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Modern Internet Model Using Distributed Resources for Dynamic Webpage Fetching

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Abstract- The principle idea of this work is to create a Modern Internet model with implementation of distributed computing system. The client will be assigned with public IP by Dynamic Host Configuration Protocol (DHCP) when he enters the network. The web URL request will be forwarded to DNS for IP address entry which is followed by general routing network. The web page is fetched from respective web server and client is served. A novice web server can also host its pages after definite IP entries against respective URLs. The internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail. A wireless ad-hoc network setup is used to implement our proposed modern internet. After assignment of IP address and Domain Name Server to the client, the system accepts the request for webpage in form of domain name. The request is matched for domain name to respective destination IP address. After proper packet routing the system connect to web server and trace back to serve the client. The network established by our work is compatible in connectivity with any current operating system. It is responsible to all commands which are used for modern internet. It can even reply for trace route and DNS query for the packets. Interconnectivity of Webmin with linux Configuration Shell brings the option of Graphical operation ability.

Keywords- Internet; DHCP; Webmin; TCP/IP; DNS

1. Introduction

The Internet is a global system of interconnected computer networks that use the standard Internet Protocol Suite (TCP/IP) to serve billions of users worldwide. The Internet carries a vast array of information resources and services, most notably the inter-linked hypertext documents of the World Wide Web (WWW) and the infrastructure to support electronic mail. The roots of System lie in a collection of computers that were linked together in the 1970s to form the US Department of Defense‟s communications systems. Fearing the consequences of nuclear attack, there was no central computer holding vast amounts of data; rather the information was dispersed across thousands of machines.

A set of rules, of protocols, known as TCP/IP was developed to allow disparate devices to work together. The original network has long since been upgraded and expanded and TCP/IP is now a standard. Section 2 states the problem analysis and significance, system challenges, related works, architecture and design is described in section 3 to 6, followed by test cases and implementation details in section 7and 8.

2. Problem Analysis and Significance

To design a modern Internet model with the existing distributed computing system infrastructures. So do achieve this initially a client is assigned with public IP by Dynamic Host Configuration Protocol (DHCP) when he enters the network. The web URL request will be forwarded to DNS for IP Address entry which is followed by general routing on network. The webpage is fetched from respective web server and client is served. A novice web server can also host its pages after definite IP entries against respective URLs.

This novel model can be taken as alternate method to fetch web pages on distributed architecture, which is commonly called as Internet. The model will be designed on similar organizational and structural levels of Internet. It can also serve as an affirmative tool for analyzing and testing of web servers and web pages prior to connectivity with actual internet. It can also be made use in web hosting and domain entries locally in an enterprise. Development of protocols will bring various ideas in different fields of study. Being an open source operating system, Linux model

will present a lucid prototype for further research and development. Use of firewall and other control lists will bring desired security and privacy to whole system.

3. Challenges

The challenges handled in this implementation are:

- Setup of DNS, DHCP, Apache Servers
- Compatibility of Network Servers
- IP Address Allocation to Servers and devices
- Configuration of a linux OS as Router
- Maintenance of Web logs
- Setup of ACLs and Firewalls
- Extension of network to various network devices
- Proper webpage exchange

As stated in section 2 the proposed work aims at creation of a Modern Internet model with implementation of distributed computing system. The client will be assigned with public IP by Dynamic Host Configuration Protocol (DHCP) when he enters the network.

The web URL request will be forwarded to DNS for IP Address entry which is followed by general routing on network. The webpage is fetched from respective web server and client is served. A novice web server can also host its pages after definite IP entries against respective URLs.

4. Related Works

The Internet is a globally distributed network comprising many voluntarily interconnected autonomous networks. It operates without a central governing body. However, to maintain interoperability, all technical and policy aspects of the underlying core infrastructure and the principal name spaces are administered by the Internet Corporation for Assigned Names and Numbers (ICANN), headquartered in Marina del Rey, California. Globally unified name spaces, in which names and numbers are uniquely assigned, are essential for the global reach of the Internet. ICANN is governed by an international board of directors drawn from across the Internet technical, business, academic, and other non-commercial communities.

