Cloud Computing Application

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Abstract - Cloud computing is gaining increasing popularity because of its higher scalability, more flexibility and ease of availability of its services.

Cloud Computing enables service providers to build a large pool of resources to their customers so that users will have resources accessible on demand. To this end, cloud computing service providers use Virtualization, since it gives them the ability to effectively share resources among their users. OpenStack, a relatively new open source cloud computing platform focuses on delivering network as a service (Naas) using virtualization technology.

OpenStack promises massively scalable cloud infrastructures .being new, it remains to be investigated on how it delivers those abilities, and what the exact workings of its internal details are. OpenStack install it with matika release this give us the tow or more scenario of OpenStack implementation.[1,2].

Key Words: SME: Storage Made Easy, OWL: Ontologies Web Ontology Language, SLA: Service Level Agreement , IETF: Internet Engineering Task Force, SaaS: Software as a Service, PaaS: Platform as a Service, IaaS: Infrastructure as a Service.

1. INTRODUCTION

Cloud computing has recently emerged as a new paradigm for hosting and delivering services over the Internet. Cloud computing is attractive to business owners as it eliminates the requirement for users to plan ahead for provisioning, and allows enterprises to start from the small and increase resources only when there is a rise in service demand. However, despite the fact that cloud computing offers huge opportunities to the Information technology IT industry, the development of cloud computing technology is currently at its infancy, with many issues still to be addressed. In this paper, we present a survey of cloud computing, highlighting its key concepts, architectural principles, and state-of-the-art implementation as well as research challenges. The aim of this research is to provide a better understanding of the design challenges of cloud computing and identify important directions in this increasingly important area.

Cloud computing is fairly new and has thus no long history. In general it originates from the late nineties and has been further developed in the next millennium, the name was created because the data send couldn't be tracked anymore when moving towards it destination. The term cloud was created because you could not determine the path a certain data package followed. The term cloud computing changed over time. In the early years of cloud computing, the organization Amazon was active in the area of cloud computing. They were already a large.

Organization investing in cloud computing. They had huge data centers which normally only use about 8 to 12% of their computing power. The rest was reserved for whenever peak usage was necessary. They started to use cloud computing in order to save costs in these huge datacenters. After this they were the first to provide cloud computing to the outside world. Not much later IBM and Google showed interest into cloud computing and started to invest. It seemed that cloud computing showed potential.

In giving a definition to cloud computing, the highest hits on Google scholar are used, in particular the ones with the most references regarding cloud computing.

As a recapitulation, cloud computing is stated into different definitions. There are definitions that define a cloud as a some what updated version of utility computing. The other, and broader, side states that anything you can access outside your firewall is cloud computing, even outsourcing. This thesis takes the definition in the middle of these two. In general cloud computing provides hardware and software services that are in the cloud and can be accessed by client as they pay for it. In the cloud means that there is no dedicated hardware reserved in a cloud providers' servers.[5].

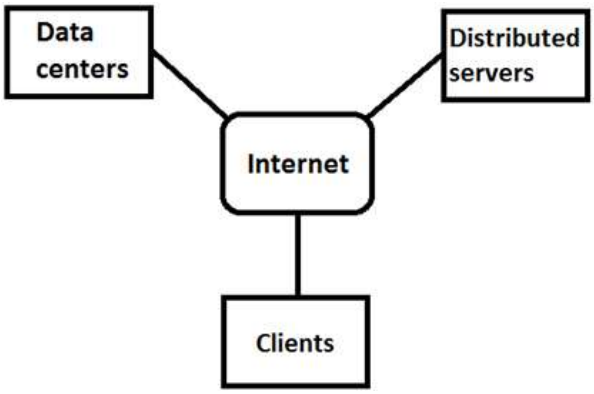

Fig -1: Simple Cloud computing network

1.1 Data centers and Distributed servers:

In general the data centres contain the services that clients want to obtain whenever they need it. This centre is often a large space which contains all servers providing these services and keeping them up and running. It is also possible to have virtual servers which reduce the amount of actual servers and space. Distributed servers are a name for those servers that are not all in one location. It doesn't matter where these servers are, as a user you won't notice anything different. These kinds of servers provide high flexibility because it doesn't matter where they stand as long as they are connected to the internet. It is easy for making a back – up of other servers. Besides this, there is no limitation in expanding the cloud.

