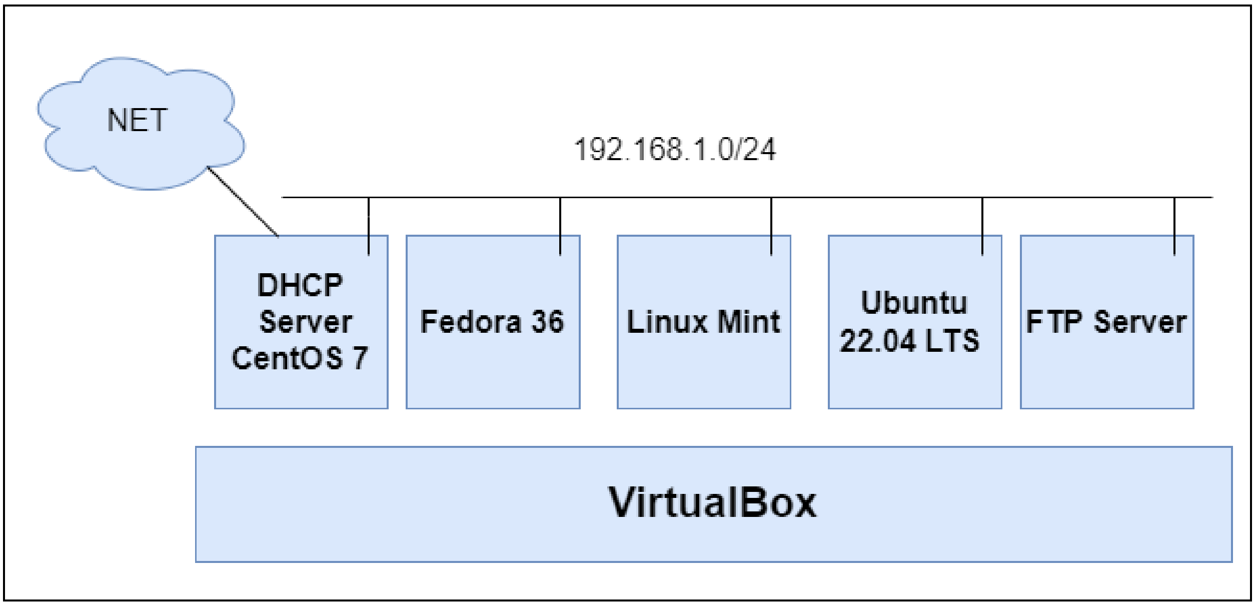
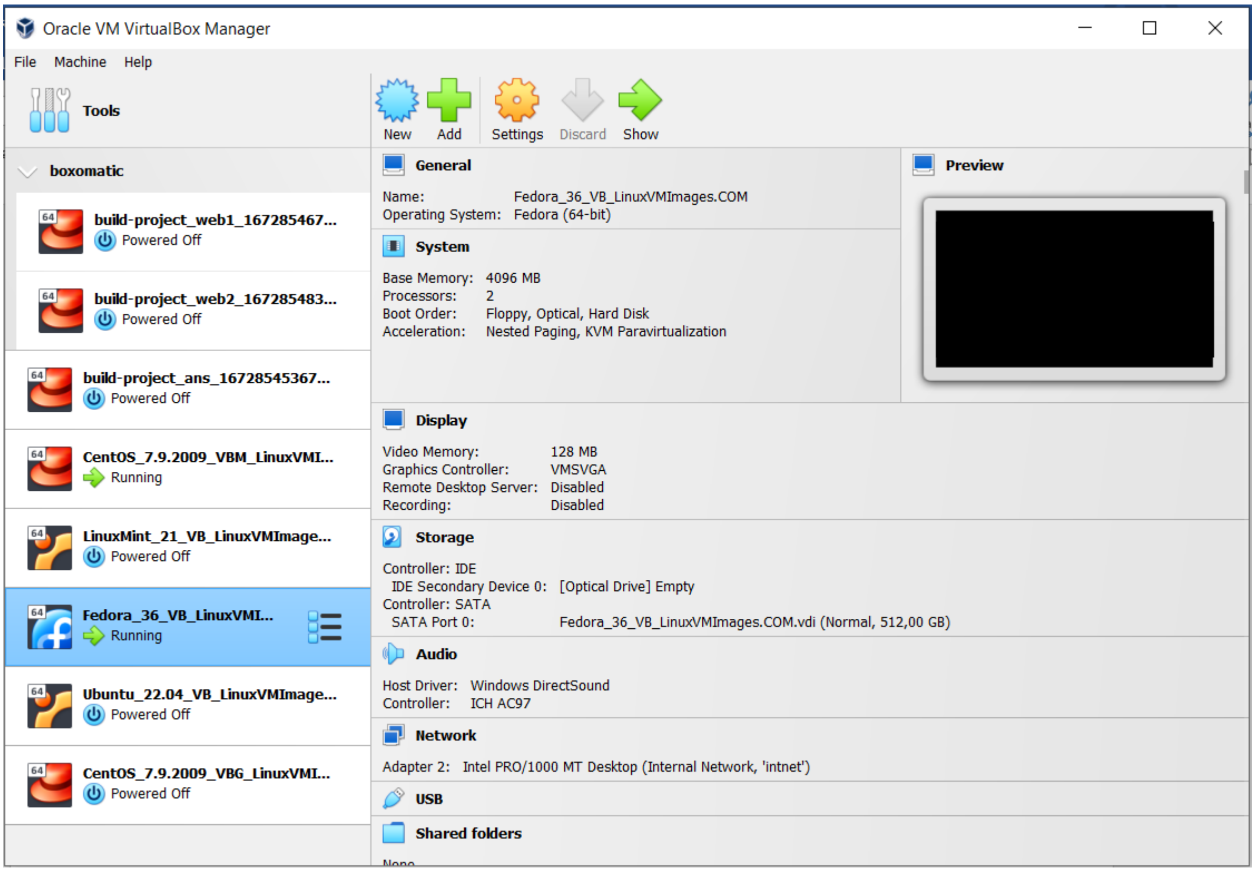
Project FTP

