

1. Introduction

Aim

As a systems administrator you have been asked to implement the following Internet & Network services using Ubuntu for a company called KhufuNet.

1. Web Server (Apache) with Virtual Hosting two sites.
2. DNS Server (BIND), Primary & Secondary
3. DHCP Server for Ubuntu clients
4. eMail Server (Postfix) & POP/IMAP Server (Dovecot)
5. FTP Server
6. SSH Server
7. File Server (Samba)
8. Network Printing (CUPS)

The domain name KhufuNet.com has already been registered. Apache will host www.KhufuNet.com and a WordPress instance; blog.KhufuNet.com

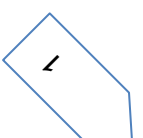
Other issue that you will need to address include but are not limited to:

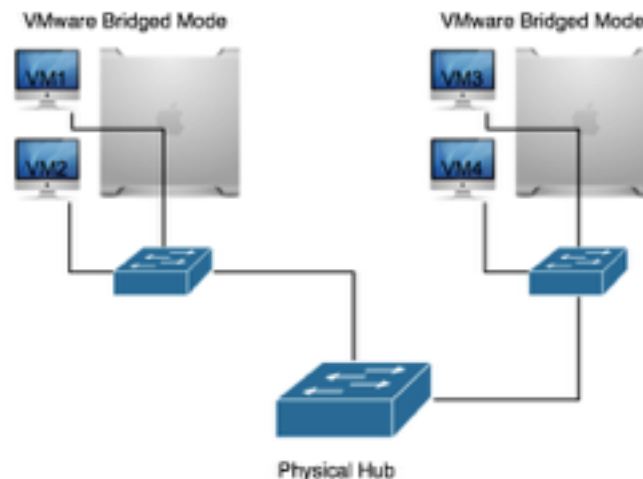
- User & Groups
- Disk Quotas
- Monitoring
- Ease of administration

Lab Topology

The lab topology is made up of two PCs running VMware in “Bridged Mode” and connected via a hub. The virtual machines are specified as follows:

- VM1 – Ubuntu desktop (DHCP client)
- VM2 – Apache Server/Name Server 1/Print Server/Samba Server
- VM3 – eMail Server/Name Server 2/DHCP Server/SSH Server/FTP Server
- VM4 – Ubuntu desktop (DHCP client)





2. Decisions

This project was to be done in group therefore between me and my group member, John Hennessy we divided the job with me having to handle the installations on VM3 and VM4.

The decision was made to use 192.168.10.0/24 as our network address and we gave each machine there IP addresses as follows:

- VM1 - 192.168.10.8
- VM2 – 192.168.10.9
- Laptop1 – 192.168.10.10
- VM3 – 192.168.10.6
- VM4 – 192.168.10.7
- Laptop2 – 192.168.10.11

After this we did the basic connections and we were able to communicate over the network by issuing the “ping” command. With this done we are now ready to start installation and configuration of packages necessary for this project to work.

3. Packages Required & Reason

The following packages are needed to implement our system and most of these packages are in APT repositories. In our installation section you will learn how to install and configure each.

- **Operating System - Linux Ubuntu 10.0**
 - Security
 - Cheap - It is free.

- Easy upgrade
- Hardware compatibility
- Applications
- **Name Server – Bind9**

To have a DNS server for the internal network of the company because long ago there were already too many computers to remember their IP and even too many computers to maintain a set of host files.

To have a DNS server for the external servers, for external clients, etc. to solve this problems become a bigger problem when the growing organization can't supply more resources than one DNS server.
- **DHCP Server**

DHCP is the short for Dynamic Host Configuration Protocol. Its purpose is to assign dynamic IP addresses to devices on a network. Dynamic addressing means that a device can have a different IP address each it connects to the network
- **SSH Server – OpenSSH server and client**

Ssh (Secure Shell) is a program to log into another computer over a network, to execute commands in a remote machine, and to move files one machine to another. It provides strong authentication and secure communications over unsecure channels. It is intended as a replacement for rlogin, rsh, and rcp
- **FTP Server – vsftp and filezilla**

File Transfer Protocol - As the name suggests, FTP is used to transfer files between computers on the same network. You can use FTP to exchange files between computer accounts, transfer files between an account and a desktop computer, or access online software archives.
- **Email-Server**

Mail Transfer Agents - Postfix

Simple, free and slick. Postfix is powerful, well established, but not too difficult to configure, and is security conscious from the start. And again its ease of setup and maintenance makes Postfix a good choice as the MTA agent.
- **Database - MySQL**

MySQL is well established and supported for the sort of lookups required in a mail server. It is widely used its ease of installation and configuration makes if a good choice. Postgres can also be used as the default database.
- **Webmail - Squirrelmail**

Easy to set up php based webmail client. And has an extensive plugin selection.
- **PHP5 & PHP5 cli**

Needed for the installation and configuration of the webmail.
- **Mail Delivery Agent(MDA) – Dovecot**

Dovecot is an open source IMAP and POP3 email server for Linux/UNIX-like systems, written with security primarily in mind. Dovecot is an excellent choice for this small email server installation, It's fast, simple to set up, requires no special administration and it uses very little memory.

