L101288
Red Hat 7 Network Install on PowerVM

—

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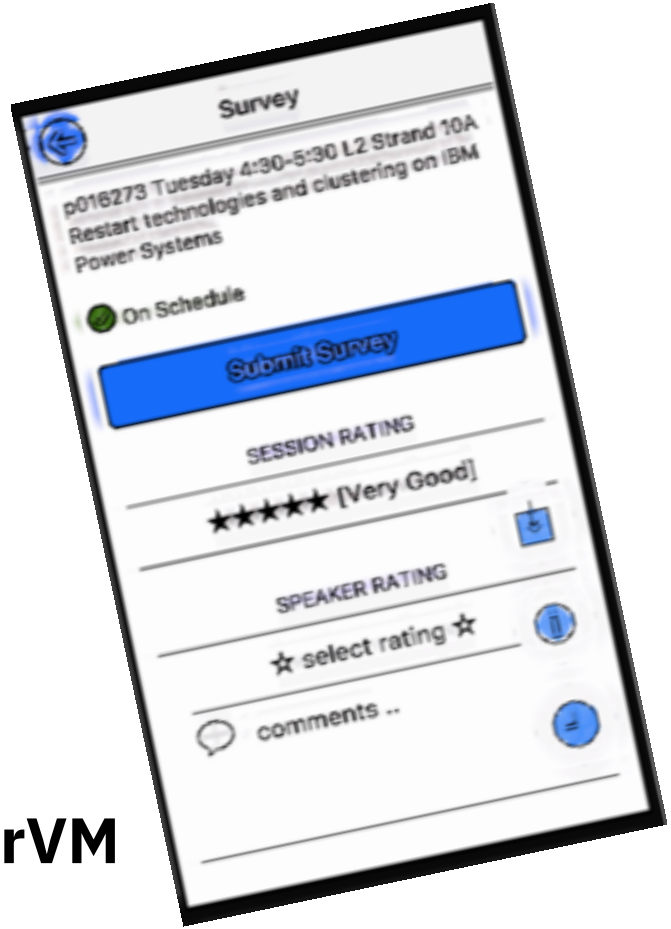


L101288
Red Hat 7 Network Install on PowerVM

RH74LE Install on PowerVM

- Back in 2014, we did network install of Red Hat onto PowerVM LPAR, including:
  - RHEL 65
  - Open Firmware 0 >
  - bootp
  - dhcp to respond to bootp
  - tftp
  - yaboot
  - kickstart
  - nfs

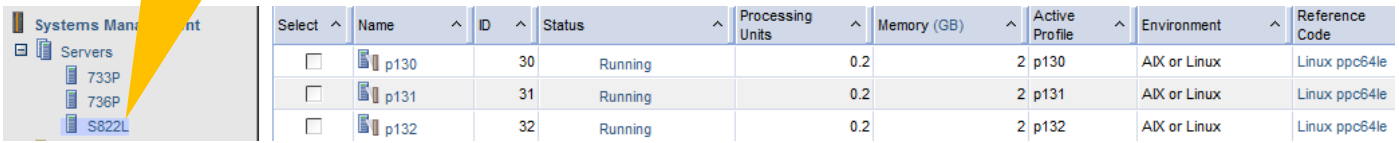
- Today, RH on PowerVM is still a target platform for many customers. Much is the same, but some things change. In this lab, we work with
  - RH74LE
  - SMS
  - bootp
  - dhcp to respond to bootp
  - tftp
  - grub2
  - kickstart
  - http

RH74LE PowerVM LPAR

- You each have a student worksheet, that lists two LPARs

	Virtual Machine Name	hostname	IP Address	netmask	Installed from
	pNNN	pNNN	10.31.193.NNN	255.255.240.0	10.31.193.186
	pNNY	pNNY	10.31.193.NNY	255.255.240.0	pNNN

- Install your first LPAR from my network install server
- Network install your second LPAR from your first LPAR
- You need not browser into the HMC. Command line instruction ahead. Just know that each of you have 2 LPARs on a POWER8 server
- What is needed for RH to become an install server?
- "Minimal install"
- RH media in dvd drive /dev/sr0, could be virtual or physical
- My tar file



