

# Netbooting of a SLES 12 SP3 PowerVM LPAR with an AIX NIM Server

For this example the following settings are assumed:

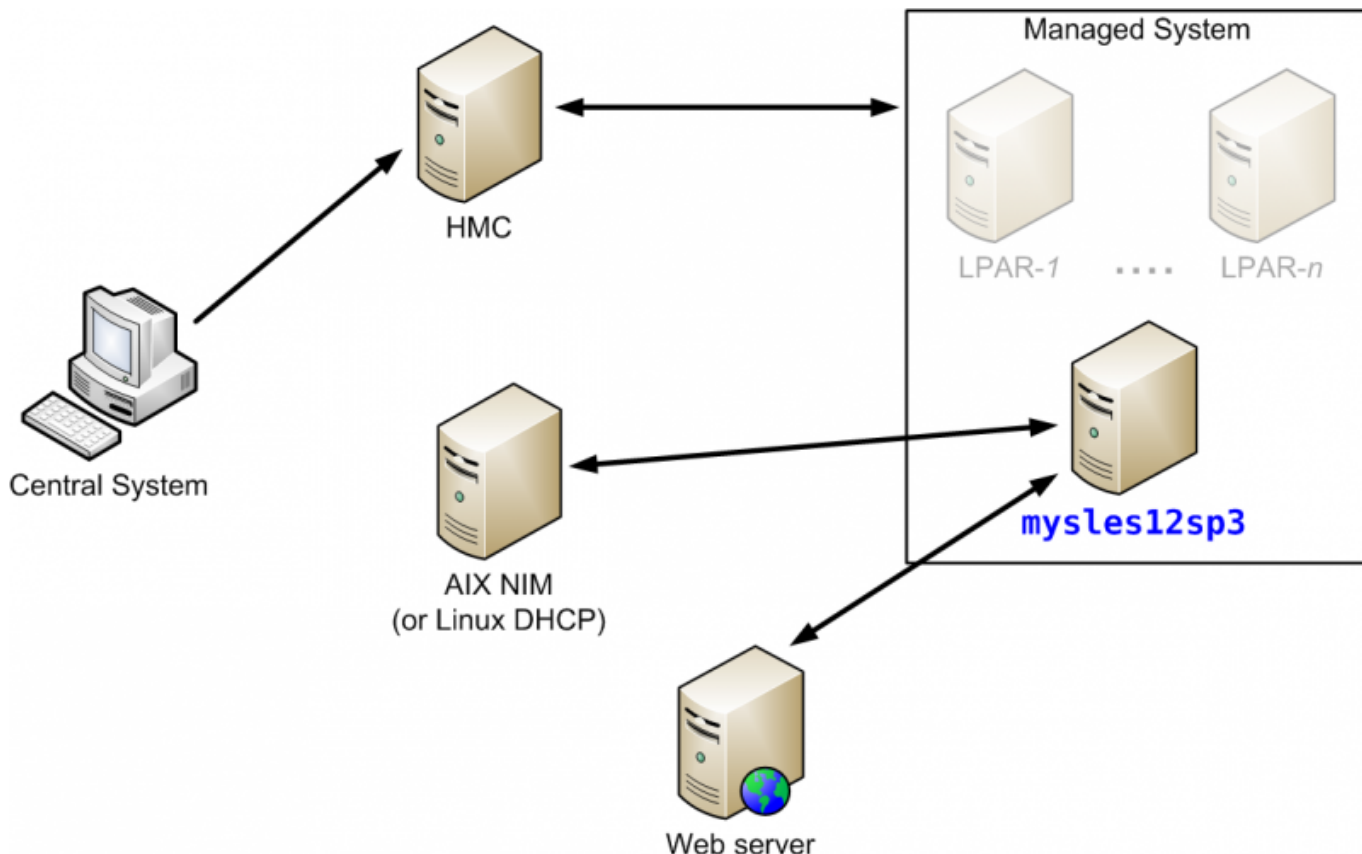
- A HMC called **hmc** manages **managed-system**.
- A LPAR named **mysles12sp3** is already defined on **managed-system**.
  - All required network and storage adapters as well as disk storage have been created up front.
  - The designated IP address is **192.168.10.75/24**.
- The AIX NIM server **nim** 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 SUSE AutoYaST XML file used for the installation is accessible through a **web server** (IP address **192.168.10.120/24**) at this URL:

[http://<web-server>/SLES\\_AutoYaST/mysles12sp3.xml](http://<web-server>/SLES_AutoYaST/mysles12sp3.xml)



How to create a SLES AutoYaST XML file is beyond the scope here, please check your SUSE documentation on how to do it!

