

# Installing Proxmox VE on a Tiny PC

---

**Task:** The Tiny PC is to be set up as a virtualization host with **Proxmox Virtual Environment (VE)**. The goal is to create a functional Proxmox installation that can be administered via a web interface.

**Expected Outcome:** A ready-to-use Proxmox VE host that supports VMs and containers and is accessible over the network.

---

## b. Preparation

### Hardware:

#### Tiny PC:

- Processor: Supports virtualization (e.g., Intel VT-x, AMD-V)
- RAM: At least 4 GB (recommended: 8 GB)
- Hard drive: At least 32 GB (recommended: 128 GB or more)
- Network card: Gigabit Ethernet

#### Peripherals:

- Monitor, keyboard, mouse for installation (not needed after installation)
- Bootable USB stick (8 GB or larger)



### Software:

- **Proxmox VE ISO image:** [Proxmox](#) (Version: e.g., 8.0)
- **Bootloader tool:** [Rufus](#) (Windows) or [Balena Etcher](#) (Linux/MacOS)

### Setup:

#### 1. Configure BIOS/UEFI:

- Activate virtualization (e.g., Intel VT-x or AMD-V).
- Disable Secure Boot.
- Set the boot order so the USB stick boots first.

#### 2. Create a bootable USB stick:

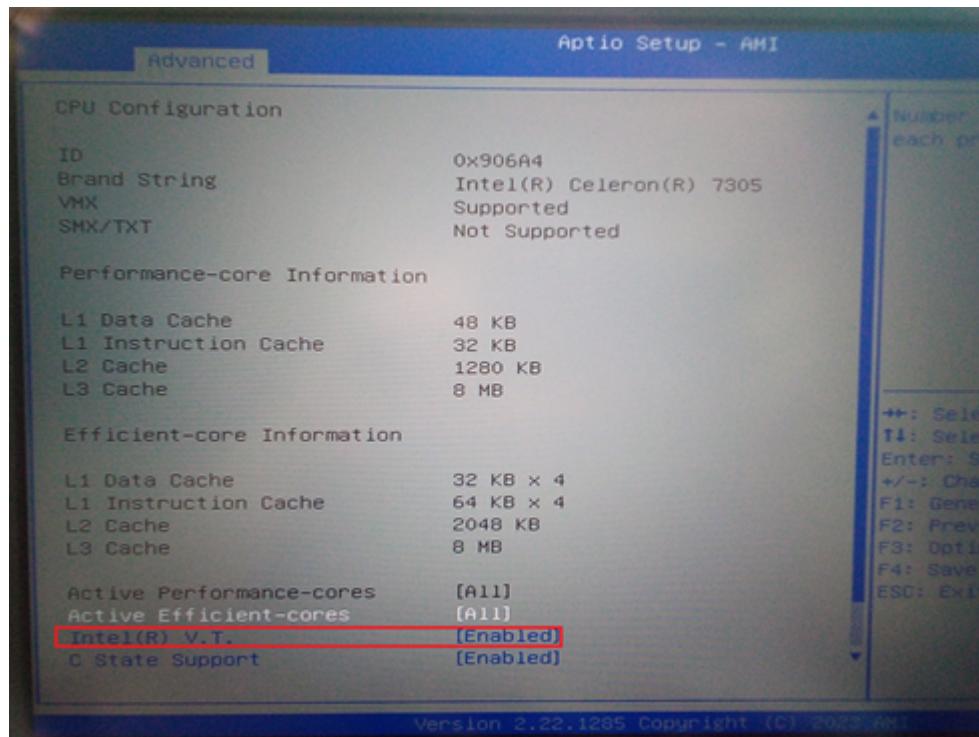
- Write the ISO image to the USB stick using Rufus or Balena Etcher.

---

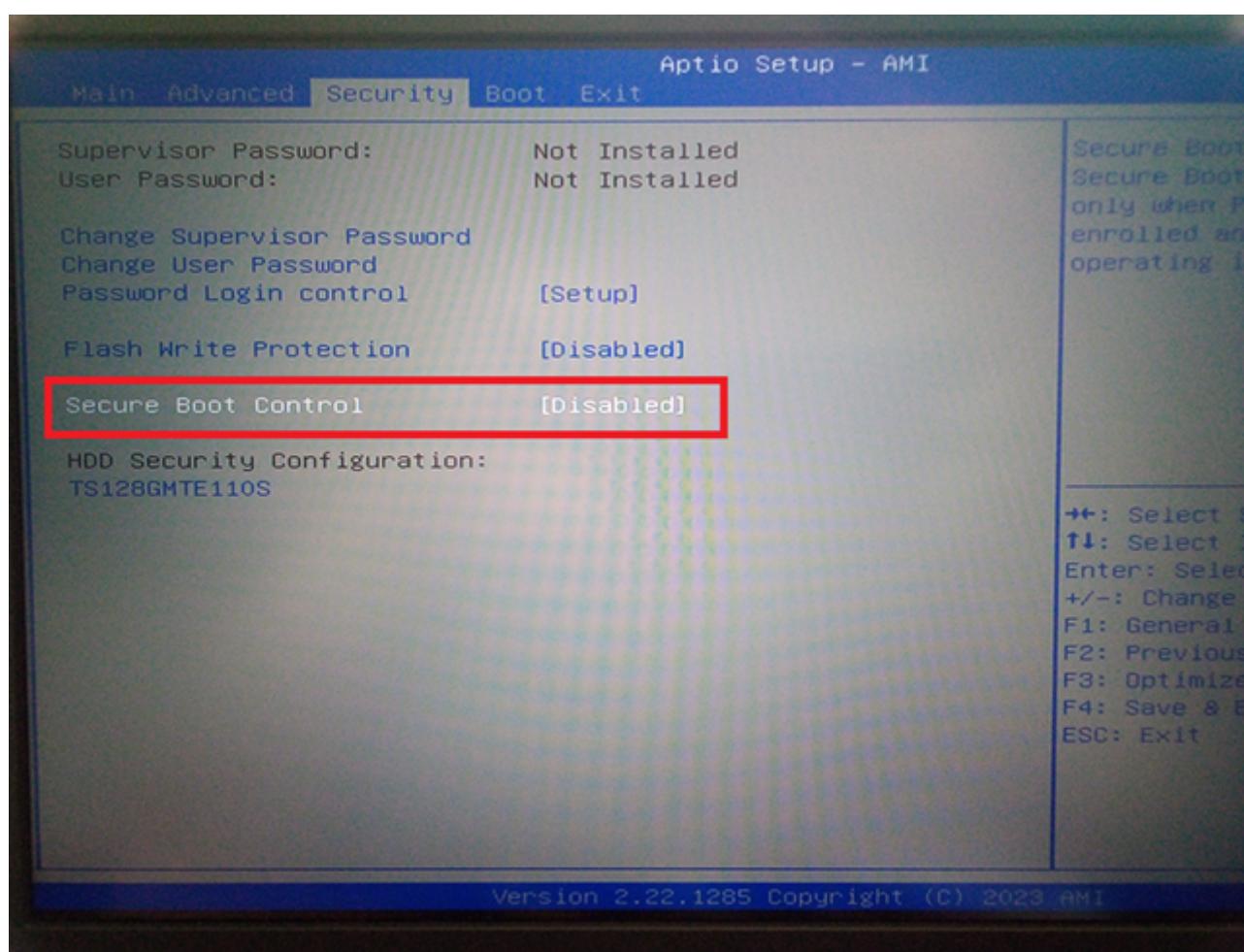
## c. Execution

### Step 1: Configure BIOS/UEFI

1. **Configure BIOS/UEFI:** After starting the computer, press the **Del** key to enter the BIOS/UEFI. Navigate to the "Advanced" section to "CPU Configuration" to enable virtualization.



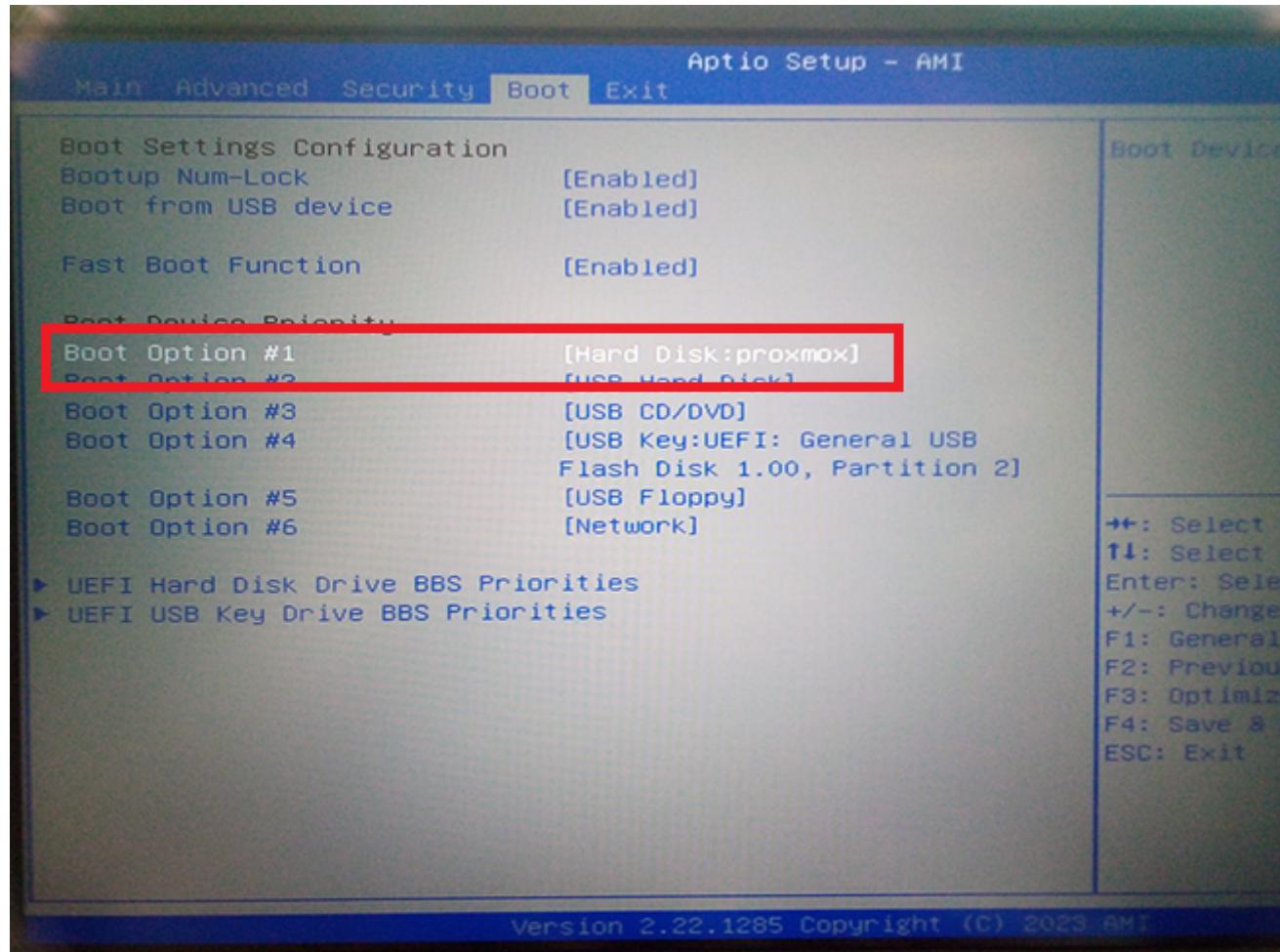
- Activate virtualization (e.g., Intel VT-x or AMD-V). In the "Security" section, disable Secure Boot.