Added installations

- **Authentication – Cyrus SASL**
Secure and trusted cryptography technology for authentication of SMTP traffic.
- **Encryption – SSI & TLS**
Secure and trusted cryptography technology for encryption of SMTP traffic.

Content Check:

- **Amavisd-new**
Easy plug in solution for spam, virus checking etc.
- **Spamassassin**
Powerful Spam fighting tool
- **Antivirus - Clamav**
Free virus scanner that can be trusted and includes update daemon.

4. INSTALLATIONS & CONFIGURATIONS

A. Base Install – Ubuntu 10.10

For this project a going to install Ubuntu 10.10 Server and Desktop to achieve these setups of installing an Email server. I will assume a server install, but it should not differ.

I will not be explaining in detail how to download and install Ubuntu because this is not the main aim of this project but if whoever is reading this report and don't understand how to do this, you can go to this address given below which gives the step by step of how to download and install Ubuntu 10.10;

<http://www.ubuntu.com/server/get-ubuntu>

B. Domain Name Server – Bind9

Step 1: Install bind 9:

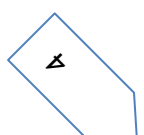
#apt-get install bind9

Step 2: Configure the main Bind files. Usually, if you install Bind from the source code, you will have to edit the file named.conf. However, Ubuntu provides you with a pre-configured Bind, so we will edit another file:

1. I start by editing the named.conf file /etc/bind/named.conf.local and add:

```
#nano /etc/bind/named.conf.local

zone "KhufuNet.com" {
    type master;
    file "/etc/bind/zones/KhufuNet.com.db";
};
```



This is the zone definition for reverse DNS.

```
zone "10.168.192.in-addr.arpa" {
    type master;
    file "/etc/bind/zones/rev.10.168.192.in-addr.arpa";
};
```

2. Next I edit the options file:

```
#nano /etc/bind/named.conf.options
```

```
forwarders {
    192.168.10.9;
};
```

3. Then I add the zone definition file with the address/machine names that the DNS server will be known:

```
#nano /etc/bind/zones/KhufuNet.com.db
```

```
KhufuNet.com      IN      SOA      ns1.KhufuNet.com. hakeem.KhufuNet.com. (
    2011050801;    Serial
    604800 ;       Refresh
    86400 ;        Retry
    2419200 ;      Expire
    604800);       Negative Cache TTL
KhufuNet.com.     IN      NS       ns1.KhufuNet.com
KhufuNet.com.     IN      MX       10      mail.KhufuNet.com

www               IN      A        192.168.10.2
ns1               IN      A        192.168.10.1
mail              IN      A        192.168.10.6
```

Save the file.

4. Make a zones directory:

```
#mkdir /etc/bind/zones
```

5. Then I create the reverse DNS zone file with the following contents:

```
#nano /etc/bind/zones/rev.10.168.192.in-addr.arpa
```

```
$TTL 604800
@ IN SOA ns1.KhufuNet.com. hakeem.KhufuNet.com. (
    2006081401 ;
    604800 ;
    86400 ;
    2419200 ;
    604800
);

1 IN A nsi.KhufuNet.com.
  IN A KhufuNet.com
```

Step 3: Restart bind:

```
#/etc/init.d/bind9 restart
```

Step 4: Modify the file resolv.conf with the following settings as shown below:

```
#nano /etc/resolv.conf
```

```
Nameserver 192.168.10.1
```

Step5: Test

```
#dig @localhost or dig KhufuNet.com
```

```
Welcome to Ubuntu!
 * Documentation: https://help.ubuntu.com/
hakeem@ubuntu:~$ sudo -i
(sudo) password for hakeem:
root@ubuntu:~# dig KhufuNet.com

<<>> DIG 9.7.1-P2 <<>> KhufuNet.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 44200
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 1, ADDITIONAL: 0

;; QUESTION SECTION:
;KhufuNet.com.                IN      A

;; AUTHORITY SECTION:
KhufuNet.com.                 30400   IN      SOA     mail.KhufuNet.com. hakeem.Khufu
et.com. 2006001401 28000 3600 604800 30400

;; Query time: 51 msec
;; SERVER: 192.168.10.6#53(192.168.10.6)
;; WHEN: Mon May 2 03:53:06 2011
;; MSG SIZE rcvd: 78
```

C.DHCP Server

Installation

On the command line interface type:

```
#apt-get install
dhcp3-server
```

At the end of the installation you will

see errors like these:

```
Generating /etc/default/dhcp3-server...
```

```
Starting DHCP server: dhcpd3 failed to start - check syslog for diagnostics.
```

```
invoke-rc.d: initscript dhcp3-server, action "start" failed.
```

That's ok because we did not have the chance yet to configure our DHCP server.

