

## **COMPUTER ENGINEERING DEPARTMENT**

### **ASSIGNMENT NO. 1**

#### **Subject: Cloud Computing**

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#### **CCL Assignment - 1**

<b>Sr. No.</b>	<b>Questions</b>	
1	What is service-oriented architecture and explain how it supports cloud computing?	[LO1]
2	Explain the Google app engine in detail and which cloud service is provided by GAP.	[LO1]
3	Explain in detail various cloud service models.	[LO1]
4	What is a hypervisor? Explain the architecture of any bare-metal hypervisor in detail.	[LO2]
5	Explain different cloud computing risks and benefits of virtualization.	[LO2]
6	What is an OpenStack? Explain in detail.	[LO3]

**Student Signature:**

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## CCL Assignment - 1

Q1: What is service oriented architecture and explain how it supports cloud computing.

Ans:

- Service Oriented Architecture (SOA) is a stage in the evolution of application development and integration.
- It defines a way to make software components reusable using the interfaces.
- SOA is an architectural approach in which applications make use of services available in the network.
- In this architecture, services are provided to form applications through a network call over the Internet.
- It uses common communication standards to speed up and streamline the service integration in applications.

How it supports cloud computing

- Migrating to the cloud is a significant and practical step for any enterprise to do with SOA integration in the cloud environment, business reap many benefits like enhanced performance, security, faster deployments and better monitoring.
- While SOA and cloud computing does exist separately and concurrently, the two technology complement each other well.
- SOA makes it easier to deploy SaaS in cloud platform while the cloud supplies the processing power and other resources required for the process.

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- SOA and cloud integration makes it easier for your organization to collaborate within and with IT as well. Cloud technology lays out a strong foundation for SOA through its storage and other platform services.
- With SOA in their cloud computing, business can reuse the already designed services, making it cost beneficial, and increased usability of software inventory.
- The reusability of existing services automatically skips the extensive and detailed testing process.
- Each element in SOA is a relatively autonomous unit. So, when you extend the cloud resources to it, SOA provides strong and direct interfaces and architecture for a robust cloud computing platform.
- Developers can find the required services to assemble any new application quickly. That gives the company the ability to respond to any business or technological shifts promptly.
- The SOA interface successfully processes the transmission of data and information while coordinating perfectly between various applications and service activities.
- Enterprises gain agility in run-time response to any changes with lower complexity and disbursement.

Q2. Explain Google App Engine in detail, and which cloud service is provided by GAE.

Ans:

### Google App Engine

- Google App Engine is also called as GAE or just App Engine. It is considered as framework of web and cloud computing platform used to develop and host various types of web applications in Google-managed data centers. These applications are executed on multiple servers.
- For an application if number of requests increases, automatic scaling is provided by the App Engine. For such web applications, to handle increasing demand more resources are allocated by the app engine automatically.
- For certain level, Google App Engine provides free usage of resources. Afterwards, fees are applied for additional storage, bandwidth or any other resource essential to the application.
- Google App Engine is released in April 2008 as a preview version and as Final in September 2011.
- Microsoft Azure is the primary cloud service platform for a broad range of operations which is adopted by GAE.

Q.3. Explain in detail various cloud service models.

Ans:

### Cloud Service Models

- ① Infrastructure as a Service (IaaS)
- ② Platform as a Service (PaaS)
- ③ Software as a Service (SaaS)

#### Infrastructure as a Service (IaaS)

- IaaS is also known as Hardware as a Service (HaaS)
- It is a computing infrastructure managed over the internet.
- The main advantage of using IaaS is that it helps users to avoid the cost and complexity of purchasing and managing the physical servers.

#### Characteristics of IaaS

- ① Resources are available as a service
- ② Services are highly scalable
- ③ Dynamic and flexible
- ④ GUI and API based access.
- ⑤ Automated administrative tasks

#### Example:

- ① Amazon Web Services (AWS)
- ② Microsoft Azure
- ③ Google Compute Engine (GCE)
- ④ Cisco Metacloud
- ⑤ Digital Ocean

### Platform as a Service (PaaS)

- PaaS cloud computing platform is created for the programmer to develop, test, run and manage the applications.

#### Characteristics of PaaS.

- ① Accessible to various users via the same development application
- ② Integrates with web services and databases
- ③ Builds on virtualization technology so resources can easily be scaled up or down as per the organization's need
- ④ Support multiple languages and frameworks
- ⑤ Provides an ability to auto-scale

#### Examples!

- ① AWS Elastic Beanstalk
- ② Windows Azure
- ③ Heroku
- ④ Google App Engine
- ⑤ OpenShift

## Software as a Service (SaaS)

- SaaS is also known as on-demand software.
- It is a software in which the applications are hosted by a cloud service provider.
- Users can access these applications with the help of internet connection and web browser.

### Characteristics of SaaS.

- ① Managed from a central location
- ② Hosted on a remote server
- ③ Accessible over the internet.
- ④ Users are not responsible for hardware and software updates. Updates are applied automatically
- ⑤ The services are purchased on the pay as per use basis.

