Low Cost Computing Using Open source Technologies like KVM and Virtualization

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Abstract

In this paper we are discussing the virtual remote environment using Local area network and some to the tools of Diskless Client. The aim of this paper is to provide very low cost resource computing using open source technology under remote desktop environments. Kernel based virtual machines and hypervisor [3], [4] application used to run virtual computer over the network. The client will get the operating system from virtual machines from local server which is in the secured network [3]. Through Desktop sharing systems, user can get the independent system. Complete resource utilization is possible because Virtual Machine run on Remote Server [5]. Using this technique we can improve the performance of the system even though having low configuration of the system.

Keywords: OS, Virtualization, Hypervisor, KVM, and Remote Desktop.

INTRODUCTION

Up gradation in operating systems is happing rapidly, user need to change or upgrade the application software as well as system software along with hardware. The replacement of new hardware is not affordable to the client or any other customers. Now days computing power is chaning day by day, even though todays latest computer system may be old from tomorrows configuration, this is happning because every day organization requirement changes and according to that manufacture come with news release of software and applicable hardware. Even though these new release in operating system and software takes place, these hardware can perform better computation. More processing power required by the new resources, one solution can be done if users prefer Diskless Client or Virtual computing using open source Technologies, these techniques used in old system, even though system having low configuration. This will result in cost reduction and resource utilization. With the help of thin clients user can use the resource of powerful system using remote machine, client can share the resources from central server. These thin clients can be any outdated system with low configuration and at least support an operating system which can handle remote desktop client services. In this paper we are giving the solution for this problem, maintenance of machines as we are ugrading the server system only, clients will not

require any maintenance, old systems save the cost of hardware and other connected devices to implement new setup in the organization for better utilization of existing hardware. Now single yuser interface for remote terminal as available with shared environment and desktop compatibility, this is become a traditional remote desktop for single user. In some remote desktop solution, powerful servers are used which shares one instance of operating system with multiple users which can work remotely, shared operating system having some drawback while running on real time network services, if one instance having trouble to book the operating system it will causes to down whole system[8]. With this solution we can reduce the cost, efforts and above mentioned problems can be solved by the extending remote desktop feature using diskless and virtualization of open source technologies. If we combined feature of remote desktop with virtual machine [9] to provide utilized dedicated thin client environment which access the operating system over the Local Area Network as well as Wide Area Network. In market some proprietary solutions are already available, which provides same facility, but cannot be owned by small organization and institutions. Our solution is based on open source software and normal desktop computers which act as remote desktop server with increasing CPU utilization and reducing cost. This technique utilizes complete resources hence can be used to improve the performance and reduce the cost or efforts required.

RELATED WORK

Todays computers are very much advance and they are powerful to use the open source virtual machine applications [10] to run the separate operating system instance over the local area network as well wide area network [11]. Virtual machine need to be made separate it is not acceptable for the execution of one to adversely affect the performance of other computer system. The heterogeneity accommodation support by the virtual machine. Remote desktop virtualization implementation works on client/server environment. Execution is on remote system which is linked to local client device over a network using remote desktop protocol. All application and data used remain on the remote system where as display, keyboard and mouse at local client device which may be conventional PC/laptops or a thin client device or a tablet, or even smart phones. This implementation is possible

with multiple desktop operating systems on a server running with hypervisor [13], [14].

User can utilize the resource of server computer system over the client this is a basic purpose of virtualization [14]. In last 10 years VMware software is only popular application to provide virtual machine over the network, now days XEN [13] open source hypervisor brought virtualization to the open source world. Redhat organization come with new RHEL 6 [16] to migrate to KVM as its supported virtualization platform. The translation to KVM in RHEL6 comes with several features which either does not exist in XEN or were not implemented in original XEN environmen

In previous work, XEN hypervisor is used to create virtualization environment and LTSP (Linux Terminal Server Project) [2], [17] is used to access Remote Desktop by making some changes in LTSP script [17]. In previous work user can access remote desktop within LAN or outside network. The model consists of two main components [17], one is management server for creating VM on physical machines user to VM mapping and second is a physical machine running VM to provide Remote Virtual Desktop. Only Linux operating system is provided as remote virtual desktop and need some changes if user wants to use Microsoft operating system [17].

IMPLEMENTATION

With this technique we can run the open source operating system from virtual machine which is available with virtualization server we may called as a virtual machine. We introduce Ubuntu operating system used as host operating system and Kernel virtual machine as a environment of virtulization to runs various system software[1]. Ubuntu LTSP[1] used as remote desktop for boot the computer system from local area network, the operating system is available with virtual environment[1] from where you can directly run the operating system in stateless fashion. Following components are the main component for the virtualization, HTTP server, LTSP server. HTTP server is used to create and manage the virtual machine on the physical system. From this protocol user can remotely access the operating system and hardware resource from the source computer system. KVM hypervisor is installed on Physical Machine as shown in Figure 1, which runs user Virtual Machine. The purpose of this LTSP is to provide a login screen through which user can connect to the LTSP server and run entire desktop on the LTSP server to those users who don't have storage. To start and run the VM's when user requests for remote desktop, we have designed scripts and daemons which run on Physical Machines.

