FTP Server Setup

1. Setup FTP server & for this check its IP-

```
[root@rhel9-server ~]# ifconfig
ens160: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.78.140  netmask 255.255.255.0  broadcast 192.168.78.255
```

2. Install require packages-

```
[root@rhel9-server ~]# yum install ftp vsftpd -y
```

3. We will make some changes in FTP config file. So have its backup first-

```
[root@rhel9-server ~]# ll /etc/vsftpd/vsftpd.conf
-rw-------. 1 root root 5039 Nov 16  2021 /etc/vsftpd/vsftpd.conf
[root@rhel9-server ~]#
```

```
[root@rhel9-server ~]# cp -rv /etc/vsftpd/vsftpd.conf /etc/vsftpd/vsftpd.conf.bkp
'/etc/vsftpd/vsftpd.conf' -> '/etc/vsftpd/vsftpd.conf.bkp'
[root@rhel9-server ~]#
```

4. Now, we will setup anonymous user access & for this edit config file-

```
[root@client1 ~]# vim /etc/vsftpd/vsftpd.conf
# Example config file /etc/vsftpd/vsftpd.conf
#
# The default compiled in settings are fairly paranoid. This sample file
# loosens things up a bit, to make the ftp daemon more usable.
# Please see vsftpd.conf.5 for all compiled in defaults.
#
# READ THIS: This example file is NOT an exhaustive list of vsftpd options.
# Please read the vsftpd.conf.5 manual page to get a full idea of vsftpd's
# capabilities.
#
# Allow anonymous FTP? (Beware - allowed by default if you comment this out).
anonymous_enable=NO
#
```

```
[root@client1 ~]# vim /etc/vsftpd/vsftpd.conf
# Example config file /etc/vsftpd/vsftpd.conf
#
# The default compiled in settings are fairly paranoid. This sample file
# loosens things up a bit, to make the ftp daemon more usable.
# Please see vsftpd.conf.5 for all compiled in defaults.
#
# READ THIS: This example file is NOT an exhaustive list of vsftpd options.
# Please read the vsftpd.conf.5 manual page to get a full idea of vsftpd's
# capabilities.
#
# Allow anonymous FTP? (Beware - allowed by default if you comment this out).
anonymous_enable=YES
```

5. After making changes, start & enable FTP service-

```
[root@rhel9-server ~]# systemctl start vsftpd.service
[root@rhel9-server ~]#
[root@rhel9-server ~]# systemctl enable vsftpd.service
Created symlink /etc/systemd/system/multi-user.target.wants/vsftpd.service → /usr/lib/systemd/system/vsftpd.service.
[root@rhel9-server ~]#
```

6. We can verify its status-

```
[root@rhel9-server ~]# systemctl status vsftpd.service
● vsftpd.service - Vsftpd ftp daemon
     Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; vendor preset: disabled)
     Active: active (running) since Fri 2022-12-16 10:28:11 IST; 28s ago
   Main PID: 34030 (vsftpd)
```

7. We will allow FTP from firewall-

```
[root@rhel9-server ~]# firewall-cmd --permanent --add-service=ftp
success
[root@rhel9-server ~]#
[root@rhel9-server ~]# firewall-cmd --reload
success
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# firewall-cmd --list-all
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens160
  sources:
  services: cockpit dhcpv6-client dns ftp http https mountd nfs ntp rpc-bind samba ssh
```

8. We will log into FTP server using local user first, list the content & then sign out from FTP-

```
[root@rhel9-server ~]# ftp 192.168.78.140
Connected to 192.168.78.140 (192.168.78.140).
220 (vsFTPd 3.0.3)
Name (192.168.78.140:root): abhay
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

```
ftp> ls
227 Entering Passive Mode (192,168,78,140,76,167).
150 Here comes the directory listing.
-rw-r--r--    1 1000     1000        113887 Oct 01 15:05 err.txt
-rw-rw-r--    1 1000     1000           646 Nov 23 16:01 error.txt
drwxr-xr-x    5 1000     1000            41 Oct 26 06:33 extract
```

