Devoted for multi vendor network

Technology, Computer

1 Introduction

This document is comprised of two chapters, one each for two case studies given in the assignment. First chapter defines the diskless workstations and introduces the characteristics of diskless workstations. It also introduces the choices available in the thin client market. First chapter also discusses on how to choose an operating system for the diskless workstations. Later in the chapter, a discussion is made on interdependence among workstation and network hardware, when it comes to implementing diskless workstations in the network.

Chapter two is devoted for multi-vendor network concept/ Strategy. First, it discusses the pros and cons of multi-vendor networking systems. Then it evaluates the impact of current network technology and standards. Furthermore the chapter contains a discussion on how network protocols facilitate multi-vendor networks. In the final part of this document the role of the software and hardware components and also the guidelines for selecting server types for multi-vendor networks is also discussed.

2 Case 1

Task 1. 1

a) Diskless Workstations

Diskless workstation is a computer system with no disk drives installed locally; therefore booting it’s operating system from a server in the local area network. Sometimes when a computer system is having a disk drive but do not using it, that system is also called a diskless workstation. Diskless

Workstations provide less costly but more secure networking solutions for enterprises.

Characteristics of diskless workstations are,

The operating system is loaded from the server when booting up. Obviously all the other software resides in the server. (Firmware is installed on the diskless workstations itself to initiate the boot process)

Processing is done in the diskless workstations, not in the server. In some implementations, processing is also done on the server and those diskless workstations are originally called “ Thin clients”.

Both the raw data and processed data are stored in the server. Diskless workstation fetches them when needed.

Choices available on the market

Conventional Diskless workstations with lower processing power and memory. E. g. Dell Wyse R Thin client

High performance Thin clients like HP t510 Flexible Thin Client

Server choices

Almost all the Linux flavours such as Ubuntu, openSUSE and etc. supports network booting and therefore can be installed on our centralized server. Also windows XP, Vista, 7 and 8 supports booting over the local area network and therefore those operating systems can also be deployed. There are user

friendly third party software available in the internet to facilitate easy deployment of diskless workstations in the company networks.

When choosing an operating system for the diskless workstations following facts can be considered.

Linux Operating systems and the software are totally free, whereas windows operating systems cost hundreds of US dollars (Agrawal et al, 2005).

Linux supports many more processor types and architectures than windows does.

Since Linux is open source, an experienced IT administrator can change the behaviour of operating system as needed.

Linux is extremely stable. It offers a feature called memory protection which prevents a crashed application from crashing the entire system (Agrawal et al, 2005).

Linux offer more security than windows does. Linux doesn’t have viruses and malwares as windows and therefore the server can operate freely without a danger to its operating system or data stored in it.

Linux outperforms windows when it comes to multi user workstations. But sometimes Linux is more “ resource hungry” than other workstations (Agrawal et al, 2005).

Both Linux and Windows supports multi-tasking.

b) Interdependence of workstation hardware with other network components

Diskless workstations have their operating systems in the server. When workstation needs to use a network component like a printer, the server will have to communicate with that network component. I. e. server has to communicate on behalf of all the diskless workstations. This can lead to congestions and increase in traffic.

Also, all the network computers are using the server hard disk, CPU, Memory and etc. workstation (Client) hardware has to wait until server hardware provides the data it requested. So the bottom line is deploying diskless workstations/ Network computers in the network will increase the Interdependence of workstation hardware. Therefore it is very important to install reliable hardware and software components in the server, and implement backup techniques and redundancy techniques for the server.

Task 1. 2

a) Benefits and constrains of different network topologies

Network topologies characterize the way in which network elements (Nodes) are interconnected to each other in a network. There are four standard network topologies to be identified. (Tanenbaum 2006)

1) Bus topology

2) Ring topology

3) Star topology

4) Mesh topology

Bus topology

All the nodes are connected to a single cable called a Bus.

Benefits

1) Easy to implement

2) Requires less cable length, and therefore it is cheaper

3) If a node (Computer) fails, that does not affect others

Constrains

1) Suitable only for networks with few computers (Lowe 2008)

2) If the cable breaks from a point, entire network will fail

Ring Topology

Network nodes are connected as a ring. When two nodes are communicating, data must travel through all the intermediate nodes (Lowe 2008)

Benefits

1) Easy to implement

2) Easy to troubleshoot

Constrains

1) If a node fails, entire network will fail

Star topology

Each and every computer is connected to a hub or switch.

Benefits

1) Centralized nature gives simplicity (Easy to troubleshoot) (Lowe 2008)

2) If a node (Computer) fails, that does not affect others

Constrains

1) If the hub fails, entire network fails

2) Require more cable lengths

Mesh Topology

Each and every node is connected to each other

Benefits

1) Offers redundancy

2) Easy to troubleshoot

3) Multiple conversations can take place at same time

Constrains

3) Waste of resources

4) Require more cable lengths and therefore expensive

Network computer was originally a trademark of Sun Microsystems for their diskless workstations. Later this term was used for all the diskless workstations. Thin client is also a diskless workstation, but unlike diskless workstation, thin client does the processing on the server.

