PXE实践

pxe部署必要软件：

syslinux（用于提供引导中所必备文件）
tftp（用于提供存放vmlinuz，initrd，syslinux.0等引导类文件）
dhcp（用于自动获取IP包括指明去哪个主机获取syslinux.0文件）
最后还需要一个web或者ftp服务，已提供系统安装中所使用的yum仓库。
另外还需要网卡中内嵌了支持pxe的ROM芯片，现在这一条基本不用担心，都支持。
现在可以找一台虚拟机安装上所需软件。

```
  Verifying  : 12:dhcp-4.2.5-42.el7.centos.x86_64                                                    8/9
  Verifying  : syslinux-4.05-12.el7.x86_64                                                           9/9

Installed:
  dhcp.x86_64 12:4.2.5-42.el7.centos         httpd.x86_64 0:2.4.6-40.el7.centos         syslinux.x86_64 0:4.05-12.el7         tftp.x86_64 0:5.2-12.el7

Dependency Installed:
```

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1.安装上述软件，这里我准备使用的是web服务。并且一台主机直接提供所有服务。
然后我们先配置dhcp

```
[root@localhost ~]# cp /usr/share/doc/dhcp-4.2.5/dhcpd.conf.example  /etc/dhcp/dhcpd.conf
cp: overwrite '/etc/dhcp/dhcpd.conf'? y
[root@localhost ~]#
```

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先将DHCP的实例配置文件覆盖配置文件，安装过后配置文件本身是空的！
然后我们在做下修改

```
subnet 172.16.0.0 netmask 255.255.0.0 {
       range 172.16.10.10 172.16.10.20;
       filename "pxelinux.0";
        server-name "172.16.10.9";

}
```

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这里我们只需要自己添加这样一段就够了，毕竟我们不是真的需要dhcp服务，只要分配出去的ip能和我们提供tftp，web服务通信即可，其他的我们都不用管。
接着我们进入tftp的根目录，这里我发现上面安装的时候装错了，装成tftp的客户端了，我们需要的是tftp-server，重新安装一个tftp-server。

```
[root@localhost tftpboot]# pwd
/var/lib/tftpboot
[root@localhost tftpboot]#
```

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2.进入此目录接着复制需要的文件至此。

```
[root@localhost tftpboot]# cp /usr/share/syslinux/pxelinux.0 ./
[root@localhost tftpboot]# cp /media/images/
efiboot.img  pxeboot/     TRANS.TBL
[root@localhost tftpboot]# cp /media/images/pxeboot/
initrd.img   TRANS.TBL    upgrade.img  vmlinuz
[root@localhost tftpboot]# cp /media/images/pxeboot/{initrd.img,vmlinuz} ./
[root@localhost tftpboot]# ls
initrd.img  pxelinux.0  vmlinuz
[root@localhost tftpboot]# cp /usr/share/syslinux/{chain.c32,mboot.c32,menu.c32,memdisk} ./
[root@localhost tftpboot]# ls
chain.c32  initrd.img  mboot.c32  memdisk  menu.c32  pxelinux.0  vmlinuz
[root@localhost tftpboot]# mkdir /var/lib/tftpboot/pxelinux.cfg
[root@localhost tftpboot]#
```

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接着创建一个目录，以提供pxelinux启动时读取选项界面。
然后我们进入此目录创建一个为default的文件，pxelinux.0是读取这个文件的，所以必须要以这个名字命名！！！！

```
default menu.c32
  prompt 10
  timeout 30
  MENU TITLE CentOS 7 PXE Menu

  LABEL linux
  MENU LABEL test install CentOS 7 x86_64
  KERNEL vmlinuz
  APPEND initrd=initrd.img inst.repo=http://172.16.10.9/centos7 ks=http://172.16.10.9/centos7.cfg
```

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yum安装仓库为web服务的centos7目录下，ks文件位置在web的根目录下叫centos7.cfg 。（这里虚拟机暂时是桥接的，过会我会配置为单主机，且地址配置为172.16.10.9）

