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EXPERIMENT NO. 9

AIM: Perform File Transfer and Access using FTP

THEORY:

Transferring files from a client computer to a server computer is called "**uploading**" and transferring from a server to a client is "**downloading**".

Requirements for using FTP

1. An FTP client like Auto FTP Manager installed on your computer
2. Certain information about the FTP server you want to connect to:
 - a. The **FTP server address**. This looks a lot like the addresses you type to browse web sites.

Example : Server address is "ftp.videodesk.net".

Sometimes the server address will be given as a numeric address, like "64.185.225.87".

b. A user name and password. Some FTP servers let you connect to them anonymously. For anonymous connections, you do not need a user name and password. To transfer files, provide your client software (Auto FTP Manager) with the server address, user name, and password. After connecting to the FTP server, you can use Auto FTP Manager's **File Manager** to upload, download and delete files. Using the File Manager is a lot like working with Windows Explorer.

FTP and Internet Connections

FTP uses one connection for commands and the other for sending and receiving data. FTP has a standard port number on which the FTP server "listens" for connections. A port is a "logical connection point" for communicating using the Internet Protocol (IP). The standard port number used by FTP servers is 21 and is used only for sending commands. Since port 21 is used exclusively for sending commands, this port is referred to as a **command port**. For example, to get a list of folders and files present on the FTP server, the FTP Client issues a "LIST" command. The FTP server then sends a list of all folders and files back to the FTP Client. So what about the internet connection used to send and receive data? The port that is used for transferring data is referred to as a **data port**. The number of the data port will vary depending on the "mode" of the connection. (See below for Active and Passive modes.)

Active and Passive Connection Mode

The FTP server may support **Active** or **Passive** connections or both. In an Active FTP connection, the client opens a port and listens and the server actively connects to it. In a Passive FTP connection, the server opens a

port and listens (passively) and the client connects to it. You must grant Auto FTP Manager access to the Internet and to choose the right type of FTP Connection Mode.

Most FTP client programs select passive connection mode by default because server administrators prefer it as a safety measure. Firewalls generally block connections that are "initiated" from the outside. Using passive mode, the FTP client (like Auto FTP Manager) is "reaching out" to the server to make the connection. The firewall will allow these outgoing connections, meaning that no special adjustments to firewall settings are required.

If you are connecting to the FTP server using **Active mode** of connection you must set your firewall to accept connections to the port that your FTP client will open. However, many Internet service providers block incoming connections to all ports above 1024. Active FTP servers generally use port 20 as their data port. **IMPLEMENTATION:**

Step 1: Installation of the Package

1. # rpm -ivh vsftpd

Step 2: Editing Configuration files

1. Open ftp configuration file `/etc/vsftpd/vsftpd.conf`

2. Set up anonymous access of FTP server.

`vsftpd.conf` is the main configuration file of FTP server and it contains lot of directives.

Configuration of an anonymous-only download is relatively simple. Default configuration of `vsftpd.conf` already supports anonymous-only download. But it also supports access from local users. All you need to do is disable the directive which allows locally configured users to login with their accounts.

```
Activities Terminal Oct 13 13:52 pc2@pc2: ~
Building dependency tree... Done
Reading state information... Done
vsftpd is already the newest version (3.0.5-0ubuntu1).
The following packages were automatically installed and are no longer required:
  systemd-hwe-hwdb tcpd
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 110 not upgraded.
pc2@pc2:~$ sudo cp/etc/vsftpd.conf /etc/vsftpd.conf.orig
sudo: cp/etc/vsftpd.conf: command not found
pc2@pc2:~$ sudo cp /etc/vsftpd.conf /etc/vsftpd.conf.orig
pc2@pc2:~$ sudo ufw status
Status: inactive
pc2@pc2:~$ sudo ufw allow 20/tcp
Rules updated
Rules updated (v6)
pc2@pc2:~$ sudo ufw allow 21/tcp
Rules updated
Rules updated (v6)
pc2@pc2:~$ sudo ufw allow 990/tcp
Rules updated
Rules updated (v6)
pc2@pc2:~$ sudo ufw allow 4000:5000/tcp
Rules updated
Rules updated (v6)
pc2@pc2:~$ sudo ufw status
Status: inactive
pc2@pc2:~$ sudo add user YgSh
sudo: add: command not found
pc2@pc2:~$ sudo adduser YgSh
adduser: Please enter a username matching the regular expression configured
via the NAME_REGEX[SYSTEM] configuration variable. Use the '--force-badname'
option to relax this check or reconfigure NAME_REGEX.
pc2@pc2:~$ sudo adduser yash
Adding user 'yash' ...
Adding new group 'yash' (1001) ...
Adding new user 'yash' (1001) with group 'yash' ...
Creating home directory '/home/yash' ...
Copying files from '/etc/skel' ...
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
Changing the user information for yash
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
pc2@pc2:~$ sudo mkdir /home/yash/ftp
Command 'sudo' not found, did you mean:
  command 'sudo' from deb sudo (1.9.9-1ubuntu2)
  command 'sudo' from deb sudo-ldap (1.9.9-1ubuntu2)
Try: sudo apt install <deb name>
pc2@pc2:~$ sudo mkdir /home/yash/ftp
pc2@pc2:~$ sudo chown nobody:nogroup /home/yash/ftp
pc2@pc2:~$ sudo chmod a-w /home/yash/ftp
pc2@pc2:~$ sudo ls -la /home/yash/ftp
total 0
dr-xr-xr-x 2 nobody nogroup 4096 Oct 13 13:39 .
drwxr-xr-x 3 yash yash 4096 Oct 13 13:39 ..
pc2@pc2:~$ sudo mkdir /home/yash/ftp/files
pc2@pc2:~$ sudo chown yash:yash /home/yash/ftp/files
pc2@pc2:~$ sudo ls -la /home/yash/ftp
total 12
dr-xr-xr-x 3 nobody nogroup 4096 Oct 13 13:41 .
drwxr-xr-x 3 yash yash 4096 Oct 13 13:39 ..
drwxr-xr-x 2 yash yash 4096 Oct 13 13:41 files
pc2@pc2:~$ echo "vsftpd test files" | sudo tee /home/yash/ftp/files/yash.txt
```

