ecler

TUTORIAL

S&F - Store & Forward
Setting up an SSH server

PLAYER ONE / PLAYER ZERO

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1. INTRODUCTION

The **Store and Forward (S&F)** module **allows PLAYER devices (Player ONE and Player ZERO) to download remote audio content to local storage media (USB/uSD).**

When it is active, it checks a remote location that hosts audio content on a daily basis, compares it to the current content stored on local media (USB/uSD) and, if necessary (if differences are detected), syncs the local content to make it an exact copy of the remote content. This is a safe method of playing content on the device during working hours (during the day), storing it on local media without the risks associated with real-time streaming.

The Store and Forward utility for remotely synchronising music content uses the Rsync (Remote Synchronization) tool.

⚠️ **This tutorial, focused exclusively on verification tests of the tool, is based on the synchronisation of a content folder with a PLAYER (Player ONE or Player ZERO) via a LINUX-based SSH server with a virtual machine on a Windows 11 PC as host**.

💡 **ECLER recommends using a virtual private server (VPS)** as a professional solution for the implementation of Store and Forward.

💡 From now on, **in this tutorial, we will use the word PLAYER to refer to both the Player ONE and Player ZERO models.**

2. INSTALLING SSH ON LINUX VIA VIRTUAL MACHINE ON PC

⚠️ This functionality may require IT knowledge, so **we recommend enlisting the support of a specialised technician.**

⚠️ To **set up cloud-based Store and Forward, a VPS (Virtual Private Server) service must be contracted** to obtain a public IP and access the SSH server via the Internet.

💡 **Before putting this tutorial into practice, we recommend reading it beforehand to avoid implementation errors**.
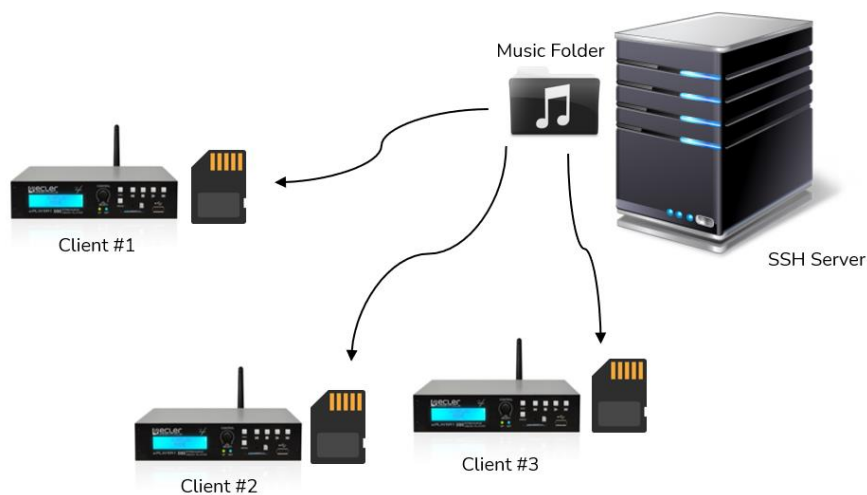

Figure 1: Standard media synchronisation (the one used in this Tutorial).

2.1 Tools Required

- **VIRTUALBOX Oracle Software.**

  On a PC with Windows 10 or 11, download and install the VirtualBox software with administrator permissions to create a Linux-based virtual machine; this will allow generation of the SSH server that will manage the Rsync synchronisation with the PLAYERS on the Network.

- **UBUNTU O.S.**

  Download the Ubuntu operating system (the LTS version).

  Click on the corresponding image to access the desired tool:

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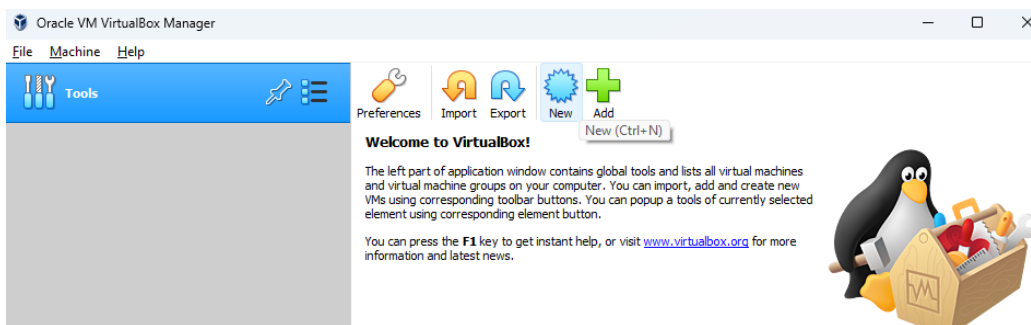
Adding audio content to the SSH server

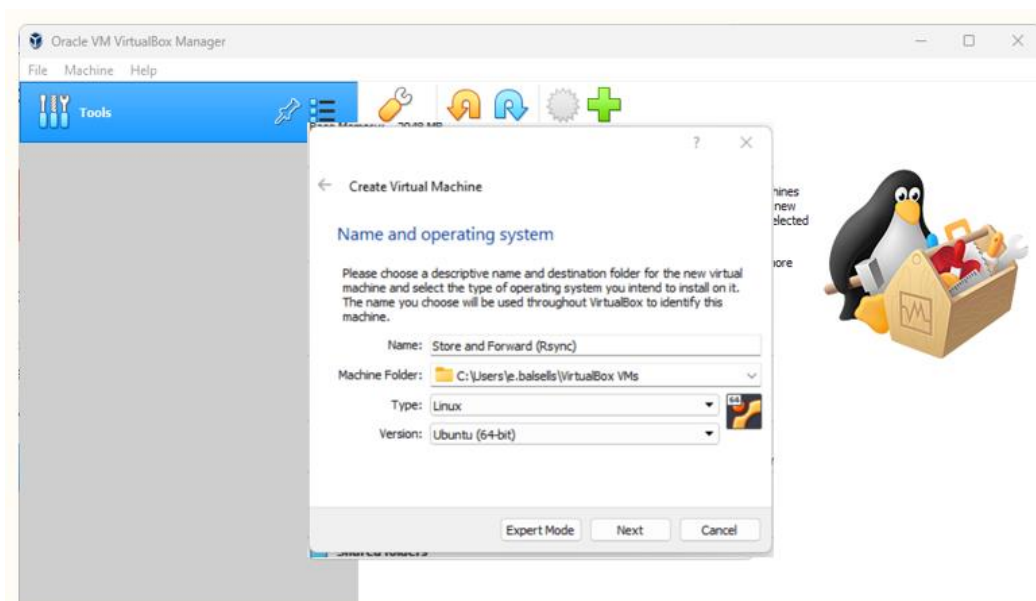Implementing S&F (Rsync) in SSH

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3. VIRTUAL MACHINE INSTALLATION (VIRTUAL BOX)

We are going to **load the UBUNTU operating system in the VirtualBox virtual machine.**

1. **Open VirtualBox as an Administrator** and click **"NEW".**

2. **Name:** **enter a name** for the virtual machine.

   Machine Folder: indicate the **folder location.**

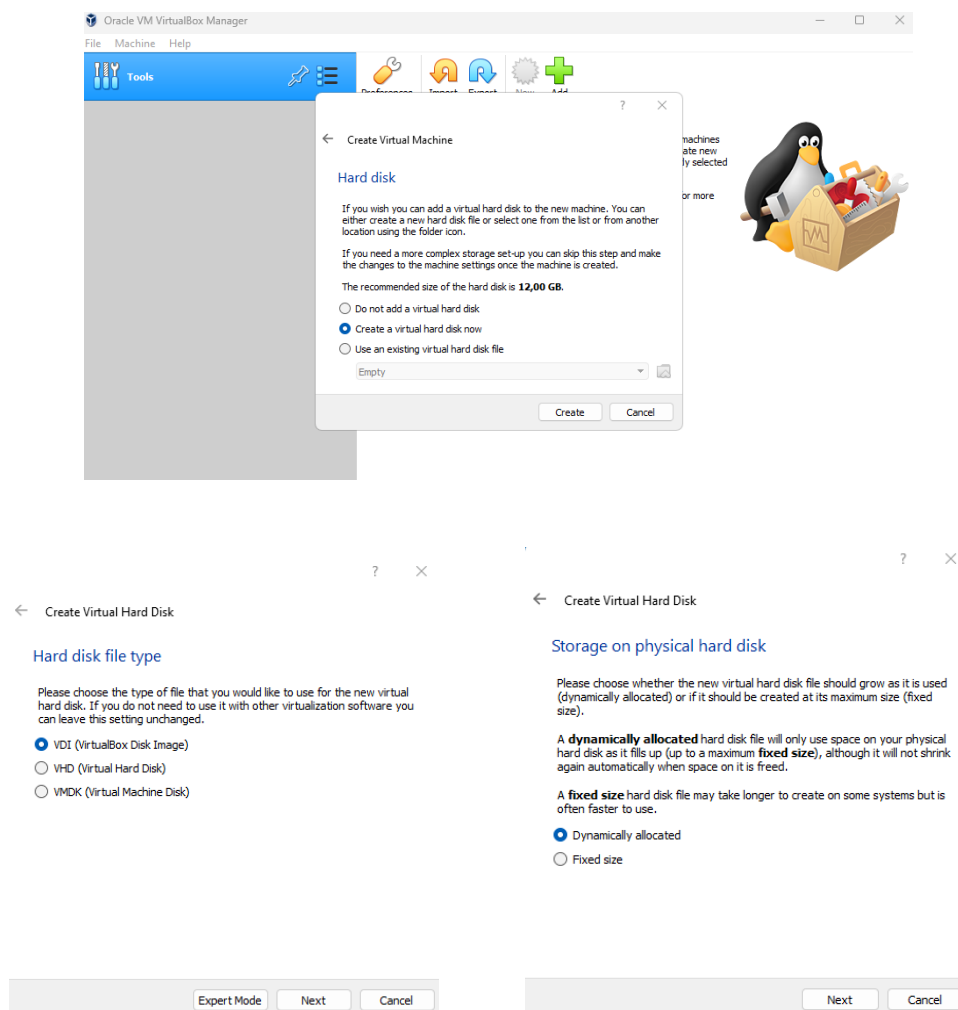   **Type:** indicate the **system type (Linux.)**

