Thin Client: New User Guide

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Thin Client: New User Guide

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1.How to turn inexpensive legacy computers into fast terminals using the power of your main computer, you will need : A fast computer to act as Server, A client computer (old and unwanted). Linux compatible network cards. A connection between computers. 2.How to centralise system administaration by useing NFS, ie placing the entire file system of a faster client on the server.

6.X−terminal

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1.Introduction

- Linux allows any reasonably new computer to be used as a server to a thin client, or many thin clients, these thin clients can be inexpensive legacy computers. For a console terminal you need a 386 with 4−8mb of ram, or for an X−Terminal a 486/66 with 8−16mb ram.
- One Option is without a hard drive, it keeps the noise down and simplifies administration as you only have one system to maintain.
- If you have legacy apps, you can have them on a hard drive with it's legacy Operating System
- This howto is aimed at those new to Unix/Linux, it will cover the essential areas you need to be aware of and point you to other documentation in that area you need to be familiar with.
- You will probably use this as an aid to the http://www.slug.org.au/etherboot/ documentation, I include some more examples of config files, and leave many of the other features of etherboot as an exercise for the reader
- If your client is sufficiently powerful only the file system need be shared, applications can run on the client system. (say a 233 32mb ram). Install an application on the server and all clients have access

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2.Hardware and Documentation

2.1 Hardware

When you start, you will need at least this

- a computer to act as Server,
- a client computer, I unplugged the power to the hard disk and disabled the drive in the bios to emulate a diskless machine
- compatible network cards
- connection between computers, I used twisted pair ethernet with RJ45 terminators
    - For two computers a *cross−over cable* is sufficient, and saves another power point, the first computer shop I went to gave me blank stares, idiots !
    - For two or more clients, you need a hub, a kit with a 10 mb 4 port hub ,2 cards sells for under A$150, you can probably do better, I've had some success with $5 second hand cards, 3m

cables for $6, a new hub for $40, a found monitor and a $60 pentium 75

2.2 Documentation

You may like to familiarise yourself with the linux documentation, specifically you can read (skim) for an overview the following :

- /usr/doc/HOWTO/mini/Diskless − a similar howto tackling this problem
- Networking Overview HOWTO − Networking capabilities of the Linux
- Ethernet HOWTO − Information on Ethernet hardware compatibility
- NET−3 HOWTO − How to configure TCP/IP networking under Linux.

Also you probably have in the /usr/doc/LDP/ directory

- The System Administrators' Guide
- The Network Administrators' Guide
- Linux Installation and Getting Started

The obligitory link

- http://www.magma.ca/~bklimas help for new linux users.

One last thing

- my network server is snoball , my client is elite and my (local)domain is gundog.net Replace with your computers names where applicable

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3.Server setup

The server needs to be setup in readiness for the client in a number of ways

3.1 Check your network services on your server

run the command `/sbin/ifconfig` if your output is similar to below then your loopback and ethernet card are correctly configured.

```
[cassie@snoball cassie]$ /sbin/ifconfig
```

```
lo        Link encap:Local Loopback
     inet addr:127.0.0.1  Bcast:127.255.255.255  Mask:255.0.0.0
     UP BROADCAST LOOPBACK RUNNING  MTU:3584  Metric:1
     RX packets:854 errors:0 dropped:0 overruns:0 frame:0
     TX packets:854 errors:0 dropped:0 overruns:0 carrier:0
     collisions:0
eth0      Link encap:Ethernet  HWaddr 00:AA:00:BB:BD:09
     inet addr:192.168.53.1  Bcast:192.168.53.255  Mask:255.255.255.0
     UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
     RX packets:190369 errors:0 dropped:0 overruns:0 frame:0
     TX packets:249267 errors:0 dropped:0 overruns:0 carrier:1
     collisions:4793           Interrupt:5 Base address:0x320
```

If not ...

