xCAT 2 cookbook for pLinux on IBM Power Series

Date: 02/19/2009

Contents

Table of Contents

1. Introduction

This cookbook introduces how to use the xCAT2 to install Linux on the IBM power series machines.
The power series machine has following characters:

1. Has multiple Lpars (The Lpar will be the target machine to install, that means the Lpar will be the compute node);
2. The Ethernet card and SCSI partition are virtual devices;
3. Use the HMC or IVM as the HCP (hardware control point)

xCAT supports two types of installation type for compute node: Full installation Diskfull (Statefull) and Diskless (Stateless). xCAT also supports a hierarchical cluster which uses one or more service nodes to handle the installation and management of compute nodes. **This cookbook will not cover hierarchy**.
Base on the two types of installations, the following installation scenarios will be introduced:

1. Install a stateful compute node
2. Install a stateless compute node

In order to make the reader understands the installation steps easily, this cookbook introduces a test environment as an example to simulate the whole installation process. The following is the test environment:

The management node:

Arch: Lpar of p5/p6
OS: Red Hat 5.2
Hostname: pmanagenode
IP: 192.168.0.1
HCP: HMC

The compute node:

Arch: Lpar of p5/p6
OS: Red Hat 5.2
Hostname: pnode1
IP: 192.168.0.10
HCP: HMC

The xCAT version:

xCAT-2.1+

2. Install the Management node

2.1. Install xCAT 2 on the Management node

Before preceding to setup your pLlinux Cluster, you should first read xCATtop for information on downloading and installing xCAT on your Management Node.

3. Setup the Management Node for node installs

3.1. Create a YUM repository for the RHEL node installs

3.1.1. Copy the iso of the Operating System which this MN running.

You can copy it from internal source server or download it from Internet

```
mkdir /iso
copy RHEL5.2-Server-20080430.0-ppc-DVD.iso to /iso/
```

3.1.2. Mount the content of the iso to a dir

```
mkdir /iso/1
cd /iso
mount -o loop RHEL5.2-Server-20080430.0-ppc-DVD.iso 1
```

3.1.3. Create a yum repository file for OS image

```
cd /etc/yum.repos.d
```

Create the /etc/yum.repos.d/rhel-Server.repo:

```
[rhe-5-server]
          name=RHEL 5 SERVER packages
          baseurl=file:///iso/1/Server
          enabled=1
          gpgcheck=0
```

3.1.4. Create a zypper repository for SLES

Add the repository using "zypper" command:

```
zypper ar file:///iso/1 sles11

if you are creating a  SLES10.2 repository
   zypper sa file:///iso/1 sles10
```

4. Setup the management node

4.1. Workaround the atftpd issue with p5

The tftp client in the open firmware of p5 is only compatible with tftp-server instead of atftpd which required by xCAT2. So we have to remove the atftpd first and then install the tftp-server. This is not required for p6 or later.

4.1.1. Remove atftp

```
service tftpd stop
rpm --nodeps -e atftp
```

4.1.2. Install the tftp server needed by xCAT, and restart it

For RHEL:

```
yum install tftp-server.ppc
```

Notes: make sure the entry "disable=no" in the /etc/xinetd.d/tftp.

```
service xinetd restart
For SLES:
zypper install tftp-server.ppc
```

4.2. Setup common attributes for xCAT in the database

4.2.1. Modify the table ppchcp (Set the default account of the HMC)

```
chtab hcp=hmc.cluster.net ppchcp.username=hscroot ppchcp.password=abc123
```

4.2.2. Modify table passwd (Set the default account of the installed node)

```
chtab key=system passwd.key=system passwd.username=root
   passwd.password=cluster
```

4.3. Define nodes in the Database

The definition of a node is stored in several tables of the xCAT database. There are two ways to define a node and add records in tables:

You can use the chdef, mkdef command and add them manually or use the **rscan** command to collect the data and use a stanza file.

We will use **rscan** command to get the attributes of the node and save the attributes into a stanza file. The stanza file can be used to update the database. You can then use the commands (**mkdef**, **chdef**, **lsdef**, and **rmdef)** to display or edit the information that was created in the database.

EXAMPLE:

We want to install a node with following attributes.

