

Netbooting of a RHEL 7.5 LE PowerVM LPAR with an AIX NIM Server

For this example the following settings are assumed:

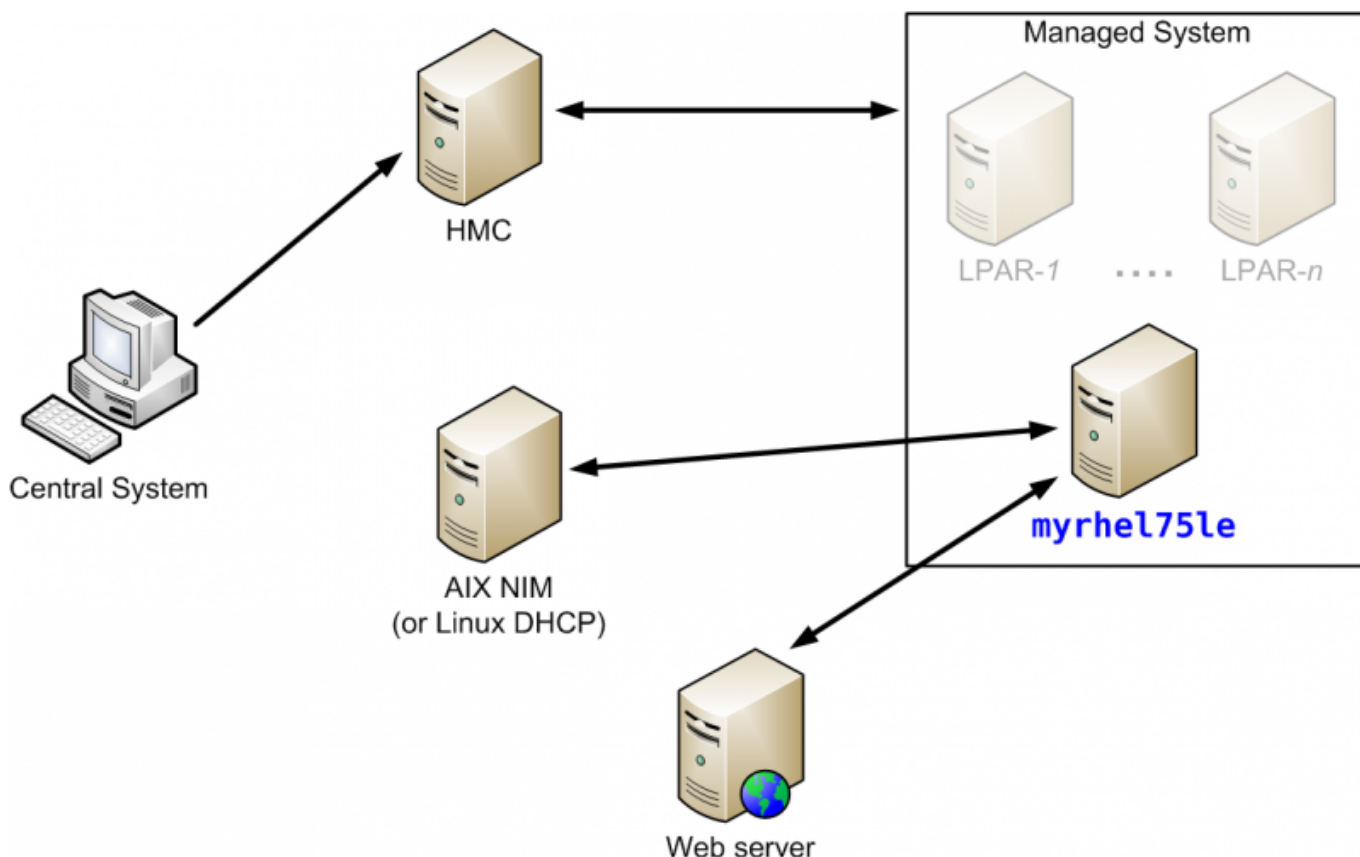
- A HMC called **hmc** manages **managed-system**.
- A LPAR named **myrhel75le** is already defined on **managed-system**.
 - All required network and storage adapters as well as disk storage have been created up front.
 - The designated IP address is **192.168.10.75/24**.
- The AIX NIM server **nim** has the IP address **192.168.10.10/24**.
- The network adapter used for netbooting has the following mac address:
96:0d:e1:c7:5b:03.
- Access to the HMC **hmc** via password-less SSH is possible from a central system.
- The Red Hat Kickstart file used for the installation is accessible through a **web server** (IP address **192.168.10.120/24**) at this URL:

```
http://<web-server>/RHEL_Kickstart/myrhel75le.ks
```



