Qualcomm Technologies, Inc.

Qualcomm Linux Virtual Machine Setup Guide

80-70018-41 AA

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Contents

1 Virtual machine setup overview

Qualcomm® Linux® uses the Ubuntu Linux distribution to sync, build, and flash the associated firmware on supported devices. If you have an Ubuntu machine, you can skip this document. If you don't have an Ubuntu machine, you need to set up a virtual machine (VM) running Ubuntu on your Windows® or Mac® host computer.

This guide describes the following:

- Required host computer configuration and software to set up an Ubuntu VM
- Required Ubuntu Linux distribution for Qualcomm Linux
- Procedures to set up VMs running the Ubuntu operating system on both Windows and Mac host computers
- Troubleshooting steps for common technical issues

1.1 Next steps

- Set up an Ubuntu VM on Windows 11 using WSL
- Set up an Ubuntu Server VM on an Arm64 Mac using UTM
- Set up an Ubuntu VM on an x86_64 Mac using UTM

2 Set up an Ubuntu VM on Windows

Windows Subsystem for Linux (WSL) is a Windows feature that allows you to run Linux distributions on Windows, without using a virtualization software. The following figure shows the tasks involved in setting up WSL on Windows.

Figure: Workflow to set up WSL

Note: You can only compile the Qualcomm Linux build using WSL. To flash the software, see Flash using the QDL tool.

2.1 Prerequisites

Before setting up WSL, do the following:

- Verify Windows host computer system requirements
- Turn on Windows features
- Set the default WSL version

Verify Windows host computer system requirements

Before setting up an Ubuntu VM using WSL, ensure your Windows host computer meets the following system requirements:

Processor architecture	X64
CPU cores	8 or more
RAM	8 GB or more
Storage	300 GB of free space
Operating system	Windows 11

Turn on Windows features

To turn on the *Windows Subsystem for Linux* and *Virtual Machine Platform* Windows features, run the following commands in Windows PowerShell with administrative privileges:

Windows feature	Command
Windows Subsystem for Linux	`Enable-WindowsOptionalFeature -Online -FeatureName Microsoft-Windows-Subsystem-Linux`
Virtual Machine Platform	`Enable-WindowsOptionalFeature -Online -FeatureName VirtualMachinePlatform`

Note: Restart the Windows host computer after running the commands.

Set the default WSL version

To set Windows Subsystem for Linux 2 as the default Linux distribution version for WSL, run the following command in Windows PowerShell with administrative privileges:

```
wsl --set-default-version 2
```

Output

```
For information on key differences with WSL 2 please visit
```

```
https://aka.ms/wsl2. The operation completed successfully.
```

2.2 Install Ubuntu in WSL

Qualcomm Linux uses the Ubuntu-22.04 Linux distribution. To verify if Ubuntu 22.04 is available as one of the distributions on your Windows host computer and then install it, do the following:

1. To list the distributions available for installation, run the following command in Windows PowerShell:

   ```
   wsl --list --online
   ```

2. Verify that the list includes Ubuntu 22.04 as one of the distributions.

   ```
   C:\Users\[redacted]>wsl --list --online
   The following is a list of valid distributions that can be installed.
   The default distribution is denoted by '*'.
   Install using 'wsl --install -d <Distro>'.

     NAME                            FRIENDLY NAME
   * Ubuntu                          Ubuntu
     Debian                          Debian GNU/Linux
     kali-linux                      Kali Linux Rolling
     Ubuntu-18.04                    Ubuntu 18.04 LTS
     Ubuntu-20.04                    Ubuntu 20.04 LTS
     Ubuntu-22.04                    Ubuntu 22.04 LTS
     Ubuntu-24.04                    Ubuntu 24.04 LTS
     OracleLinux_7_9                 Oracle Linux 7.9
     OracleLinux_8_7                 Oracle Linux 8.7
     OracleLinux_9_1                 Oracle Linux 9.1
     openSUSE-Leap-15.6              openSUSE Leap 15.6
     SUSE-Linux-Enterprise-15-SP5    SUSE Linux Enterprise 15 SP5
     SUSE-Linux-Enterprise-15-SP6    SUSE Linux Enterprise 15 SP6
     openSUSE-Tumbleweed             openSUSE Tumbleweed
   ```

   Note: If you don't see Ubuntu 22.04 in the distributions listed, contact Microsoft support.

3. To update WSL, run the following command:

   ```
   wsl --update
   ```

4. To install Ubuntu 22.04 LTS, run the following command:

```
wsl --install -d Ubuntu-22.04
```

5. After the installation is complete, set the username and password for the Ubuntu 22.04 Linux distribution you installed.

2.3 Configure global settings for WSL

To configure WSL global settings, such as memory, processors, and the swap storage space for the Ubuntu VM, do the following:

1. Open Windows File Explorer and go to the `C: Users<username>` directory.
2. Do one of the following:
   - If the `.wslconfig` file exists, skip to Step 3.
   - If the `.wslconfig` file doesn't exist, create a file named `.wslconfig`.
3. Open the `.wslconfig` file in a text editor, copy the following text, and save it:

```
# Settings apply across all Linux distributions running
on WSL 2
[wsl2]
# Limits VM memory to use no more than 4 GB, this can be
set as whole numbers using GB or MB
memory=64GB
# Sets the VM to use two virtual processors
processors=16
# Sets amount of swap storage space to 8GB, default is 25
% of available RAM
swap=64GB
# Sets swapfile path location, default is %USERPROFILE%\
AppData\Local\Temp\swap.vhdx
swapfile=C:\\temp\\wsl-swap.vhdx
# Enable experimental features
[experimental]
# Automatically releases cached memory after detecting
idle CPU usage. Set to gradual for slow release, and
dropcache for instant release of cached memory.
autoMemoryReclaim=dropcache
```

Note: Set the values for memory, processors, and swap size to match with the specifications of your Windows host computer.

4. To shut down WSL, run the following command in Windows PowerShell:

```
wsl --shutdown
```

5. To restart WSL, run the following command in Windows PowerShell:

```
wsl
```

2.4 Configure Ubuntu settings in WSL

To set up the WSL environment, configure the following Ubuntu settings in WSL:

- DNS settings
- Git settings
- WSL local settings

DNS settings

To configure DNS settings for WSL, use the `resolv.conf` file.

1. In a Linux terminal window, use the `sudo` command to add the following contents in the `/etc/resolv.conf` file:

```
sudo rm /etc/resolv.conf
sudo bash -c 'echo "nameserver 8.8.8.8" > /etc/resolv.conf'
```

2. When you close the Linux terminal window, the nameserver automatically reverts to its default nameserver setting. To save the changes you made to the `resolv.conf` file permanently, run the following command:

```
sudo chattr -f +i /etc/resolv.conf
```

3. To change the write permissions and update the `resolv.conf` file, run the following command:

```
sudo chattr -f -i /etc/resolv.conf
```

Git settings

To enable long path support for Git, run the following command in the Linux terminal window:

```
git config --global core.longpaths true
```

WSL local settings

To configure local settings for the Ubuntu Linux distribution you installed, use the wsl.conf file. The settings in the wsl.conf file are automatically applied every time you run WSL.

