Individual Assigment

Operating System

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SUBMITION DATE:06/05/18 E.C

SUBMITION TO Lec.Wendmu

Installation of Ubuntu Server in a Virtual Environment

1. Introduction

Background

An operating system (OS) is system software responsible for managing computer hardware and software resources while providing essential services for application programs. It acts as an interface between the user and the computer hardware, ensuring efficient and secure system operation.

Ubuntu Server is a Linux-based operating system designed specifically for server environments. It is widely used in enterprises, data centers, and cloud platforms due to its stability, strong security features, open-source nature, and Long Term Support (LTS). The LTS versions of Ubuntu Server provide updates and security patches for up to five years, making them suitable for production and long-term deployment.

With the rapid growth of virtualization and cloud computing, Ubuntu Server has become a preferred choice for virtualized environments because of its lightweight architecture, high performance, and broad community support.

Motivation

Ubuntu Server is selected as the operating system for this installation due to several important technical and practical advantages. Being open-source and free, Ubuntu Server reduces licensing costs while allowing full access to system configuration and customization. Its lightweight and efficient architecture makes it suitable for both physical servers and virtual environments with limited resources.

Ubuntu Server is also supported by Long Term Support (LTS) releases, which provide security updates and maintenance for up to five years. This ensures system stability and reliability, making it an ideal choice for long-term server deployment. Additionally, Ubuntu Server is widely used in cloud platforms, enterprise

infrastructures, and data centers, proving its reliability and industry acceptance.

Installing Ubuntu Server in a virtual environment enables safe experimentation, learning, and testing without impacting physical hardware. Virtualization provides flexibility, easy recovery, and efficient resource utilization, making it an effective approach for understanding modern server operating systems.

2. Objectives

The main objectives of this documentation and practical exercise are as follows:

- To understand the concept of virtualization and its importance in modern operating systems
- To successfully install Ubuntu Server on a virtual machine using a virtualization tool
- To gain hands-on experience in server operating system installation and configuration
- To understand and select the appropriate filesystem based on operating system requirements
- To identify, analyze, and resolve problems encountered during the installation process

3. Requirements

- To successfully install Ubuntu Server in a virtual environment, the following hardware and software requirements must be met.

3.1 Hardware Requirements

- Processor: 64-bit CPU with hardware virtualization support (Intel VT-x or AMD-V)
- RAM: Minimum 2 GB (4 GB recommended for better performance)

- Storage: At least 25 GB of available disk space
- Internet Connection: Optional, but recommended for updates and package installation

3.2 Software Requirements

- Host Operating System: Windows, Linux, or macOS
- Virtualization Tool (any one):
- VMware Workstation
- Oracle VM VirtualBox
- Operating System ISO:
- Ubuntu Server Long Term Support (LTS) version (e.g., Ubuntu Server 22.04 LTS)

4. Virtualization Overview (What, Why, How)

What is Virtualization?

Virtualization is a technology that enables multiple operating systems to run simultaneously on a single physical machine. This is achieved by creating virtual machines (VMs), each of which functions as an independent computer with its own operating system, applications, and allocated resources such as CPU, memory, and storage.

Instead of running directly on physical hardware, the operating systems run on virtualized hardware provided by a software layer known as a hypervisor. Virtualization allows better utilization of physical resources while maintaining isolation between different operating systems.

Why Virtualization?

Virtualization is widely adopted in modern operating systems and data centers due to the following advantages:

Efficient Hardware Utilization: Multiple VMs share the same physical hardware, reducing idle resource usage

Cost Reduction: Fewer physical machines are required, lowering hardware, power, and maintenance costs

Easy Testing and Development: New operating systems or applications can be tested without affecting the host system

Isolation and Security: Each virtual machine operates independently, preventing faults or security issues from spreading

Snapshot and Backup Capability: VMs can be saved, restored, or rolled back to previous states easily

Scalability: Virtual machines can be created, modified, or removed quickly as requirements change

How Virtualization Works?

Virtualization works through a software component called a hypervisor, which acts as an intermediary between the physical hardware and the operating systems. Popular hypervisors include VMware Workstation and Oracle VM VirtualBox.

The hypervisor performs the following functions:

Allocates CPU time, memory, storage, and network resources to each virtual machine

Ensures isolation so that one VM does not interfere with another

Emulates hardware components such as disks, network cards, and processors

When a virtual machine is started, the hypervisor provides virtualized hardware to the guest operating system (Ubuntu Server), allowing it to run as if it were installed on a physical system.

5. Installation Steps (Series Step Format)

Step 1: Install Virtualization Software

Download and install VMware Workstation or VirtualBox

Enable virtualization from BIOS/UEFI if disabled

Step 2: Download Ubuntu Server ISO

Visit official Ubuntu website

Download Ubuntu Server LTS ISO file

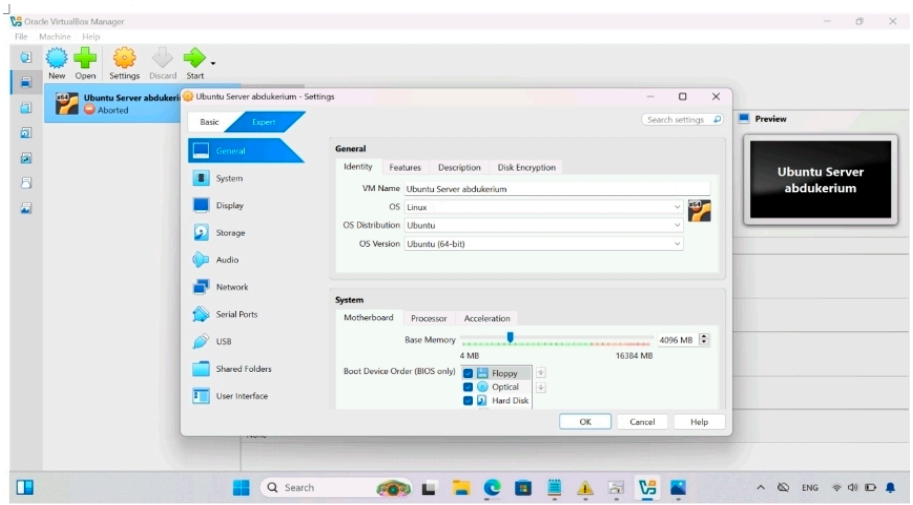
Step 3: Create a New Virtual Machine

Open virtualization software

Click New Virtual Machine

Select Installer disc image file (ISO)

Choose Ubuntu Server ISO



Step 4: Configure Virtual Machine

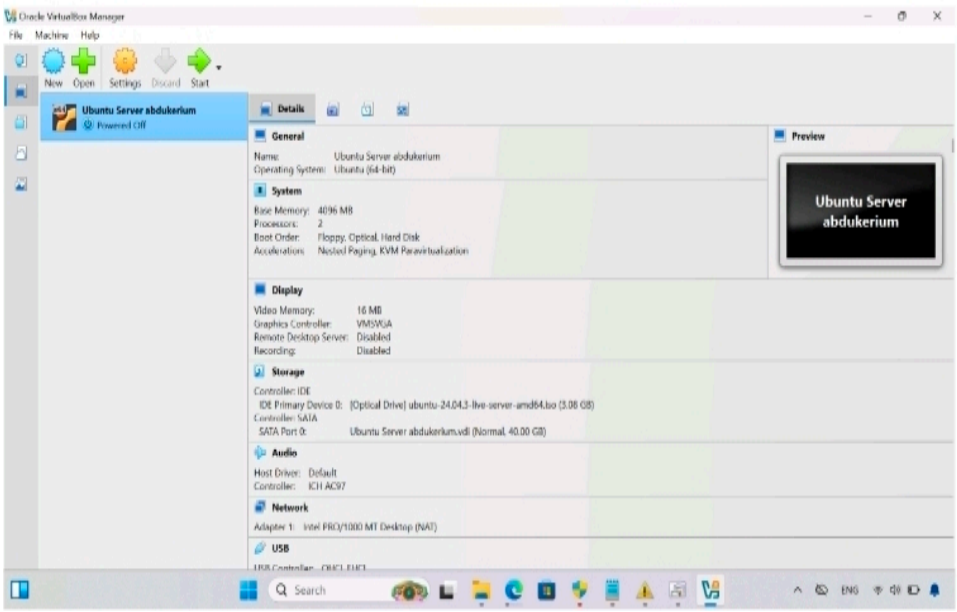
Name the VM (Example: Ubuntu-Server-YourFullName)

