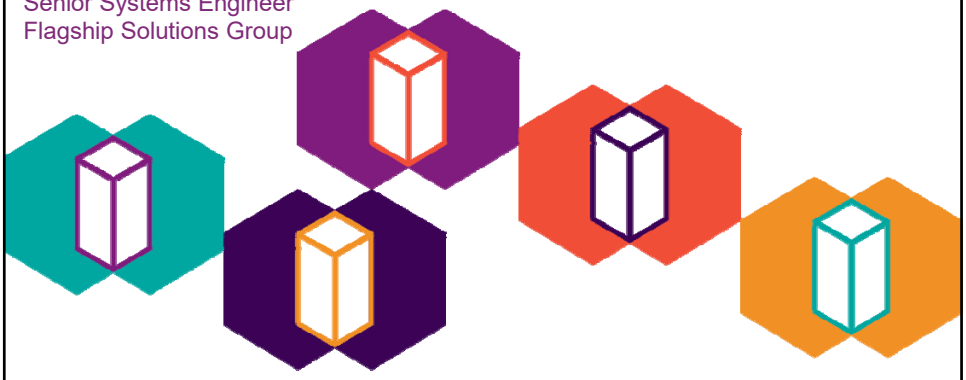
p014083 – NIM 101

Jaqui Lynch
Senior Systems Engineer
Flagship Solutions Group



Agenda

- Introduction
- NIM Resources
- Setup
- Client installs
- Hints and tips

2

Introduction

- Central point of management for installation and maintenance
- Used for LPARs and standalone servers
- Create golden image and clone LPARs
- Can install from software, golden image or mksysb
- Can use to apply maintenance or add bundles of products
- Can install multiple servers at a time
- Push or pull installs
- Fast – DVD takes about 8 hours, NIM 15 minutes
- Can do alternate disk installs, multibos, NIM clones

3

NIM environment

- Master
  - NIM server itself
  - Owns and provides the resources necessary to service clients
  - Stores information about clients and resources
  - Stores information about NIM in its database
  - Need to backup NIM database regularly
- Client
  - Machines defined as clients
  - Standalone, diskless, dataless
  - System WPAR machines
- Network
  - Must support NFS
  - If using TCP wrappers will need to unwrap tftp and bootpd on the NIM master
  - At AIX v5.3 NIM no longer requires the r commands (rsh)
  - Use nimsh instead of rsh, etc

4

NIM Server Setup

- Must be at highest level of AIX that you plan to support
- Should use dedicated resources for Disk and Network
  - Affects ability to restore images if depends on VIO
  - Same applies to TSM server
- Plan for memory (2-4GB is plenty) and core (.5 of a core with 2 VPs)
- Create scaleable VG - nimvg on disk to hold NIM resources
  - Do not put NIM resources into rootvg
- Create /nim filesystem in nimvg (JFS2)
- I also create a separate filesystem called /backups for mksysb images
- Install filesets and any updates from TLs for them
- bos.sysmgt.nim.master
- bos.sysmgt.nim.spot
- bos.sysmgt.nim.client
- Also ensure the following filesets are installed
  - bos.net.tcp.server
  - bos.net.nfs.server
- Use lslpp to check they are there

5

More Setup

- Note – NIM does not like dot in resource names so use _
- Put AIX DVD in the DVD drive or replace /dev/cd0 below with the directory you have the BFFs from the DVD loaded up to
- Setup NIM
  - nim_master_setup –B –a device=/dev/cd0 -a file_system=/nim -a volume_group=nimvg
  - Creates /tftpboot
  - Will not take a mksysb of the NIM server
  - Creates SPOT and lpp_source resources in /nim

  - Directory Structure:
  - /nim
  - /nim/lpp_source
  - /nim/images
  - /nim/spot
  - /nim/bosinst_data
  - /nim/resolv_conf

