

Intro to Linux

Remote Networking Tools Lab

Remote Networking Tools Materials

- Materials needed
 - Ubuntu Linux Machine
 - Kali Linux Machine
- Software Tools used
 - nano editor
 - Secure Shell (SSH)
 - Secure Copy Protocol (scp)
 - SSH File Transfer Protocol (SFTP)



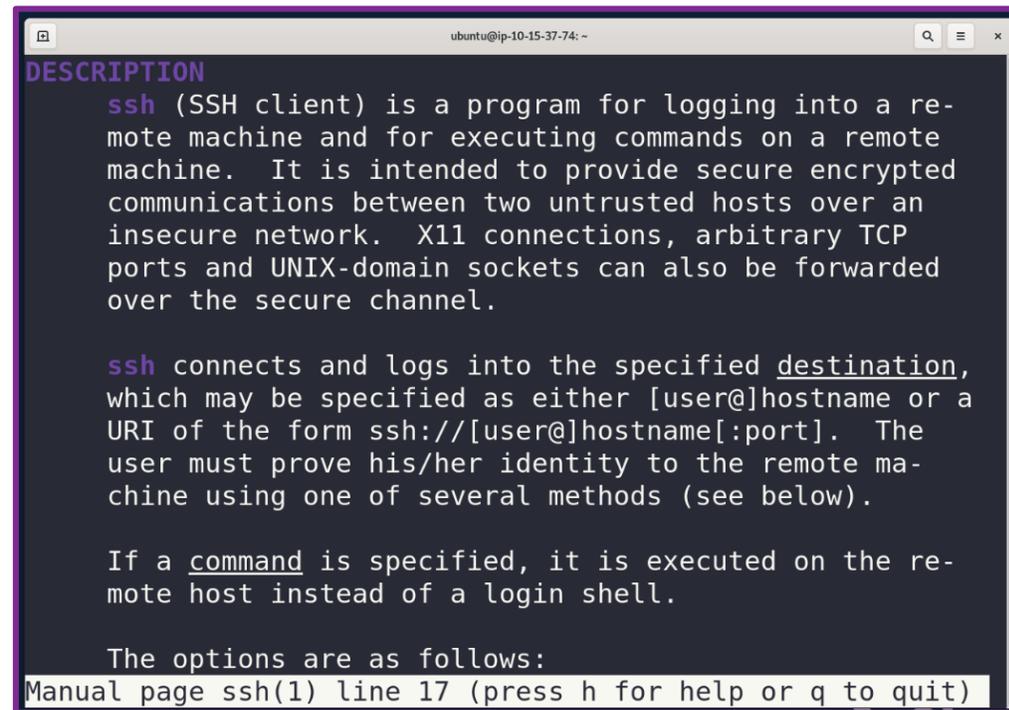
Objectives Covered

- Linux+ Objectives (XKO-005)
 - Objective 1.5 - Given a scenario, use the appropriate networking tools or configuration files
 - Remote Networking tools
 - Secure Shell (SSH)
 - Secure Copy Protocol (SCP)
 - SSH File Transfer Protocol (SFTP)



Secure Shell (SSH) Protocol

- SSH allows the creation of a secure/ encrypted connection between machines to allow the exchange of information.
- Secure Copy Protocol (SCP) and SSH File Transfer Protocol (SFTP) are both based on the SSH protocol, allowing secure and encrypted transfer of files.



```
ubuntu@ip-10-15-37-74: ~
DESCRIPTION
ssh (SSH client) is a program for logging into a re-
mote machine and for executing commands on a remote
machine. It is intended to provide secure encrypted
communications between two untrusted hosts over an
insecure network. X11 connections, arbitrary TCP
ports and UNIX-domain sockets can also be forwarded
over the secure channel.

ssh connects and logs into the specified destination,
which may be specified as either [user@]hostname or a
URI of the form ssh://[user@]hostname[:port]. The
user must prove his/her identity to the remote ma-
chine using one of several methods (see below).

If a command is specified, it is executed on the re-
mote host instead of a login shell.

The options are as follows:
Manual page ssh(1) line 17 (press h for help or q to quit)
```