Assign:

RAM: 2–4 GB

CPU: 2 cores

Disk size: 25 GB (dynamically allocated)



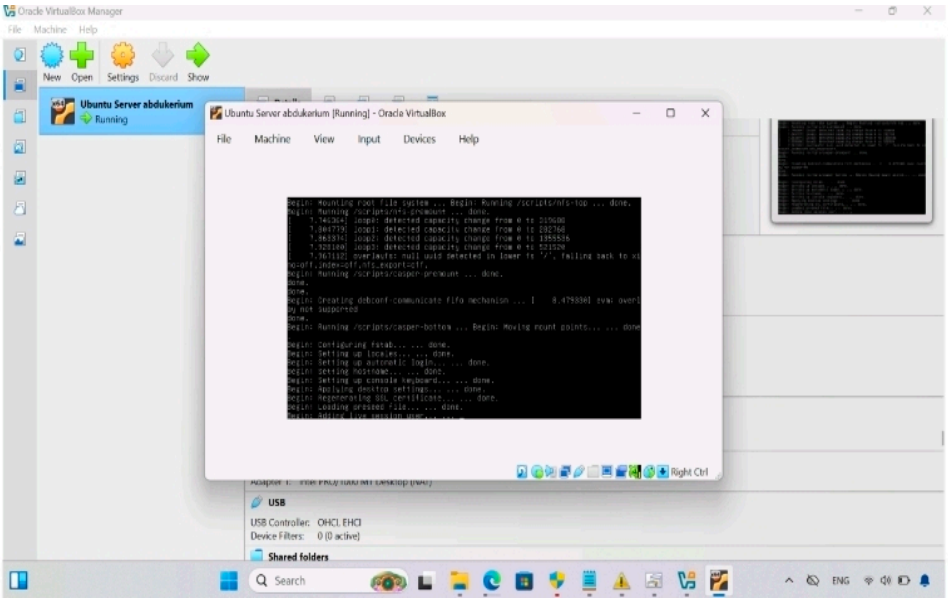
Step 5: Start Ubuntu Server Installation

Power on the VM

Select language

Choose keyboard layout

Select Install Ubuntu Server

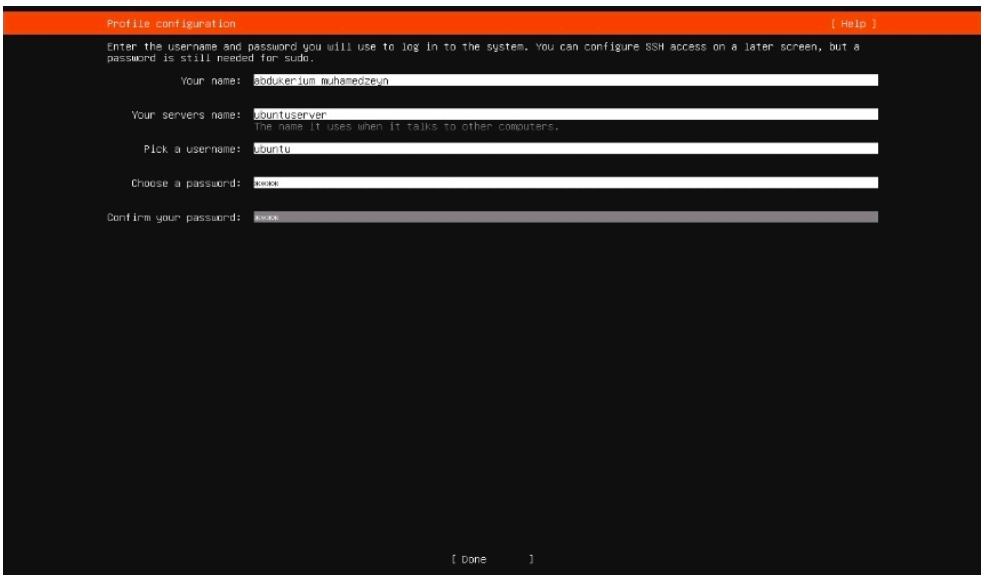


Step 6: User Account Creation

Enter your full name (mandatory)

Set server name

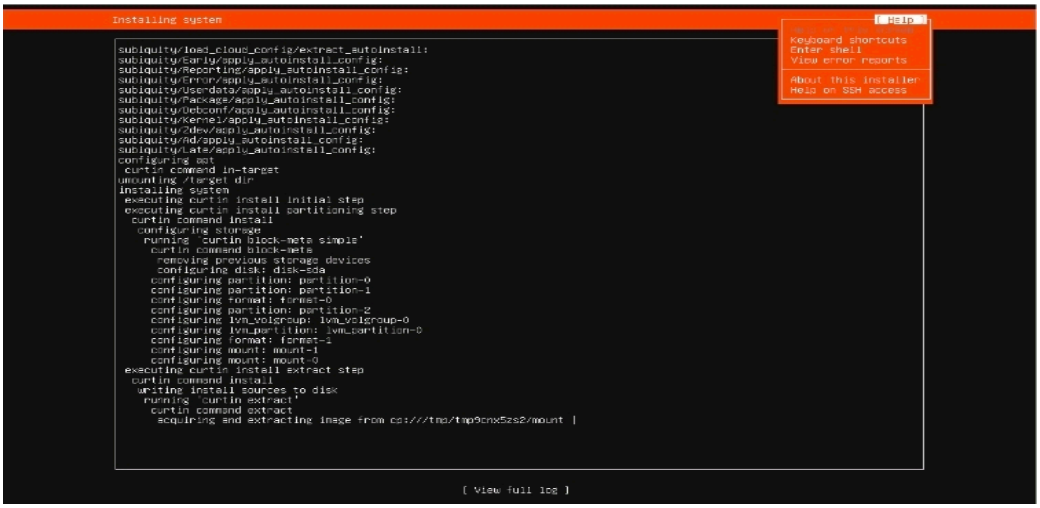
Create username and password



Step 7: Complete Installation

Wait for installation to complete

Reboot the virtual machine



Here is the corrected and rewritten version with the problem changed to “No bootable medium found” and the solution written clearly in your own words, suitable for an assignment or report:

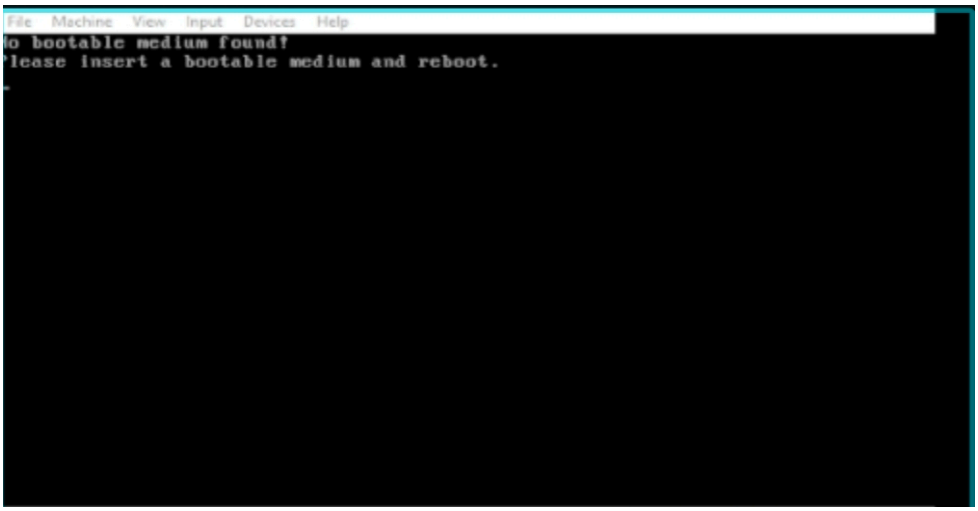
6. Issues (Problems Faced)

Issue

No bootable medium found

Description

The virtual machine fails to start because
no operating system is detected.
This usually happens when an ISO file is
not attached or the boot order is incorrect.