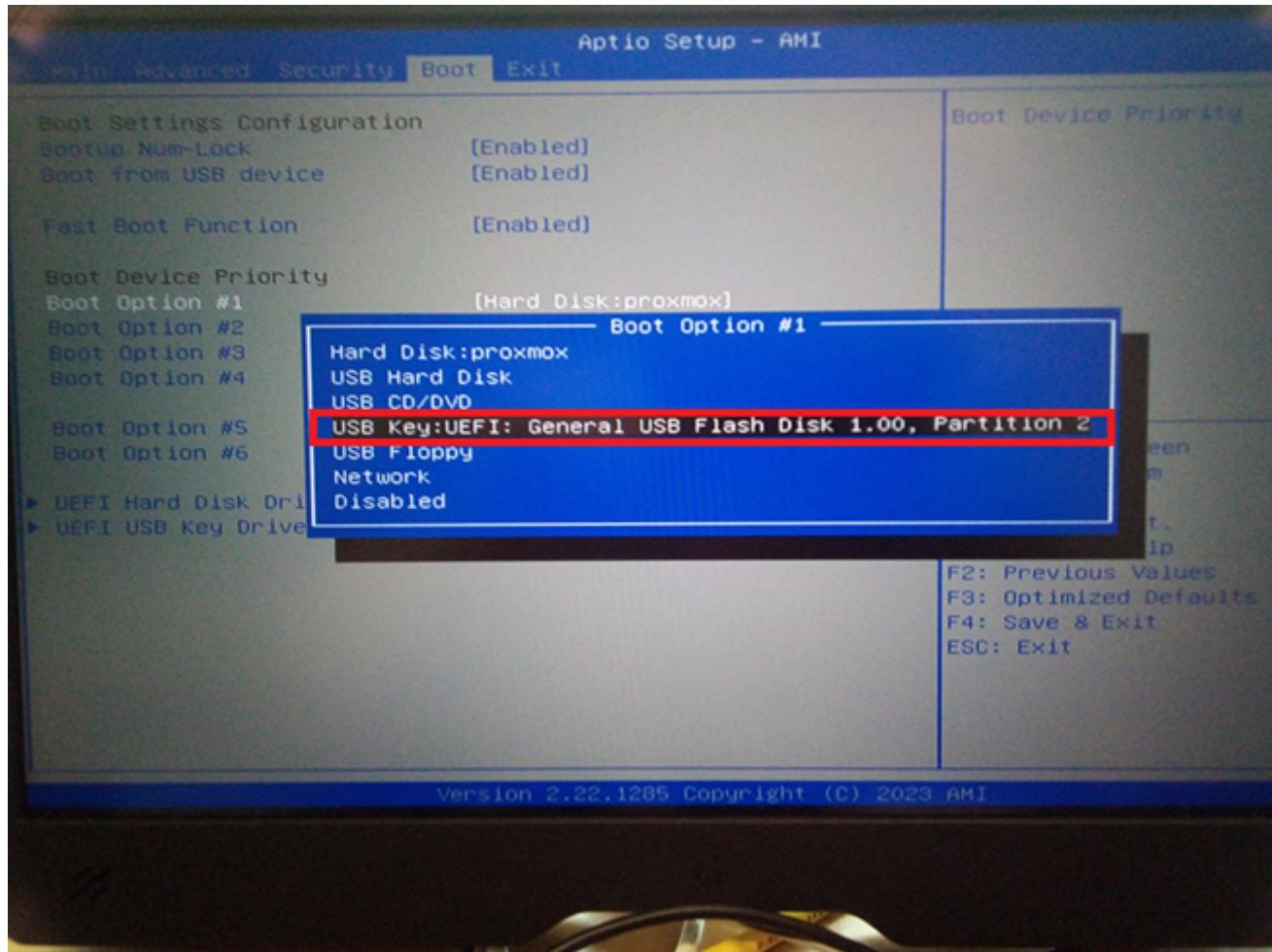


- Disable Secure Boot.
- Set the boot order so the USB stick starts first.

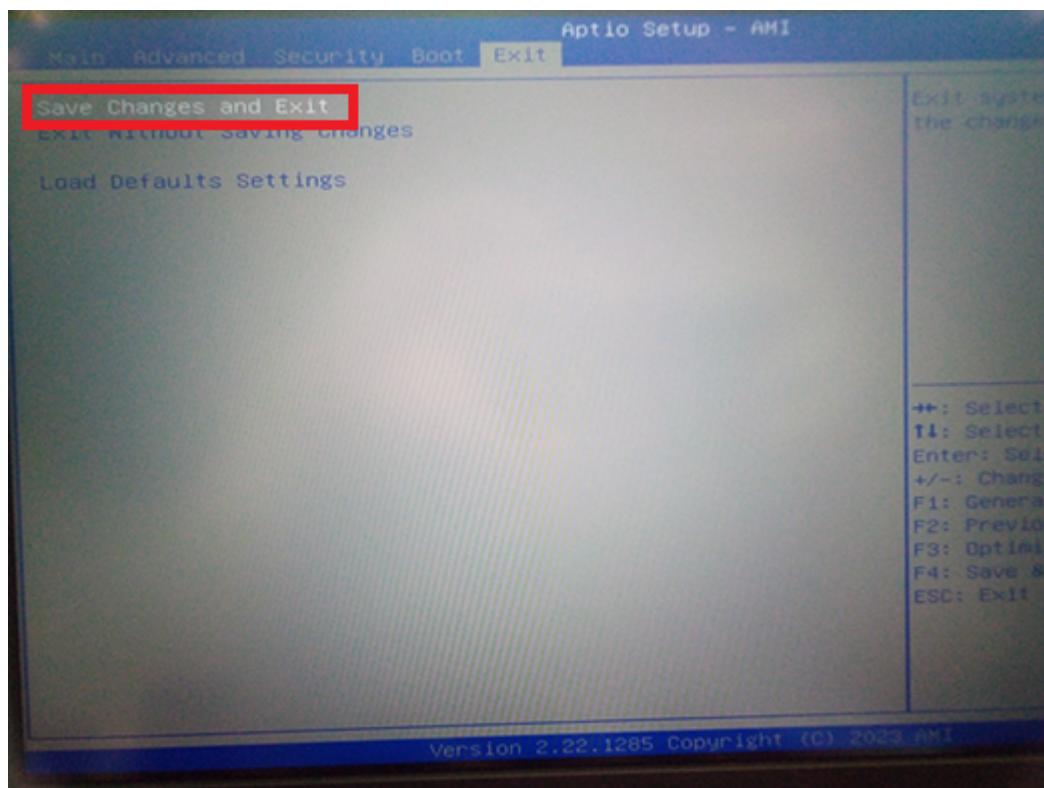
**There are 2 ways to adjust the boot order.**

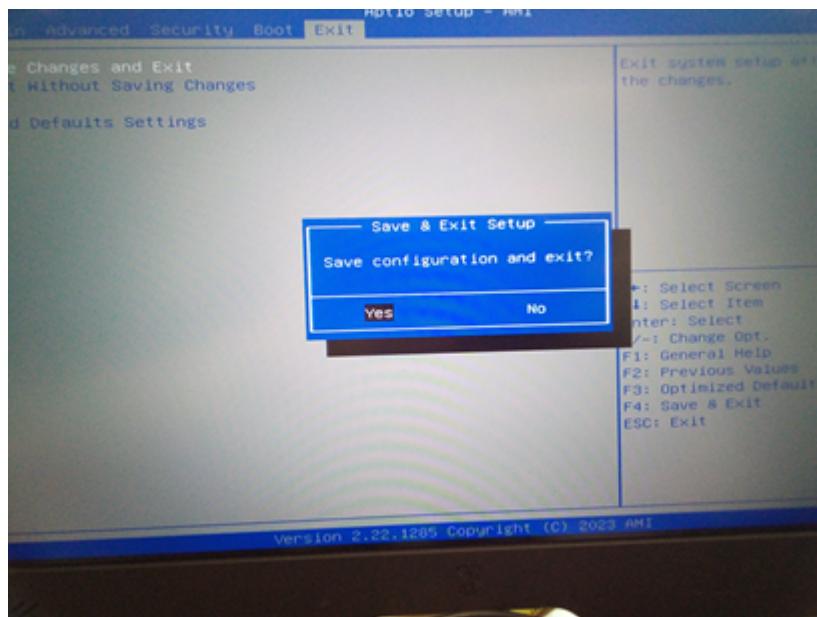
a) Change the boot order in the BIOS/UEFI. This can be done in the "Boot" section under "Boot Option."



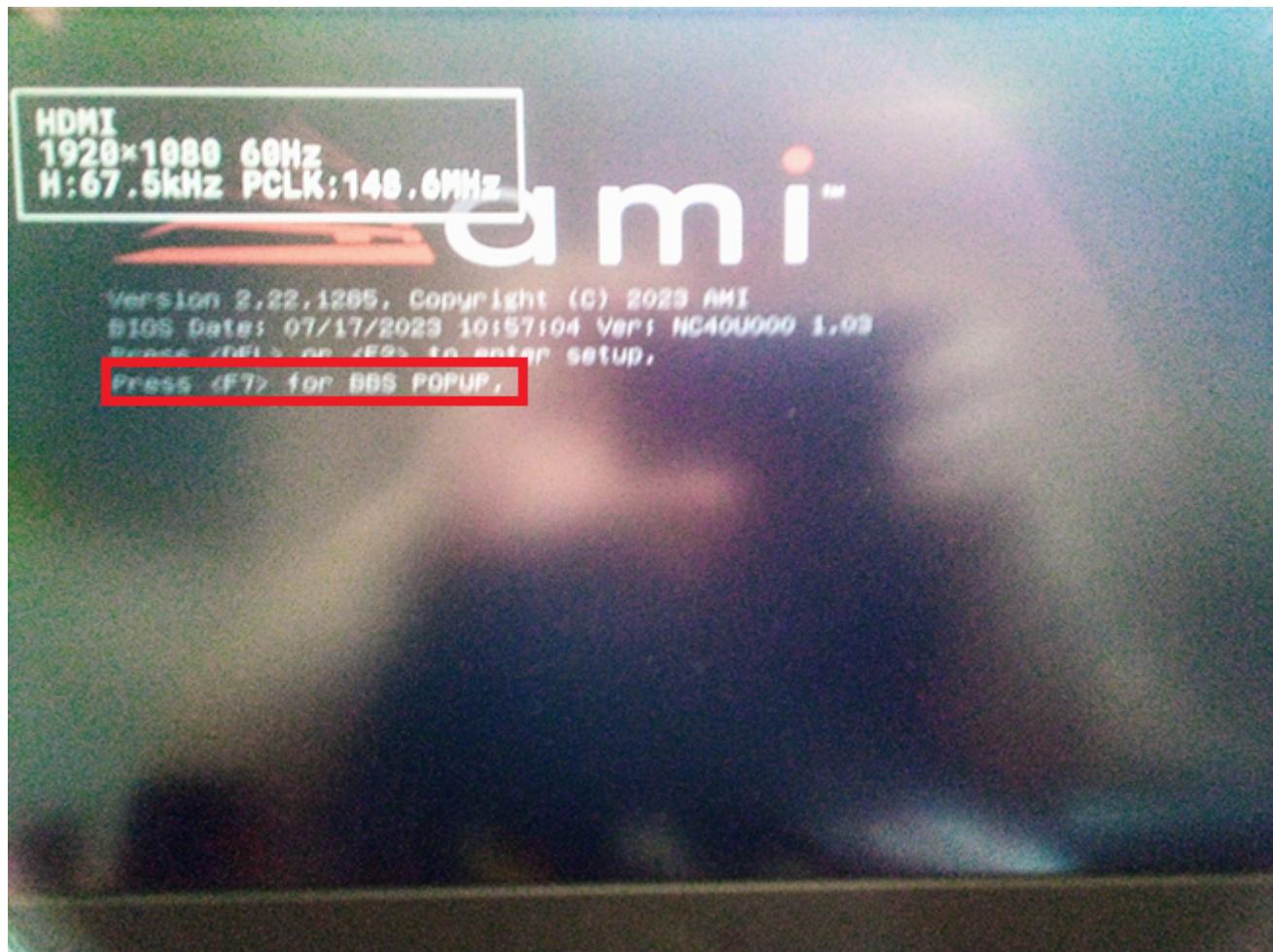


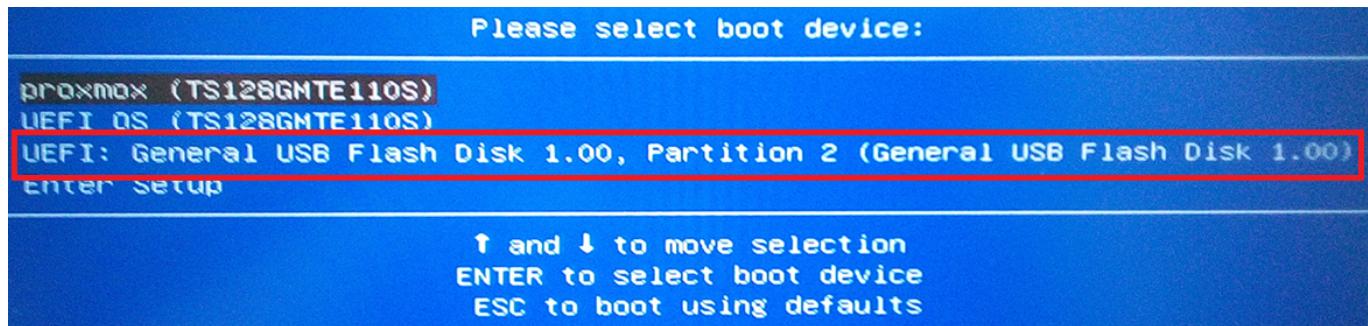
Then go to "EXIT" and select and confirm **Save Changes and Exit**.





- b) To select a specific boot medium, it is sufficient to call up the BBS menu. The key for this varies depending on the manufacturer, from **F2** to **F7**.