Remote Networking Tools Overview

1. Edit the `sshd.config` file to allow access
2. Connect the Kali and Ubuntu machines via `ssh`
3. Create a file in each machine through `ssh`
4. Use Secure Copy Protocol (SCP) to move a file
5. Use SSH File Transfer Protocol (SFTP) to move a file



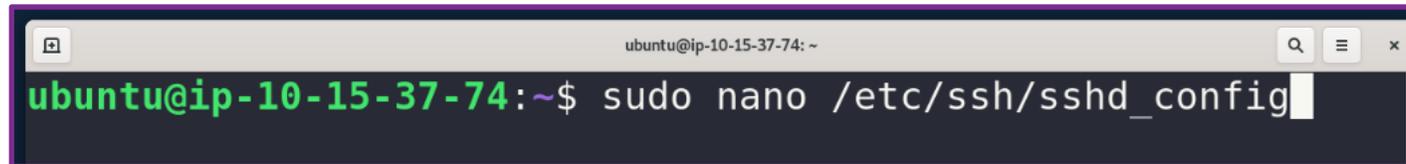
Setup Environments

- Log into your range account.
- Once logged in, right click on your browser's tab for the range and click duplicate to have two tabs or windows open.
- Open the Ubuntu Linux Environment in one tab.
 - You should be on your Ubuntu Linux Desktop.
- Open the Kali Linux Environment in the other tab.
 - You should be on your Kali Linux Desktop.



Opening the sshd.config for Ubuntu

- Move to your Ubuntu machine
- Open a terminal by clicking the white and black icon on the dashboard on the left.
- Open the sshd.config file with the nano editor
- **sudo nano /etc/ssh/sshd_config**

A terminal window screenshot with a dark background and a purple border. The title bar shows 'ubuntu@ip-10-15-37-74: ~'. The command 'sudo nano /etc/ssh/sshd_config' is entered at the prompt. The prompt is 'ubuntu@ip-10-15-37-74:~\$'.

```
ubuntu@ip-10-15-37-74: ~  
ubuntu@ip-10-15-37-74:~$ sudo nano /etc/ssh/sshd_config
```



Editing the sshd.config for Ubuntu

- Scroll down to the line that has “PasswordAuthentication no” and change “no” to “yes”
- Hit CTRL+X, Y, [Enter] to save the file changes

```
ubuntu@ip-10-15-37-74: ~  
GNU nano 4.8 /etc/ssh/sshd config  
# To disable tunneled clear text passwords, change to no here>  
PasswordAuthentication no  
#PermitEmptyPasswords no  
  
# Change to yes to enable challenge-response passwords (beware of  
# some PAM modules and threads)  
ChallengeResponseAuthentication no  
  
# Kerberos options  
#KerberosAuthentication no  
#KerberosOrLocalPasswd yes
```

```
ubuntu@ip-10-15-37-74: ~  
GNU nano 4.8 /etc/ssh/sshd config Modified  
# To disable tunneled clear text passwords, change to no here>  
PasswordAuthentication yes  
#PermitEmptyPasswords no  
  
# Change to yes to enable challenge-response passwords (beware of  
# some PAM modules and threads)  
ChallengeResponseAuthentication no  
  
# Kerberos options  
#KerberosAuthentication no  
#KerberosOrLocalPasswd yes
```



Restart the ssh Service for Ubuntu

- Restart the ssh service to update its settings based on the changes made

```
ubuntu@ip-10-15-37-74: ~  
ubuntu@ip-10-15-37-74:~$ sudo nano /etc/ssh/sshd_config  
ubuntu@ip-10-15-37-74:~$ sudo service ssh restart  
ubuntu@ip-10-15-37-74:~$
```



Editing the sshd.config for Kali

- Switch to the Kali machine. You will need to perform the same steps in Kali. Open a terminal by clicking the white and black icon in the top left.
- **`sudo nano /etc/ssh/sshd_config`**
- Scroll down to the line that has “PasswordAuthentication no” and change “no” to “yes”
- Hit CTRL+X, Y, [Enter] to save the file changes
- Restart the ssh service
- **`sudo service ssh restart`**