1.Introduction

In this project, we will build a simple virtual network with a server that acts as a FTP server. The network is shown below:



To succeed in this task, we will need: VirtualBox; virtual machines CentOS 7, Fedora 36, Linux Mint, and Ubuntu 22.04. The network will be IPv4 192.168.1.0/24. For our convenience, we will use already installed Linux images from https://www.linuxvmimages.com/. Let's get started!



boxomatic

build-project_web1_167285467... Powered Off

build-project_web2_167285483... Powered Off

build-project_ans_16728545367... Powered Off

CentOS_7.9.2009_VBM_LinuxVMI... Running

LinuxMint_21_VB_LinuxVMImage... Powered Off

Fedora_36_VB_LinuxVMI... Running

Ubuntu_22.04_VB_LinuxVMImage... Powered Off

CentOS_7.9.2009_VBG_LinuxVMI... Powered Off

General

```
Name:              Fedora_36_VB_LinuxVMImages.COM
Operating System:  Fedora (64-bit)
```

System

```
Base Memory:  4096 MB
Processors:   2
Boot Order:   Floppy, Optical, Hard Disk
Acceleration: Nested Paging, KVM Paravirtualization
```

Display

```
Video Memory:          128 MB
Graphics Controller:   VMSVGA
Remote Desktop Server: Disabled
Recording:             Disabled
```

Storage

```
Controller: IDE
  IDE Secondary Device 0:  [Optical Drive] Empty
Controller: SATA
  SATA Port 0:             Fedora_36_VB_LinuxVMImages.COM.vdi (Normal, 512,00 GB)
```

Audio

```
Host Driver:  Windows DirectSound
Controller:   ICH AC97
```

Network

```
Adapter 2:  Intel PRO/1000 MT Desktop (Internal Network, 'intnet')
```

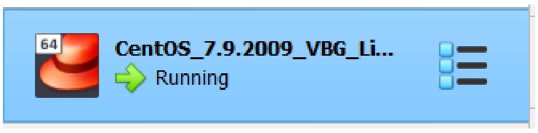
USB

Shared folders

None

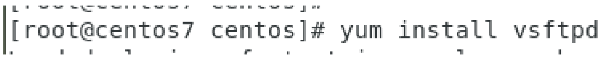
The imported images are: CentOS_7.9.2009_VBM_LinuxVMI, LinuxMint_21_V8_LinuxVMImage, Fedora_36_*, and Ubuntu_22.04_VB_Linux*.

