PROJECT REPORT ON

“Introduction to Virtualization with VirtualBox”

Submitted By: Adithya Sharma

UID-24MCA20314

Under The Guidance of:

Mrs. Geetanjali Sharma

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University Institute of Computing

Chandigarh University,

Mohali, Punjab

CERTIFICATE

This is to certify that Adithya Sharma (UID-24MCA20314) have successfully completed the project title **"Introduction to Virtualization with VirtualBox"** at University Institute of Computing under my supervision and guidance in the fulfilment of requirements of first semester, **Master of Computer Application** Of Chandigarh University, Mohali, Punjab.

Dr. Abdullah	Mrs. Geetanjali Sharma
Head of the Department	Project Guide Supervisor
University Institute of Computing	University Institute of Computing

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We shall remain grateful to Dr. Manisha Malhotra, Additional Director, University Institute of Technology, for providing us a strong academic atmosphere by enforcing strict discipline to do the project work with utmost concentration and dedication.

Finally, we must say that no height is ever achieved without some sacrifices made at some end and it is here where we owe our special debt to our parents and our friends for showing their generous love and care throughout the entire period of time.

Date: 23.10.2024

Place: Chandigarh University,Mohali,Punjab

Adithya Sharma ,
UID: 24MCA20314

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Introduction

Linux, an open-source operating system kernel, has grown to become a critical component of the modern computing landscape. Originally developed by Linus Torvalds in 1991, Linux provides the foundation for a wide range of operating systems known as "distributions" (or distros). These distributions package the Linux kernel with additional software, utilities, and features tailored for specific user needs, from personal computing to enterprise servers and embedded systems.

Linux distributions vary in terms of user interface, system architecture, and use case, ranging from user-friendly options like Ubuntu and Linux Mint to specialized environments like Red Hat Enterprise Linux for corporate use. One of the most recognized distributions for security professionals is **Kali Linux**.

Kali Linux, based on Debian, is a powerful distribution specifically designed for digital forensics, penetration testing, and ethical hacking. It includes hundreds of pre-installed tools for tasks like network analysis, vulnerability assessments, and exploitation. The availability of such tools makes Kali Linux a popular choice among cybersecurity professionals and ethical hackers.

This project aims to explore the Linux operating system, its various distributions, and focus particularly on the features and applications of Kali Linux. It will provide an overview of Linux’s architecture, compare key distributions, and analyze how Kali Linux is used in the field of cybersecurity. Through this project, we will gain a deeper understanding of Linux’s role in different computing environments and how specialized distributions like Kali Linux serve niche purposes such as network defense and ethical hacking.

Implementation

Dual Booting a Windows Laptop with Kali Linux, Though increases the speed and efficiency of the OS, but we can not switch between Windows and Kali Linux instantly. To do so, we will have to install Kali Linux in Virtual Box or any other hypervisor. So, what is a hypervisor? Refer to this article Hypervisors. So now, whenever we want to switch between both operating systems, we will have to just change the active Window from the Virtual box to any other window and vice versa. Also, sometimes we came across situations like when we want to start learning Linux and command line stuff but using Linux as a main Operating System without having a basic idea of it is not a good option and here either dual-booting solves the problem or the virtual machine does the same.
The virtual box will provide some part of the hardware from the existing hardware in your PC to the Kali Linux at the time when you use it so that Kali Linux can operate.

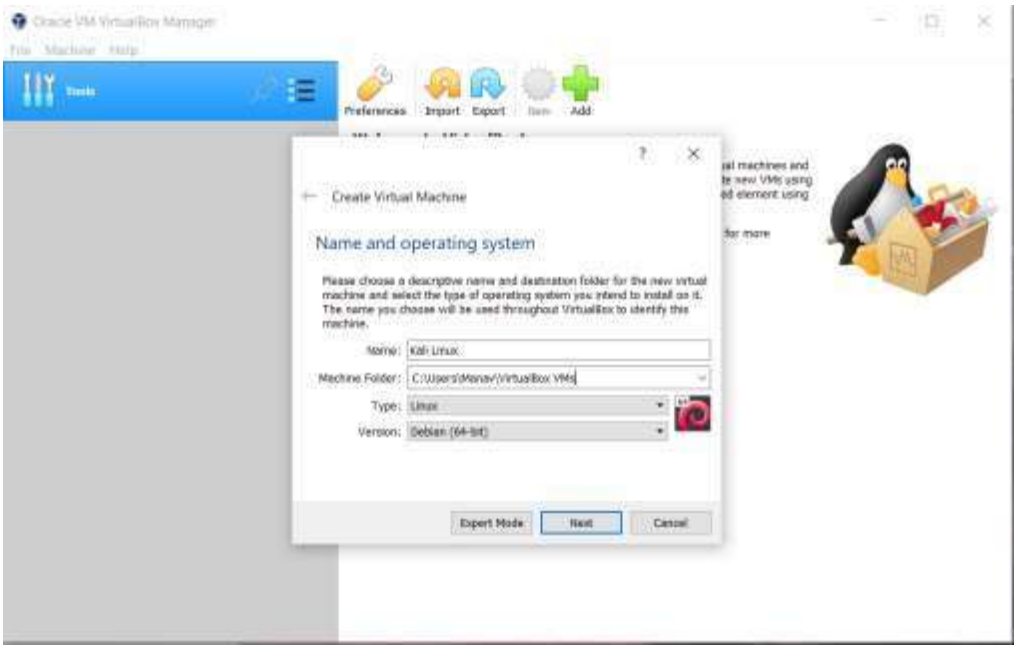
Prerequisites

- 20GB free disk space on other OS
- Kali Linux ISO File which can be downloaded from here.
- Virtual Box on the System. Refer to the article – Installing Virtual Box
- Minimum of 5-10 GB free space in your hard disk
- A minimum of 8 GB RAM is recommended