Configuration

The error message the installation ends with might be a little confusing, but the following steps will help you configure the service:

Note: Please set your server and desktop VMs to “Bridged Mode”

First, we need to setup a static IP address for the DHCP server. We will need to edit the /etc/network/interfaces file;

```
# nano /etc/network/interfaces
```

This file should look as follows: First we see the loopback network interface,

```
auto lo
iface lo inet loopback
```

then the primary network interface,

```
auto eth0
iface eth0 inet dhcp
```

Comment out the line **iface eth0 inet dhcp** and replace with the following lines:

```
iface eth0 inet static
address 192.168.10.6
netmask 255.255.255.0
gateway 192.168.10.1
```

Next, edit the DHCP configuration file `/etc/dhcp3/dhcpd.conf`. First make a backup copy:

```
# cp /etc/dhcp3/dhcpd.conf dhcpd.backup
# nano /etc/dhcp3/dhcpd.conf
```

Next I need to write a subnet declaration, a listing of the IP addresses the DHCP server will hand out to client systems. The file comes with sample subnet declarations; the easiest way to write your own is to remove the comment marks (the # marks) from the lines and enter in your own values.

```
subnet 192.168.1.0 netmask 255.255.255.0 {
range 192.168.10.10 192.168.1.100;
option routers 192.168.10.1;
option domain-name-servers 192.168.10.2, 192.168.10.3;
default-lease-time 6000;
max-lease-time 72000;
}
```

Next you will need to edit one more file, the `/etc/default/dhcp3-server` file, to configure which network interfaces the DHCP server will listen on for client requests:

```
# nano /etc/default/dhcp3-server
```

Once editing the file, look for the line marked INTERFACES. You'll need to edit that to allow the DHCP server to listen for requests on your system's Ethernet card, which is usually `eth0`:

```
INTERFACES="eth0"
```

Save the file, exit your text editor, and reboot your Ubuntu 10.10 Maverick Meerkat system. Once the system restarts, you can launch the DHCP server with this command and you need to restart networking services using the following commands:

```
# /etc/init.d/dhcp3-server start
```

Or

```
# service dhcp3-server start
```

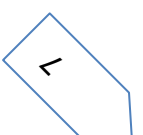
Test

Uncomment out the line **iface eth0 inet dhcp** and disable the static address in the `/etc/network/interfaces` file, reboot the server.

When the server is back on issue this command;

```
#ifconfig
```

And the server should be given an IP address from the range specified in the configuration file. If this happens the installation and configuration is a success. On client command type:



```
#/etc/init.d/networking restart
```

D. FTP Server

File Transfer Protocol (FTP) is a TCP protocol for uploading and downloading files between computers. FTP works on a client/server model. The server component is called an **FTP daemon**. It continuously listens for FTP requests from remote clients. When a request is received, it manages the login and sets up the connection. For the duration of the session it executes any of commands sent by the FTP client.

Access to the FTP server will be managed using:

- Authenticated

In the Authenticated mode a user must have an account and a password. User access to the FTP server directories and files is dependent on the permissions defined for the account used at login.

vsftpd - FTP Server Installation

vsftpd is an FTP daemon available in Ubuntu. It is easy to install, set up, and maintain. To install vsftpd you can run the following command:

```
#sudo apt-get install vsftpd
```

User Authenticated FTP Configuration

By default **vsftpd** is configured to authenticate system users and allow them to download files. If you want users to be able to upload files, edit /etc/vsftpd.conf file:

```
write_enable=YES
```

Now restart **vsftpd**:

```
#sudo restart vsftpd
```

Now when system users login to FTP they will start in their **home** directories where they can download, upload, create directories, etc. .

The configuration file consists of many configuration parameters. The information about each parameter is available in the configuration file.

Securing FTP

There are options in /etc/vsftpd.conf to help make **vsftpd** more secure. For example users can be limited to their home directories by uncommenting:

```
chroot_local_user=YES
```

You can also limit a specific list of users to just their home directories:

```
chroot_list_enable=YES
```

```
chroot_list_file=/etc/vsftpd.chroot_list
```

After uncommenting the above options, create a /etc/vsftpd.chroot_list containing a list of users one per line. Then restart **vsftpd**:

```
#sudo restart vsftpd
```

Also, the /etc/ftp users file is a list of users that are **disallowed** FTP access. The default list includes root, daemon, nobody, etc. To disable FTP access for additional users simply add them to the list.

FTP can also be encrypted using **FTPS**. Different from **SFTP**, **FTPS** is FTP over Secure Socket Layer (SSL). **SFTP** is a FTP like session over an encrypted **SSH** connection. A major difference is that users of SFTP need to have a **shell** account on the system, instead of a **nologin** shell. Providing all users with a shell may not be ideal for some environments, such as a shared web host.

