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Node Scaling of Telecom services on Emerging Cloud

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***Abstract*:** Invention of internet has given boost to the new emerging business called the Cloud Computing. Cloud computing has given advantages to make way for reducing operational costs. It gives companies and individuals to get various services without investing in traditional way, user pay for the service they use, for the time they use them. In this paper we will try to discuss how telecom operators, as a leader in providing telecom services, can do to be competitive with multinational companies in market as cloud service providers. As companies already have infrastructure, it gives them a head start in the emerging field. Also we will try to explain model to use in the vendor, which will help telecom operators launch cloud services.

***Keywords*:** Cloud Computing, Cloud Provider, Cloud Stack, Telecom Operator.

INTRODUCTION

The cloud solutions are based on key principles and pillars that drive as the differentiators for entire portfolio of cloud products. THE first pillar is focused on data as key assets of the cloud - enterprise consistency express concern about their integrity of the data. The second pillar is focused on importance running your business in real-time. the third pillar recognizes the demanding needs of modern business, it requires-performance, scale, quality, economics, compliance and security of all the data andservices.
In the telco world, the companies transit from 2G, and 3G to 4G. Cloud too has multigenerational technology. Implicates Unlocking full cloud potential means migrating legacy applications while executing on new cloud-specific workloads. For cloud, this means that we can integrate our systems into one single, governed model.

RELATED COMPONENTS

The Cloud System is a full-stack to handle all workload across multiple industries. Each layer in the stack can be offered independently of the layers above or below. They can also be combined into converged offerings, such as secure storage, providing additional value. The main offerings include:

Data Center and Hardware & Equipment Management

HDS 8000 is a new generation of hyper scale Datacenter systems realizing a dis aggregated hardware architecture, using optical interconnect and a new equipment manager for multi-
vendor environments. It enables complete operator cloud transformations, including support for Network Functions.

Converged Cloud

This orchestrates[1] and manages the provisioning, activation and optimization of cloud infrastructure resources to realize virtual service functions and applications. It also monitors these network services to ensure consistent levels of service quality. Manager orchestrates and manages both physical and virtual network functions and continue to provide a full suite of end to end network management capabilities to multiple domains.

Cloud Transformation Service

Basically the thing works with three cloud domain services: Telecom Cloud, IT Cloud and commercial cloud. Telecom cloud enable customers to achieve network agility through software defined networking and virtualized network functions. IT cloud standardizes, simplifies and automates IT in order to achieve operational efficiency. Commercial Cloud enables cloud services offerings. All three are supported by a full range of services, ranging from consulting and systems integration to managedservices.

Data and compute solutions through a suite through a suite of offerings focused on the following:

1. **Security and integrity[3]:** The Accuracy and safety of all the data is the key to business continuity. Business Cloud system meets the high requirements to ensure your data is correct in every step of transformation process. Imagine that every piece of data can be signed like a fingerprint and that one can verify its integrity, when it was created and by whom at anytime.

2. **Automation:** This is the underlying technology that enables enterprises to run their digital business in real time. The Business Cloud system includes a developer platform that delivers easy reach into both legacy and modern systems, masking the complexity of the underlying infrastructure. This enables developers to deploy in a safe and predictable manner, maximizing speed and minimizing risk across the entire IT operation.

3. **Governance:** This system includes the governance capabilities that can be easily integrated into existing governance capabilities that can easily be integrated into existing governance process and ensures that applications and

data are fully functioning. The governance solutions enable the secure management of performance, scalability quality, compliance andsecurity.

- **Accessibility:** In order to be effective, cloud solutions need to deliver accessibility with agility[5]. Flexibility, scalability, and security. We should enable accessibility across both legacy and modern infrastructure focusing on an open, shared and reachable paradigm supported by the most robust security tools on the markettoday.

Cloud Execution Environment in Industry

It is an environment containing hypervisors, Virtual switched, system functions and O&M support for these functions. It is designed to give support both of all product portfolio and third party applications.

The key value propositions of Cloud Execution Environment[6] Are High performance (Improved throughput and latency), High availability (VM recovery at unexpected compute host failures), End-2-End Security (For infrastructure, service provider and end user) and Rapid deployment of applications (Orchestrated applications and CEE reference solution) which are not available from Open source platforms.

Key Features of CEE are:

- Accelerated virtualswitch
- ResourceManagement
- Compute Monitoring HighAvailability
- End to endsecurity
- VLANtrucking.
- EfficientO&M.

