

Cloud Computing Assignment :- Q4

Ques Give a detailed discussion for the following :-

- 1) Open source IaaS software (any one with architecture) ?
- # **Eucalyptus** :- It is an open source software platform for carry out IaaS or infrastructure as a service in hybrid cloud computing or private cloud computing environment. Eucalyptus in cloud computing pools together existing virtualized framework to make cloud resources for storage as a service, network as a service and infrastructure as a service.
- Elastic Utility computing Architecture for linking your programs to useful systems is short known as Eucalyptus in cloud computing
- > The architecture of eucalyptus consists of the following readings :-
 1. **Images** :- Any software application configuration, module software or framework software packaged and conveyed in the Eucalyptus cloud is known as Eucalyptus Machine Image.
 2. **Instances** :- When we run the picture and utilize it, it turns into an instance
 3. **Networking** :- The eucalyptus network is partitioned into three modes : static mode, system mode & managed mode.

4. Access control :- It is utilized to give limitations to clients.
 5. Eucalyptus Elastic Block Storage :- It gives block-level storage volumes to connect to an instance.
 6. Auto-scaling and load adjusting :- It is utilized to make or obliterate cases or administrations dependent on necessities.
- » Components of Eucalyptus :-
1. cluster controller :- It oversees at least one Node controller and liable for sending and overseeing occurrences on them.
 2. Storage controller :- It permits the making of depictions of volumes.
 3. cloud controller :- It is a front end for whole environment.
 4. Walrus storage controller :- It is a straightforward record storage framework.
 5. Node controller :- It is an essential part of Nodes. It keeps up life cycle of the occasions running on every node. Also, various other tools can be utilized to associate with AWS and Eucalyptus which are Vagrant AWS plugin (to give config records to oversee AWS instance), s3curl (for collaboration between AWS S3 and Eucalyptus walrus) s3fs (utilised to mount a bucket from walrus or S3 as local document framework)

CloudBerry S3 Explorer (instrument for overseeing documents among S3 and Walrus)

>> Advantages:-

1. It can be utilized to benefit both Eucalyptus private cloud and Eucalyptus public cloud.
2. Clients can run Amazon or Eucalyptus machine pictures as examples on both clouds.
3. It isn't extremely mainstream or look out yet is a solid contender to CloudStack and OpenStack.
4. It has 100% Application programming interface similarity with all Amazon web services.
5. Eucalyptus can be utilized with DevOps apparatuses like chef and Puppet.

2) Open Source PaaS software (any one with architecture)?

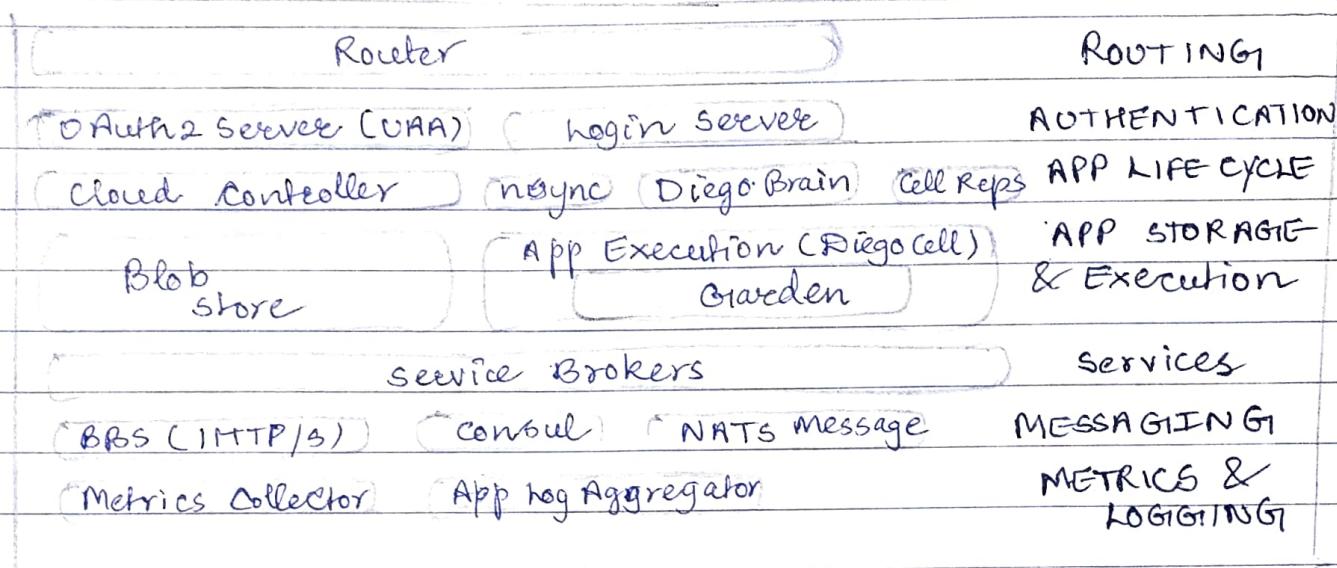
Cloud Foundry:

