BAHIR DAR UNIVERSITY

BAHIR DAR INSTITUTE OF TECHNOLOGY

(BiT)

FACULTY OF COMPUTING

DEPARTMENT :ITBED

NAME:Kindu Debrie

YEAR:3rd(2018 E.C)

COURSE :OPERATING SYSTEM

Allocated Operating System: illumos

Worldwide PC Brand: Cyber power

Mobile brand:HTC

introduction

1, Background

Illumos is an open-source Unix operating system that evolved from the OpenSolaris project after Oracle discontinued Solaris development. The Illumos community continues to maintain and improve core Solaris technologies, making Illumos a reliable and enterprise-class operating system. One of the most popular Illumos distributions is OpenIndiana Hipster, which provides a user-friendly graphical installer while preserving advanced Unix features.

Illumos is designed for system administrators, developers, and research environments where stability, scalability, and observability are required. Unlike mainstream Linux distributions, Illumos places strong emphasis on technologies such as ZFS (Zettabyte File System) for data integrity, DTrace for advanced system performance analysis, and Zones for lightweight virtualization.

1.2 Motivation

The motivation for this project is to bridge theoretical operating system knowledge with hands-on practical experience. Topics such as the boot process, filesystem management, disk partitioning, and user authentication become clearer when practiced in a real installation environment.

By installing Illumos using OpenIndiana Hipster in a virtual machine, students can safely practice operating system deployment without risking physical hardware. The installation process also develops troubleshooting skills, as real installations often involve challenges such as BIOS virtualization errors, black screens, network configuration problems, and input device issues. This project therefore prepares learners for real-world system administration and virtualization tasks.

2. Objectives of the Project

The objectives of this project are structured to cover both technical and conceptual learning outcomes:

Practical Installation Skills

To demonstrate the ability to install Illumos (OpenIndiana Hipster) in a virtual machine using real hardware-like settings.

Application of Theory

To apply operating system concepts such as the boot process, disk partitioning, ZFS filesystem configuration, and user account creation.

Troubleshooting Competence

To identify, analyze, and resolve installation-time problems such as BIOS virtualization errors, display issues, and network failures.

Understanding Virtualization

To understand how virtualization allows multiple operating systems to run on a single physical machine efficiently.

Preparation for System Administration

To gain confidence in OS installation and configuration tasks required in professional IT environments.

3. Requirements (Based on Actual Installation Used)

3.1 Hardware Requirements

Host computer with Intel or AMD processor supporting virtualization

RAM: 2GB (used during installation)

CPU Cores: 2

Virtual Hard Disk: 25 GB

Virtualization enabled in BIOS

3.2 Software Requirements

Oracle VM VirtualBox (downloaded from virtualbox.org)

OpenIndiana Hipster ISO (2025 version)

Example: OI-hipster-gui-20231017.iso

Optional: VMware Workstation (for comparison)

4. Installation Steps

Step 1: Download Illumos ISO

The OpenIndiana Hipster ISO was downloaded from the official OpenIndiana website and saved in the Downloads folder.

Step 2: Install VirtualBox

Oracle VM VirtualBox was downloaded from the official VirtualBox website and installed successfully.

Step 3: Create New Virtual Machine

A new virtual machine was created with the following settings:

Name: IllumOS_Sofeniyas_Debrie

Type: Solaris

Version: Oracle Solaris 11 (64-bit)

Step 4: Set Memory Size

The memory size was set to 4096 MB (4 GB) to ensure smooth performance.

Step 5: Create Virtual Hard Disk

Disk type: VDI

Allocation: Dynamically allocated

Size: 25.00 GB

Step 6: Attach Illumos ISO

The OpenIndiana ISO file was attached under Settings ’n Storage ’n Controller IDE.

Step 7: Configure System Settings

Processor cores: 2

PAE/NX: Enabled

Video memory: 128 MB

Step 8: Start Installation

The VM was started and the OpenIndiana boot menu appeared. The live session was started by pressing Enter.

