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Virtual Desktop Infrastructure as Supporting Facilities in College

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Abstract

The use of mobile computing devices has become a trend among students, many students who have it and used it in everyday activities. However, these devices are still limited in its use and, rarely used to assist students in college activities. Virtual desktop infrastructure is a solution, so that mobile devices owned by students can be used in lectures. VDI allows students to run applications that previously could only run on personal computers with Microsoft Windows operating system, so it can run on any device they own. This paper will describe testing of the maximum number of virtual desktops that can run on hardware that is already available, and the performance of the server when running the maximum number of virtual desktops.

Keywords : *Virtual desktop infrastructure, Virtual machine, education.*

1 INTRODUCTION

Developments in technology, making the birth of many types and specifications of mobile computing devices that combine computing and communication capabilities, each device has diverse computing capabilities, with the weaknesses and strengths of each. The operating system used a mobile device can be made to maximize the use of the device, according to product requirements. Some applications cannot be run on all operating existing systems, this is because the mobile operating system designed to support a limited hardware. These devices have generally used by students in the lecture activities, ranging from the search for a college assignment, lecture materials, work reports, and so on. On average students need a notebook or netbook to be able to run applications that are used during the lectures (e.g. MS Office, Photoshop, application programming interface). This is because the application can only run properly on Microsoft Windows operating systems and requires a relatively high specification device. Student owned devices such as tablets or smartphones cannot be used to study the time course of lectures and completing assignments in class. Students also only use one operating system i.e. Microsoft windows because most of the software used is only

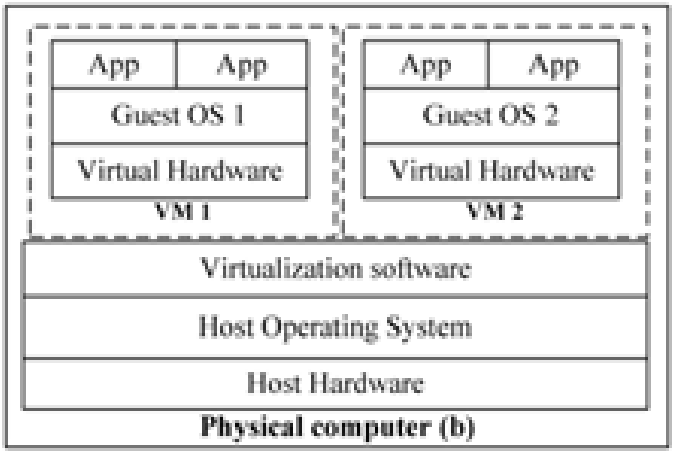

Figure 1: Illustration of Virtualization on Host Computer

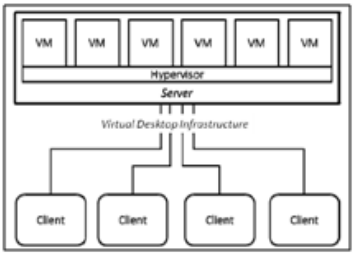

Figure 2: Illustration of Virtual Desktop Infrastructure

running on the operating system. Thus the authors tried to examine the solution of problems that occur, namely the diversity of hardware and operating systems used by students. This is intended to allow students to keep learning without having to be limited by the device they are using. VDI (Virtual Desktop Infrastructure) allows the client to access his virtual desktop using hardware that is owned by the client with a variety of operating systems used by client. Applications required by the client, will be run on a virtual desktop and use the specifications that are set to be able to run the application properly. This paper will discuss the design and initial implementation of a virtual desktop Infrastructure projects using the infrastructure already available on STMIK PalComTech. This design is expected to be a reference to implement VDI at the college as a whole. In this paper, the virtual server testing up to the maximum number of virtual desktops appropriate hardware capabilities available. After getting the maximum number of virtual desktops that can run, performance tests will be done in. By using Microsoft Hyper-V 2012 as the software used to perform virtualization (hypervisor) and Citrix VDI-in-a-box as a software service provider for VDI.