1. In the Linux terminal window, use the `sudo` command to add the following contents in the `/etc/wsl.conf` file:

```
[network]
generateResolvConf = false
[automount]
options = "metadata"
[boot]
command = service docker start
```

2. In Windows PowerShell, run the following command to restart WSL:

```
wsl --shutdown
```

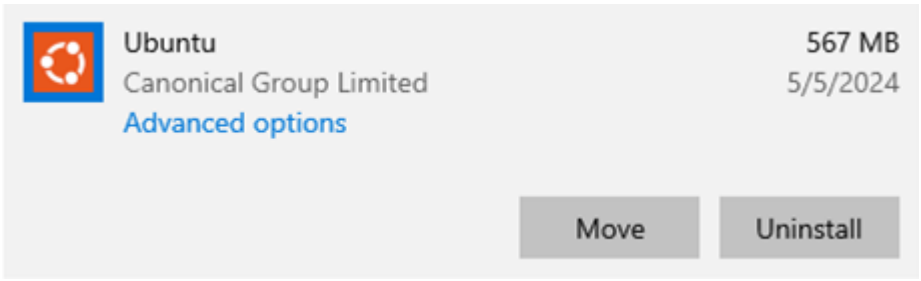
2.5 Optional: Change the Ubuntu installation drive

Ubuntu installs on the C drive by default. If the C drive on your Windows host computer doesn't have enough disk space for builds, you can move the Ubuntu installation to another drive.

To move the Ubuntu installation to another drive, do the following:

1. Open *Add or Remove Programs* and find the Ubuntu installation in the list.
2. In the *Control Panel*, select *Programs* > *Programs and Features*.
3. Right-click the Ubuntu installation for which you want to change the drive, and select *Uninstall* or *Uninstall/Change*.

   The following dialog box appears.



4. Select *Move*.
5. Select the drive that you want to move the Ubuntu installation to and select *Move*.

Note: To access the WSL workspace, go to the following path using the Windows File Explorer:

```
\\wsl$
```

2.6 Next steps

- Sync, build, and flash Qualcomm Linux
- Fix network failures in the Ubuntu VM

3 Set up an Ubuntu Server VM on an Arm64 Mac

UTM is an open-source VM host for macOS®, which allows you to run other operating systems on Macs, including Ubuntu. The following figure shows the tasks involved in setting up an Ubuntu Server VM using UTM on an Arm64 Mac.

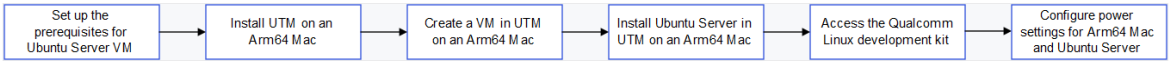


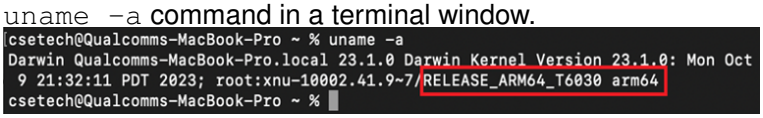
Figure: Workflow to set up Ubuntu VM

3.1 Prerequisites

- Ensure that your host computer meets the system requirements listed in Host computer requirements for Arm64 Mac.
- Download the necessary software listed in Ubuntu Server VM software requirements for Arm64 Mac.

Host computer requirements for Arm64 Mac

The host computer requirements to set up an Ubuntu Server VM on an Arm64 Mac are as follows:

Processor architecture	Arm64
	To verify that the architecture of your Mac is Arm64, run the `uname -a` command in a terminal window. 
CPU cores	8 or more
RAM	8 GB or more
Storage	300 GB of free space for the UTM VM
Operating system	macOS 14

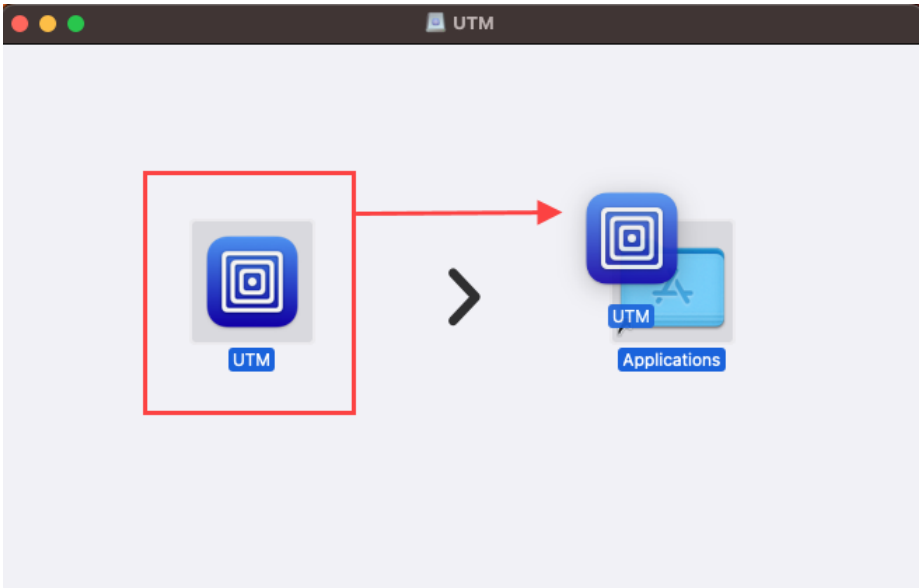
Ubuntu Server VM software requirements for Arm64 Mac

The software requirements to set up an Ubuntu Server VM on an Arm64 Mac are as follows:

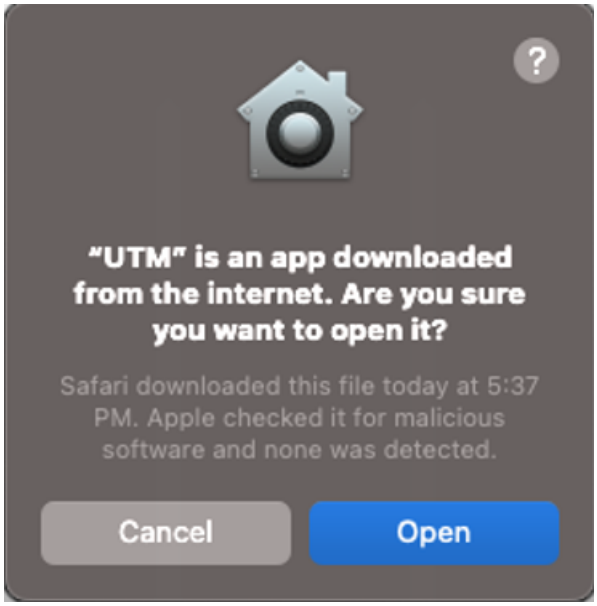
Software	Description
UTM virtualization software	Download the UTM virtualization software from the UTM website.
Ubuntu Server International Organization for Standardization (ISO)	Use one of the Ubuntu 22.04 64-bit Arm® (ARMv8/AArch64) Server LTS versions. Qualcomm recommends that you download the latest version of Ubuntu Server 22.04 ISO (for example, ubuntu-22.04.5-live-server-arm64.iso) from the Ubuntu website.

