Design and Implementation of a Network of Services Under a Platform of Virtualization in The Company Cine Cable TV.

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***Abstract*- This investigation pretends to introduce the virtualization like a technological alternative for companies, institutions, and organizations which have data infrastructure, the same which can optimize, exploiting a lot the computing resources in a fast and easy way; furthermore, friendly with the environment.**

The implementation of the platform of virtualization will be carried out in the Data Center in the Company Cine Cable TV, the same will facilitate a rack server for the execution of the project, which will be virtualized through the software "VMware ESXi 5.5; allowing the simultaneous function of different operating systems and virtual servers from a centralized environment.

Nowadays, the majority of companies have a challenge in the using of technological tools, allowing the sustainable and scalability development in the TI Area, so the virtualization is ideal in these cases because it reduces the underutilization of hardware, allow the energy saving, costs, and improve the efficiency in management and production of new services.

***Indexed Terms* - TI, Host, HFC, Doble Play.**

I. INTRODUCTION

CINE CABLE TV provides services of Internet and Television using a network of HFC data, and requires that the infrastructure of hardware and software are constantly updated according to the latest technologies available on the market, in order to provide scalability and stability to the company, and thus give an optimal service to its users. **[1]**

In the latest years, the company has increased in a significant percentage the number of users, hence its infrastructure has been repowered acquiring some tools of software and hardware; some of these programs and operating systems purchased normally need an individual physical server for installation, it means having an access of embedded servers in the racks of the Data Center.

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Therefore, this project proposes the design and implementation of a platform of virtualization, in order to help the current situation of the company taking a maxim advantage of the computing resources without underutilized servers, giving flexibility and scalability in the management of hardware, and virtual servers as the company required.

II. FOUNDATIONS OF THE VIRTUALIZATION

The technology of virtualization is a combination of hardware and software which permit the function of a physical resource as logical multiple ones, thus having a better development and utilization of the properties of hardware of a host.

A. Generalities

Virtualization allows through the utilization of software to create multiple virtual machines, these ones have their own independent operating system; as these physical resources are shared between the virtual machines without interfering with other ones.

The virtual machines behave like a real one, because they can allow to host applications, file servers, data base servers, email servers, and even can be used like high performance application servers. **[2]**

B. Basic Concepts of Virtualization

Virtual Machine.-It simulates an enough hardware to allow a guest operating system runs in isolated manner, but at the same time using the computing resources from the host machine.

Host.-This is the Operating System, which is administering or controlling the physical server or host.

Guest.– The guest software is that or those Operating Systems which are running under the host (Hypervisor), which controls the hardware, and makes it possible that multiple operating systems coexist without interfering between them, as shown in the **Figure 1**. **[3]**

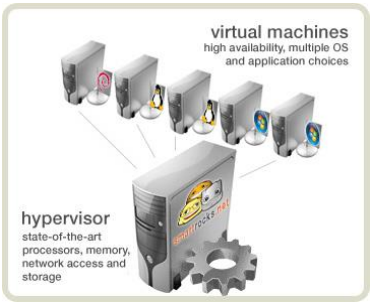

Fig. 1. Unification of servers through the virtualization.

Source. (Nazareno, 2011)

Hipervisor.- This is the responsible of the management and sharing the real resources of hardware to create and administer multiple virtual machines or virtualized hardware, having like a result a strong and stable system, in which can consolidate many operating system of independent way; in case of disaster or collapse of one of the operating system, the others keep working continuously.

Hipervisor Type 1 (Bare-Metal).- This is a software that installs and executes directly on a physical host without the need of installing it on another operating system; it is responsible to perform the operating system functions, besides, management resources and guest systems, such shown the **Figure 2**. Examples: Citrix (Xen Server), VMware (ESX/ESXi), Microsoft (Hyper-V).

Fig. 2. Type 1 Virtualization

Source. (Nazareno, 2011)

Hypervisor Type 2 (Hosted). - This kind of hypervisor runs as an application, as it installs on an existing operating system as **Figure 3** shows. This separation of functions can be useful when the underlying hardware does not have support like a type 1 hypervisor. Examples: VMware (Workstation), Oracle (Virtual Box), which are installed on operating systems Windows, Linux, MacOS. **[4]**

Fig. 3. Type 2 Virtualization

Source. (Nazareno, 2011)

C. Advantages of The Virtualization.

The virtualization of servers shows the following advantages:

a) Decrease the underutilization of the computing resources.
b) Reduce considerably the using of the physical space in the racks of the Data Center.
c) Improve agility in maintenance.
d) Reduce energy consumption.
e) Allow fast restoration from a server to a previous state after suffering a blockage or failure.
f) Perform a backup of the entire Virtual Server.
g) Virtual machines have a minimal reliance on the physical hardware, so provide the availability of performing the restoration and migration in different hosts.

III. DESIGN AND IMPLEMENTATION OF THE SOLUTION

A. Physical Topology of The Data Network

Cine Cable Tv counts with an own infrastructure where there are the network and television equipment denominated Head End, place from where the signal double play (Television and Internet) is emitted to all its users, (shown in **Figure 4**).