```
ftp> bye
221 Goodbye.
[root@rhel9-server ~]#
```

9. Next, we will try to login with anonymous user (As we already allowed it from config file). Specify password in mail id format. We will see content & try to download file (if any) from FTP server pub directory-

```
[root@rhel9-server ~]# ftp 192.168.78.140
Connected to 192.168.78.140 (192.168.78.140).
220 (vsFTPd 3.0.3)
Name (192.168.78.140:root): anonymous
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
ftp> ls
227 Entering Passive Mode (192,168,78,140,216,226).
150 Here comes the directory listing.
drwxr-xr-x    2 0        0               6 Nov 16  2021 pub
226 Directory send OK.
ftp>
ftp> cd pub
250 Directory successfully changed.
ftp>
```

```
ftp> ls
227 Entering Passive Mode (192,168,78,140,87,203).
150 Here comes the directory listing.
drwxr-xr-x    2 0        0              22 Dec 16 05:19 pub
226 Directory send OK.
ftp> cd pub
250 Directory successfully changed.
ftp> ls
227 Entering Passive Mode (192,168,78,140,140,226).
150 Here comes the directory listing.
-rw-rw-rw-    1 0        0              12 Dec 16 05:19 name.txt
226 Directory send OK.
ftp> get name.txt
local: name.txt remote: name.txt
227 Entering Passive Mode (192,168,78,140,232,130).
150 Opening BINARY mode data connection for name.txt (12 bytes).
226 Transfer complete.
12 bytes received in 3.1e-05 secs (387.10 Kbytes/sec)
```

Note: It will get downloaded in same location from where we are logging in from cmd or terminal.

```
ftp> bye
221 Goodbye.
[root@rhel9-server ~]#
```

10. If we don't allow anonymous user access from FTP config file, we will get error during anonymous login-

```
[root@rhel9-server ~]# ftp 192.168.78.140
Connected to 192.168.78.140 (192.168.78.140).
220 (vsFTPd 3.0.3)
Name (192.168.78.140:root): anonymous
331 Please specify the password.
Password:
530 Login incorrect.
Login failed.
ftp> bye
221 Goodbye.
[root@rhel9-server ~]#
```

11. In windows machine, if we try to connect FTP server, we will be able to connect, but can't list directory content. It shows one error as shown here-

```
PS C:\Users\Abhay> ftp 192.168.78.140
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
331 Please specify the password.
Password:
230 Login successful.
ftp> put test.txt
200 PORT command successful. Consider using PASV.
425 Failed to establish connection.
```

12. To fix this, we will turn on one of FTP Boolean in RHEL server-

```
[root@rhel9-server ~]# getsebool -a | grep ftp
ftpd_anon_write --> off
ftpd_connect_all_unreserved --> off  <—
ftpd_connect_db --> off
ftpd_full_access --> off
ftpd_use_cifs --> off
ftpd_use_fusefs --> off
ftpd_use_nfs --> off
ftpd_use_passive_mode --> off
httpd_can_connect_ftp --> off
httpd_enable_ftp_server --> off
tftp_anon_write --> off
tftp_home_dir --> off
[root@rhel9-server ~]#
```

```
[root@rhel9-server ~]# setsebool -P ftpd_connect_all_unreserved 1
[root@rhel9-server ~]#
[root@rhel9-server ~]#
[root@rhel9-server ~]# getsebool -a | grep ftp
ftpd_anon_write --> off
ftpd_connect_all_unreserved --> on      <---
ftpd_connect_db --> off
ftpd_full_access --> off
ftpd_use_cifs --> off
ftpd_use_fusefs --> off
ftpd_use_nfs --> off
ftpd_use_passive_mode --> off
httpd_can_connect_ftp --> off
httpd_enable_ftp_server --> off
tftp_anon_write --> off
tftp_home_dir --> off
[root@rhel9-server ~]#
```

13. Now we will be able to list directory content as well as download & upload file. Few terms are explained as-

➢ To download a single file: get <file-name>
➢ To download a multiple file: mget <file1-name><file2-name><file3-name>
➢ To upload single file: put <file-name>
➢ To upload multiple file: mput <file1-name><file2-name><file3-name>