Step 3: Restart the vsftpd service

```
Activities Terminal Oct 13 13:53 pc2@pc2: ~
pc2@pc2:~$ sudo adduser yash
Adding user 'yash' ...
Adding new group 'yash' (1001) ...
Adding new user 'yash' (1001) with group 'yash' ...
Creating home directory '/home/yash' ...
Copying files from '/etc/skel' ...
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: password updated successfully
Changing the user information for yash
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
pc2@pc2:~$ sudo mkdir /home/yash/ftp
Command 'sudo' not found, did you mean:
  command 'sudo' from deb sudo (1.9.9-1ubuntu2)
  command 'sudo' from deb sudo-ldap (1.9.9-1ubuntu2)
Try: sudo apt install <deb name>
pc2@pc2:~$ sudo mkdir /home/yash/ftp
pc2@pc2:~$ sudo chown nobody:nogroup /home/yash/ftp
pc2@pc2:~$ sudo chmod a-w /home/yash/ftp
pc2@pc2:~$ sudo ls -la /home/yash/ftp
total 0
dr-xr-xr-x 2 nobody nogroup 4096 Oct 13 13:39 .
drwxr-xr-x 3 yash yash 4096 Oct 13 13:39 ..
pc2@pc2:~$ sudo mkdir /home/yash/ftp/files
pc2@pc2:~$ sudo chown yash:yash /home/yash/ftp/files
pc2@pc2:~$ sudo ls -la /home/yash/ftp
total 12
dr-xr-xr-x 3 nobody nogroup 4096 Oct 13 13:41 .
drwxr-xr-x 3 yash yash 4096 Oct 13 13:39 ..
drwxr-xr-x 2 yash yash 4096 Oct 13 13:41 files
pc2@pc2:~$ echo "vsftpd test files" | sudo tee /home/yash/ftp/files/yash.txt
```

