DS Docs

Testing FUSS with Incus

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1. About FUSS

FUSS is a GNU/Linux distribution based on Debian, for a Digitally Sustainable School. It includes all the software that is needed to create a computer lab:

server, client and standalone machines, with centralized user authentication and home directories.

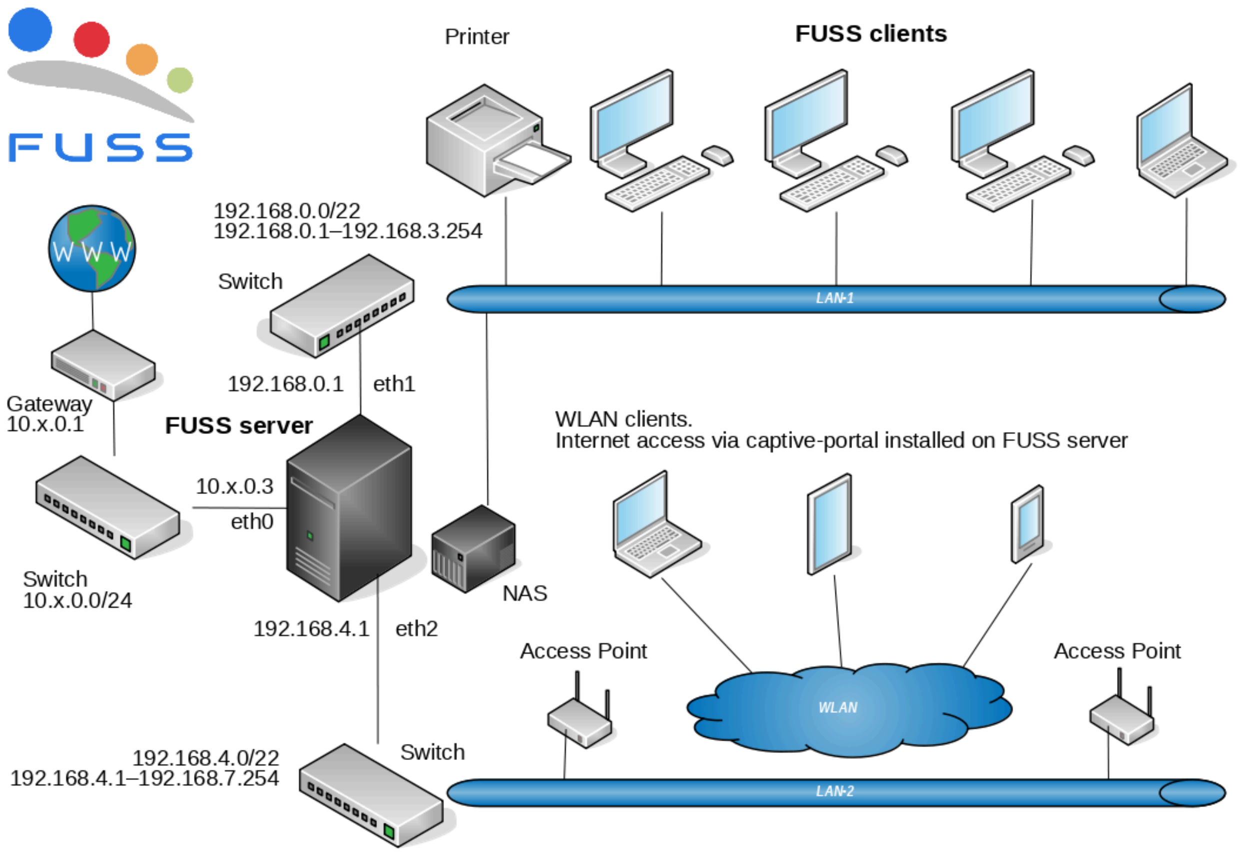


Figure 1. Typical topology of a FUSS network

▼ FUSS Workshop Video Recordings

- Introduction
- Installing fuss-server, fuss-client, and using Clonezilla
- Installing a client, creating user accounts, using Clonezilla

2. Server setup

Because I don’t have resources for testing it locally, I got a dedicated root server on Hetzner, and tried to test FUSS with virtual machines, virtual LANs etc. I use Incus to manage containers and virtual machines on this server.

