

# A Study on the Implementation of Server Based Networks and their Supportive Networks

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## **Abstract:**

**Background:** Server based network systems perform the centralization of the network functions. It also provides the ability to allow the companies to share folders and data with high level of security as well as increase the web browsing speed and the backup process. After the identification of required server-based network type based on the problems that the clients face, a particular server-based network will be installed along with any other required supporting networks. This study is designed to analyze server-based network system implementations according to client requirements. A questionnaire was used to gather the information on the satisfaction of the clients and the success rate of those implementations. After that for the evaluation of data, a qualitative analysis was done, in order to have a proper idea on the demand of the server-based networks by the clients and any other supportive networks.

**Materials and Methods:** Various business have different requirement in their systems for safety, reliability, accessibility etc. Therefore, these businesses require different types of solutions to meet their important requirements. The requirements of the various businesses are defined as problem statements and a proposed statement is provided to solve the issue. A step-by-step guide is also proposed to implement the solution.

**Results:** The results show the variation of solutions required by the different businesses and some solutions are requested more often than others.

**Conclusion:** Majority of the businesses has realized the importance of data retention and protection against purposeful and natural disasters. Also, the businesses are keen on providing secure and faster access to their data as well.

**Key Word:** Server-based network; supportive networks; qualitative analysis.

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## I. Introduction

In the world of computing, network is a common terminology. The network of computing can be based on a server or working peer-to-peer. In this article, it has been focused on ‘what is a server-based network?’ As the name suggests, the base for server-based network is a server. The server used as the base for this network is often known as “central server”. In order to access the whole system, users need to send a request for permission to this central server. Therefore, a central server on server-based network is connected to multiple clients. Other than the access to the whole system, central server also shares data as well.

Most businesses that rely their operation on data processing often consider the data as an important asset. Therefore, by sharing the data, it is not saved in a single location. Therefore, even if a damage occurs on the client computer, the data remains safe. To put it simply, the shared data works as backup on such a circumstance. Of course, the data shared on a server-based network is not for any clients. Another security level needs to be implemented so that the shared data of a client cannot be opened by other clients. In this case, the most common security measure is using a client account. Users will have their corresponding username and password. After the users log in to their account, they will have clearance on which shared data can be accessed. Therefore, the shared data of a client can only be accessed by a user with authority clearance.

A server-based network is centralized in nature. Also, the storage in this kind of network is centralized. In other words, a server-based network is based on a centralized structure and provides a way to communicate via the web. The Internet is the most widely used client-server network.

## II. State of the Art

The computers can be connected to each other with cables, through satellite links or even wirelessly. This will make the computers a part of a network. Regardless of how to connect the computers to each other, the resulting

network will be organized in one of two broad ways. Either the computers will communicate directly with the other computers in the network, or they will use another computer as a medium to communicate with the other computers [1]. The first type of network architecture (or network structure) is known as the peer-to-peer architecture, while the second type of network architecture is known as the client-server architecture. Both these kinds of architectures are suitable for different scenarios, and both of them have their advantages and disadvantages. Sometimes a computer network even has a combination of peer-to-peer architecture and client-server architecture, but most of the companies use peer-to-peer architecture as their existing network system [2].

#### **A. What is a Peer-to-Peer Network?**

A peer-to-peer network is a network that lets the computers in a network communicate directly with each other, without an intermediary. Every computer in the network can share resources or information directly with the other computers in the network. Also, every computer in the network is given equal responsibility when it comes to communication. No computer is responsible for performing the majority of the communication work. Peer-to-peer networking differs greatly from a normal client-server network. There is no server to oversee the communication work or to provide a centralized storage. Each computer is responsible for overseeing the network [3].

Peer-to-peer networks are commonly small (LANs or CANs) scale. An example of a peer-to-peer network is two computers connected to each other at the house via the LAN port [4]. A peer-to-peer network can be either wireless or wired. If a couple of computers, a printer and a broadband router are there, then both a peer-to-peer network as well as a client-server network can be recognized. The computers will communicate with each other and share the printer, without a server, making it a peer-to-peer network [5]. The router lets them connect to the internet, which is a tiered architecture where many computers are connected to each other in layers, with servers acting as intermediaries (a characteristic of the client-server architecture). This makes the home network a hybrid network [2].