ssh from Kali to Ubuntu

- To start a ssh tunnel between machines use `ssh ubuntu@<ubuntu_IP_address> -p 22`
- Type yes since this is the first time these machines are connected, then enter the ubuntu password which is “password”
- Type `pwd` and `ls` to see where you are and what files are available
- At this point you have full terminal access to the ubuntu machine

```
kali@kali:~$ sudo nano /etc/ssh/sshd_config
(kali@10.15.62.109)-[~]
(kali@10.15.62.109)-[~] $ sudo service ssh restart
(kali@10.15.62.109)-[~]
(kali@10.15.62.109)-[~] $ ssh ubuntu@10.15.92.100 -p 22
The authenticity of host '10.15.92.100 (10.15.92.100)'
can't be established.
ED25519 key fingerprint is SHA256:sXrZ/9T3A0iLdhV0TREJ+
DJSc4+XrrGnIWTERBiUJXg.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[f
ingerprint])? yes
Warning: Permanently added '10.15.92.100' (ED25519) to
the list of known hosts.
ubuntu@10.15.92.100's password: █
```

```
ubuntu@ip-10-15-92-100:~$ pwd
/home/ubuntu
ubuntu@ip-10-15-92-100:~$ ls
Desktop      Music        Templates   snap
Documents   Pictures     Videos     thinclient_drives
Downloads    Public       pwndbg
ubuntu@ip-10-15-92-100:~$ █
```



Create a Text File in Ubuntu from Kali

- While in the ssh connection, create a text file
- `touch ubuntu_home.txt`
- `nano ubuntu_home.txt`
- Type “This file was created in the Ubuntu from Kali.”
- Hit Ctrl+X, Y, and [Enter] to save the changes
- Use `ls` to view the files
- `cat ubuntu_home.txt` to print the contents of the file to verify it.
- Type `exit` to close the ssh connection.

```
ubuntu@ip-10-15-92-100:~$ touch ubuntu_home.txt
ubuntu@ip-10-15-92-100:~$ nano ubuntu_home.txt
ubuntu@ip-10-15-92-100:~$ ls
Desktop  Music  Templates  snap
Documents Pictures Videos  thinclient_drives
Downloads Public  pwnDBG     ubuntu_home.txt
ubuntu@ip-10-15-92-100:~$ cat ubuntu_home.txt
This file was created in the ubuntu machine from Kali.
ubuntu@ip-10-15-92-100:~$
```



ssh from Ubuntu to Kali

- Switch to the Ubuntu machine
- Start a ssh tunnel between machines
- **ssh kali@<kali_IP_address> -p 22**
- Type yes again since this is a new connection from this direction, then enter the kali password which is “password”
- Type **pwd** and **ls** to see where you are and what files are available
- At this point you have full terminal access to the kali machine

```
ubuntu@ip-10-15-92-100:~$ ssh kali@10.15.62.109 -p 22
The authenticity of host '10.15.62.109 (10.15.62.109)' can't be established.
ECDSA key fingerprint is SHA256:eAhIaHW3bPxssCCnWTDJySiLeWecwk+ruj5TEswEwWA.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
yes
Warning: Permanently added '10.15.62.109' (ECDSA) to the list of known hosts.
kali@10.15.62.109's password: █
```

```
(kali㉿kali)-[~]
└─$ pwd
/home/kali

(kali㉿kali)-[~]
└─$ ls
CourseFiles  Downloads  Public      juice-shop
Desktop      Music      Templates  thinclient_drives
Documents    Pictures   Videos

(kali㉿kali)-[~]
└─$
```



Create a Text File in Kali from Ubuntu

- Just as you did before create a text file
- `touch kali_home.txt`
- `nano kali_home.txt`
- Type “This file was created in the Kali from Ubuntu.”
- Hit Ctrl+X, Y, and [Enter] to save the changes
- Use `ls` to view the files
- `cat kali_home.txt` to print the contents of the file to verify it.
- Type `exit` to close the ssh connection.

```
(kali㉿kali)-[~]
└─$ touch kali_home.txt

(kali㉿kali)-[~]
└─$ nano kali_home.txt

(kali㉿kali)-[~]
└─$ ls
CourseFiles  Downloads  Public      juice-shop
Desktop      Music      Templates   kali_home.txt
Documents    Pictures    Videos     thinclient drives

(kali㉿kali)-[~]
└─$ cat kali_home.txt
This file was created in the Kali from Ubuntu.

(kali㉿kali)-[~]
└─$
```