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3. In the next step, we indicate **the main memory (RAM)** that our **virtual machine** will have. **This should be set to 2GB (2048MB)**.
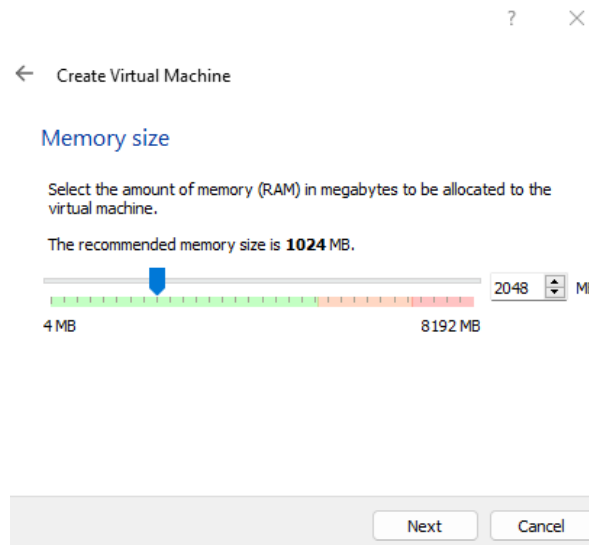

4. Now **we will create a "virtual" hard disk**, which will essentially be a folder that will occupy space on the physical hard disk dynamically.
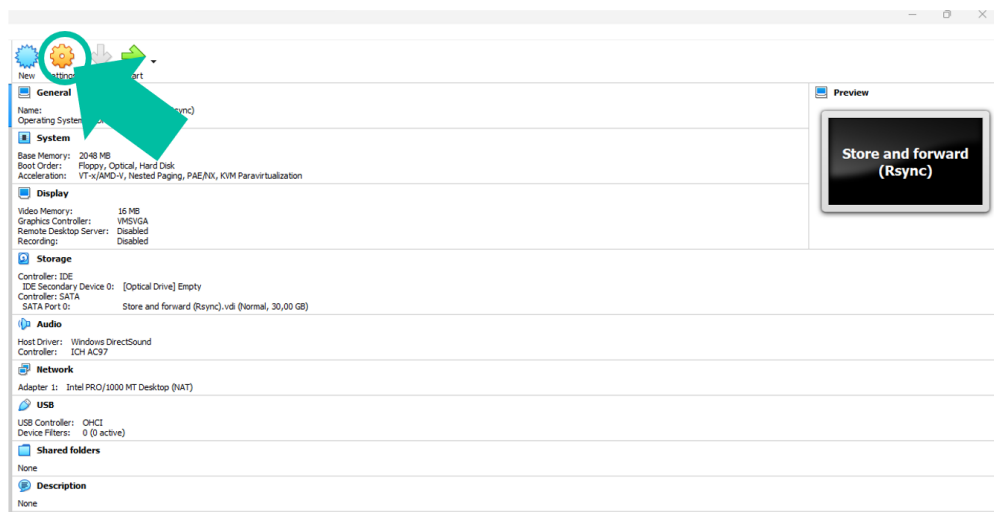
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We must also **indicate** the **usable space limit that we wish to apply;** in this particular case we will use a 30GB limit.
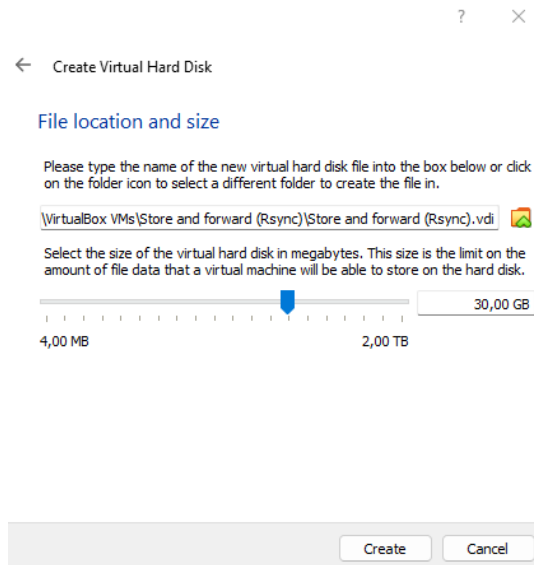
Our virtual machine overview is almost ready, now we must **configure it.**
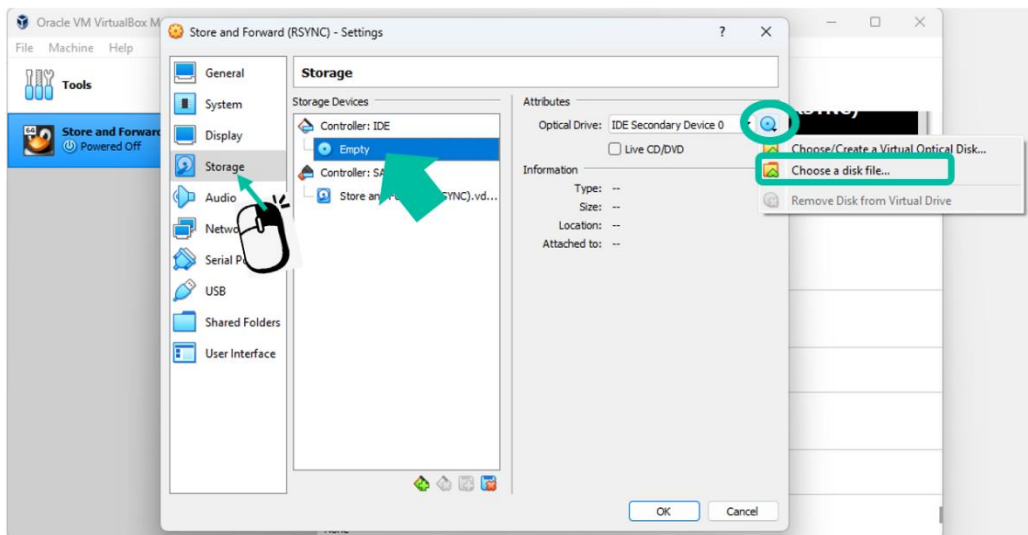
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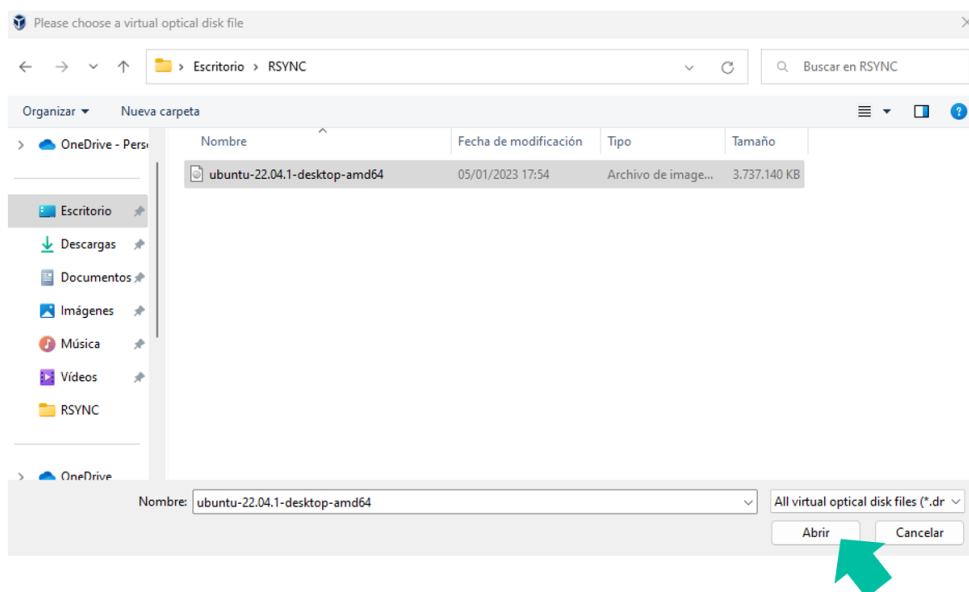
Store & Forward module (Rsync)

5. The **following menu** will appear, in which you must:

Place the cursor over "Storage", click **the right mouse button** and **select "Empty"**.