Figure 3: Desktop display of the virtual desktop that has been installed

2 VIRTUAL DESKTOP INFRASTRUCTURE

2.1 Virtualization Concept

Virtualization is a technology where the software will simulate individual computer hardware on one computer (the host). Each simulated computer simulation called virtual machines (also known as VM or guest OS). Each virtual machine has hardware specs simulating the allocation of processor, hard disk, memory, and network are obtained from the host computer (server). The host computer can run either one or more virtual machines, and each virtual machine will share resources with the host computer [1]. Hardware Virtualization offers several advantages, including infrastructure consolidation, ease of replication and relocation, the normalization of the system, and resource isolation. In short, Virtual Machines gives users the ability to run multiple virtual computers on the same physical at the same time and store them in almost any kind of media. Each virtual machine can run its own set of applications on its own operating system. A process partition to prevent data leakage and create a virtual machine is isolated from one another. As with physical computers, virtual machines require a physical network, virtual networks, or a combination of both types of networks to communicate. Virtual hardware create abstraction layer for each guest operating system. Abstraction is the process of separating the hardware functionality of the underlying hardware. Because the operating system is built on the ideal of hardware, user can change the physical hardware without affecting the function of the virtual machine. Virtualization layer is responsible for mapping virtual hardware resources to the physical host [2].

2.2 How VDI work

Virtualization not only is applied to the server. Technologies such as Remote Desktop Services have proved that a remote user can work well when logging into a desktop on a server. One of the challenges of server - based computing is that the user logged into the server together , where they run the applications that have been provided by the administrator . Failure on the server can affect dozens of users and changes made on the server of a service can be disturbing. The company desire is the isolation and flexibility of a PC combined with a centralized Remote Desktop Services. This is possible with Virtual Desktop Infrastructure (VDI). Clients connect remotely, which has been installed on a terminal or a PC, the client will connect to the broker when it starts working. Broker will forward the users connection to the virtual machine where the user will enter. The virtual machine is not running a server

Table 1: The Hardware specification

Device	Quantity	Description
Hypervisor Server	1 Unit	Intel Xeon E5606 2.13 GHz
		Intel s5500BC
		DDR3 8GB RAM
		VGA onboard
		Intel(R) 82567LM-2 Gigabit
Client	10 Unit	Intel Dual Core1.6 GHz
		DDD2 1GB RAM
		VGA card onboard
		LAN Card Fast Ethernet
Native Desktop	1 Unit	Zyrex LW4843
		InterCorei3 2.1GHz
		Intel HM165
		2GB DDR3 RAM
		500GB SATA HDD
		Intel HD Graphic

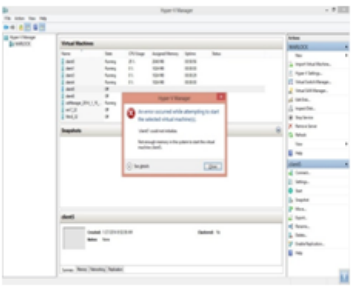

Figure 4: Hypervisor server cannot run virtual desktops 5 and 6

OS , but running a desktop OS like Windows Vista or Windows 7 , and the guest OS has all the Necessary user applications installed on it . Each user has their own virtual machines and their own independent work environment [1]. One easy way to explain VDI, VDI enables users to access their Windows operating system well, from anywhere, anytime, from any device. Although many people understand the difference between a session and desktop virtualization, some still mixes scenarios each VDI use. Because there are two types of virtual desktops, pooled and private: With pooled collections of virtual machines, the administrator can choose to deploy VDI virtual machines through pool. In this model, all users in a virtual machine pool share a single master image. The changes made during a session of each user are stored in the virtual hard disk will be discarded as soon as the user logs off. The main advantage of this model is to have only one image to be managed, which reduces complexity and simplifies storage management, thereby reducing the cost of implementation [1].

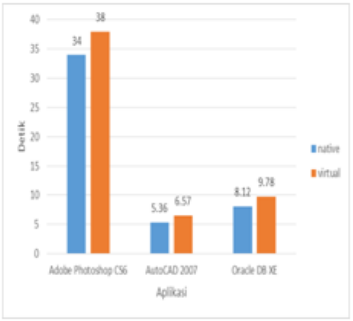

Figure 5: Loading time comparison chart of virtual desktops and native desktop

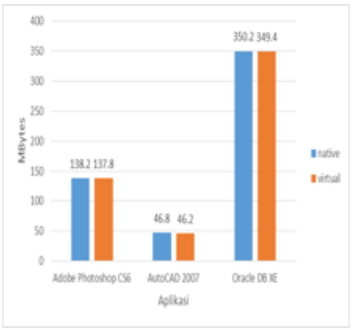

Figure 6: CPU usage graph comparison of virtual desktops and native desktop

3 VIRTUAL DESKTOP INFRASTRUCTURE ON STMIK PALCOMTECH

Virtual desktop infrastructure is implemented in STMIK PalComTech, using a conditioned lab infrastructure similar to the actual circumstances of use. Both the server and client is at one gigabit LAN network, which is connected using UTP cable. Virtual desktop infrastructure on STMIK PalComTech implemented using hardware already available. As for the hardware specs are as follows in Table 1.

