

Server Configuration and Networking

A Project Report on Industrial Training

Under the Supervision of
Mr Santu Purkait
Netcamp Solutions Pvt. Ltd.

By
Ankit Kumar Goel (1609110015)



Department of
Computer Science and Engineering

JSS ACADEMY OF TECHNICAL EDUCATION, NOIDA
Session: - 2019-2020

DECLARATION

This is to certify that the Project Report Entitled “**Server Configuration and Networking**” which is being submitted in partial fulfillment of the requirement for the award of technical training certificate during degree B. Tech in Computer Science and Engineering to JSSATE, Noida (Dr. A.P.J. Abdul Kalam Technical University, Lucknow) comprises only original work and studies carried out by the students themselves.

Date:04/12/2019

Ankit Kumar Goel

(1609110015)

Approved By:

Mr. Santu Purkait

Project Supervisor

TABLE OF CONTENTS

Cover Page.....	i
Certificate.....	ii
Declaration by Student.....	iii
Vision, Mission, PEO.....	v
PO.....	vii
PSO, CO, CO-PO-PSO Mapping.....	vii
Acknowledgement.....	ix
Abstract.....	x
About Company.....	xi
List of Figures.....	xii
List of Abbreviations.....	xiv

Chapter 1: INTRODUCTION.....	1
1.1 Definition.....	1
1.2 Types of Network.....	3
1.2.1 LAN.....	3
1.2.2 WAN.....	4
1.3 Network Models.....	5
1.3.1 Layering concepts and benefits.....	5
1.3.2 OSI Network model.....	5
Chapter 2: TOOLS & TECHNOLOGIES USED.....	8
2.1 VMWare Workstation Pro(12.0.0).....	8
2.2 Webmin-1.330-1.noarch.....	10
Chapter 3: HISTORY OF TECHNOLOGY.....	14
3.1 History of Technology used.....	14
3.2 Feature of Technology used and need.....	15
3.3 Need and Added features.....	17
Chapter 4: WORK DONE.....	20
4.1 Problem Statement.....	20
4.2 Snapshots.....	23

Chapter 5: CONCLUSION & FURURE SCOPE.....	34
5.1 Future Aspects of Project.....	34
5.2 Industrial Relevance.....	34
5.3 Societal Relevance.....	36
5.4 Future Scope of Project.....	36
REFERENCES.....	38

VISION AND MISSION

VISION OF THE INSTITUTE

JSS Academy of Technical Education Noida aims to become an Institution of excellence in imparting quality **Outcome Based Education** that empowers the young generation with **Knowledge, Skills, Research, Aptitude and Ethical values** to solve **Contemporary Challenging Problems.**

MISSION OF THE INSTITUTE

Develop a platform for achieving globally acceptable level of intellectual acumen and technological competence. Create an inspiring ambience that raises the motivation level for conducting quality research .Provide an environment for acquiring ethical values and positive attitude

VISION OF THE DEPARTMENT

“To spark the imagination of the Computer Science Engineers with values, skills and creativity to solve real world problems.”

MISSION OF THE DEPARTMENT

To inculcate creative thinking and problem solving skills through effective teaching, learning and research.

To empower professionals with core competency in the field of Computer Science and Engineering.

To foster independent and lifelong learning with ethical and social responsibilities.

COURSE OUTCOMES (COs)

C411.1	To adapt with real life working environment.
C411.2	To acquire skills and knowledge on latest tools and technologies.
C411.3	To solve the real world problems effectively.
C411.4	To effectively communicate solution to problems through technical reports and oral presentations

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM EDUCATIONAL OUTCOMES (PEOs)

PEO1: To empower students with effective computational and problem solving skills.

PEO2: To enable students with core skills for employment and entrepreneurship.

PEO3: To imbibe students with ethical values and leadership qualities.

PEO4: To foster students with research oriented ability which helps them in analyzing and solving real life problems and motivate them for pursuing higher studies.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: An ability to apply foundation of Computer Science and Engineering, algorithmic principles and theory in designing and modeling computation based systems.

PSO2: The ability to demonstrate software development skills

CO-PO-PSO MAPPING

	P O1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
C411. 1	2	2	2	2	3	3	3	3	3	3	2	3	3	2
C411. 2	3	2	2	2	3	1	1	3	2	2	1	3	3	3
C411. 3	3	3	2	2	2	3	3	3	3	2	1	3	3	3
C411. 4	3	3	2	2	2	2	2	3	3	3	2	3	3	3

Acknowledgement

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to Netcamp Solutions Pvt. Ltd. for their guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project. I would like to express my gratitude towards Mr. Santu Purkait, Director: Netcamp Solutions Pvt. Ltd. for their kind co-operation and encouragement which helped me in completion of this project. I would like to express my special gratitude and thanks to organisation persons for giving me such attention and time. My thanks and appreciations also go to my colleagues in developing the project and people who have willingly helped me out with their abilities.

Name: Ankit Kumar Goel

Roll No.: 1609110015

ABSTRACT

Our topic for this training was to learn how to create a network and give permission to users, and host the DNS & web server on the network. The design of such a system is modified using Samba and Disk Partitioning. The purpose of the final project is to help students to enhance their knowledge and implement whatever they have learned. It is a system of networks that allows the user to create their own server and perform given task in it. Various technologies like Vmware and Webmin has been used in this project. Email configuration, DHCP, web hosting, user permissions and group permissions. The knowledge of IP address and WLAN has also been used in this project. Disk Partitioning gives a better way of organization of work. This training allowed me to increase my knowledge in Networking And DNS Management with which we had many difficulties.

About Company

Netcamp Solutions Private Limited is a Non-govt company, incorporated on 17 May, 2013. It's a private unlisted company and is classified as a 'company limited by shares'.

Company's authorized capital stands at Rs 2.0 lakhs and has 50.0% paid-up capital which is Rs 1.0 lakhs. Netcamp Solutions Private Limited last annual general meeting (AGM) happened on 12 Sep, 2018. The company last updated its financials on 31 Mar, 2018 as per Ministry of Corporate Affairs (MCA).

Netcamp Solutions Private Limited is majorly in Business Services business from last 6 years and currently, company operations are active. Current board members & directors are SANTU PURKAIT and BARNALI BANERJEE .

Company is registered in Kolkata (West Bengal) Registrar Office. Netcamp Solutions Private Limited registered address is 130, HEMANTA MUKHOPADHYAY SARANI, 130 CIT SCH, XLVII P-130, JADUNATH SARKAR (LAKE TERRACE) KOLKATA Kolkata WB 700029 IN.

LIST OF FIGURES

SR NO.	TITLE	PAGE NO.
4.2.1	DNS Server Setup	23
4.2.2	Edit the Forward Zone for DNS	23
4.2.3	Edit the Master Zone for DNS	24
4.2.4	Address Records are Set	24
4.2.5	Virtual Servers set	25
4.2.6	Editing the Host Address	25
4.2.7	Setup the Send Mail Options	26
4.2.8	Setup the Subdomain as mail.intermail.in	26
4.2.9	Setup mail Server Records	27
4.2.10	Updated Virtual Server List	27
4.2.11	Send Mail Options	28
4.2.12	Networking and Protocols	28
4.2.13	Editing Host address	29
4.2.14	Setup User and Password	29
4.2.15	Adding Users and Permissions	30

4.2.16	Email Login Page	30
4.2.17	Email Inbox	31
4.2.18	Email View	31
4.2.19	Setup Ip and DHCP Server	32
4.2.20	List of client options	32
4.2.21	Creation of subnets	33

LIST OF ACRONYMS

1.	NAT	Network Address Translation
2.	VLSM	Variable Length Subnet Mask
3.	VLAN	Virtual Local Area Network
4.	VTP	Virtual Trunking Protocol
5.	DNS	Domain Name Server
6.	DHCP	Dynamic Host Configuration Protocol
7.	HTTP	HyperText Transfer Protocol
8.	ACL	Access Control List
9.	FTP	File Transfer Protocol
10.	TCP	Transmission Control Protocol
11.	UDP	User Datagram Protocol
12.	IMAP	Internet Message Access Protocol
13.	SMTP	Simple Mail Transfer Protocol
14.	POP	Post Office Protocol

CHAPTER 1

INTRODUCTION

This project was conducted in two stages: the first is to familiarize myself with the development in networking (IP Address, Subnetting CIDR). During this first step we created network so that any system can communicate with each other in a network. For the second part of my project, we created DNS management system with web hosting and Mail server to design a server. The design consists of therefore in a system that user can be managed and can communicate with each other in network.

Our topic for this training was to learn how to create a network give permission to users, and host the DNS & web server on the network. The design of such a system is modified using Samba and Disk Partitioning. The purpose of the final project is to help students to enhance their knowledge and implement whatever they have learned. It is a system of networks that allows the user to create their own server and perform given task in it. So we also used my knowledge of web hosting during my training. This training allowed me to increase my knowledge in Networking And DNS Management with which we had many difficulties, but also to discover different aspects of Jaipur culture and wonderful people who made this training really enriching for me.

This project increased my knowledge in the Networking and server configuration that was difficult for me before. I also learned how to use samba, disk partition, quota, firewall using CLI mode and hosting web server. I also learned many Linux commands to perform different functions in CLI mode and to create whole system of user in which they connect with each other and share file system. Finally, this project allowed me to use my DNS Configuration skills acquired during my studies.

The main goal of the project was to clear the concepts of networking as given here:

1.1 Definition :-

It is the interconnection of multiple devices, generally termed as Hosts connected using multiple paths for the purpose of sending/receiving data or media. There are also multiple devices or mediums which help in the communication between two different devices which are known as **Network devices**. Ex: Router, Switch, Hub, Bridge.

Requirement of Networking :-

Resource sharing

To make all programs, equipment, and especially data available to anyone on the network without regard to the physical location of the resource and the user.

High reliability

As all files could be replicated on two or three machines, so if one of them is unavailable (due to a hardware failure) the other copies could be used.

Scalability

It is the ability to increase system performance gradually as the workload grows just by adding more processors. A computer network can provide a powerful *communication medium* along widely separated employees. The use of networks to enhance human-to-human communication will probably prove more important than technical goals such as improved reliability.