- loopback, if this isn't here you need to activate it at start up,
- ethernet card, is it being detected,is the driver a module
- you can set these in linuxconf or netcfg

3.2 Setting up a dhcpd daemon

Here the server gives out IP numbers to requests by clients

- is DHCPD installed, maybe (as root) just run ntsysv and have it start at boot time
- this `/etc/dhcpd.conf` file assigns static IP numbers if you have a matching MAC address, A MAC address is a unique 'number' given to the NIC. The start of the 'number' is based on the manufacturer, if you don't have a sticker on the card, attempt to load the rom image from eprom or floppy and see what it reports. (see client setup)

```
#/etc/dhcpd.conf
subnet 192.168.35.0 netmask 255.255.255.0 {
    option domain-name "gundog.net";
    range dynamic-bootp 192.168.35.128 192.168.35.255;
    default-lease-time 21600;
    max-lease-time 43200;
    }

host 286 {
        filename "/tftpboot/kermit.nb";
        hardware ethernet 00:80:c8:22:ae:de;
        fixed-address 192.168.35.70;
        }

host elite {
    filename "/tftpboot/vmlinuz.xterm";
    hardware ethernet 00:00:79:80:34:c9;
    fixed-address 192.168.35.23;
        option host-name "elite";
```

- the `/etc/hosts` file resolves IP numbers into host names

```
#etc/hosts
127.0.0.1       localhost    localhost.localdomain
192.168.53.1    snoball      snoball.gundog.net
192.168.53.23   elite        elite.gundog.net
```

3.3 Tftpd setup

trivial ftp − after you have your IP number your client requests a kernal, this is delivered over ethernet.

- Install tftpd, make sure it's active in `/etc/inetd.conf`, typical line

```
tftp dgram udp wait root /usr/sbin/tcpd in.tftpd -s /tftpboot
```

restart inetd, kill −HUP "process id of inetd"

3.4 Kernel image

You must compile a kernel for the Client that includes NFS support and the NIC driver for that client compiled in (not modules). Answer yes to *Root file system on NFS?* and *BOOTP support?*

After building the kernel, run mknbi−linux from the Etherboot distribution on it.(the mknbi program in the netboot/linux directory) Install this tagged image as /tftpdir/"vmlinuz.xterm".

see etherboot−4.2/doc/html/README−3.html

should i put a copy of mine somewhere for download RH6.0 ne2000 NIC

3.5 Security

It's easiest to allow anybody and anything to run services and process on your computer, but one day you will be sorry. You restrict these by your /etc/hosts.deny and specifically restore rights by /etc/hosts.allow, indicative examples :

```
#hosts.deny
# all except those in hosts.allow
ALL:ALL


#hosts.allow
#only hosts within my domain and my host at home.
ALL:LOCAL, 192.168.53.       #<-- note:no space after :
```

more security – look for more information in the ldp–howto's and if your using etherboot, in it's security howto.

4.Client setup

Network loader

A small program that runs as a BIOS extension, can be loaded from a floppy, or you can burn an eprom chip and insert it on your network card for a totally diskless client. It handles the DHCPD query and TFTP loading and then transfers control to the loaded image. It uses TCP/IP protocols.

There are two free implementations of TCP/IP net loaders: Etherboot and Netboot: Etherboot uses built–in drivers while Netboot uses Packet drivers.

- see etherboot–4.2/doc/html/README–2.html,
- I compiled the option to ask local or Network and default to local after 5 seconds
- making a boot rom floppy, floppyload.bin was tricky to find, I copied it into the directory of compiled rom images

```
cat floppyload.bin ne2000.lzrom > /dev/fd0
```

5.Network files system

The Client requests to mount `/tftpboot/`*<IP address of client>* as its `/` by NFS from server. You must export this from the server,(maybe symlink to /tftpboot/`client` to be safe.)

NFS is a big topic there is a HOWTO and two mini Howto's.

first you need to create a copy of your current system under /tftpboot ken has written two scripts that do all your work, I called them makefirst and makecopy. my first client takes 20–30mb and the copy less. I used du –h to look for large unnecesary files.

