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Title of Assignment: Assignment no.2 Study and implementation of Infrastructure as a Service		
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Aim: Study and implementation of Infrastructure as a Service

Problem Statement: Study and implementation of Infrastructure as a Service

Background Information:

IaaS is also known as Hardware as a Service (HaaS). It is one of the layers of the cloud computing platform. It allows customers to outsource their IT infrastructures such as servers, networking, processing, storage, virtual machines, and other resources. Customers access these resources on the Internet using the pay-as-per-user model.

In traditional hosting services, IT infrastructure was rented out for a specific period of time, with pre-determined hardware configuration. The client paid for the configuration and time, regardless of the actual use. With the help of the IaaS cloud computing platform layer, clients can dynamically scale the configuration to meet changing requirements and are billed only for the services actually used.

IaaS cloud computing platform layer eliminates the need for every organization to maintain the IT infrastructure.

IaaS is offered in three models: public, private, and hybrid cloud. The private cloud implies that the infrastructure resides at the customer's premises. In the case of the public cloud, it is located at the cloud computing platform vendor's data center, and the hybrid cloud is a combination of the two in which the customer selects the best of both public cloud and private cloud.

IaaS provider provides the following services -

- Compute: Computing as a Service includes virtual central processing units and virtual main memory for the Vms that is provisioned to the end-users.
- Storage: IaaS provider provides back-end storage for storing files.

- **Network:** Network as a Service (NaaS) provides networking components such as routers, switches, and bridges for the VMS.
- **Load balancers:** It provides load-balancing capability at the infrastructure layer.

How to Implement:

The implementation of the service is achieved on multiple platforms. It can be done on public, private, community, or hybrid cloud services. There are now many big infrastructures as a Service providers as this idea is fast catching up all over the world due to the enormous advantages of Iaas and its increasing affordability to business organizations.

There are many things to consider before choosing the Iaas companies and implementing the system. Some of the points to ponder before deciding on moving to the Iaas cloud computing platform and choosing the Iaas provider are listed below.

- **A Reason**– You must have a compelling business basis and purpose that makes you decide on moving to the Iaas bandwagon.
- **A strategy**– Once you decide, you need to have a clear strategy for moving forward by thinking ahead regarding any potential disruptions to any part of the business operation.
- **An Estimate**– You have to work out a proper estimate of the cost and savings due to the migration.

- **Testing**– Once decided, run a test on a small part of the project to check its reliability and functioning to forestall any potential bottlenecks.
- **Full understanding**– There should be full convergence and clarity between the provider and user regarding the requirements and terms of the agreement.
- **Information**– Keep all relevant parties, from employees, vendors, clients, and investors, informed about the schedule.
- **Backup**– Have multiple back-ups of all data before the switchover.

Detailed analyses of the multiple Infrastructure as a service, IaaS, and providers concerning all relevant factors like their expertise, cost, experience, implementation, service, and other factors are to be done before finally choosing one vendor.

Working of IAAS:

SaaS, PaaS, and IaaS in cloud computing make up the three fundamental service delivery methods. Typically, an IaaS provider allows clients access to their infrastructure consisting of servers, storage, data center, networking, and computing over the internet as per clients' requirements. The user organization can create an IT environment that suits his needs.

Usually, the services offered by an IaaS provider include other benefits like billing management, access management, IP address, storage, security, backup, network connections, and related items. The users have the flexibility to design their IT infrastructure as per their business requirements. The IaaS cloud provider services are charged on a pay-by-

use method which gives flexibility to the users to scale up or down the service requirements based on the business volume and data storage.

The Iaas architecture is the structural design of the computing network that delivers computing resources through the cloud. The specific architecture for a business can vary depending on the requirements and goals of the client organization.

Hardware/Software Required: Ubuntu operating system, Virtual machine, WAMP/ZAMP server, any tool or technology that can be used for implementation of web application e.g., JAVA, PHP, etc.