3.接着我们将创建centos7目录 并将光盘挂载至目录

```
[root@localhost pxelinux.cfg]# mkdir /var/www/html/centos7
[root@localhost pxelinux.cfg]# mount /dev/sr0 /var/www/html/centos7/
mount: /dev/sr0 is write-protected, mounting read-only
[root@localhost pxelinux.cfg]# ls /var/www/html/centos7/
CentOS_BuildTag  EFI  EULA  GPL  images  isolinux  LiveOS  Packages  repodata  RPM-GPG-KEY-CentOS-7  RPM-GPG-KEY-CentOS-Testing-7  TRANS.TBL
[root@localhost pxelinux.cfg]#
```

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然后我们需要准备一个ks配置文件，最方便的方式是用system-config-kickstart生成一个，但需要安装图形界面，这里我没准备，就准备直接更改一下家目录的annaconda文件。

先将文件拷贝至html目录下并改名为centos7.cfg

```
[root@localhost pxelinux.cfg]# cp /root/anaconda-ks.cfg /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# ls /var/www/html/centos7
CentOS_BuildTag  EFI  EULA  GPL  images  isolinux  LiveOS  Packages  repodata  RPM-GPG-KEY-CentOS-7  RPM-GPG-KEY-CentOS-Testing-7  TRANS.TBL
[root@localhost pxelinux.cfg]# ls /var/www/html/centos7.cfg
/var/www/html/centos7.cfg
```

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4.在接着就可以改改配置文件了

```
#version=DEVEL
# System authorization information
auth --enableshadow --passalgo=sha512
# Use CDROM installation media
#cdrom
install
url --url="http://172.16.10.9/centos7"
# Use graphical install
graphical
# Run the Setup Agent on first boot
firstboot --enable
ignoredisk --only-use=sda
# Keyboard layouts
keyboard --vckeymap=us --xlayouts='us'
# System language
lang en_US.UTF-8

# Network information
network  --bootproto=dhcp --device=eno16777736 --ipv6=auto --activate
network  --hostname=localhost.localdomain

# Root password
rootpw --iscrypted $6$7BFS7VL.GokUU3QT$GdcZguDkn5kY8xCx2j918R1fhQgNXxi.gaUX5T8LAbmrtnJHWdF3v.9ySoCvoZarTqVZp9991QjNbIgNMs0ut/
# System services
services --disabled="chronyd"
# System timezone
timezone Asia/Shanghai --isUtc --nontp
# System bootloader configuration
bootloader --append=" crashkernel=auto" --location=mbr --boot-drive=sda
# Partition clearing information
clearpart --none --initlabel
# Disk partitioning information
part btrfs.619 --fstype="btrfs" --ondisk=sda --size=30720
part /boot --fstype="xfs" --ondisk=sda --size=500
btrfs none --label=centos --data=single btrfs.619
btrfs / --subvol --name=root LABEL=centos

%packages
@^minimal
@core
kexec-tools

%end
```

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这里我主要增加了横线标出那一行，因为之前是通过光盘安装，这里我们要通过web服务安装，之前通过cdrom安装已经被我注释掉了，接着我们就可以启动服务，并且调整虚拟机了！

```
[root@localhost pxelinux.cfg]# systemctl start httpd
[root@localhost pxelinux.cfg]# systemctl start dhcpd
Job for dhcpd.service failed because the control process exited with error code. See "systemctl status dhcpd.service" and "journalctl -xe" for details.
[root@localhost pxelinux.cfg]# systemctl start tftp
[root@localhost pxelinux.cfg]#
```

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dhcpd报错了 先看看报错什么吧

```
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: No subnet declaration for eno16777736 (192.168.20.105).
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: ** Ignoring requests on eno16777736.  If this is not what
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:    you want, please write a subnet declaration
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:    in your dhcpd.conf file for the network segment
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:    to which interface eno16777736 is attached. **
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: Not configured to listen on any interfaces!
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: This version of ISC DHCP is based on the release available
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: on ftp.isc.org.  Features have been added and other changes
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: have been made to the base software release in order to make
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: it work better with this distribution.
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: Please report for this software via the CentOS Bugs Database:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:     http://bugs.centos.org/
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]:
Feb 05 22:00:17 localhost.localdomain dhcpd[2325]: exiting.
Feb 05 22:00:17 localhost.localdomain systemd[1]: dhcpd.service: main process exited, code=exited, status=1/FAILURE
Feb 05 22:00:17 localhost.localdomain systemd[1]: Failed to start DHCPv4 Server Daemon.
-- Subject: Unit dhcpd.service has failed
```