7. Solutions

Problem

No bootable medium found

Solution

Attach a valid operating system ISO file to the virtual

8. Filesystem Support

Filesystem Used: ext4

The filesystem selected for the Ubuntu Server installation is ext4 (Fourth Extended Filesystem). It is the default and most widely used filesystem in Linux-based operating systems.

Why ext4?

The ext4 filesystem is chosen for Ubuntu Server due to the following reasons:

- It is the default filesystem for Linux, ensuring maximum compatibility
- Provides high performance and stability, even under heavy workloads

- Supports journaling, which helps prevent data corruption during unexpected shutdowns
- Capable of handling large files and large storage volumes, making it suitable for server environments
- Requires fewer system resources compared to advanced filesystems like ZFS

For general-purpose server deployments, ext4 offers an excellent balance between performance, reliability, and simplicity.

Justification (Practical Knowledge Demonstration)

For Linux servers, ext4 is the most appropriate filesystem when stability and performance are the primary requirements.

Filesystems like ZFS are better suited for storage-heavy enterprise environments, while Btrfs is useful for snapshot-based systems.

For cross-platform compatibility, exFAT is commonly used on removable storage, not servers.

Therefore, ext4 is the right choice for Ubuntu Server in a virtualized environment.

Section 9: Advantages and Disadvantages of Ubuntu Server, written to demonstrate technical understanding:

9 Advantages and Disadvantages of Ubuntu Server

Advantages

- Free and Open-Source:

Ubuntu Server is completely free to use and distributed under an open-source license. This eliminates licensing costs and allows users to customize and modify the system according to their

requirements.

- Secure and Stable:

Ubuntu Server includes strong security features such as regular security updates, firewall support, and role-based access control. Its stable architecture makes it suitable for long-term and mission-critical server deployments.

- Long Term Support (LTS):

LTS versions of Ubuntu Server receive security updates and maintenance for up to five years. This ensures system reliability and reduces the need for frequent upgrades in production environments.

- Strong Community and Enterprise Support:

Ubuntu Server has a large global community and extensive documentation. Additionally, Canonical provides professional enterprise support, making troubleshooting and system management easier.

Disadvantages

- No Graphical User Interface (GUI) by Default:

Ubuntu Server is primarily command-line based. While this improves performance and security, it can be challenging for beginners who are not familiar with Linux commands.

- Requires Linux Command-Line Knowledge:

Effective management of Ubuntu Server requires proficiency in Linux shell commands, configuration files, and system administration concepts.

- Limited Native Windows Compatibility:

Ubuntu Server does not natively support Windows-specific applications or filesystems such as NTFS for full read/write operations, which may create compatibility challenges in mixed-

OS environments.

10. Conclusion

The installation of Ubuntu Server in a virtual environment provides valuable insight into modern server operating systems and virtualization technology. Through this practical exercise, the fundamental concepts of operating systems, virtualization, and filesystem management were successfully applied and understood. Virtualization enabled the safe and efficient deployment of Ubuntu Server without affecting physical hardware, demonstrating its importance in modern computing environments.

Ubuntu Server proved to be a reliable and efficient operating system due to its stability, security featur cloud computing, and enterprise server management.

Ubuntu Server proved to be a reliable and efficient operating system due to its stability, security feature, and Long Term Support (LTS). The step-by-step installation process helped in gaining hands-on experience with server configuration, user account creation, network setup, and filesystem selection. Choosing the ext4 filesystem ensured optimal performance and stability for the Linux-based server environment.

Overall, this implementation strengthened practical skills, improved technical confidence, and enhanced understanding of server administration concepts. The experience gained from this installation forms a strong foundation for advanced learning in Linux system administration,

11. Future Outlook / Recommendations

Building on the foundational experience gained from installing Ubuntu Server in a virtual environment, the following recommendations are suggested to further enhance skills and

knowledge in server administration and modern IT infrastructure:

1. Practice Advanced Linux Commands:

Developing proficiency in Linux command-line operations, shell scripting, and system management commands will enable efficient server administration and troubleshooting.

2. Learn Server Services:

Gaining hands-on experience with widely used server applications such as Apache, Nginx, MySQL/MariaDB, and containerization tools like Docker will prepare you for real-world server deployment and management.

3. Explore Cloud Platforms:

Virtualized environments simulate cloud computing. Learning platforms like AWS, Microsoft Azure, and Google Cloud will broaden your understanding of scalable, distributed, and cloud-based server deployments.

4. Study Advanced Filesystems:

Understanding filesystems beyond ext4, such as ZFS and Btrfs, will enable better data integrity, snapshot management, and storage optimization for enterprise-level servers.

5. Security and Automation:

Implementing server security practices (firewalls, SELinux/AppArmor) and automation tools (Ansible, Puppet) will enhance efficiency, reliability, and readiness for production environments.

Summary: By continuing to practice these advanced skills, learners can progress from basic server installation to professional-level Linux system administration, virtualization management, and cloud infrastructure deployment. These skills are highly valuable in modern IT and enterprise environments.

12. Evaluation Readiness (Confidence Statement)

Based on the practical installation of Ubuntu Server in a virtual environment and the accompanying study, the following points highlight readiness and technical competence:

1. Correct Filesystem Choice:

o The ext4 filesystem was selected for Ubuntu Server due to its stability, performance, journaling support, and suitability for Linux-based servers. This demonstrates an understanding of filesystem selection based on OS requirements.

2. Strong Understanding of Virtualization Concepts:

o Virtualization was implemented using a hypervisor (VMware Workstation or VirtualBox), showing knowledge of how virtualization works, its advantages, and its practical applications in server deployment.

3. Hands-On Installation Experience:

o The full step-by-step installation of Ubuntu Server, including user account creation, network setup, and storage configuration, was completed successfully in a virtual environment.

4. Ability to Troubleshoot Installation Issues:

o Common problems, such as virtualization settings, network configuration errors, and disk allocation issues, were identified and resolved, demonstrating problem-solving skills.

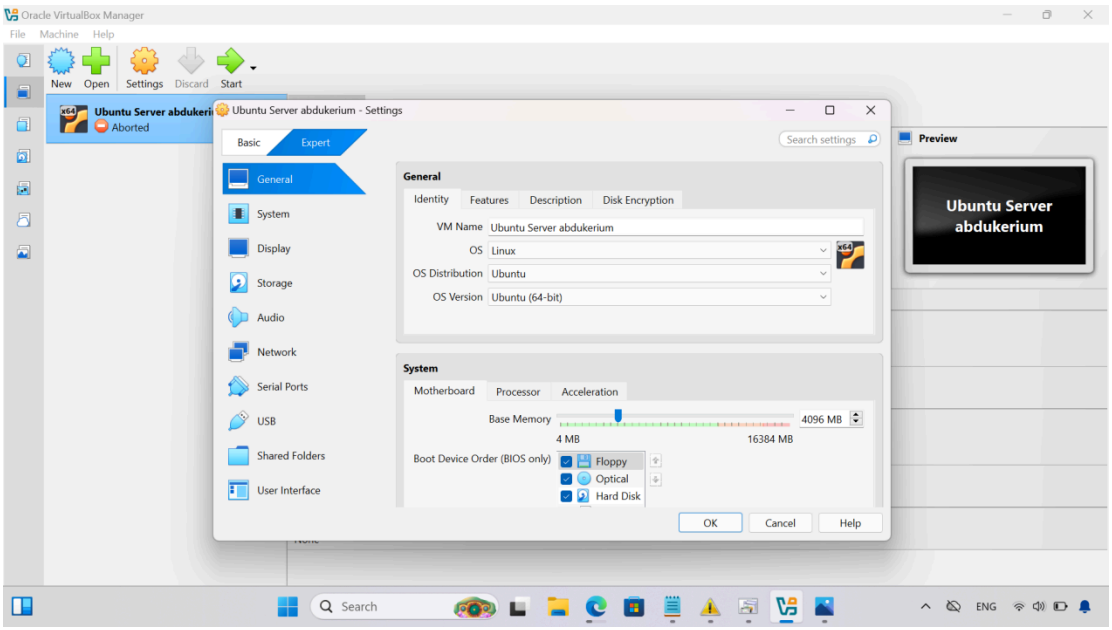
5. Knowledge of Operating System History and Evolution:

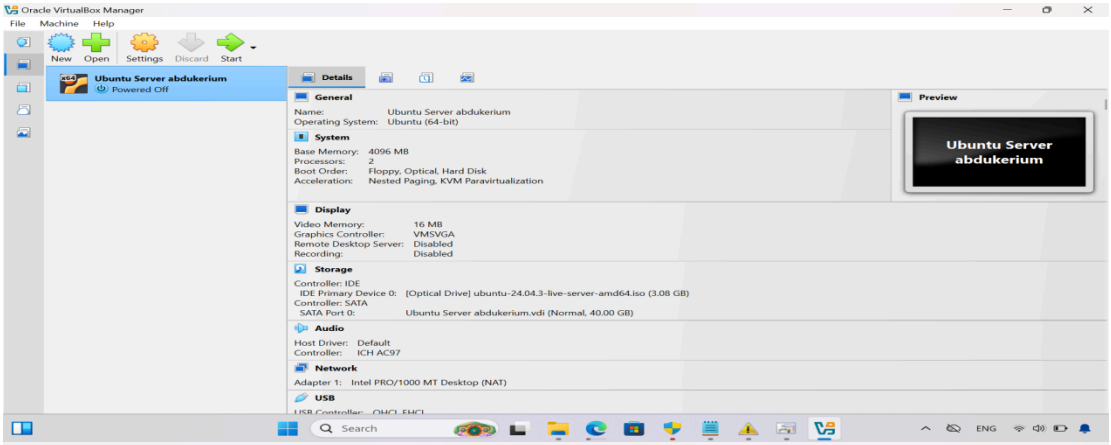
o The documentation shows an understanding of Ubuntu Server's place in the Linux ecosystem, its LTS releases, and its historical development as a reliable server OS.

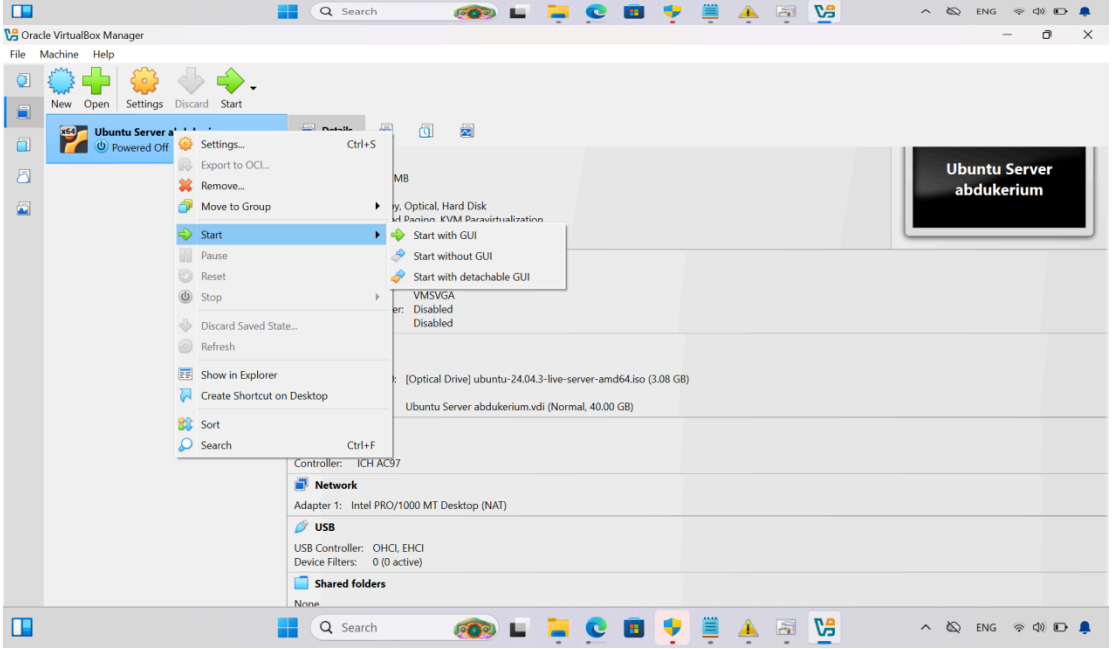
Summary:

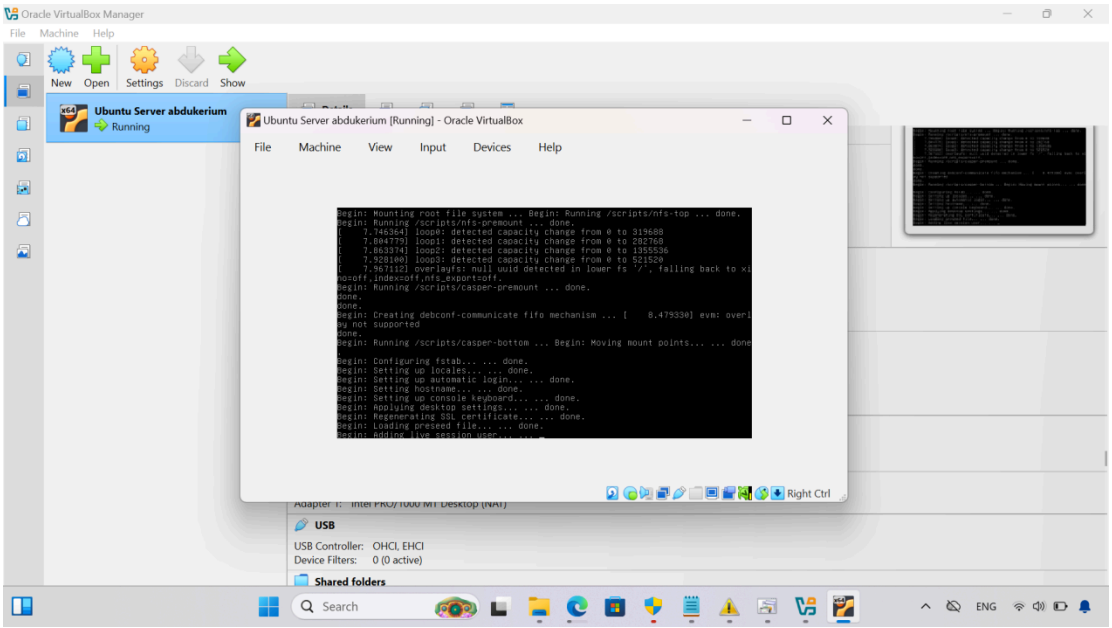
This documentation and practical exercise demonstrate full confidence in technical skills, system administration knowledge, and the ability to apply theoretical concepts in a virtualized environment. The learner is prepared to handle server installation, configuration, and management tasks effectively.