To configure **FTPS**, edit `/etc/vsftpd.conf` and at the bottom add:

```
ssl_enable=Yes
```

Also, notice the certificate and key related options:

```
rsa_cert_file=/etc/ssl/certs/ssl-cert-snakeoil.pem
```

```
rsa_private_key_file=/etc/ssl/private/ssl-cert-snakeoil.key
```

By default these options are set the certificate and key provided by the **ssl-cert** package. In a production environment these should be replaced with a certificate and key generated for the specific host.

Now restart **vsftpd**, and non-anonymous users will be forced to use **FTPS**:

```
#sudo restart vsftpd
```

To allow users with a shell of `/usr/sbin/nologin` access to FTP, but have no shell access, edit `/etc/shells` adding the **nologin** shell:

```
#nano /etc/shells
```

```
/bin/csh
```

```
/bin/sh
```

```
/usr/bin/es
```

```
/usr/bin/ksh
```

```
/bin/ksh
```

```
/usr/bin/rc
```

```
/usr/bin/tcsh
```

```
/bin/tcsh
```

```
/usr/bin/esh
```

```
/bin/dash
```

```
/bin/bash
```

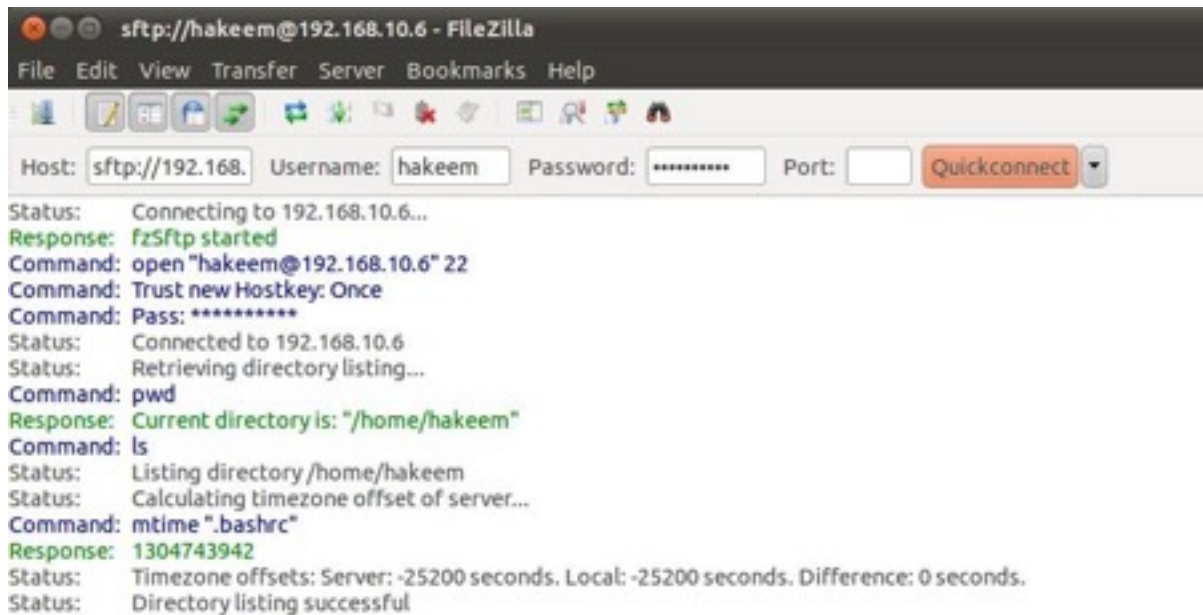
```
/bin/rbash
```

```
/usr/bin/screen
```

```
/usr/sbin/nologin
```

Test

Install filezilla on Ubuntu client and use to connect into the server(host), result should be as shown below:



```

sftp://hakeem@192.168.10.6 - FileZilla
File Edit View Transfer Server Bookmarks Help
Host: sftp://192.168. Username: hakeem Password: ***** Port: Quickconnect
Status: Connecting to 192.168.10.6...
Response: fzSftp started
Command: open "hakeem@192.168.10.6" 22
Command: Trust new Hostkey: Once
Command: Pass: *****
Status: Connected to 192.168.10.6
Status: Retrieving directory listing...
Command: pwd
Response: Current directory is: "/home/hakeem"
Command: ls
Status: Listing directory /home/hakeem
Status: Calculating timezone offset of server...
Command: mtime ".bashrc"
Response: 1304743942
Status: Timezone offsets: Server: -25200 seconds. Local: -25200 seconds. Difference: 0 seconds.
Status: Directory listing successful

```

E. OpenSSH Server

OpenSSH is a freely available version of the Secure Shell (SSH) protocol family of tools for remotely controlling a computer or transferring files between computers. Traditional tools used to accomplish these functions, such as **telnet** or **rnp**, are insecure and transmit the user's password in clear text when used. OpenSSH provides a server daemon and client tools to facilitate secure, encrypted remote control and file transfer operations, effectively replacing the legacy tools.