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好吧，我们应该要先调整虚拟机在启动dhcp，因为定义的172网段和真实的网段不同。

我们先测试下http和tftp

```
[root@localhost pxelinux.cfg]# curl http://192.168.20.105/centos7/
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Final//EN">
<html>
 <head>
  <title>Index of /centos7</title>
 </head>
 <body>
<h1>Index of /centos7</h1>
  <table>
   <tr><th valign="top"><img src="/icons/blank.gif" alt="[ICO]"></th><th><a href="?C=N;O=D">Name</a></th><th><a href="?C=M;O=A">Last modified</a></th><th><a href="
?C=S;O=A">Size</a></th><th><a href="?C=D;O=A">Description</a></th></tr>
   <tr><th colspan="5"><hr></th></tr>
<tr><td valign="top"><img src="/icons/back.gif" alt="[PARENTDIR]"></td><td><a href="/">Parent Directory</a>       </td><td> </td><td align="right">  - </td><t
d> </td></tr>
<tr><td valign="top"><img src="/icons/unknown.gif" alt="[   ]"></td><td><a href="CentOS_BuildTag">CentOS_BuildTag</a>       </td><td align="right">2015-12-10 06:3
5  </td><td align="right"> 14 </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="EFI/">EFI/</a>                 </td><td align="right">2015-12-10 06:33  </td><td
align="right">  - </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/text.gif" alt="[TXT]"></td><td><a href="EULA">EULA</a>                 </td><td align="right">2015-12-10 06:35  </td><td al
ign="right">215 </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/text.gif" alt="[TXT]"></td><td><a href="GPL">GPL</a>                  </td><td align="right">2015-12-10 06:35  </td><td ali
gn="right"> 18K</td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="LiveOS/">LiveOS/</a>              </td><td align="right">2015-12-10 06:33  </td><
td align="right">  - </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="Packages/">Packages/</a>            </td><td align="right">2015-12-10 07:13  </td
><td align="right">  - </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/unknown.gif" alt="[   ]"></td><td><a href="RPM-GPG-KEY-CentOS-7">RPM-GPG-KEY-CentOS-7</a>   </td><td align="right">2015-12-10
 06:35  </td><td align="right">1.7K</td><td> </td></tr>
<tr><td valign="top"><img src="/icons/unknown.gif" alt="[   ]"></td><td><a href="RPM-GPG-KEY-CentOS-Testing-7">RPM-GPG-KEY-CentOS-T..&gt;</a></td><td align="right"
>2015-12-10 06:35  </td><td align="right">1.7K</td><td> </td></tr>
<tr><td valign="top"><img src="/icons/unknown.gif" alt="[   ]"></td><td><a href="TRANS.TBL">TRANS.TBL</a>            </td><td align="right">2015-12-10 07:14  </t
d><td align="right">2.8K</td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="images/">images/</a>              </td><td align="right">2015-12-10 06:33  </td><
td align="right">  - </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="isolinux/">isolinux/</a>            </td><td align="right">2015-12-10 06:33  </td
><td align="right">  - </td><td> </td></tr>
<tr><td valign="top"><img src="/icons/folder.gif" alt="[DIR]"></td><td><a href="repodata/">repodata/</a>            </td><td align="right">2015-12-10 07:14  </td
><td align="right">  - </td><td> </td></tr>
   <tr><th colspan="5"><hr></th></tr>
</table>
</body></html>
```

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```
[root@localhost pxelinux.cfg]# curl http://192.168.20.105/centos7.cfg
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access /centos7.cfg
on this server.</p>
</body></html>
```

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这里可以看到我们请求yum仓库是成功了，但是ks文件缺失败了，提示没权限，检查一下文件权限。