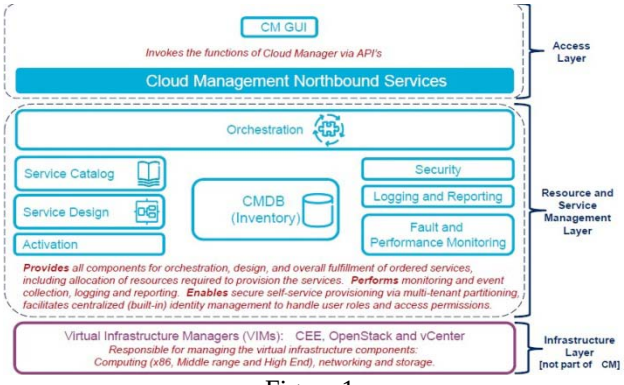

Figure 1

The following components exist in CEE:

- Image store provides a catalog & repository for virtual diskimages.
- Ephemeral store provides a local storage area for tenantVMs.
- Compute provides virtual servers upondemand.
- Identity provides authentication & authorization for all CEEservers.
- Network provides "Network connectivity as a service" between interface devices managed by other OpenStackservices.
- Object Store allows you to store or retrieveobjects.
- Dashboard provides means of managing a CEE region.
- Life cycle manager provides means of managing the infrastructure hardware andsoftware.

TELCO GRADE SYSTEM

OpenStack used as a cloud execution environment. It is a virtualization management system which provides the virtualization layer between the virtual applications and network and data center infrastructure.

OpenStack[4] enables cloud execution environment to offer on- demand computing resources by provisioning and managing virtual machines. It controls the pool of resources for through compute, storage, image, identity and networking APIs.

The cloud would be related to as the direct consumer for the datacenter from which the data would be fetched and it would be used for the cost center to cut off the cost utilized in the services that the consumer uses to get the service from the provider.

Here in this paper we try to scale operations that are scheduled for predictable Peak hour capacity. Secondly, Scaling operations are triggered based on monitored triggered i:e CPU Load, Next to it that the cloud could correspond to unplanned traffic events e:g natural disaster, accident etc.

Managed scaling = triggered from outside the application (e.g. by OSS or CM or some other component)

Self-scaling= the application itself decides to adjust its capacity.

Here we will discuss about managed scaling and more precisely about the automated managed scaling.

Telco vApp in cloud & Scaling

The following are the properties we need to deploy within the cloud as virtual machine network**:**

- Telco vApp deployed as set of VMs constituting a cluster
- Exposing the application as one entity on network level and thus providing manageable solution with lowOPEX.
- Dimensioned to fit expected capacity by deploying corresponding number of VMs in thecluster
- Scaling in/out of the system is handled by add/removing the cluster members/VMs in the node

Standard driven Automatic Deployment of Telco vAPP

The standard we could follow to drive the app in telco cloud for the system to get the hierarchy in the system as given:

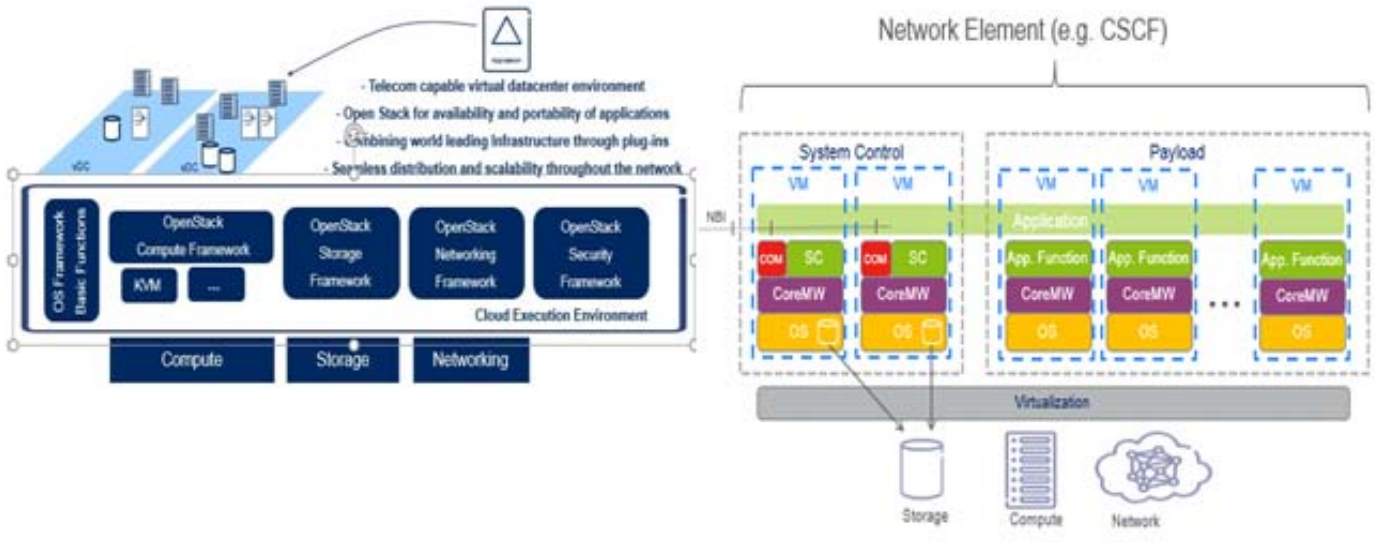

Figure 2

Rapid deployment of vApp on telco server

We deploy an Open Virtualization Format (OVF)[2] package. This contains several virtual machines and how to connect them with several virtual and physical networks. Once everything is deployed, the new application (CSCF in this case) is ready to be used. We can repeat the operation a second time to deploy a second CSCF. Once everything is deployed, we have a second CSCF ready to be used.