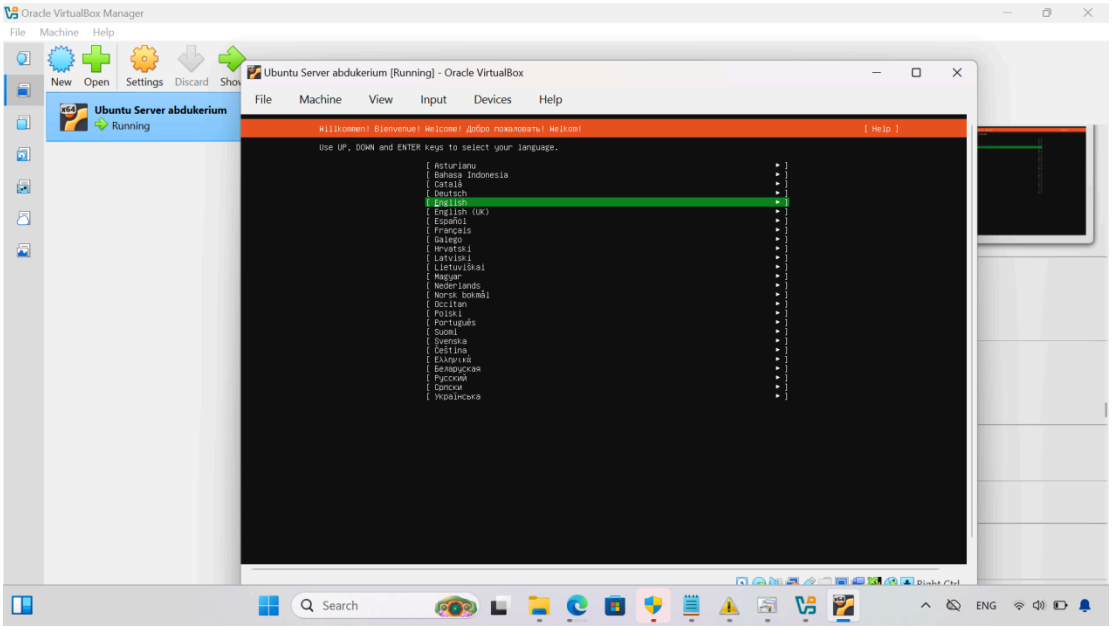
"Include relevant screenshots below each section to visually demonstrate the installation steps, partitioning, user creation, filesystem selection, VM configuration, and any issues encountered, ensuring the documentation is clear and fully illustrative."

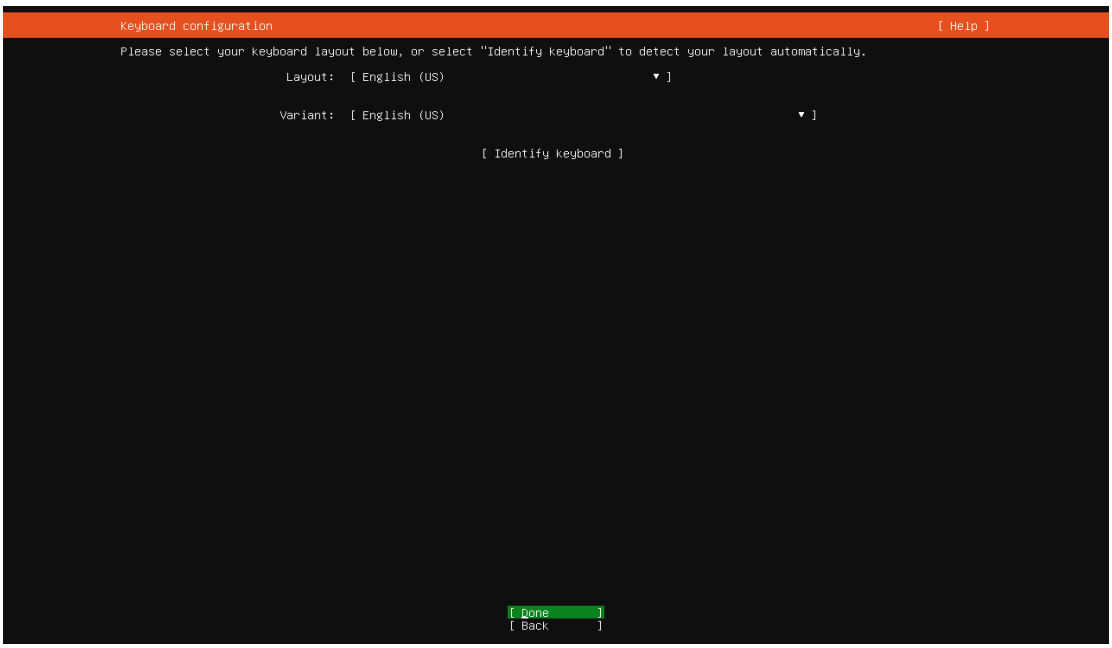


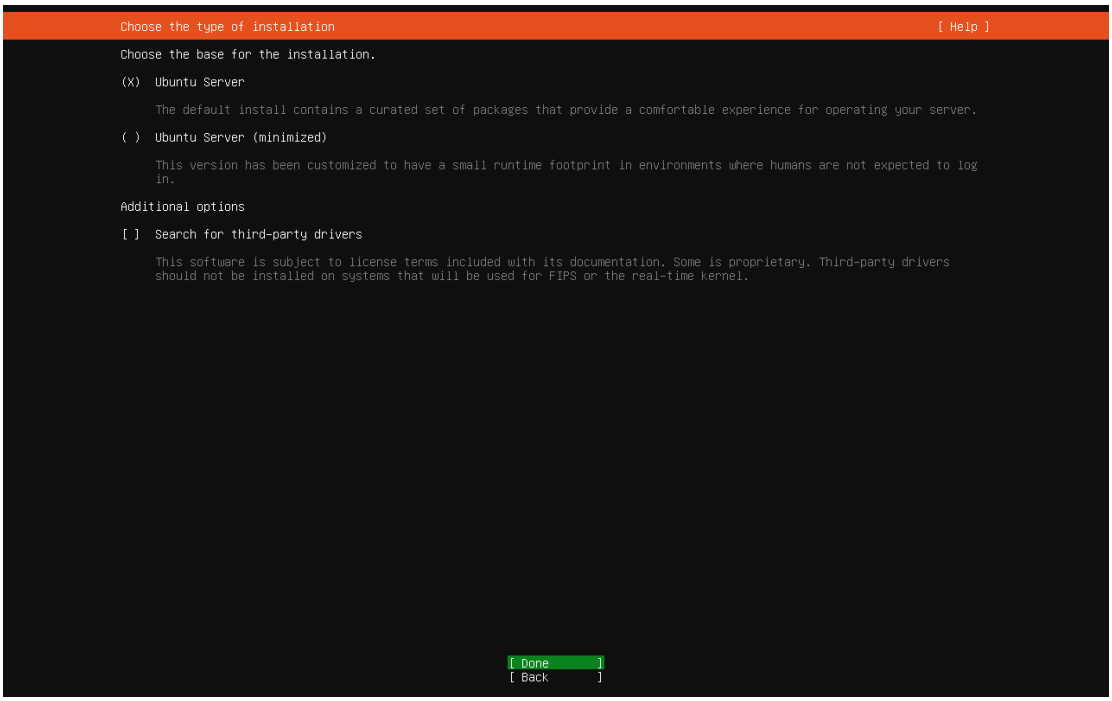

Oracle VirtualBox Manager
File Machine Help
New Open Settings Discard Start
Ubuntu Server abdukerium
Powered Off
Details
General
Name: Ubuntu Server abdukerium
Operating System: Ubuntu (64-bit)
System
Base Memory: 4096 MB
Processors: 2
Boot Order: Floppy, Optical, Hard Disk
Acceleration: Nested Paging, KVM Paravirtualization
Display
Video Memory: 16 MB
Graphics Controller: VMSVGA
Remote Desktop Server: Disabled
Recording: Disabled
Storage
Controller: IDE
IDE Primary Device 0: [Optical Drive] ubuntu-24.04.3-live-server-amd64.iso (3.08 GB)
Controller: SATA
SATA Port 0: Ubuntu Server abdukerium.vdi (Normal, 40.00 GB)
Audio
Host Driver: Default
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
Preview
Ubuntu Server abdukerium
Search
ENG

