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## **INT301: Open Source Technologies**

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# 1.Introduction

## **1.1 Objective of the project**

- Transfer the files from server to client using any Open Source Software.
- Explore other options for this open-source software

## **1.2 Description of the project**

Open-source software is based on the idea that the user cannot only view but also can change the source code of the existing application.

Here in this project, First I am using **SFTP** to transfer the files from server to client. And Then WinSCP Open Source Software.

## **1.3 Scope of the project**

The purpose of the project is to transfer files from server to client. This project is based on the Open Source Software which helps you to transfer the files from one server to another.

# 2. System Description

## **2.1 Target System Description**

### **SFTP**

The SSH File Transfer Protocol (also Secure File Transfer Protocol, or SFTP) is a network protocol that provides file access, file transfer, and file management functionalities over any reliable data stream.

It was designed by the Internet Engineering Task Force (IETF) as an extension of the Secure Shell protocol (SSH) version 2.0 to provide secure file transfer capabilities.

This protocol assumes that it is run over a secure channel, such as SSH, that the server has already authenticated the client, and that the identity of the client user is available to the protocol.

## **SFTP Server and Client**

### **SFTP Server:**

- There are numerous SFTP server implementations both for UNIX, Windows and MacOS. The most widely known is perhaps OpenSSH, but there are also proprietary implementations. Typically the port used is 22. SFTP file transfer protocol is part of SSH protocol suite.

### **SFTP Client:**

- It is a command-line program that implements the client part of this protocol. As an example, the sftp program supplied with OpenSSH implements this.
- Some implementations of the scp program support both the SFTP and SCP protocols to perform file transfers, depending on what the server supports.

## **OpenSSH**

- OpenSSH is a free open source set of computer tools used to provide secure and encrypted communication over a computer network by using the ssh protocol.
- Many people, new to computers and protocols, create a misconception about OpenSSH, they think it is a protocol, but it is not, it is a set of computer programs that use the ssh protocol.
- OpenSSH is developed by the Open BSD group and it is released under Simplified BSD License.

- A main factor which has made possible for OpenSSH to be used so much among system administrators is its multi-platform capability and very useful nice features it has.
- The latest version — is OpenSSH 9.3 which has been released on 15 March 2023.

## **Why to use sftp over ftp/telnet?**

- The most important reason why should use OpenSSH tools over ftp and telnet is that all communications and user credentials using OpenSSH are encrypted, they are also protected from man in the middle attacks.
- If a third party tries to intercept your connection, OpenSSH detects it and informs you about that.

## **Features of OpenSSH**

- Secure Communication
- Strong Encryption (3DES, Blowfish, AES, Arcfour)
- X11 Forwarding (encrypt X Window System traffic)
- Port Forwarding (encrypted channels for legacy protocols)
- Strong Authentication (Public Key, One-Time Password and Kerberos Authentication)
- Agent Forwarding (Single-Sign-On)
- Interoperability (Compliance with SSH 1.3, 1.5, and 2.0 protocol Standards)
- SFTP client and server support in both SSH1 and SSH2 protocols.
- Data Compression
- Kerberos and AFS Ticket Passing