Hostname: pnode1
IP: 192.168.0.10
Arch: ppc64 (An Lpar of power5); machine name: Server-9117-MMA-SNxxxx; Lpar ID: 1; Lpar profile: vlpar1.prof;
HCP: HMC (hmc.cluster.net: 192.168.0.100)
Install Interface: eth0
OS: rhels5.2
Postscripts: setupntp (The scripts will be run after the installation)
Group: hmc,all (The node belong to these groups, then it will has the attributes of these groups as default)
Nodetype: compute (A common node. If you want to install a service node, the Nodetype should be “service”)

The attributes of Management node:

Hostname: pmanagenode
IP: 192.168.0.1

4.3.1. Gather Node information using the rscan command

4.3.1.1. Define HMC as an xCAT node

First, we define the hardware control point of the nodes in the cluster database.

The following command will create an xCAT node definition for an HMC with a host name of "*hmc01*". The *groups, nodetype, mgt, username*, and *password* attributes must be set.

```
mkdef -t node -o hmc01 groups="all"  nodetype=hmc  mgt=hmc
            username=hscroot  password=abc123
```

4.3.1.2. Discover the LPARs managed by HMC

Use the **rscan** command to gather the LPAR information. This command can be used to display the LPAR information in several formats and can also write the LPAR information directly to the xCAT database. In this example we will use the "-z" option to create a stanza file that contains the information gathered by **rscan** as well as some default values that could be used for the node definitions.

To write the stanza format output of **rscan** to a file called "node.stanza*"* run the following command.

```
rscan –z hmc01 >  node.stanza
```

This file can then be checked and modified as needed. For example you may need to add a different name for the node definition or add additional attributes and values.

Note*: The stanza file will contain stanzas for things other than the LPARs. This information must also be defined in the xCAT database. It is not necessary to modify the non-LPAR stanzas in any way.*

The stanza file will look something like the following.

```
Server-9117-MMA-SN10F6F3D:
        objtype=node
        nodetype=fsp
        id=5
        model=9118-575
        serial=02013EB
        hcp=hmc01
        pprofile=
        parent=Server-9458-10099201WM_A
        groups=fsp,all
        mgt=hmc

pnode1:
        objtype=node
        nodetype=lpar,osi
        id=9
        hcp=hmc01
        pprofile=lpar9
        parent=Server-9117-MMA-SN10F6F3D
```

```
    groups=all
    mgt=hmc

pnode2:
    objtype=node
    nodetype=lpar,osi
    id=7
    hcp=hmc01
    pprofile=lpar6
    parent=Server-9117-MMA-SN10F6F3D
    groups=all
    mgt=hmc
```

***Note**: The **rscan** command supports an option to automatically create node definitions in the xCAT database. To do this the LPAR name gathered by **rscan** is used as the node name and the command sets several default values. If you use the "-w" option make sure the LPAR name you defined will be the name you want used as your node name.*

For a node which was defined correctly before, you can use the "lsdef –z [nodename]> node.stanza" command to export the definition into the node.stanza, and use command "cat node.stanza | chdef -z" to update the node.stanza according to your need.

4.3.1.3. Define xCAT node using the stanza file

The information gathered by the **rscan** command can be used to create xCAT node definitions.
Since we have put all the node information in a stanza file we can now pass the contents of the file to the **mkdef** command to add the definitions to the database.

```
cat node.stanza | mkdef –z
```

4.3.2. Update the node definitions using the chtab command:

4.3.2.1. Modify the table nodelist

```
chtab node="pnode1" nodelist.groups=hmc,all
```

4.3.2.2. Modify the table nodehm

This lpar of power5 use the HMC as the HCP

```
chtab node="pnode1" nodehm.power=hmc nodehm.mgt=hmc nodehm.cons=hmc
```

4.3.2.3. Modify the table noderes

```
chtab node="pnode1" noderes.netboot=yaboot
   noderes.tftpserver=192.168.0.1 noderes.nfsserver=192.168.0.1
   noderes.monserver=192.168.0.1 noderes.installnic="eth0"
   noderes.primarynic="eth0" noderes.xcatmaster=192.168.0.1
```

Note: Please make sure the attributes "installnic" and "primarynic" are set up the correct Ethernet Interface of compute node. Otherwise the compute node installation may hang requesting information from an incorrect interface.