3.2 Install UTM on an Arm64 Mac

1. Double-click the *UTM.dmg* file downloaded earlier and drag the *UTM* icon onto the *Applications* icon.

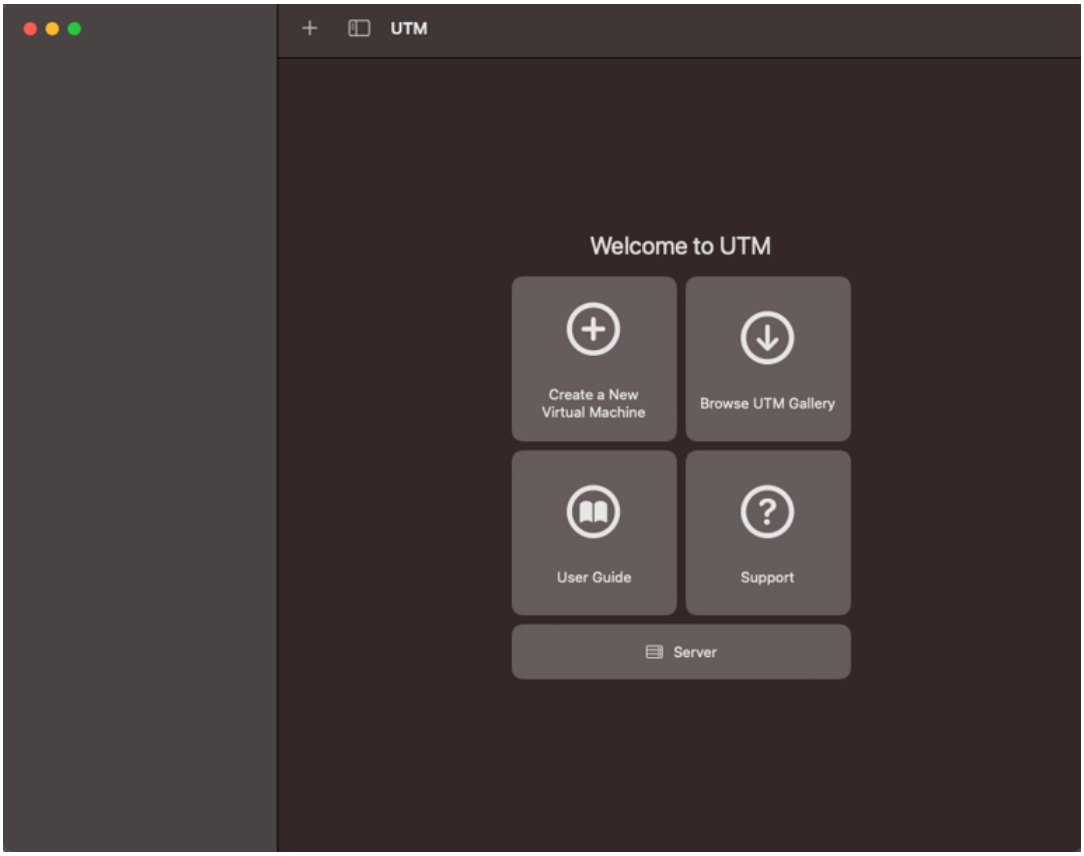


2. While installing UTM, if you see the following dialog box, select *Open*:



3. Open Launchpad, search for *UTM*, and select *UTM*.

   The UTM main window appears.



3.3 Create a VM in UTM on an Arm64 Mac

1. In the UTM main window, select *Create a New Virtual Machine*.
2. On the *Start* screen, select *Virtualize*.
3. On the *Operating System* screen, select the *Linux* OS.
4. On the *Linux* screen, browse and select the Ubuntu ISO image you downloaded, and select *Continue*.
5. On the *Hardware* screen, specify the memory and CPU cores you want to assign to the Ubuntu VM, and select *Continue*. The recommended values are as follows:
   - Memory: About 70% of the available memory
   - CPU cores: At least 50% of the available cores

   If you leave the *CPU Cores* field blank or set it to 0, UTM allocates all the host computer cores to the VM. Allocating all CPU cores to the VM can make the host computer slow or unresponsive.

Note: To check the memory size and the CPU core count of a Mac host computer, see the instructions in the macOS User Guide.

6. On the *Storage* screen, specify the drive size for the VM, and select *Continue*.

Note: Qualcomm recommends that you assign at least 300 GB of storage space for the VM.

7. If you want to share a directory between the host computer and the VM, do the following on the *Shared Directory* screen:
   a. Browse and select the directory.
   b. Select *Continue*.
8. On the *Summary* screen, do the following:
   a. Review the configuration summary for the VM that you are creating.
   b. Provide a name to the VM.
   c. Select *Save*. The UTM main window lists the newly created VM.

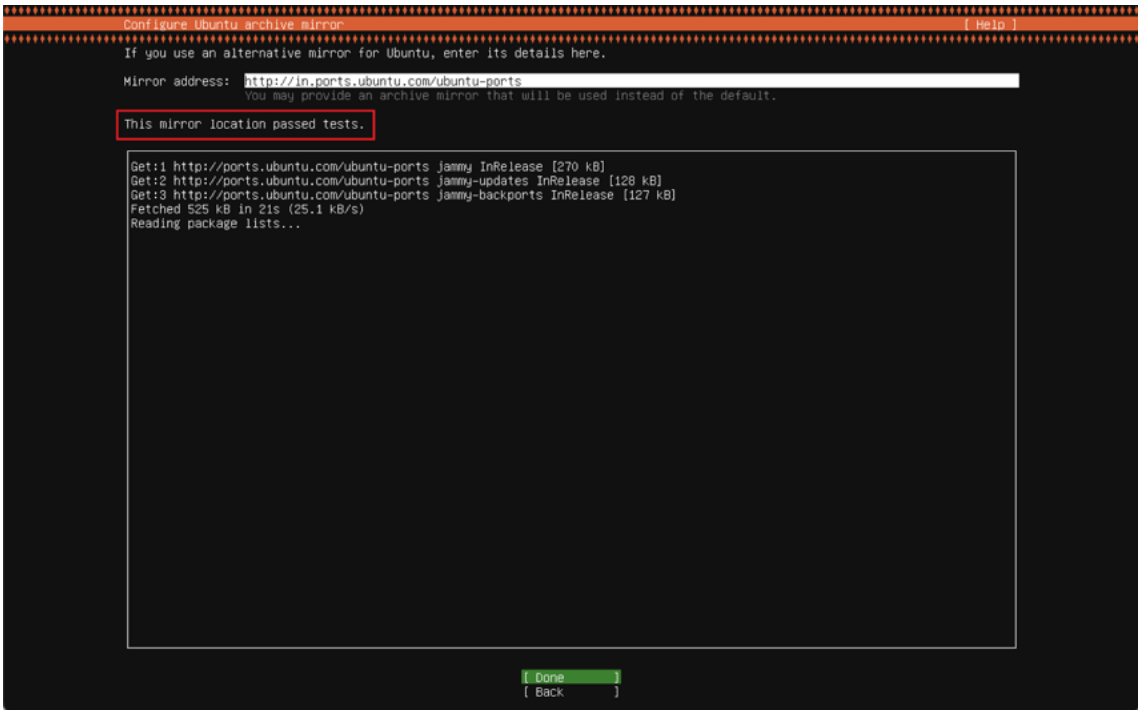
3.4 Install Ubuntu Server in UTM on an Arm64 Mac