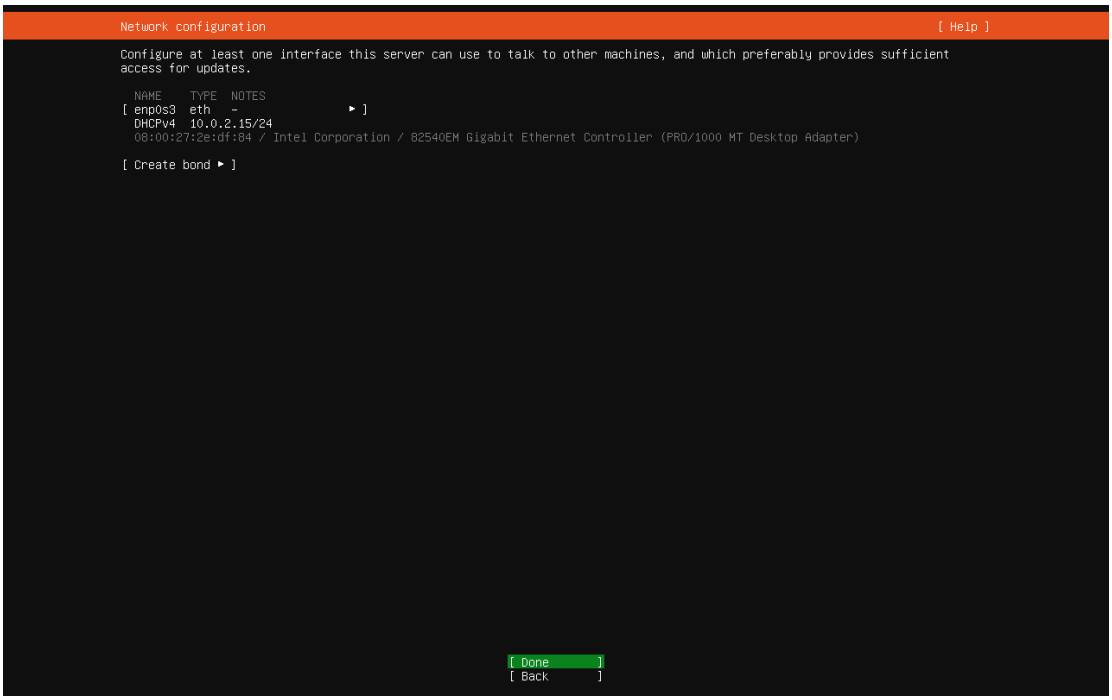

Oracle VirtualBox Manager
File Machine Help
New Open Settings Discard Start
Powered Off
Settings... Ctrl+S
Export to OCI...
Remove...
Move to Group
Start
Pause
Reset
Stop
Discard Saved State...
Refresh
Show in Explorer
Create Shortcut on Desktop
Sort
Search Ctrl+F
Start with GUI
Start without GUI
Start with detachable GUI
Ubuntu Server abdukerium
[Optical Drive] ubuntu-24.04.3-live-server-amd64.iso (3.08 GB)
Ubuntu Server abdukerium.vdi (Normal, 40.00 GB)
Controller: ICH AC97
Network
Adapter 1: Intel PRO/1000 MT Desktop (NAT)
USB
USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
None
Search
ENG

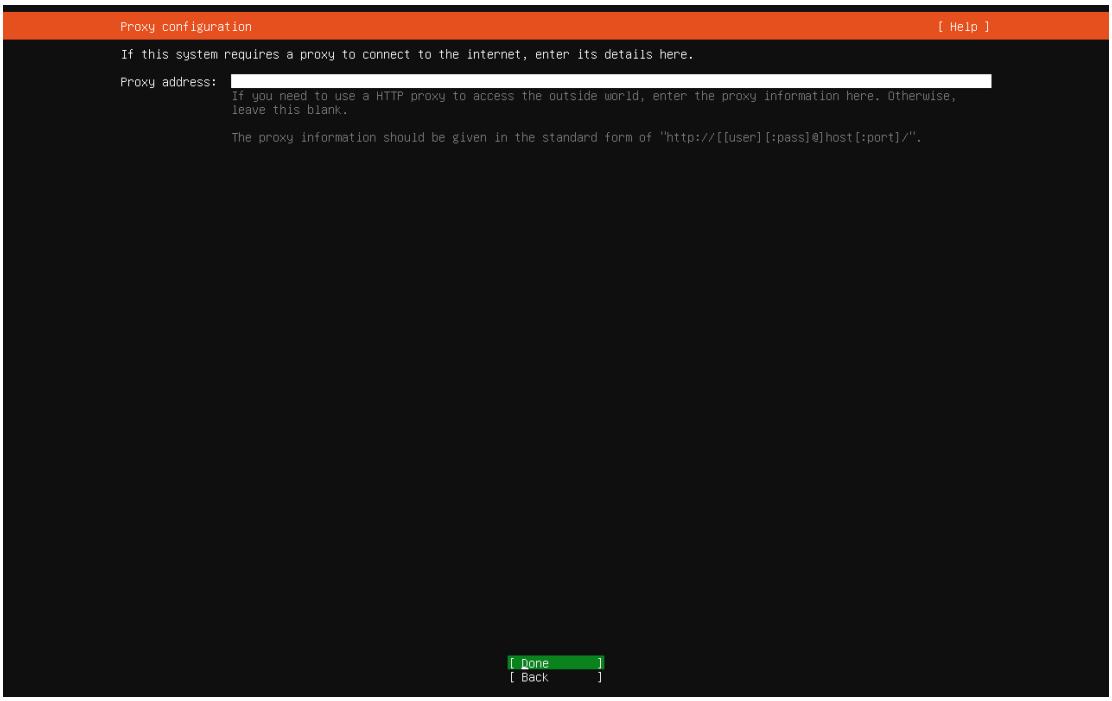

Oracle VirtualBox Manager
File Machine Help
New Open Settings Discard Show
Ubuntu Server abdukerium
Running
Ubuntu Server abdukerium [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Begin: Mounting root file system ... Begin: Running /scripts/nfs-top ... done.
Begin: Running /scripts/nfs-premount ... done.
Begin: Running /scripts/casper-premount ... done.
Begin: Creating debconf-communicate fifo mechanism ... done.
Begin: Running /scripts/casper-bottom ... Begin: Moving mount points... ... done.
Begin: Configuring fstab... ... done.
Begin: Setting up locales... ... done.
Begin: Setting up automatic login... ... done.
Begin: Setting hostname... ... done.
Begin: Setting up console keyboard... ... done.
Begin: Applying desktop settings... ... done.
Begin: Regenerating SSL certificate... ... done.
Begin: Loading preseed file... ... done.
Right Ctrl
USB
USB Controller: OHCI, EHCI
Device Filters: 0 (0 active)
Shared folders
Search
ENG