First LPAR network install

- ssh (putty) to HMC, and power off target client LPAR

- In preparation for your first LPAR install
  - open putty on student laptop
  - ssh to your HMC (shown on worksheet)
  - student / abcd1234
  - power off your LPAR
  - close the vterm console for the LPAR

- Power off your PowerVM LPAR

```
student@m1-hmc-1:~> chsysstate -m S8n2L -r lpar -o shutdown --immed -n p1nn
HSCL1558 The operation is unavailable in the current partition state.
```

- This message says it was already off. Good.

```
student@m1-hmc-1:~> rmvterm -m S8n2L -p p1nn
```

- Close the vterm console to your LPAR

- Stay logged in at HMC

Back on HMC command line, activate client LPAR

- Still on the HMC, now boot your first LPAR to SMS…

- **Boot LPAR to System Management Services (SMS). LPAR name and LPAR profile name are the same, "p1nn"**

```
student@m1-hmc-1:~> chsysstate -m S8n2L -r lpar -o on  -n p1nn -f p1nn -b sms
```

```
student@m1-hmc-1:~> mkvterm -m S8n2L -p p1nn
```

- **Open vterm console to your LPAR, and look for the SMS Main Menu on the next slide**

SMS Main Menu

```
PowerPC Firmware
Version FW860.20 (SV860_082)
SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.PowerPC Firmware
-------------------------------------------------------------------------------
 Main Menu
 1.   Select Language
 2.   Setup Remote IPL (Initial Program Load)
 3.   Change SCSI Settings
 4.   Select Console
 5.   Select Boot Options
```

- Type 2 and hit enter for Setup Remote IPL

```
-------------------------------------------------------------------------------
 Navigation Keys:

                                  X = eXit System Management Services
-------------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

```
------------------------------------------------------------------------------
NIC Adapters
     Device                            Location Code                 Hardware
                                                                     Address
1.  Interpartition Logical LAN      U8233.E8B.103733P-V26-C2-T1  5e15ee8c4302
```

- **Type 1 and hit enter for the "Interpartition Logical LAN"**

```
------------------------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen   X = eXit System Management Services
------------------------------------------------------------------------------
Type menu item number and press Enter or select Navigation key:1
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Select Internet Protocol Version.

  1. IPv4 - Address Format 123.231.111.222
  2. IPv6 - Address Format 1234:5678:90ab:cdef:1234:5678:90ab:cdef

  ---
  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:1

- Type 1 and hit enter for IPv4

SMS Menus

```
PowerPC Firmware
Version FW860.20 (SV860_082)
SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.
-------------------------------------------------------------------------------
 Select Network Service.
 1.   BOOTP
 2.   ISCSI
```

- Type 1 and hit enter for BOOTP

```
-------------------------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System Management Services
-------------------------------------------------------------------------------
Type menu item number and press Enter or select Navigation key:1
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Network Parameters
  Interpartition Logical LAN: U8233.E8B.103733P-V26-C2-T1
  1. IP Parameters
  2. Adapter Configuration
  3. Ping Test
  4. Advanced Setup: BOOTP

  - **Type 1 and hit enter for IP Parameters**

  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:1

SMS Menus

```
 PowerPC Firmware
 Version FW860.20 (SV860_082)
 SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.
-------------------------------------------------------------------------------
 IP Parameters
Interpartition Logical LAN: U8233.E8B.103733P-V26-C2-T1
 1.   Client IP Address                    [10.31.193.NNN]
 2.   Server IP Address                    [10.31.193.186]
 3.   Gateway IP Address                   [10.31.196.250]
 4.   Subnet Mask                          [255.255.240.0]
```

- **Fill in all four of these.**
- **Client - your PowerVM LPAR IP**
- **Server - For your first LPAR, use my server 10.31.193.186. For your second LPAR, use your first LPAR for Server IP address**
- **Gateway as appears here**
- **Subnet Mask as appears here**
- **When satisfied, hit ESC once**

```
-------------------------------------------------------------------------------
 ESC key = return to previous screen         X = eXit System Management Services
-------------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Network Parameters
  Interpartition Logical LAN: U8233.E8B.103733P-V26-C2-T1
  1. IP Parameters
  2. Adapter Configuration
  3. Ping Test
  4. Advanced Setup: BOOTP