Cloud Foundry is an open source cloud computing platform developed in house at VMware. It is optimized to deliver:-

- Fast application development and deployment
- High scalable and available architecture
- DevOps-friendly workflows
- A reduced chance of human error
- Multi-tenant compute efficiencies

Cloud Foundry not only lightens developers' workloads but also handles so much of an application's resource management and reduce the overhead burden of team operations, freeing resources for development.

the architecture of Cloud Foundry is:-



Cloud Foundry Architecture

- Router :- The router routes incoming traffic to appropriate component, either a cloud controller component or a hosted application running on Diego Cell. The router periodically queries the Diego Bulletin Board System (BBS) to determine which cells & containers each application runs on.
- Authentication :- OAuth2 Server (VAA) and Login Server work together to provide identity management.
- App Life Cycle :- Cloud Controller (CC) and Diego Brain directs the deployment of applications to push an app to cloud foundry, you target the cc. The sync, BBS and cell Rep components work together along a chain to keep apps running. At one end is user and at other are instances of applications running

- App Storage and Execution :- It consists of "Blobstore" a repository for large binary files which contains application code packages, Buildpacks, Droplets etc. The "Diego Cell" component that manages the lifecycle of these containers and the processes running in them.
- Services :- The service broker for a particular service is responsible for providing the service instance.
- Messaging :- consists of internal HTTPs and BBS. The cloud foundry component VMs communicate with each other internally through HTTP and HTTPS protocols, sharing temporary messages and data stored in Diego's Bulletin Board system.
- Metrics and Logging :- The loggerator system streams application logs to developers and the metrics collector gather metrics and statistic from the components.

3) Open Source SaaS software (any one with architecture)

OpenNebula :- It is a powerful, easy-to-use, open source platform to build and manage Enterprise clouds. OpenNebula provides unified management of IT infrastructure and applications, ~~and avoiding~~ vendor lock-in and reducing complexity resource consumption and operational costs.

- OpenNebula combines virtualization and container technologies with multi-tenancy, automatic provision

and elasticity to offer on-demand applications and services.

- Benefits of OpenNebula :-
- It is 100% open source & offers all features in one edition
- It provides control via command line or web interface, which is ideal for a variety of groups and needs
- OpenNebula is available for all major Linux distributions these, simplifying installation
- It is interoperable and supports OCCI and AWS.

Architecture of OpenNebula :-

A standard openNebula cloud consists of Cloud Management Cluster, with front-end node(s) and the Cloud Infrastructure made of one or several workload clusters. These can be located at multiple geographical locations, with different configurations and technologies to better meet your needs;

- i) Edge cluster :- can be automatically deployed both on-premise and on public cloud or edge providers to enable true hybrid environments.
- ii) Open Cloud Clusters :- based on certified combinations of open source hypervisors, storage and networking technologies
- iii) VMware Clusters :- that use existing VMware infrastructures.

4) Open source Cloud Simulator software (any one with architecture)

CloudSim :- is an open-source framework, which is used to simulate cloud computing infrastructure and services. It is used for modelling and simulating a cloud computing environment as a means for evaluating a hypothesis prior to software development in order to reproduce test and results.

