

Fedora 35

- [NTP / SSH](#)
- [DNS / DHCP](#)
- [FTP /](#)
- [/](#)
-

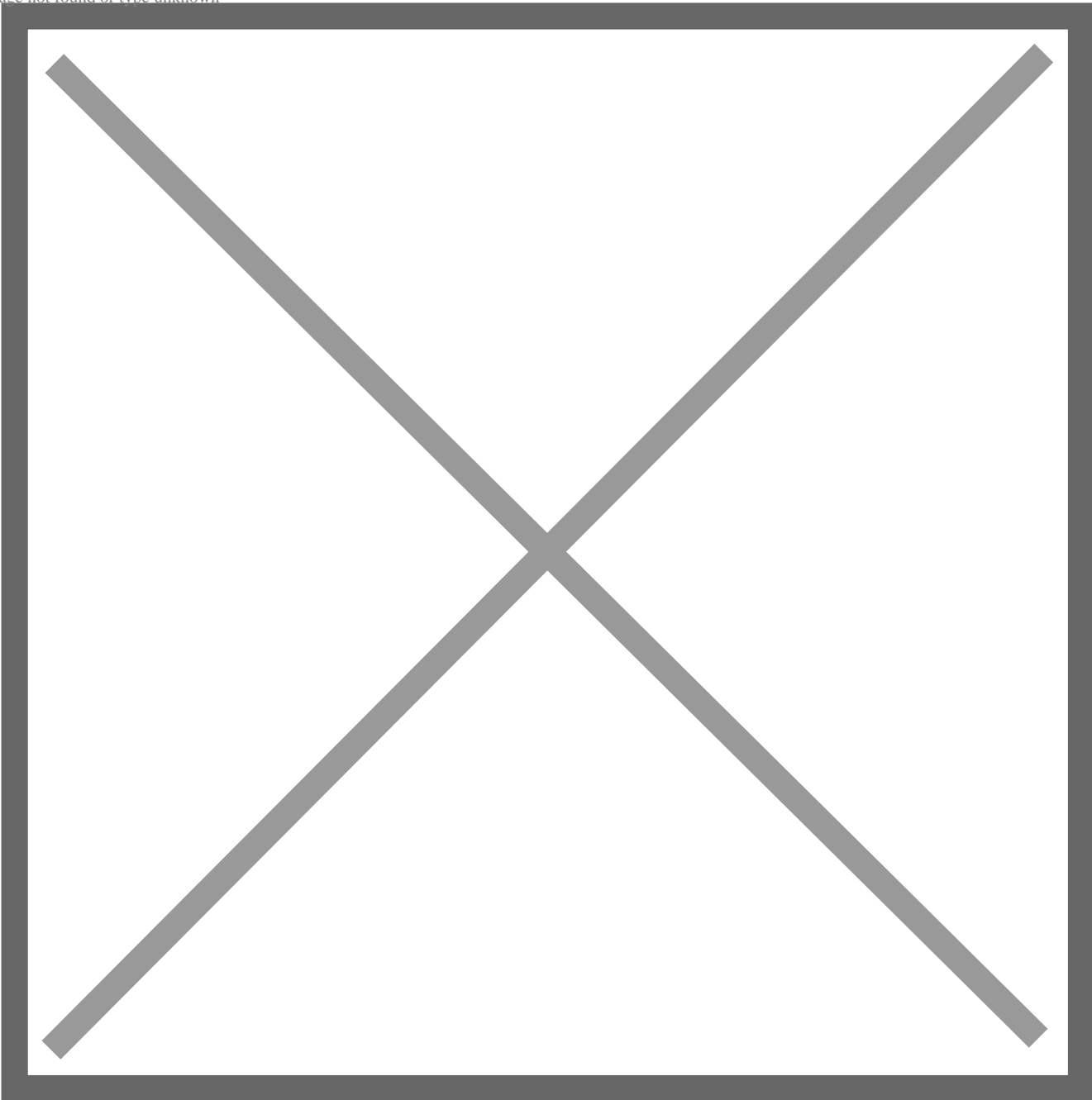
Fedora 35 2021/11/03

[1]	Fedora 35 2021 11 2
	⇒ http://download.fedoraproject.org/pub/fedora/1

Fedora 35

	Fedora 35 ISO DVD Windows 8/10
[2]	DVD DVD Fedora ISO [B

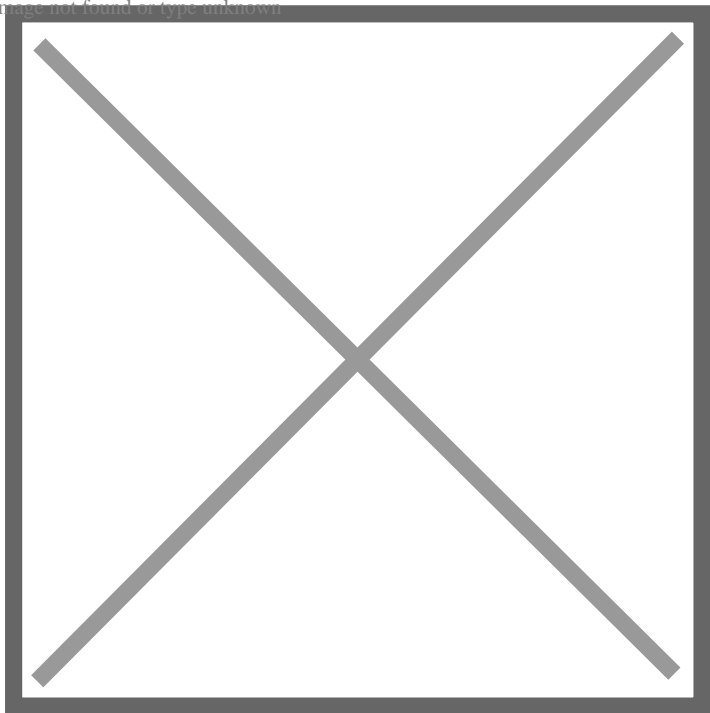
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[3]

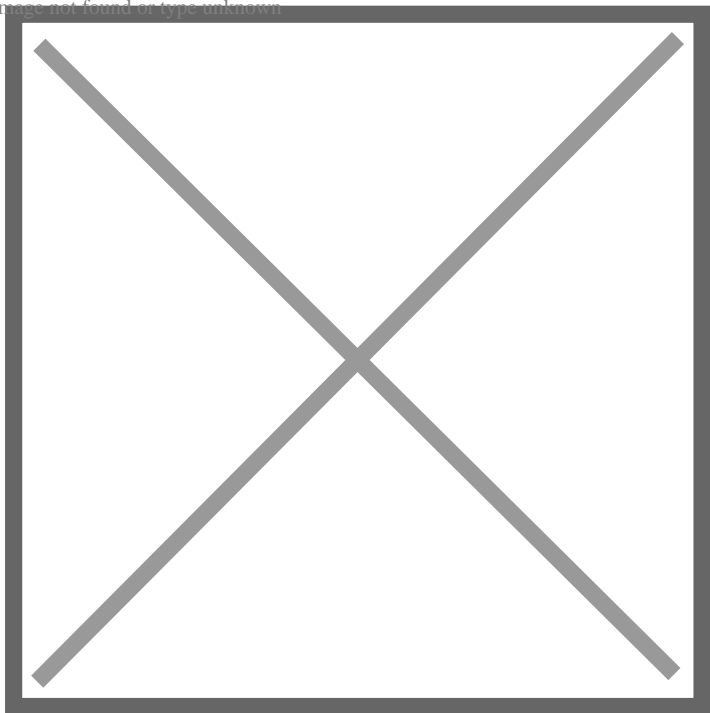
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[4]

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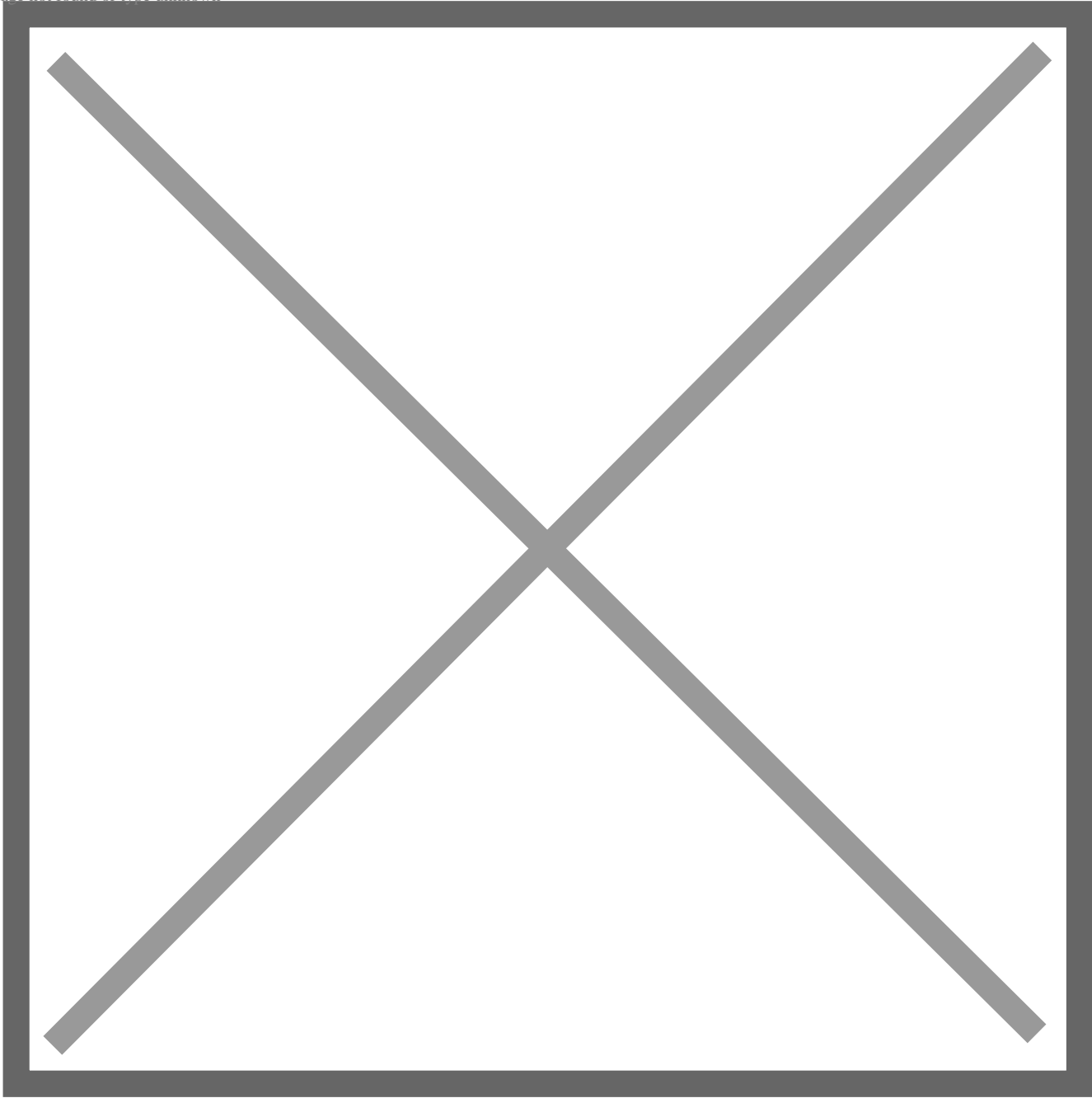


[1]

Fedora 35

Fedora 35

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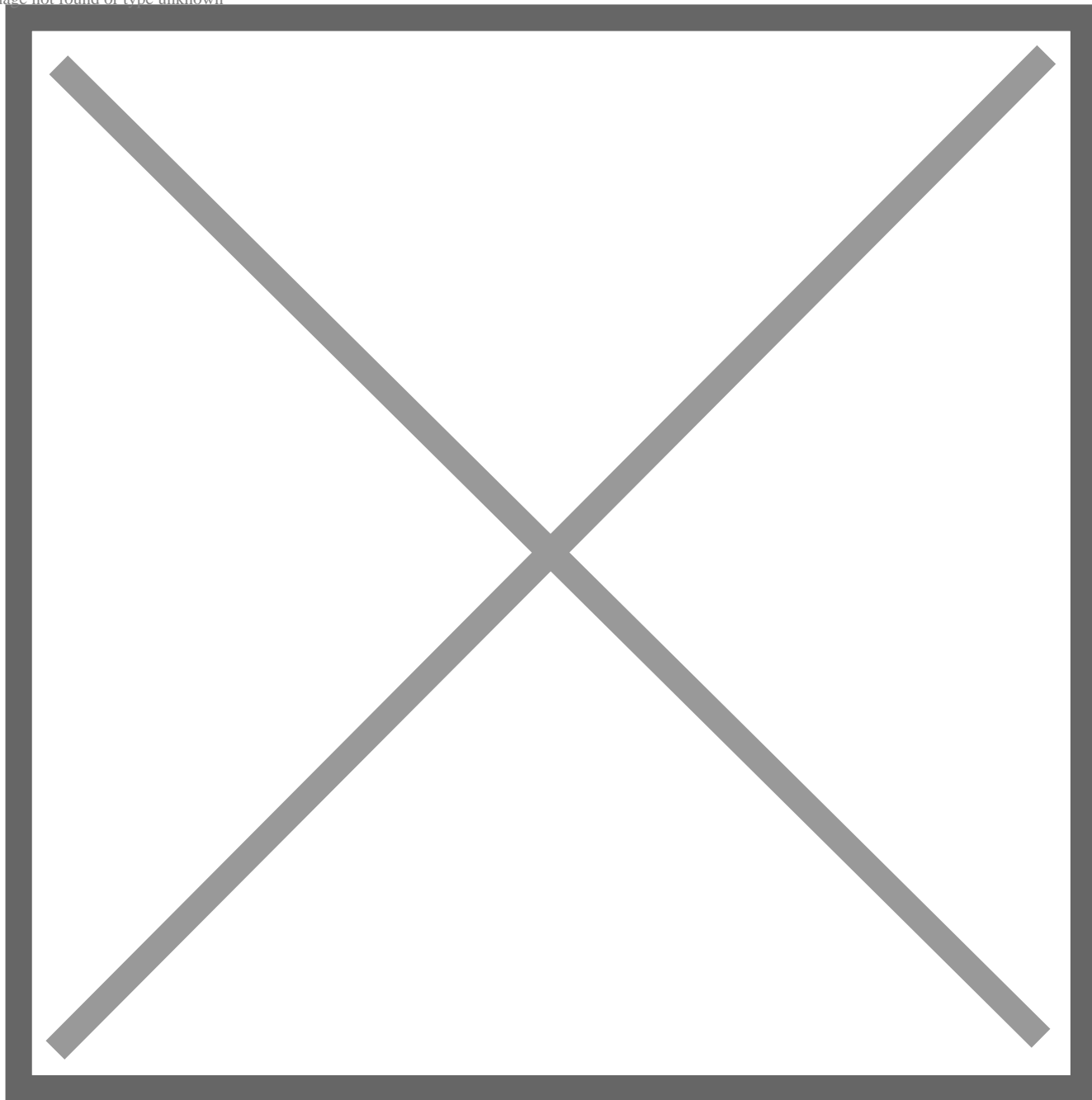


[2]

[LOCALIZATION]

[Keyb

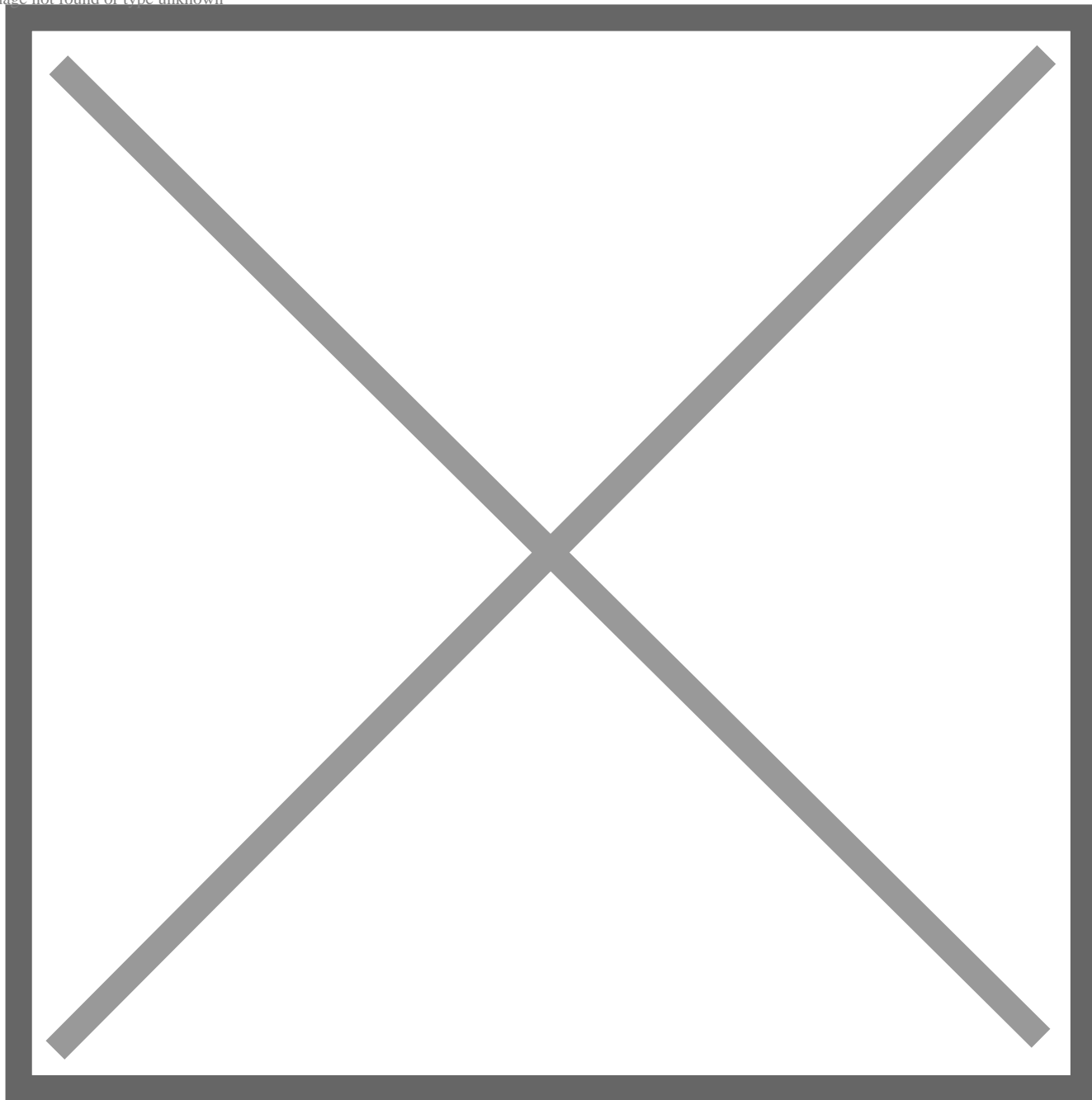
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[3]

[+]

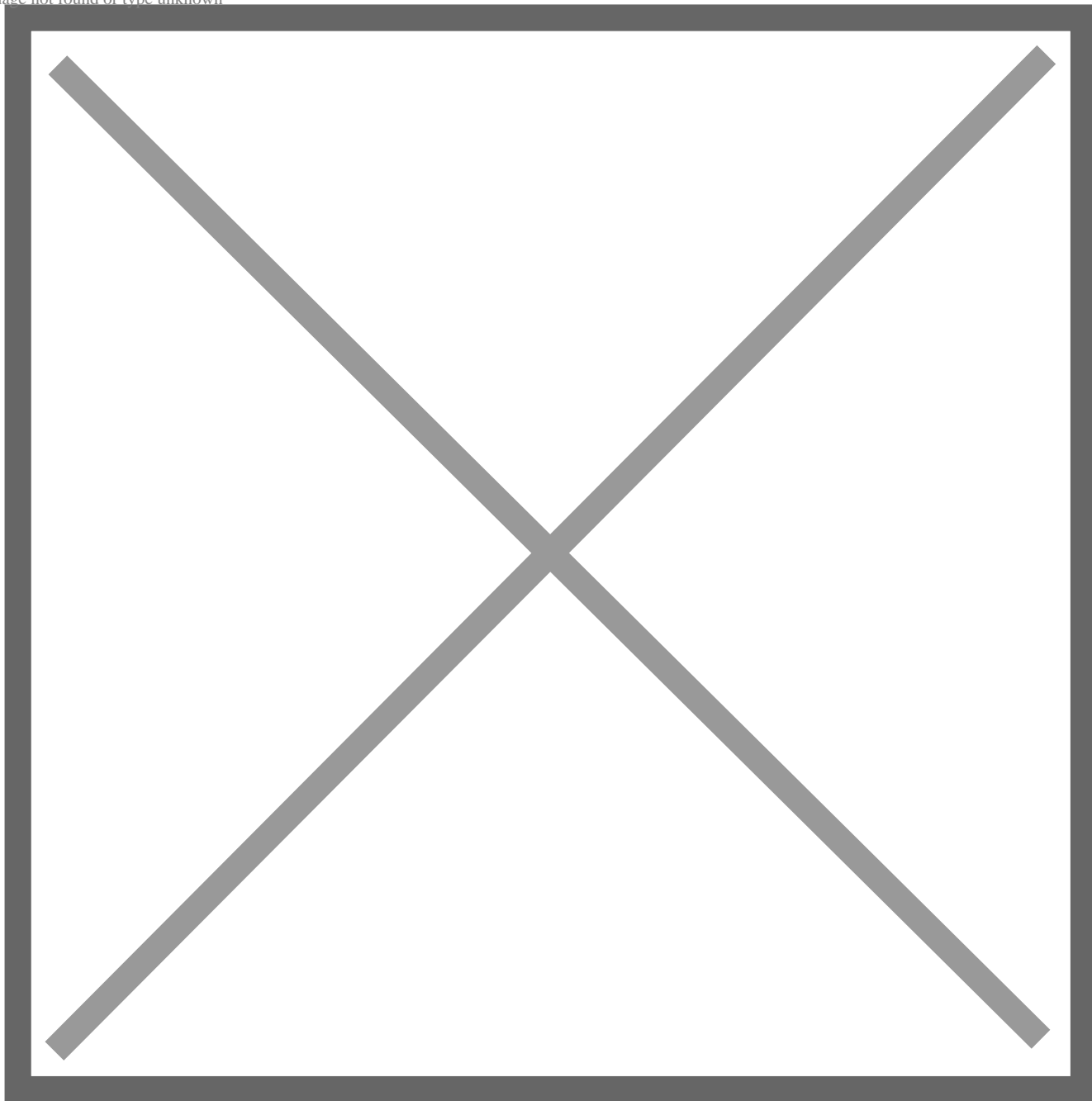
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[4]

[]

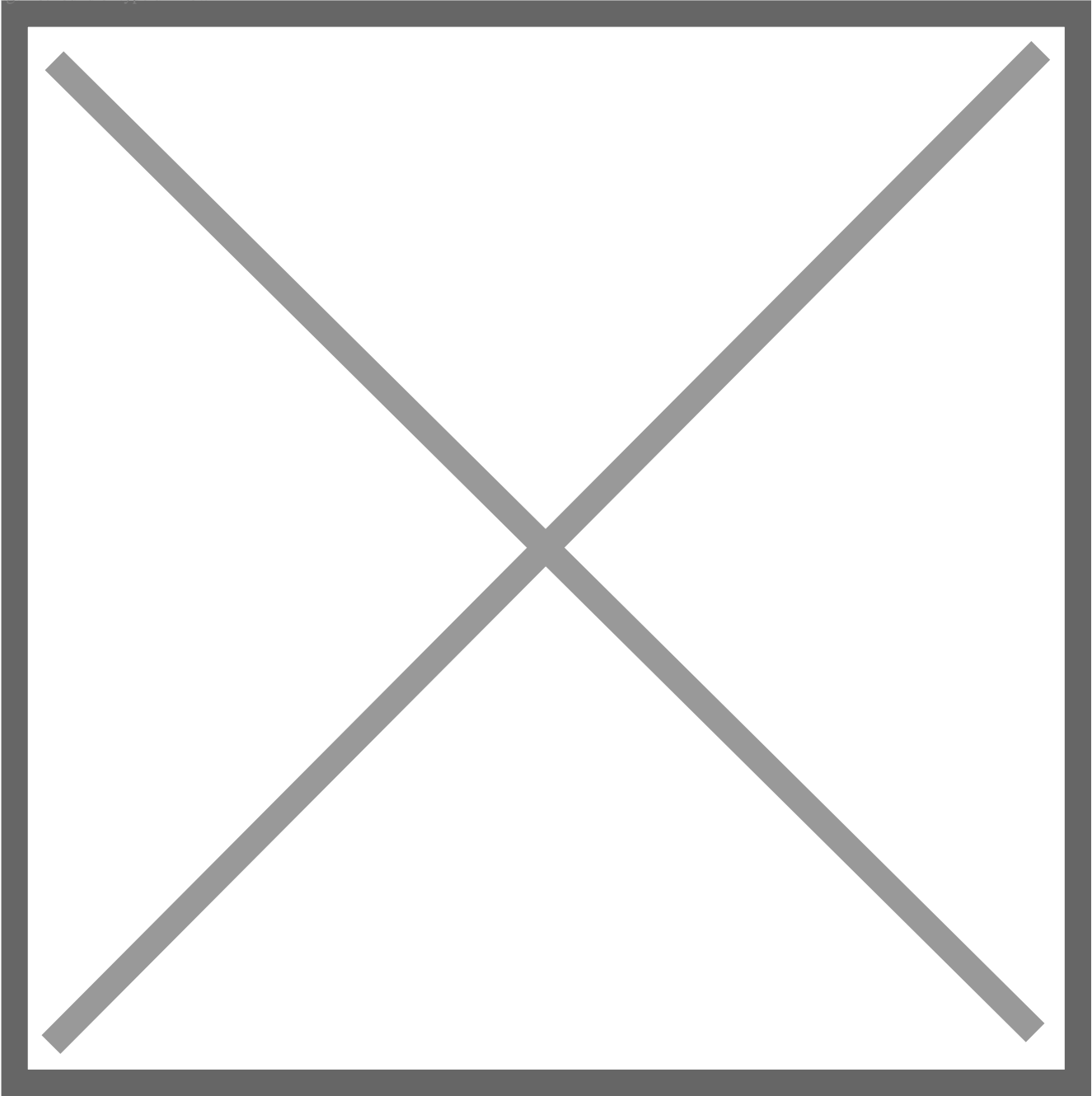
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[5]

[]

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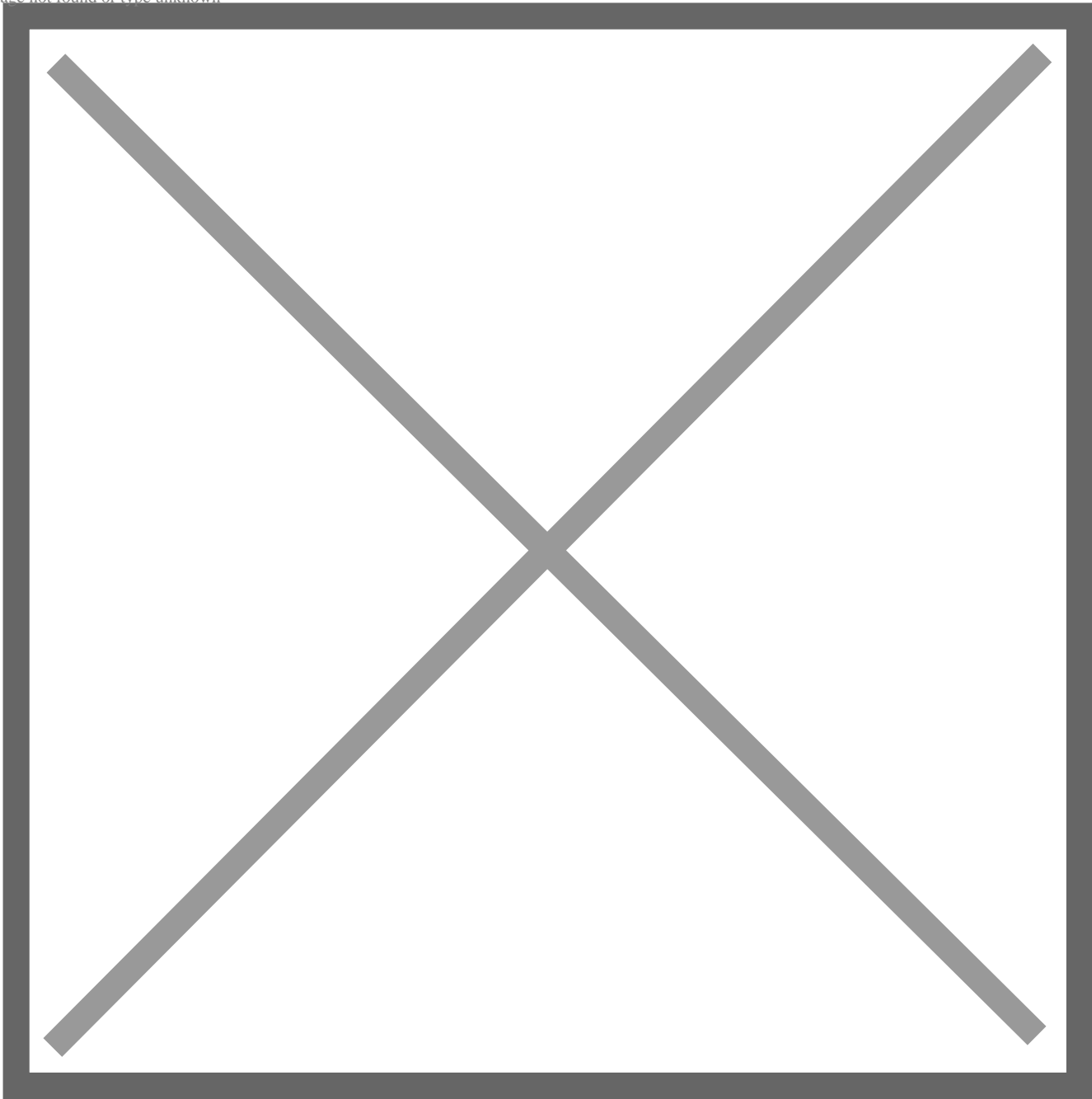
[6]

[2]

[]

[]

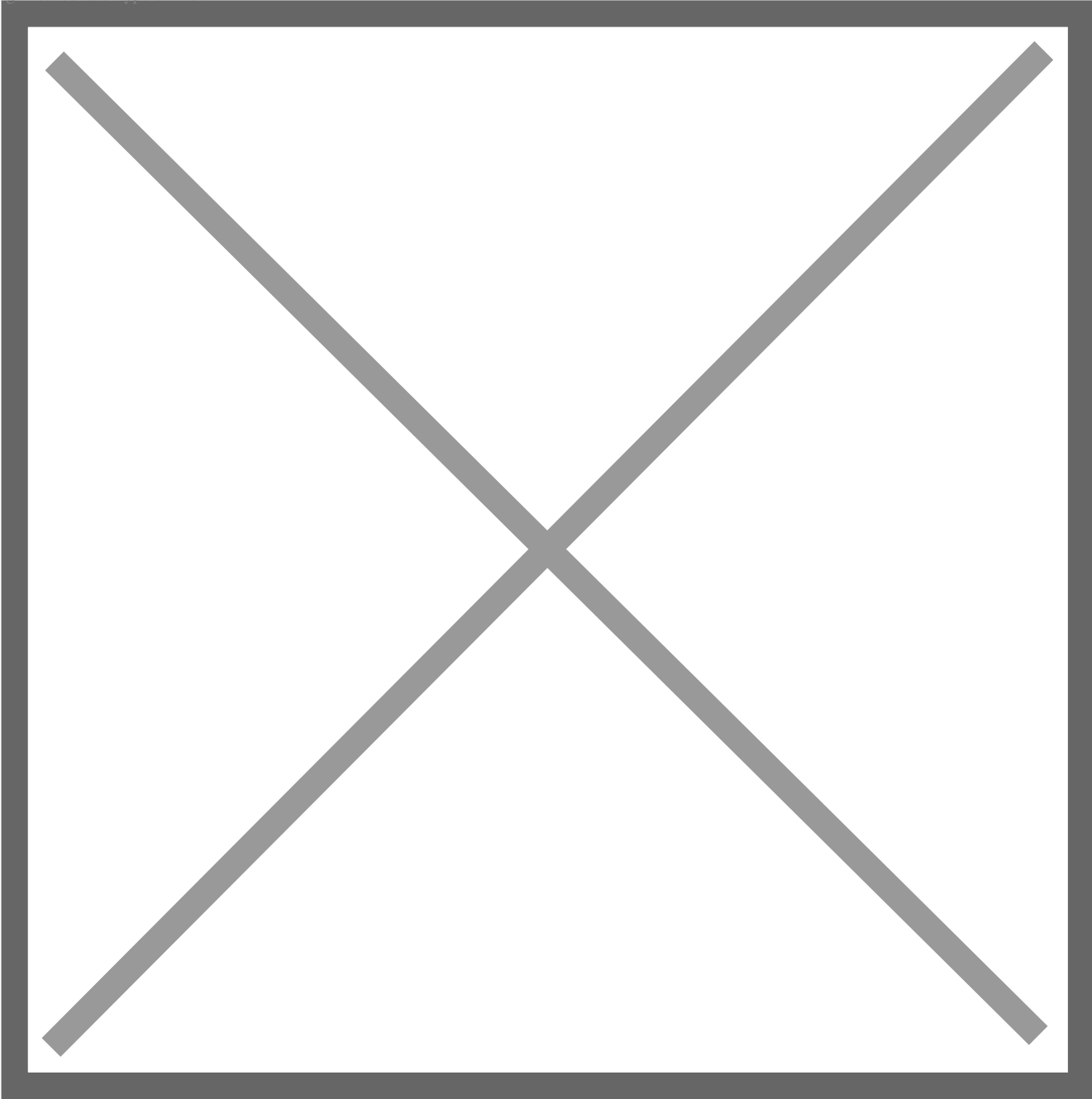
Image not found or type unknown



[7]

Installation Summary [2] [Software Selection
[Fedora Server Edition]