  - Type 3 and hit enter for Ping Test

  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:3

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Ping Test
  Interpartition Logical LAN: U8233.E8B.103733P-V26-C2-T1
  Speed, Duplex: auto,auto
  Client IP Address: 10.31.193.*NN*
  Server IP Address: 10.31.193.*NNN*
  Gateway IP Address: 10.31.196.250
  Subnet Mask: 255.255.240.0
  Protocol: Standard
  Spanning Tree Enabled: 0
  Connector Type:

  - **Type 1 and hit enter to Execute Ping Test**

  1. Execute Ping Test

  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:1

SMS Menus

- 10.31.193.NN: 24 bytes from 10.31.193.NNN: icmp_seq=10 ttl=? time=22 ms

```
.------------------.
|  Ping  Success.  |
`------------------'
```

- **Press any key**

```
Press any key to continue.........
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Ping Test
  Interpartition Logical LAN: U8233.E8B.103733P-V26-C2-T1
  Speed, Duplex: auto,auto
  Client IP Address: 10.31.193.*NN*
  Server IP Address: 10.31.193.*NNN*
  Gateway IP Address: 10.31.196.250
  Subnet Mask: 255.255.240.0
  Protocol: Standard
  Spanning Tree Enabled: 0
  Connector Type:

  - Type m to go to the Main Menu

  1. Execute Ping Test

  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:m

Back at SMS Main Menu

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

Main Menu

1. Select Language
2. Setup Remote IPL (Initial Program Load)
3. Change SCSI Settings
4. Select Console
5. **Select Boot Options**

- **Type 5 and hit enter to Select Boot Options**

Navigation Keys:

X = eXit System Management Services

Type menu item number and press Enter or select Navigation key:5

SMS Menus

```
PowerPC Firmware
Version FW860.20 (SV860_082)
SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.
-------------------------------------------------------------------------------
Multiboot
1.   Select Install/Boot Device
2.   Configure Boot Device Order
3.   Multiboot Startup <OFF>
4.   SAN Zoning Support
```

- Type 1 and hit enter to Select Install/Boot Device

```
-------------------------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System Management Services
-------------------------------------------------------------------------------
Type menu item number and press Enter or select Navigation key:1
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

```
--------------------------------------------------------------------------------
Select Device Type
1.   Tape
2.   CD/DVD
3.   Hard Drive
4.   Network
5.   List all Devices
```

- Type 4 and hit enter for Network

```
--------------------------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System Management Services
--------------------------------------------------------------------------------
Type menu item number and press Enter or select Navigation key:4
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

```
--------------------------------------------------------------------------------
Select Network Service.
1.   BOOTP
2.   ISCSI
```

- Type 1 and hit enter for BOOTP

```
--------------------------------------------------------------------------------
Navigation keys:
M = return to Main Menu
ESC key = return to previous screen         X = eXit System Management Services
--------------------------------------------------------------------------------
Type menu item number and press Enter or select Navigation key:1
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

  Select Device
  Device Current Device
  Number Position Name
  1. 3 Interpartition Logical LAN
  (loc=U8247.22L.211C31A-V30-C2-T1)

  Navigation keys:
  M = return to Main Menu
  ESC key = return to previous screen X = eXit System Management Services
  ---
  Type menu item number and press Enter or select Navigation key:1

- **Type the number of the "Interpartition Logical LAN" and hit enter**

SMS Menus

```
 PowerPC Firmware
 Version FW860.20 (SV860_082)
 SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.
-------------------------------------------------------------------------------
 Select Task

Interpartition Logical LAN
    ( loc=U8233.E8B.103733P-V26-C2-T1 )

 1.   Information
 2.   Normal Mode Boot
 3.   Service Mode Boot
```

- Type 2 and hit enter for Normal Mode Boot

```
-------------------------------------------------------------------------------
 Navigation keys:
 M = return to Main Menu
 ESC key = return to previous screen         X = eXit System Management Services
-------------------------------------------------------------------------------
 Type menu item number and press Enter or select Navigation key:2
```

SMS Menus

- PowerPC Firmware
  Version FW860.20 (SV860_082)
  SMS (c) Copyright IBM Corp. 2000,2016 All rights reserved.