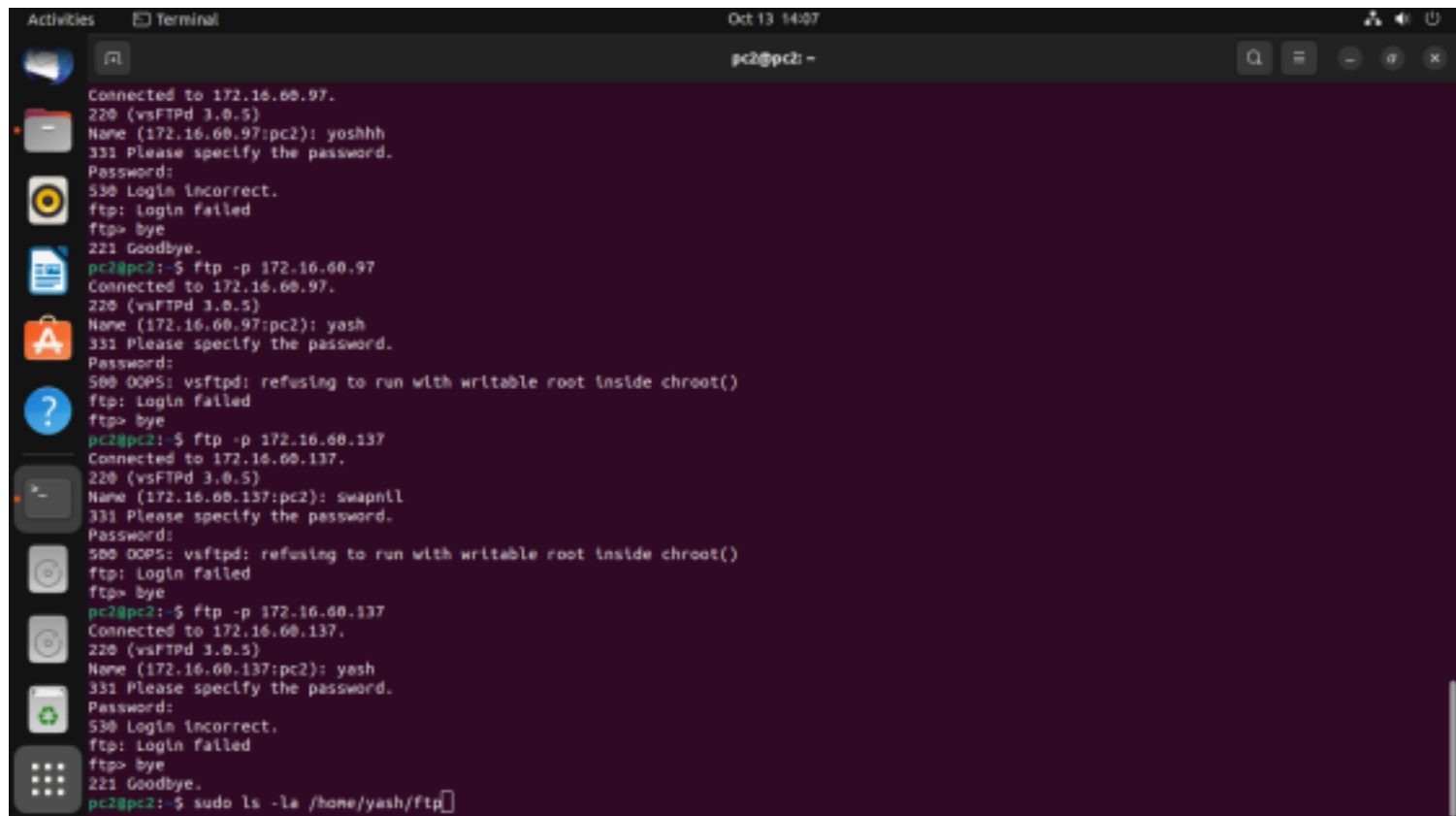
Step 4: Check connectivity with FTP Server.

Ping ip address of the ftp server (192.168.10.10)

```
Activities Terminal Oct 13 13:54 pc2@pc2: ~  
Adding new user 'yash' (1001) with group 'yash' ...  
Creating home directory '/home/yash' ...  
Copying files from '/etc/skel' ...  
New password:  
BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
passwd: password updated successfully  
Changing the user information for yash  
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  
pc2@pc2: $ sudo mkdir /home/yash/ftp  
Command 'sudo' not found, did you mean:  
  command 'sudo' from deb sudo (1.9.9-1ubuntu2)  
  command 'sudo' from deb sudo-ldap (1.9.9-1ubuntu2)  
Try: sudo apt install <deb name>  
pc2@pc2: $ sudo mkdir /home/yash/ftp  
pc2@pc2: $ sudo chown nobody:nogroup /home/yash/ftp  
pc2@pc2: $ sudo chmod a-w /home/yash/ftp  
pc2@pc2: $ sudo ls -la /home/yash/ftp  
total 8  
dr-xr-xr-x 2 nobody nogroup 4096 Oct 13 13:39 .  
drwxr-x--- 3 yash yash 4096 Oct 13 13:39 ..  
pc2@pc2: $ sudo mkdir /home/yash/ftp/files  
pc2@pc2: $ sudo chown yash:yash /home/yash/ftp/files  
pc2@pc2: $ sudo ls -la /home/yash/ftp  
total 12  
dr-xr-xr-x 3 nobody nogroup 4096 Oct 13 13:41 .  
drwxr-x--- 3 yash yash 4096 Oct 13 13:39 ..  
drwxr-xr-x 2 yash yash 4096 Oct 13 13:41 files  
pc2@pc2: $ echo "vsftpd test files" | sudo tee /home/yash/ftp/files/yosh.txt  
vsftpd test files  
pc2@pc2: $ sudo nano /etc/vsftpd.conf  
pc2@pc2: $
```