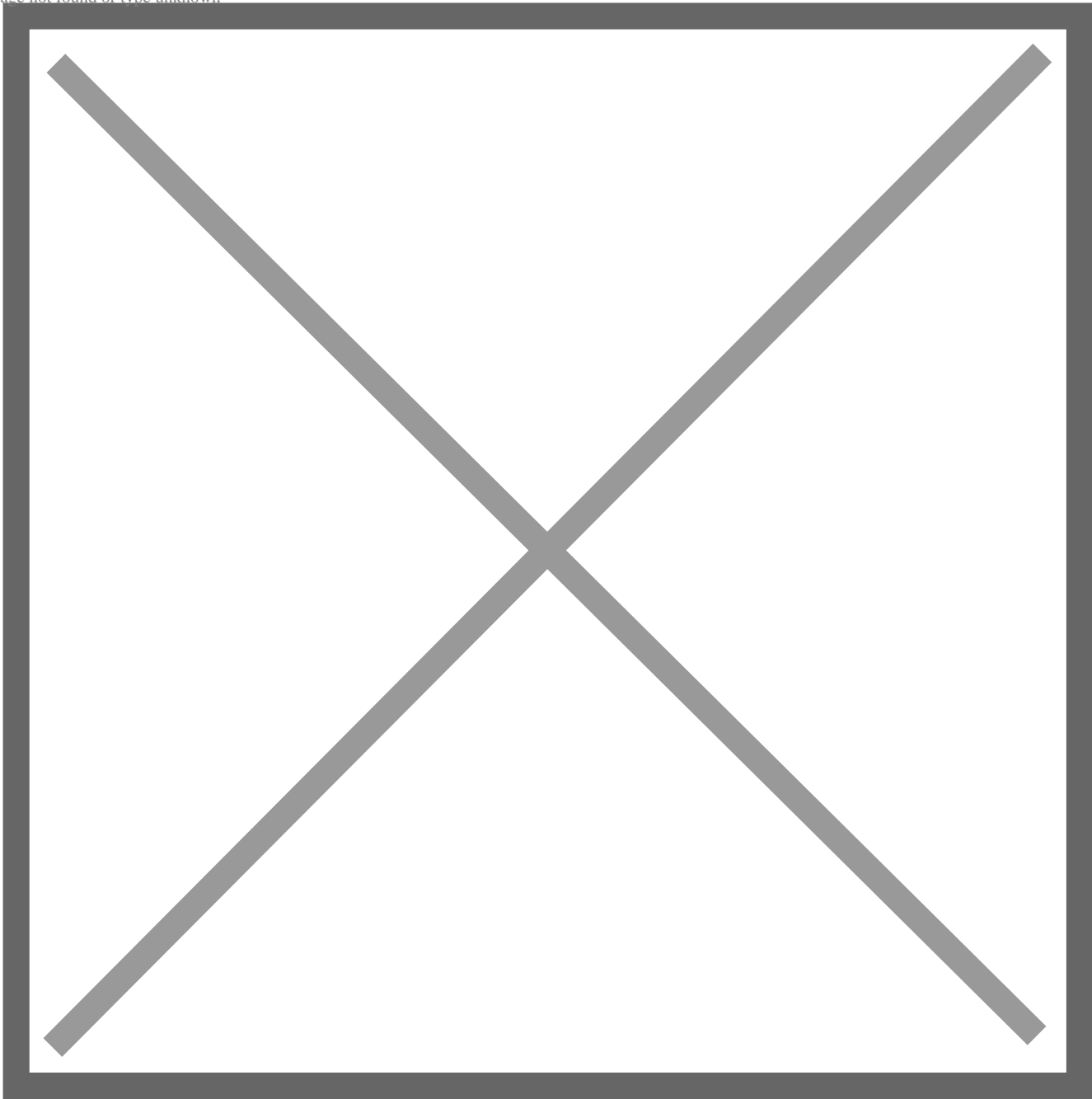
Image not found or type unknown



[8]

Installation Summary [2] [Installation Destination]
Fedora
HDD
[Storage Configuration] [Custom]
[Automatic] [/boot], [/], [/home], [swap]
/home
OK [Done]

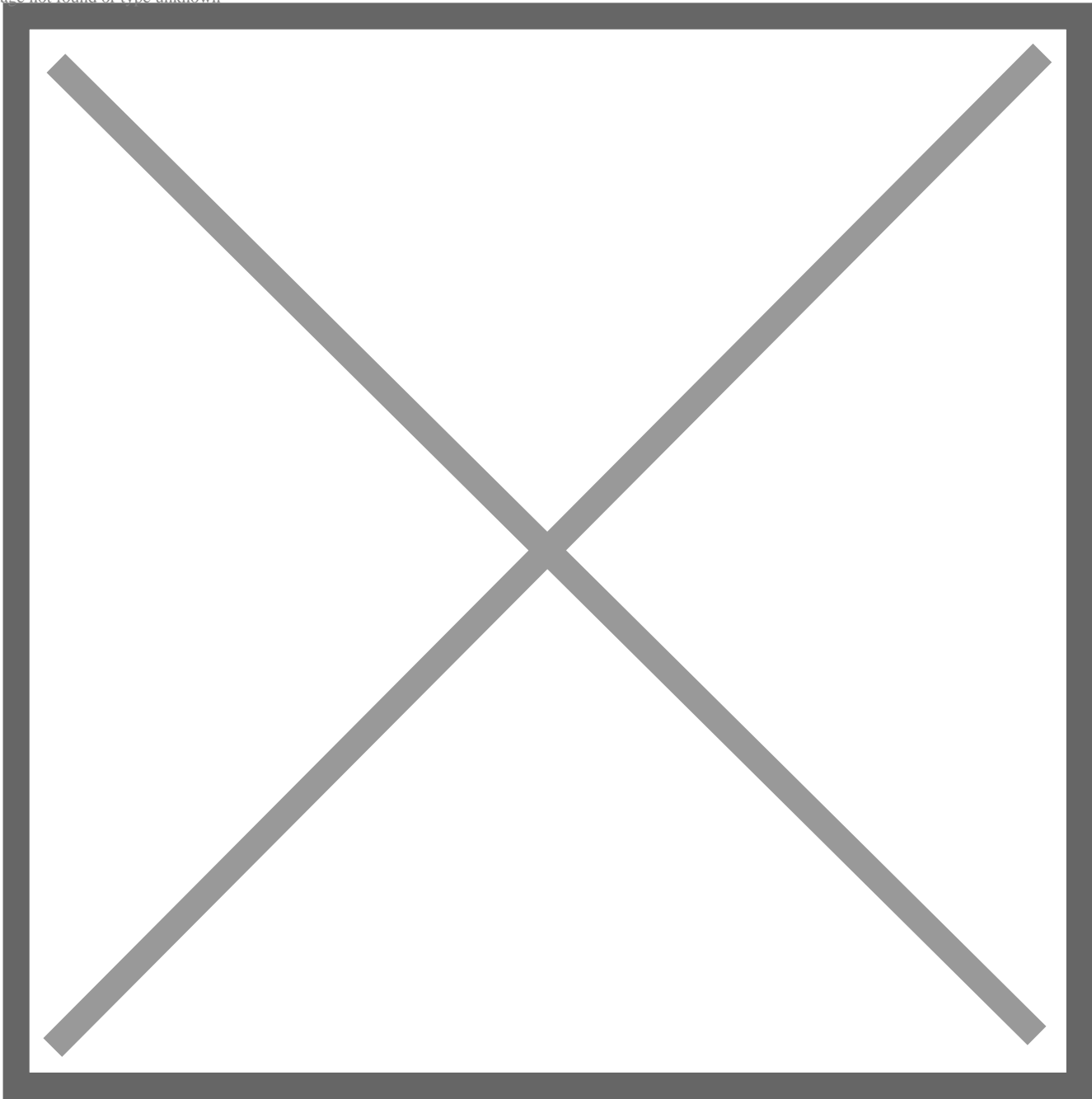
Image not found or type unknown



[9]

[2] []
Fedora []

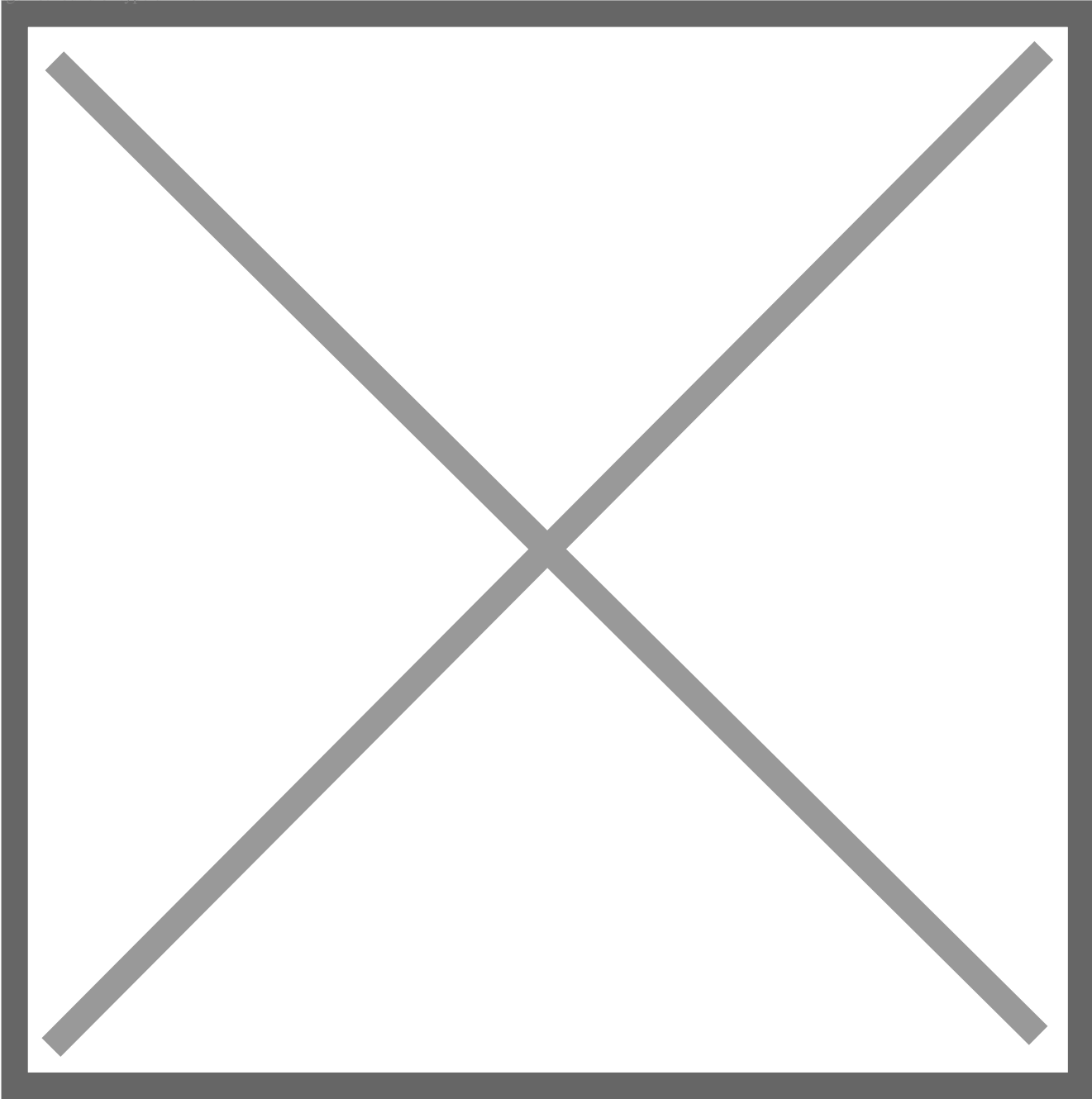
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[10]

	[2]	[USER SETTINGS]	[Root Password]
root		[Enable root account]	root
root		[root]	

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[11]

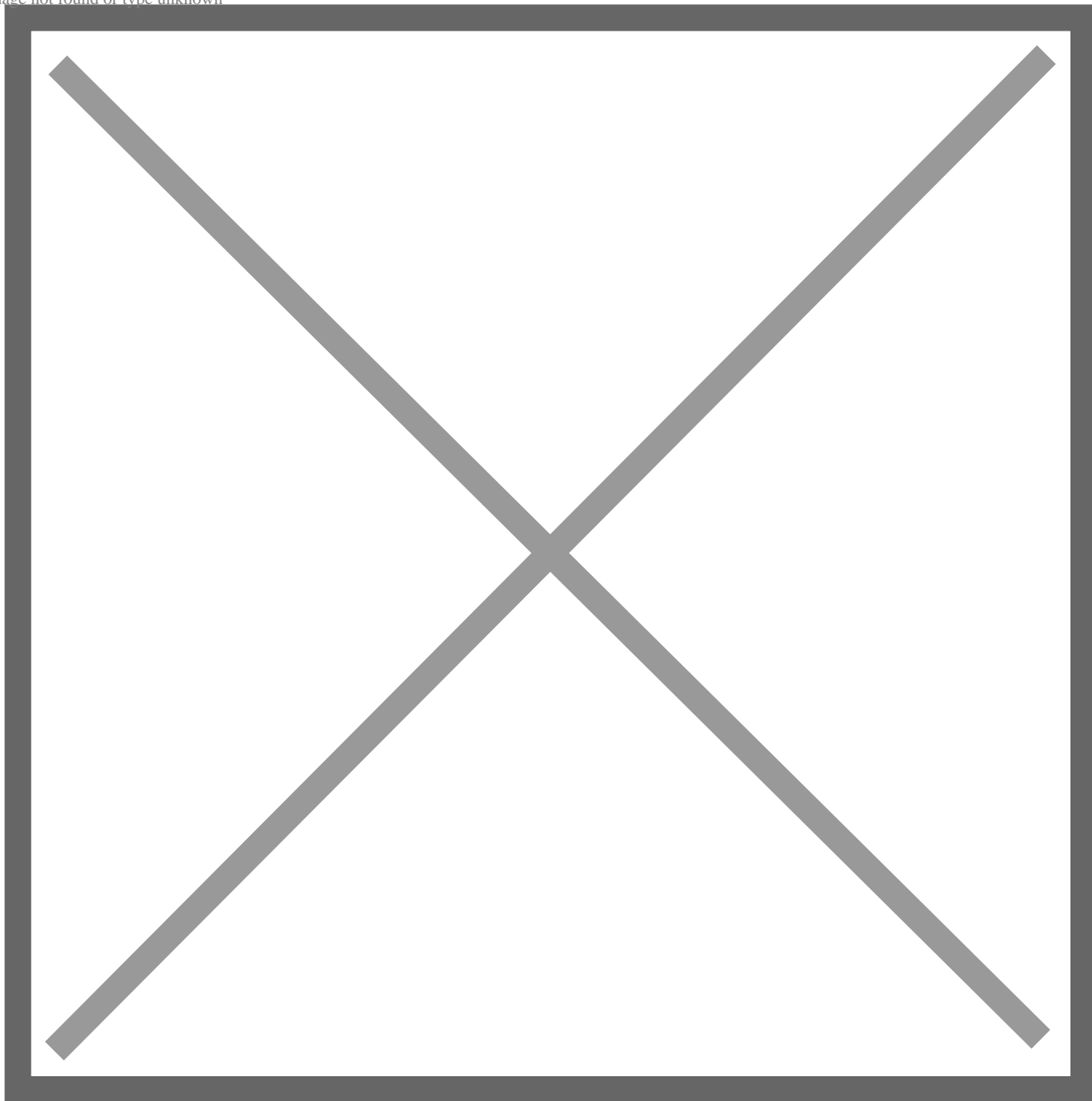
[2]

[]
root

[]

[Make this user admin

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[12]

[] Fedora

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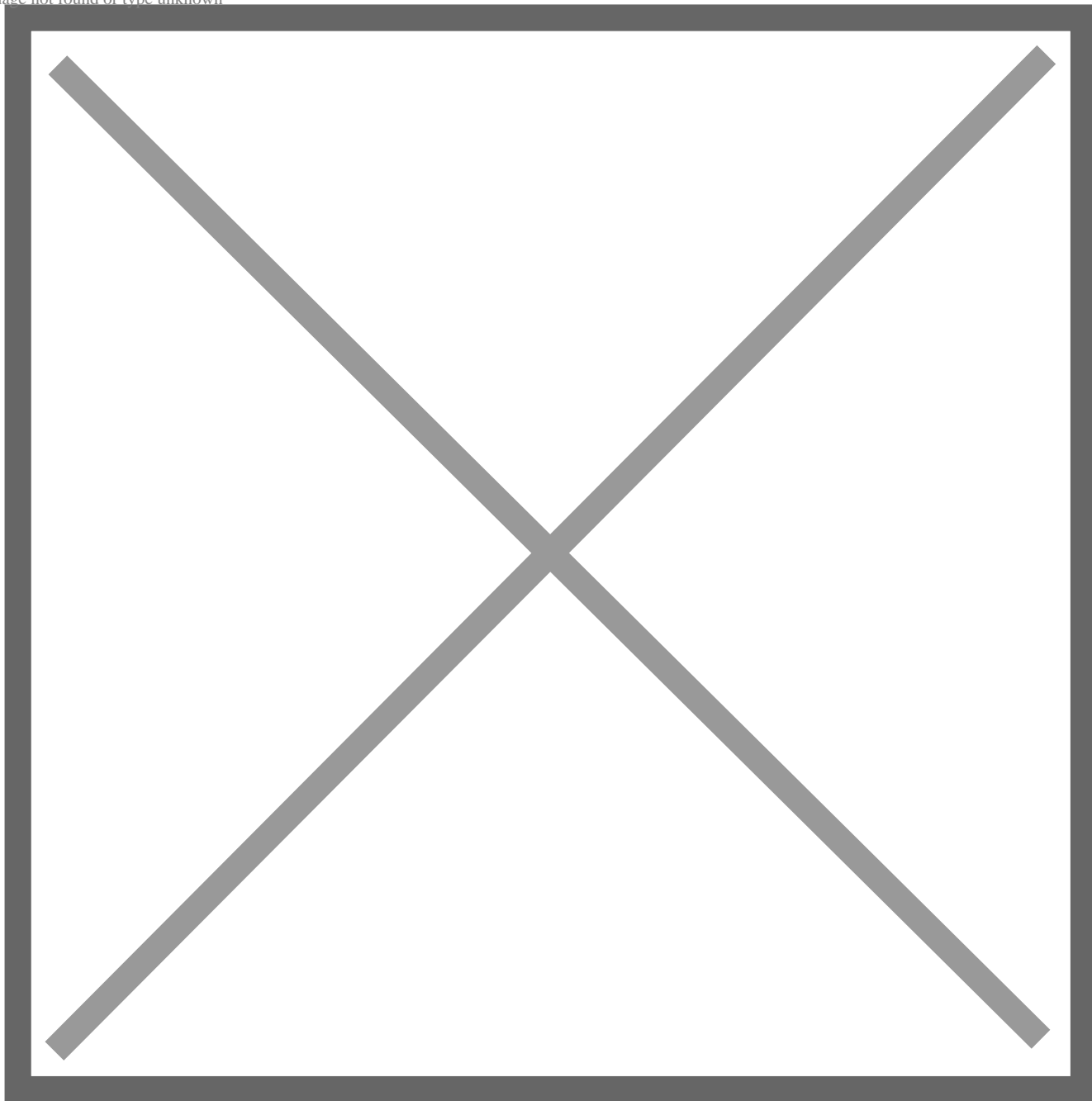
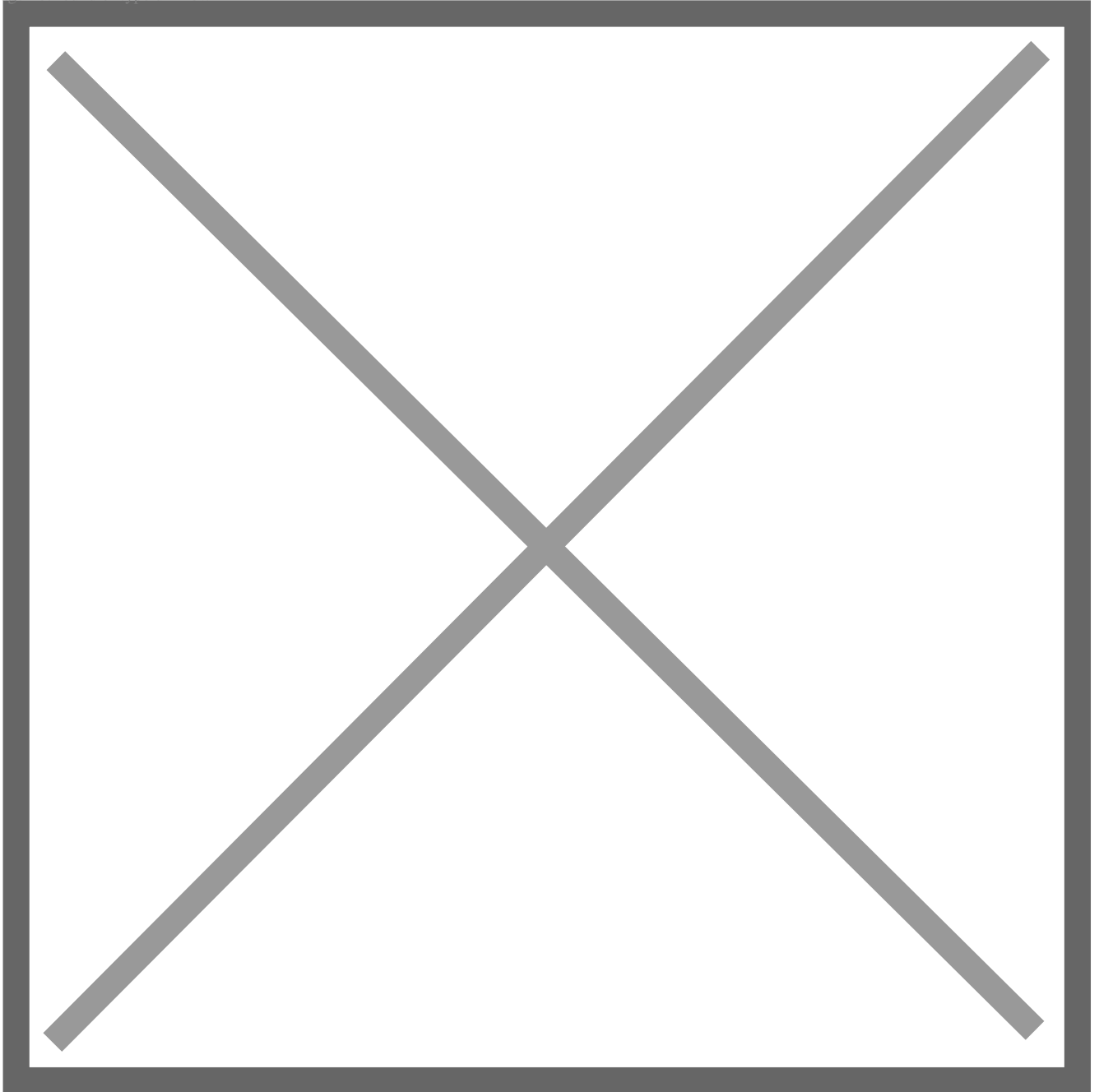


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[14]

root

Fedora 3

Fedora Linux 35
x86_64 (ttyS0) 5.14.10-300.fc35.x86_64

Web <https://fedora:9090/> <https://10.0.0.223:9090/>

Fedora

	Fedora Server
[1]	[fedora]

```
[root@localhost ~]# useradd fedora
[root@localhost ~]# passwd fedora
Changing password for user fedora.
New UNIX password:          # input any password you'd like to set
Retype new UNIX password:   # confirm
passwd: all authentication tokens updated successfully.
```

[2]	root	[su]
-----	------	------

```
localhost login: fedora      # login username
password:                   # input user password
[fedora@localhost ~]$ su -   # switch to root
Password:                   # input root password
[root@localhost ~]#         # just switched to root
```

[3]	[su] [wheel]	[su]
-----	-----------------	------

```
[root@localhost ~]# usermod -aG wheel fedora
[root@localhost ~]# vi /etc/pam.d/su
##PAM- 1.0
auth            sufficient      pam_rootok.so
# Uncomment the following line to implicitly trust users in the "wheel" group.
#auth           sufficient      pam_wheel.so trust use_uid
# Uncomment the following line to require a user to be in the "wheel" group.
# uncomment the following line
auth            required        pam_wheel.so use_uid
auth            substack        system-auth
auth            include         postlogin
account         sufficient      pam_succeed_if.so uid = 0 use_uid quiet
account         include         system-auth
password        include         system-auth
session         include         system-auth
session         include         postlogin
```

```
session          optional          pam_xauth.so
```

```
# verify settings with a user that is not in allowed group
```

```
[redhat@localhost ~]$ su -
```

```
Password:
```

```
su: Permission denied      # denied normally
```

```
[4]
```

```
# remove a user [fedora] (only removed user account)
```

```
[root@localhost ~]# userdel fedora
```

```
# remove a user [fedora] (removed user account and his home directory both)
```

```
[root@localhost ~]# userdel -r fedora
```

SELinux

[1] FireWall

```
[root@localhost ~]# systemctl status firewalld
```

```
* firewalld.service - firewalld - dynamic firewall daemon
```

```
Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; vendor>
```

```
Active: active (running) since Thu 2021-11-04 08:41:32 JST; 5min ago
```

```
Docs: man:firewalld(1)
```

```
Main PID: 762 (firewalld)
```

```
Tasks: 2 (limit: 4647)
```

```
Memory: 34.3M
```

```
CPU: 388ms
```

```
CGroup: /system.slice/firewalld.service
```

```
+-- 762 /usr/bin/python3 -s /usr/sbin/firewalld --nofork --nopid
```

```
# [Active: active (running) ***] means firewalld is running now
```

[2] FireWall FireWall

CentOS Stream 8

Fedora 35 Firewallld

[3] FireWall Machines FireWall Fedora FireV

```
# stop service
```

```
[root@localhost ~]# systemctl stop firewalld
```

```
# disable service
```

```
[root@localhost ~]# systemctl disable firewalld
Removed /etc/systemd/system/multi-user.target.wants/firewalld.service.
Removed /etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service.
```

SELinux

[4] SELinux (Security-Enhanced Linux)

```
[root@localhost ~]# getenforce
Enforcing      # SELinux is enabled
```

```
[5]      SELinux      SELinux      SELinux
      SELinux      CentOS Stream 8
      Fedora 35      SELinux      Enforcing
[6]                                SELinux      SELinux
```

```
# disable SELinux
[root@localhost ~]# grubby --update-kernel ALL --args selinux=0
# restart computer to apply changes
[root@localhost ~]# reboot
# if falling back to enable, run like follows
[root@localhost ~]# grubby --update-kernel ALL --remove-args selinux
```

[1] IP [enp1s0]

```
#      HostName
[root@localhost ~]# hostnamectl set-hostname dlp.srv.world
# display devices
[root@localhost ~]# nmcli device
DEVICE  TYPE      STATE      CONNECTION
enp1s0  ethernet  connected  enp1s0
lo      loopback  unmanaged  --

#      IPv4
[root@localhost ~]# nmcli connection modify enp1s0 ipv4.addresses 10.0.0.30/24
```

```

#
[root@localhost ~]# nmcli connection modify enp1s0 ipv4.gateway 10.0.0.1
#   DNS
#       DNS       ⇒ ipv4.dns "10.0.0.10 10.0.0.11 10.0.0.12"
[root@localhost ~]# nmcli connection modify enp1s0 ipv4.dns 10.0.0.10
#   DNS
[root@localhost ~]# nmcli connection modify enp1s0 ipv4.dns-search srv.world
#       [auto]     DHCP
[root@localhost ~]# nmcli connection modify enp1s0 ipv4.method manual
#
[root@localhost ~]# nmcli connection down enp1s0; nmcli connection up enp1s0
Connection 'enp1s0' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/1)
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)

#
[root@localhost ~]# nmcli device show enp1s0
GENERAL. DEVICE:                enp1s0
GENERAL. TYPE:                  ethernet
GENERAL. HWADDR:                52:54:00:D3:14:49
GENERAL. MTU:                   1500
GENERAL. STATE:                 100 (connected)
GENERAL. CONNECTION:            enp1s0
GENERAL. CON- PATH:              /org/freedesktop/NetworkManager/ActiveC>
WIRED- PROPERTIES. CARRIER:    on
IP4. ADDRESS[ 1]:               10.0.0.30/24
IP4. GATEWAY:                   10.0.0.1
IP4. ROUTE[ 1]:                 dst = 10.0.0.0/24, nh = 0.0.0.0, mt = 1>
IP4. ROUTE[ 2]:                 dst = 0.0.0.0/0, nh = 10.0.0.1, mt = 100
IP4. DNS[ 1]:                   10.0.0.10
IP4. SEARCHES[ 1]:              srv.world
IP6. ADDRESS[ 1]:               fe80::5054:ff:fed3:1449/64
IP6. GATEWAY:                   --
IP6. ROUTE[ 1]:                 dst = fe80::/64, nh = ::, mt = 100

#
[root@localhost ~]# ip address show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen

```

```

1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default
qlen 1000
    link/ether 52:54:00:d3:14:49 brd ff:ff:ff:ff:ff:ff
    inet 10.0.0.30/24 brd 10.0.0.255 scope global noprefixroute enp1s0
        valid_lft forever preferred_lft forever
    inet6 fe80::5054:ff:fed3:1449/64 scope link noprefixroute
        valid_lft forever preferred_lft forever

```

[1]

```

#
# [--all]
# [--no-pager]      [less/more]
[root@dlp ~]# systemctl -t service

```

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION	>
abrt-journal-core.service	loaded	active	running	Creates ABRT problem	>
abrt-oops.service	loaded	active	running	ABRT kernel log watc	>
abrt-xorg.service	loaded	active	running	ABRT Xorg log watche	>
abrttd.service	loaded	active	running	ABRT Automated Bug R	>
atd.service	loaded	active	running	Deferred execution s	>
.....					
.....					
systemd-zram-setup@zram0.service	loaded	active	exited	Create swap on /dev/>	
user-runtime-dir@0.service	loaded	active	exited	User Runtime Directo	>
user@0.service	loaded	active	running	User Manager for UID	>

LOAD = Reflects whether the unit definition was properly loaded.

ACTIVE = The high-level unit activation state, i.e. generalization of SUB.

SUB = The low-level unit activation state, values depend on unit type.

54 loaded units listed. Pass --all to see loaded but inactive units, too.

To show all installed unit files use 'systemctl list-unit-files'.

#

```
[root@dlp ~]# systemctl list-unit-files -t service
```

UNIT FILE	STATE	VENDOR PRESET
abrt-journal-core.service	enabled	enabled
abrt-oops.service	enabled	enabled
abrt-pstoreoops.service	disabled	disabled
abrt-vmcore.service	enabled	enabled
abrt-xorg.service	enabled	enabled
abrt.service	enabled	enabled
arp-ethers.service	disabled	disabled
atd.service	enabled	enabled
auditd.service	enabled	enabled

.....

.....

udisks2.service	enabled	enabled
usb_modeswitch@.service	static	-
user-runtime-dir@.service	static	-
user@.service	static	-
wpa_supplicant.service	disabled	disabled

219 unit files listed.

[2]

smartd

```
[root@dlp ~]#systemctl disable --now smartd
```

Fedora Server

Fedora Server

[1]

```
[root@dlp ~]# dnf -y upgrade
```

Dependencies resolved.

Package	Arch	Version	Repo	Size
---------	------	---------	------	------

=====

Installing:

kernel	x86_64	5.14.14-300.fc35	updates	65 k
--------	--------	------------------	---------	------

Upgrading:

NetworkManager	x86_64	1:1.32.12-2.fc35	updates	2.3 M
NetworkManager-bluetooth	x86_64	1:1.32.12-2.fc35	updates	52 k
NetworkManager-libnm	x86_64	1:1.32.12-2.fc35	updates	1.7 M
NetworkManager-team	x86_64	1:1.32.12-2.fc35	updates	30 k
NetworkManager-wifi	x86_64	1:1.32.12-2.fc35	updates	116 k
NetworkManager-wwan	x86_64	1:1.32.12-2.fc35	updates	58 k
alsa-sof-firmware	noarch	1.9-1.fc35	updates	580 k
bc	x86_64	1.07.1-14.fc35	updates	118 k
bluez	x86_64	5.62-1.fc35	updates	973 k
bluez-libs	x86_64	5.62-1.fc35	updates	84 k
btrfs-progs	x86_64	5.14.2-1.fc35	updates	962 k
checkpolicy	x86_64	3.3-1.fc35	updates	338 k
cockpit	x86_64	256-1.fc35	updates	44 k
cockpit-bridge	x86_64	256-1.fc35	updates	490 k
cockpit-networkmanager	noarch	256-1.fc35	updates	523 k
cockpit-packagekit	noarch	256-1.fc35	updates	572 k
cockpit-selinux	noarch	256-1.fc35	updates	226 k
cockpit-storaged	noarch	256-1.fc35	updates	584 k
cockpit-system	noarch	256-1.fc35	updates	2.4 M
cockpit-ws	x86_64	256-1.fc35	updates	1.3 M
curl	x86_64	7.79.1-1.fc35	updates	310 k
dnf-plugins-core	noarch	4.0.24-1.fc35	updates	35 k
dnsmasq	x86_64	2.86-3.fc35	updates	333 k
dracut	x86_64	055-6.fc35	updates	347 k
dracut-config-rescue	x86_64	055-6.fc35	updates	12 k
dracut-network	x86_64	055-6.fc35	updates	61 k
dracut-squash	x86_64	055-6.fc35	updates	12 k
fedora-logos	noarch	35.0-2.fc35	updates	1.3 M
gdb-headless	x86_64	11.1-2.fc35	updates	4.3 M
gdbm-libs	x86_64	1:1.22-1.fc35	updates	58 k
gnupg2	x86_64	2.3.3-1.fc35	updates	2.5 M
hwdata	noarch	0.352-1.fc35	updates	1.5 M
iwl100-firmware	noarch	39.31.5.1-126.fc35	updates	134 k

.....

.....