How to create a Red Hat Kickstart file is beyond the scope here, please check your RHEL documentation on how to do it!

This picture shows the example setup in detail:



1) Create the files for netbooting on a different RHEL LE system

```
[root@pkvm-le-rhel75 ~]$ grub2-mknetdir --net-directory=/var/lib/tftpboot
Netboot directory for powerpc-ieee1275 created. Configure your DHCP server
to point to
/boot/grub2/powerpc-ieee1275/core.elf
```

2) Transfer the RHEL netboot infrastructure to the AIX NIM server

```
[root@pkvm-le-rhel75 ~]$ cd /var/lib/tftpboot
[root@pkvm-le-rhel75-nfs tftpboot]$ tar cf /tmp/rhel7u5le-bootptab.tar boot
[root@pkvm-le-rhel75-nfs tftpboot]$ scp /tmp/rhel7u5le-bootptab.tar
root@nim:/tmp
```

3) Unpack the RHEL netboot infrastructure on the AIX NIM server

```
[root@nim ~]$ cd /tftpboot
[root@nim tftpboot]$ mkdir rhel7u5-le
[root@nim tftpboot]$ cd rhel7u5-le
[root@nim rhel7u5-le]$ tar xvpf /tmp/rhel7u5le-bootptab.tar
```

4) Create the entry in the /etc/bootptab file on the AIX NIM server

```
[root@nim ~]$ cat etc/bootptab:
# Legend:
# first field -- hostname (may be full domain name and probably should be)
# bf -- bootfile
# ip -- host IP address
# ht -- hardware type
# ha -- hardware address
# sa -- server IP address to tftp bootfile from
# sm -- subnet mask
myrhel75le:bf=/tftpboot/myrhel75le:ip=192.168.10.75:ht=ethernet:ha=960DE1C75
B03:sa=192.168.10.10:sm=255.255.255.0:
```

5) Create the symbolic link to the GRUB2 binary

```
[root@nim ~]$ cd /tftpboot
[root@nim tftpboot]$ ln -s rhel7u5-le/boot/grub2/powerpc-ieee1275/core.elf
myrhel75le
[root@nim tftpboot]$ ls -l myrhel75le
lrwxrwxrwx 1 root system 41 2017-10-06 14:45 myrhel75le -> ./rhel7u5-
le/boot/grub2/powerpc-ieee1275/core.elf
```

6) Activate the bootp changes

As the bootp daemon runs under the control of the inetd daemon we have to notify the inetd to refresh its subsystems.

```
[root@nim ~]$ refresh -s inetd
```

7) Set the global /boot symbolic link

- Unfortunately GRUB2 is not always working relatively to /tftpboot as “root” directory, therefore is it absolutely vital to set the following symbolic link:

```
[root@nim ~]$ cd /; ln -s /tftpboot/rhel7u5-le/boot /boot
```

**Note:**

The TFTP server on AIX does not chroot incoming clients into a specific directory by default.

Instead, access to the server is controlled by the `/etc/tftpaccess.ctl` file.