### **III. Problem Statement**

Various business scenarios require different solutions when it comes to implementing a corporate computer network. The different requirements and scenarios observed are defined as specific problem statements.

#### **A. Problem Statement I**

Some businesses have requested to develop a tool which allows them to apply some policies with the ability of sharing a common printer and folders with controlled access. Also, they required controlling their functions from one computer while blocking the Ads and increasing the speed of web browsing. Not only that, but also the client needed to allow only people within certain regions or countries to be able to gain access to them.

#### **B. Problem Statement II**

Some of the businesses have asked for an application that authenticates and authorizes all users and computers while assigning and enforcing security policies for all computers, installing or updating software. For an example, when a user logs into a computer they needed to check the submitted password and determines whether the user is a system administrator or normal user. Other than that, they need to establish a framework to deploy other related services such as Certificate Services, Active Directory Federation Services, Lightweight Directory Services, and Rights Management Services. Also, they need to customize how data is organized to meet their company's needs while managing from any computer, and if necessary, it requires to provide built in replication and redundancy. They also need to keep network access rights management centralized as well.

#### **C. Problem Statement III**

A company requested for an application with the ability of backing up and restoring files, folders, databases and hard drives to prevent the loss of data in the event of a hard drive failure, user error, disaster or accident. As their business data is everywhere, they have become the victims of cyber-attacks and data breach resulting in public scrutiny and suffered losses in brand reputation, customer loyalty and customer trust. Therefore, they needed the protection from Hackers, Viruses and Ransomware. Also, they needed the protection from physical disasters such as a fire, flood or another type of natural disaster that can wipe out all the data in their location and make recovery virtually impossible.

#### **D. Problem Statement IV**

Some companies required private labelled name servers which are registered with domain registry under their own domain name. Also they wanted it to be only registered by owner of the primary domain name while allowing the management of different subdomains to be done by different groups.

#### **E. Problem Statement V**

Leading companies have asked for a tool which enables them to create their own email address without connecting to a 3<sup>rd</sup> party company. Also, they requested to control their emails with one computer and backup the data while securing the containing details. They required to send the emails with large attachments and even during a connection failure they needed the emails to be stored.

#### **F. Problem Statement VI**

Companies required to reduce the chance of a breach while adding an additional layer of security between servers and outside traffic. They needed to carry out Sensitive Tasks Anonymously while protecting any of their current research and development and other company activities. Also, they required to do the function of cloud data storage and peering to improve customer experience. Also, they required to prohibit the accessing of unsecure or inappropriate websites on company networks by employees. They requested for a server that has the ability to increase the speed of their company network that are accessed by multiple users, and strip ads from websites while freeing up space in their busy network, so their team can access the Internet quickly and easily.

#### **G. Problem Statement VII**

Companies wanted to store web site files and broadcast them over the Internet for their site visitors to see upon the request of a visitor's browser. Other than that, they needed a powerful computer that stores and transmits data via the Internet. When someone visits a web page on their site, they needed to dictate what appears on the visitor's computer screen.

### **IV. Proposed Statement**

The previous section discussed the requirements of the businesses and corporations. This section discusses the server-based solutions proposed for specific requirements.

#### **A. Proposed statement I**

The best solution for those who are suffering from the problem statement I is the installation and the implementation of a DNS server. A DNS server is a computer that is set up and registered to become part of the domain name system (DNS). The domain name system is the technology behind the public names of Internet domains and websites.

They are the readable website addresses that we interact with on a daily basis. When a person searches with Google or another search engine, and the results are returned, cached under all of the descriptive text and links are the domain names of the websites that are listed. A DNS server is an element, and an essential component at that, of the overall process that makes it possible for sites to display in a web browser.

#### **B. Proposed statement II**

The best solution for those who are suffering from the problem statement II is the installation and the implementation of an Active directory domain service. Active Directory (AD) is a Microsoft technology used to manage computers and other devices on a network. It is a primary feature of Windows Server, an operating system that runs both local and Internet-based servers.

Active Directory allows network administrators to create and manage domains, users, and objects within a network. For example, an admin can create a group of users and give them specific access privileges to certain directories on the server. As a network grows, Active Directory provides a way to organize a large number of users into logical groups and subgroups, while providing access control at each level.