Installed:

```
python3-tracer-0.7.6-1.fc34.noarch
reportd-0.7.4-4.fc34.x86_64
sscg-2.6.2-5.fc34.x86_64
tpm2-tools-5.0-2.fc34.x86_64
tracer-common-0.7.6-1.fc34.noarch
whois-nls-5.5.9-1.fc34.noarch
```

Complete!

Moduler

[1]

```
[root@dlp ~]# dnf module list
```

Fedora Modular 34 - x86_64

Name	Stream	Profiles Summary
avocado	latest	default [d], minimal Framework with tools and libraries for Automated Testing
avocado	82lts	default, minimal Framework with tools and libraries for Automated Testing
avocado-vt	latest	default Avocado Virt Test Plugin
avocado-vt	82lts	default Avocado Virt Test Plugin
cri-o	nightly	default Kubernetes Container Runtime Interface for OCI-based containers

.....

.....

varnish	6.0	default Varnish HTTP cache
---------	-----	----------------------------

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

[2]

```
# [Node.js]
```

```
[root@dlp ~]# dnf module list nodejs
```

```
Fedora Modular 35 - x86_64
```

Name	Stream	Profiles	Summary
nodejs	12	default [d], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16	default, development, minimal	Javascript runtime

```
Fedora Modular 35 - x86_64 - Updates
```

Name	Stream	Profiles	Summary
nodejs	12	default [d], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16	default, development, minimal	Javascript runtime

```
Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled
```

```
# Node.js 12
```

```
[root@dlp ~]# dnf module -y install nodejs:12
```

```
Dependencies resolved.
```

```
=====
====
Package           Arch    Version                               Repository
Size
```

```
=====
====
Installing group/module packages:
```

nodejs	x86_64	1: 12. 22. 7-1. module_f35+13211+80e67b81	updates-modular
--------	--------	---	-----------------

94 k

npm	x86_64	1: 6. 14. 15-1. 12. 22. 7. 1. module_f35+13211+80e67b81	updates-modular
-----	--------	---	-----------------

3.3 M

```
Installing dependencies:
```

nodejs-libs	x86_64	1: 12. 22. 7-1. module_f35+13211+80e67b81	updates-modular
-------------	--------	---	-----------------

12 M

```
Installing weak dependencies:
```

nodejs-docs	noarch	1: 12. 22. 7-1. module_f35+13211+80e67b81	updates-modular
-------------	--------	---	-----------------

3.0 M

nodejs-full-i18n	x86_64	1: 12. 22. 7-1. module_f35+13211+80e67b81	updates-modular
------------------	--------	---	-----------------

7.7 M

Installing module profiles:

nodejs/default

Enabling module streams:

nodejs 12

Transaction Summary

=====

====

Install 5 Packages

.....

.....

[Node.js 12] [e]nabled [i]nstalled

[root@dlp ~]# dnf module list nodejs

Fedora Modular 35 - x86_64

Name	Stream	Profiles	Summary
nodejs	12 [e]	default [d] [i], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16	default, development, minimal	Javascript runtime

Fedora Modular 35 - x86_64 - Updates

Name	Stream	Profiles	Summary
nodejs	12 [e]	default [d] [i], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16	default, development, minimal	Javascript runtime

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

[root@dlp ~]# node -v

v12.22.7

#

[root@dlp ~]# dnf module reset nodejs

[Node.js 16]

[root@dlp ~]# dnf module enable nodejs:16

[root@dlp ~]# dnf module -y install nodejs:16/default

[Node.js 16] [e]nabled

[root@dlp ~]# dnf module list nodejs

Fedora Modular 35 - x86_64

Name	Stream	Profiles	Summary
nodejs	12	default [d], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16 [e]	default [i], development, minimal	Javascript runtime

Fedora Modular 35 - x86_64 - Updates

Name	Stream	Profiles	Summary
nodejs	12	default [d], development, minimal	Javascript runtime
nodejs	14	default, development, minimal	Javascript runtime
nodejs	15	default, development, minimal	Javascript runtime
nodejs	16 [e]	default [i], development, minimal	Javascript runtime

Hint: [d]efault, [e]nabled, [x]disabled, [i]nstalled

```
[root@dlp ~]# node -v
v16.11.1
```

web

[Fedora Server] Cockpit Admin Console

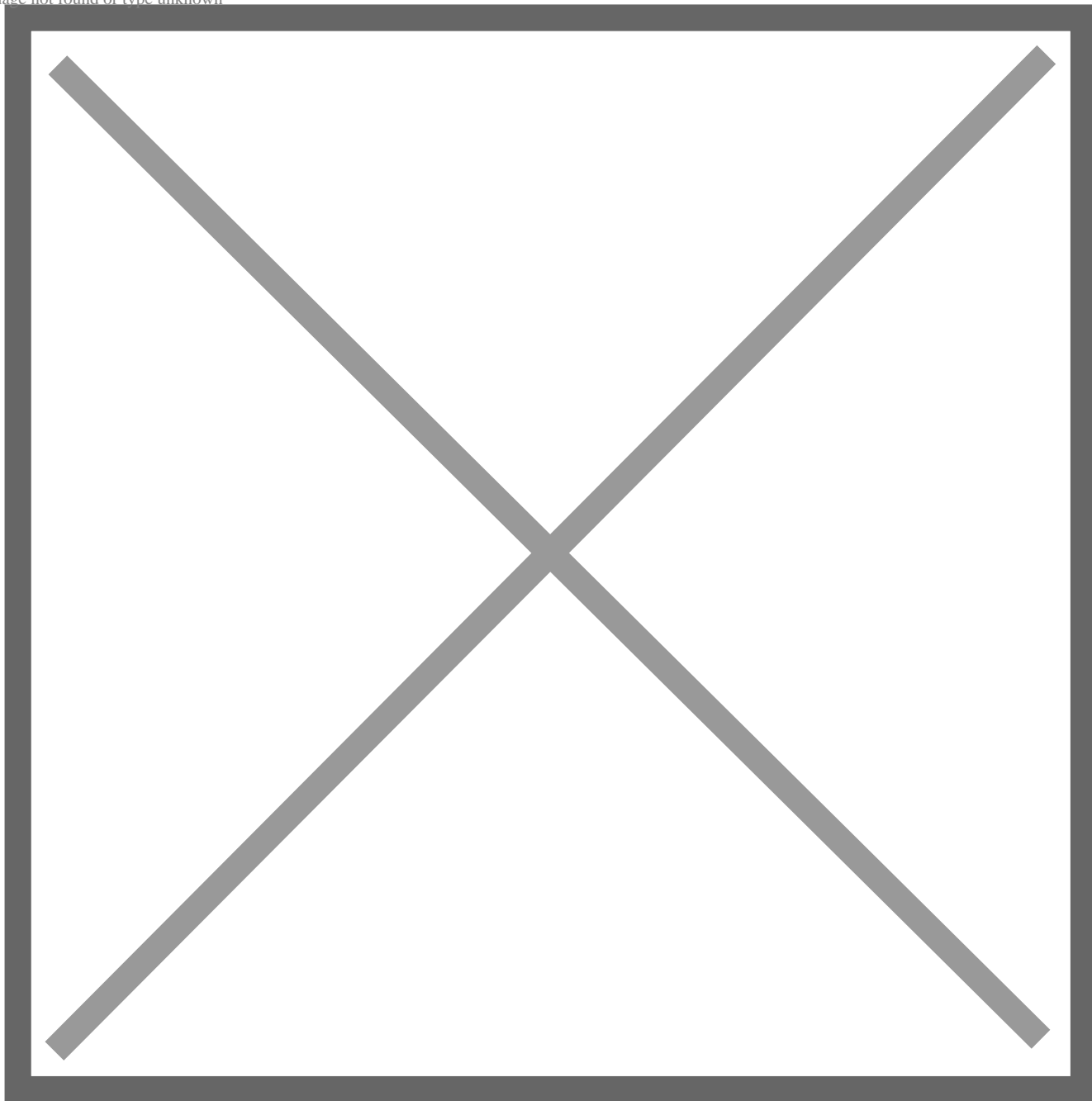
Web Fedora

Cockpit Firewallld Fedora

[cockpit] [9090]

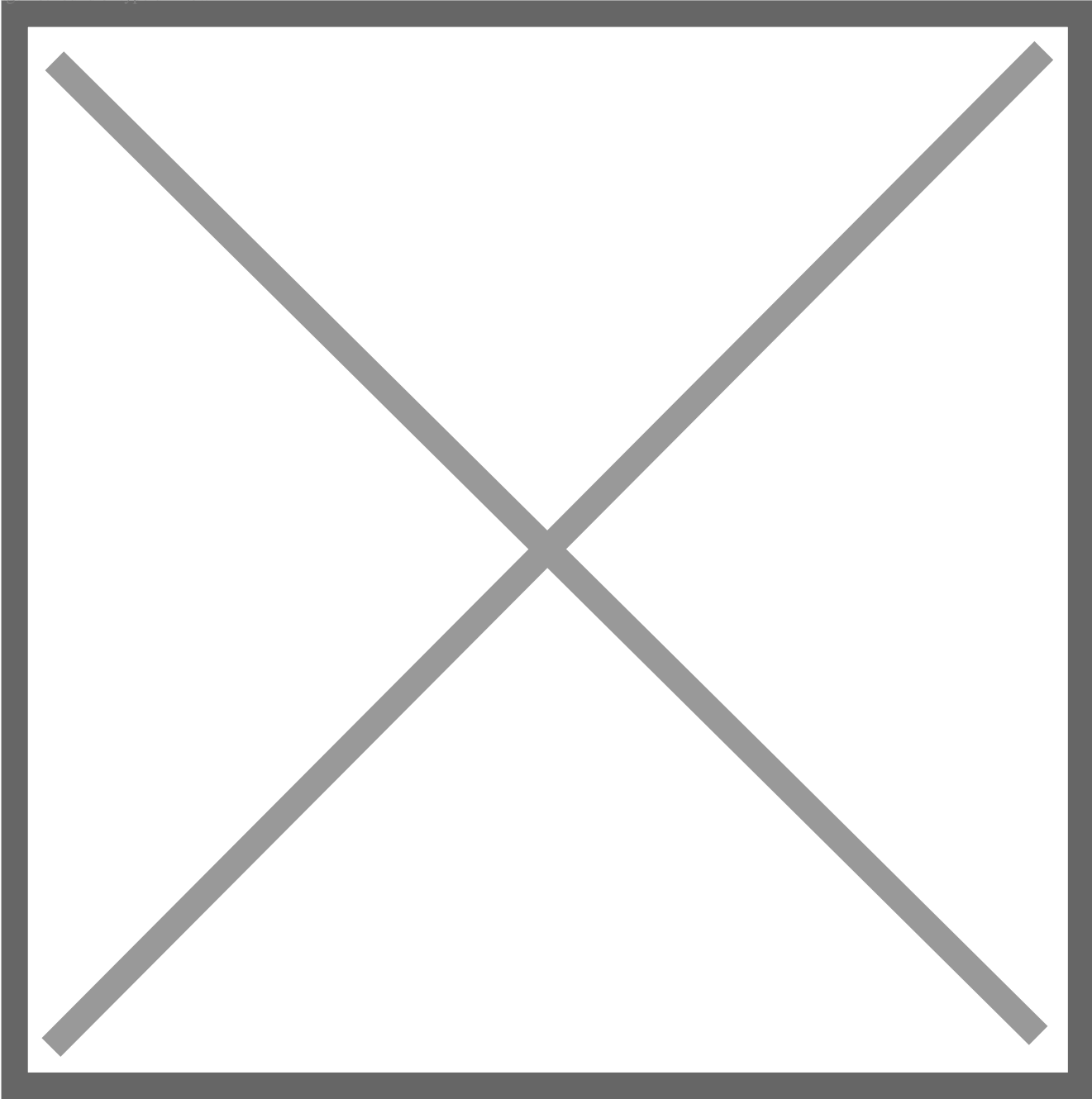
[1]	localhost	Web	[https://(IP):9090/]
-----	-----------	-----	------------------------

Image not found or type unknown



[2]

Image not found or type unknown

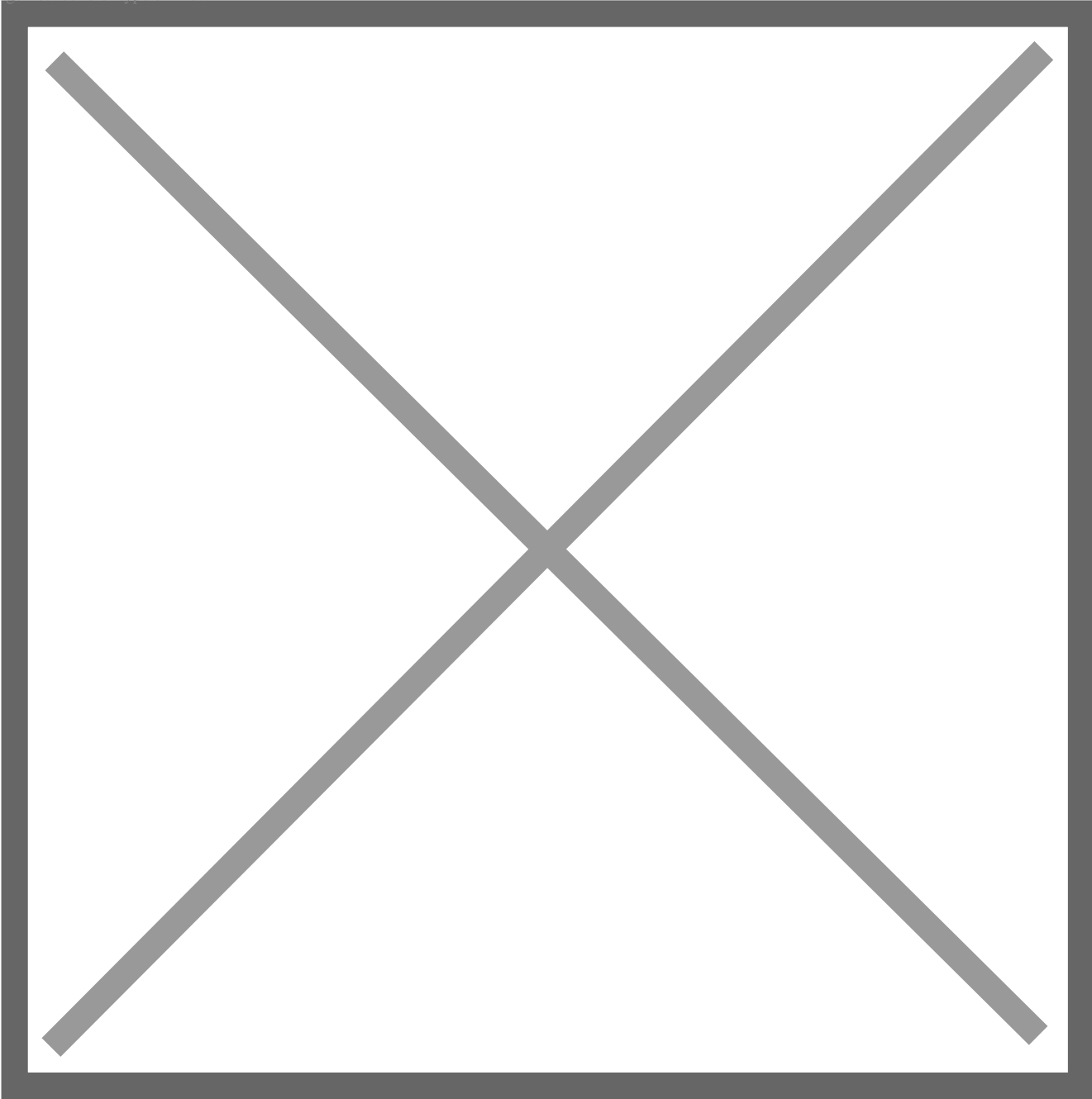


[3]

[]

[]

Image not found or type unknown

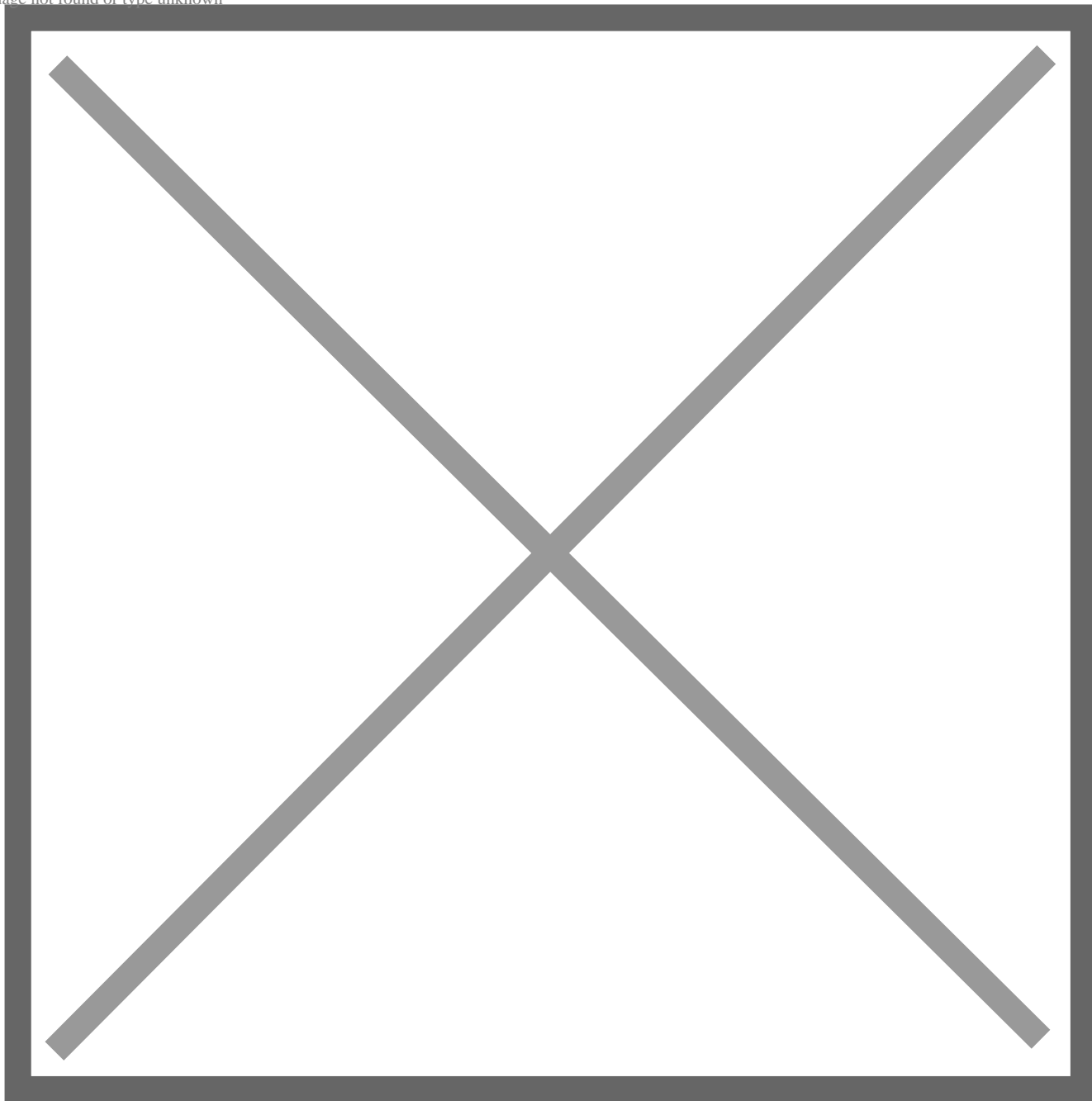


[4]

[Storage]

Storage

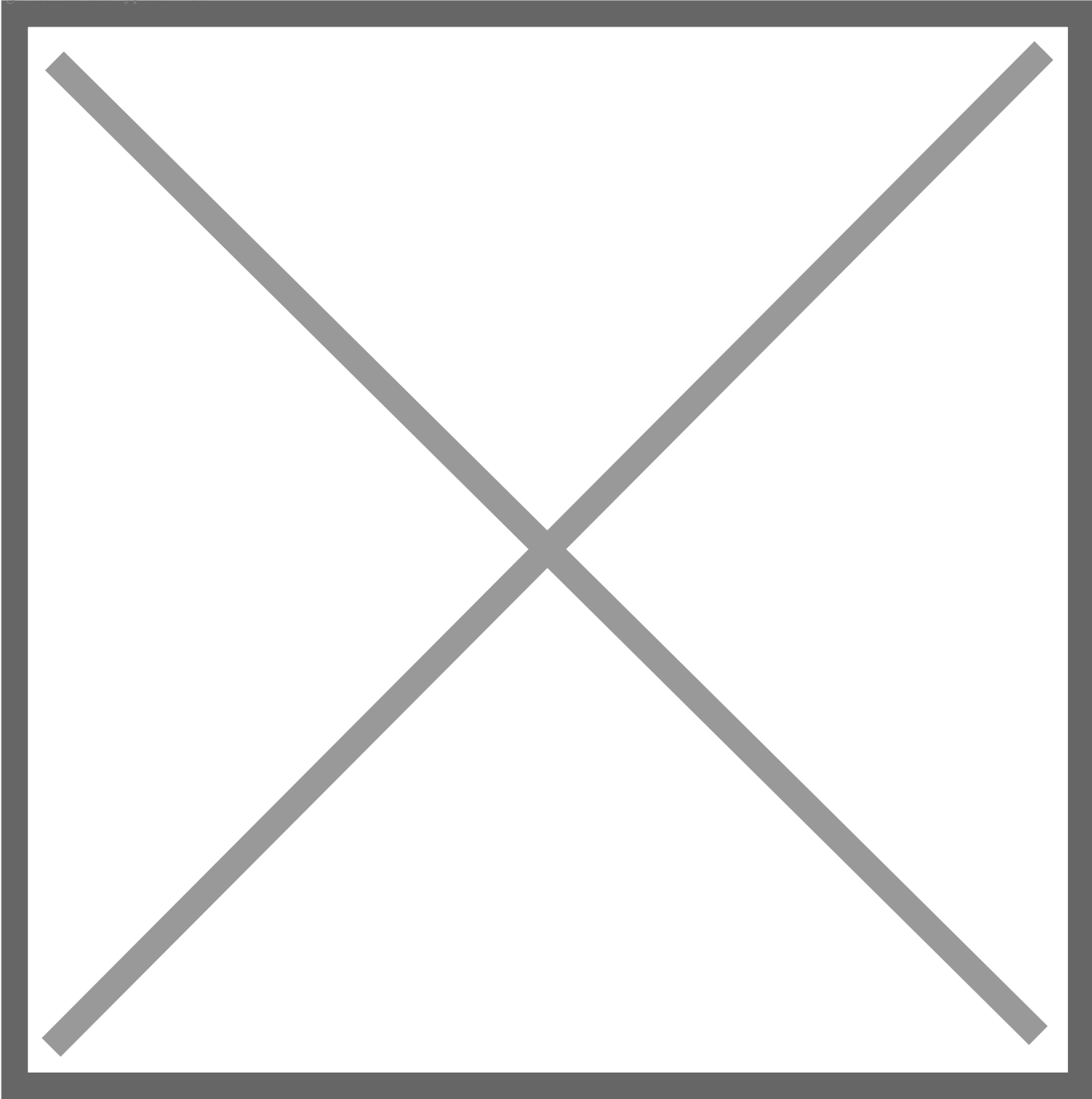
Image not found or type unknown



[5]

[]

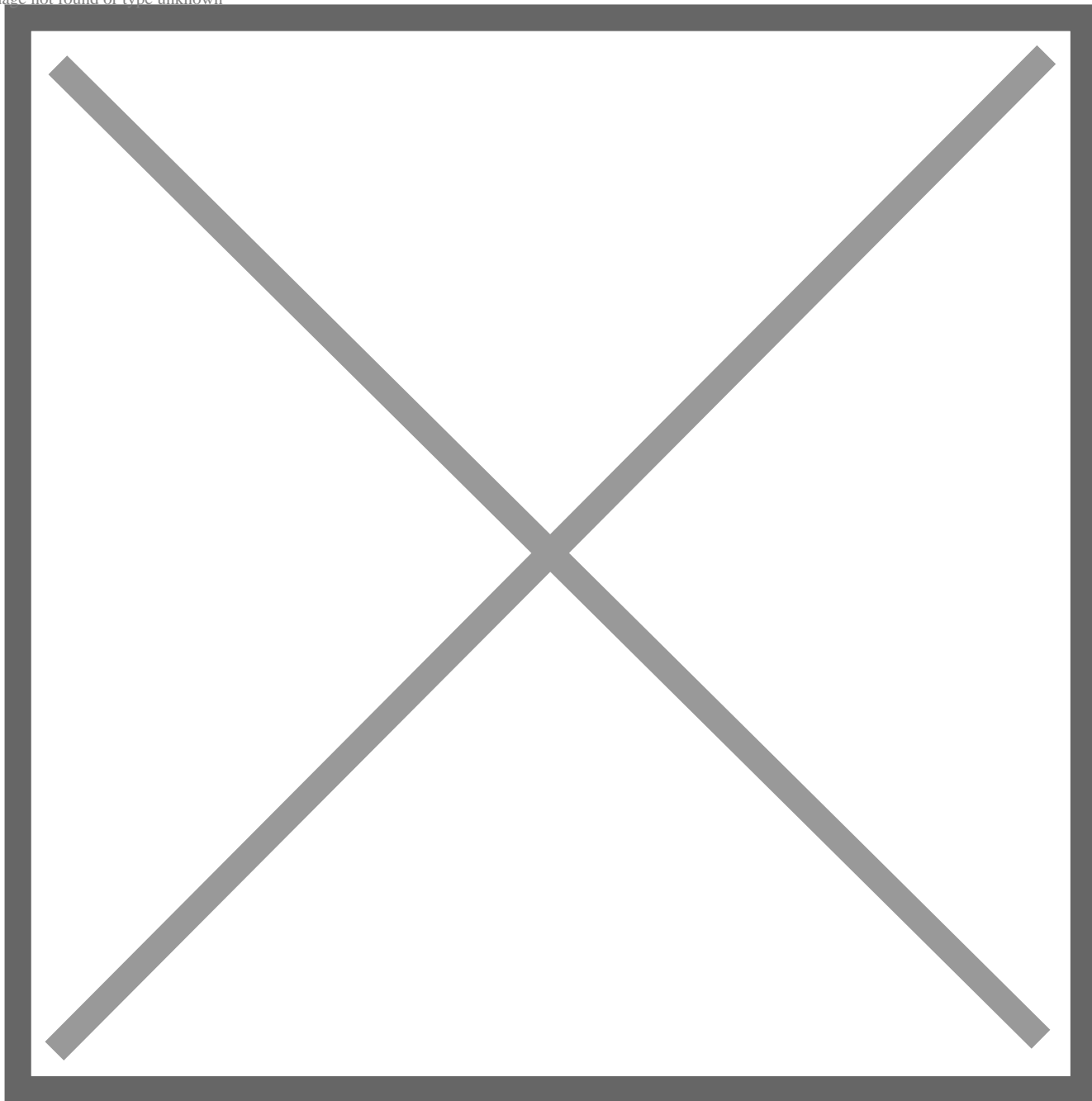
Image not found or type unknown



[6]

[Accounts]

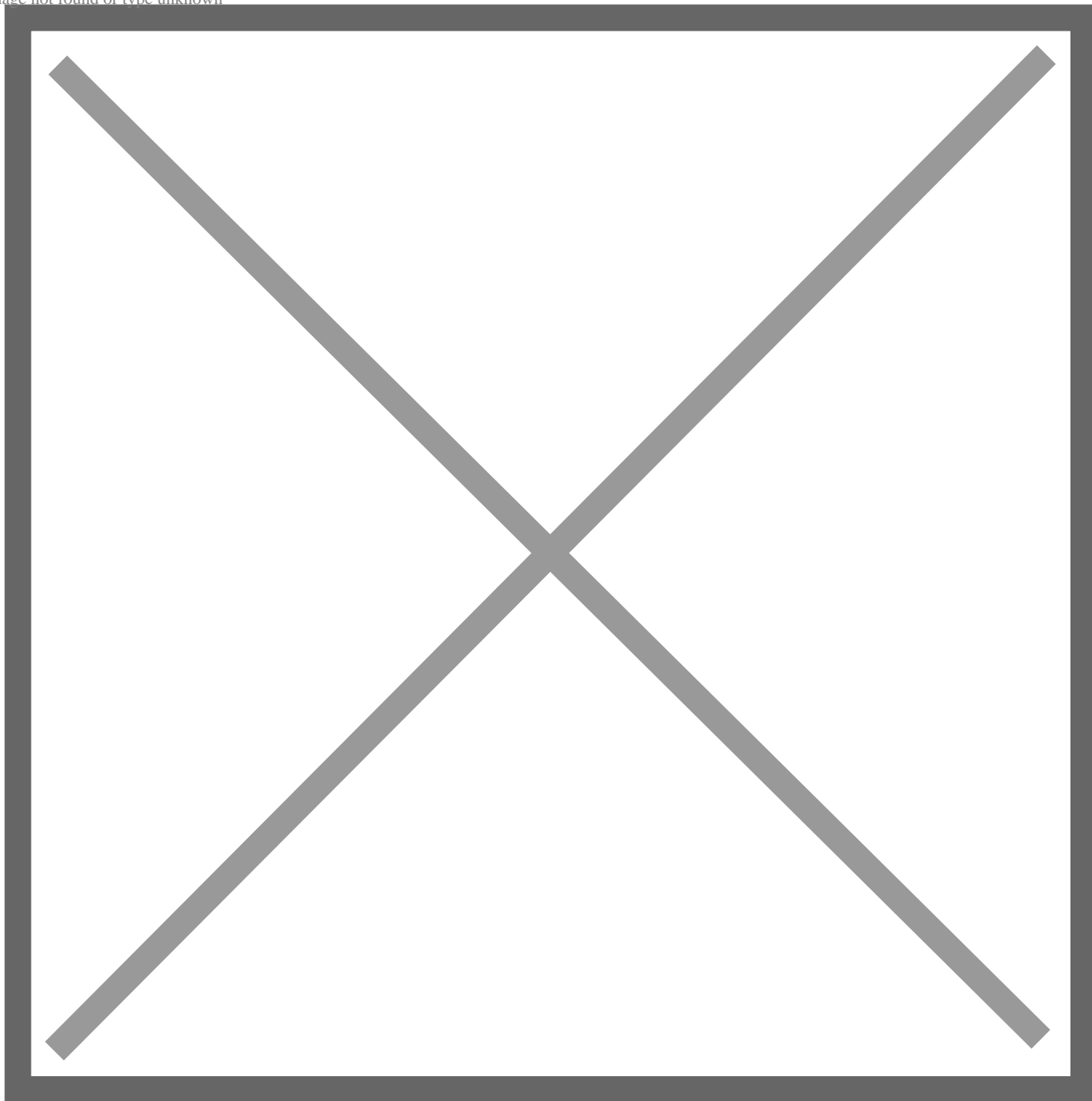
Image not found or type unknown



[7]

[]

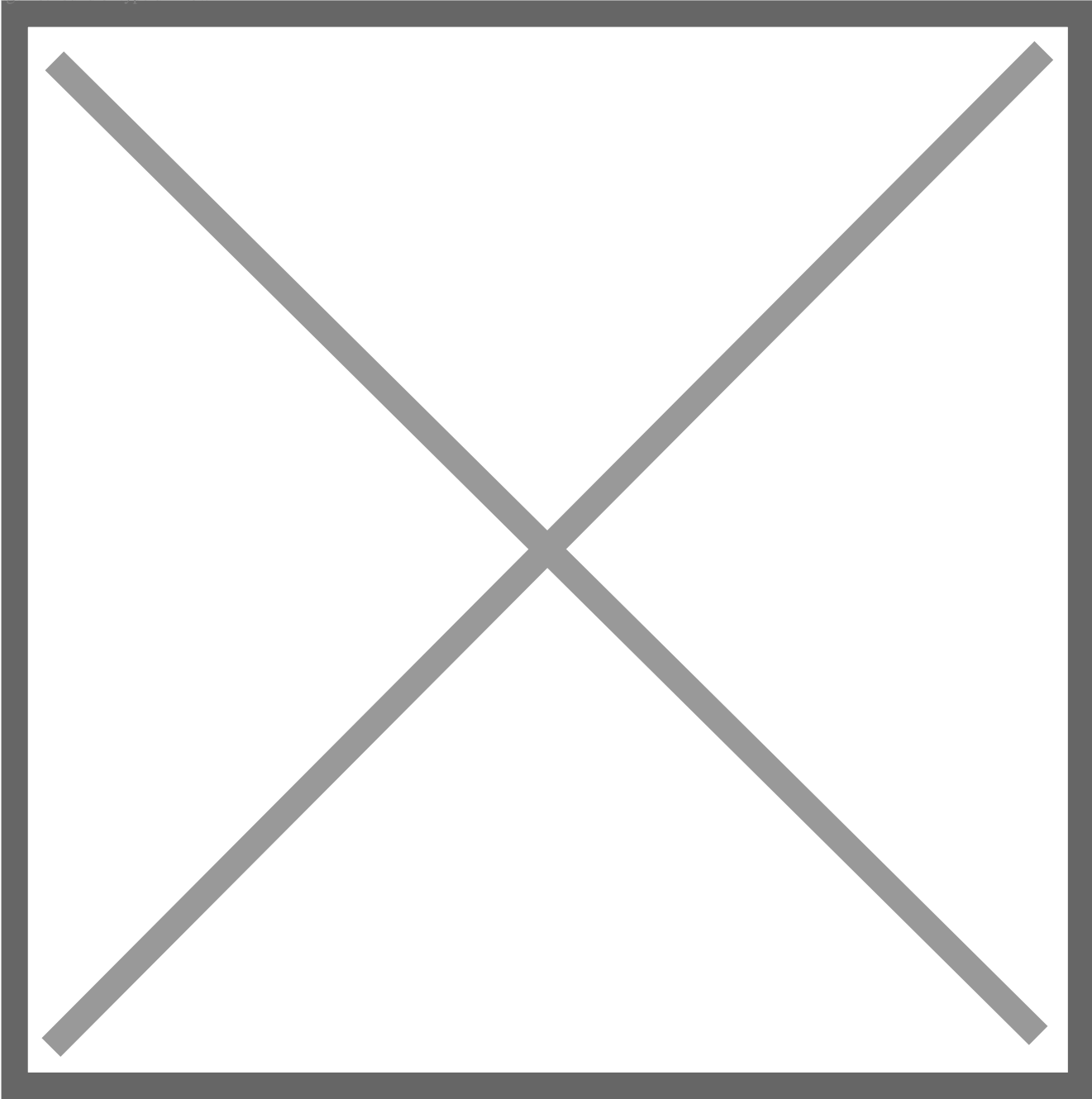
Image not found or type unknown



[8]