## 2.2 Assumptions

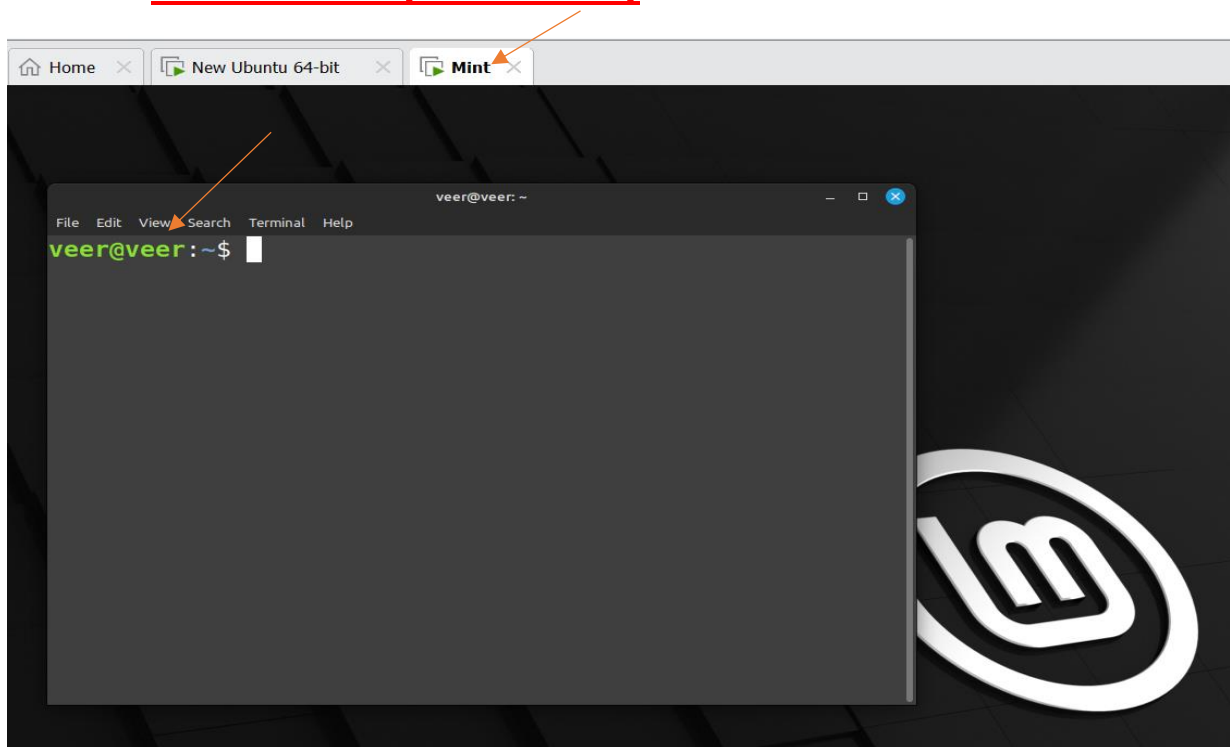
1. Assuming Linux Mint (As Server)
2. Assuming Ubuntu (As Client)
3. The protocol assumes that it is run over a secure channel, such as SSH.

## 3. Analysis Report

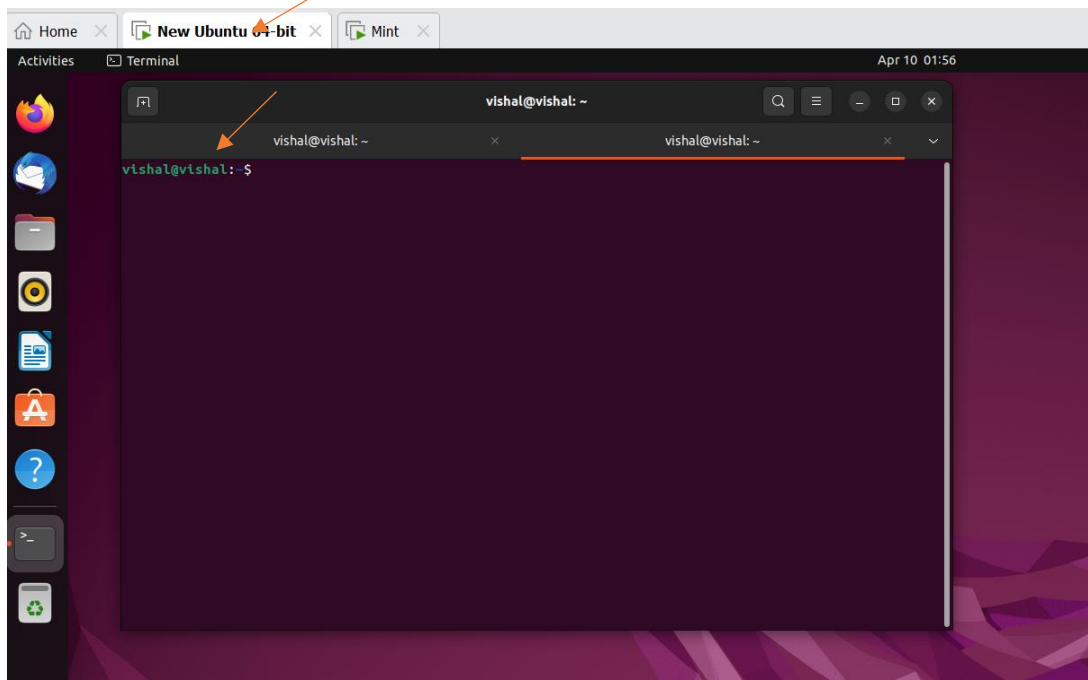
### OpenSSH Requirements

- OpenSSH can be installed on any kind of Linux systems and any kind of network connections.
- I have used Ubuntu and Linux Mint in the demonstration.