```
[root@localhost pxelinux.cfg]# ll /var/www/html/centos7.cfg
-rw------- 1 root root 1216 Feb  5 21:57 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# chmod 644 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# ll /var/www/html/centos7.cfg
-rw-r--r-- 1 root root 1216 Feb  5 21:57 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]#
```

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发现确实权限问题，修改，在测试

```
[root@localhost pxelinux.cfg]# curl http://192.168.20.105/centos7.cfg
<!DOCTYPE HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>403 Forbidden</title>
</head><body>
<h1>Forbidden</h1>
<p>You don't have permission to access /centos7.cfg
on this server.</p>
</body></html>
[root@localhost pxelinux.cfg]# ll /var/www/html/centos7.cfg
-rw------- 1 root root 1216 Feb  5 21:57 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# chmod 644 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# ll /var/www/html/centos7.cfg
-rw-r--r-- 1 root root 1216 Feb  5 21:57 /var/www/html/centos7.cfg
[root@localhost pxelinux.cfg]# curl http://192.168.20.105/centos7.cfg
#version=DEVEL
# System authorization information
auth --enableshadow --passalgo=sha512
# Use CDROM installation media
#cdrom
install
url --url="http://172.16.10.9/centos7"
# Use graphical install
```

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可以正常请求到文件内容了，接着测试下tftp