[]

Image not found or type unknown



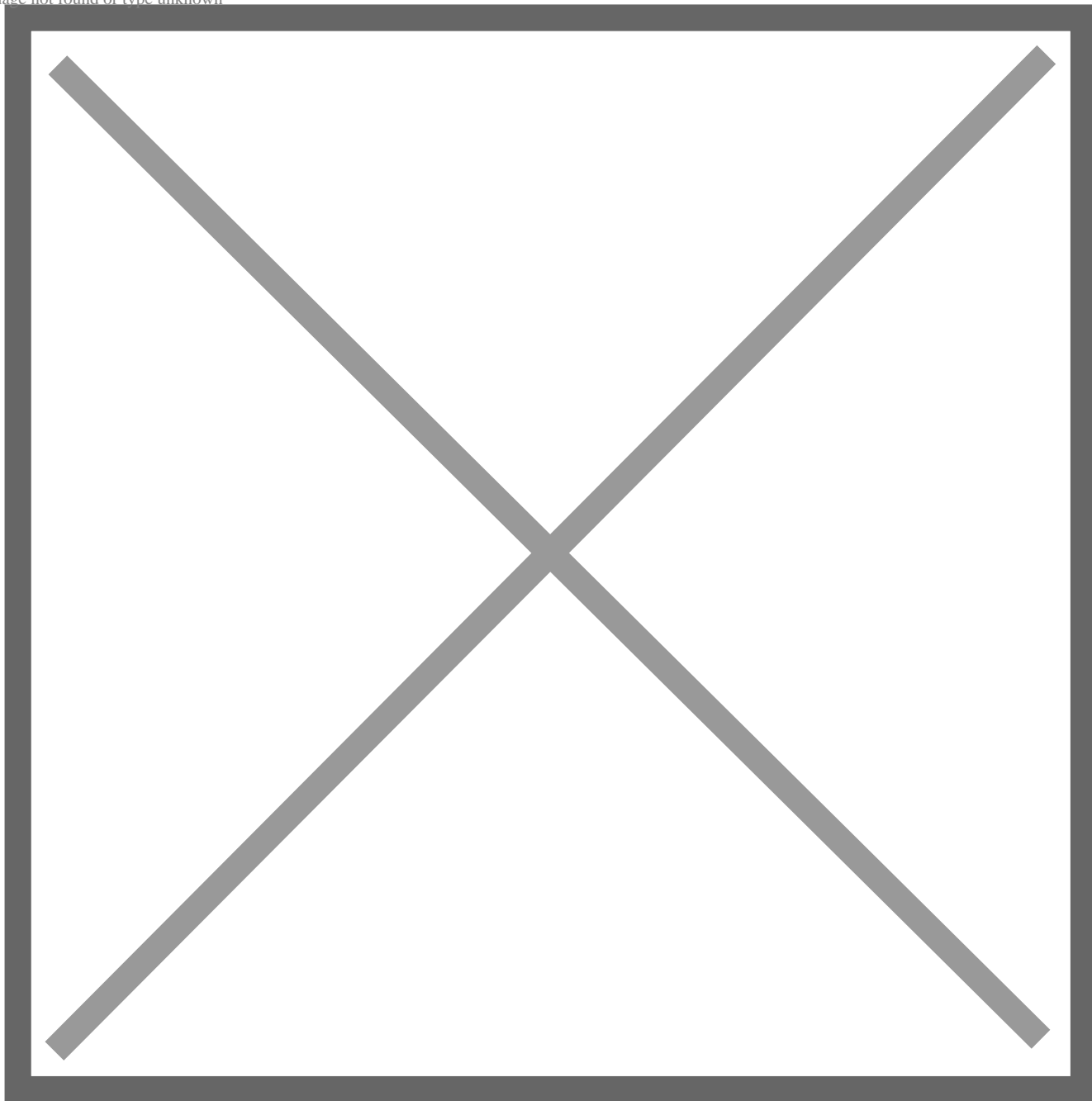
[9]

[SELinux]

SELinux

SELinux

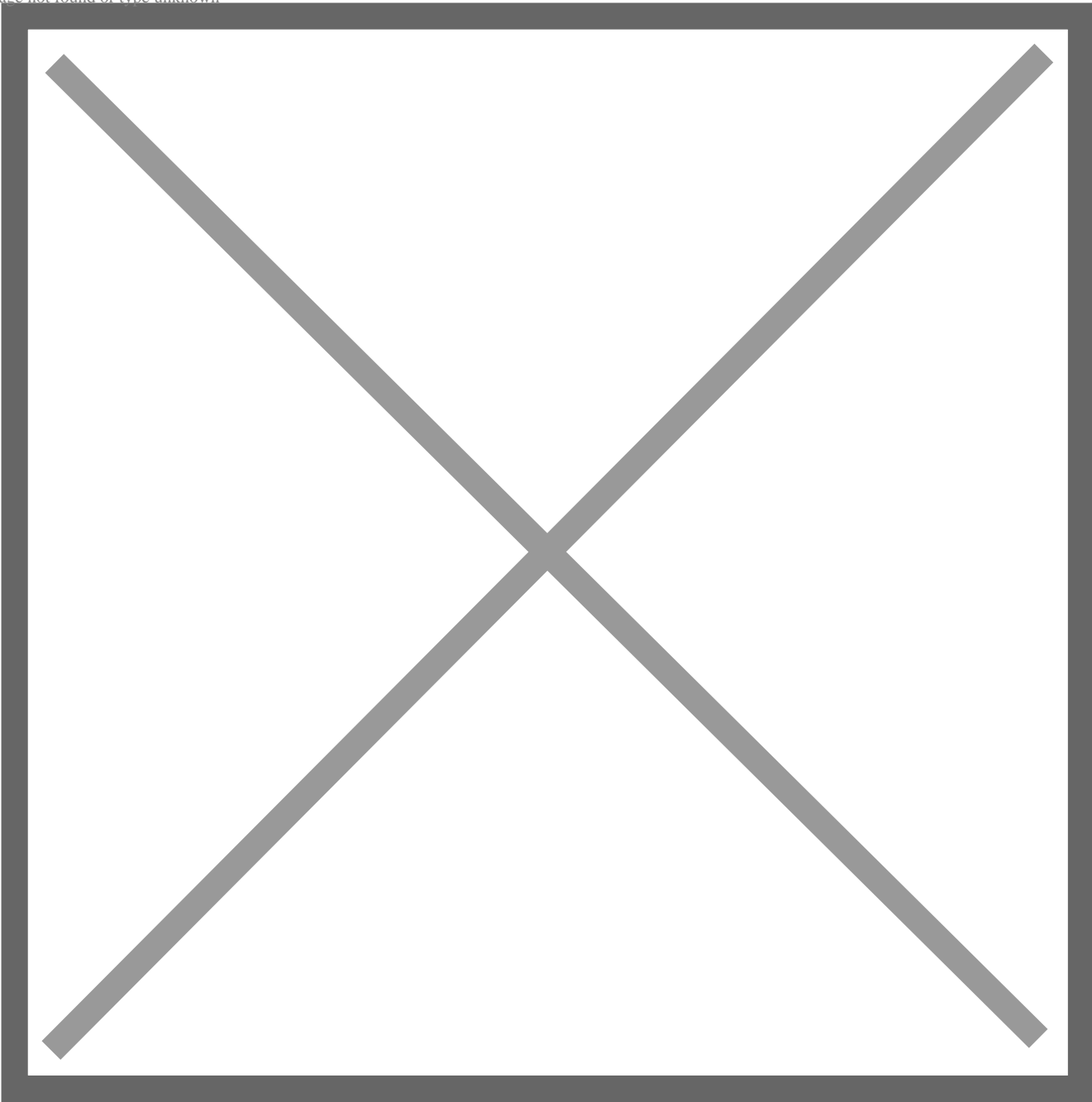
Image not found or type unknown



[10]

[]

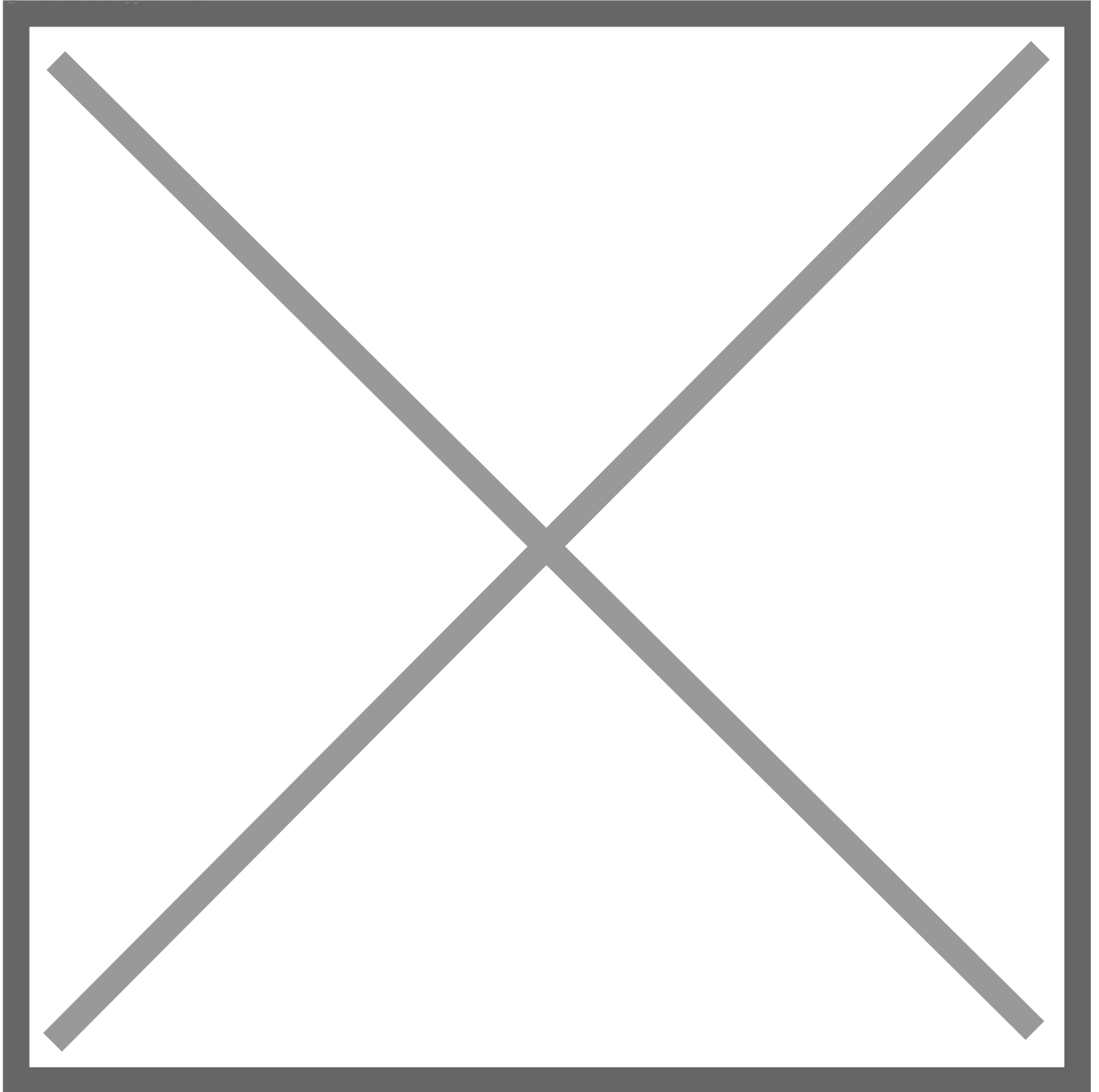
Image not found or type unknown



[11]

[]

Image not found or type unknown



sudo

NTP / SSH

NTP

NTP

Chrony NTP
[1] Chrony

```
[root@dlp ~]# dnf -y install chrony
[root@dlp ~]# vi /etc/chrony.conf
# line 3: change servers to synchronize (replace to your own timezone NTP server)
# need NTP server itself to sync time with other NTP server
#pool 2.centos.pool.ntp.org iburst
pool ntp.nict.jp iburst
# line 27: add network range to allow to receive time synchronization requests from NTP
Clients
# specify your local network and so on
# if not specified, only localhost is allowed
allow 10.0.0.0/24
[root@dlp ~]# systemctl enable --now chronyd
```

[2] Firewalld NTP NTP [123/UDP]

```
[root@dlp ~]# firewall-cmd --add-service=ntp
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

[3]

```
[root@dlp ~]# chronyc sources
MS Name/IP address              Stratum Poll Reach LastRx Last sample
=====
^+ ntp-a3.nict.go.jp              1    6    17    3    +171us[ +843us] +/- 8339us
```


^* ntp-a2.nict.go.jp	1	6	17	4	+304us[+976us]	+/-	8983us
^+ ntp-b3.nict.go.jp	1	6	17	4	-2654us[-1982us]	+/-	11ms
^- ntp-b2.nict.go.jp	1	6	17	3	-1036us[-1036us]	+/-	9465us

NTP

[1]

NTP

[allow ***]

```
[root@node01 ~]# dnf -y install chrony
[root@node01 ~]# vi /etc/chrony.conf
# line 3: change to your own NTP server or others in your timezone
#pool 2.centos.pool.ntp.org iburst
pool dlp.srv.world iburst
[root@node01 ~]# systemctl enable --now chronyd
# verify status
[root@node01 ~]# chronyc sources
MS Name/IP address          Stratum Poll Reach LastRx Last sample
=====
^* dlp.srv.world             2      6   17   11    +19us[ +8744ns] +/-    29ms
```

[2] NTPStat

```
root@node01 ~]# dnf -y install ntpstat
[root@node01 ~]# ntpstat
synchronised to NTP server (10.0.0.30) at stratum 3
time correct to within 29 ms
polling server every 64 s
```

SSH

OpenSSH

SSH

[1] Minimal Install Fedora OpenSSH

```
root@dlp ~]# systemctl status sshd
* sshd.service - OpenSSH server daemon
```

```
Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor pres>
Active: active (running) since Thu 2021-11-04 09:40:43 JST; 3h 38min ago
Docs: man:sshd(8)
      man:sshd_config(5)
Main PID: 770 (sshd)
Tasks: 1 (limit: 4649)
Memory: 2.5M
CPU: 12ms
CGroup: /system.slice/sshd.service
        +- - 770 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"
```

.....

.....

[2] Firewallld SSH SSH [22/TCP]

```
[root@dlp ~]# firewall-cmd --add-service=ssh
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

SSH Fedora

Fedora SSH

[3] SSH

```
[root@client ~]# dnf -y install openssh-clients
```

[4] SSH

```
# ssh [username@(hostname or IP address)]
[root@client ~]# ssh fedora@dlp.srv.world
The authenticity of host 'dlp.srv.world (10.0.0.30)' can't be established.
ED25519 key fingerprint is SHA256: gM9dNgDXW8/3Zv6bw1xD3nY1ffRrMZ6ZWZxYpmMn3PQ.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'dlp.srv.world' (ED25519) to the list of known hosts.
fedora@dlp.srv.world's password:
Web console: https://dlp.srv.world:9090/ or https://10.0.0.30:9090/
```

```
[ fedora@dlp ~]$ # logged
```

[5] SSH

```
# for example, run [cat /etc/passwd]
[ fedora@client ~]$ ssh fedora@dlp.srv.world "cat /etc/passwd"
fedora@dlp.srv.world's password:
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
daemon:x:2:2:daemon:/sbin:/sbin/nologin
.....
.....
tcpdump:x:72:72:/:/sbin/nologin
fedora:x:1000:1000:/:/home/fedora:/bin/bash
clevis:x:990:988:Clevis Decryption Framework unprivileged
user:/var/cache/clevis:/usr/sbin/nologin
```

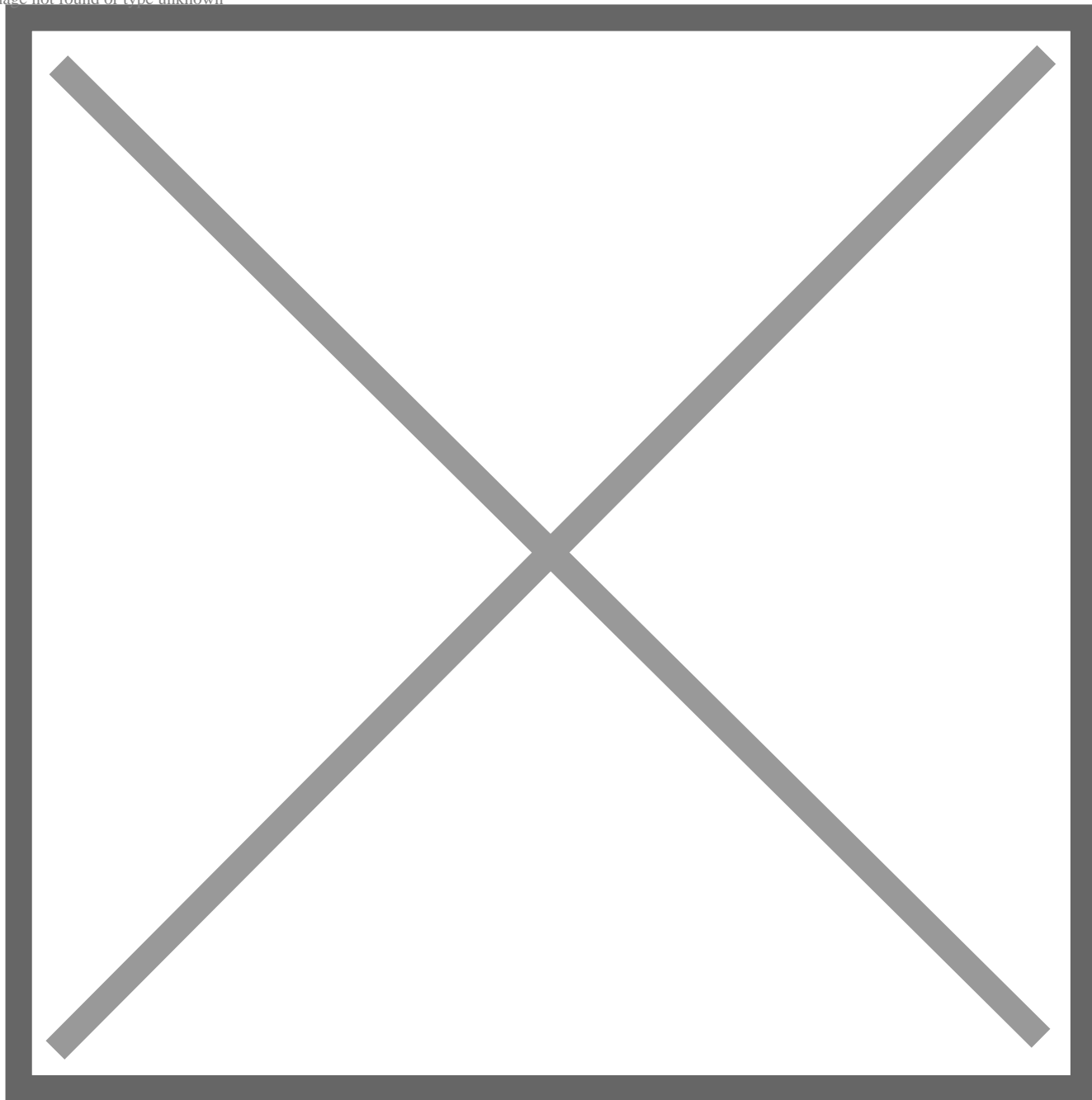
SSH Windows #1

Windows SSH Windows 11

[6] Windows SSH
Putty (www.chiark.greenend.org.uk/~sgtatham/putty/)

Putty	[Host name]	IP	[Open]
-------	-------------	----	--------

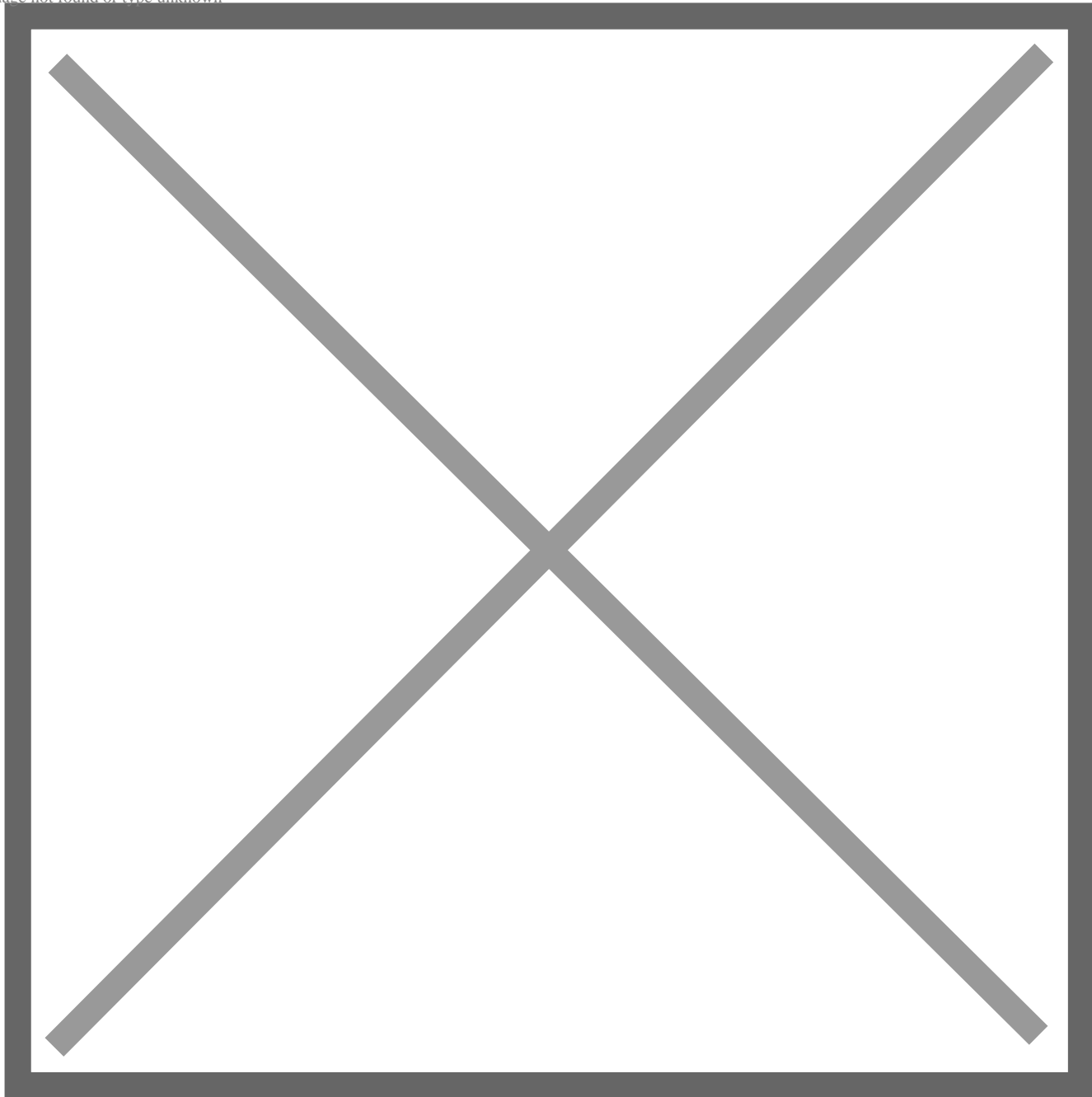
Image not found or type unknown



[7]

Fedora

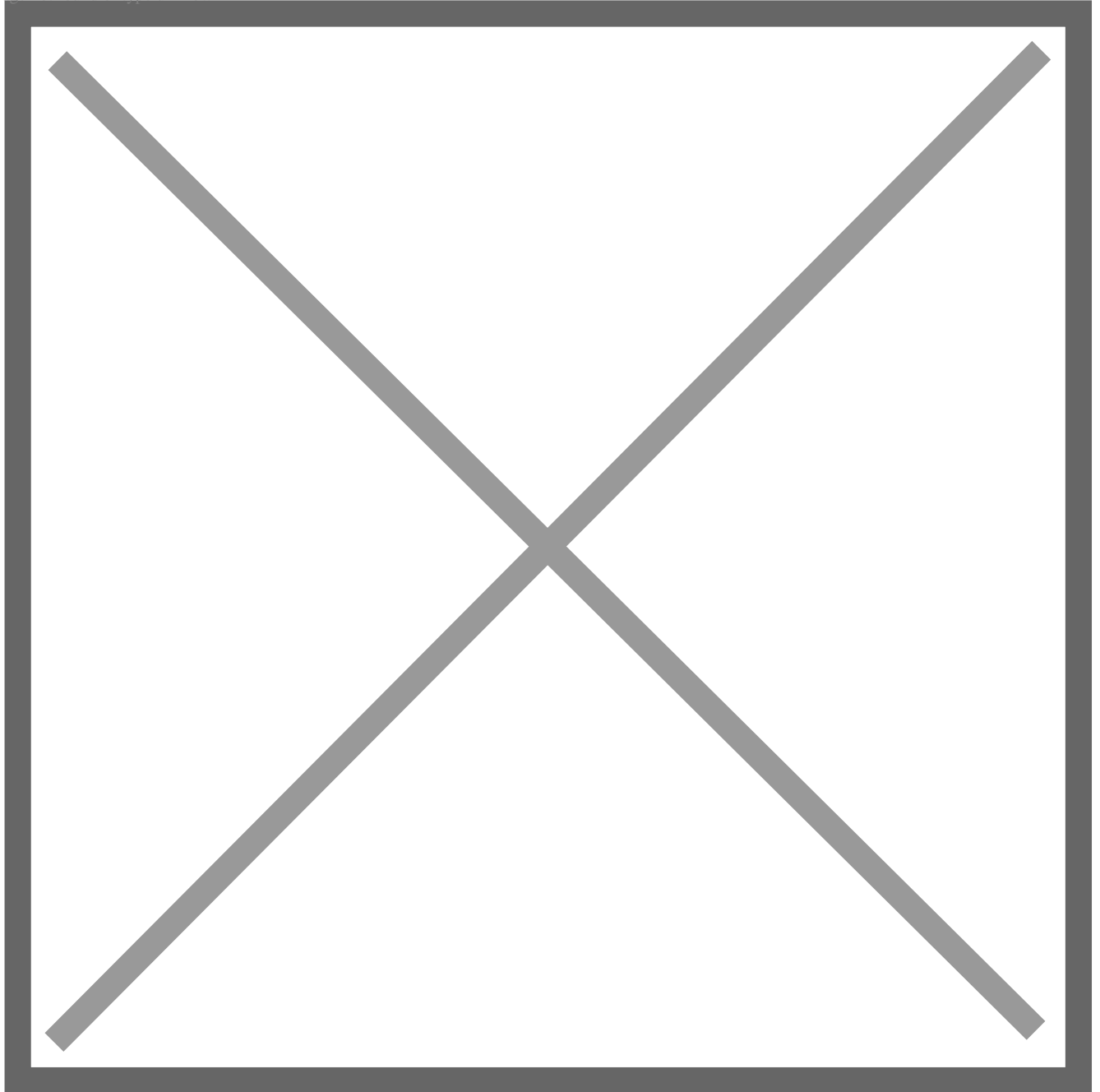
Image not found or type unknown



SSH Windows #2

[8] Windows 11 OpenSSH Windows
Putty 3rd SSH PowerShell [ssh]
OpenSSH [4] [5]

Image not found or type unknown



OpenSSH : SSH (Fedora)

SSH

[1] SCP (Secure Copy)

```
# command ⇒ scp [Option] Source Target
# copy the [test.txt] on localhost to remote host [node01.srv.world]
[fedora@dlp ~]$ scp ./test.txt fedora@node01.srv.world: ~/
fedora@node01.srv.world's password:      # password of the user
```

```

test.txt                                100%   10    0.0KB/s   00:00

# copy the [/home/fedora/test.txt] on remote host [node01.srv.world] to the localhost
[redhat@dlp ~]$ scp fedora@node01.srv.world:/home/fedora/test.txt ./test.txt
fedora@node01.srv.world's password:
test.txt                                100%   10    0.0KB/s   00:00

```

[2] SFTP SSH SFTP
 [/etc/ssh/sshd_config] [Subsystem sftp /usr/libexec/openssh/sftp-server]

```

# sftp [Option] [user@host]
[redhat@dlp ~]$ sftp fedora@node01.srv.world
fedora@node01.srv.world's password:      # password of the user
Connected to node01.srv.world.
sftp>

# show current directory on remote host
sftp> pwd
Remote working directory: /home/fedora

# show current directory on localhost
sftp> !pwd
/home/redhat

# show files in current directory on remote host
sftp> ls -l
drwxrwxr-x    2 fedora    fedora                7 Nov 04 21:33 public_html
-rw-rw-r--    1 fedora    fedora                10 Nov 04 22:53 test.txt

# show files in current directory on localhost
sftp> !ls -l
total 4
-rw-rw-r--    1 redhat    redhat                10 Nov 04 21:53 test.txt

# change directory
sftp> cd public_html
sftp> pwd
Remote working directory: /home/fedora/public_html

# upload a file to remote host

```

```

sftp> put test.txt redhat.txt
Uploading test.txt to /home/fedora/redhat.txt
test.txt                                100%  10    0.0KB/s   00:00

sftp> ls -l
drwxrwxr-x    2 fedora    fedora          6 Nov 04 21:33 public_html
-rw-rw-r--    1 fedora    fedora          10 Nov 04 21:39 redhat.txt
-rw-rw-r--    1 fedora    fedora          10 Nov 04 22:53 test.txt

# upload some files to remote host
sftp> put *.txt
Uploading test.txt to /home/fedora/test.txt
test.txt                                100%  10    0.0KB/s   00:00
Uploading test2.txt to /home/fedora/test2.txt
test2.txt                                100%   0    0.0KB/s   00:00

sftp> ls -l
drwxrwxr-x    2 fedora    fedora          6 Nov 04 21:33 public_html
-rw-rw-r--    1 fedora    fedora          10 Nov 04 21:39 redhat.txt
-rw-rw-r--    1 fedora    fedora          10 Nov 04 21:45 test.txt
-rw-rw-r--    1 fedora    fedora          10 Nov 04 21:46 test2.txt

# download a file from remote host
sftp> get test.txt
Fetching /home/fedora/test.txt to test.txt
/home/fedora/test.txt                    100%  10    0.0KB/s   00:00

# download some files from remote host
sftp> get *.txt
Fetching /home/fedora/fedora.txt to fedora.txt
/home/fedora/fedora.txt                  100%  10    0.0KB/s   00:00
Fetching /home/fedora/test.txt to test.txt
/home/fedora/test.txt                    100%  10    0.0KB/s   00:00
Fetching /home/fedora/test2.txt to test2.txt
/home/fedora/test2.txt                   100%  10    0.0KB/s   00:00

# create a directory on remote host
sftp> mkdir testdir
sftp> ls -l
drwxrwxr-x    2 fedora    fedora          6 Nov 04 21:33 public_html
-rw-rw-r--    1 fedora    fedora          10 Nov 04 21:39 redhat.txt

```



```

-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:45 test.txt
-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:46 test2.txt
drwxrwxr-x 2 fedora fedora 6 Nov 04 21:53 testdir

# delete a directory on remote host
sftp> rmdir testdir
rmdir ok, `testdir' removed
sftp> ls -l
drwxrwxr-x 2 fedora fedora 6 Nov 04 21:33 public_html
-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:39 redhat.txt
-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:45 test.txt
-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:46 test2.txt

# delete a file on remote host
sftp> rm test2.txt
Removing /home/fedora/test2.txt
sftp> ls -l
drwxrwxr-x 2 fedora fedora 6 Nov 04 21:33 public_html
-rw-rw-r-- 1 fedora fedora 10 Nov 04 21:39 redhat.txt
-rw-rw-r-- 1 fedora fedora 10 Nov 04 Nov 04 21:45 test.txt

# execute commands with ![command]
sftp> !cat /etc/passwd
root:x:0:0:root:/root:/bin/bash
bin:x:1:1:bin:/bin:/sbin/nologin
.....
.....
redhat:x:1001:1001: /home/redhat: /bin/bash

# exit
sftp> quit
221 Goodbye.