1.2 TYPES OF NETWORK

1.2.1 LAN (LOCAL AREA NETWORK)

These are privately owned networks within a single building or campus of up to a few kilometres in size. LAN's are distinguished from other networks by three characteristics:

- 1) Their size
- 2) Their transmission technology

3) Their topology

LAN's are restricted in size, which means that the worst-case transmission time is bounded and known in advance. LAN's often use a transmission technology consisting of a single cable to which all the machines are attached. LANs run at speeds of 10 to 100 Mbps, have low delays, and make very few errors.

LAN SETUP

IEEE has produced several standards for LANs. These standards collectively known as **IEEE 802**. IEEE802.3 (Ethernet), IEEE802.4 (Token Bus), IEEE802.5 (Token Ring)

1.2.2 WAN (WIDE AREA NETWORK)

It is a Computer network that spans a relatively large geographical area, often a country or continent. Typically a WAN consists of two or more Local Area Network. Computers connected to a WAN are often connected through public networks such as telephone systems. They can also be connected through leased lines or satellites. The largest WAN in existence is the Internet. WANs run at speed of maximum 2 to 10 Mbps.

WAN SETUP

Three types of approaches are used to connect WANs:

- 1) Circuit switching, which provides a fixed connection (at least for the duration of a call or session), so that each packet takes the same path. Examples of this approach include ISDN, Switched 56, and Switched T1.
- 2) Packet switching, which establishes connections during the transmission process so that different packets from the same transmission may take different routes and may arrive out of sequence at the destination. Examples of this approach are X.25, frame relay, and ATM.
- 3) Leased lines, which can provide a dedicated connection for private use.

1.3 NETWORK MODELS

1.3.1 Layering Concepts and Benefits

Interoperability – Layering promotes greater interoperability between devices from different manufacturers and even between different generations of the same type of device from the same manufacturer.

Greater Compatibility – One of the greatest of all of the benefits of using a hierarchical or layered approach to networking and communications protocols is the greater compatibility between devices, systems and networks that this delivers.

Better Flexibility – Layering and the greater compatibility that it delivers goes a long way to improving the flexibility; particularly in terms of options and choices, that network engineers and administrators alike crave so much.

Scalability – Experience has shown that a layered or hierarchical approach to networking protocol design and implementation scales better than the horizontal approach.

Mobility – Greater mobility is more readily delivered whenever we adopt the layered and segmented strategies into our architectural design

Cost Effective Quality – The layered approach has proven time and time again to be the most economical way of developing and implementing any system(s) be they small, simple, large or complex makes no difference.

1.3.2 OSI NETWORK MODEL

The OSI model describes how information makes its way from application programs through a network medium to another application program in other computer. It divides one big problem into seven problems. Each problem is addressed by one of the seven layers of the OSI model.

Functions of Network Layers in Brief:

APPLICATION LAYER

other computer. It divides one big problem into seven smaller problems.

- Used for applications specifically written to run over the network
- Allows access to network services that support applications
- Directly represents the services that directly support user applications
- Handles network access, flow control and error recovery
- Example apps are file transfer, e-mail, Net BIOS-based applications

PRESENTATION LAYER

- Translates from application to network format and vice-versa
- All different formats from all sources are made into a common uniform format that the rest of the OSI model can understand
- Responsible for protocol conversion, character conversion, data encryption / decryption, expanding graphics commands, data compression
- Sets standards for different systems to provide seamless communication from multiple protocol stacks
- Not always implemented in a network protocol

SESSION LAYER

- Establishes, maintains and ends sessions across the network
- Responsible for name recognition (identification) so only the designated parties can participate in the session
- Provides synchronization services by planning checkpoints in the data stream => if session fails, only data after the most recent checkpoint need be transmitted

- Manages who can transmit data at a certain time and for how long
- Examples are interactive login and file transfer connections, the session would connect and reconnect if there was an interruption; recognize names in sessions and register names in history

TRANSPORT LAYER

- Additional connection below the session layer
- Manages the flow control of data between parties across the network
- Divides streams of data into chunks or packets; the transport layer of the receiving computer reassembles the message from packets
- "Train" is a good analogy => the data is divided into identical units
- Provides error-checking to guarantee error-free data delivery, with on losses or duplications
- Provides acknowledgment of successful transmissions; requests retransmission if some packets don't arrive error-free
- Provides flow control and error-handling: TCP, ARP, RARP

NETWORK LAYER

- Translates logical network address and names to their physical address(e.g. computer name ==> MAC address)
- Responsible for addressing and determining routes for sending
- Managing network problems such as packet switching, data congestion and routing
- If router can't send data frame as large as the source computer sends, the network layer compensates by breaking the data into smaller units. At the receiving end, the network layer reassembles the data

- Think of this layer stamping the addresses on each train car
IP; ARP, RARP, ICMP; RIP; OSFP

DATA LINK LAYER

- Turns packets into raw bits 100101 and at the receiving end turns bits into packets.
- Handles data frames between the Network and Physical layers
- The receiving end packages raw data from the Physical layer into data frames for delivery to the Network layer
- Responsible for error-free transfer of frames to other computers via the Physical Layer
- This layer defines the methods used to transmit and receive data on the network. It consists of the wiring, the devices use to connect the NIC to the wiring, the signalling involved to transmit / receive data and the ability to detect signalling errors on the network media.

PHYSICAL LAYER

- Transmits raw bit stream over physical cable
- Defines cables, cards, and physical aspects
- Defines NIC attachments to hardware, how cable is attached to NIC

Chapter 2

Tools and Technology Used

2.1 Vmware Workstation Pro(12.0.0):

VMware Workstation is a hosted hypervisor that runs on x64 versions of Windows and Linux operating systems (an x86 version of earlier releases was available) it enables users to set up virtual machines (VMs) on a single physical machine, and use them simultaneously along with the actual machine. Each virtual machine can execute its own operating system, including versions of Microsoft Windows, Linux, BSD, and MS-DOS. VMware Workstation is developed and sold by VMware, Inc., a division of Dell Technologies. There is a free-of-charge version, VMware Workstation Player, for non-commercial use. An operating system license is needed to use proprietary ones such as Windows. Ready-made Linux VMs set up for different purposes are available from several sources.

VMware Workstation supports bridging existing host network adapters and sharing physical disk drives and USB devices with a virtual machine. It can simulate disk drives; an ISO image file can be mounted as a virtual optical disc drive, and virtual hard disk drives are implemented as .vmdk files.

VMware Workstation Pro can save the state of a virtual machine (a "snapshot") at any instant. These snapshots can later be restored, effectively returning the virtual machine to the saved state, as it was and free from any post-snapshot damage to the VM.

VMware Workstation includes the ability to group multiple virtual machines in an inventory folder. The machines in such a folder can then be powered on and powered off as a single object, useful for testing complex client-server environments.

We have used Red Hat Linux Enterprise Server through VMware Workstation Pro and RHEL_4 i386.iso image file is mounted on it. Implementation of network IP configuration can be done using VMware workstation.

VMware Workstation is a great tool that allows you to run other operating systems than what is currently running on your laptop. Maybe you would like to test out the new Windows 10 features, but you're not ready to install it on your own computer. Perhaps

you need to test out some new features on Windows Server 2012 or test a Skype for Business proof of concept. Another use case might be needing to stage a Linux application. All of this can be accomplished easily with VMware Workstation.

VMware Workstation just might be an IT administrators best friend. Nothing quite sends shivers up the spine of administrators than having to roll out an entirely new application, mass configuration changes, or tricky proof of concept scenarios. On the other hand, many times in corporate environments, there are applications that run on old legacy systems that you may be afraid to touch for fear of it breaking. Maybe there is a critical application that only runs on Windows XP, but all the computers in the organization are now Windows 8 or higher. By creating a VM you can test and verify configuration changes on the legacy system before rolling out to production. Proof of Concept testing is also a very common use case in IT departments. When you need to prove that the new app works to management, spin up one or more VMs to prove this out. There really is an almost unlimited number of VMware Workstation uses for the IT administrator.

With VMware Workstation, Systems Engineers can now hop on a plane with their laptop and VMware Workstation with entire virtual networks and perform application demonstrations at potential client sites. Consider a web based application that has a very specific set of requirements such as a client, a database, and a web server all on different machines that interact with each other. How could a Systems Engineer demonstrate that with only a laptop? With VMware Workstation, they can do so easily. Multiple virtual machines could be created ahead of time, configured for the multi tier application, and simply brought online when it comes time for the product demo. No matter what application you might need to demonstrate, VMware Workstation is a fantastic solution.

With the modern world of JavaScript applications that run in the Browser, testing has become more important than ever across all of the popular web browsers. Even if you have all browsers installed on your host machine, what about different versions of that browser? In fact, sometimes you will see a web application work fine using Google Chrome on Windows 7, but you find a bug using the same exact browser but on Linux or OSX. When you consider that you'll need to test multiple browsers and versions on

multiple operating systems, it simply becomes too much to do on a host machine. Microsoft even offers their own virtual machines for browser testing so you can test the Microsoft Edge browser in addition to versions of IE8 through IE11 using Microsoft approved virtual machines.

If you're a software developer, you know the importance of having the correct environment to both build and test your application on. You can't build a web application on Microsoft IIS for example, and then when you push it to the production LAMP stack and have it fail. Management is not going to be fond of, "Well it works on my machine" excuse. With VMware Workstation, software developers can test their application against multiple operating systems as well as take snapshots of virtual machines both before and after installation of their application to see how it affects the operating system and so on. In many ways, it gives the developer an unlimited virtual lab environment for which to test their applications to minimize potential platform bugs or errors before moving to a production environment.

2.2 Webmin-1.330-1.noarch:

Webmin is a program that simplifies the process of managing a Linux or Unix system. Normally you need to manually edit configuration files and run commands to create accounts, set up a web server and manage email forwarding. Webmin lets you perform these tasks and many more through an easy to use web interface and automatically updates all required configuration files for you. This makes the job of administering your system much easier.

Some of the things you can do with Webmin are:

- Create, edit and delete Unix Accounts on your system.
- Export Files and Directories to other systems with the NFS protocol.
- Set up Disk Quotas to control the amount of space available to users for their files.
- Install, view and remove Software Packages in RPM and other formats.