Step 5: Test the FTP server and transfer files using command prompt

```
Activities Terminal Oct 13 13:57 pc2@pc2: ~  
BAD PASSWORD: The password is shorter than 8 characters  
Retype new password:  
passwd: password updated successfully  
Changing the user information for yash  
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  
pc2@pc2: $ sudo mkdir /home/yash/ftp  
Command 'sudo' not found, did you mean:  
  command 'sudo' from deb sudo (1.9.9-1ubuntu2)  
  command 'sudo' from deb sudo-ldap (1.9.9-1ubuntu2)  
Try: sudo apt install <deb name>  
pc2@pc2: $ sudo mkdir /home/yash/ftp  
pc2@pc2: $ sudo chown nobody:nogroup /home/yash/ftp  
pc2@pc2: $ sudo chmod a-w /home/yash/ftp  
pc2@pc2: $ sudo ls -la /home/yash/ftp  
total 8  
dr-xr-xr-x 2 nobody nogroup 4096 Oct 13 13:39 .  
drwxr-x--- 3 yash yash 4096 Oct 13 13:39 ..  
pc2@pc2: $ sudo mkdir /home/yash/ftp/files  
pc2@pc2: $ sudo chown yash:yash /home/yash/ftp/files  
pc2@pc2: $ sudo ls -la /home/yash/ftp  
total 12  
dr-xr-xr-x 3 nobody nogroup 4096 Oct 13 13:41 .  
drwxr-x--- 3 yash yash 4096 Oct 13 13:39 ..  
drwxr-xr-x 2 yash yash 4096 Oct 13 13:41 files  
pc2@pc2: $ echo "vsftpd test files" | sudo tee /home/yash/ftp/files/yosh.txt  
vsftpd test files  
pc2@pc2: $ sudo nano /etc/vsftpd.conf  
pc2@pc2: $ echo "Yash Vira" | sudo tee -a /etc/vsftpd.userlist  
Yash Vira  
pc2@pc2: $ cat /etc/vsftpd.userlist  
Yash Vira  
pc2@pc2: $
```

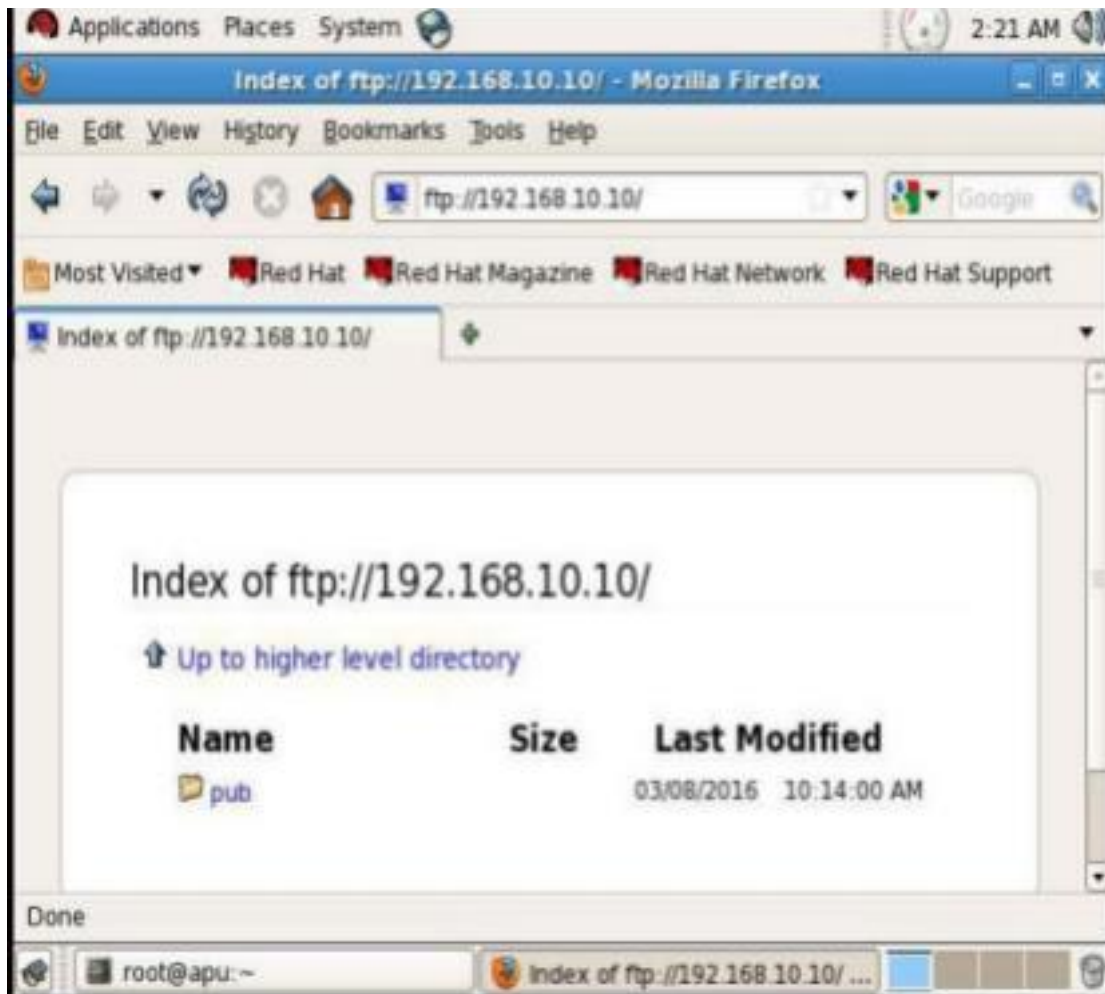
A terminal window titled 'Terminal' with a dark background and light text. The window shows a series of FTP login attempts. The first attempt is to 172.16.68.97 with username 'yoshhh', which fails. The second attempt is to 172.16.68.97 with username 'yash', which also fails with an error message: '500 OOPS: vsftpd: refusing to run with writable root inside chroot()'. The third attempt is to 172.16.68.137 with username 'swapnll', which fails with the same error. The fourth attempt is to 172.16.68.137 with username 'yash', which fails. Finally, the user runs the command 'sudo ls -la /home/yash/ftp' which shows the contents of the ftp directory.

```
Activities Terminal Oct 13 14:07 pc2@pc2: -
Connected to 172.16.68.97.
220 (vsFTPd 3.0.5)
Name (172.16.68.97:pc2): yoshhh
331 Please specify the password.
Password:
530 Login incorrect.
ftp: Login failed
ftp> bye
221 Goodbye.
pc2@pc2:~$ ftp -p 172.16.68.97
Connected to 172.16.68.97.
220 (vsFTPd 3.0.5)
Name (172.16.68.97:pc2): yash
331 Please specify the password.
Password:
500 OOPS: vsftpd: refusing to run with writable root inside chroot()
ftp: Login failed
ftp> bye
pc2@pc2:~$ ftp -p 172.16.68.137
Connected to 172.16.68.137.
220 (vsFTPd 3.0.5)
Name (172.16.68.137:pc2): swapnll
331 Please specify the password.
Password:
500 OOPS: vsftpd: refusing to run with writable root inside chroot()
ftp: Login failed
ftp> bye
pc2@pc2:~$ ftp -p 172.16.68.137
Connected to 172.16.68.137.
220 (vsFTPd 3.0.5)
Name (172.16.68.137:pc2): yash
331 Please specify the password.
Password:
530 Login incorrect.
ftp: Login failed
ftp> bye
221 Goodbye.
pc2@pc2:~$ sudo ls -la /home/yash/ftp
```