1. Run UTM.
2. In the UTM main window, select the *Play* icon to run the Ubuntu ISO image through virtualization.
3. Select *Try or Install Ubuntu Server* using the arrow keys and select *Enter*.

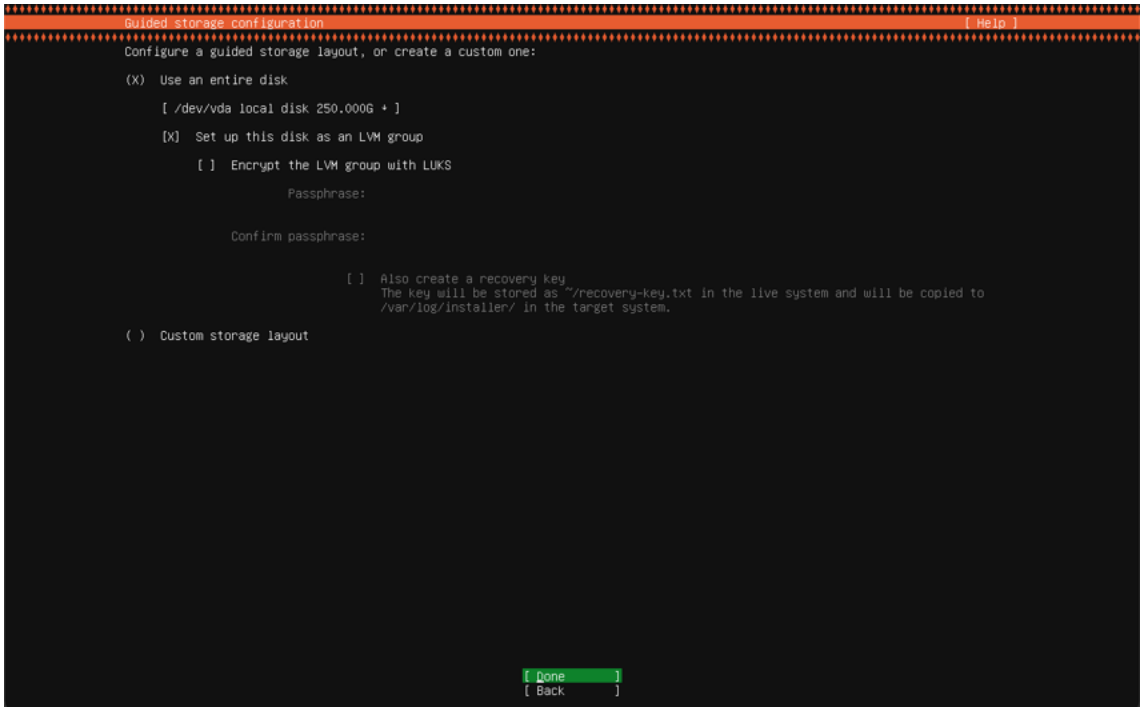
4. Choose a language and select *Enter*.
5. Optional: You may see a screen to update the installer. Choose one of the following options and select *Enter*:

- *Update to the new installer*
- *Continue without updating*

6. Choose a keyboard layout, select *Done*, and select *Enter*.
7. Select the *Ubuntu Server* installation base, select *Done*, and select *Enter*.
8. Select the appropriate network interface, select *Done*, and select *Enter*.
9. Select the appropriate proxy configuration, select *Done*, and select *Enter*.
10. If necessary, configure the mirror address and wait until the mirror location passes all the tests, select *Done*, and select *Enter*.

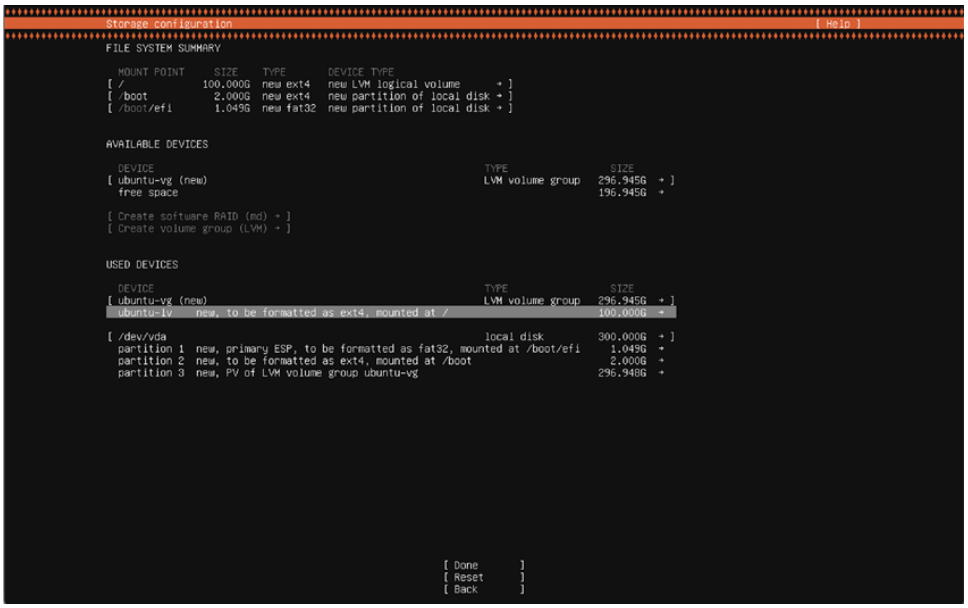


11. Select *Use an entire disk* > *Set up this disk as an LVM group*, select *Done*, and select *Enter*.

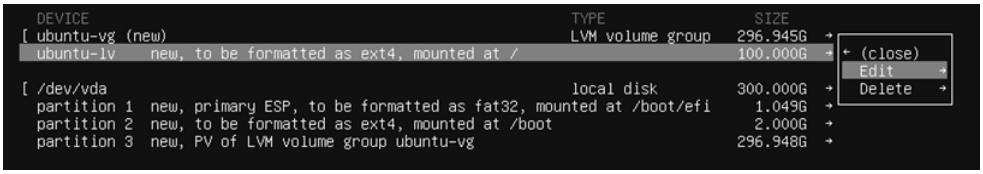


12. Configure the storage space as follows:

    a. Under the *USED DEVICES* section, select *ubuntu-lv*, and select *Enter* to view more options.



    b. In the dialog box, select *Edit*, and select *Enter*.



c. In the *Size* field, type *296.000G*, select *Save*, and select *Enter*. The updated size should now reflect for the ubuntu-lv entry.

d. Select *Done* and select *Enter*.

