



RHEL OS INSTALLIATION

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Installation of RHEL OS in VMware Workstation

Introduction

Red Hat Enterprise Linux (RHEL) is a widely used enterprise-grade Linux distribution known for its stability, security, and long-term support. Virtualization tools like VMware Workstation allow users to install and run RHEL in an isolated environment, making it ideal for testing, development, and learning purposes. Virtualization enhances flexibility, reducing hardware dependency while providing a safe testing ground for different configurations and applications.

Objectives

- Understand the concept of virtualization and its benefits.
- Install RHEL OS on VMware Workstation.
- Configure the virtual machine settings for optimal performance.
- Document the installation process with step-by-step guidance and screenshots.
- Address common issues encountered during installation and provide solutions.
- Explore the supported file systems and their benefits.
- Discuss the advantages and disadvantages of virtualization.

Requirements

Hardware Requirements

To ensure a smooth installation, the following hardware specifications are recommended:

- Processor:** Intel/AMD 64-bit processor with virtualization support (VT-x/AMD-V)
- RAM:** Minimum 4GB (8GB or more recommended for better performance)
- Storage:** At least 20GB of free disk space

Network: Stable internet connection (optional for updates and additional software installation)

Software Requirements

VMware Workstation (or VMware Player): Virtualization software to run the RHEL OS in an isolated environment.

RHEL ISO image: Officially downloaded from the Red Hat website.

Virtualization enabled in BIOS/UEFI settings.