- Change your system's IP address, DNS Server settings and routing configuration.
- Set up a Linux Firewall to protect your computer or give hosts on an internal LAN access to the Internet.
- Create and configure virtual web servers for the Apache Web Server.
- Manage databases, tables and fields in a MySQL or PostgreSQL Database Server.
- Share files with Windows systems by configuring Samba Windows File Sharing.
- DHCP (Dynamic Host Configuration Protocol) implementation which automatically provides and assigns IP addresses, default gateways and other network parameters to client devices

These are just a few of the available functions. Webmin provides a simple web interface that lets you configure almost all common services and popular servers on Unix systems. It protects you from the syntax errors and other mistakes often made when editing configuration files directly and warns you before potentially dangerous actions.

Because Webmin is accessed through a web browser, you can log in from any system connected to your network. There is no difference between running it locally and running it remotely, and it is much easier to use over the network than other graphical configuration programs.

Webmin has a modular design: Each function is contained in a module that generally can be installed or removed independently from the rest of the program. Each module manages some service or server, such as Unix users, the Apache Web Server or Software Packages.

If you have manually configured your system, Webmin will recognize all existing settings. Webmin reads the standard configuration files on your system and updates them directly rather than use its own database. This means you can freely mix Webmin, manual configuration and other programs or scripts that work in the same way.

While Webmin was developed for Linux users, Webmin can be used with many other flavors of Unix, such as Solaris, FreeBSD and HP/UX. Webmin understands the

differences between all these operating systems and can adjust its user interface and behavior to fit your OS. This means it often can hide the underlying differences between Unix variants and present a similar or identical interface no matter which OS you use. Webmin is a configuration tool, and so you must have programs installed for it to configure. For example, the Apache module requires that the actual Apache web server be installed. Fortunately, all services and servers that Apache manages are either included with most standard Linux distributions or can be downloaded and installed freely.

As an administrator of a system running a DNS server, we had to spend a lot of time updating the server's configuration files to add new host records requested by users. Giving them the root password was not an option because they did not have the experience to properly edit the zone files and restart the server. The solution was a simple web interface that would display existing DNS records and allow them to be edited, created and deleted. Users were given access to this interface to make the changes they needed safely. Next came modules for Unix users, Samba, mounting filesystems, NFS and Cron jobs. Web interface that is used to do above functionalities named as webmin.

Webmin was written for people with some Linux experience who might be unfamiliar with the intricacies of system administration. Even though it makes the process of creating Unix users or managing the Squid Proxy Server easy, you first must have some idea of what a Unix account is and what Squid does. The average user probably runs Webmin on a Linux system at home or on a company network.

The program assumes you are familiar with basic TCP/IP networking concepts, such as IP addresses, DNS servers and hostnames. It also assumes the user understands the layout of the Unix filesystem, what users and groups are and where user files are located. If you use Webmin to manage some server like Apache or Sendmail, you should have some idea of what they can do and what kind of configuration you want.

Webmin runs with full root privileges, which means it can edit any file and run any command on your system. This means it is quite possible to delete all files on your system or make it un-bootable, if you make a mistake when using the program,

especially if you configure something you don't understand. Even though Webmin usually warns you before performing some potentially dangerous action, plenty of scope for causing damage remains.

Even though it can be used on a system with no Internet connection, Webmin benefits if your system is on a network. It can download new software packages, Perl modules or even new versions of Webmin for you, if connected. Because Webmin runs with root privileges, you must be able to log in to your system as root to install and start it. This means Webmin cannot be used on a system on which you have only a normal account, such as a virtual web server that is shared with other people. You might be able to get your system administrator to install and configure it for you, though.

If you are an experienced system administrator, Webmin may not seem to be a good tool for you because using it generally is slower than directly editing configuration files and running commands.

CHAPTER 3

History and features of the technology:

3.1 History of the technology used:

Vmware Workstation Pro(12.0.0):The first product, VMware Workstation, was delivered in May 1999, and the company entered the server market in 2001 with VMware GSX Server (hosted) and VMware ESX Server (hostless). In 2003, VMware launched VMware Virtual Center, vMotion, and Virtual SMP technology. 64-bit support was introduced in 2004. Many other versions were introduced with additional features.

Webmin: Webmin was written by Jamie Cameron, author of Managing Linux Systems with Webmin: System Administration and Module Development. He released the first version of Webmin (version 0.1) in October 1997. Since then, its user interface, features and appearance have changed dramatically, and almost all of the code has been re-written. However, the basic concept of a web-based administration tool has been the same since that very first release.

Jamie started writing Webmin when he was the administrator for a system running a [DNS server](#) and had to spend a lot of time updating the server's configuration files to add new host records requested by users. Giving them the root password was not an option because they did not have the experience to properly edit the zone files and restart the server. The solution was a simple web interface that would display existing DNS records and allow them to be edited, created and deleted. Users were given access to this interface to make the changes they needed safely.

DNS management was just the start, though. Once Jamie saw the possibilities for simplifying the configuration of a Unix system through a web interface, he started to add other features to the program and put them into modules. Next came modules for Unix users, Samba, mounting filesystems, NFS and Cron jobs. He thought up the name Webmin, made it available for anyone to download and announced it on a few mailing lists. The initial feedback was good, so he kept writing.

Over the years, the program went through multiple user interfaces and dozens of modules, added support for non-English languages, advanced access control, supported a lot more operating systems and incorporated many other features. The Linux distribution companies Caldera and MSC.Linux have supported the project financially, and many users have made contributions of code patches, modules, translations and suggestions. Besides the standard modules, more than 100 others have been written by other users and can be added to Webmin on your system.

3.2 Features of the technology used:

VMware Workstation:

- Full support of Windows 10
- VMware Workstation Pro provides the following support for Windows 10:
 - Run Windows 10 as a virtual machine
 - Run Windows 10 as a host operating system
 - Windows 10 Auto Detect and Easy Install
 - Unity support for Windows 10
 - Migrate Windows 10 PC to a virtual machine
 - New guest operating systems support
 - Support has been added for the following operating systems:
 - Ubuntu 15.04
 - Fedora 22
 - CentOS 7.1
 - RHEL 7.1
 - Oracle Linux 7.1
 - VMware Project Photon
 - Advanced graphics

- Support has been added for the following standards:
- DirectX 10
- OpenGL 3.3
- Performance improvements for suspending and resuming encrypted virtual machines
- Improved vCloud Air Integration (Workstation Pro on Windows only)
- Power operation on remote virtual machines
- Enhanced user experience
- Support IPv6 NAT network
- Tear away tabs
- You can drag open tabs out of the Workstation Pro window into new or already existing Workstation Pro windows.
- Automatically suspend virtual machines on host shutdown
- Support 4K monitors with high resolution UI
- Support for multiple monitors with different DPI settings
- Echo cancellation for voice and video calls with Microsoft Lync and Skype
- Added USB 3.0 support to Windows 7 virtual machines (with the latest Intel USB driver)
- Improved standard installer
- Added NAT network configuration in Virtual Network Editor on Linux hosts
- Respect left-handed mouse setting on Windows host

Webmin:

Webmin is largely based on Perl, running as its own process and web server. It defaults to TCP port 10000 for communicating, and can be configured to use SSL if OpenSSL is installed with additional required Perl Modules.

It is built around modules, which have an interface to the configuration files and the Webmin server. This makes it easy to add new functionality. Due to Webmin's modular design, it is possible for anyone who is interested to write plugins for desktop configuration.

Webmin also allows for controlling many machines through a single interface, or seamless login on other webmin hosts on the same subnet or LAN.

3.3 Need and added features of the technologies:

VMWare Workstation:

1. Windows 10 Creators Update

Windows 10 Creators update is Microsoft's attempt to bring out the creative side lurking inside of it. From a Workstation Pro perspective, Windows 10 Creators Update is now supported both as a guest OS and host OS itself. Other related support features include Auto Detect, Easy Install and Unity support.

2. Guest operating systems support

This KB article gives you a side-by-side supported guest OS list for Workstation Pro v12 and v14. The new ones are as follows:

Windows Server 2016

Ubuntu 16.04 / 17.04

CentOS 7.4

Debian 8.9 / 9.0 / 9.1

Fedora 25 / 26

Red Hat Enterprise Linux 6.9 / 7.3 / 7.4

SLE/Desktop 12 SP3

OpenSUSE 42.3

3. Security Features

Workstation 14 Pro now fully supports Guest VBS Support and Virtual TPM.

Virtualization Based Security (VBS) on Windows 10 and Windows Server 2016 VMs is now supported. This allows you to leverage advanced security features like Credential Guard and Device Guard on Windows 10 / 2016 guest OSes. Note that VBS support is currently supported on Intel CPUs with the best performance attainable using Intel Skylake generation and above.

Workstation 14 Pro now supports Trusted Platform Module 2.0 for use with advanced security and encryption technologies such as BitLocker.

Secure Boot support for virtual machines is also included to ensure only trusted code is loaded by the UEFI firmware during a VM's boot-up process.

4. VMware Hardware Version 14

Hardware version 14 allows you to assign 64-bit guest OS a maximum 64GB of memory, support for Intel Skylake and AMD Ryzen processors. Virtual NVMe support is also provided via a new virtual NVMe storage controller for improved guest operating system performance on Host SSD drives, a great opportunity to test vSAN.

5. Advanced Networking

If Workstation is installed on a Windows host, you can now rename networks in the Virtual Network Editor to better organize your environment. The networks that can be renamed are the ones you add other than the default VMnet0,1 and 8.

Another great addition is the Network Latency simulation feature which allows you to stress test applications, amongst other things, by introducing packet loss, latency and bandwidth capping. This works on virtual machines on a per-vNIC basis. These settings are accessible from the VM's settings by clicking on the Advanced tab for the selected network card. For further details have a look at the official documentation.

Advanced networking features include induced latency and bandwidth capping for testing purposes.

6. ESXi Host Power Operations

You can now put (and pull out) ESXi hosts in maintenance mode as well as shutting and restarting them. To this, you must connect directly to an ESXi host. vCenter managed hosts don't appear to benefit from this functionality.