NOTE

NOTE

Incus is a community fork of LXD (which is owned by Canonical).

For details about how to install and setup such a server see:

1. Dedicated Root Server
2. Basic server setup
3. Secure the server
4. Setup Incus
5. Setup Xpra

3. Create virtual LANs

All the containers and VMs are connected by default to a bridge (usually named **incusbr0**), which provides them with DHCP, DNS, and allows them to connect to the internet. It acts like a gateway for the VMs.

But we also need another virtual LAN for the FUSS clients, and another one for the Access Points. Let's call them `LAN1` and `LAN2`. These LANs should not provide DHCP and should not act as a gateway for the VMs, because this should be done by the FUSS server.

```
incus network list
incus network create LAN1 \
    ipv4.address=none ipv4.nat=false
incus network show LAN1
incus network unset LAN1 ipv4.address
incus network unset LAN1 ipv4.nat
incus network unset LAN1 ipv6.address
incus network unset LAN1 ipv6.nat
incus network show LAN1

incus network list
incus network create LAN2 \
    ipv4.address=none ipv4.nat=false
```

```
incus network show LAN2
incus network unset LAN2 ipv4.address
incus network unset LAN2 ipv4.nat
incus network unset LAN1 ipv6.address
incus network unset LAN1 ipv6.nat
incus network show LAN2
```

Let’s also add them to the `trusted` zone of **firewalld**:

```
firewall-cmd --permanent --zone=trusted --add-interface=LAN1
firewall-cmd --permanent --zone=trusted --add-interface=LAN2
firewall-cmd --reload
firewall-cmd --zone=trusted --list-all
```

4. Install the FUSS server

We are going to install it from scratch, starting from a basic Debian installation (instead of using a pre-installed FUSS image to build a virtual machine, inside proxmox).

4.1. Create a VM

```
incus init fuss-server --empty --vm \
    --network=incusbr0 \
    -d root,size=100GB \
    -c limits.memory=4GB -c limits.cpu=2
incus network attach LAN1 fuss-server eth1 eth1
incus network attach LAN2 fuss-server eth2 eth2
```

By default, the VM is connected to the network **incusbr0**, which also allows it to access the internet. We also attach **fuss-server** to **LAN1** and **LAN2**, so it is going to have two more network interfaces connected to these LANs.

With the last command we also make the size of the disk bigger than the default one.

Notice (on the first command) that instead of providing an image for the VM, we have used the option `--empty`, which means that nothing will be installed by default on the disk. We need to download the installation iso of Debian 12 ("bookworm") and attach it to the VM like a CDROM:

```
wget https://cdimage.debian.org/debian-cd/current/amd64/iso-
cd/debian-12.5.0-amd64-netinst.iso

incus config device add \
    fuss-server cdrom disk \
    source=$(pwd)/debian-12.5.0-amd64-netinst.iso \
    boot.priority=1
incus config set \
    fuss-server security.secureboot=false
```

The options `boot.priority=1` and `security.secureboot=false` are needed to make sure that we actually boot the system from this iso.

```
incus config device show fuss-server
incus config show fuss-server | less
```

4.1.1. Install the server

Let's start the fuss-server VM:

```
incus start fuss-server --console=vga
```

NOTE

We should run this command on a terminal that we access through Xpra, so that the console of the virtual machine is displayed on our local machine (laptop).

The VM will boot from the iso that we downloaded, and we can follow the installation steps. This section of the FUSS docs has more details about the selections during installation: https://fuss-tech-guide.readthedocs.io/it/latest/quick-install.html#configurazioni-iniziali

After finishing the installation, we should remove the cdrom device from the VM and start it again:

```
incus stop -f fuss-server
incus config device rm fuss-server cdrom
incus config device show fuss-server

incus start fuss-server
incus console fuss-server --type=vga
```

4.1.2. Install the incus-agent

The VM that we just installed from an iso cannot be managed easily with `incus` commands — some functionality is not available. For example we cannot do `incus shell fuss-server` to get a shell inside the VM.