A drop-down menu will open and **in Attributes, click on the blue disk to the right** of "Optical Drive".
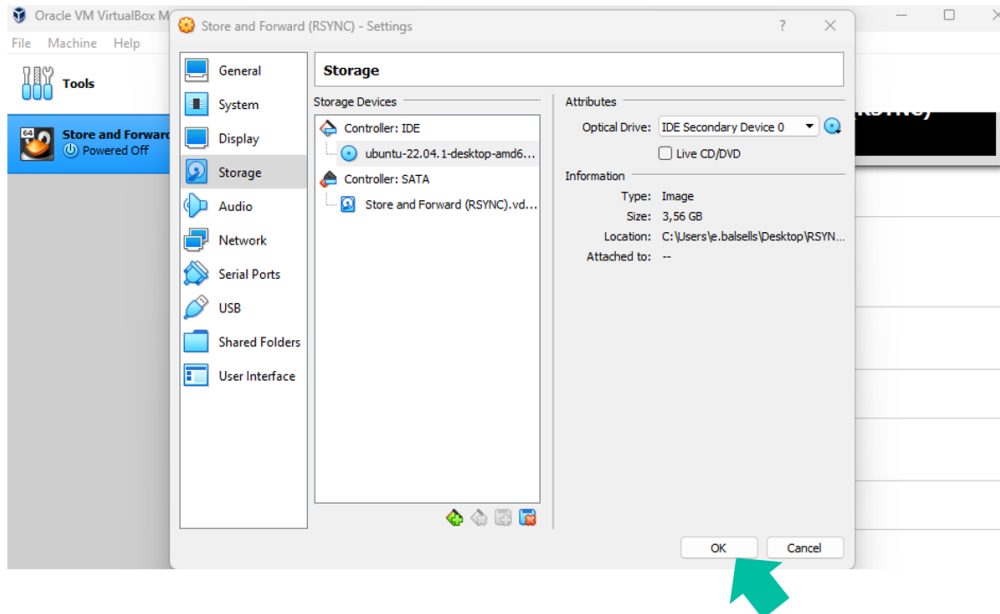

Locate the Ubuntu file you **downloaded earlier and** click **"Open".**

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Once the file is loaded, **click OK.**

6. **Virtual machine NETWORK configuration.**

In this step **we will configure the network adapter to create an additional physical network** to the one present on the PC, which **will be used in Ubuntu where the SSH Server will be hosted.**

💡 **We recommend configuring the associated network on the PC you are using with a FIXED IP** rather than a dynamic one (DHCP).

💡 **The Router must be correctly configured in DHCP mode, so that it assigns a different IP to that of the PC,** which will be the one used by the Virtual Machine.

💡 We recommend **using a wired network to the configured PC, with no additional network or WiFi active during this process.**

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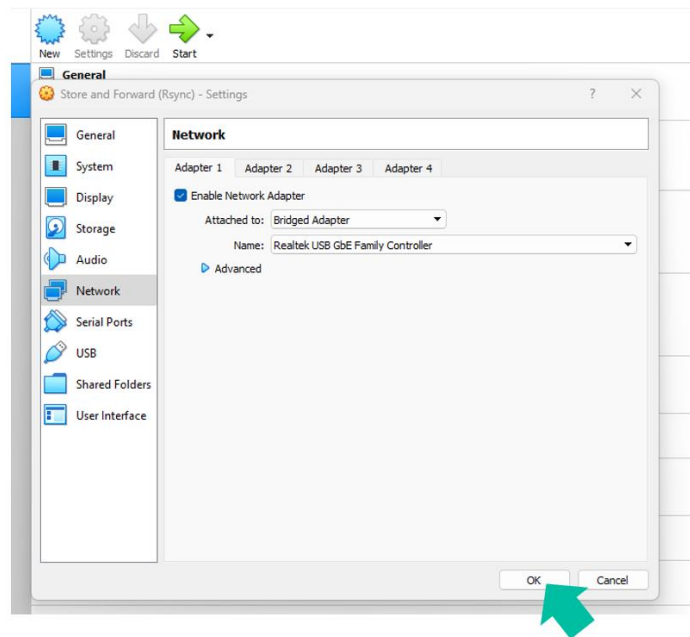Adding audio content to the SSH server

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In the **Configuration menu,** select **"Network"** and under **Adapter 1, check "Enable Network Adapter"** to enable it.
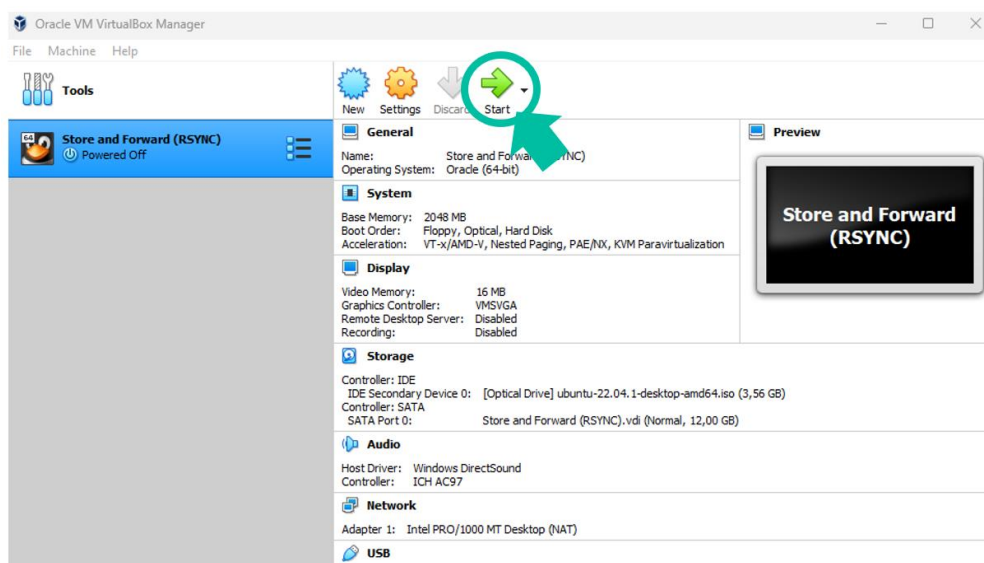
Next, **in** the **"Attached to"** drop-down list, **select "Bridged Adapter",** and **in "Name", select your wired network card.**
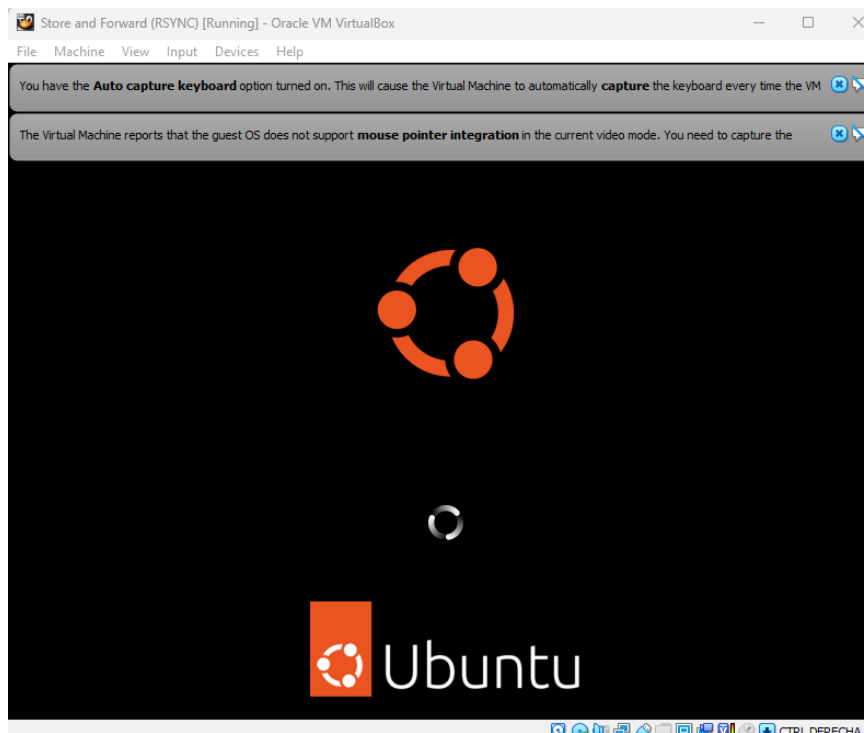
Lastly, **click OK.**

7. The last step to enable a Linux operating system in the virtual machine is the **installation of the operating system.**

To start the installation, **select "Start" after checking the previously configured virtual machine.**

