



NEXTHOP

4/30/15 BUILD-IT-NIGHT: PXE

Overview

PXE stands for Preboot eXecution Environment. It is used to boot an operating system over the network. It can be used with Linux and Windows, Apple decided to unsurprisingly create their own proprietary method. We will be focusing on booting a Linux OS from a Linux server as that is the simplest. PXE is most often used in order to image computers without having to go to every single computer and boot from a DVD/flash drive.

Before you Begin

- Team up into groups of two - Make some new friends!
- Grab a bench and patch both computers onto the same VLAN
- Spin up a CentOS 7 VM
- Download a CentOS 7 ISO (or any other Linux OS you want to PXE boot) from mirrors.rit.edu. Do NOT use a Live CD, must be full ISO.

Requirements

- PXE boot a Linux ISO!

Instructions - See Appendix for help

1. Set your IP address
 - a. 10.151.____.____
2. For the purposes of this lab we are going to disable the firewall to eliminate problems. (If you have time at the end try enabling it and allowing the proper ports.)
 - a. `systemctl disable firewalld / systemctl stop firewalld`
 - b. Disable SELinux in `/etc/sysconfig/selinux` or in `/etc/selinux/config`
3. Install the required packages

- a. dhcp, tftp, tftp-server, syslinux, vsftpd
4. Configure the DHCP Server
 - a. See Appendix for config as this is not a DHCP lab
5. Enable the TFTP server in /etc/xinetd.d/tftp
6. Copy the following files from /usr/share/syslinux to /var/lib/tftpboot - These files will be used to boot the OS on the remote client
 - a. chain.c32, mboot.c32, memdisk, menu.c32, pxelinux.0
7. Make the folders "netboot" and "pxelinux.cfg" inside the tftpboot folder.
8. Mount the ISO you downloaded earlier in the VM and then mount it to /var/ftp/pub
 - a. `mount /dev/sr0 /var/ftp/pub`
9. Copy files below from the CD (/var/ftp/pub) to /var/lib/tftpboot/netboot
 - a. vmlinuz & initrd.img
 - i. File names may be slightly different. Might be in a folder called "islinux" or "pxe"
10. Create an encrypted password using the following command and copy the resulting hash (123456 is my password)
 - a. `openssl passwd -1 "123456"`
11. Create a kickstart file and use the template configuration from the Appendix
 - a. `vim /var/lib/tftpboot/netboot/kickstart.cfg`
12. Create a PXE menu - Template in Appendix
 - a. `vim /var/lib/tftpboot/pxelinux.cfg/default`
13. Restart the vsftpd & xinetd (for TFTP) services
14. Create a new Virtual machine on your machine or another attached to the same VLAN and try to PXE Boot! Make sure you change the boot order in VirtualBox or VMWare to network boot first!

Appendix

Description of required packages

DHCP - Server to hand out IP addresses to clients

TFTP - Server to transfer files

Syslinux - Used to boot Linux operating systems

VSFTPD - A FTP Server

Configuring the DHCP Server

Config for /etc/dhcp/dhcpd.conf

Change the "XX" to your IP addresses

Remember to start the service when done

```
ddns-update-style interim;
ignore client-updates;
authoritative;
allow booting;
allow bootp;
allow unknown-clients;

subnet 10.151.XX.0 netmask 255.255.255.0 {
    range 10.151.XX.50 10.151.XX.99;
    option routers 10.151.XX.254;
    default-lease-time 600;
    max-lease-time 7200;

    # PXE SERVER IP (CentOS box)
    next-server 10.151.XX.XX;
    filename "pxelinux.0";
}
```

Configuring the TFTP Server

/etc/xinetd.d/tftp should look like the following

```
service tftp
{
    socket_type          = dgram
    protocol             = udp
    wait                = yes
    user                 = root
    server               = /usr/sbin/in.tftpd
    server_args          = -s /var/lib/tftpboot
```

```

        disable                = no
        per_source              = 11
        cps                     = 100 2
        flags                    = IPv4
    }

```

Kickstart Config

```

firewall --disabled

# Install OS instead of upgrade
install

# Use NFS installation media
url --url="ftp://10.151.XX.XX/pub/"

# Root password (hash from previous step)
rootpw --iscrypted $1$3YEIv0rH$6dLl3RFggt4ZNvS3HuZUL/

# System authorization information
auth useshadow passalgo=sha512

# Use graphical install
graphical

firstboot disable

keyboard us

lang en_US

selinux disabled

logging level=info

timezone Europe/Amsterdam

# System bootloader configuration
bootloader location=mbr

clearpart --all --initlabel

part swap --asprimary --fstype="swap" --size=1024

part /boot --fstype xfs --size=200

part pv.01 --size=1 --grow

volgroup rootvg01 pv.01

logvol / --fstype xfs --name=lv01 --vgname=rootvg01 --size=1 --grow

%packages
@core
wget
net-tools
%end

```

```
%post
```

```
%end
```

PXE Menu Config

Pay attention to vmlinuz and initrd specific names/paths

```
default menu.c32
```

```
prompt 0
```

```
timeout 30
```

```
MENU TITLE NextHop PXE Menu
```

```
LABEL centos7_x64
```

```
MENU LABEL CentOS 7 X64
```

```
KERNEL /netboot/vmlinuz
```

```
APPEND initrd=/netboot/initrd.img inst.repo=ftp://10.151.XX.XX/pub  
ks=/netboot/kickstart.cfg
```