```
[root@localhost pxelinux.cfg]# tftp 192.168.20.105
tftp> ^C
tftp> [root@localhost pxelinux.cfg]#
[root@localhost pxelinux.cfg]#
[root@localhost pxelinux.cfg]#
[root@localhost pxelinux.cfg]# cd /tmp/
[root@localhost tmp]# tftp 192.168.20.105
tftp> get vmliunz
Error code 1: File not found
tftp> get vmliuxz
Error code 1: File not found
tftp> get vmlinuz
tftp> ^C
tftp> [root@localhost tmp]#
[root@localhost tmp]# ls
systemd-private-469412fcaefc4fd1a4d900fb05658369-httpd.service-vNvz47  tmpL7rukY  vmlinuz  vmliunz  vmliuxz  yum_save_tx.2017-01-27.04-22.A42aQc.yumtx
[root@localhost tmp]# ll
total 5040
drwx------ 1 root root       6 Feb  5 21:57 systemd-private-469412fcaefc4fd1a4d900fb05658369-httpd.service-vNvz47
-rw------- 1 root root       0 Jan 31 18:27 tmpL7rukY
-rw-r--r-- 1 root root 5156528 Feb  5 22:07 vmlinuz
-rw-r--r-- 1 root root       0 Feb  5 22:07 vmliunz