6

NIM on my 7.2 system

```
oslevel -s  (on NIM Master)
7200-01-02-1717

lslpp -l | grep bos.sysmgt.nim
  bos.sysmgt.nim.client     7.2.1.1  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.master     7.2.1.0  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.spot       7.2.1.0  COMMITTED  Network Install Manager - SPOT
  bos.sysmgt.nim.client     7.2.1.1  COMMITTED  Network Install Manager –

# df -g /nim
Filesystem    GB blocks     Free %Used    Iused %Iused Mounted on
/dev/lvnim       450.00    393.58   13%    69573     1% /nim

#ls -al /nim
total 16
drwxr-xr-x   10 root    system       4096 Feb 17 11:07 .
drwxr-xr-x   69 root    system       4096 May 05 13:05 ..
drwxr-xr-x    2 root    system        256 Feb 17 11:23 bosinst_data
drwxr-xr-x    2 root    system        256 Apr 24 09:37 images
drwxr-xr-x    2 root    system        256 Feb 17 11:06 installp_bundle
drwxr-xr-x    2 root    system        256 Feb 17 11:03 lost+found
drwxr-xr-x    4 root    system        256 Apr 24 09:20 lpp_source
drwxr-xr-x    2 root    system        256 May 05 13:01 mksysb
drwxr-xr-x    2 root    system        256 Feb 17 11:06 resolv_conf
```

Check network setup

- # cat /etc/hosts | grep gandalf
- 10.152.10.124   gandalf
-
- # cat /etc/inetd.conf
- ##
- ## service socket protocol wait/ user   server   server program
- ## name   type   nowait   program   arguments
- ##
- bootps dgram   udp   wait   root   /usr/sbin/bootpd   bootpd /etc/bootptab
- tftp   dgram udp6   SRC   nobody /usr/sbin/tftpd   tftpd -n
-
- Do not TCP wrap these
- For security reasons you can comment them out and just uncomment when you want to use them

8

NIM Resources

- Machines
  - These are the clients
- lpp_source
  - The lpp_source (Licensed Program Product source) directory contains the images that AIX uses to load software. These are typically the BFF (backup file format) images that exist on the AIX installation CDs or DVD. Each OS version should have its own lpp_source. Additionally these should be separated into 32-bit and 64-bit lpp_source sets.
- SPOT
  - The SPOT (Shared Product Object Tree) is a directory that is created from the lpp_source. The SPOT is used in a similar fashion to the boot images and installation scripts on the Base installation CD volume 1 for AIX. It may be necessary to create multiple SPOTs depending on the maintenance levels and versions that need to be supported.
- mksysb
  - The NIM master can use lpp_source to install an instance or it can install the instance from a mksysb of either that instance or another one. Once the mksysb is restored a script can be run automatically to customize the instance .

9

Create LPP and SPOT

Download base DVDs as ISO images and use smitty bffcreate to create a source directory containing the images
Download the latest service pack and save the images into a directory

Create an LPPsource
nim -o define -t lpp_source -a server=master -a source=/usr/local/software/aix72/aix72-base -a packages=all -a location=/nim/lpp_source/lpp7212 lpp7212
Update LPPsource with fixes and additional packages
nim -o update -a packages=all -a source=/usr/local/software/addons lpp7212
nim -o update -a packages=all -a source=/usr/local/software/aix72/fix72 lpp7212
nim -o update -a packages=all -a source=/usr/local/software/aix72/aix72tl01sp2 lpp7212
nim -o update -a packages=all -a source=/usr/local/software/flrtfixes/OpenSSH_7.1.101.5000 lpp7211
nim -o showres lpp7212 | grep bos.net
nim -o showres lpp7212 | grep bos.alt.disk
nim -o check lpp7212

Create the SPOT
nim -o define -t spot -a server=master -a source=lpp7212 -a location=/nim/spot/spot7212 spot7212
nim -o check spot7212
nim -o cust -a filesets=bos.alt_disk_install.boot_images -a lpp_source=lpp7212 spot7212
You may need to use smitty to install bos.alt_disk_install.boot_images and bos.alt_disk_install.rte into the SPOT

nim -o showres spot7212 | grep -i bos.alt
bos.alt_disk_install.boot_images
bos.alt_disk_install.rte 7.2.1.0 C F Alternate Disk Installation