4.3.2.4. Modify the table nodetype

```
chtab node="pnode1" nodetype.os="rhels5.2" nodetype.arch="ppc64"
   nodetype.profile="compute" nodetype.nodetype="lpar,osi"
```

Note: This means when node: pnode1 is installed, it will install the rhels5.2 OS and architecture: ppc64.

4.3.2.5. Modify the table ppc and vpd

How to obtain the node attributes from the HMC

To achieve the ARCH attributes in example, we list all the lpar attributes of the node. You can follow these steps to obtain the lpar attributes of a new Lpar.

1. Login the HMC
2. Use the "ssh HMC-l hscroot id to login" .
3. Display the machines managed by this HMC
   lssyscfg -r sys
4. Display the lpars of the machine
   lssyscfg -r lpar -m Server-9117-MMA-SNxxxx

Modify the table ppc

```
chtab node="pnode1" ppc.hcp=hmc.cluster.net ppc.id=1
   ppc.pprofile=vlpar1.prof ppc.parent=Server-9117-MMA-SNxxxx
```

Modify the table vpd

```
chtab node=Server-9117-MMA-SNxxxx vpd.serial=xxxx vpd.mtm=9117-MMA
Note: the mtm and serial num come from the output of 5.1.5.1
```

4.3.2.1. Modify the table chain

```
chtab node="pnode1" chain.node="pnode1" chain.currstate=boot
   chain.currchain=boot
```

4.3.2.2. Modify the table postscripts

```
chtab node=pnode1 postscripts.postscripts=setupntp
This only needs to be done, if  you want NTP setup on the compute node.
```

4.4. Setup the Management Node Services

4.4.1. Update the networks table

EXAMPLE:

An interface which needs to be added:

```
eth1      Link encap:Ethernet  HWaddr FE:99:72:0C:8B:04
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::fc99:72ff:fe0c:8b04/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:5373584 errors:0 dropped:0 overruns:0 frame:0
```

```
        TX packets:10583411 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:406081967 (387.2 MiB)  TX bytes:15279683348 (14.2 GiB)
        Interrupt:20
```

You can use the chtab or tabedit command to add the network entry:

```
chtab net=192.168.0.0 networks.netname=net1 networks.mask=255.255.255.0
   networks.mgtifname=eth1 networks.gateway=192.168.0.1
   networks.dhcpserver=192.168.0.1 networks.tftpserver=192.168.0.1
   networks.nameservers=192.168.0.1
```

4.4.2. Setup the DNS

4.4.2.1. Setup /etc/hosts with entries for all you nodes, hmcs, fsps

```
127.0.0.1   localhost
192.168.0.1 pmanagenode
192.168.0.10 pnode1
```

4.4.2.2. Setup the nameserver

Add following lines into /etc/resolv.conf

```
search cluster.net
nameserver 192.168.0.1
```

4.4.2.3. Setup the DNS attributes in the Site table

```
chtab key=nameservers site.value=192.168.0.1 (Setup local machine as
   nameserver)
chtab key=forwarders site.value=9.114.1.1  (Setup the external
   nameserver)
chtab key=domain site.value=cluster.net (Setup the local domain)
```

4.4.2.4. Setup DNS configuration

```
makedns
service named start
chkconfig --level 345 named on
```

4.4.3. Configure conserver

```
makeconservercf
service conserver restart
```

4.4.4. Check rcons

```
rcons pnode1
```

If the output is:

Can't locate object method "stty" via package "IO::Tty" at
/opt/xcat/lib/perl/xCAT/PPCcli.pm line xxx.

Download the package "perl-IO-Stty-.02-1.2.el5.rf.noarch.rpm" and install the package manually, following the step:

rpm -ivh perl-IO-Stty-.02-1.2.el5.rf.noarch.rpm

4.4.5. Update the mac table with the address of the node(s)

If there's only one ethernet adapter on the node:

```
getmacs pnode1
```

But, if there're more than one ethernet adapters on the node, you have to specify more parameters like this:

```
getmacs pnode1 -S 192.168.0.1 -G 192.168.0.1 -C 192.168.0.10
```

The output looks like following:

```
pnode1:
 Type   Location Code   MAC Address     Full Path Name  Ping Result
   Device Type

ent U9133.55A.10E093F-V4-C5-T1 f2:60:f0:00:40:05 /vdevice/l-
   lan@30000005  virtual
```