Step 9–15: Installation Wizard

The installation wizard guided the setup process:

Language: English

Keyboard: US English

Time zone: Selected appropriately

User account created using full student name

Installation type: Entire Disk

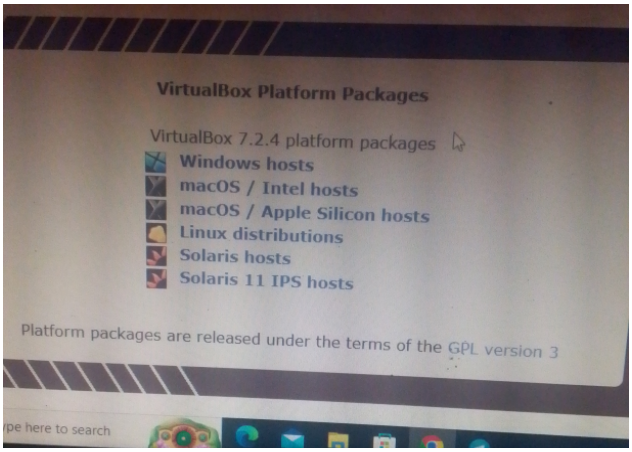
Filesystem: ZFS (default rpool)

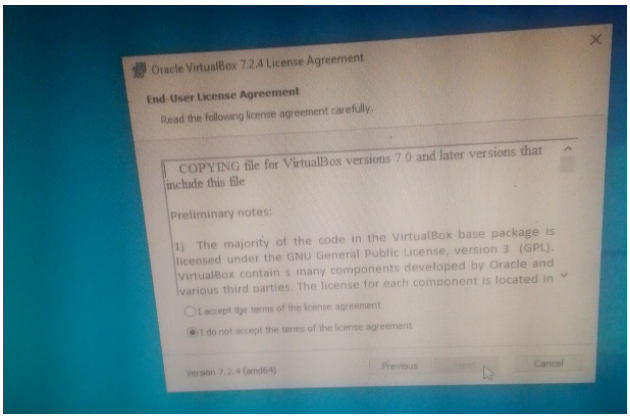
Installation summary reviewed and confirmed

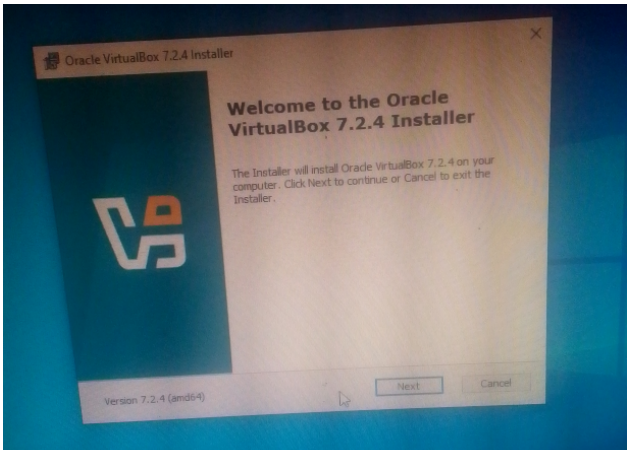
Step 16–18: Installation Completion

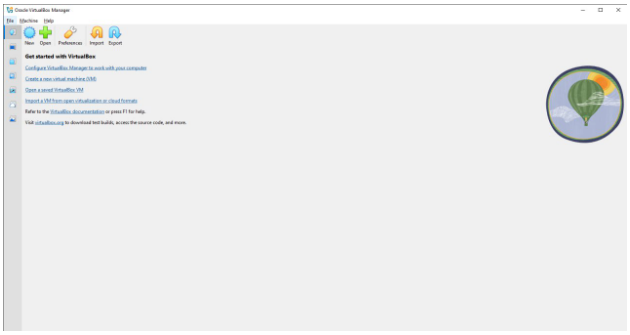
After installation completed, the system was restarted and the ISO was removed. The login screen appeared successfully.