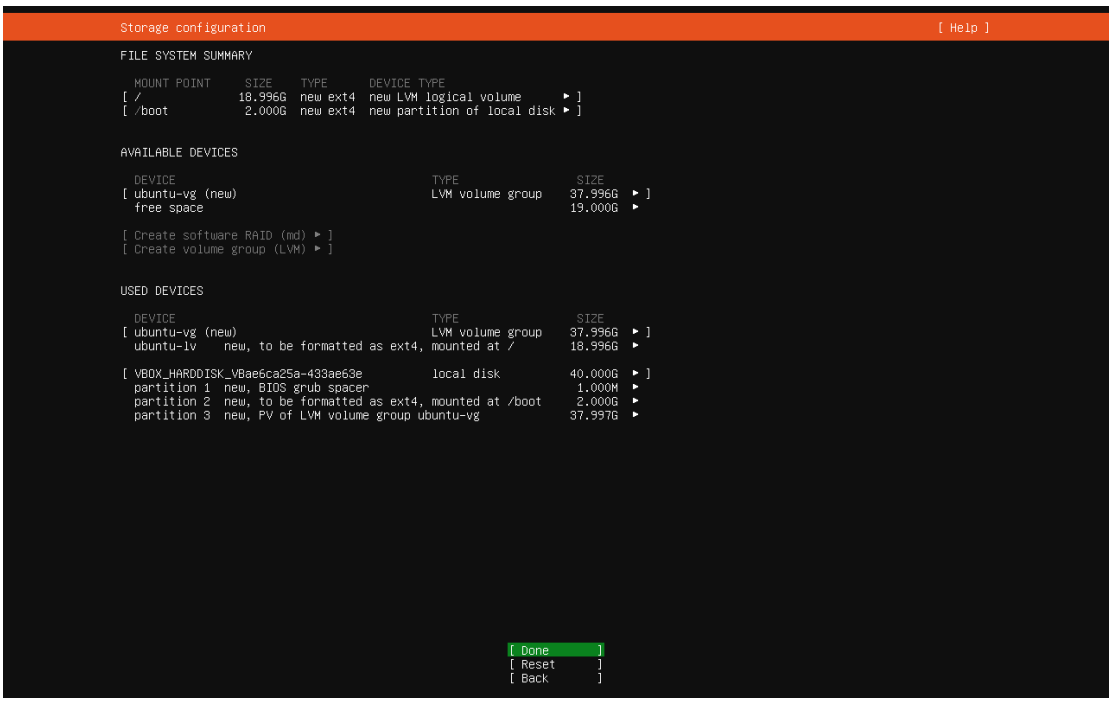

Oracle VirtualBox Manager
File Machine Help
New Open Settings Discard
Ubuntu Server abdukerium
Running
Ubuntu Server abdukerium [Running] - Oracle VirtualBox
File Machine View Input Devices Help
Willkommen! Bienvenue! Welcome! Добро пожаловать! Welkom!
[Help]
Use UP, DOWN and ENTER keys to select your language.
[Asturianu]
[Bahasa Indonesia]
[Català]
[Deutsch]
[English]
[English (UK)]
[Español]
[Français]
[Galego]
[Hrvatski]
[Latviski]
[Lietuviškai]
[Magyar]
[Nederlands]
[Norsk bokmål]
[Occitan]
[Polski]
[Português]
[Suomi]
[Svenska]
[Čeština]
[Ελληνικά]
[Беларуская]
[Русский]
[Српски]
[Українська]
Search
ENG

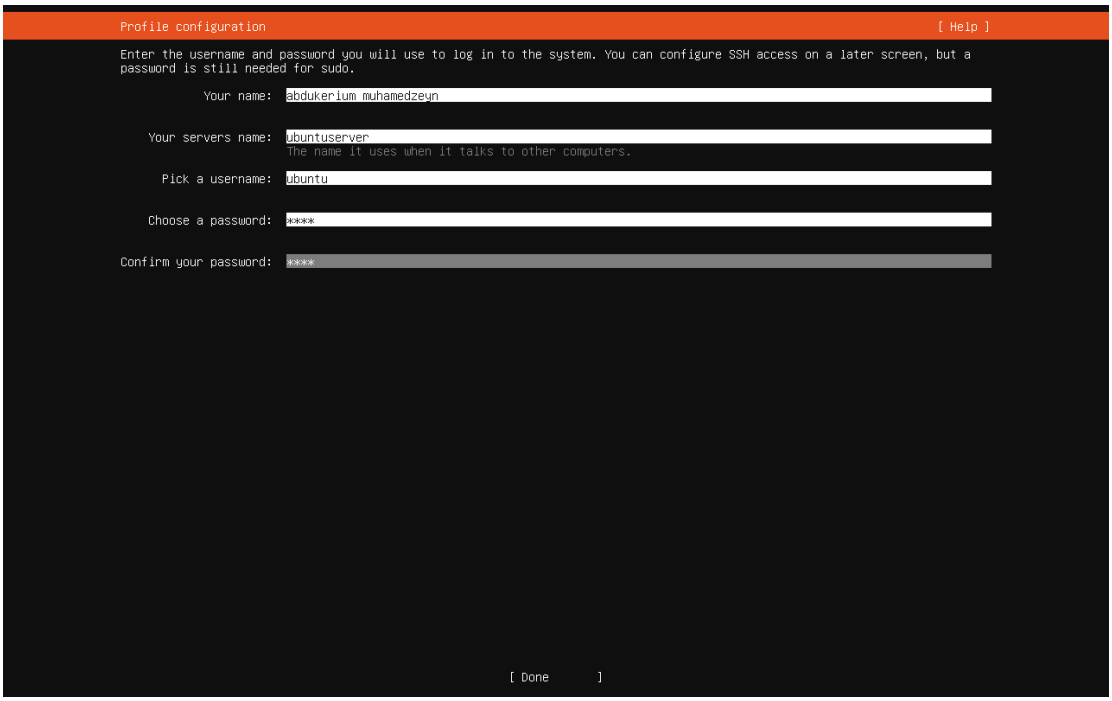

Keyboard configuration
[Help]
Please select your keyboard layout below, or select "Identify keyboard" to detect your layout automatically.
Layout: [English (US) ▾]
Variant: [English (US) ▾]
[Identify keyboard]
[Done]
[Back]

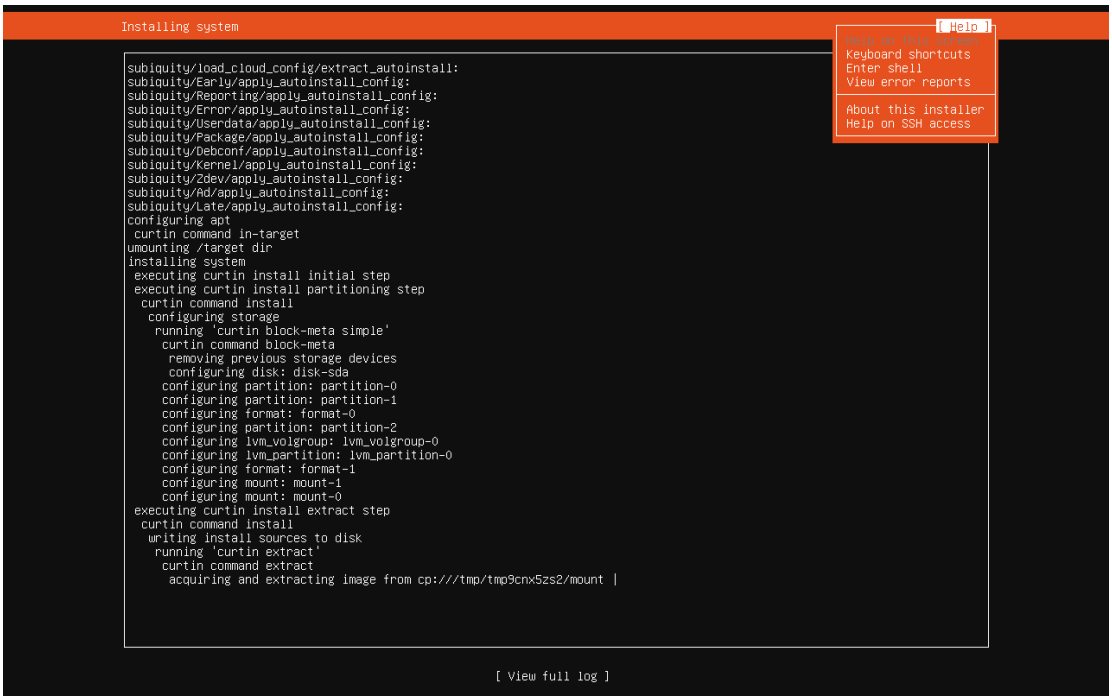

Choose the type of installation
[Help]
Choose the base for the installation.
(X) Ubuntu Server
The default install contains a curated set of packages that provide a comfortable experience for operating your server.
( ) Ubuntu Server (minimized)
This version has been customized to have a small runtime footprint in environments where humans are not expected to log in.
Additional options
[ ] Search for third-party drivers
This software is subject to license terms included with its documentation. Some is proprietary. Third-party drivers should not be installed on systems that will be used for FIPS or the real-time kernel.
[Done]
[Back]