2. Configuration of the FTP server



First, we start the CentOS server and enter the password and username **centos.**

First we update the system with the command “yum update -y” and reboot. After that we install vsftpd with this command:



```
[root@centos7 centos]# yum install vsftpd
```

After the installation is ready, we go to /etc/vsftpd/ directory and open the configuration file vsftpd.conf with vim editor to make some configurations. The results after configuration are these:

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
#
# Uncomment this to allow local users to log in.
# When SELinux is enforcing check for SE bool ftp_home_dir
local_enable=YES
#
# Uncomment this to enable any form of FTP write command.
write_enable=YES
```

```
#
# Default umask for local users is 077. You may wish to change this to 022,
# if your users expect that (022 is used by most other ftpd's)
local_umask=022
#
# Uncomment this to allow the anonymous FTP user to upload files. This only
# has an effect if the above global write enable is activated. Also, you will
# obviously need to create a directory writable by the FTP user.
# When SELinux is enforcing check for SE bool allow_ftpd_anon_write, allow_ftpd_full_access
#anon_upload_enable=YES
#
# Uncomment this if you want the anonymous FTP user to be able to create
# new directories.
#anon_mkdir_write_enable=YES
#
# Activate directory messages - messages given to remote users when they
# go into a certain directory.
dirmessage_enable=YES
#
# Activate logging of uploads/downloads.
xferlog_enable=YES
#
# Make sure PORT transfer connections originate from port 20 (ftp-data).
connect_from_port_20=YES
#
# If you want, you can arrange for uploaded anonymous files to be owned by
# a different user. Note! Using "root" for uploaded files is not
# recommended!
#chown_uploads=YES
#chown_username=whoever
#
# You may override where the log file goes if you like. The default is shown
# below.
#xferlog_file=/var/log/xferlog
#
# If you want, you can have your log file in standard ftpd xferlog format.
# Note that the default log file location is /var/log/xferlog in this case.
xferlog_std_format=YES
#
# You may change the default value for timing out an idle session.
#idle_session_timeout=600
#
# You may change the default value for timing out a data connection.
#data_connection_timeout=120
#
# It is recommended that you define on your system a unique user which the
# ftp server can use as a totally isolated and unprivileged user.
#nopriv_user=ftpsecure
#
# Enable this and the server will recognise asynchronous ABOR requests. Not
# recommended for security (the code is non-trivial). Not enabling it,
# however, may confuse older FTP clients.
#async_abor_enable=YES
#
# By default the server will pretend to allow ASCII mode but in fact ignore
# the request. Turn on the below options to have the server actually do ASCII
# mangling on files when in ASCII mode. The vsftpd.conf(5) man page explains
# the behaviour when these options are disabled.
# Beware that on some FTP servers, ASCII support allows a denial of service
# attack (DoS) via the command "SIZE /big/file" in ASCII mode. vsftpd
# predicted this attack and has always been safe, reporting the size of the
# raw file.
# ASCII mangling is a horrible feature of the protocol.
#ascii_upload_enable=YES
```

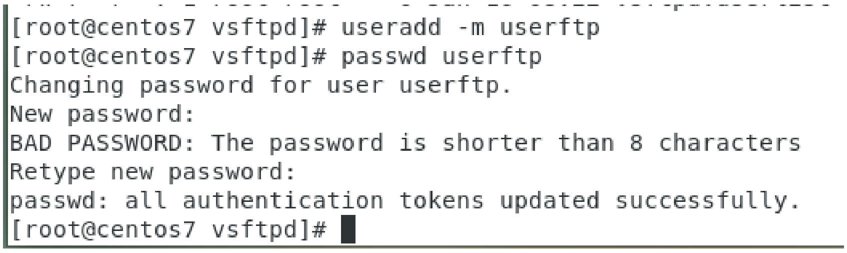
```
#ascii_download_enable=YES
#
# You may fully customise the login banner string:
#ftpd_banner=Welcome to blah FTP service.
#
# You may specify a file of disallowed anonymous e-mail addresses. Apparently
# useful for combatting certain DoS attacks.
#deny_email_enable=YES
# (default follows)
#banned_email_file=/etc/vsftpd/banned_emails
#
# You may specify an explicit list of local users to chroot() to their home
# directory. If chroot_local_user is YES, then this list becomes a list of
# users to NOT chroot().
# (Warning! chroot'ing can be very dangerous. If using chroot, make sure that
# the user does not have write access to the top level directory within the
# chroot)
#chroot_local_user=YES
#chroot_list_enable=YES
# (default follows)
#chroot_list_file=/etc/vsftpd/chroot_list
#
# You may activate the "-R" option to the builtin ls. This is disabled by
# default to avoid remote users being able to cause excessive I/O on large
# sites. However, some broken FTP clients such as "ncftp" and "mirror" assume
# the presence of the "-R" option, so there is a strong case for enabling it.
#ls_recurse_enable=YES
#
# When "listen" directive is enabled, vsftpd runs in standalone mode and
# listens on IPv4 sockets. This directive cannot be used in conjunction
# with the listen_ipv6 directive.
listen=NO
```