Power operations on ESXi are now natively supported

7. Native OVF support

Workstation 14 Pro comes with improved OVF/OVA support. This means, it's now easier to build vSphere labs for testing purposes with vCSA (vCenter Server Appliance) 6.0 and 6.5 fully supported.

8. Scan for Virtual Machines

This feature allows you to scan folders for any virtual machines you might have forgotten about after removing them from the inventory. The feature is supported on local folders, network shared storage and USB drives. Use the Scan for Virtual

Machines option from the File menu to run the feature. You can scan an entire drive if you wish with the scan location set to default virtual machines folder.

Webmin: Webmin can be expanded by installing modules, which can be custom made. Aside from this, there are two other major projects that extend the functionality of webmin:

1. Usermin presents and controls a subset of the features available in Webmin, such as webmail and other user-level tasks, rather than administrator-level tasks.
2. Virtualmin, which is a web hosting control panel. Out of the box, Virtualmin enables users to host websites under domains. This gives the server admin and the end user an easy to use interface for managing their websites.

Webmin released Minecraft Server Module 1.0 in January 2013, and version 1.1 in March 2013. The module presents a very basic GUI for server administration. While server management application Multicraft may be more sleekly designed, the free version of Multicraft is limited to 10 simultaneous players. The Webmin Minecraft server is free and open source with no limitations on simultaneous players.

CHAPTER 4

Work Done

4.1 Problem Statement

Consider yourself a Final year Engineering student, who will be passing out in July 2018. Year 2017 was a bad year in terms of job or job market, with the global slowdown and recession the prospect of a 5 figure Salary Cheque is a mirage for the students passing out in year 2018. Your college authorities with the help of your college alumni association has lined up few off-campus placement drives, but none of them will give the amount of salary you were looking for in the year 2018.

Meantime in your summer break some of you joined a networking course in IPEC Ghaziabad offered by Netcamp Solutions Private Limited Company. The course was for 20 days. The basic idea for joining the course was going away from the mad – mad world for 20 days.

Though the idea was FUN and MASTI, you liked the course and learned how to setup a network infrastructure which can be a basic platform for any e-Business.

After completing the course, you decided, enough is enough no more searching for jobs, you will start your own company which will provide e-Business and e-Service solutions to various small companies across the Country.

On the last day of the training program, during your tea break (in the mess) you proposed your idea to all of your group members of your group. You were overwhelmed with the support and their willingness to join your new venture. All wanted to leave their own mark – idea was to be a “JOB Maker – Not a JOB Seeker”.

You all decided to start, the company name will be the group name that you had in Netcamp. You decided to start the web services first so you can display your product lines on the web as well as communicate with your future customers. The Owner of Netcamp was very happy with your initiation, he agreed to give you a loan of Rs. 10,00,000/- (Rupees ten lac only) as

your starting capital. In fact he was so happy that some of his students are willing to take the path which he has taken some 5 years ago, he gave the loan at meager 4% annual interest (where the business loan is anything about 9% + from any reputed bank in India) You bought the following items to start your Company and plan to inaugurate the portal by 9am 1st October 2018. (very little time left – but you are motivated to go ahead and – confident you will be ready by then)

- a) Rented a space to use it as office and keep your servers
- b) 3 Red Hat Linux Enterprise server. With plenty of memory and storage space
- c) 3 live IP address
- d) 32Mbps internet connection from reliance
- e) A domain name as netcamp.in

After a group meeting you decided to do the following and get it going.

- Create one web server which will host all the websites for the Company (netcamp.in)
- Create one DNS server
- Create one mailing server which will provide the email service for the Institution / Company (mail.netcamp.in – and should be able to access from web). Mail server should have POP3 support so user can download email in their own laptop/desktop. (Please customize the mail page with your own company logo and company name)
- The mail server will be the file server which will have file storage space for the user.
- File server will also have a DHCP server (range of IPs =192.168.1.150 to 192.168.1.190 gateway=192.168.1.1 and DNS server = give your DNS server) so that it can give IP address to all client machines.
- You were 4/5 in your group you decided that you will be the Chairman of the company and will have access to all the files / folders in your company. You created three departments – Sales, RandD and Accounts. Please divide the group members in all these groups. For the file management you decided about the following points.
- Email address

username@netcamp.in

company.in (should also open as www.netcamp.in)

sales.company.in

research.company.in

accounts.company.in

mail.company.in

- Common data folder for user (only departmental access – only the department people can read and write on the same)

/departmentname/data

- Common driver folder for the user (only departmental access – only access (r-x) but they can't write on the same)

/departmentname/driver

Please make a note, chairman will have full access on these folder called data and driver;

You should also view others domain and send mail to them

Please design and implement the same.

Please note Reliance will give the public IP address only after a week, so all job has to be done with private IP address only [speak to Santu Sir] for the same.

Firewall : Please use firewall in your server make sure that telnet, ftp and ssh is not allowed from outside the network (allow only to your group members ip only)