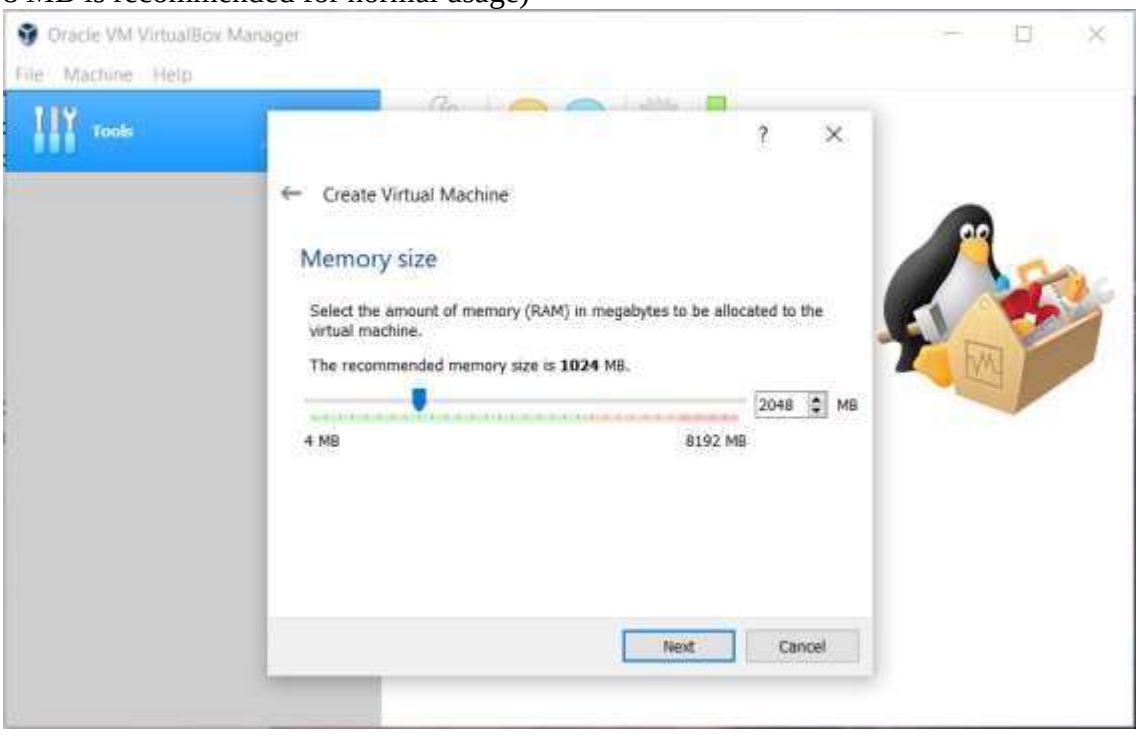
Procedure:

1. Open Virtual Box and then press the new button.

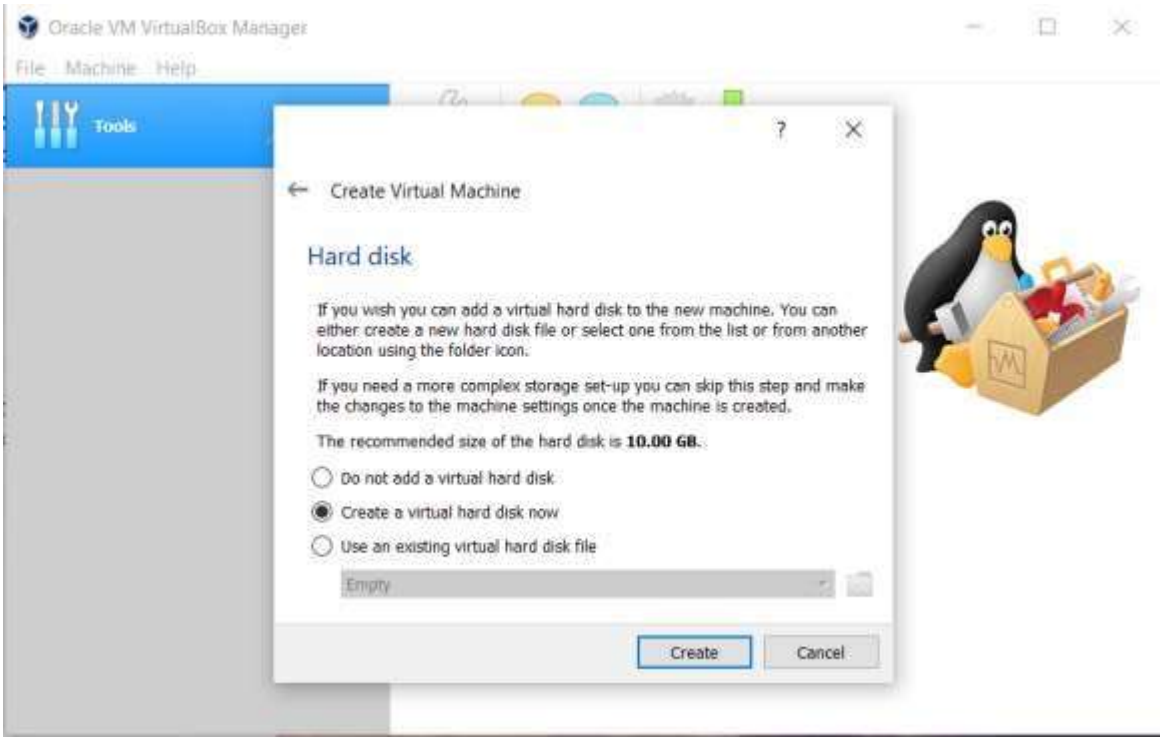
2. Write the name of the virtual machine and select it to Debian based 64bit Linux architecture.



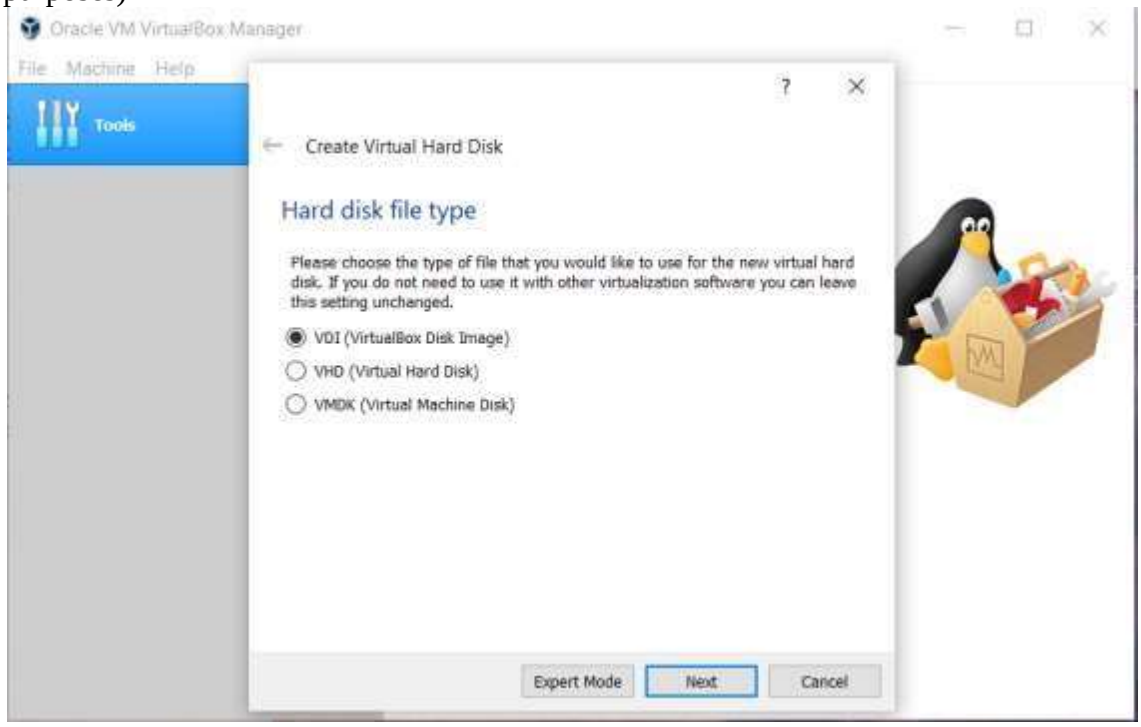
3. Allot the size of RAM memory you want to allocate to the Virtual Machine of Kali Linux. (2048 MB is recommended for normal usage)