1.2 Clients:

Most general clients are regular desktop PC's or laptops. Other clients nowadays are also mobile phones (PDA). The mobile devices are of big importance for cloud computing. They provide the high mobility to those who are trying to access the cloud. In general there are three sorts of clients to distinguish. These are mobile, thin and thick clients. Mobile clients are those with mobile phones. Thin clients are using remote hardware and software. What a user sees is visualized by the server and not by an own hard disk with operating system. On the contrary, thick clients use own hard disks and usually access the cloud trough a web browser.

1.3 Users:

Logically, behind the clients come the users. Without users, there is no purpose for a cloud. In cloud computing we can distinguish four different types of users. All these groups of users will be explained.

The groups to be distinguished as users in cloud computing are:

- Internet Infrastructure developers

- Service Authors

- Integration and provisioning experts

- End users

To point out the differences between the users and for the sake of understanding better what cloud computing is and how it is maintained, all users are explained. Even though for this thesis the focus lies on the end users it is important to distinguish these four kinds of users of the cloud.

1.4 Developers:

The (Internet-infrastructure) developers in the cloud are those who develop and maintain the cloud. They have to guarantee and develop that all services get integrated. Their task is to provide end users with a simple interface, and keeping the complexity at a lower level.

1.5 Service authors:

These authors are somewhat different from the developers but in some cases have overlapping function. Where developers focus on providing all services, authors focus on individual services which may get used directly. Unlike the developers they don't need knowledge about technical specification of the cloud; they solely focus on providing easy to use services.

1.6 Integration and provisioning experts:

These experts are really more focused on the end-user solutions. They are trying to interface with end users, and try to meet in what end users want.

1.7 End users:

The end users eventually have the highest importance as is mentioned before. End users expect that their cloud services have clear and easy to use interfaces, support and information provision. Also the end users have to be protected from any hazard. Therefore it is important to guarantee security in a cloud, something what will come up later in this thesis. All these requirements make no difference for the kind of users. Some users may hire cloud services for hours, and some for years. These different end-users should meet the same service as they could have equally important data streams into the cloud. The service also depends upon the Service Level Agreement.

A Service Level Agreement (SLA) is included in a service contract between two parties. This agreement states what services are guaranteed by one party to the other. It states for example the performance agreements, but also more importantly the security and safety agreements.[2,3,4].

2. Service models:

Though service-oriented architecture advocates "everything as a service" (with the acronyms EaaS or XaaS or simply aas), cloud-computing providers offer their "services" according to different models, of which the three standard models per National Institute of Standards and Technology (NIST) are Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). These models offer increasing abstraction; they are thus often portrayed as layers in a stack: infrastructure-, platform- and software-as-a-service, but these need not be related. For example, one can provide SaaS implemented on physical machines (bare metal), without using underlying PaaS or IaaS layers, and conversely one can run a program on IaaS and access it directly, without wrapping it as SaaS.

