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# Comprehensive Guide:

## Setting up Kali Linux on UTM for Mac M1 and M2

February 8, 2024

### ISSUED BY

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# Purpose

The purpose of this run book is to provide a comprehensive guide for users interested in setting up Kali Linux on UTM for Mac M1 and M2 computers. It outlines step-by-step instructions, from downloading UTM and Kali Linux to configuring the virtual machine within UTM and performing post-installation tasks. The run book aims to simplify the installation and configuration process, ensuring that users can efficiently create a virtualized environment for cybersecurity testing, digital forensics, and security research purposes. Additionally, the run book includes descriptions of Kali Linux and UTM, highlighting their key features and functionalities to help users understand their capabilities and benefits. Overall, the run book serves as a practical resource for users seeking to leverage Kali Linux on macOS using the UTM virtualization platform.

## What is Kali Linux

Kali Linux is a specialised Linux distribution designed for penetration testing, digital forensics, and security auditing. It is developed and maintained by Offensive Security, a leading provider of information security training and certification. Kali Linux is renowned for its extensive set of pre-installed tools and utilities tailored for various aspects of cybersecurity testing and analysis.

## Key Features:

1. **Penetration Testing Tools:** Kali Linux includes a wide array of penetration testing tools for assessing the security of networks, systems, and applications. These tools range from network scanners and vulnerability assessment frameworks to exploitation tools and password crackers.
2. **Digital Forensics Utilities:** Kali Linux provides robust digital forensics capabilities, allowing users to conduct investigations, analyse digital evidence, and recover data from various storage media. It includes tools for disk imaging, file carving, memory analysis, and forensic analysis of network traffic.
3. **Security Assessment Frameworks:** Kali Linux incorporates popular security assessment frameworks such as Metasploit and Burp Suite, which enable professionals to identify vulnerabilities, exploit security flaws, and simulate real-world cyber attacks. These frameworks streamline the process of security testing and help organisations improve their defences.
4. **Wireless Network Testing:** Kali Linux offers specialised tools for wireless network testing and exploitation. Users can perform wireless network reconnaissance, capture and analyse network traffic, and assess the security of Wi-Fi networks using tools like Aircrack-ng and Wireshark.
5. **Web Application Security:** Kali Linux includes tools for testing the security of web applications, APIs, and web servers. It provides scanners for identifying common web vulnerabilities such as SQL injection, cross-site scripting (XSS), and command injection, as well as tools for web application fuzzing and exploitation.

6. **Exploitation Frameworks:** Kali Linux features comprehensive exploitation frameworks like Metasploit, allowing users to develop and execute custom exploits against vulnerable systems and applications. These frameworks facilitate the discovery and exploitation of security weaknesses in target environments.

#### Pre-installed Tools:

Some of the pre-installed tools and utilities available in Kali Linux include:

- **Nmap:** Network scanner and reconnaissance tool.
- **Wireshark:** Network protocol analyzer.
- **John the Ripper:** Password cracking tool.
- **Burp Suite:** Web application security testing framework.
- **Metasploit Framework:** Exploitation framework for developing and executing exploits.
- **Aircrack-ng:** Wireless network assessment tool.
- **Volatility:** Memory forensics framework.
- **Hydra:** Password brute-forcing tool.
- **Nikto:** Web server vulnerability scanner.

#### Usage and Community:

Kali Linux is widely used by cybersecurity professionals, penetration testers, ethical hackers, and security enthusiasts worldwide. Its extensive documentation, community forums, and online resources make it accessible to users of all skill levels. The active community of contributors and developers ensures regular updates, bug fixes, and improvements to the distribution, keeping it at the forefront of cybersecurity testing and research.

In summary, Kali Linux is a versatile and powerful platform for conducting cybersecurity assessments, digital forensics investigations, and security research. Its comprehensive set of pre-installed tools, combined with its user-friendly interface and active community support, make it an indispensable resource for professionals and enthusiasts in the field of information security.

## What is UTM?

#### UTM (Universal Type Manager):

UTM is a virtualization platform specifically designed for macOS, developed by Felix Schwarz. It enables users to run virtual machines (VMs) on their Mac computers, allowing them to use multiple operating systems simultaneously without the need for additional hardware. UTM offers a user-friendly interface and robust functionality, making it an ideal choice for users seeking to leverage virtualization for various purposes, including software testing, development, education, and more.

### Key Features:

1. **Versatile Virtualization:** UTM supports a wide range of guest operating systems, including Windows, Linux, macOS, and various BSD distributions. Users can create and manage multiple virtual machines with different configurations to suit their specific needs.
2. **Performance Optimization:** UTM utilises QEMU (Quick Emulator) as its virtualization backend, providing efficient performance and compatibility with a variety of hardware platforms, including Apple Silicon (ARM64) chips found in Mac M1 and M2 computers.
3. **User-Friendly Interface:** UTM offers an intuitive graphical user interface (GUI) that simplifies the process of creating, configuring, and managing virtual machines. Users can easily customise VM settings, allocate system resources, and install guest operating systems with minimal effort.
4. **Hardware Acceleration:** UTM supports hardware acceleration features, such as OpenGL acceleration, to enhance the performance and graphical capabilities of virtualized environments. This ensures smooth operation and optimal user experience, particularly when running resource-intensive applications and graphical workloads.
5. **Integration with macOS:** UTM seamlessly integrates with macOS, allowing users to leverage native system features and resources within virtualized environments. This includes support for peripherals, file sharing, networking, and other macOS functionalities, enhancing the interoperability and usability of virtual machines on Mac computers.
6. **Open-Source Foundation:** UTM is built upon open-source technologies, with its source code available on GitHub for community contribution and collaboration. This open development model fosters innovation, transparency, and continuous improvement, ensuring that UTM remains a reliable and cutting-edge virtualization solution for macOS users.

### Usage and Applications:

UTM is utilised by a diverse user base, including software developers, system administrators, educators, and hobbyists, for various purposes:

- **Software Development and Testing:** UTM enables developers to create isolated development environments, test software compatibility across different operating systems, and evaluate application performance under various configurations.
- **Education and Training:** UTM serves as a valuable tool for educational institutions and training providers, allowing students to explore different operating systems, practice system administration tasks, and learn about virtualization concepts in a hands-on manner.
- **System Administration and Maintenance:** System administrators use UTM to simulate network environments, troubleshoot system issues, and perform maintenance tasks without affecting their primary macOS environment.
- **Security Research and Testing:** UTM supports the creation of virtualized security testing environments, facilitating the evaluation of cybersecurity tools, techniques, and procedures in a controlled and isolated environment.

In summary, UTM is a versatile and powerful virtualization platform for macOS, offering a wide range of features and capabilities to meet the needs of users across various industries and disciplines. Its intuitive interface, robust performance, and integration with macOS make it an indispensable tool for running virtual machines on Mac computers and exploring different operating systems and software environments.

## Why does Kali and UTM work so well?

Kali Linux works well with UTM (Universal Type Manager) for several reasons:

1. **ARM64 Compatibility:** Kali Linux provides official builds specifically optimised for the ARM64 architecture, which is used in Apple's M1 and M2 chips. This compatibility ensures that Kali Linux can run smoothly on Mac computers equipped with these processors when virtualized using UTM.
2. **QEMU Virtualization Backend:** UTM utilises QEMU (Quick Emulator) as its virtualization backend, which is a versatile and powerful emulator that supports a wide range of hardware platforms and architectures, including ARM64. This allows UTM to effectively emulate the ARM64 architecture required to run Kali Linux on Mac M1 and M2 systems.
3. **Hardware Acceleration Support:** UTM offers support for hardware acceleration features, such as OpenGL acceleration, which can enhance the performance and graphical capabilities of virtualized environments. This ensures that Kali Linux running within a UTM virtual machine can leverage hardware acceleration for improved responsiveness and visual fidelity.
4. **Integration with macOS:** UTM seamlessly integrates with macOS, providing native support for peripherals, file sharing, networking, and other macOS functionalities within virtualized environments. This integration ensures smooth interoperability between Kali Linux and macOS, allowing users to access and utilise macOS resources seamlessly while running Kali Linux in a virtual machine.
5. **Ease of Use:** UTM offers an intuitive user interface that simplifies the process of creating, configuring, and managing virtual machines. Users can easily set up a Kali Linux virtual machine within UTM without the need for complex configurations or technical expertise, making it accessible to users of all skill levels.
6. **Community Support:** Both Kali Linux and UTM benefit from active and vibrant communities of users, developers, and contributors who provide support, feedback, and resources. This collaborative ecosystem ensures that users can find assistance, troubleshooting tips, and guidance when running Kali Linux on UTM, enhancing the overall user experience and reliability of the virtualization setup.

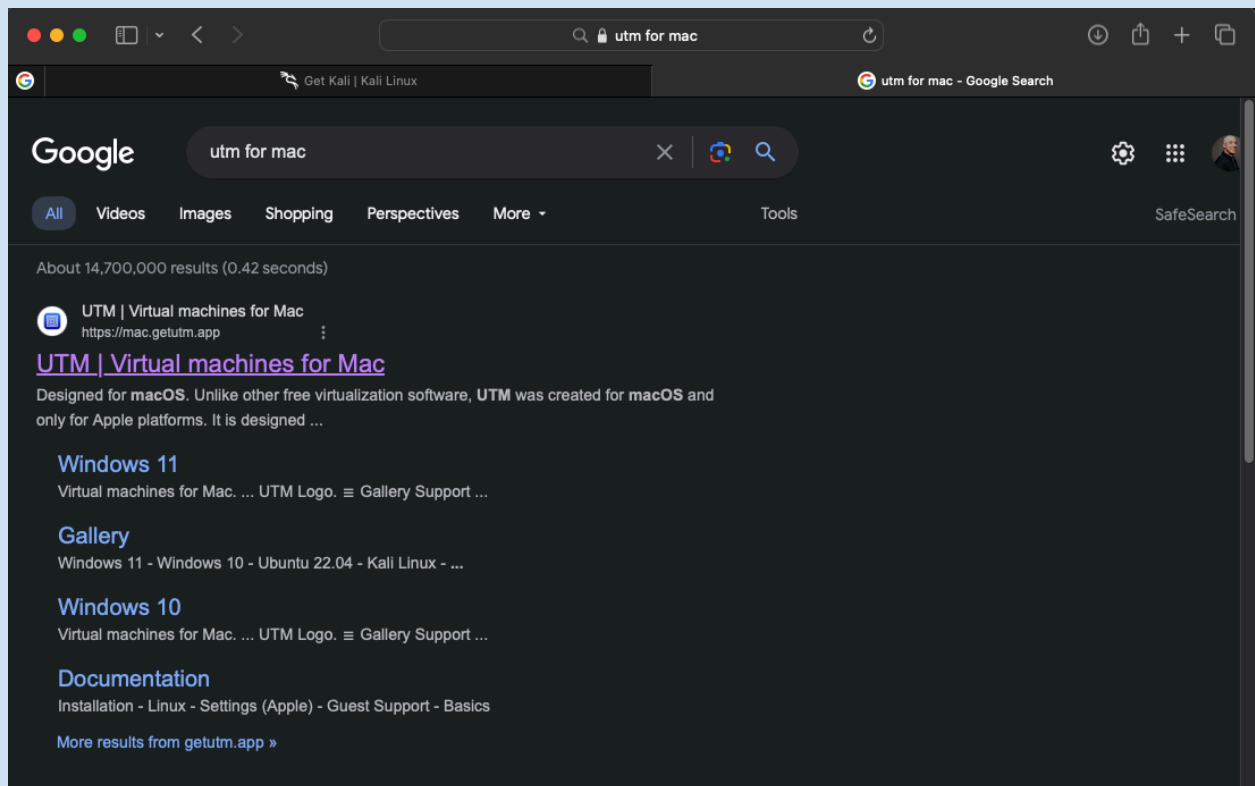
In summary, Kali Linux works well with UTM due to its ARM64 compatibility, support for hardware acceleration, integration with macOS, ease of use, and strong community support. Together, these factors contribute to a seamless and reliable experience for users seeking to run Kali Linux on Mac M1 and M2 systems using UTM as the virtualization platform.

## How to use Kali Linux and UTM:

### 1. Download UTM and Kali Linux:

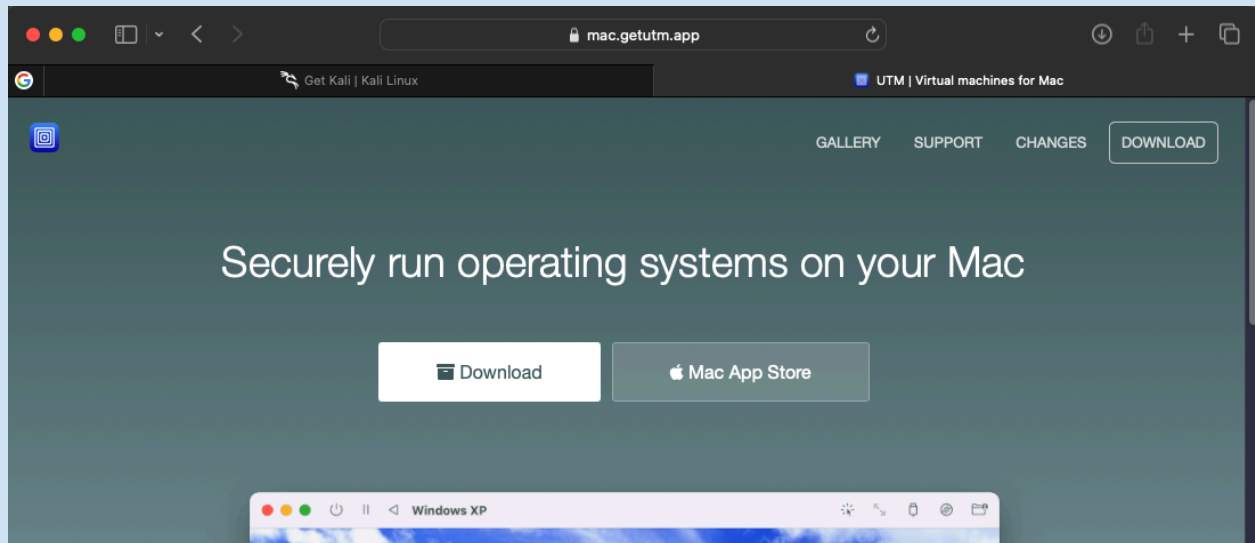
Navigate to UTM Website:

- Open your web browser and go to <https://mac.getutm.app> to access the UTM website.