The Domain Name System (DNS) servers distribute the job of mapping domain names to IP addresses among servers allocated to each domain. Internet routers are specialized computers that interconnect the network by switching communications from one line to another at cross points. The IP address is the geographical descriptor of the virtual world, and the addresses of both source and destination systems are stored in the header of every packet that flows across the Internet. When a computer communicates with another on the Internet, it addresses each packet with the other computer's IP address and then sends it to the closest Internet router. The router then uses a routing algorithm to send the packet across the Internet to the destination computer.

5. Architectural Specification

Dynamic Host Configuration Protocol- Dynamic Host Configuration Protocol automates network-parameter assignment to network devices from one or more DHCP servers. Even in small networks, DHCP is useful because it makes it easy to add new machines to the network, When a DHCP-configured client connects to a network, the DHCP client sends a broadcast query requesting necessary information from a DHCP server. The DHCP server manages a pool of IP addresses and information about client configuration parameters such as default gateway, domain name, the name servers, other servers such as time servers, and so forth. On receiving a valid request, the server assigns the computer an IP address, a lease, and other IP configuration parameters, such as the subnet mask and the default gateway. The query is typically initiated immediately after booting, and must complete before the client can initiate IP-based communication with other hosts.

Domain Name System-The Domain Name System (DNS) servers distribute the job of mapping domain names to IP addresses among servers allocated to each domain. The Domain Name System (DNS) is a hierarchical naming system built on a distributed database for computers, services, or any resource connected to the Internet or a private network. It associates various information with domain names assigned to each of the participating entities. The IP address assigned to a computer may change frequently because of physical moves or network reconfigurations. The major advantage of the network of DNS servers is that domain names stay the same even when IP addresses change, and so the domain name servers can transparently take care of the mapping.

Apache Server - Apache server is a computer program that delivers (serves) content, such as web pages, using the Hypertext Transfer Protocol (HTTP), over the World Wide Web. The term web server can also refer to the computer or virtual machine running the program.Apache supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes. Some common language interfaces support Perl, Python, Tcl, and PHP. Popular authentication modules include mod_access, mod_auth, mod_digest, and mod_auth_digest, the successor to mod_digest. A sample of other features include SSL and TLS support, a proxy module, a URL rewriter (also known as a rewrite engine, implemented under mod_rewrite), custom log files, and filtering support.

5.1 Requirements Specification

Hardware specifications -Processor X86 Compatible processor with 1.7 GHz Clock speed RAM 512 MB or more ,Hard disk 20 GB or more, Monitor VGA/SVGA, Ethernet Wireless enabled NIC card, Keyboard 104 Keys, Mouse 2 buttons/ 3 buttons and IP Phone Mobile phone with wi - fi functionality

Software Specifications -Server Operating System : Red Hat Enterprise Linux 4 Client Operating System : Microsoft windows 98 or higher, Working Tool : VMware Workstation Enterprise, Graphical tool : Webmin -1 (Nettech Pvt. Ltd), Browser : Internet Explorer 8.0 Database : Microsoft Access and Ad hoc network : Microsoft Wireless network adapter driver.