Installation

To install the OpenSSH server application, and related support files, use this command at a terminal prompt:

```
#sudo apt-get install openssh-server
```

This command will install both openssh client and server. The **openssh-server** package can also be selected to install during the Server Edition installation process.

Configuration

First I start by editing the `/etc/ssh/sshd_config` file but First copy the `/etc/ssh/sshd_config` file to make a backup:

```
#sudo cp /etc/ssh/sshd_config /etc/ssh/sshd_config.backup
```

```
#sudo chmod a-w /etc/ssh/sshd_config.backup
```

After making changes to the `/etc/ssh/sshd_config` file, save the file, and restart the **sshd** server application to effect the changes using the following command at a terminal prompt:

```
#sudo /etc/init.d/ssh restart
```

Configure SSH Keys

SSH **keys** allow authentication between two hosts without the need of a password. SSH key authentication uses two keys a **private** key and a **public** key.

To generate the keys, from a terminal prompt enter:

ssh-keygen -t dsa

This will generate the keys using a **DSA** authentication identity of the user. During the process you will be prompted for a password. Simply hit **Enter** when prompted to create the key.

By default the **public** key is saved in the file `~/.ssh/id_dsa.pub`, while `~/.ssh/id_dsa` is the **private** key. Now copy the `id_dsa.pub` file to the remote host and append it to `~/.ssh/authorized_keys` by entering:

```
ssh-copy-id hakeem@localhost
```

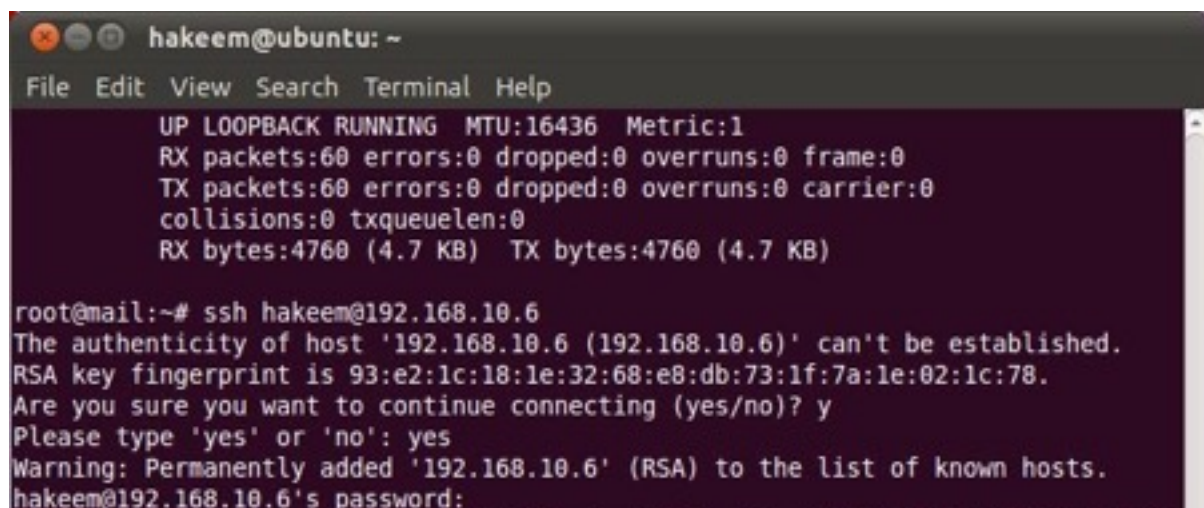
Finally, double check the permissions on the `authorized_keys` file, only the authenticated user should have read and write permissions. If the permissions are not correct change them by:

```
#chmod 600 ~/.ssh/authorized_keys
```

Test

You should now be able to SSH to the host without being prompted for a password. In the Ubuntu client type

```
#ssh hakeem@192.168.10.6
```



```
hakeem@ubuntu: ~
File Edit View Search Terminal Help
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:60 errors:0 dropped:0 overruns:0 frame:0
TX packets:60 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:4760 (4.7 KB) TX bytes:4760 (4.7 KB)

root@mail:~# ssh hakeem@192.168.10.6
The authenticity of host '192.168.10.6 (192.168.10.6)' can't be established.
RSA key fingerprint is 93:e2:1c:18:1e:32:68:e8:db:73:1f:7a:1e:02:1c:78.
Are you sure you want to continue connecting (yes/no)? y
Please type 'yes' or 'no': yes
Warning: Permanently added '192.168.10.6' (RSA) to the list of known hosts.
hakeem@192.168.10.6's password:
```

F. Install Postfix

In this setup I KhufuNetcom and it has a valid MX record setup as mail.KhufuNet.com. Remember to replace KhufuNetcom with yourdomain.com with your actual domain in the example codes in this howto. Also I assume that you know what an MX record is. To find out MX your type in a terminal:

```
#dig mx KhufuNet.com
```

To install postfix

```
#sudo apt-get install postfix
```

Install mailx or mailutils package for use as command mail utility program. Mail command is installed with this package.

```
sudo apt-get install mailutils
```

Test your default setup

Add a user before you start this.

```
#sudo useradd -m -s /bin/bash hakeem
```

```
#sudo passwd hakeem
```

Test your default installation using the following code segment.

```
#telnet localhost 25
```

(if that doesn't work, check to see if postfix is running)

```
#sudo postfix status
```

If it is not running, start it

```
#sudo postfix start
```

Postfix will prompt like following in the terminal so that you can use to type SMTP commands.