13. To set up your profile, specify the required details, select *Save*, and select *Enter*.
14. Skip the *Ubuntu Pro* upgrade option, select *Continue*, and select *Enter*.
15. Optional: Select *Install OpenSSH Server* to set up SSH, select *Done*, and select *Enter*.

Note: OpenSSH isn't required for syncing, compiling, and flashing Qualcomm Linux. Install the OpenSSH server only if you want to allow secure remote access for the Ubuntu VM.

---

16. Select a *Docker* snap, select *Done*, and select *Enter*.

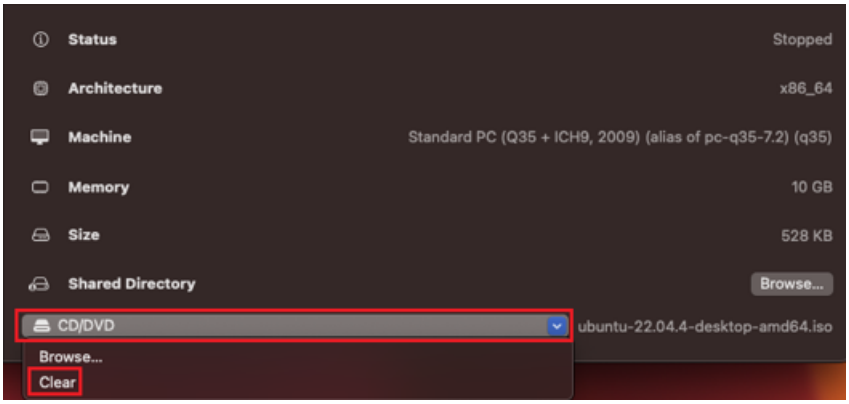
    Wait for the installation process to complete.

Note: The installation process may suggest multiple Docker channels, such as stable and candidate. Select an appropriate Docker channel to continue with the installation.

---

17. After the installation is successful, select the *Power* icon to shut down and stop the VM.

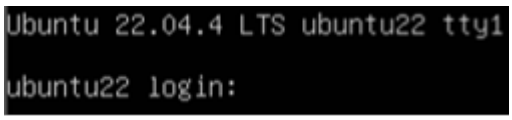
18. In the *Confirmation* dialog box, select *OK*. After the VM stops, close the window.
19. In the UTM main window, in the *CD/DVD* drop-down list, select *Clear*.



20. Confirm that the ISO image association is empty against the CD/DVD option.

21. To run the Ubuntu VM, select the *Play* icon.

22. After the Ubuntu operating system boots successfully, enter the credentials to sign in and access the shell.



23. Run the following commands to update the Ubuntu operating system and install the graphical desktop environment, followed by a restart:

```
sudo apt update && sudo apt upgrade -y
```

```
sudo apt install ubuntu-desktop -y
```

```
reboot
```

24. Sign in to the Ubuntu VM you created.

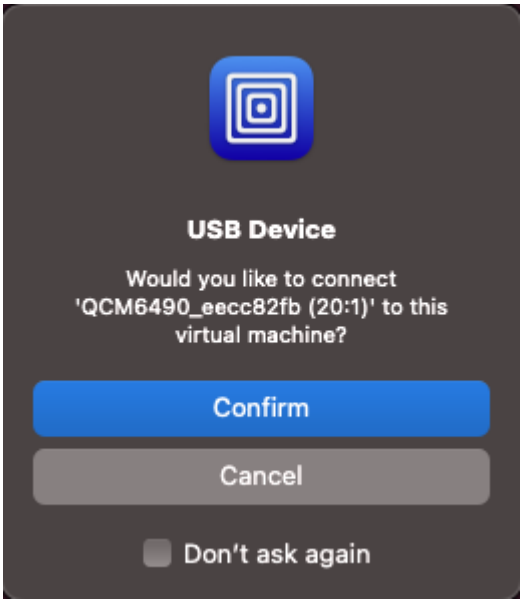
3.5 Access the Qualcomm Linux development kit

To access the Qualcomm Linux development kit from the Ubuntu Server VM, do the following:

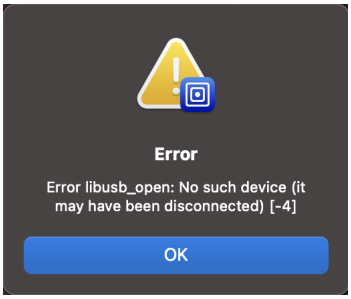
1. Connect the Qualcomm Linux development kit to the host computer.

   The UTM software may show you a dialog box to confirm whether the virtualized Ubuntu operating system should have access to the Qualcomm Linux development kit.

   a. If you see a dialog box as follows, select *Confirm*:

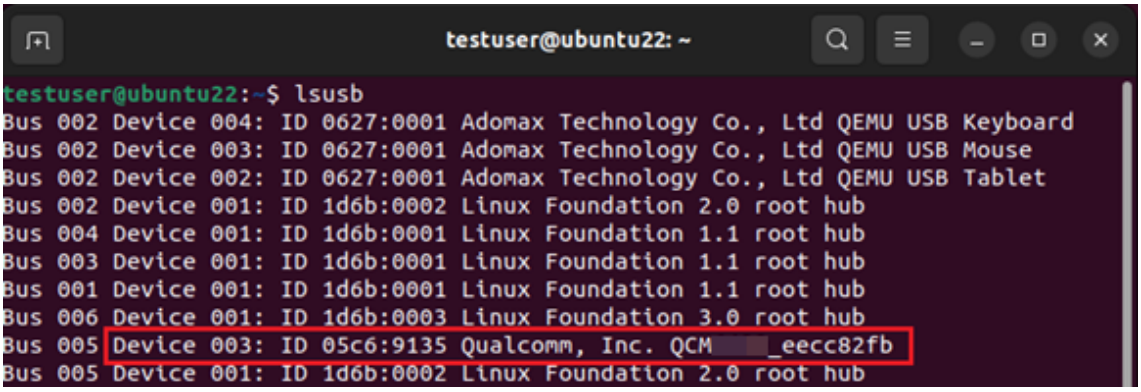


b. After selecting *Confirm*, if you see the following USB disconnection error, select *OK* to ignore it:



2. To verify if the Ubuntu VM can access the Qualcomm Linux development kit, run the `lsusb` command in a Linux terminal window.