6. System Design

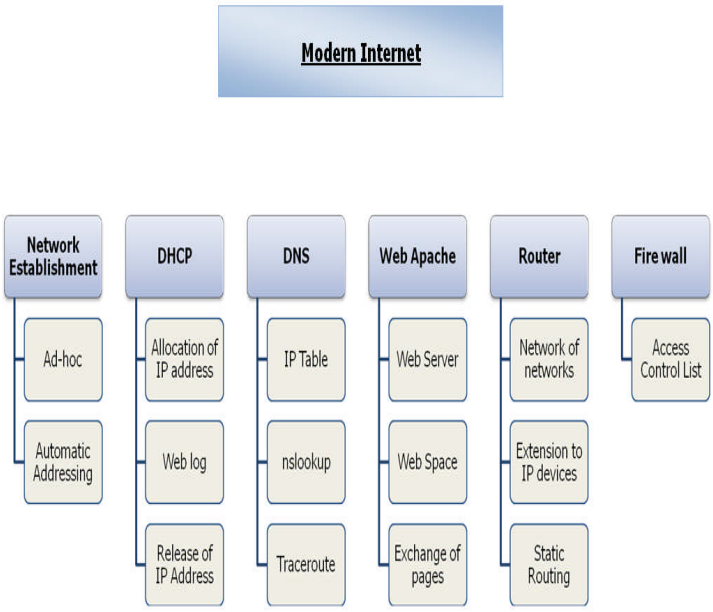


Fig.1 – Analytical Internet Model

6.1 High Level Design

High Level Design After assignment of IP Address and Domain Name Server to the client, the system accepts the request for webpage in form of domain name. The request is matched for domain name to respective destination IP address. After proper packet routing the system connect to web server and trace back to serve the client. The network established by is compatible in connectivity with any current operating system. It is responsive to all commands which are used for modern Internet. It can even reply for trace route and DNS query for the packets.

6.2 System's Input Design

Input Design In the input design, user-oriented inputs are converted into a computer based system format. It also includes determining the record media, method of input, speed of capture and entry on to the screen. Data entry accepts commands and data through a keyboard. The major approach to input design is the menu and the prompt design. In each alternative, the user‟s options are predefined. The data flow diagram indicates logical data flow, data stores, source and destination. Input data are collected and organized into a group of similar data. Once identified input media are selected for processing.

6.3 System's Output Design

Output Design In the output design, the emphasis is on producing a hard copy of the information requested or displaying the output on the CRT screen in a predetermined format. Two of the most output media today are printers and the screen. Most users now access their reports from a hard copy or screen display. Computer' s output is the most important and direct source of information to the user, efficient, logical, output design should improve the systems relations with the user and help in decision-making. As the outputs are the most important source of information to the user, better design should improve the system' s relation and also should help in decision-making.

6.4 System's Low Level Design

When a host or client comes into a network it needs two steps to connect the network. First it can get a

Ad-hoc network that is a isolated network. Second it needs to have a IP address to communicate to network.

DHCP: It is a Dynamic Host Configuration Protocol. It assign the IP address to new coming hot or client. It keeps log file of assigned IP address with respect to hot MAC Address. When a host leaves the network then that IP released and can be assign to another host. **DNS:** DNS (Domain Name System) is an Internet service that translates Domain names into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on IP addresses. Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4. It maintains a table which has Domain Name and corresponding IP address entry.

Web Apache: Web Apache is used as a web server that has web space where web pages are stored. When a client requests for a page, requested page is send from web server.

Router: A Router checks the data packet for its destination address and protocol format details. If the router microprocessor finds a match in its address tables, it routes it to that destination address. If the destination address is on a network type that uses a different transmission protocol, the appropriate new protocol data is added to the packet. It connects different networks in a network using IP Subnet Mask Address. Here static routing will be use.

Firewall: A firewall is a part of a computer system or network that is designed to block unauthorized access while permitting authorized communications. It is a device or set of devices that is configured to permit or deny network transmissions based upon a set of rules and other criteria. Using Access Control List particular IP address or domain data can be blocked

