A Comparison of Win2K and Linux as
Internet Service Provider Platforms

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Abstract

This paper presents an objective analysis of Windows 2000 Advanced Server and Red Hat Linux 7.3 as platforms for providing services to the Internet. First the criteria used for analysis will be presented. Next the methodology used to gather the data will be described. Then the results of performed experiments will be analyzed. Finally results will be summarized and implications of the research will be discussed.

Several different aspects of service management were analyzed: installation, configuration, administration, and overall deployment of network services. The services studied include DNS, DHCP, web services (WWW, FTP, and SMTP), and email services. In addition, preliminary results of load testing will be presented. This paper does not argue why one platform is better than the other; on the contrary, the facts are presented so that the reader can determine which technology best fits his/her needs.

Criteria

We chose to use two of the most current and stable network operating systems available. In the Linux domain, RedHat 7.3 was used. From Windows, Windows 2000 Advance Server was deployed. Each OS was installed on a Dell OptiPlex GXa workstation. Each had a Pentium II Intel processor with 256Mb of RAM.

From the installation and configuration of each of these systems qualitative data was derived – a side-by-side comparison of how easily the services were to install and configure. Also, statistics were collected to represent overall time and load testing of the two systems.

The objective comparison of these two processes was accomplished by having one individual who was familiar with each operating system do the first installation and configuration. These individuals then traded places and reproduced the same installation on the operating system that they were unfamiliar with. These times were recorded and provided in this paper as appendix A.

Analysis of Results

Internet services are a communication from one port to another following a defined protocol. These protocols are used to transmit data over a physical link. The process of handling, configuring, and managing the communication of these ports has stirred controversy. The controversy is between which operating system will do the job better – Linux or Windows.

These two operating systems take a very different approach when it comes to network services. In order to discuss the different implementations of network services, it is necessary to define and describe the different ways that Linux and Microsoft handle service management.

Linux offers a variety of different ways to install, manage, and configure services. For example, a service can be manually installed by compiling source code. The most common means of installing services is through an RPM (RedHat Package Manager) package. RPM files are self extracting and do all the 'dirty work' of installation. Once a service has been installed, configuration files may be modified to meet system requirements. In most cases, all of this is done from the command line.

Windows uses a tool called the Microsoft Management Console (MMC) as a Graphical User Interface (GUI) for configuration and administration of network services. MMC allows administrators to delegate specific tasks and services over the entire system. Unlike Linux, Windows restricts configuration options to what the GUI offers. An administrator may not have complete access to modify all parts of the service. An advantage of the MMC is that it allows administration access to all services from the same window and remote access to other computers to perform the same tasks.

Operating System

RedHat offers the user a choice of either a text based or GUI installation. Windows uses a combination of both text and GUI. For the purpose of this paper the RedHat installation was done in text mode. Appendix A shows that the RedHat installation took about 15 minuets less than Windows. This time difference is because RedHat only installs components specified from the user configuration. The Windows installation includes many additional software programs that may not be used.

Ease of installation is comparable. Both have descriptive instructions that guide the novice user but do not encumber a more proficient user. The RedHat text installation guides the user through each step of configuration and then installs the components the user specified. Windows installs everything and prompts for user input during the installation. Windows allows the user to choose additional services to install. It was discovered that trying to install additional software components during the initial installation caused several errors. Correcting these errors required the reinstallation of the OS without these components.

DNS

RedHat allows the user to install DNS during the OS installation. Windows claims to do the same, but as mentioned previously, we were never able to do so. DNS must be installed through the Windows Control Panel after the OS has been completely installed. Both RedHat and Windows require that the appropriate zone files be created and configured. RedHat requires several files be created and edited properly. This can be challenging because of complexity of the configuration files. Windows completes the process through a GUI that creates configuration files by prompting the user to enter the necessary information and then writing the files independent of the user.

DNS was installed and configured 20 minutes faster with Windows and was much less complex. Additional research was required to learn how to install and configure DNS in RedHat. This task was achievable, but not simple.

DHCP

DHCP is one of the most important network services. RedHat requires two RPM files - DHCP client and server. After both RPM's were installed the dhcpd.conf file had to be configured through a command line editor for the basic configuration. Windows uses an installation similar to that of DNS. It is installed through the OS and then the initial configuration is done through the MMC. Both RedHat and Windows require that DHCP be started after the initial configuration.

