(一)Pxe boot schematic diagram

PXE Client		PXE Server

1. Power on

2. Request DHCP lease →

DHCP + TFTP Server (dnsmasq)

3. ← Return DHCP lease + iPXE firmware

4. Request iPXE boot script using iPXE firmware →

Web Server (nginx)

5. ← Return iPXE boot script

6. Request PXE image →

7. ← Return PXE image

8. Boot PXE image
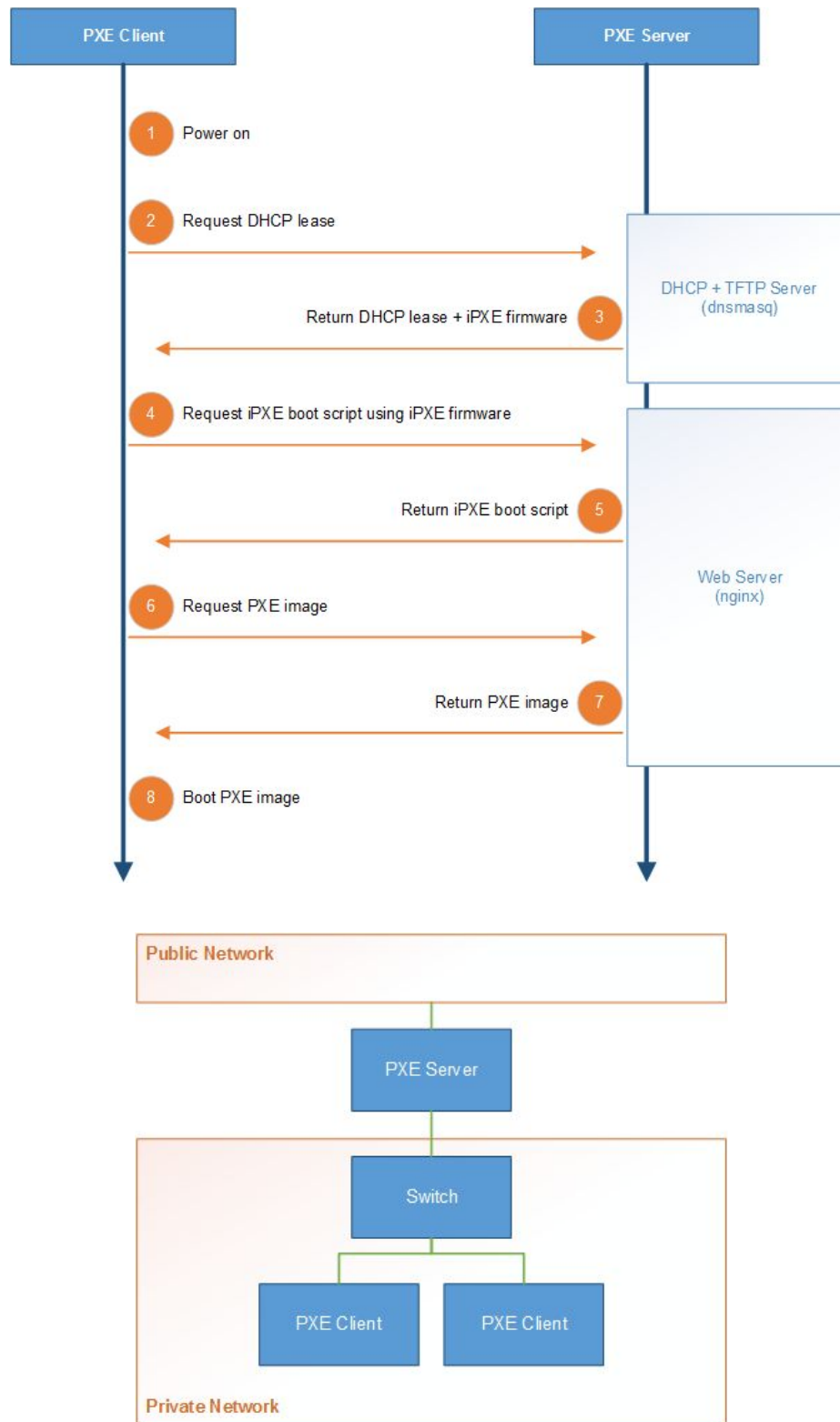
Public Network

PXE Server

Private Network

Switch

PXE Client | PXE Client

In computing, the Preboot eXecution Environment (PXE,) specification describes a standardized client-server environment that boots a software assembly, retrieved from a network, on PXE-enabled clients. On the client side it requires only a PXE-capable network interface controller (NIC), and uses a small set of industry-standard network protocols such as DHCPand TFTP.