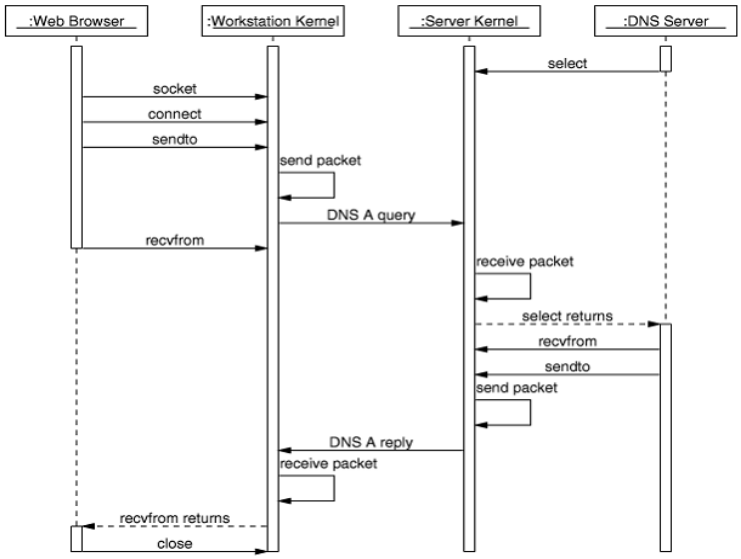


Figure 2 High Level Sequence Diagram for DNS Query

Sequence Diagram for DNS query Fig A Eucalyptus cloud setup consists of five types of components. The cloud controller (CLC) and "Walrus" are top-level components, with one of each in a cloud installation. The cloud controller is a Java program that offers EC2-compatible SOAP and "Query" interfaces, as well as a Web interface to the outside world.

7. Test Case Generation

Test Case -1

- DNS Entry Check

Description: Checks the entry in DNS table
Test Data: Test the given URL vit.ac.in with nslookup
Expected Result: Returns the respective web servers IP address
Actual Result: Return the IP address of vit.ac.in „s web server
Status: Pass

Test Case -2

- Existence of network server

Description: Confirmation for server existence
Test Data: Connect to network
Expected Result: Confirmation of Connectivity with pop up msg
Actual Result: A pop up message received.

Status: Pass

Assignment of IP Address when client comes to network
Description: DHCP assigns the IP address to client
Test Data: Connect to network
Expected Result: IP address is assigned
Actual Result: Verification of assignment with ipconfig/all
Status: Pass

Test Case -3

- Functioning of web server

Description: Fetching of web pages from respective web server
Test Data: Surf the network with a web address
Expected Result: Display of web page on browser
Actual Result: Web page is displayed
Status: Pass

- Multiple networks connectivity

Description: Checks the connectivity with different server
Test Data Ping the server of different network
Expected Send packets to different network
Actual Result: Sent packets received
Status: Pass

Test Case -4

- Routing of pages on different networks

Description: Routes the web pages on different network
Test Data: Request for web page of different network
Expected Result: Web page is displayed on browser
Actual Result: Web page is displayed on browser
Status: Not done

- Extension of network

Description: Network is extended to IP devices
Test Data: Web page request from device
Expected Result: Display of web page
Actual Result: Web page is displayed
Status: Fail

Test Case -5

- Fire wall functioning

Description: Restrict unauthorized access
Test Data: Try to access with static IP address
Expected Result: Ping packets falls
Actual Result: TTL times out
Status: Pass

8. Implementation Modules

Module I:

- Configuration of DHCP
- Automated Network Discovery to novice client
- Assignment of public IP Address
- Maintenance of MAC Address table with respective client IP

Module II:

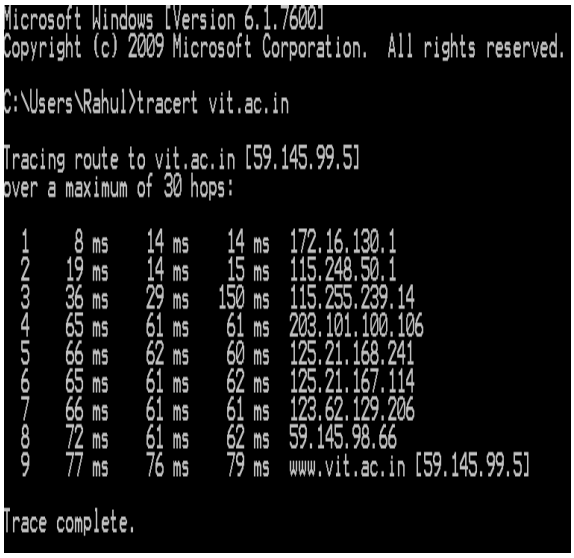
- Configuration of DNS
- Accepting request for domain from clients
- Replying with server IP for respective domain request
- Maintenance of Master Domain Table