```
PS C:\Users\Abhay> ftp 192.168.78.140
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
200 Always in UTF8 mode.
User (192.168.78.140:(none)): abhay
331 Please specify the password.
Password:
230 Login successful.
ftp>
ftp> put test.txt
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
ftp: 48 bytes sent in 0.00Seconds 24.00Kbytes/sec.
```

```
ftp> get err.txt
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for err.txt (113887 bytes).
226 Transfer complete.
ftp: 113887 bytes received in 0.05Seconds 2148.81Kbytes/sec.
ftp>
```

```
ftp> mput dump.txt log.txt welcome.txt
mput dump.txt? y
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
ftp: 113887 bytes sent in 0.00Seconds 56943.50Kbytes/sec.
mput log.txt? y
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
ftp: 206 bytes sent in 0.00Seconds 206.00Kbytes/sec.
mput welcome.txt? y
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 Transfer complete.
ftp: 48 bytes sent in 0.00Seconds 48.00Kbytes/sec.
ftp>
```

Allow or deny users from login using FTP:

1. Go to FTP default config directory & list the content-

```
[root@rhel9-server ~]# cd /etc/vsftpd/
[root@rhel9-server vsftpd]# ls -ll
total 28
-rw-------. 1 root root  125 Nov 16  2021 ftpusers
-rw-------. 1 root root  361 Nov 16  2021 user_list
-rw-------. 1 root root 5039 Dec 16 10:53 vsftpd.conf
-rw-------. 1 root root 5039 Dec 16 10:26 vsftpd.conf.bkp
-rwxr--r--. 1 root root  352 Nov 16  2021 vsftpd_conf_migrate.sh
```

2. Edit user_list file & add user to whom you want to deny the access-

```
[root@rhel9-server vsftpd]# vim user_list
# vsftpd userlist
# If userlist_deny=NO, only allow users in this file
# If userlist_deny=YES (default), never allow users in this file, and
# do not even prompt for a password.
# Note that the default vsftpd pam config also checks /etc/vsftpd/ftpusers
# for users that are denied.
root
bin
daemon
adm
lp
sync
shutdown
halt
mail
news
uucp
operator
games
nobody
```

For example, we want to deny "abhay" user from FTP login. We will add its username in above file.

3. Next, go to FTP config file (vim /etc/vsftpd.conf) & add following line & restart FTP service-

```
pam_service_name=vsftpd
userlist_enable=YES
userlist_deny=YES
```

systemctl restart vsftpd.service

4. Now check with abhay user login-

```
PS C:\Users\Abhay> ftp 192.168.78.140
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
200 Always in UTF8 mode.
User (192.168.78.140:(none)): abhay
530 Permission denied.
Login failed.
```

Change FTP Default Port Number:

1. Go to FTP config file (vim /etc/vsftpd.conf) & add custom port number other than default one-

```
# Make sure PORT transfer connections originate from port 20 (ftp-data).
connect_from_port_20=YES
listen_port=3434
```

2. Restart FTP service-

```
[root@rhel9-server vsftpd]# systemctl restart vsftpd.service
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]#
```

3. Allow this custom port from firewall-

```
[root@rhel9-server vsftpd]# firewall-cmd --permanent --add-port=3434/tcp
success
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# firewall-cmd --reload
success
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# firewall-cmd --list-all
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens160
  sources:
  services: cockpit dhcpv6-client dns ftp http https mountd nfs ntp rpc-bind samba ssh
  ports: 2222/tcp 3434/tcp
```

4. Now, test the FTP connection in linux-

```
[root@rhel9-server vsftpd]# ftp 192.168.78.140
ftp: connect: Connection refused
ftp>
ftp> bye
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# ftp 192.168.78.140 3434
Connected to 192.168.78.140 (192.168.78.140).
220 (vsFTPd 3.0.3)
Name (192.168.78.140:root): abhay
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
```

5. Similarly, test the FTP connection in windows-

```
PS C:\Users\Abhay> ftp 192.168.78.140
> ftp: connect :Connection refused
ftp> bye
PS C:\Users\Abhay>
```