The objective of this work is to provide complete independent operating system in the form of Remote Desktop. Functionalities of this Virtual Remote Desktop are very similar to regular desktops available on independent machine. This virtual remote desktop is accessible through any thin client or wireless devices (Smartphone's, tablets). If user wants any proprietary version of operating system as virtual remote desktop, this system is also implemented by using

RDP (Remote Desktop Protocol). For cost effective solution we have used Ubuntu as a host operating system as well as guest operating system. Remote computer system can work or act as a service provider about the operating systems and other hardware which is available with virtual pool. Operating systems can separately access by the virtual client over the network, HTTP and LTSP are the major protocol and component to take the control of accessing campatablity of whole operating system over the network. The services related with this technique must be in running position at server side[17], service httpd status, service httpd start and service httpd stop command used to ensure that wheater the service of the particular configuration file is properly running or not.
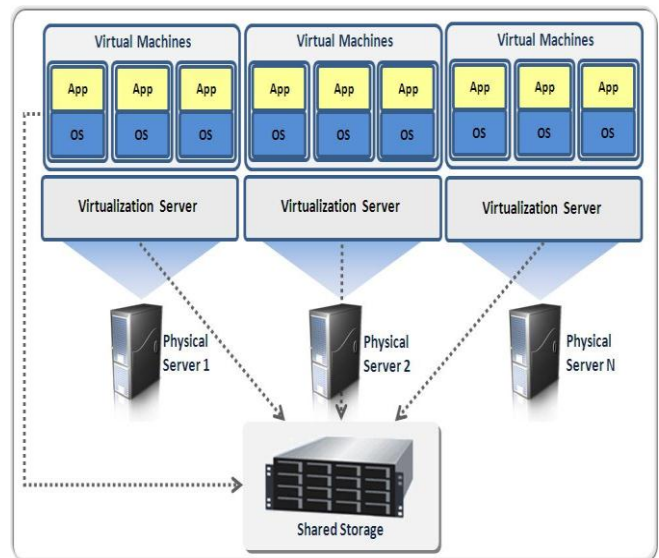

Figure 1. Shared Storage with Physical Servers

COMPONENTS REQUIRED FOR VIRTUALIZATION

1) Hypervisor: KVM [13] is new hypervisor that has gained popularity in the past few years, but not XEN, which supports Para virtualization as well as hardware assisted virtualization [13]. KVM supports some specific processors like AMDV and Intel VTx processors [13]. KVM is implemented as kernel module which when loaded, converts the kernel into bare metal hypervisor. KVM was designed and implemented after the development and release of hardware assisted virtualization extensions and has been optimized to take a full advantage of these extensions rather than building them in as an afterthought. Due to this, KVM requires Intel VT or AMD-V extensions be present and enabled on host system. AS we are using Intel VT extension system, this choice is suitable for virtualization. Opens source having a powerful architecture support to work on linux environment and because of that all packages managed properly by the single host system.

2) LTSP: LTSP is used is used to provide remote desktop for Linux users, who are diskless client. LTSP does not require any software or OS to use LTSP remote desktop. It uses only a PXE (Pre Execution Environment) enabled network card [17].

3) Other Remote Access Mechanism: According to the guest OS running on hypervisor, the choice can be made using both guest OS and host OS. If open source solution is required LTSP, VNC (Virtual Network Computing) [19], rdesktop (Remote Desktop Protocol client) [20] can be used. If proprietary solution is used RDP/rdesktop can be used. Comparison of various remote accesses mechanism is given in Table I.

Table I
Components Of Various Remote Access Mechanism

	VNC	Open Thin Client	LTSP	rdesktop
Open source	Yes	Yes	Yes	Yes
USB support at client	No	Yes	Yes	No
Audio support at client	No	Yes	Yes	Yes
Local execution of application	No	Yes	Yes	No
GUI exports	RFB(Remote Frame Buffer)	SH.X	X-DMCP	RDP
Soft dependencies	No	Yes(Java)	No	No

CONCLUSION AND FUTURE WORK

KVM provides an excellent platform for deploying Virtual Machines to provide a virtualization based Remote Desktop. We are using open source tools, so we expect that there is no need for frequent upgradation of systems and management becomes very easy with virtualization. The complete resource utilization is possible with our work. Via incomprehensive experimentation, our result shows the performance of KVM and Intel VT based systems is much better than old independent systems.

This work is implemented on single system; we are working to combine multiple systems to provide Virtual Remote Desktop, so Load balancing is not implemented.

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