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The **following screen** will appear; select **"Try or Install Ubuntu"** then **press ENTER.**
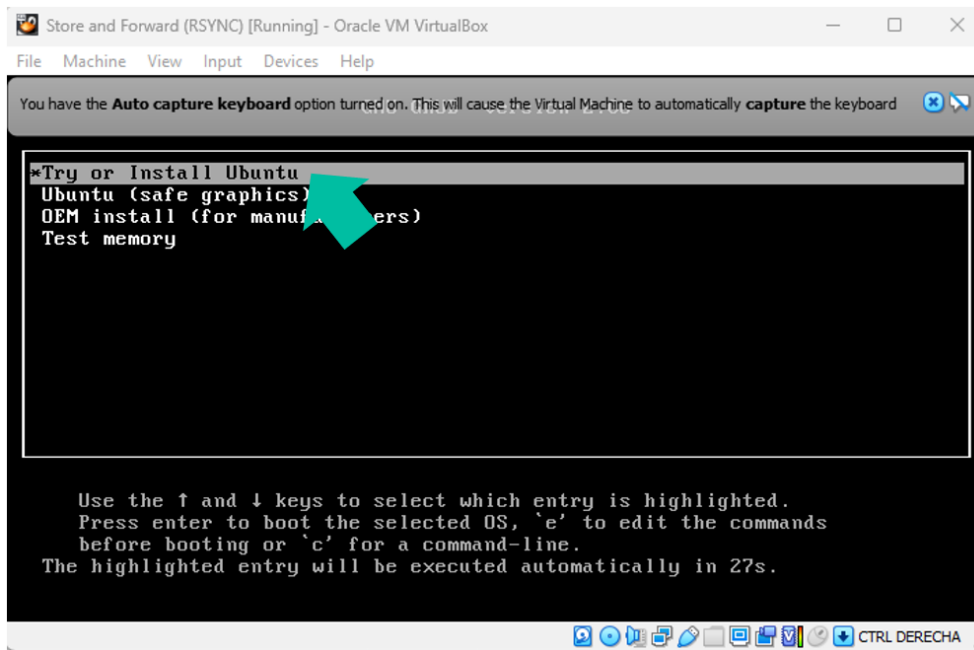
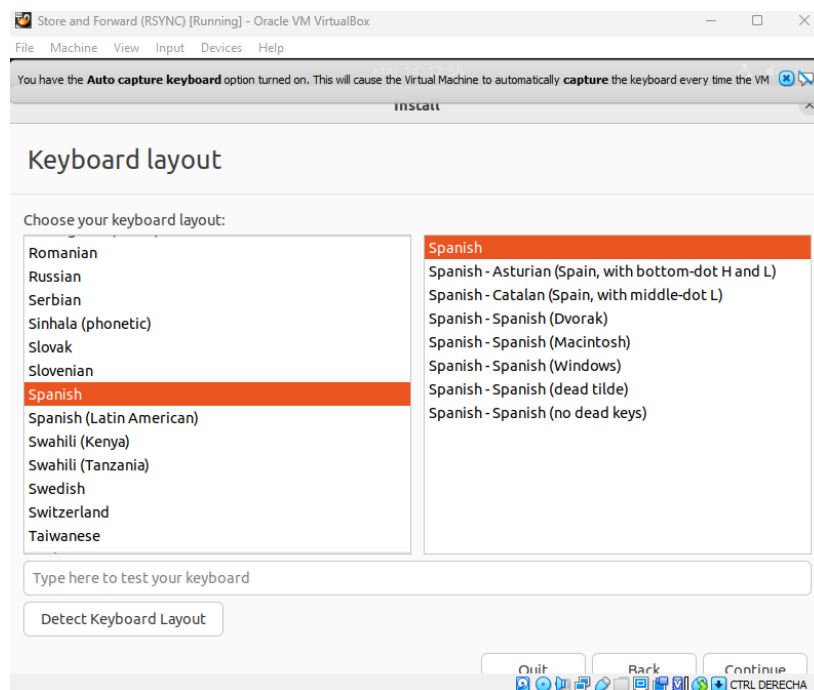The system will load and the **operating system configuration menu will open.**
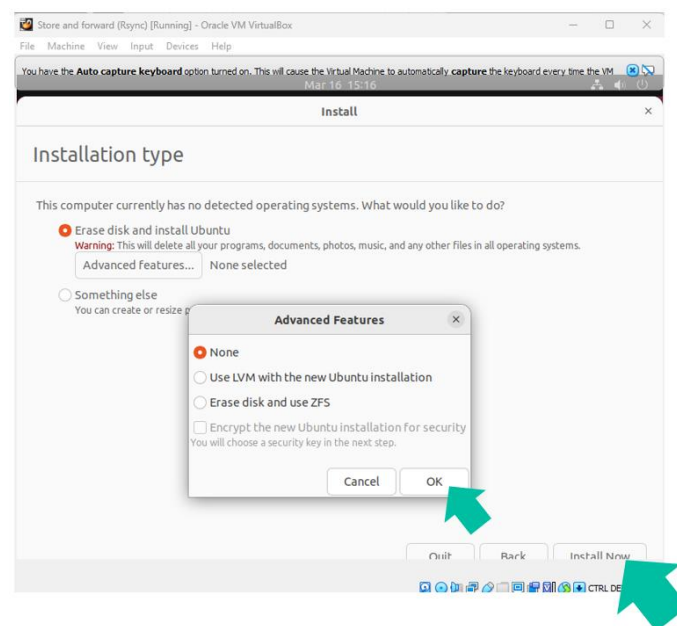
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Select the language and then select **"Install Ubuntu"**.
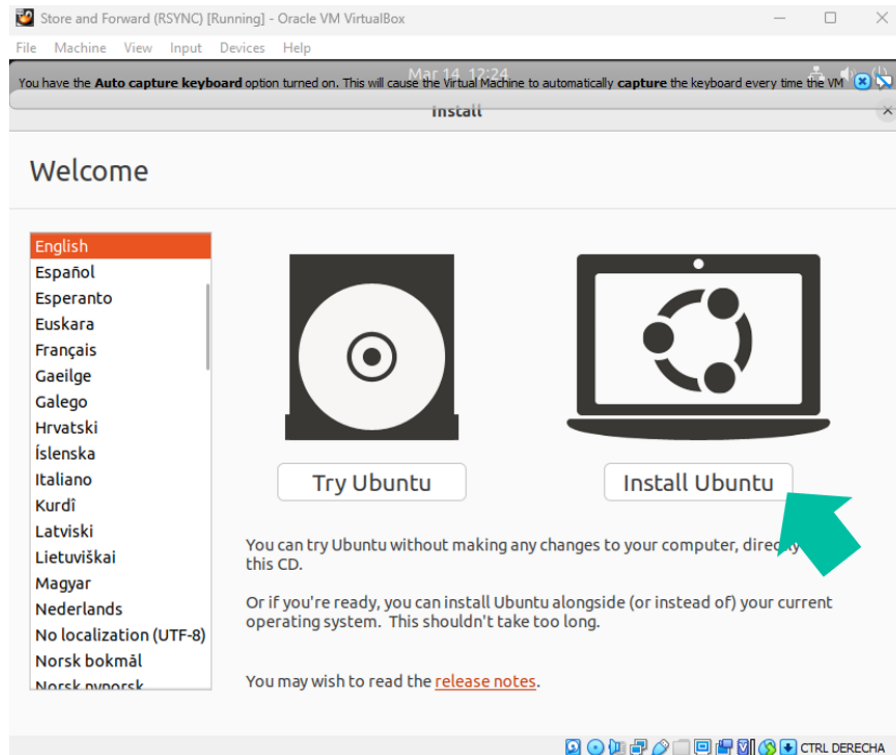
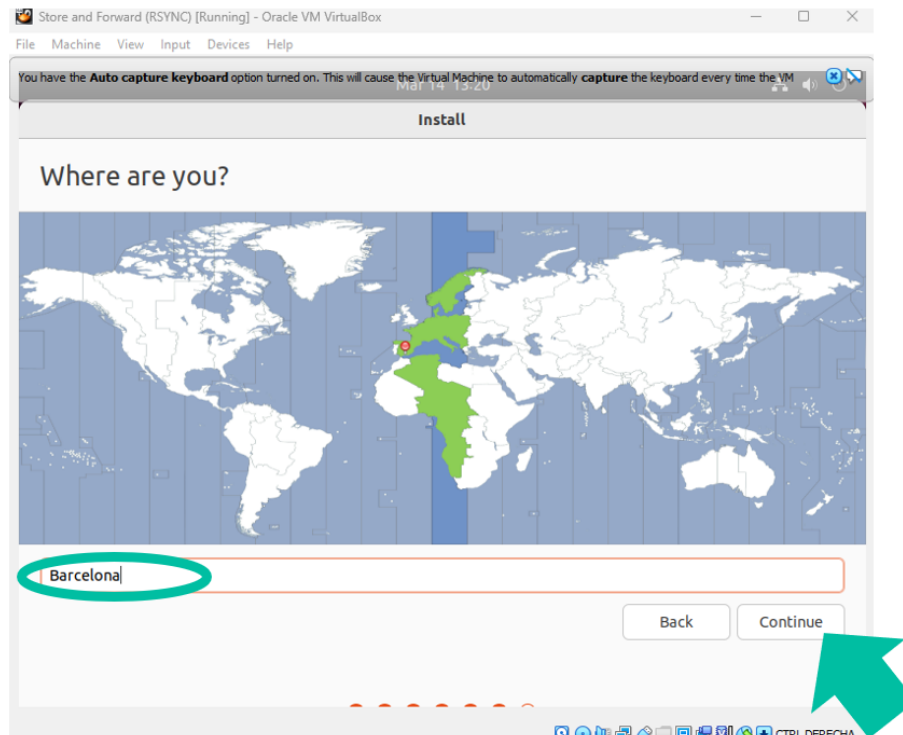Select the keyboard layout language and **click continue.**

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The **"Updates and other software"** screen will appear; **select "Minimal installation" and "Download updates while installing Ubuntu"** and click **Continue.**
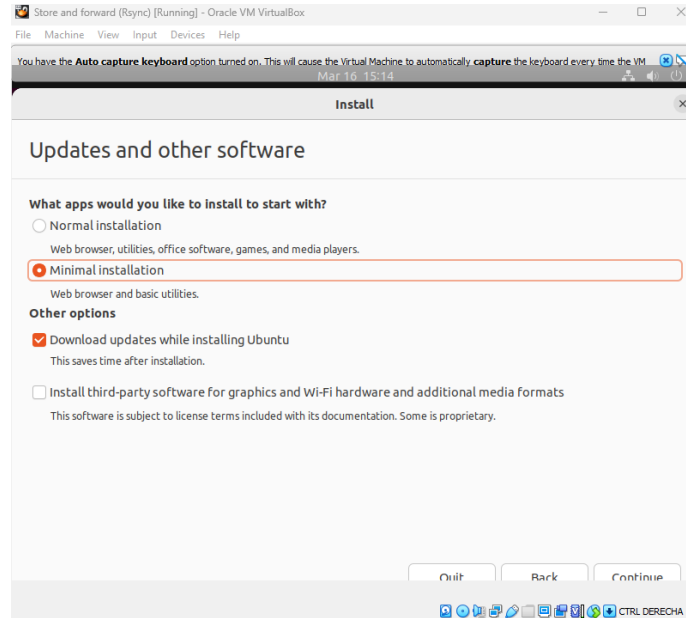
On the next screen that appears, select the type of installation. **Select "Advanced Features".**

A new window will open, select **"None"** and click **OK and** then click on **"Install now".**