## Step 2: Download the Proxmox ISO and create a bootable USB stick

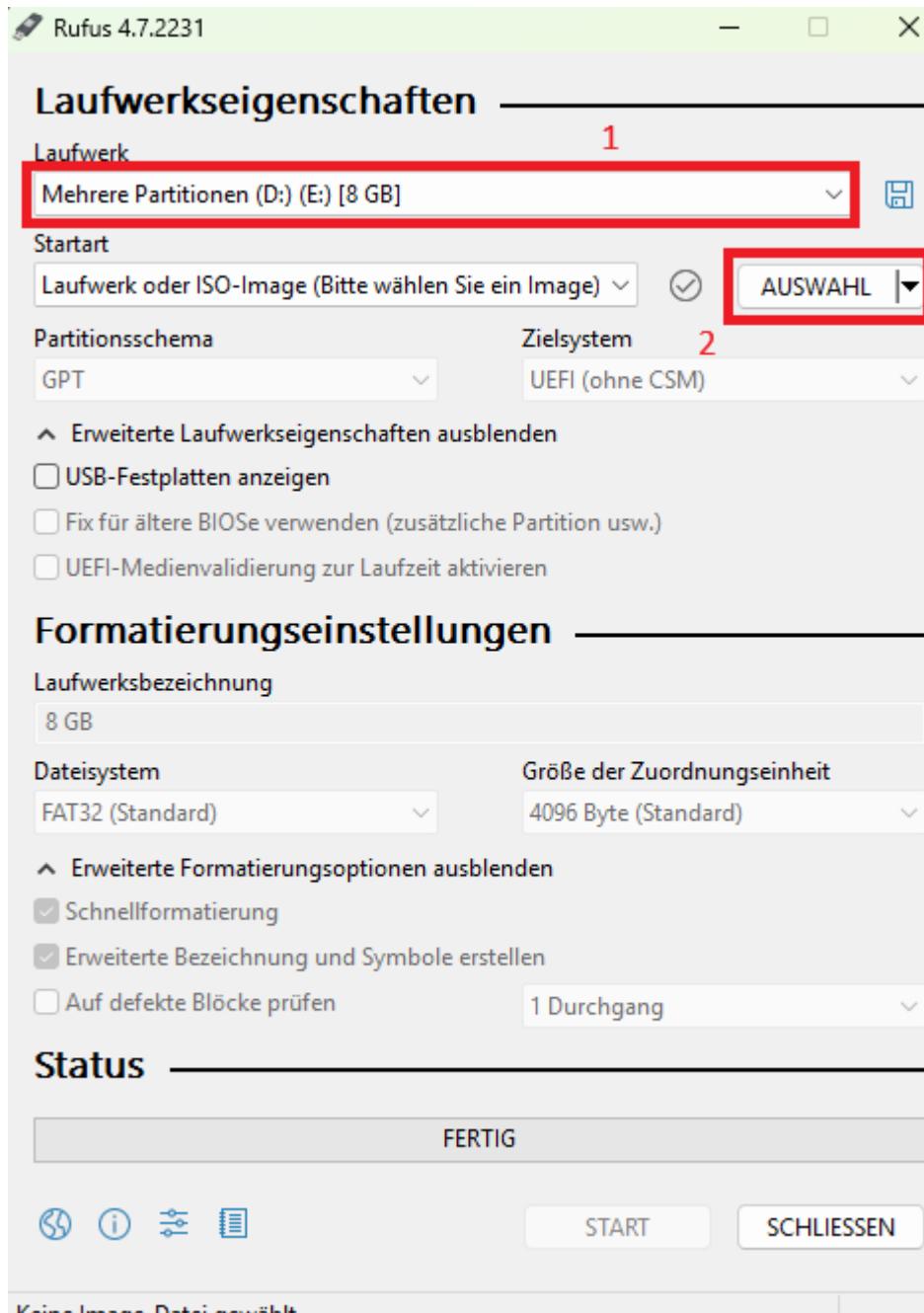
1. Go to the [Proxmox download page](#).
2. Download the latest Proxmox VE ISO image (e.g., [proxmox-ve\\_8.x.iso](#)).

Proxmox VE 8.4 ISO Installer			
	Version 8.4-1	Dateigröße 1,57 GB	Hochgeladen am 09. April 2025
	SHA256SUM d237d70ca48a9f6eb47f95fd4fd337722c3f69f8106393844d027d28c26523d8		<a href="#">Download</a> <a href="#">Torrent</a>

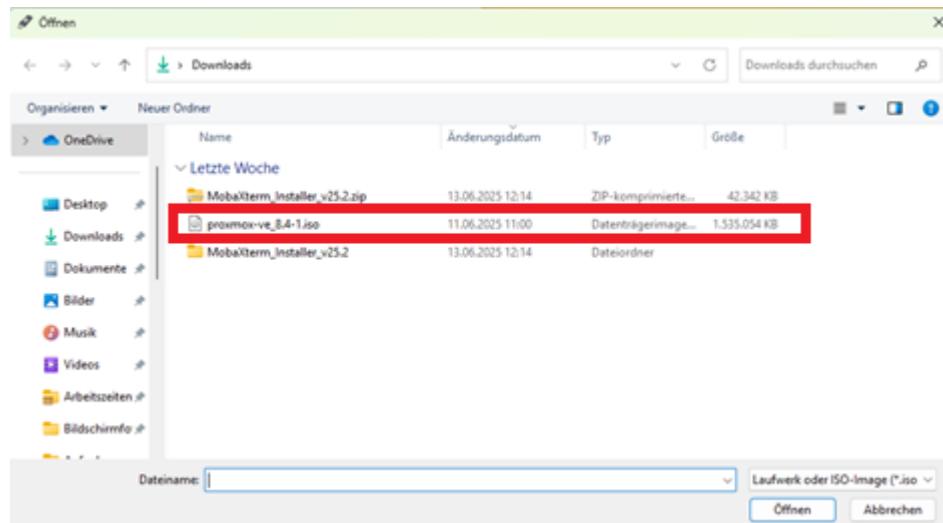
  

Proxmox Backup Server 3.4 ISO Installer			
	Version 3.4-1	Dateigröße 1,31 GB	Hochgeladen am 10. April 2025
	SHA256SUM ed4777f570f2589843765fff9e942288ff16a6cc3728655733899188479b7e08		<a href="#">Download</a> <a href="#">Torrent</a>

3. Create a bootable USB stick with Rufus (Windows) or Balena Etcher (Linux/MacOS).
  - Select the ISO image and the USB stick.
  - Click "Start" to create the stick. Creating a bootable USB stick with Rufus:



1. Select the drive to which the image should be written.
2. Select the image to be written to the USB stick.



## Rufus



**WARNUNG: ALLE DATEN AUF LAUFWERK 'Mehrere Partitionen (D:) (E:) [8 GB]' WERDEN GELÖSCHT.**  
Klicken Sie auf OK, um fortzufahren. Klicken Sie auf ABBRECHEN, um abzubrechen.

OK

Abbrechen

If the USB stick already contains data, please confirm the warning if the data may be deleted.

## Mehrere Partitionen erkannt



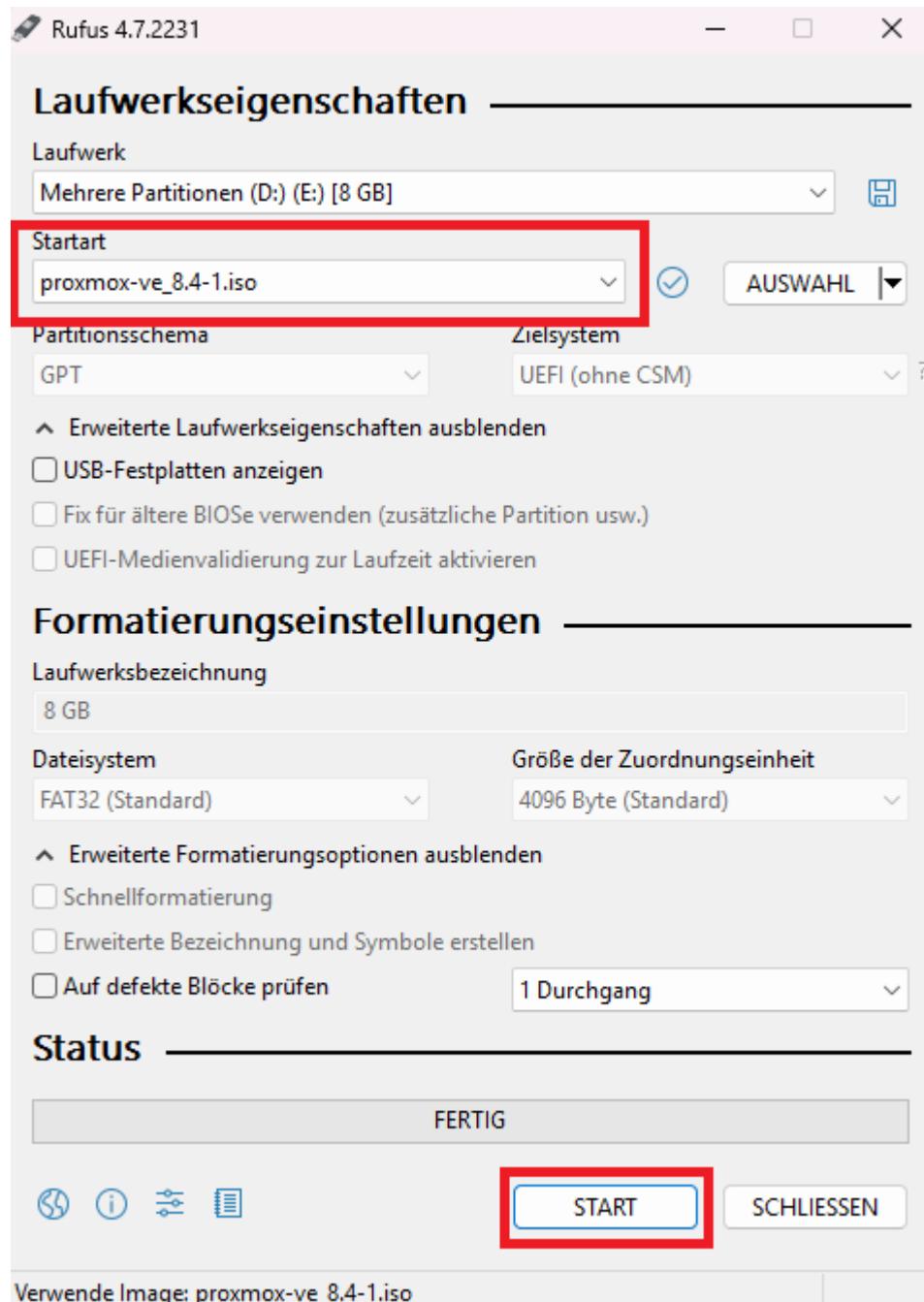
**ACHTUNG! DIESES LAUFWERK VERFÜGT ÜBER MEHRERE PARTITIONEN!**

Darunter sind möglicherweise Partitionen, die unter Windows nicht sicht- bzw. nutzbar sind. Wenn Sie fortfahren, sind Sie selbst für den Datenverlust auf diesen Partitionen verantwortlich.