```

OpenSSH : SSH (Windows)

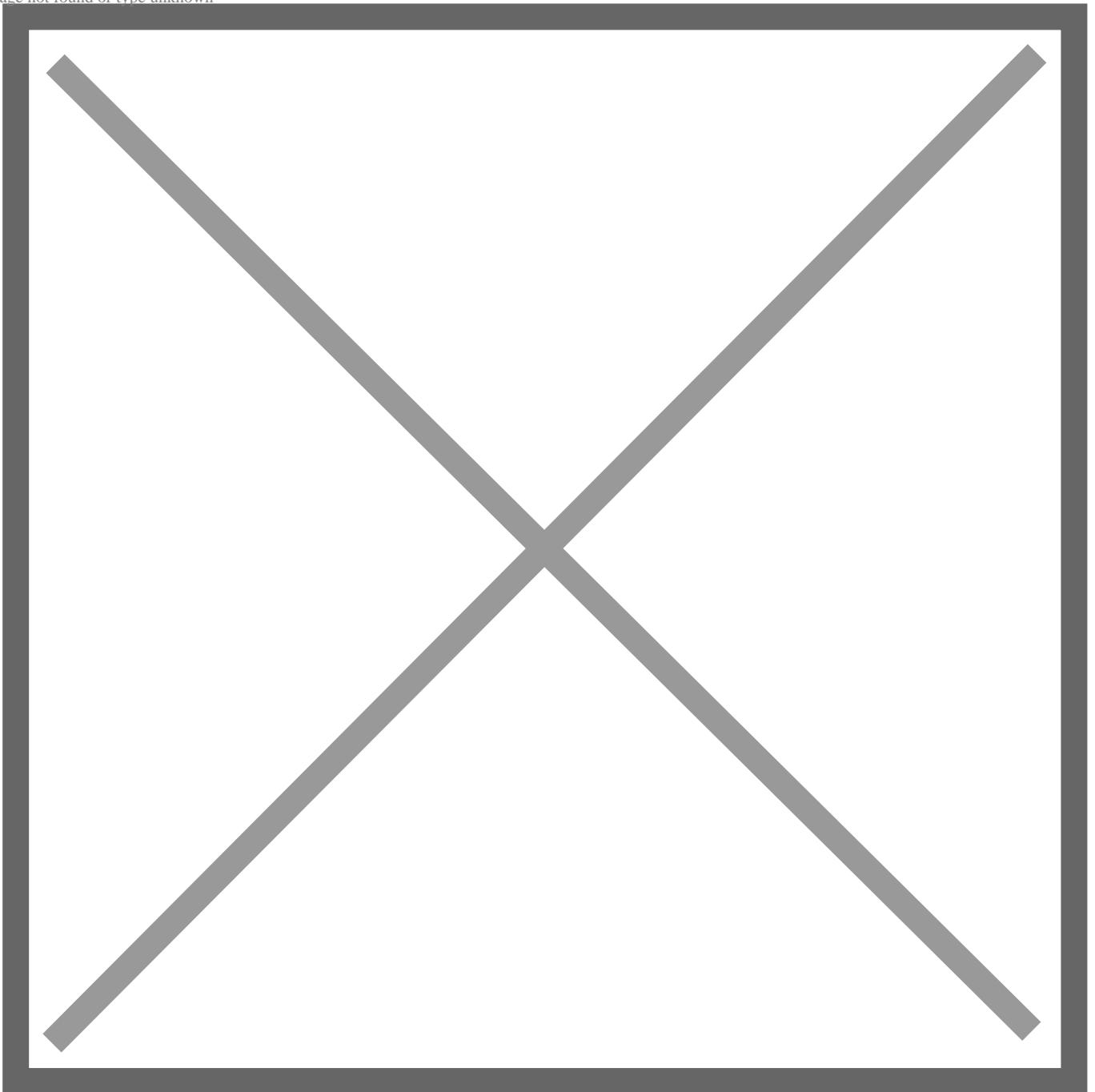
Windows SSH

WinSCP (winscp.net/eng/download.php)

Windows 11 OpenSSH Windows
[\[scp\]](#) [\[sftp\]](#)

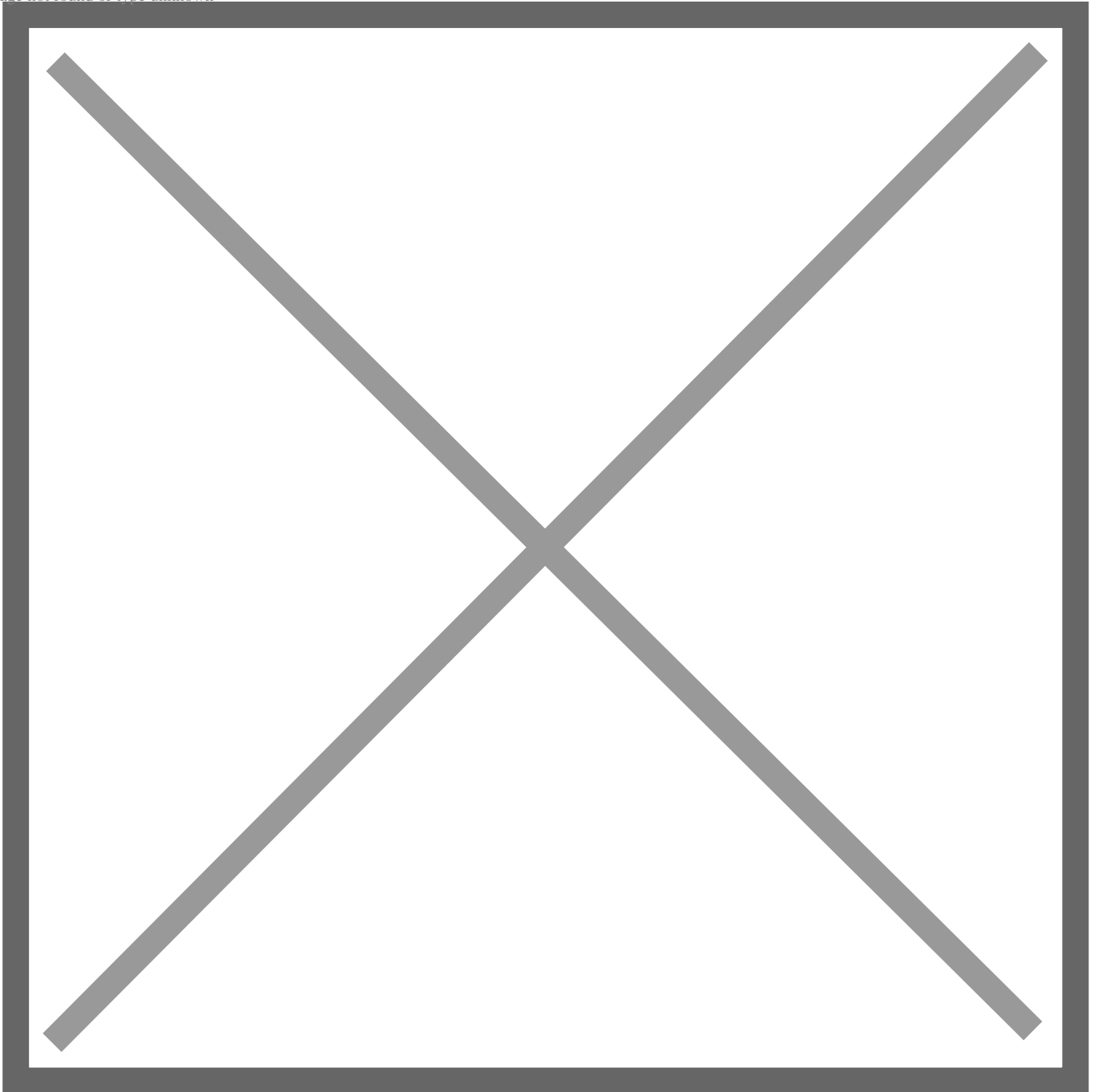
[1] WinSCP

Image not found or type unknown



[2] WinSCP SSH

Image not found or type unknown



OpenSSH SSH

SSH

[1] SSH

```
# create key-pair
[fedora@dlp ~]$ ssh-keygen -t ecdsa
Generating public/private ecdsa key pair.
Enter file in which to save the key (/home/fedora/.ssh/id_ecdsa): # Enter or input changes if
```

```

you want
Created directory '/home/fedora/.ssh'.
Enter passphrase (empty for no passphrase): # set passphrase (if set no passphrase, Enter
with empty)
Enter same passphrase again:
Your identification has been saved in /home/fedora/.ssh/id_ecdsa
Your public key has been saved in /home/fedora/.ssh/id_ecdsa.pub
The key fingerprint is:
SHA256: eZV3AxI39NqZglzADa/51KFMR3wyvbMlBhkQrZTymNI fedora@dlp.srv.world
The key's randomart image is:
.....
.....

[ fedora@dlp ~]$ ll ~/.ssh
total 8
-rw-----. 1 fedora fedora 557 Nov  4 14:54 id_ecdsa
-rw-r--r--. 1 fedora fedora 182 Nov  4 14:54 id_ecdsa.pub

[ fedora@dlp ~]$ mv ~/.ssh/id_ecdsa.pub ~/.ssh/authorized_keys

```

[2]

```

[ fedora@node01 ~]$ mkdir ~/.ssh
[ fedora@node01 ~]$ chmod 700 ~/.ssh
# transfer the private key to the local ssh directory
[ fedora@node01 ~]$ scp fedora@dlp.srv.world:/home/fedora/.ssh/id_ecdsa ~/.ssh/
fedora@dlp.srv.world's password:
id_ecdsa                                100% 2655      2.2MB/s   00:00

[ fedora@node01 ~]$ ssh fedora@dlp.srv.world
Enter passphrase for key '/home/fedora/.ssh/id_ecdsa': # passphrase if you set
Last login: Thu Apr 28 19:49:52 2021
[ fedora@dlp ~]$ # logged

```

[3] [PasswordAuthentication no]

```

[root@dlp ~]# vi /etc/ssh/sshd_config
# line 65 : uncomment and change to [no]
PasswordAuthentication no
[root@dlp ~]# systemctl restart sshd

```

Windows #1 SSH

Windows SSH
Putty
Windows

[4] [Putty] [Puttygen.exe] [Putty.exe]
www.chiark.greenend.org.uk/~sgtatham/putty/
[Puttygen.exe] [Load]

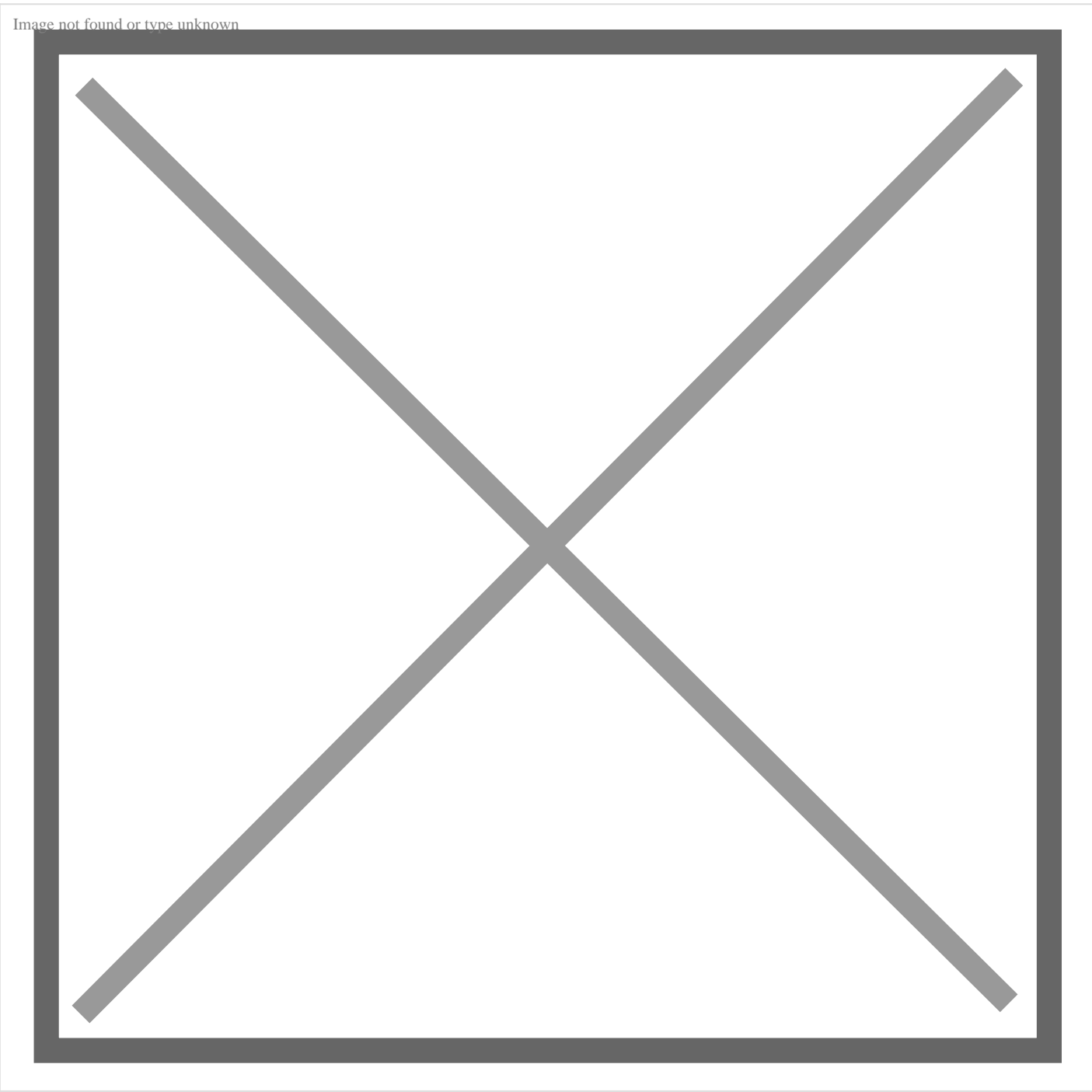
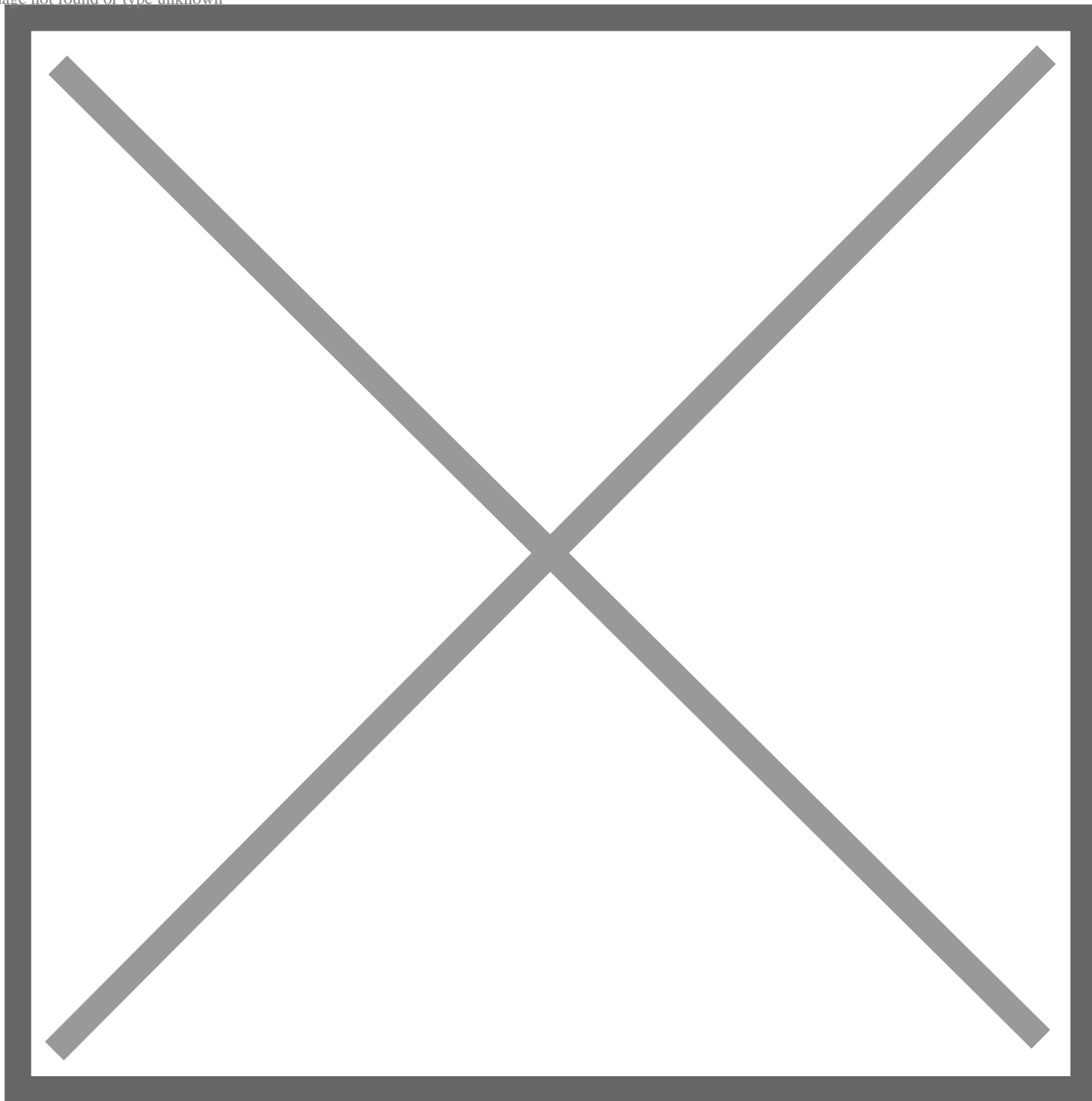
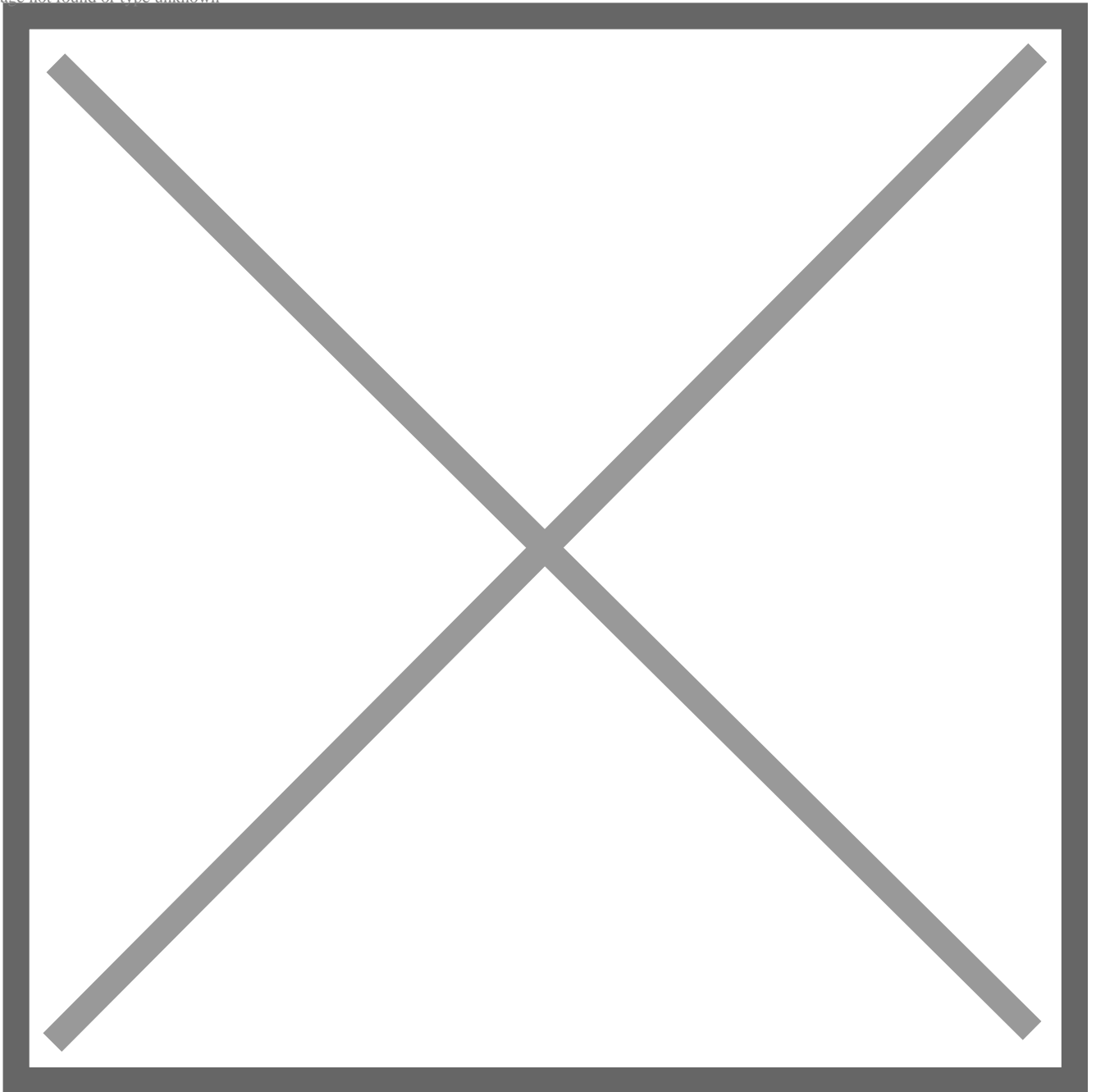


Image not found or type unknown



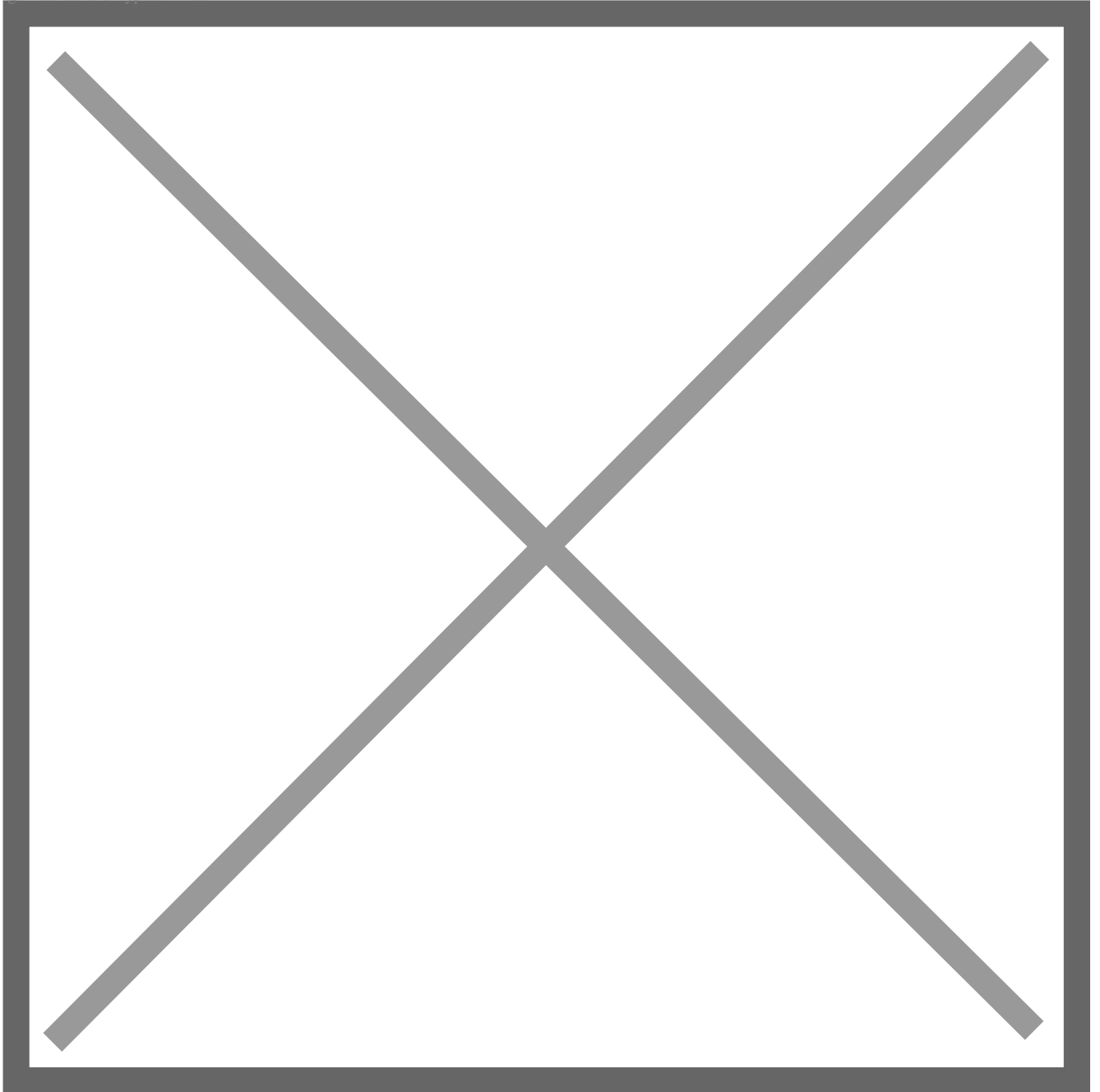
[6] []

Image not found or type unknown



[7] Putty [Connection] - [SSH] - [Auth] [Private key file]

Image not found or type unknown

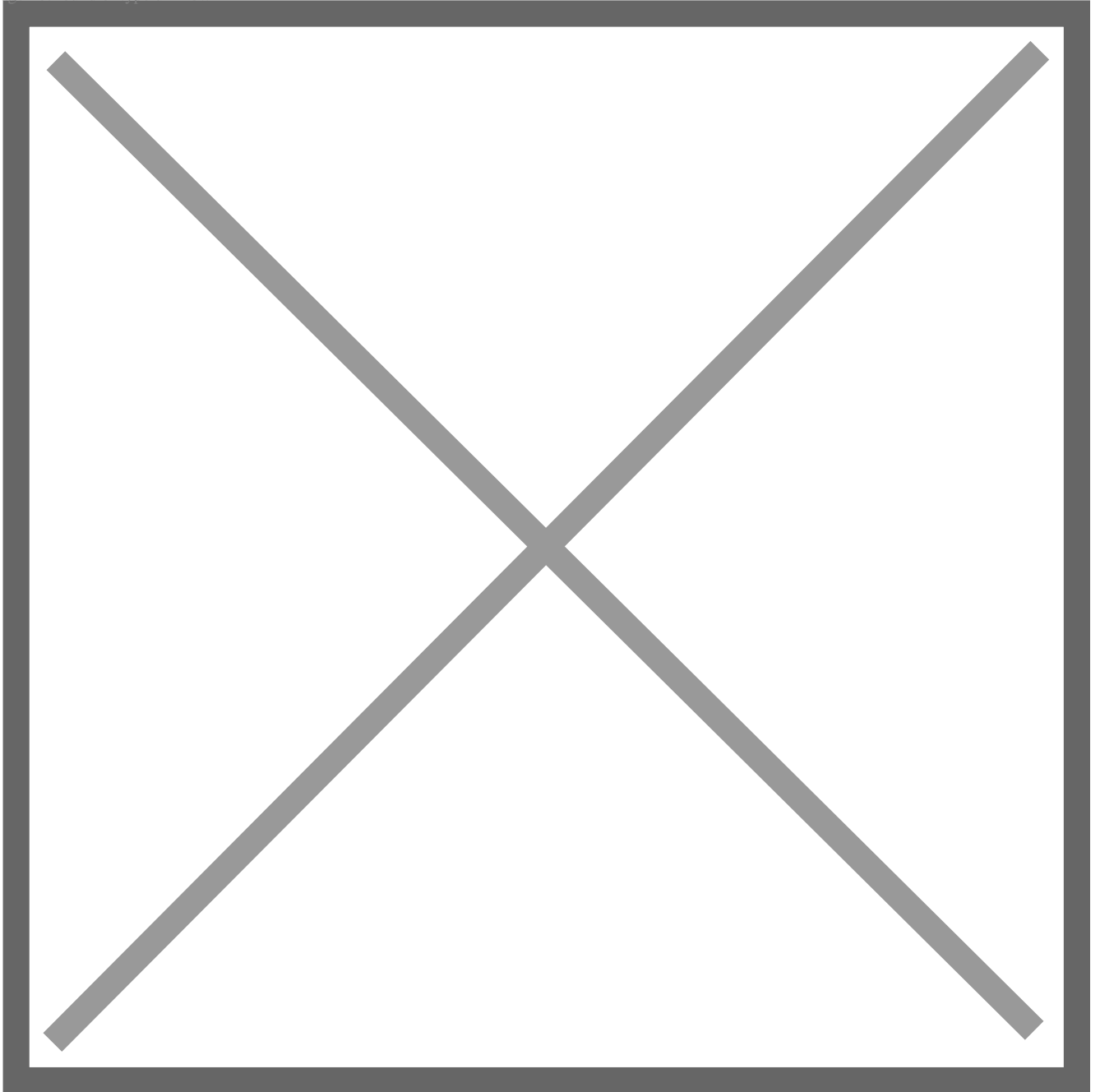


[8]

[Session]

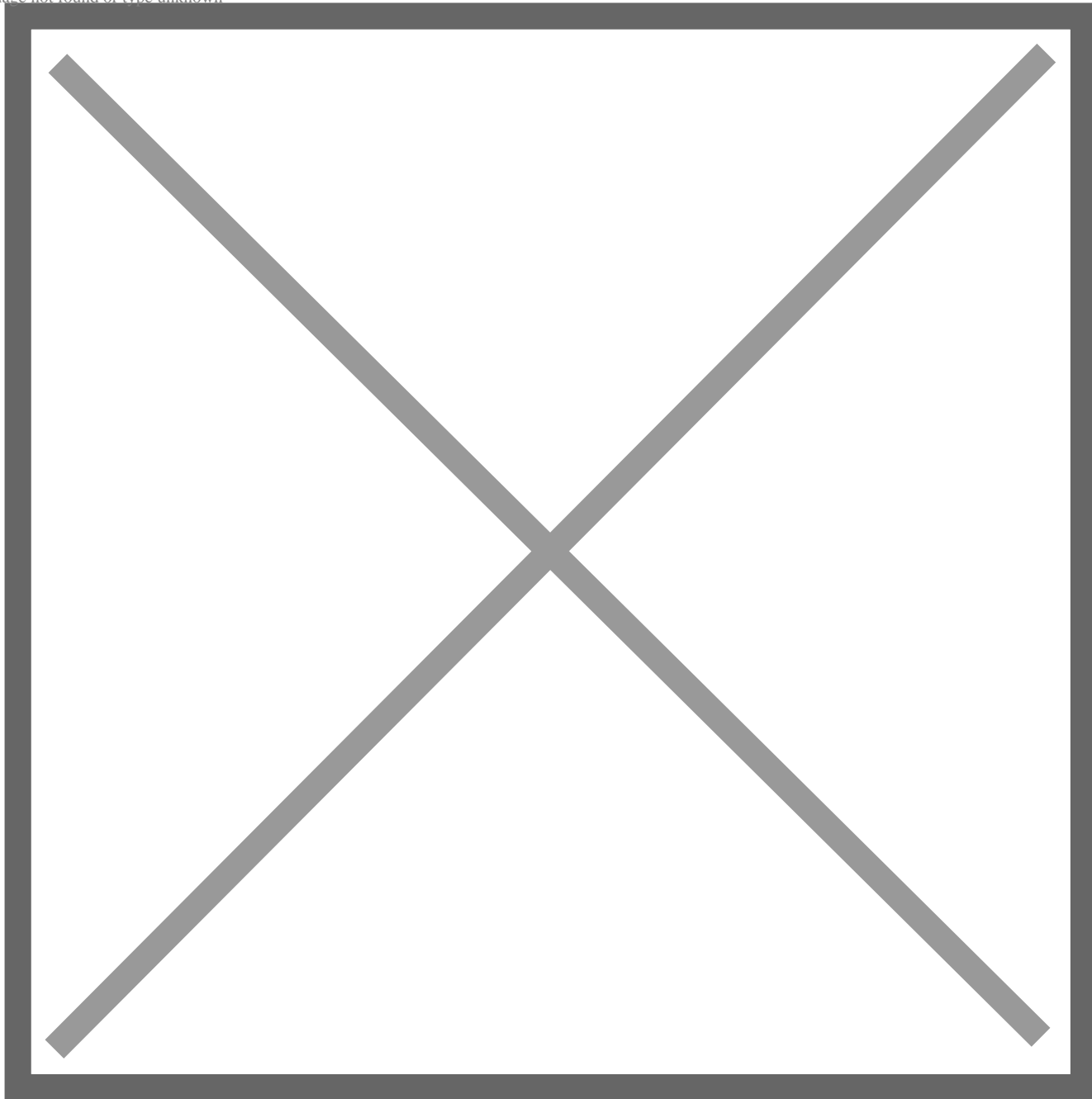
SSH

Image not found or type unknown



[9] SSH

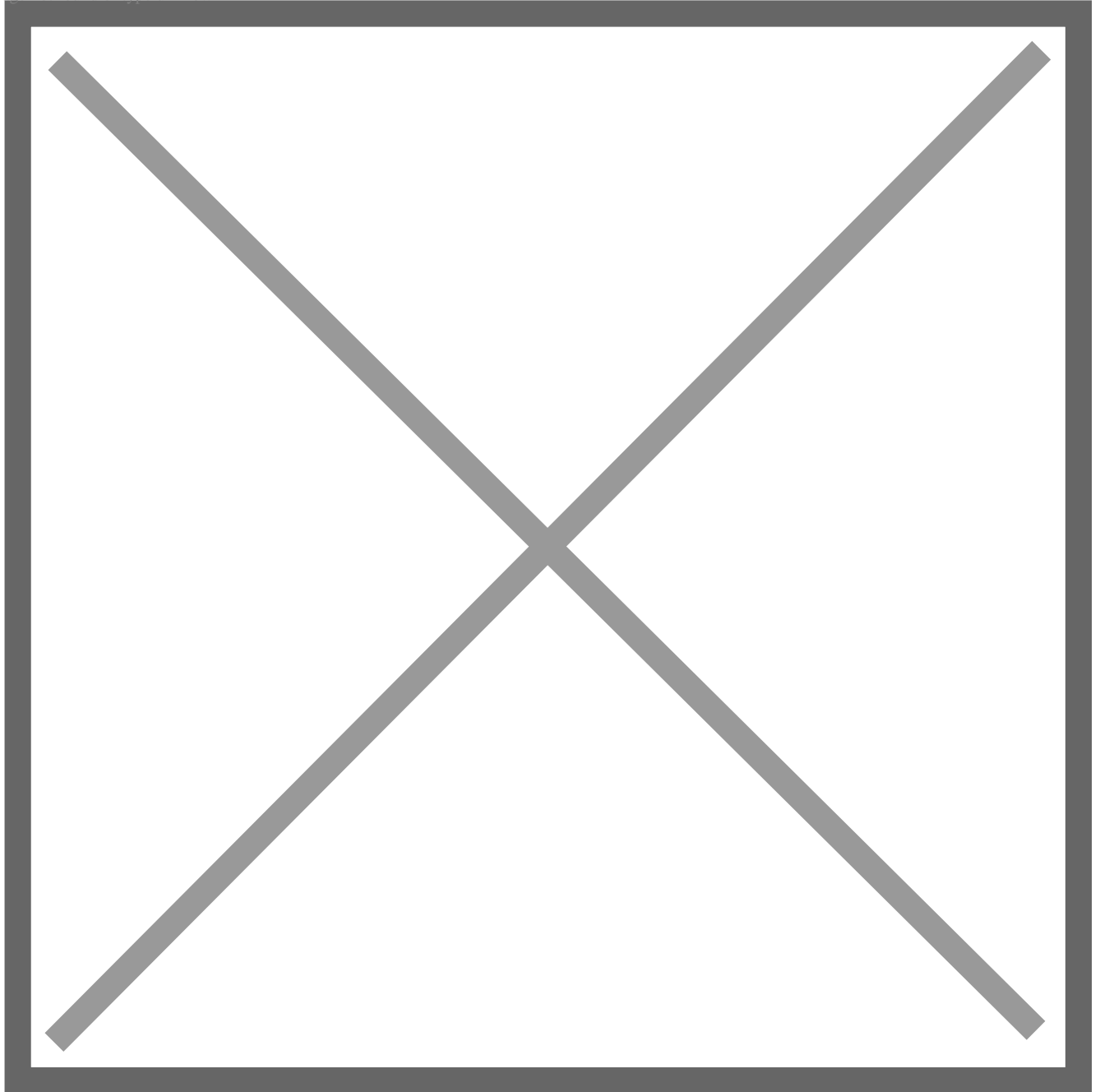
Image not found or type unknown



Windows #2 SSH

[10] Windows 11 OpenSSH Windows
Putty 3rd SSH
Windows 10 [(logon user home).ssh]

Image not found or type unknown



OpenSSH SFTP + Chroot

SFTP + Chroot

SFTP

chroot

[1] [/home] Chroot

```
# create a group for SFTP only
[root@dlp ~]# groupadd sftp_users
# for example, set [fedora] user as SFTP only user
```

```
[root@dlp ~]# usermod -aG sftp_users fedora
[root@dlp ~]# vi /etc/ssh/sshd_config
# line 123 : comment out and add a line
#Subsystem      sftp    /usr/libexec/openssh/sftp-server
Subsystem       sftp    internal-sftp

# add to the end
Match Group sftp_users
    X11Forwarding no
    AllowTcpForwarding no
    ChrootDirectory /home
    ForceCommand internal-sftp
[root@dlp ~]# systemctl restart sshd
```

[2] SFTP

```
[fedora@node01 ~]$ ssh dlp.srv.world
fedora@dlp.srv.world's password:
This service allows sftp connections only.
Connection to dlp.srv.world closed.    # denied normally
[fedora@node01 ~]$ sftp dlp.srv.world
fedora@dlp.srv.world's password:
Connected to dlp.srv.world.
sftp> ls -l
drwx-----  3 1000    1000          95 Nov  4 05:54 fedora
drwx-----  2 1001    1001          83 Nov  3 23:43 redhat
sftp> pwd
Remote working directory: /
sftp> exit
```

OpenSSH SSH

SSH-Agent SSH

[1] SSH-Agent

```
# run SSH-Agent
[fedora@node01 ~]$ eval $(ssh-agent)
Agent pid 1389
# add passphrase
```

```
[fedora@node01 ~]$ ssh-add
Enter passphrase for /home/fedora/.ssh/id_ecdsa:
Identity added: /home/fedora/.ssh/id_ecdsa (fedora@dlp.srv.world)
# confirm
[fedora@node01 ~]$ ssh-add -l
256 SHA256: eZV3AxI39NqZglzADa/51KFMR3wyvbMLBhkQrZTymNI fedora@dlp.srv.world (ECDSA)
# verify to connect without inputting passphrase
[fedora@node01 ~]$ ssh dlp.srv.world hostname
dlp.srv.world
# stop SSH-Agent
# if not execute it, SSH-Agent process remains even if you logout System, be careful
[fedora@node01 ~]$ eval $(ssh-agent -k)
Agent pid 1389 killed
```

DNS / DHCP

BIND DNS

[1] BIND

```
[root@dlp ~]# dnf -y install bind bind-utils
```

[2] BIND [10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /etc/named.conf

.....