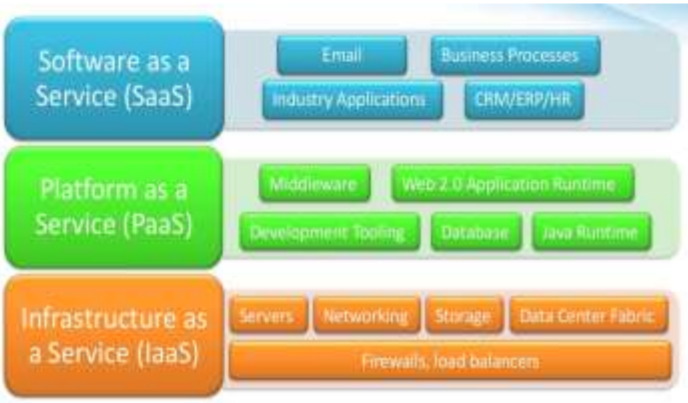

Fig -2: Simple Cloud computing Services

2.1 Infrastructure as a service (IaaS):

According to the Internet Engineering Task Force (IETF), the most basic cloud-service model is that of providers offering computing infrastructure – virtual machines and other resources – as a service to subscribers. Infrastructure as a service (IaaS) refers to online services that abstract the user from the details of infrastructure like physical computing resources, location, data partitioning, scaling, security, backup etc. A hypervisor, such as Xen, Oracle Virtual Box, Oracle VM, KVM, VMware ESX/ESXi, or Hyper-V, runs the virtual machines as guests. Pools of hypervisors within the cloud operational system can support large numbers of virtual machines and the ability to scale services up and down according to customers' varying requirements. Linux containers run in isolated partitions of a single Linux kernel running directly on the physical hardware. Linux groups and namespaces are the underlying Linux kernel technologies used to isolate, secure and manage the containers. Containerization offers higher performance than virtualization, because there is no hypervisor overhead. Also, container capacity auto-scales dynamically with computing load, which eliminates the problem of over-provisioning and enables usage-based billing. IaaS clouds often offer additional resources such as a virtual-machine disk-image library, raw block storage, file or object storage, firewalls, load balancers, IP addresses, virtual local area networks (VLANs), and software bundles. IaaS-cloud providers supply these resources on-demand from their large pools of equipment installed in data centers. For wide-area connectivity, customers can use either the Internet or carrier clouds (dedicated virtual private networks). To deploy their applications, cloud users install operating-system images and their application software on the cloud infrastructure. In this model, the cloud user patches and maintains the operating systems and the application software. Cloud providers typically bill IaaS services on a utility computing basis: cost reflects the amount of resources allocated and consumed.

Fig -3: Simple IaaS

2.2 Software as a service (SaaS):

2.2.1 Main article: Software as a service:

In the software as a service (SaaS) model, users gain access to application software and databases. Cloud providers manage the infrastructure and platforms that run the applications. SaaS is sometimes referred to as "on-demand software" and is usually priced on a pay-per-use basis or using a subscription fee. In the SaaS model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. Cloud users do not manage the cloud infrastructure and platform where the application runs. This eliminates the need to install and run the application on the cloud user's own computers, which simplifies maintenance and support. Cloud applications differ from other applications in their scalability which can be achieved by cloning tasks onto multiple virtual machines at run-time to meet changing work demand. Load balancers distribute the work over the set of virtual machines. This process is transparent to the cloud user, who sees only a single access-point. To accommodate a large number of cloud users, cloud applications can be multitenant, meaning that any machine may serve more than one cloud-user organization.

The pricing model for SaaS applications is typically a monthly or yearly flat fee per user, so prices become scalable and adjustable if users are added or removed at any point.

Proponents claim that SaaS gives a business the potential to reduce (Information technology) IT operational costs by outsourcing hardware and software maintenance and support to the cloud provider. This enables the business to reallocate IT operations costs away from hardware/software spending and from personnel expenses, towards meeting other goals. In addition, with applications hosted centrally, updates can be released without the need for users to install new software. One drawback of SaaS comes with storing the users' data on the cloud provider's server. As a result, there could be unauthorized access to the data. For this reason, users are increasingly adopting intelligent third-party key-management systems to help secure their data.