4.4.6. Check rpower is working to the node

```
rpower pnode1 stat
rpower pnode1 on/off
```

4.4.7. Setup dhcp

4.4.7.1. Setup the site table dhcp interfaces

```
chtab key=dhcpinterfaces site.value='pmanagenode|eth1'
```

4.4.7.2. Configure the DHCP

```
Add the relevant networks into the DHCP configuration:
makedhcp -n
```

Add the defined node into the DHCP configuration:

```
makedhcp -a
service dhcpd restart
```

Note: Please make sure there is only one dhcpd server running in the subnet

5. Install a Compute Node

EXAMPLE:

Hostname: pnode1
IP: 192.168.0.10
Arch: ppc64 (An Lpar of power5); machine name: Server-9117-MMA-SNxxxx; Lpar ID: 1; Lpar profile: vlpar1.prof;
HCP: HMC (hmc.cluster.net: 192.168.0.100)

Install Interface: eth0
OS: rhels5.2
Postscripts: setupntp (The scripts will be run after the installation)
Group: hmc,all (The node belong to these groups, then it will has the attributes of these groups as default)
Nodetype: compute (A common node. If you want to install a service node, the Nodetype should be "service")

The attributes of Management node:

Hostname: pmanagenode
IP: 192.168.0.1

An example for pnode1.stanza

```
pnode1:
   objtype=node
   arch=ppc64
   cons=hmc
   power=hmc
   currchain=boot
   currstate=boot
   groups=hmc,all
   hcp=hmc.cluster.net
   id=1
   mgt=hmc
   nodetype=lpar,osi
   os=rhels5.2
   parent=Server-9117-MMA-SNxxxx
   mtm=9117-MMA
   serial=xxxx
   power=hmc
   pprofile= vlpar1.prof
   profile=compute.ppc64
   installnic=eth0
   primarynic=eth0
   postscripts=setupntp
   netboot=yaboot
   xcatmaster=192.168.0.1
   tftpserver=192.168.0.1
   monserver=192.168.0.1
   nfsserver=192.168.0.1
```

5.1.1. Prepare the installation source

```
copycds /iso/RHEL5.2-Server-20080430.0-ppc-DVD.iso
```

Note: If you encounter the issue that the iso cannot be mounted by the copycds command. Make sure the SElinux is disabled. See .

5.1.2. Diskfull/Statefull Node installation

5.1.2.1. Set the node status

```
nodeset "pnode1" install
```

5.1.2.2. Reboot to start the installation

```
rpower "pnode1" boot
```

5.1.2.3. Check the installation results

1. SSH service on the node is working and you can login without a password
2. If ssh is not working, force exchange the ssh key to the compute node using xdsh:

```
xdsh pnode1 -K

        Note: If you cannot ssh into the node without a password, then
        when you run this command to exchange the keys. At that point
        you should be able to run

xdsh pnode1 date
```

5.1.1. Install a Diskless/Stateless Compute node

5.1.1.1. Generate the stateless image for compute node

We will build the stateless image on the Management Node. It will have the same OS and architecture of the Management node. If you need another OS image or architecture than is installed on the Management Node, you will need a machine that meets the architecture you want for the image and create the image on that node.

5.1.1.2. Check the compute node packaging list

```
cd /opt/xcat/share/xcat/netboot/rh/
```

For SLES:

```
cd /opt/xcat/share/xcat/netboot/sles/
```

Check to make sure compute.exlist excludes the packages you want to exclude.

Check to make sure compute.pkglist has the following packages to install

```
bash
nfs-utils
stunnel
dhclient
kernel
openssh-server
openssh-clients
busybox-anaconda
wget
vim-minimal
```

```
ntp
```

And add any other packages you would like to install on your compute node. For example, if you want to have userids with passwords you should add the following:

```
cracklib
libuser
passwd
```

For SLES11, make sure the files compute.sles11.ppc64.pkglist and compute.sles11.ppc64.otherpkgs.pkglist exist. And make sure compute.sles11.ppc64.pkglist has the following packages to install

```
aaa_base
bash
nfs-utils
dhcpcd
kernel-ppc64
openssh
psmisc
wget
sysconfig
syslog-ng
klogd
vim
```

Make sure compute.sles11.ppc64.otherpkgs.pkglist has at least the following packages to install

```
stunnel
```

5.1.1.3. Run image generation

```
cd /opt/xcat/share/xcat/netboot/rh
./genimage -i eth0 -n ibmveth -o rhels5.2 -p compute

For SLES11:
./genimage -i eth0 -n ibmveth -o sles11 -p compute
```

For SLES11, the rpm package of stunnel should be put into the directory /install/post/otherpkgs/sles11/ppc64. Since SLES11 doesn't ship stunnel with it, you have to build the rpm package from the source code. You can get the source code of stunnel from http://www.stunnel.org/download/source.html.