#### **C. Proposed statement III**

The best solution for those who are suffering from the problem statement III is the installation and the implementation of a Backup server. A backup server is a type of server that enables the backup of data, files, applications and/or databases on a specialized in-house or remote server. It combines hardware and software technologies that provide backup storage and retrieval services to connected computers, servers or related devices.

A backup server is generally implemented in an enterprise IT environment where computing systems across an organization are connected by a network to one or more backup servers. A backup server consists of standard hardware server with substantial storage capacity, mostly with redundant storage drives and a purpose-built backup server application. The backup schedule for each computer may be installed with a client utility application or configured within the host operating system (OS). At the scheduled time, the host connects with the backup server to initiate the data backup process. The backup may be retrieved or recovered in the event of data loss, data corruption or disaster recovery.

#### **D. Proposed statement IV**

The best solution for those who are suffering from the problem statement IV is the installation and the implementation of a Child server. Child Name Servers are private labelled name servers which are registered with domain registry under the own domain name. Child Name Servers needs to be registered with registry and also, it's record needs to be pointed to IP address of the DNS Server before they can be used as name servers with other domain names. Child Name Servers can be only registered by owner of the primary domain name.

You could use them for a number of reasons;

- If the parent nameserver is run by a DNS provider, the child nameserver could allow to host the names in the subdomain themselves and update them without relying on the DNS provider's (possibly clunky) APIs.
- Within a large organization it could allow the management of different subdomains to be done by different groups.
- You might do it if you wanted a subdomain to contain dynamic names.

#### **E. Proposed statement V**

The best solution for those who are suffering from the problem statement V is the installation and the implementation of a Mail server. A mail server (sometimes also referred to an e-mail server) is a server that handles and delivers e-mail over a network, usually over the Internet. A mail server can receive e-mails from client computers and deliver them to other mail servers. A mail server can also deliver e-mails to client computers. A client computer is normally the computer where you read the e-mails, for example the computer at home or in the office. Also, an advanced mobile phone or Smartphone, with e-mail capabilities, can be regarded as a client computer in these circumstances.

#### **F. Proposed statement VI**

The best solution for those who are suffering from the problem statement VI is the installation and the implementation of a Proxy server. A proxy server acts as a gateway between you and the Internet. It's an intermediary server separating end users from the websites they browse. Proxy servers provide varying levels of functionality, security, and privacy depending on the use case, needs or company policy. If you're using a proxy server, Internet traffic flows through the proxy server on its way to the address you requested. The request then comes back through that same proxy server (there are exceptions to this rule), and then the proxy server forwards the data received from the website to you. Modern proxy servers do much more than forwarding web requests, all in the name of data security and network performance. Proxy servers act as a firewall and web filter, provide shared network connections, and cache data to speed up common requests. A good proxy server keeps users and the internal network protected from the bad stuff that lives out in the wild Internet. Lastly, proxy servers can provide a high level of privacy.

#### **G. Proposed statement VII**

The best solution for those who are suffering from the problem statement VII is the installation and the implementation of a Web server. A web server is a computer that runs websites. It's a computer program that distributes web pages as they are requested. The basic objective of the web server is to store, process and deliver web pages to the users. This intercommunication is done using Hypertext Transfer Protocol (HTTP). These web pages are mostly static content that includes HTML documents, images, style sheets and text etc. Apart from HTTP, a web server also supports SMTP (Simple Mail Transfer Protocol) and FTP (File Transfer Protocol) protocol for emailing and for file transfer and storage.

The main job of a web server is to display the website content. If a web server is not exposed to the public and is used internally, then it is called Intranet Server. When anyone requests for a website by adding the URL or web address on a web browser's (like Chrome or Firefox) address bar (like [www.economicstimes.com](http://www.economicstimes.com)), the browser

sends a request to the Internet for viewing the corresponding web page for that address. A Domain Name Server (DNS) converts this URL to an IP Address (For example 192.168.216.345), which in turn points to a Web Server.

## **V. Methodology**

Network design is the planning phase a company's IT infrastructure must go through before it is implemented. It involves evaluating and understanding how all the elements of the network link together (from routers, switches, and servers to desktops, laptops and printers) and how they can be made to run as efficiently as possible. A well-designed network can bring increased operational efficiency. Network design is a task that is usually performed by network designers, IT administrators and other related employees.