Are you sure you want to exit System Management Services?
1. **Yes**
2. No

- Type 1 for Yes and hit enter

Navigation Keys:

X = eXit System Management Services

Type menu item number and press Enter or select Navigation key:1

Boot Progress

```
----------------
chosen-network-type = ethernet,auto,none,auto
server IP           = 10.31.193.186
client IP           = 10.31.193.1nn
gateway IP          = 10.31.196.250
device              = /vdevice/l-lan@30000002
MAC address         = 5e 15 ea cc 74 2
loc-code            = U8233.E8B.103733P-V40-C2-T1

BOOTP request retry attempt: 1
```

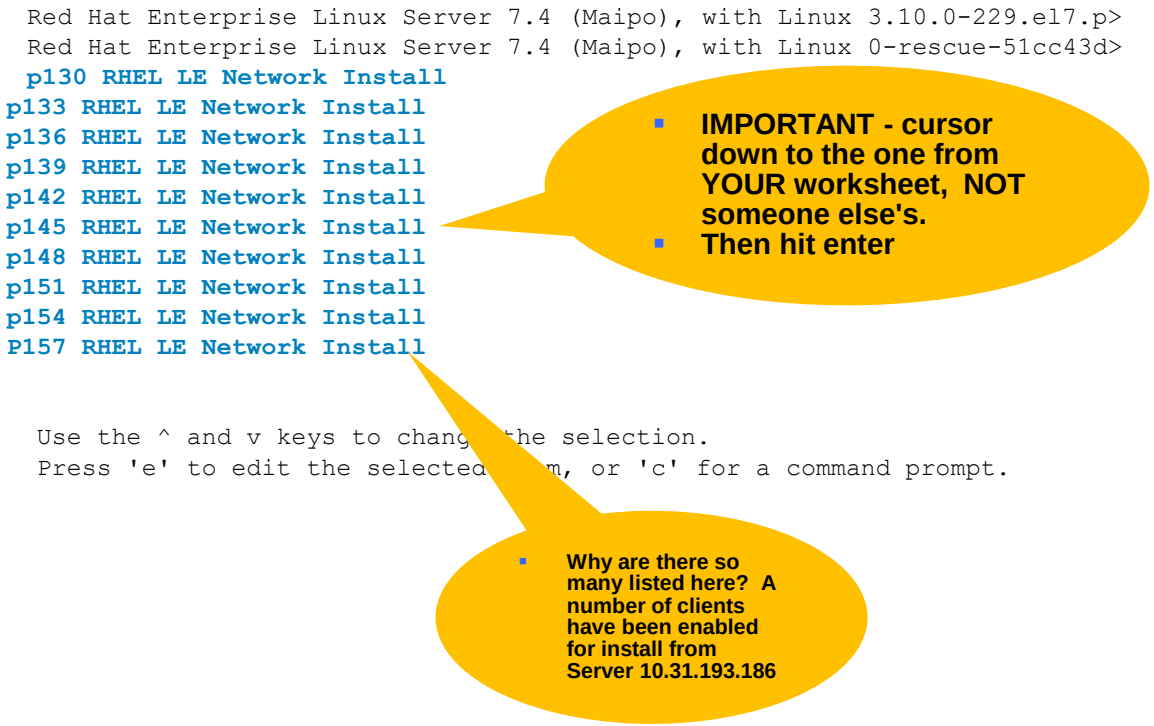
- What you put into SMS Remote IPL Setup

- What DHCP and tftp returmed from the install server

```
TFTP BOOT --------------------------------------------------
Server IP.....................10.31.193.186
Client IP.....................10.31.193.1nn
Gateway IP....................10.31.196.250
Subnet Mask...................255.255.240.0
( 1  ) Filename.................../boot/grub2/powerpc-ieee1275/core.elf
TFTP Retries..................5
Block Size....................512
FINAL PACKET COUNT = 324
FINAL FILE SIZE = 165876  BYTES
```

grub menu

- Quickly cursor down to your LPAR menuentry, and press enter



Installation complete

```
Installing iwl135-firmware (423/423)
Performing post-installation setup tasks
Installing boot loader
.
Performing post-installation setup tasks
.
Configuring installed system
.
Writing network configuration
.
Creating users
.
Configuring addons
.
Generating initramfs
.
Running post-installation scripts
.
        Use of this product is subject to the license agreement found at
usr/share/redhat-release/EULA

        Installation complete.  Press return to quit
```