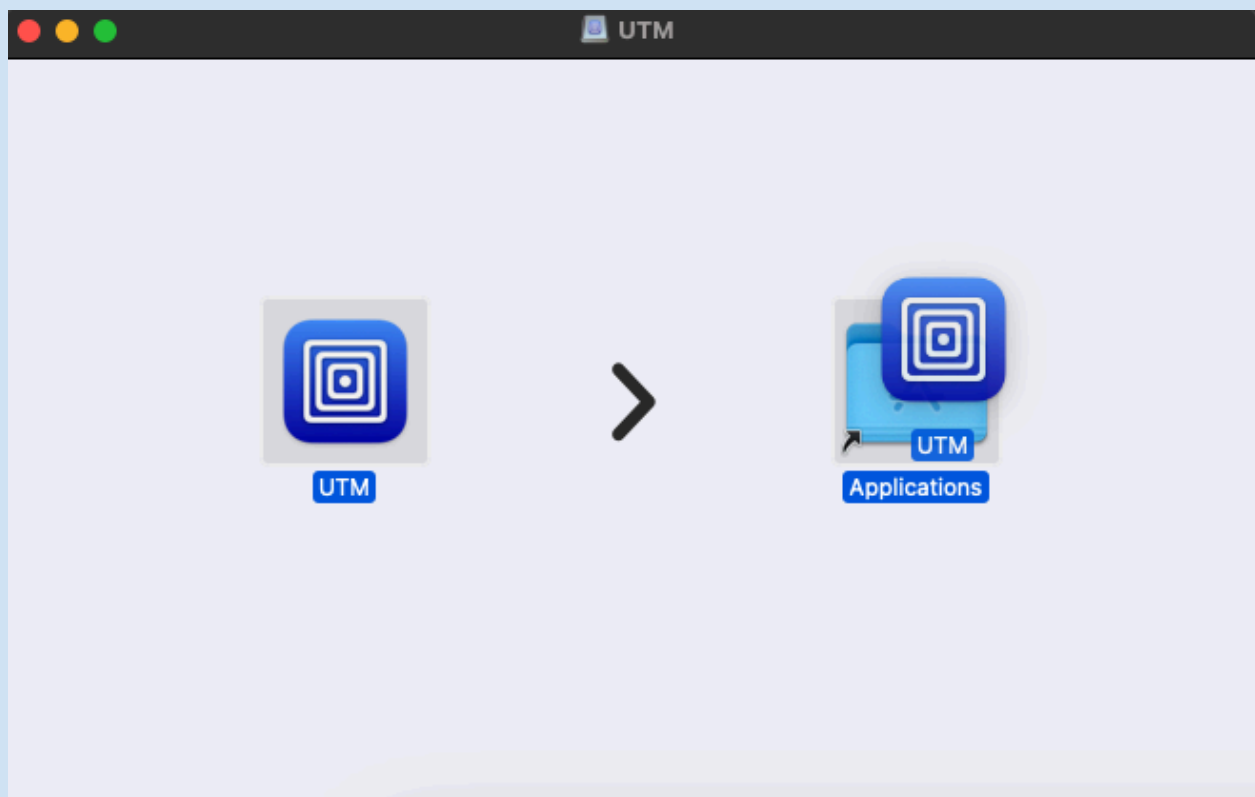
Download UTM:

- On the UTM website, locate the download button and click on it to initiate the download process.



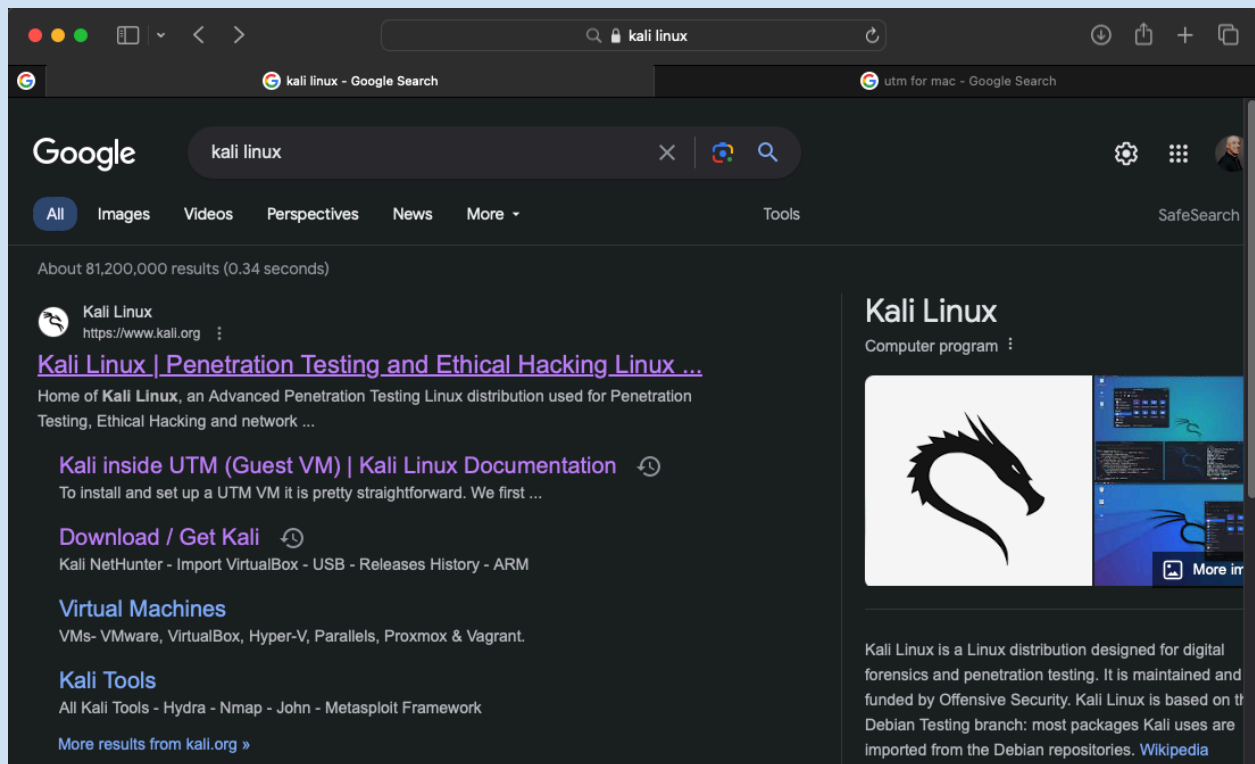
Install UTM:

- Once the download is complete, navigate to your "Downloads" folder.
- Locate the downloaded UTM file (usually in .dmg format) and double-click to open it.
- Drag the UTM icon to your "Applications" folder to install UTM on your Mac.



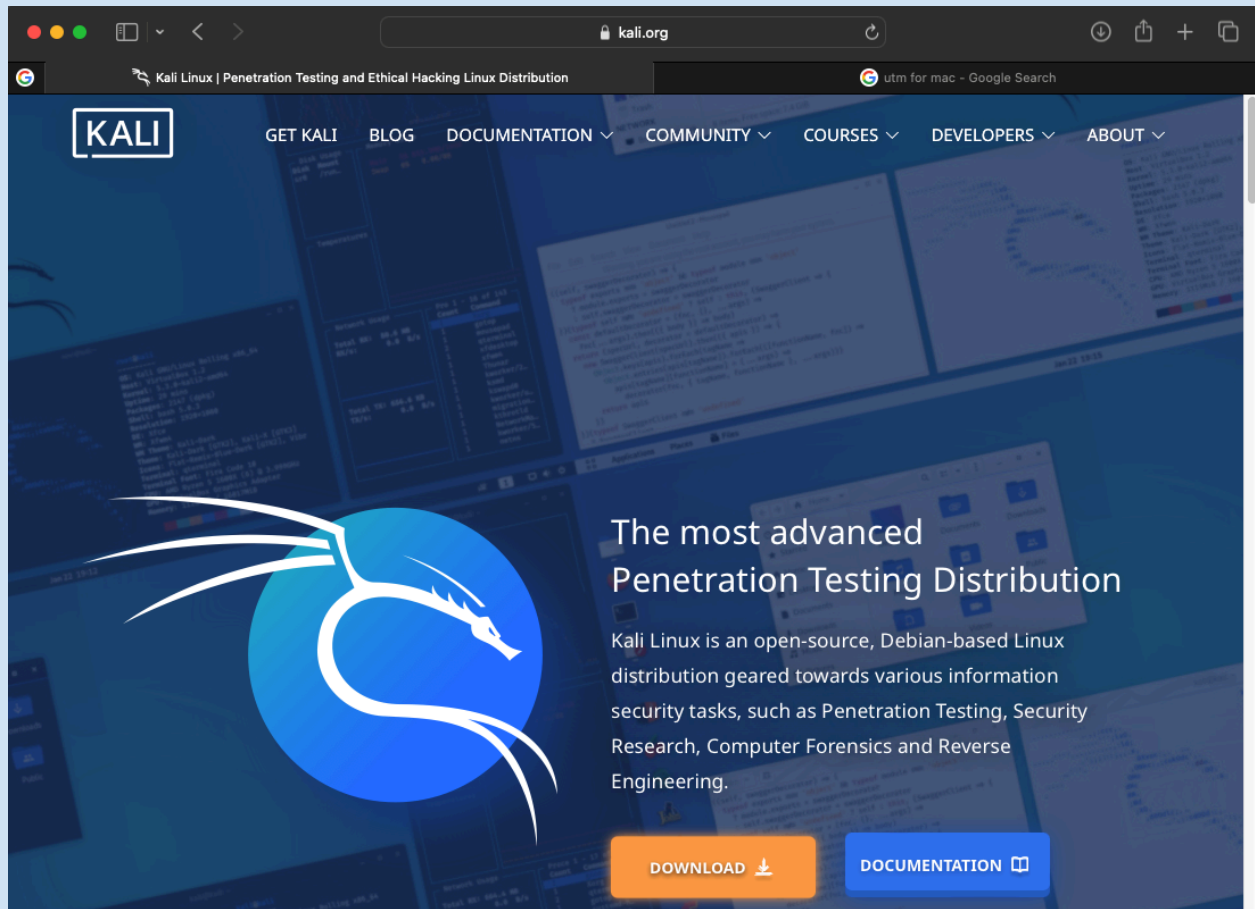
Download Kali Linux:

- Visit the Kali Linux website at <https://www.kali.org/get-kali/#kali-platforms>.



- Click on the download icon and select the latest version of Kali Linux compatible with Apple Silicon (ARM64).





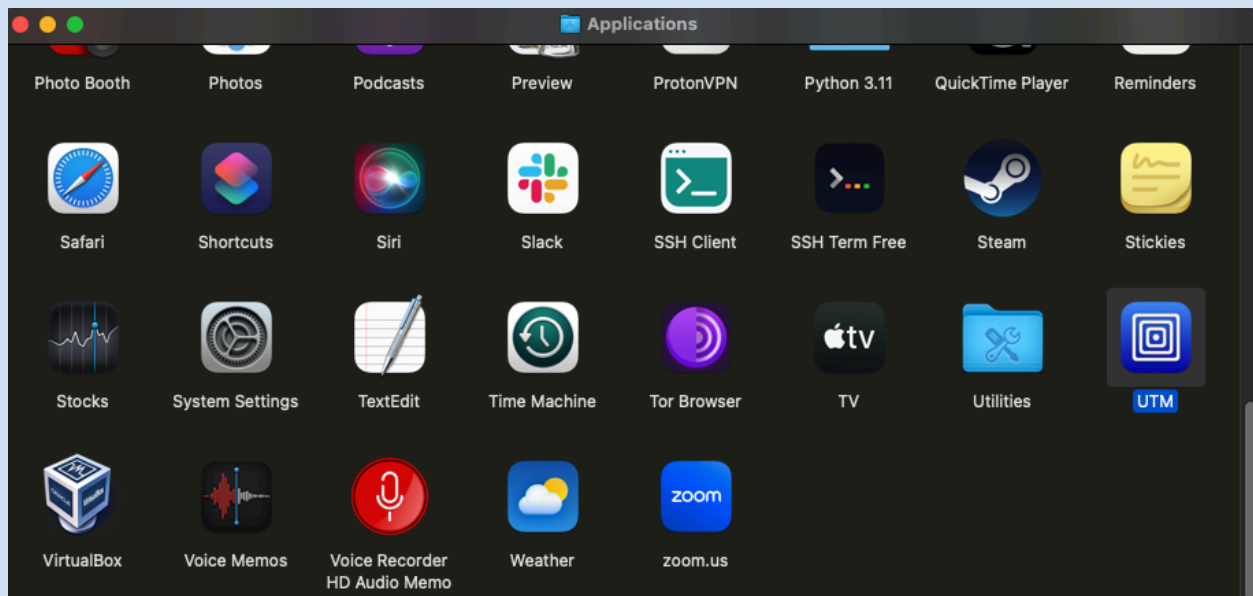
## 2. Verify Kali Linux Download:

- Once the download is complete, navigate to your "Downloads" folder.
- Verify that the downloaded Kali Linux file is intact and complete.

