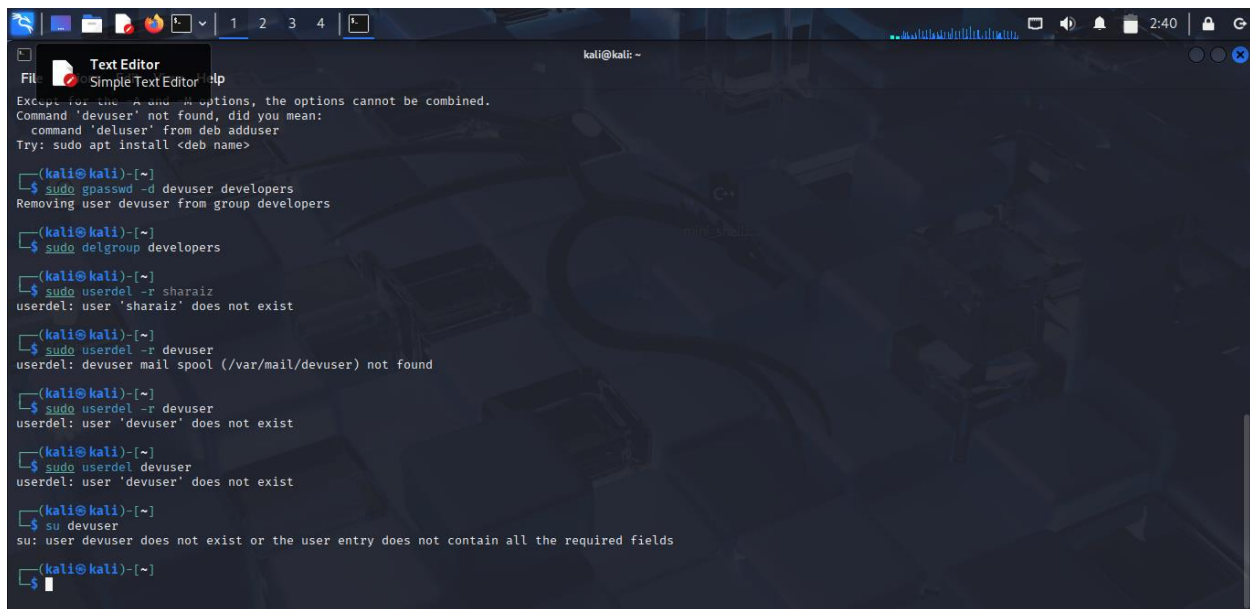
(kali@kali)-[~]
$ sudo groupadd developers

(kali@kali)-[~]
$ sudo usermod -aG developers sharaiz

(kali@kali)-[~]
$ group developers
Command 'group' not found, did you mean:
command 'groups' from deb coreutils
Try: sudo apt install <deb name>

(kali@kali)-[~]
$ groups developers
groups: 'developers': no such user

(kali@kali)-[~]
```



A terminal window on Kali Linux showing a series of commands for user management. A text editor window titled 'Simple Text Editor' is open in the background, displaying an error message about the 'devuser' command. The terminal commands and their outputs are as follows:

```
(kali@kali)-[~]
$ sudo gpasswd -d devuser developers
Removing user devuser from group developers

(kali@kali)-[~]
$ sudo delgroup developers

(kali@kali)-[~]
$ sudo userdel -r sharaiz
userdel: user 'sharaiz' does not exist

(kali@kali)-[~]
$ sudo userdel -r devuser
userdel: devuser mail spool (/var/mail/devuser) not found