5.1.1.4. Edit inittab

This is only for SLES11, ignore it if the diskless image is for Red hat.

```
cd /install/netboot/sles11/ppc64/compute/rootimg/etc
```

Uncomment the console line in the file inittab:

```
cons:12345:respawn:/sbin/smart_agetty -L 38400 console
```

5.1.1.5. Edit init.d/boot.rootfsck

This is only for SLES11, ignore it if the diskless image is for Red hat.

```
cd /install/netboot/sles11/ppc64/compute/rootimg/etc
```
Edit the file init.d/boot.rootfsck if it exists, change "`MAY_FSCK=1`" to "`MAY_FSCK=0`" in the line 40.

5.1.1.6. Edit securetty

This is only for SLES11, ignore it if the diskless image is for Red hat.
Add "console" entry to the end of the file securetty if there's no "console" entry in the file.

5.1.1.7. Edit fstab:

cd /install/netboot/rhels5.2/ppc64/compute/rootimg/etc/
Add following lines into the fstab:

```
proc /proc proc rw 0 0
sysfs /sys sysfs rw 0 0
devpts /dev/pts devpts rw,gid=5,mode=620 0 0
compute_ppc64 / tmpfs rw 0 1
```

5.1.1.8. Pack the image

```
packimage -o rhels5.2 -p compute -a ppc64
or for SLES
packimage -o sles11 -p compute -a ppc64
```

5.1.1.9. Set the node status

```
nodeset "pnode1" netboot
```

5.1.1.10. Reboot to start the installation

```
rpower "pnode1" boot
```

5.1.1.11. Check the installation result

SSH service to the compute node is working. You can ssh login without a password.

6. Additional Commands

6.1. rflash

rflash - Performs Licensed Internal Code (LIC) update support for HMC-attached POWER5 and POWER6 Systems.

6.1.1. Requirements

POWER5 and POWER6 Licensed Internal Code updates must meet the following prerequisites:
1. Enable the HMC to allow remote ssh connections.
2. Ensure that ssh is installed on the AIX xCAT management node. If you are using an AIX management node, make sure the value of "useSSHonAIX" is "yes" in the site table.

chtab key="useSSHonAIX" site.value=yes

3. The Lpar , CEC, or BPA has been defined in the **nodelist, nodehm,nodetype,vpd, ppc** tables
4. Define the HMC related the above node as a node on the management node. For example,
nodeadd hmc01.clusters.com groups=hmc
5. Setup SSH connection to HMC
Run the rspconfig command to set up and generate the ssh keys on the xCAT management node and transfer the public key to the HMC. You must also manually configure the HMC to allow remote ssh connections. For example:
rspconfig hmc01.clusters.com sshcfg=enable
6. Get the Microcode update package and associated XML file.

6.1.1. To perform firmware update for a CEC of HMC-attached System p5 and p6

6.1.1.1. Define the CEC as a node on the management node .

Update the xCAT required xCAT tables:

Modify the nodelist table
nodeadd Server-m_tmp-SNs_tmp groups=hmc,all

Modify the table nodehm
chtab node="Server-m_tmp-SNs_tmp" nodehm.mgt="hmc"

Modify the table nodetype:
chtab node="Server-m_tmp-SNs_tmp" nodetype.nodetype="fsp"

Modify the table ppc:
chtab node="Server-m_tmp-SNs_tmp" ppc.hcp= hmc01.clusters.com

Modify the tab vpd:
chtab node=Server-m_tmp-SNs_tmp vpd.serial=s_tmp vpd.mtm=m_tmp

Set the account of the HMC(Modify the ppchcp):
chtab hcp=hmc01.clusters.com ppchcp.username=hscroot ppchcp.password=abc123

6.1.1.1. Setup SSH connection to HMC

Generate the ssh keys on the xCAT management node and transfer the public key to the HMC to configure the HMC to allow remote ssh connections. See Setup SSH connection to HMC.