.....

# add : set ACL entry for local network
acl internal-network {
    10.0.0.0/24;
};

options {
    # change ( listen all )
    listen-on port 53 { any; };
    # change if need ( if not listen IPv6, set [none] )
    listen-on-v6 { any; };
    directory          "/var/named";
    dump-file           "/var/named/data/cache_dump.db";
    statistics-file     "/var/named/data/named_stats.txt";
    memstatistics-file  "/var/named/data/named_mem_stats.txt";
    secroots-file       "/var/named/data/named.secroots";
    recursing-file      "/var/named/data/named.recursing";
    # add local network set on [acl] section above
    # network range you allow to recive queries from hosts
    allow-query         { localhost; internal-network; };
    # network range you allow to transfer zone files to clients
```

```

# add secondary DNS servers if it exist
allow-transfer { localhost; };

.....

.....

recursion yes;

dnssec-enable yes;
dnssec-validation yes;

managed-keys-directory "/var/named/dynamic";

pid-file "/run/named/named.pid";
session-keyfile "/run/named/session.key";

/* https://fedoraproject.org/wiki/Changes/CryptoPolicy */
include "/etc/crypto-policies/back-ends/bind.config";
};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

zone "." IN {
    type hint;
    file "named.ca";
};

include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";

# add zones for your network and domain name
zone "srv.world" IN {
    type master;
    file "srv.world.lan";
    allow-update { none; };
};

```

```
};

zone "0.0.10.in-addr.arpa" IN {
    type master;
    file "0.0.10.db";
    allow-update { none; };
};

# if you don't use IPv6 and also suppress logs for IPv6 related, possible to change
# set BIND to use only IPv4
[root@dlp ~]# vi /etc/sysconfig/named
# add to the end
OPTIONS="-4"

# For how to write the section [*.*.*.in-addr.arpa], write your network address reversely
like follows

# case of 10.0.0.0/24
# network address    ⇒ 10.0.0.0
# network range      ⇒ 10.0.0.0 - 10.0.0.255
# how to write       ⇒ 0.0.10.in-addr.arpa

# case of 192.168.1.0/24
# network address    ⇒ 192.168.1.0
# network range      ⇒ 192.168.1.0 - 192.168.1.255
# how to write       ⇒ 1.168.192.in-addr.arpa
```

[3] [named.conf]

BIND :

[1] IP
[10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/srv.world.lan
$TTL 86400
@ IN SOA dlp.srv.world. root.srv.world. (
    # any numerical values are OK for serial number but
    # recommendation is [YYYYMMDDnn] (update date + number)
    2021110901 ;Serial
    3600       ;Refresh
    1800       ;Retry
```



```

        604800      ;Expire
        86400      ;Minimum TTL
    )

    # define Name Server
    IN  NS          dlp.srv.world.
    # define Name Server's IP address
    IN  A           10.0.0.30
    # define Mail Exchanger Server
    IN  MX 10       dlp.srv.world.

# define each IP address of a hostname
dlp    IN  A       10.0.0.30
www    IN  A       10.0.0.31

```

[3] BIND

BIND :

[1] BIND

```
[root@dlp ~]# systemctl enable --now named
```

[2] Firewalld DNS DNS [53/TCP,UDP]

```
[root@dlp ~]# firewall-cmd --add-service=dns
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

[3] DNS DNS [enp1s0]

```
root@dlp ~]# nmcli connection modify enp1s0 ipv4.dns 10.0.0.30
[root@dlp ~]# nmcli connection down enp1s0; nmcli connection up enp1s0
```

[4] [ANSWER SECTION]

```
[root@dlp ~]# dig dlp.srv.world.

; <<>> DiG 9.16.22-RH <<>> dlp.srv.world.
;; global options: +cmd
;; Got answer:
```

```
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 49661
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: dfa3f5cee693b548010000006189b47fd276e33a7ce318ef (good)
;; QUESTION SECTION:
;dlp.srv.world.                IN      A

;; ANSWER SECTION:
dlp.srv.world.                86400   IN      A      10.0.0.30

;; Query time: 2 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:36:31 JST 2021
;; MSG SIZE rcvd: 86

[root@dlp ~]# dig -x 10.0.0.30

; <<>> DiG 9.16.22-RH <<>> -x 10.0.0.30
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 40024
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 7fa0458fcfcb227e010000006189b4a41afc0733b0cca9e3 (good)
;; QUESTION SECTION:
;30.0.0.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
30.0.0.10.in-addr.arpa. 86400   IN      PTR      dlp.srv.world.

;; Query time: 4 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:37:08 JST 2021
;; MSG SIZE rcvd: 106
```

BIND :

[1] BIND

```
[root@dlp ~]# dnf -y install bind bind-utils
```

[2] BIND
 [172.16.0.80/29] [srv.world]
 [172.16.0.80/29] IP

```
[root@dlp ~]# vi /etc/named.conf
.....
.....
options {
    # change ( listen all )
    listen-on port 53 { any; };
    # change if need ( if not listen IPv6, set [none] )
    listen-on-v6 { any; };
    directory      "/var/named";
    dump-file       "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    secroots-file   "/var/named/data/named.secroots";
    recursing-file  "/var/named/data/named.recursing";
    # change : receive queries from all hosts
    allow-query      { any; };
    # network range you allow to transfer zone files to clients
    # add secondary DNS servers if it exist
    allow-transfer   { localhost; };

    .....
    .....

    # change : not allow recursive queries
    # answer to zones only this server has their entries
    recursion no;

    dnssec-enable yes;
    dnssec-validation yes;

    managed-keys-directory "/var/named/dynamic";
```

```

pid-file "/run/named/named.pid";
session-keyfile "/run/named/session.key";

/* https://fedoraproject.org/wiki/Changes/CryptoPolicy */
include "/etc/crypto-policies/back-ends/bind.config";
};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

zone "." IN {
    type hint;
    file "named.ca";
};

include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";

# add zones for your network and domain name
zone "srv.world" IN {
    type master;
    file "srv.world.wan";
    allow-update { none; };
};

zone "80.0.16.172.in-addr.arpa" IN {
    type master;
    file "80.0.16.172.db";
    allow-update { none; };
};

# if you don't use IPv6 and also suppress logs for IPv6 related, possible to change
# set BIND to use only IPv4
[root@dlp ~]# vi /etc/sysconfig/named
# add to the end
OPTIONS="- 4"

```

```
# For how to write the section [*.*.*.*.in-addr.arpa], write your network address reversely  
like follows  
# case of 172.16.0.80/29  
# network address    ⇒ 172.16.0.80  
# network range      ⇒ 172.16.0.80 - 172.16.0.87  
# how to write       ⇒ 80.0.16.172.in-addr.arpa
```

[3] [named.conf]

[1] IP
[10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/srv.world.lan  
$TTL 86400  
@ IN SOA dlp.srv.world. root.srv.world. (  
    # any numerical values are OK for serial number but  
    # recommendation is [YYYYMMDDnn] (update date + number)  
    2021110901 ;Serial  
    3600       ;Refresh  
    1800       ;Retry  
    604800     ;Expire  
    86400      ;Minimum TTL  
)  
  
    # define Name Server  
    IN NS      dlp.srv.world.  
    # define Name Server's IP address  
    IN A       10.0.0.30  
    # define Mail Exchanger Server  
    IN MX 10   dlp.srv.world.  
  
    # define each IP address of a hostname  
    dlp IN A    10.0.0.30  
    www IN A    10.0.0.31
```

[2] IP
[10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/0.0.10.db
```

```

$TTL 86400
@   IN  SOA      dlp.srv.world. root.srv.world. (
        2021110901  ;Serial
        3600        ;Refresh
        1800        ;Retry
        604800      ;Expire
        86400       ;Minimum TTL
)

# define Name Server
IN  NS      dlp.srv.world.

# define each hostname of an IP address
30   IN  PTR      dlp.srv.world.
31   IN  PTR      www.srv.world.

```

[3] BIND

BIND :

[1] BIND

```
[root@dlp ~]# systemctl enable --now named
```

[2] Firewallld DNS DNS [53/TCP,UDP]

```

[root@dlp ~]# firewall-cmd --add-service=dns
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success

```

[3] DNS DNS
[enp1s0]

```

[root@dlp ~]# nmcli connection modify enp1s0 ipv4.dns 10.0.0.30
[root@dlp ~]# nmcli connection down enp1s0; nmcli connection up enp1s0

```

[4] [ANSWER SECTION]

```

[root@dlp ~]# dig dlp.srv.world.

; <<>> DiG 9.16.22-RH <<>> dlp.srv.world.
;; global options: +cmd

```

```
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 49661
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: dfa3f5cee693b548010000006189b47fd276e33a7ce318ef (good)
;; QUESTION SECTION:
;dlp.srv.world.                IN      A

;; ANSWER SECTION:
dlp.srv.world.                86400   IN      A      10.0.0.30

;; Query time: 2 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:36:31 JST 2021
;; MSG SIZE rcvd: 86

[root@dlp ~]# dig -x 10.0.0.30

; <<>> DiG 9.16.22-RH <<>> -x 10.0.0.30
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 40024
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 7fa0458fcfcb227e010000006189b4a41afc0733b0cca9e3 (good)
;; QUESTION SECTION:
;30.0.0.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
30.0.0.10.in-addr.arpa. 86400   IN      PTR      dlp.srv.world.

;; Query time: 4 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:37:08 JST 2021
;; MSG SIZE rcvd: 106
```

BIND :

[1] IP
[10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/srv.world.lan
$TTL 86400
@ IN SOA dlp.srv.world. root.srv.world. (
    # any numerical values are OK for serial number but
    # recommendation is [YYYYMMDDnn] (update date + number)
    2021110901 ;Serial
    3600       ;Refresh
    1800       ;Retry
    604800     ;Expire
    86400      ;Minimum TTL
)

# define Name Server
IN NS      dlp.srv.world.
# define Name Server's IP address
IN A       10.0.0.30
# define Mail Exchanger Server
IN MX 10   dlp.srv.world.

# define each IP address of a hostname
dlp IN A    10.0.0.30
www IN A    10.0.0.31
```

[2] IP
[10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/0.0.10.db
$TTL 86400
@ IN SOA dlp.srv.world. root.srv.world. (
    2021110901 ;Serial
    3600       ;Refresh
```



```

        1800          ;Retry
        604800       ;Expire
        86400        ;Minimum TTL
    )

    # define Name Server
    IN NS      dlp.srv.world.

# define each hostname of an IP address
30      IN PTR    dlp.srv.world.
31      IN PTR    www.srv.world.

```

[3] BIND

BIND :

[1] BIND

```
[root@dlp ~]# systemctl enable --now named
```

[2] Firewalld DNS DNS [53/TCP,UDP]

```

[root@dlp ~]# firewall-cmd --add-service=dns
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success

```

[3] DNS DNS
[enpls0]

```

[root@dlp ~]# nmcli connection modify enpls0 ipv4.dns 10.0.0.30
[root@dlp ~]# nmcli connection down enpls0; nmcli connection up enpls0

```

[4] [ANSWER SECTION]

```

[root@dlp ~]# dig dlp.srv.world.

; <<>> DiG 9.16.22-RH <<>> dlp.srv.world.
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 49661

```

```
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: dfa3f5cee693b548010000006189b47fd276e33a7ce318ef (good)
;; QUESTION SECTION:
;dlp.srv.world.                IN      A

;; ANSWER SECTION:
dlp.srv.world.                86400   IN      A      10.0.0.30

;; Query time: 2 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:36:31 JST 2021
;; MSG SIZE rcvd: 86

[root@dlp ~]# dig -x 10.0.0.30

; <<>> DiG 9.16.22-RH <<>> -x 10.0.0.30
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 40024
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 7fa0458fcfcb227e010000006189b4a41afc0733b0cca9e3 (good)
;; QUESTION SECTION:
;30.0.0.10.in-addr.arpa.      IN      PTR

;; ANSWER SECTION:
30.0.0.10.in-addr.arpa. 86400   IN      PTR      dlp.srv.world.

;; Query time: 4 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:37:08 JST 2021
;; MSG SIZE rcvd: 106
```

BIND :

[named.conf] View
[named.conf]

[1] [10.0.0.0/24] [172.16.0.80/29] [srv.world]
 [172.16.0.80/29] IP

```
[root@dlp ~]# vi /etc/named.conf
.....
.....
# add : set ACL entry for local network
acl internal-network {
    10.0.0.0/24;
};

options {
    # change ( listen all )
    listen-on port 53 { any; };
    # change if need ( if not listen IPv6, set [none] )
    listen-on-v6 { any; };
    directory      "/var/named";
    dump-file       "/var/named/data/cache_dump.db";
    statistics-file "/var/named/data/named_stats.txt";
    memstatistics-file "/var/named/data/named_mem_stats.txt";
    secroots-file   "/var/named/data/named.secroots";
    recursing-file  "/var/named/data/named.recursing";
    # add local network set on [acl] section above
    # network range you allow to receive queries from hosts
    allow-query      { localhost; internal-network; };
    # network range you allow to transfer zone files to clients
    # add secondary DNS servers if it exist
    allow-transfer   { localhost; };

    .....
    .....

    recursion yes;

    dnssec-enable yes;
    dnssec-validation yes;

    managed-keys-directory "/var/named/dynamic";
```

```
pid-file "/run/named/named.pid";
session-keyfile "/run/named/session.key";

/* https://fedoraproject.org/wiki/Changes/CryptoPolicy */
include "/etc/crypto-policies/back-ends/bind.config";
};

logging {
    channel default_debug {
        file "data/named.run";
        severity dynamic;
    };
};

# change all lines follows
# set internal network zones
view "internal" {
    match-clients {
        localhost;
        internal-network;
    };
    zone "." IN {
        type hint;
        file "named.ca";
    };
    zone "srv.world" IN {
        type master;
        file "srv.world.lan";
        allow-update { none; };
    };
    zone "0.0.10.in-addr.arpa" IN {
        type master;
        file "0.0.10.db";
        allow-update { none; };
    };
};
include "/etc/named.rfc1912.zones";
include "/etc/named.root.key";
};
```

```
# set external network zones
view "external" {
    # match all except targets defined on [match-clients] on internal section
    match-clients { any; };
    allow-query { any; };
    # not allow recursive queries
    recursion no;
    zone "srv.world" IN {
        type master;
        file "srv.world.wan";
        allow-update { none; };
    };
    zone "80.0.16.172.in-addr.arpa" IN {
        type master;
        file "80.0.16.172.db";
        allow-update { none; };
    };
};
```

[2] [named.conf] Zone

BIND :

[named.conf]

[1] IP
 [10.0.0.0/24] [srv.world]

```
[root@dlp ~]# vi /var/named/srv.world.lan
$TTL 86400
@ IN SOA dlp.srv.world. root.srv.world. (
    # any numerical values are OK for serial number but
    # recommendation is [YYYYMMDDnn] (update date + number)
    2021110901 ;Serial
    3600       ;Refresh
    1800       ;Retry
    604800     ;Expire
    86400      ;Minimum TTL
)

# define Name Server
IN NS dlp.srv.world.
```

```

# define Name Server's IP address
IN A      10.0.0.30

# define Mail Exchanger Server
IN MX 10   dlp.srv.world.

# define each IP address of a hostname
dlp      IN A      10.0.0.30
www      IN A      10.0.0.31

```

[2] IP [10.0.0.0/24] [srv.world]

```

[root@dlp ~]# vi /var/named/0.0.10.db
$TTL 86400
@ IN SOA      dlp.srv.world. root.srv.world. (
    2021110901 ;Serial
    3600       ;Refresh
    1800       ;Retry
    604800     ;Expire
    86400      ;Minimum TTL
)

# define Name Server
IN NS      dlp.srv.world.

# define each hostname of an IP address
30 IN PTR    dlp.srv.world.
31 IN PTR    www.srv.world.

```

[3] BIND

BIND :

[1] BIND

```

[root@dlp ~]# systemctl enable --now named

```

[2] FirewallD DNS DNS [53/TCP,UDP]

```

[root@dlp ~]# firewall-cmd --add-service=dns
success

```

```
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

[3] DNS DNS
[enpls0]

```
[root@dlp ~]# nmcli connection modify enpls0 ipv4.dns 10.0.0.30
[root@dlp ~]# nmcli connection down enpls0; nmcli connection up enpls0
```

[4] [ANSWER SECTION]

```
[root@dlp ~]# dig dlp.srv.world.

; <<>> DiG 9.16.22-RH <<>> dlp.srv.world.
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 49661
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: dfa3f5cee693b548010000006189b47fd276e33a7ce318ef (good)
;; QUESTION SECTION:
; dlp.srv.world.                   IN       A

;; ANSWER SECTION:
dlp.srv.world.           86400   IN       A       10.0.0.30

;; Query time: 2 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:36:31 JST 2021
;; MSG SIZE rcvd: 86

[root@dlp ~]# dig -x 10.0.0.30

; <<>> DiG 9.16.22-RH <<>> -x 10.0.0.30
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 40024
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1
```

```
;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 7fa0458fcfcb227e010000006189b4a41afc0733b0cca9e3 (good)
;; QUESTION SECTION:
; 30.0.0.10.in-addr.arpa.          IN      PTR

;; ANSWER SECTION:
30.0.0.10.in-addr.arpa. 86400    IN      PTR      dlp.srv.world.

;; Query time: 4 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:37:08 JST 2021
;; MSG SIZE rcvd: 106
```

BIND : (CNAME)

CNAME

[1] CNAME

```
[root@dlp ~]# vi /var/named/srv.world.lan
$TTL 86400
@   IN  SOA      dlp.srv.world. root.srv.world. (
        # update serial if update zone file
        2021110902 ;Serial
        3600       ;Refresh
        1800       ;Retry
        604800     ;Expire
        86400     ;Minimum TTL
)

    IN  NS       dlp.srv.world.
    IN  A         10.0.0.30
    IN  MX 10     dlp.srv.world.

dlp    IN  A      10.0.0.30
www    IN  A      10.0.0.31

# [Alias] IN CNAME [Original Name]
ftp    IN  CNAME  dlp.srv.world.
```



```

[root@dlp ~]# rndc reload
server reload successful
# verify resolution
[root@dlp ~]# dig ftp.srv.world.

; <<>> DiG 9.16.22-RH <<>> ftp.srv.world.
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 44967
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 1232
; COOKIE: 04c6ca63bc5d1dde010000006189b6eb91495a7eb8875559 (good)
;; QUESTION SECTION:
;ftp.srv.world.                IN      A

;; ANSWER SECTION:
ftp.srv.world.                86400   IN      CNAME   dlp.srv.world.
dlp.srv.world.                86400   IN      A       10.0.0.30

;; Query time: 2 msec
;; SERVER: 10.0.0.30#53(10.0.0.30)
;; WHEN: Tue Nov 09 08:46:51 JST 2021
;; MSG SIZE rcvd: 104

```

BIND : Chroot

Chroot

```

[1] Chroot      [/var/named/chroot]
    [named.conf] [/var/named/chroot/etc/named.conf]
        [/var/named/chroot/var/named/**]
            [/var/named/chroot]

```

```

[root@dlp ~]# dnf -y install bind-chroot
[root@dlp ~]# mkdir /var/named/chroot/usr/lib64/named
[root@dlp ~]# /usr/libexec/setup-named-chroot.sh /var/named/chroot on
[root@dlp ~]# systemctl disable --now named
[root@dlp ~]# systemctl enable --now named-chroot

```

```
Created symlink /etc/systemd/system/multi-user.target.wants/named-chroot.service →  
/usr/lib/systemd/system/named-chroot.service.
```

```
[root@dlp ~]# ll /var/named/chroot/etc  
total 716  
drwxr-x---. 3 root named    23 Nov  2 04:55 crypto-policies  
-rw-r--r--. 2 root root    309 Sep 27 05:32 localtime  
drwxr-x---. 2 root named     6 Nov  2 04:55 named  
-rw-r-----. 1 root named 2390 Nov  9 08:45 named.conf  
-rw-r-----. 1 root named 1029 Nov  2 04:55 named.rfc1912.zones  
-rw-r--r--. 1 root named   686 Nov  2 04:55 named.root.key  
drwxr-x---. 3 root named    25 Nov  2 04:55 pki  
-rw-r--r--. 1 root root   6568 Jul 16 17:35 protocols  
-rw-r-----. 1 root named   100 Nov  9 08:35 rndc.key  
-rw-r--r--. 1 root root 701745 Jul 16 17:35 services
```

```
[root@dlp ~]# ll /var/named/chroot/var/named  
total 24  
-rw-r--r--. 1 root  root   313 Nov  9 08:34 0.0.10.db  
drwxr-x---. 7 root  named   61 Nov  2 04:55 chroot  
drwxrwx---. 2 named named   23 Nov  9 08:35 data  
drwxrwx---. 2 named named  108 Nov  9 08:47 dynamic  
-rw-r-----. 1 root  named 2253 Nov  2 04:55 named.ca  
-rw-r-----. 1 root  named  152 Nov  2 04:55 named.empty  
-rw-r-----. 1 root  named  152 Nov  2 04:55 named.localhost  
-rw-r-----. 1 root  named  168 Nov  2 04:55 named.loopback  
drwxrwx---. 2 named named    6 Nov  2 04:55 slaves  
-rw-r--r--. 1 root  root   404 Nov  9 08:46 srv.world.lan
```

BIND

DNS

DNS [ns.server.education] (192.168.100.85) DNS [dlp.srv.world] (172.16.0.85)

[1] DNS

```
[root@dlp ~]# vi /etc/named.conf  
.....  
.....  
options {  
    listen-on port 53 { any; };  
    listen-on-v6 { any; };
```

```

directory      "/var/named";
dump-file      "/var/named/data/cache_dump.db";
statistics-file "/var/named/data/named_stats.txt";
memstatistics-file "/var/named/data/named_mem_stats.txt";
secroots-file  "/var/named/data/named.secrets";
recursing-file  "/var/named/data/named.recursing";
allow-query    { localhost; internal-network; };
# add secondary server to allow to transfer zone files
allow-transfer { localhost; 192.168.100.85; };

```

.....

.....

```

[root@dlp ~]# vi /var/named/srv.world.wan
$TTL 86400
@   IN  SOA    dlp.srv.world. root.srv.world. (
        # update serial if update zone file
        2021110903 ;Serial
        3600      ;Refresh
        1800      ;Retry
        604800    ;Expire
        86400     ;Minimum TTL
)

    IN  NS     dlp.srv.world.
        # add secondary server
    IN  NS     ns.server.education.
    IN  A      172.16.0.82
    IN  MX 10   dlp.srv.world.

dlp    IN  A      172.16.0.82
www    IN  A      172.16.0.83

```

```

[root@dlp ~]# systemctl restart named

```

[2] onDNS

```

[root@ns ~]# vi /etc/named.conf
# add target zone info
# for IP address, it's the Master server's IP address
zone "srv.world" IN {
    type slave;

```

```
masters { 172.16.0.82; };  
file "slaves/srv.world.wan";  
notify no;  
};  
  
[root@ns ~]# systemctl restart named  
[root@ns ~]# ls /var/named/slaves  
srv.world.wan    # zone file transfered
```

DHCP : DHCP

DHCP IP

[1] DHCP IPv4

```
[root@dlp ~]# dnf -y install dhcp-server  
[root@dlp ~]# vi /etc/dhcp/dhcpd.conf  
# create new  
# specify domain name  
option domain-name "srv.world";  
  
# specify DNS server's hostname or IP address  
option domain-name-servers dlp.srv.world;  
  
# default lease time  
default-lease-time 600;  
  
# max lease time  
max-lease-time 7200;  
  
# this DHCP server to be declared valid  
authoritative;  
  
# specify network address and subnetmask  
subnet 10.0.0.0 netmask 255.255.255.0 {  
    # specify the range of lease IP address  
    range dynamic-bootp 10.0.0.200 10.0.0.254;  
    # specify broadcast address  
    option broadcast-address 10.0.0.255;  
    # specify gateway
```

```
option routers 10.0.0.1;  
}
```

```
[root@dlp ~]# systemctl enable --now dhcpd
```

[2] Firewallld DHCP DHCP [67/UDP]

```
[root@dlp ~]# firewall-cmd --add-service=dhcp  
success  
[root@dlp ~]# firewall-cmd --runtime-to-permanent  
success
```

DHCP DHCP Fedora2021/11/09

DHCP DHCP IP

[1] Fedora [enp1s0]

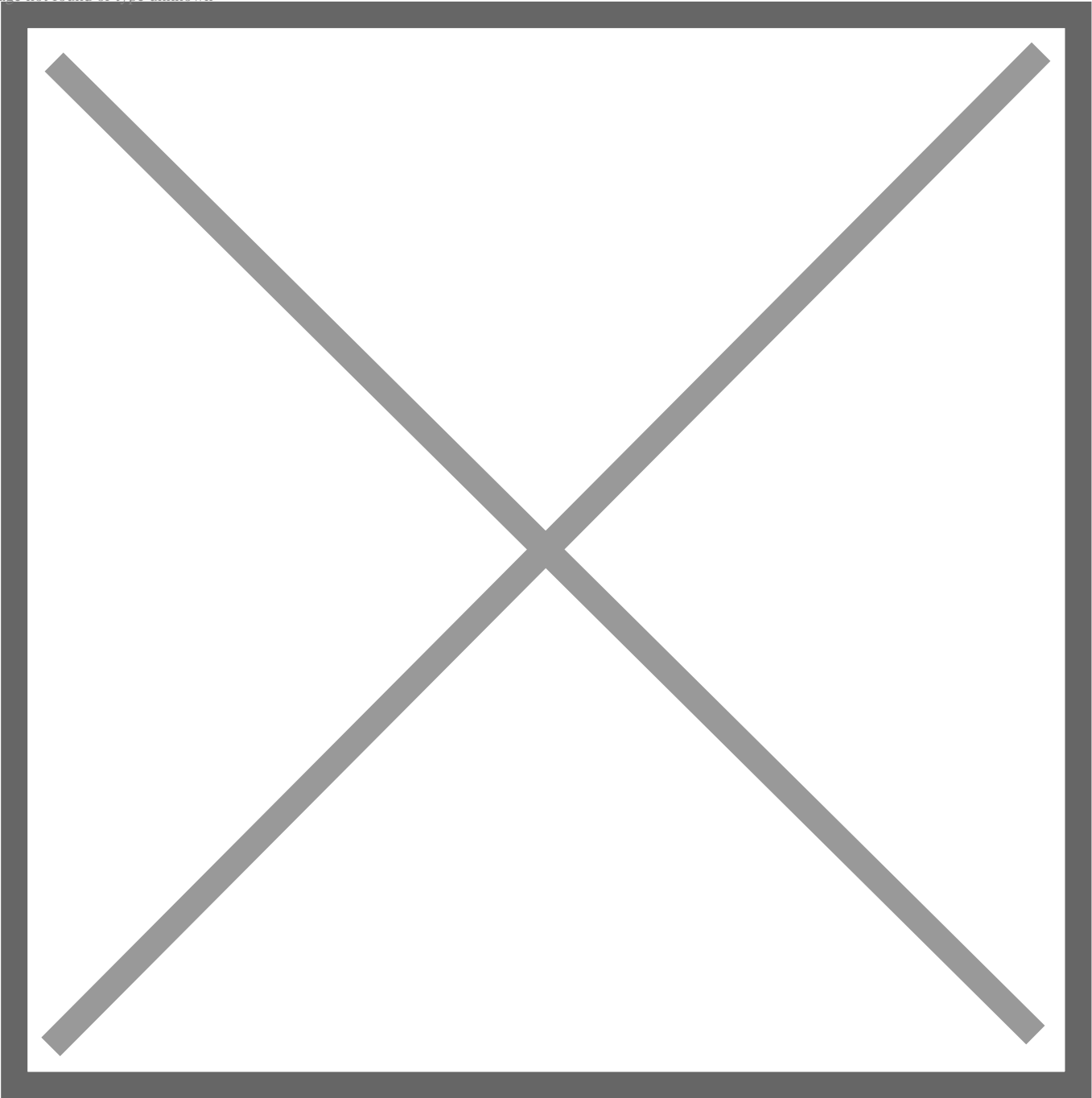
```
# install DHCP client if not installed (generally installed by default)  
[root@client ~]# dnf -y install dhcp-client  
[root@client ~]# nmcli connection modify enp1s0 ipv4.method auto  
[root@client ~]# nmcli connection down enp1s0; nmcli connection up enp1s0
```

DHCP DHCP Windows

Windows DHCP Windows 11

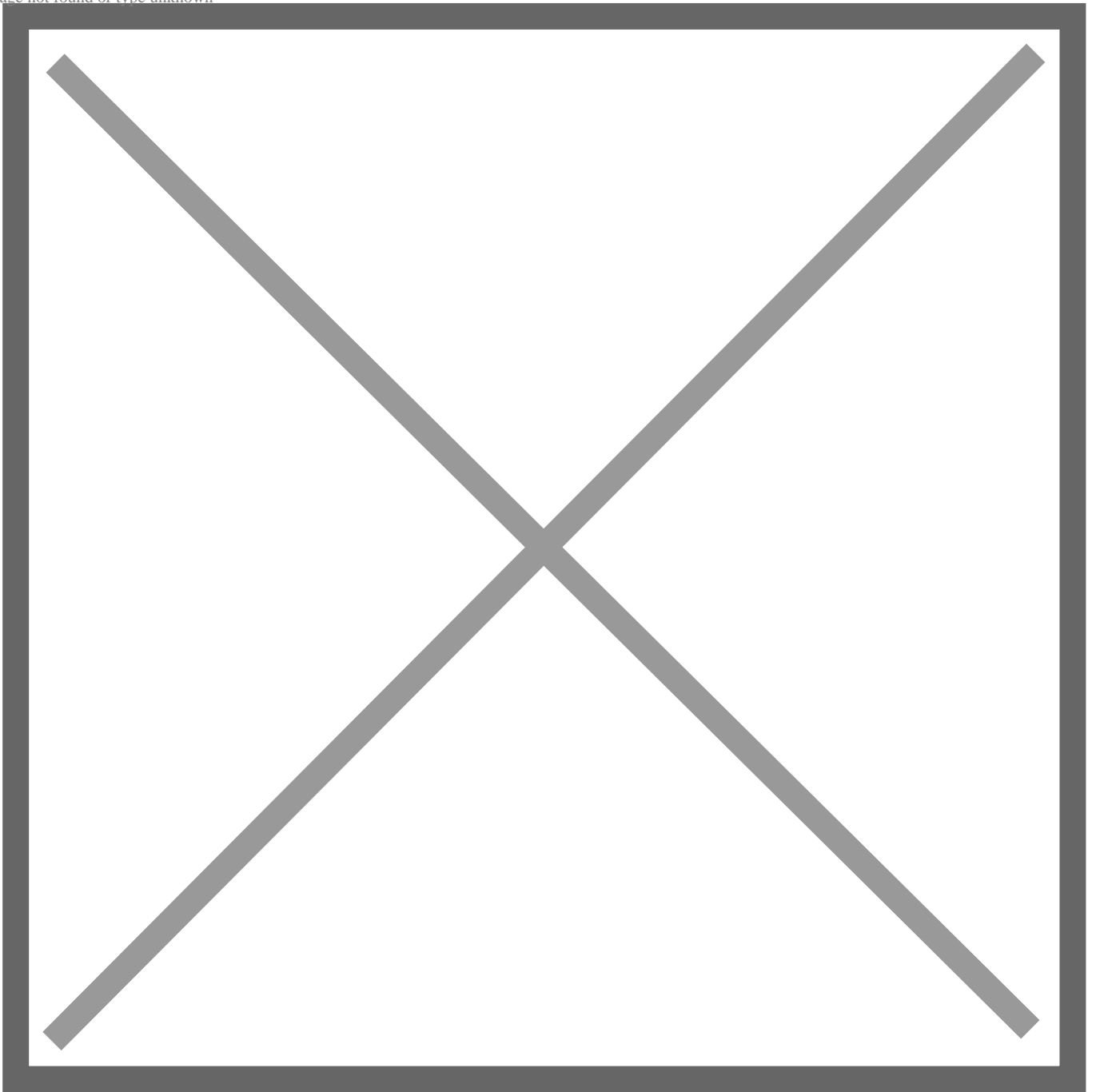
[2] [] []

