

Linux PXE Server

Synopsis

In my home lab I found myself burning DVD's every time I wanted to test a new Linux OS or check out an ISO based tool. I knew there had to be a better, more efficient way to do my testing. My experience led me to The Preboot Execution Environment (PXE). PXE is an industry standard that allows a networked computer to load an operating system remotely. So I grabbed a Raspberry Pi, loaded it with the latest Rasbian image and built a PXE server...

Basic PXE Setup

First thing, update package lists. Then install a TFTP server, DHCP Server, NFS support, and the PXE booting files. (Since my router is providing DHCP I am using a proxy dhcp. dnsmasq comes with many tools, two of which are tftp and proxy dhcp.)

```
sudo apt-get update
sudo apt-get install dnsmasq nfs-kernel-server syslinux-common
```

Lets make the root directory for our tftp server. I'll put mine at / for this example

```
mkdir /tftpboot
```

The next step is to copy all the PXE boot files to the / of the tftp server(/tftpboot) and create the necessary files and directories .

```
cp -r /usr/lib/syslinux/* /tftpboot/
mkdir /tftpboot/pxelinux.cfg
sudo nano /tftpboot/pxelinux.cfg/default
```

Add following:

```
DEFAULT menu.c32
PROMPT 0

MENU TITLE PXE Boot

LABEL Test
MENU LABEL Test
```

Now, edit the dnsmasq settings. by adding the lines below to the end of the dnsmasq.conf file(this will enable the tftpserver and proxy DHCP required to assign PXE clients IP address). After editing the dnsmasq.cof file restart dnsmasq.

```
sudo nano /etc/dnsmasq.conf
```

Add/Edit the following info to the dnsmasq.conf

```
interface=eth0
dhcp-range=192.168.0.0,proxy
dhcp-boot=pxelinux.0
pxe-service=x86PC,"Booting from Network...",pxelinux
enable-tftp
tftp-root=/tftpboot
dhcp-boot=pxelinux.0,servername,192.168.0.50
```

Restart dnsmasq

```
sudo service dnsmasq restart
```

Intermediate Test

Now is a good time to test our configuration. From a remote computer, attempt to PXE boot. You should successfully receive an IP address and go to a boot menu.

Configure NFS Boot

Next we will set up th NFS support. Here we will create a few directories for organization and mounting purposes.

```
mkdir /tftpboot/iso ##Store distribution iso's here
mkdir /tftpboot/nfs ##Directory where we will create distribution mount
folders.
mkdir /tftpboot/nfs/ubuntu ##Folder where we will mount the ubuntu iso
```

Edit the /etc/exports file

```
sudo nano /etc/exports
```

Add following line:

```
/tftpboot/nfs/ubuntu/ *(ro, sync, no_subtree_check)
```

Mount the ISO

```
mount -o loop iso/ubuntu-13.04.iso nfs/ubuntu/
```

NOTE: In the future, if you add any additional entries to the /etc/exports file, nfs-kernel-server must be restarted.

Now enable rpcbind and restart nfs.

```
update-rc.d rpcbind enable && update-rc.d nfs-common enable
service rpcbind start
```

```
service nfs-kernel-server restart
```

Edit the default config file

```
sudo nano /tftpboot/pxelinux.cfg/default
```

Add the following:

```
DEFAULT menu.c32
PROMPT 0

MENU TITLE PXE Boot

LABEL Test
MENU LABEL Test

LABEL Ubuntu
MENU LABEL ^Ubuntu 13.04
KERNEL nfs/ubuntu/casper/vmlinuz
APPEND initrd=nfs/ubuntu/casper/initrd.lz boot=casper netboot=nfs
nfsroot=192.168.0.50:/tftpboot/nfs/ubuntu
```

Note: For some distributions I had to add the following to the end of the APPEND line:

```
ip=HostIP:ServerIP:RouterIP:Subnet:::none rw
```

```
Example: ip=192.168.0.10:192.168.0.50:192.168.0.1:255.255.255.0:::none rw
```

Install Windows over PXE

In this tutorial I only covered how to PXE Ubuntu. If you are interested in installing Windows using this PXE Server, head over to my [Install Windows over PXE Tutorial](#)

Diskless Booting #2

If you have made it this far, congrats you are well on your way to diskless booting. This tutorial only covered booting to livecd's and installation media. If you are interested in diskless booting, then you may want to check out my [iSCSI PXE boot tutorial](#).

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