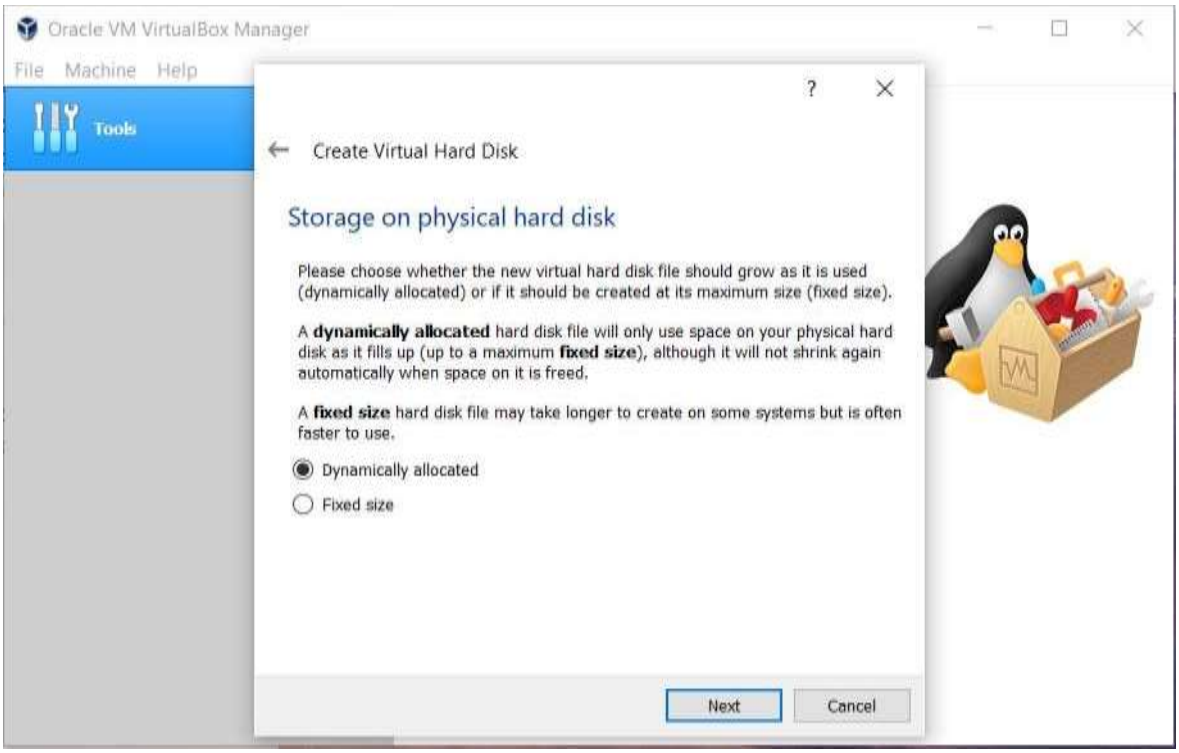
4. Select the option to create a virtual hard disk now and then click on the create button.



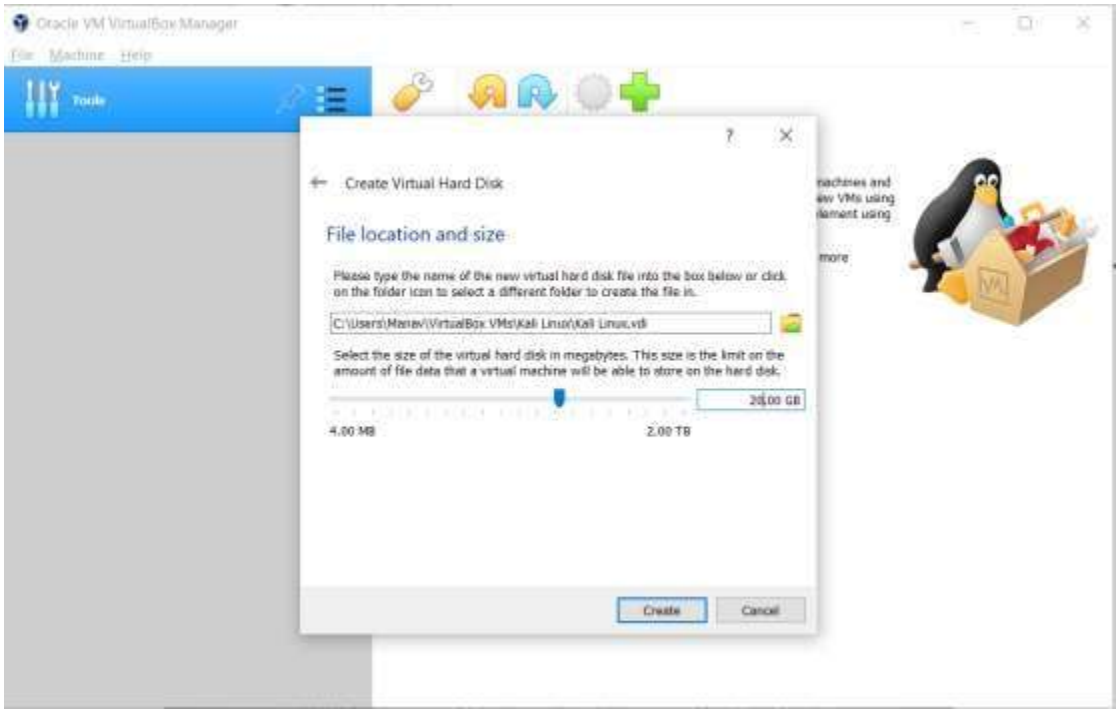
5. Now, Select the Hard Disk File type for Virtual Hard Disk. (VDI is recommended for daily purposes)