To help with the physical implementation process, the network design should be drawn out as a network diagram, which then acts as a guide for when the engineers come to install it. There are a number of details the network infrastructure design should show, these include;

- A clear map of the network
- The structure and layout of the cabling required
- The quantity, type and location of all devices on the network
- The IP addressing structure
- Details of the network security architecture and processes

### **1. Design a Domain Environment Using DNS Server and ADDS**

- Step 1: Follow the installation and configuration of Domain name server and the installation of Active Directory Domain (ADD) services
- Step 2: Client another pc in server
- Step 3: Follow the configuration of ADDs
- Step 4: Add the policies to the client by server

### **2. Design a Backup server**

- Step 1: Follow an installation and configuration of server OperationSystem in the main pc
- Step 2: Setup the pc as a backup server
- Step 3: Add the Client pc in main server
- Step 4: Check whether the backup is functioning properly.

### **3. Design Child server**

- Step 1: Follow the installation and the configuration of the server
- Step 2: Install the server in child servers
- Step 3: Add the client pc in child server
- Step 4: Check the function of client pc by the main server

### **4. Design Mail Server**

- Step 1: Follow the installation of the mail server in main server
- Step 2: Add the client pc under main server
- Step 3: Follow the installation outlook and configuration
- Step 4: Check for the mails

### **5. Design Proxy Server**

- Step 1: Follow the installation of proxy server when routers are connected
- Step 2: Proceed the configuration and setup the proxy
- Step 3: Check whether the policies are working or not by the client
- Step 4: For a better protection, don't distribute Internet to main server

### **6. Design Web Server**

- Step 1: Follow the installation and the configuration of web server in main server
- Step 2: Proceed the implementation of website or more in the server
- Step 3: Port by forwarding and using static IP router
- Step 4: Check for the internal and external network connections using website name or IP

## **VI. Supporting Networks to Implement Server-Based Networks**

The supporting networks play an important role during the implementation of the server-based networks. The main function of the supporting network is to facilitate the function of the server-based network. Their role is to overcome the issue that may arise during the implementation of the server-based networks. Therefore, without the supporting networks there might be a large number of technical difficulties that has to be faced.

### **A. Wireless Bridging**

In computer networking, a bridge joins two networks so that the networks can communicate with each other and serve as a single network. As Wi-Fi and other wireless networks expanded in popularity, the need to link these networks with one another and with older wired networks increased. Bridges make internetwork connections possible. This wireless bridging technology consists of hardware as well as network protocol support [6].

### **B. Virtual Local Area Network (VLAN)**

A Virtual Local Area Network (VLAN) refers to a logical grouping of different hosts in a similar broadcast domain. VLANs simplifies the task for the IT network administrators to divide & make groups in a network, based on their functional and security requirements without having to plug/unplug physical LAN cables or modify the existing IT network infrastructure [10].

### **C. Network Attached Storage**

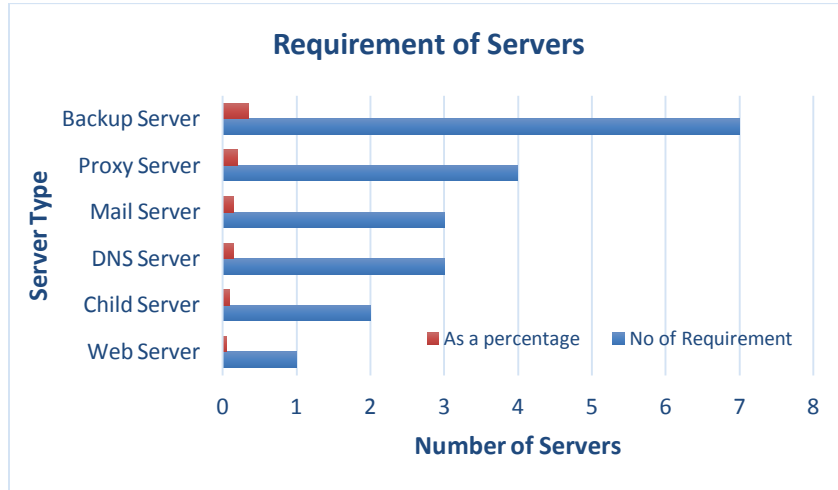
Network Attached Storage (NAS) is by far the easiest type of storage networking to implement. The simplest way to think of NAS is as a specialized kind of a file server. Anyone who has used a server as a repository for user files should be able to easily grasp the concept of NAS. Instead of writing a file to the C drive on a local desktop, it is written to another drive perhaps the N drive – which means the files are saved directly onto the NAS box (also known as a filer, or NAS filer) [11].

