

MULTI-PLATFORM DISKLESS WORKSTATION

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MULTI-PLATFORM DISKLESS WORKSTATION

A Master project submitted to the Graduate School in partial fulfillment of the requirements for the degree of Master of Science (Information Technology),

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ABSTRAK

Masa dan tenaga yang banyak serta kos yang tinggi diperlukan untuk mengurus jumlah komputer yang banyak. Stesenkerja tanpa cakera pelbagai platform (multi-platform diskless workstation) merupakan komputer yang boleh menjalankan pelbagai sistem operasi dan mempunyai kos penyelenggaraan yang rendah. Konfigurasi dan sistem-sistem operasinya disimpan di dalam komputer pelayan. Stesenkerja ini dikonfigurasi untuk menjalankan applikasi dari komputer pelayan. Ia tidak mempunyai cakera keras dan menyimpan data di dalam komputer pelayan. Stesenkerja ini mempunyai keupayaan untuk melayari Internet. Ia sebenarnya adalah terminal bodoh. Pengurusan stesenkerja ini dijalankan di komputer pelayan dan ini mengurangkan kos penyelenggaraan rangkaian

Stesenkerja ini dibuat dengan menggunakan cakera liut 1.44MB. Ia mendapatkan konfigurasi daripada komputer pelayan. Alamat IPnya juga akan diberi oleh komputer pelayan. Selepas mendapatkan semua konfigurasi, ia akan beroperasi seperti komputer biasa akan tetapi perisian dan data diakses melalui rangkaian dari komputer pelayan. Semua aktiviti dijalankan di komputer pelayan dan dipamerkan di monitor stesenkerja.

Manfaat penggunaan stesenkerja tanpa cakera pelbagai platform ialah pengurusan berpusat. Pengurusan berpusat membolehkan peningkatan perisian dijalankan dengan lebih cepat dan senang serta menghalang pengguna daripada memasukkan perisian yang tidak dibenarkan. Serangan virus juga dapat dikurangkan. Dengan menyokong pelbagai platform, stesenkerja ini membolehkan pelbagai sistem operasi digunakan. Konsep pengurusan berpusat yang diterapkan dalam persekitaran pelbagai platform ini mengurangkan kos pemilikan komputer dengan ketara.

ABSTRACT

It is time consuming, costly and labor intensive to manage a large number of computers. Multi-platform diskless workstation is a computer that can run several operating systems and has low maintenance cost. Its configuration and operating systems are stored inside the server. The workstation is configured to run applications from the server. It has no hard disk and stored data inside the server. The workstation also has the ability to roam the Internet through router. In actuality, the workstation is a dumb terminal. Since all the management of the workstation is done on the server, the cost in maintaining the network is reduced.

The workstation is booted from a pre-configured 1.44MB floppy disk. It requests for its configuration parameters from the server. The server will also assign IP address to the workstation. Once the workstation received all its parameters, it operates as normal computer with the exception that the software and data are accessed through the network from the server. All activities are done on the server and displayed on the workstation monitor.

The benefit of using multi-platform diskless workstation is the centralized management of the network. Centralized management will enable software upgrades to be done quickly and smoothly. It would also deny the user from installing unauthorized software. The treat of virus attack can also be reduced. By being multi-platform, the user can gained access to different applications based on different operating systems. The management centric concept incorporated in multi-platform environment reduces the total cost of computer ownership significantly.

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

The need to share data, information and resources is the reason for networking. In networking, computers are connected together in order for the users to communicate and share resources. Networking is defined as the sharing of hardware resources, software resources, and information (Sahatt, 1992). The key word here is sharing. Thus the use of the hardware will be more effective by being able to share resources. Initially networking is the connection between several dumb terminals and the host (server). Each terminal will be given a slice of time by the server to execute its job. With the arrival of personal computers (PC), networking enters into new dimension. These PCs have processing power. When they are connected through networking, work on an individual PC can be sent to another PC for editing or processing.