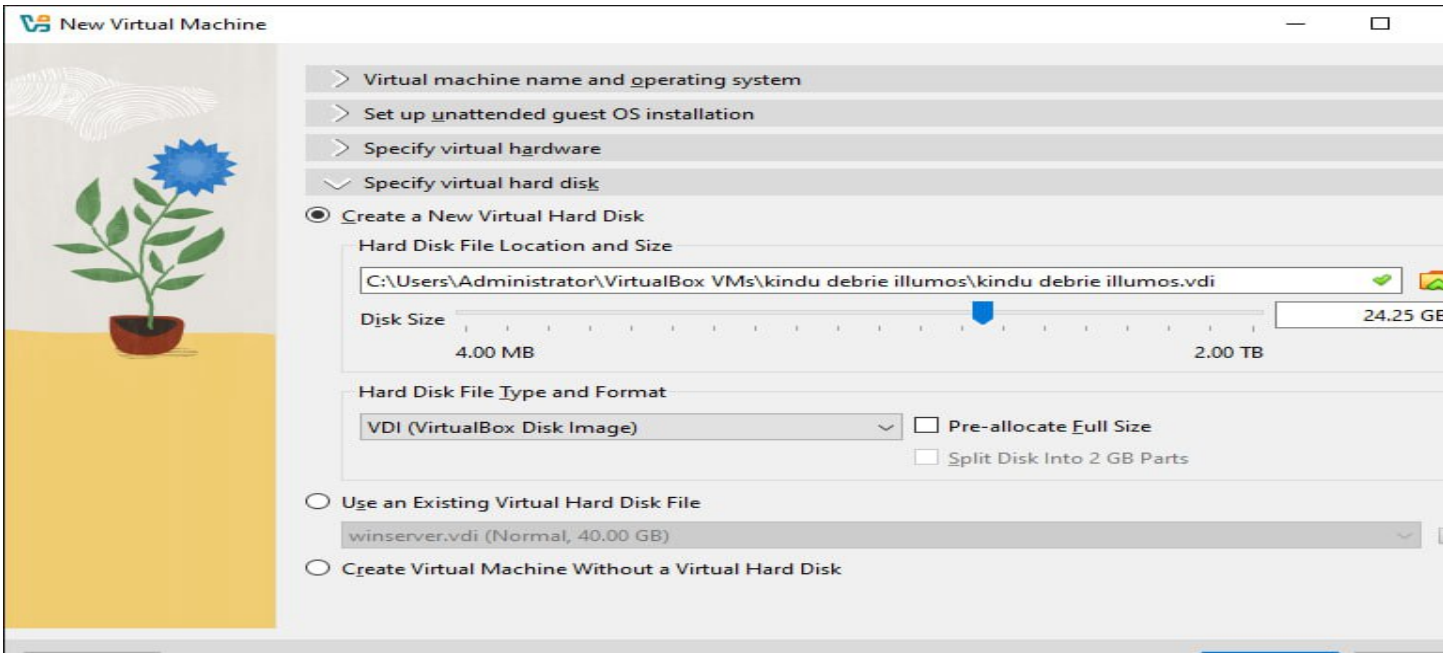
Step 19: Verify Installation

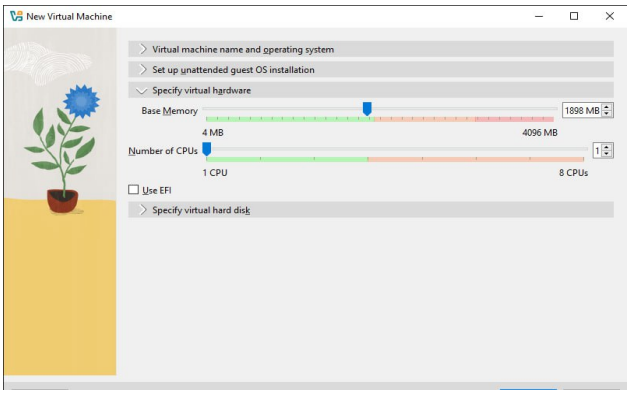


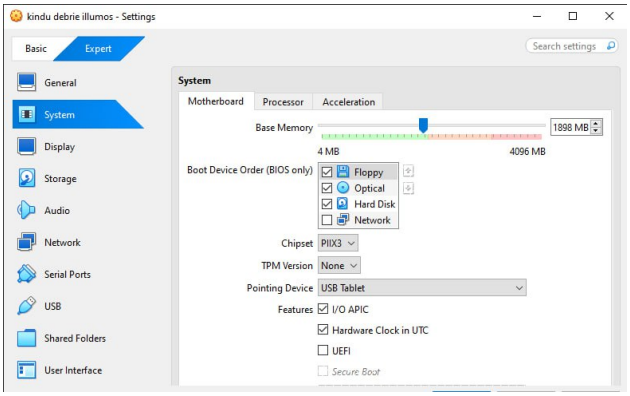

Oracle VirtualBox 7.2.4 License Agreement
End-User License Agreement
Read the following license agreement carefully.
COPYING file for VirtualBox versions 7.0 and later versions that include this file
Preliminary notes:
1) The majority of the code in the VirtualBox base package is licensed under the GNU General Public License, version 3 (GPL). VirtualBox contain s many components developed by Oracle and various third parties. The license for each component is located in
I accept the terms of the license agreement
I do not accept the terms of the license agreement
Version 7.2.4 (amd64)
Previous
Next
Cancel