To fix this, we need to install `incus-agent` inside the VM. From the VGA console, get a root terminal and do:

```
mount -t 9p config /mnt
cd /mnt
./install.sh
cd
umount /mnt
systemctl start incus-agent
```

4.2. Setup LAN1 interface

Append these lines to `/etc/network/interfaces`:

```
cat <<EOF >> /etc/network/interfaces

# LAN1
allow-hotplug enp6s0
iface enp6s0 inet static
      address 192.168.0.1
      netmask 255.255.255.0
      network 192.168.0.0
```

```
EOF
```

Then activate this interface:

```
ip addr
ifup enp6s0
ip addr
```

4.3. Install `fuss-server`

The custom package `fuss-server` contains the scripts that are needed to do the installation and configuration of the server.

First of all, append these line to `/etc/apt/sources.list`:

```
cat <<EOF >> /etc/apt/sources.list

deb http://deb.debian.org/debian/ bookworm-backports main
deb [signed-by=/usr/share/keyrings/fuss-keyring.gpg]
http://archive.fuss.bz.it/ bookworm main

EOF
```

Then add the key:

```
apt install gnupg
wget -qO \
    /usr/share/keyrings/fuss-keyring.gpg \
    https://archive.fuss.bz.it/apt.gpg
```

Finally install the package:

```
apt update
apt install fuss-server
```

4.4. Configuration

```
fuss-server --help
fuss-server configure
cat /etc/fuss-server/fuss-server.yaml
fuss-server create
```

The `create` command will run the Ansible scripts that are needed to install and configure the rest of the system.

For more explanations and details see: https://fuss-tech-guide.readthedocs.io/it/latest/server/configurazione_server.html#configurazione-fuss-server

5. Install a FUSS client

We are going to install first the latest version of the Debian 12 Xfce live ISO, which can be downloaded from here: https://cdimage.debian.org/mirror/cdimage/release/current-live/amd64/iso-hybrid/

```
debarchive="https://cdimage.debian.org"
path="mirror/cdimage/release/current-live/amd64/iso-hybrid"
wget "$debarchive/$path/debian-live-12.5.0-amd64-xfce.iso"
```

More details about how to install a client are available at the technician's manual.

5.1. Create a VM

Create an empty VM, connected to LAN1:

```
incus init client1 \
    --empty --vm \
    --network=LAN1 \
    -d root,size=40GB \
    -c limits.memory=2GB \
    -c limits.cpu=2
```

Attach the iso file as a device of type disk, and make it the first boot option. Disable also secureboot:

```
incus config device add client1 cdrom \
    disk source=$(pwd)/debian-live-12.5.0-amd64-xfce.iso \
    boot.priority=1
incus config set client1 security.secureboot=false
```

Check its config:

```
incus config device show client1
incus config show client1 | less
```

5.2. Install it

Start it with a VGA console:

```
incus start client1 --console=vga
```

Complete the installation.

NOTE

During the installation, use `http://proxy:8080` as HTTP Proxy, because this client is on the LAN behind the FUSS server, and the server has installed squid and uses it as a proxy.

Stop the client, remove the iso device, and start it again:

```
incus stop -f client1
incus config device remove client1 cdrom
incus config device show client1
incus start client1
incus console client1 --type=vga
```

Login as `root` and install the Incus agent:

```
mount -t 9p config /mnt
cd /mnt
./install.sh
cd
umount /mnt
systemctl start incus-agent
```