6. Now select the type of Physical Hard Disk Storage. (Dynamically Allocated is recommended for general purposes)

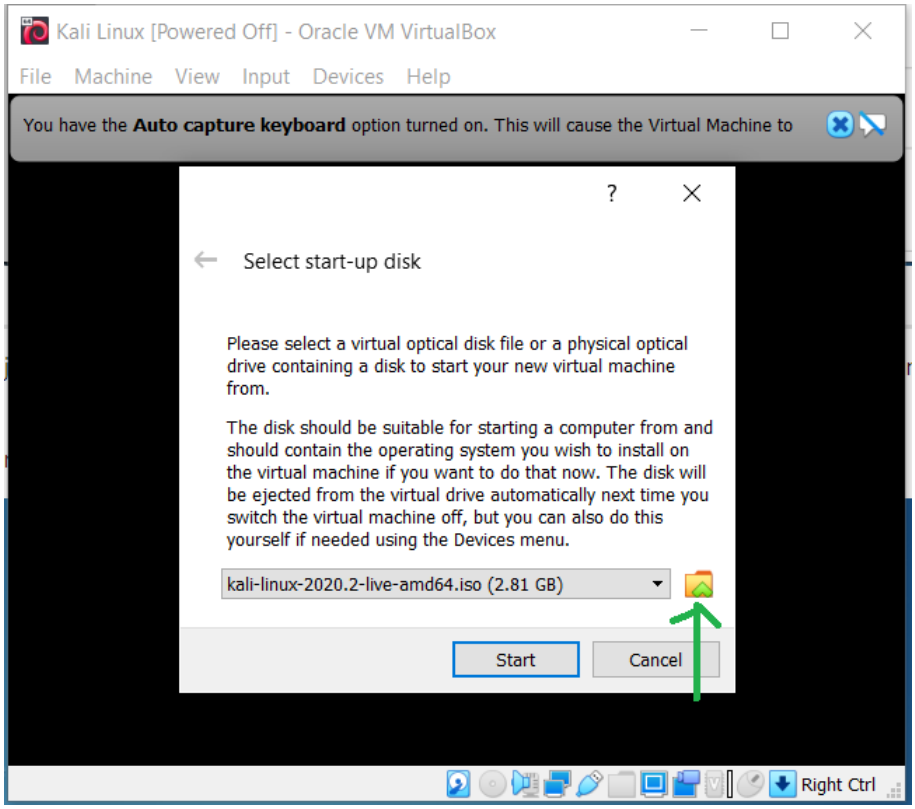


7. Select the size of your virtual hard disk and also the location where you want to save your machine and its files.



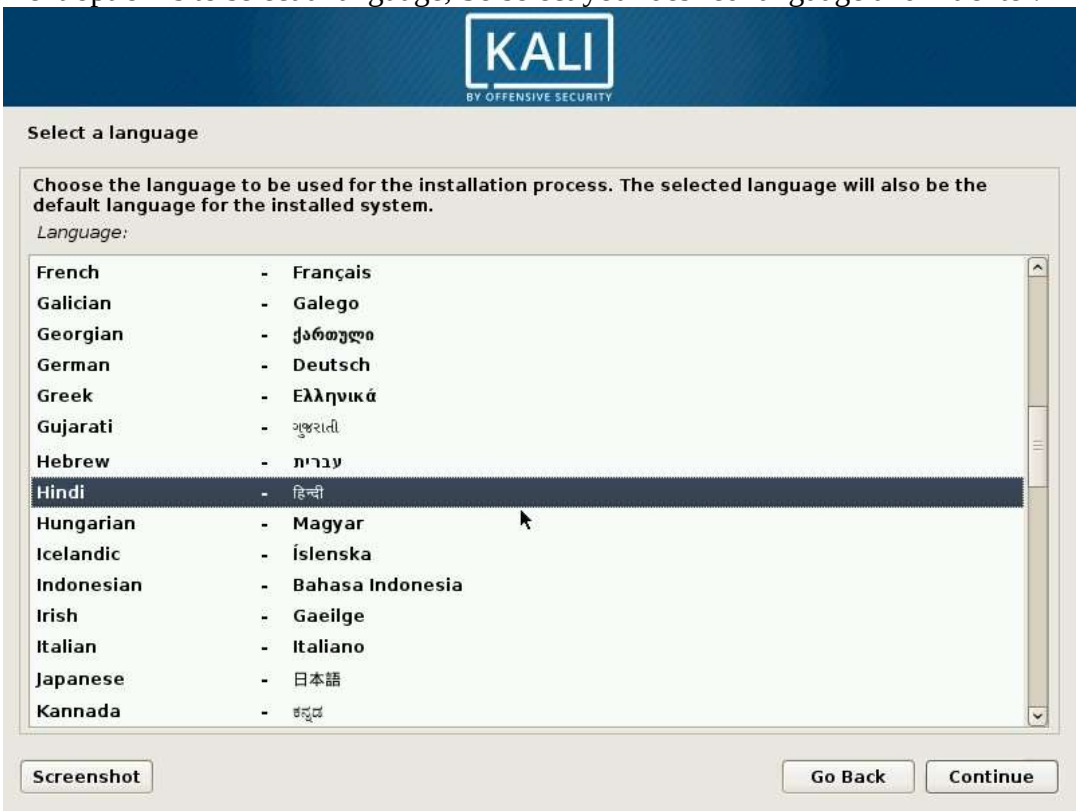
8. As soon as the processing is completed click on the Virtual machine name on the left panel and click on the start but ton from the top.

9. Now click on the Browse icon located just above the cancel button and select your downloaded Kali Linux ISO file and then click on the start button.