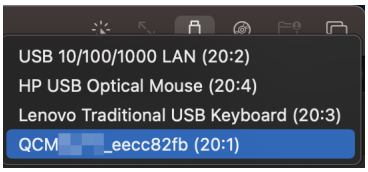
   The output shows the Qualcomm Linux development kit as follows:



   If the Qualcomm Linux development kit isn't detected in the Ubuntu VM, do the following:

a. Select *USB Devices* in the toolbar of the UTM VM window.

b. Select *QCMXXXX_xxxxxxxx*.



Note: If you don't see the Qualcomm Linux development kit listed as one of the USB devices, do the following:

1. In UTM settings, select *Input* in the left panel.
2. Set the value in the *Maximum Shared USB Devices* field to 10.

3.6 Configure power settings for Arm64 Mac and Ubuntu Server

To ensure that the Mac host computer and the Ubuntu Server VM don't go to sleep due to inactivity, do the following:

- To configure the sleep and wake settings for the Mac host computer, see macOS User Guide.
- To configure the power settings for Ubuntu Server, do the following:
  1. In *System Settings* for Ubuntu, select *Power*.
  2. Turn off *Automatic Suspend*.

3.7 Next steps

- Sync, build, and flash Qualcomm Linux
- Fix network failures in the Ubuntu VM
- Troubleshoot slow or unresponsive Mac host computer

4 Set up an Ubuntu VM on an x86_64 Mac

UTM is an open-source VM host for macOS, which allows you to run other operating systems on Macs, including Ubuntu. The following figure shows the tasks involved setting up an Ubuntu VM using UTM on an x86_64 Mac.

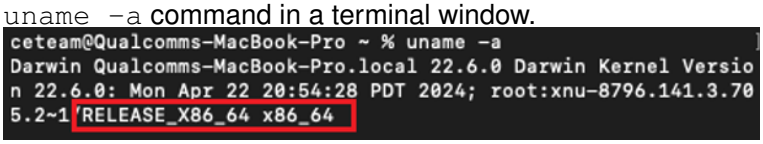
Figure: Workflow to set up Ubuntu VM

4.1 Prerequisites

- Ensure that your host computer meets the system requirements listed in Host computer requirements for x86_64 Mac.
- Download the necessary software listed in Ubuntu VM software requirements for x86_64 Mac.

Host computer requirements for x86_64 Mac

The host computer requirements to set up an Ubuntu VM on an x86_64 Mac are as follows:

Processor architecture	x86_64
	To verify that the architecture of your Mac is x86_64, run the `uname -a` command in a terminal window. 
CPU cores	8 or more
RAM	8 GB or more
Storage	300 GB of free space for the UTM VM
Operating system	macOS 13 or higher

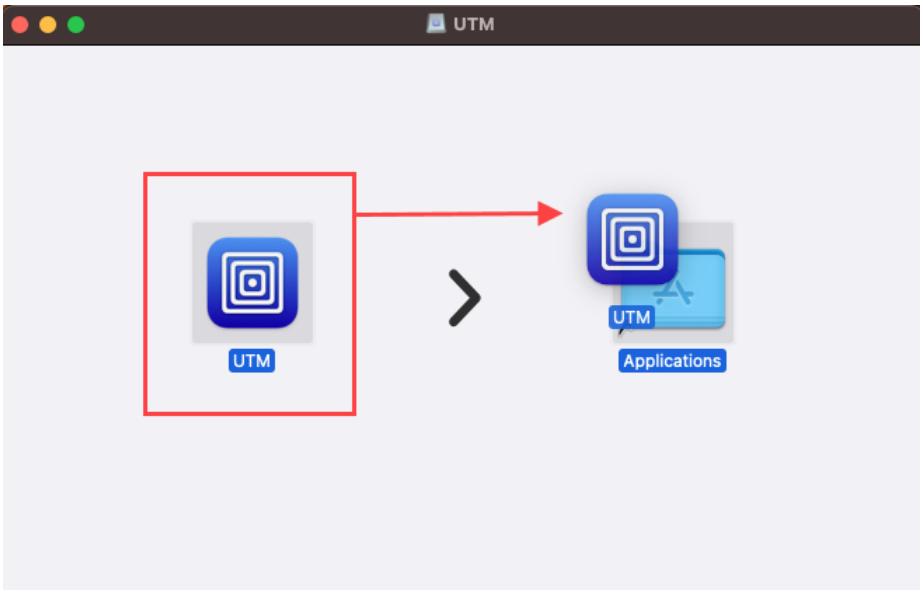
Ubuntu VM software requirements for x86_64 Mac

The software requirements to set up an Ubuntu VM on an x86_64 Mac are as follows:

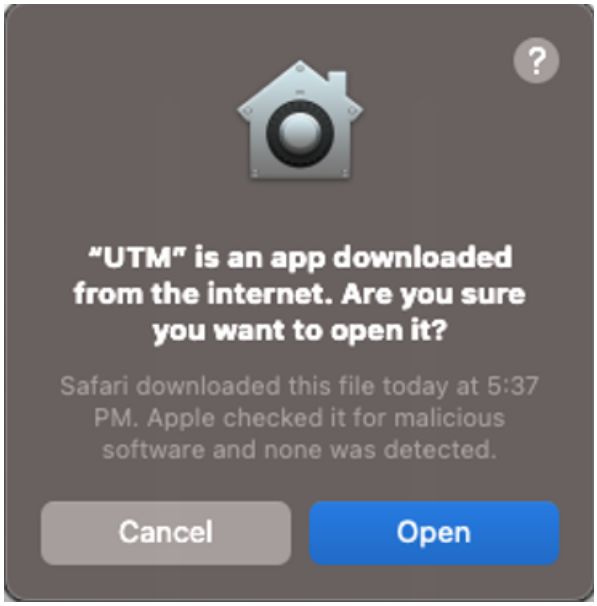
Software	Description
UTM virtualization software	Download the UTM virtualization software from the UTM website.
Ubuntu ISO	Use one of the Ubuntu 22.04 64-bit PC (AMD64) Desktop LTS versions. Qualcomm recommends that you download the latest version of Ubuntu 22.04 ISO (for example, ubuntu-22.04.5-desktop-amd64.iso) from the Ubuntu website.