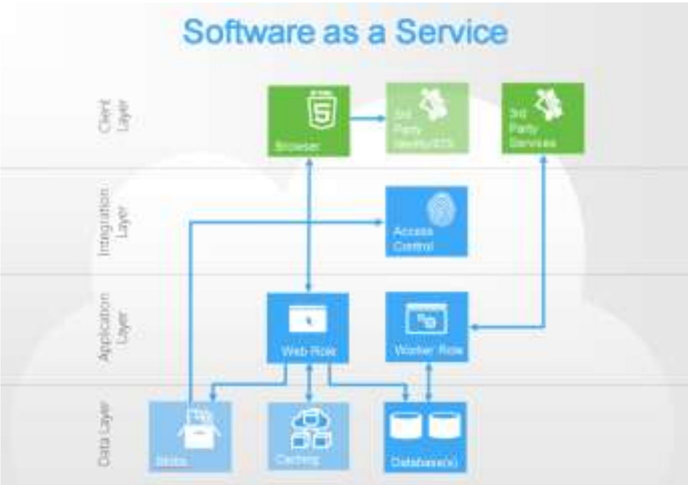

Fig -4: Simple SaaS

2.3 Cloud computing compared with other technologies:

With the understanding of what cloud computing is, we might see some similarities with other technologies. This paragraph is all about explaining what Cloud computing isn't and what the differences are with similar looking technologies. Most of these technologies are older than cloud computing and more familiar with the audience, therefore it is important to distinguish it from Cloud computing.

The systems of Autonomic computing are the first to be mixed up with cloud computing. This form of computing differs in the way it works. The goal of autonomic computing is to provide systems than work autonomous. This means that they have to be able to do self-managing. They must configure and fix failures themselves. It is similar to cloud computing because it also consists of large computer systems that have a high-level guidance from humans.

The difference between cloud computing and grid computing is more refined, but it is easy to explain. Grid computing focuses on large scale whereas cloud computing provides services for both smaller and larger scale. Grid computing usually provides high performance constantly, and (the major advantage of) cloud computing provides the performance when necessary.

Another comparison is drawn with mainframes; the difference might be clear with a mainframe, but there also similarities. A mainframe could be seen as a cloud. Though it is clear that a mainframe provides access to employees in large organization and the mainframe is completely centralized. That is what differs with cloud computing, as also is the performance. Mainframes provide continuously high performance and cloud computing only whenever necessary.

The comparison also has been drawn with peer-to-peer systems. This is because there is a whole cloud of users which are both "client" and "servers". This is also the difference. In cloud computing clients themselves do not act as providers of any service.

The last comparison that is discussed is the comparison with service oriented computing. Off course cloud computing is service oriented. But service oriented computing focuses more on techniques that run in the SaaS. Cloud computing, as mentioned several times before, focuses on providing computing services rather than the techniques.

2.4 Benefits of cloud computing:

It is easy to say that cloud computing provides benefits to those who use it. The idea is to find out what these benefits actually are. In general the benefits we focus on are for the group of end users. As mentioned before, the major benefit for any end user is of course that cloud computing can be used simply whenever you need it. It is a pay-as-you-go system. The question then is: why is this actually a benefit? To begin with the user organization, there is no physical room necessary for all the hardware to install. Furthermore there are no maintenance costs for all the hardware.

Besides the hardware it is the applications that provide benefits. The cloud is filled with applications that are ready to use, and more important the data used in this application is always accessible from anywhere in the world.

An SLA (Service Level Agreement) guarantees that quality measures are known before entering a cloud. These SLA's are important for the users and can be better maintained then when an organization purchases all the hard and software by itself.

Not a direct benefit, but also important, is that the datacenters are usually placed at strategic chosen places that lower the costs of maintenance. Think of low wages countries.

Focusing more on the users of the cloud the benefits become more concrete. As has become very clear now, scalability is one of the major benefits. When an organization is expecting a peak in its IT use, they simply acquire more IT services from the cloud. This is also the beauty of it, it is very simple. Because huge organizations have invested in Cloud computing, the users can also expect a certain degree of security.

Cloud computing provides thus a combination of economic and performance benefits. The economic benefit lies in the costs that have to be made whenever an organization needs additional IT services, and this relates to the performance benefits. The extra performance can be acquired whenever necessary and improves the performance of an organization directly.