### 1. Linux Mint (As Server)

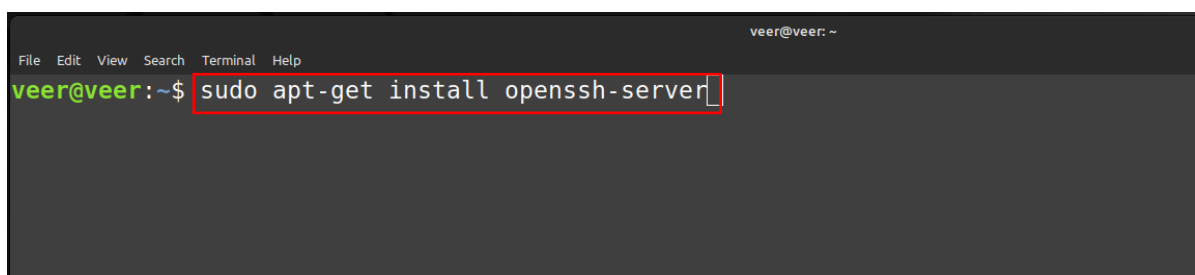


## 2: Ubuntu (As Client)



To transfer the files from Linux Mint (server)  
to Ubuntu (client):

### 1. Install OpenSSH on Linux Mint



```
veer@veer: ~$ sudo apt-get install openssh-server
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  ncurses-term openssh-client openssh-sftp-server ssh-import-id
Suggested packages:
  keychain libpam-ssh monkeysphere ssh-askpass molly-guard
The following NEW packages will be installed:
  ncurses-term openssh-server openssh-sftp-server ssh-import-id
The following packages will be upgraded:
  openssh-client
1 upgraded, 4 newly installed, 0 to remove and 248 not upgraded.
Need to get 1,659 kB of archives.
After this operation, 6,046 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-client amd64 1:8.9p1-3ubuntu0.1 [908 kB]
Get:2 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-sftp-server amd64 1:8.9p1-3ubuntu0.1 [38.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates/main amd64 openssh-server amd64 1:8.9p1-3ubuntu0.1 [434 kB]
Get:4 http://archive.ubuntu.com/ubuntu jammy/main amd64 ncurses-term all 6.3-2 [267 kB]
Get:5 http://archive.ubuntu.com/ubuntu jammy/main amd64 ssh-import-id all 5.11-0ubuntu1 [10.1 kB]
Fetched 1,659 kB in 4s (393 kB/s)
Preconfiguring packages ...
(Reading database ... 537844 files and directories currently installed.)
Preparing to unpack .../openssh-client_1%3a8.9p1-3ubuntu0.1_amd64.deb ...
Unpacking openssh-client (1:8.9p1-3ubuntu0.1) over (1:8.9p1-3) ...
Selecting previously unselected package openssh-sftp-server.
Preparing to unpack .../openssh-sftp-server_1%3a8.9p1-3ubuntu0.1_amd64.deb ...
```

## Enable SSH

```
veer@veer: ~$ sudo systemctl is-enabled ssh
enabled
veer@veer: ~$ sudo systemctl status ssh
● ssh.service - OpenBSD Secure Shell server
   Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2023-04-10 01:13:14 IST; 3min 35s ago
     Docs: man:sshd(8)
           man:sshd_config(5)
   Main PID: 2668 (sshd)
      Tasks: 1 (limit: 4520)
     Memory: 1.7M
        CPU: 48ms
    CGroup: /system.slice/ssh.service
            └─2668 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Apr 10 01:13:14 veer systemd[1]: Starting OpenBSD Secure Shell server...
Apr 10 01:13:14 veer sshd[2668]: Server listening on 0.0.0.0 port 22.
Apr 10 01:13:14 veer sshd[2668]: Server listening on :: port 22.
Apr 10 01:13:14 veer systemd[1]: Started OpenBSD Secure Shell server.
veer@veer: ~$ sudo ufw allow ssh
Rules updated
Rules updated (v6)
veer@veer: ~$
```