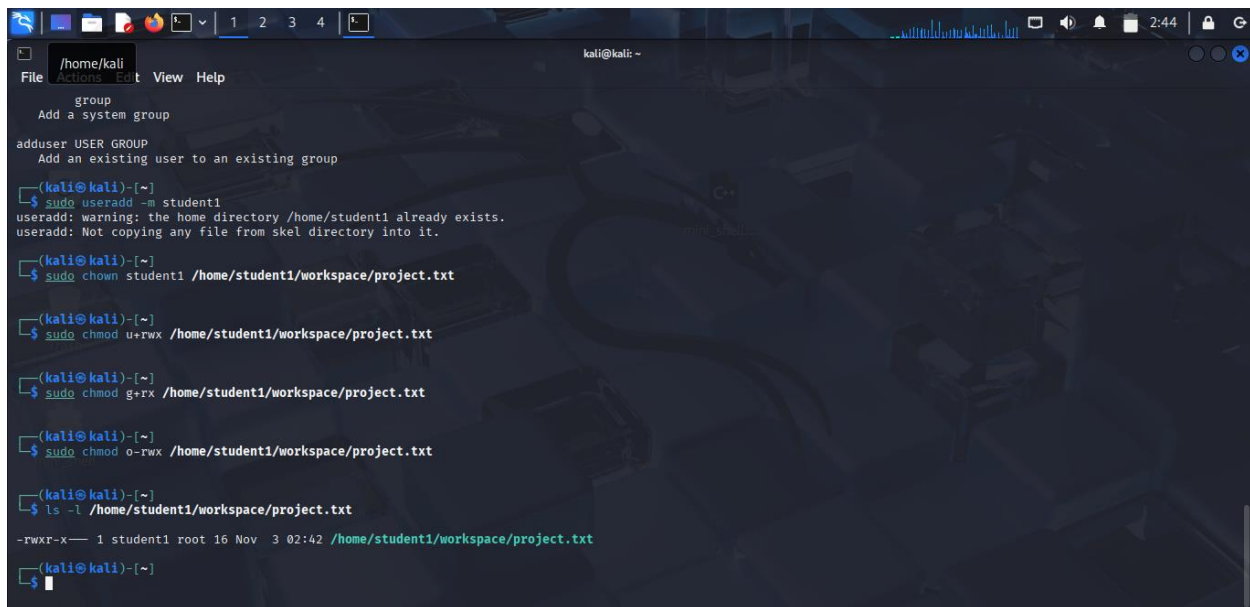
(kali@kali)-[~]
$ sudo userdel -r devuser
userdel: user 'devuser' does not exist

(kali@kali)-[~]
$ sudo userdel devuser
userdel: user 'devuser' does not exist

(kali@kali)-[~]
$ su devuser
su: user devuser does not exist or the user entry does not contain all the required fields

(kali@kali)-[~]
$
```

Task 2:



A terminal window on Kali Linux showing commands for adding a user and setting permissions. A text editor window titled 'group' is open in the background, displaying the 'adduser' command. The terminal commands and their outputs are as follows:

```
(kali@kali)-[~]
$ sudo useradd -m student1
useradd: warning: the home directory /home/student1 already exists.
useradd: Not copying any file from skel directory into it.

(kali@kali)-[~]
$ sudo chown student1 /home/student1/workspace/project.txt

(kali@kali)-[~]
$ sudo chmod u+rx /home/student1/workspace/project.txt

(kali@kali)-[~]
$ sudo chmod g+rx /home/student1/workspace/project.txt

(kali@kali)-[~]
$ sudo chmod o-rwx /home/student1/workspace/project.txt

(kali@kali)-[~]
$ ls -l /home/student1/workspace/project.txt
-rwxr-x--- 1 student1 root 16 Nov  3 02:42 /home/student1/workspace/project.txt

(kali@kali)-[~]
$
```

```
kali@kali: ~  
File Actions Edit View Help  
  
(kali@kali)-[~]  
$ sudo chmod +t /home/student1/workspace  
  
(kali@kali)-[~]  
$ sudo chmod u+s /home/student1/workspace/runme.sh  
chmod: cannot access '/home/student1/workspace/runme.sh': No such file or directory  
  
(kali@kali)-[~]  
$ sudo chmod u+s /home/student1/workspace/runme.sh  
chmod: cannot access '/home/student1/workspace/runme.sh': No such file or directory  
  
(kali@kali)-[~]  
$ sudo bash -c 'echo -e "#!/bin/bash\nnecho Hello from runme.sh" > /home/student1/workspace/runme.sh'  
  
(kali@kali)-[~]  
$ sudo chmod +x /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$ sudo chmod u+s /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$ ls -l /home/student1/workspace/runme.sh  
-rwsr-xr-x 1 root root 37 Nov  3 02:48 /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$
```

```
kali@kali: ~  
File Actions Edit View Help  
Text Editor  
Simple Text Editor  
  
(kali@kali)-[~]  
$ sudo chmod u+s /home/student1/workspace/runme.sh  
chmod: cannot access '/home/student1/workspace/runme.sh': No such file or directory  
  
(kali@kali)-[~]  
$ sudo bash -c 'echo -e "#!/bin/bash\nnecho Hello from runme.sh" > /home/student1/workspace/runme.sh'  
  
(kali@kali)-[~]  
$ sudo chmod +x /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$ sudo chmod u+s /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$ ls -l /home/student1/workspace/runme.sh  
-rwsr-xr-x 1 root root 37 Nov  3 02:48 /home/student1/workspace/runme.sh  
  