## 3. Creating a Virtual Machine in UTM:

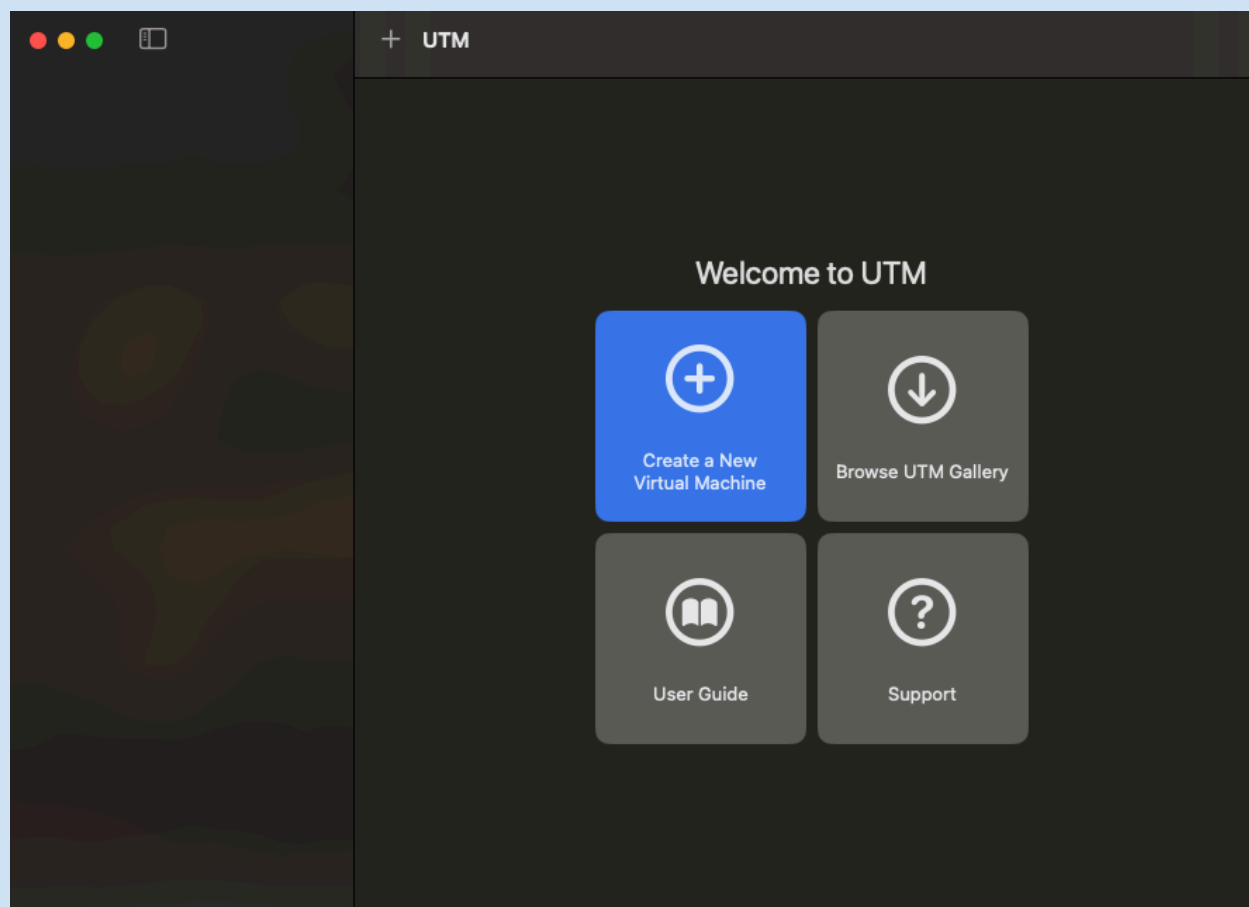
Open UTM:

- Open the UTM application from your "Applications" folder.



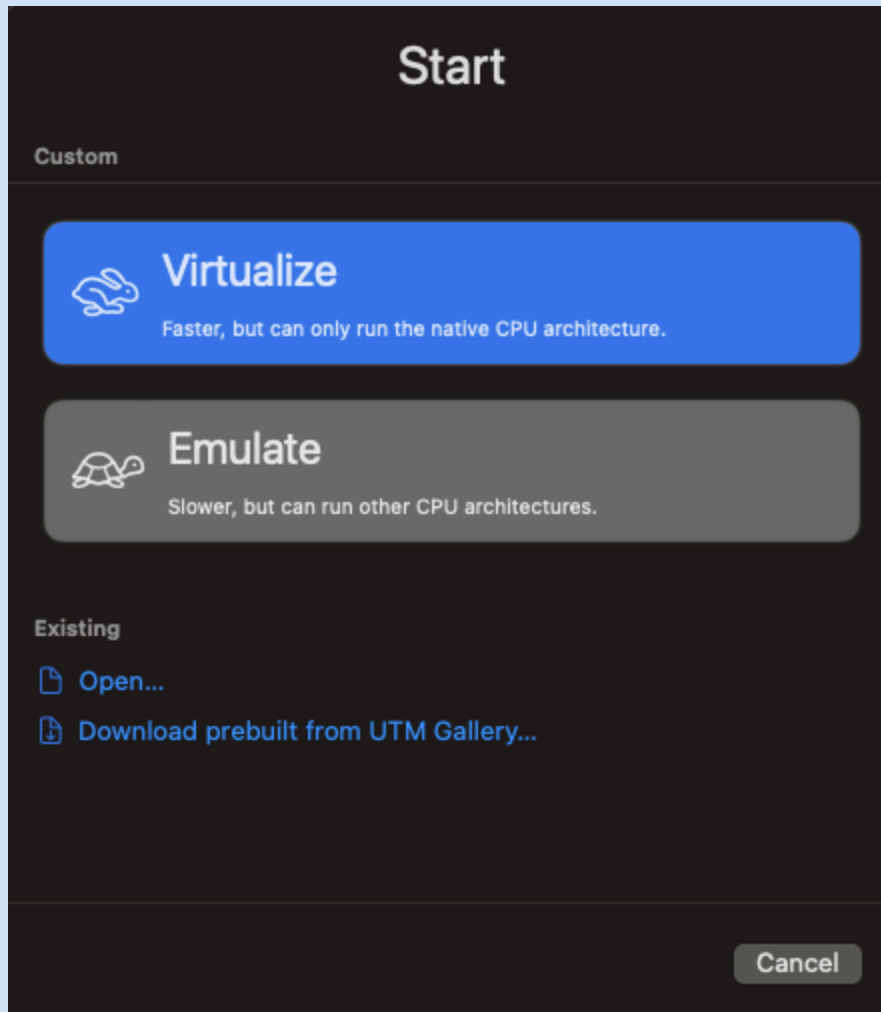
Create New Virtual Machine:

- In UTM, select "Create a New Virtual Machine" to begin the setup process.



Select Virtualize Option:

- Choose the "Virtualize" option and select "Linux" as the operating system for the virtual machine.



# Operating System

Preconfigured



macOS 12+



Windows



Linux

Custom



Other

Cancel

Go Back

Choose Kali Linux ISO:

- Opt not to use Apple Virtualization and proceed with QEMU.
- Browse and select the Kali Linux ISO image downloaded earlier.

# Linux

## Virtualization Engine

☐ Use Apple Virtualization

Apple Virtualization is experimental and only for advanced use cases. Leave unchecked to use QEMU, which is recommended.

## Boot Image Type

☐ Boot from kernel image

[🔗 Ubuntu Install Guide](#)

## Boot ISO Image

kali-linux-2023.4-installer-arm64.iso

ClearBrowse...


CancelGo BackContinue

Specify RAM Allocation:



- Specify the desired amount of RAM allocation for the virtual machine (e.g., 6GB) for optimal performance.
- Enable hardware OpenGL acceleration for smooth graphical performance.

## Hardware

### Memory

 6144 MB

### CPU

CPU Cores   Default

### Hardware OpenGL Acceleration

☒ Enable hardware OpenGL acceleration

There are known issues in some newer Linux drivers including black screen, broken compositing, and apps failing to render.

Cancel Go Back Continue

Allocate Storage Space:

- Allocate default storage space (e.g., 64GB) for the virtual machine's storage.

## Storage

Size

Specify the size of the drive where data will be stored into.

64 GB

Cancel

Go Back

Continue



#### 4. Virtual Machine Configuration:

Rename Virtual Machine:

- Rename the virtual machine to a descriptive name (e.g., "Kali Linux") for easy identification.

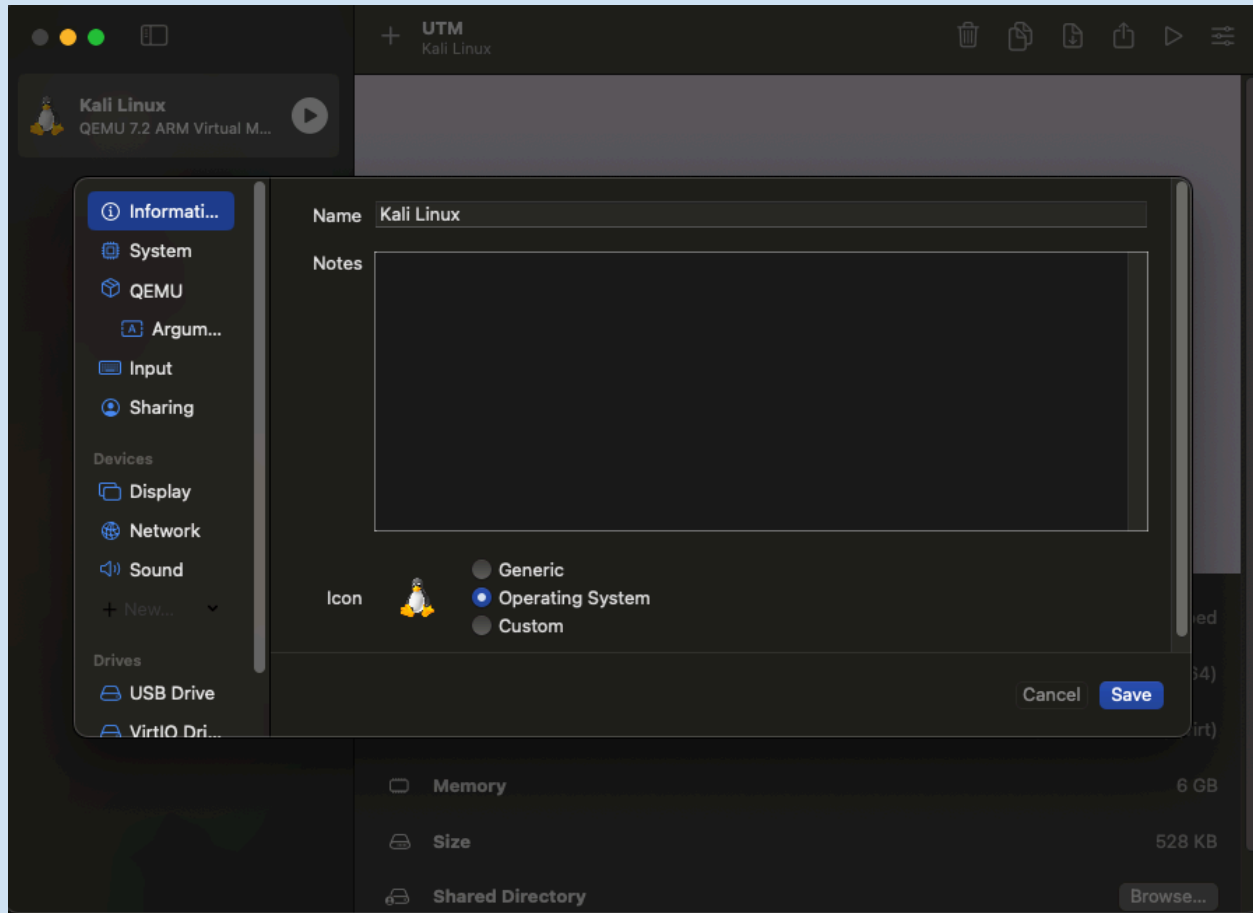
The image shows a 'Summary' window for configuring a virtual machine. The window has a dark theme. At the top, the title 'Summary' is centered. Below it, there are several configuration fields, each with a label on the left and a text input field on the right. The fields are: 'Name' (containing 'Kali Linux'), 'Engine' (containing 'QEMU'), 'Architecture' (containing 'ARM64 (aarch64)'), 'System' (containing 'QEMU 7.2 ARM Virtual Machine (alias of virt-7)'), 'RAM' (containing '6 GB'), 'CPU' (containing 'Default Cores'), 'Storage' (containing '64 GB'), 'Operating System' (containing 'Linux'), and 'Boot Image' (containing '/Users/newflowtechnologiesllc./Desktop/kali-li'). There are also checkboxes: 'Open VM Settings' (unchecked), 'Use Virtualization' (checked), 'Hardware OpenGL Acceleration' (checked), and 'Skip Boot Image' (unchecked). At the bottom of the window, there are three buttons: 'Cancel', 'Go Back', and 'Save'.