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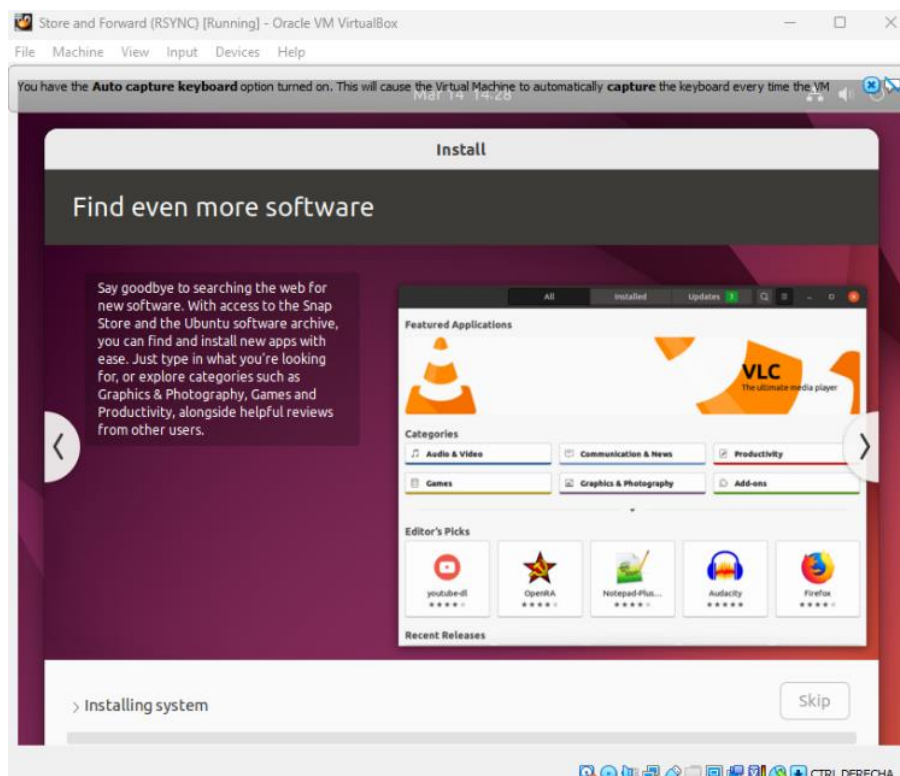
An information box will appear, **click "Continue".**
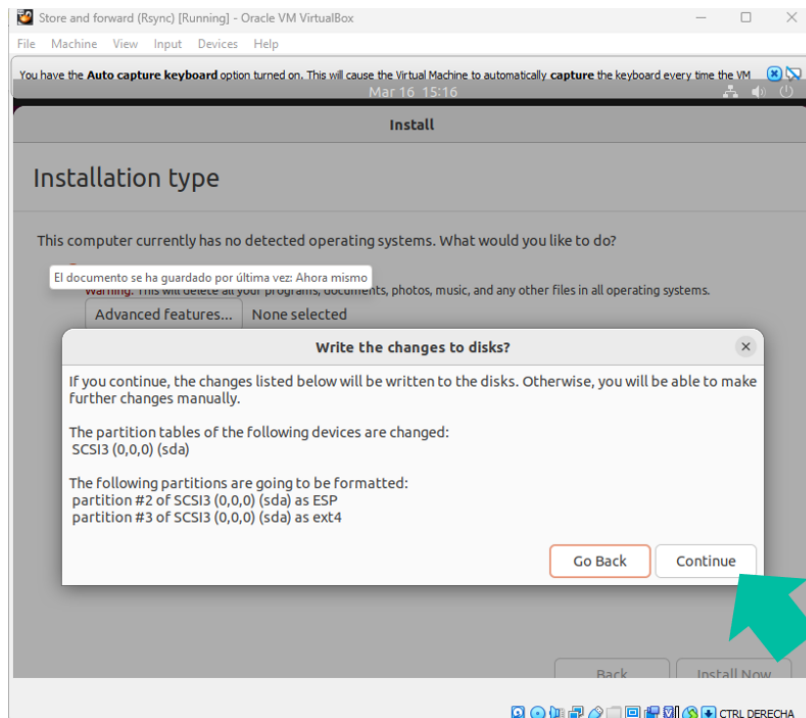
Enter your location and click "**Continue**".

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**Create your user profile and password** and click "**Continue**".
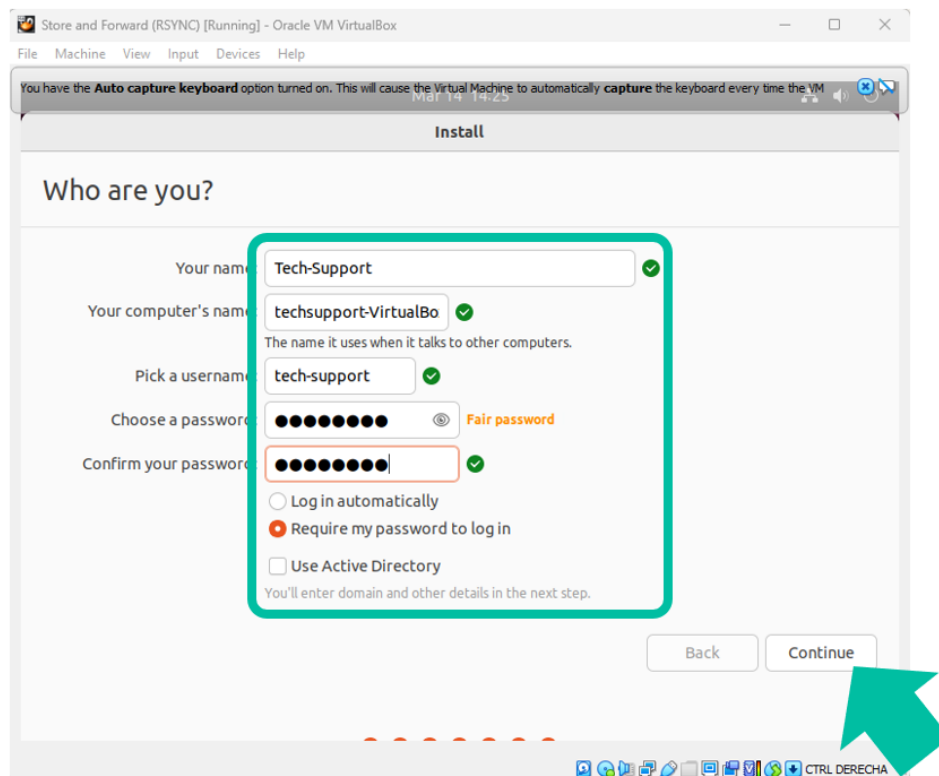
At this point **the installation of the Ubuntu operating system will begin**.

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Once **finished, you will be prompted to reboot**. Press **"Enter"**.
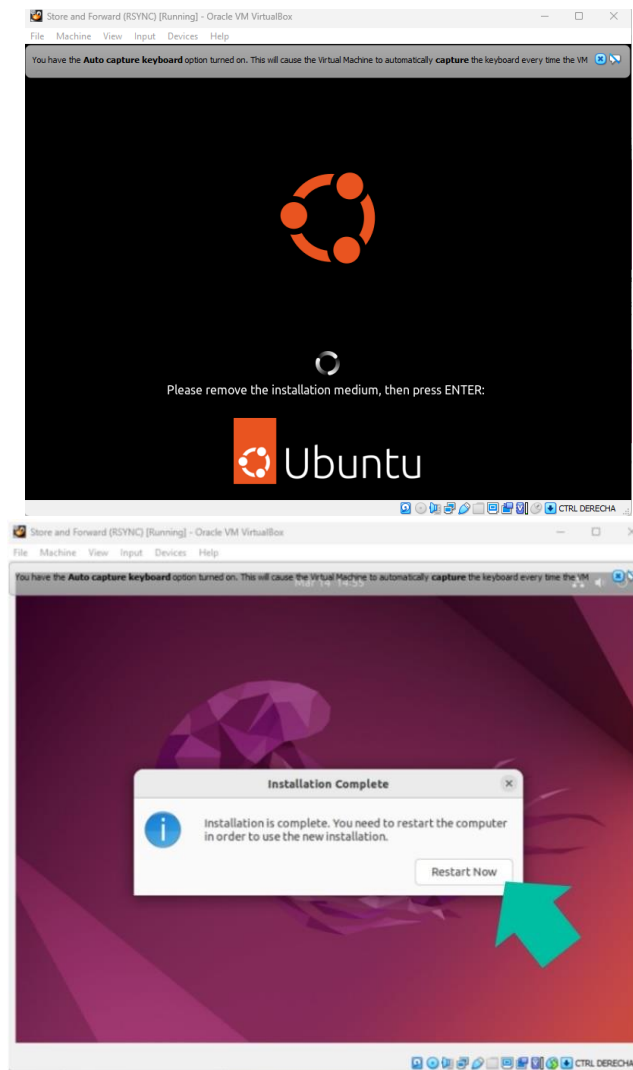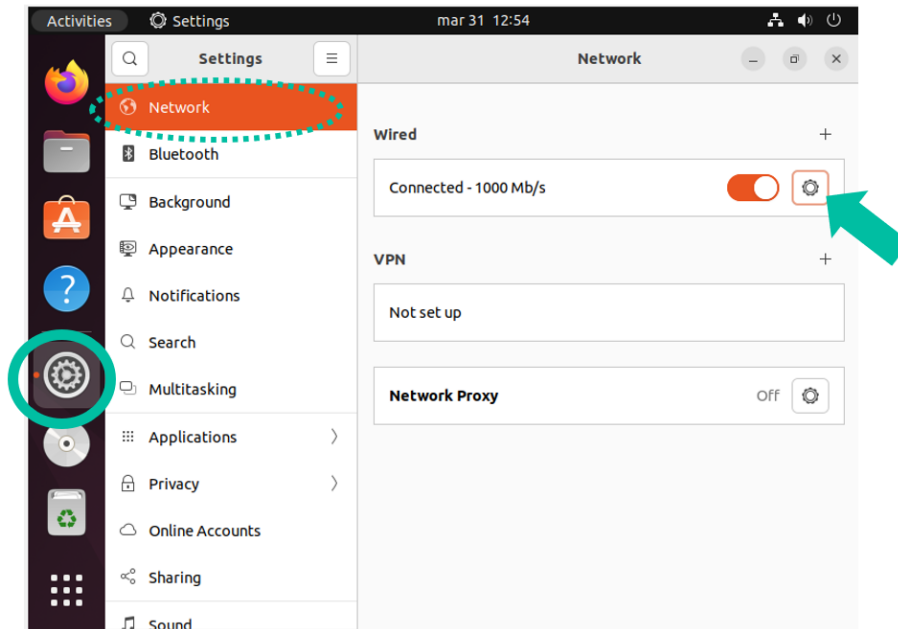

