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INTERNET & NETWORK SERVICES

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The Scenario

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

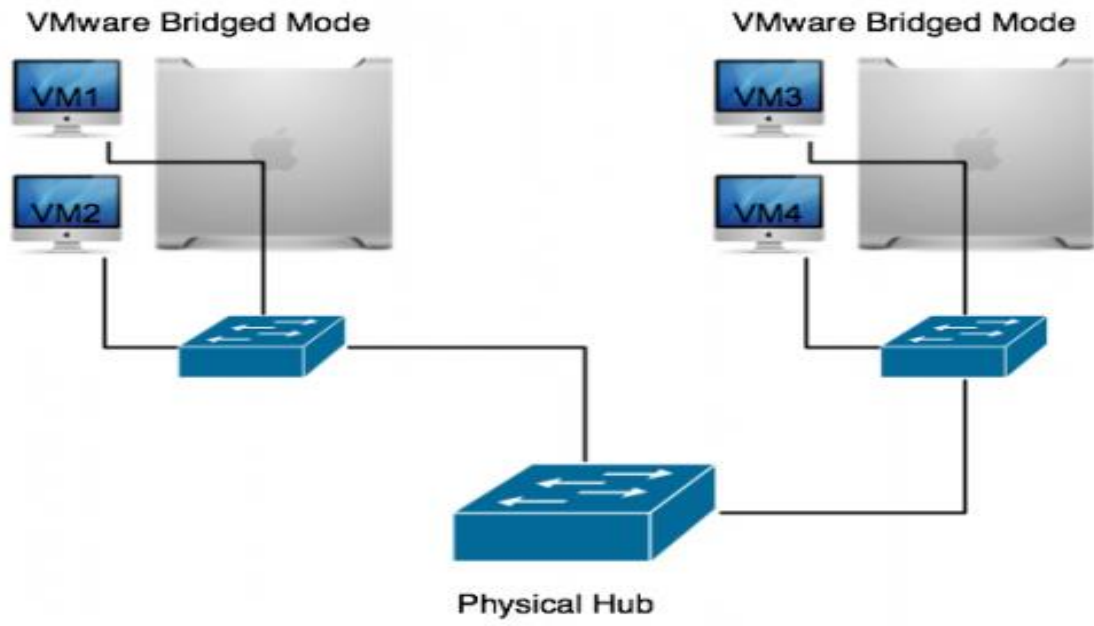
Other issue that you will need to address include but are not limited to:

- 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)



In order to do this we need two laptops and four virtual machines. Two on each, I am setting up VM3 and VM4. I need the following software to implement these. I need an [Ubuntu Server](#) and a [Ubuntu desktop](#), I will be running these as Virtual Machines using [VMware](#).

A brief explanation on what will be installed;

Operating systems - Ubuntu Server is an open source server, it will be used to run the following packages below. Ubuntu desktop is also an open source operating system.

eMail Server – Postfix is a free and open-source mail transfer agent (MTA) that routes and delivers electronic mail. It is intended as a fast, easier-to-administer, and secure alternative to the widely-used Sendmail MTA. http://en.wikipedia.org/wiki/Postfix_%28software%29

Name Server 2 – Bind9 - The Domain Name System, or DNS, is one of the Internet's fundamental building blocks. It is the global, hierarchical, and distributed host information database that's responsible for translating names into addresses and vice versa, routing mail to its proper destination, and many other services. <http://www.bind9.net/>

DHCP Server - DHCP stands for Dynamic Host Control Protocol and with this protocol a new host on the network can issue a request for IP information. The DHCP server will then provide the host with all of the necessary information it needs to communicate on the network, such as its IP address and netmask and the gateway and DNS servers to use. <http://timhorgan.wordpress.com/2011/03/21/dhcp-server/>

SSH Server - ServerOpenSSH 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 rcp, 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. <http://timhorgan.wordpress.com/2011/03/21/dhcp-server/>

