Up gradation of Network monitoring Software with Absolute Zero Downtime and no Performance Loss Using Double virtualization

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Abstract: *This paper explains about the network monitoring software provided by different networking company .In general all of the NMS of different networking company have a general deployment architecture .and these NMS are regularly upgraded to the updated technology .but the procedure of up gradation followed by them in current market as many disadvantages which is discussed in this paper and a new procedure of up gradation is explained which will overcome the disadvantages of the existing procedure.*

Keywords: Network Management System (NMS), Network Element(NE), Virtual Machine(VM), Operating system(OS).

1. Introduction

To the current world and technology, where internet plays an important role. But the heart of internet was network which connects many devices forming a network which is called internet. Defining network is easy but actual implementation and maintaining of such large network is very difficult. Earlier there were many network operators who where maintaining these network manually (manually refers that if any of the network element fails the operators has to detect where it has failed manually and correct that defect manually).As the network become huge it was very difficult to maintain manually. At that time many companies came up with a concept of NMS (network management system) where one can monitor the live network from a single point where you can monitor the live network 24*7[2]. This was achieved by the connection between NMS and Network element if anything goes wrong on the NE, it can be corrected through NMS which will automatically correct the defect. Now coming to this NMS which is not only a software it's a complete package which contains many software and hardware integrated to network elements this package all together is called NMS. Normally many operators as such NMS but they all have similar architecture in general where they implement this NMS. These NMS similar to an software that as to be upgraded in a regular interval to meet the new technology. Upgrading an NMS is a difficult process where network monitoring becomes difficult because live network cannot be monitored for a certain period of time which is called unmonitored time (down time) .This disadvantage is can overcome by using a concept of double virtualization which is explained in detail in this paper.

2. Background

Dealing with the architecture of current NMS uses the concept of virtualization where several software's of NMS run independently but sharing the common hardware resources as shown in the following figure.
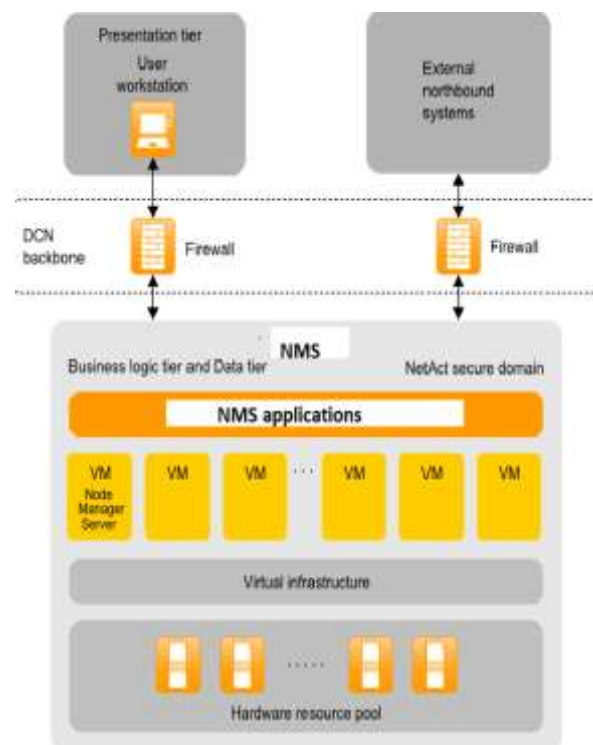

Figure 1: Existing NMS Architecture

Figure 1[3] all hardware are aggregated as resource pool which is shared upon different machines by using the concept of virtualization that is achieved by using virtualization infrastructure upon the resource pool so that virtualization is achieved . Then different virtual machines are installed and software's are independently installed on different vm's. This package is totally considered as NMS which is later integrated with different NE. Thus NMS monitors the live mobile network.

3. Up gradation Design of NMS

After dealing with the architecture of the NMS .the next step is dealing with the up gradation of NMS.
The question rises why upgrade is required. Up gradation is a process where the existing

the different versions of operating system are released with extra features.

