vCloud and vSphere

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vSphere and vCloud are categorized as infractructure as a service(Iaas) offering. vSphere was developed by VMware and is a cloud computing virtualization platform[1]. vSphere is not one piece of software but a suite of tools such as vCenter, ESXi, vSphere client and a number of other technologies. Similarly, vCloud is also a suite of applications but for establishing an infrastructure for a private cloud[2]. The suite includes the vsphere suite, but also contains site recovery management for disaster recovery, site networking and security. These services as well as Iaas in general are discussed. Advantages of utilizing such as service are presented followed by an analysis of vSphere and vCloud. The big data extensions available for these services are examined.

Keywords: vCloud, vSphere, Iaas, I524

https://github.com/cloudmesh/classes/blob/master/docs/source/format/report/report.pdf

1. CLOUD COMPUTING

With the rise of high speed internet, connectivity amongst devices locally made cloud computing a practical alternative to the standard local solution. Cloud computing is defined as the utilization of remote servers to provide the computing power and data management instead of utilizing a local computer. During the late 1990's, companies started to see the potential benefits of moving to the cloud, one of the first companies to do so was salesforce.com, which delivered applications to end users over the internet [3]. Today there are many companies in the business of cloud computing. The majority of business coming from Microsoft, Google, and Amazon. There are subdivisions of cloud computing such as software as service(Saas), platform as a service(Paas), and infrastructure as a service(Iaas). Saas is software that runs remotely from a service provider and is utilized over the internet, some examples that fall into this category are google docs, gmail, office, and office 365. Paas are web and database services enabling the user to develop and run applications in the cloud, some examples are google app engine, microsoft azure, and amazon web services. Iaas provides the user virtualized computing resources over the internet such as amazon web services, Microsoft azure, and VMware. It is important to note that many providers offer more than just one type of cloud computing option[4].

Iaas is a business model in where a provider will host all components of infrastructure including hardware, software, servers, data storage for their clients. The cost to the client is at a rate of usage which can range from different rates such as per hour, week, or month. While it might seem costly to pay for such as service, utilization of Iaas provide several advantages for organizations to use such as service. Management does not have the upfront costs their own IT infrastructure as well as maintaining hardware or replacing equipment that is obsolete. The responsibility of ensuring the network is and up and running through having a qualified team of IT staff is also mitigated. The cost of Iaas is metered thus companies will only pay for what they need[5]. Depending on the application of an Iaas, there may be instances where a company may need to quickly scale up their usage. A great example is when a website produces an unexpected influx of visits in short period. If the IT infrastructure is maintained in house, it might not be able to quickly scale up to the demand. This would be detrimental to the business due to a slow online experience of the customer or possibly a website that crashes[6]. It is both costly and impractical to staff IT personnel to monitor demands twenty four hours a day seven days a week. The Iaas has the capacity to scale with depends and solutions are in place to help alleviate instances where a sudden increase in IT infrastructure is required. Disaster recovery is a major worry for companies, implementation of a safe backup solution can be both costly and difficult to execute. Iaas offer disaster recovery solutions, as long as an internet connection is available the same environment can be accessed from leading to little to no downtime. With offsite storage of data via Iaas any form of data loss is potential is limited to very little or none[5].

2. VCLOUD AND VSPHERE

vCloud falls into the cloud computing subcategory Iaas. It is a suite of multiple products that include vSphere, vCloud Direc-

tor, vCloud, connector, vCloud networking and security, vCloud networking and security, vCenter site recovery and manager, vCenter operations management suite, vFabric application director, and vCloud automation center. vSphere is responsible for the physical hardware resource management and allocation of virualization across alarge group of infrastructure such as CPUs, data storage and networking.

vSphere utilizes ESXi which is an enterprise class type 1 hypervisor. A hypervisor also known as a virtual machine manager is defined as "a hardware virualization technique that allows multiple guest operating systems (OS) to run on a single host system at the same time. The guest OS shares the hardware of the host computer, such that each OS appears to have its own processor, memory and other hardware resources" [7]. The type 1 refers to a type of hypervisor that can run directly on the hosts pc to control its resources.

vCloud director is a tool for overall cloud management it helps the user build hybrid clouds through pooling resources into data centers. This product helps empower exisiting IT within an organization the tools necessary to expand their infrastructure into the cloud. vCloud connector creates a single user interface that as a bridge between private and public clouds, this simplifies management by enabling the user to transfer workloads under a single hybrid cloud umbrella.

vCloud networking and security provides capabilities to protect virtual machines. A firewall is applied either encompassing a virtual datacenter or at the network interface. VPN or virtual private network is utilized to ensure safety for extensions of the virtual data center, as well as secure sockets layer (SSL) VPN which is an industry standard for security compliance[8]. With regards to data security, a feature included will scan file servers for sensitive data such as credit card or social security numbers and ensure proper measures are place for protection of such critical data.