Module III:

- Configuration of Apache
- Registration of domain in DNS
- Allocation of space for Web Hosting
- Linking of IP request with web page location

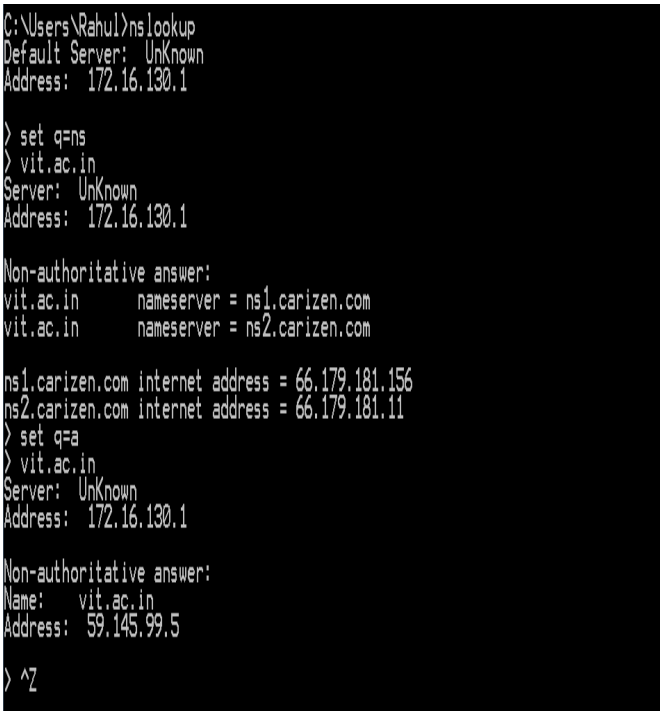
Module IV:

- Development of web pages
- Configuration of Fire Wall
- Maintenance of Web log
- Configuration of Access List



Traceroute of vit.ac.in on internet

Test Results Test cases are generated and unit testing is performed to generate source code and integration testing is performed to detect design errors. One Test case status is "Fail" and another Test case status is "Not done" with Test Id 4.



Domain Entry of vit.ac.in on internet

9. Conclusion

The model of modern internet is thus an alternative for the present internet, which is also a way in which internet model can be developed. We have incorporated with the best techniques available in current scenario and also the usage of graphical user tool i.e. webmin-I. This is thus compatible in connectivity with any current operating system. It can even reply for trace route and DNS query for the packets. Interconnectivity of Webmin with Linux Configuration shell brings the option of graphical operation ability. It is responsive to all commands which are used for modern Internet. This made us more familiarize with the internet and its various working protocols. Development of protocols brings various ideas in different fields of study , Being an open source operating system, Linux model present a lucid architecture for further research development. Use of firewall and other control lists bring desired security and privacy to whole system. We have proposed a method for the interoperability with DHCP and DNS over the TCP/IP network supported DHCP. This method ensures that, though IP addresses are changed dynamically, DHCP clients are transparent. In this way, we have considered that the change of IP addresses allocated by the existing DHCP gives rise to difficult communication problems with the same host.

10. Future Work

The architecture of this implementation is quite compatible with present internet. This can replace an existing internet on demand. It can also serve as an affirmative tool for analyzing and testing of web servers and web pages prior to connectivity with actual internet. It can also be made use in web hosting and domain entries locally in an enterprise. A network based on the interoperation system between DHCP server and DNS server has capabilities which provide the efficiency of IP addresses and maintain consistency between host names managed by DNS and the actual address assignment done via DHCP. We look forward for the database connectivity of system for initiation and hosting of serial transactions between different clients present on network with well encrypted and authenticated methods.

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