The Windows installation of DHCP was easier than RedHat because the user did not have to manually modify the configuration file. Even though RedHat required manual configuration, the changes needed where simple.

Web Services

In the Linux domain, the dominant web server is Apache. Apache is developed and maintained as an open-source HTTP server. Statistics report that Apache powers over 60% of the web sites on the Internet. Apache was easily installed using an RPM from the Apache website. Apache can also be installed as part of the operating system. Manual installation allows for the most recent release of the software. Microsoft's Internet Information Service (IIS) was installed by default with the Windows 2000 OS and started automatically. Many other files and scripts were installed by default. These automatic installations with default parameters create many possible security problems.

The greatest strength of Apache is its robustness. Apache can easily support many modules to provide other services to the web. The biggest weakness of IIS is that it requires a custom-built installation for greater security and performance. This is not an easy task. Both IIS and Apache must be patched regularly to protect against newly discovered security exploits.

Email Services

Part of Windows email requires that the server be a Windows Domain Controller. For the purposes of this paper the details of domain creation and administration will not be covered. The *RedHat* release of Linux includes a server-side email application. This can be installed using the RPM file provided with the software. The RedHat release of Sendmail includes the POP3 client. Microsoft has developed its own email server called Microsoft Exchange. Exchange provides all necessary software to deliver and receive email. Windows requires that clients receive email through Outlook. This places limitations on the software available to retrieve email.

Sendmail is a very robust tool that allows the system administrator to control nearly every facet of the program. There is a configuration file that contains all of the controls for how Sendmail operates. Exchange used a proprietary email standard called MAPI. The installation and configuration of RedHat and Windows email services were equal in difficulty. The disparity between the two comes in the total installation time. RedHat was installed and running in twenty-five minutes. It took one and a half hours to install Exchange on the Windows server. Exchange uses Active Directory's user management to configure email.

Preliminary Load Testing

Load testing was preformed to help determine how each email service handled heavy traffic. A web page that uses the SMTP service offered by Exchange and Sendmail was created with an infinite loop that would continuously send email. This web page was run for 5 min with the number of instances show in Table 1.

Instances Sending Emails:	RedHat Emails Received:	Windows Emails Received:
1	1091	1085
5	1067	1061
8	1311	1322
16	1376	1352

Table 1

Each of the email services was designed to handle a large amount of email traffic. Testing showed that each could easily handle small to medium loads. Additional load testing could provide a clearer distinction between which of the two services would perform better under larger loads, however, for most applications either would perform adequately.

Conclusion

The nature of network services requires that different systems have a common form of communication. When a network service is deployed, an associated port will be opened on the server to handle requests for that service. Standards allow services to be deployed from either of the two operating systems discussed in this paper. Administrators are not forced into making a decision that limits running services strictly on one OS. Our findings indicate that each operating system has strengths and weaknesses. A system administrator

has the luxury of choosing which system to use to implement these services. For example, one OS can be used to deploy DNS and another used to deploy email services. This allows a great degree of flexibility without tying the entire network to one operating system.

Windows requires a substantial financial commitment. Microsoft submits each user to license agreements. RedHat can be purchased for under $100 or downloaded for free from the Internet. The cost of Windows provides for simplified initial configuration.

RedHat Linux may not meet every need of a network. Windows may fall short as well. The final decision is not between RedHat and Windows, the decision must be based on an understanding of the strengths and weaknesses of each. This understanding can then be used to determine which OS provides the greater number of services at the least time and financial cost.

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Biography

RUSSELL OLSEN is a senior in the Information Technology program with a Business Management minor at Brigham Young University. He is a level 2 MCP and has several years of practical networking experience. Upon Graduation in August 2003, he will begin his professional career with Ernst & Young's Technology and Security Risk Services in Atlanta, GA.

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Appendix A

	Windows 2000	Linux RedHat 7.3
OS and basic service installation	50 Minutes	35 Minutes
DNS	5 Minutes	25 Minutes
DHCP	5 Minutes	15 Minutes
WEB	0 Minutes*	10 Minutes
Email	1 Hour 30 Minutes	25 Minutes
Total time	2 Hours 30 Minutes	1 Hour 50 Minutes

* Was installed and running by default