PXE 一键装机

PXE(Preboot eXecute Environment,预启动执行环境)，主要用于在无人值守安装系统中引导客户端主机安装 Linux 操作系统。Kickstart 是一种无人值守的安装方式,其工作原理是预先把原本需要运维人员手工填写的参数保存成一个 ks.cfg 文件,当安装过程中需要填写参数时则自动匹配 Kickstart 生成的文件。

一、安装前的准备

软硬件配置：网卡要支持 pxe 启动，操作系统也要支持 pxe 启动
DHCP 服务器用于分配 ip
TFTP 服务器帮助客户端获取引导及驱动文件
VSFTP 服务器用于存储操作系统的安装文件，也可以使用 httpd 来替代 vsftpd 服务程序。

二、实战环境

[root@pxe ~]# cat /etc/redhat-release
CentOS Linux release 7.4.1708 (Core)

三、配置静态 ip

[root@pxe ~]# cat /etc/sysconfig/network-scripts/ifcfg-eth0
# Generated by dracut initrd
DEVICE="eth0"
ONBOOT=yes
BOOTPROTO=static
IPADDR=192.168.1.200
PREFIX=24
GATEWAY=192.168.1.254
TYPE=Ethernet
NM_CONTROLLED=no

四、配置 dhcp 服务

[root@pxe ~]# yum -y install dhcp
[root@pxe ~]# cat /etc/dhcp/dhcpd.conf
DHCP Server Configuration file.
see /usr/share/doc/dhcp*/dhcpd.conf.example
see dhcpd.conf(5) man page
ddns-update-style none;
ignore client-updates;
default-lease-time 14400;
max-lease-time 86400;
allow bootp;

```
allow booting;
local-address 192.168.1.200;                                    #本机 ip
local-port 67;
include "/etc/dhcp/subnet";
```

[root@pxe ~]# cat /etc/dhcp/subnet

```
subnet  192.168.1.0 netmask 255.255.255.0 {
    option routers 192.168.1.254;
    option subnet-mask 255.255.255.0;
    option domain-name-servers 192.168.1.254;
    option ntp-servers 192.168.1.254;
    filename "/gpxelinux.0";
    next-server 192.168.1.200;                                  #本机 ip
        pool {
        range dynamic-bootp 192.168.1.10 192.168.1.240;
        default-lease-time 3600;
        max-lease-time 72000;
        allow unknown-clients;
    }
}
```

五、配置 **tftp** 服务

[root@pxe ~]# yum -y install tftp-server

[root@pxe ~]# cd /var/lib/tftpboot/

[root@pxe tftpboot]# ls

```
chain.c32  gpxelinux.0  mboot.c32  memdisk  menu.c32  pxelinux.0
[root@pxe tftpboot]#  mkdir pxelinux.cfg
[root@pxe tftpboot]# cd pxelinux.cfg/
```

[root@pxe pxelinux.cfg]# vim default

```
[root@pxe pxelinux.cfg]# cat default
default menu.c32
prompt 0
timeout 60
LABEL CentOS7
    MENU LABEL CentOS 7 install
    KERNEL centos7/vmlinuz
    APPEND    initrd=centos7/initrd.img    ks=ftp://192.168.1.200/pub/ks7.cfg
ksdevice=bootif console=tty0 console=ttyS0,115200
```

[root@pxe tftpboot]# mkdir centos7

```
[root@pxe tftpboot]# cd centos7
```

[root@pxe centos7]# ls
initrd.img vmlinuz

[root@pxe tftpboot]# tree . # 安装 tree 软件
.
|-- centos7
| |-- initrd.img
| `-- vmlinuz
|-- chain.c32
|-- gpxelinux.0
|-- mboot.c32
|-- memdisk
|-- menu.c32
|-- pxelinux.0
`-- pxelinux.cfg
    `-- default