- The Advantages of CloudSim are:-

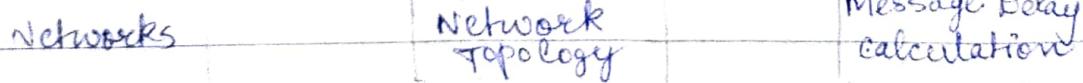
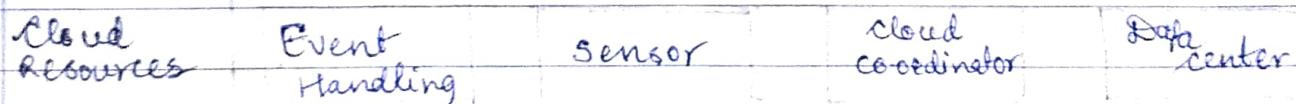
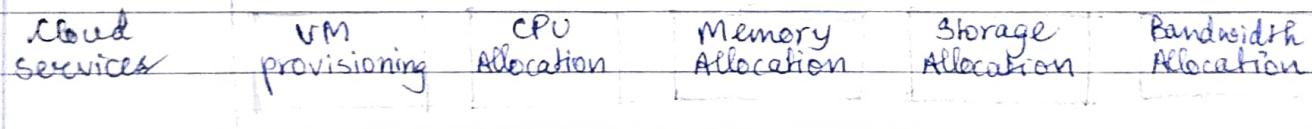
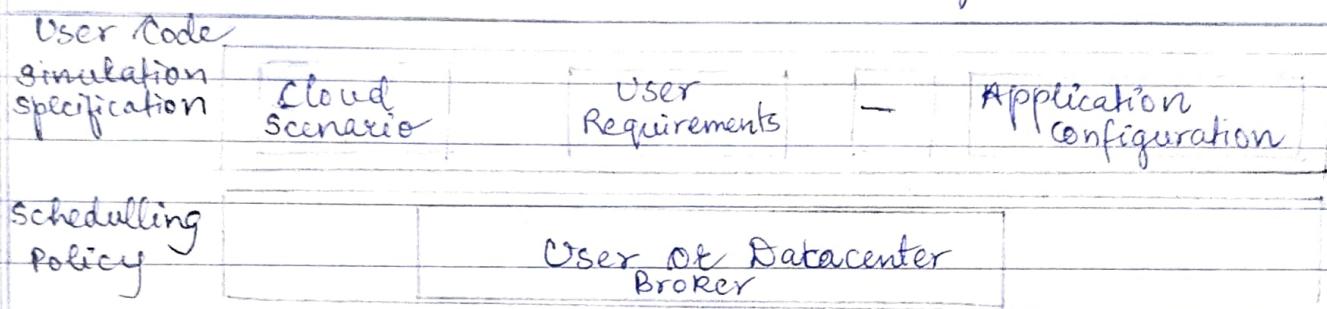
- Open source and free of cost, so it favours developers to work in the field.
- Easy to download and set-up
- It is more generalized and extensible to support modelling and experimentation.
- Does not require any high-specs computer to work on.
- Provides pre-defined allocation policies and utilization models for managing resources
- Tackle bottleneck before deployment to reduce risk, lower costs, increase performance and raise revenue.

- The Advantages Architecture of CloudSim includes :-

- CloudSim Core Simulation Engine :- provides interface for management of resources such as VM, memory and bandwidth of virtualized Datacenters.
- CloudSim layer manages the creation and execution of core entities such as VMs, cloudlets etc. It also handles network-related execution along with provisioning of

resources and their execution and management.

- User Code :- is the layer controlled by the user. The developer can write the requirement of the hardware specifications in this layer according to the scenario.