5.3. Install fuss-client

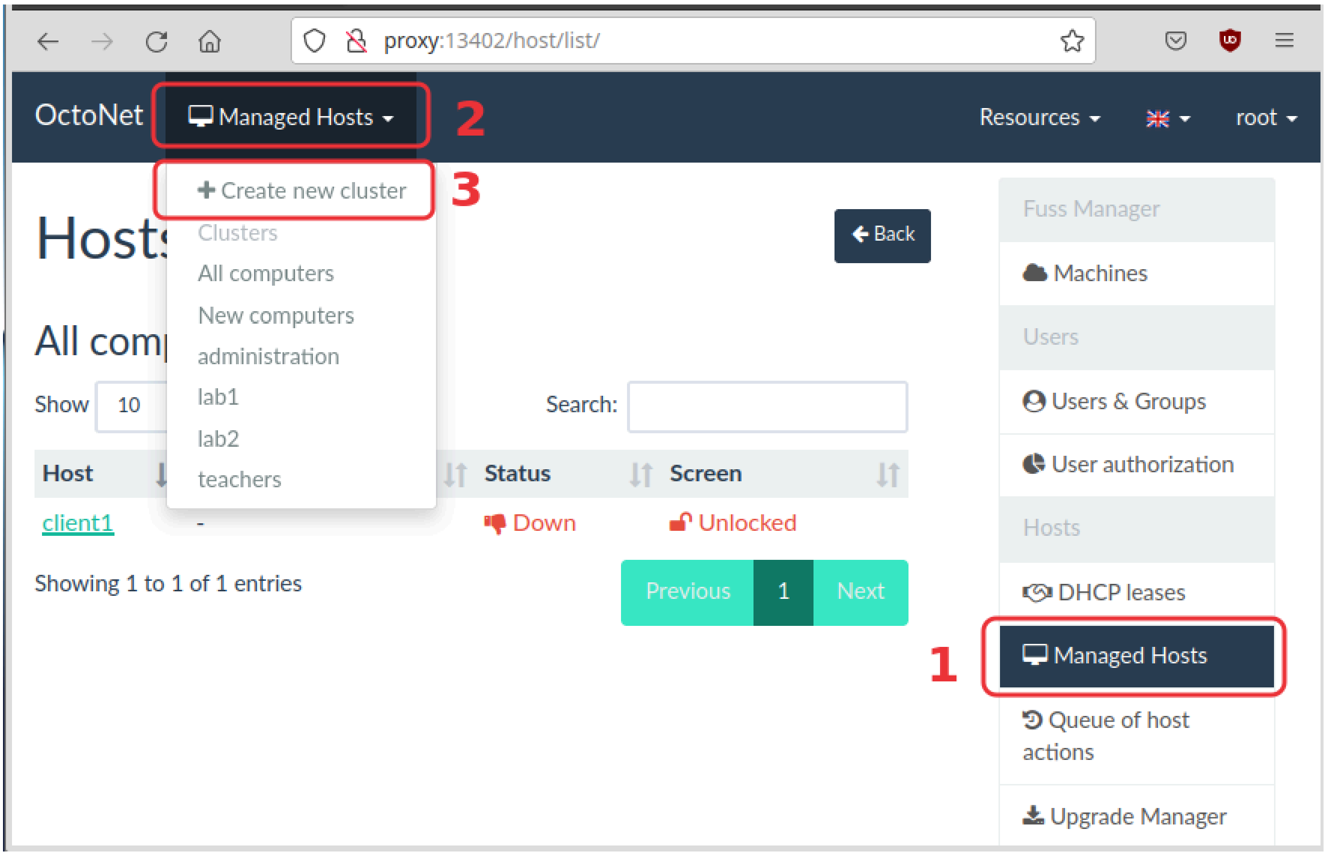
```
incus shell client1

cat <<EOF >> /etc/apt/sources.list

deb [signed-by=/usr/share/keyrings/fuss-keyring.gpg]
http://archive.fuss.bz.it/ bookworm main
deb http://httpredir.debian.org/debian bookworm-backports main

EOF

apt install wget
export http_proxy=http://proxy:8080
export https_proxy=http://proxy:8080
wget -qO /usr/share/keyrings/fuss-keyring.gpg
https://archive.fuss.bz.it/apt.gpg

apt update

cat <<EOF >> /etc/apt/apt.conf.d/no-bookworm-firmware.conf
APT::Get::Update::SourceListWarnings::NonFreeFirmware "false";
EOF

apt update
apt upgrade
apt dist-upgrade

apt install fuss-client
apt install systemd-timesyncd screen
```

5.4. Client configuration

Configuration of the client is done with the command `fuss-client`:

```
fuss-client --help
```

However, before starting the configuration, we need to know in which cluster/group of computers this client belongs to. Actually we haven't defined yet any clusters. One way for doing it is through the Octonet web interface. Open in browser `http://proxy:13402` and login with username `root` and the *master password* defined on the configuration of the server (it is not the password of the `root` account on the server). Then click on "Managed Hosts" on the right, click on "Managed Hosts" on the top, and select "Create new cluster" from the menu.