```
#
# This directive enables listening on IPv6 sockets. By default, listening
# on the IPv6 "any" address (::) will accept connections from both IPv6
# and IPv4 clients. It is not necessary to listen on *both* IPv4 and IPv6
# sockets. If you want that (perhaps because you want to listen on specific
# addresses) then you must run two copies of vsftpd with two configuration
# files.
# Make sure, that one of the listen options is commented !!
listen_ipv6=YES


pam_service_name=vsftpd
userlist_enable=YES
userlist_file=/etc/vsftpd/vsftpd.userlist
userlist_deny=NO
tcp_wrappers=YES
user_sub_token=userftp
local_root=/home/userftp/ftp/
```

Also we create file “vsftpd.userlist” where we store the list of usernames four our FTP server. For now we have only one user **userftp.**

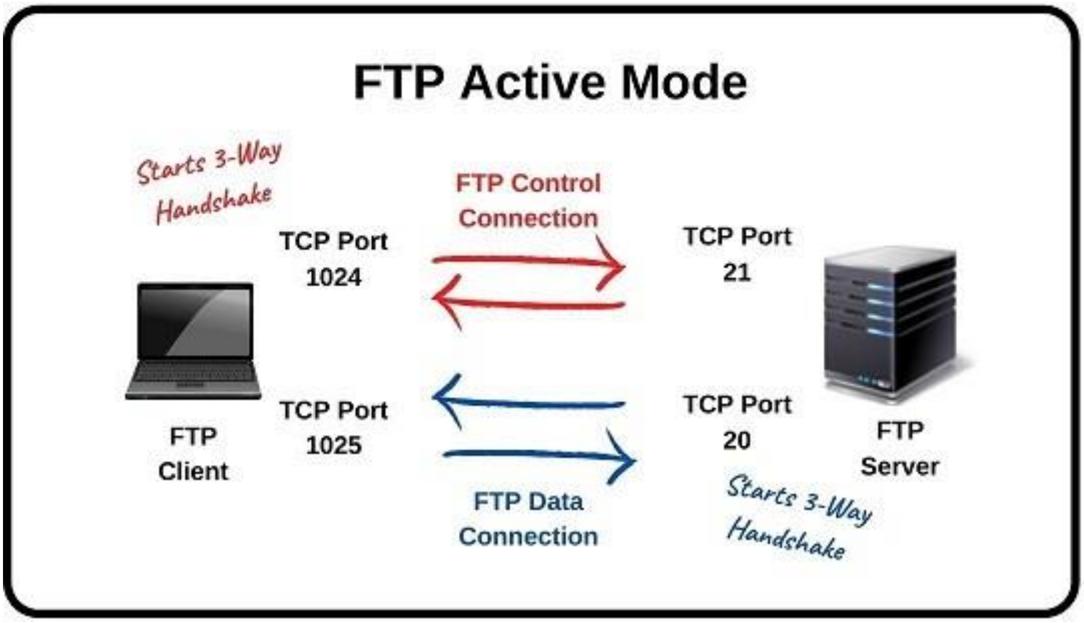
We add new user **userftp** with password **userftp**. For now this will be username/password for accessing the FTP server.

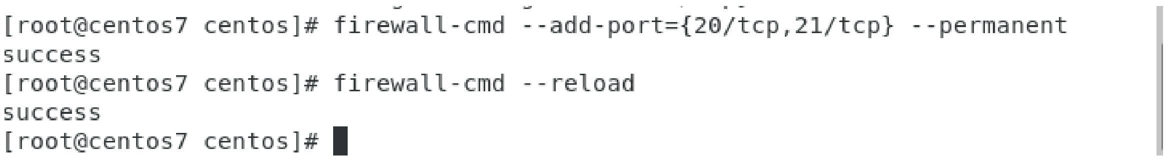