### Example:

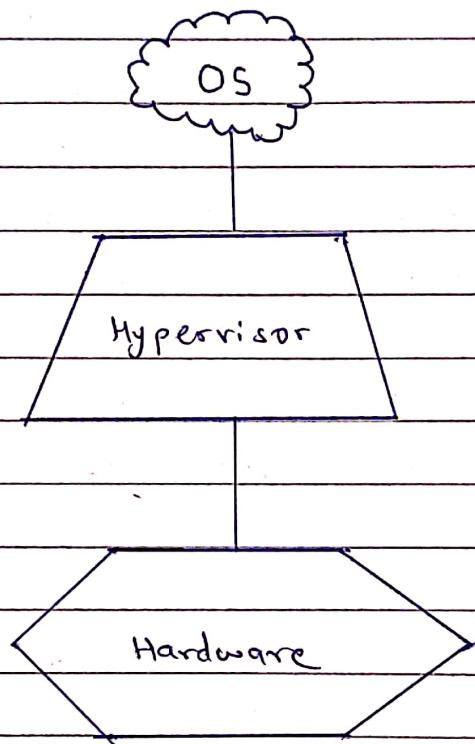
- ① Google Apps
- ② GotoMeeting
- ③ Dropbox
- ④ Salesforce
- ⑤ Slack.

Q4: What is a hypervisor? Explain architecture of any bare metal hypervisor in detail.

Ans:

- A hypervisor, also known as a virtual machine monitor (VMM) is a type of virtualization software that supports the creation and management of virtual machines by separating a computer's software from its hardware.
- Hypervisors translate requests between the physical and virtual resources, making virtualization possible.
- When a hypervisor is installed directly on a hardware of a physical machine, between the hardware and the Operating system (OS), it is called a bare-metal hypervisor.
- Some bare metal hypervisors are embedded into the firmware at the same level as the motherboard basic input/output system (BIOS). This is necessary for some systems to enable the operating system on a computer to access and use virtualization software.
- Because the bare metal hypervisor separates the OS from the underlying hardware, the software no longer relies on or is limited to specific hardware devices or drivers.
- This means bare-metal hypervisors allow operating systems and their associated applications to run on a variety of types of hardware.
- They also allow multiple operating systems and virtual machines to reside on the same physical server.

- Because the virtual machines are independent of the physical machine, they can move from machine to machine or platform to platform; shifting workloads are allocating networking, memory, storage and processing resources across multiple servers according to needs.



Q5. Explain different cloud computing risks and benefits of virtualization.

Ans:

Benefits of virtualization in cloud computing

#### ① Flexibility

- Organizations have the flexibility to share systems without essentially having to share critical information or data across the systems

#### ② Data Protection

- They can prevent loss or damage to critical data in cases where the system is compromised owing to malicious activities.

#### ③ Security against attacks

- They have the ability to reduce the risk of multiple attacks in case of an exposure by methodically isolating applications and virtual machines

#### ④ Cost Effectiveness

- It improves the physical security of organizations by reducing hardware requirements, thereby leading to fewer data centers.

#### ⑤ Better Access Control

- A higher level of access control is offered to system and network administrators which separates responsibilities and improves the system's efficiency.

## Risks of Virtualization in Cloud Computing

### ① It can be expensive

- Virtualization can be quite a pricey investment upfront.

### ② Virtualization might not be compatible with other services and applications

- It may be possible that not all servers and applications are virtualization friendly.

### ③ It creates a security risk

- In virtualization system, sometimes maintaining security of data gets difficult.

### ④ It creates an availability issue

- It is a little bit uncertain that every time there will be availability of resources.

### ⑤ It requires several links in a chain that must work together cohesively

Q6 What is Openstack. Explain in detail.

Ans:

- Openstack is a free and open-source cloud-computing software platform. Users primarily deploy it as an Infrastructure-as-a-service (IaaS).
- The technology consists of a group of interrelated projects that controls pools of processing, storage and networking resources throughout a data center - which users manage through a web-based dashboard, through command-line tools or through a RESTful API.

#### Components of Openstack.

- Openstack is made up of many different moving parts. Because of its open nature, anyone can add additional components to Openstack to help it to meet their needs.
- But the Openstack community has collaboratively identified nine key components that are a part of the "core" of Openstack.

- ① Nova is the primary computing engine behind Openstack
- ② Swift is a storage system for objects and files
- ③ Cinder is a block storage component.
- ④ Horizon is the dashboard behind Openstack
- ⑤ Keystone provides identity services for Openstack.
- ⑥ Glance provides image services to Openstack.
- ⑦ Neutron provides the networking capability for Openstack
- ⑧ Ceilometer provides telemetry services
- ⑨ Heat is the orchestration component of Openstack.

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## Features of OpenStack

- ① Capability and Portability
- ② Security
- ③ Management and Visibility
- ④ Cloud storage
- ⑤ Quality Control.