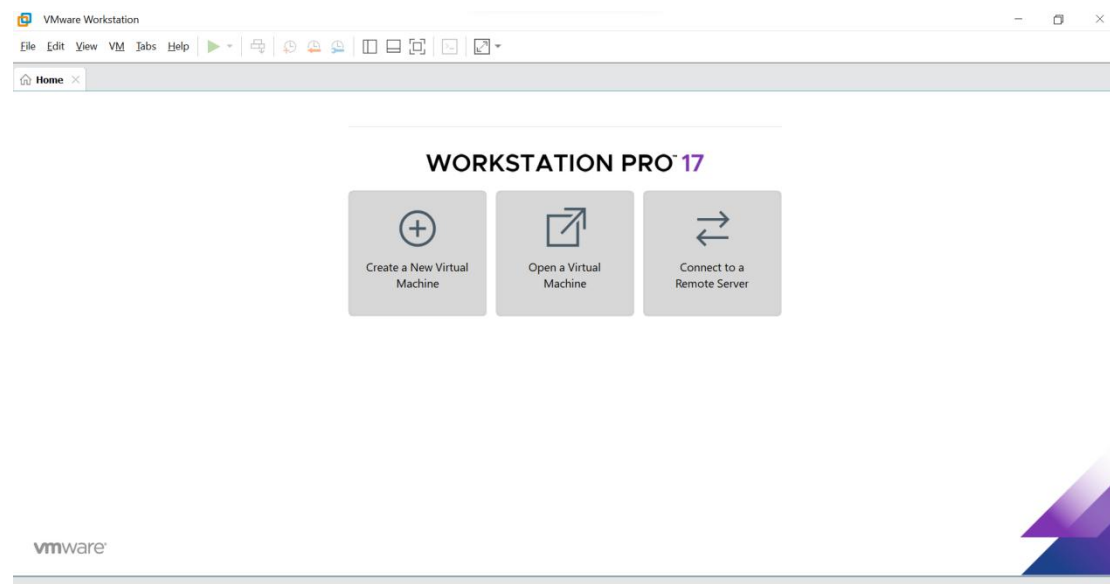
Installation Steps

Step 1: Download and Install VMware Workstation

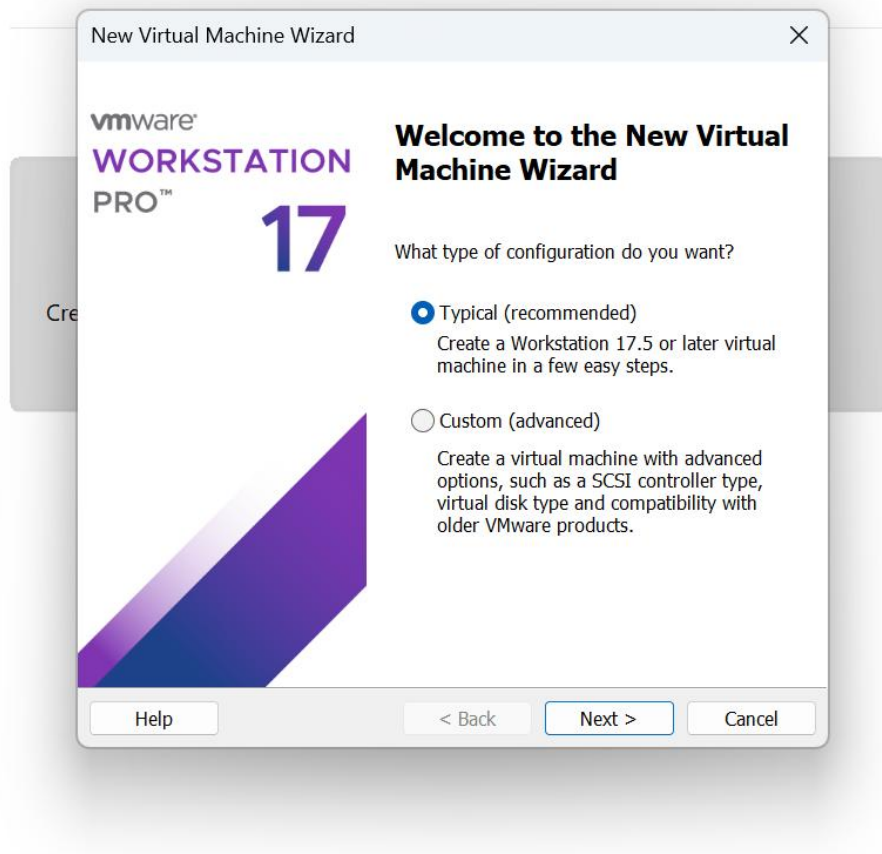
- 1 Visit the VMware website and download VMware Workstation.
- 2 Run the installer and follow the step-by-step installation wizard.
- 3 Accept the terms and conditions and complete the installation.

Step 2: Create a New Virtual Machine

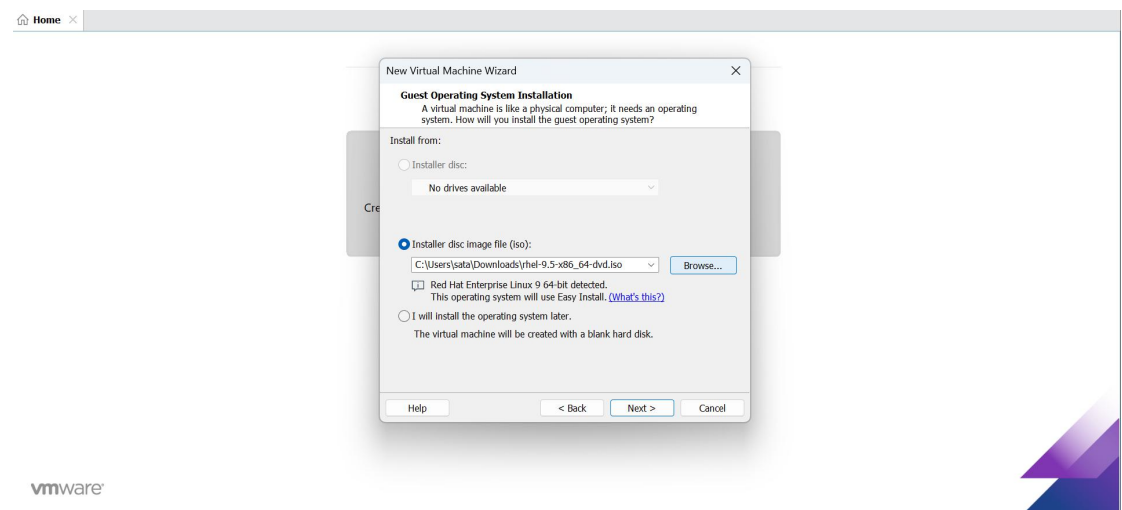
- 1 Open **VMware Workstation** and click **Create a New Virtual Machine**.