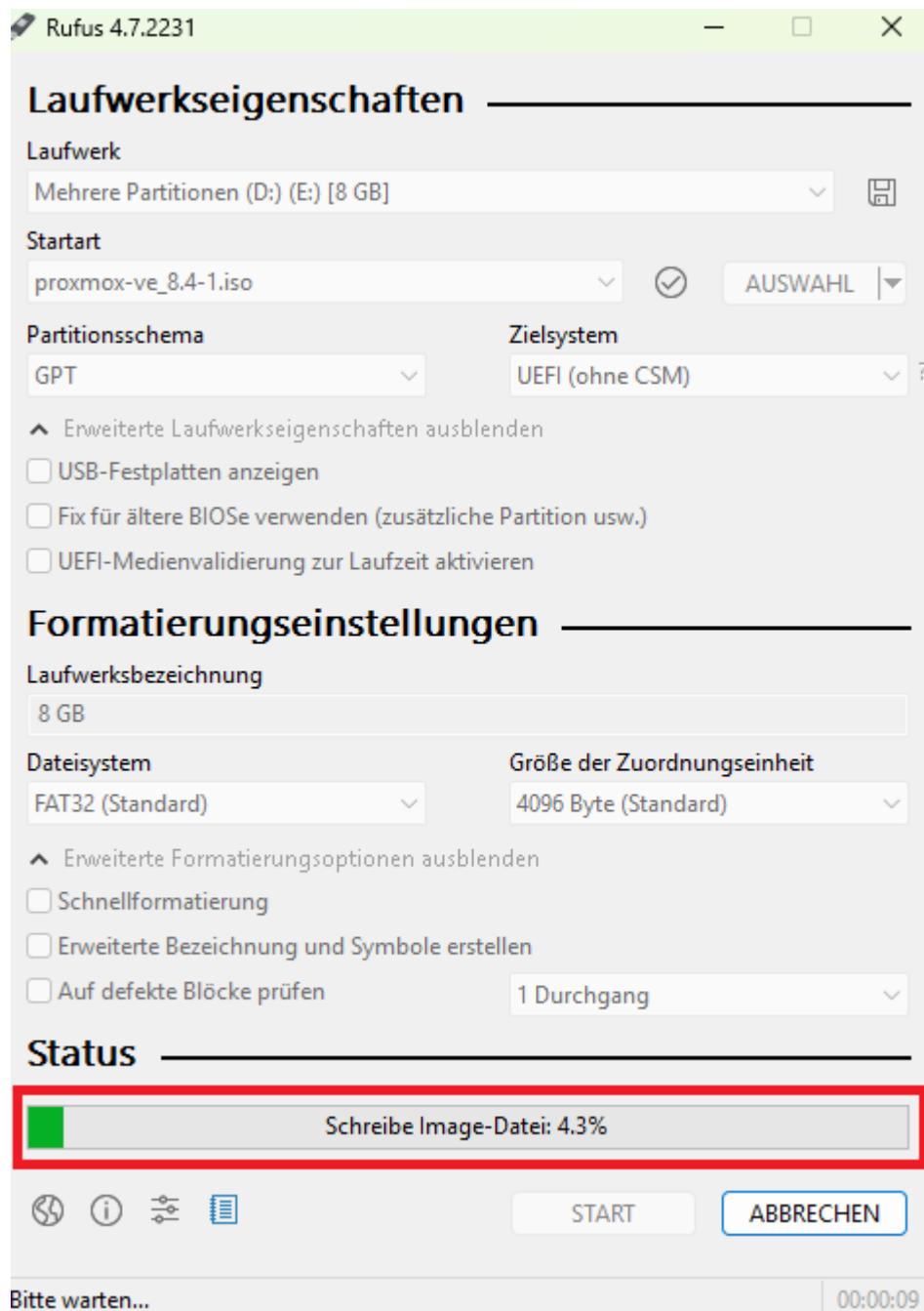
OK

Abbrechen

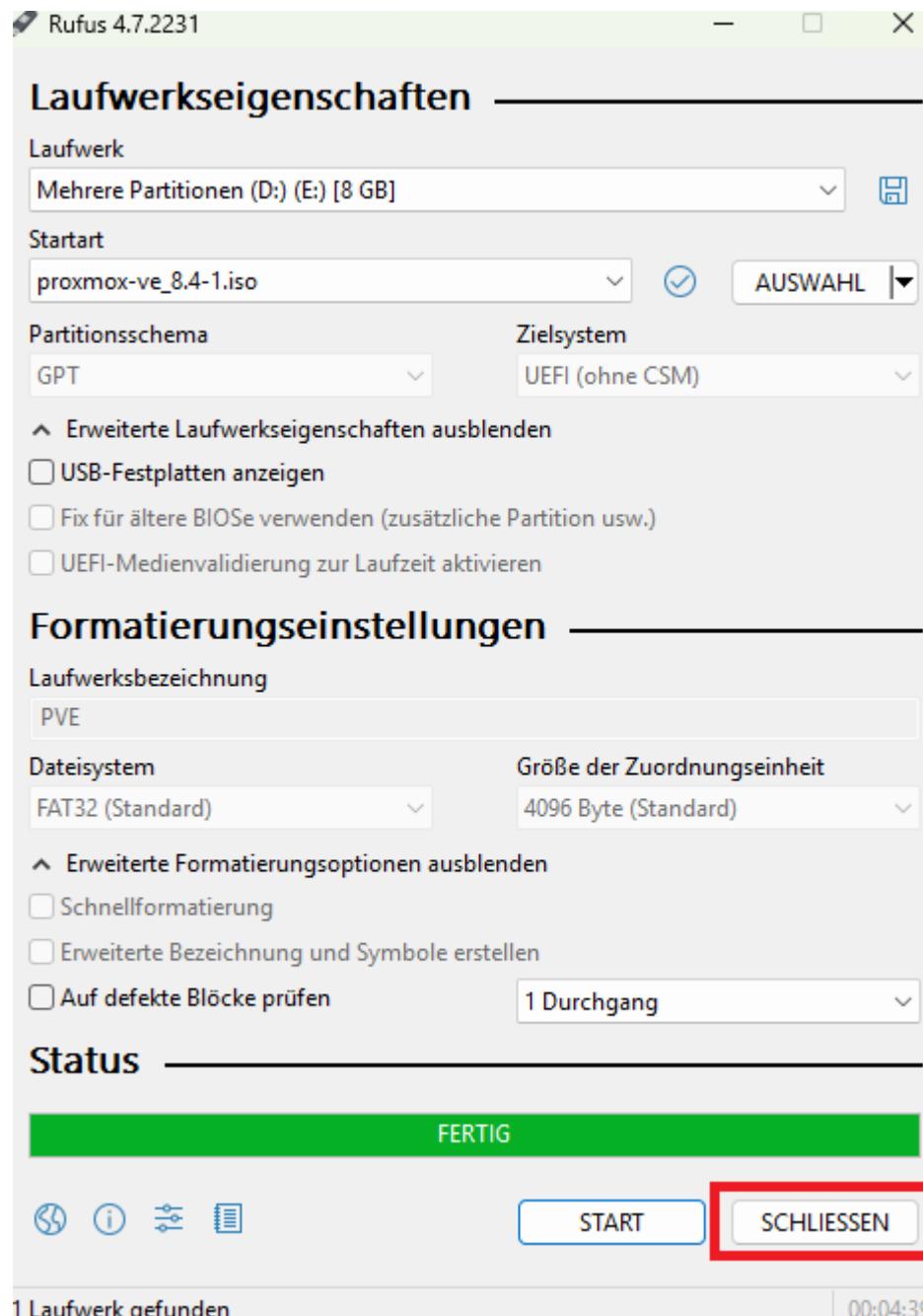
Simply confirm the warning with OK.



After selection, the ISO file appears in the red-marked area at the top. Now simply click on START.



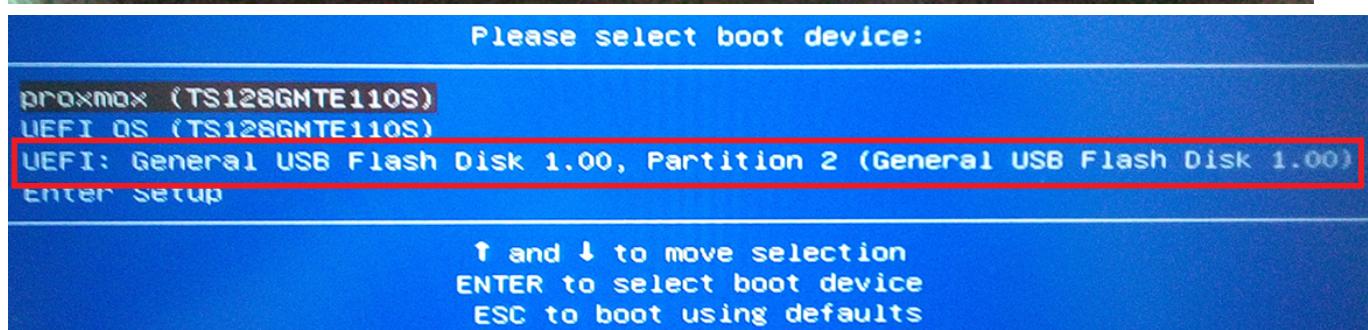
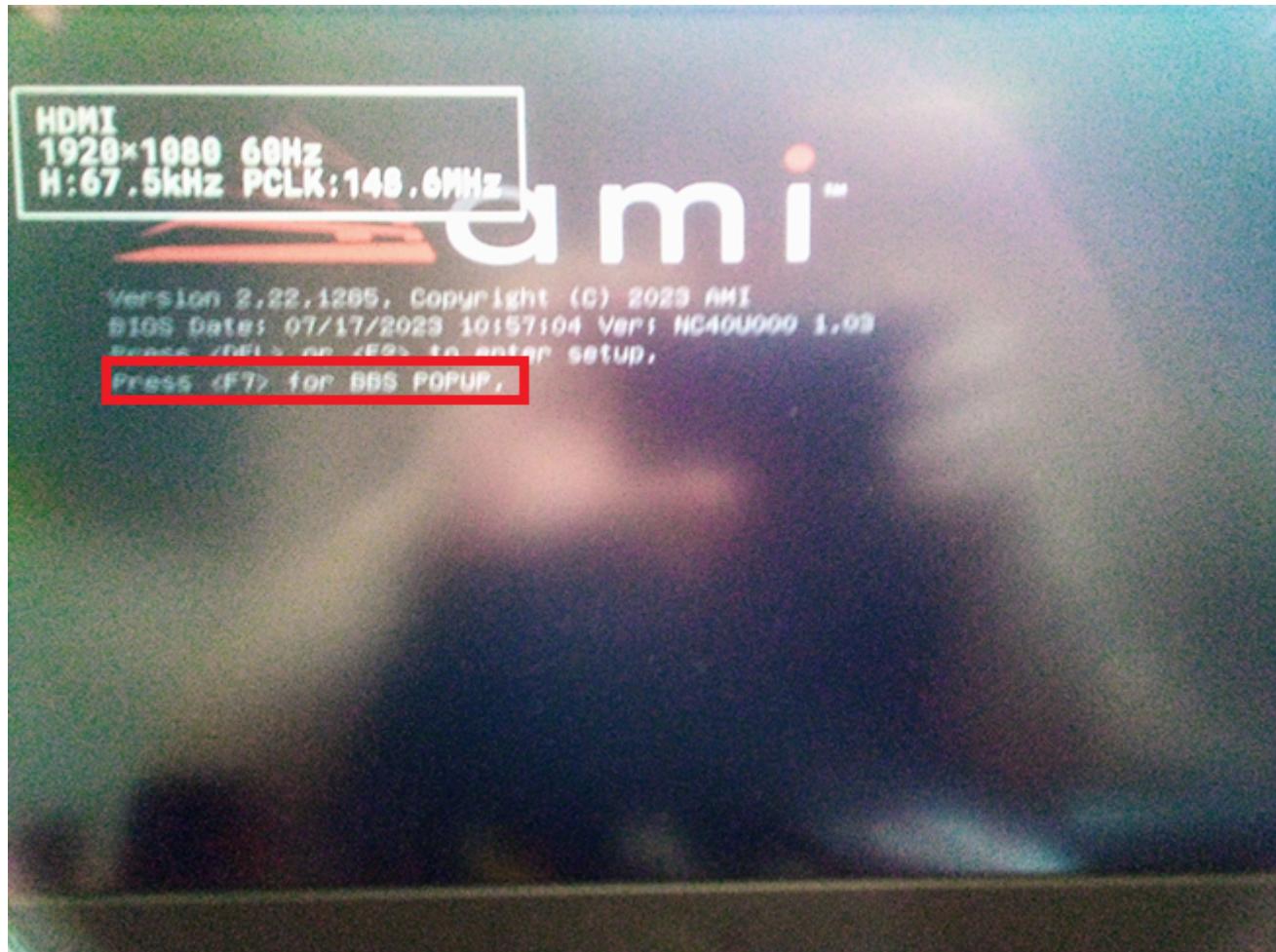
Wait until the status says "Ready."



After the writing process is complete, simply click on **CLOSE**.

### Step 3: Start the Proxmox installation

1. Plug the USB stick into the Tiny PC and start the Tiny PC.
2. In the boot menu (usually via **F2** to **F8**, depending on the motherboard manufacturer), select the USB stick.



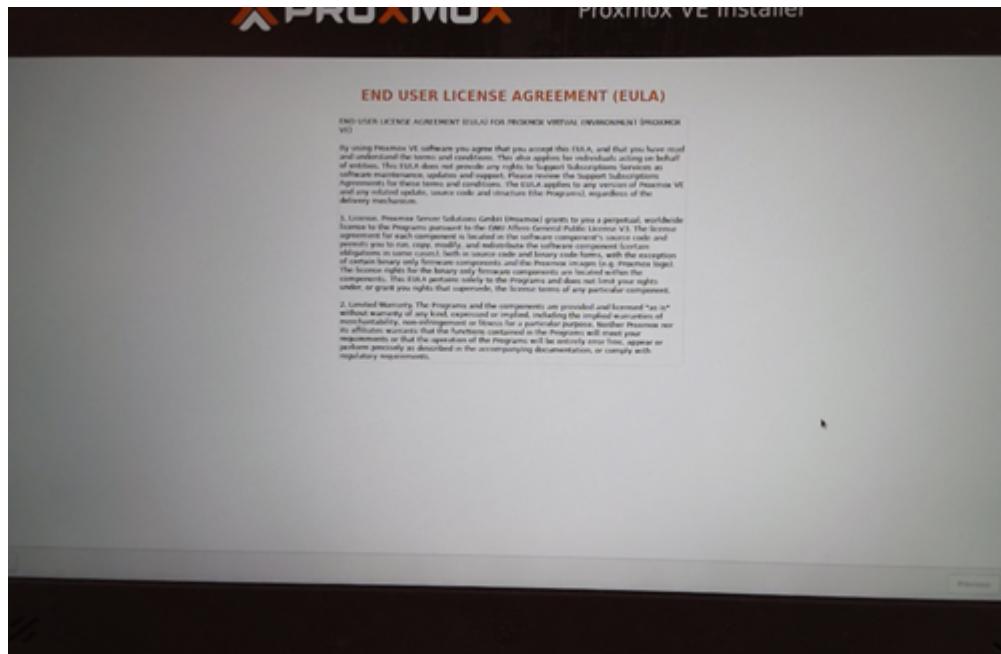
3. In the Proxmox boot menu, select **Install Proxmox VE Terminal UI** or **Install Proxmox VE Graphic**. The installation process is the same.