Trying 127.0.0.1...

Connected to mail.KhufuNet.com.

Escape character is '^['.

220 localhost.localdomain ESMTP Postfix (Ubuntu)

Type the following code segment in Postfix's prompt.

```
ehlo localhost
```

```
mail from: root@localhost
```

```
rcpt to: hakeem@localhost
```

```
data
```

```
Subject: My first mail on Postfix
```

```
Hi,
```

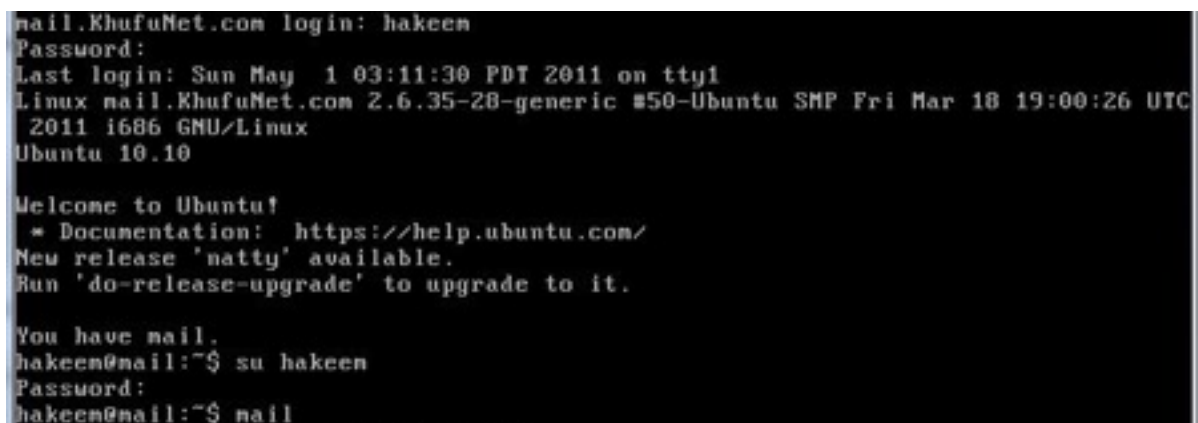
```
Are you there?
```

```
regards,
```

```
Admin
```

```
. (Type the .[dot] in a new Line and press Enter )
```

```
quit
```



```
mail.KhufuNet.com login: hakeem
Password:
Last login: Sun May  1 03:11:30 PDT 2011 on tty1
Linux mail.KhufuNet.com 2.6.35-28-generic #50-Ubuntu SMP Fri Mar 18 19:00:26 UTC
2011 i686 GNU/Linux
Ubuntu 10.10

Welcome to Ubuntu!
 * Documentation:  https://help.ubuntu.com/
New release 'natty' available.
Run 'do-release-upgrade' to upgrade to it.

You have mail.
hakeem@mail:~$ su hakeem
Password:
hakeem@mail:~$ mail
```

Check the mailbox of hakeem

```
su - hakeem
```

```
mail
```

When you type mail command an output like follows display in your terminal.

```

"/var/mail/hakeem": 1 message 1 new
>M 1 Cron Daemon Sun May 1 03:09 17/938 Cron <root@mail> I -x /
?
Return-Path: <root@mail.KhufuNet.com>
X-Original-To: root
Delivered-To: root@mail.KhufuNet.com
Received: by mail.KhufuNet.com (Postfix, from userid 0)
        id CA39E100BFF; Sun, 1 May 2011 03:09:01 -0700 (PDT)
From: root@mail.KhufuNet.com (Cron Daemon)
To: root@mail.KhufuNet.com
Subject: Cron <root@mail> [ -x /usr/lib/php5/maxlifetime ] && [ -d /var/lib/ph
p5 ] && find /var/lib/php5/ -type f -cmin +$(/usr/lib/php5/maxlifetime) -print0
l xargs -n 200 -r -0 rm

```

You will observe that mails are indexed by numbers and you can type the number of which the mail that you want to read. For example type no "2" to read the 2nd mail. The type "q" to quit. The mail will be written to a file called maildir in user's home directory. According to our example it will be /home/hakeem/maildir.