2.5 Security in cloud computing:

It is important that the cloud is transparent. Any user that wants to access the cloud should provide an explanation of what data they want, how they use it, why they use it etc. Clearly all the behavior of the cloud users should be monitored and explained. Without this form of control, data could easily get leaked to competitors for example.

The users then should also only be exposed to information that is necessary to do what they need to do. There should be no other data than what is required for the things a user wants to do (depending on the sort of user). Besides this there should be a data limit. Certain actions require only a certain amount of data and can be predefined. This boundary limits anyone who tries to do any harm to an organization in the cloud. Next there should be a link between data and actions to be made in the system. This would only unblock data that is connected to a certain action in the cloud.

When users want to know something about their own privacy, they should be able to see only information regarding to themselves. It is then important that personal information is correct, but also that they cannot see information about other users.

In the end there has to be someone responsible for that everything happens as described above. There have to be certain functions that check whether all standard procedures are followed by all the users.

2.6 Cloud computing services in real life:

Cloud computing is not only a theoretical technology anymore. It is currently being used by a lot of people without even knowing that they do. Think of social media; Facebook being one of the largest and most widely used social media platform, also uses cloud computing. In this case it is Software as a service. All users of Facebook can use the “Facebook application” for their personal data, but in essence they are not able to change anything to this “application”. The “application” is in complete control of the service provider, in this case Facebook.

An even better example is Google (Apps). In this case we will discuss Google docs in particular in order to point out how convenient cloud computing can be. In Google docs it is possible to create an own word, excel or PowerPoint document online. This document is then stored on the server. Any changes made are also stored on this server. The word processor provided by Google is free from any charges and does not need to be purchased whatsoever. Google “hosts” the word processor for anyone who decides to use it. Besides the convenience of having your documents in the word processer online and being accessible from anywhere, it is also possible to share these documents with other people accessing the cloud. Within the cloud another person is able to change your document if he has the rights to do so. He can also access the word processor in the cloud together with the document you have uploaded and you can both change anything in real-time.

Larger providers of services are represented by cloud computing providers such as Amazon or IBM. They provide more complete solutions and go further than only software as a service. They also provide infrastructure and Platform as a service. The two providers mentioned before were mainly focused on free cloud providing services whereas IBM and Amazon provide more complete solutions. Their clients have more interest in security because they will be processing their core business for example trough cloud computing.[1,3,4,5].

3. RESEARCH PROBLEM

Anytime, Anywhere Access By opting for cloud services you can access your documents, files, applications without any location and time constraint. More over you can share the docs with others, also you can work in multi user mode as well (means more than 2 people can simultaneously access and work on a single doc.) . If you are a SME (Storage made easy) then having an in-house IT team is quite expensive, so the alternate is to go for managed cloud services where you don’t need to buy the IT hardware, also the cost of hiring a team of IT professionals is saved. While you are running a startup, your core aim is to somehow expand your business and make it stable. The best thing to do here is to divide your time and attention according to your business requirements. Governments worldwide are investing to create economic regions of cloud technology development. Organizations that do not adopt cloud computing along with their competitors risk missing out on expected benefits such as the flexibility and agility afforded by on-demand services and access to the latest versions of technologies.

4. RESEARCH OBJECTIVES

Thanks to its high flexibility, cost-effectiveness and availability Cloud Computing has quickly imposed itself on the IT scenery, rapidly flooding the market with new appealing services and offers. How-ever, the current lack of a shared standard for the description of such services can represent an obstacle to the development of interoperable and portable Cloud solutions. The approach we investigate consists in the creation of a set of interrelated OWL ontologies (Web Ontology Language), which describe both Cloud Services and APIs/methods used to invoke them.

5. METHODOLOGY

The methodology used to do this research .it begin with discussing about the method to operate OpenStack with Services.

