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Deployment of Private Cloud and Analysis of data for Business Case

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Abstract— Cloud computing technology has been emerging and spreading at a great pace due to its service oriented architecture, elasticity, cost-effectiveness, etc. Many organizations are using Infrastructure-as-a-Service (IaaS) public Clouds for data migration away from traditional IT Infrastructure but there are a few fields such as finance, hospitals, military and others that are reluctant to use public Clouds due to perceived security vulnerability. Enterprises in such fields feel more vulnerable to security breaches and feel secure using in-house IT infrastructure. The introduction of private Clouds is a solution for these businesses. This paper focuses on deployment of private Cloud with the help of apache cloud stack, Analysis of data for Building the Business case for Private Cloud. I have proposed a platform and evaluated a service oriented IaaS model of private Cloud which provides a platform to the business suite to sell it as a **PaaS** service to the customers.
Comparative analysis includes cloud services delivery (SaaS, PaaS, IaaS) and deployment models (private, public, and hybrid).

Keywords— Cloud Computing, Private Cloud, Cloud Orchestration, Infrastructure as a Service, Platform as a Service, CloudStack, VMWARE hypervisor, XenServer, Compute Storage, Multisite Deployment

I. INTRODUCTION

Cloud computing now offers organizations more choices regarding how to run infrastructures, save costs, and delegate liabilities to third-party providers. It has become an integral part of technology and business models, and has forced businesses to adapt to new technology strategies. Private Clouds have been substituted for the traditional IT Infrastructure due to its flexible "pay-as-you-go" model within an organization by departments and enhanced privacy relative to public Clouds in the form of administration control and supervision. These models significantly expand the range of available options, and task organizations with dilemmas over which cloud computing model to employ.

Some well-known service models are Software as a Service (**SaaS**), Platform as a Service (**PaaS**) and Infrastructure as a Service (**IaaS**).

These service models can be combined with a deployment model: public, **private** or hybrid. If the services are provided over the internet then it is public cloud or external cloud and if it is provided within an organization through intranet then it is named as private cloud or internal cloud. Hybrid cloud is an internal/external cloud which allows a public cloud to interact with the clients but keep their data secured within a private cloud.

The analysis of cloud computing models has shown that Private and Hybrid deployment models are going to stay for years ahead. In the long-term private and Hybrid cloud models most probably will be used only for business cases.

II. RELATED WORK

Apache CloudStack is open source software designed to deploy and manage large networks of virtual machines, as a highly available, highly scalable Infrastructure as a Service (IaaS) cloud computing platform. CloudStack is used by a number of service providers to offer public cloud services, and by many companies to provide an on premises (private) cloud offering, or as part of a hybrid cloud solution [2].

CloudStack, which has been known as one of the most popular open source cloud computing software, was chosen by many cloud vendors for creating, managing, and deploying their infrastructure cloud services. The deployment architecture of CloudStack is classified in to two. The management server and the cloud infrastructure. The management server shall manage the cloud infrastructure. We need to provision resources like hosts, storage devices to the management server which will in turn manages them. The architecture of our CloudStack setup is as below figure Fig.2

A host is a terminal in which the guest virtual machines run using the provided computing resources. Every host is installed with a hypervisor software to manage the guest virtual machines. The role of the host in CloudStack Fig. 2.

CloudStack Architecture deployment is to provide the networking resources, processing units, storage and memory which shall be utilized for hosting the virtual machines. It must also connect to internet or intranet to other machines. The hosts shall reside across different data centers in different geographical locations. Each of these host shall have variety of CPU Speeds, RAM‟s, Operating systems etc. but it is necessary that all the hosts present within a cluster must be homogenous [2]. Multiple hosts are grouped to form cluster. Inside the cluster all the hosts shall have identical hardware, same type and version of hypervisor. Moreover all of the hosts in a cluster must be in the same subnet and share the primary storage. Live migration of Virtual Machine instances from one host to the other host within the same cluster is possible without interrupting any service to the end-user. Typically multiple clusters are stored in a single rack as they need to present in the same subnet. A cluster can be associates with a primary storage. This shall hold the data for that specific cluster. A single rack is represented a Pod. In a pod, all the hosts will be in the same subnet. Pods will not be visible to the end user.it is an internal classification of CloudStack. Multiple pods are present within a zone. The zone provides redundancy and physical isolation for the CloudStack infrastructure. Multiple zones can be present in a data center. Although usually only a single zone is present in a data center, which is separated geographically.

III. METHODOLOGY

Cloud Computing Service Models

Cloud service models describe how cloud services are made available to clients. Most fundamental service models include a combination of IaaS (infrastructure as a service), PaaS (platform as a service), and SaaS (software as a service). These service models may have synergies between each other and be interdependent – for example, PaaS is dependent on IaaS because application platforms require physical infrastructure (see Figure 6).

The IaaS (Infrastructure as a Service) model provides infrastructure components to clients. Components may include virtual machines, storage, networks, firewalls, load balancers, and so on. With IaaS, clients have direct access to the lowest-level software in the stack – that is, to the operating system on virtual machines, or to the management dashboard of a firewall or load balancer. Amazon Web Services is one of largest IaaS providers.

The PaaS (Platform as a Service) model delivers a pre-built application platform to the client; clients needn't spend time building underlying infrastructure for their applications. On the backend, PaaS automatically scales and provisions required infrastructure components depending on application requirements. Typically, PaaS solutions provide an API that includes a set of functions for programmatic platform management and solution development. Google App Engine is a popular PaaS provider, and Amazon Web Services also provides some PaaS solutions in addition to IaaS offerings.