Procedure:

Installation Steps:

(<https://docs.openstack.org/devstack/latest/guides/single-machine.html>)

1. Add user

```
useradd -s /bin/bash -d /opt/stack -m stack
```

```
apt-get install sudo -y
```

```
echo "stack ALL=(ALL) NOPASSWD: ALL" >> /etc/sudoers
```

```
login as stack user
```

2. Download DevStack

```
sudo apt-get install git -y || sudo yum install -y git
```

```
git clone https://git.openstack.org/openstack-dev/devstack
```

```
cd devstack
```

3. Run DevStack

Now to configure stack.sh. DevStack includes a sample in devstack/samples/local.conf. Create local.conf as shown below to do the following:

- Set FLOATING_RANGE to a range not used on the local network, i.e. 192.168.1.224/27. This configures IP addresses ending in 225-254 to be used as floating IPs.
- Set FIXED_RANGE and FIXED_NETWORK_SIZE to configure the internal address space used by the instances.
- Set FLAT_INTERFACE to the Ethernet interface that connects the host to your local network. This is the interface that should be configured with the static IP address mentioned above.
- Set the administrative password. This password is used for the admin and demo accounts set up as OpenStack users.
- Set the MySQL administrative password. The default here is a random hex string which is inconvenient if you need to look at the database directly for anything.
- Set the RabbitMQ password.

- Set the service password. This is used by the OpenStack services (Nova, Glance, etc) to authenticate with Keystone.

local.conf should look something like this:

```
[[local|localrc]]
```

```
FLOATING_RANGE=192.168.1.224/27
```

```
FIXED_RANGE=10.11.12.0/24
```

```
FIXED_NETWORK_SIZE=256
```

```
FLAT_INTERFACE=eth0
```

```
ADMIN_PASSWORD=supersecret
```

```
DATABASE_PASSWORD=iheartdatabases
```

```
RABBIT_PASSWORD=flopsymopsy
```

```
SERVICE_PASSWORD=iheartksl
```

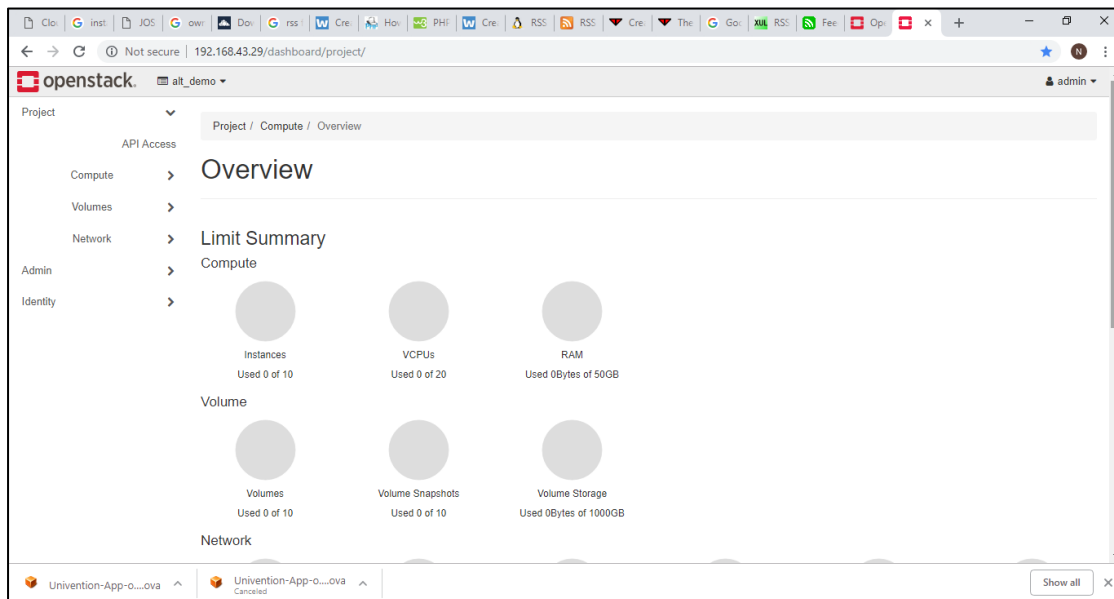
4. Run DevStack:

```
./stack.sh
```

A seemingly endless stream of activity ensues. When complete you will see a summary of stack.sh's work, including the relevant URLs, accounts and passwords to poke at your shiny new OpenStack.

5. Using OpenStack

At this point you should be able to access the dashboard from other computers on the local network. In this example that would be <http://192.168.43.29/> for the dashboard (aka Horizon). Launch VMs and if you give them floating IPs and security group access those VMs will be accessible from other machines on your network.



GitHub Repo Link: [PrathamRaka/Cloud-Computing-Analysis](https://github.com/PrathamRaka/Cloud-Computing-Analysis)
(github.com)

Conclusion: We have installed Ubuntu/Xen as a bare metal hypervisor and implemented it. It provides access to computing resources in a virtual environment. With the help of Infrastructure as a service, we can build our own IT platform. We can install Windows Operating System on Ubuntu and vice versa.