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

Installation

Before we start we type the command:

```
#apt-get install updates
```

This will update the server with the latest configurations.

```
Hit http://security.ubuntu.com maverick-security/universe i386 Packages
Ign http://us.archive.ubuntu.com/ubuntu/ maverick-updates/universe Translation-e
n_US
Hit http://security.ubuntu.com maverick-security/multiverse i386 Packages
Hit http://us.archive.ubuntu.com maverick Release
Hit http://us.archive.ubuntu.com maverick-updates Release
Hit http://us.archive.ubuntu.com maverick/main Sources
Hit http://us.archive.ubuntu.com maverick/restricted Sources
Hit http://us.archive.ubuntu.com maverick/universe Sources
Hit http://us.archive.ubuntu.com maverick/multiverse Sources
Hit http://us.archive.ubuntu.com maverick/main i386 Packages
Hit http://us.archive.ubuntu.com maverick/restricted i386 Packages
Hit http://us.archive.ubuntu.com maverick/universe i386 Packages
Hit http://us.archive.ubuntu.com maverick/multiverse i386 Packages
Hit http://us.archive.ubuntu.com maverick-updates/main Sources
Hit http://us.archive.ubuntu.com maverick-updates/restricted Sources
Hit http://us.archive.ubuntu.com maverick-updates/universe Sources
Hit http://us.archive.ubuntu.com maverick-updates/multiverse Sources
Hit http://us.archive.ubuntu.com maverick-updates/main i386 Packages
Hit http://us.archive.ubuntu.com maverick-updates/restricted i386 Packages
Hit http://us.archive.ubuntu.com maverick-updates/universe i386 Packages
Hit http://us.archive.ubuntu.com maverick-updates/multiverse i386 Packages
Reading package lists... Done
root@ubuntu:~#
root@ubuntu:~# _
```

Domain Name Server – Bind9

<https://help.ubuntu.com/8.04/serverguide/C/dns-configuration.html>

Install bind 9:

```
#sudo apt-get install bind9
```

```
root@ubuntu:~# apt-get install bind9_
```

To add a DNS zone to BIND9, turning BIND9 into a Primary Master server, the first step is to edit `/etc/bind/named.conf.local`:

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

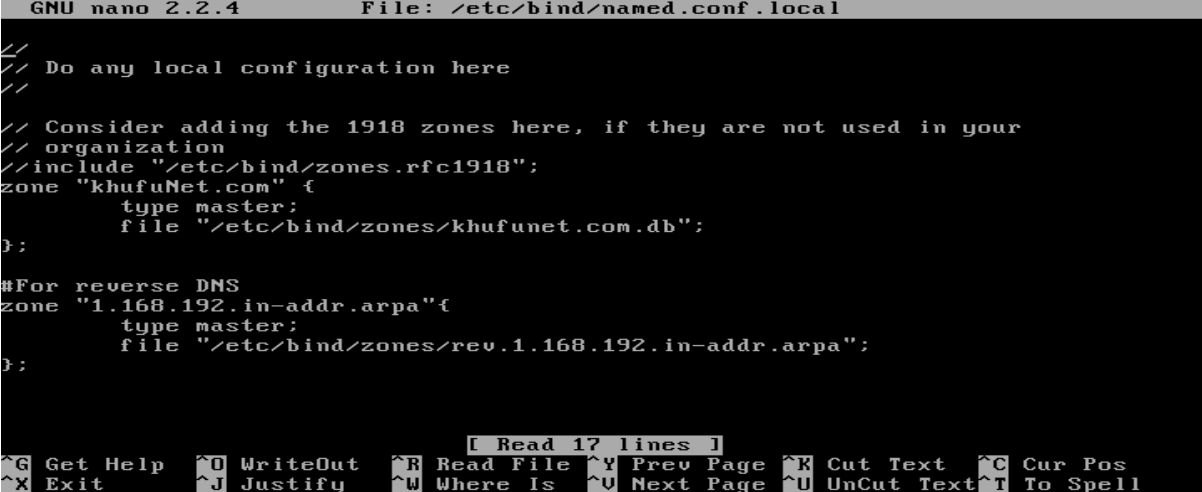
Now enter the text below:

```

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

#For Reverse DNS
zone "1.168.192.in-addr.arpa" {
    type master;
    file "/etc/bind/zones/rev.1.168.192.in-addr.arpa";
};

```



```

GNU nano 2.2.4      File: /etc/bind/named.conf.local

//
// Do any local configuration here
//
// Consider adding the 1918 zones here, if they are not used in your
// organization
//include "/etc/bind/zones.rfc1918";
zone "khufunet.com" {
    type master;
    file "/etc/bind/zones/khufunet.com.db";
};

#For reverse DNS
zone "1.168.192.in-addr.arpa" {
    type master;
    file "/etc/bind/zones/rev.1.168.192.in-addr.arpa";
};

[ Read 17 lines ]
^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^U Next Page ^U UnCut Text ^T To Spell

