Information Technology System Concepts Tutorial

Computer Science · Answer Key · 19 Questions

1. What is the primary mechanism through which operating systems abstract hardware resources for applications?

A) Providing a common interface via system calls
B) Offering full hardware platform abstraction
C) Enforcing strong isolation between entire system environments
D) Allowing multiple OSs to run concurrently on a single physical machine

2. Which technology is generally more efficient for deploying a scalable application, especially for microservices, due to its lightweight nature and faster startup times?

A) Virtualized environments
B) Container-based setups
C) Traditional physical servers
D) Bare-metal cloud instances

3. In overcommitted cloud environments, what can cause VM performance degradation?

A) Excessive paging leading to thrashing
B) Memory deduplication
C) Dynamic memory allocation by hypervisors
D) Ballooning of memory

4. How did virtualization influence the shift to cloud-native solutions by decoupling software from hardware?

A) It enabled server consolidation and reduced hardware costs, laying the foundation for IaaS.
B) It increased the complexity of hardware management.
C) It led to a decrease in the adoption of pay-per-use models.
D) It made auto-scaling less feasible.

5. What is a significant security risk associated with a compromised hypervisor in a cloud environment?

A) VM escape, allowing control of the host
B) Reduced isolation between VMs
C) Unrestricted access to other VMs' memory or storage
D) Increased susceptibility to denial-of-service attacks

6. For migrating a legacy application with strict configuration dependencies, which cloud service model is most suitable?

A) IaaS (Infrastructure as a Service)
B) PaaS (Platform as a Service)
C) SaaS (Software as a Service)
D) FaaS (Function as a Service)

7. When designing a high-level architecture for a legacy application migration using VMs, what component would typically be used for persistent storage attached to each VM?

A) Persistent block storage (e.g., AWS EBS)
B) Object storage (e.g., AWS S3)
C) Local instance storage
D) Network Attached Storage (NAS)

8. What is a potential technical challenge when migrating legacy applications to the cloud, and how can it be mitigated?

A) Challenge: Poor scalability; Mitigation: Use performance monitoring and VM resizing.
B) Challenge: High network latency; Mitigation: Increase application code complexity.
C) Challenge: Incompatible operating systems; Mitigation: Convert all applications to a single OS.
D) Challenge: Increased hardware costs; Mitigation: Reduce the number of VMs used.

9. Compared to operating systems, what does a virtual machine provide a stronger abstraction of?

A) An entire hardware platform
B) Individual hardware resources
C) Application-specific interfaces
D) Network connectivity

10. Which of the following is a characteristic of container-based setups that makes them efficient for scalability?

A) Sharing the host OS kernel
B) Requiring a separate OS for each container
C) Higher resource overhead compared to VMs
D) Slower startup times

11. Which operating system memory management policy can lead to VM performance degradation due to excessive page swapping?

A) Paging
B) Memory deduplication
C) Ballooning
D) Smart allocation algorithms

12. What is a key benefit of virtualization that contributed to the shift towards cloud-native solutions?

A) Decoupling software from physical hardware
B) Increasing the reliance on physical hardware
C) Limiting the ability to consolidate servers
D) Reducing the adoption of DevOps practices

13. Modern hypervisors mitigate security risks by implementing measures such as:

A) Secure boot and encryption
B) Allowing direct access to host memory
C) Disabling regular patching
D) Reducing isolation between VMs

14. Why might VMs be preferred over containers for certain legacy applications?

A) When application components require different OSs or strong isolation.
B) When the application is designed for microservices.
C) When fast startup times are critical.
D) When resource efficiency is the top priority.

15. What is a characteristic of virtual machines that makes them less resource-efficient than containers?

A) Higher resource overhead
B) Sharing the host OS kernel
C) Faster startup times
D) Lightweight nature

16. Which memory management technique can improve efficiency in virtualized setups by freeing up unused memory from VMs?

A) Ballooning
B) Paging
C) Thrashing
D) Swapping

17. The evolution of virtualization technologies has directly supported which aspect of cloud-native designs?

A) Auto-scaling
B) Increased hardware dependency
C) Reduced reliance on APIs
D) Slower disaster recovery

18. What is the primary function of the hypervisor in relation to virtual machines?

A) To enforce isolation between VMs
B) To provide a user interface for applications
C) To manage individual hardware components
D) To directly run applications without an OS

19. For a legacy application migration, why is IaaS a good recommendation over PaaS or SaaS?

A) It provides full control over the OS and application stack.
B) It requires significant code changes.
C) It offers less customization.
D) It abstracts away the operating system entirely.