About pxe,we need a server and a client.

The server runs three services: DHCP，TFTP，FTP（HTTP）.

1. DHCP_server

The DHCP service is used to assign an IP address to the client.

Step:

yum -y install dhcp

vim /etc/dhcp/dhcpd.conf

subnet 192.168.4.0 netmask 255.255.255.0 {

range 192.168.4.10 192.168.4.200;

next-server 192.168.4.7;

filename "pxelinux.0";

}

systemctl restart dhcpd

systemctl enable dhcpd

2. TFTP_server

'Simple file transfer protocol, which provides small file transfer service via UDP port 69.

By default, resources should be deployed to the /var/lib/tftpboot directory.

We use TFTP to transfer boot files and linux kernel files.

A). The NIC boot program pxelinux.0 is provided by the package syslinux.

Syslinux is a powerful boot loader and compatible with a variety of media.

Its purpose is to simplify the time to first install Linux and to create a repair or other special purpose boot disk.

Pxelinux is a Syslinux derivative, for booting Linux off a network server, using a network ROM conforming to the Intel PXE (Pre-Execution Environment) specification.

step：

#yum -y install syslinux

#rpm -ql syslinux | grep pxelinux.0

(/usr/share/syslinux)

Copy the files to the /var/lib/tftpboot directory.

B). Pxelinux.cfg → Pre-launch configuration file

#mkdir /var/lib/tftpboot/pxelinux.cfg

→ Create a pxelinux.cfg directory in the tftpboot directory

#cp isolinux/isolinux.cfg /var/lib/tftpboot/pxelinux.cfg/default

→ Copy the isolinux.cfg boot file to the pxelinux.cfg file in the tftpd storage directory and name it default.

Modify default files.

vi /var/lib/tftpboot/pxelinux.cfg/default

default vesamenu.c32 //change to default

//修改No.66 lines

label linux

  menu label

  menu default

  kernel vmlinuz

  append initrd=initrd.img ks=http://192.168.4.150/ks.cfg-

Note: The above code in default is an ordinary pxe installer. The installer used in the redhat series linux is anaconda.

Anaconda will be explained later.

C). The kernel and initialization files for PXE installation can be extracted from the RHEL7 iso

directory: /images/pxeboot/.

step:

#mount /home/jikwang/Document/iso/RHVH-2019-2-1.iso /media

#cd /media/image/pxeboot/{initrd.img,vmlinuz} /var/lib/tftpboot/

#cp /media/isolinux/{boot.msg,vesamenu.c32,splash.jpg} /var/lib/tftpboot/

3. HTTP or FTP_server

The role of FTP or HTTP is to transmit iso, we use iso to act as remote yum source.

Note: The location of the image is defined by the parameter Liveimg --url in the kickstart file.

step:

#mkdir   /var/www/html/iso

#cp -r /mnt   /var/www/html/rhel7

Copy the mounted image to the httpd directory.

4. KickStart

The kickstart file is an answer file that describes the commands needed during the installation

process. It can define the latest installation source. → Liveimg --url

We can use the graphical configuration tool system-config-kickstart to automatically generate an

answer file.

#yum -y install system-config-kickstart

The following is the main project and parameter introduction in the Kickstart file.

https://access.redhat.com/documentation/zh-cn/red_hat_enterprise_linux/7/html/installation_guide/s

ect-kickstart-syntax

（二）ANACONDA

Anaconda is the installation program used by Fedora, Red Hat Enterprise Linux and some other distributions.anaconda is a fairly sophisticated installer. It supports installation from local and remote sources such as CDs and DVDs, images stored on a hard drive, NFS, HTTP, and FTP.