Image not found or type unknown



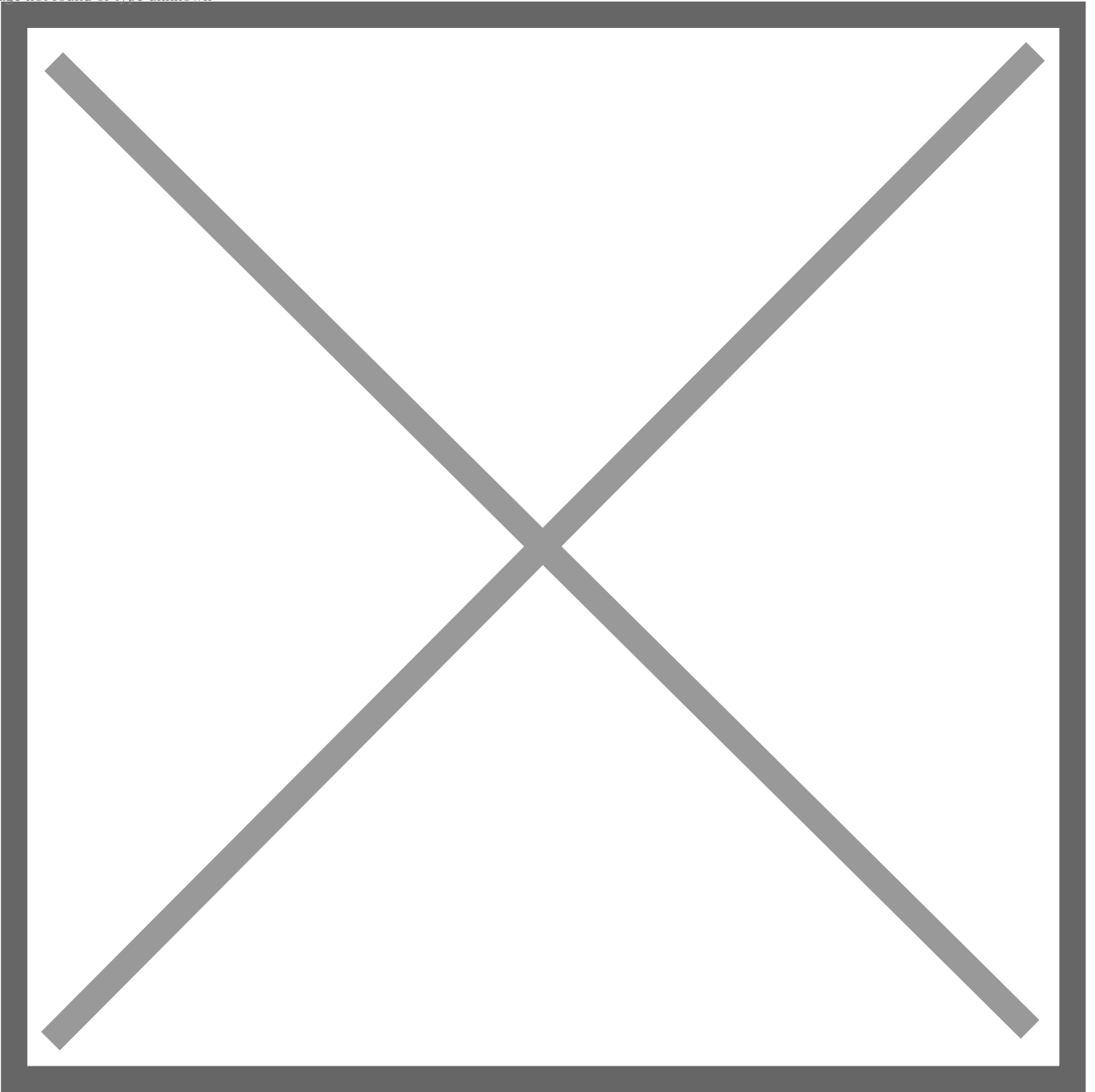
[3] [IP] [DHCP] []

Image not found or type unknown



[4] [] [(DHCP)]

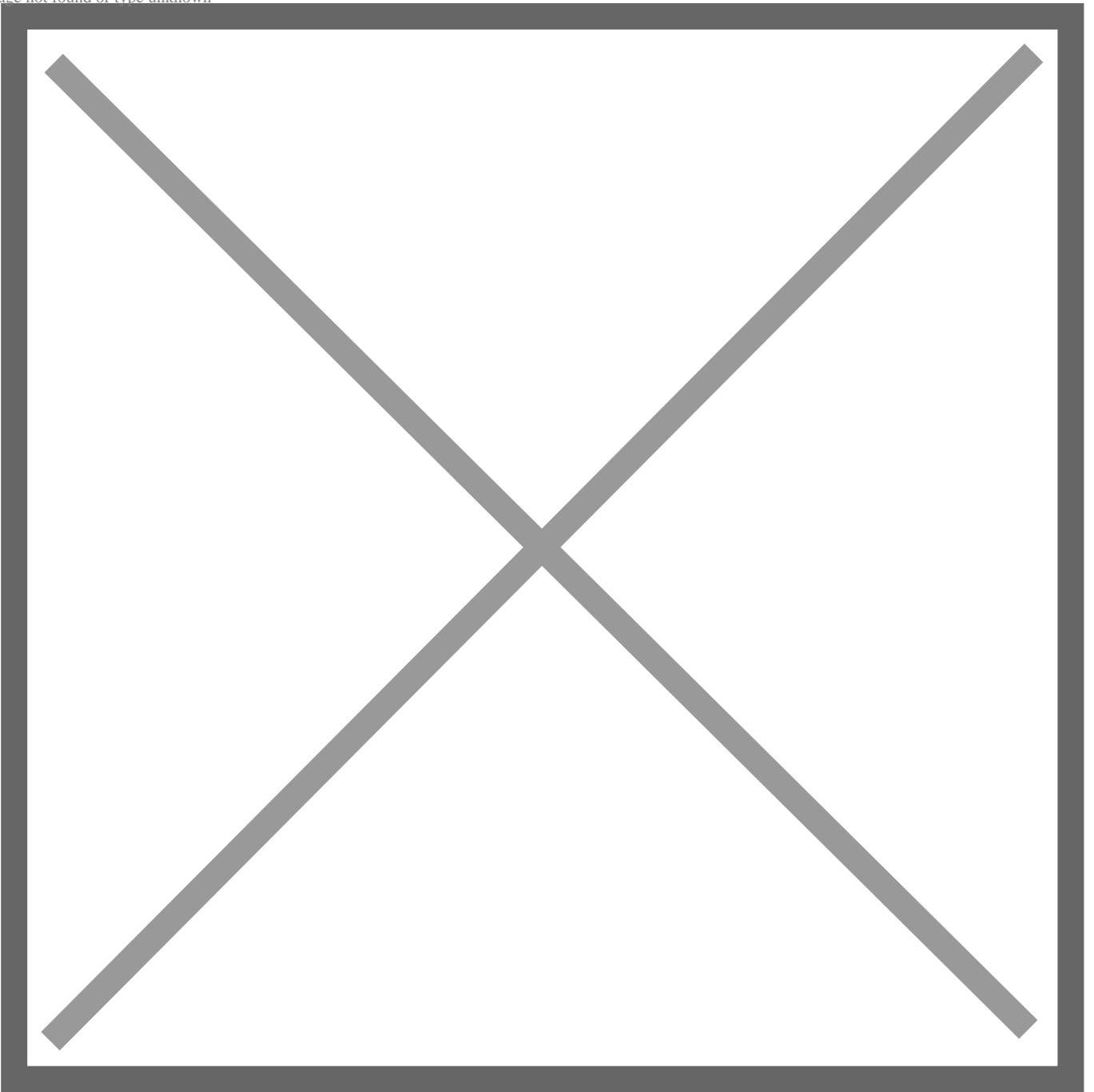
Image not found or type unknown



[5]

IP

Image not found or type unknown



NFS

NFS NFS Server

NFS

[1] NFS

```
[root@dlp ~]# dnf -y install nfs-utils
[root@dlp ~]# vi /etc/idmapd.conf
# line 5 : uncomment and change to your domain name
Domain = srv.world
[root@dlp ~]# vi /etc/exports
# create new
# for example, set [/home/nfsshare] as NFS share
/home/nfsshare 10.0.0.0/24(rw,no_root_squash)
[root@dlp ~]# mkdir /home/nfsshare
[root@dlp ~]# systemctl enable --now rpcbind nfs-server
```

[2] FirewallD NFS

```
[root@dlp ~]# firewall-cmd --add-service=nfs
success
# if use NFSv3, allow follows, too
[root@dlp ~]# firewall-cmd --add-service={nfs3,mountd,rpc-bind}
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

	NFS
	NFS
	NFS NFS
	IPPORT_RESERVED (1024) Internet

no_wdelay	NFS			
no_subtree_check				
root_squash	uid/gid 0	uid/gid	uid	gid
no_root_squash				
all_squash	uid	gid	NFS	FTP
no_all_squash				
anonuid=UID	uid	gid	PC/NFS	
anongid=GID	annuid=UID			

NFS NFS

NFS NFS NFS

```
+-----+ | +-----+
|[NFS ]|10.0.0.30| 10.0.0.51|[NFS ]|
| dlp.srv.world +-----+-----+ node01.srv.world |
|||
+-----+ +-----+
```

[1] NFS

```
[root@node01 ~]# dnf -y install nfs-utils
[root@node01 ~]# vi /etc/idmapd.conf
# line 5 : uncomment and change to your domain name
Domain = srv.world
[root@node01 ~]# mount -t nfs dlp.srv.world:/home/nfsshare /mnt
[root@node01 ~]# df -hT
Filesystem                                Type      Size  Used Avail Use% Mounted on
devtmpfs                                 devtmpfs  1.9G   0    1.9G   0% /dev
tmpfs                                     tmpfs     2.0G   0    2.0G   0% /dev/shm
tmpfs                                     tmpfs     783M  968K  782M   1% /run
/dev/mapper/fedora_fedora-root           xfs       15G   1.6G   14G  11% /
tmpfs                                     tmpfs     2.0G   4.0K   2.0G   1% /tmp
/dev/vda1                                 xfs      1014M  195M   820M  20% /boot
tmpfs                                     tmpfs     392M    0    392M   0% /run/user/0
dlp.srv.world:/home/nfsshare             nfs4       15G   1.6G   14G  11% /mnt
# NFS share is mounted

# if mount with NFSv3, add [-o vers=3] option
```

```
[root@node01 ~]# mount -t nfs -o vers=3 dlp.srv.world:/home/nfsshare /mnt
[root@node01 ~]# df -hT /mnt
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
dlp.srv.world:/home/nfsshare	nfs	15G	1.5G	14G	10%	/mnt

[2] [/etc/fstab]

```
[root@node01 ~]# vi /etc/fstab
```

/dev/mapper/fedora_fedora-root	/	xfs	defaults	0 0
UUID=7a32c4aa-4536-4a53-9098-d8fce81050e6	/boot	xfs	defaults	0 0
# add to the end : set NFS share				
dlp.srv.world:/home/nfsshare	/mnt	nfs	defaults	0 0

[3] NFS AutoFS

```
[root@node01 ~]# dnf -y install autofs
[root@node01 ~]# vi /etc/auto.master
```

```
# add to the end
/-        /etc/auto.mount
```

```
[root@node01 ~]# vi /etc/auto.mount
```

```
# create new : [mount point] [option] [location]
/mnt    -fstype=nfs,rw dlp.srv.world:/home/nfsshare
```

```
[root@node01 ~]# systemctl enable --now autofs
# move to the mount point to verify mounting
[root@node01 ~]# cd /mnt
[root@node01 mnt]# ll
```

```
total 4
drwxr-xr-x. 2 root root 6 Nov 9 14:13 testdir
-rw-r--r--. 1 root root 10 Nov 9 14:13 testfile.txt
```

```
[root@node01 mnt]# grep /mnt /proc/mounts
```

```
/etc/auto.mount /mnt autofs
rw,relatime,fd=17,pgrp=24684,timeout=300,minproto=5,maxproto=5,direct,pipe_ino=50098 0 0
dlp.srv.world:/home/nfsshare /mnt nfs4
rw,relatime,vers=4.2,rsize=524288,wsiz=524288,namlen=255,hard,proto=tcp,timeo=600,retrans=2,sec=sys,clientaddr=10.0.0.51,local_lock=none,addr=10.0.0.30 0 0
```

NFS NFS 4 ACL

NFS(v4) ACL NFS 4 ACL
POSIX ACL Tool

[1] NFSv4 NFS NFS NFS 4 ACL

```
[root@node01 ~]# dnf -y install nfs4-acl-tools
```

[2]

```
[root@node01 ~]# df -hT /mnt
Filesystem                                Type  Size  Used Avail Use% Mounted on
dlp.srv.world: /home/nfsshare nfs4    15G   1.6G   14G   11% /mnt

[root@node01 ~]# ll /mnt
total 4
drwx-----. 2 root root  6 Nov  9 17:45 testdir
-rw-----. 1 root root 10 Nov  9 17:44 testfile.txt
```

[3] NFSv4 ACL

```
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
A::OWNER@:rwatTcCy
A::GROUP@:tcy
A::EVERYONE@:tcy

[root@node01 ~]# nfs4_getfacl /mnt/testdir

# file: /mnt/testdir
A::OWNER@:rwaDxtTcCy
A::GROUP@:tcy
A::EVERYONE@:tcy

# each entry means like follows
# ACE = Access Control Entry
# (ACE Type):(ACE Flags):(ACE Principal):(ACE Permissions)
```

	A = Allow
D	D = Deny
d	Directory-Inherit ACE
F	File-Inherit ACE
n	No-Propagate-Inherit ACE
	Inherit-Only / ACE ACE
(USER)@(NFSD)	[NFSDomain] [idmapd.conf] [Domain]
(GROUP)@(NFSD)	[g] ⇒ A:g:GROUP@NFSDomain:rxtncy
@	
@	
@	
ACE	
r	/
w	/
	/
X	/
d	
D	
n	
ñ	
C	ACL
C	ACL
○	
ACE	nfs4_setfacl ACE
R	R = rntcy
W	W = watTNcCy
X	X = xtcy

```
[root@node01 ~]# ll /mnt
total 4
drwx-----. 2 root root  6 Nov  9 17:45 testdir
-rw-----. 1 root root 10 Nov  9 17:44 testfile.txt

[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
A::OWNER@:rwatTcCy
A::GROUP@:tcy
A::EVERYONE@:tcy

# add generic read/execute for [fedora] user to [/mnt/testfile.txt] file
[root@node01 ~]# nfs4_setfacl -a A::fedora@srv.world:rxtncy /mnt/testfile.txt
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
D::OWNER@:x
A::OWNER@:rwatTcCy
A::1000:rxtcy
A::GROUP@:tcy
A::EVERYONE@:tcy

# verify with [fedora] user
[fedora@node01 ~]$ ll /mnt
total 4
drwx-----. 2 root root  6 Nov  9 17:45 testdir
-rw-r-x---. 1 root root 10 Nov  9 17:44 testfile.txt

[fedora@node01 ~]$ cat /mnt/testfile.txt
test file

# delete generic read/execute for [fedora] user from [/mnt/testfile.txt] file
[root@node01 ~]# nfs4_setfacl -x A::1000:rxtcy /mnt/testfile.txt
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
```



```
A: : OWNER@: rwaTcCy
A: : GROUP@: tcy
A: : EVERYONE@: tcy
```

[5] ACL

```
[root@node01 ~]# nfs4_setfacl -e /mnt/testfile.txt

# $EDITOR is run and enter to ACL editing
# default $EDITOR on Fedora 34 is [nano], if $EDITOR=null, default is set to [vi]
## Editing NFSv4 ACL for file: /mnt/testfile.txt
A: : OWNER@: rwaTcCy
A: : GROUP@: tcy
A: : EVERYONE@: tcy
```

[6] ACE

```
# create ACL list
[root@node01 ~]# vi acl.txt
A: : fedora@srv.world: RX
A: : redhat@srv.world: RWX

# add ACL from the file
[root@node01 ~]# nfs4_setfacl -A acl.txt /mnt/testfile.txt
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
D: : OWNER@: x
A: : OWNER@: rwaTcCy
A: : 1000: rxtcy
A: : 1001: rwxtcy
A: : GROUP@: tcy
A: : EVERYONE@: tcy
```

[7] ACE ACE

```
# create ACL list
[root@node01 ~]# vi acl.txt
A: : OWNER@: rwxtTcCy
A: : GROUP@: tcy
A: : EVERYONE@: tcy
```

```
# replace ACL from the file
[root@node01 ~]# nfs4_setfacl -S acl.txt /mnt/testfile.txt
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
A::OWNER@:rwaxtTcCy
A::GROUP@:tcy
A::EVERYONE@:tcy
```

[8] ACE ACE

```
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

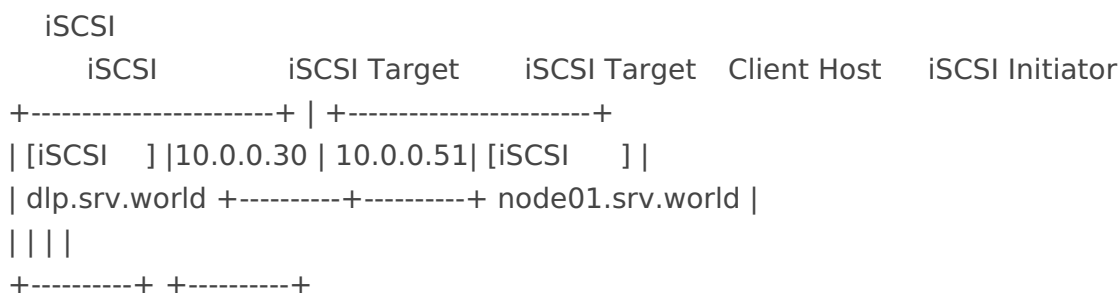
# file: /mnt/testfile.txt
A::OWNER@:rwaxtTcCy
A::GROUP@:tcy
A::EVERYONE@:tcy

# replace EVERYONE's ACE to read/execute
[root@node01 ~]# nfs4_setfacl -m A::EVERYONE@:tcy A::EVERYONE@:RX /mnt/testfile.txt
[root@node01 ~]# nfs4_getfacl /mnt/testfile.txt

# file: /mnt/testfile.txt
A::OWNER@:rwaxtTcCy
A::GROUP@:rxtcy
A::EVERYONE@:rxtcy
```

iSCSI

iSCSI Targetcli



[1]

```
[root@dlp ~]# dnf -y install targetcli
```

[2] iSCSI

[/var/lib/iscsi_disks]

SCSI

```
# create a directory
[root@dlp ~]# mkdir /var/lib/iscsi_disks
# enter the admin console
[root@dlp ~]# targetcli
targetcli shell version 2.1.54
Copyright 2011-2013 by Datera, Inc and others.
For help on commands, type 'help'.

/> cd backstores/fileio

# create a disk-image with the name [disk01] on [/var/lib/iscsi_disks/disk01.img] with 10G
/backstores/fileio> create disk01 /var/lib/iscsi_disks/disk01.img 10G
Created fileio disk01 with size 10737418240
/backstores/fileio> cd /iscsi

# create a target
# naming rule : [ iqn.(year)-(month).(reverse of domain name):(any name you like) ]
/iscsi> create iqn.2021-11.world.srv:dlp.target01
Created target iqn.2021-11.world.srv:dlp.target01.
Created TPG 1.
Global pref auto_add_default_portal=true
Created default portal listening on all IPs (0.0.0.0), port 3260.
/iscsi> cd iqn.2021-11.world.srv:dlp.target01/tpg1/luns

# set LUN
/iscsi/iqn.20...t01/tpg1/luns> create /backstores/fileio/disk01
Created LUN 0.
/iscsi/iqn.20...t01/tpg1/luns> cd ../acls

# set ACL (it's the IQN of an initiator you permit to connect)
/iscsi/iqn.20...t01/tpg1/acls> create iqn.2021-11.world.srv:node01.initiator01
Created Node ACL for iqn.2021-11.world.srv:node01.initiator01
Created mapped LUN 0.
```

```

/iscsi/iqn.20...t01/tpgl/acls> cd iqn.2021-11.world.srv:node01.initiator01

# set UserID and Password for authentication
/iscsi/iqn.20...w.initiator01> set auth userid=username
Parameter userid is now 'username'.
/iscsi/iqn.20...w.initiator01> set auth password=password
Parameter password is now 'password'.
/iscsi/iqn.20...w.initiator01> exit
Global pref auto_save_on_exit=true
Configuration saved to /etc/target/saveconfig.json

# after configuration above, the target enters in listening like follows
[root@dlp ~]# ss -napt | grep 3260
LISTEN 0      256          0.0.0.0:3260      0.0.0.0:*

[root@dlp ~]# systemctl enable target

```

[3] Firewalld iSCSI Target

```

[root@dlp ~]# firewall-cmd --add-service=iscsi-target
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success

```

iSCSI (tgt)

iSCSI

scsi-target-utils iSCSI Target (tgt)

iSCSI iSCSI Target iSCSI Target Client Host iSCSI Initiator

```

+-----+ | +-----+
| [iSCSI ] | 10.0.0.30 | 10.0.0.51 | [iSCSI ] |
| dlp.srv.world +-----+-----+ node01.srv.world |
| | |
+-----+ +-----+

```

[1]

```

[root@dlp ~]# dnf -y install scsi-target-utils

```

[2] iSCSI

[/var/lib/iscsi_disks]

SCSI

```
[root@dlp ~]# systemctl enable --now tgt
# show status
[root@dlp ~]# tgtadm --mode target --op show
Target 1: iqn.2021-11.world.srv:dlp.target01
  System information:
    Driver: iscsi
    State: ready
  I_T nexus information:
  LUN information:
    LUN: 0
      Type: controller
      SCSI ID: IET      00010000
      SCSI SN: beaf10
      Size: 0 MB, Block size: 1
      Online: Yes
      Removable media: No
      Prevent removal: No
      Readonly: No
      SWP: No
      Thin-provisioning: No
      Backing store type: null
      Backing store path: None
      Backing store flags:
    LUN: 1
      Type: disk
      SCSI ID: IET      00010001
      SCSI SN: beaf11
      Size: 10737 MB, Block size: 512
      Online: Yes
      Removable media: No
      Prevent removal: No
      Readonly: No
      SWP: No
      Thin-provisioning: No
      Backing store type: rdwr
      Backing store path: /var/lib/iscsi_disks/disk01.img
      Backing store flags:
  Account information:
    username
  ACL information:
```

ALL

iqn.2021-11.world.srv:node01.initiator01

```
# create a disk image
[root@dlp ~]# mkdir /var/lib/iscsi_disks
[root@dlp ~]# dd if=/dev/zero of=/var/lib/iscsi_disks/disk01.img count=0 bs=1 seek=10G
[root@dlp ~]# vi /etc/tgt/conf.d/target01.conf
# create new
# if you set some devices, add <target>-</target> and set the same way with follows
# naming rule : [ iqn.(year)-(month).(reverse of domain name):(any name you like) ]
<target iqn.2021-11.world.srv:dlp.target01>
    # provided device as a iSCSI target
    backing-store /var/lib/iscsi_disks/disk01.img
    # iSCSI Initiator's IQN you allow to connect
    initiator-name iqn.2021-11.world.srv:node01.initiator01
    # authentication info ( set anyone you like for "username", "password" )
    incominguser username password
</target>
```

[3] SELinux SELinux

```
[root@dlp ~]# dnf -y install policycoreutils-python-utils
[root@dlp ~]# chcon -R -t tgtd_var_lib_t /var/lib/iscsi_disks
[root@dlp ~]# semanage fcontext -a -t tgtd_var_lib_t /var/lib/iscsi_disks
```

[4] Firewalld iSCSI Target

```
[root@dlp ~]# firewall-cmd --add-service=iscsi-target
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

[5] tgtd

```
[root@dlp ~]# systemctl enable --now tgtd
# show status
[root@dlp ~]# tgtadm --mode target --op show
Target 1: iqn.2021-11.world.srv:dlp.target01
    System information:
        Driver: iscsi
```

```
State: ready
I_T nexus information:
LUN information:
  LUN: 0
    Type: controller
    SCSI ID: IET      00010000
    SCSI SN: beaf10
    Size: 0 MB, Block size: 1
    Online: Yes
    Removable media: No
    Prevent removal: No
    Readonly: No
    SWP: No
    Thin-provisioning: No
    Backing store type: null
    Backing store path: None
    Backing store flags:
  LUN: 1
    Type: disk
    SCSI ID: IET      00010001
    SCSI SN: beaf11
    Size: 10737 MB, Block size: 512
    Online: Yes
    Removable media: No
    Prevent removal: No
    Readonly: No
    SWP: No
    Thin-provisioning: No
    Backing store type: rdwr
    Backing store path: /var/lib/iscsi_disks/disk01.img
    Backing store flags:
Account information:
  username
ACL information:
  ALL
  iqn.2021-11.world.srv:node01.initiator01
```

iSCSI

iSCSI

```
+-----+ | +-----+
|[iSCSI  ]|10.0.0.30| 10.0.0.51|[iSCSI  ]|
|dlp.srv.world +-----+-----+ node01.srv.world |
||||
+-----+ +-----+
```

[1] iSCSI Initiator iSCSI Target

```
[root@node01 ~]# dnf -y install iscsi-initiator-utils
[root@node01 ~]# vi /etc/iscsi/initiatorname.iscsi
# change to the same IQN you set on the iSCSI target server
InitiatorName=iqn.2021-11.world.srv:node01.initiator01
[root@node01 ~]# vi /etc/iscsi/iscsid.conf
# line 58 : uncomment
node.session.auth.authmethod = CHAP
# line 69,70 : uncomment and specify the username and password you set on the iSCSI target
server
node.session.auth.username = username
node.session.auth.password = password
# discover target
[root@node01 ~]# iscsiadm -m discovery -t sendtargets -p 10.0.0.30
10.0.0.30:3260,1 iqn.2021-11.world.srv:dlp.target01

# confirm status after discovery
[root@node01 ~]# iscsiadm -m node -o show
# BEGIN RECORD 2.1.4
node.name = iqn.2021-11.world.srv:dlp.target01
node.tpgt = 1
node.startup = automatic
node.leading_login = No
iface.iscsi_ifacename = default
.....
.....
node.conn[0].iscsi.HeaderDigest = None
node.conn[0].iscsi.DataDigest = None
node.conn[0].iscsi.IFMarker = No
node.conn[0].iscsi.OFMarker = No
# END RECORD
```



```
# login to the target # if logout => iscsiadm --mode node --logoutall=all
[root@node01 ~]# iscsiadm -m node --login
Logging in to [iface: default, target: iqn.2021-11.world.srv:dlp.target01, portal:
10.0.0.30,3260]
Login to [iface: default, target: iqn.2021-11.world.srv:dlp.target01, portal: 10.0.0.30,3260]
successful.

# confirm the established session
[root@node01 ~]# iscsiadm -m session -o show
tcp: [1] 10.0.0.30:3260,1 iqn.2021-11.world.srv:dlp.target01 (non-flash)
# confirm the partitions
[root@node01 ~]# cat /proc/partitions
major minor #blocks name

11          0    1048575 sr0
252         0    31457280 sda
252         1     1048576 sda1
252         2    30407680 sda2
253         0     15728640 dm-0
251         0     4007936 zram0
8           0     10485760 sdb

# added new device provided from the target server as [sdb]
```

[2] iSCSI Initiator

```
# create label
[root@node01 ~]# parted --script /dev/sdb "mklabel gpt"
# create partition
[root@node01 ~]# parted --script /dev/sdb "mkpart primary 0% 100%"
# format with XFS
[root@node01 ~]# mkfs.xfs -i size=1024 -s size=4096 /dev/sdb1
meta-data=/dev/sdb1            isize=1024   agcount=4, agsize=654336 blks
      =                       sectsz=4096   attr=2,   projid32bit=1
      =                       crc=1         finobt=1, sparse=1, rmapbt=0
      =                       reflink=1      bigtime=0
data      =                       bsize=4096   blocks=2617344, imaxpct=25
      =                       sunit=0        swidth=0 blks
naming    =version 2           bsize=4096   ascii-ci=0, ftype=1
log       =internal log       bsize=4096   blocks=2560, version=2
      =                       sectsz=4096   sunit=1 blks, lazy-count=1
```

```
realtime =none                extsz=4096   blocks=0, rtextents=0
```

```
[root@node01 ~]# mount /dev/sdb1 /mnt
```

```
[root@node01 ~]# df -hT
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
devtmpfs	devtmpfs	1.9G	0	1.9G	0%	/dev
tmpfs	tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	tmpfs	786M	1.0M	785M	1%	/run
/dev/mapper/fedora_fedora-root	xfs	15G	1.6G	14G	11%	/
tmpfs	tmpfs	2.0G	4.0K	2.0G	1%	/tmp
/dev/sda1	xfs	1014M	186M	829M	19%	/boot
tmpfs	tmpfs	393M	0	393M	0%	/run/user/0
/dev/sdb1	xfs	10G	99M	9.9G	1%	/mnt

GlusterFS 9

GlusterFS 9

GlusterFS

GlusterFS /

[sdb1]

[/glusterfs]

[1] GlusterFS

```
[root@node01 ~]# dnf -y install glusterfs-server
```

```
[root@node01 ~]# systemctl enable --now glusterd
```

```
[root@node01 ~]# gluster --version
```

glusterfs 9.4

Repository revision: git://git.gluster.org/glusterfs.git

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GlusterFS comes with ABSOLUTELY NO WARRANTY.

It is licensed to you under your choice of the GNU Lesser

General Public License, version 3 or any later version (LGPLv3

or later), or the GNU General Public License, version 2 (GPLv2),

in all cases as published by the Free Software Foundation.