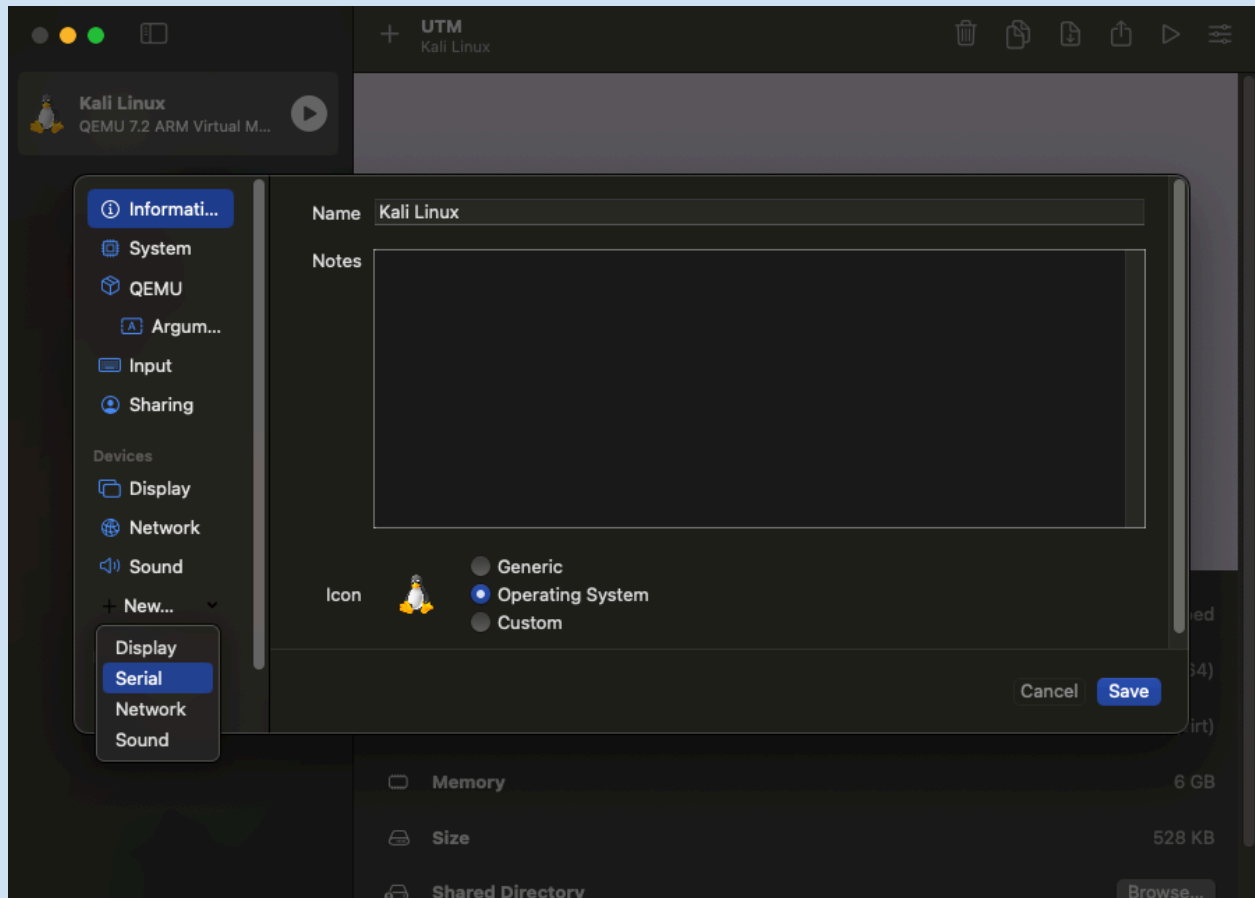
Field	Value
Name	Kali Linux
Engine	QEMU
Architecture	ARM64 (aarch64)
System	QEMU 7.2 ARM Virtual Machine (alias of virt-7)
RAM	6 GB
CPU	Default Cores
Storage	64 GB
Operating System	Linux
Boot Image	/Users/newflowtechnologiesllc./Desktop/kali-li

Buttons: Cancel, Go Back, Save

Add Serial Device:

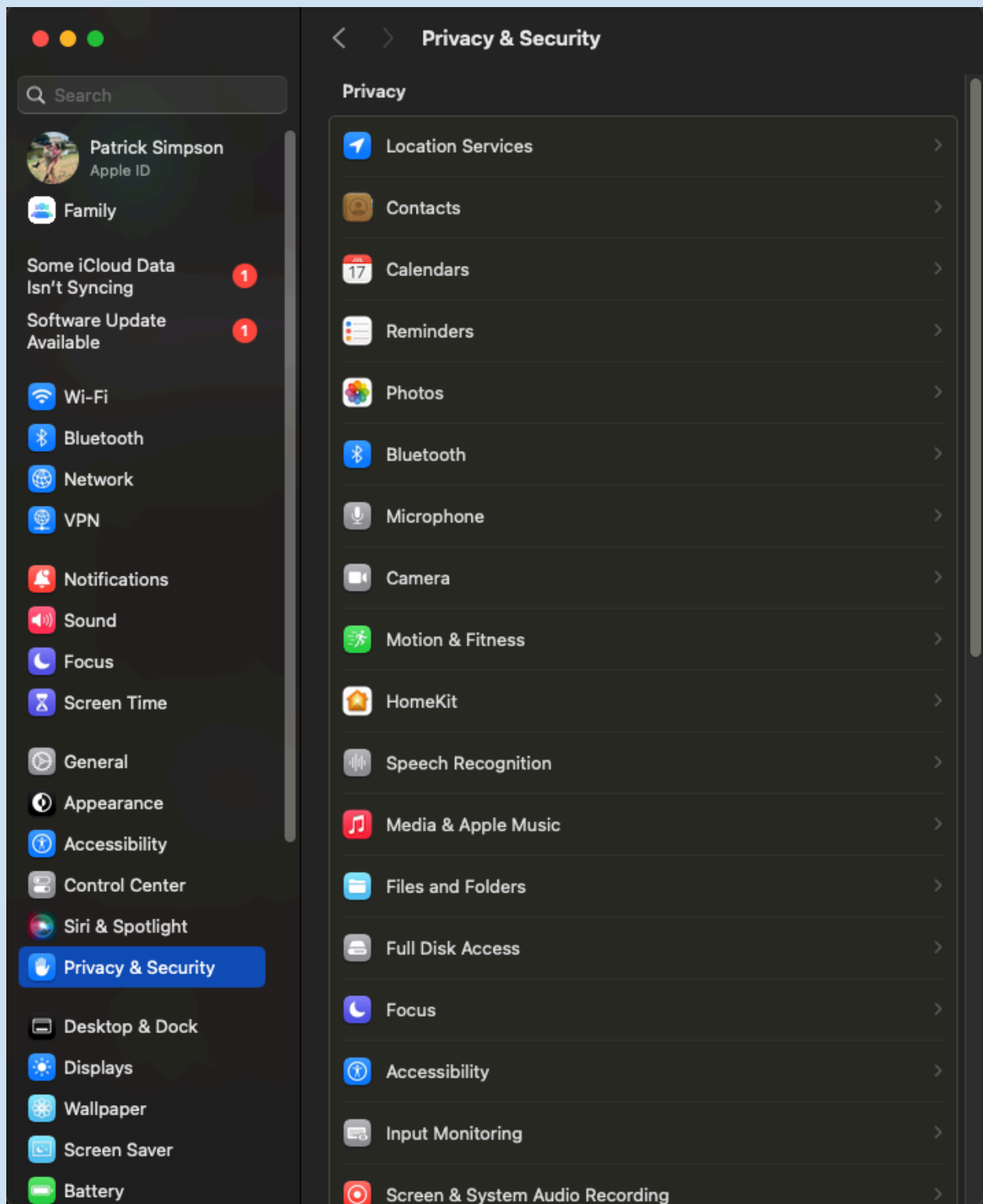
- Navigate to the "Settings" tab and add a new serial device in the devices section.

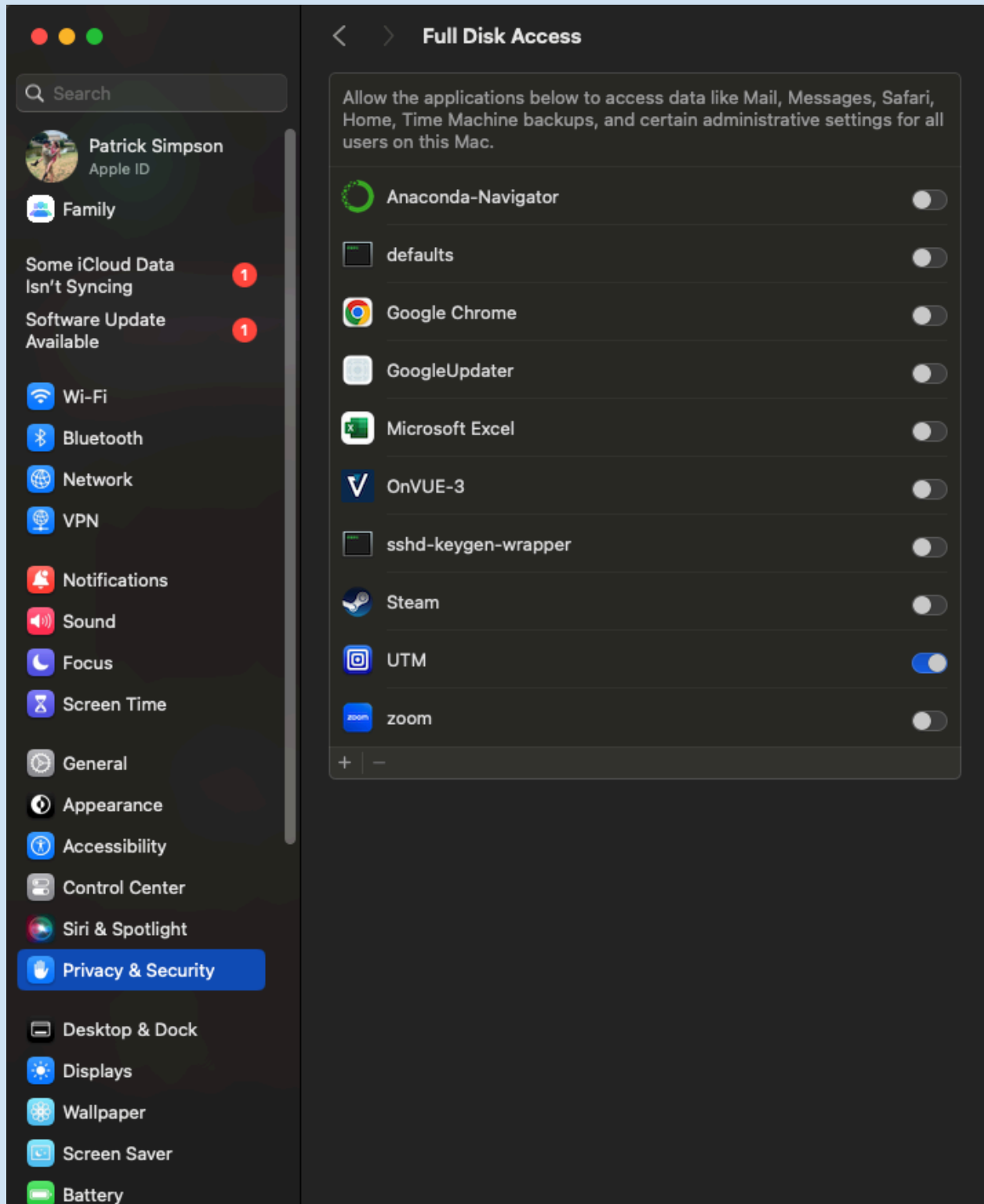




Grant Disk Access:

- Ensure that UTM has full disk access by granting permissions in your Mac's system settings under "Privacy and Security."