The following describes the installation of Proxmox with the graphical user interface:

#### Step 4: Install Proxmox

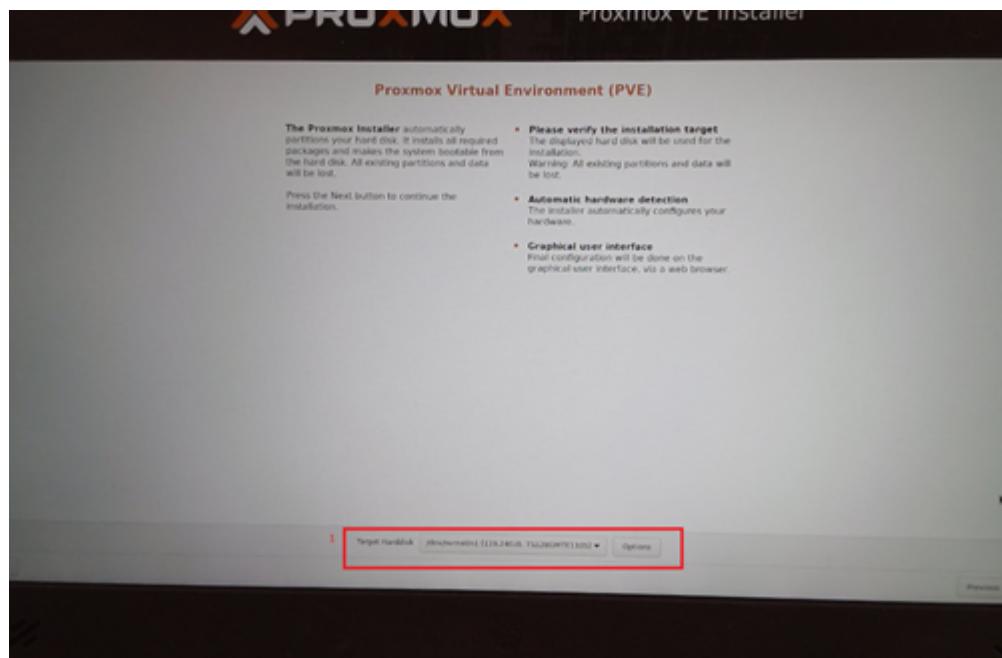
##### 1. Accept license terms:

- Read and agree to the license terms.



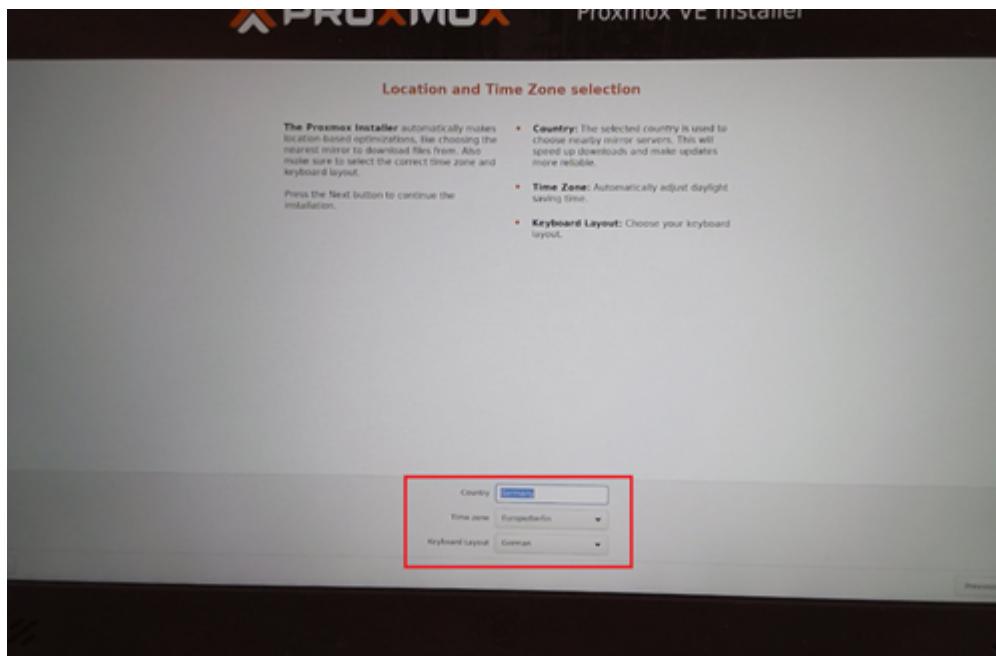
## 2. Select hard drive:

- Select the hard drive for the installation (all data on the hard drive will be deleted).



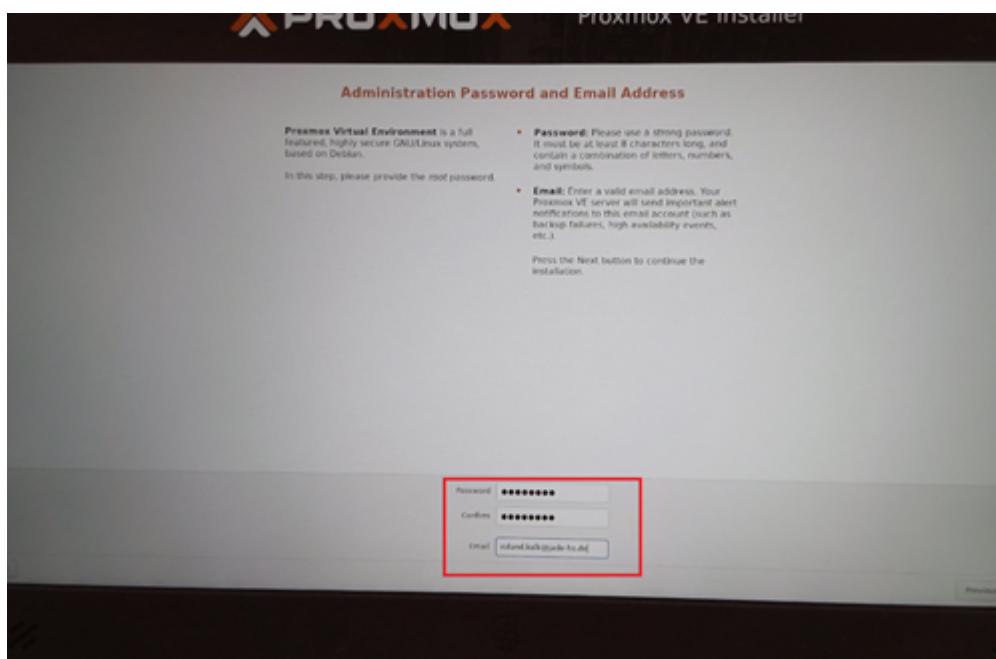
## 3. Set time zone and language:

- Select the desired time zone and keyboard layout.



#### 4. Password and email:

- Set a strong root password.
- Enter an email address for system notifications.



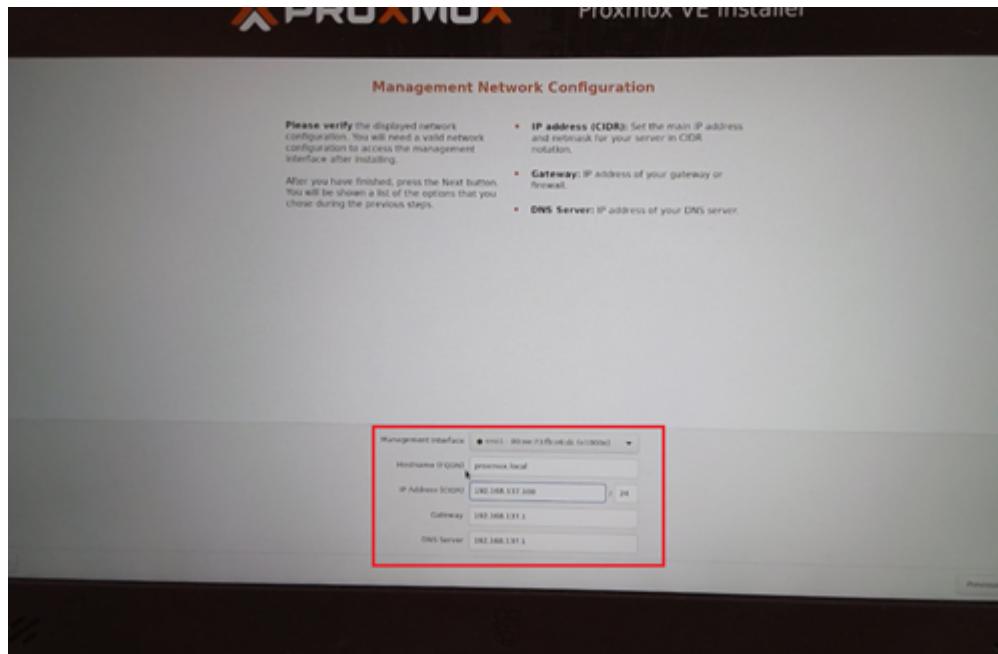

---

>Note: Servers are not allowed in the university network. Therefore, we use a network configuration realized with ICS in the university network.

---

#### 5. Configure network settings:

- Select the network adapter from `eno1`.
- Enter the hostname, e.g., `proxmox.local`.
- For the static IP, enter the IP address in the following format `192.168.137.***/24`, Gateway `192.168.137.1`, and DNS Server `192.168.137.1`.



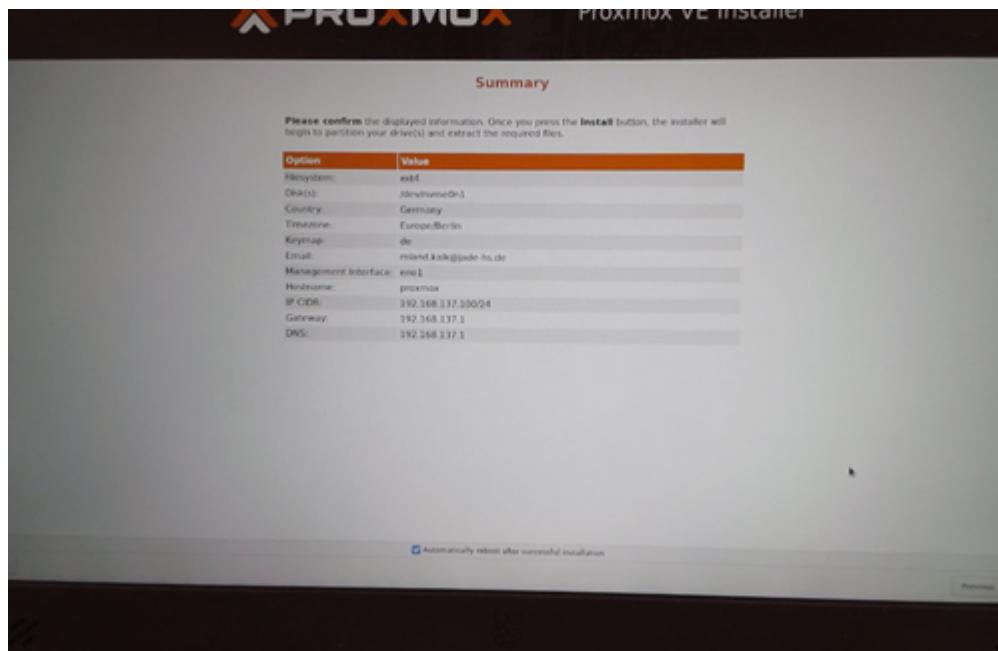
[!info] Why a static IP address? A static IP address ensures that the VM always uses the same network address (e.g., **192.168.1.100**), regardless of how often it is started or reconnected. This makes it always reachable for other devices or VMs at the same address. This is important when the VM serves as a server (e.g., database or web server).

Further information: [[04 Execution Static IP for an Ubuntu LTS VM]]

Note: We use **\*.local** to specify the domain of our virtual environment. This will be used consistently for naming the other servers/LXCs. This domain is important for various requirements, such as a unique FQDN (fully qualified domain name), SSL certificates, DNS resolution, etc.

## Step 5: Complete the installation

1. Check the settings and click **Install**.

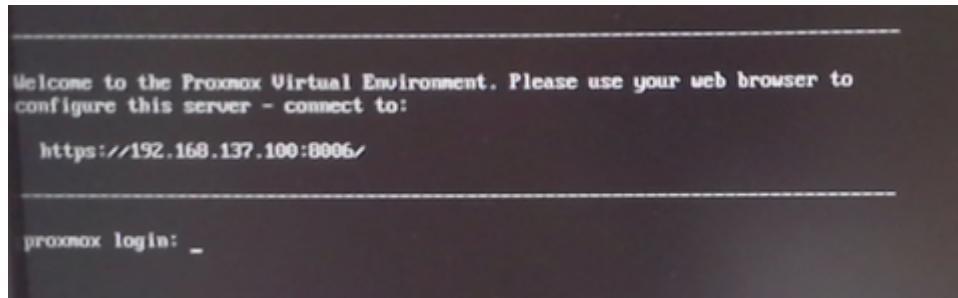


2. Wait until the installation is complete (approx. 10–20 minutes). 3. Remove the USB stick and restart the Tiny PC.

## Step 6: Check network connectivity

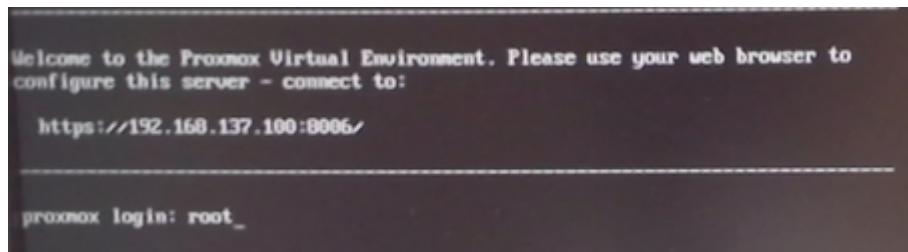
To check network connectivity, we use the CLI (Command Line) of the newly installed Proxmox system. Proxmox already displays the address that will be needed later in the web interface. To do this, we first have to log in to the system. This is done with the user **root** and the password set during installation. Please do not be surprised when entering the password that no placeholders are shown for the characters you type. In the CLI on Linux-based systems, the cursor remains in place when entering the password.