2 directories, 9 files

以上文件见以下链接地址：
https://github.com/lmzf2018/1804/tree/master/important/PXE 一键装机

[root@pxe ~]# systemctl restart tftp
[root@pxe ~]# systemctl enable tftp

六、配置 vsftp 服务

[root@pxe ~]# yum -y install vsftpd
[root@pxe ~]# cat /etc/vsftpd/vsftpd.conf
...
# listens on IPv4 sockets. This directive cannot be used in conjunction
# with the listen_ipv6 directive.
listen=YES #NO 改为 YES
#
# This directive enables listening on IPv6 sockets. By default, listening
# on the IPv6 "any" address (::) will accept connections from both IPv6
# and IPv4 clients. It is not necessary to listen on *both* IPv4 and IPv6
# sockets. If you want that (perhaps because you want to listen on specific
# addresses) then you must run two copies of vsftpd with two configuration
# files.
# Make sure, that one of the listen options is commented !!
listen_ipv6=NO #YES 改为 NO

pam_service_name=vsftpd

```
userlist_enable=YES
tcp_wrappers=YES

use_localtime=YES
chroot_list_enable=YES
chroot_local_user=YES
userlist_deny=YES
listen_address=0.0.0.0
listen_port=21
pasv_min_port=50000

pasv_max_port=51000
pasv_enable=YES
pasv_promiscuous=YES
port_promiscuous=NO
max_clients=9
max_per_ip=9
```

七、创建 **ks.cfg** 文件

```
[root@pxe pub]# pwd
/var/ftp/pub
[root@pxe pub]# ls
ks7.cfg
[root@pxe pub]# cat ks7.cfg
#platform=x86, AMD64, or Intel EM64T
#version=DEVEL
# Install OS instead of upgrade
install
# Keyboard layouts
keyboard 'us'
# Root password
rootpw 123456
# System timezone
timezone Asia/Shanghai
# Use network installation
url --url="ftp://192.168.1.254/centos7"                    #镜像地址
# System language 创建
lang en_US.UTF-8
# Firewall configuration
firewall --disabled
# System authorization information
auth   --useshadow   --passalgo=sha512
```

```
# Use text mode install
text
# Installation logging level
logging --level=warning
# Run the Setup Agent on first boot
firstboot --disable
# SELinux configuration
selinux --disabled
# Do not configure the X Window System
skipx
# Network information
network --device=bootif --onboot=on --hostname=localhost --bootproto=bootp
--noipv6
# Reboot after installation
reboot
# System bootloader configuration
bootloader --location=mbr
# Clear the Master Boot Record
zerombr
# Partition clearing information
clearpart --all --initlabel
# Disk partitioning information
part /boot --asprimary --fstype=xfs --size=512
part /        --asprimary --fstype=xfs --size=1 --grow

%packages --nobase
@Core --nodefaults
-iwl3160-firmware
-iwl6000g2b-firmware
-iwl2030-firmware
-iwl7265-firmware
-iwl1000-firmware
-iwl4965-firmware
-iwl2000-firmware
-iwl3945-firmware
-alsa-tools-firmware
-aic94xx-firmware
-iwl135-firmware
-iwl7260-firmware
-iwl6050-firmware
-iwl6000g2a-firmware