Management mode supported by Anaconda:

To enter the installation step, you need to have a bootloader to boot a special Linux installation environment system; there are several ways to boot:

1. Small boot image based on network mode, need to provide a small boot image;

2. U disk boot, boot the installation process through a small boot image in the bootable storage media;

3. Based on the PXE network installation method, provide a complete installation environment for PXE;

4. Other bootloder boot (eg: GRUB)

Introduce reference linked:

https://rhinstaller.github.io/anaconda/intro.html

Anaconda boot options:

When the installation environment is set up, the next step is the performance of anaconda.

We want to start the Anaconda installer program by two parameters, which point to the mirror position of A.

1. Inst.repo
2. Inst.stage2

Boot reference linked:

https://rhinstaller.github.io/anaconda/boot-options.html

（三）Relationship between pxe with anaconda:

Pxe is a bootloader, that provides an installation environment.

Anaconda is installer that performs the operations required for the installation.

Installation is divided into two stage:

Step1: → pxe

Load the kernel image vmlinuz under the isolinux directory and the initial RAM disk initrd.img to establish the installation environment. The init program calls the loader program, the loader loads the kickstart file, and finally runs the /usr/bin/anaconda main program to enter the stage2.
Boot.img
    -pxelinux.0   → Boot starp
    -pxelinux.cfg   → Boot configure file: define the installer's location.
    -vmlinuz, initrd.img   → kernel and boot loader initialized RAM disk

Step2: → installer

The anaconda program loads each python and bash module and performs the installation steps.
The main part of the stage2.img image file is the installer anaconda, which calls a large number of scripts under /usr/lib/anaconda, and the resource files used during the installation process are under /usr/share/anaconda.
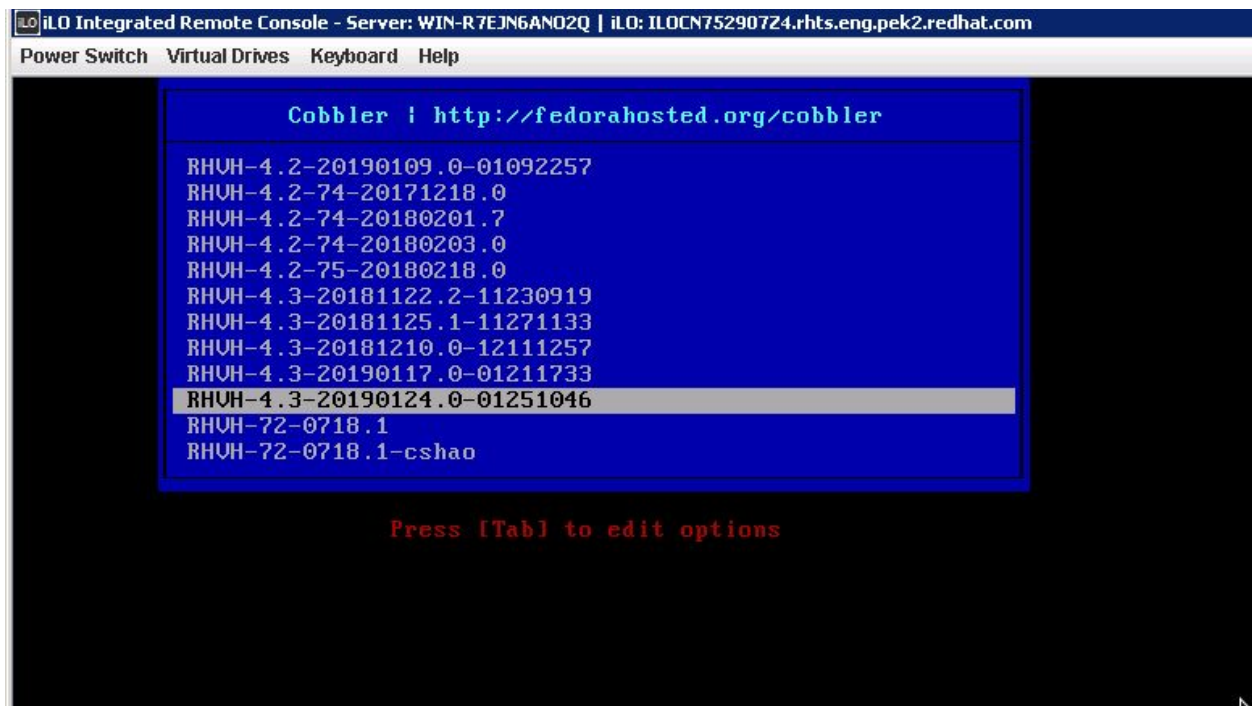
Conclusion:
Order of file calls:
isolinux/vmlinuz--->isolinux/initrd.img--->/init--->/sbin/loader--->imagaes/install.img--->/usr/bin/anaconda