SaaS (Software as a Service) provides ready online software solutions. The SaaS software provider has complete control of application software. SaaS application examples include online mail, project-management systems, CRMs, and social media platforms.

Cloud Orchestration

Cloud orchestration is typically used to provision, deploy or start servers; acquire and assign storage capacity; manage networking; create VMs; and gain access to specific software on cloud services. This is accomplished through three main, closely related attributes of cloud orchestration: service, workload and resource orchestration. An orchestration platform can integrate permission checks for security and compliance.

Cloud orchestration technology must work with heterogeneous systems, potentially servicing a global cloud deployment in different geographical locations and with different providers. Many cloud orchestrator users run public cloud and private deployments

Network Orchestration

Network Orchestration, also known as Software-defined networking (SDN) Orchestration is the process of automatically programming the behavior of the network, so that the network smoothly coordinates with the hardware and the software elements to further support applications and services.

The main idea behind Network Service Orchestration is to separate the network services from the network components, however automatically configuring the network as per the service specifications provided.

How does SDN Orchestration works

Orchestration platforms can include several types of Open source software, which are built using common APIs that could tie into standard networking technologies. Some of the companies which develop and supply SDN orchestration tools are Big Switch, CENX, Cyan, Overture Networks and Anuta Networks and much more.

SDN Orchestration involves coordinating software with an SDN Controller, which in turn is built using Open Source technology like OpenDaylight. The controller can also be

programmed to make automatic decisions regarding the network in the case of network congestion, security problems, and faulty devices. Service Orchestration uses several network protocols including, OpenFlow and IP based networking.

In the future, Network Orchestration system will provide an important link between several ranges of technologies which would enable cloud-based network and communication services. Hence, it is expected that they will provide the support and automation technology which would eventually bridge the gap between telecom systems, OSS systems, data centers and customers interested in buying cloud based technology and other network services.

Moreover, in order to further optimize the cloud services and improve network tuning so that perfect orchestration provides a better coordination between devices, Datapath.io provides a sustainable solution such as Network Performance Optimization and Anycast.

IV. RESULTS AND DISCUSSION

Apache CloudStack is open source software designed to deploy and manage large networks of virtual machines, as a highly available, highly scalable Infrastructure as a Service (IaaS) cloud computing platform. CloudStack is used by a number of service providers to offer public cloud services, and by many companies to provide an onpremises (private) cloud offering, or as part of a hybrid cloud solution [2]. CloudStack, which has been known as one of the most popular open source cloud computing software, was chosen by many cloud vendors for creating, managing, and deploying their infrastructure cloud services. The deployment architecture of CloudStack is classified in to two. The management server and the cloud infrastructure. The management server shall manage the cloud infrastructure. We need to provision resources like hosts, storage devices to the management server which will in turn manages them. The architecture of our CloudStack setup is as below figure Fig.2

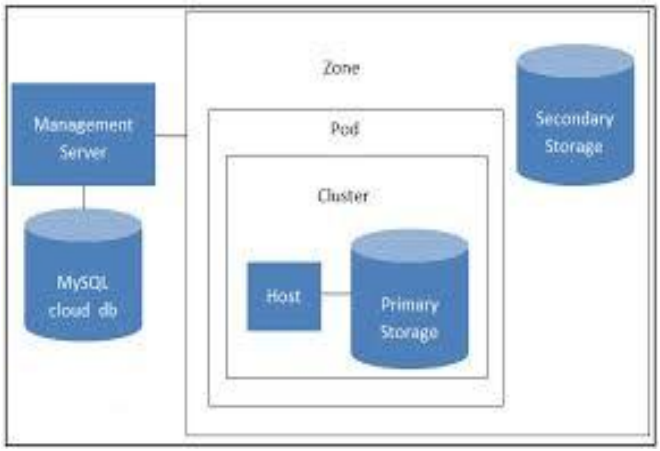

Fig.2. CloudStack Architecture

A host is a terminal in which the guest virtual machines run using the provided computing resources. Every host is installed with a hypervisor software to manage the guest virtual machines. The role of the host in CloudStack Fig. 2. CloudStack Architecture deployment is to provide the networking resources, processing units, storage and memory which shall be utilized for hosting the virtual machines. It must also connect to internet or intranet to other machines. The hosts shall reside across different data centers in different geographical locations. Each of these host shall have variety of CPU Speeds, RAM‟s, Operating systems etc. but it is necessary that all the hosts present within a cluster must be homogenous [2]. Multiple hosts are grouped to form cluster. Inside the cluster all the hosts shall have identical hardware, same type and version of hypervisor. Moreover all of the hosts in a cluster must be in the same subnet and share the primary storage. Live migration of Virtual Machine instances from one host to the other host within the same cluster is possible without interrupting any service to the end-user. Typically multiple clusters are stored in a single rack as they need to present in the same subnet. A cluster can be associates with a primary storage. This shall hold the data for that specific cluster. A single rack is represented a Pod. In a pod, all the hosts will be in the same subnet. Pods will not be visible to the end user.it is an internal classification of CloudStack. Multiple pods are present within a zone. The zone provides redundancy and physical isolation for the CloudStack infrastructure. Multiple zones can be present in a data center. Although usually only a single zone is present in a data center, which is separated geographically.

V. CONCLUSION AND FUTURE SCOPE

The above mentioned insightful information explains the need for the deployment of private cloud as a Platform for the enterprises and standalone users using it for specific purposes for satisfying the need to use the cloud computing. With the instalment of VMWARE on any OS Platform, as a

hypervisor which allows the use of expanding the resources with the minimum usage of memory.

Using the high end mechanism on any basic machine which connects the servers through cloudStack on our platform through which you can manage the resources on the cloud with the high end security mechanism.

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