Lecture 9

Virtual Machines (VMs)

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TIMES OF INDIA GROUP
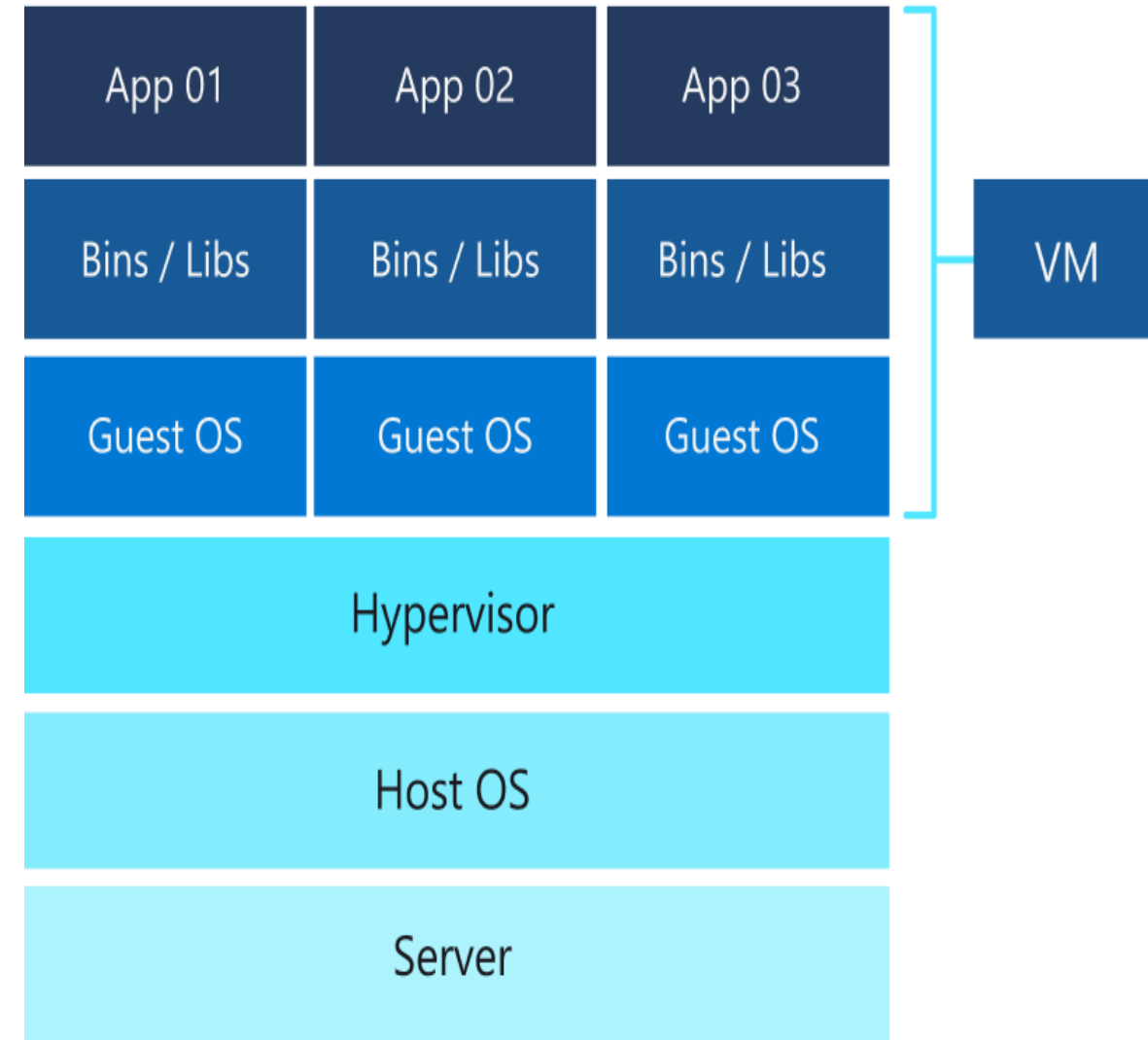
What is virtual machine?

Virtual Machine (VM)

- VM is a virtual environment that functions as a virtual computer system with its own CPU, memory, network interface, and storage, created on a physical hardware system.

- Software called a hypervisor separates the machine's resources from the hardware and provisions them appropriately so they can be used by the VM.

App 01	App 02	App 03
Bins / Libs	Bins / Libs	Bins / Libs
Guest OS	Guest OS	Guest OS

VM

Hypervisor
Host OS
Server

Virtual Machine (VM)

- VMs are ==isolated== from the rest of the system, and multiple VMs can exist on a single piece of hardware, like a server. They can be moved between host servers depending on demand or to use resources more efficiently.

- VMs allow ==multiple different operating systems to run simultaneously== on a single computer—like a Linux, windows, etc. Each operating system runs in the same way an operating system or application normally would on the host hardware, so the end user experience emulated within the VM is nearly identical to a real-time operating system experience running on a physical machine.

How does VM works?

How does VM works?