We can download the file using anonymous user but cannot upload the file. Also the default data location (or pwd) of FTP server will be pub directory during anonymous access. **b.**

Access the FTP server and transfer files using command prompt

First go to browser then and type [FTP://192.168.10.10](ftp://192.168.10.10). It will show default location of pub directory.




User Specific Authentication

1. Create local user and provide password to it.

```
[root@apu ~]# adduser abc
..
[root@apu ~]# passwd abc
Changing password for user abc.
New UNIX password:
BAD PASSWORD: it is too short
Retype new UNIX password:
passwd: all authentication tokens updated successfully.
[root@apu ~]#
```

VSFTPD configuration file.

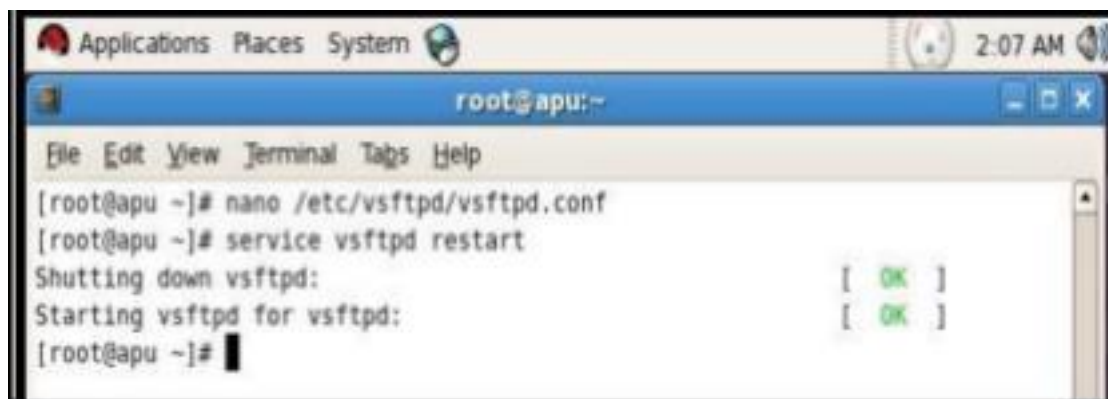
2. Edit



A terminal window titled 'root@apu:~' with a menu bar (File, Edit, View, Terminal, Tabs, Help). The user has executed the command 'vi etc/vsftpd/vsftpd.conf'. The terminal displays the following configuration lines from the file:

```
# Allow anonymous FTP? (Beware - allowed by default if you comment this out)
anonymous_enable=NO
#
# Uncomment this to allow local users to log in.
local_enable=YES
#
# Uncomment this to enable any form of FTP write command.
write_enable=YES
```