Pxe & anaconda used in the work

1.At work, the pxe server is 10.66.8.177 and the three services have been installed. You can see this interface by starting the machine on the network:

2.When choosing the iso we need to install,

we will find that the iso in the server is not up-to-date.

We need to write the latest installation image in our own ks file.

3.We will choose the latest image in this system.

Press the tab key, you will see three files: linux kernel file vmlinux, linux boot file initrd.img,

inst.stage2 file, ks file.
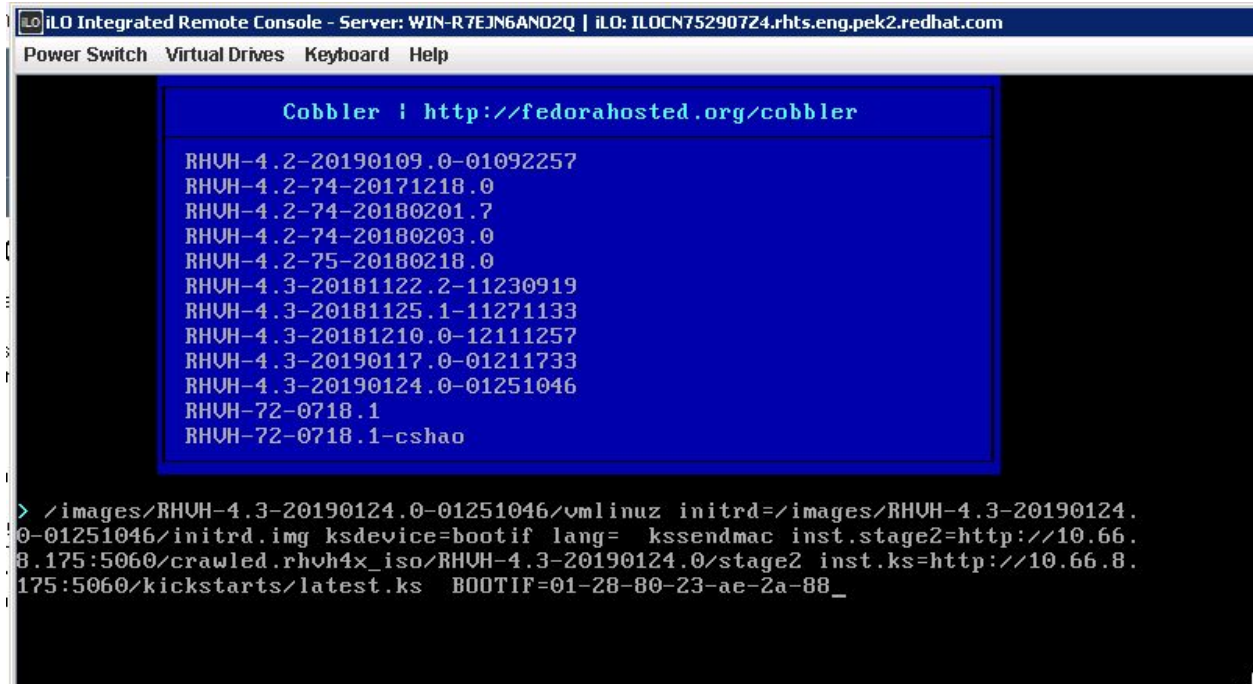
4.

Stage1:

boot.img:

 /images/RHVH-4.3-20190124.0-01251046/vmlinuz

initrd=/images/RHVH-4.3-20190124.0-0121046/initrd.img

Stage2:

Installer.img:

inst.stage2=http://10.66.8.175:5060/crawled.rhvh4x_iso/RHVH-4.3-20190124.0/stage2

Modify: inst.ks=http://10.66.8.175:5060/kickstarts/latest.ks

Modify the installation source in the ks file to the latest package.