4.2 Install UTM on an x86_64 Mac

1. Double-click the *UTM.dmg* file downloaded earlier and drag the *UTM* icon onto the *Applications* icon.

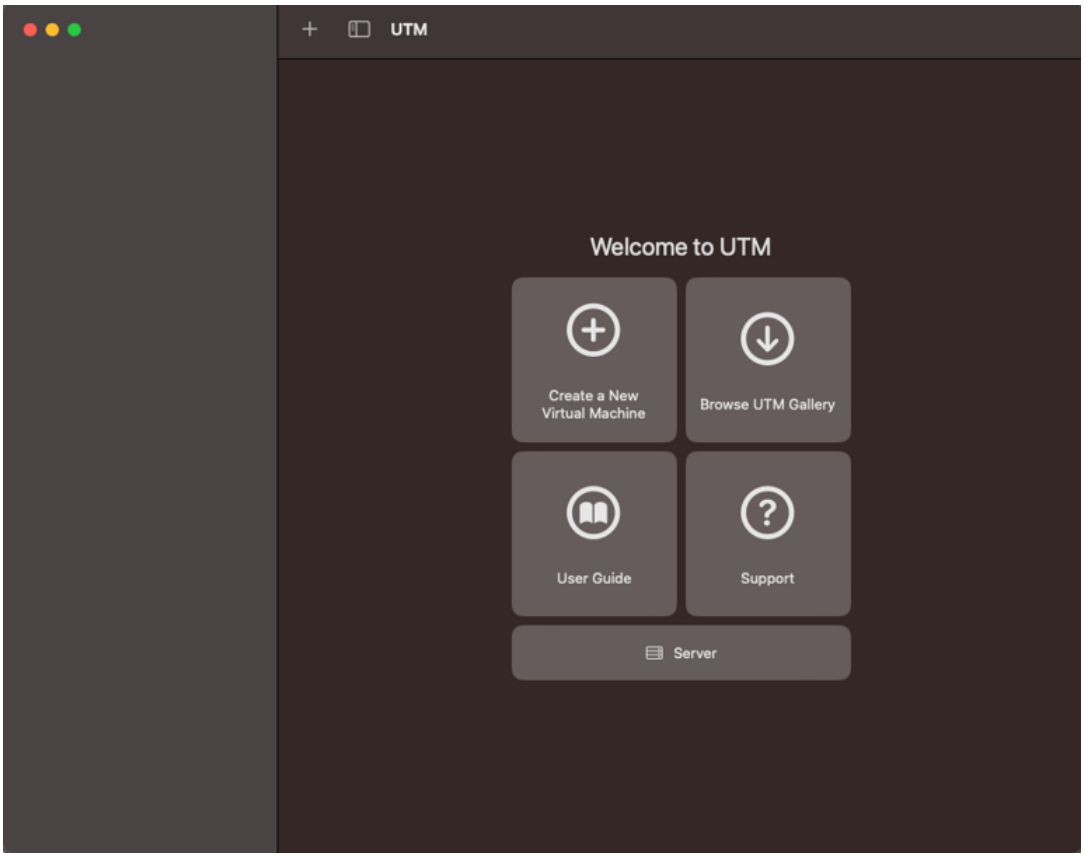


2. While installing UTM, if you see the following dialog box, select *Open*:



3. Open Launchpad, search for *UTM*, and select *UTM*.

   The UTM main window appears.



4.3 Create a VM in UTM on an x86_64 Mac

1. In the UTM main window, select *Create a New Virtual Machine*.
2. On the *Start* screen, select *Virtualize*.
3. On the *Operating System* screen, select the *Linux* OS.
4. On the *Linux* screen, browse and select the Ubuntu ISO image you downloaded, and select *Continue*.
5. On the *Hardware* screen, specify the memory and CPU cores you want to assign to the Ubuntu VM, and select *Continue*. The recommended values are:
   - Memory: About 70% of the available memory
   - CPU cores: At least 50% of the available cores

   If you leave the *CPU Cores* field blank or set it to 0, UTM allocates all the host computer cores to the VM. Allocating all CPU cores to the VM can make the host computer slow or unresponsive.

   Note: To know the memory size and the CPU core count of a Mac host computer, see the instructions in the macOS User Guide.

6. On the *Storage* screen, specify the drive size for the VM, and select *Continue*.

   Note: Qualcomm recommends that you assign at least 300 GB of storage space for the VM.

7. If you want to share a directory between the host computer and the VM, do the following on the *Shared Directory* screen:
   a. Browse and select the directory.
   b. Select *Continue*.
8. On the *Summary* screen, do the following:
   a. Review the configuration summary for the VM that you are creating.
   b. Provide a name to the VM.
   c. Select *Save*. The UTM main window lists the newly created VM.

4.4 Install Ubuntu in UTM on an x86_64 Mac

1. In the UTM main window, select the *Play* icon to run the Ubuntu ISO image through virtualization.

2. Select *Try or Install Ubuntu* using the arrow keys and select *Enter*.

3. On the *Welcome* screen, select a language, and select *Install Ubuntu*.
4. On the *Keyboard Layout* screen, select a keyboard layout, and select *Continue*.
5. The system selects *Normal installation* by default on the *Updates and other software* screen. Select the *Minimal installation* option button if you don't want to install all the Ubuntu operating system features.
6. On the *Installation type* screen, select the *Erase disk and install Ubuntu* option button, and select *Install Now*.

Note: The *Erase disk and install Ubuntu* option erases only the storage area allocated to the VM. It doesn't erase any other data or system files on the host computer.

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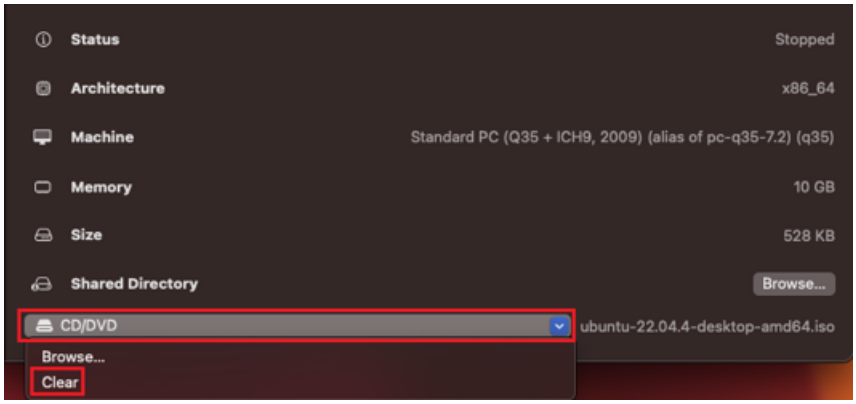
7. On the *Write the changes to disk?* dialog box, select *Continue*.
8. On the *Where are you?* screen, select the appropriate time zone.
9. On the *Who are you?* screen, specify the required details, and select *Continue* to start the installation.
10. After the installation is complete, select *Restart Now*.
11. To shut down and stop the VM, select the *Power* icon.

12. In the *Confirmation* dialog box, select *OK*. After the VM is stopped, close the window.
13. In the UTM main window, in the *CD/DVD* drop-down list, select *Clear*.