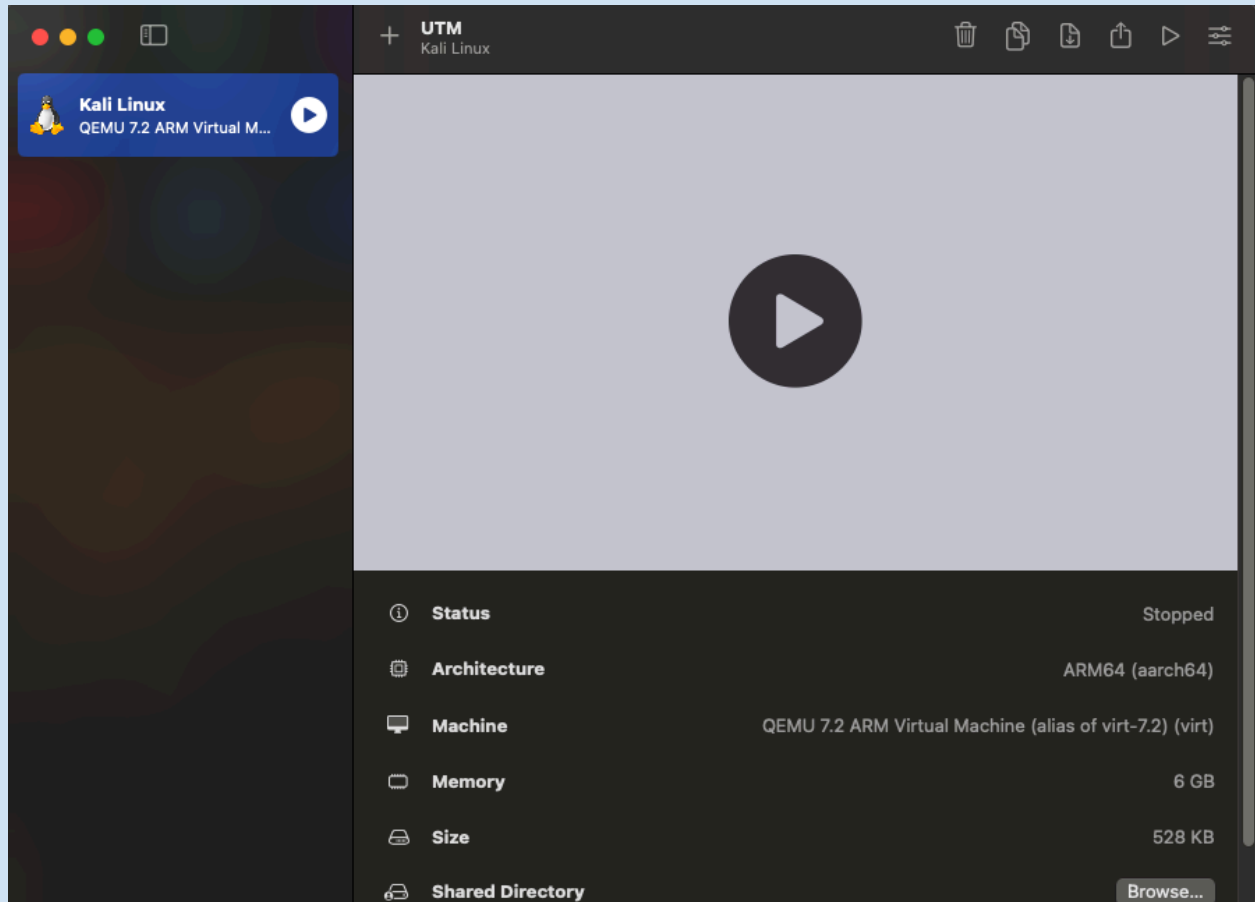
Reboot UTM:

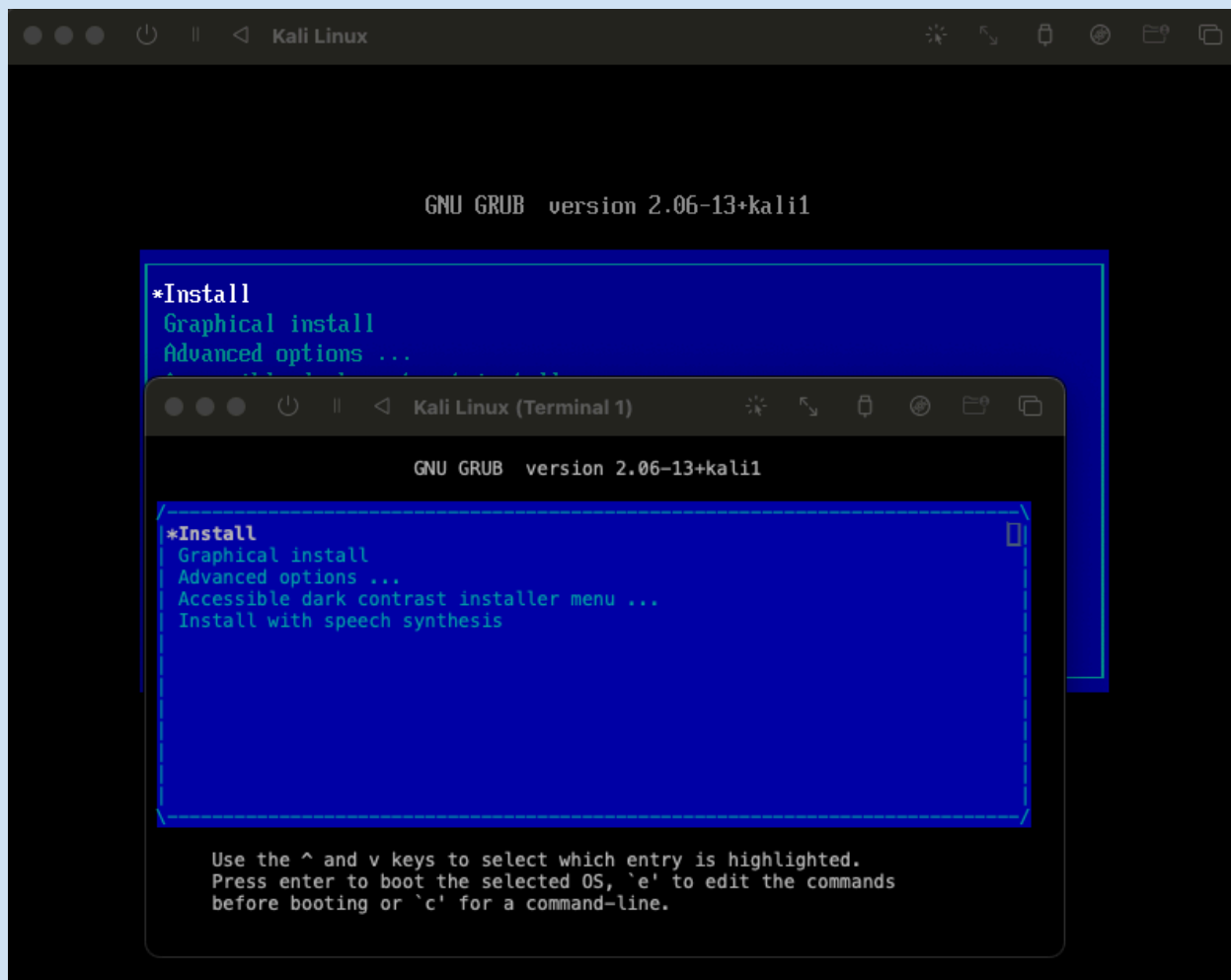
- If necessary, reboot UTM to apply the changes made to disk access permissions.

## 5. Installation of Kali Linux:

Initiate Installation Process:

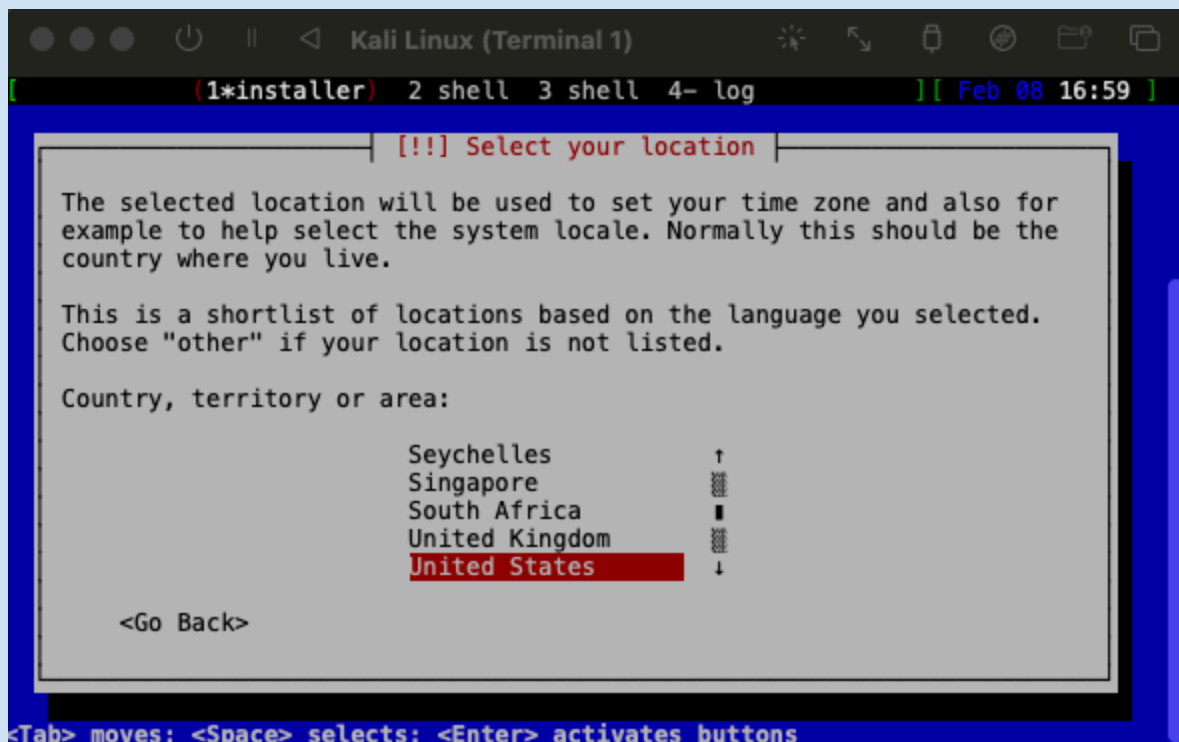
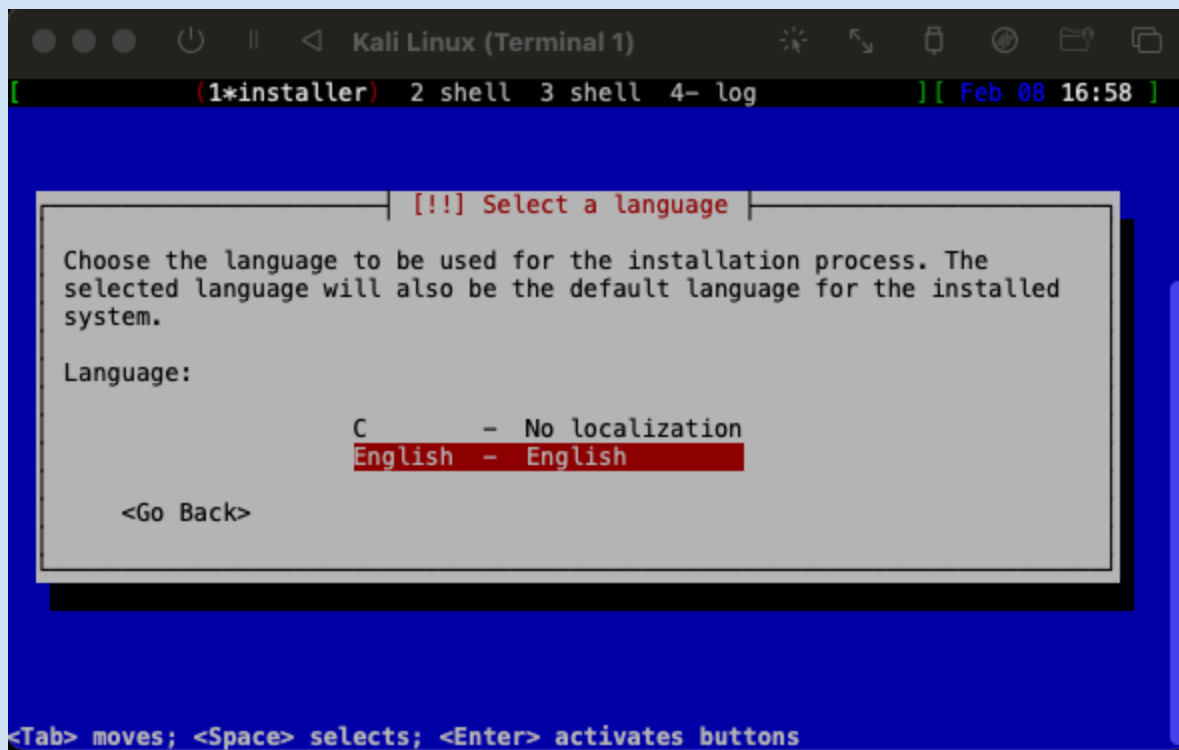
- Reopen UTM and initiate the installation process by selecting the start icon.