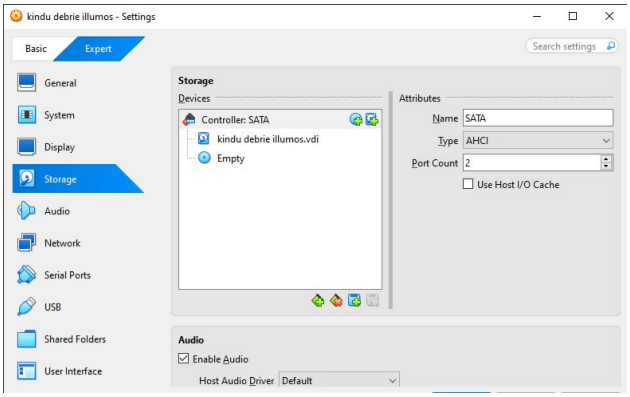

Oracle VirtualBox 7.2.4 Installer
Welcome to the Oracle VirtualBox 7.2.4 Installer
The Installer will install Oracle VirtualBox 7.2.4 on your computer. Click Next to continue or Cancel to exit the Installer.
Version 7.2.4 (amd64)
Next
Cancel

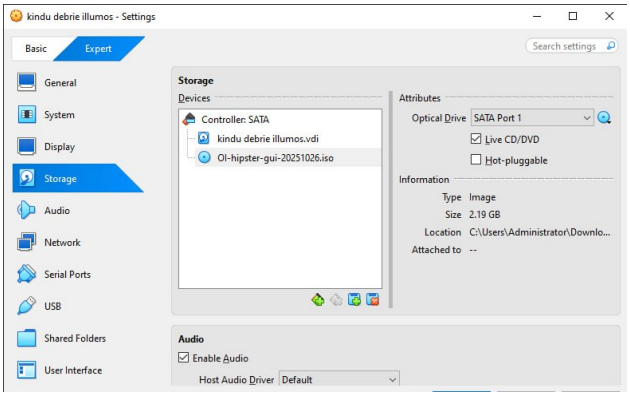

Oracle VirtualBox Manager
File Machine Help
New Open Preferences Import Export
Get started with VirtualBox

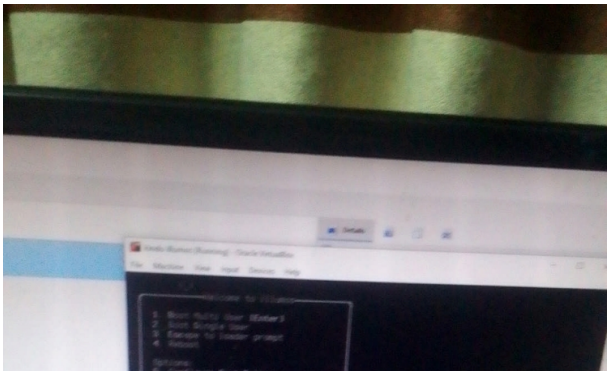

New Virtual Machine
Virtual machine name and operating system
Set up unattended guest OS installation
Specify virtual hardware
Specify virtual hard disk
Create a New Virtual Hard Disk
Hard Disk File Location and Size
C:\Users\Administrator\VirtualBox VMs\kindu debrie illumos\kindu debrie illumos.vdi
Disk Size
24.25 GB
4.00 MB
2.00 TB
Hard Disk File Type and Format
VDI (VirtualBox Disk Image)
Pre-allocate Full Size
Split Disk Into 2 GB Parts
Use an Existing Virtual Hard Disk File
winserver.vdi (Normal, 40.00 GB)
Create Virtual Machine Without a Virtual Hard Disk

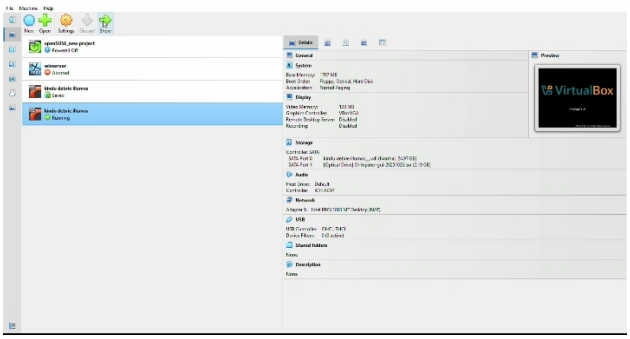

New Virtual Machine
Virtual machine name and operating system
Set up unattended guest OS installation
Specify virtual hardware
Base Memory
1898 MB
4 MB
4096 MB
Number of CPUs
1
1 CPU
8 CPUs
Use EFI
Specify virtual hard disk