-iwl5000-firmware
-ivtv-firmware
-iwl100-firmware
```

```
-iwl5150-firmware
-iwl105-firmware
-iwl6000-firmware
-alsa-firmware
-postfix
-audit
-tuned
chrony
psmisc
net-tools
screen
vim-enhanced
tcpdump
lrzsz
ltrace
strace
traceroute
whois
bind-utils
tree
mlocate
rsync
lsof
lftp
patch
diffutils
cpio
time
nmap
socat
man-pages
rpm-build
createrepo
%end

%pre
%end

%post --interpreter=/bin/bash
rm -f /etc/yum.repos.d/*.repo
cat >/etc/yum.repos.d/local.repo <<'EOF'
[local_repo]
name=CentOS-$releasever - Base
baseurl=ftp://192.168.1.254/centos7
```

```
enabled=1
gpgcheck=1
EOF
rpm -import ftp://192.168.1.254/centos7/RPM-GPG-KEY-CentOS-7
yum erase -y NetworkManager NetworkManager-libnm kexec-tools firewalld-filesystem polkit
sed 's,^CRONDARGS=.*,&"-m off",' -i /etc/sysconfig/crond
sed 's,^\(OPTIONS=\).*,\1"-4",'  -i /etc/sysconfig/chronyd
sed 's,^server .*,&\ncmdallow 127.0.0.1,' -i /etc/chrony.conf
sed 's,^#\(terminfo xterm \x27is.*\),\1\nterm xterm,' -i /etc/screenrc
cat >>/etc/sysconfig/network <<'EOF'
IPV6INIT="no"
NETWORKING="yes"
NOZEROCONF="yes"
EOF
echo -e "# ::1\t\tlocalhost localhost.localdomain localhost6 localhost6.localdomain6" >/etc/hosts
echo -e "127.0.0.1\tlocalhost localhost.localdomain localhost4 localhost4.localdomain4" >>/etc/hosts
echo -e 'export TZ='Asia/Shanghai' PYTHONSTARTUP="/usr/lib64/python2.7/pystartup.py"
TMOUT=7200' >/etc/profile.d/environ.sh
echo -e "blacklist acpi_pad\nblacklist power_meter" >/etc/modprobe.d/blacklist.conf
cat >/usr/lib64/python2.7/pystartup.py <<'EOF'
#!/usr/bin/python
# -*- coding:utf_8 -*-
#from __future__ import print_function
from rlcompleter import readline
readline.parse_and_bind("tab: Complete")
EOF
cat >/etc/sysctl.d/70-system.conf <<'EOF'
net.ipv4.ip_forward = 1
net.ipv4.ip_default_ttl = 255 创建
net.ipv6.conf.all.disable_ipv6 = 1
net.ipv6.conf.default.disable_ipv6 = 1
net.ipv6.conf.lo.disable_ipv6 = 0

net.ipv4.conf.default.rp_filter = 1
net.ipv4.conf.all.arp_ignore = 1
net.ipv4.conf.all.arp_announce = 2
kernel.sysrq = 16
vm.swappiness = 0
EOF
```

```
# config vimrc
cat >>/etc/vimrc<<'EOF'
set wrapscan
set noautoindent
set showmatch
set binary
set noswapfile
set ignorecase              " Do case insensitive matching
set foldmethod=syntax
set foldlevel=100
filetype plugin off
EOF
sed -e 's,^#\(Port\).*,\1 10022,' \
     -e 's,^#\(ListenAddress 0.0.0.0\),\1,' \
     -e 's,^#\(PermitRootLogin\).*,\1 yes,' \
     -e 's,^#\(MaxAuthTries\).*,\1 3,' \
     -e 's,^#\(UseDNS\).*,\1 no,' -i /etc/ssh/sshd_config
cat >/etc/sysconfig/network-scripts/ifcfg-eth0 <<'EOF'
# Generated by dracut initrd
DEVICE="eth0"
ONBOOT="yes"
IPV6INIT="no"
IPV4_FAILURE_FATAL="no"
NM_CONTROLLED="no"
TYPE="Ethernet"
BOOTPROTO="dhcp"
EOF
%end
```