14. Confirm that the ISO image association is empty against the CD/DVD option.

15. To run the Ubuntu VM, select the *Play* icon.

16. Sign in to the Ubuntu VM you created.

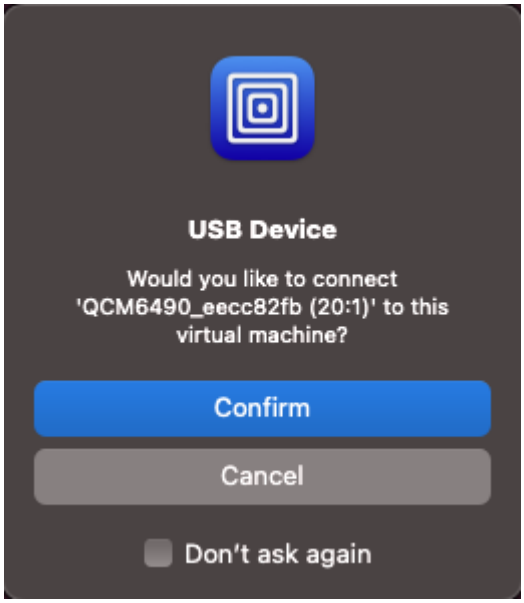
4.5 Access the Qualcomm Linux development kit

To access the Qualcomm Linux development kit from the Ubuntu VM, do the following:

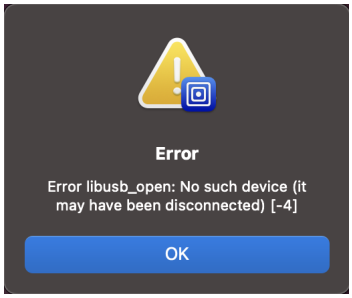
1. Connect the Qualcomm Linux development kit to the host computer.

   The UTM software may show you a dialog box to confirm whether the virtualized Ubuntu operating system should have access to the Qualcomm Linux development kit.

   If you see a dialog box as follows, select *Confirm*:

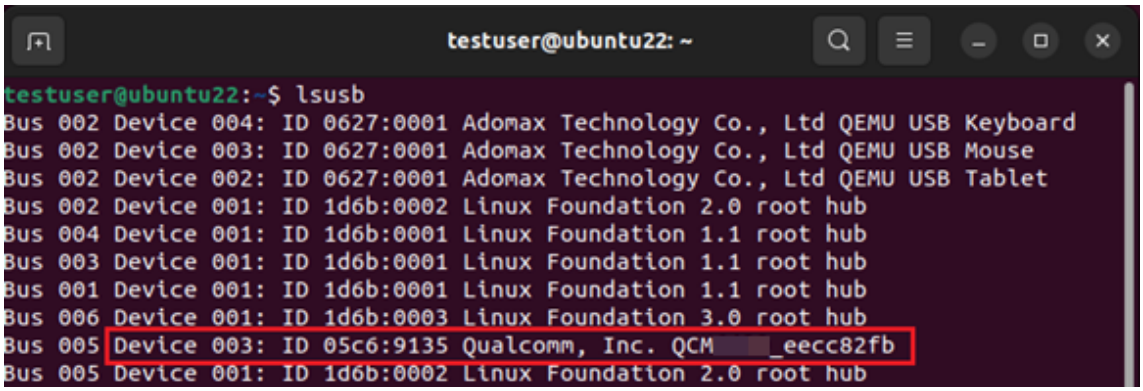


After selecting *Confirm*, if you see the following USB disconnection error, select *OK* to ignore it.



2. To verify if the Ubuntu VM can access the Qualcomm Linux development kit, run the `lsusb` command in a Linux terminal window.

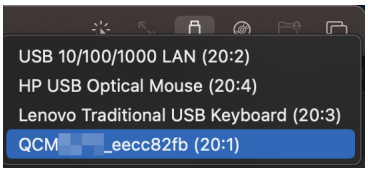
   The output shows the Qualcomm Linux development kit as follows:



   If the Qualcomm Linux development kit isn't detected in the Ubuntu VM, do the following:

a. Select *USB Devices* in the toolbar of the UTM VM window.

b. Select *QCMXXXX_xxxxxxxx*.



Note: If you don't see the Qualcomm Linux development kit listed as one of the USB devices, do the following:

1. In UTM settings, select *Input* in the left panel.
2. Set the value in the *Maximum Shared USB Devices* field to 10.

4.6 Configure power settings for x86_64 Mac and Ubuntu

To ensure that the Mac host computer and the Ubuntu VM don't go to sleep due to inactivity, do the following:

- To configure the sleep and wake settings for the Mac host computer, see macOS User Guide.
- To configure the power settings for Ubuntu, do the following:
  1. In *System Settings* for Ubuntu, select *Power*.
  2. Turn off *Automatic Suspend*.

4.7 Next steps

- Sync, build, and flash Qualcomm Linux
- Fix network failures in the Ubuntu VM
- Troubleshoot slow or unresponsive Mac host computer

5 Troubleshoot host computers and virtual machines

This information provides troubleshooting steps for common technical issues.

5.1 Fix network failures in the Ubuntu VM

Occasionally, network failures may occur in the Ubuntu VM while the host computer has no network issues. Any ongoing compilation in the Ubuntu VM may result in fetch failure.

To re-establish the network in the Ubuntu VM, do the following:

1. To find the corresponding network interface, run the `ip link` command in the Ubuntu terminal window.

   The Ubuntu terminal window returns a network interface. For example, enp0s1.

2. To re-establish the network in the Ubuntu VM, use the network interface and run the following commands:

   ```
   ip link set dev <network_interface> down
   ```

   ```
   ip link set dev <network_interface> up
   ```

   For example:

   ```
   ip link set dev enp0s1 down
   ```

   ```
   ip link set dev enp0s1 up
   ```

5.2 Optimize slow or unresponsive Mac host computer

If the Mac host computer is slow or unresponsive, the UTM VM may be consuming all the available resources of the host computer.

To troubleshoot this issue, do one of the following:

- Use the recommended settings to reconfigure the memory and CPU core allocation for the

Ubuntu VM. For instructions, see Step 5 in the following:

– Create a VM in UTM on an Arm64 Mac

– Create a VM in UTM on an x86_64 Mac

- Reconfigure the Ubuntu VM settings such that the Ubuntu VM and the host computer use the available resources optimally. For example, distribute the memory and CPU cores equally among the host computer and the VM.

  Also, avoid running CPU-intensive tasks on the host computer when you are using the Ubuntu VM.

6 References

6.1 Related documents

Title	Number
Qualcomm Technologies, Inc.	
Qualcomm Linux Build Guide	80-70018-254
RB3 Gen 2 Quick Start Guide	80-70018-253
Resources	
https://mac.getutm.app/	
https://www.releases.ubuntu.com/22.04/	
https://support.apple.com/en-in/guide/mac-help/syspr35536/mac	
https://learn.microsoft.com/en-us/cpp/windows/latest-supported-vc-redist?view=msvc-170	

6.2 Acronyms and terms

Acronym or term	Definition
ISO	International Organization for Standardization
LTS	Long-term support
VM	Virtual machine
WSL	Windows Subsystem for Linux

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