4.2 Snapshots

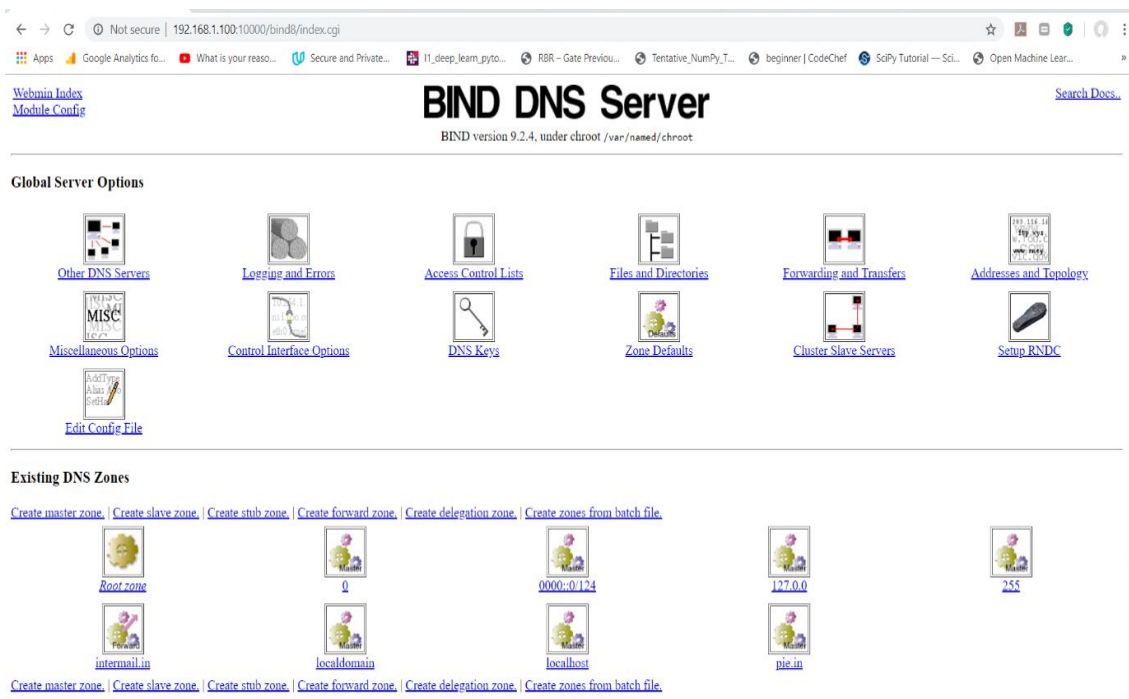


Figure 4.2.1 DNS Server Setup



Figure 4.2.2 Edit the Forward Zone for DNS

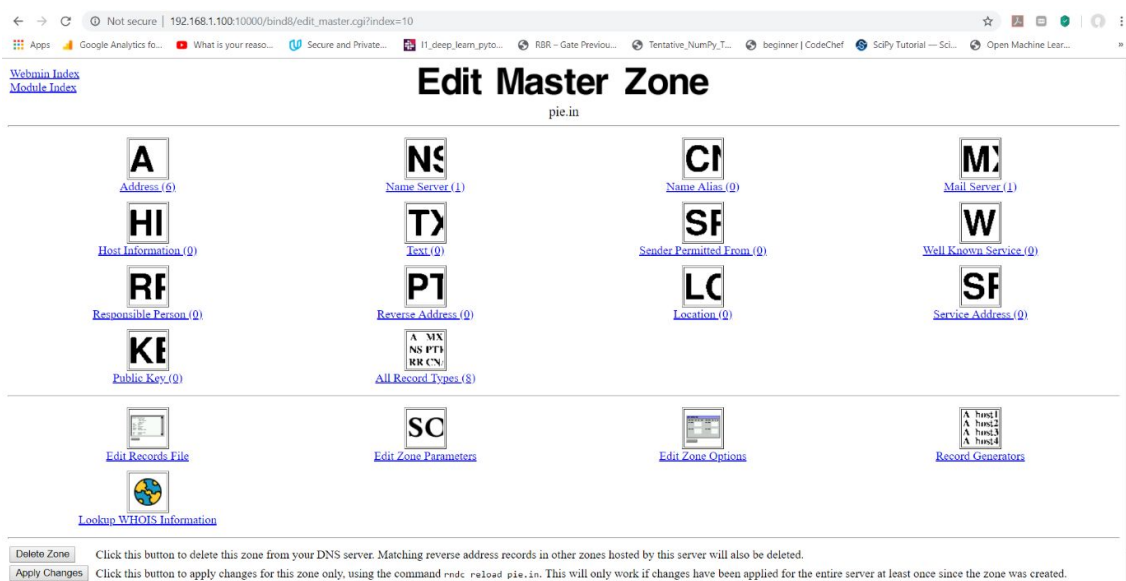


Figure 4.2.3 Edit the Master Zone for DNS

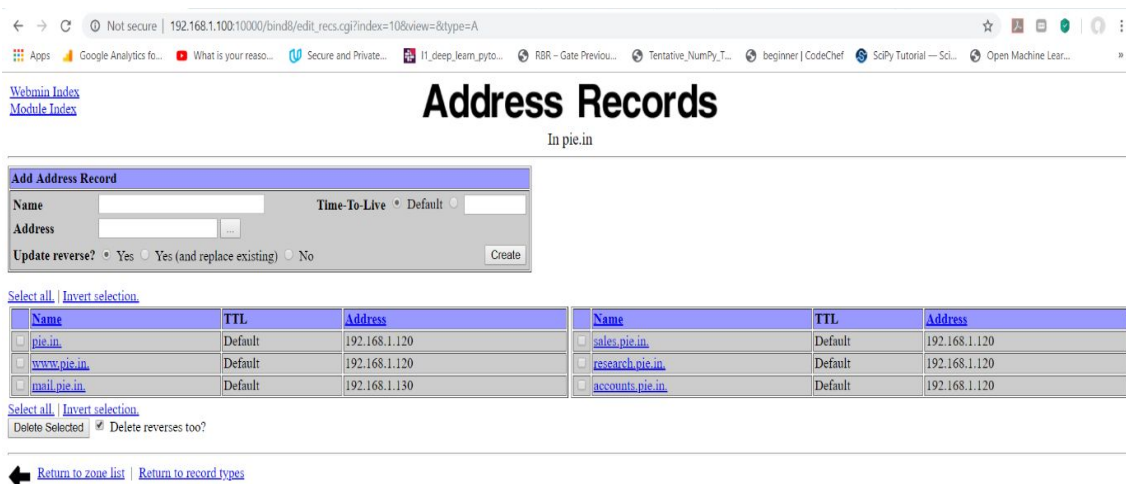


Figure 4.2.4 Address Records are set

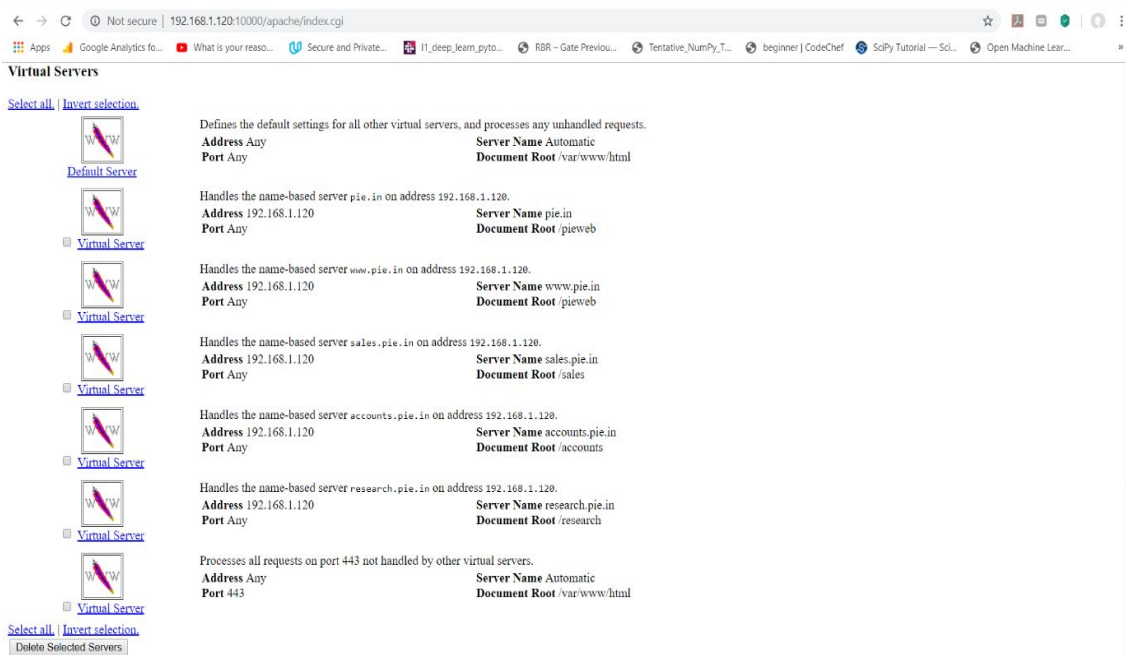


Figure 4.2.5 Virtual Servers present

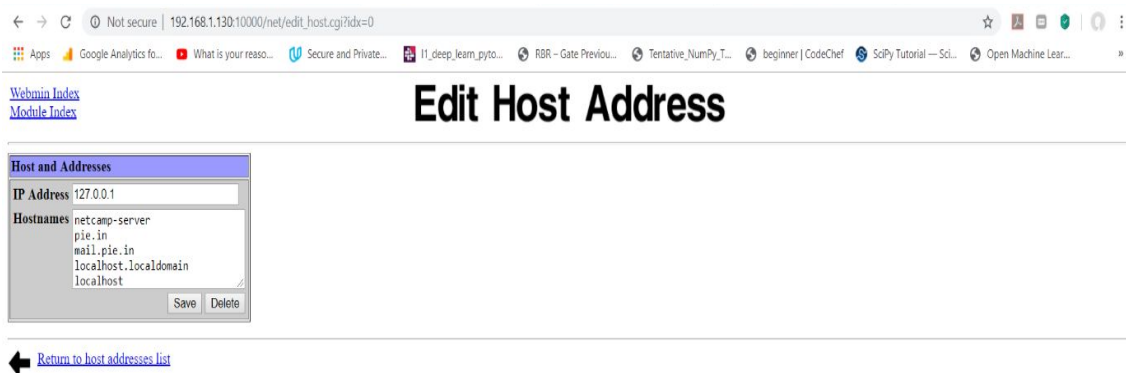


Figure 4.2.6 Editing the host address

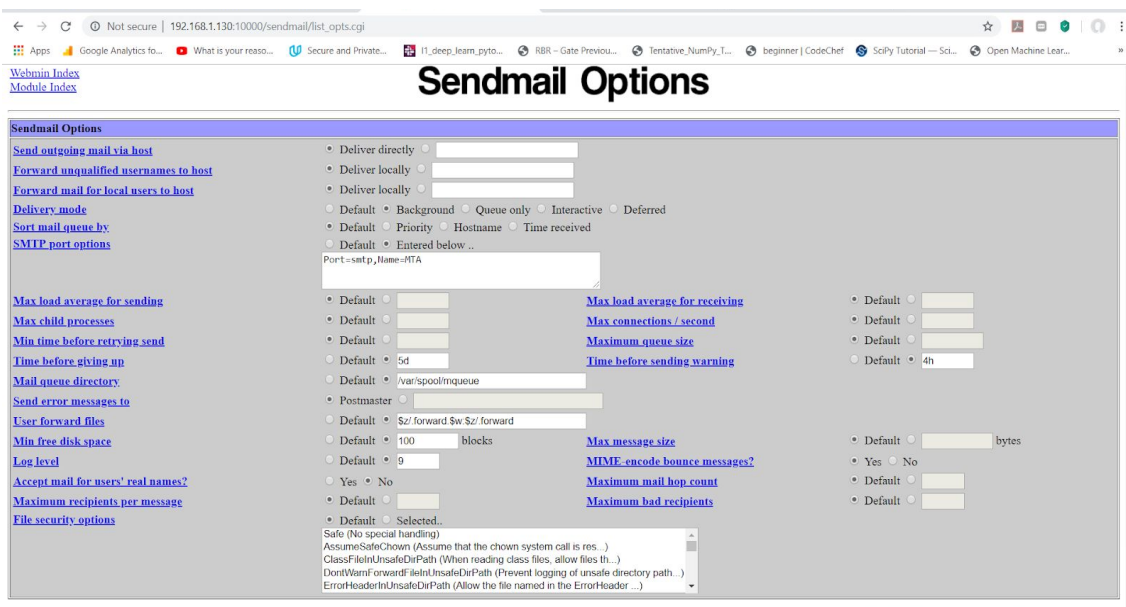


Figure 4.2.7 Setup the sendmail options

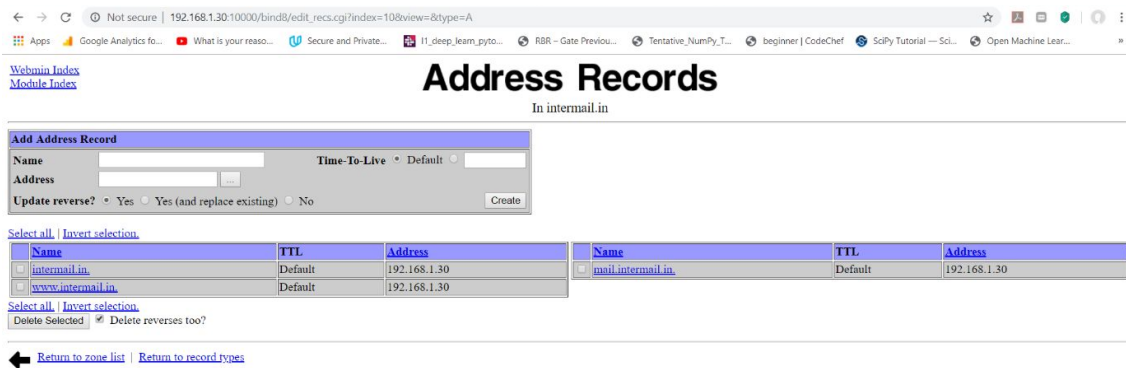


Figure 4.2.8 Setup the subdomain as mail.intermail.in

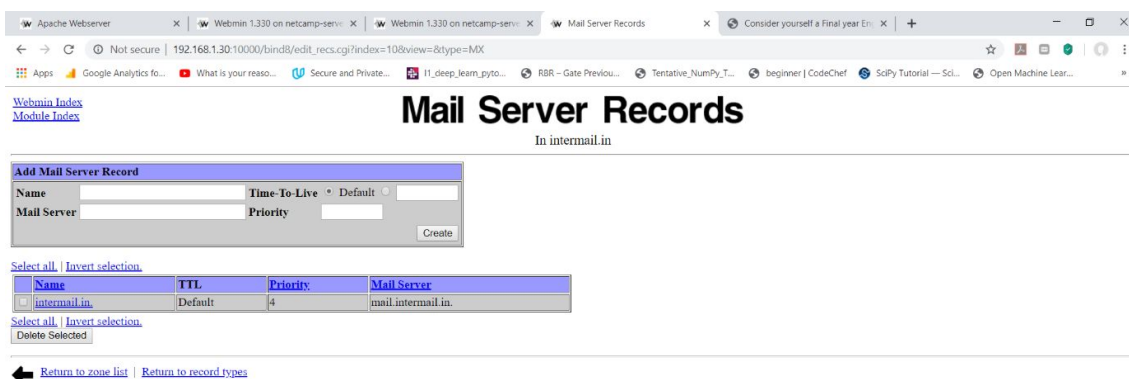


Figure 4.2.9 Setup mail server records

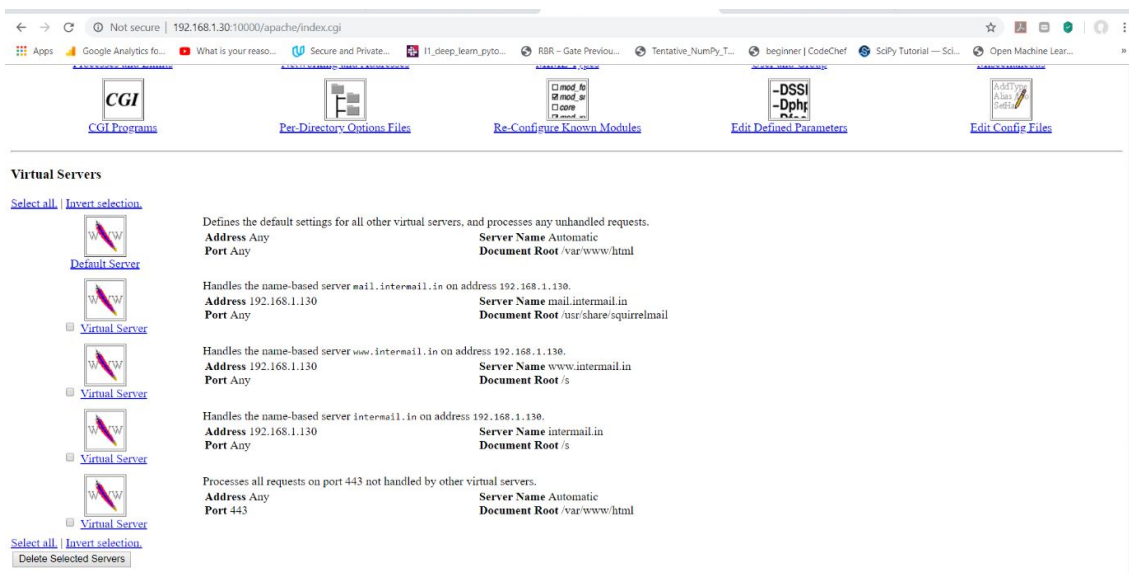


Figure 4.2.10 Updated Virtual Server List

← → ↻ Not secure | 192.168.1.30:10000/sendmail/list_opts.cgi

Apps Google Analytics fo... What is your reaso... Secure and Private... /1_deep_learn_pyto... RBR - Gate Previo... Tentative_NumPy_T... beginner | CodeChef SciPy Tutorial — Sci... Open Machine Lear...

[Webmin Index](#)
[Module Index](#)

Sendmail Options

Sendmail Options

[Send outgoing mail via host](#)
[Forward unqualified usernames to host](#)
[Forward mail for local users to host](#)
[Delivery mode](#)
[Sort mail queue by](#)
[SMTP port options](#)

[Max load average for sending](#)
[Max child processes](#)
[Min time before retrying send](#)
[Time before giving up](#)
[Mail queue directory](#)
[Send error messages to](#)
[User forward files](#)
[Min free disk space](#)
[Log level](#)
[Accept mail for users' real names?](#)
[Maximum recipients per message](#)
[File security options](#)

• Deliver directly
• Deliver locally
• Deliver locally
• Default ☐ Background ☐ Queue only ☐ Interactive ☐ Deferred