```

Then we edit the following:

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

```

forwarders {
    192.168.1.7;
};

```

Now we change the zone definition file with the address and machine names as show in screenshot:

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

```
GNU nano 2.2.4      File: /etc/bind/db.khufunet.com      Modified
;
; BIND data file for local loopback interface
;
$TTL      604800
@         IN      SOA      ns2.khufunet.com. root.khufunet.com (
                        2      ; Serial
                        604800 ; Refresh
                        86400  ; Retry
                        2419200 ; Expire
                        604800 ) ; Negative Cache TTL
;
;
ns2        IN      NS2      ns2.khufunet.com
ns2        IN      A        192.168.1.7
www        IN      A        192.168.1.3
mail       IN      A        192.168.1.13
;
;

^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Text ^T To Spell
```

Make a zones directory:

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

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

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

Restart bind:

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

Edit the resolv.conf

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

Nameserver 192.168.1.3

To test our new domain and DNS Entries:

```
#Nslookup
```

Ns2

Then to restart bind9 you type

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

<https://help.ubuntu.com/8.04/serverguide/C/dns-configuration.html>

DHCP Server

We start by installing DHCP:

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

After installation the DHCP server will give an error and will not start, this is normal as we need to first configure the server settings.

```
Setting up dhcp3-server (3.1.3-2ubuntu6.2) ...  
Generating /etc/default/dhcp3-server...  
* Starting DHCP server dhcpd3  
* check syslog for diagnostics.  
[fail]  
invoke-rc.d: initscript dhcp3-server, action "start" failed.  
root@ubuntu:~#
```

Note: Set your server and desktop VMs to "Bridged Mode"

Next 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 192.168.1.200  
netmask 255.255.255.0  
gateway 192.168.1.1
```

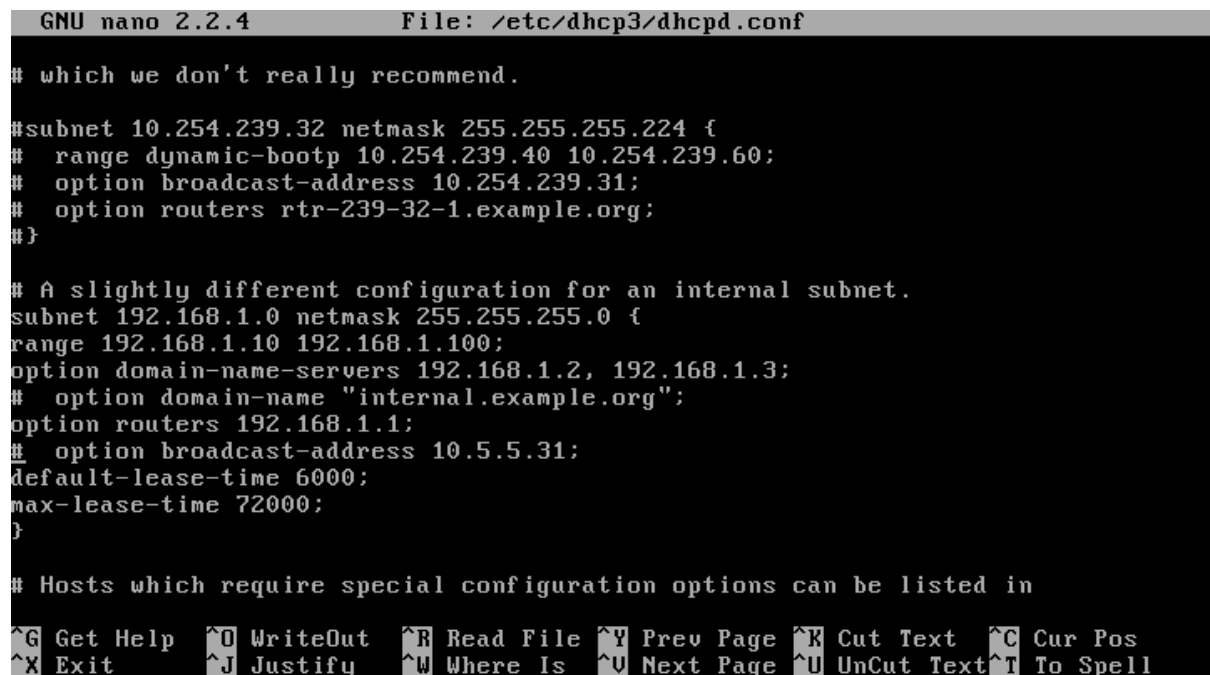
Next, edit the DHCP configuration file /etc/dhcp3/dhcpd.conf. First make a backup copy:

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

Next we will 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. Here, for instance, is what a subnet declaration would look like for

a network segment addressed 192.168.1.0, with a subnet mask of 255.255.255.0, with the DHCP server configured to use an address range from 192.168.1.1 to 192.168.1.100:

```
subnet 192.168.1.0 netmask 255.255.255.0 {  
range 192.168.1.10 192.168.1.100;  
option routers 192.168.1.1;  
option domain-name-servers 192.168.1.2, 192.168.1.3;  
default-lease-time 6000;  
max-lease-time 72000;  
}
```



```
GNU nano 2.2.4      File: /etc/dhcp3/dhcpd.conf  
  
# which we don't really recommend.  
  
#subnet 10.254.239.32 netmask 255.255.255.224 {  
#  range dynamic-bootp 10.254.239.40 10.254.239.60;  
#  option broadcast-address 10.254.239.31;  
#  option routers rtr-239-32-1.example.org;  
#}  
  
# A slightly different configuration for an internal subnet.  
subnet 192.168.1.0 netmask 255.255.255.0 {  
range 192.168.1.10 192.168.1.100;  
option domain-name-servers 192.168.1.2, 192.168.1.3;  
#  option domain-name "internal.example.org";  
option routers 192.168.1.1;  
#  option broadcast-address 10.5.5.31;  
default-lease-time 6000;  
max-lease-time 72000;  
}  
  
# Hosts which require special configuration options can be listed in  
  
^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text  ^C Cur Pos  
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Text ^T To Spell
```

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
```

Now add in "eth0" to the file:

```
INTERFACES="eth0"
```

```
GNU nano 2.2.4      File: /etc/default/dhcp3-server

# Defaults for dhcp initscript
# sourced by /etc/init.d/dhcp
# installed at /etc/default/dhcp3-server by the maintainer scripts

#
# This is a POSIX shell fragment

# On what interfaces should the DHCP server (dhcpd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACES="eth0"
```

Save and reboot the server!

Once it starts back up, type this command to start dhcp:

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

```
root@ubuntu:~# /etc/init.d/dhcp3-server start
* Starting DHCP server dhcpd3                      [ OK ]
root@ubuntu:~#
root@ubuntu:~# _
```

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

FTP Server

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
```

By default **vsftpd** is *not* configured to only allow anonymous download. If you wish to enable anonymous download edit `/etc/vsftpd.conf` changing, there are a number of other files to be changed also:

```
#nano /etc/vsftpd.conf
```

```
anonymous_enable=Yes
write_enable=YES
anon_upload_enable=YES
chroot_list_enable=Yes
```

```
# Allow anonymous FTP? (Disabled by default)
anonymous_enable=YES
#
# Uncomment this to allow local users to log in.
local_enable=YES
#
# Uncomment this to enable any form of FTP write command.
write_enable=YES
#
```

After making the change restart **vsftpd**:

```
#sudo restart vsftpd
```

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

```
ssl_enable=Yes
```

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

SSH Server

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

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

