**DevOps HW Conceptual Questions 🡪Anil Kumar Yalla**

1. **Why can code be difficult to run on another machine?**

It will be difficult to run the same code on different machine because while deploying the code on different machine, it depends on lot of factors (computing environment).

The environment(softwares) used on the machines may not be same(compatible) which results in many dependency errors. One of the main reasons is that the two machines may run on different Operating System which may cause failures to run code on different machines.

1. **Explain the concepts of a computing environment.**

Good code running isn’t the complete thing to be able to run the code. It requires entity that coexist with its running environment, also known as computing environment, which helps to operate, run, and maintain the value of code. An ideal computing environment should possess the properties are

* It should be reproducible
* It should be resilient(recoverable)
* It should be secure, scalable, and flexible
* It should maintain resource utilization.

1. **Compare full emulation virtualization vs. binary translation**

A full emulation virtualization is used to emulate the properties of a system on any other system. It runs a virtual machine as a user application. It emulates the CPU, memory, disk, and other hardware components virtually in code.

It exactly does what full system hardware performs but in software code, which runs on back of hardware. Because of this performance might be slow. It is not very good approach for fully developed operating system.

Binary translation implements virtualization, in which it does not require hardware virtualization features. it involves translating the unsafe(privileged) instructions of the guest into safe, making sure only it can be executed in the context of the virtual guest without impacting any other outside the scope of the virtual machine.

1. **What are some use cases associated with microvms and unikernels?**

Microvms provide a virtual machine architecture to isolate the instance from other. These are used to isolate untrusted computing operation from a computer's host operating system. These are smaller and they usually reduce the file system not the kernel size. Some use cases are Embedded applications such as docker

Unikernels implement the virtualization where it contains only necessary things to achieve specific function or run code along with minimum OS functionality to run the code. Usecases are lambda functions, optimized ML FPGA chips in Azure.

1. **In VM workshop, why can't the Virtual Box Ip address be pinged from the host (or accessible from the web browser)?**

When we try to ping the virtual box Ip address through web browser or host machine it throws timed out error because the virtual box machine is implemented as virtual private network, which is not accessible from other systems. To enable this, we should implement bridge networking or host only networking or port forwarding which allows the communication between host and the virtual machine.

1. **Compare bridged networking with host-only networking**

Bridge networking and host only networking helps in communication between the virtual machine and the host system. But in host only networking, virtual machine is statistically assigned one ip address and it is only accessible by the host OS, on which the virtual machine is running. It also requires admin privileges to create the network, whereas bridge networking, the virtual machine will have subnet address of the host machine which can be accessed by the host machine as well as all other computers in the host network. So based on the requirements we chose which type of network is useful for the implementation.

1. **How does exactly does bakerx access the virtual machine through ssh?**

To make ssh connection, it will look for free port numbers which are not used by any other virtual machines or host. Then it registers the virtual box with the image. It creates network interfaces with NAT and bridged networking. And also it adds port forward numbers which indicate when the system receives a request for a port it will redirect it to the specified port. Then it boots the virtual machines if there is any previous instance of the virtual machine. Now the ssh daemon starts listening to the specified port and the socket listens for data to be received from the ssh server. Now ssh connection is established and also taken care of if we create multiple vms with same port number.

1. **Explain the difference between the rootfs disk image and initrd disk image.**

Rootfs is a unique root file system, which has all applications, libraries including home folder to perform the basic operations. Initrd is a temporary root file system which contains just enough executables and system files to support the boot of the system. It is unpacked by the kernel during booting.

1. **What was a new feature, challenge, or interesting learning experience that you encountered while doing the homework or classroom exercises?**

The most important thing I learned during the homework is port forwarding. It was more interesting when virtual machine can’t communicate with the host directly and also how we can communicate between virtual machines and host computers and other computers on the same network using NAT, Bridge networking and host only networking**.**