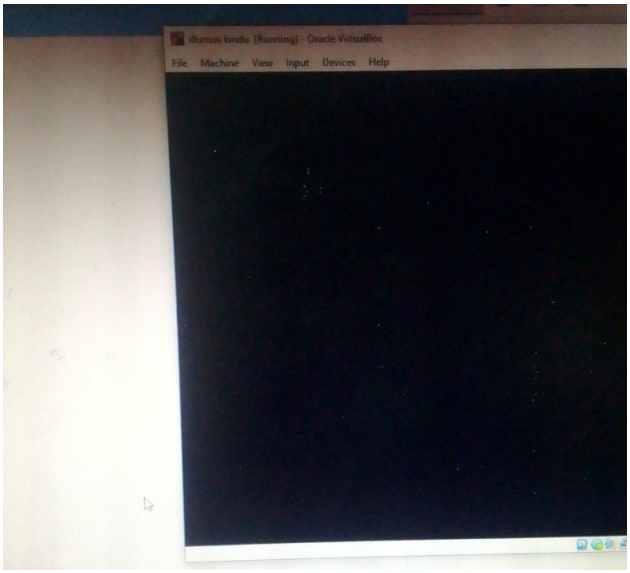

kindu debrie illumos - Settings
Basic
Expert
Search settings
General
System
Display
Storage
Audio
Network
Serial Ports
USB
Shared Folders
User Interface
System
Motherboard
Processor
Acceleration
Base Memory
1898 MB
4 MB
4096 MB
Boot Device Order (BIOS only)
Floppy
Optical
Hard Disk
Network
Chipset
PIIX3
TPM Version
None
Pointing Device
USB Tablet
Features
I/O APIC
Hardware Clock in UTC
UEFI
Secure Boot

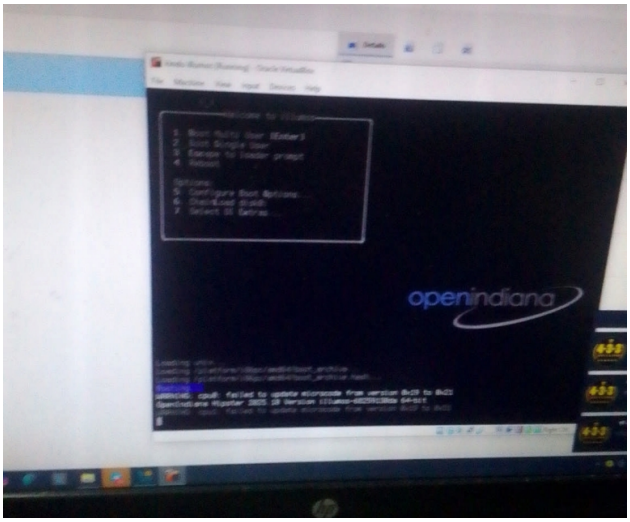

kindu debrie illumos - Settings
Basic
Expert
Search settings
General
System
Display
Storage
Audio
Network
Serial Ports
USB
Shared Folders
User Interface
Storage
Devices
Controller: SATA
kindu debrie illumos.vdi
Empty
Attributes
Name SATA
Type AHCI
Port Count 2
Use Host I/O Cache
Audio
Enable Audio
Host Audio Driver Default

