



# **DEVOPS INTERNSHIP**

## **2021**

**Assignment**  
**VM and Containers**

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## **Question Number 1:**

### **Working Mechanism of Virtual Machines (Virtualization):**

Virtualization is the process of creating a virtual computing environment with the help of virtualization software, known as a hypervisor. The hypervisor runs on the top of the Host Operating system to run an image of the guest operating system. The hypervisor acts as a mediator, a controller, and an interface provider. The hypervisor allows a user to allocate a fixed amount of disk space (storage), temporary storage (RAM), processor, network interface, and all other required hardware components, virtually, which virtual machine borrows from the host system. Virtual Machines work as a separate computing environment with some dedicated hardware components and their separate operating system. The virtual machine cannot interfere with the host system as it is isolated from the host operating system. Microsoft Hyper-V, Oracle VM Virtual Box, VMware Workstation are some Virtualization software. The bare-metal hypervisor can run directly on top of hardware without a host operating system. VMware ESXi is such type of hypervisor which is mainly used by Enterprises.

## **Question Number 2:**

### **Working Mechanism of Containers (Containerization):**

The container is a special type of software that can virtualize packages and separate applications in an isolated environment for deployment. Containers share the same OS kernel without the need for virtualization. In containerization, containers store the components, including files, packages, libraries, dependencies, and environment variables required to run desired software. Host Operating System restricts the container's access to physical components like processor, memory, and storage to prevent the container from consuming the host's resources. All the components required to run the containers are stored in the container image file that the container engine executes. Container images are static, complete, and executable versions of the service or the application. Containers can have multiple layers with the base layer containing all the required files to run the container and dependencies required to execute certain code in a container. Each container can have a certain container layer on top of the base layer that can be static and saved and reused by multiple containers. Docker is an example of containerization technology.

### **Question Number 3:**

#### **Problems that Virtualization solves:**

- As it does not require dedicated hardware to run, it is cheaper and easier to implement.
- Due to its portable nature, it allows faster deployment of servers and resources.
- It is energy efficient as it does not require a dedicated system.
- It helps to reduce system downtime and provide better redundancy during the disaster recovery period as backup VM images can be easily deployed.
- It helps to reduce organization size and increase efficiency and productivity as the number of hardware and software resources to manage is less.
- With virtual images, it is easy for a company to migrate to the cloud which is harder in traditional computing.

#### **Drawbacks of the Virtualization in the context of modern application deployment:**

- As multiple virtual machines have a completely different OS with a separate kernel, it needs more resources and resources to be shared with the host and other VM, which can cause lag while serving the application.
- The size of virtual machine images is usually large, which might cause problems while transferring images to another system.
- As virtual machines have a complete Operating system, all the packages and dependencies required to run and deploy applications need to be installed, which is time-consuming.
- Not all web app and server technologies are supported in a virtualized environment that can cause a problem during deployment.

#### **Question Number 4:**

##### **Problems that the Containerization solves regarding modern application deployment and approaches that it takes:**

- Containers readily come up with the base program, packages, and library to run the application server, so it is easier to deploy.
- As it shares the kernel with the host operating system, it is minimal, efficient and less resource-hungry which makes it an optimal choice to run modern applications.
- It is easier and faster to create containers, which is more suitable for modern applications as they require rapid development and deployment.
- The size of the container image is small and portable, which makes it easy to transfer and install in another host.
- Containers have better support for modern technical concepts like CI/CD that makes them suitable for modern applications.
- Containers can run multiple individual applications on the same number of servers.