(kali@kali)-[~]  
$ sudo mkdir /home/student1/workspace/shared  
$ sudo chmod g+s /home/student1/workspace/shared  
  
(kali@kali)-[~]  
$ ls -ld /home/student1/workspace/shared  
drwxr-sr-x 2 root root 4096 Nov  3 02:49 /home/student1/workspace/shared  
  
(kali@kali)-[~]  
$
```

Task 3:

```
kali@kali: ~  
File Actions Edit View Help  
$ sudo systemctl status ssh  
  
● ssh.service - OpenBSD Secure Shell server  
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: disabled)  
   Active: active (running) since Mon 2025-09-15 02:49:11 EDT; 1 month 18 days ago  
 Invocation: d1ae0c76d2f2406caecb638201540a59  
    Docs: man:sshd(8)  
          man:sshd_config(5)  
   Main PID: 2341 (sshd)  
     Tasks: 1 (limit: 2208)  
    Memory: 4.7M (peak: 9.4M)  
       CPU: 384ms  
   CGroup: /system.slice/ssh.service  
           └─2341 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"  
  
Sep 15 02:49:10 kali systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...  
Sep 15 02:49:11 kali sshd[2341]: Server listening on 0.0.0.0 port 22.  
Sep 15 02:49:11 kali sshd[2341]: Server listening on :: port 22.  
Sep 15 02:49:11 kali systemd[1]: Started ssh.service - OpenBSD Secure Shell server.  
Oct 23 17:53:26 kali sshd-session[122880]: Accepted publickey for kali from 10.0.2.15 port 46530 ssh2: ED25519 SHA256:rPYzTXt0j3VFmI9Fu92ytXosYKq5Mx+aPFAKpHWvCok  
Oct 23 17:53:26 kali sshd-session[122880]: pam_unix(sshd:session): session opened for user kali(uid=1000) by kali(uid=0)  
Oct 23 17:53:26 kali sshd-session[122880]: pam_unix(sshd:session): session closed for user kali  
Oct 23 17:53:33 kali sshd-session[122967]: Accepted publickey for kali from 10.0.2.15 port 53100 ssh2: ED25519 SHA256:rPYzTXt0j3VFmI9Fu92ytXosYKq5Mx+aPFAKpHWvCok  
Oct 23 17:53:33 kali sshd-session[122967]: pam_unix(sshd:session): session opened for user kali(uid=1000) by kali(uid=0)  
Oct 23 17:53:34 kali sshd-session[122967]: pam_unix(sshd:session): session closed for user kali  
  
$ sudo systemctl start apache2  
$ sudo systemctl enable apache2  
  
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2  
Created symlink '/etc/systemd/system/multi-user.target.wants/apache2.service' → '/usr/lib/systemd/system/apache2.service'.
```

```
kali@kali: ~  
File Actions Edit View Help  
  
Sep 15 02:49:10 kali systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...  
Sep 15 02:49:11 kali sshd[2341]: Server listening on 0.0.0.0 port 22.  
Sep 15 02:49:11 kali sshd[2341]: Server listening on :: port 22.  
Sep 15 02:49:11 kali systemd[1]: Started ssh.service - OpenBSD Secure Shell server.  
Oct 23 17:53:26 kali sshd-session[122880]: Accepted publickey for kali from 10.0.2.15 port 46530 ssh2: ED25519 SHA256:rPYzTXt0j3VFmI9Fu92ytXosYKq5Mx+aPFAKpHWvCok  
Oct 23 17:53:26 kali sshd-session[122880]: pam_unix(sshd:session): session opened for user kali(uid=1000) by kali(uid=0)  
Oct 23 17:53:26 kali sshd-session[122880]: pam_unix(sshd:session): session closed for user kali  
Oct 23 17:53:33 kali sshd-session[122967]: Accepted publickey for kali from 10.0.2.15 port 53100 ssh2: ED25519 SHA256:rPYzTXt0j3VFmI9Fu92ytXosYKq5Mx+aPFAKpHWvCok  
Oct 23 17:53:33 kali sshd-session[122967]: pam_unix(sshd:session): session opened for user kali(uid=1000) by kali(uid=0)  
Oct 23 17:53:34 kali sshd-session[122967]: pam_unix(sshd:session): session closed for user kali  
  
$ sudo systemctl start apache2  
$ sudo systemctl enable apache2  
  
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install enable apache2  
Created symlink '/etc/systemd/system/multi-user.target.wants/apache2.service' → '/usr/lib/systemd/system/apache2.service'.  
  