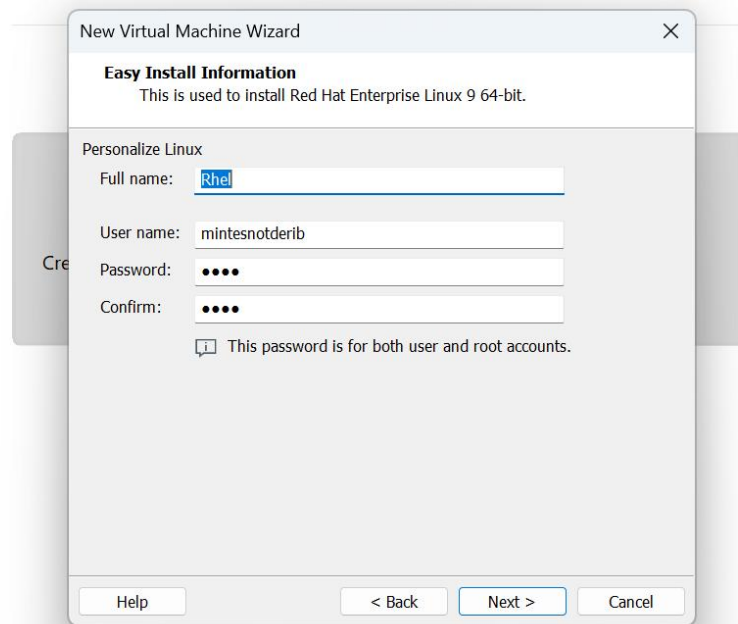
- 2 Choose **Typical (recommended)** for easy steps over VM settings.



3 Select **Install from ISO** and browse for the RHEL ISO file.



4 Assign a meaningful **VM name** and specify its storage location.



5 Allocate **memory** (at least 4GB recommended, but 8GB is preferred for better performance).

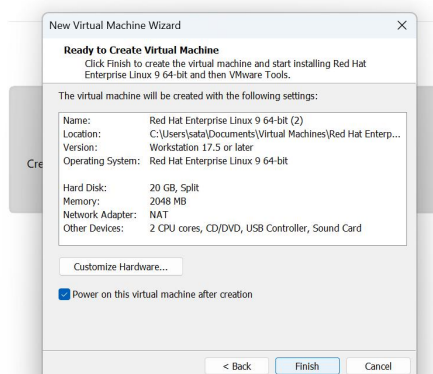
6 Configure **processors** (2 or more recommended for multitasking efficiency).