Host	Status	Screen
client1	Down	Unlocked

Showing 1 to 1 of 1 entries

Let's say that the name of this cluster is `lab1`. Now we can setup the client like this:

```
fuss-client -a -g lab1 -H client1 --light
```

The option `-a` is for adding a new client. The option `-g` is for the group/cluster of computers where this client belongs to. The option `-H` sets the hostname. The option `--light` will make a basic installation; without this option lots of educationsl programs will be installed (and right now we don’t want to do it, since we are just testing).

5.5. Fix the screen resolution

Let’s also fix the screen resolution of the client (because it gets automatically a very big resolution):

```
sed -i /etc/fuss-client/display-setup-
script/setDisplayResolution \
    -e 's/autorandr/#autorandr/'
sed -i /etc/fuss-client/display-setup-
script/setDisplayResolution \
    -e '/#autorandr/a xrandr -s 1280x800'
```

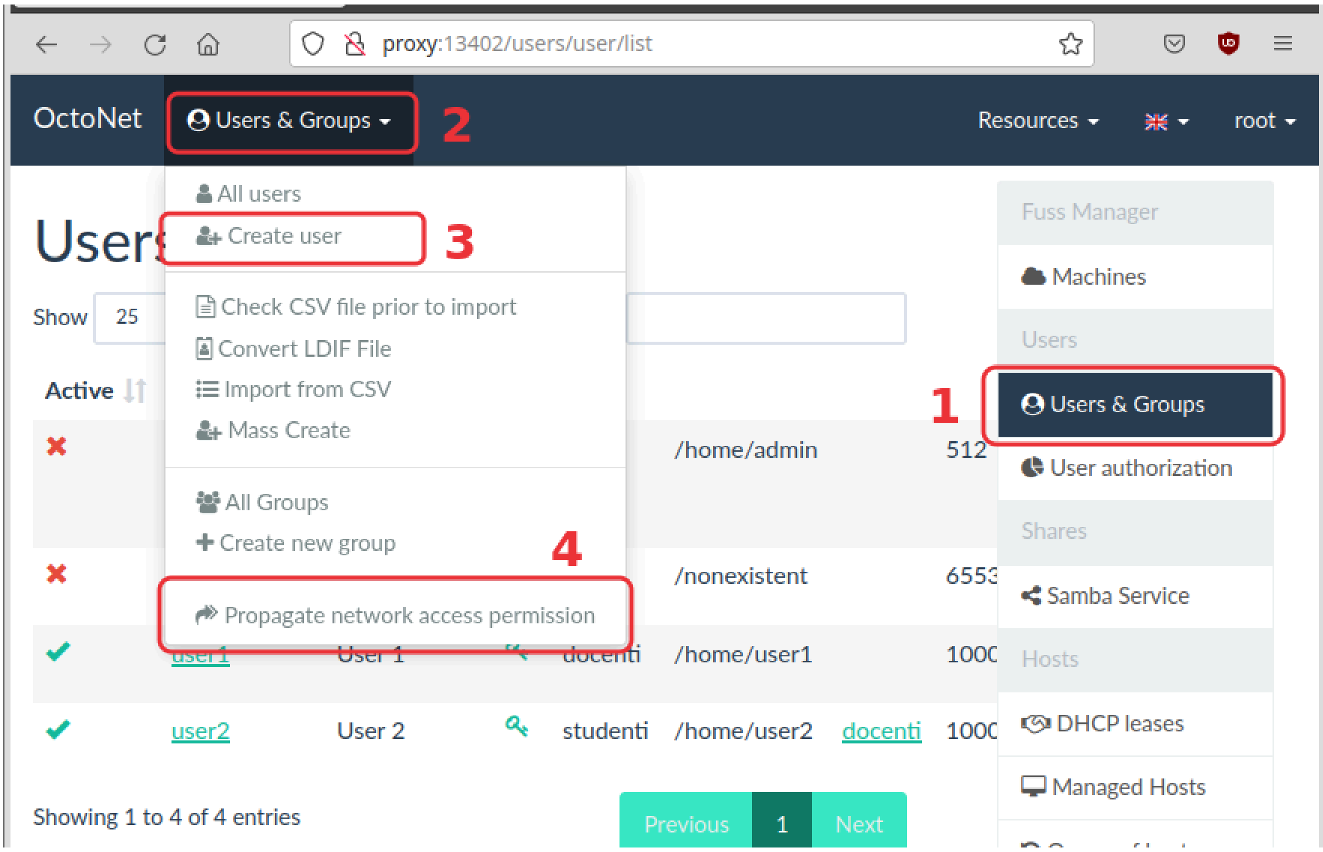
> NOTE
>
> This is needed only when testing with INCUS VMs. When installation is done on a real machine, most probably this issue does not happen.