## WFW Enable

```
veer@veer:~$ sudo ufw status verbose
Status: inactive
veer@veer:~$ sudo ufw enable
Firewall is active and enabled on system startup
veer@veer:~$ sudo ufw reload
Firewall reloaded
veer@veer:~$ sudo ufw status verbose
Status: active
Logging: on (low)
Default: deny (incoming), allow (outgoing), disabled (routed)
New profiles: skip

To Action From
-----
22/tcp ALLOW IN Anywhere
22/tcp (v6) ALLOW IN Anywhere (v6)

veer@veer:~$
```

## 2. Check IP of Ubuntu (Client)

```
vishal@vishal:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.182.129 netmask 255.255.255.0 broadcast 192.168.182.255
    inet6 fe80::fb32:7d1a:3f14:38b5 prefixlen 64 scopeid 0x20<link>
    ether 00:0c:29:a3:a6:e1 txqueuelen 1000 (Ethernet)
    RX packets 3192 bytes 1885076 (1.8 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 746 bytes 88206 (88.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 188 bytes 17134 (17.1 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 188 bytes 17134 (17.1 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

vishal@vishal:~$
```



### 3. Check IP of Linux Mint (Server)

```
veer@veer:~$ ifconfig
ens33: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.182.130 netmask 255.255.255.0 broadcast 192.168.182.255
    inet6 fe80::db7a:2fed:8c48:6107 prefixlen 64 scopeid 0x20<link>
    ether 00:0c:29:cb:8b:56 txqueuelen 1000 (Ethernet)
    RX packets 1351 bytes 1741628 (1.7 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 482 bytes 36488 (36.4 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 135 bytes 11948 (11.9 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 135 bytes 11948 (11.9 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

veer@veer:~$
```

### 4. On Ubuntu (As Client)

- I want to access the files in Ubuntu from Linux Mint.
- Use following command to get connected Ubuntu to Linux Mint using **sftp**.

```
vishal@vishal:~$ sftp veer@192.168.182.130
The authenticity of host '192.168.182.130 (192.168.182.130)' can't be established.
ED25519 key fingerprint is SHA256:GwgZtjEG+wVy+4a8m7/pdggqNT/m28353o3sCok6lko.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.182.130' (ED25519) to the list of known hosts.
veer@192.168.182.130's password:
```

### 5. SMTP Prompt

```
vishal@vishal:~$ sftp veer@192.168.182.130
The authenticity of host '192.168.182.130 (192.168.182.130)' can't be established.
ED25519 key fingerprint is SHA256:GwgZtjEG+wVy+4a8m7/pdggqNT/m28353o3sCok6lko.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '192.168.182.130' (ED25519) to the list of known hosts.
veer@192.168.182.130's password:
Connected to 192.168.182.130.
sftp> ls
Desktop Documents Downloads Music Pictures Public Templates Videos Warpinator
sftp>
```

## 6. Make & See the files on Linux Mint (As Server)

- I have created two files 'open.dev' and 'open.txt' in Linux Mint (Server) to transfer from this to Ubuntu (Client) using 'touch' command.
- You can see both the files using 'ls' command.

```
veer@veer: ~  
File Edit View Search Terminal Help  
veer@veer:~$ touch open.dev  
veer@veer:~$ ls  
Desktop Documents Downloads Music open.dev Pictures Public Templates Videos Warpinator  
veer@veer:~$
```

```
veer@veer: ~  
File Edit View Search Terminal Help  
veer@veer:~$ touch open.txt  
veer@veer:~$ ls  
Desktop Documents Downloads Music open.dev open.txt Pictures Public Templates Videos Warpinator  
veer@veer:~$
```

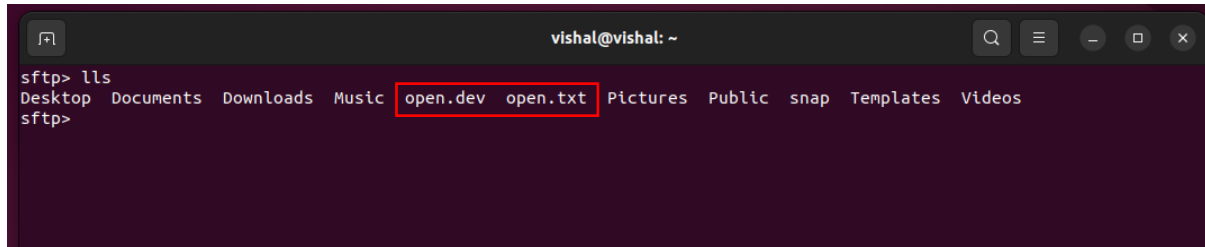
## 7. See the files in Ubuntu using 'ls' command.

```
vishal@vishal:~$ sftp veer@192.168.182.130  
The authenticity of host '192.168.182.130 (192.168.182.130)' can't be established.  
ED25519 key fingerprint is SHA256:GwgZtjEG+wVy+4a8m7/pdggqnT/m28353o3sCok6lko.  
This key is not known by any other names  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added '192.168.182.130' (ED25519) to the list of known hosts.  
veer@192.168.182.130's password:  
Connected to 192.168.182.130.  
sftp> ls  
Desktop Documents Downloads Music Pictures Public Templates Videos Warpinator  
sftp>
```