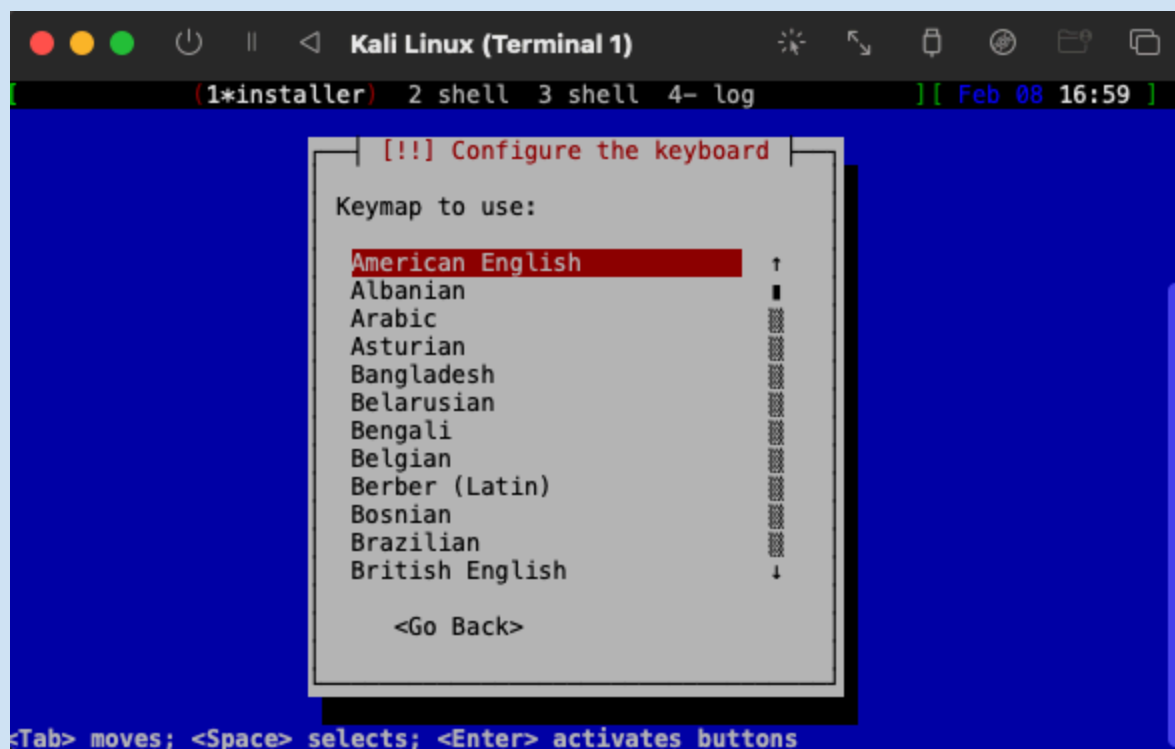


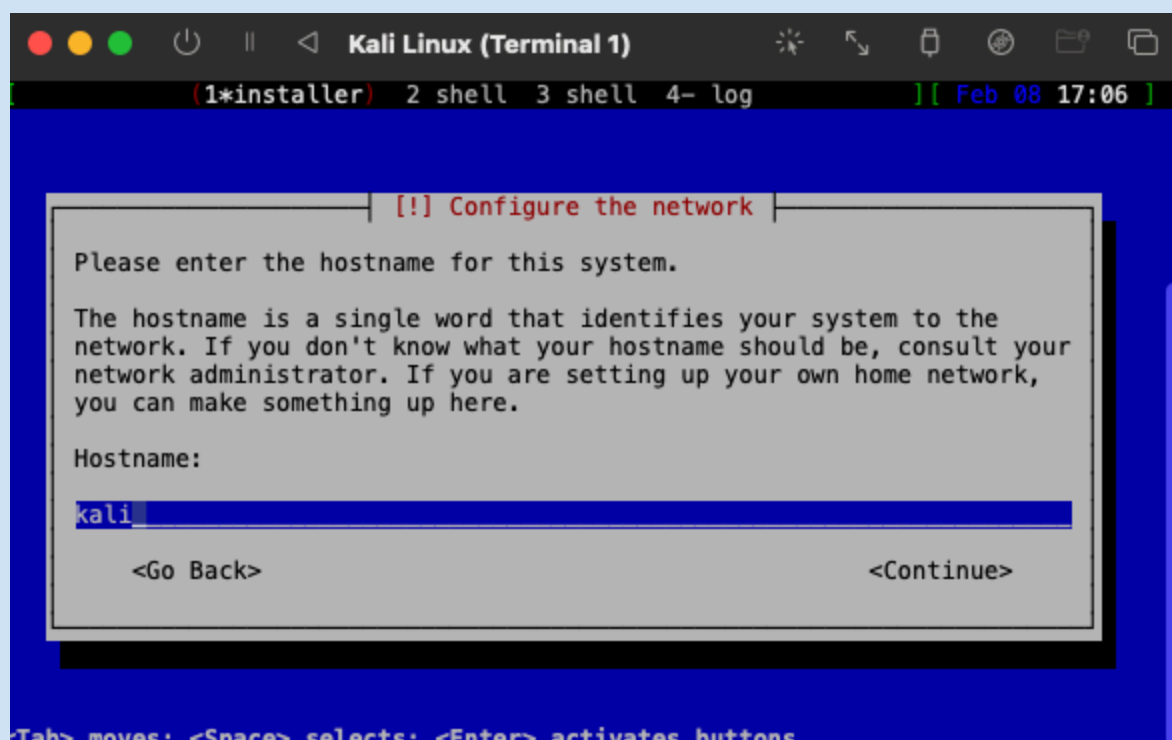
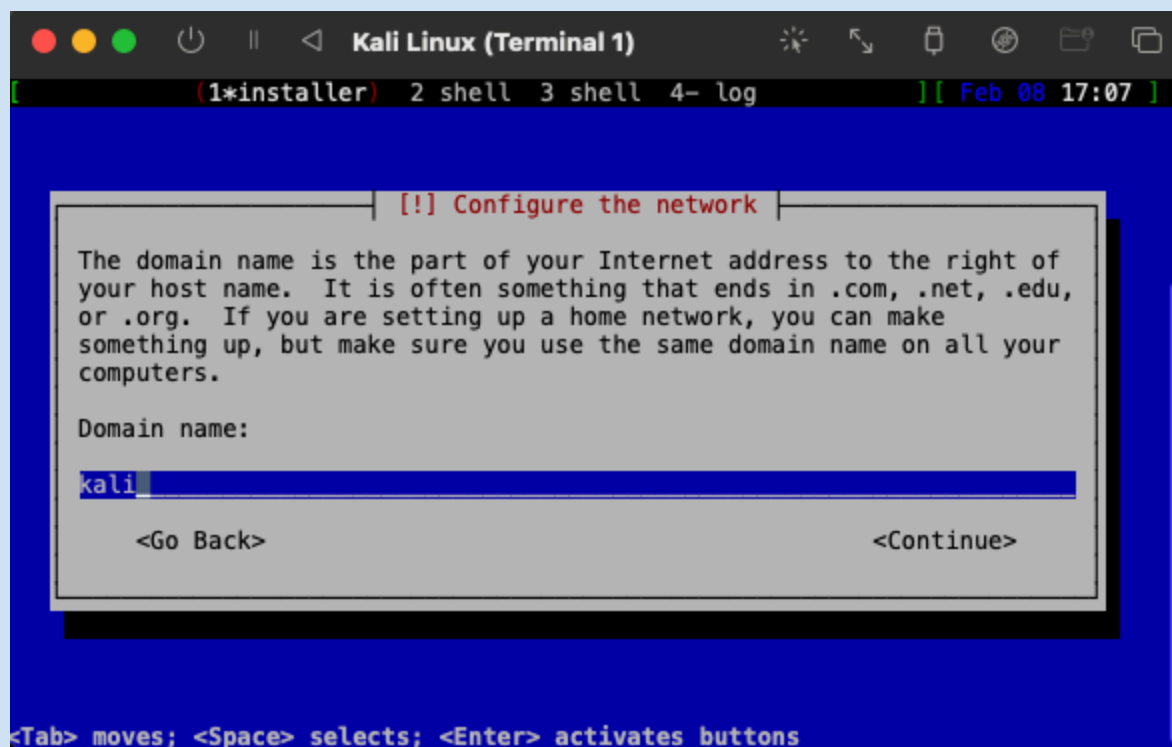
Follow On-Screen Prompts:

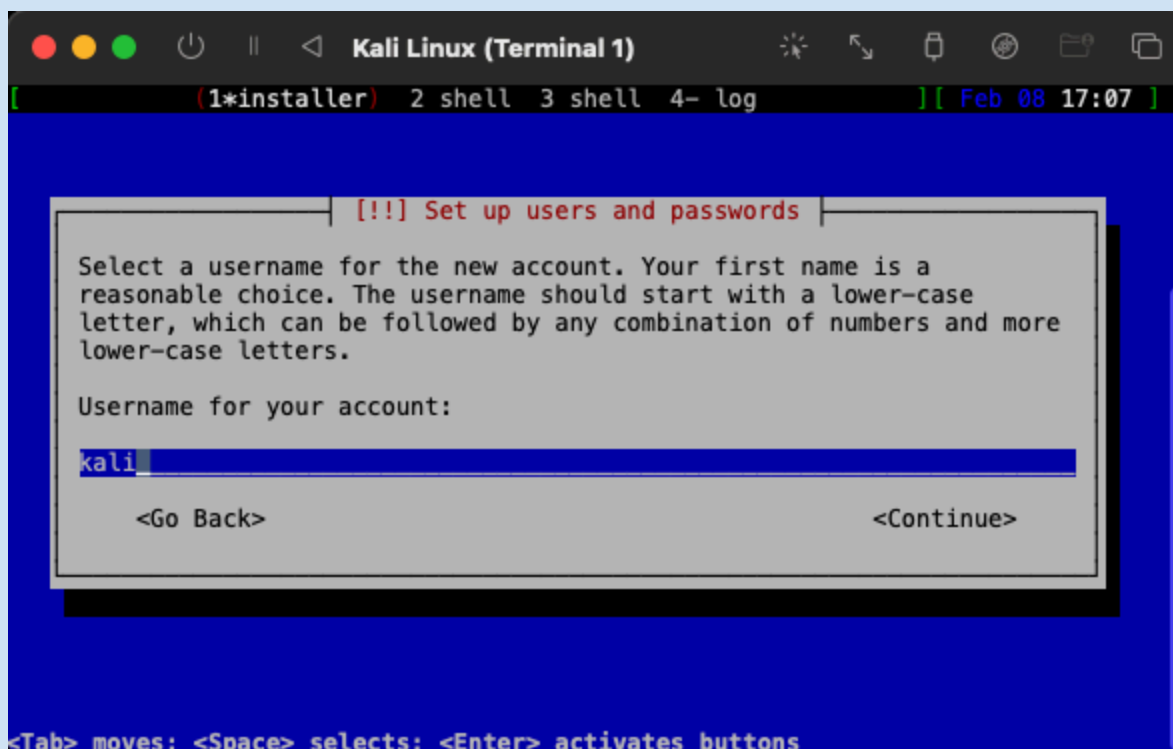
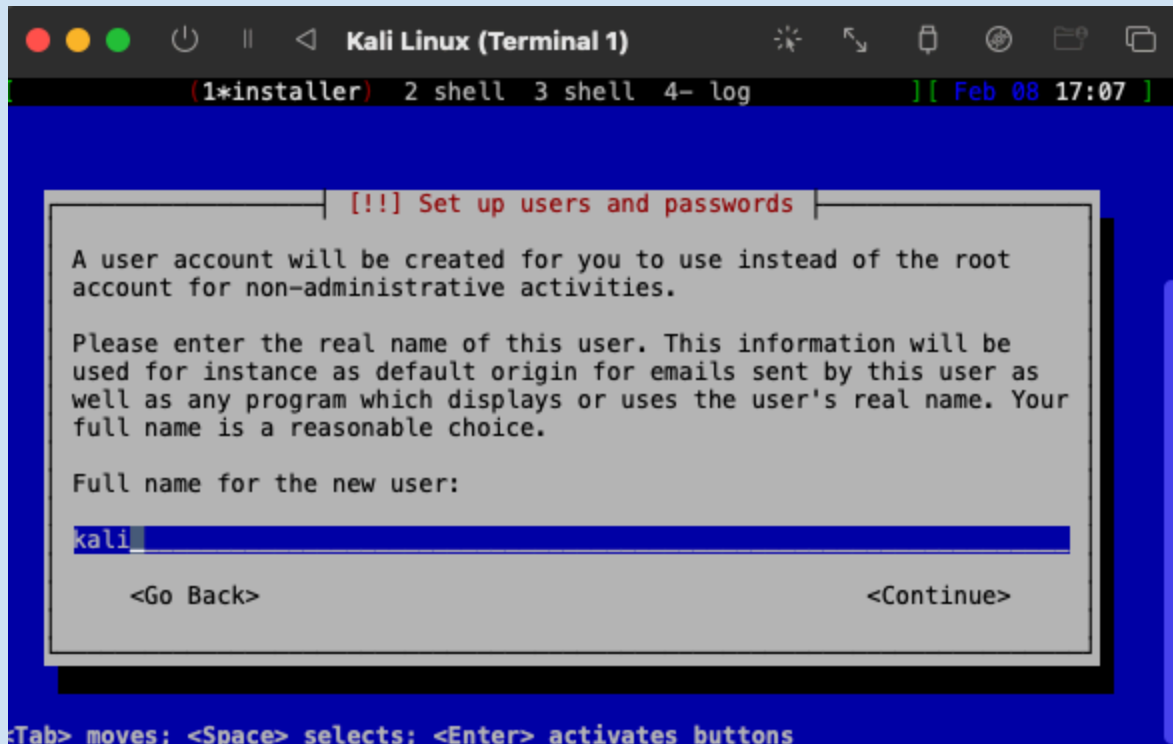
- Follow the on-screen prompts to select language, location, keyboard configuration, hostname, domain, username, and password for the Kali Linux system.