$ sudo systemctl restart apache2  
  
$ sudo systemctl stop apache2  
$ sudo systemctl disable apache2  
  
Synchronizing state of apache2.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.  
Executing: /usr/lib/systemd/systemd-sysv-install disable apache2  
Removed '/etc/systemd/system/multi-user.target.wants/apache2.service'.  
  
$
```


Task 4:

```
kali@kali: ~  
File Actions Edit View Help  
-(kali@kali)-[~]  
$ sudo journalctl -xe  
  
Nov 03 02:52:55 kali systemd[1]: Reloading ...  
Nov 03 02:52:56 kali systemd-sshd-generator: Configuration directory '/etc/ssh/' does not exist! No units generated.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: SysV service '/etc/init.d/lnetsim' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: SysV service '/etc/init.d/stunnel4' lacks a native systemd unit file, automatically generating a unit file for co  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: SysV service '/etc/init.d/ptunnel' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: SysV service '/etc/init.d/stunnel4' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: SysV service '/etc/init.d/dns2tcp' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171838]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali (sd-exec-[171822]): /usr/lib/systemd/system-generators/systemd-sshd-generator terminated by signal ABRT.  
Nov 03 02:52:56 kali systemd[1]: Reloading finished in 352 ms.  
Nov 03 02:52:56 kali systemd[1]: Reload requested from client PID 171703 ('systemctl') (unit session-2.scope) ...  
Nov 03 02:52:56 kali systemd[1]: Reloading ...  
Nov 03 02:52:56 kali systemd-sshd-generator: Configuration directory '/etc/ssh/' does not exist! No units generated.  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: SysV service '/etc/init.d/lnetsim' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: SysV service '/etc/init.d/stunnel4' lacks a native systemd unit file, automatically generating a unit file for co  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: SysV service '/etc/init.d/ptunnel' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: Please update package to include a native systemd unit file.  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: ! This compatibility logic is deprecated, expect removal soon. !  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: SysV service '/etc/init.d/dns2tcp' lacks a native systemd unit file, automatically generating a unit file for com  
Nov 03 02:52:56 kali systemd-sysv-generator[171901]: Please update package to include a native systemd unit file.
```

```
kali@kali: ~  
File Actions Edit View Help  
-(kali@kali)-[~]  
$ sudo journalctl -u apache2  
  
Nov 03 02:51:58 kali systemd[1]: Starting apache2.service - The Apache HTTP Server ...  
Nov 03 02:51:59 kali apachectl[170999]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the 'ServerName'  
Nov 03 02:51:59 kali systemd[1]: Started apache2.service - The Apache HTTP Server.  
Nov 03 02:52:45 kali systemd[1]: Stopping apache2.service - The Apache HTTP Server ...  
Nov 03 02:52:45 kali apachectl[171592]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the 'ServerName'  
Nov 03 02:52:45 kali systemd[1]: apache2.service: Deactivated successfully.  
Nov 03 02:52:45 kali systemd[1]: Stopped apache2.service - The Apache HTTP Server.  
Nov 03 02:52:45 kali systemd[1]: Starting apache2.service - The Apache HTTP Server ...  
Nov 03 02:52:45 kali apachectl[171599]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the 'ServerName'  
Nov 03 02:52:45 kali systemd[1]: Started apache2.service - The Apache HTTP Server.  
Nov 03 02:52:55 kali systemd[1]: Stopping apache2.service - The Apache HTTP Server ...  
Nov 03 02:52:55 kali apachectl[171696]: AH00558: apache2: Could not reliably determine the server's fully qualified domain name, using 127.0.1.1. Set the 'ServerName'  
Nov 03 02:52:55 kali systemd[1]: apache2.service: Deactivated successfully.  
Nov 03 02:52:55 kali systemd[1]: Stopped apache2.service - The Apache HTTP Server.  
  