```
[root@centos7 vsftpd]# useradd -m userftp
[root@centos7 vsftpd]# passwd userftp
Changing password for user userftp.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@centos7 vsftpd]# █
```

Now we create new directory /home/userftp/ftp. This directory will be used for access and storing the files for our FTP server:

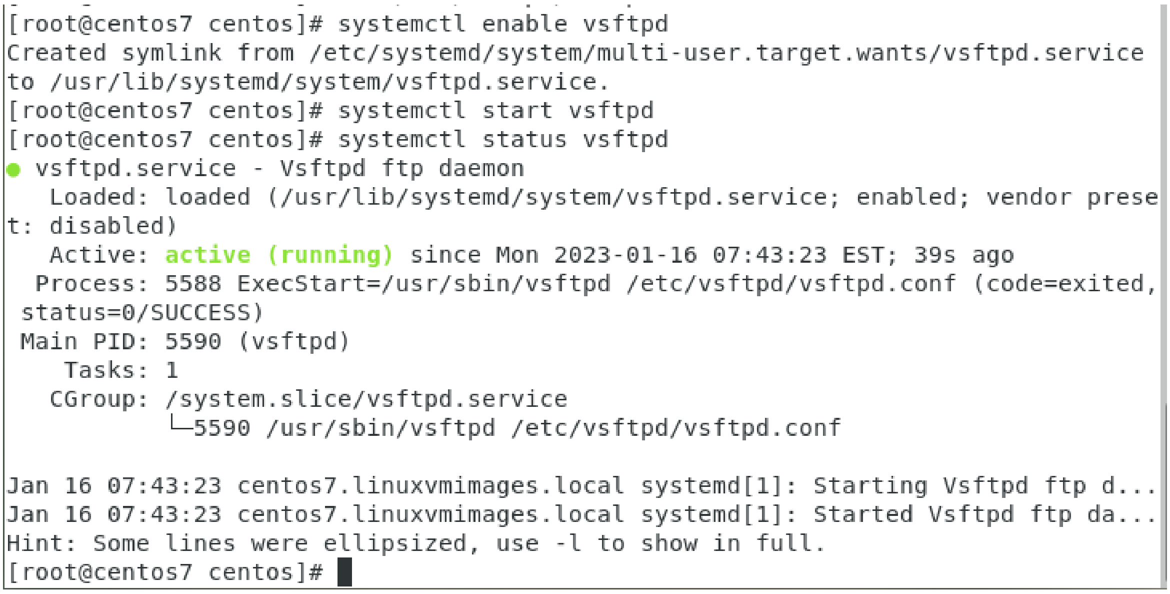
Save this modifications and continue to firewall. FTP uses two ports: 20 and 21 on TCP. Port 20/TCP is used for data port and 21/TCP port for command port. Best explanation is given the image below:





```
[root@centos7 centos]# firewall-cmd --add-port={20/tcp,21/tcp} --permanent
success
[root@centos7 centos]# firewall-cmd --reload
success
[root@centos7 centos]# █
```

Next phase is to activate vsftpd through Systemd:

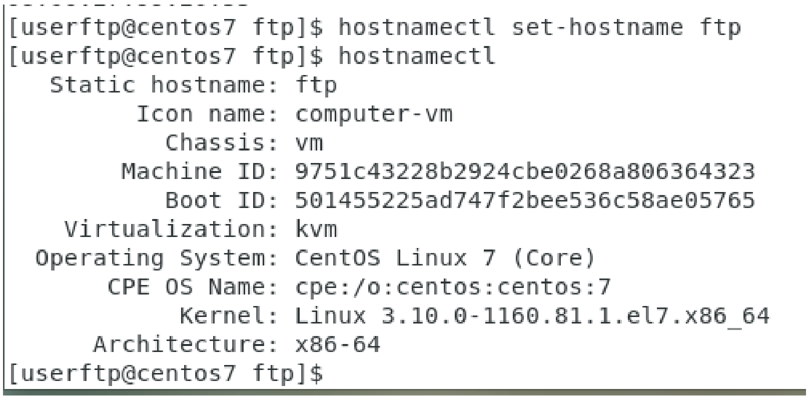


```
[root@centos7 centos]# systemctl enable vsftpd
Created symlink from /etc/systemd/system/multi-user.target.wants/vsftpd.service
to /usr/lib/systemd/system/vsftpd.service.
[root@centos7 centos]# systemctl start vsftpd
[root@centos7 centos]# systemctl status vsftpd
● vsftpd.service - Vsftpd ftp daemon
   Loaded: loaded (/usr/lib/systemd/system/vsftpd.service; enabled; vendor prese
t: disabled)
   Active: active (running) since Mon 2023-01-16 07:43:23 EST; 39s ago
  Process: 5588 ExecStart=/usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf (code=exited,
 status=0/SUCCESS)
 Main PID: 5590 (vsftpd)
    Tasks: 1
   CGroup: /system.slice/vsftpd.service
           └─5590 /usr/sbin/vsftpd /etc/vsftpd/vsftpd.conf

Jan 16 07:43:23 centos7.linuxvmimages.local systemd[1]: Starting Vsftpd ftp d...
Jan 16 07:43:23 centos7.linuxvmimages.local systemd[1]: Started Vsftpd ftp da...
Hint: Some lines were ellipsized, use -l to show in full.
[root@centos7 centos]# █
```

Looks like everything is well!

For final configuration we set this FTP server with name **ftp:**