7 Create a **new virtual hard disk** with at least **20GB of storage**.

8 Choose the default **network settings** (NAT or Bridged, depending on internet connectivity requirements).

9 Click **Finish** to complete the VM creation.

Home

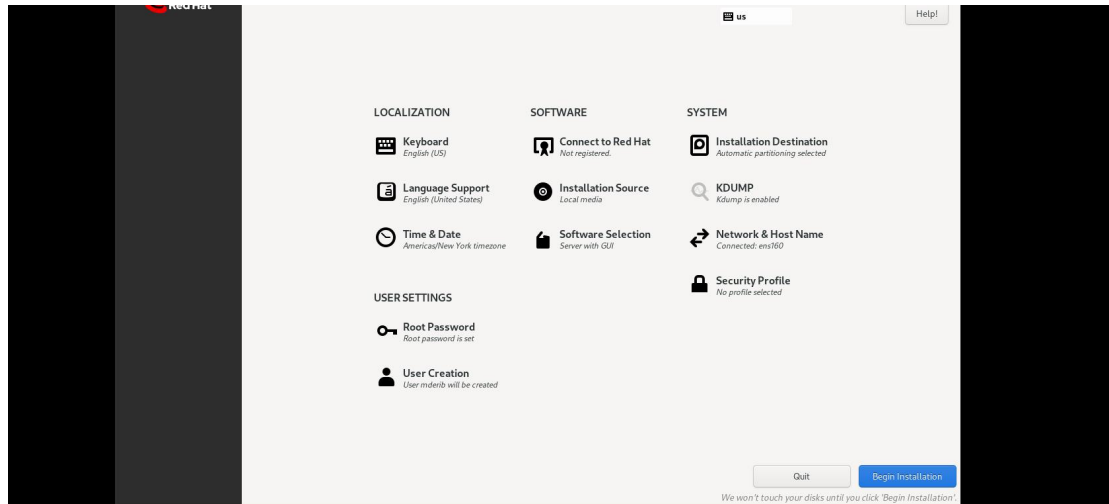


vmware



Step 3: Install RHEL on the Virtual Machine

1 Start the VM and boot from the RHEL ISO.



2 Select **Install Red Hat Enterprise Linux** from the menu.



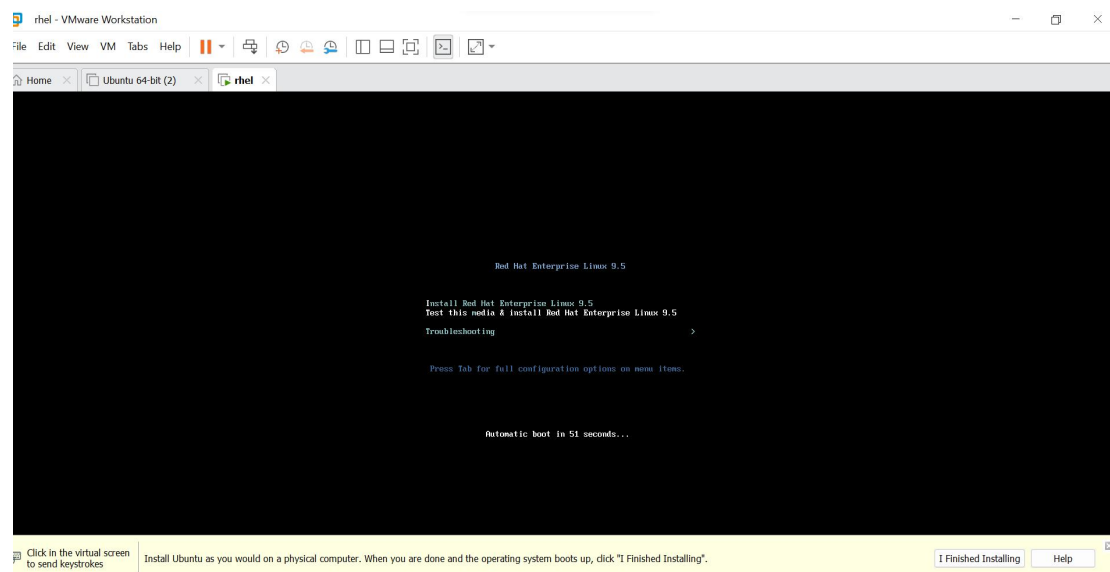
3 Choose the **language and keyboard** settings.