[root@pxe ~]# systemctl restart vsftpd
[root@pxe ~]# systemctl enable vsftpd

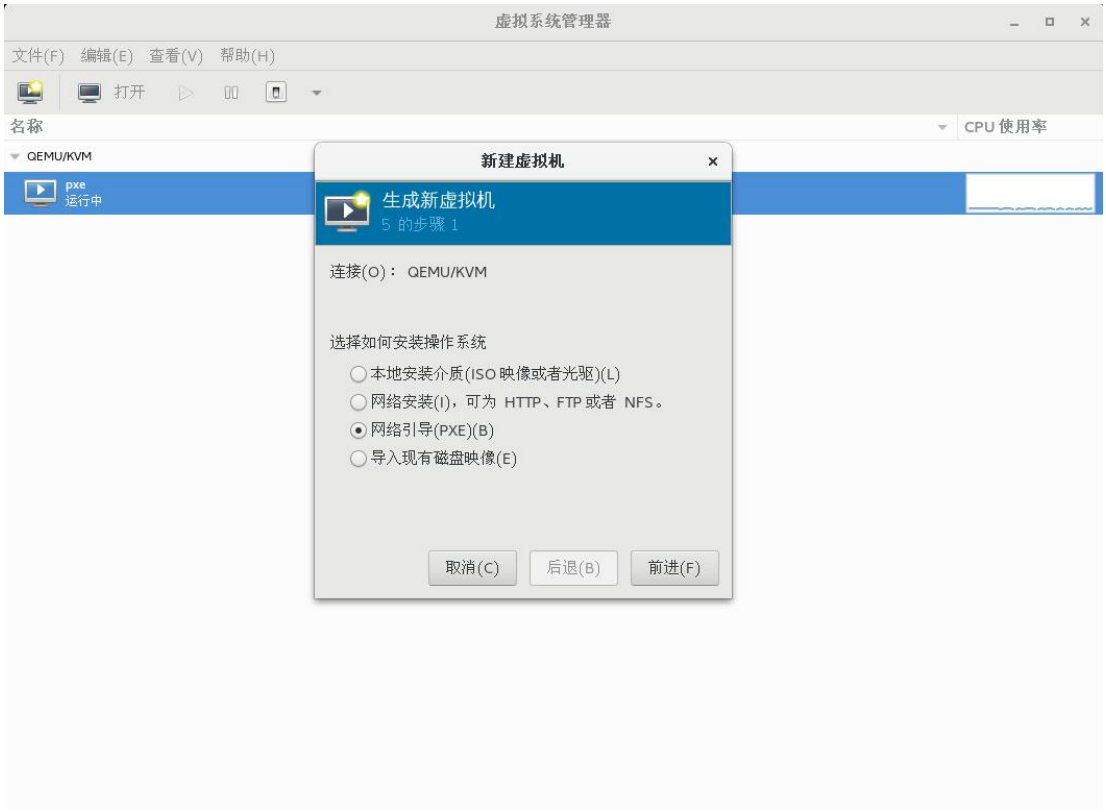
八、保证文件夹有读和执行**(rw)**权限,普通文本文件有读**(r)**权限（**important**）