Cloud Disaster recovery is defined as "a backup and restore strategy that involves storing and maintaining copies of electronic records in a cloud computing environment"[9]. This also addressed in the feature vCenter site recovery manager. It is an automated solution that will recover from downtimes in a timely manner. This is done so by using replication technology to migrate virtual machines to a different site. Users are able to test the migration process in order to safely address any potential migration issues.

3. LICENSING

Depending on the demand, the cost of vCloud can be quite expensive. It is important to note that there are currently Iaas offerings that are free but with limit usage. Amazon web services offers a free tier consisting of certain limits such as 1 million requests per month on aws lambda, 25 gb of storage through dynamoDB, 100 million free events per month on amazon mobile analytics and many other limits[10]. Other services generally offer limited time services followed by a pay requirement.

4. VSPHERE BIG DATA EXTENSIONS

Within the vSphere suite is a feature that can support big data and Apache Hadoop workloads. A set of tools are available for the user to deploy and run Hadoop within the virtual infrastructure. The following distributions of Hadoop are supported: apache Hadoop, cloudera, pivotal, hortonworks, and mapR. Customization options such deploying a specific version of Hadoop or even multiple types of Hadoop are supported. In order to automate the management of Hadoop, VMware initiated project Serengeti. It can quickly deploy a Hadoop cluster into vSphere, it will protect master node by automatically starting a new virtual machine if there is a suspected failure. An important note is that graphical user interface of big data extensions is only supported on the web client 5.1 or later, if big data extensions is installed on vSphere 5.0, all abilities of the administrator can only be performed within the command-line[11].

5. VCLOUD API

The vCloud application program interface (API) enables the client and the director to communicate via HTTP through an XML exchange[12]. This type of workflow is referred to as a RESTful workflow. REST is defined as Representational State Transfer, which "describes an architectural style characteristic of programs that use the HTTP to exchange serialized representations of objects between a client and a server"[12]. These transfers are executed by a script to pertaining to the acronym CRUD which is create, retrieve, update or delete an object defined by the API.

The vCloud API is responsible for the definition of objects that are normally found in a cloud computing environment such as organizations, users/groups, catalogs, virtual data center or VDC, virtual systems and images, and tasks[12]. An organization is a combination of users, groups, and computing resources. The user must undergo a verification through an identity provider in vcloud director or externally. This verification is done so by using an exchange of data in security assertion markup language or SAML. The catalog will possess all vApp templates and media images configurable in a private local repository, or published content accessible publicly. The vds is the environment for virtual systems dictating allocation of resources such as storage, CPU, and memory.

As previously stated, the exchange of representations on the API are done so through the XML documents. The following attributes within the XML document are id, type, and href[12]. The id attribute is a unique identifier that is not reused and is context free. The type is a multipurpose internet mail extension(MIME). The href is the object reference which is a URL expression. This URL will also includes the id attribute thus it will not be reused. Along with attributes, elements pertaining to a specific object and its creation or modification are detailed in the document as well.

6. CONCLUSION

VMware is one of the oldest companies that have been involved in the virtualization market. Their service provides a suite of tools that assist companies who want to utilize IT virtual infrastructure. The Iaas can help businesses in a lot of areas that would be difficult in a private IT environment such as scalablity, cost, disaster recovery and backup. There are drawbacks to Iaas such as risk of downtime from the IT service provider and security risks of sensitive data, however the vCloud suite has features that can address these drawbacks with regards to security. Additionally, vcloud supports big data extensions including support for various versions of hadoop and have initiatives such as project serengeti which will automate its management. Vcloud is a potential option for clients interested in extending their IT infrastructure into the cloud.

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