4 Configure **installation destination** (select the virtual hard disk).

5 Set the **root password** and create a new user account using your **full name**.

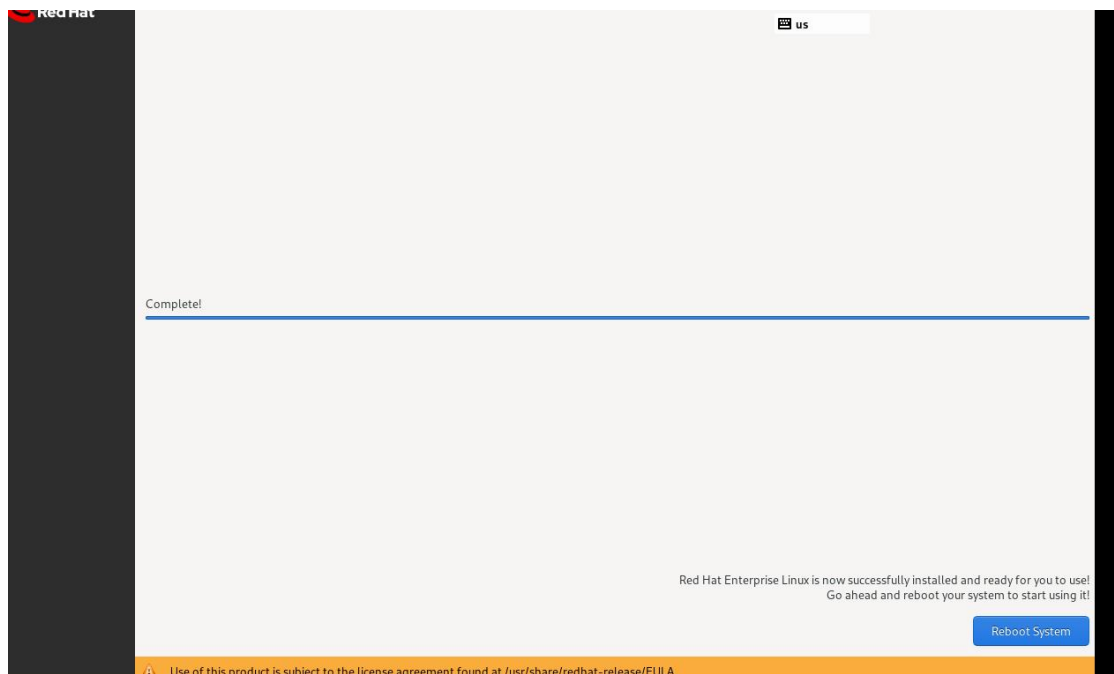
The screenshot shows the 'CREATE USER' window during the Red Hat Enterprise Linux 9.5 installation. The window has a dark header with 'CREATE USER' on the left and 'RED HAT ENTERPRISE LINUX 9.5 INSTALLATION' on the right. Below the header, there are input fields for 'Full name' (Mintesnot Derib) and 'User name' (mderib). There are two checkboxes: 'Make this user administrator' (unchecked) and 'Require a password to use this account' (checked). Below these are password fields for 'Password' and 'Confirm password', both masked with dots. A strength indicator bar shows the password is 'Strong'. An 'Advanced...' button is at the bottom. A 'Done' button is in the top left corner, and a 'Help!' button is in the top right corner.