Make sure your `/etc/tftpaccess.ctl` file looks like this – or at least allows access to the `/tftpboot` and `/boot` directories:

```
[root@nim ~]$ cat /etc/tftpaccess.ctl
# NIM access for network boot
allow:/tftpboot
allow:/boot
```

8) Create a customized GRUB2 grub.cfg file in /tftpboot

The naming for this customized `grub.cfg` file is `grub.cfg-01-<MAC-ADDRESS>` with `<MAC-ADDRESS>` coded as `xx-yy-zz-aa-bb-cc`.

```
[root@nim ~]$ cat /tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03
set default=0
set timeout=10

echo -e "\nWelcome to the Red Hat Enterprise Linux 7.5 LE installer!\n\n"

menuentry 'Red Hat Enterprise Linux 7.5 LE' {
    linux rhel7u5-le/vmlinuz ro
    ip=192.168.10.10::192.168.10.1:255.255.255.0:myrhel75le:eth0:none
    inst.ks=http://192.168.10.120:/RHEL_Kickstart/myrhel75le.ks
    initrd rhel7u5-le/initrd.img
}
```

If you don't want to use a customized GRUB2 grub.cfg file then you have to edit the [/tftpboot/rhel75-le/boot/grub2/grub.cfg](#) file.

```
[root@nim ~]$ cat /tftpboot/rhel75-le/boot/grub2/grub.cfg
set default=0
set timeout=10

echo -e "\nWelcome to the Red Hat Enterprise Linux 7.5 LE installer!\n\n"

menuentry 'Red Hat Enterprise Linux 7.5 LE' {
    linux rhel7u5-le/vmlinuz ro
    ip=192.168.10.10::192.168.10.1:255.255.255.0:myrhel75le:eth0:none
    inst.ks=http://192.168.10.120:/RHEL_Kickstart/myrhel75le.ks
    initrd rhel7u5-le/initrd.img
}
```



In our example here the files `/tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03` and `/tftpboot/rhel75-le/boot/grub2/grub.cfg` are identical.

9) Copy the proper boot images into the right location

- From the RHEL 7.5 LE DVD image - mounted under `/mnt` in this example - copy these files:

```
[root@nim ~]$ cp /mnt/ppc/ppc64/vmlinuz /tftpboot/rhel7u5-le/vmlinuz
[root@nim ~]$ cp /mnt/ppc/ppc64/initrd.img /tftpboot/rhel7u5-le/initrd.img
[root@nim ~]$ chmod 0644 /tftpboot/rhel7u5-le/*
```

10) Start the `lpar_netboot` command on the HMC

At last, initiate the installation from the central system via password-less SSH access of the HMC.

```
[root@<central system> ~]$ ssh hscroot@<hmc> lpar_netboot -t ent -m
960DE1C75B03 -S <nim> -C 192.168.10.75 -K 255.255.255.0 -s auto -d auto -f -
i -E LPAR_NETBOOT_DEBUG -T off myrhel75le <lpar_profile_of_myrhel75le>
<managed-system>
```

After a while your Kickstart-automated RHEL installation should begin...

Using a Linux DHCP Server instead of the AIX NIM Server

- The same steps as in the AIX NIM server scenario would be performed but a Linux DHCP server would be used instead of the AIX NIM server.

```
[root@<linux_dhcp> ~]$ cat /etc/dhcpd.conf
option domain-name "<your_domain_name_here>";
option domain-name-servers 192.168.10.8; # DNS server IP address
option routers 192.168.10.1;
option ntp-servers 192.168.10.8; # NTP server IP address
ddns-update-style none;
ignore unknown-clients;
allow bootp;
subnet 192.168.10.0 netmask 255.255.255.0 {
    range 192.168.10.100 192.168.10.250;
    default-lease-time 86400;
    max-lease-time 604800;
}
host myrhel75le {
    hardware ethernet 96:0D:E1:C7:5B:03;
    filename "myrhel75le";
    fixed-address 192.168.10.75;
    next-server 192.168.10.51; # DHCP server IP address
}
```

GRUB2 sequence of TFTP requests for RHEL 7.5 LE

Using tcpdump and wireshark the following sequence of TFTP requests during the initial GRUB2 booting can be observed.