• Default ☐ Priority ☐ Hostname ☐ Time received
• Default ☐ Entered below ...
Port = smtp, Name = HTA

• Default ☐
• Default ☐
• Default ☐
• Default ☐ 5d
• Default ☐ /var/spool/mqueue
• Postmaster
• Default ☐ \$z/ forward \$w \$z/ forward
• Default ☐ 100 blocks
• Default ☐ 9
• Yes ☐ No
• Default ☐
• Default ☐ Selected
Safe (No special handling)
AssumeSafeChown (Assume that the chown system call is res...)
ClassFileInUnsafeDirPath (When reading class files, allow files th...)
Don'tVimFowardInUnsafeDirPath (Prevent logging of unsafe directory path...)
ErrorHandlerInUnsafeDirPath (Allow the file named in the ErrorHandler ...)

[Max load average for receiving](#)
[Max connections / second](#)
[Maximum queue size](#)
[Time before sending warning](#)

• Default ☐
• Default ☐
• Default ☐
• Default ☐ 4h
• Default ☐ bytes
• Yes ☐ No
• Default ☐
• Default ☐

Figure 4.2.11 Sendmail Options

← → ↻ Not secure | 192.168.1.30:10000/dovecot/edit_net.cgi

Apps Google Analytics fo... What is your reaso... Secure and Private... /1_deep_learn_pyto... RBR - Gate Previo... Tentative_NumPy_T... beginner | CodeChef SciPy Tutorial — Sci... Open Machine Lear...

[Webmin Index](#)
[Module Index](#)

Networking and Protocols

Dovecot networking and mail protocol options

Serve mail protocols

IMAP
POP3
IMAP (SSL)
POP3 (SSL)

Accept SSL connections? ☐ Yes ☐ No ☐ Default (Yes)

Interfaces for IMAP connections
Interfaces for POP3 connections
Interfaces for IMAP SSL connections
Interfaces for POP3 SSL connections

• Default ☐ All IPv4 and IPv6 ☐ All IPv4 ☐ IP address
• Default ☐ All IPv4 and IPv6 ☐ All IPv4 ☐ IP address
• Default ☐ All IPv4 and IPv6 ☐ All IPv4 ☐ IP address
• Default ☐ All IPv4 and IPv6 ☐ All IPv4 ☐ IP address

Save

← [Return to module index](#)