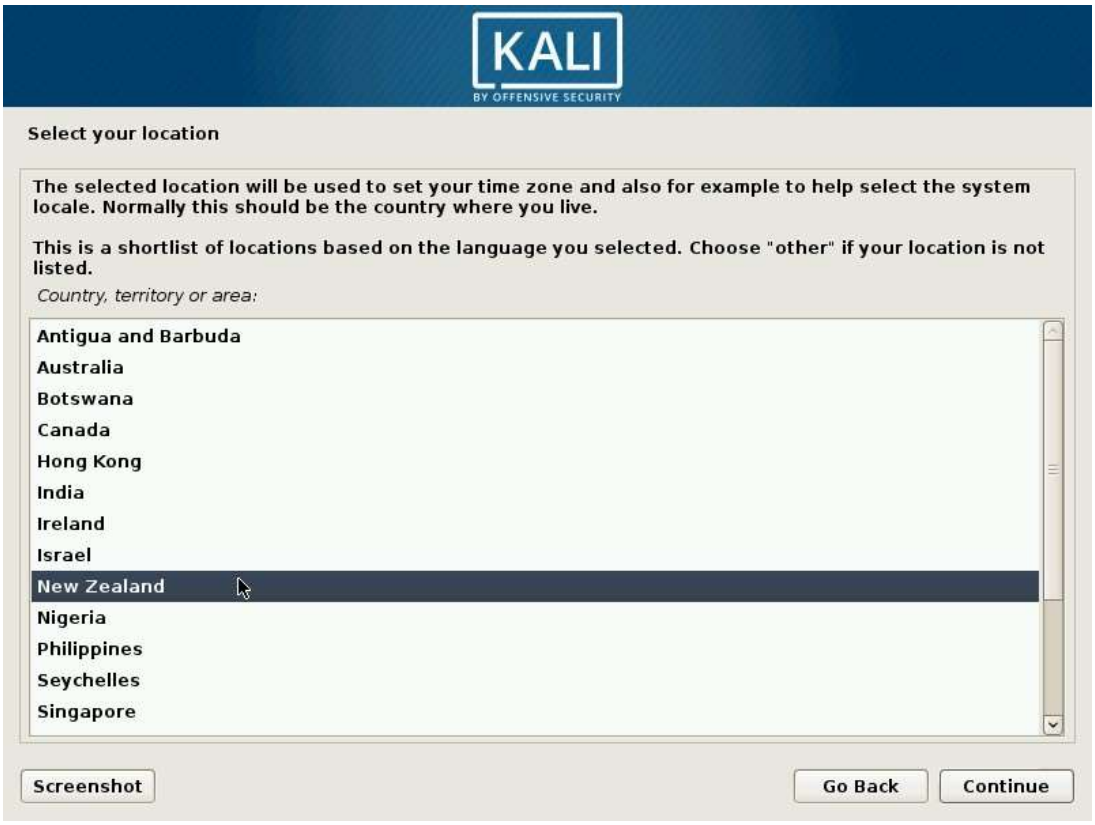


10. This will boot our virtual machine from the chosen Kali Linux ISO file. Select the Graphical Install button and hit enter.

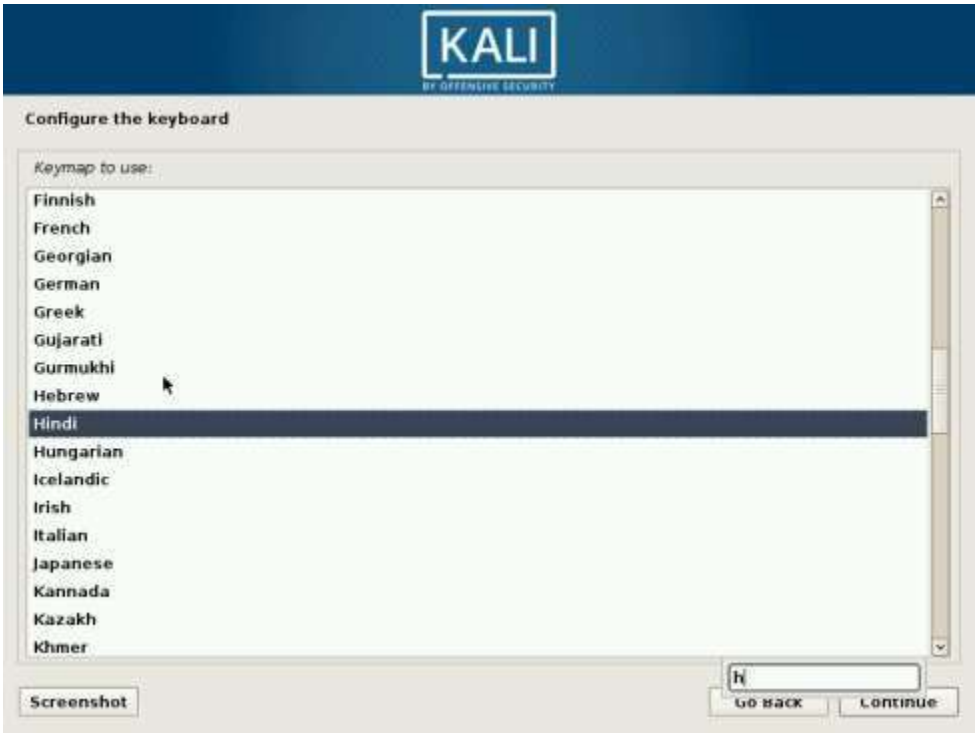
11. The next option is to select a language, So select your desired language and hit enter.



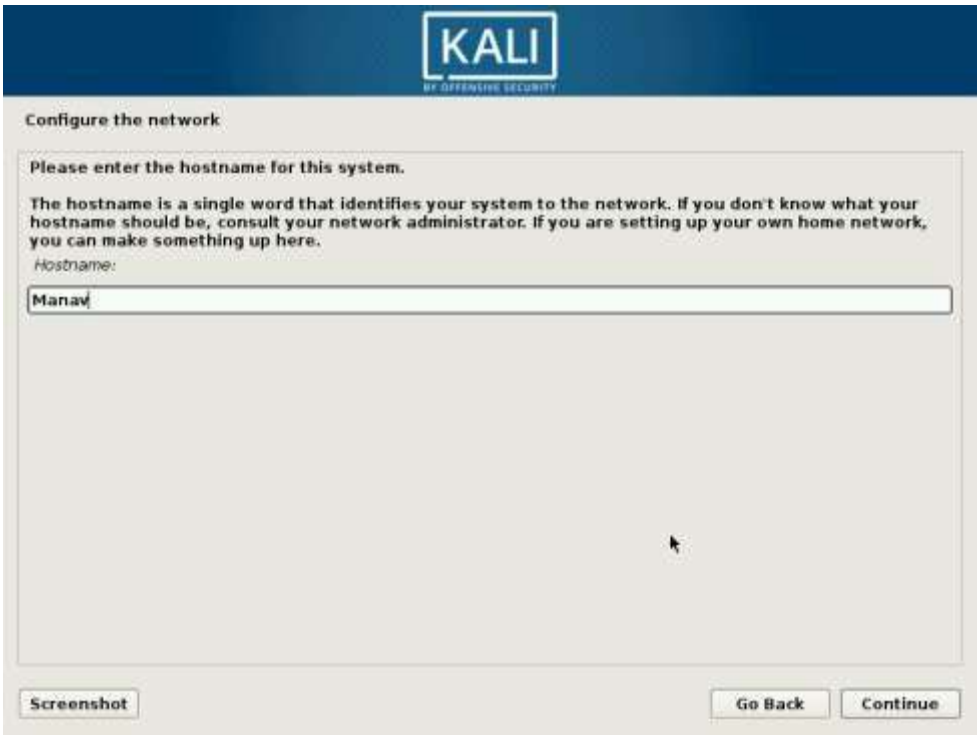
12. The next step is to select a country, territory, or area, So select your respective one.