see etherboot–4.2/doc/html/diskless–5.html

the following seem to me to be the critical files here

5.1 server specific

```
#/etc/exports
/tftpboot/elite             elite(rw,no_root_squash)
/tftpboot/elite             gordon(rw,no_root_squash)
/usr                        *.gundog.net(ro)
/home                       *.gundog.net(rw)
/mnt/cdrom                  (ro)

run exportfs -a  to reread the exports file after
changes /usr/sbin/exportfs --help


#/etc/sysconfig/network
NETWORKING=yes
FORWARD_IPV4="no"
HOSTNAME="snoball"         <-----------
GATEWAYDEV=""
GATEWAY=""


#/etc/sysconfig/network-scripts/ifcfg-eth0
IPADDR="192.168.53.1"            <-----------
BOOTPROTO=none
```

5.2 client specific

```
#tftpboot/elite/etc/fstab
snoball:/tftpboot/elite    /               nfs rw  1 1
none                    /proc proc          defaults   0 0
snoball:/usr            /usr                nfs     ro  1 1
snoball:/home           /home               nfs     rw  1 1


#tftpboot/elite/etc/sysconfig/network
NETWORKING=yes
FORWARD_IPV4=nomore
HOSTNAME=elite
GATEWAYDEV=
GATEWAY="192.168.53.1"       <-----------


#/tftpboot/elite/etc/sysconfig/network-scripts/ifcfg-eth0
DEVICE=eth0
USERCTL=yes
ONBOOT=yes
BOOTPROTO=none
BROADCAST=192.168.53.255
NETWORK=192.168.53.0
NETMASK=255.255.255.0
IPADDR=192.168.53.23         <-----------
```

#odd fiddles #itemize> #item>fast... #item>cp /usr/bin/xargs /tftpboot/client/bin/xargs #/itemize>

6.X−terminal

With no further changes your client should boot on the CLIENT pc, it just happens to be sharing it's files via NFS

At this point you have a console terminal. you need to make just a few more changes to run X

- Configuring X

  As root on client run Xconfigurator and mouseconfig,

  If this fails use XF86Setup check your RPMS dir on your CD (eg.ls *Setup*)

- X Font Server

```
#chech how xfs starts on server /etc/rc.d/init.d/xfs
  start)
    echo −n "Starting X Font Server: "
    rm −fr /tmp/.font−unix
    daemon −−check xfs su xfs −c xfs −s /bin/sh
    touch /var/lock/subsys/xfs
    echo
    ;;

#edit XF86Config for all machines
    FontPath  "tcp/snoball:7100"
```

- Console login

  You are now set up for a console login to the client PC. You are using the client memory and processor, this is adequate for console programs and there and many or great merit, program in python, email with pine or browse with lynx.

  You may still start X from here, make the server changes in the next section, at the prompt type `X −query snoball` and you will get the login box to the server

- Graphical login

  Server set up

```
1. Make sure the client is matched by a clause in /etc/X11/xdm/Xaccess
*   CHOOSER BROADCAST   #any indirect host can get a chooser
```

```
2. Comment out the :0 in /etc/X11/xdm/Xservers
#:0 local /usr/X11R6/bin/X

3. Then make sure that xdm is run from the init scripts.
#etc/inittab
id:5:initdefault:

and
# Run xdm in runlevel 5
# xdm is now a separate service
x:5:respawn:/etc/X11/prefdm -nodaemon
xdm:5:respawn:/usr/X11R6/bin/xdm -nodaemon
```

On the client

Get the slow PC's to run on the server, Fast PC's (eg 166mhz 32mb ram)can run ok on their own CPU and memory

the part maarked WARNING dosn't actually work as yet, but I'm close to getting the syntax correct, use the two stage method via the console login in the mean time.

```
#/tftpboot/elite/etc/inittab

id:5:initdefault:                                    #WARNING
x:5:respawn:/usr/X11R6/bin/Xwrapper -query snoball   #WARNING

OR to run on client ??

id:3:initdefault:                                    #runlevel 3 ie console
x:5:respawn:/etc/X11/prefdm -nodaemon
```

7.Acknowledgments & further exercises

Markus Gutschke and Ken Yap the authors of the Etherboot program.

Extend your system with the following programs

- squid – cache your web browsing for others on your network
- junkbuster – banish web banner adds
- mailman – mailinglist ;setup via e–mail or web
- imp – web based email (with a java enabled browser)
- python – for some Java and C is just too hard
- sgmltools – knock out multiple versions of your docs
- suggestions ?

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