

Cloud Computing

TA -1

=====

Name of the student : - Vinni Sanjiv Fengade

Roll No : - 67

Section : - CSE -B

=====

Task -:

Create a Detailed Case Study about Open Source Virtualization Software used in Data Center or in Company for creating a virtual network and providing the IT resources to the requesting client /VM in an easy and efficient manner.

=====

Case Study - Red Hat Enterprise Software

Introduction

Virtualization is a technology that enables a single physical machine to host multiple virtual machines (VMs), each running a separate, virtualized operating system as a user-space process on the host's operating system. This technology has become increasingly popular in recent years due to its ability to consolidate multiple physical machines into a single machine, which reduces space, power, and maintenance requirements. In this case study, we will provide an overview of virtualization in Red Hat Enterprise Linux 8 (RHEL 8), including its benefits, components, and different types.

Benefits of Virtualization

Virtualization offers several benefits, including the ability to consolidate multiple physical machines into a single machine, which reduces space, power, and maintenance requirements. It also enables testing of software configurations and features in a safe and isolated environment. Virtualization can also improve the availability and reliability of applications by providing high availability and disaster recovery capabilities.

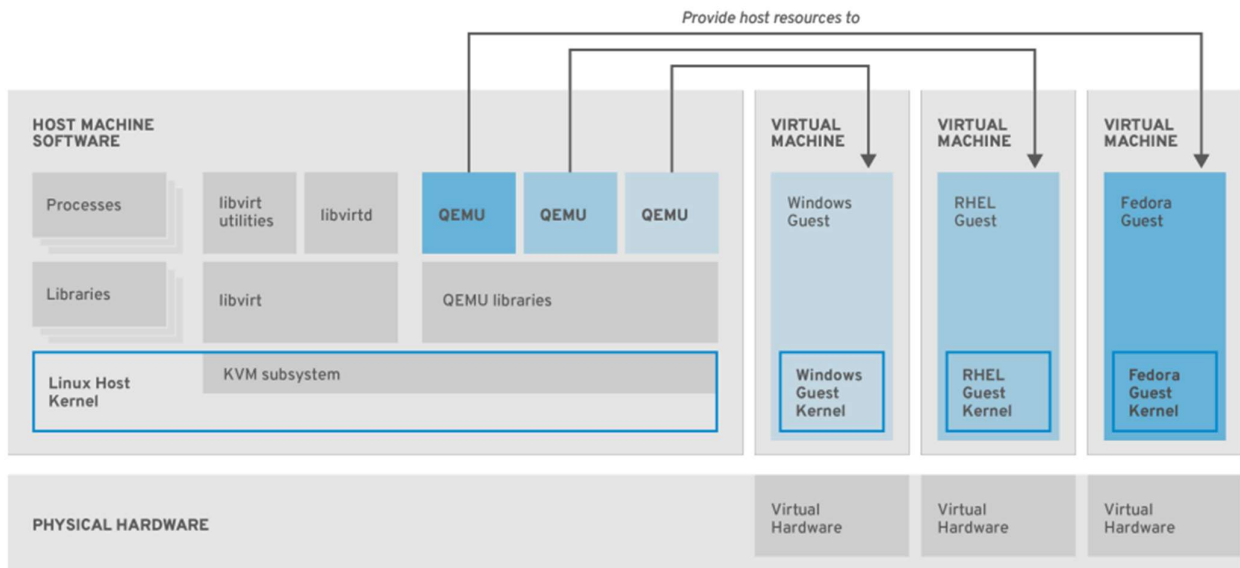
Components of Virtualization in RHEL 8

RHEL 8 provides the virtualization functionality, which enables a machine running RHEL 8 to host multiple virtual machines (VMs), also referred to as guests. VMs use the host's physical hardware and computing resources to run a separate, virtualized operating system (guest OS) as a user-space process on the host's operating system. The default hypervisor in RHEL 8 is QEMU, which is used to create and manage VMs. In addition, the libvirt software suite serves as a management and communication layer, making QEMU easier to interact with, enforcing security rules, and providing a number of additional tools for configuring and running VMs.

Virtualization in RHEL 8 consists of several principal software components, including:

1. Hypervisor: The basis of creating virtual machines (VMs) in RHEL 8 is the hypervisor, a software layer that controls hardware and enables running multiple operating systems on a host machine. The hypervisor includes the Kernel-based Virtual Machine (KVM) module and virtualization kernel drivers. These components ensure that the Linux kernel on the host machine provides resources for virtualization to user-space software.
2. QEMU emulator: At the user-space level, the QEMU emulator simulates a complete virtualized hardware platform that the guest operating system can run in, and manages how resources are allocated on the host and presented to the guest.
3. libvirt: The libvirt software suite serves as a management and communication layer, making QEMU easier to interact with, enforcing security rules, and providing a number of additional tools for configuring and running VMs.
4. XML configuration file: A host-based XML configuration file (also known as a domain XML file) determines all settings and devices in a specific VM. The configuration includes metadata such as the name of the VM, time zone, and other information about the VM. It also includes a description of the devices in the VM, including virtual CPUs (vCPUs), storage devices, input/output devices, network interface cards, and other hardware, real and virtual. VM settings such as the maximum amount of memory it can use, restart settings, and other settings about the behavior of the VM are also included in the configuration.

Together, these components provide a powerful and flexible virtualization platform that enables users to create and manage multiple VMs on a single physical machine.



Type of Virtualization in RHEL 8

There are three types of virtualization available in RHEL 8: full virtualization, para-virtualization, and containerization. Full virtualization is the most common type of virtualization, which emulates a complete set of hardware, including a virtual CPU, memory, storage, and network interfaces. Para-virtualization is a type of virtualization that requires modifications to the guest operating system to allow it to communicate directly with the hypervisor, which can improve performance. Containerization is a lightweight form of virtualization that allows multiple isolated user-space instances to run on a single host operating system, sharing the same kernel and system resources.

Management Interfaces

RHEL 8 provides several management interfaces for virtualization, including command-line interfaces (CLI) and graphical user interfaces (GUI). The `virsh` utility is a CLI tool that provides a shell interface for managing VMs and their configurations. The `virt-install` utility is a CLI tool for creating new VMs. The `virt-xml` utility is a CLI tool for editing the configuration of a VM. The `guestfish` utility is a CLI tool for examining and

modifying VM disk images. The RHEL 8 web console, also known as Cockpit, provides a remotely accessible and easy-to-use GUI for managing VMs and virtualization hosts. The Virtual Machine Manager (virt-manager) application provides a specialized GUI for managing VMs and virtualization hosts.

Conclusion

Virtualization is a powerful technology that enables a single physical machine to host multiple virtual machines, each running a separate, virtualized operating system as a user-space process on the host's operating system. RHEL 8 provides a comprehensive set of tools and utilities for managing virtualization, including the libvirt software suite, the QEMU hypervisor, and a variety of CLI and GUI management interfaces. By consolidating multiple physical machines into a single machine, virtualization can reduce space, power, and maintenance requirements, while also improving the availability and reliability of applications. With its many benefits and flexible management options, virtualization is an essential technology for modern IT environment.