

**SSN COLLEGE OF ENGINEERING, KALAVAKKAM**

Department of Computer Science and Engineering

**B.E. (CSE) VII Semester UNIT TEST – I**

**CS6703 GRID AND CLOUD COMPUTING**

**Date: 24.07.2017**

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**Time: 08.00 – 09:30 a.m.**

**Max. Marks: 50**

**Unit Test – I - Answer Key**

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**Part A (10 x 2 = 20)**

**1. Define and Differentiate Grid and Cloud Computing. (CO1) (K2)**

**Grid Computing:** Grid computing (Foster and Kesselman, 1999) is a growing technology that facilitates the executions of large-scale resource intensive applications on geographically distributed computing resources

**Cloud computing** provides pool of resources like compute, storage, networking components and IO devices to users on demand. Users pay for the service they use from cloud.

OR

Cloud computing is the use of computing resources (hardware and software) from the pool of virtualized computer resources that are delivered as a service over a network (typically the Internet). Customers pay for the resources they use.

S.No.	GRID COMPUTING	CLOUD COMPUTING
1	GRID does not use virtualization to provide resources on-demand.	Virtualization is the key technology that enables the cloud.
2	GRID is set mainly between community organizations	Cloud is set by a single Organization and used by many people with the help of internet
3	Used by researchers	Open for public
4	No pay per usage model	Pay per usage model

**2. How does Cloud Computing provides on-demand functionality? (CO2) (K3)**

**Ans:** Cloud provides on-demand functionality using a pay-per-use model which is implemented as follows:

- A cloud comprises large number of physical instances (resource pool)
- The cloud provider maps the incoming request to a free resource from the resource pool
- It uses virtualization to create a virtual instance according to the specified request

- If oversubscription is used, then cloud provider uses live VM migration to support SLAs.

**3. Whether Grid computing supports Virtualization? If yes, how? (CO2) (K3)**

**Ans:** Grid mostly does not support virtualization of hardware resources like CPU, memory, IO devices. At times for collaborative sharing of compute resources, the server is virtualized.

**Is Virtualization necessary for Cloud? Justify (CO2) (K2)**

**Ans:** Cloud can exist without virtualization. But it is difficult and inefficient. Cloud makes the notion of “Pay for what you use” and infinite availability – Use as much as you want. This is practical only with lot of flexibility and efficiency at back end. Efficiency is readily available in virtualized environment. Virtualization enables rapid scaling of resources.

**4. Sketch and define SOA. (CO1) (K2)**

**Ans:** A service-oriented architecture (SOA) is an architectural pattern in computer software design in which application components provide services to other components via a communications protocol, typically over a network.



**5. What are the design requirements of VMM? (CO2) (K1)**

**Ans:** The design requirements of VMM are as follows:

- should provide an environment for programs which is essentially identical to the original machine.
- should not introduce too much overhead, programs run in this environment should show, at worst, only minor decreases in speed.
- VMM should be in complete control of the system resources and allocates resources to VM.
- It is not possible for a program to access any resource not explicitly allocated to it.

**Part B (3 x 10 = 30)**

**6.a. Briefly define the following basic techniques and technologies that represent recent related advances in computer architecture, parallel processing, distributed computing, Internet technology and information services. Categorize the technique that provides advancements to above mentioned technologies. (CO1) (K3) (3+3+4+3+3)**

**i. High-performance Computing (HPC) system**

**Ans:** HPC demands accurate results and they are used in Scientific applications. This is an advancement to distributed computing.

## **ii. High-throughput Computing (HTC) system**

**Ans:** HTC demands results to be produced in very less time. Result may be appropriate rather than being accurate. This is widely used in Business application. This provides advancement to Parallel Processing.

## **iii. Peer-to-peer (P2P) network**

**Ans:** P2P is self-organizing network without any master-slave kind of architecture. It includes heterogeneous resources and peer may join and leave the network at any time. Peers work in a co-ordinated way to provide a service. Overlay network is a network that is formed on top of physical network in P2P system in order to connect nodes together that provide a service. P2P provides advancement to Distributed Computing & Information Services.

## **iv. Computer cluster versus Computational grid.**

**Ans:** Cluster of machines provide a cooperative environment in which set of machines form a cluster in a particular locations. It is necessary to combine all machines with heterogeneous resources as a single system image.

Computational Grid allow applications to run on a remote server, and can have heterogeneous resources. These two provide advancement to Distributed Computing & Internet Technology.

## **v. Virtual machine versus virtual infrastructure**

**Ans:** Virtual Machine provide a similar platform as that of original machine which allows users to install OS and develop applications. Virtual Infrastructure was formed by virtualizing the physical resources and utilizing the existing resources efficiently. These provide advancement to computer architecture.

OR

## **6. b. i. What are the differences between multicore CPUs and GPUs in terms of architecture and usage? (CO1) (K2) (8)**

**Ans: Multicore CPU** has many cores which could be used for data intensive application.

**GPU:** GPU consists of hundreds to thousands of simple cores for processing data intensive applications. It takes care of video processing. It helps CPU in performing floating point operations

ii. What type of Virtualization is more suitable in IaaS, PaaS and SaaS service layers? Justify your answer. (CO2) (K3) (6)

**Ans: IaaS:** Hardware-assisted Virtualization. Easy to add a hardware while designing the architecture.

**PaaS:** Para-Virtualization. Easy to modify the guest OS.

**SaaS:** Full Virtualization. It hides and simulates the underlying hardware completely without affecting application flexibility.

iii. How is the hardware-level virtualization issues addressed? (CO2) (K2) (2)

**Ans:** To reduce the performance overhead of hardware – level virtualization OS-level virtualization is designed. Operating system level virtualization inserts a virtualization layer inside an operating system to partition a machine's physical resources

## **7. a. Explain different types of Virtualization in Cloud Computing and give advantages and disadvantages of each type of Virtualization (6 + 4) (CO2) (K2)**

**Ans:** Full Virtualization

Para-Virtualization

Hardware-assisted Virtualization and OS-Level Virtualization

OR

**7. b. What is the purpose for Live Migration of VM? Explain Live Migration process of a VM from one host to another with neat diagram. (CO2) (K2) (2+5+3)**

**Ans: Purpose of Live Migration:** Load Balancing, Allowing applications to run even during power failure at a data center, Prior identification of failure in data centre, would allow applications to run on different host..