The programme will restart and will ask for the **user password**, type it and **press "Enter"**.
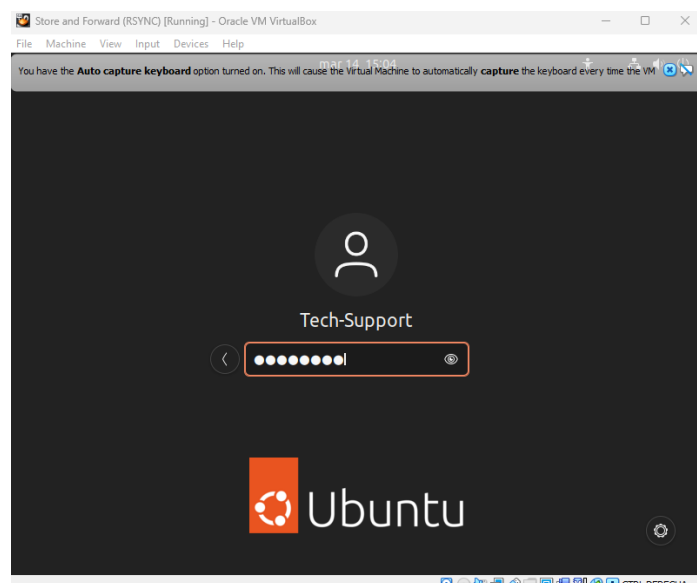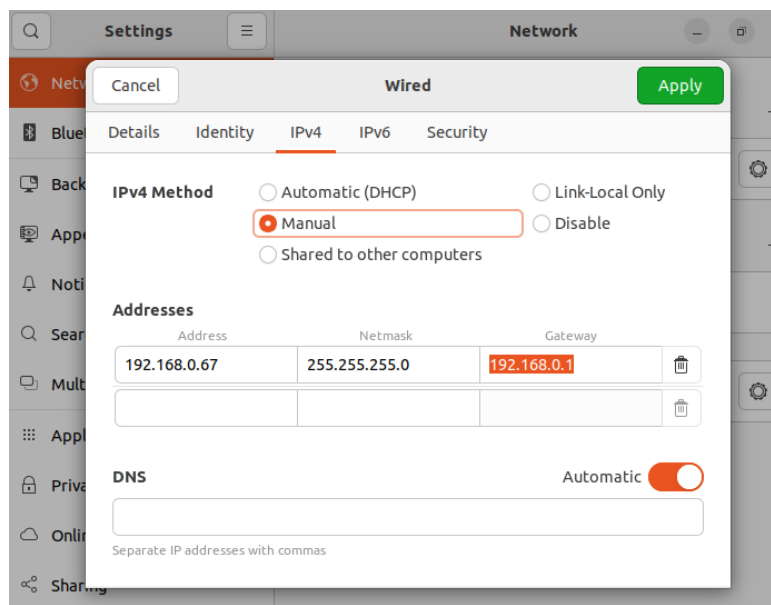
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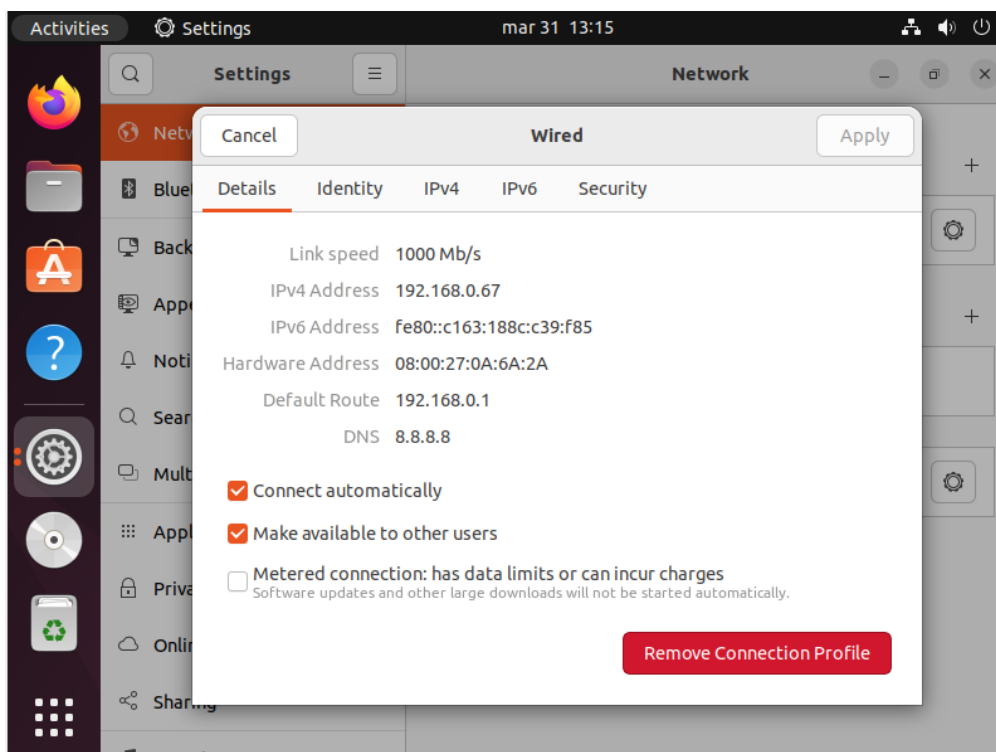8. You will now need to configure the NETWORK in Ubuntu.

The next step is to configure a fixed IP according to the network where the configured PC is connected, which will be a **"new" physical fixed IP** as explained above. Finally, click on "**Apply**".

⚠️ **The physical IP must not be the same as the one used by your Windows computer.**

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Next, you will need to **restart Ubuntu**.
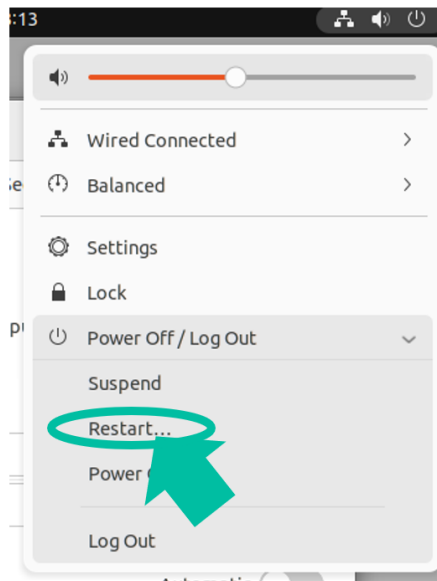
Finally, once rebooted, **log back in with your username and review the network configuration in detail** to make sure that it has been applied correctly.

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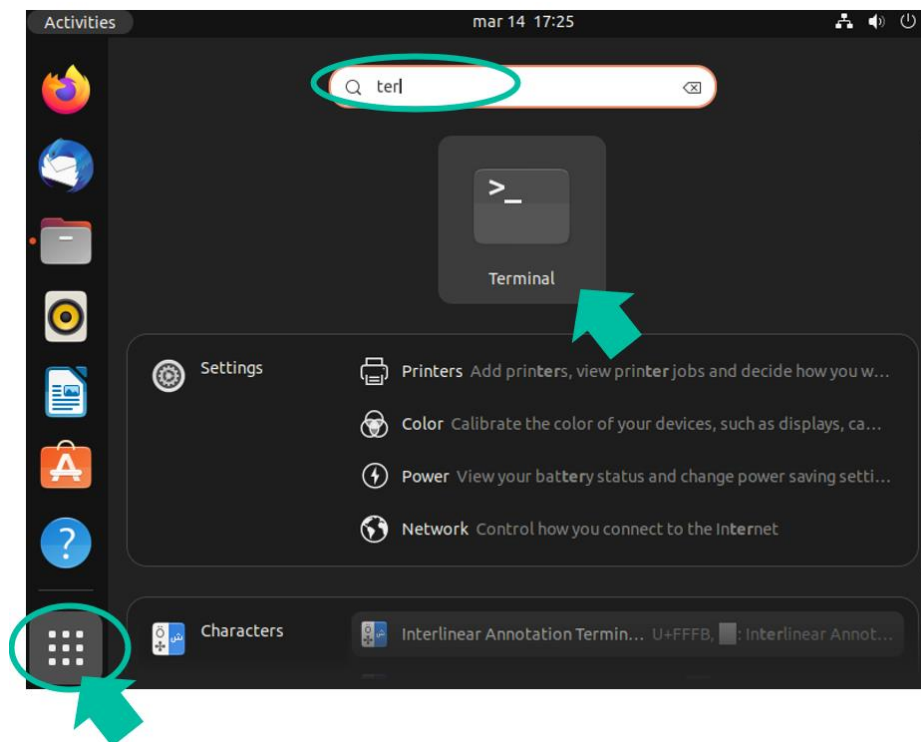
It is necessary to **install the SSH package on Linux**. To do this, **type the following command** and **press ENTER**:

<div align="center">sudo apt-get install ssh</div>
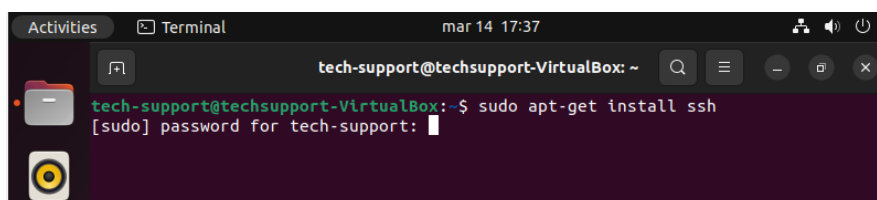
Next, **type the password** that will be requested and then press **ENTER**.