Figure2 explains the upgrade process where the existing architecture of present NMS is cloned and new architecture is setup with the same configuration of the existing one and then a new NMS is installed on different vm's of new setup .Once the new setup is ready it as to switch over the live network as shown in the above diagram while switching over from old NMS to new NMS there is down time of average 7-8hours where the live network is not monitored during this period of time which is an important disadvantage of present architecture and other disadvantages of the present procedure is the extra huge amount of cost required to create new copy of the exiting one (which includes new hardware, new vm infrastructure). To summarize the main disadvantages of the present system is :

- 7-8 hours of down time
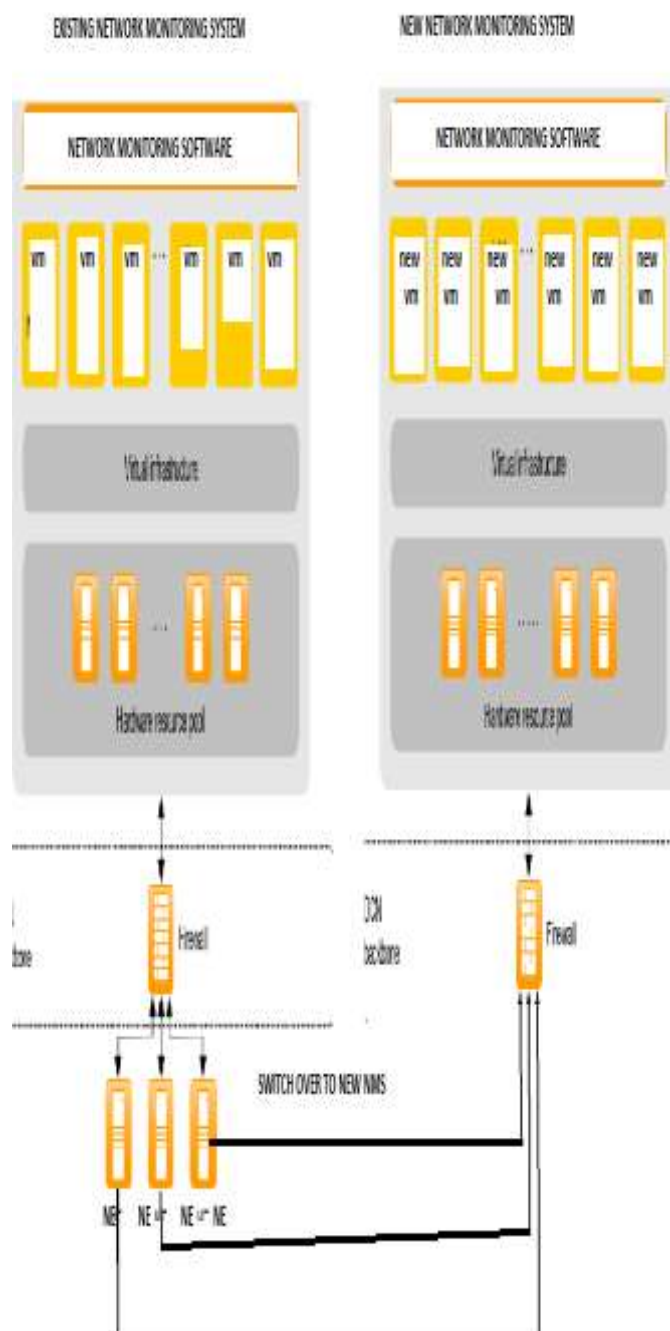- Cost to create the replica of existing architecture

Figure 3 : Step by step Up grade Procedure fro Existing NMS

4. New Implementation Process

The disadvantage of the old upgrade process can be overcome by new process. The new process uses the concept of virtualization in great manner. Firstly in brief we will discuss regarding virtualization .[1]virtualization is concept of separating the operating system from the underlying hardware by layer called hypervisor which separates the OS and the hardware .

Figure 2 : Existing Upgrade Process
NMS is changed to new NMS which is nothing but new features are added and also the existing features are more stabilized so that it improves the performance it is similar to
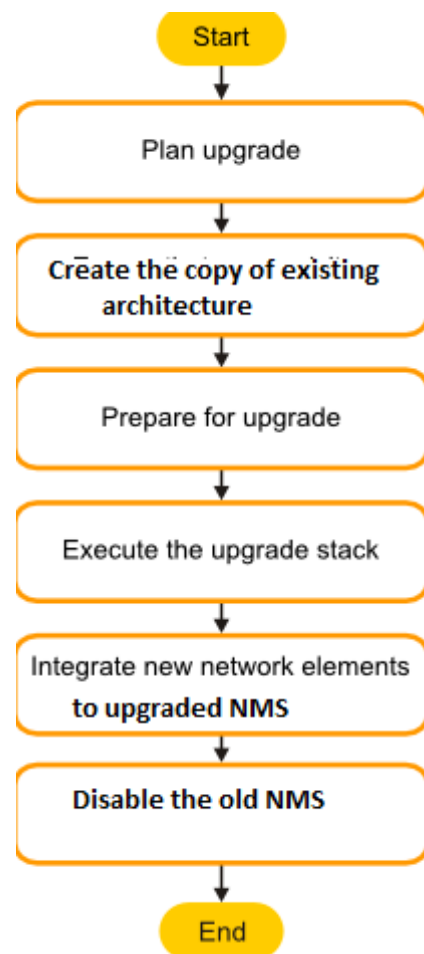
There are two types of hypervisor
- Type1 or bare metal hypervisor
- Type2 hypervisor
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Type1 hypervisor: This type of hypervisor is directly installed on the hardware above that many instances of operating system is deployed they are called virtual machines