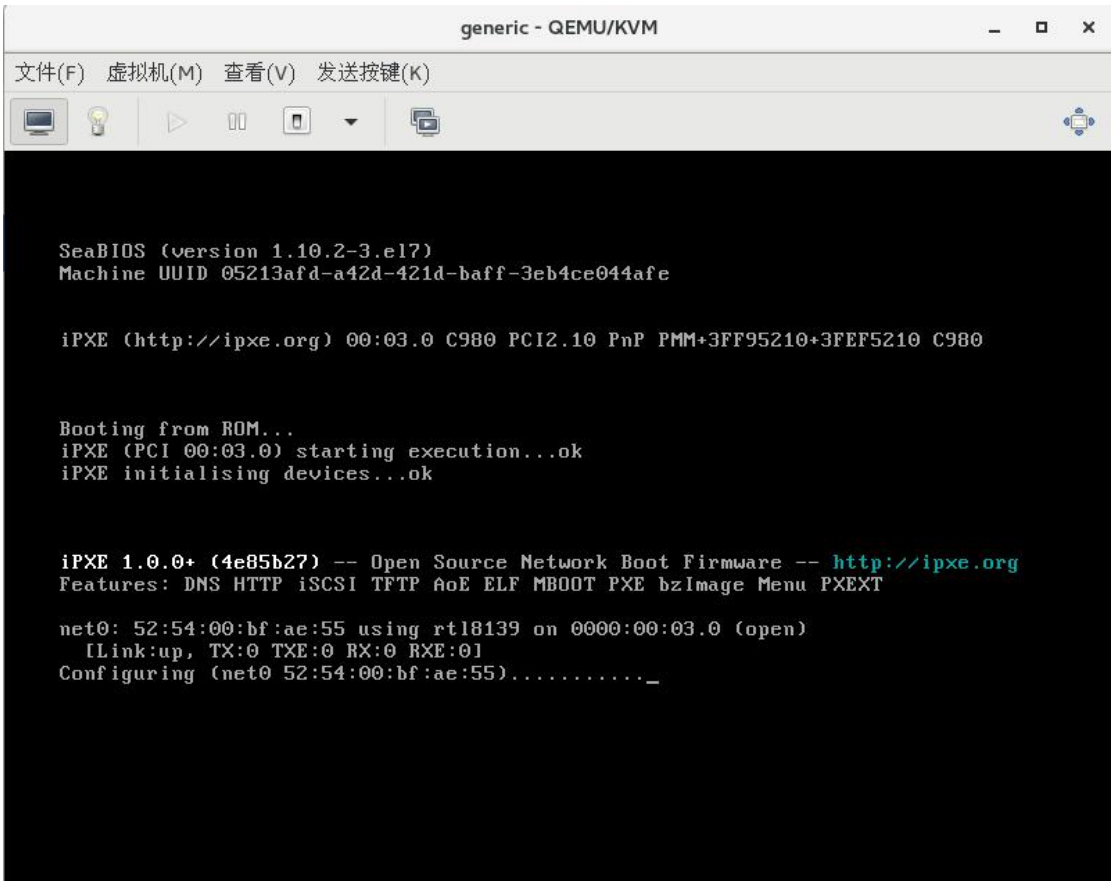
[root@pxe ~]# ll /var/lib/tftpboot/

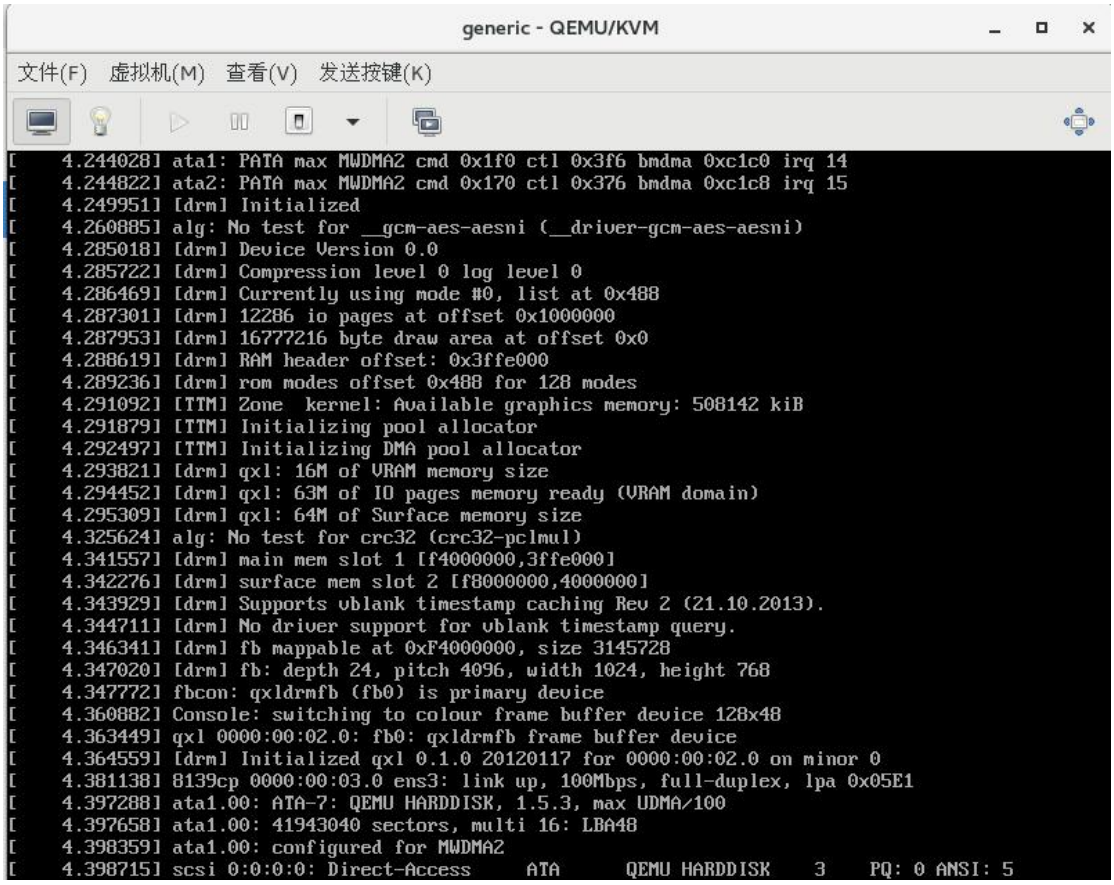
```
总用量 268
drwxr-xr-x 2 root root     39 9 月   5 22:59 centos7
-rw-r--r-- 1 root root 20832 9 月   5 22:49 chain.c32
-rw-r--r-- 1 root root 89376 9 月   5 22:49 gpxelinux.0
-rw-r--r-- 1 root root 35676 9 月   5 22:49 mboot.c32
-rw-r--r-- 1 root root 26268 9 月   5 22:49 memdisk
-rw-r--r-- 1 root root 61796 9 月   5 22:49 menu.c32
-rw-r--r-- 1 root root 26759 9 月   5 22:49 pxelinux.0
drwxr-xr-x 2 root root     21 9 月   5 23:01 pxelinux.cfg
```