The output looks like this:



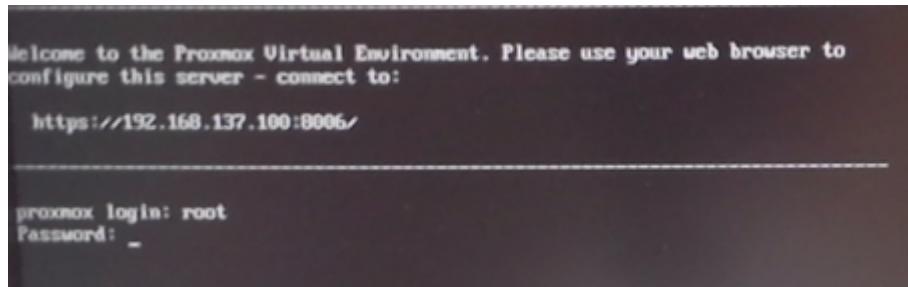
```
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:
https://192.168.137.100:8006/
proxmox login: _
```

after entering the user **root**



```
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:
https://192.168.137.100:8006/
proxmox login: root_
```

now press **Enter**



```
Welcome to the Proxmox Virtual Environment. Please use your web browser to
configure this server - connect to:
https://192.168.137.100:8006/
proxmox login: root
Password: _
```

Now enter the password:

Welcome to the Proxmox Virtual Environment. Please use your web browser to configure this server - connect to:  
<https://192.168.137.100:8006/>

```
proxmox login: root
Password:
Linux proxmox 6.8.12-9-pve #1 SMP PREEMPT_DYNAMIC PMX 6.8.12-9 (2025-03-16T19:18Z) x86_64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Jun 18 11:33:46 CEST 2025 on pts/0
root@proxmox:~#
```

1. First, we try to ping the computer that shares the internet connection with our virtual network. Since we are using the ICS function of Windows here, we ping the address **192.168.137.1**.

We end the ping with **CTRL + C**.

Further information: [00 - Network Card Experiment](#)

This explains how to configure a USB network adapter via ICS.

The command is: **ping 192.168.137.1** If we have configured everything correctly during the installation, we should get this output:

```
Linux proxmox 6.8.12-9-pve #1 SMP PREEMPT_DYNAMIC PMX 6.8.12-9 (2025-03-16T19:18Z) x86_64
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
root@proxmox:~# ping 192.168.137.1
PING 192.168.137.1 (192.168.137.1) 56(84) bytes of data.
64 bytes from 192.168.137.1: icmp_seq=1 ttl=128 time=1.04 ms
64 bytes from 192.168.137.1: icmp_seq=2 ttl=128 time=1.17 ms
64 bytes from 192.168.137.1: icmp_seq=3 ttl=128 time=1.13 ms
64 bytes from 192.168.137.1: icmp_seq=4 ttl=128 time=1.23 ms
^C
--- 192.168.137.1 ping statistics ---
1 packets transmitted, 4 received, 0% packet loss, time 3004ms
root@proxmox:~#
```

2. After we have established that there is a network connection to our ICS computer, we check whether there is a connection to the internet. To do this, we also use the **ping** command and enter the IP address of Google's DNS (Domain Name Server) as the IP address: **ping 8.8.8.8** Here too, if everything is configured correctly, we should get this output.

```
root@proxmox:~# ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=114 time=11.2 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=114 time=11.0 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=114 time=10.8 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=114 time=10.6 ms
^C
--- 8.8.8.8 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 10.60/10.883/11.159/0.213 ms
root@proxmox:~#
```

3. Finally, we test the name resolution to the internet. To do this, we also use the `ping` command and as the destination, we now enter a web address. In this example, we use the address of Heise. `ping heise.de` If everything is configured correctly, it should look something like this.

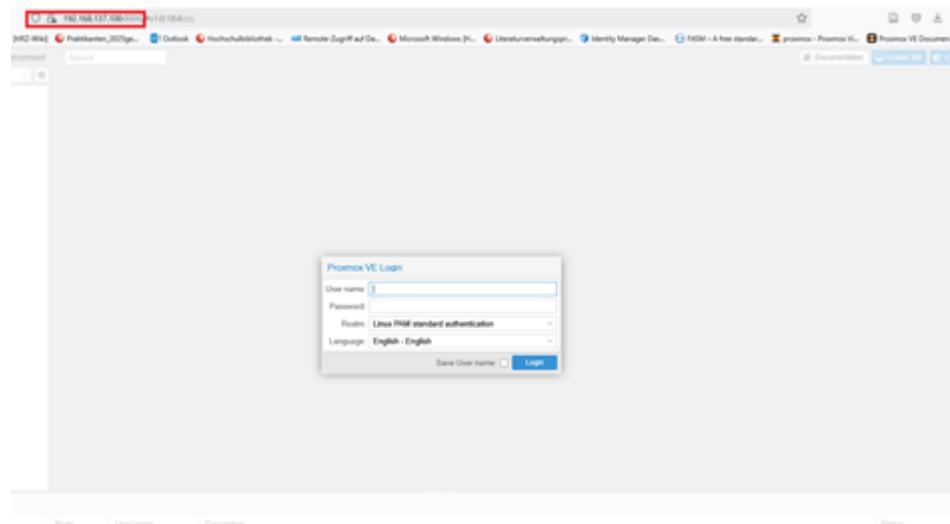
```
root@proxmox:~# ping heise.de
PING heise.de (193.99.144.80) 56(84) bytes of data.
64 bytes from redirector.heise.de (193.99.144.80): icmp_seq=1 ttl=244 time=15.9 ms
64 bytes from redirector.heise.de (193.99.144.80): icmp_seq=2 ttl=244 time=16.4 ms
64 bytes from redirector.heise.de (193.99.144.80): icmp_seq=3 ttl=244 time=16.2 ms
64 bytes from redirector.heise.de (193.99.144.80): icmp_seq=4 ttl=244 time=16.1 ms
^C
--- heise.de ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 15.943/16.173/16.445/0.185 ms
root@proxmox:~#
```

so that we can download and install updates and upgrades from the Debian repositories, as the source servers are entered as web addresses in the source list.

## Step 7: Access the Proxmox web interface

1. Open a browser on another device and enter the Proxmox URL:

- `https://<Proxmox-IP-Address>:8006`



2. Due to a missing certificate, a warning will be issued, which shows the page as unsafe. Click on "Advanced" here (see the image below) and select "Allow Exception."



Dies ist keine sichere Verbindung

Angreifer könnten versuchen, deine Informationen von **192.168.137.100** zu stehlen, etwa Passwörter, Nachrichten oder Kreditkartendaten. [Weitere Informationen zu dieser Warnung](#)

NET::ERR\_CERT\_AUTHORITY\_INVALID

Q Aktiviere den erweiterten Schutz, um für ein Höchstmaß an Sicherheit zu sorgen

Erweitert

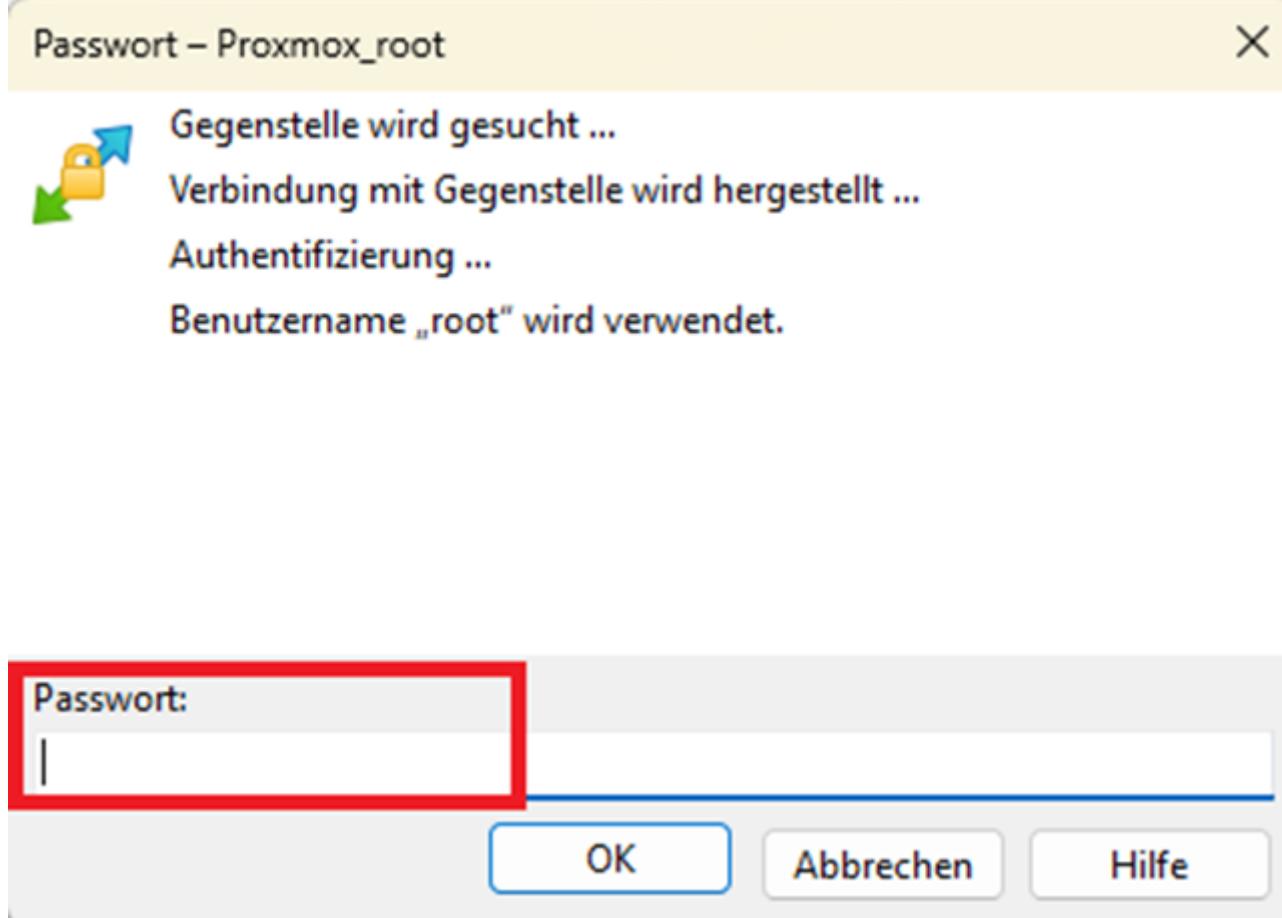
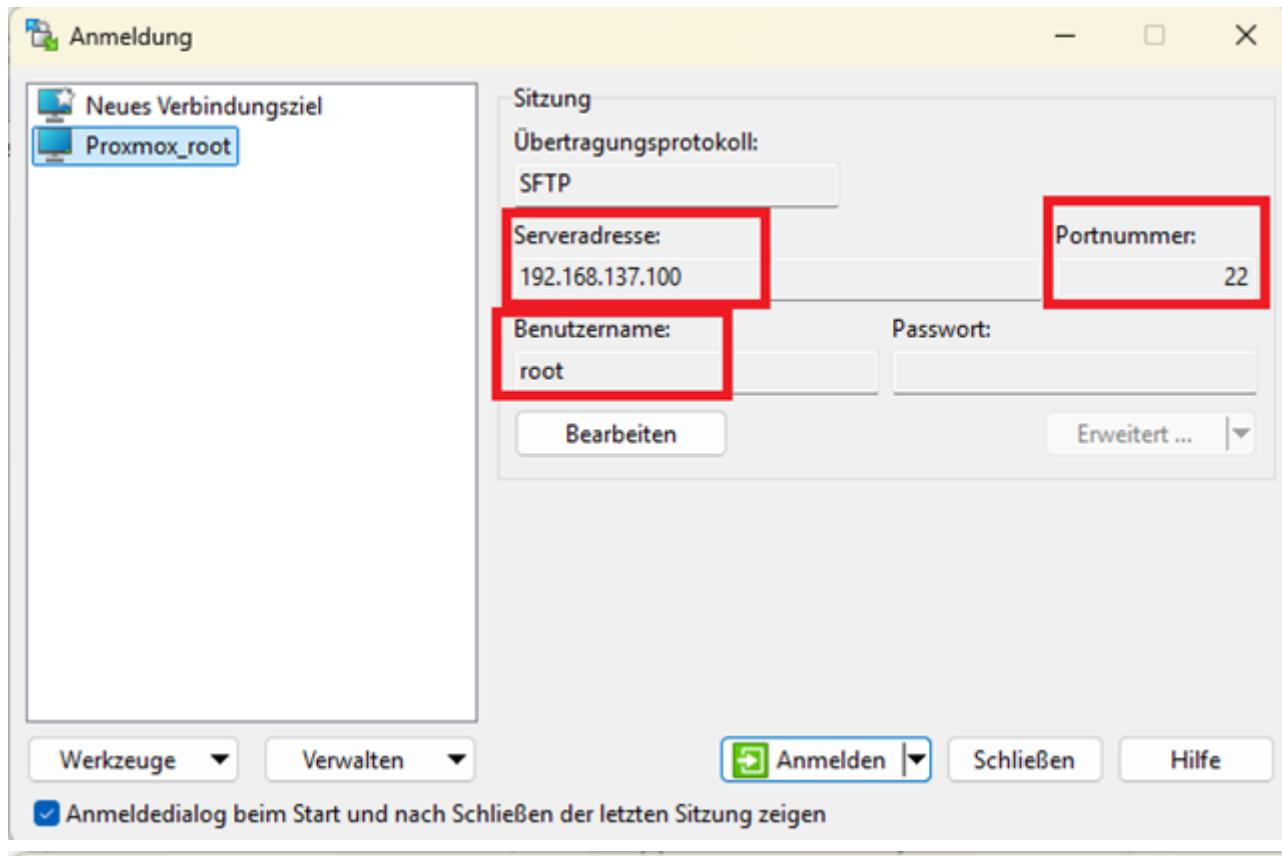
Zurück zu sicherer Website

3. Log in with **root** and the password set during installation. Here you can also set the language of the web interface.