Client LPAR Console login

- Client console login

```
[  OK  ] Started IBM Performance Management for PowerLinux Systems.
         Starting IBM Performance Management for PowerLinux Systems...
[  OK  ] Started Command Scheduler.
         Starting Command Scheduler...
[  OK  ] Started LVM2 PV scan on device 8:3.
[    5.026504] IPv6: ADDRCONF(NETDEV_UP): eth0: link is not ready

Red Hat Enterprise Linux Server 7.4 (Maipo)
Kernel 3.10.0-693.11.6.el7.ppc64le on an ppc64le

p142 login: [   12.285437] DCCP: Activated CCID 2 (TCP-like)
[   12.285477] DCCP: Activated CCID 3 (TCP-Friendly Rate Control)
[   13.633283] bridge: automatic filtering via arp/ip/ip6tables has been deprecated. Update your
cripts to load br_netfilter if you need this.
[   13.634919] Bridge firewalling registered
[   13.655693] nf_conntrack version 0.5.0 (16384 buckets, 65536 max)
[   13.882232] IPv6: ADDRCONF(NETDEV_UP): docker0: link is not ready
[   19.055484] rpaphp: RPA HOT Plug PCI Controller Driver version: 0.1
```

- **That is your console login: prompt. Other console messages may follow it**
- **Login as root, abcd1234**

Client LPAR Console login

```
[root@p1nn ~]# systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/usr/lib/systemd/system/docker.service; enabled; vendor preset: disabled)
   Active: active (running) since Mon 2017-04-10 17:45:56 EDT; 1min 30s ago
     Docs: https://docs.docker.com
 Main PID: 1435 (dockerd)
   Memory: 68.0M
   CGroup: /system.slice/docker.service
           ├─1435 /usr/bin/dockerd
           └─1725 docker-containerd -l unix:///var/run/docker/libcontainerd/d...

Apr 10 17:45:54 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:54.96..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:55.99..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.02..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.05..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.16..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.22..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.23..."
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.23..."
Apr 10 17:45:56 p130.pvw.ibm.com systemd[1]: Started Docker Application Container Engine.
Apr 10 17:45:56 p130.pvw.ibm.com dockerd[1435]: time="2017-04-10T17:45:56.24..."
Hint: Some lines were ellipsized, use -l to show in full.
```

- **If we find docker "active running" we know that your install ran all the way to the end of the kickstart.**
- **As preparation for IBM Cloud private (Kubernetes) lab, the kickstart installs and enables docker**

Turn your first LPAR into an install server

- On your first LPAR, as root…
- Retrieve sk tar file script

```
# cd
# wget http://10.31.193.186/kickstart/sk_rh_v26.tar.gz

# tar -Pxzvf ./sk_rh_v26.tar.gz
```

- These files include
  - the script ./sk_rh_v20_pvm
  - A performance and mongo repository for the performance lab
  - Templates for kickstart files e.g., ./raw-template-v13-73LE-ks.cfg
  - the rpm for IBM repository definitions (enable RMC, DLPAR, LPM, etc)
  - an expect script to run with the ibm repository configure script

Turn your first LPAR into an install server

- Run the script with no arguments first, to see usage message

```
# ./sk_rh_v20_pvm
Usage:

For server setup, use -s flag.  If selinux is not disabled,
you will be prompted to take reboot
sk_rh_v20_pvm -s

After setup, to enable a client for install
sk_rh_v20_pvm -H <hmc ip> -u <hmc user> \
              -m <managed server> \
              -c <client hostname> \    (must resolve to IP)
              -p <partition name> \
              -f <profile name> \
              -d <targetdisk> (e.g. sda for single path, mpatha for multipath)

Enable assumes client LPAR is powered off, and
the LPAR console is not open.  The client LPAR
will be activated to read Ethernet MAC address
by HMC lpar_netboot command.
```

Setup your install server

- as root on your first LPAR

```
# ./sk_rh_v20_pvm -s
```

You will be prompted for a "simple" version name for what you are installing. The script has been generalized to handle any RH7, CentOS7, on PowerVM

IF prompted, take reboot of first LPAR. If not prompted, don't. You'll only be prompted for reboot if selinux was permissive or enforcing.