Figure 4.2.12 Networking and Protocols

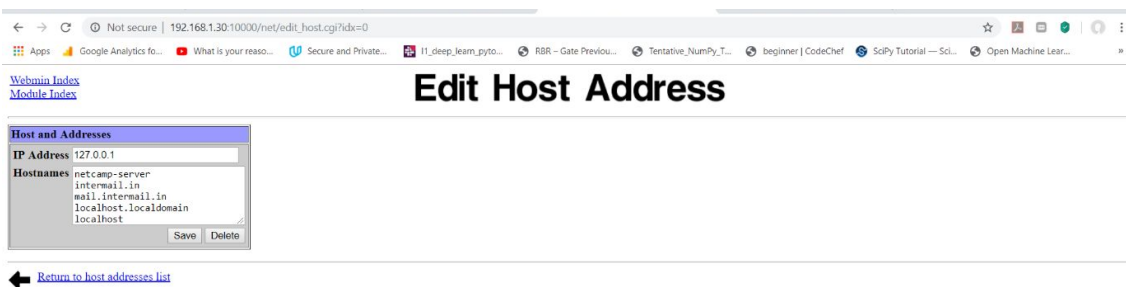


Figure 4.2.13 Editing Host Address

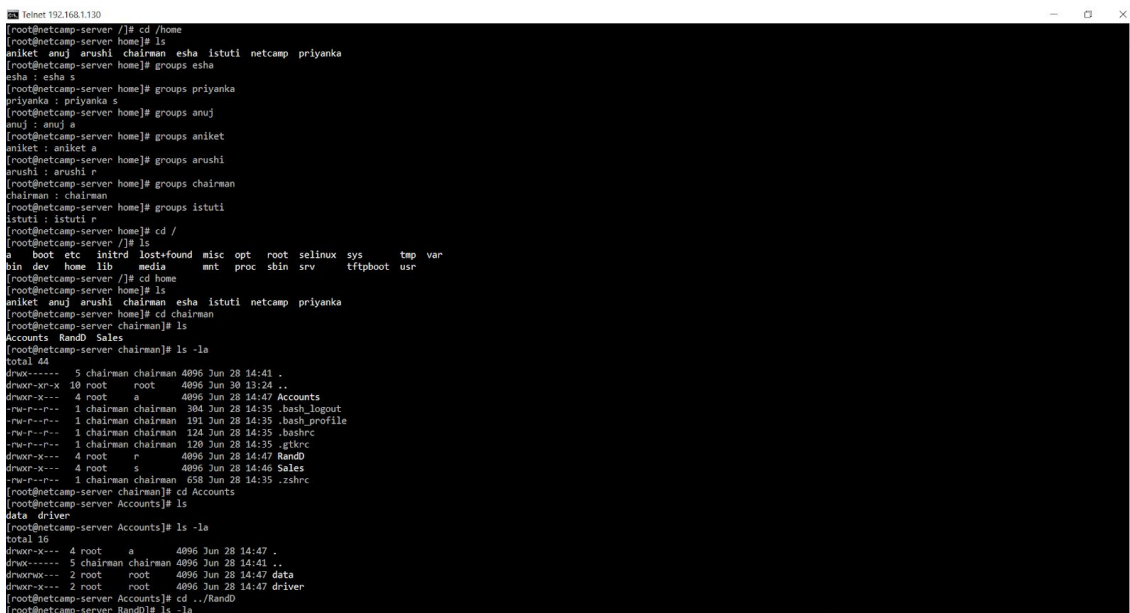


Figure 4.2.14 Setup user and password

```
telnet 192.168.1.130
[root@netcamp-server home]# groups chairman
chairman : chairman
[root@netcamp-server home]# groups istuti
istuti : istuti r
[root@netcamp-server home]# cd /
[root@netcamp-server /]# ls
a boot etc initrd lost+found misc opt root selinux sys tmp var
bin dev home lib media mnt proc sbin srv tftpboot usr
[root@netcamp-server home]# ls
aniket anuj arushi chairman esha istuti netcamp priyanka
[root@netcamp-server home]# cd chairman
[root@netcamp-server chairman]# ls
Accounts Rand0 Sales
[root@netcamp-server chairman]# ls -la
total 44
drwxr-xr-x 5 chairman chairman 4096 Jun 28 14:41 .
drwxr-xr-x 10 root root 4096 Jun 30 13:24 ..
drwxr-xr-x 4 root a 4096 Jun 28 14:47 Accounts
-rw-r--r-- 1 chairman chairman 384 Jun 28 14:35 .bash_logout
-rw-r--r-- 1 chairman chairman 191 Jun 28 14:35 .bash_profile
-rw-r--r-- 1 chairman chairman 124 Jun 28 14:35 .bashrc
-rw-r--r-- 1 chairman chairman 120 Jun 28 14:35 .gtkr
drwxr-xr-x 4 root r 4096 Jun 28 14:47 Rand0
drwxr-xr-x 4 root s 4096 Jun 28 14:46 Sales
-rw-r--r-- 1 chairman chairman 658 Jun 28 14:35 .zshrc
[root@netcamp-server chairman]# cd Accounts
[root@netcamp-server Accounts]# ls
data driver
[root@netcamp-server Accounts]# ls -la
total 16
drwxr-xr-x 4 root a 4096 Jun 28 14:47 .
drwxr-xr-x 5 chairman chairman 4096 Jun 28 14:41 ..
drwxr-xr-x 2 root root 4096 Jun 28 14:47 data
drwxr-xr-x 2 root root 4096 Jun 28 14:47 driver
[root@netcamp-server Accounts]# cd ../Rand0
[root@netcamp-server Rand0]# ls -la
total 16
drwxr-xr-x 4 root r 4096 Jun 28 14:47 .
drwxr-xr-x 5 chairman chairman 4096 Jun 28 14:41 ..
drwxr-xr-x 2 root root 4096 Jun 28 14:47 data
drwxr-xr-x 2 root root 4096 Jun 28 14:47 driver
[root@netcamp-server Rand0]# cd ../Sales
[root@netcamp-server Sales]# ls -la
total 16
drwxr-xr-x 4 root s 4096 Jun 28 14:46 .
drwxr-xr-x 5 chairman chairman 4096 Jun 28 14:41 ..
drwxr-xr-x 2 root root 4096 Jun 28 14:46 data
drwxr-xr-x 2 root root 4096 Jun 28 14:46 driver
[root@netcamp-server Sales]#
```