Type 2 hypervisor: In this type operating system is installed on hardware above that hypervisor is installed on this hypervisor another operating system is installed (Ex: virtual box).

In this new process of up gradation we introduce a new concept of virtualization called double virtualization. In this concept we use both type of hypervisors i.e., type1 and type2 hypervisor s. In the new architecture the concept of double virtualization is used which is explained below.

In the existing architecture of NMS firstly they pool all the hardware resources to a single resource and on that pooled hardware resources they will install the virtualization layer(hypervisor) which is nothing but type 1 hyper visor is installed directly on the bare hardware and in the existing upgrade procedure they will clone the existing architecture and upgrade the clone one and they will switch the live network to the newly cloned setup. By doing this there is disadvantage of downtime and creation of clone.

In the new process there is no requirement of cloning the existing one separately .Upgrade process is done on the existing NMS without disturbing the live network. This is achieved by double virtualization concept as per the existing architecture virtualization infrastructure is directly installed on the bare hardware and vm's are installed on the virtualization infrastructure which becomes type 1 virtualization. In the new process without setting up new clone we use the existing vm's which is achieved by type 1 hypervisor and also the concept of type 2 virtualization is used where on the existing vm we will setup another vm(on the existing vm's os we will install another virtual machine) which will be the exact clone of existing one . mean while the existing vm will be monitoring the live network and upgrade will be carried out on the new vm achieved by type 2 hypervisor once the upgrade on new vm is achieved we will do a seamless live migration from the new vm to existing vm thus without any down time we will achieve upgrade the following figure explains clearly.
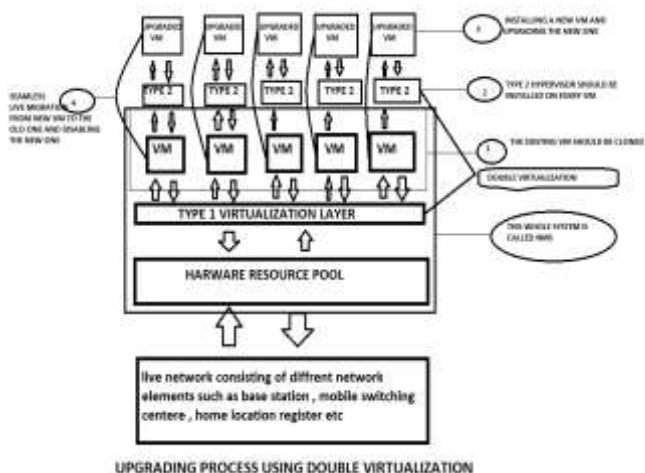
The above figure clearly explains the new process of up gradation

- step is to create a new vm's of the existing vm
- Install a type 2 hypervisor on every vm
- Create a new vm and start a new upgrade
- Once the upgrade is done ,seamless live migration is done from new one to old one and disabling the new one

Functionality of the new process is the existing vm's will be monitoring the live network whereas the upgrade is done on the new vm that has been setup on the existing vm. While the upgrade is going on,the existing vm monitors the live network without any intervention. After the upgrade is done, seamless live migration is done to the existing vm thus there will be no down time.

5. Conclusion

A new process of up gradation based on the concept of double virtualization is proposed in this paper. The design and the implementation are given. The up gradation process is done with no down time and it's cost effective. Thus we use the new concept of virtualization called double virtualization here both type1 and type2 hypervisor is used .

6. References

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[2]   http://www1.cse.wustl.edu/~jain/cis788-97/ftp/net_monitoring.pdf
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Figure 4 : Upgrading Process Using Double Virtualization