If one needs to migrate a virtual machine from one physical hosts to another (planned maintenance of the host, emergency situation, consolidation of the applications on fewer hosts, etc.). This can be done while the applications are running. The network connections are reconfigured so that the traffic is not interrupted when the virtual machine is moved to the new host.

The principle demonstrate now is rather simple: when a telco application is under high load such as during a busy hour, then it will probably run at full capacity. But then there is less traffic going through it, then you could reduce itscapacity.

During the busy hour you could run a telco application with 4 traffic processors, each one running in a virtual machine and each virtual machine runs on a physical processor. Outside this busy hour, when there is less traffic and less load on that telco application, you can run the same application using only 2 traffic processors. The virtual machines that are not needed can be turnedoff.

If you are running the datacenter, you can decide what to do with the physical processors that are now released: you can run some other applications on them . This will allow you to save power by switching off the computing resources that are not needed, for example during the night. The next morning, they can be automatically turned on again to be prepared for handling the traffic of the busy hour.

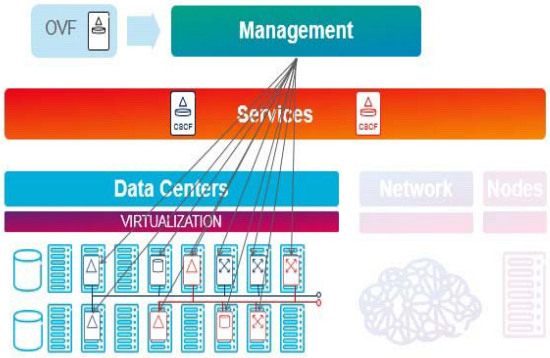

Figure 3

Preparation for Setting Up and initializing the traffic

For getting the data initialized from one server and running the same application from one to the other would require the application that will automatically support the transmission from the one to the other.

- Initially verify that your X server is running correctly. Verify that you have used the "-X" option to enable X forwarding forssh
- sshIP
- cd <directory in which you have checked out the telcocloudcode>
- tools/vc_vApp_start.sh
- This will first initiate the registration of 7000 subscribers for both, originating and terminating calls. Verify in the vAPP main GUIunder.
- In your browser (vapp-controller GUI), verify that the load is higher than 25 after a few seconds. You need the load to be high enough before activating the automaticscaling. Further in the vAppp GUI set the threshold levels

Figure 4

Running the traffic and shifting the same in the GUI:
The below is the load graph for the Circuit Switch Fall Back system. The Blue line represent the average load, other 6 represent the load on each payload node. The traffic is caused by the generator that initiates hundreds of call per second. After some time the traffic would become high and that would trigger automatic scaling of the traffic from one to the other node. A new virtual machine is started, it will load all the software for the CSCF, then it will synchronize its data with the other cluster members and finally it will be ready to take sometraffic.

We need to use the cluster instead of the whole app in single Virtual Machine as

- Better management of the high availability, redundancy and other telcoconstraints.
- Single integration point and management interface instead of exposing multiple integration points and management interfaces if each VM was visible in the network as a separateentity.
- Same concept for the physical and virtual nodes. Existing OSS systems can manage the virtualized nodes in the same way as the physicalones.

Figure 5

We need this Virtual machine to be deployed as the features it would give us to hold the traffic in high and low traffic situations overall saving the below system requirements[7]:

- Most core network nodes have their own clustering mechanism:
- Loadbalancing
- Redundancy
- Cluster management,O&M
- VM scaling and orchestration as done for most IT applications may notwork
- Node-specific actions required to ensure traffic isolation, graceful shutdown and to avoid breaking cluster redundancy
- Loadmonitoring
- Load monitoring from outside the application may include load that is not useful (e.g., memory scrubbing and other backgroundtasks)
- Load reports from inside the application provides more accurate data if performance counters can be collected in real-time.

CONCLUSION

Cloud computing has great impact on resource providing, Marketing, & service availability. Telco cloud have tobecome useful in terms of business and technical cloud IT, In order to provide services. Telecom providers just have to discussabout the cloud they need to implement to provide theirservices.
The companies have advantage of control over end to end user connectivity. This cloud emergence will provide great business models, process, cost cutting and service availability in spite of providing good service management.
Innovative mechanisms for automatically managing complex cloud services and associated QoS and other SLA requirements are needed to take the cloud model to the next level, and bring increased automation into the underlying architecture. Developed technologies, model-based service definition and automatic resolution of SLAs, will help bring about automation in the cloud by extending the service-creation environment and supporting service providers to create non-conflicting, differentiated offerings
with short times to market and automatic SLA fulfillment.

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