## **VII. Discussion**

In the field of networks, among all the network types the server-based networks are the widely used network type. There is various kind of servers depending upon their use, they can be a web server (which servers HTTP requests), Database servers (which runs DBMS), File server (which provides files to clients), Mail server, print server, Game server, Application server and many more. The companies have showed their preference on the server-based networks because of the high safety, high accuracy, high accessibly and the ability to control many functions as well. Based on the data that has been gathered below are the outcomes on the requirement of server-based networks.

**Table No 1:** Requirement of Servers

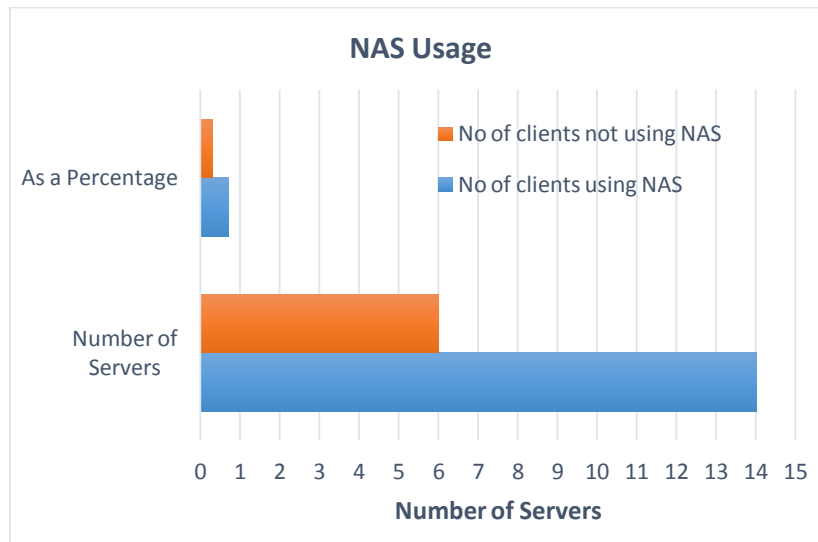
<b>Type of Server</b>	<b>No.of Requirement</b>	<b>As a percentage</b>
DNS Server	3	15%
Backup Server	7	35%
Child Server	2	10%
Mail Server	3	15%
Proxy Server	4	20%
Web Server	1	5%



According to the table which depict the number of requirements by different clients, there is a huge range of variation. Most of them have requested for the backup server while the least requirement is for child name servers. The domain name servers and mail servers are equal in demand while the proxy servers are the second highest option that is requested by the clients.

**Table No2: NAS Usage**

No. of client use NAS	No. of client not use NAS
14	6
70%	30%



The graph of NAS represents requirement of clients for the storage attached to the network. Based on the results that has been gathered majority of the clients use NAS while a minority avoid the usage of NAS as a storage attached to the implemented network. Majority has selected the NAS as it provides the facility, while a file server has a limited supply of storage, NAS storage can provide terabytes (TB) of space that is instantly accessible to anyone over a standard Ethernet connection also when compared to a general-purpose server serving files, NAS offers faster data access and easier administration.

### **VIII. Conclusion**

Based on the results, the majority requests for a backup server because they all are having the troubles related to the ability of backing up and restoring files, folders, databases and hard drives during a hard drive failure, user error, disaster or accident. Also, most of them have become the victims of a cyber-attacks and data breach and they needed the protection from Hackers, Viruses and Ransomware as well as the protection from physical disasters such as a fire, flood or another type of natural disaster. As a solution for all those issue the clients have concluded to install the backup servers.

The majority had accepted the NAS as it will act as the network attached storage. Not only that, but also it offers faster data access and easier administration for the client. Therefore, it has become an advantage for the clients. In order to gain that advantage, the majority of the clients have applied the NAS.

This study was carried out for a period of 6 months, analyzing the data availability of own clientele. An extensive study possibly would provide more accurate details. However, organizations are reluctant to provide information regarding their computer network configurations for security reasons. Given today's corporate environment, ICT requirements and policies on data security and faster access, it is clear that the results obtained adhere to these requirements.

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