Also at this time, open another ssh session to your HMC, for your 2nd LPAR install. Power off the 2nd LPAR, and close its console

```
# chsysstate -m S8n2L -r lpar -o shutdown --immed -n p1nq
# rmvterm -m S8n2L -p p1nq
```

Enable your 2nd LPAR install

- **Do this for the second LPAR**
- as root on your first LPAR…

```
# ./sk_rh_v20_pvm -H <HMC ip addr> -u <HMC user name> \ <enter>
> -m <managed server name> \ <enter>
> -c <LPAR hostname> \ <enter>
> -p <LPAR name> \ <enter>
> -f <LPAR profile name> \ <enter>
> -d sda <enter>
```

- **See worksheet for HMC IP. Everyone uses HMC user "student"**
- **Hostname, LPAR name, profile name are all the same "p1nn" See your worksheet**

```
# ./sk_rh_v20_pvm -H 10.31.193.20 -m S822L -u student -c p1nn -p p1nn -f p1nn
check if p1nn is already running...
enter student password at HMC 10.31.193.20
The authenticity of host '10.31.193.20 (10.31.193.20)' can't be established.
ECDSA key fingerprint is 0e:4f:6b:63:f9:ca:9b:0f:7b:92:a2:54:53:fb:26:5e.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.31.193.20' (ECDSA) to the list of known hosts.
Password:
running lpar_netboot at HMC 10.31.193.20 for MAC address of p1nn ...
enter student password at HMC 10.31.193.20
Password:
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-3.10.0-229.el7.ppc64
Found initrd image: /boot/initramfs-3.10.0-229.el7.ppc64.img
Found linux image: /boot/vmlinuz-0-rescue-51cc43dd509a4fd88eabe91292bc8d5c
Found initrd image: /boot/initramfs-0-rescue-1cc43dd509a4fd88eabe91292bc8d5c.img
done
```

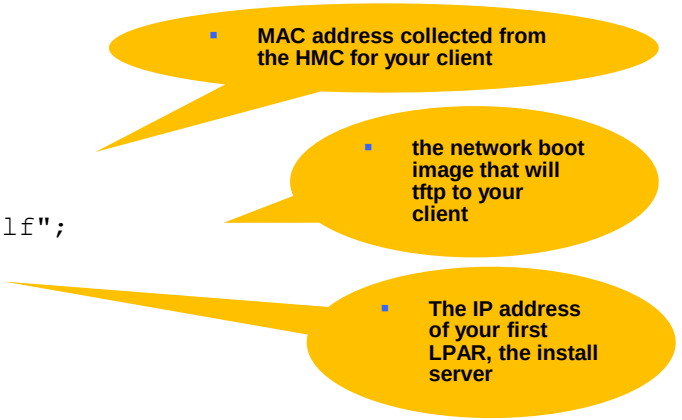
- **sample output**

What did the script do?

- See the client entry in /etc/dhcp/dhcpd.conf

  # tail -7 /etc/dhcp/dhcpd.conf

```
host p1nq {
hardware ethernet 5e:15:ee:31:31:8c:02;
fixed-address 10.31.193.1nn;
filename "/boot/grub2/powerpc-ieee1275/core.elf";
server-name "10.31.193.1nq";
}
```



- See the grub2 menuentry for your client

```
# tail -6 /etc/grub.d/40_custom
set timeout=120

menuentry 'p1nn RHEL LE Network Install' --class fedora --class gnu_linux --class gnu --class os {
        linux /ppc/ppc64/vmlinuz ro selinux=0 inst.text inst.ks=http://10.31.193.1nn/kickstart/p1nq-ks.cfg
        initrd /ppc/ppc64/initrd.img
}
```

What did the script do?