13. The next step is to configure your keymap. Confirm the keymap you want to use and click Next.

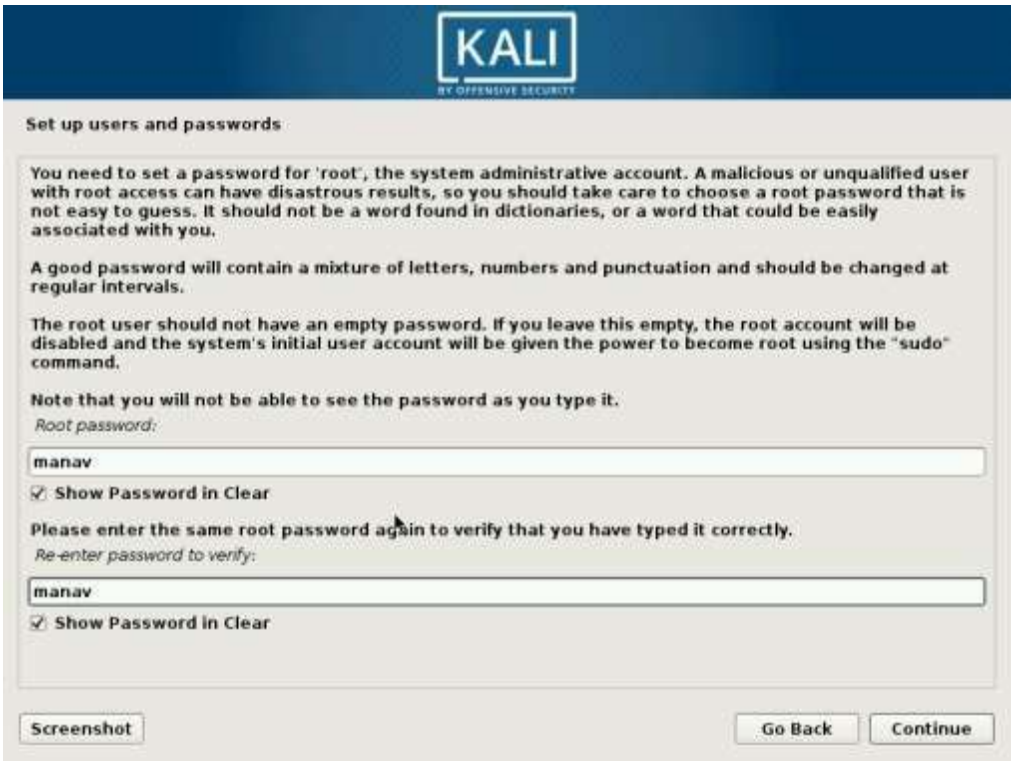


14. In the next step it is asking for a hostname, Enter the same and press the continue button.



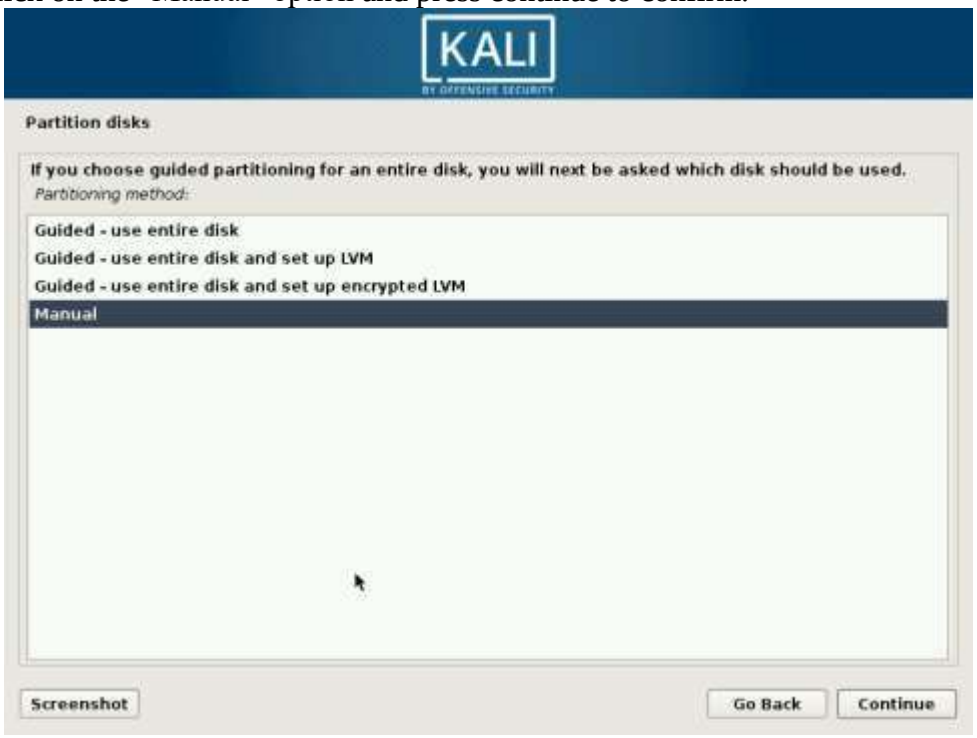
15. The next step is to enter the domain name of your choice you may leave it blank if you don't have any.

16. Enter a strong password for your Kali Linux OS and click continue.

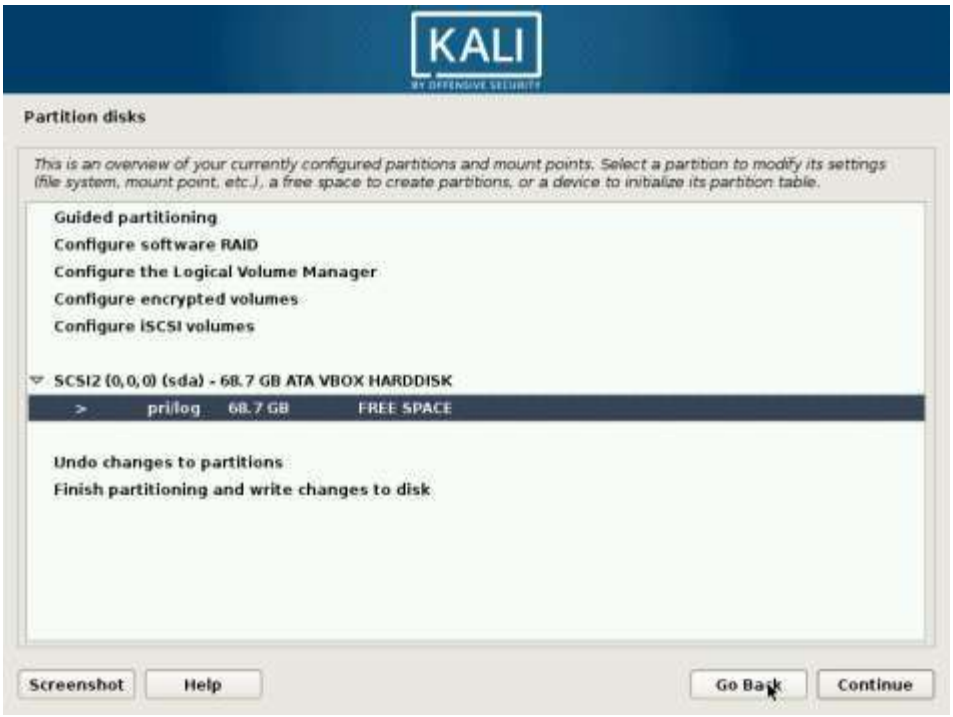


17. The next step is to select a time zone of your choice which you want to use as a default time zone for the Kali Linux machine.