3. Restart VSFTPD service.



A terminal window titled 'root@apu:~' with a menu bar (File, Edit, View, Terminal, Tabs, Help). The user has executed the following commands:

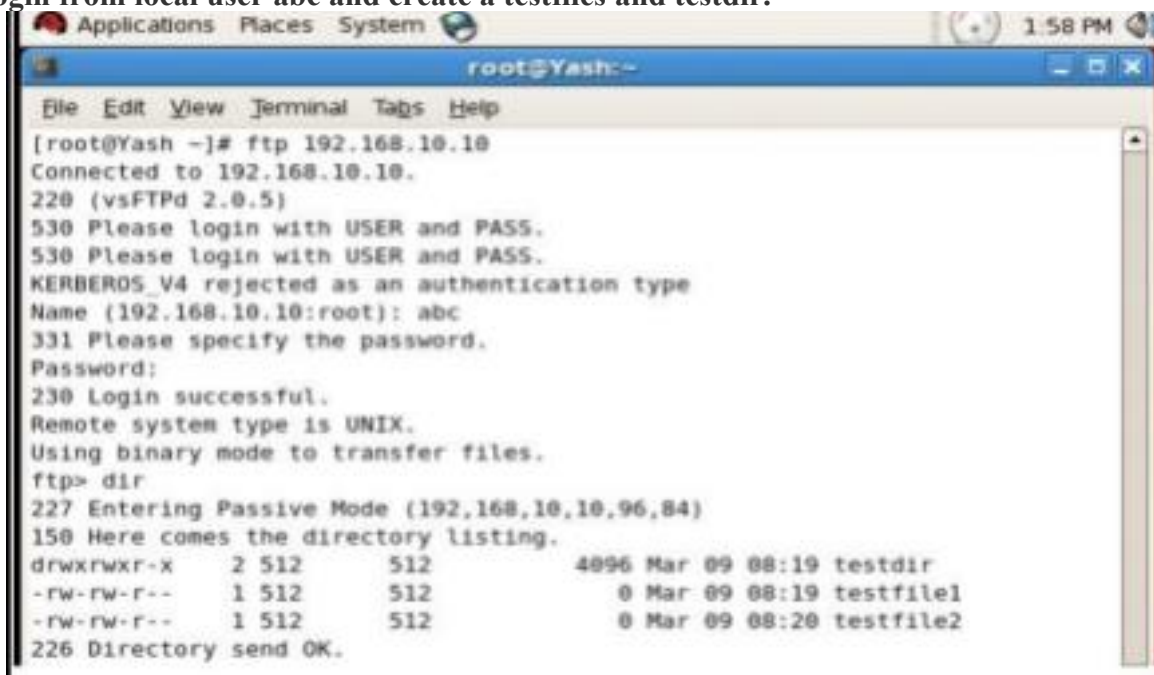
```
[root@apu ~]# nano /etc/vsftpd/vsftpd.conf
[root@apu ~]# service vsftpd restart
```

The output of the 'service vsftpd restart' command is shown:

```
Shutting down vsftpd: [ OK ]
Starting vsftpd for vsftpd: [ OK ]
[root@apu ~]#
```

Access FTP server through command prompt

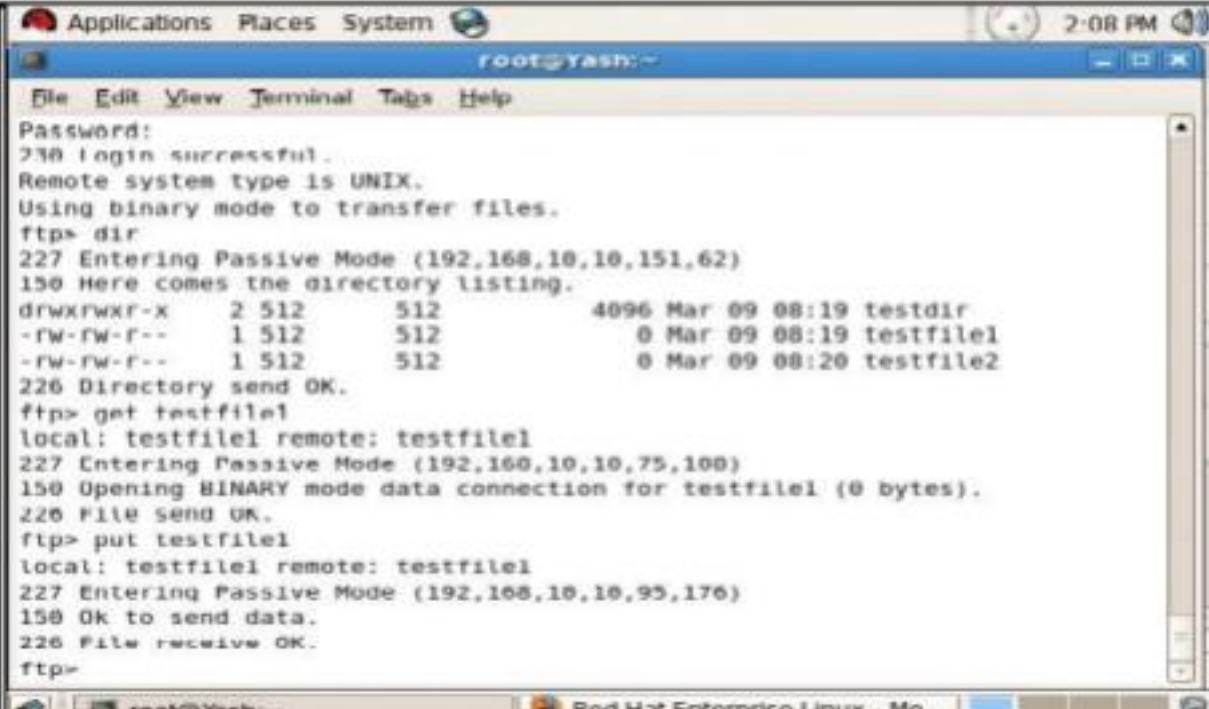
Login from local user abc and create a testfiles and testdir.