6 Begin the installation process and wait for completion.



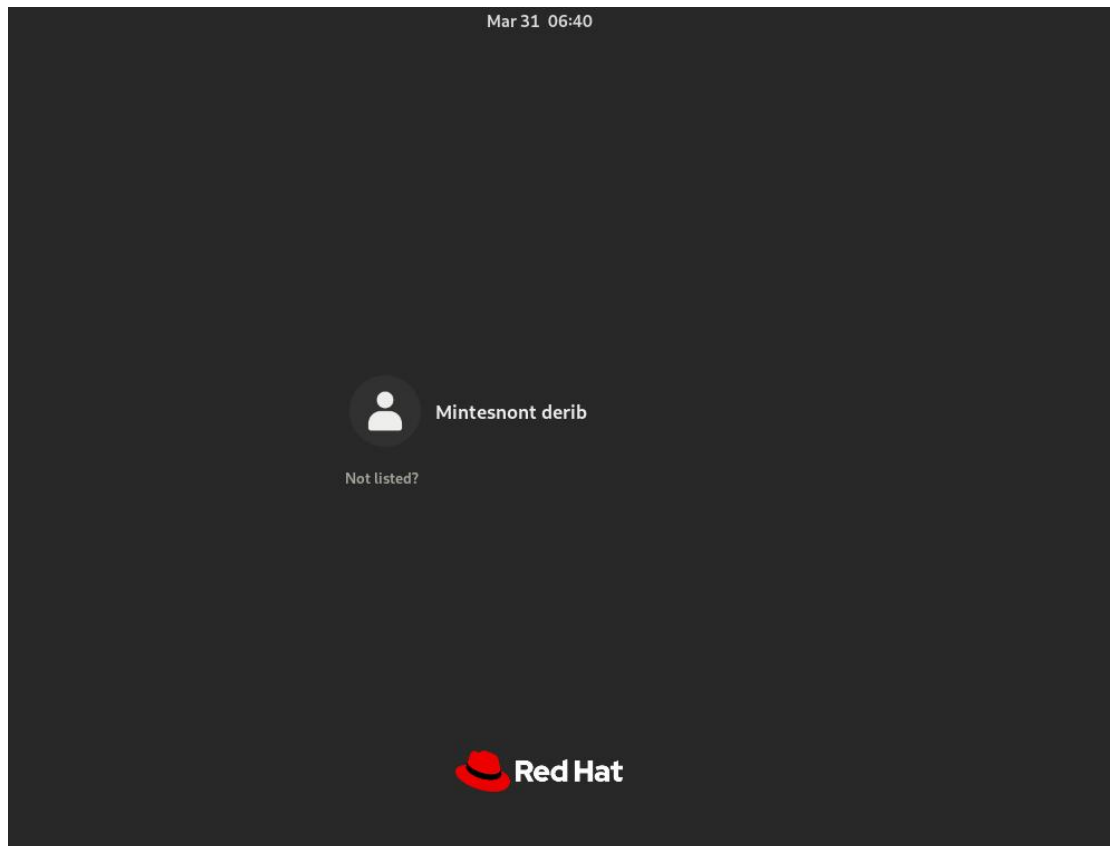

```
[ OK ] Started Show Plymouth Boot Screen.
[ OK ] Started Forward Password Requests to Plymouth Directory Watch.
[ OK ] Reached target Local Encrypted Volumes.
[ OK ] Reached target Path Units.
[ OK ] Finished Wait for udev To Complete Device Initialization.
       Starting Device-Mapper Multipath Device Controller...
[ OK ] Started Device-Mapper Multipath Device Controller.
[ OK ] Reached target Preparation for Local File Systems.
[ OK ] Reached target Local File Systems.
[ OK ] Reached target System Initialization.
[ OK ] Reached target Basic System.
/dev/sr0: 3ac8d58e67989f5efc55accfe18b8e00
Fragment sums: 4f1eb2fed664ec752f45e6efb583388c3c3f1da0a8aa6d5c9999c1434833
Fragment count: 20
Supported ISO: no
Press [Esc] to abort check.
Checking: 058.4%_
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7 Once installed, reboot the VM and remove the installation media.

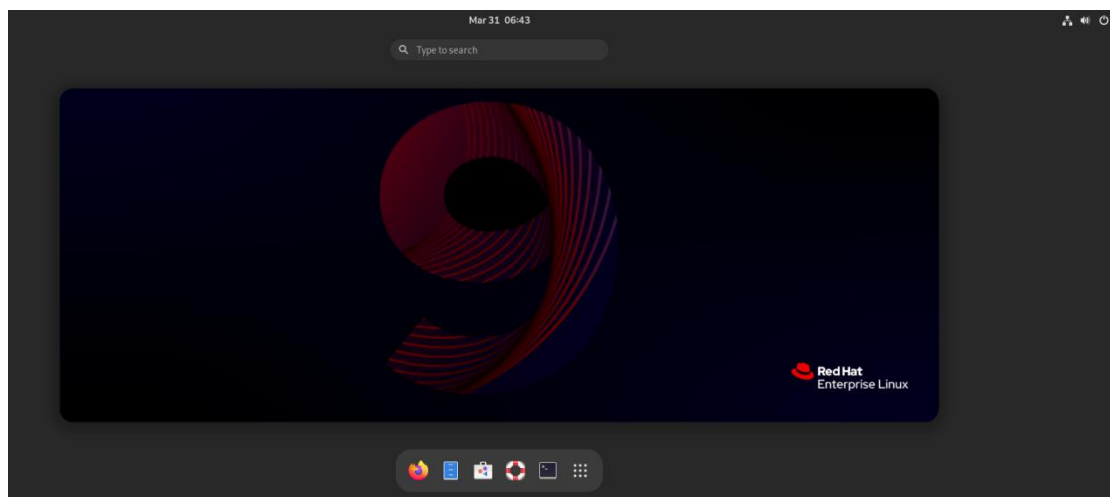


Step 4: Post-Installation Configuration

1 Log in using the created user credentials.



Finally I get the GUI of RHEL OS

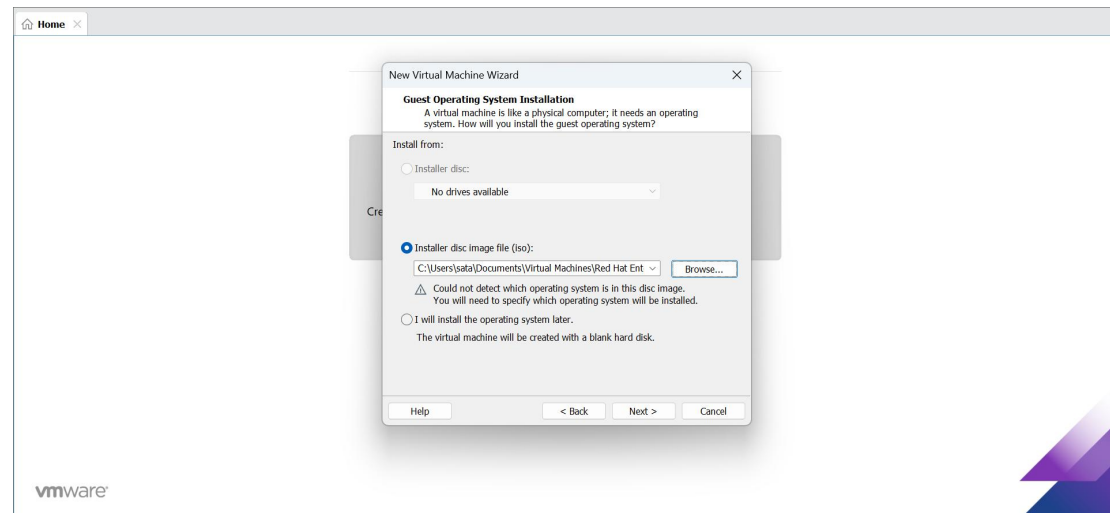


Issues Faced During Installation

Common Problems and Their Solutions

1 VMware Workstation does not detect the RHEL ISO

This was one of the frustrating parts of the project. I encountered several issues when trying to browse and select the ISO. VMware wasn't able to detect my ISO file, and I had trouble downloading the correct version. For instance, in my first attempt, I downloaded a 3.6 GB RHEL ISO, but it didn't work. In my second attempt, I downloaded a 1 GB version, but that also failed to work.



2 Solution

When I encountered this problem, I turned to the internet for help. I followed a formal procedure and was able to download the correct 11 GB version of the RHEL OS. Once I had the proper ISO file, I tried browsing and selecting it again, and this time, everything worked as expected.

Reflecting on the experience, I realized that when you first introduced me to VMware and Ubuntu, I was very eager to explore the tools and dive into virtualization. At that time, I decided to install Ubuntu on VMware. During that installation process, I faced numerous challenges, but I was able to tackle them successfully with persistence and research. This experience helped me become more comfortable with VMware and its quirks, which made the RHEL installation process much smoother. Because of the knowledge I gained from installing Ubuntu, I encountered far fewer issues when setting up RHEL OS on VMware.