18. Now click on the "Manual" option and press continue to confirm.

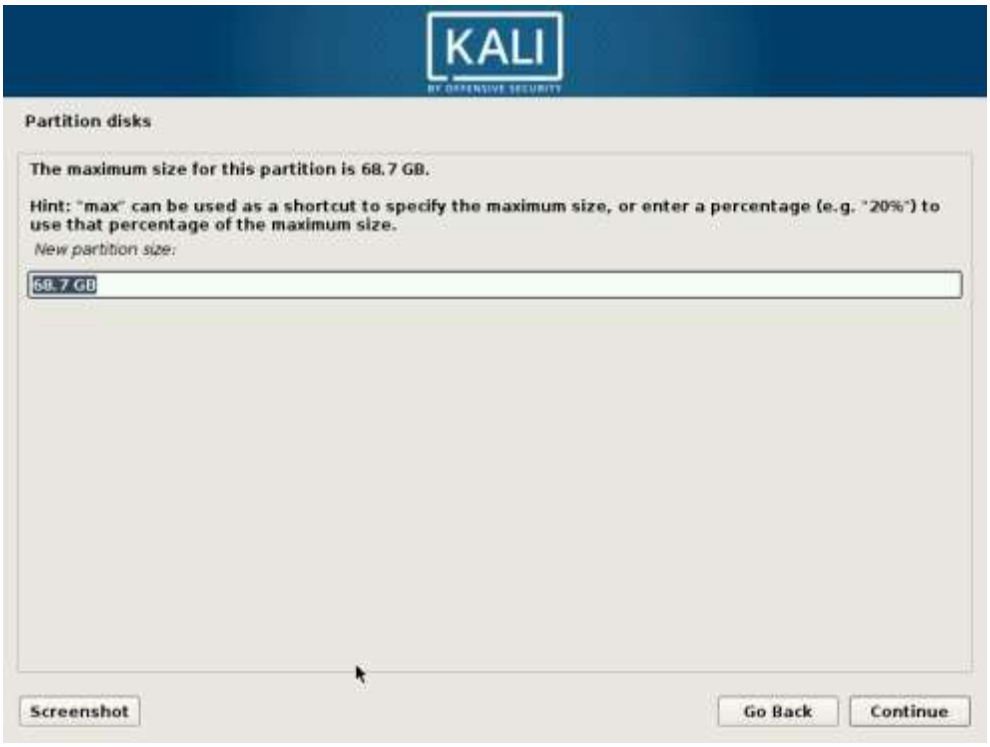


19. Now select the Free Space and create a new partition with that and click continue. Also, it is recommended for new users to not use a separate partition for root, home, and swap areas.



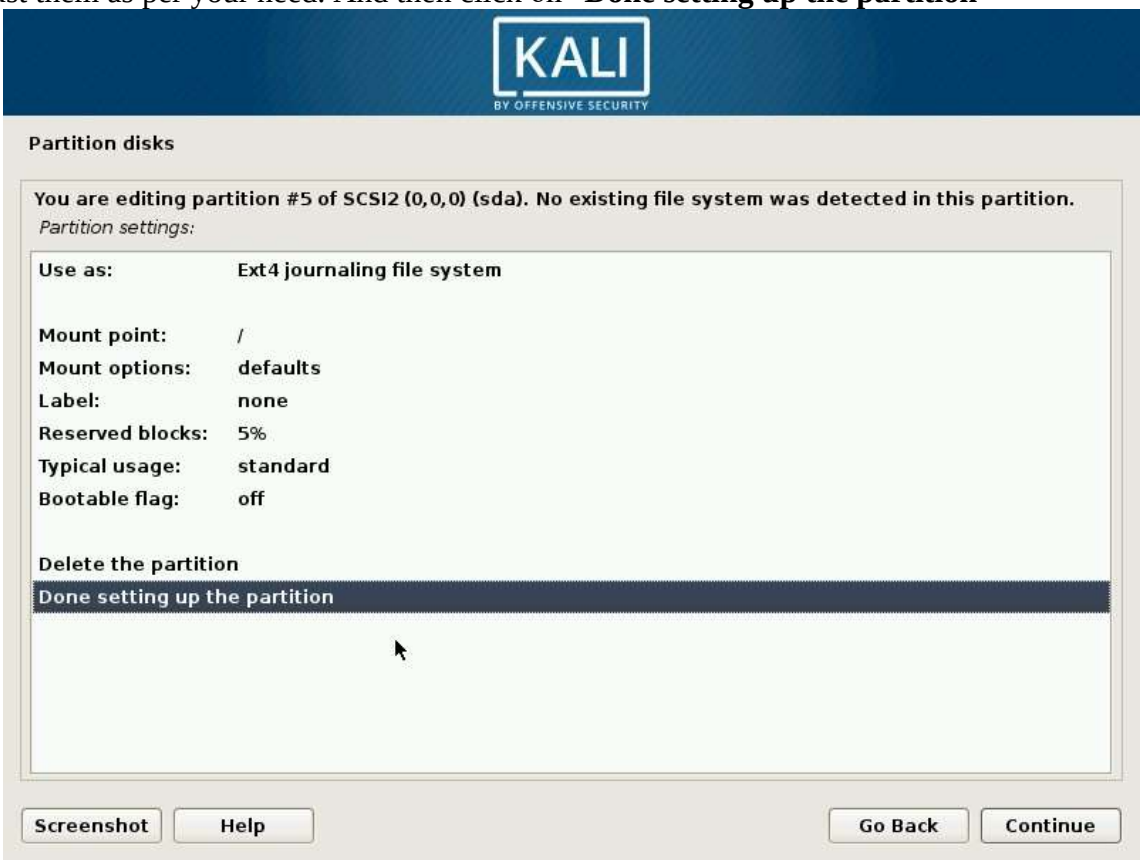
20. Now click on create a new partition.