[2] Firewalld GlusterFS

```
[root@node01 ~]# firewall-cmd --add-service=glusterfs
```

success

```
[root@node01 ~]# firewall-cmd --runtime-to-permanent
success
```

GlusterFS 9

```
GlusterFS
  2
  2      3
|
+-----+ | +-----+
| [GlusterFS #1] | 10.0.0.51 | 10.0.0.52 | [GlusterFS #2] |
| node01.srv.world +-----+-----+ node02.srv.world |
| | | |
+-----+ +-----+
↑ ↑
  1   3 ...   2   4 ...
```

```
GlusterFS      /
                [sdb1]          [/glusterfs]
```

[1] GlusterFS

[2] GlusterFS

```
[root@node01 ~]# mkdir -p /glusterfs/distributed
```

[3]

```
# probe nodes
[root@node01 ~]# gluster peer probe node02
peer probe: success.

# confirm status
[root@node01 ~]# gluster peer status
Number of Peers: 1

Hostname: node02
Uuid: 447dedcb-fe9b-4743-851c-a7c2adef0043
State: Peer in Cluster (Connected)

# create volume
[root@node01 ~]# gluster volume create vol_distributed transport tcp \
node01:/glusterfs/distributed \
```

```

node02: /glusterfs/distributed
volume create: vol_distributed: success: please start the volume to access data
# start volume
[root@node01 ~]# gluster volume start vol_distributed
volume start: vol_distributed: success
# confirm volume info
[root@node01 ~]# gluster volume info

Volume Name: vol_distributed
Type: Distribute
Volume ID: 3a671a01-2a6c-4c4d-858c-4c8e401bc23c
Status: Started
Snapshot Count: 0
Number of Bricks: 2
Transport-type: tcp
Bricks:
Brick1: node01: /glusterfs/distributed
Brick2: node02: /glusterfs/distributed
Options Reconfigured:
storage.fips-mode-rchecksum: on
transport.address-family: inet
nfs.disable: on

```

GlusterFS 9 GlusterFS + NFS-Ganesha

NFS-Ganesha	GlusterFS	NFS	Gluster Volume
NFS-Ganesha	NFS	v3 v4.0 v4.1 pNFS	
[1]	Gluster	NFS	
	Gluster	NFS	
		NFS	

```

# OK if [nfs.disable: on] (default setting)
[root@node01 ~]# gluster volume get vol_distributed nfs.disable
Option                                Value
-----                                -
nfs.disable                           on

# if [nfs.disable: off], turn to disable
[root@node01 ~]# gluster volume set vol_distributed nfs.disable on
volume set: success

```

```
# if NFS server is running, disable it
[root@node01 ~]# systemctl disable --now nfs-server
```

[2] GlusterFS NFS-Ganesha

```
[root@node01 ~]# dnf -y install nfs-ganesha-gluster
[root@node01 ~]# mv /etc/ganesha/ganesha.conf /etc/ganesha/ganesha.conf.org
[root@node01 ~]# vi /etc/ganesha/ganesha.conf

# create new
NFS_CORE_PARAM {
    # possible to mount with NFSv3 to NFSv4 Pseudo path
    mount_path_pseudo = true;
    # NFS protocol
    Protocols = 3,4;
}

EXPORT_DEFAULTS {
    # default access mode
    Access_Type = RW;
}

EXPORT {
    # uniq ID
    Export_Id = 101;
    # mount path of Gluster Volume
    Path = "/vol_distributed";
    FSAL {
        [# any name
        name = GLUSTER;
        # hostname or IP address of this Node
        hostname="10.0.0.51";
        # Gluster volume name
        volume="vol_distributed";
    }
    # config for root Squash
    Squash="No_root_squash";
    # NFSv4 Pseudo path
    Pseudo="/vfs_distributed";
    # allowed security options
    SecType = "sys";
}

LOG {
    # default log level
```

```

    Default_Log_Level = WARN;
}

[root@node01 ~]# systemctl enable --now nfs-ganesha
# verify mount
[root@node01 ~]# showmount -e localhost
Export list for localhost:
/vfs_distributed (everyone)

```

[3] Firewalld NFS

```

[root@node01 ~]# firewall-cmd --add-service=nfs
success
[root@node01 ~]# firewall-cmd --runtime-to-permanent
success

```

[4] NFS

```

[root@client ~]# dnf -y install nfs-utils
# specify Pseudo path set on [Pseudo=***] in ganesha.conf
[root@client ~]# mount -t nfs4 node01.srv.world:/vfs_distributed /mnt
[root@client ~]# df -hT

```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
devtmpfs	devtmpfs	1.9G	0	1.9G	0%	/dev
tmpfs	tmpfs	2.0G	0	2.0G	0%	/dev/shm
tmpfs	tmpfs	783M	996K	782M	1%	/run
/dev/mapper/fedora_fedora-root	xfs	15G	1.6G	14G	11%	/
tmpfs	tmpfs	2.0G	4.0K	2.0G	1%	/tmp
/dev/vda1	xfs	1014M	195M	820M	20%	/boot
tmpfs	tmpfs	392M	0	392M	0%	/run/user/0
node01.srv.world:/vfs_distributed	nfs4	30G	3.5G	27G	12%	/mnt

```

# verify reading and writing
[root@client ~]# echo "Gluster NFS write test" > /mnt/testfile.txt
[root@client ~]# cat /mnt/testfile.txt
Gluster NFS write test

```

GlusterFS 9 GlusterFS + SMB

GlusterFS SMB

```

[root@node01 ~]# dnf -y install samba ctdb samba-vfs-glusterfs
# stop the target Gluster volume and change settings
[root@node01 ~]# gluster volume stop vol_distributed
Stopping volume will make its data inaccessible. Do you want to continue? (y/n) y
volume stop: vol_distributed: success
[root@node01 ~]# gluster volume set vol_distributed user.smb enable
volume set: success
[root@node01 ~]# gluster volume set vol_distributed performance.write-behind off
volume set: success
[root@node01 ~]# gluster volume set vol_distributed group samba
volume set: success
[root@node01 ~]# vi /var/lib/glusterd/hooks/1/start/post/S29CTDBsetup.sh
# line 25 : change to the target Gluster volume name
META="vol_distributed"
[root@node01 ~]# vi /var/lib/glusterd/hooks/1/stop/pre/S29CTDB-teardown.sh
# line 13 : change to the target Gluster volume name
META="vol_distributed"
# start Gluster volume
[root@node01 ~]# gluster volume start vol_distributed
volume start: vol_distributed: success
# with the settings above, following mounting is done automatically
[root@node01 ~]# df -h /gluster/lock

```

Filesystem	Size	Used	Avail	Use%	Mounted on
node01.srv.world:/vol_distributed.tcp	30G	3.5G	27G	12%	/gluster/lock

```

[root@node01 ~]# tail -1 /etc/fstab
node01.srv.world:/vol_distributed /gluster/lock glusterfs _netdev,transport=tcp,xlator-
option=*client*.ping-timeout=10 0 0

[root@node01 ~]# vi /etc/ctdb/nodes
# create new
# write all Nodes that configure target Gluster volume
10.0.0.51
10.0.0.52
[root@node01 ~]# vi /etc/ctdb/public_addresses
# create new
# set virtual IP address for SMB access
# [enp1s0] means network interface name => replace to your environment

```

```

10.0.0.59/24 enp1s0
[root@node01 ~]# systemctl enable --now ctdb
# confirm status
[root@node01 ~]# ctdb status
Number of nodes: 2
pnn: 0 10.0.0.51          OK ( THIS NODE)
pnn: 1 10.0.0.52          DISCONNECTED| UNHEALTHY| INACTIVE
Generation: 1113695787
Size: 1
hash: 0 lmaster: 0
Recovery mode: NORMAL ( 0)
Recovery master: 0

[root@node01 ~]# ctdb ip
Public IPs on node 0
10.0.0.59 0

```

[2] Samba

[smbgroup]

[smbshare]

```

# mount Gluster volume with GlusterFS Native and create a shared folder for SMB access
[root@node01 ~]# mount -t glusterfs node01.srv.world:/vol_distributed /mnt
[root@node01 ~]# mkdir /mnt/smbshare
[root@node01 ~]# groupadd smbgroup
[root@node01 ~]# chgrp smbgroup /mnt/smbshare
[root@node01 ~]# chmod 770 /mnt/smbshare
[root@node01 ~]# umount /mnt
[root@node01 ~]# vi /etc/samba/smb.conf
[global]
    workgroup = SAMBA
    security = user

    passdb backend = tdbsam

    printing = cups
    printcap name = cups
    load printers = yes
    cups options = raw
    # add follows
    clustering = yes

```



```

    kernel share modes = no
    kernel oplocks = no
    map archive = no
    map hidden = no
    map read only = no
    map system = no
    store dos attributes = yes

# following 9 lines are configured automatically
[gluster-vol_distributed]
comment = For samba share of volume vol_distributed
vfs objects = glusterfs
glusterfs: volume = vol_distributed
glusterfs: logfile = /var/log/samba/glusterfs-vol_distributed.%.log
glusterfs: loglevel = 7
path = /
read only = no
kernel share modes = no
# add follows
writable = yes
valid users = @smbgroup
force create mode = 777
force directory mode = 777
inherit permissions = yes

[root@node01 ~]# systemctl enable --now smb
# add Samba user
[root@node01 ~]# useradd fedora
[root@node01 ~]# smbpasswd -a fedora
New SMB password:      # set any SMB password
Retype new SMB password:
Added user fedora.
[root@node01 ~]# usermod -aG smbgroup fedora

```

[3] SELinux

```

[root@node01 ~]# setsebool -P use_fusefs_home_dirs on
[root@node01 ~]# setsebool -P samba_load_libgfapi on
[root@node01 ~]# setsebool -P domain_kernel_load_modules on

```

[4] Firewall

```
[root@node01 ~]# firewall-cmd --add-service={samba,ctdb}
success
[root@node01 ~]# firewall-cmd --runtime-to-permanent
success
```

[5] Linux SMB Windows

```
# verify with [smbclient]
[root@client ~]# smbclient //node01.srv.world/gluster-vol_distributed -U fedora
Enter SAMBA\fedora's password:
Try "help" to get a list of possible commands.

# verify writable to move to shared folder
smb: \> cd smbshare

smb: \smbshare\> mkdir testdir
smb: \smbshare\> ls
.                D            0  Tue Nov  9 15:13:16 2021
..               D            0  Tue Nov  9 15:09:06 2021
anaconda-ks.cfg  A          872  Tue Nov  9 15:13:17 2021
testdir          D            0  Tue Nov  9 15:12:38 2021

31436800 blocks of size 1024. 27701820 blocks available

smb: \smbshare\> exit
```


KVM

KVM	+QEMU
CPU	VT AMD-V

[1]	
-----	--

```
[root@dlp ~]# dnf -y install qemu-kvm libvirt virt-install
# confirm modules are loaded
[root@dlp ~]# lsmod | grep kvm
kvm_intel                331776  0
kvm                      1019904  1 kvm_intel
irqbypass                16384   1 kvm

[root@dlp ~]# systemctl enable --now libvirtd
```

[2]	KVM Bridge [enp1s0]
-----	-----------------------------

```
# add bridge [br0]
[root@dlp ~]# nmcli connection add type bridge autoconnect yes con-name br0 ifname br0
Connection 'br0' (80672c58-969e-4e7e-9e09-c4baa6117afb) successfully added.
# set IP address for [br0]
[root@dlp ~]# nmcli connection modify br0 ipv4.addresses 10.0.0.30/24 ipv4.method manual
# set Gateway for [br0]
[root@dlp ~]# nmcli connection modify br0 ipv4.gateway 10.0.0.1
# set DNS for [br0]
[root@dlp ~]# nmcli connection modify br0 ipv4.dns 10.0.0.10
# set DNS search base for [br0]
[root@dlp ~]# nmcli connection modify br0 ipv4.dns-search srv.world
# remove the current interface
[root@dlp ~]# nmcli connection del enp1s0
# add the removed interface again as a member of [br0]
[root@dlp ~]# nmcli connection add type bridge-slave autoconnect yes con-name enp1s0 ifname
enp1s0 master br0
# restart
[root@dlp ~]# reboot
[root@dlp ~]# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen
```

1000

link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00

inet 127.0.0.1/8 scope host lo

valid_lft forever preferred_lft forever

inet6 ::1/128 scope host

valid_lft forever preferred_lft forever

2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel master br0 state UP

group default qlen 1000

link/ether 52:54:00:aa:86:00 brd ff:ff:ff:ff:ff:ff

3: br0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default

qlen 1000

link/ether 9a:7e:5f:73:79:d6 brd ff:ff:ff:ff:ff:ff

inet 10.0.0.30/24 brd 10.0.0.255 scope global noprefixroute br0

valid_lft forever preferred_lft forever

Podman

Podman

Docker Cli

Podman

Service Daemon

[1]

Podman

```
[root@dlp ~]# dnf -y install podman
```

[2]

[Podman World]

```
# download the official image
[root@dlp ~]# podman pull fedora
Resolved "fedora" as an alias (/etc/containers/registries.conf.d/000-shortnames.conf)
Trying to pull registry.fedoraproject.org/fedora:latest...
Getting image source signatures
.....
.....
Writing manifest to image destination
Storing signatures
1b52edb0818147bea39780625ec01ab46944284acf16d8bcfa4055f8a854a9f5

# run echo inside a container
[root@dlp ~]# podman run fedora /bin/echo "Welcome to the Podman World"
Welcome to the Podman World
```

[3]

[i] [t]
[]

```
[root@dlp ~]# podman run -it fedora /bin/bash
[root@c466d78a528d /]# # connected
[root@c466d78a528d /]# uname -a
Linux c466d78a528d 5.14.10-300.fc35.x86_64 #1 SMP Thu Oct 7 20:48:44 UTC 2021 x86_64 x86_64
x86_64 GNU/Linux
[root@c466d78a528d /]# exit
exit
[root@dlp ~]# # come back
```

[4]

[d]

```
[root@dlp ~]# podman run -itd fedora /bin/bash
0c5954f2e21190f86c892de6e256951c1d5576b5d2aa00be6b799778709f56c9

# show podman proceses
[root@dlp ~]# podman ps
CONTAINER ID   IMAGE                                     COMMAND                  CREATED
STATUS        PORTS          NAMES
0c5954f2e211   registry.fedoraproject.org/fedora:latest /bin/bash               11 seconds ago   Up 11
seconds ago          funny_jang

# attach to container session
[root@dlp ~]# podman exec -it 0c5954f2e211 /bin/bash
[root@0c5954f2e211 /]#      # connected
[root@0c5954f2e211 /]# exit

# stop container process (if force stop, specify [kill])
[root@dlp ~]# podman stop 0c5954f2e211
[root@dlp ~]# podman ps
CONTAINER ID   IMAGE      COMMAND                  CREATED   STATUS    PORTS     NAMES
```

FreeIPA

FreeIPA

RHEL []

[1]

FreeIPA

```
[root@dlp ~]# dnf -y install freeipa-server freeipa-server-dns freeipa-client
```

[2]

DNS FreeIPA

```
# add own hostname
```

```
[root@dlp ~]# echo '10.0.0.40 dlp.ipa.srv.world dlp' >> /etc/hosts
```

```
[root@dlp ~]# ipa-server-install --setup-dns
```

The log file for this installation can be found in /var/log/ipaserver-install.log

=====

This program will set up the IPA Server.

Version 4.9.7

This includes:

- * Configure a stand-alone CA (dogtag) for certificate management
- * Configure the NTP client (chronyd)
- * Create and configure an instance of Directory Server
- * Create and configure a Kerberos Key Distribution Center (KDC)
- * Configure Apache (httpd)
- * Configure DNS (bind)
- * Configure the KDC to enable PKINIT

To accept the default shown in brackets, press the Enter key.

Enter the fully qualified domain name of the computer
on which you're setting up server software. Using the form

<hostname>.<domainname>

Example: master.example.com.

```
# confirm hostname and Enter
```

```
Server host name [dlp.ipa.srv.world]:
```

```
Warning: skipping DNS resolution of host dlp.ipa.srv.world
```


The domain name has been determined based on the host name.

confirm domain name and Enter

Please confirm the domain name [ipa.srv.world]:

The kerberos protocol requires a Realm name to be defined.

This is typically the domain name converted to uppercase.

confirm realm name and Enter

Please provide a realm name [IPA.SRV.WORLD]:

Certain directory server operations require an administrative user.

This user is referred to as the Directory Manager and has full access to the Directory for system management tasks and will be added to the instance of directory server created for IPA.

The password must be at least 8 characters long.

set Directory Manager password

Directory Manager password:

Password (confirm):

The IPA server requires an administrative user, named 'admin'.

This user is a regular system account used for IPA server administration.

set IPA admin password

IPA admin password:

Password (confirm):

Checking DNS domain ipa.srv.world., please wait ...

if you set DNS forwarder, answer [yes]

Do you want to configure DNS forwarders? [yes]:

The following DNS servers are configured in systemd-resolved: 10.0.0.10

Do you want to configure these servers as DNS forwarders? [yes]:

All detected DNS servers were added. You can enter additional addresses now:

Enter an IP address for a DNS forwarder, or press Enter to skip:

DNS forwarders: 10.0.0.10

Checking DNS forwarders, please wait ...

DNS server 10.0.0.10 does not support DNSSEC: answer to query '. SOA' is missing DNSSEC signatures (no RRSIG data)

Please fix forwarder configuration to enable DNSSEC support.

DNS server 10.0.0.10: answer to query '. SOA' is missing DNSSEC signatures (no RRSIG data)

Please fix forwarder configuration to enable DNSSEC support.

WARNING: DNSSEC validation will be disabled

if you search reverse zone of DNS forwarder, answer [yes]

Do you want to search for missing reverse zones? [yes]:

if you configure chrony, answer [yes]

Do you want to configure chrony with NTP server or pool address? [no]:

The IPA Master Server will be configured with:

Hostname: dlp.ipa.srv.world

IP address(es): 10.0.0.40

Domain name: ipa.srv.world

Realm name: IPA.SRV.WORLD

The CA will be configured with:

Subject DN: CN=Certificate Authority,O=IPA.SRV.WORLD

Subject base: O=IPA.SRV.WORLD

Chaining: self-signed

BIND DNS server will be configured to serve IPA domain with:

Forwarders: 10.0.0.10

Forward policy: only

Reverse zone(s): No reverse zone

confirm settings and proceed with [yes]

Continue to configure the system with these values? [no]: yes

The following operations may take some minutes to complete.

Please wait until the prompt is returned.

Disabled p11-kit-proxy

Synchronizing time

No SRV records of NTP servers found and no NTP server or pool address was provided.

Using default chrony configuration.

Attempting to sync time with chronyc.

Time synchronization was successful.

Configuring directory server (dirsrv). Estimated time: 30 seconds

[1/41]: creating directory server instance

Validate installation settings ...

Create file system structures ...

Perform SELinux labeling ...

Create database backend: dc=ipa,dc=srv,dc=world ...

Perform post-installation tasks ...

[2/41]: tune ldbm plugin

[3/41]: adding default schema

[4/41]: enabling memberof plugin

.....

.....

=====

Setup complete

Next steps:

1. You must make sure these network ports are open:

TCP Ports:

- * 80, 443: HTTP/HTTPS
- * 389, 636: LDAP/LDAPS
- * 88, 464: kerberos
- * 53: bind

UDP Ports:

- * 88, 464: kerberos
- * 53: bind
- * 123: ntp

2. You can now obtain a kerberos ticket using the command: 'kinit admin'
This ticket will allow you to use the IPA tools (e.g., ipa user-add)
and the web user interface.

Be sure to back up the CA certificates stored in /root/cacert.p12

These files are required to create replicas. The password for these
files is the Directory Manager password

The ipa-server-install command was successful

[3]

Kerberos

```
[root@dlp ~]# kinit admin
```

```
Password for admin@IPA.SRV.WORLD:      # IPA admin password
```

```
[root@dlp ~]# klist
```

```
Ticket cache: KCM: 0
```

Default principal: admin@IPA.SRV.WORLD

Valid starting	Expires	Service principal
11/11/2021 16: 47: 03	11/12/2021 16: 09: 58	krbtgt/IPA.SRV.WORLD@IPA.SRV.WORLD

[4]	
-----	--

```
[root@dlp ~]# firewall-cmd --add-service={freeipa-ldap, freeipa-ldaps, dns, ntp}
success
[root@dlp ~]# firewall-cmd --runtime-to-permanent
success
```

Apache httpd

Apache httpd Web

[1]

Apache httpd

```
[root@www ~]# dnf -y install httpd
# rename or remove welcome page
[root@www ~]# mv /etc/httpd/conf.d/welcome.conf /etc/httpd/conf.d/welcome.conf.org
```

[2]

httpd

```
[root@www ~]# vi /etc/httpd/conf/httpd.conf
# line 91 : change to admin's email address
ServerAdmin root@srv.world
# line 100 : change to your server's name
ServerName www.srv.world:80
# line 149 : change (remove [Indexes])
Options FollowSymLinks
# line 156 : change
AllowOverride All
# line 169 : add file name that it can access only with directory's name
DirectoryIndex index.html index.php index.cgi
# add follows to the end
# server's response header
ServerTokens Prod
[root@www ~]# systemctl enable --now httpd
```

[3]

HTTP HTTP 80/TCP

```
[root@www ~]# firewall-cmd --add-service=http
success
[root@www ~]# firewall-cmd --runtime-to-permanent
success
```

[4]

HTML

```
[root@www ~]# vi /var/www/html/index.html
<html>
```

```
<body>
<div style="width: 100%; font-size: 40px; font-weight: bold; text-align: center;">
Test Page
</div>
</body>
</html>
```

MariaDB 10.5

MariaDB

[1]

MariaDB

```
[root@www ~]# dnf module -y install mariadb:10.5
[root@www ~]# vi /etc/my.cnf.d/charset.cnf
# create new
# set default charset
# if not set, default is [latin1]
# for the case of 4 bytes UTF-8, specify [utf8mb4]
[mysqld]
character-set-server = utf8mb4

[client]
default-character-set = utf8mb4

[root@www ~]# systemctl enable --now mariadb
```

[2]

Firewalld

MariaDB

MariaDB [3]

```
[root@www ~]# firewall-cmd --add-service=mysql
success
[root@www ~]# firewall-cmd --runtime-to-permanent
success
```

[3]

MariaDB

```
[root@www ~]# mysql_secure_installation
```

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
SERVERS IN PRODUCTION USE! PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
haven't set the root password yet, you should just press enter here.

Enter current password for root (enter for none):

OK, successfully used password, moving on...

Setting the root password or using the `unix_socket` ensures that nobody can log into the MariaDB root user without the proper authorisation.

You already have your root account protected, so you can safely answer 'n'.

```
# Switch to [unix_socket] authentication or not
# [unix_socket] authentication is already enabled by default, so it's OK with [No]
Switch to unix_socket authentication [Y/n] n
... skipping.
```

You already have your root account protected, so you can safely answer 'n'.

```
# set MariaDB root password or not
# [unix_socket] authentication is enabled by default, but
# if you set root password, it's also possible to login with password authentication.
# if not set root password, only OS root user can login as MariaDB root user
Change the root password? [Y/n] n
... skipping.
```

By default, a MariaDB installation has an anonymous user, allowing anyone to log into MariaDB without having to have a user account created for them. This is intended only for testing, and to make the installation go a bit smoother. You should remove them before moving into a production environment.

```
# remove anonymous users
Remove anonymous users? [Y/n] y
... Success!
```

Normally, root should only be allowed to connect from 'localhost'. This ensures that someone cannot guess at the root password from the network.

```
# disallow root login remotely
Disallow root login remotely? [Y/n] y
... Success!
```

By default, MariaDB comes with a database named 'test' that anyone can access. This is also intended only for testing, and should be removed

before moving into a production environment.

```
# remove test database
```

```
Remove test database and access to it? [Y/n] y
```

```
- Dropping test database...
```

```
... Success!
```

```
- Removing privileges on test database...
```

```
... Success!
```

Reloading the privilege tables will ensure that all changes made so far will take effect immediately.

```
# reload privilege tables
```

```
Reload privilege tables now? [Y/n] y
```

```
... Success!
```

Cleaning up...

All done! If you've completed all of the above steps, your MariaDB installation should now be secure.

Thanks for using MariaDB!

```
# connect to MariaDB with root
```

```
[root@www ~]# mysql
```

```
Welcome to the MariaDB monitor.  Commands end with ; or \g.
```

```
Your MariaDB connection id is 9
```

```
Server version: 10.5.11-MariaDB MariaDB Server
```

```
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
```

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
```

```
# [Unix_Socket] authentication is enabled by default
```

```
MariaDB [(none)]> show grants for root@localhost;
```

```
+-----+
+-----+
```

```
| Grants for
```

```
root@localhost
```

```

+-----+
-----+
| GRANT ALL PRIVILEGES ON *.* TO `root`@`localhost` IDENTIFIED VIA mysql_native_password
USING 'invalid' OR unix_socket WITH GRANT OPTION |
| GRANT PROXY ON ''@%' TO 'root'@`localhost` WITH GRANT
OPTION |
+-----+
-----+
2 rows in set (0.000 sec)

# show user list
MariaDB [(none)]> select user,host,password from mysql.user;
+-----+-----+-----+
| User      | Host      | Password |
+-----+-----+-----+
| mariadb.sys | localhost |          |
| root       | localhost | invalid  |
| mysql      | localhost | invalid  |
+-----+-----+-----+
3 rows in set (0.002 sec)

# show database list
MariaDB [(none)]> show databases;
+-----+
| Database      |
+-----+
| information_schema |
| mysql          |
| performance_schema |
+-----+
3 rows in set (0.001 sec)

# create test database
MariaDB [(none)]> create database test_database;
Query OK, 1 row affected (0.000 sec)

# create test table on test database
MariaDB [(none)]> create table test_database.test_table (id int, name varchar(50), address
varchar(50), primary key (id));
Query OK, 0 rows affected (0.108 sec)

```

```

# insert data to test table
MariaDB [(none)]> insert into test_database.test_table(id, name, address) values("001",
"Fedora", "Hiroshima");
Query OK, 1 row affected (0.036 sec)

# show test table
MariaDB [(none)]> select * from test_database.test_table;
+----+-----+-----+
| id | name  | address |
+----+-----+-----+
|  1 | Fedora | Hiroshima |
+----+-----+-----+
1 row in set (0.000 sec)

# delete test database
MariaDB [(none)]> drop database test_database;
Query OK, 1 row affected (0.111 sec)

MariaDB [(none)]> exit
Bye

```

[4]

MariaDB

```

[root@www ~]# systemctl stop mariadb
[root@www ~]# rm -rf /var/lib/mysql/*
[root@www ~]# mysql_install_db --datadir=/var/lib/mysql --user=mysql
[root@www ~]# systemctl start mariadb

```

FTP /

Samba

Samba

[1]

Samba

```
[root@smb ~]# dnf -y install samba
[root@smb ~]# mkdir /home/share
[root@smb ~]# chmod 777 /home/share
[root@smb ~]# vi /etc/samba/smb.conf
[global]
    # line 11 : add (set charset)
    unix charset = UTF-8
    dos charset = CP932
    # change (Windows default)
    workgroup = WORKGROUP
    security = user
    # add (IP addresses you allow to access)
    hosts allow = 127. 10.0.0.
    # add (no authentication)
    map to guest = Bad User

.....
.....

# add to the end
# any Share name you like
[Share]
    # specify shared directory
    path = /home/share
    # allow writing
    writable = yes
    # allow guest user (nobody)
    guest ok = yes
    # looks all as guest user
    guest only = yes
```

```
# set permission [777] when file created
force create mode = 777

# set permission [777] when folder created
force directory mode = 777
```

```
[root@smb ~]# systemctl enable --now smb
```

[2]

SELinux

[/home]

SELinux

```
[root@smb ~]# setsebool -P samba_enable_home_dirs on
[root@smb ~]# restorecon -R /home/share
```

[3]

Firewalld

Samba

```
[root@smb ~]# firewall-cmd --add-service=samba
success

[root@smb ~]# firewall-cmd --runtime-to-permanent
success
```



Postfix

Postfix SMTP

[1]

```
[root@mail ~]# dnf -y install postfix
```

[2]

[SMTP-Auth](#) [Dovecot](#) [SASL](#)

```
[root@mail ~]# vi /etc/postfix/main.cf
# line 95 : uncomment and specify hostname
myhostname = mail.srv.world
# line 102 : uncomment and specify domain name
mydomain = srv.world
# line 118 : uncomment
myorigin = $mydomain
# line 135 : change
inet_interfaces = all
# line 138 : change it if use only IPv4
inet_protocols = ipv4
# line 183 : add
mydestination = $myhostname, localhost.$mydomain, localhost, $mydomain
# line 283 : uncomment and specify your local network
mynetworks = 127.0.0.0/8, 10.0.0.0/24
# line 438 : uncomment (use Maildir)
home_mailbox = Maildir/
# line 593 : add
smtpd_banner = $myhostname ESMTP
# add to the end
# for example, limit an email size for 10M
message_size_limit = 10485760

# SMTP-Auth settings
smtpd_sasl_type = dovecot
```

```
smtpd_sasl_path = private/auth
smtpd_sasl_auth_enable = yes
smtpd_sasl_security_options = noanonymous
smtpd_sasl_local_domain = $myhostname
smtpd_recipient_restrictions = permit_mynetworks, permit_auth_destination,
permit_sasl_authenticated, reject
```

```
[root@mail ~]# systemctl enable --now postfix
```

[3]	Firewalld	SMTP	SMTP	[25/TCP]
-----	-----------	------	------	----------

```
[root@mail ~]# firewall-cmd --add-service=smtp
success
[root@mail ~]# firewall-cmd --runtime-to-permanent
success
```

GNOME

GUI

Fedora

GUI

GUI

[1]

GNOME

```
[root@dlp ~]# dnf -y group install "Basic Desktop" GNOME
```

[2]

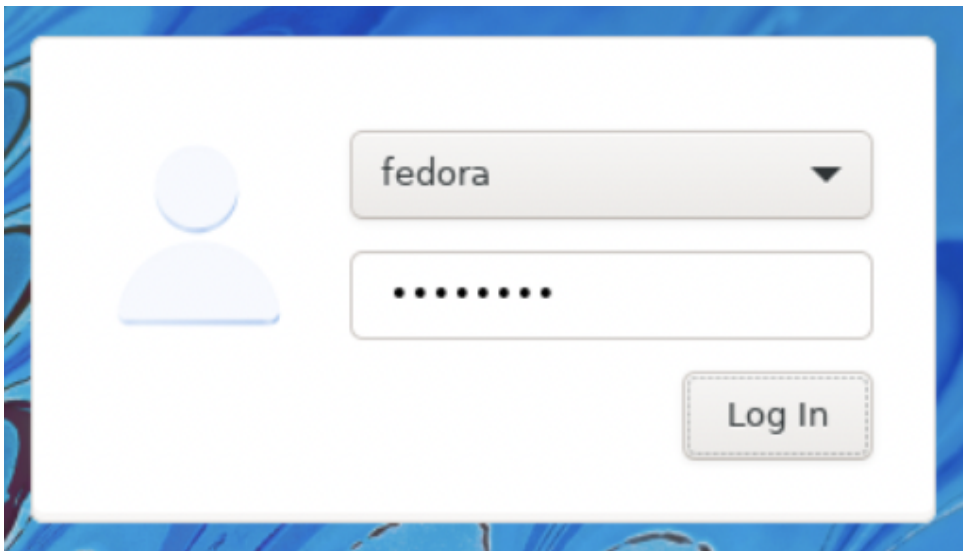
Desktop

CUI

Desktop

```
[fedora@dlp ~]$ startx
```

[3]



[4]

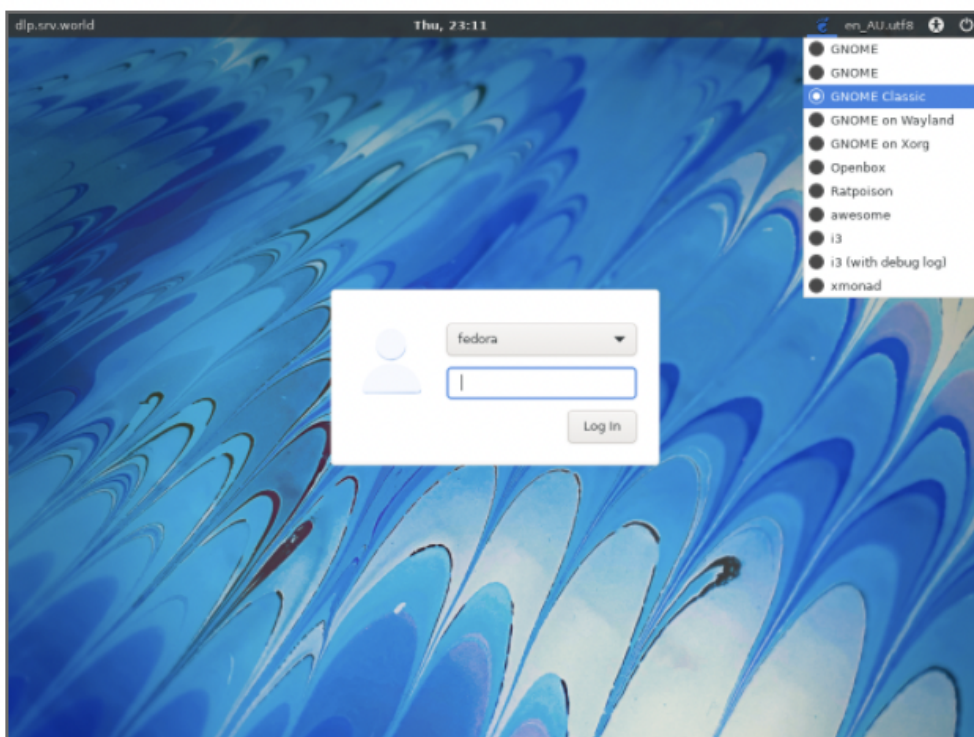
GNOME



[5]

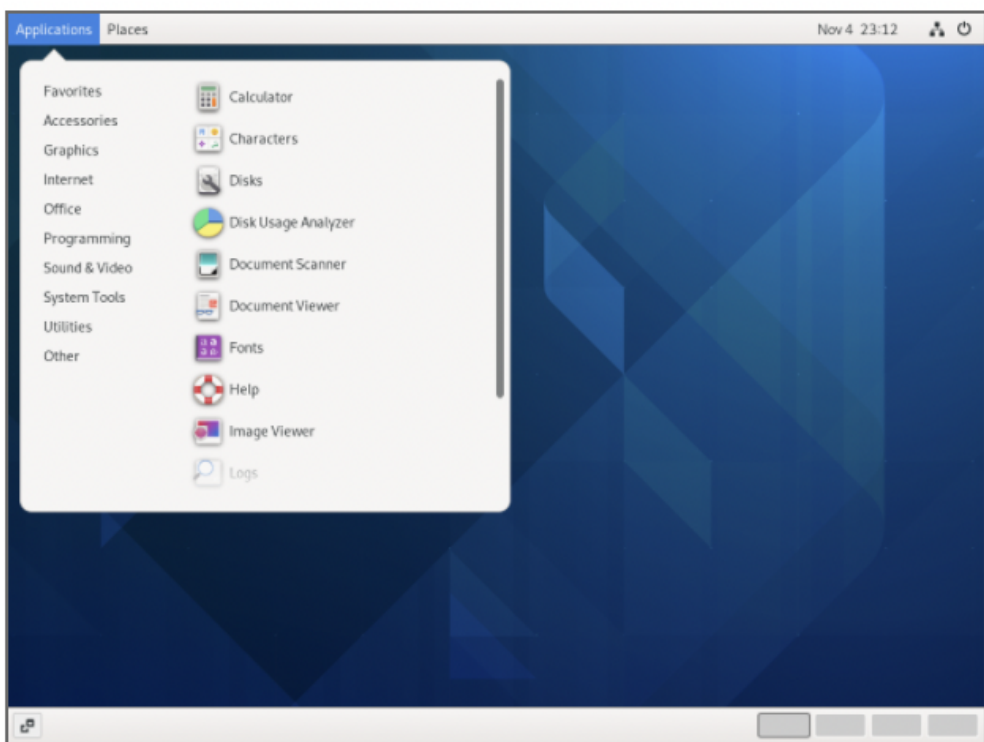
GNOME Shell

[Sign In]



[6]

GNOME



[1]	
-----	--

```
# show current hostname
[root@localhost ~]# hostname
localhost.localdomain
# change hostname
[root@localhost ~]# hostname dlp.srv.world
[root@localhost ~]# hostname
dlp.srv.world      # changed
```

[2]	
-----	--

```
[root@localhost ~]# hostnamectl set-hostname dlp.srv.world
# show settings
[root@localhost ~]# hostnamectl
Static hostname: dlp.srv.world
          Icon name: computer-vm
          Chassis: vm
          Machine ID: 4d832da9210f4cf8a4e4fbda78a5f42f
          Boot ID: 782a2058fcc74321938134befdb1709a
Virtualization: kvm
Operating System: Fedora Linux 35 (Server Edition)
          CPE OS Name: cpe:/o:fedoraproject:fedora:35
          Kernel: Linux 5.14.10-300.fc35.x86_64
          Architecture: x86-64
Hardware Vendor: Red Hat
Hardware Model: KVM
```