## 8. Use 'get' command to copy file

```
sftp> get open.txt  
Fetching /home/veer/open.txt to open.txt  
sftp> ll  
Desktop Documents Downloads Music open.dev open.txt Pictures Public snap Templates Videos  
sftp>  
sftp>
```

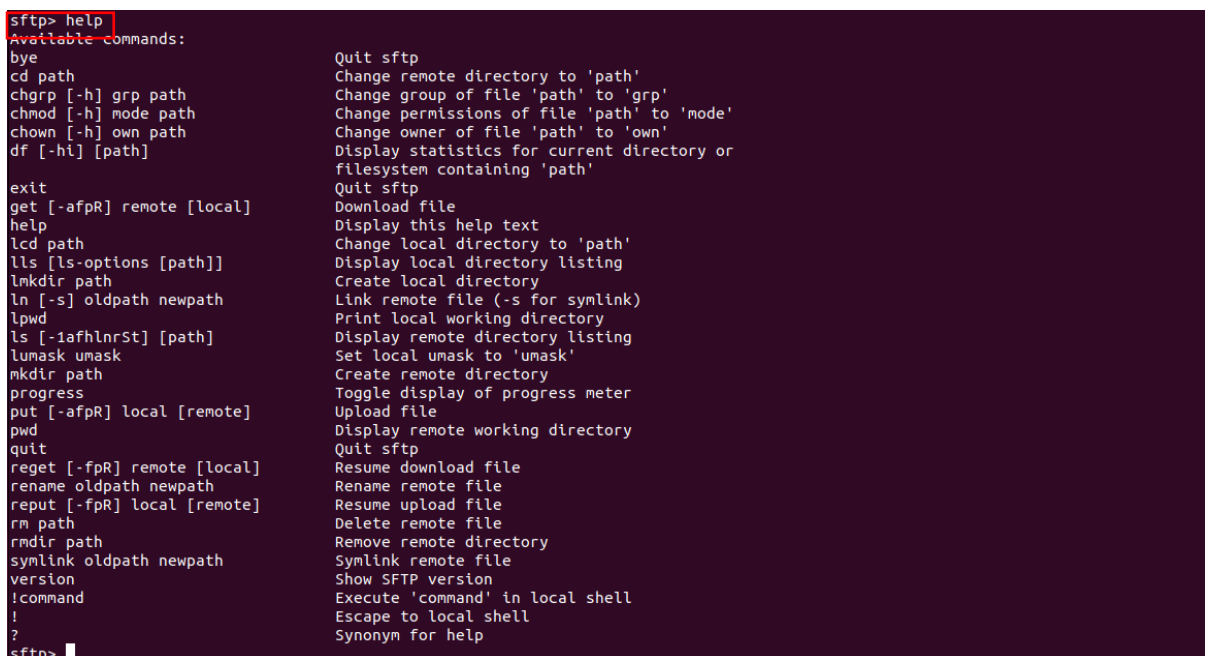
## 9. Now, you can check files have been transferred from Linux Mint (Server) to Ubuntu (Client)



A terminal window titled 'vishal@vishal: ~' showing the output of the 'lls' command in an sftp session. The output lists files in the remote directory: Desktop, Documents, Downloads, Music, open.dev, open.txt, Pictures, Public, snap, Templates, and Videos. The files 'open.dev' and 'open.txt' are highlighted with a red box.

```
sftp> lls
Desktop Documents Downloads Music open.dev open.txt Pictures Public snap Templates Videos
sftp>
```

## 10. Check other sftp commands by typing help



A terminal window showing the output of the 'help' command in an sftp session. The output lists available commands and their descriptions. The 'help' command is highlighted with a red box.