Setting Postfix Support for Maildir-style Mailboxes

Maildir is a format for an e-mail spool that does not require file locking to maintain message integrity because the messages are kept in separate files with unique names. A Maildir is a directory (often named Maildir) with three subdirectories named tmp, new, and cur. The subdirectories should all reside on the same filesystem.

Another reason to use Maildir format is that Courier IMAP/POP3 servers only work with Maildir format of mailboxes.

Instruct Postfix to use Maildir instead of Box:

```
# sudo postconf -e "home_mailbox = Maildir/"
```

Ensure Procmail isn't used: (if the step was taken during dpkg-reconfigure, by mistake)

```
#sudo postconf -e "mailbox_command = "
```

Restart Postfix to make changes effect.

```
#sudo /etc/init.d/postfix restart
```

Test your setup again

Check the mailbox of hakeem

```
su - hakeem
```

```
MAIL=/home/hakeem/Maildir
```

```
Mail
```

```

root@mail:~# telnet 192.168.10.6 25
telnet: could not resolve 192.168.10.6/25: Temp
root@mail:~# telnet 192.168.10.6 25
Trying 192.168.10.6...
Connected to 192.168.10.6.
Escape character is '^J'.
220 mail.KhufuNet.com ESMTP Postfix (Ubuntu)
HELO hakeem.KhufuNet.com
250 mail.KhufuNet.com
MAIL FROM:<root@KhufuNet.com>
250 2.1.0 Ok
RCPT TO:<hakeem@KhufuNet.com>
250 2.1.5 Ok
DATA
354 End data with <CR><LF>.<CR><LF>
subject: Test message
body of message!
250 2.0.0 Ok: queued as 1144B100B52

```

G. Installing courier IMAP and POP3

```
#sudo apt-get install courier-pop  
#sudo apt-get install courier-imap
```

Adding your local domains to postfix

Add your domains to mydestination: (my destination is a value in the postfix configuration file. to view your existing setting, type `sudo postconf mydestination`)

```
#sudo postconf -e "mydestination = mail.KhufuNet.com, localhost.localdomain, localhost,  
KhufuNet.com"
```

(note that command above will overwrite your previous settings of mydestination, so make note of your previous entries)

Add your local networks, too:

Postfix comes with the localhost (127.0.0.1) entry; then add your network

```
#sudo postconf -e "mynetworks = 127.0.0.0/8, 192.168.10.0/24"
```

Make Postfix to receive mail from the Internet

Instruct Postfix to receive on all interfaces:

```
#sudo postconf -e "inet_interfaces = all"
```

Make Postfix accept IPv4, IPv6 protocols

If you're not using IPv6 yet, and you're paranoid, use "ipv4" instead of "all". Again, this is to suit your own network sensibilities.

```
#sudo postconf -e "inet_protocols = all"
```

Finally, restart Postfix;

```
#sudo /etc/init.d/postfix restart
```

Test your setup again using following code:

```
telnet mail.KhufuNet.com 25  
ehlo KhufuNet.com  
mail from: root@KhufuNet.com  
rcpt to: hakeem@KhufuNet.com  
data  
Subject: My first mail for my domain
```

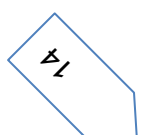
```
Hi,  
Are you there?  
regards,  
Admin  
.  
(and Enter In a new Line)  
quit
```

Check the mailbox of hakeem

```
su - hakeem  
cd Maildir/new  
ls
```

Now you will see mail has a separate file.

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Testing Courier POP3 & IMAP

Type in a terminal as above with changing to POP3 & IMAP

```
Connection closed by foreign host.
root@mail:~# su hakeem
hakeem@mail:/root$ mail
No mail for hakeem
hakeem@mail:/root$ telnet 192.168.10.6 143
Trying 192.168.10.6...
Connected to 192.168.10.6.
Escape character is '^I'.
* OK [CAPABILITY IMAP4rev1 UIDPLUS CHILDREN NAMESPACE THREAD=ORDEREDSUBJECT THRE
AD=REFERENCES SORT QUOTA IDLE ACL ACL2=UNION STARTTLS] Courier-IMAP ready. Copyr
ight 1998-2010 Double Precision, Inc. See COPYING for distribution information.
```

Local Alias database

Creating an alias for an account

The following codes illustrate how you can setup an alias, this step is optional.

Create a user

```
#sudo useradd -m -s /bin/bash sysadmin
#sudo passwd sysadmin
```

Edit the alias table

Open the alias file with:

```
#sudo vi /etc/aliases
```

Add the following code:

```
hakeem: sysadmin
```

To make your changes take effect type:

```
#Sudo newaliases
```

To test your changes send a mail to hakeem and check the mail in /home/sysadmin/Maildir/new folder.

Postfix virtual Aliases for separate domains and Linux system accounts

With this approach, every hosted domain can have its own info etc. email address. However, it still uses Linux system accounts for local mailbox deliveries.