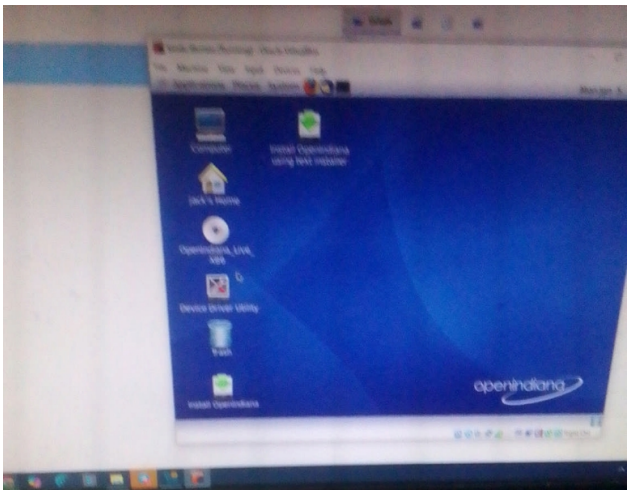

kindu debrie illumos - Settings
Basic
Expert
Search settings
General
System
Display
Storage
Audio
Network
Serial Ports
USB
Shared Folders
User Interface
Storage
Devices
Controller: SATA
kindu debrie illumos.vdi
OI-hipster-gui-20251026.iso
Attributes
Optical Drive SATA Port 1
Live CD/DVD
Hot-pluggable
Information
Type Image
Size 2.19 GB
Location C:\Users\Administrator\Downlo...
Attached to --
Audio
Enable Audio
Host Audio Driver Default