```
[userftp@centos7 ftp]$ hostnamectl set-hostname ftp
[userftp@centos7 ftp]$ hostnamectl
   Static hostname: ftp
         Icon name: computer-vm
           Chassis: vm
        Machine ID: 9751c43228b2924cbe0268a806364323
           Boot ID: 501455225ad747f2bee536c58ae05765
    Virtualization: kvm
  Operating System: CentOS Linux 7 (Core)
       CPE OS Name: cpe:/o:centos:centos:7
            Kernel: Linux 3.10.0-1160.81.1.el7.x86_64
      Architecture: x86-64
[userftp@centos7 ftp]$
```

Let set in our DHCP server, which we created before, a preferred IP address for our FTP server.

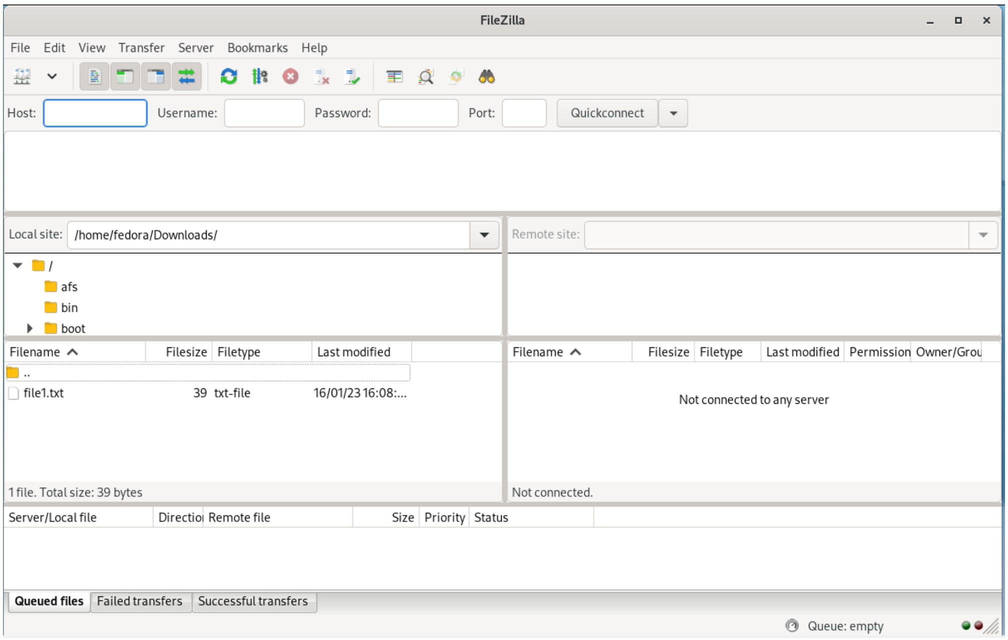
```
host ftp {
    option host-name "ftp.project.dhcp";
    hardware ethernet 08:00:27:99:20:55;
    fixed-address 192.168.1.10;
}
```

This code above is placed in **dhcpd.conf** for DHCP server, where fixed-address is our preferred address; hardware Ethernet is the MAC address of the FTP server; option host-name is a just name for this address and host ftp is the name, which we gave with hostnamectl.

The configuration is ready and we are going to see how this server works!

3. Demonstration

Let’s start virtual machine Fedora 36 and install Filezilla. Filezilla is user-friendly program with GUI. To install this program we use “dnf install filezilla”.



Local site: /home/fedora/Downloads/

- /
  - afs
  - bin
  - boot

Filename	Filesize	Filetype	Last modified
..			
file1.txt	39	txt-file	16/01/23 16:08:...

1 file. Total size: 39 bytes

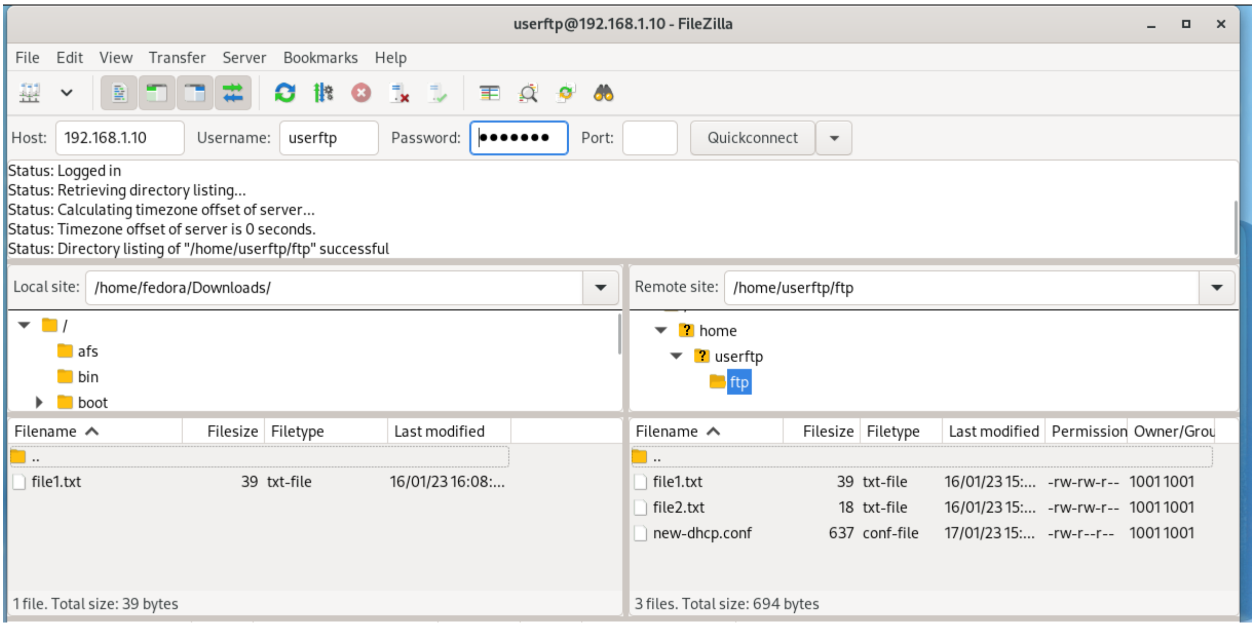
Filename	Filesize	Filetype	Last modified	Permission	Owner/Grou

Not connected to any server

Not connected.

Server/Local file	Directioi	Remote file	Size	Priority	Status

Permit access to FTP server by entering username **userftp** and password **userftp.**


userftp@192.168.1.10 - FileZilla
File Edit View Transfer Server Bookmarks Help
Quickconnect

Host: 192.168.1.10 Username: userftp Password: ●●●●●●● Port:

```
Status: Logged in
Status: Retrieving directory listing...
Status: Calculating timezone offset of server...
Status: Timezone offset of server is 0 seconds.
Status: Directory listing of "/home/userftp/ftp" successful
```

Local site: /home/fedora/Downloads/

Remote site: /home/userftp/ftp

/
afs
bin
boot
home
userftp
ftp

Filename	Filesize	Filetype	Last modified
..			
file1.txt	39	txt-file	16/01/23 16:08:...

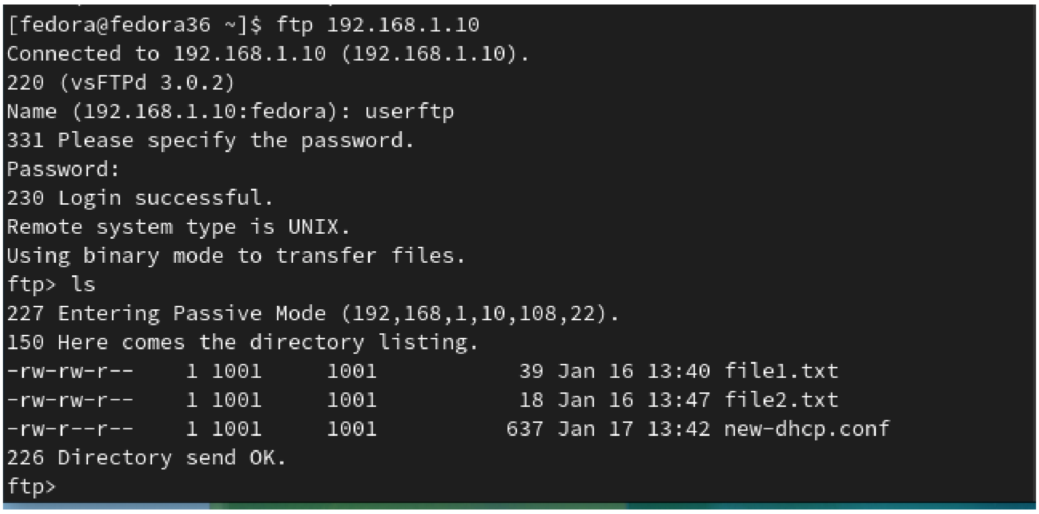
1 file. Total size: 39 bytes

Filename	Filesize	Filetype	Last modified	Permission	Owner/Grou
..					
file1.txt	39	txt-file	16/01/23 15:...	-rw-rw-r--	1001 1001
file2.txt	18	txt-file	16/01/23 15:...	-rw-rw-r--	1001 1001
new-dhcp.conf	637	conf-file	17/01/23 15:...	-rw-r--r--	1001 1001

3 files. Total size: 694 bytes

This is the results, which we wanted! As you can see on FTP Server we have three files stored: file1.txt, file2.txt and new-dhcp.conf.

Another way to access FTP server is to use console.



```
[fedora@fedora36 ~]$ ftp 192.168.1.10
Connected to 192.168.1.10 (192.168.1.10).
220 (vsFTPd 3.0.2)
Name (192.168.1.10:fedora): userftp
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
227 Entering Passive Mode (192,168,1,10,108,22).
150 Here comes the directory listing.
-rw-rw-r--    1 1001     1001           39 Jan 16 13:40 file1.txt
-rw-rw-r--    1 1001     1001           18 Jan 16 13:47 file2.txt
-rw-r--r--    1 1001     1001          637 Jan 17 13:42 new-dhcp.conf
226 Directory send OK.
ftp>
```

This is our project. I hope you like it and see you later!