5.1 Steps

Creating a sandbox environment using server with high specification allows us to discover and experiment with the OpenStack Compute service .this Server gives us the ability to spin up the machines and networks without affecting the rest of our working environment, and freely, we can spend less time creating our test environments and more time using OpenStack, installable using Centos 7 package management

Fig -5: installing Centos 7

5.2 Installing OpenStack Identity service:

We will be performing an installation and configuration of OpenStack Identity service, know as keystone, using the Centos cloud archive. Once configured, connecting to our OpenStack cloud environment will be performed through our new OpenStack Identity service.

The backend data store for our OpenStack Identity service will be a MySQl database.

Required packages:
Openstack-swift
Openstack-swift-account
Openstack-swift-auth
Openstack-swift-container
Openstack-swift-object
Openstack-swift-proxy
To install all packages
yum install openstack-* [1]

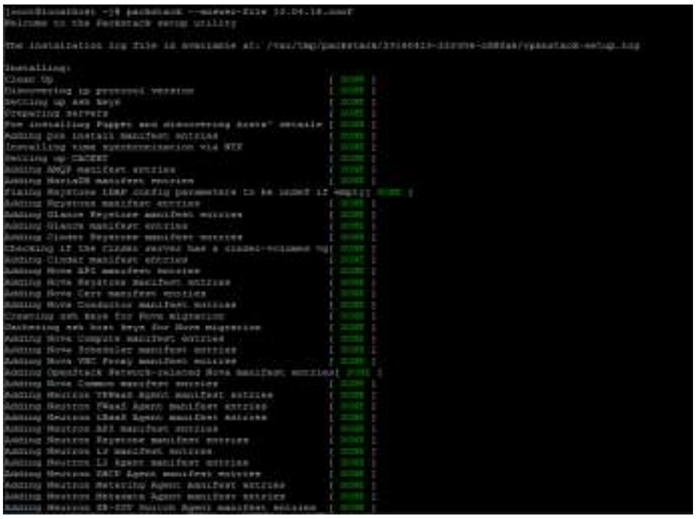

Fig -6: installing OpenStack package

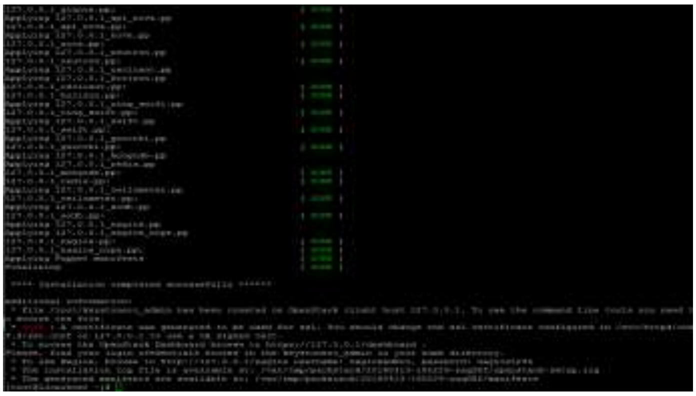

Fig -7: installing OpenStack complete

5.3 After installing package

Then after installing complete we are try to connect the OpenStack with Browser

Fig -8: OpenStack with browser

To login OpenStack dashboard using username and password

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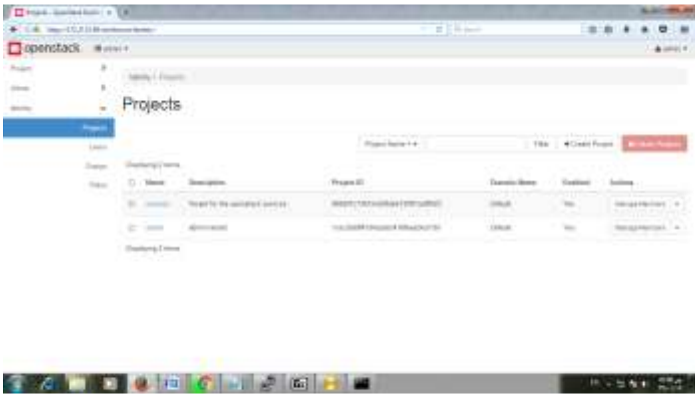

Fig -9: interface of dashboard

5.4 initialization server with OpenStack Steps:

After creating the OpenStack with all services then need to create example server to see how its work with cloud environment.