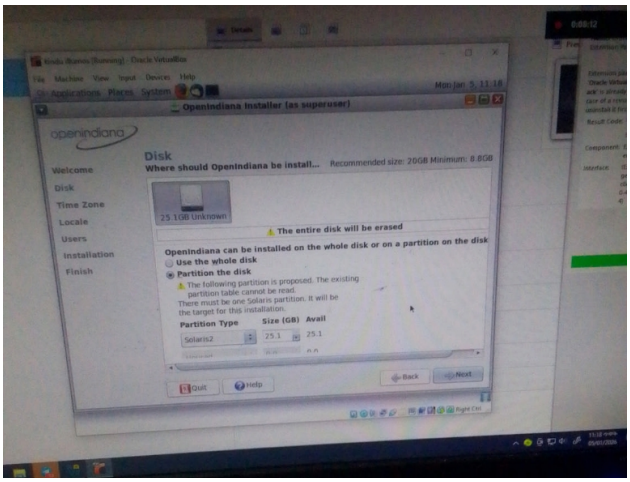


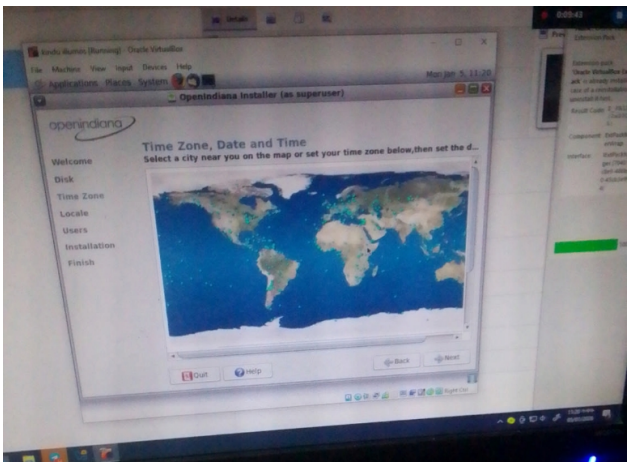

VirtualBox

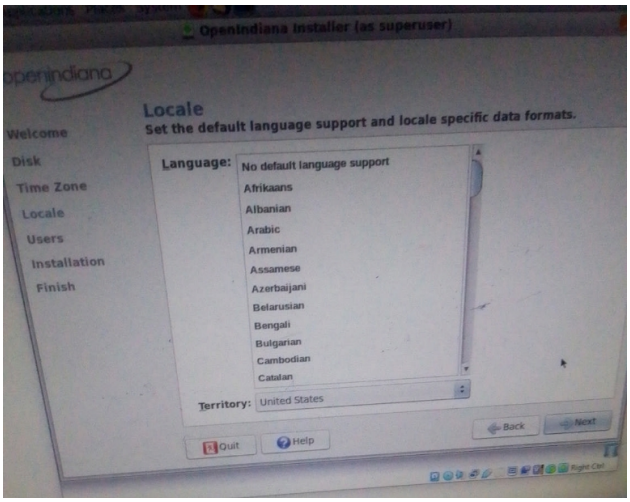

illumos kindu [Running] - Oracle VirtualBox
File Machine View Input Devices Help

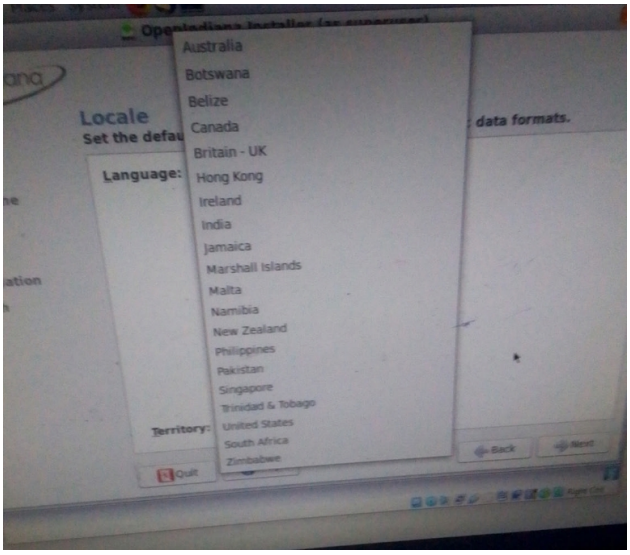

openindiana

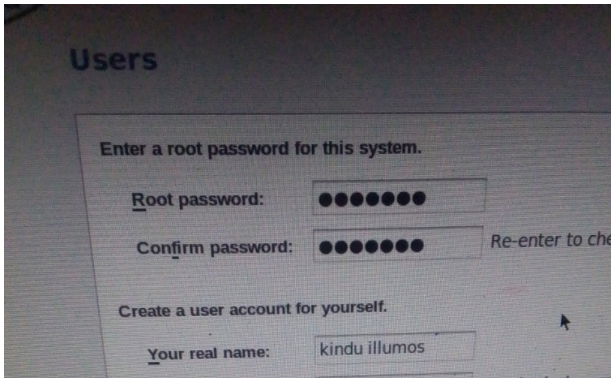

openindiana


OpenIndiana Installer (as superuser)
openindiana
Welcome
Disk
Time Zone
Locale
Users
Installation
Finish
Disk
Where should OpenIndiana be install...
Recommended size: 20GB Minimum: 8.8GB
25.1GB Unknown
The entire disk will be erased
OpenIndiana can be installed on the whole disk or on a partition on the disk
Use the whole disk
Partition the disk
Partition Type
Size (GB)
Avail
Solaris2
25.1
Quit
Help
Back
Next

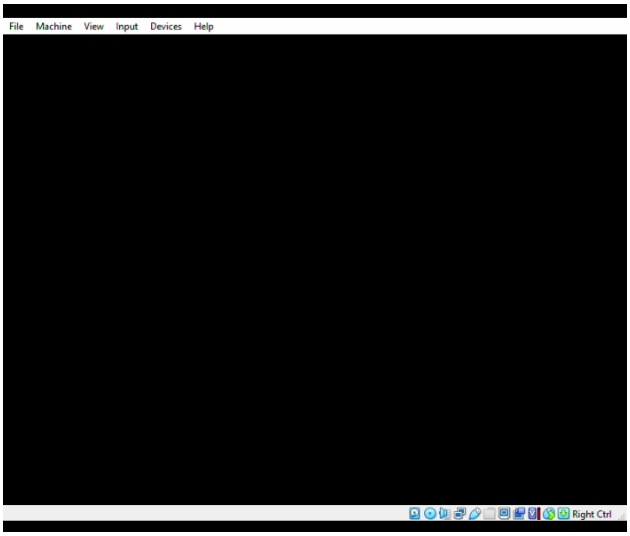

OpenIndiana Installer (as superuser)
openindiana
Welcome
Disk
Time Zone
Locale
Users
Installation
Finish
Time Zone, Date and Time
Select a city near you on the map or set your time zone below,then set the d...
Quit
Help
Back
Next

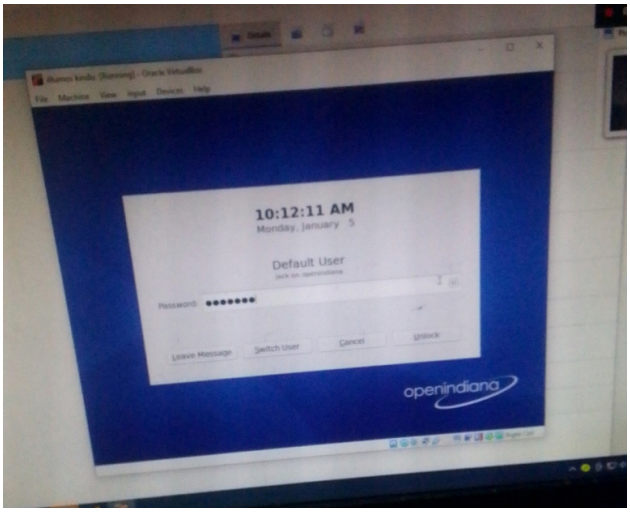

OpenIndiana Installer (as superuser)
openindiana
Welcome
Disk
Time Zone
Locale
Users
Installation
Finish
Locale
Set the default language support and locale specific data formats.
Language:
No default language support
Afrikaans
Albanian
Arabic
Armenian
Assamese
Azerbaijani
Belarusian
Bengali
Bulgarian
Cambodian
Catalan
Territory:
United States
Quit
Help
Back
Next