21. Now enter the partition size to be created.

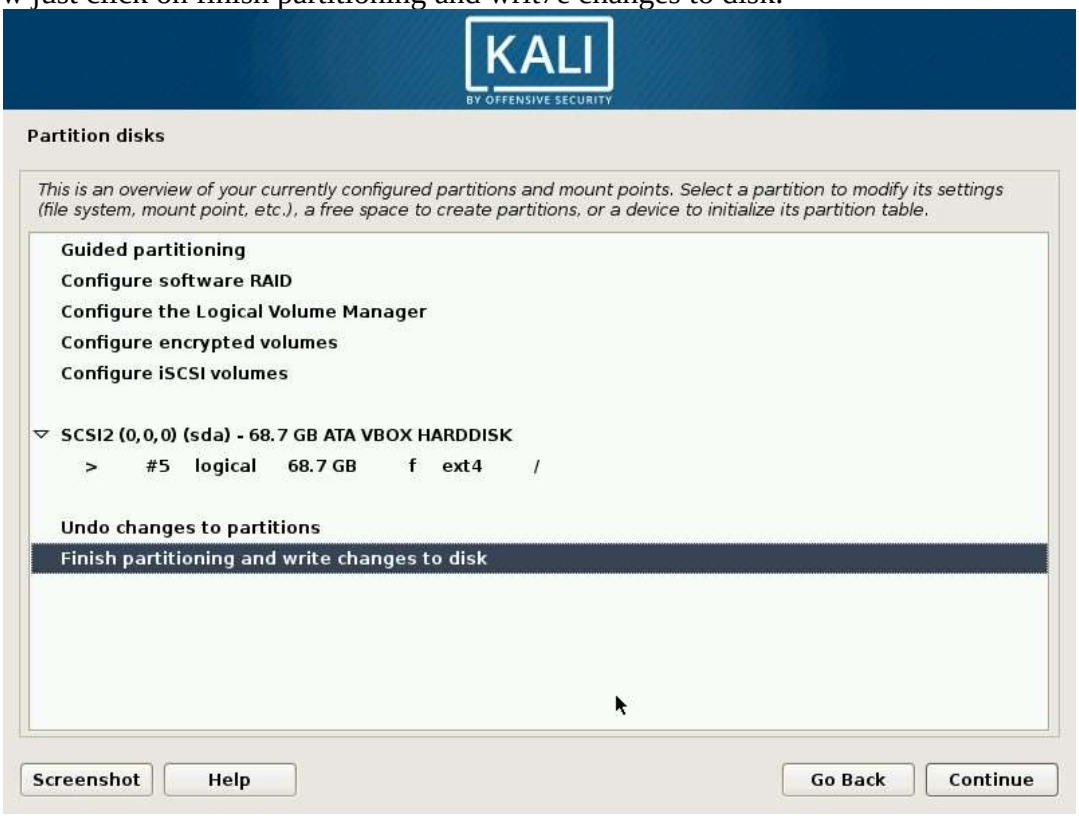


22. Now select the partition type as "**Logica**l".

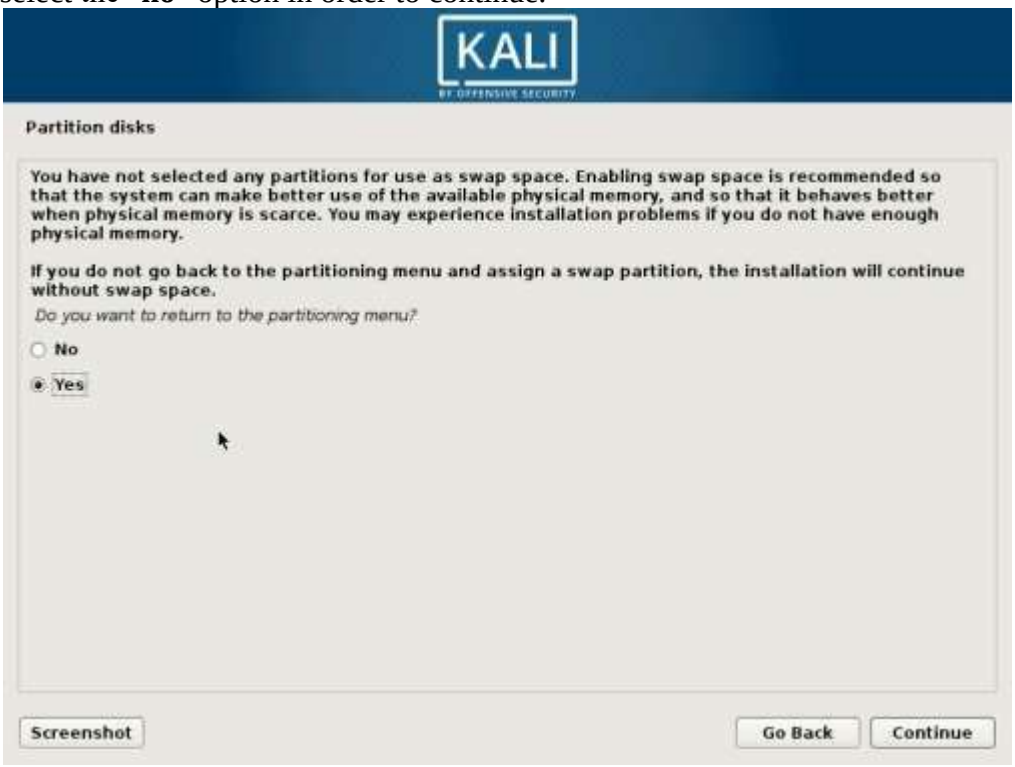
23. Now if you are new to Linux then use the following settings for the partition or you may also adjust them as per your need. And then click on "**Done setting up the partition**"



24. Now just click on finish partitioning and writ7e changes to disk.



25. Now select the "**no**" option in order to continue.



26. Now in order to write changes to the disk select the "**yes**" option and then click on continue.

27. Now, wait for a few minutes for the Kali system to be installed into your Virtual Machine.

28. The next option is to select whether to install the GRUB boot loader to the master boot record or not. Click on yes to add the same.

29. Choose your respective hard disk to boot into, from the list of devices.

30. This will start installing the Kali Linux OS and will take a few minutes to completely install the same and will reboot after the successful completion of the installation.

31. Once the complete process is finished successfully, It will automatically restart the virtual machine and will boot the Kali Linux OS.

32. In order to close the Virtual Machine, Simply Shutdown the Kali Linux OS, this action will automatically terminate the Virtual Machine.

Conclusion

The successful installation of **Kali Linux** in **VirtualBox** marks an important step in creating a controlled, isolated environment for security testing and ethical hacking. By leveraging virtualization, users can explore the powerful features of Kali Linux without affecting their primary operating system, making it an ideal setup for both beginners and professionals in the field of cybersecurity.

Throughout this project, we demonstrated how to set up VirtualBox, configure system resources, and install Kali Linux. We also highlighted the benefits of virtualization, such as ease of use, system isolation, and the flexibility to create multiple environments for testing and experimentation.

This project has provided valuable insights into the process of working with **virtual machines** and how to use Kali Linux in a secure and controlled manner. By replicating this setup, users can explore the extensive set of tools Kali Linux offers, gaining hands-on experience with ethical hacking, penetration testing, and cybersecurity analysis without risk to their host system.

With the completion of this installation, users are now equipped to delve deeper into the specialized features of Kali Linux, further enhancing their understanding and skills in cybersecurity.