💡 **Linux** has its own security system that does **not allow the password you type to be displayed**, although it does process it.

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Once the command has been processed after entering the password, **type "y" in lowercase** and then press "**Enter**".

The following screen will appear:

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5. GENERATING SSH KEYS

⚠️ **It is very important to perform this step correctly; please pay attention before processing the data**.

In this **example** we will use the administrator username: Tech-Support.

Use the command ssh-keygen -m PEM **to generate the keys and press ENTER directly in response to each question** (without typing anything).

```
tech-support@techsupport-VirtualBox:~$ cd
tech-support@techsupport-VirtualBox:~$ ssh-keygen -m PEM
Generating public/private rsa key pair.
Enter file in which to save the key (/home/tech-support/.ssh/id_rsa):
```

Without typing anything, **press** the **ENTER** key **3 times**, i.e. **leaving** the fields for:

1. "enter file in which...", press ENTER.

2. "enter passphrase...", press ENTER

3. "enter same passphrase...", press ENTER.

```
Enter file in which to save the key (/home/tech-support/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
```

At this point, the **public keys will be generated and displayed on the** screen.

```
tech-support@techsupport-VirtualBox:~$ ssh-keygen -m PEM
Generating public/private rsa key pair.
Enter file in which to save the key (/home/tech-support/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/tech-support/.ssh/id_rsa
Your public key has been saved in /home/tech-support/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:LrxdGzEzI4qKGLTWFjcmqxRzopEzAAUEFdQI7T9C13M tech-support@techsupport-Vir
tualBox
The key's randomart image is:
+---[RSA 3072]----+
|BO=+             |
|. o .            |
|..   .           |
|..o . o E        |
|=* * + oS *       |
|o+O Oo.o . *      |
|o+ =..+ . o       |
|+oo.   + . o      |
|o..    . . .      |
+----[SHA256]-----+
tech-support@techsupport-VirtualBox:~$
```

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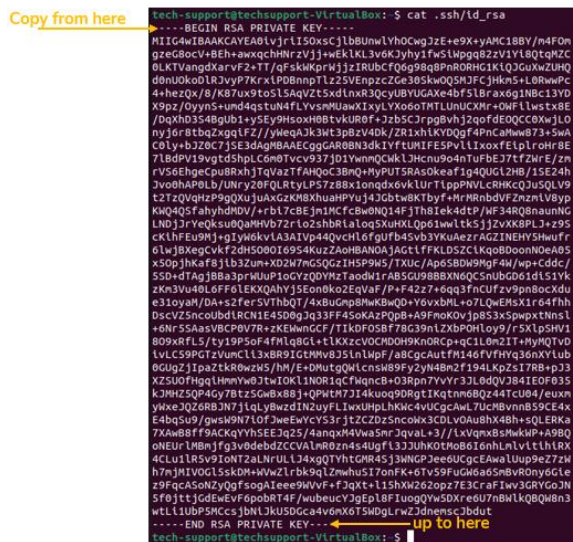**Add the public keys to the authorised keys** with the following command and then **press ENTER**:

cat .ssh/id_rsa.pub >> .ssh/authorized_keys

You may view the private key that you need to enter in the Store and Forward configuration page of the PLAYER:

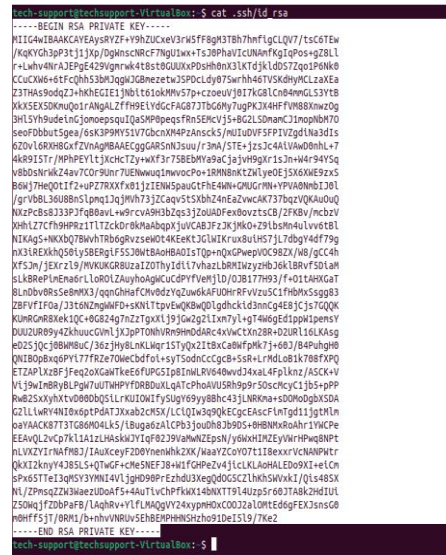cat .ssh/id_rsa

Copy the complete text, from "-----BEGIN RSA..." by dragging the cursor to the end, to "...PRIVATE KEY-----".
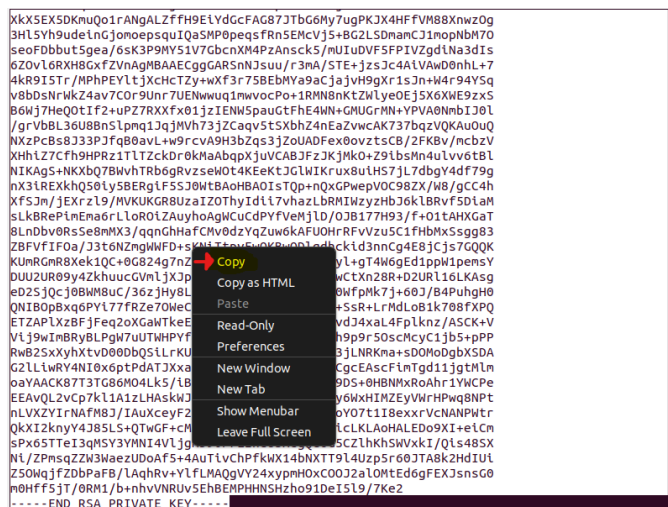
Unselected text   Selected text

Copy the selected text:

⚠️ **Save the copied key in a text file for later use in the S&F module of your PLAYER, as detailed later.**

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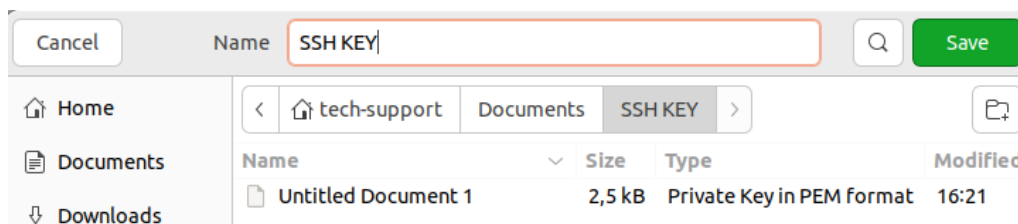
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To save it, open the "Text Editor" application.
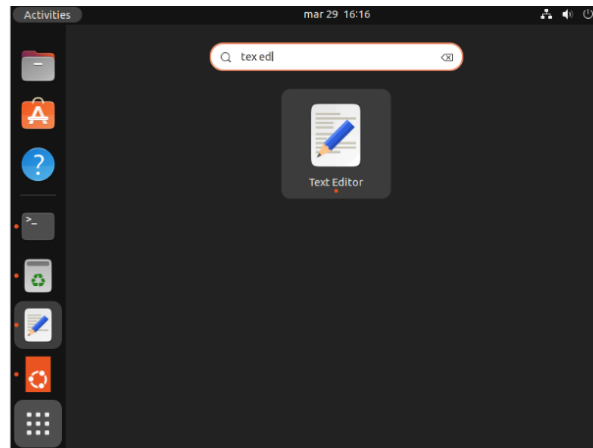
Click the **right mouse button, paste the copied text and save it** in the Documents folder.

💡 **We advise you to send this file by email or keep it at hand** so that you may paste the key as detailed in the S&F section of the PLAYER.

💡 We also advise you to **copy and paste the keys into a txt. file to have them at hand when you implement them in the PLAYER,** as the default location will be the following: Username Admin home/.ssh

⚠️ **Please do not touch or edit the original files.**

💡 If you want to apply **multiple users with different content groups**, we recommend that you **refer to the Content Groups section of the** **Player One** or **Player Zero** user **manual .**

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6. SSH KEY ADAPTATION TO LATEST UBUNTU VERSION

New versions of Linux have made the RSA algorithms used by PLAYERS obsolete.

The PLAYER Store & Forward LOG **will display an error message** as follows:

```
General    Remote Source    Local Target    Log

Key is a ssh-rsa key
Wrote key to '/tmp/saf-dropbear.key'
username=Tech-Support
hostname=192.168.0.67
timeout=25
port=22
source=/home/documents/bgm
target=/media/usb/

ssh: Connection to Tech-Support@192.168.0.67:22 exited: No matching algo hostkey
rsync: connection unexpectedly closed (0 bytes received so far) [Receiver]
rsync error: error in rsync protocol data stream (code 12) at io.c(226) [Receiver=3.1.3]
```

In this case, to allow the execution of PLAYER RSA, **it is necessary to modify the server configuration**.

To resolve this quickly, use the following command in the server terminal:

sudo sh -c 'echo "HostKeyAlgorithms +ssh-rsa" >> /etc/ssh/sshd_config'

sudo sh -c 'echo "PubkeyAcceptedAlgorithms=+ssh-rsa" >> /etc/ssh/sshd_config'

sudo systemctl restart sshd

7. ADDING AUDIO CONTENT TO THE SSH SERVER.

The next step is to **place the audio content on the SSH server for each specific user or content group**. A folder will thus be created in the main directory of each content group in order to have music media compatible with the PLAYER, which you may host in the folder to be synchronised and which may be transferred via online downloads, email, links, etc.

For example, you may create a download link to a cloud-based file platform containing such media. Example path: home/documents/bgm/

> 💡 **You can use the Firefox browser** to download it.