Each virtual desktop configuration by using 1 core CPU, 1024 MB Ram (dynamic-to 2048MB), 60 GB hard drive, and one network interface connected to a virtual switch. To use a virtual desktop on the client, can be done with Microsoft Remote Desktop or Citrix receiver. To use Citrix receiver Citrix receiver installation required on the client computer. After the installation is done the client can log on citrix web page VDI-in-a-box and will immediately be directed to the Citrix receiver. Virtual desktop login page and can be seen in Figure 3.

4 VDI PERFORMANCE TEST

4.1 The Maximum number of virtual desktops

After testing with 4 virtual desktops successfully performed, the test was continued by adding 2 more to the virtual desktop configuration, to 6 virtual desktops. In this test VDI

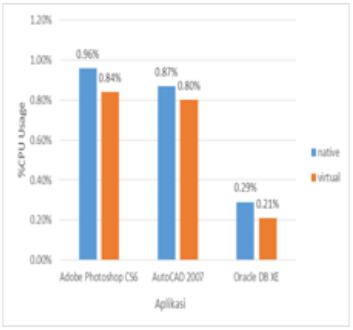

Figure 7: RAM usage graph comparison of virtual desktops and native desktop

manager trying to run 2 clients again and monitored server capacity utilization by 86%. However hypervisor cannot run both the virtual desktops, due to the capacity of RAM that does not comply can be seen in figure 4. From the results of the testing that has been done, it was found that the virtual desktops that can run simultaneously as many as 4 virtual desktops. At the time of the virtual desktop will turn into 5, the hypervisor does not allow the addition of virtual desktops running. By removing the error message "not enough memory in the system to start the virtual machine" which means that the hypervisor considers the available memory is not sufficient to add one virtual desktop again. If detailed memory usage on the hypervisor, it can be seen that it takes to run the hypervisor memory of 740 MB, VDI manager using memory of 1024 MB, then the average idle one virtual desktop to use memory of 1240 MB. In total we will get the use of a memory of 6740 MB or 85% of the total memory when in percentages.

4.2 Performance of Virtual Desktops Compared to Native Desktop

The results of the comparison are shown in Figure 5, 6, 7, and 8. Showed no significant difference from the time of loading, CPU usage, RAM and hard drive. These comparisons also show absence of significant performance difference only between the native and virtual desktops. For long loading application, it can be seen performance difference between native and virtual desktop that is equal to 10.52% for application Photoshop Adobe CS6, 18.41% for the application AutoCAD 2007, 16.97% for the Oracle DB XE application and overall there is a difference of 15.3 % between native and virtual desktops.

From the test results and the discussion that has been made use of virtual desktop infrastructure as a means of supporting lectures at the college is very possible to do. Virtual desktop infrastructure gives freedom to the students to use the devices owned by students, without limitation specifications constrained devices and operating system used. Performance shown by the relatively same virtual desktop with native desktop tested in this study. These results also support previous research by R. Miseviciene et al., (2012) [3] and Plestys, et al. (2013) [5] which states that already VDI technology can be applied and used as a means of supporting lectures.

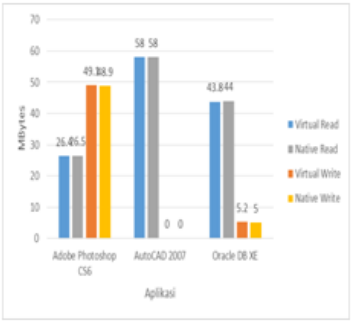

Figure 8: Graphic comparison of the use of virtual desktop hard disk and native desktop hard disk

5 CONCLUSION

After testing has been done in this paper, it can be concluded that, more virtual desktops running on the hypervisor server resource usage will be growing, especially the use of RAM that cannot be shared between virtual desktops.

With a virtual desktop configuration that has been done and the server has 8192MB of RAM can run 4 virtual desktops simultaneously. Virtual desktop infrastructure can be used as a means of supporting classes in college because of his ability to run applications that are used by the students well.

The lack of difference in the performance of the virtual desktop when compared to native desktop as shown by the difference in application load time by an average of 15.3

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