For network computers and thin clients, mesh topology is not suitable. In mesh topology all the clients are connected with each other, but these connections are useless. Since the server is connected to all the clients and server has the files and processed data, it can directly transfer them to the desired destinations. Bus topology and ring topology are too risky and it is also a waste of resources. If the network has the star topology; i. e. each and every diskless node is connected to the centralized server using a dedicated path the resources will be used in an efficient manner.

b) Impact of current network technology on network computers

One can think, if the files are stored on a remote server, then to access those files from the thin client will take more time than a normal workstation does. Also in one particular implementation of a thin client all the processing is done in the server. But thanks to the modern LAN technologies that is not a problem at all. Gigabit Ethernet provides 10-100 gigabits per second data rates within the LAN.

Also in the last decade hard disk drives and processors evolved a lot giving greater speeds, memory capacities and performance to the network. Since all the clients are storing their data on central server, server needs to have high capacity hard disks with higher access speeds. Also the technology has

become cheaper over the time. These facts really help the evolvement of network computer concept.

c) How network protocols enable the effective utilization of Network computers

It is evident that a network with diskless workstations/ Network computers has much data to be transferred back and forth between the server and itself than a network with normal PC workstations. So there will be more traffic in the network and almost all the time server will be accessed by many client workstations. This will lead to collisions and collisions will trigger retries from the clients and that will also add up to the network traffic, thus making exponential growth of the traffic. Therefore an impressive multiple access protocol is needed for the network, in order to effectively utilizes the true strength of network computers. TCP/IP protocol stack provides a powerful multiple access technology in its data link layer.

Ethernet, fast Ethernet and Gigabit Ethernet are some of the most important physical layer protocols that enable fast communication between network computers.

3 Case 2

Task 2. 1

a) Benefits and constrains of Network systems and topologies in multi-vendor networks

When a network evolves with the time the enterprise would want to purchase more equipment for the network. But by now there may be

cheaper products in the market, from other vendors than your original vendor. So multi-vendor networks can save initial cost for the evolved network. Also when a new technology is introduced by a different vendor, that saves time and cost, it is good to purchase those equipments than sticking to the same vendor.

Different vendors have different configuration changes, different user interfaces different terms and etc. Therefore working in a multi-vendor system is a harder job and requires more expertise and experience. Also it will require training programs for existing professionals and it may demand more IT professionals for the company.

If we consider star topology, each node is connected to the hub or switch. Therefore at most only two nodes of different vendors will be communicating with each other physically. But if we take mesh topology, the situation is different. Each node is connected with every other node in the network. Therefore a machine built by a particular vendor will have to communicate with many more machines manufactured by different vendors.

b) Impact of Current Network Technology for the multi-vendor networks

New network operating systems are compatible with each other. Services are built in to those operating systems and therefore they can co-exist after little or no configuration changes are done.

Network protocols are standardized by IEEE to maintain consistency in networking devices and operations. This facilitates the multi-vendor network environments to grow popularity.

c) Duty of Network Protocols in multi-vendor network environments

Different network components may have different hardware and/or software specifications. They may be manufactured by different vendors. But at the end of the day, a network administrator must be able to connect all those network components with each other and build a working network. This is achieved by the use of network protocols. (Lammle 2007)

Generally todays multi-vendor networks use TCP/IP protocol stack which comprises of five layers. A layer normally has two interfaces with the immediate bottom layer and the immediate top layer. Each layer provides a set of functions to the layer above, and relies on the functions of the layer below (Kozierok 2005). Interface on the top will clearly specify the services that are available from that layer. And Interface on the bottom will clearly specify the services that required from the immediate bottom layer (Kozierok 2005).

So, as long as network components manufacturers stick to this layered protocol architectures, it does not matter how the hardware work, what are the hardware and software specifications inside and etc.

d) Role of software and Hardware in multi-vendor networks

Different vendors will implement the same process using different hardware units with different performance. Even though the hardware is vendor specific, sometimes same software can be installed on them and then the user will have the same interfaces and that will hide the complexity induced by the multi-vendor network for some extent. But sometimes the vendor

itself develops the software that runs on its hardware and that will increase the overhead of remembering configuration settings and menu items for different vendors. So in a multi-vendor network environment the job of the hardware would be to perform the task in a unique way with its available hardware chips and processing powers. The job of the software is to control the unique hardware as needed but presenting common configurations settings and interfaces to the user.

e) Server types for multi-vendor networks

When selecting a server for a multi-vendor network environment, the IT administrator must take into account the vendors that are in the network. Some vendors are interoperable while some are not. Server can be used to make communication possible among those non interoperable vendors and that technique is called Server Interoperability. This is accomplished by installing communication services on the server as opposed to the other approach where software are installed on the clients to make communication compatible. This way we can connect an Apple Macintosh client to a Windows network environment. Microsoft Windows provides software that facilitates network services for Apple Macintosh and Linux clients. Some modern servers have these services built into them, so that the network administrator doesn’t have to worry about it.

4 Conclusion

From this assignment I was able to sharpen my knowledge on Diskless workstations and thin clients. I identified the characteristics of diskless

workstations and the choices available on the market; both in hardware aspect and in software aspect. I discussed about the network operating systems available for the diskless workstations and also about the interdependence of workstation hardware in the context of networks with diskless workstations.

Also, in order to provide answers for task 2, I studied about the advantages and dis advantages of multi-vendor network Strategy. Then I discussed the impact of multi-vendor network Strategy on current network technology and standards. Also I studied about how network protocols enable machines of different vendors' coexist in the same network. Also I did a small research about selecting a server for a multi-vendor network environment and about the role of software and hardware in a multi-vendor network. That was really helpful for me and the results were introduced in the latter part of the assignment.