6. Manage user accounts

User management is centralized, and it can be done from the web interface of OctoNet, at http://proxy:13402/ . Login as `root`, using the *master password* given during the configuration of the fuss-server.

6.1. Add new users

Open the OctoNet interface (on http://proxy:13402/) and add a couple of new users, for example `user1` and `user2`.



NOTE

Don’t forget to click the "Propagate" button, after creating the new users.

Now restart the client and try to login with each of them:

```
incus stop -f client1
incus start client1 --console=vga
```

Note that when you try to open a web site, the proxy asks you to authenticate with a username and password. Use the same username and password that you used to login to your account.

6.2. Add users from CSV

Create a CSV file like this:

```
cat <<EOF > user-list.csv
User 001,user001,pass001,studenti
User 002,user002,pass002,studenti
User 003,user003,pass003,studenti
User 004,user004,pass004,studenti
User 005,user005,pass005,studenti
EOF
```

In this example, the first column is the full name, the second one is the username, the third one is the password, and the last column is the primary group. The order of the columns does not matter because it can be fixed during the import.

There is an option in the menu for checking the file before importing it. After the check you can start importing.

For more details about creating accounts from CSV files, look at the corresponding docs.

7. Using Clonezilla

7.1. Save a client image

To start Clonezilla on `client1`, we have to boot it from the LAN. We need to disable secure boot and to set the network interface as the first boot device:

```
incus config set client1 security.secureboot=false
incus config device show client1
incus config device set client1 eth0 boot.priority=1
incus config device show client1
```

```
incus stop client1 --force
incus start client1 --console=vga
```

NOTE

As an alternative, without changing the boot order, we can keep pressing ESC as soon as the VM is started, until we get to the BIOS menu. Then select *Boot Manager*, and then *UEFI PXEv4*.

TIP

In case the mouse is locked, press `Shift_L + F12` to unlock it.

Now it will show the Clonezilla menu and you can save the image of the client on the server. For more details see this page.

After the image is saved, we can stop client1, remove the boot priority (that makes it boot from network), and start it again:

```
incus stop client1 --force
incus config device unset client1 eth0 boot.priority
incus config device show client1
incus start client1 --console=vga
```

7.2. Install a client from image

```
incus init client2 \
    --empty --vm \
    --network=LAN1 \
    -d root,size=40GB \
    -c limits.memory=2GB \
    -c limits.cpu=2
incus config set client2 security.secureboot=false
incus config device set client2 eth0 boot.priority=1
incus config device show client2

incus start client2 --console=vga
```

8. Testing Captive Portal

1. Install the CP on the FUSS server:

   ```
   incus shell fuss-server
   fuss-server cp
   exit
   ```

2. Create a VM that is connected to `LAN2` (similarly to the previous examples for `client1` and `client2`). Then try to access the internet from it.

0 comments

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