With virtual alias domains, each hosted address is aliased to a local UNIX system account or to a remote address. The example below shows how to use this mechanism for the fossedu.org and linuxelabs.com domains.

Inside the **main.cf** file, we tell it how to handle these virtual domains:

```
sudo postconf -e "virtual_alias_domains = KhufuNet.com"
#sudo postconf -e "virtual_alias_maps = hash:/etc/postfix/virtual"
```

Edit the /etc/postfix/virtual file:

Add two Linux system accounts

```
sudo useradd -m -s /bin/bash hakeem
sudo useradd -m -s /bin/bash john
```


Set passwords for the above users.

```
sudo passwd hakeem
sudo passwd john
sudo vi /etc/postfix/virtual
```

Add the following code segment:

```
info@KhufuNet hakeem
```

To create a Map Database type :

```
#sudo postmap /etc/postfix/virtual
```

Postmap is utility program that will convert /etc/postfix/virtual to /etc/postfix/virtual.db in Berkley DB format, so that Postfix can access the data faster.

Note: Always restart Postfix when you make any to the Postfix files for the changes to take effect:

```
#sudo /etc/init.d/postfix restart
```

After the Postfix is working, next I install MYSQL and PHPmyAdmin.

Database

MySQL

Next I will need to create a user to use in MySQL for mail only. Then you need to create the database, Don't forget your chosen mail username and password. You will need the password you specified for **root** during MySQL package installation.

Log in as root

```
#mysql -u root -p
```

Then enter password for the root account when prompted

```
#Enter password:
```

Then we create the mail database

```
#create database maildb;
```

Then we create a new user: "hakeem"

```
#GRANT SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON maildb.* TO
'hakeem'@'localhost' IDENTIFIED by 'mailPASSWORD'; GRANT
SELECT,INSERT,UPDATE,DELETE,CREATE,DROP ON maildb.* TO 'hakeem'@'%'
IDENTIFIED by 'mailPASSWORD';
#exit;
```

Edit(create) how to find the users mailbox location

```
#nano /etc/postfix/mysql_mailbox.cf
```

```
user=hakeem
password=mailPASSWORD
dbname=maildb
table=users
select_field=maildir
where_field=id hosts=127.0.0.1
additional_conditions = and enabled = 1
```

Create how to find the email domains

NOTE: All this SQL commands can be easily done using PHPmyadmin after you install it.

After installing and adding users and the domain to the database next is to install an email client to view the email on the Ubuntu client side.

Ubuntu comes with Evolution mail, you just need to set it up to send and receive email from the email server.

You can follow this easy to follow guide on the link below;

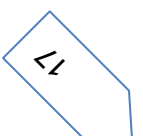
<http://www.simplehelp.net/2007/08/11/how-to-set-up-evolution-for-email/>

After this set up you are good to go and start using your email account.

Summary & Conclusion

Initially when we were given this project to perform I thought after performing the last assignment, this will be easier, but hell no it was really challenging but in a way a good avenue to learn. My main concern was that I have never perform any of this installations

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before but I was confident of the fact that I can research this over the time I had but I was wrong, it took me the whole Easter break and it was tough.

From the beginning, me and my partner (John) encounter our first issue when we configure the IP addresses of the Virtual machines and the Laptops, and we try to get the machines communicate by issuing the ping command but they won't communicate. We were on this problem for some time before we discover that it's the firewall on the laptops that were actually blocking the communication.

The next challenge was the issue of changing between the network adapters (NAT or BRIDGE). Though I got over the problem over the period of performing this task but it disrupt me at the beginning because services that were suppose to communicate and it took me sometimes before I got over this. And also I found out that whenever you change from DHCP To STATIC in the '/etc/network/interfaces' file you have to reboot the machine for the change to take effect.

After scaling this initial problems, I was able to quickly recognise this initial issue and solve them during my installations and configurations of the remaining packages.

The next installation to give me a problem was the configuration of the 'bind' file, the main problem here deals with spelling errors, the right IP address and putting the dot(.) rightly. I spent over 2 days and 2 installations to get the DNS working. But because of my experience acquired during this project help me troubleshoot this problems and be able to solve them.

In conclusion, even though this project threw up many challenges I believe I have learned a lot during the execution of this project, such as what Postfix does? How it works? How to configure DHCP to give dynamic IP address?. Although, I wasn't able to get some of the services to work as it's suppose to work but I know these project has taught me a lot and I believe the experience will come into good use in my workplace in the future.

Finally, given the opportunity to start the project again I believe I will do better with a successful result in terms of my installations and configurations because I gave my all to make this service work and I know I did my best.

Reference

<http://timhorgan.wordpress.com/2011/03/21/dhcp-server/>

<http://ubuntuforums.org/showthread.php?t=236093>

<https://help.ubuntu.com/community/PostfixBasicSetupHowto>

<https://help.ubuntu.com/10.10/serverguide/C/ftp-server.html>