Cloudsim Core Simulation Engine
Architecture of Cloud Sim

Some of most common classes are:-

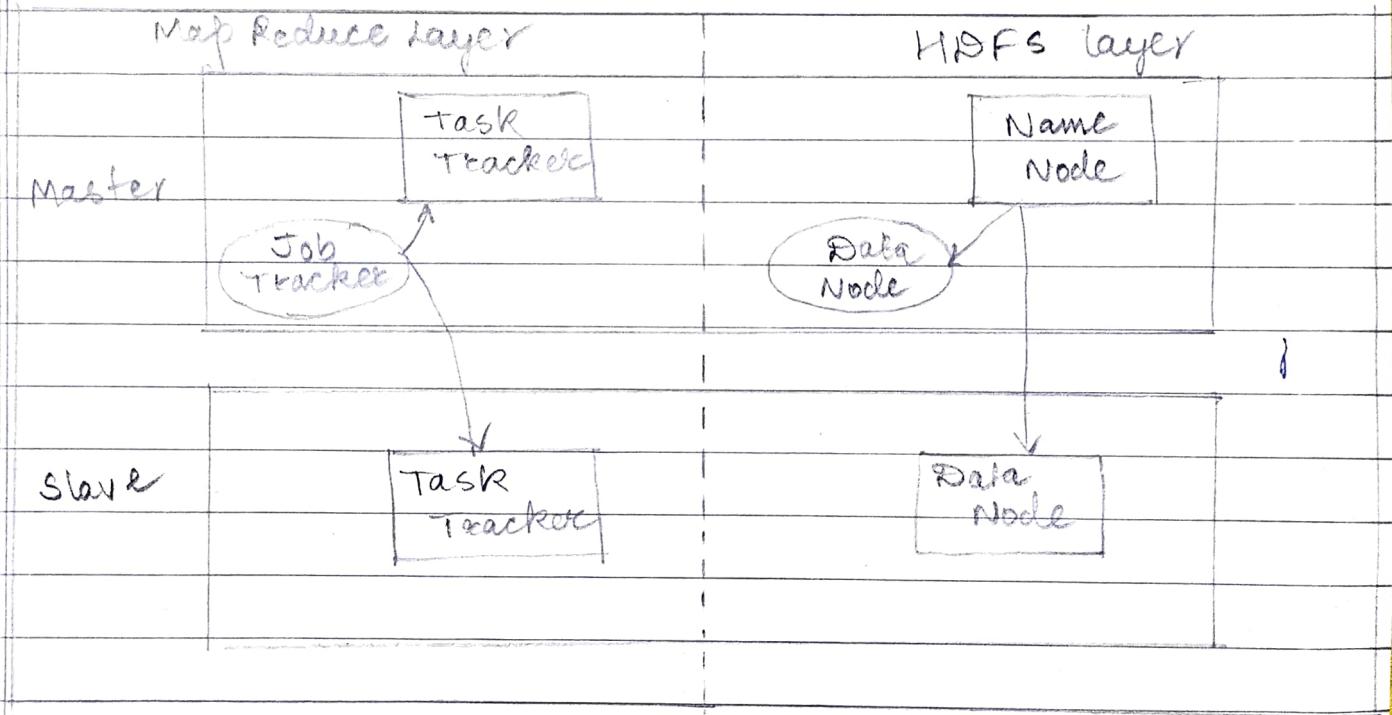
- Datacenter :- used for modelling the foundational hardware equipment of any cloud environment, that is Datacenter. This class provides methods to specify functional requirements.
- Host :- this class executes actions related to management of virtual machines. It also defines policies for provisioning memory and bandwidth to virtual machines.
- VM :- this class represents a virtual machine by providing data members defining VM's bandwidth RAM and mips.
- Cloudlet :- a class representing any task that is run on VM, like a processing task, or a memory access task or file updating task.
- Datacenter Broker :- is an entity acting on behalf of user / customer. It is responsible for functioning of VMs.
- CloudSim :- class responsible for initializing and starting the simulation environment after all cloud entities have been defined and later stopping

5) Open source Distributed Systems Software (any one software with architecture) ?

Hadoop :- The Hadoop Distributed file system is a distributed file system for Hadoop. It contains a master-slave architecture. This architecture consists of a single NameNode performing the role of master, and multiple

DataNodes performing the role of a slave. The various architectural components are :-

- Name Node :- It is a single master server node existing in the HDFS cluster. It manages the file system namespace by executing an operation like opening, renaming and closing the files.
- Data Node :- The HDFS cluster contains multiple DataNodes. It is responsibility of DataNode to read and write requests from the file system's clients. Also performs creation, deletion and replication upon instruction from NameNode.



Hadoop Architecture

- Job Tracker :- The role of Job Tracker is to accept the Map Reduce jobs from client and process the data by using NameNode. In response, NameNode provides metadata to Job Tracker.

- Task Tracker :- It works as a slave node for Job Tracker. It receives task & code from Job Tracker & applies that code on the file. This process is also called as a Mapper.
- >> MapReduce layer :- It comes into existence when the client application submits the Map Reduce Job to Job Tracker. In response, the Job Tracker sends the request to appropriate Task Trackers.