Figure 4.2.15 Adding users and permissions

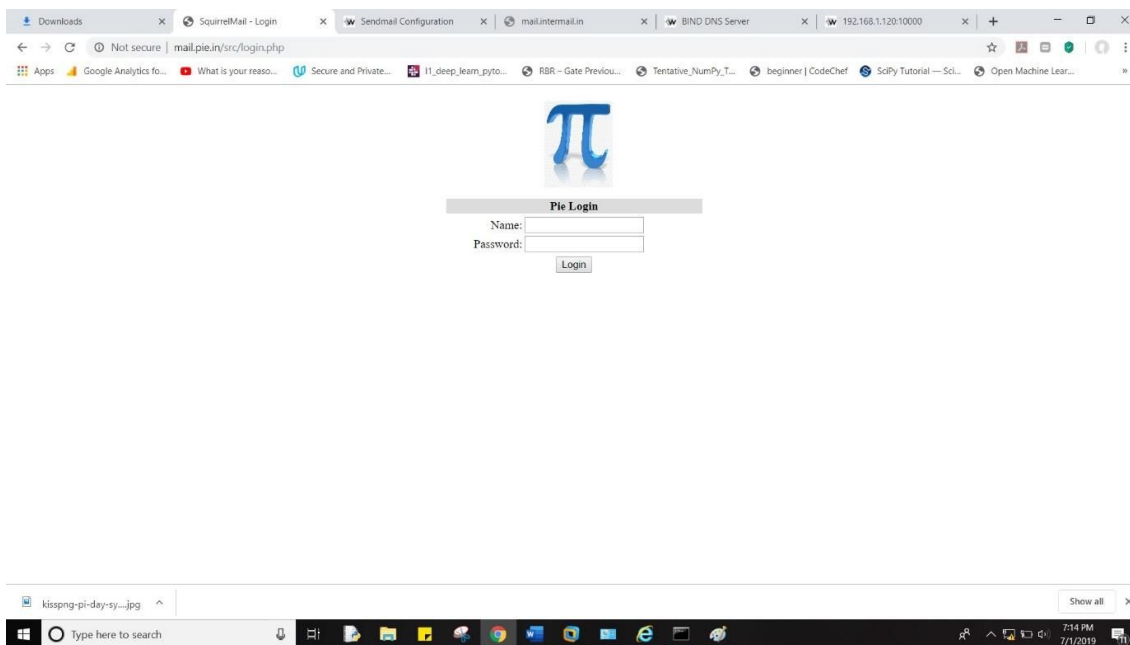


Figure 4.2.16 Email Login Page

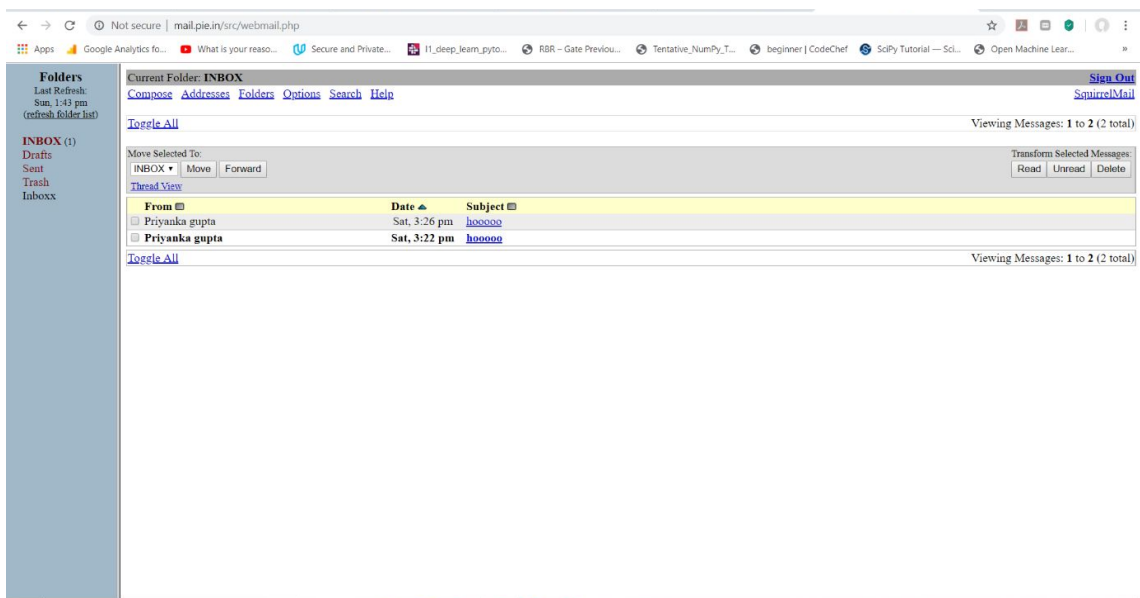


Figure 4.2.17: Email inbox

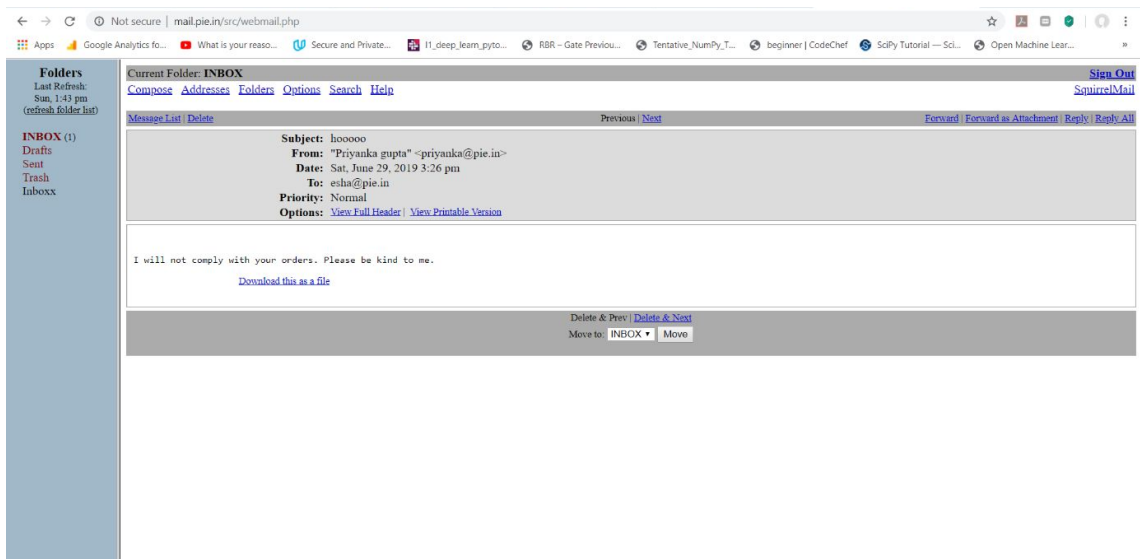


Figure 4.2.18 Email View

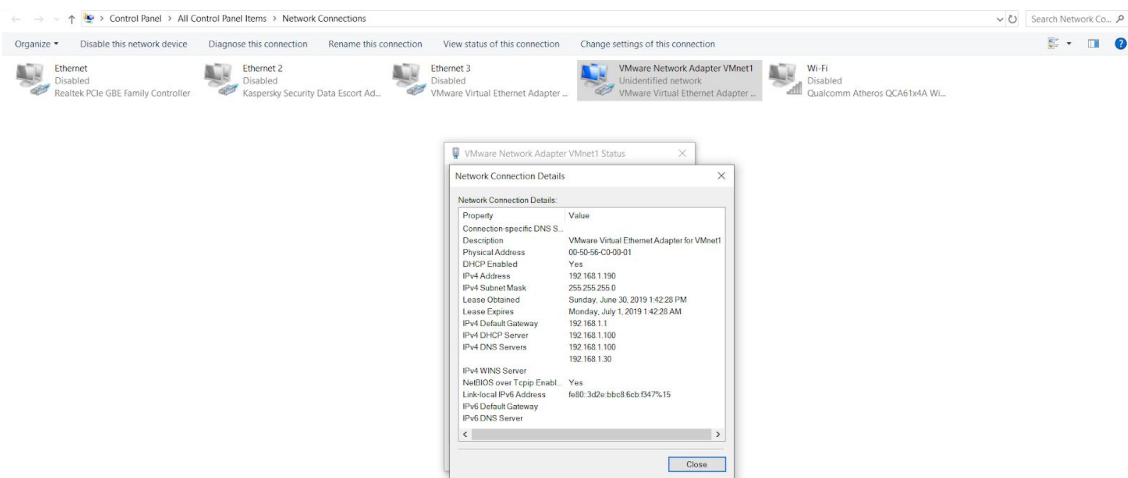


Figure 4.2.19 Setup IP and DHCP server

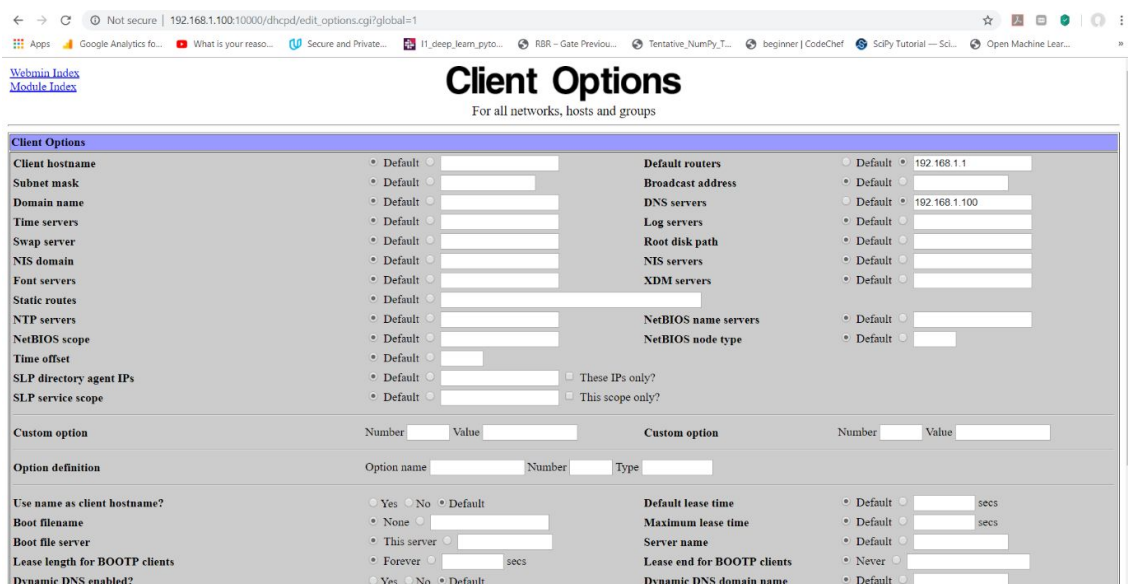


Figure 4.2.20 List of Client Options

← → ↻ Not secure | 192.168.1.100:10000/dhcpd/edit_subnet.cgi?new=1 ☆ 📄 📁 ⚙️

📱 Apps 📊 Google Analytics fo... 📺 What is your reaso... 🔒 Secure and Private... 📄 /1_deep_learn_pyto... 🌐 RBR - Gate Previo... 📄 Tentative_NumPy_T... 📄 beginner | CodeChef 📄 SciPy Tutorial — Sci... 📄 Open Machine Lear...

[Webmin Index](#)
[Module Index](#)

Create Subnet

Subnet Details
Subnet description
Network address
Address ranges
Shared network
Boot filename
Boot file server
Lease length for BOOTP clients
Dynamic DNS enabled?
Dynamic DNS reverse domain
Allow unknown clients?
client-updates: Can clients update their own records?
Server is authoritative for this subnet?
Hosts directly in this subnet

Pie DHCP Server

192.168.1.0

192.168.1.150 - 192.168.1.190

<None>

None

This server

Forever

Yes

No

Default

Allow

Deny

Ignore

Default

Allow

Deny

Ignore

Default

Yes

Default (No)

Dynamic BOOTP ?

Default lease time

Maximum lease time

Server name

Lease end for BOOTP clients

Dynamic DNS domain name

Dynamic DNS hostname

Groups directly in this subnet

255.255.255.0

Default

secs

Default

secs

Default

Never

Default

From client

Create

← [Return to subnet list](#)

Figure 4.2.21 Creation of Subnet

Chapter 5

CONCLUSION AND FUTURE SCOPE

5.1 The Future Aspects of this Project is that it can be expanded to enterprise level. Server configuration and networking are an essential part of computer science and engineering. How Internet works? How are various servers hosted and maintained? This project can be expanded to designing a network for an organisation. Using other tools like GNS3, Cisco Packet Tracer and many more. The extension of this project to many more users and implementing more security features other than firewall. The various protocols like Access List, Switch/Mac binding, Route Map etc... Networking is vast and growing field of technology. There is a demand of network design which is high-availability, flexibility, scalability and manageability. . A hierarchical network model is a useful high-level tool for designing a reliable network infrastructure. It breaks the complex problem of network design into smaller and more manageable areas. By separating the various functions that exist on a network into modules, the network is easier to design.

5.2 The Industrial relevance of the project is that through this project I learnt the concepts of webmin and vmware. Webmin is a program that simplifies the process of managing a Linux or Unix system. Normally we need to manually edit configuration files and run commands to create accounts, set up a web server and manage email forwarding. Webmin lets us perform these tasks and many more through an easy to use web interface and automatically updates all required configuration files for us. This makes the job of administering our system much easier.

Webmin provides a simple web interface that lets us configure almost all common services and popular servers on Unix systems. It protects us from the syntax errors and other mistakes often made when editing configuration files directly and warns us before potentially dangerous actions. Webmin is accessed through a web browser so we can log in from any system connected to our network. There is no difference between running it locally and running it remotely, and it is much easier to use over the network than other graphical configuration programs.

As an administrator of a system running a DNS server, we had to spend a lot of time updating the server's configuration files to add new host records requested by users. Giving them the root password was not an option because they did not have the experience to properly edit the zone files and restart the server. The solution was a simple web interface that would display existing DNS records and allow them to be edited, created and deleted. Users were given access to this interface to make the changes they needed safely. Next came modules for Unix users, Samba, mounting filesystems, NFS and Cron jobs. Web interface that is used to do above functionalities named as webmin.

Webmin runs with full root privileges, which means it can edit any file and run any command on your system. This means it is quite possible to delete all files on your system or make it un-bootable, if you make a mistake when using the program, especially if you configure something you don't understand. Even though Webmin usually warns you before performing some potentially dangerous action, plenty of scope for causing damage remains.

Vmware Workstation enables users to set up virtual machines (VMs) on a single physical machine, and use them simultaneously along with the actual machine. Each virtual machine can execute its own operating system, including versions of Microsoft Windows, Linux, BSD, and MS-DOS. VMware Workstation supports bridging existing host network adapters and sharing physical disk drives and USB devices with a virtual machine. It can simulate disk drives; an ISO image file can be mounted as a virtual optical disc drive, and virtual hard disk drives are implemented as .vmdk files. VMware Workstation includes the ability to group multiple virtual machines in an inventory folder. The machines in such a folder can then be powered on and powered off as a single object, useful for testing complex client-server environments.

VMware Workstation is a great tool that allows you to run other operating systems than what is currently running on your laptop. Maybe you would like to test out the new Windows 10 features, but you're not ready to install it on your own computer. Perhaps you need to test out some new features on Windows Server 2012 or test a Skype for Business proof of concept. Another use case might be needing to stage a Linux application. All of this can be accomplished easily with VMware Workstation.

5.3 Speaking of the societal relevance, through this project we are able to understand the basic working of email protocol, concept of IP addressing and its configuration as well as the importance of various permissions and its impact. Through this project I also got to learn about the working of DHCP and its usage and how networking helps in our day to day life. Thus it helps us to understand how actually Internet works. Through this project if we want to build a small network at home we could use the system and protocol provided in this project. This project is also relevant to gaming as the concept used helps us to learn a lot about the WLAN technology and its usage.

5.4 Coming to future scope of the project, through this project I understood the basic working of IP addresses and how they are useful. Learning about the email configuration helps me to learn about the basics of email protocol which could be used in future. The growth of about six percent is expected in the employment of network engineers, from 2016 to 2026. The demand for network engineers has increased over the last decade as companies have expanded their IT networks. Many companies also require candidates to have specific network certifications and years of experience.

Savvy businesses will take advantage of this opportunity by building networks of freelancers and contractors who'll be engaged with the company. Even when they aren't actively working for the organisation, these workers will still interact with it because of the community. Engineering firm AECOM has created such a network for its contractors. This provides it with on-demand talent (who are in short supply in engineering) and helps keep workers up-to-date with opportunities and company news. When networking becomes higher priority, a lot more communities and events will

appear. Each one will need a unique selling point to attract members. Therefore, niche networking groups that focus on a particular industry, interest or pain-point will take shape.

REFERENCES

[1] “Data Communications and Networking”, Chapter 12: Multiple Access [PowerPoint slides]. [Online]

Available : <http://networking.khu.ac.kr/...03.../Chapter12%20Multiple%20Access.ppt>

[2012, February 16]

[2] D.Russell.(1989), “The Principles of Computer Networking” United Kingdom:Cambridge University Press (p.101-109) [Online]

Available :

http://books.google.com.my/books?id=ReDwVJGlxLsC&pg=PA101&lpg=PA101&dq=what+is+slotted+ring+operation&source=bl&ots=kTkXpUz5Qs&sig=3vIDjRpiUNJPvIQYl2FqgRyO9dw&hl=en&sa=X&ei=F11CT8bXEJDLrQe5hPC9Bw&redir_esc=y#v=onepage&q=what%20is%20slotted%20ring%20operation&f=false

[2012, February 17]

[3] “Local Area Networks”, (n.d) [Online]

Available : <http://www.netguru.net/ntc/NTCC2.htm>

[2012, February 18]