Filesystem Support in RHEL

RHEL supports multiple file systems, each with distinct advantages:

- **ext4** (Fourth Extended File System)

Supported by: RHEL (natively)

Why: This is the default and recommended filesystem for RHEL. It offers great performance, stability, and support for large file sizes and volumes. It's the go-to filesystem for most Linux distributions.

- **XFS (X File System)**

Supported by: RHEL (natively)

Why: XFS is a high-performance filesystem that is great for handling large-scale data storage. It's particularly useful for systems that require high scalability, such as servers with large volumes of data.

- **Btrfs (B-tree File System)**

Supported by: RHEL (but experimental in some versions)

Why: Btrfs offers advanced features such as snapshots, checksums for data integrity, and better compression. However, it's still considered experimental for production use in RHEL

but the above are natively the supported file system in RHEL OS but we can still support the other file system using the third driver(third party)

Advantages and Disadvantages of Virtualization

Advantages:

Enables running multiple OS instances on a single machine.

Provides a secure environment for software testing and development.

Reduces hardware costs by eliminating the need for multiple physical servers.

Facilitates quick recovery through snapshots and backups.

Supports easy migration and scalability in enterprise settings.

Disadvantages:

Requires a powerful host system with sufficient resources (CPU, RAM, and storage).

Performance overhead compared to running an OS natively.

Licensing costs for proprietary virtualization software (e.g., VMware Workstation).

May introduce compatibility issues with some hardware drivers.

Conclusion

Installing RHEL on VMware Workstation provides a flexible, efficient, and secure way to explore and test the enterprise-grade Linux environment. With proper configuration, users can leverage the power of virtualization to run and manage multiple OS instances seamlessly.

Future Outlook / Recommendations

Explore alternative virtualization solutions like **VirtualBox** and **KVM**.

Configure **network bridging** for better connectivity in virtual machines.

Automate installations using **Kickstart files** for faster and consistent deployment.

Implement **snapshots** to easily revert to previous system states in case of issues.

Consider **containerization** technologies like **Docker** and **Podman** for lightweight virtualization alternatives.