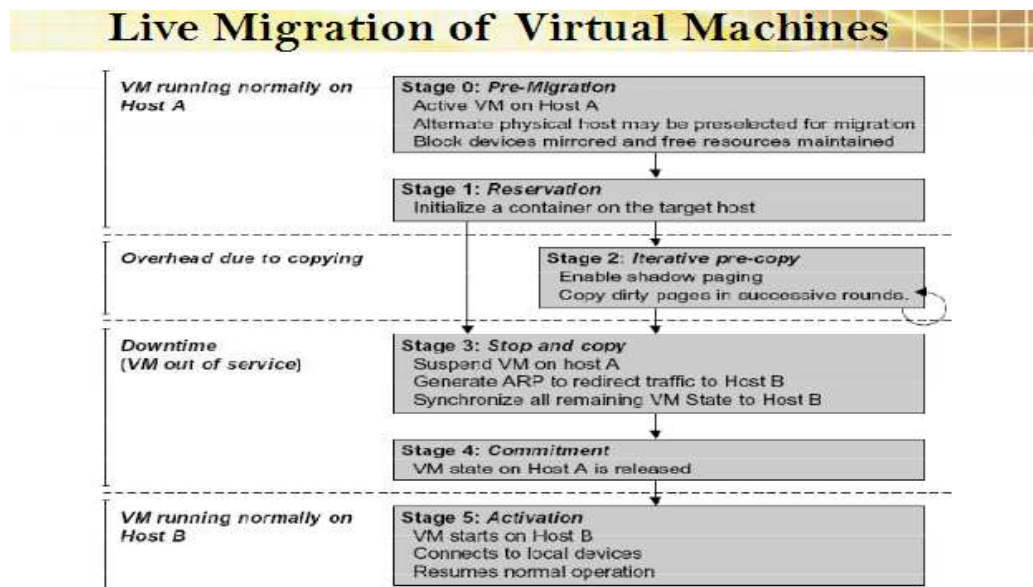


FIGURE 3.20

Live migration process of a VM from one host to another.

**8. a. Explain the Cloud Deployment models and services of cloud computing with one example for each service. (7) (CO2) (K2)**

### Deployment Models

1. Private Cloud
2. Public Cloud
3. Hybrid Cloud
4. Community Cloud

### Service Models

1. Infrastructure as a Service
2. Platform as a Service
3. Software as a Service.

OR

**8. b. Discuss about the Pros and Cons of Cloud Computing. (7) (CO3) (K1)**

**Ans: Pros**

- Lower-Cost Computers for Users
- Improved Performance
- Lower IT Infrastructure Costs
- Fewer Maintenance Issues
- Lower Software Costs
- Instant Software Updates
- Increased Computing Power
- Unlimited Storage Capacity
- Increased Computing Power
- Unlimited Storage Capacity
- Increased Data Safety
- Improved Compatibility Between Operating Systems
- Improved Document Format Compatibility
- Easier Group Collaboration
- Universal Access to Documents
- Latest Version Availability
- Removes the Tether to Specific Devices

**Cons**

- Requires a Constant Internet Connection
- Doesn't Work Well with Low-Speed Connections
- Can Be Slow
- Features Might Be Limited
- Stored Data Might Not Be Secure
- If the Cloud Loses Your Data, You're Screwed

**PART C**

**9. a. Explain about the technology that is appropriate for Scientific applications, Collaborative Research and Development. Discuss about how it is different from Distributed Computing. (CO1) (K3) (7)**

**Grid Computing.** Grid computing is focused on the ability to support computation across multiple administrative domains that sets it apart from traditional distributed computing. Grids offer a way of using the information technology resources optimally inside an organization involving virtualization of computing resources. Its concept of support for multiple administrative policies and security authentication and authorization mechanisms enables it to be distributed over a local, metropolitan, or wide-area network.

**Distributed Computing:** Distributed Computing is an environment in which a group of independent and geographically dispersed computer systems take part to solve a complex problem, each by solving a part of solution and then combining the result from all computers. These systems are loosely coupled systems coordinately working for a common goal.

### **Difference between Distributed and Grid Computing**

**Distributed Computing** normally refers to managing or pooling the hundreds or thousands of computer systems which individually are more limited in their memory and processing power. On the other hand, **grid computing** has some extra characteristics. It is concerned to efficient utilization of a pool of heterogeneous systems with optimal workload management utilizing an enterprise's entire computational resources (servers, networks, storage, and information) acting together to create one or more large pools of computing resources. Grid uses resources across administrative domains. There is no limitation of users, departments or originations in grid computing.

OR

**9. b. Suppose imagine that organizations can't get the hardware or infrastructure that a particular application needs from a public cloud provider. For example, if your workload needs a virtual machine (VM) with 24GB of RAM and just two CPUs, a public cloud provider will most likely offer you the biggest instance type (VM with higher capacity than what you require) which is available with provider and it may not be cost effective for you. And the organization demands that the application data pertaining to people in that locale remain within the country. What technologies need to be implemented to tackle this scenario? Justify your answer. (CO2) (K3) (7)**

**Ans:** Data Centre Virtualization or Private Cloud.