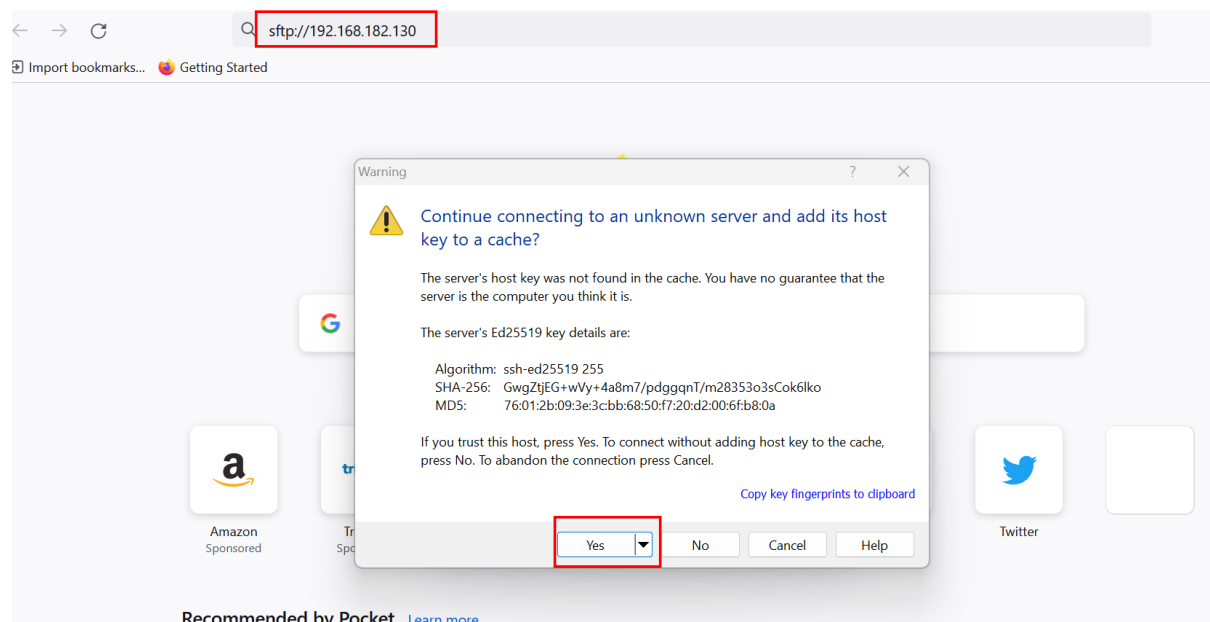
```
sftp> help
Available commands:
bye
cd path
chgrp [-h] grp path
chmod [-h] mode path
chown [-h] own path
df [-hi] [path]
exit
get [-afpR] remote [local]
help
lcd path
lls [ls-options] [path]
lnkdir path
ln [-s] oldpath newpath
lpwd
ls [-lafhlNrSt] [path]
lumask umask
mkdir path
progress
put [-afpR] local [remote]
pwd
quit
reget [-fpR] remote [local]
rename oldpath newpath
reput [-fpR] local [remote]
rm path
rmdir path
symlink oldpath newpath
version
!command
!
?
sftp>
```

## Other ways to copy files

Once authentication is completed and connection is done successfully, we can also use following ways to copy the files.