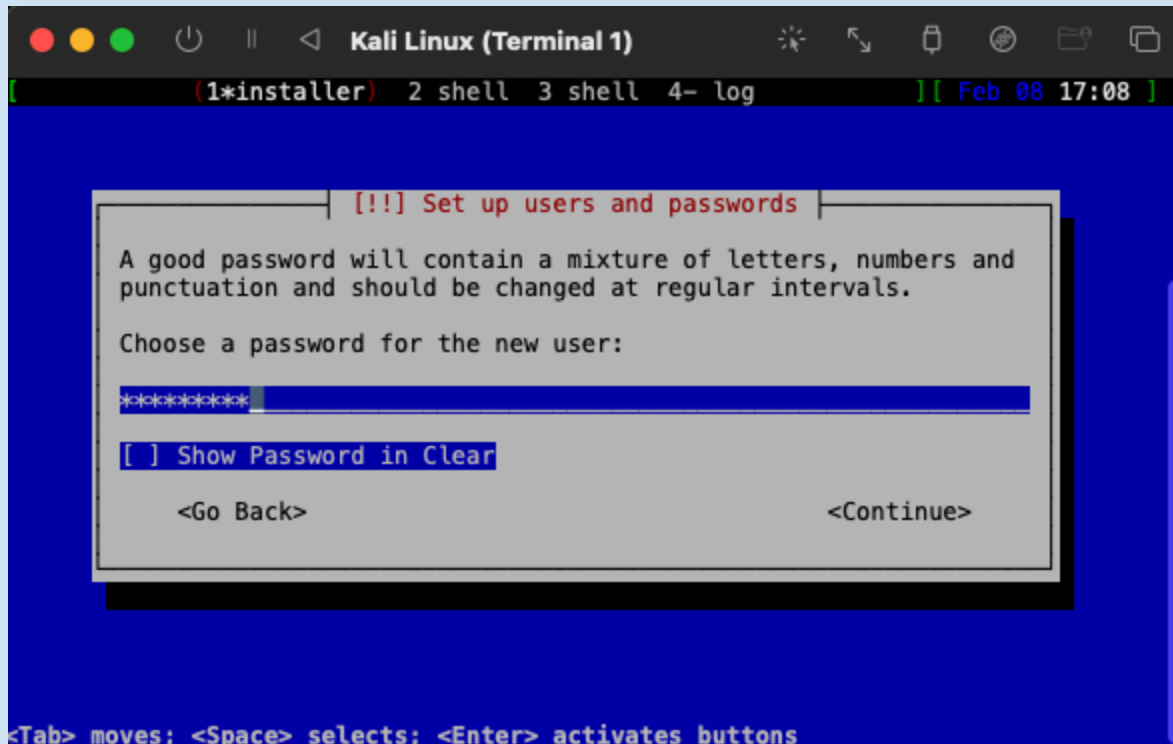






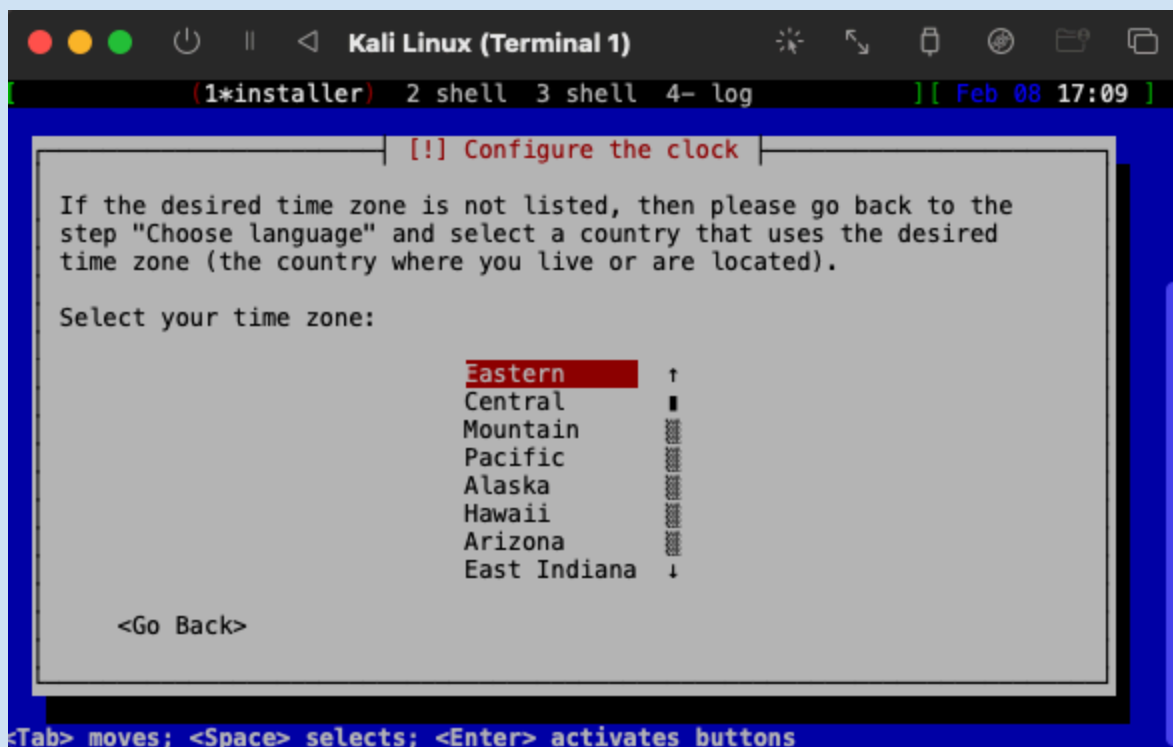






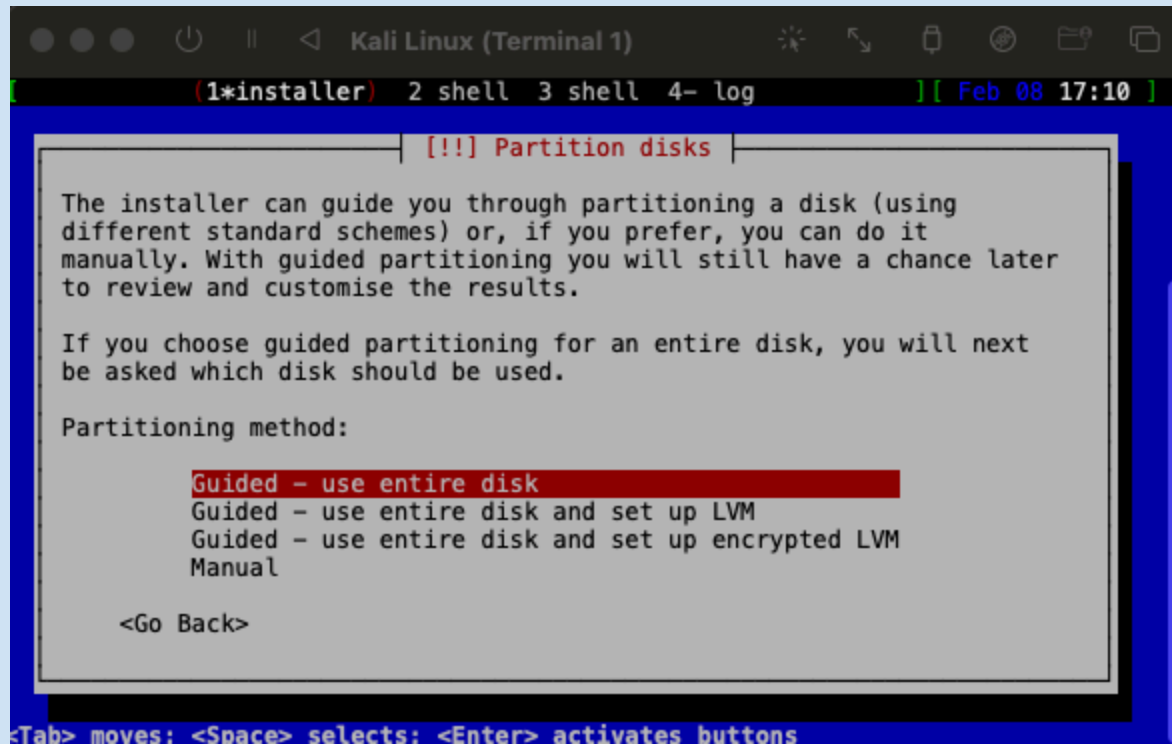
Guided Partitioning:

- Select timezone and proceed with guided partitioning (use entire disk) for the installation.



Software Selection:

- Choose software selection options based on your requirements.



```
Kali Linux (Terminal 1)
(1*installer) 2 shell 3 shell 4- log [ Feb 08 17:10 ]

!!! Partition disks

The installer can guide you through partitioning a disk (using
different standard schemes) or, if you prefer, you can do it
manually. With guided partitioning you will still have a chance later
to review and customise the results.

If you choose guided partitioning for an entire disk, you will next
be asked which disk should be used.

Partitioning method:
  Guided - use entire disk
  Guided - use entire disk and set up LVM
  Guided - use entire disk and set up encrypted LVM
  Manual

  <Go Back>

<Tab> moves: <Space> selects: <Enter> activates buttons
```

```
Linux (Terminal 1)
(1*installer) 2 shell 3 shell 4- log [ Feb 08 17:28 ]

Virtual disk 1 (vda) - Virtio Block Device: 32.2 GB

The disk can be partitioned using one of several different schemes.
If you are unsure, choose the first one.

Partitioning scheme:
  All files in one partition (recommended for new users)
  Separate /home partition
  Separate /home, /var, and /tmp partitions
  <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

```
Kali Linux (Terminal 1)
(1*installer) 2 shell 3 shell 4- log [ Feb 08 17:13 ]

[!!!] Partition disks

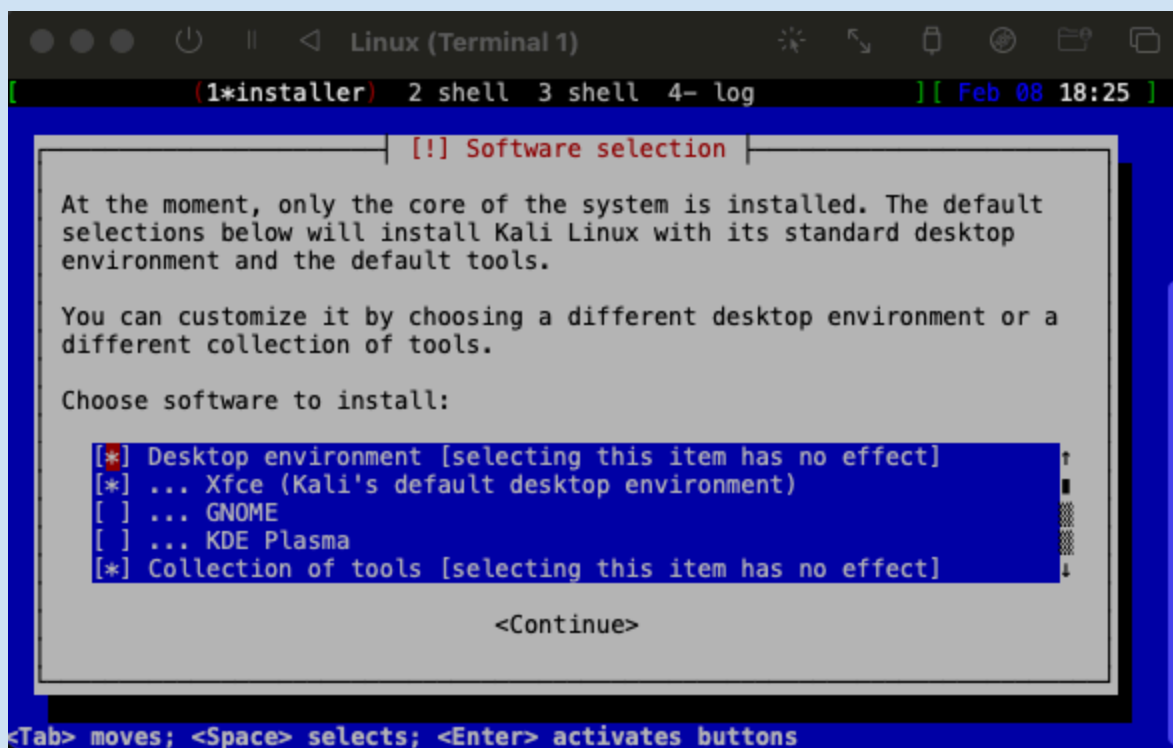
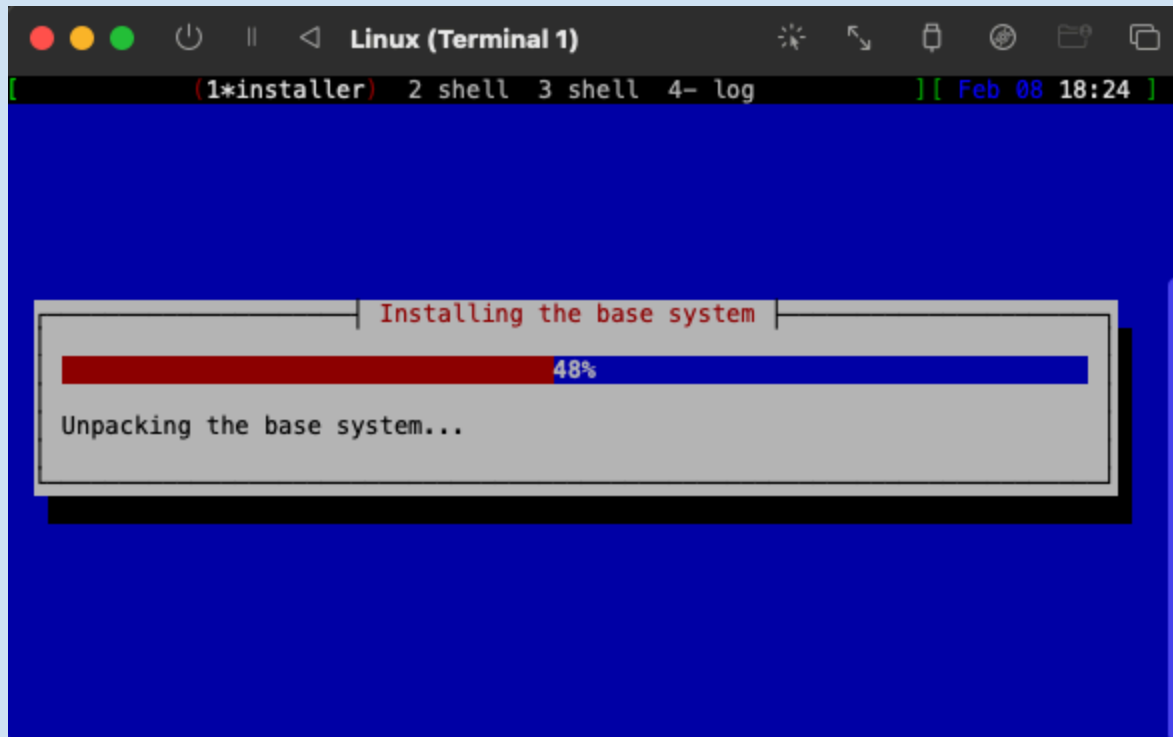
Note that all data on the disk you select will be erased, but not
before you have confirmed that you really want to make the changes.