View and Transfer with SCP

- With the ssh connection terminated, view the files by using ls to see that the ubuntu_home.txt file has been added.
- Transfer the file using SCP
- `scp ubuntu_home.txt kali@<kali_IP_address>:/home/kali/`
- Enter the password at the prompt and you should see the status of the transfer immediately

```
ubuntu@ip-10-15-37-138:~$ ls
Desktop    Music      Templates  snap
Documents  Pictures   Videos    thinclient drives
Downloads  Public     pwndbg     ubuntu_home.txt
ubuntu@ip-10-15-37-138:~$ scp ubuntu_home.txt kali@10.15.25.85:/home/kali
kali@10.15.25.85's password:
ubuntu_home.txt                               100%  43    19.1KB/s   00:00
ubuntu@ip-10-15-37-138:~$ █
```



View and Transfer with SFTP

- Switch over to the Kali machine.
- With the ssh connection terminated, view the files by using `ls` to see that the `kali_home.txt` file has been added, as well as the `ubuntu_home.txt` file that you just transferred via SCP.
- Transfer the kali file using SFTP
- `sftp ubuntu@<ubuntu_IP_address>`
- Enter the password at the prompt and you should see the `sftp>` prompt.

```
(kali@10.15.25.85)-[~]
└─$ ls
CourseFiles  Music      Videos      ubuntu_home.txt
Desktop      Pictures   juice-shop
Documents    Public     kali_home.txt
Downloads    Templates thinclient_drives

(kali@10.15.25.85)-[~]
└─$ sftp ubuntu@10.15.37.138
ubuntu@10.15.37.138's password:
Connected to 10.15.37.138.
sftp> █
```



SFTP vs SCP

- You probably noticed SFTP does not look or function the same as SCP
- SCP can be used for fast and secure transfers, but is limited to just those transfers
- On the other hand, SFTP allows navigation of directories and transferring of files both to and from machines.
- You can type **help** to get an extensive list of commands

```
(kali@10.15.25.85)-[~]
└─$ ls
CourseFiles Music Videos ubuntu_home.txt
Desktop Pictures juice-shop
Documents Public kali_home.txt
Downloads Templates thinclient_drives

(kali@10.15.25.85)-[~]
└─$ sftp ubuntu@10.15.37.138
ubuntu@10.15.37.138's password:
Connected to 10.15.37.138.
sftp> help
Available commands:
bye Quit sftp
cd path Change remote directory to 'path'
chgrp [-h] grp path Change group of file 'path' to 'grp'
```



Transferring via SFTP

- Use the following to transfer the Kali file to the Ubuntu
- `put kali_home.txt /home/ubuntu`
- You should see a status listed almost immediately
- While connected you can use `ls` and `pwd` to check out the ubuntu's directory. Type `exit` when you are finished.

```
sftp> put kali_home.txt /home/ubuntu/  
Uploading kali_home.txt to /home/ubuntu/kali_home.txt  
kali_home.txt          100%  47    83.0KB/s   00:00  
sftp> ls  
Desktop                Documents              Downloads  
Music                  Pictures               Public  
Templates              Videos                kali_home.txt  
pwndbg                 snap                   thinclient_drives  
ubuntu_home.txt  
sftp> pwd  
Remote working directory: /home/ubuntu
```



Check the file in Ubuntu

- Return to the Ubuntu and use `ls` to view the files. You should see both the kali and ubuntu files.
- Use `cat kali_home.txt` to view the file.

```
ubuntu@ip-10-15-37-138:~$ ls
Desktop    Downloads  Pictures   Templates  pwndbg    thinclient drives
Documents  Music      Public     Videos     snap      ubuntu_home.txt
ubuntu@ip-10-15-37-138:~$ ls
Desktop    Music      Templates  pwndbg      ubuntu_home.txt
Documents  Pictures   Videos     snap
Downloads  Public     kali_home.txt thinclient drives
ubuntu@ip-10-15-37-138:~$ cat kali_home.txt
This file was created in the Kali from Ubuntu.
ubuntu@ip-10-15-37-138:~$
```



Wrap-up

- ssh offers a secure, encrypted connection to a remote machine
- SCP and SFTP both offer secure ways to transfer files and are based on the ssh protocol allowing encryption
- SCP is fast and easy to transfer
- SFTP offers more options in navigation and file/ directory navigation