[root@pxe ~]# ll /var/lib/tftpboot/pxelinux.cfg/default
-rw-r--r-- 1 root root 233 9 月 5 22:53 /var/lib/tftpboot/pxelinux.cfg/default

九．系统安装流程




generic - QEMU/KVM
文件(F) 虚拟机(M) 查看(V) 发送按键(K)
SeaBIOS (version 1.10.2-3.el7)
Machine UUID 05213afd-a42d-421d-baff-3eb4ce044afe
iPXE (http://ipxe.org) 00:03.0 C980 PCI2.10 PnP PMM+3FF95210+3FEF5210 C980
Booting from ROM...
iPXE (PCI 00:03.0) starting execution...ok
iPXE initialising devices...ok
iPXE 1.0.0+ (4e85b27) -- Open Source Network Boot Firmware -- http://ipxe.org
Features: DNS HTTP iSCSI TFTP AoE ELF MBOOT PXE bzImage Menu PXEXT
net0: 52:54:00:bf:ae:55 using rtl8139 on 0000:00:03.0 (open)
[Link:up, TX:0 TXE:0 RX:0 RXE:0]
Configuring (net0 52:54:00:bf:ae:55).....


generic - QEMU/KVM
文件(F) 虚拟机(M) 查看(V) 发送按键(K)
[4.244028] ata1: PATA max MWDMA2 cmd 0x1f0 ctl 0x3f6 bmdma 0xc1c0 irq 14
[4.244822] ata2: PATA max MWDMA2 cmd 0x170 ctl 0x376 bmdma 0xc1c8 irq 15
[4.249951] [drm] Initialized
[4.260885] alg: No test for __gcm-aes-aesni (__driver-gcm-aes-aesni)
[4.285018] [drm] Device Version 0.0
[4.285722] [drm] Compression level 0 log level 0
[4.286469] [drm] Currently using mode #0, list at 0x488
[4.287301] [drm] 12286 io pages at offset 0x1000000
[4.287953] [drm] 16777216 byte draw area at offset 0x0
[4.288619] [drm] RAM header offset: 0x3ffe000
[4.289236] [drm] rom modes offset 0x488 for 128 modes
[4.291092] [TTM] Zone kernel: Available graphics memory: 508142 kiB
[4.291879] [TTM] Initializing pool allocator
[4.292497] [TTM] Initializing DMA pool allocator
[4.293821] [drm] qxl: 16M of VRAM memory size
[4.294452] [drm] qxl: 63M of IO pages memory ready (VRAM domain)
[4.295309] [drm] qxl: 64M of Surface memory size
[4.325624] alg: No test for crc32 (crc32-pclmul)
[4.341557] [drm] main mem slot 1 [f4000000,3ffe000]
[4.342276] [drm] surface mem slot 2 [f8000000,4000000]
[4.343929] [drm] Supports vblank timestamp caching Rev 2 (21.10.2013).
[4.344711] [drm] No driver support for vblank timestamp query.
[4.346341] [drm] fb mappable at 0xF4000000, size 3145728
[4.347020] [drm] fb: depth 24, pitch 4096, width 1024, height 768
[4.347772] fbcon: qxldrmfb (fb0) is primary device
[4.360882] Console: switching to colour frame buffer device 128x48
[4.363449] qxl 0000:00:02.0: fb0: qxldrmfb frame buffer device
[4.364559] [drm] Initialized qxl 0.1.0 20120117 for 0000:00:02.0 on minor 0
[4.381138] 8139cp 0000:00:03.0 ens3: link up, 100Mbps, full-duplex, lpa 0x05E1
[4.397288] ata1.00: ATA-7: QEMU HARDDISK, 1.5.3, max UDMA/100
[4.397658] ata1.00: 41943040 sectors, multi 16: LBA48
[4.398359] ata1.00: configured for MWDMA2
[4.398715] scsi 0:0:0:0: Direct-Access ATA QEMU HARDDISK 3 PQ: 0 ANSI: 5