6.1.1.1. Check firmware level

rinv Server-m_tmp-SNs_tmp firm

6.1.1.1. Update the firmware

Download the Microcode update package and associated XML file from the IBM Web site: http://www14.software.ibm.com/webapp/set2/firmware/gjsn. Create the **/tmp/fw** directory, if necessary, and copy the downloaded files to the **/tmp/fw** directory.

Run the **rflash** command with the **--activate** flag to specify the update mode to perform the updates.（Please see the "**rflash**" manpage for more information）

```
rflash Server-m_tmp-SNs_tmp  -p /tmp/fw --activate disruptive
```

NOTE: You Need check your update is concurrent or disruptive here!! other commands sample:

```
rflash Server-m_tmp-SNs_tmp  -p /tmp/fw --activate concurrent
```

Notes:

1) If the noderange is the group lpar, the upgrade steps are the same as the CEC's.
2) System p5 and p6 updates can require time to complete and there is no visual indication that the command is proceeding.

6.1.1. To perform firmware update for a BPA of HMC-attached System p5 and p6

6.1.1.1. Define the BPA as a node on the management node.

Update the xCAT tables:

Modify the nodelist table. Define the BPA as a node

nodeadd Server-m_tmps_tmp groups=hmc,all

Modify the table nodehm

```
chtab node="Server-m_tmps_tmp"  nodehm.mgt="hmc"
```

Modify the table nodetype:

```
chtab node="Server-m_tmps_tmp"  nodetype.nodetype="fsp"
```

Modify the table ppc:

```
chtab node="Server-m_tmps_tmp"  ppc.hcp= hmc01.clusters.com ppc.id=x
```

Modify the tab vpd:

```
chtab node=Server-m_tmps_tmp  vpd.serial=s_tmp vpd.mtm=m_tmp
```

Set the account of the HMC(Modify the ppchcp):
chtab hcp=hmc01.clusters.com ppchcp.username=hscroot ppchcp.password=abc123

6.1.1.2. Make sure that the BPA must be the "parent" attribute of one CEC which is controlled by the same HMC in PPC table.

If not, add an item in the table ppc:

```
chtab node="Server-mtmp-SNstmp"  ppc.hcp=
hmc01.clusters.com ppc.id=n ppc.parent="Server-
m_tmps_tmp"
```

6.1.1.1. Setup SSH connection to HMC

Generate the ssh keys on the xCAT management node and transfer the public key to the HMC to configure the HMC to allow remote ssh connections.

See Setup SSH connection to HMC.

6.1.1.1. User rinv to check the firmware level (see rinv manpage).

rinv Server-m_tmps_tmp firm

6.1.1.1. Update the firmware

Download he Microcode update package and associated XML file from the IBM Web site:
http://www14.software.ibm.com/webapp/set2/firmware/gjsn.

Create the **/tmp/fw** directory, if necessary, and copy the downloaded files to the **/tmp/fw** directory.

Run the rflash command with the --activate flag to specify the update mode to perform the updates.

```
rflash Server-m_tmps_tmp  -p /tmp/fw --activate disruptive
```

NOTE: You Need check your update is concurrent or disruptive here!! other commands sample:

```
rflash Server-m_tmps_tmp  -p /tmp/fw --activate concurrent
```

6.1.1. Commit currently activated LIC update(copy T to P) for a CEC of HMC-attached System p5 and p6

1. See To perform firmware update for a CEC of HMC-attached System p5 and p6 steps (1 – 4).
2. Check the output of the last step, to check whether the LIC will be committed. If yes the run the rflash command with the –commit flag.

```
rflash  Server-m_tmp-SNs_tmp --commit
```

Notes:
(1)If the noderange is BPA/Lpar, the commit steps are the same as the CEC's.
(2)If to recover the installed LIC updates , the 1-6 steps of 9.1.4 . Only the last step is different.
(3) At present, the command "**licutil**" on HMC doesn't support for the "**commit**" and "**recover**" operation on the BPA. And "**rflash**" is dependent on the "**licutil**" command. So When the **–commit** or **--recover** two flags is used, the **noderange** cannot be a BPA or BPA list in the "**rflash**" command. xCAT will pay the attention to the changes all the time.