With the introduction of local area network (LAN), networking has spread. In LAN, there are two ways to be connected. The first is server-based model and the second is the peer-to-peer model. In server-based model, there is a

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REFERENCES

- A.Ranch, David., (1999). *Setting up IP Masquerade*, Linux Magazine (August).
<http://www.linux.mag.com/1999-08/guru-01.html> (6 Jun 2001)
- Caesar., (1999). VMware on track to deliver virtual machine monitor to Linux, NT.
<http://www.ars-technical.com/li8nux/reviews/1q99/vmware-pre-1.html>
(4 April 2001)
- Comes, Phil., (1997). "The Linux A-Z". Hertfordshire: Prentice Hall, Europe.
- Danesh, Arman., (1999). "Red-Hat Linux 6". Alameda: SYBEX Inc.
- Finlay, Douglas., (2001). "Multiples Worlds" Becomes Virtually Server-Centric.
<http://www.vmware.com/news/SDTimes.html> (3 April 2001)
- Forouzan, Behrouz., (1998). "Introduction to Data Communications and Networking". San Francisco: McGraw Hill.
- GNU General Public License (1991).
<http://www.linux.org/info/gnu.html> (5 Jun 2001)
- Hasenstein, Micheal., (1997). Linux IP Network Address Translation.
<http://ipmasq.cjb.net> (6 Jun 2001)
- Heath, S., (1993). "Effective PC Networking". London: Heinemann.

Jordan, L., & Churchill, B., (1994). "Communication and Networking for the PC". Indianapolis: Newriders Publishing.

Kercheval, Berry., (1999). "DHCP – A guide to Dynamic TCP/IP Network Configuration". New Jersey: Prentice-Hall,Inc.

Linux Information Sheet

<http://www.ibiblio.org/mdw/HOWTO/INFO-SHEET-1.html>

(30 August 2000)

Linux IP Masquerading Web Site

<http://www.indyramp.com/masq> (5 Jun 2001)

Maruhn, Oliver., (2001). Emulating a complete PC with VMware.

<http://linuxticker.com/articles/641.html> (4 Jun 2001)

Mullen, Patrick., (2000). Inside VMware.

<http://www.thedukeofur.org/VMware-Review/index.shtml.htm>

(10 April 2001)

Nunamaker, J.F.Jr., Chen,M., & Titus, D.M., (1991). *System Development in Information System Research*, Journal of Management Information System. Pg. 89-106.

Oppenheimer, Priscilla.,(1999). "Top-Down Network Design".

Indiana: Macmillan Technical Publishing.

Ramos, E., Schroeder, A., Beheler, A., (1996). "Computer Networking

Concepts". Columbus, Ohio: Prentice Hall.

Patrizio, Andy., (1991). VMware Lets Several OSes Run Concurrently.

<http://techweb.com/wire/story/TWB1999021150014> (19 April 2001)

Schatt, S., (1992). "PC Networking For Systems Programmers". Singapore: John Wiley & Sons. Inc.

Sierring, Peter., (1999). VMware 1.0: Windows with Linux.
<http://www.heise.de/ct/english/99/14/054> (19 April 2001)

Siyam, K. S., (1997). "Inside TCP/IP (3rd ed.)". Indianapolis: New Riders Publishing.

Stern, Hal., (1991). "Managing NFS and NIS". California: O'reilly & Associates, Inc.

Stallings, W., (1993). "Local and Metropolitan Area Networks (4th ed.)". Singapore: Maxwell Macmillan International.

Stamper, D.A., (1994). "Local Area Networks". California: The Benjamin/Cummings Publishing Company, Inc.

VMware., (2000). VMware Wins PC Magazine Technical Excellence Award.
<http://www.vmware.com/news/releases/pemagawardpc.html> (19 April 2001)

What is Linux?
<http://www.linux.org/info/index.html> (5 Jun 2001)

Why use Linux?
<http://www.linuxlinks.com/local/why.shtml> (5 Jun 2001)