The screenshot shows the Proxmox VE Login interface. It has four input fields: 'User name' containing 'root', 'Password' containing redacted text, 'Realm' set to 'Linux PAM standard authentication', and 'Language' set to 'English - English'. Below the fields are two buttons: 'Save User name: ' and a blue 'Login' button.

#### Step 8: Import Proxmox CA certificate into the client

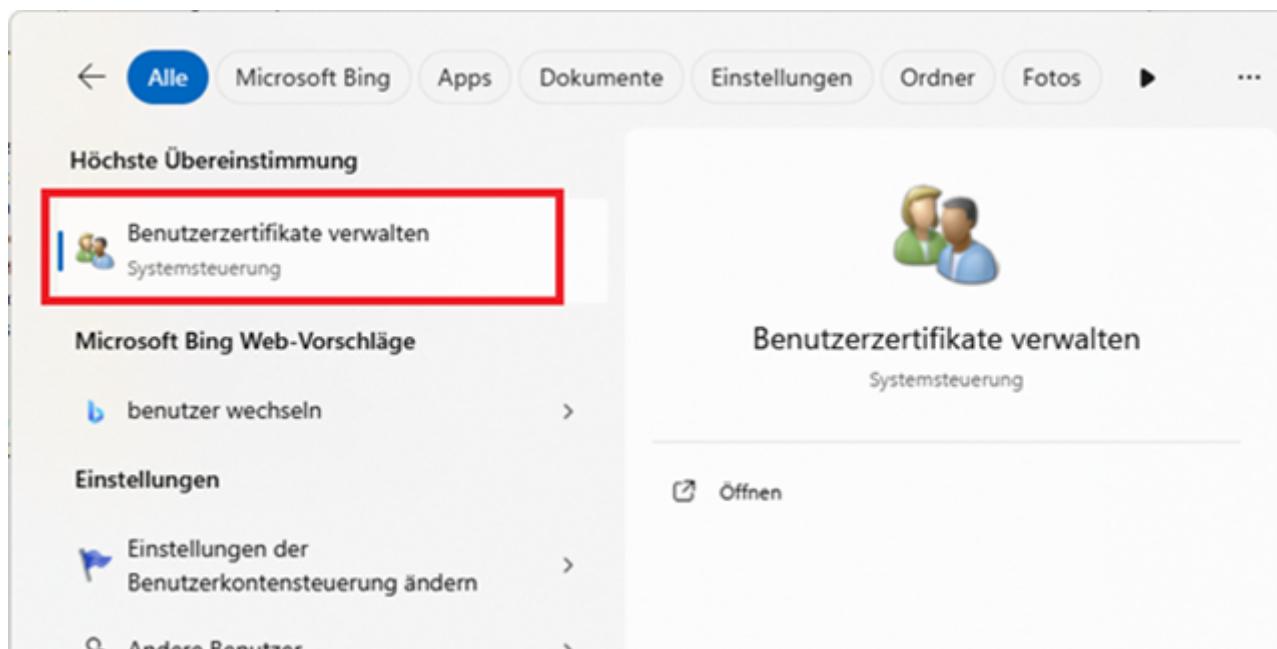
1. Proxmox automatically creates a Root CA certificate with the corresponding RSA key during installation.  
To avoid getting certificate error messages, we need to import the certificate created by Proxmox into our client as a trusted certificate.
2. To copy the Proxmox certificate to our client, we use an SFTP-capable program like WinSCP. Here is the download link for WinSCP: [WinSCP](#) We open an **SFTP** session in WinSCP to our Proxmox host with the IP **192.168.137.100** with port 22 and user:**root**



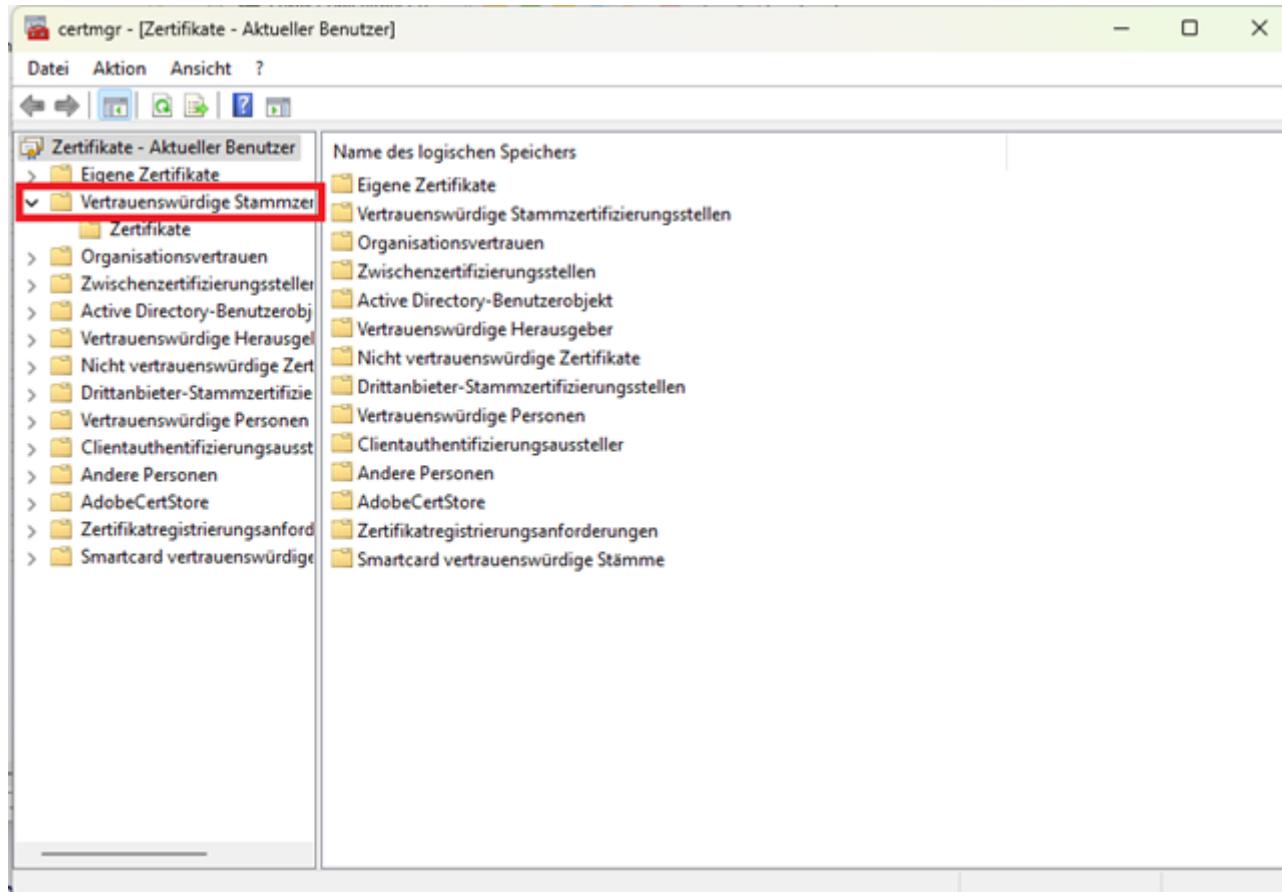
3. We now switch to the directory `/etc/pve/` and download the file `pve-root-ca.pem` to our tmp directory on drive `C:\tmp\`.

Name	Größe	Typ	Geändert		Name	Größe	Geändert	Rechte	Besitzer
Übergeordnetes V...			24.07.2025 13:47:26		..	03.07.2025 15:11:57		rwxr-xr-x	root
Dateiordner			04.07.2025 14:44:43		firewall	18.06.2025 20:25:21		rwxr-xr-x	root
AdressDaten.txt	156 KB	Textdokument	06.03.2023 18:49:25		ha	18.06.2025 20:25:21		rwxr-xr-x	root
ca.cert.pem	3 KB	PEM-Datei	07.07.2025 14:00:20		local	01.01.1970 01:00:00		rwxr-xr-x	root
MQTT allgemein.zip	10 KB	ZIP-komprimierte...	04.07.2025 14:42:02		lxc	01.01.1970 01:00:00		rwxr-xr-x	root
pve-root-ca.pem	3 KB	PEM-Datei	03.07.2025 09:15:04		mapping	18.06.2025 20:25:21		rwxr-xr-x	root
server.cert.pem	2 KB	PEM-Datei	07.07.2025 14:00:20		nodes	18.06.2025 20:25:17		rwxr-xr-x	root
server.key.pem	2 KB	PEM-Datei	07.07.2025 14:00:20		openvz	01.01.1970 01:00:00		rwxr-xr-x	root
Test.zip	12 KB	ZIP-komprimierte...	26.05.2025 12:55:10		priv	18.06.2025 20:25:17		rwxr-----	root
TesterJava.ipynb	2 KB	Jupyter-Quelldatei	24.07.2025 13:47:26		qemu-server	01.01.1970 01:00:00		rwxr-xr-x	root
VSCodeUserSetup-x6...	104.995 KB	Anwendung	28.03.2023 15:05:05		sdn	18.06.2025 20:25:21		rwxr-xr-x	root
xampp-windows-x64-...	153.891 KB	Anwendung	28.03.2023 15:04:55		virtual-guest	18.06.2025 20:25:11		rwxr-xr-x	root
					authkey.pub	1 KB	19.08.2025 10:30:58	rw-----	root
					authkey.pub.old	1 KB	19.08.2025 10:30:58	rw-r-----	root
					datacenter.cfg	1 KB	18.06.2025 20:24:21	rw-r-----	root
					pve-root-ca.pem	3 KB	18.06.2025 20:25:21	rw-----	root
					pve-www.key	2 KB	18.06.2025 20:25:18	rw-r-----	root
					replication.cfg	0 KB	30.07.2025 13:49:22	rw-t-----	root
					storage.cfg	1 KB	18.06.2025 20:24:21	rw-t-----	root
					user.cfg	1 KB	18.06.2025 20:24:21	rw-t-----	root
					vzdump.cron	1 KB	30.07.2025 13:49:22	rw-t-----	root

4. Now, in the Windows search bar on our ICS client, enter **Manage user certificates** and select the top result from the list.



5. In CertMngr, we navigate to the **Trusted Root Certification Authorities** directory and click the arrow on the left to display the directory structure.



Now right-click on the "Certificates" subfolder and then click on "All Tasks" and then on "Import."

6. The Certificate Import Wizard will now open.

The screenshot shows the 'Willkommen' (Welcome) screen of the 'Zertifikatimport-Assistent' (Certificate Import Wizard). At the top right is a close button (X). Below it, a back arrow and the title 'Zertifikatimport-Assistent' are displayed. The main text area contains a brief description of the wizard's purpose: 'Dieser Assistent hilft Ihnen beim Kopieren von Zertifikaten, Zertifikatvertrauenslisten und Zertifikatssperrenlisten vom Datenträger in den Zertifikatspeicher.' It also explains what a certificate is and where it is stored. A 'Speicherort' (Storage location) section contains two radio buttons: 'Aktueller Benutzer' (Current User), which is selected, and 'Lokaler Computer' (Local Computer). At the bottom, a note says 'Klicken Sie auf "Weiter", um den Vorgang fortzusetzen.' (Click 'Next' to continue.) The 'Weiter' (Next) button is highlighted with a red border, while the 'Abbrechen' (Cancel) button is not.

← Zertifikatimport-Assistent

## Willkommen

Dieser Assistent hilft Ihnen beim Kopieren von Zertifikaten, Zertifikatvertrauenslisten und Zertifikatssperrenlisten vom Datenträger in den Zertifikatspeicher.

Ein von einer Zertifizierungsstelle ausgestelltes Zertifikat dient der Identitätsbestätigung. Es enthält Informationen für den Datenschutz oder für den Aufbau sicherer Netzwerkverbindungen. Ein Zertifikatspeicher ist der Systembereich, in dem Zertifikate gespeichert werden.