5.4.1 Upload image of server

With the OpenStack utility we will upload image (operation system image) from any kind of storage into OpenStack see this in figure 10

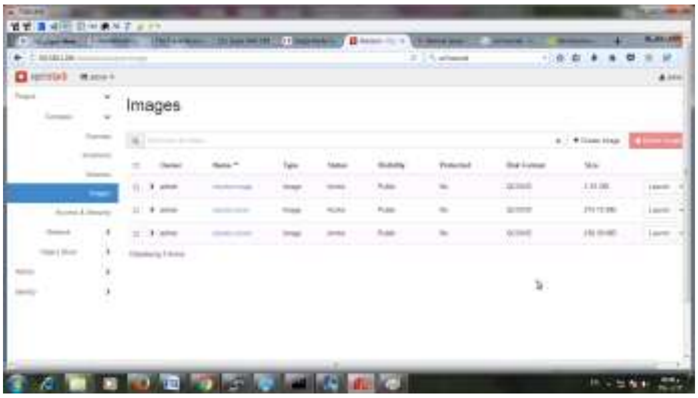

Fig -10: upload image

5.4.2 Creating volume (HDD)

Steps two create volume of our machine in OpenStack with specification.

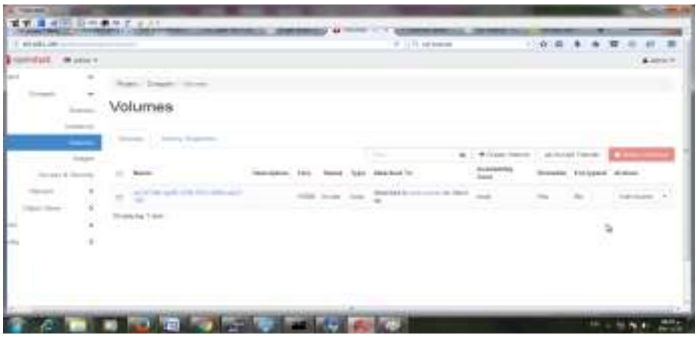

Fig -11: creating volume

5.4.3 Creating network

In this area we are creating network subnet (external and eternal)

Fig -12: creating subnet

5.4.4 Creating instance

Fig -13: creating instance

5.4.5 Create web server (in instance)

Fig -14: creating server

5.4.6 Overview the web server

Fig -15: overview of server

6. CONCLUSION

OpenStack is a highly modular and extensible and platform and it is a good alternative if you want to hand large-scale data efficiently. Computer nodes are the workhouse of your openstack and the place where your users' application will run. They are likely to be affected by your decisions on what to deploy and how you deploy it. Their requirements should be reflected in the choices you make.

7. RECOMMENDATIONS

First off all the software it's should be Ubuntu 16.04 with kernel version 3.13.0-34-generic or later, in centos, Centos 7 with kernel 3.10.0 or later for example. All this with CPU mluticore processor, Infrastructure (control plane) hosts should have multicore processors for best performance, some services, such as MySQL, benefit from additional CPU cores.

Deployment hosts a minimum of 10 GB of disk space is sufficient for holding the OpenStack-Ansible repository and Compute hosts Disk space requirements depend on the total number of instances running on each host and the amount of disk space allocated to each instance. Compute hosts must have a minimum of 1 TB of disk space available.

Storage hosts hosts running the Block Storage (cinder) service often consume the most disk space in OpenStack environments. Storage hosts must have a minimum of 1 TB of disk space.

Infrastructure (control plane) hosts The OpenStack control plane contains storage-intensive services, such as the Image service (glance), and MariaDB. These hosts must have a minimum of 100 GB of disk space

You can deploy an OpenStack environment with only one physical network interface. This works for small environments, but it can cause problems when your environment grows.

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