```
PS C:\Users\Abhay> ftp
ftp>
ftp> open 192.168.78.140 3434
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
200 Always in UTF8 mode.
User (192.168.78.140:(none)): abhay
331 Please specify the password.
Password:
230 Login successful.
```

Change Default Directory for Anonymous User:

1. Enable anonymous login access from FTP config file-

```
# Allow anonymous FTP? (Beware - allowed by default if you comment this out).
anonymous_enable=YES
#
```

2. Add following line for new anonymous FTP directory-

```
pam_service_name=vsftpd
userlist_enable=YES
anon_root=/ftp
```

3. Restart FTP service-

```
[root@rhel9-server vsftpd]# systemctl restart vsftpd.service
[root@rhel9-server vsftpd]#
```

4. Create custom directory for FTP anonymous access as mentioned in FTP config file. Verify its selinux context-

```
[root@rhel9-server vsftpd]# mkdir /ftp
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# ls -ldZ /ftp/
drwxr-xr-x. 2 root root unconfined_u:object_r:default_t:s0 6 Dec 17 11:56 /ftp/
[root@rhel9-server vsftpd]#
```

5. If we try to login with anonymous user, we will be able to do that. But we cannot list new FTP directory content-

```
PS C:\Users\Abhay> ftp 192.168.78.140
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
200 Always in UTF8 mode.
User (192.168.78.140:(none)): anonymous
331 Please specify the password.
Password:
230 Login successful.
ftp>
ftp> ls
226 Transfer done (but failed to open directory).
```

Reason: SELinux context of this new anonymous directory is different from required one.

6. We can verify default FTP directory context & change this new FTP directory context accordingly-

```
[root@rhel9-server vsftpd]# ls -ldZ /var/ftp/pub/
drwxr-xr-x. 2 root root system_u:object_r:public_content_t:s0 22 Dec 16 10:49 /var/ftp/pub/
[root@rhel9-server vsftpd]#
```

```
[root@rhel9-server vsftpd]# chcon -t public_content_t /ftp/
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# ls -ldZ /ftp/
drwxr-xr-x. 2 root root unconfined_u:object_r:public_content_t:s0 6 Dec 17 11:56 /ftp/
[root@rhel9-server vsftpd]#
```

Note: Using chcon, context will get removed if we do autorelabel. To solve this, we use semanage command for changing directory/file context & run restorecon to force it to stay as it is even we run autorelabel.

7. Next, we will create one file in this new directory-

```
[root@rhel9-server vsftpd]# cal > /ftp/cal.txt
[root@rhel9-server vsftpd]#
```

8. Now if we ant to list new anonymous FTP directory content in windows, we can see that & even download the files-

```
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
cal.txt
226 Directory send OK.
ftp: 12 bytes received in 0.00Seconds 12000.00Kbytes/sec.
ftp>
ftp>
ftp> get cal.txt
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for cal.txt (168 bytes).
226 Transfer complete.
ftp: 168 bytes received in 0.00Seconds 168000.00Kbytes/sec.
ftp>
```

9. If we want to remove this custom anonymous FTP directory & use the default one, We will comment following line in FTP config file & restart FTP service-

```
pam_service_name=vsftpd
userlist_enable=YES
#anon_root=/ftp
```

```
[root@rhel9-server vsftpd]#
[root@rhel9-server vsftpd]# systemctl restart vsftpd.service
[root@rhel9-server vsftpd]#
```

10. We can verify the same & will see "pub" as default anonymous FTP directory-

```
PS C:\Users\Abhay> ftp 192.168.78.140
Connected to 192.168.78.140.
220 (vsFTPd 3.0.3)
200 Always in UTF8 mode.
User (192.168.78.140:(none)): anonymous
331 Please specify the password.
Password:
230 Login successful.
ftp>
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
pub    ←
226 Directory send OK.
ftp: 8 bytes received in 0.00Seconds 8000.00Kbytes/sec.
ftp> cd pub    ←
250 Directory successfully changed.
ftp> ls    ←
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
name.txt    ←
226 Directory send OK.
ftp: 13 bytes received in 0.00Seconds 13000.00Kbytes/sec.
```