Assignment 1

Due Date 27th May 2022

Answer all the questions.

**Q1: What is hypervisor? Discuss the types of hypervisor.**

**ANSWER:**

A hypervisor is software that creates and runs [virtual machines (VMs)](https://www.redhat.com/en/topics/virtualization/what-is-a-virtual-machine). A hypervisor, sometimes called a virtual machine monitor (VMM), isolates the hypervisor operating system and resources from the virtual machines and enables the creation and management of those VMs.

The hypervisor treats resources—like CPU, memory, and storage—as a pool that can be easily reallocated between existing guests or to new virtual machines.

**Types of hypervisors**

There are 2 different types of hypervisors that can be used for virtualization: type 1 and type 2 hypervisors.

**Type 1**

A type 1 hypervisor, also referred to as a native or bare metal hypervisor, runs directly on the host’s hardware to manage guest operating systems. It takes the place of a host operating system and VM resources are scheduled directly to the hardware by the hypervisor.

This type of hypervisor is most common in an enterprise data center or other server-based environments.

KVM, Microsoft Hyper-V, and VMware vSphere are examples of a type 1 hypervisor. KVM was merged into the Linux kernel in 2007, so if you’re using a modern version of [Linux](https://www.redhat.com/en/topics/linux), you already have access to KVM.

**Type 2**

A type 2 hypervisor is also known as a hosted hypervisor, and is run on a conventional operating system as a software layer or application.

It works by abstracting guest operating systems from the host operating system. VM resources are scheduled against a host operating system, which is then executed against the hardware.

A type 2 hypervisor is better for individual users who want to run multiple operating systems on a personal computer.

VMware Workstation and Oracle VirtualBox are examples of a type 2 hypervisor.

**Q2: Write about the QEMU its benefits and applications.**

**ANSWER:**

QEMU is **an open source emulator and virtualization tool that specializes in emulating different CPU architectures**. QEMU 5.0 introduced new and updated features, such as support for non-volatile dual in-line memory module hardware and shared file systems.  As an emulator, it is used to run operating systems and applications written for another hardware platform; for example, running ARM software on an x86-based PC.

**QEMU Software advantages**

* Multiple architectures are supported by default.
* Can simulate IA-32 ( x86 ) PC, AMD 64 PC, MIPS R4000, Sun SPARC sun3 and PowerPC (PReP and Power Macintosh) architecture.
* Scalable to customize new instruction sets.
* Open source, portable, fast simulation.

Applications:

For virtualization, QEMU is used **to emulate devices and certain privileged instructions** and requires either the KQEMU or KVM kernel modules and the host operating system to provide a virtual machine environment. It is typically used to run Windows and DOS applications on x86-based Linux computers.

* QEMU is used to start virtual machines. The QEMU application is named **qemu-system-arm** (for 32 bit platforms) or **qemu-system-aarch64** (for 64 bit platforms).

In addition to the QEMU executable itself, the following is a list of the minimum components that must be available on the target system to launch a virtual machine using QEMU:

* The host Linux kernel on the target must be built with virtualization support for KVM enabled .
* A guest OS kernel image (e.g. zImage or Image for Linux)
* A guest root filesystem (If needed by the guest OS. For example, a Linux guest requires a rootfs.)
* Recommended: A working network interface (to interface to the guest's console and the QEMU monitor)