Australia
Botswana
Belize
Canada
Britain - UK
Hong Kong
Ireland
India
Jamaica
Marshall Islands
Malta
Namibia
New Zealand
Philippines
Pakistan
Singapore
Trinidad & Tobago
United States
South Africa
Zimbabwe
Locale
Language:
Territory:
Quit
Back


Users
Enter a root password for this system.
Root password:
Confirm password:
Re-enter to che
Create a user account for yourself.
Your real name:
kindu illumos


File Machine View Input Devices Help
Applications Places System
Mon Jan 5, 08:39
OpenIndiana Installer (as superuser)
openindiana
Installing
Welcome
Disk
Time Zone
Locale
Users
Installation
Finish
www.openindiana.org
openindiana
Thank you for choosing OpenIndiana
We hope you enjoy using OpenIndiana. If you like it, please remember to blog, tweet and spread the word.
Twitter: @openindiana
Lastly, please report any bugs you find to:
https://www.illumos.org/projects/openindiana
illumos
Quit
Help
Install
Right Ctrl


File Machine View Input Devices Help
Right Ctrl



System verification was performed using terminal commands:

uname -a ’n confirmed SunOS illumos

zpool list ’n confirmed ZFS pool creation

5. Problems Faced During Installation

Problem 1: VM Would Not Start

Error: “VT-x is disabled in the BIOS”

Cause: Virtualization disabled in BIOS

Problem 2: Black Screen After Boot

No error message

Screen remained blank after boot menu

Problem 3: Network Not Working

Error: Network unavailable

Occurred after installation

Problem 4: Mouse Not Working

Mouse pointer became stuck during installation

6. Solutions and Future Recommendations

Solution to Problem 1

Virtualization was enabled in BIOS/UEFI (VT-x / AMD-V).

Future Advice: Always check BIOS virtualization before creating a VM.

Solution to Problem 2

Graphics controller was changed to VBoxSVGA, and video memory increased.

Future Advice: Use compatible display settings for Unix-based OSs.

Solution to Problem 3

Network adapter was changed to Bridged Adapter, and network services were enabled using terminal commands.

Future Advice: Verify network mode after OS installation.

Solution to Problem 4

Mouse integration was toggled, and host key was used to release the mouse.

Future Advice: Install Guest Additions when supported.

7. Filesystem Support

Illumos primarily uses the ZFS filesystem, which is known for its reliability and advanced data protection features. ZFS provides end-to-end data integrity, snapshots, replication, and efficient storage management. Although ZFS consumes more memory than simpler filesystems, it is highly suitable for enterprise and server environments.

Other supported filesystems include UFS (legacy) and limited support for FAT32 for external

storage devices.

8. Advantages and Disadvantages

Advantages

Enterprise-grade ZFS filesystem

Strong system monitoring tools

Stable Unix architecture

Disadvantages

Limited hardware support

Smaller learning community

Requires higher system resources

9. Virtualization in Modern Operating Systems

Virtualization allows multiple operating systems to run on a single physical machine by abstracting hardware resources. It improves resource utilization, reduces cost, and provides isolated environments for testing and learning. Virtualization works through a hypervisor, such as VirtualBox, which manages CPU, memory, and storage for virtual machines. In modern IT, virtualization is essential for cloud computing, DevOps, and enterprise infrastructure.

10. Conclusion

The installation of Illumos (OpenIndiana Hipster) provided valuable real-world experience in operating system deployment. The project strengthened theoretical understanding, improved troubleshooting skills, and demonstrated the importance of virtualization in modern IT environments.The Illumos operating system installation project provided valuable hands-on experience with enterprise-level operating systems.

11. Future Outlook / Recommendation

Future work may include exploring advanced Illumos features such as Zones and DTrace, comparing Illumos with Linux and BSD systems, and using Illumos as a training platform for enterprise system administration.