-(kali@kali)-[~]  
$ sudo journalctl -f  
  
Nov 03 02:55:01 kali CRON[172916]: pam_unix(cron:session): session closed for user root  
Nov 03 02:55:19 kali sudo[172671]: pam_unix(sudo:session): session closed for user root  
Nov 03 02:55:31 kali sudo[173162]: kali : TTY=pts/0 ; PWD=/home/kali ; USER=root ; COMMAND=/usr/bin/journalctl -u ssh -p err  
Nov 03 02:55:31 kali sudo[173162]: pam_unix(sudo:session): session opened for user root(uid=0) by kali(uid=1000)  
Nov 03 02:55:31 kali sudo[173162]: pam_unix(sudo:session): session closed for user root  
Nov 03 02:55:45 kali sudo[173282]: kali : TTY=pts/0 ; PWD=/home/kali ; USER=root ; COMMAND=/usr/bin/journalctl -u apache2  
Nov 03 02:55:45 kali sudo[173282]: pam_unix(sudo:session): session opened for user root(uid=0) by kali(uid=1000)  
Nov 03 02:56:10 kali sudo[173282]: pam_unix(sudo:session): session closed for user root  
Nov 03 02:56:14 kali sudo[173514]: kali : TTY=pts/0 ; PWD=/home/kali ; USER=root ; COMMAND=/usr/bin/journalctl -f  
Nov 03 02:56:14 kali sudo[173514]: pam_unix(sudo:session): session opened for user root(uid=0) by kali(uid=1000)
```

Task 5:

```
kali@kali: ~  
File Actions Edit View Help  
$ ssh-keygen -t rsa -b 4096 -C "sharaiz.ahmed@gmail.com"  
  
Generating public/private rsa key pair.  
Enter file in which to save the key (/home/kali/.ssh/id_rsa):  
Enter passphrase for "/home/kali/.ssh/id_rsa" (empty for no passphrase):  
Enter same passphrase again:  
Your identification has been saved in /home/kali/.ssh/id_rsa  
Your public key has been saved in /home/kali/.ssh/id_rsa.pub  
The key fingerprint is:  
SHA256:xQuq1TAP9Yfa8zPqFLNl3+OMLyAx0IO884//voP010k sharaiz.ahmed@gmail.com  
The key's randomart image is:  
+--[RSA 4096]--+  
|+.o .  
|=+00+ . .  
|oo+.. . 0  
|ooo . 0  
|o=oo S .  
|o0.o 0  
|o+=0+ 0  
|..+0+0+ .  
|.00+0E+  
+--[SHA256]--+  
  
(kali@kali)-[~]  
$ ssh-copy-id user@server-ip  
  
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/kali/.ssh/id_rsa.pub"  
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed  
/usr/bin/ssh-copy-id: ERROR: ssh: Could not resolve hostname server-ip: Temporary failure in name resolution  
  
(kali@kali)-[~]  
$ sudo nano /etc/ssh/sshd_config
```

```
kali@kali: ~  
File Actions Edit View Help  
Ign:1 http://http.kali.org/kali kali-rolling/main amd64 ufw all 0.36.2-9  
Ign:1 http://http.kali.org/kali kali-rolling/main amd64 ufw all 0.36.2-9  
Ign:1 http://http.kali.org/kali kali-rolling/main amd64 ufw all 0.36.2-9  
Err:1 http://http.kali.org/kali kali-rolling/main amd64 ufw all 0.36.2-9  
Temporary failure resolving 'http.kali.org'  
Error: Failed to fetch http://http.kali.org/kali/pool/main/u/ufw/ufw_0.36.2-9_all.deb Temporary failure resolving 'http.kali.org'  
Error: Unable to fetch some archives, maybe run apt-get update or try with --fix-missing?  
  
(kali@kali)-[~]  
$ sudo systemctl restart ssh  
$ sudo systemctl status ssh  
  
● ssh.service - OpenBSD Secure Shell server  
   Loaded: loaded (/usr/lib/systemd/system/ssh.service; enabled; preset: disabled)  
   Active: active (running) since Mon 2025-11-03 03:20:09 EST; 57ms ago  
  Invocation: 7a07d1947b424ab9ba62c60818686d29  
     Docs: man:sshd(8)  
           man:sshd_config(5)  
  Process: 185407 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)  
    Main PID: 185407 (sshd)  
       Tasks: 1 (limit: 2208)  
      Memory: 1.5M (peak: 2M)  
         CPU: 68ms  
    CGroup: /system.slice/ssh.service  
            └─185407 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"  
  
Nov 03 03:20:08 kali systemd[1]: Starting ssh.service - OpenBSD Secure Shell server...  
Nov 03 03:20:09 kali sshd[185407]: Server listening on 0.0.0.0 port 2222.  
Nov 03 03:20:09 kali sshd[185407]: Server listening on :: port 2222.  
Nov 03 03:20:09 kali systemd[1]: Started ssh.service - OpenBSD Secure Shell server.  
  
(kali@kali)-[~]  
$
```