- Virtualization is the process of creating a software-based or "virtual" version of a computer, with dedicated amounts of CPU, memory and storage that are "borrowed" from a physical host computer such as your personal computer—and/or a remote server.
- A VM is a computer file, typically called an image, which behaves like an actual computer. It can run in a window as a separate computing environment, often to run a different operating system (OS) or even to function as the user's entire computer experience as is common on many people's work computers.
- The VM is partitioned from the rest of the system, meaning that the software inside a VM cannot interfere with the host computer's primary OS.

Usage of VMs

Usage of VMs

- VMs may be deployed to accommodate different levels of processing power needs, to run software that requires a different operating system, or to test applications in a safe, sandboxed environment.

- VMs have historically been used for server virtualization.

Usage of VMs

- VMs can perform specific tasks considered too risky to carry out in a host environment, such as accessing ==virus-infected data or testing operating systems==. Since the virtual machine is separated from the rest of the system, the software inside the virtual machine cannot tamper with the host computer.

- Building and deploying applications to the cloud.

Merits of VMs

Merits of VMs

Merits of VMs

Cost Saving · Agility and speed · Lower downtime · Scalability · Security

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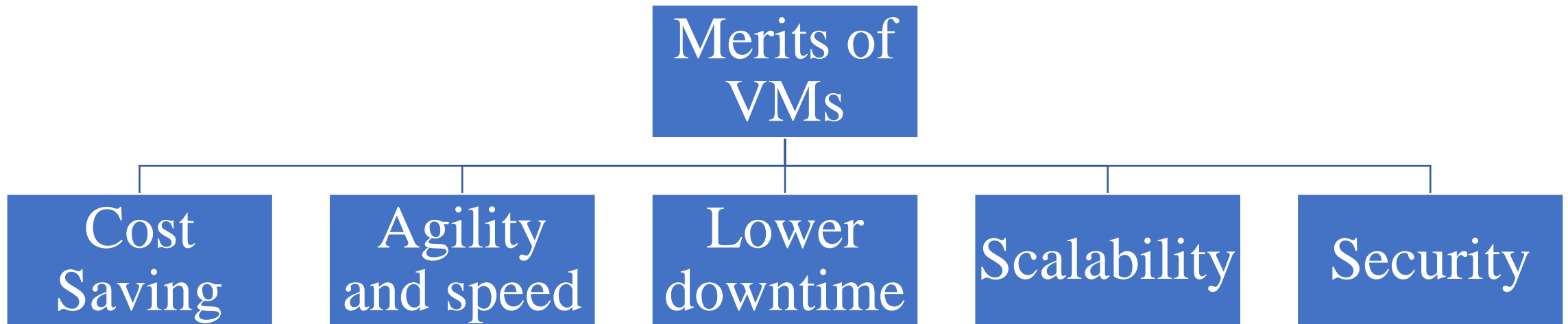
Merits of VMs

- **Cost savings:** Running multiple virtual environments from one piece of infrastructure means that you can ==drastically reduce your physical infrastructure== footprint. This boosts your bottom line- decreasing the need to maintain nearly as many servers and saving on maintenance costs and electricity.

- **Agility and speed:** Spinning up a VM is relatively ==easy and quick== and is much simpler than provisioning an entire new environment for developers. Virtualisation makes the process of running dev-test scenarios a lot quicker.

Merits of VMs

- **Lowered downtime:** VMs are so portable and easy to move from one hypervisor to another on a different machine- this means that they are a great solution for <mark>backup</mark>, in the event the host goes down unexpectedly.

- **Scalability:** VMs allow you to more easily <mark>scale your apps</mark> by adding more physical or virtual servers to distribute the workload across multiple VMs. As a result you can increase the availability and performance of your apps.

Merits of VMs

- **Security:** Because VMs run in multiple operating systems, using a guest operating system on a VM allows you to run apps of questionable security and protects your host operating system. VMs also allow for better security forensics and are often used to safely study computer viruses, isolating the viruses to avoid risking their host computer.

Demerits of VMs

Demerits of VMs

- Running multiple VMs on one physical machine can result in <mark>unstable performance</mark> if infrastructure requirements are not met.

- VMs are less efficient and run slower than a full physical computer.

Quiz

Quiz

Question: On a particular server, within each virtual machine:

a) You can run any version of Windows without regard for the version(s) running in the other virtual machines.
b) The versions of Windows must be no more than one release apart.
c) The versions of Windows must be exactly the same.
d) None of the options is correct.

Quiz

Question: **When it comes to avoiding major outages, the use of server virtualization:**

a) Reduces the frequency of hardware-related service outages.
b) Has no material impact.
c) Requires that levels of redundancy be increased to avoid an increase in outages affecting multiple applications or services.
d) None of the options is correct.

Question: On a particular server:

a) You can reboot a virtual machine without it having any effect on the other virtual machines.

b) If you reboot one virtual machine, all the other virtual machines reboot at the same time.

c) If you need to reboot one virtual machine, you have to first reboot the physical server. The individual virtual machines then reboot automatically when the physical machine reboot is finished.

d) None of the options is correct.

Links

- https://azure.microsoft.com/en-in/overview/what-is-a-virtual-machine/#overview
- https://www.vmware.com/topics/glossary/content/virtual-machine

Thanks