```
root@ubuntu:~# apt-get install openssh-server [ OK ]
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  openssh-client
Suggested packages:
  ssh-askpass libpam-ssh keychain openssh-blacklist openssh-blacklist-extra
  rssh molly-guard
The following NEW packages will be installed:
  openssh-server
The following packages will be upgraded:
  openssh-client
1 upgraded, 1 newly installed, 0 to remove and 80 not upgraded.
Need to get 1,142kB of archives.
After this operation, 819kB of additional disk space will be used.
Do you want to continue [Y/n]? y
Get:1 http://us.archive.ubuntu.com/ubuntu/ maverick-updates/main openssh-client
i386 1:5.5p1-4ubuntu5 [840kB]
Get:2 http://us.archive.ubuntu.com/ubuntu/ maverick-updates/main openssh-server
i386 1:5.5p1-4ubuntu5 [302kB]
Fetched 1,142kB in 10s (110kB/s)
Preconfiguring packages ...
```

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

eMail Server

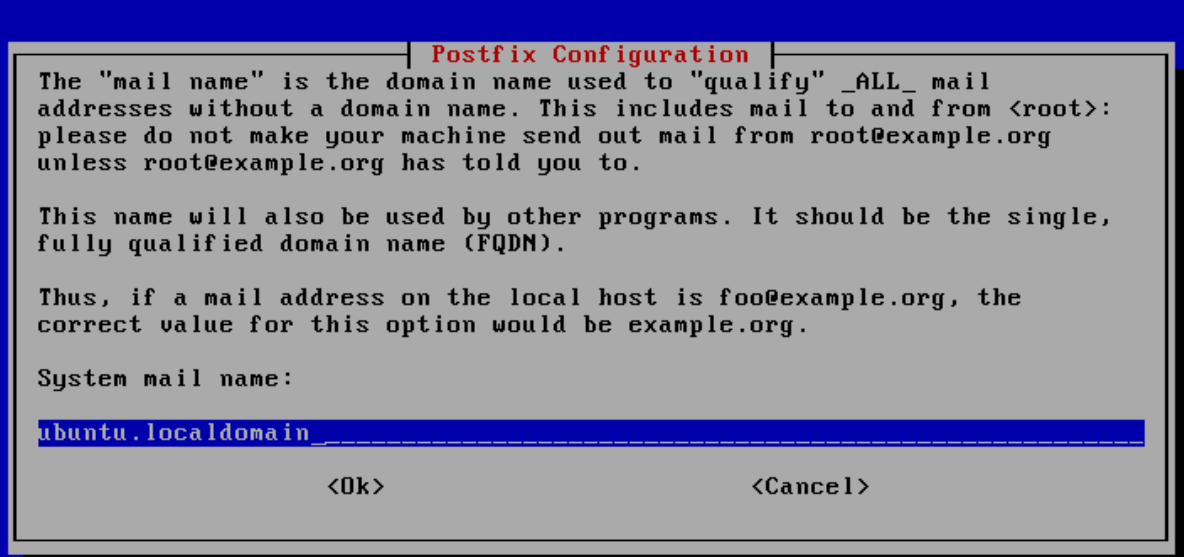
To install Postfix you must type the command

```
#sudo aptitude install postfix
```

```
root@ubuntu:~# apt-get install postfix
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  ssl-cert
Suggested packages:
  procmail postfix-mysql postfix-pgsql postfix-ldap postfix-p
  resolvconf postfix-cdb mail-reader openssl-blacklist
The following NEW packages will be installed:
  postfix ssl-cert
0 upgraded, 2 newly installed, 0 to remove and 72 not upgrade
Need to get 1,319kB of archives.
After this operation, 3,326kB of additional disk space will b
Do you want to continue [Y/n]? y
Get:1 http://us.archive.ubuntu.com/ubuntu/ maverick/main ssl-
.5kB|
Get:2 http://us.archive.ubuntu.com/ubuntu/ maverick-updates/m
7.1-1ubuntu0.1 [1,304kB]
89% [2 postfix 1,164kB/1,304kB 89%]
```

This command will bring you back to configuration if you accidentally exit.

```
#sudo dpkg-reconfigure postfix
```



The "mail name" is the domain name used to "qualify" _ALL_ mail addresses without a domain name. This includes mail to and from <root>: please do not make your machine send out mail from root@example.org unless root@example.org has told you to.

This name will also be used by other programs. It should be the single, fully qualified domain name (FQDN).

Thus, if a mail address on the local host is foo@example.org, the correct value for this option would be example.org.

System mail name:

ubuntu.localdomain

<Ok> <Cancel>

In the configuration you will be prompted the following:

General type of mail configuration: **Internet Site**

System mail name: **ns2.khufunet.com**

Root and postmaster mail recipient: **<eric>**

Other destinations for mail: **ns2.khufunet.com, khufunet.com**

Force synchronous updates on mail queue?: **No**

Local networks: **127.0.0.0/8**

Yes doesn't appear to be requested in current config

Mailbox size limit (bytes): **0**

Local address extension character: **+**

Internet protocols to use: **all**

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