A terminal window titled 'root@Yash:~' with a menu bar (File, Edit, View, Terminal, Tabs, Help). The user has executed the command 'ftp 192.168.10.10'. The terminal displays the following output:

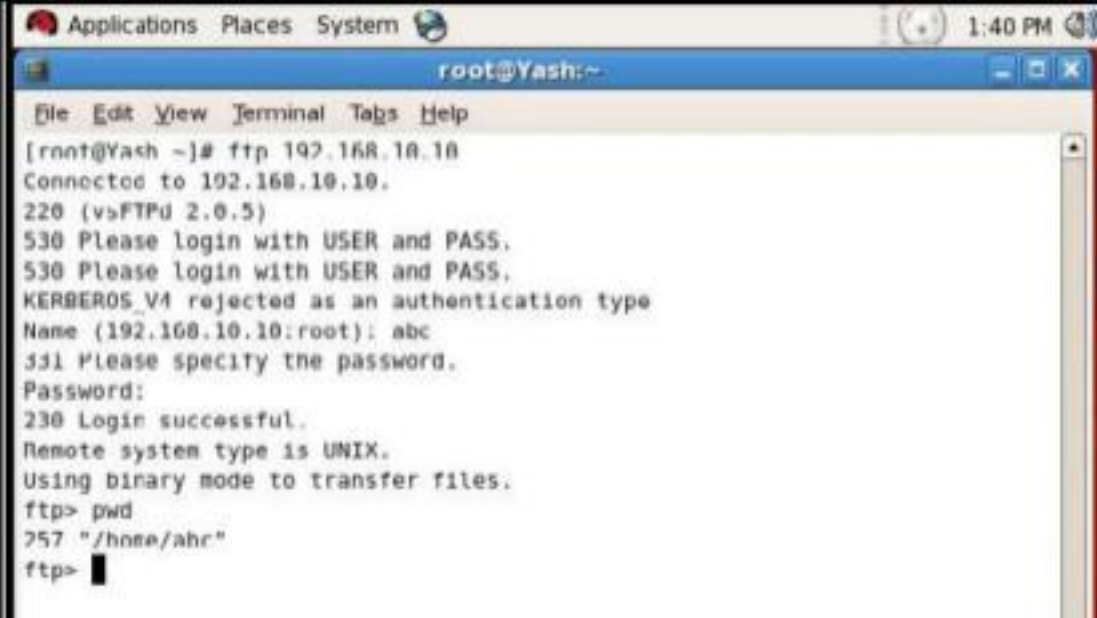
```
[root@Yash ~]# ftp 192.168.10.10
Connected to 192.168.10.10.
220 (vsFTPd 2.0.5)
530 Please login with USER and PASS.
530 Please login with USER and PASS.
KRB5V4 rejected as an authentication type
Name (192.168.10.10:root): abc
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> dir
227 Entering Passive Mode (192,168,10,10,96,84)
150 Here comes the directory listing.
drwxrwxr-x  2 512    512    4096 Mar 09 08:19 testdir
-rw-rw-r--  1 512    512      0 Mar 09 08:19 testfile1
-rw-rw-r--  1 512    512      0 Mar 09 08:20 testfile2
226 Directory send OK.
```

upload/download file.



```
Applications Places System 2:08 PM
root@Yash:~
File Edit View Terminal Tabs Help
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> dir
227 Entering Passive Mode (192.168.10.10,151,62)
150 Here comes the directory listing.
drwxrwxr-x  2 512    512    4096 Mar 09 08:19 testdir
-rw-rw-r--  1 512    512      0 Mar 09 08:19 testfile1
-rw-rw-r--  1 512    512      0 Mar 09 08:20 testfile2
226 Directory send OK.
ftp> get testfile1
local: testfile1 remote: testfile1
227 Entering Passive Mode (192.168.10.10,75,100)
150 Opening BINARY mode data connection for testfile1 (0 bytes).
226 File send OK.
ftp> put testfile1
local: testfile1 remote: testfile1
227 Entering Passive Mode (192.168.10.10,95,176)
150 Ok to send data.
226 File receive OK.
ftp>
```

Default location .