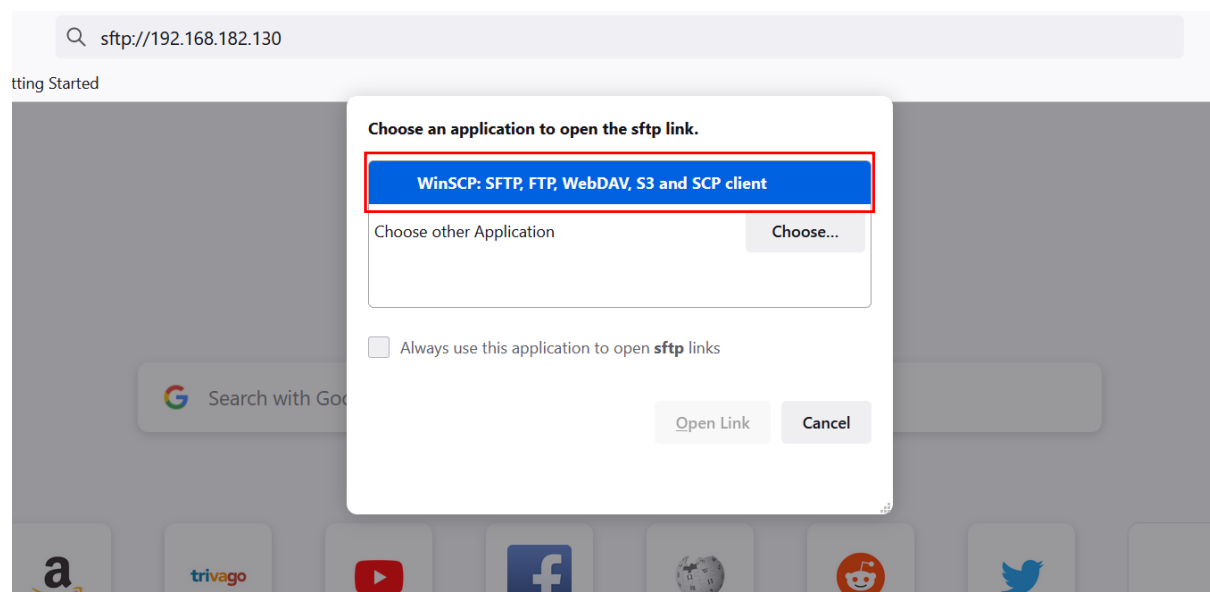
- i. Web browser.
- ii. File browser.

## Use IP of Linux Mint (Server) IP




## I am using WinSCP application to open the sftp link.

WinSCP is a free and open-source SSH File Transfer Protocol, File Transfer Protocol, WebDAV, Amazon S3, and secure copy protocol client for Microsoft Windows. Its main function is secure file transfer between a local computer and a remote server.



# Enter username and password

Username - 192.168.182.130




Searching for host...  
Connecting to host...  
Authenticating...

Username:

OK

Cancel

Password - 192.168.182.130



Searching for host...  
Connecting to host...  
Authenticating...

Password:

•••••

OK

Cancel

# See the files

C:\ - 192.168.182.130 - WinSCP

Local Mark Files Commands Session Options Remote Help

Synchronize Queue Transfer Settings Default

192.168.182.130 x New Session

C:\

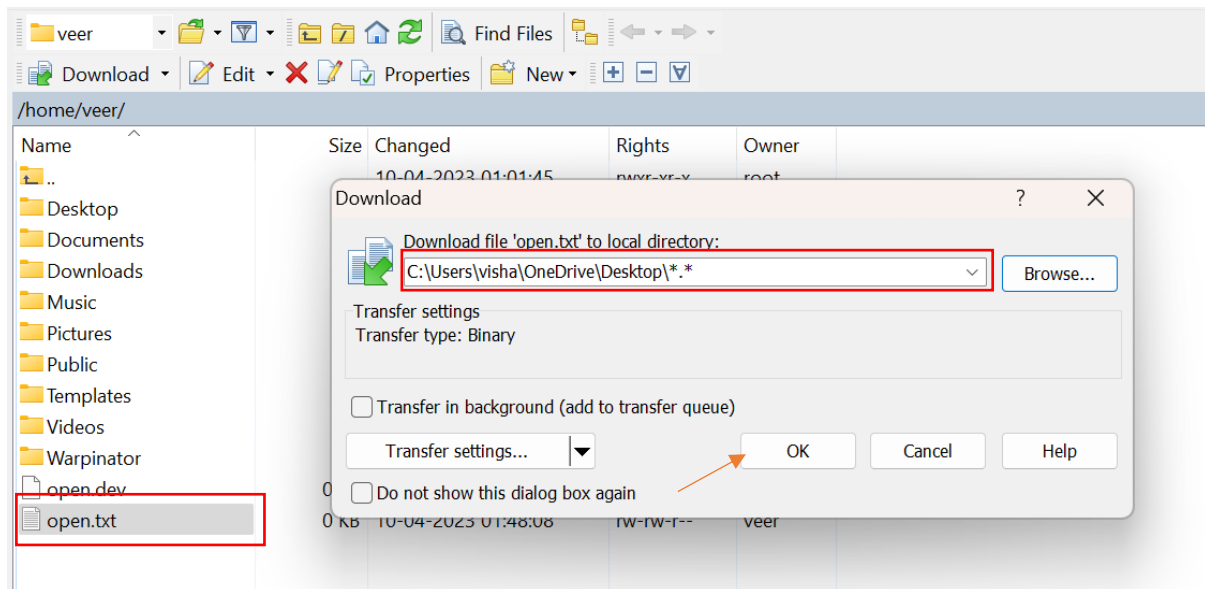
veer

Find Files

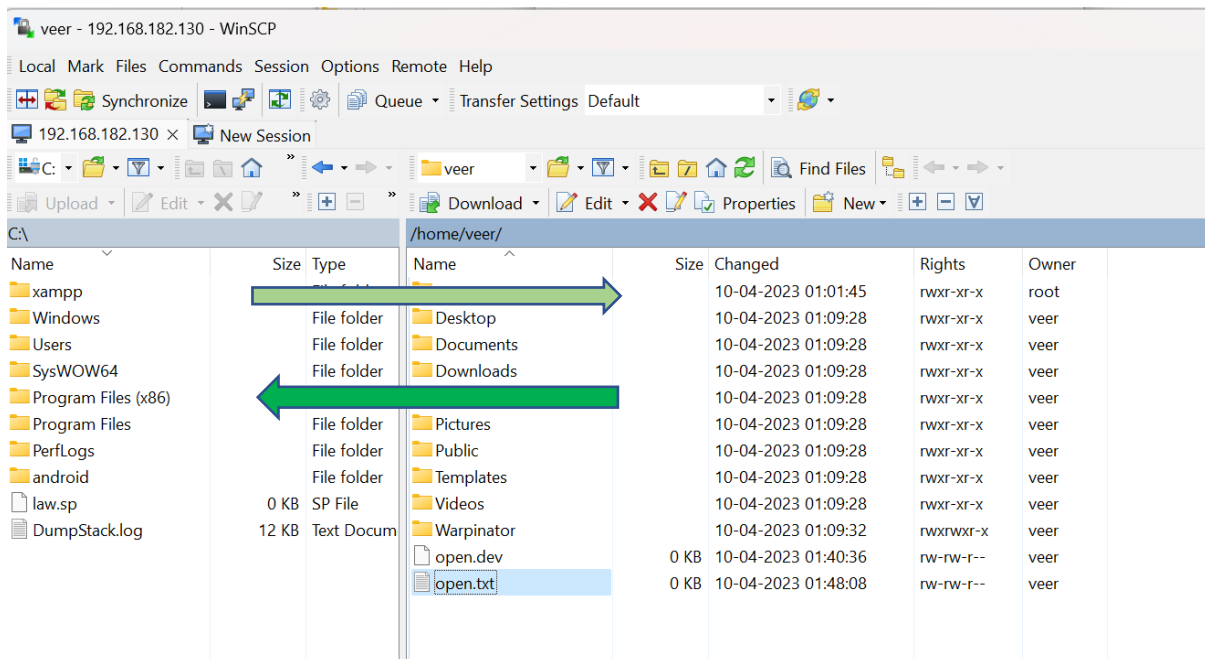
Upload Edit Download Edit Properties New

Name	Size	Type	Name	Size	Changed	Rights	Owner
xampp		File folder	..		10-04-2023 01:01:45	rwxt-xr-x	root
Windows		File folder	Desktop		10-04-2023 01:09:28	rwxt-xr-x	veer
Users		File folder	Documents		10-04-2023 01:09:28	rwxt-xr-x	veer
SysWOW64		File folder	Downloads		10-04-2023 01:09:28	rwxt-xr-x	veer
Program Files (x86)		File folder	Music		10-04-2023 01:09:28	rwxt-xr-x	veer
Program Files		File folder	Pictures		10-04-2023 01:09:28	rwxt-xr-x	veer
PerfLogs		File folder	Public		10-04-2023 01:09:28	rwxt-xr-x	veer
android		File folder	Templates		10-04-2023 01:09:28	rwxt-xr-x	veer
law.sp	0 KB	SP File	Videos		10-04-2023 01:09:28	rwxt-xr-x	veer
DumpStack.log	12 KB	Text Docum	Warpinator		10-04-2023 01:09:32	rwxtwxr-x	veer
			open.dev	0 KB	10-04-2023 01:40:36	rw-rw-r--	veer
			open.txt	0 KB	10-04-2023 01:48:08	rw-rw-r--	veer

**Click on the filename and download it**



**You may access the files of Linux Mint directly by WinSCP application and do multiple things according to your requirement.**



## 4. Reference/ Bibliography

1. Wikipedia
2. Google