Client IP:	192.168.10.75 (= 0xC0A80A4B)
MAC address:	96:0D:E1:C7:5B:03

```
13 0.023061 192.168.10.75 192.168.10.10 TFTP 73 Read Request,
File: /tftpboot/myrhel75le, Transfer type: octet
```

```
642 7.548135 192.168.10.75 192.168.10.10 TFTP 111 Read Request,
File: /boot/grub2/powerpc-ieee1275/normal.mod, Transfer type: octet,
blksize=1024, tsize=0
939 7.594158 192.168.10.75 192.168.10.10 TFTP 113 Read Request,
File: /boot/grub2/powerpc-ieee1275/terminal.mod, Transfer type: octet,
blksize=1024, tsize=0
954 7.797228 192.168.10.75 192.168.10.10 TFTP 111 Read Request,
File: /boot/grub2/powerpc-ieee1275/crypto.mod, Transfer type: octet,
blksize=1024, tsize=0
971 8.000194 192.168.10.75 192.168.10.10 TFTP 112 Read Request,
File: /boot/grub2/powerpc-ieee1275/gettext.mod, Transfer type: octet,
blksize=1024, tsize=0
988 8.203462 192.168.10.75 192.168.10.10 TFTP 109 Read Request,
File: /boot/grub2/powerpc-ieee1275/gzio.mod, Transfer type: octet,
blksize=1024, tsize=0
1011 8.208153 192.168.10.75 192.168.10.10 TFTP 112 Read Request,
File: //tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03, Transfer type: octet,
blksize=1024, tsize=0
1013 8.408127 192.168.10.75 192.168.10.10 TFTP 100 Read Request,
File: //tftpboot/grub.cfg-C0A80A4B, Transfer type: octet, blksize=1024,
tsize=0
1015 8.608099 192.168.10.75 192.168.10.10 TFTP 99 Read Request,
File: //tftpboot/grub.cfg-C0A80A4, Transfer type: octet, blksize=1024,
tsize=0
1017 9.021123 192.168.10.75 192.168.10.10 TFTP 98 Read Request,
File: //tftpboot/grub.cfg-C0A80A, Transfer type: octet, blksize=1024,
tsize=0
1019 9.221195 192.168.10.75 192.168.10.10 TFTP 97 Read Request,
File: //tftpboot/grub.cfg-C0A80, Transfer type: octet, blksize=1024, tsize=0
1021 9.421168 192.168.10.75 192.168.10.10 TFTP 96 Read Request,
File: //tftpboot/grub.cfg-C0A8, Transfer type: octet, blksize=1024, tsize=0
1023 9.621142 192.168.10.75 192.168.10.10 TFTP 95 Read Request,
File: //tftpboot/grub.cfg-C0A, Transfer type: octet, blksize=1024, tsize=0
1025 9.821217 192.168.10.75 192.168.10.10 TFTP 94 Read Request,
File: //tftpboot/grub.cfg-C0, Transfer type: octet, blksize=1024, tsize=0
1027 10.021184 192.168.10.75 192.168.10.10 TFTP 93 Read Request,
File: //tftpboot/grub.cfg-C, Transfer type: octet, blksize=1024, tsize=0
1029 10.221159 192.168.10.75 192.168.10.10 TFTP 112 Read Request,
File: //tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03, Transfer type: octet,
blksize=1024, tsize=0
```

RHEL will try to find (please note the hex-coded IP-address here: 192.168.10.75 = 0xC0A80A4B) in the following order:

```
/tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03
/tftpboot/grub.cfg-C0A80A4B
/tftpboot/grub.cfg-C0A80A4
/tftpboot/grub.cfg-C0A80A
/tftpboot/grub.cfg-C0A80
/tftpboot/grub.cfg-C0A8
```

```
/tftpboot/grub.cfg-C0A  
/tftpboot/grub.cfg-C0  
/tftpboot/grub.cfg-C  
/tftpboot/grub.cfg-01-96-0d-e1-c7-5b-03
```

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