- The script also parsed one of the kickstart templates with sed, to create a specific kickstart for your 2nd LPAR

```
# ls /var/www/html/kickstart/*cfg
/var/www/html/kickstart/template-v13-73LE-ks.cfg
/var/www/html/kickstart/template-v13-73LE-no-mongo-ks.cfg
/var/www/html/kickstart/template-spencert-ks.cfg
/var/www/html/kickstart/template-nasypany-ks.cfg
/var/www.html/kickstart/p1nq-ks.cfg
```

Enable your PowerVM client LPAR install

- Just FYI, the script is using native tools provided by Red Hat, for handling grub2 in the network install on PowerVM
  - grub2-mknetdir
  - writing your own custom grub entries in /etc/grub.d/40_custom
  - grub2-mkconfig
  - https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Installation_Guide/chap-installation-server-setup.html#sect-network-boot-setup-ppc-grub2

21.1.3. Configuring Network Boot for IBM Power Systems Using GRUB2

Earlier, you opened another HMC login session

- Boot your 2nd LPARs SMS
  `# chsysstate -m S8n2L -r lpar -o on -n p1nq -f p1nq -b sms`
- Open the vterm console for 2nd LPAR
  `# mkvterm -m S8n2L -p p1nq`
- Remote IPL Setup, this time **server IP is YOUR first LPAR IP**
- For 2nd LPAR choose network as boot / install device
- Use pages 8-23 in this deck for guidance on Remote IPL, and Install / Boot device
- Network boot 2nd LPAR, and install if from your 1st LPAR
- Check for docker running on 2nd LPAR, after install

RH Network Install on PowerVM Summary

- Your first RH74LE LPAR was installed from my server 10.31.193.186
- Your second was installed from your first LPAR
- POWER Firmware, Open Firmware, SMS…
  - shows a fair number of exposed nuts and bolts (bootp, dhcp, tftp, grub) and that…
  - necessitates turning of nuts and bolts inside your RH Install Server…
  - which the sk_rh_v20_pvm script handled.
- Your install server could now install 1000s of PowerVM LPARs.

Thank you

Steven Knudson
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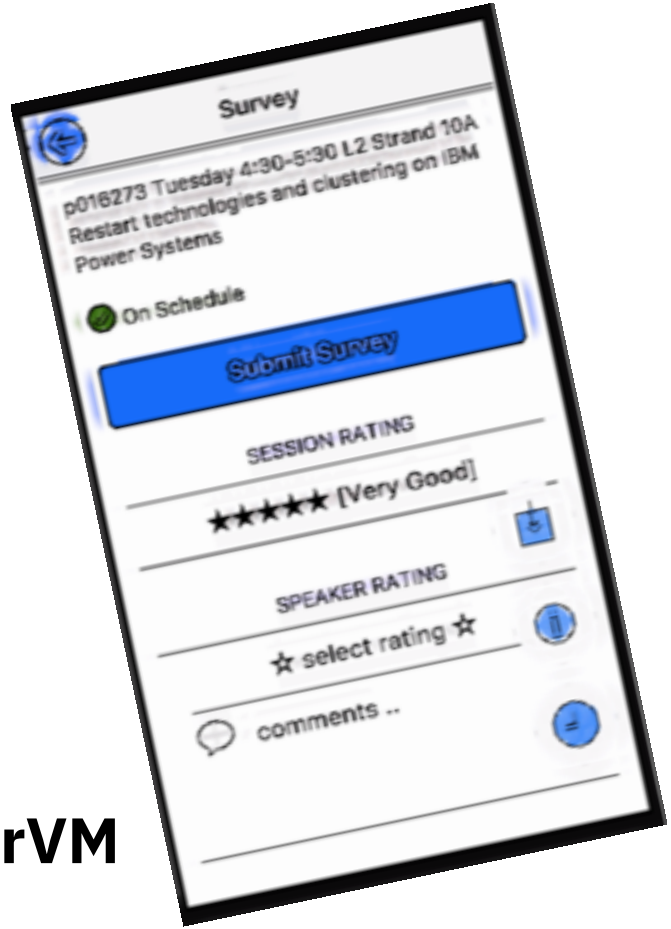

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Red Hat 7 Network Install on PowerVM

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