By following these steps and recommendations, users can fully utilize the potential of RHEL in a virtualized environment for development, testing, and learning purposes.

Question number two

2. Briefly explain the what, why, and how virtualization in modern operating system.

What is Virtualization in Modern Operating Systems?

Virtualization is the process of creating a virtual version of a hardware platform, storage device, network resources, or operating system. This allows multiple operating systems to run on a single physical machine by abstracting the hardware and providing a simulated environment for each operating system.

Why is Virtualization Used in Modern Operating Systems?

Resource Optimization: Virtualization allows efficient use of hardware resources by running multiple virtual machines (VMs) on a single physical machine.

Isolation: Each VM operates independently, ensuring that processes in one VM do not interfere with processes in another. This is important for security and stability.

Cost Efficiency: Virtualization reduces the need for multiple physical servers, thus lowering hardware and energy costs.

Testing and Development: Virtualization enables developers to test software in isolated environments without affecting the main system.

Disaster Recovery: Virtual machines can be easily backed up, cloned, and restored, ensuring business continuity in case of failures.

How Does Virtualization Work in Modern Operating Systems?

Hypervisor: The key technology behind virtualization is the **hypervisor** (also known as the Virtual Machine Monitor, VMM), which manages virtual machines. There are two types:

Type 1 Hypervisor (Bare-Metal): Runs directly on the host hardware, like VMware ESXi and Microsoft Hyper-V.

Type 2 Hypervisor (Hosted): Runs on top of a host operating system, like VMware Workstation and Oracle VirtualBox.

Virtual Machines: Each VM runs its own operating system, which can be different from the host system's OS. VMs are allocated a portion of the host's resources (CPU, RAM, storage, etc.), and they operate independently.

Resource Allocation: The hypervisor allocates resources from the physical machine to the virtual machines based on pre-configured settings (CPU, memory, and storage).

Management and Monitoring: Virtualization platforms often come with management tools to control, monitor, and optimize VM performance, including the ability to dynamically allocate resources as needed.

In summary, virtualization is a crucial technology in modern operating systems that maximizes resource efficiency, enhances security, and enables the flexible use of multiple operating systems on a single physical machine.