> ⚠️ **Remember to have Ubuntu connected to the network with Internet access,** as without an Internet connection you will not be able to launch the content synchronisation.

8. IMPLEMENTING S&F (Rsync) IN SSH

HOST (the host is the IP address of the SSH server so that it can be indicated to the PLAYER

> 💡 In the case of **an external connection, you may need an IT technician to access the PLAYER through the communication port;** please provide that person with the necessary information, such as the IP address of the Host or MAC address of the device.

The following steps will describe **how to get the necessary information for later entry into the PLAYER**.

1. How do I determine the IP address of the Host?

   First, **you need to install the network package**.

   - **Open the** terminal **application**.
   - Type: sudo apt install net-tools and press **ENTER**.
   - Enter the **password ADMIN** (not visible) and press **ENTER**.

```
tech-support@techsupport-VirtualBox: $ sudo apt install net-tools
[sudo] password for tech-support:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 165 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://es.archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60
+git20181103.0eebece-1ubuntu5 [204 kB]
Fetched 204 kB in 1s (268 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 178889 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb .
..
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Processing triggers for man-db (2.10.2-1) ...
tech-support@techsupport-VirtualBox: $
```

   - In the terminal, **type:** **Ifconfig** and press **ENTER**

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The IP of the SSH server in this example is the same as the one we configured earlier. In our example: 192.168.0.67.

> 💡 To avoid transcription errors, we recommend that you take a **screenshot of the data,** which you must provide to the IT technician in charge of maintaining the network where the PLAYER is installed.

2. Communication port

By default it is number 22 in the SSH servers, but if the IT technician advises that you cannot use this port where the PLAYER is located, they must tell you the port that you can use to enter the number in the S&F module of the PLAYER, as well as to authorise the complete connection of the IP Host (SSH server).

3. Folder

Where the SSH server's **music media are located.**

> 💡 **We recommend avoiding names with capital letters or symbols.**

In our **example**: /home/tech-support/Documents/bgm/

- "tech-support" is the user name,
- "bgm" is the name of the folder we choose and must always be included in the path.

> ⚠️ **Linux differentiates between UPPERCASE and lowercase letters**. If the path is entered incorrectly, the synchronisation will not be performed and will return an error in the LOG.

4. Username

You must **enter the user with which you configured the virtual machine**, in this case the user ADMIN: tech-support
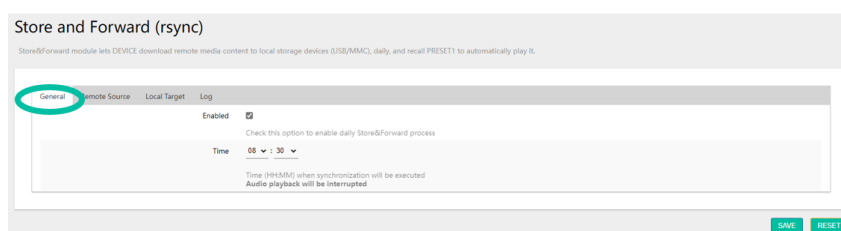
5. Private key

You must **access the txt. file into which you copied the key** that you generated in our SSH Server.

9. STORE AND FORWARD MODULE (Rsync)

Now that you have all the **necessary data** to implement the configuration, **you will implement it in the S&F module of your PLAYER**.
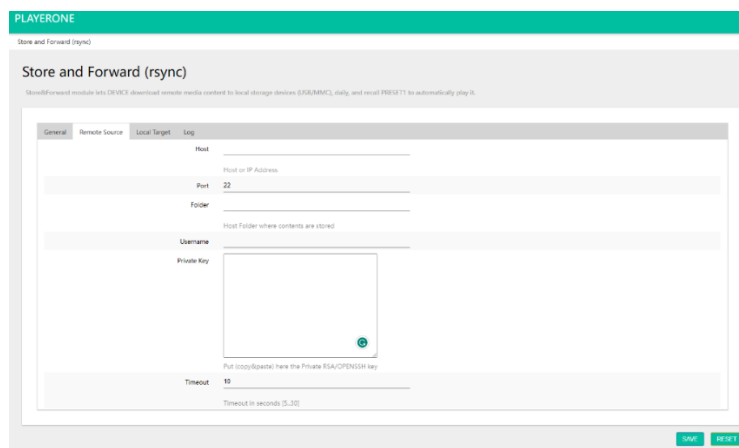
1. General

- **Enabled**: In this section, activate the S&F Module (Rsync) by checking the box.

- **Time:** this is a **very important** point, it is where the exact time of media synchronisation between our SSH server and the PLAYER is configured so that Rsync does the rest automatically.

- Next, **please press** SAVE

⚠ **It is very important that both the PLAYER and the SSH server have continuous network access during media synchronisation**. Otherwise, the LOG module will show a synchronisation error message.

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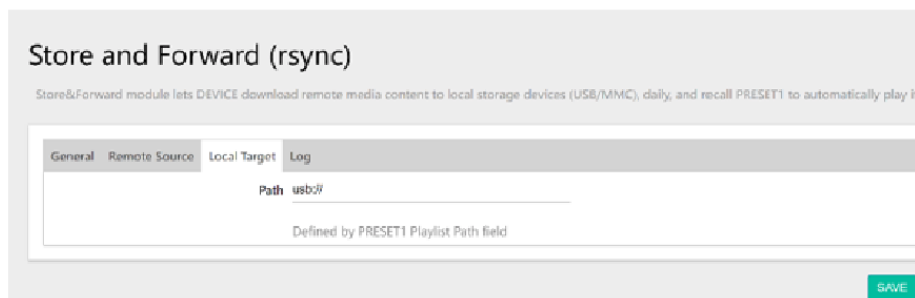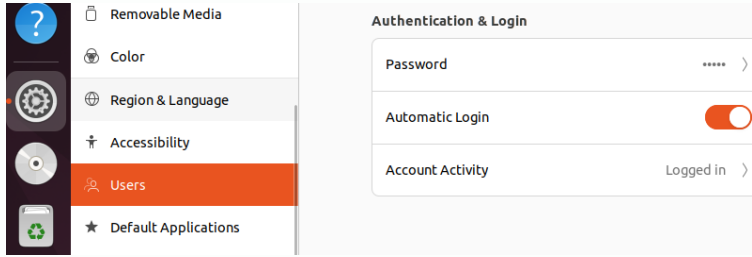Implementing S&F (Rsync) in SSH
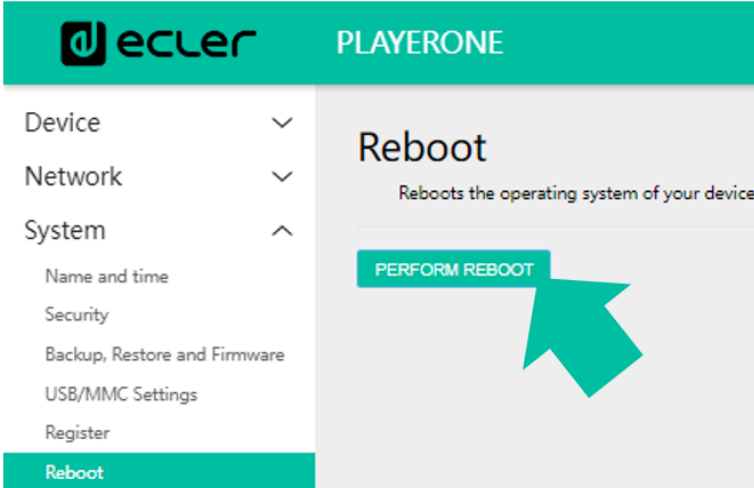
Store & Forward module (Rsync)

2. Remote Source

Lastly, you must **fill in all the data previously covered in this section**.

⚠️ **Make sure that all parameters are entered correctly.**

⚠️ **Remember to press** [SAVE] **when you have finished configuring each tab**.

💡 For your convenience, **you can resize the** "private key" **text field** to your liking.

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In our example:

- **Host**: 192.168.0.67
- **Port:** 22
- **Folder:** /home/tech-support/Documents/bgm
- **Username:** tech-support
- **Private Key:** That you saved previously.
- **Timeout:** 25 sec.

3. **Local Target**

In this section, **you will indicate where Rsync will synchronise the files it receives from the SSH server**, either on a USB stick or SD card inserted in the PLAYER, in FAT32 format.

a) **Indicate the Path you wish to use**, which you will later configure in the associated PRESET1. In this example: usb://

b) **PRESET 1 of our PLAYER** is configured, so that the files from our USB or SD can be played.

c) Press [SAVE] **to save the Preset.**

d) You must check that all the parameters are correctly saved, that the SSH server is operating and that there are no power settings that might disable it.

> 💡 **We recommend leaving "Automatic login" enabled in Ubuntu**
>
> | | | | |
> |---|---|---|---|
> | ? | Removable Media | **Authentication & Login** | |
> | ⚙ | Color | Password | ····· > |
> | | Region & Language | Automatic Login | 🔘 |
> | ○ | Accessibility | Account Activity | Logged in > |
> | | **Users** | | |
> | ♲ | Default Applications | | |
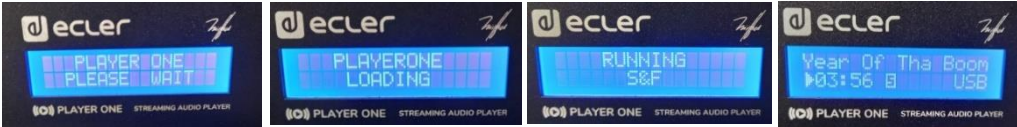
e) Restart the PLAYER.

The S&F module starts automatically and will start to dump and playback the contents to the storage previously indicated.

> 💡 **Example of display in Player ONE** (Player ZERO does not have a display and must therefore be monitored via the Web App).
>
>

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f) Lastly, **check the PLAYER's LOG** to make sure that everything is correct.

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