This picture shows the example setup in detail:



## 1) Create the files for netbooting on a different SLES system

```
[root@pkvm-sles12sp3 ~]$ 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 SLES netboot infrastructure to the AIX NIM server

```
[root@pkvm-sles12sp3 ~]$ cd /var/lib/tftpboot
[root@pkvm-sles12sp3 tftpboot]$ tar cf /tmp/sles12sp3-bootptab.tar boot
[root@pkvm-sles12sp3 tftpboot]$ scp /tmp/sles12sp3-bootptab.tar
root@nim:/tmp
```

## 3) Unpack the SLES netboot infrastructure on the AIX NIM server

```
[root@nim ~]$ cd /tftpboot
[root@nim tftpboot]$ mkdir sles12sp3
[root@nim tftpboot]$ cd sles12sp3
[root@nim sles12sp3]$ tar xvpf /tmp/sles12sp3-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
mysles12sp3:bf=/tftpboot/mysles12sp3:ip=192.168.10.75:ht=ethernet:ha=960DE1C
75B03: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 sles12sp3/boot/grub2/powerpc-ieee1275/core.elf
mysles12sp3
[root@nim tftpboot]$ ls -l mysles12sp3
lrwxrwxrwx  1 root system 46 Nov 20 14:45 mysles12sp3 ->
./sles12sp3/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/sles12sp3/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 only possible location is: `/tftpboot/sles12sp3/boot/grub2/grub.cfg`

```
[root@nim ~]$ cat /tftpboot/sles12sp3/boot/grub2/grub.cfg
set default=0
set timeout=10

echo -e "\nWelcome to the SLES 12 SP3 installer!\n\n"

menuentry 'Install my SLES 12 SP3' {
    linux sles12sp3/linux ro vnc=0 ifcfg=eth0=192.168.10.75/24,192.168.10.1
    autoyast=http://192.168.10.120/SLES_AutoYaST/mysles12sp3.xml
    install=http://192.168.10.120/ppc/SLES12-SP3
    initrd sles12sp3/initrd
}
```

## 9) Copy the proper boot images into the right location

- From the SLES 12 SP3 DVD image - mounted under /mnt in this example - copy these files:

```
[root@nim ~]$ cp /mnt/ppc/ppc64/linux /tftpboot/sles12sp3/linux
[root@nim ~]$ cp /mnt/ppc/ppc64/initrd /tftpboot/sles12sp3/initrd
[root@nim ~]$ chmod 0644 /tftpboot/sles12sp3/*
```

## 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 mysles12sp3 <lpar_profile_of_mysles12sp3>
<managed-system>
```

After a while your AutoYaST-automated SLES 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 mysles12sp3 {
    hardware ethernet 96:0D:E1:C7:5B:03;
    filename "mysles12sp3";
    fixed-address 192.168.10.75;
    next-server 192.168.10.51;        # DHCP server IP address
}
```

## GRUB2 sequence of TFTP requests for SLES 12 SP3

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



SLES 12 looks for the grub.cfg file only here:  
**/tftpboot/sles12sp3/boot/grub2/grub.cfg**

```
506 16.527572 192.168.10.75 192.168.10.10 TFTP 85 Read Request, File:
/tftpboot/mysles12sp3, Transfer type: octet, blksize=1428
793 17.410470 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
1104 17.509813 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
1123 17.595988 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
1143 17.623303 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
1164 17.640432 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
1197 17.754018 192.168.10.75 192.168.10.10 TFTP 112 Read Request, File:
/boot/grub2/powerpc-ieee1275/command.lst, Transfer type: octet,
blksize=1024, tsize=0
```

```
1213 17.893224 192.168.10.75 192.168.10.10 TFTP 112 Read Request, File:
/boot/grub2/powerpc-ieee1275/command.lst, Transfer type: octet,
blksize=1024, tsize=0
1229 18.041401 192.168.10.75 192.168.10.10 TFTP 107 Read Request, File:
/boot/grub2/powerpc-ieee1275/fs.lst, Transfer type: octet, blksize=1024,
tsize=0
1244 18.114254 192.168.10.75 192.168.10.10 TFTP 107 Read Request, File:
/boot/grub2/powerpc-ieee1275/fs.lst, Transfer type: octet, blksize=1024,
tsize=0
1257 18.124603 192.168.10.75 192.168.10.10 TFTP 111 Read Request, File:
/boot/grub2/powerpc-ieee1275/crypto.lst, Transfer type: octet, blksize=1024,
tsize=0
1273 18.444346 192.168.10.75 192.168.10.10 TFTP 111 Read Request, File:
/boot/grub2/powerpc-ieee1275/crypto.lst, Transfer type: octet, blksize=1024,
tsize=0
1287 18.570517 192.168.10.75 192.168.10.10 TFTP 113 Read Request, File:
/boot/grub2/powerpc-ieee1275/terminal.lst, Transfer type: octet,
blksize=1024, tsize=0
1308 19.115787 192.168.10.75 192.168.10.10 TFTP 113 Read Request, File:
/boot/grub2/powerpc-ieee1275/terminal.lst, Transfer type: octet,
blksize=1024, tsize=0
1324 19.473895 192.168.10.75 192.168.10.10 TFTP 92 Read Request, File:
/boot/grub2/grub.cfg, Transfer type: octet, blksize=1024, tsize=0
1345 20.117690 192.168.10.75 192.168.10.10 TFTP 109 Read Request, File:
/boot/grub2/powerpc-ieee1275/echo.mod, Transfer type: octet, blksize=1024,
tsize=0
1483 29.194426 192.168.10.75 192.168.10.10 TFTP 110 Read Request, File:
/boot/grub2/powerpc-ieee1275/linux.mod, Transfer type: octet, blksize=1024,
tsize=0
1508 29.272453 192.168.10.75 192.168.10.10 TFTP 108 Read Request, File:
/boot/grub2/powerpc-ieee1275/elf.mod, Transfer type: octet, blksize=1024,
tsize=0
```

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