Select disk to partition:
  Virtual disk 1 (vda) - 68.7 GB Virtio Block Device
  <Go Back>

<Tab> moves; <Space> selects; <Enter> activates buttons
```

Wait for Installation:

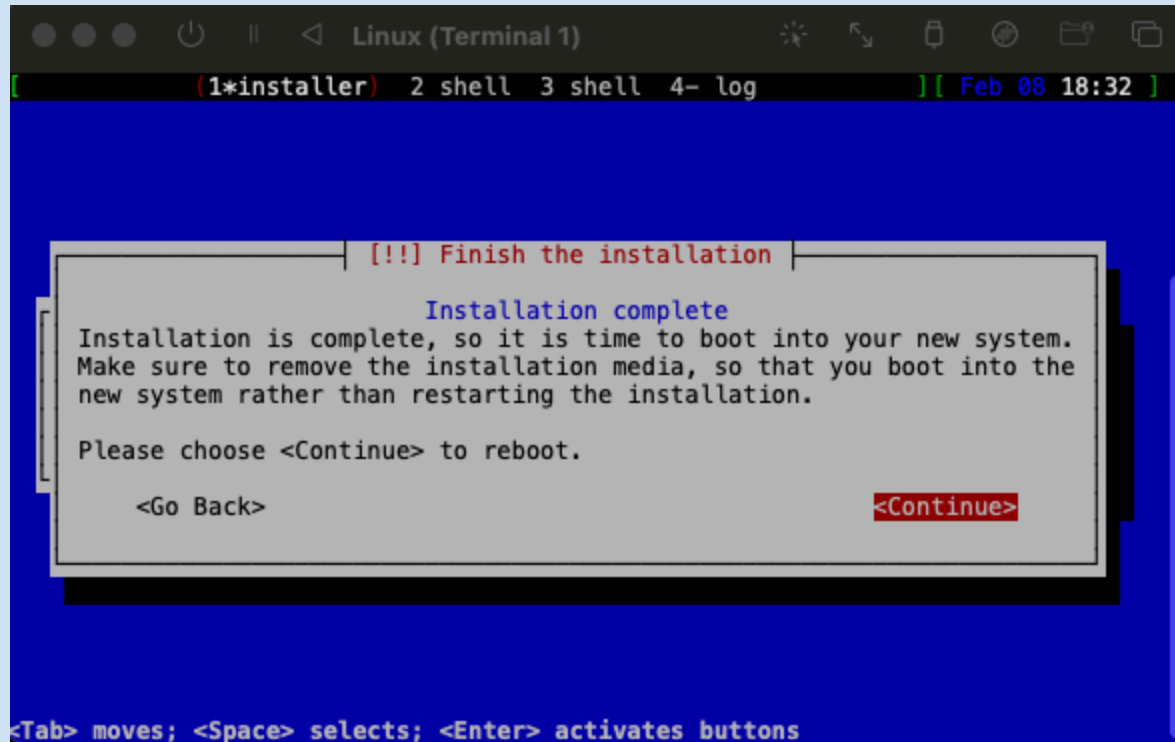
- Wait for the installation process to complete.



## 6. Post-Installation Configuration:

Reboot UTM:

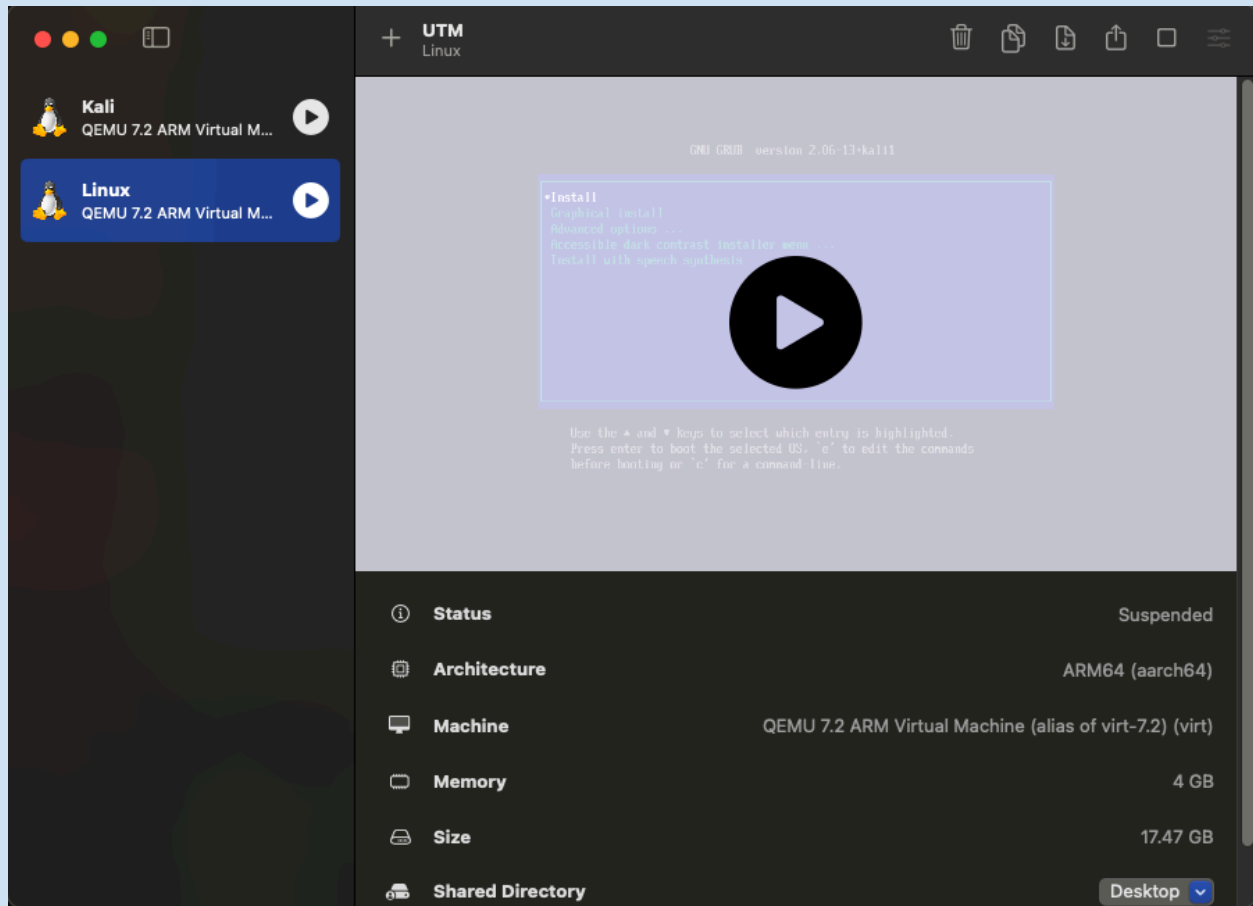
- Upon receiving the "Finish the Installation" prompt, continue and reboot UTM to apply the changes.





Clear CD/DVD Option:

- Re-launch UTM and clear the CD/DVD option in the settings.



Start Virtual Machine:

- Start the virtual machine and select the Kali Linux option.



Access Virtual Machine:

- Enter the username and password created during setup to access the virtual machine.

## 7. Terminal Setup and Update:

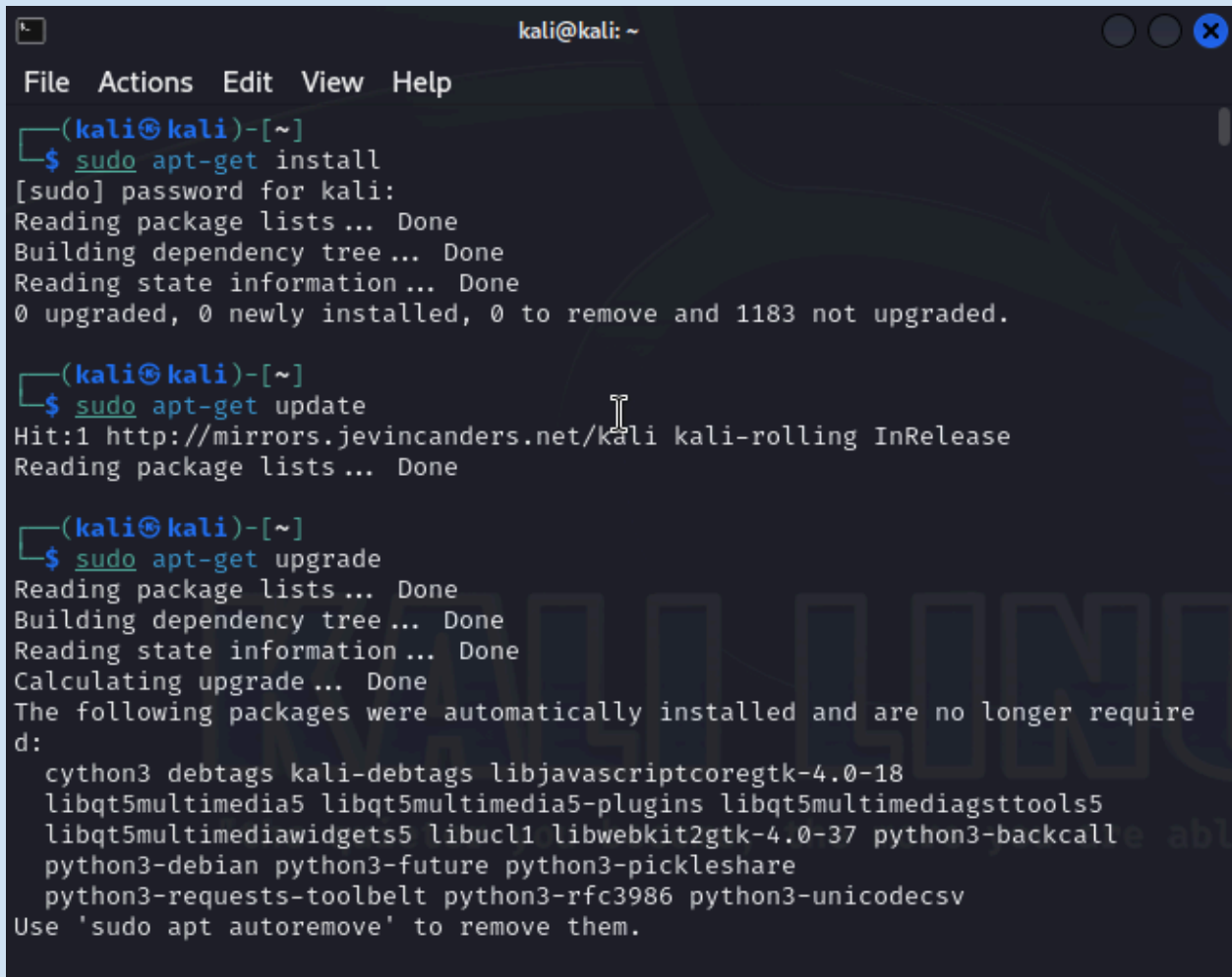
Open Terminal:

- Open the terminal within Kali Linux.



Execute Commands:

- Execute the following commands to install necessary packages, update repositories, and upgrade existing software within the virtual machine:

A screenshot of a Kali Linux terminal window. The window title is 'kali@kali: ~'. The menu bar shows 'File', 'Actions', 'Edit', 'View', and 'Help'. The terminal shows three commands being executed: 1. '\$ sudo apt-get install' followed by '[sudo] password for kali:' and progress messages: 'Reading package lists... Done', 'Building dependency tree... Done', 'Reading state information... Done', and '0 upgraded, 0 newly installed, 0 to remove and 1183 not upgraded.' 2. '\$ sudo apt-get update' followed by 'Hit:1 http://mirrors.jevincanders.net/kali kali-rolling InRelease' and 'Reading package lists... Done'. 3. '\$ sudo apt-get upgrade' followed by 'Reading package lists... Done', 'Building dependency tree... Done', 'Reading state information... Done', 'Calculating upgrade... Done', and a list of packages to be installed: 'cython3', 'debtags', 'kali-debtags', 'libjavascriptcoregtk-4.0-18', 'libqt5multimedia5', 'libqt5multimedia5-plugins', 'libqt5multimediasgsttools5', 'libqt5multimediawidgets5', 'libucl1', 'libwebkit2gtk-4.0-37', 'python3-backcall', 'python3-debian', 'python3-future', 'python3-pickleshare', 'python3-requests-toolbelt', 'python3-rfc3986', and 'python3-unicodcsv'. It ends with 'Use 'sudo apt autoremove' to remove them.'

```
kali@kali: ~  
File Actions Edit View Help  
(kali@kali)-[~]  
$ sudo apt-get install  
[sudo] password for kali:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
0 upgraded, 0 newly installed, 0 to remove and 1183 not upgraded.  
  
(kali@kali)-[~]  
$ sudo apt-get update  
Hit:1 http://mirrors.jevincanders.net/kali kali-rolling InRelease  
Reading package lists... Done  
  
(kali@kali)-[~]  
$ sudo apt-get upgrade  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
Calculating upgrade... Done  
The following packages were automatically installed and are no longer require  
d:  
  cython3 debtags kali-debtags libjavascriptcoregtk-4.0-18  
  libqt5multimedia5 libqt5multimedia5-plugins libqt5multimediasgsttools5  
  libqt5multimediawidgets5 libucl1 libwebkit2gtk-4.0-37 python3-backcall  
  python3-debian python3-future python3-pickleshare  
  python3-requests-toolbelt python3-rfc3986 python3-unicodcsv  
Use 'sudo apt autoremove' to remove them.
```

This detailed run book provides step-by-step instructions for setting up Kali Linux on UTM for Mac M1 and M2 computers, ensuring a smooth and successful installation process.