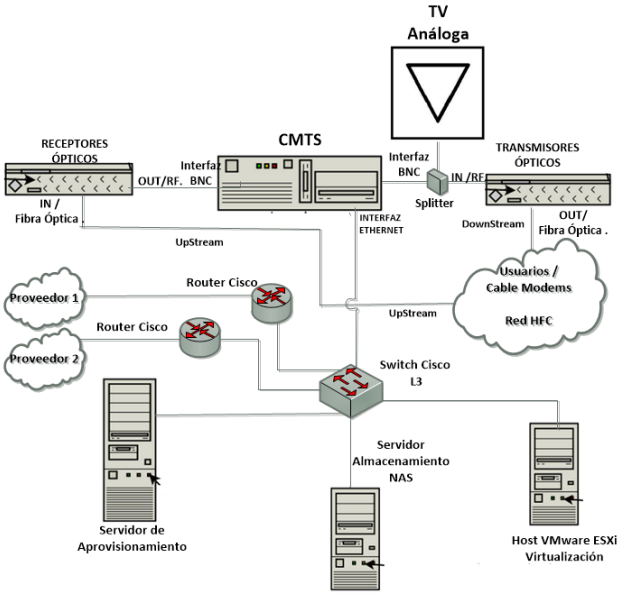

Fig. 4. Physical Topology Cine Cable TV – Ibarra

Source. (Data Management Department Cinecable TV, 2015)

B. HFC Network Structure

A "HFC Network" is basically conformed by three elements such as: Optic fiber network, Node converter of optic signs or RF and a coaxial wire network, (shown in **Figure 5**).

a) Optic fiber network. - It is the main network for the distribution, begins from the Head End until optic nodes.
b) Node optic. - This equipment is dedicated to perform the conversation of optic signs to RF, and it is usually located on the external network to few blocks of users.

c) Coaxial network. - This secondary distribution network begins in the node optics and arrives until the last mile or final user. **[5]**

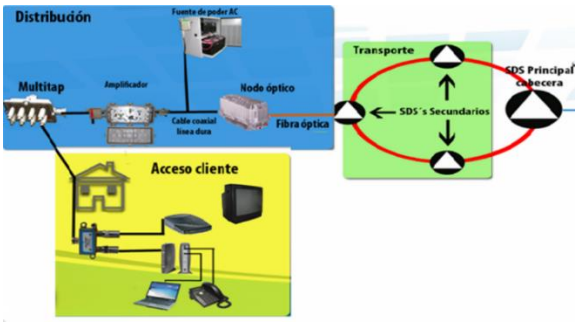

Fig. 5. HFC Network Structure.

Source. (Cine Cable Tv., s.f.)

C. *Solution of Software for Virtualization.*

VMWARE ESXi.- This is the leader company in software of virtualization, and possess a wide range of products which are adjusted to the necessities of small, medium, and big companies that require a virtual platform in their data centers to obtain scalability and efficiency in the management of computing resources.

One of the main advantages of VMware is to provide a high level of confidence in virtualization of applications or server at the company level, as offering multiple services for subscriptions to trainings, certifications, and several languages support, in this way the costumers of VMware have the guarantee and technical sustenance of an intense network of professional certifications to start the implementation and set the virtualization. **[6]**

D. *Virtualization Scenario.*

To proceed with the implementation of the software of virtualization and virtual machines, firstly the software and hardware requirements are analyzed for each server under the supervision of the responsible person of the Data Network Management of the company, to define the parameters and how the project will be carried out. (It is shown in **Figure 6**).

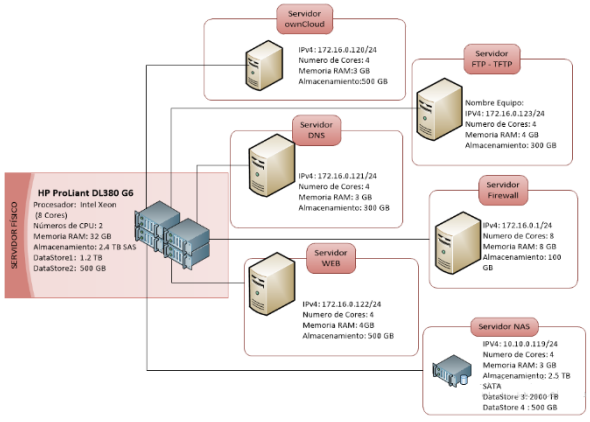

Fig. 6. Virtualization Scenario in Cinecable TV.

Source. (Data Management Department Cinecable TV, 2015)

Each virtual server will count with its own virtualized hardware, it will be assigned by the hypervisor VMware ESXi for monitoring and supervising that all virtual machines are correct executed. The software VMware ESXi can be downloaded from the official site VMware: (https://my.vmware.com/web/vmware/downloads). Where the application VMware, vSphere costumers are also available for downloading, which allow to perform the management and administration of the virtual machines. **[7]**

IV. CONCLUSIONS

- Virtualization allows Cine cable TV can save costs in the implementation of new services and optimize the use of the hardware resources which exist in its Data infrastructure.
- VMware ESXi server counts with a RAID system, which permits to have redundancy of hard drive where the virtual machines are kept, providing some tolerance for contingencies.
- The response time of an employed service on a virtualized environment is as fast as if it were a physical server, just with a minimal difference depending on robustness of the virtualized hardware, and the hypervisor type that is used.
- Virtualization streamlines the operation and maintenance process, as allows to complete migration and cloning tasks of the virtual servers without needing to stop the service.
- Having a power backup like a battery bank and an UPS dispositive can counteract problems caused by power loss and ensure continuity of services.
- Access for each virtual server is independent, and if the security is compromised, this would affect just at the server in question.
- In the development of the investigation, a comparison of the most influential solutions of the visualizer hardware were done, and the results were that VMware is the best and it fits the requirements of the company.
- In the analysis of benefit - cost, the conclusion was that VMware being a software with a lot of maturity in the market offers the following benefits for the company: stability, security, scalability, and technical support; all of these are essential for the production environment.

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