-rw-r--r-- 1 root root       0 Feb  5 22:07 vmliuxz
-rw------- 1 root root     252 Jan 27 04:22 yum_save_tx.2017-01-27.04-22.A42aQc.yumtx
[root@localhost tmp]#
```

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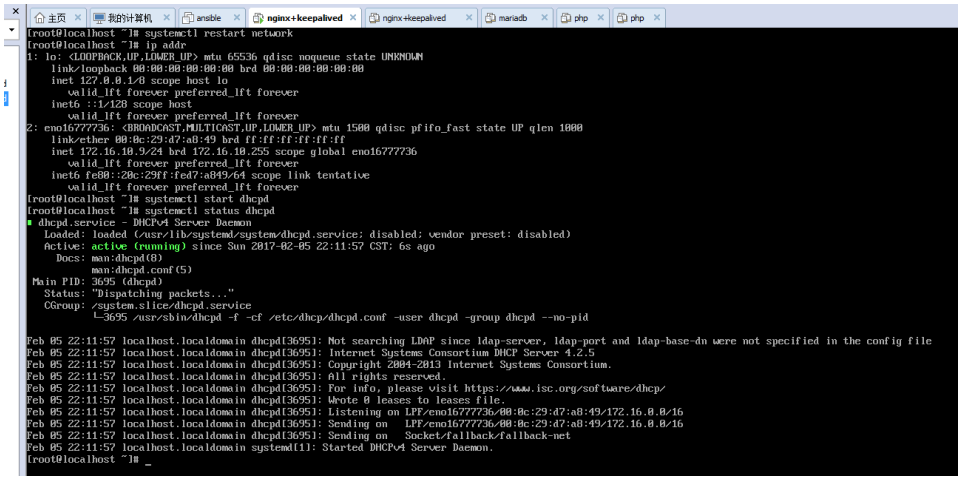
5.登陆tftp服务并且下载了一个文件，至此，我们可以去修改虚拟机，启动dhcp了



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这里我已经指定了静态地址，并且把虚拟机已经调整。可以看到dhcp服务也正常启动了！接着我们就可以找一台主机启动测试了。

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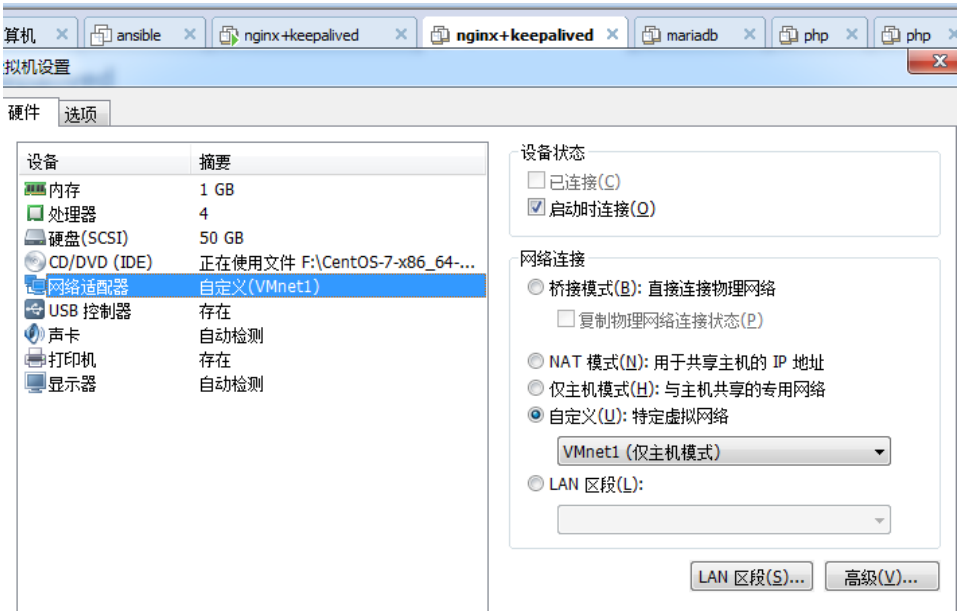

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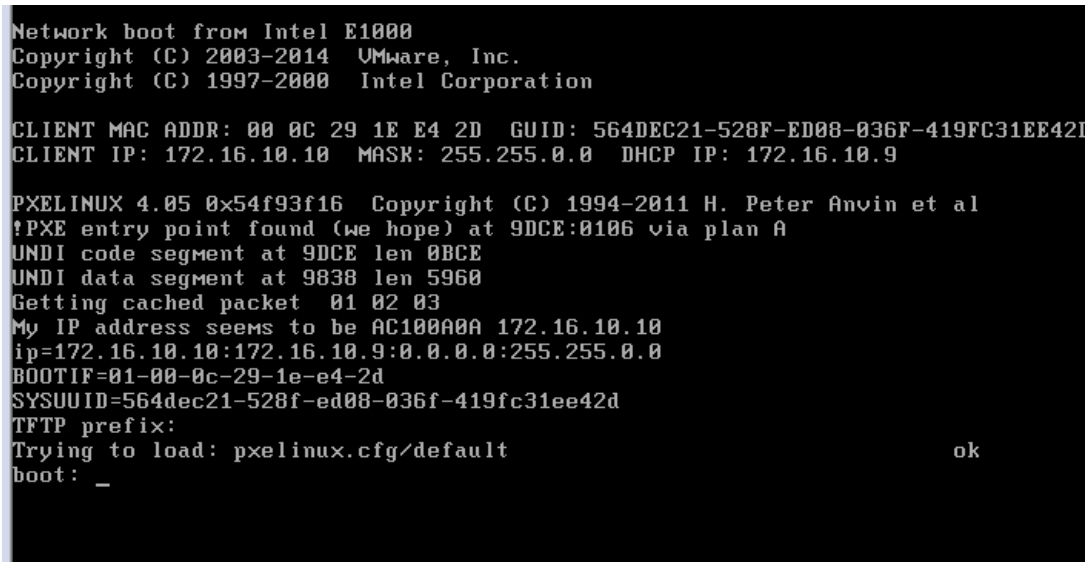
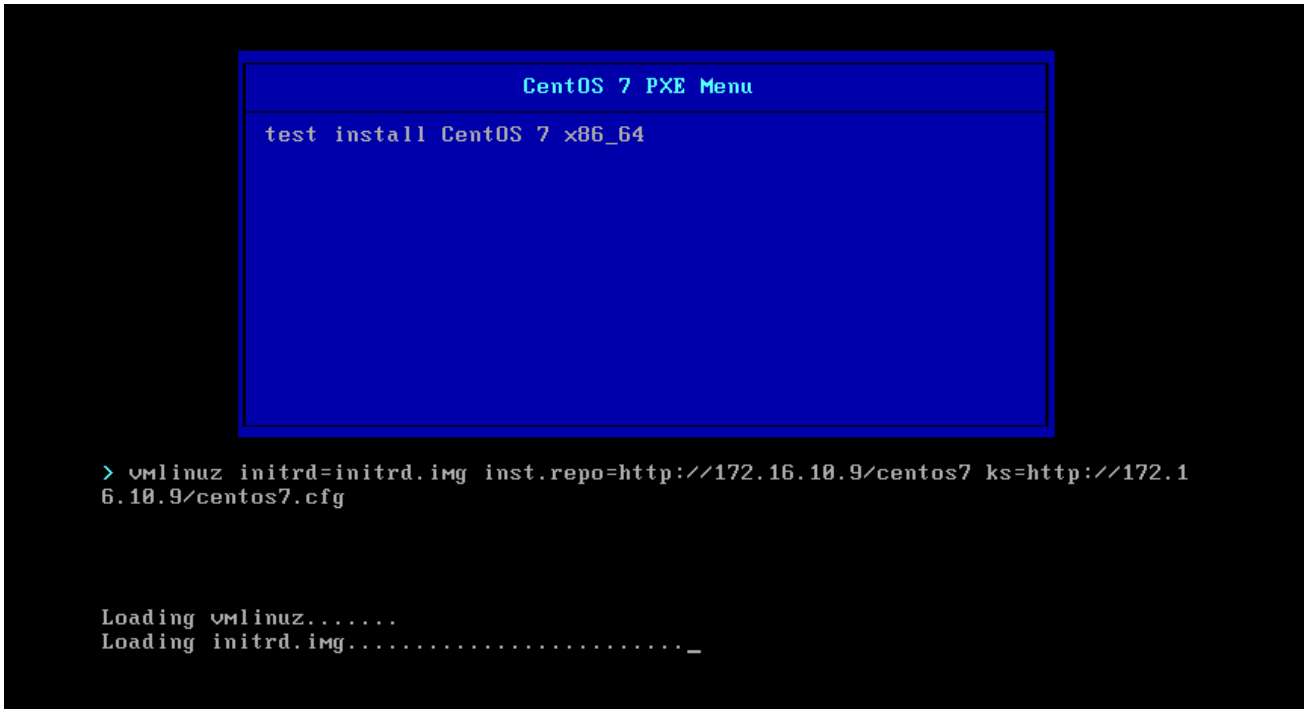
这里我找了个主机，并且把两台主机调整至同一个网段，并且把虚拟机带的dhcp服务已经关闭，可以开机了！！



blob.png



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正确的获得了地址，并且我们刚才自己添加的选项也已经再此！tab键也可以像grub一样看到具体的配置 至此，后面的就不演示了，ks文件根据自己实际需要调整。

部分配置文件参考如下：
https://github.com/WZQ1397/kickstart