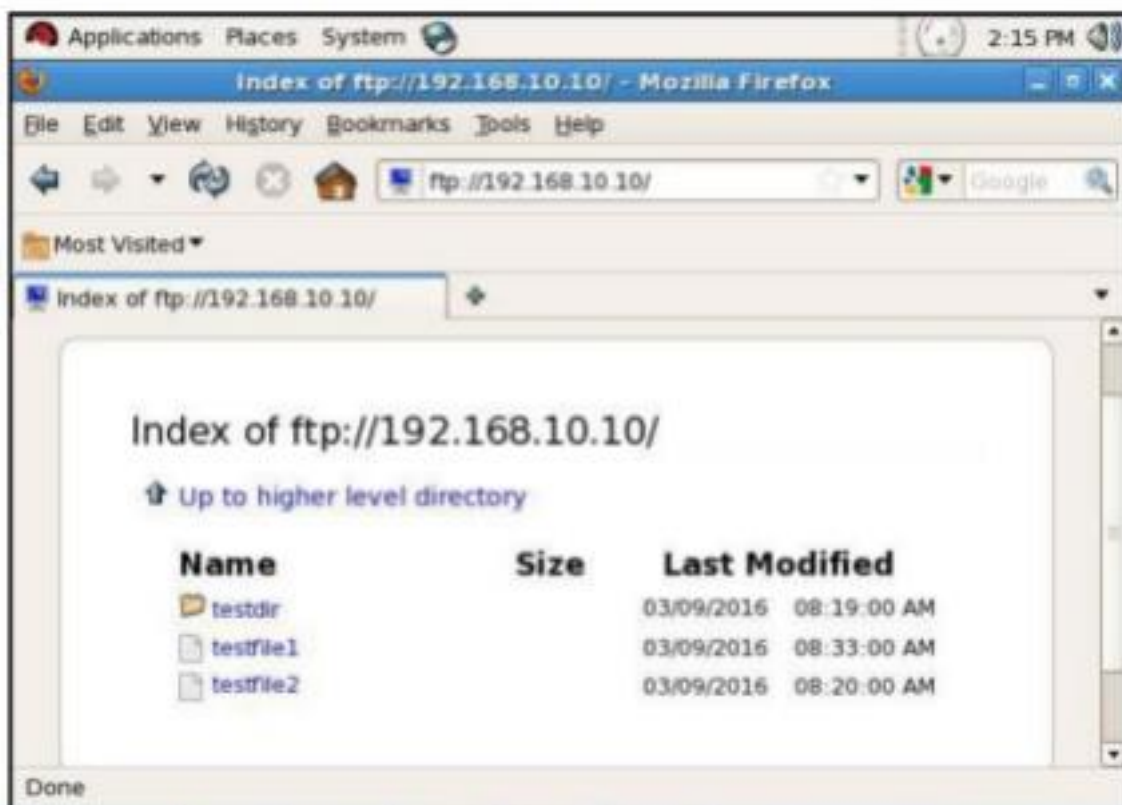
```
Applications Places System 1:40 PM
root@Yash:~
File Edit View Terminal Tabs Help
[rroot@Yash ~]# ftp 192.168.10.10
Connected to 192.168.10.10.
220 (v)FTPd 2.0.5)
530 Please login with USER and PASS.
530 Please login with USER and PASS.
KERBEROS_V4 rejected as an authentication type
Name (192.168.10.10:root): abc
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> pwd
257 "/home/abc"
ftp>
```


TO ACCESS FTP SERVER THROUGH BROWSER.

Now go to browser and type [FTP://192.168.10.10](ftp://192.168.10.10). Add username and password of local user and press enter.



LIST OF DIRECTORIES AND FILES CREATED IN LOCAL USER WILL BE SHOWN.



CONCLUSION:

The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another host over a TCP-based network, such as the Internet. FTP is built on a client-server architecture and uses separate control and data connections between the client and the server.

During the Anonymous access of FTP server default location of FTP data will be pub directory. However during user specific access default location of ftp data will be user directory in /home on server.

Questions:

1. What is File Transfer Protocol?
2. Explain security concerns of FTP.
3. Explain active and passive connection mode of FTP.
4. Explain remote FTP or FTPmail
5. Explain Anonymous FTP