Speicherort

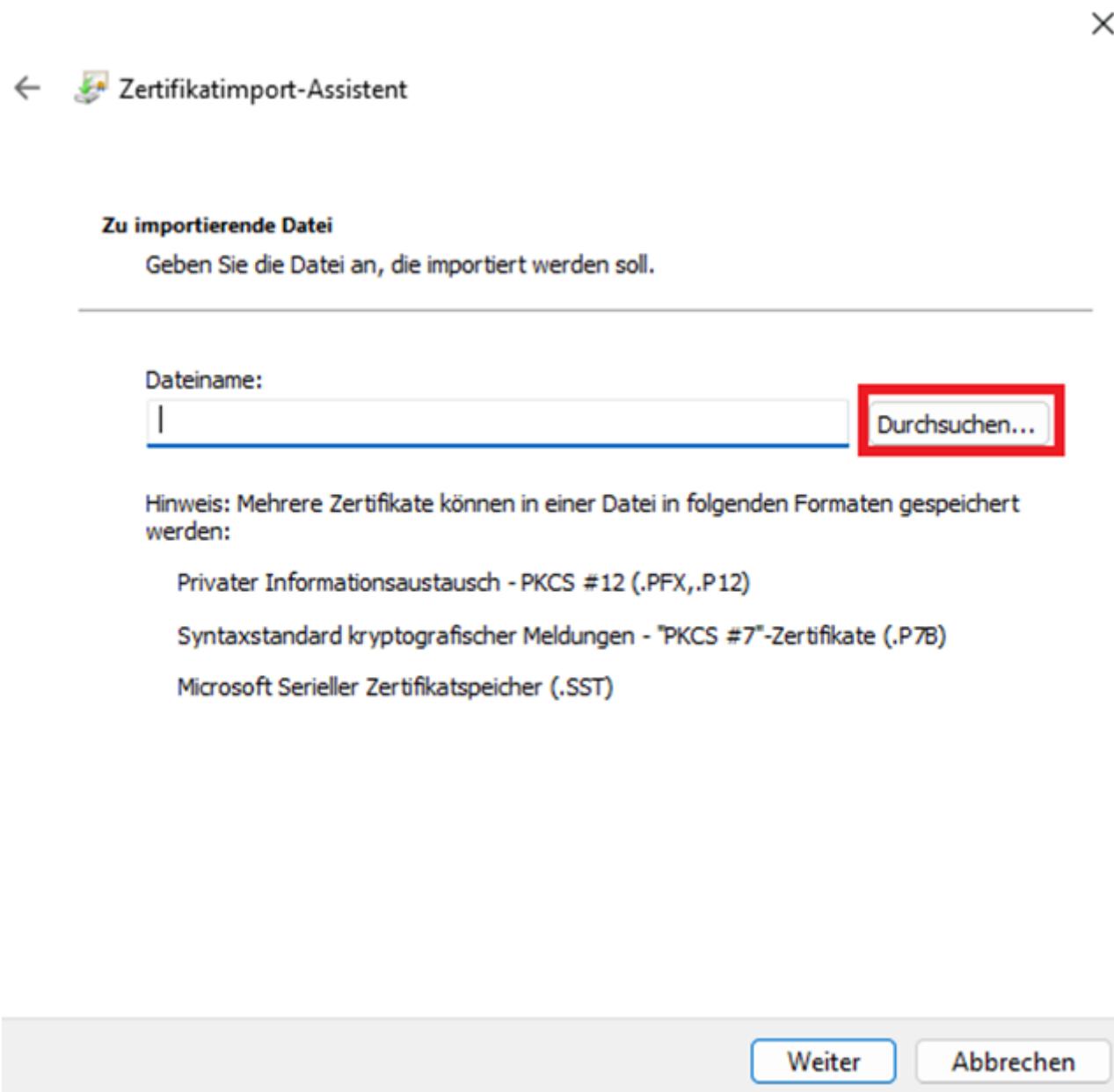
Aktueller Benutzer

Lokaler Computer

Klicken Sie auf "Weiter", um den Vorgang fortzusetzen.

Weiter Abbrechen

Click "Next."



Now we click "Browse" and select the directory where we previously downloaded the Proxmox certificate.

```
![ZertifikatAuswahlDownloadVerzeichnis]
("./0250attachments/ZertifikatAuswahlDownloadVerzeichnis.png)
```

We select the previously downloaded Proxmox certificate and click "Open."

```
![ZertifikatImportAssistentFileAuswahl]
("./0250attachments/ZertifikatImportAssistentFileAuswahl.png)
```

Now click on "Next."

We will now receive a security warning.

Simply confirm this, and the Proxmox certificate has been imported into the client.

```
![ZertifikatImportAssistentSicherheitswarnung]
("./0250attachments/ZertifikatImportAssistentSicherheitswarnung.png)
```

We will have to repeat this procedure later with other certificates to be able to establish a secure connection via TLS/SSL for our apache2, mariadb, and other applications.

Note! In production systems, however, public, trusted certification authorities or an internal certification authority, which is centrally managed in a company, are used for this.

## Step 9: Adjusting Chrony time server configuration for the university network

This describes how to configure the time server `time.jade-hs.de` in **Proxmox VE** using the **Chrony service**.

We have to adjust the time server because the Jade University blocks NTP port 123, which means that no time synchronization can take place.

Further information: The document [Explanation of why time synchronization is important] deals with this topic in more detail.

### 1. Adjust Chrony configuration

Open the Chrony configuration file with an editor:

```
nano /etc/chrony/chrony.conf
```

```
GNU nano 7.2                                     /etc/chrony.conf
# Welcome to the chrony configuration file. See chrony.conf(5) for more
# information about usable directives.

# Include configuration files found in /etc/chrony/conf.d.
confdir /etc/chrony/conf.d

# Use Debian vendor zone.
pool pool ntp.ubuntu.com iburst

# Use time sources from DHCP.
sourcedir /run/chrony-dhcp

# Use NTP sources found in /etc/chrony/sources.d.
sourcedir /etc/chrony/sources.d

# This directive specify the location of the file containing ID/key pairs for
# NTP authentication.
keyfile /etc/chrony/chrony.keys

# This directive specify the file into which chronyd will store the rate
# information.
driftfile /var/lib/chrony/chrony.drift

# Save NTS keys and cookies.
ntsdumpdir /var/lib/chrony

# Uncomment the following line to turn logging on.
#log tracking measurements statistics

# Log files location.
logdir /var/log/chrony
```

Look for the lines that start with `pool` or `server` (e.g., `pool ntp.ubuntu.com iburst`) and comment them out or delete them.

Instead, add the following time server:

```
server time.jade-hs.de iburst
```

```
GNU nano 7.2                                     /etc/chrony/chr
# Welcome to the chrony configuration file. See chrony.conf(5) for more
# information about usable directives.

# Include configuration files found in /etc/chrony/conf.d.
confdir /etc/chrony/conf.d

# Use Debian vendor zone.
server time.jade-hs.de iburst

# Use time sources from DHCP.
sourcedir /run/chrony-dhcp

# Use NTP sources found in /etc/chrony/sources.d.
sourcedir /etc/chrony/sources.d

# This directive specify the location of the file containing ID/key pairs for
# NTP authentication.
keyfile /etc/chrony/chrony.keys

# This directive specify the file into which chrony will store the rate
# information.
driftfile /var/lib/chrony/chrony.drift

# Save NTS keys and cookies.
ntsdumpdir /var/lib/chrony

# Uncomment the following line to turn logging on.
#log tracking measurements statistics

# Log files location.
logdir /var/log/chrony
```

Info: `iburst` ensures faster synchronization at startup.

## 2. Save and close the configuration file

In nano: Press `Ctrl + O` to save and `Ctrl + X` to exit.

## 3. Restart Chrony

```
systemctl restart chrony
```

## 4. Check status and synchronization Show Chrony status:

```
systemctl status chrony
```

```
root@proxmox:~# systemctl status chrony
● chrony.service - chrony, an NTP client/server
  Loaded: loaded (/lib/systemd/system/chrony.service; enabled; preset: enabled)
  Active: active (running) since Wed 2025-06-18 12:48:34 CEST; 25s ago
    Docs: man:chronyd(8)
          man:chronyc(1)
          man:chrony.conf(5)
  Process: 46629 ExecStart=/usr/sbin/chronyd $DAEMON_OPTS (code=exited, status=0/
 Main PID: 46633 (chronyd)
   Tasks: 2 (limit: 4389)
  Memory: 1.3M
    CPU: 58ms
   CGroup: /system.slice/chrony.service
           └─46633 /usr/sbin/chronyd -F 1
               ├─46634 /usr/sbin/chronyd -F 1
```

Check NTP synchronization:

chronyc sources

```
root@proxmox:~# chronyc sources
MS Name/IP address      Stratum Poll Reach LastRx Last sample
=====
^* glob-ntp1.hs-woe.de        2   6   177   46    -61us[ -376us] +/-  200ms
root@proxmox:~#
```

Or for more precise information:

chronyc tracking

```
root@proxmox:~# chronyc sources
MS Name/IP address      Stratum Poll Reach LastRx Last sample
=====
^* glob-ntp1.hs-woe.de        2   6   177   46    -61us[ -376us] +/-  200ms
root@proxmox:~# chro
chronyc chronyd chroot
root@proxmox:~# chronyc tr
tracking trimrtc
root@proxmox:~# chronyc tracking
Reference ID      : 8B0DF03A (glob-ntp1.hs-woe.de)
Stratum          : 3
Ref time (UTC)   : Wed Jun 18 10:55:07 2025
System time      : 0.0000056914 seconds fast of NTP time
Last offset      : +0.000025293 seconds
RMS offset       : 0.000256559 seconds
Frequency        : 64.968 ppm slow
Residual freq   : +0.010 ppm
Skew             : 1.520 ppm
Root delay       : 0.002425635 seconds
Root dispersion  : 0.196552441 seconds
Update interval  : 64.4 seconds
Leap status      : Normal
root@proxmox:~#
```

## Notes

The `/etc/chrony/chrony.conf` file is loaded automatically when Chrony starts.

If Proxmox is running in an isolated network, make sure the time server is reachable.

## Step 10: Perform Proxmox Update and Upgrade

1. In the Proxmox web interface, select "Proxmox" on the left side and then select "Updates."
2. Now click on "Refresh." A popup window will open, and Proxmox will try to download information about updates. An error message will appear here. These errors relate to the Proxmox Enterprise version, which is not free.

Task viewer: Update package database

**Output** Status

Stop Download

```
starting apt-get update
Hit:1 http://ftp.de.debian.org/debian bookworm InRelease
Hit:2 http://ftp.de.debian.org/debian bookworm-updates InRelease
Hit:3 http://security.debian.org bookworm-security InRelease
Err:4 https://enterprise.proxmox.com/debian/ceph-quincy bookworm InRelease
  401 Unauthorized [IP: 45.84.67.184 443]
Err:5 https://enterprise.proxmox.com/debian/pve bookworm InRelease
  401 Unauthorized [IP: 45.84.67.184 443]
Reading package lists...
E: Failed to fetch https://enterprise.proxmox.com/debian/ceph-quincy/dists/bookworm/InRelease 401 Unauthorized [IP: 45.84.67.184 443]
E: The repository 'https://enterprise.proxmox.com/debian/ceph-quincy bookworm InRelease' is not signed.
E: Failed to fetch https://enterprise.proxmox.com/debian/pve/dists/bookworm/InRelease 401 Unauthorized [IP: 45.84.67.184 443]
E: The repository 'https://enterprise.proxmox.com/debian/pve bookworm InRelease' is not signed.
TASK ERROR: command 'apt-get update' failed: exit code 100
```

3. To fix this error, we have to change the Proxmox repository. The Enterprise repository is currently entered here, as can be seen in the picture.

<input type="checkbox"/> File: /etc/apt/sources.list.d/ceph.list (1 repository)	✓ deb https://enterprise.proxmox.com/debian/ceph-quincy	bookworm	enterprise	
<input type="checkbox"/> File: /etc/apt/sources.list.d/pve-enterprise.list (1 repository)	✓ deb https://enterprise.proxmox.com/debian/pve	bookworm	pve-enterprise	

We can disable this at the top of the web interface.

4. Now we have to add a new repository to be able to perform updates or upgrades.

Enabled	Types	URLs	Suites	Components	Options	Origin	Comment
<input type="checkbox"/>	deb	http://ftp.de.debian.org/debian	bookworm	main contrib			
<input type="checkbox"/>	deb	http://ftp.de.debian.org/debian	bookworm-updat...	main contrib			
<input type="checkbox"/>	deb	http://security.debian.org	bookworm-security	main contrib			security updates
<input type="checkbox"/>	deb	http://download.proxmox.com/debian/pve	bookworm	pve-no-subscription			
<input type="checkbox"/>	deb	https://enterprise.proxmox.com/debian/ceph-quincy	bookworm	enterprise			
<input type="checkbox"/>	deb	https://enterprise.proxmox.com/debian/pve	bookworm	pve-enterprise			

There, we select "Add" and in the following menu, we select **No Subscription**. Now we can update and upgrade Proxmox.

#### d. Sources

- "balenaEtcher - Flash OS Images to SD Cards & USB Drives." Accessed June 11, 2025. [Etcher](#).
- "Network Configuration - Proxmox VE." Accessed June 6, 2025. [Proxmox Wiki](#).
- "Proxmox VE Documentation Index." Accessed June 4, 2025. [Proxmox Docs](#).
- "Rufus - Create bootable USB drives easily." Accessed June 11, 2025. [Rufus](#).
- "chrony - Documentation." Accessed June 18, 2025. [Chrony Doc](#).
- "Time Synchronization - Proxmox VE." Accessed June 18, 2025. [Proxmox Wiki Time\\_Synchronization](#).
- "Table of Contents :: WinSCP." Accessed: August 19, 2025. [Online]. Available at: [WinSCP Docs](#)
- **Tiny PC BIOS Documentation:** Manufacturer's documentation for BIOS/UEFI options.

#### Related Documentation:

- Guide to setting up an Ubuntu VM with Proxmox

**Note:** Make sure that the Tiny PC always has a constant power supply and network connection after installation to ensure a stable virtualization environment.

#### License

This work is licensed under the **Creative Commons Attribution - ShareAlike 4.0 International License**.

To the license text on the [Creative Commons website](#)