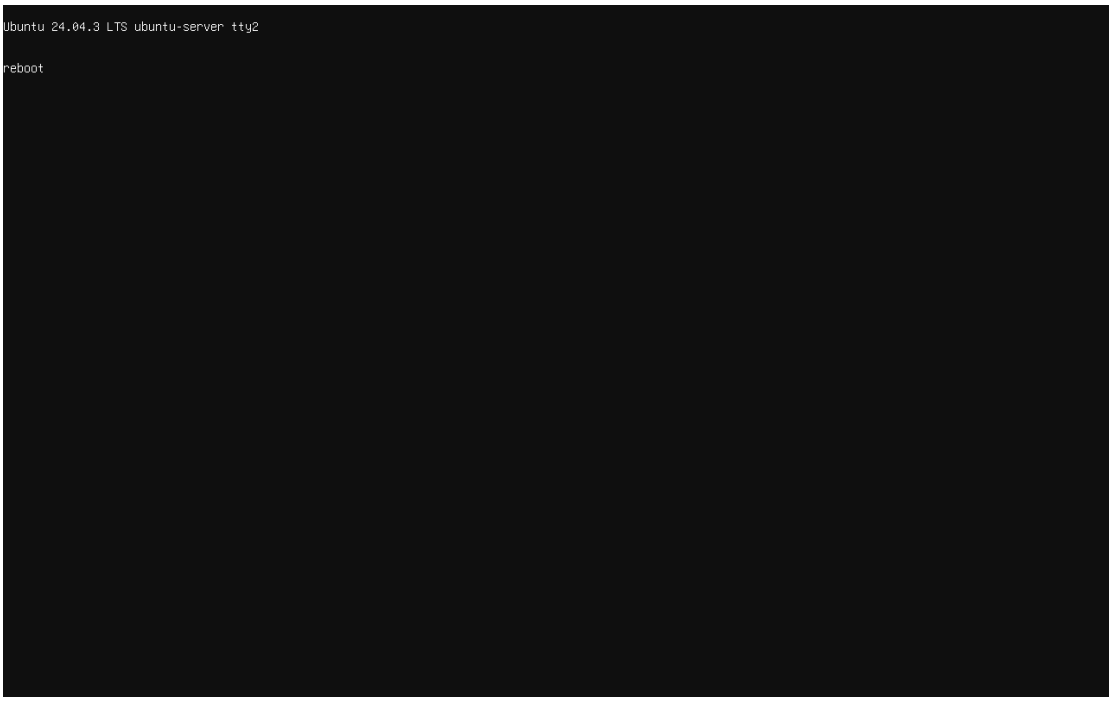

Network configuration
[Help]
Configure at least one interface this server can use to talk to other machines, and which preferably provides sufficient access for updates.
NAME TYPE NOTES
[enp0s3 eth - ▸]
DHCPv4 10.0.2.15/24
08:00:27:2e:df:84 / Intel Corporation / 82540EM Gigabit Ethernet Controller (PRO/1000 MT Desktop Adapter)
[Create bond ▸]
[Done]
[Back]

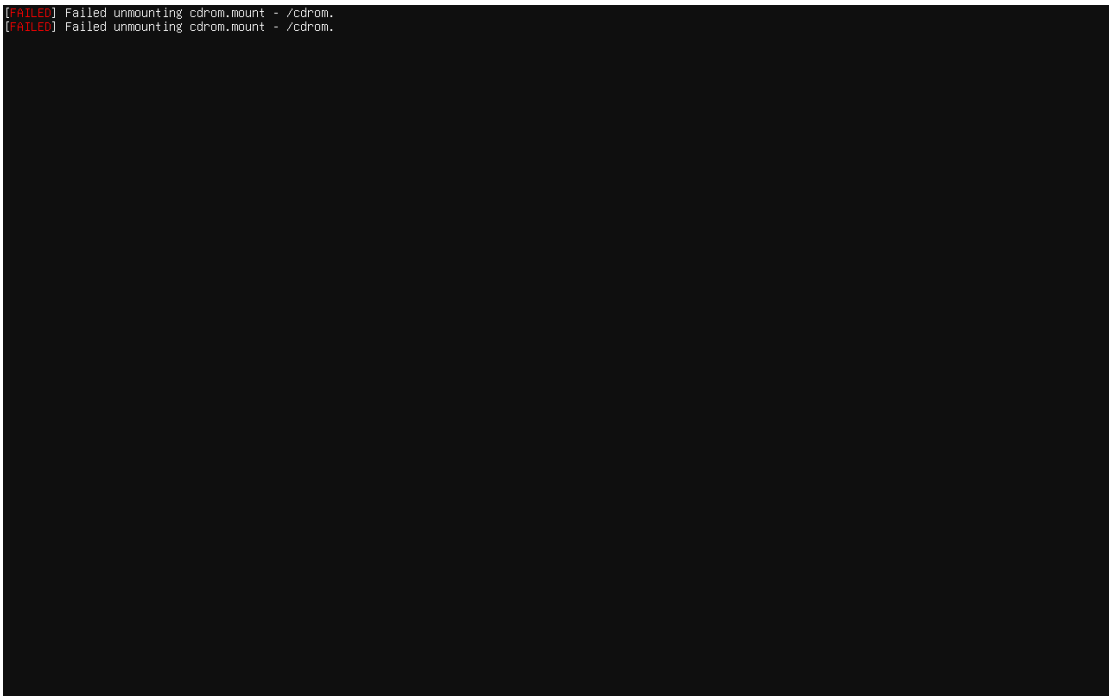

Proxy configuration
[Help]
If this system requires a proxy to connect to the internet, enter its details here.
Proxy address:
If you need to use a HTTP proxy to access the outside world, enter the proxy information here. Otherwise, leave this blank.
The proxy information should be given in the standard form of "http://[[user][:pass]@]host[:port]/".
[Done]
[Back]


Storage configuration
[Help]
FILE SYSTEM SUMMARY
MOUNT POINT SIZE TYPE DEVICE TYPE
[/ 18.996G new ext4 new LVM logical volume ▸]
[/boot 2.000G new ext4 new partition of local disk ▸]
AVAILABLE DEVICES
DEVICE TYPE SIZE
[ubuntu-vg (new) LVM volume group 37.996G ▸]
free space 19.000G ▸
[Create software RAID (md) ▸]
[Create volume group (LVM) ▸]
USED DEVICES
DEVICE TYPE SIZE
[ubuntu-vg (new) LVM volume group 37.996G ▸]
ubuntu-lv new, to be formatted as ext4, mounted at / 18.996G ▸
[VBOX_HARDDISK_VBae6ca25a-433ae63e local disk 40.000G ▸]
partition 1 new, BIOS grub spacer 1.000M ▸
partition 2 new, to be formatted as ext4, mounted at /boot 2.000G ▸
partition 3 new, PV of LVM volume group ubuntu-vg 37.997G ▸
[Done]
[Reset]
[Back]


Profile configuration
[Help]
Enter the username and password you will use to log in to the system. You can configure SSH access on a later screen, but a password is still needed for sudo.
Your name: abdukerium muhamedzeyn
Your servers name: ubuntuserver
The name it uses when it talks to other computers.
Pick a username: ubuntu
Choose a password: ****
Confirm your password: ****
[Done]


Installing system
[Help]
Keyboard shortcuts
Enter shell
View error reports
About this installer
Help on SSH access
subiquity/load_cloud_config/extract_autoinstall:
subiquity/Early/apply_autoinstall_config:
subiquity/Reporting/apply_autoinstall_config:
subiquity/Error/apply_autoinstall_config:
subiquity/Userdata/apply_autoinstall_config:
subiquity/Package/apply_autoinstall_config:
subiquity/Debconf/apply_autoinstall_config:
subiquity/Kernel/apply_autoinstall_config:
subiquity/Zdev/apply_autoinstall_config:
subiquity/Ad/apply_autoinstall_config:
subiquity/Late/apply_autoinstall_config:
configuring apt
curtin command in-target
umounting /target dir
installing system
executing curtin install initial step
executing curtin install partitioning step
curtin command install
configuring storage
running 'curtin block-meta simple'
curtin command block-meta
removing previous storage devices
configuring disk: disk-sda
configuring partition: partition-0
configuring partition: partition-1
configuring format: format-0
configuring partition: partition-2
configuring lvm_volgroup: lvm_volgroup-0
configuring lvm_partition: lvm_partition-0
configuring format: format-1
configuring mount: mount-1
configuring mount: mount-0
executing curtin install extract step
curtin command install
writing install sources to disk
running 'curtin extract'
curtin command extract
acquiring and extracting image from cp:///tmp/tmp9cnx5zs2/mount |
[View full log]


Ubuntu 24.04.3 LTS ubuntu-server tty2
reboot


[FAILED] Failed unmounting cdrom.mount - /cdrom.
[FAILED] Failed unmounting cdrom.mount - /cdrom.