5/23/2017 10

More

Take a 7.1 mksysb of a system and migrate it to a 7.2.1.2 mksysb to use later for restore
Copy orginal mksysb to /nim/images and create a resource for it then:
nimadm -T xxmksysb-apr2417 -O /nim/mksysb/xxmksysb-may0417 -s spot7212 -l lpp7212 -j nimvg -Y -N

listvgbackup -f'/nim/mksysb/xxmksysb-may0417' | grep rc.tcpip
listvgbackup -f'/nim/images/xxmksysb-apr2417' | grep rc.tcpip
nim -o allocate -a lpp_source=lpp7212 -a spot=spot7212 -a mksysb=xxmksysb-may0417 -a bosinst_data=bosinst72 -a installp_bundle=netapphak60 gandalf

Set LPAR up to do a mksysb install using smitty or nim –o bos_inst
Check it is correct:
ls -l /tftpboot
tail /etc/bootptab
showmount –e

Copy /nim/images/xxmksysb-apr2417 to /backups
Then on running client:
alt_disk_mksysb -m /backups/xxmksysb-apr2417 -d hdisk11 -k
bosboot -a -d hdisk10 (current rootvg) - ends cb4e
hdisk11 ends c7cd - set bootlist to point here and reboot

NIM Resources 1/2

#ls -l /nim/lpp_source
drwxr-xr-x 5 root system 256 Feb 17 11:26 721lpp_res
drwxr-xr-x 6 root system 256 May 05 12:45 lpp7212

ls –l /nim/spot
drwxr-xr-x 3 bin bin 256 Feb 17 11:36 721spot_res
drwxr-xr-x 3 root system 256 Apr 10 13:30 spot7211
drwxr-xr-x 3 root system 256 May 04 12:32 spot7212

#ls –l /nim/images
-rw-r--r-- 1 root system 8488089600 Apr 24 09:38 xxmksysb-apr2417

#ls –l /nim/mksysb
-rw-r--r-- 1 root system 8231219200 Apr 24 11:24 xxapr2417mksysb
-rw-r--r-- 1 root system 8440883200 May 04 15:37 xxmksysb-may0417
-rw-r--r-- 1 root system 8440883200 May 05 13:04 xxmksysb-may0517

#lspv | grep nimvg
hdisk7 00f6934bdeb1713b nimvg active
hdisk63 00f6934be0630676 nimvg active

NIM Resources 2/2

```
# lsvg nimvg
VOLUME GROUP:       nimvg                    VG IDENTIFIER:  00f6934b00004c000000012ee06306b7
VG STATE:           active                   PP SIZE:        512 megabyte(s)
VG PERMISSION:      read/write               TOTAL PPs:      998 (510976 megabytes)
MAX LVs:            256                      FREE PPs:       83 (42496 megabytes)
LVs:                4                        USED PPs:       915 (468480 megabytes)
OPEN LVs:           3                        QUORUM:         2 (Enabled)
TOTAL PVs:          2                        VG DESCRIPTORS: 3
STALE PVs:          0                        STALE PPs:      0
ACTIVE PVs:         2                        AUTO ON:        yes
MAX PPs per VG:     32768                    MAX PVs:        1024
LTG size (Dynamic): 1024 kilobyte(s)         AUTO SYNC:      no
HOT SPARE:          no                       BB POLICY:      relocatable
MIRROR POOL STRICT: off
PV RESTRICTION:     none                     INFINITE RETRY: no
DISK BLOCK SIZE:    512                      CRITICAL VG:    no
FS SYNC OPTION:     no                       CRITICAL PVs:   no

#lsvg -l nimvg
nimvg:
LV NAME     TYPE       LPs   PPs   PVs  LV STATE      MOUNT POINT
lvnimlog    jfs2log      4     4     2   closed/syncd  N/A
lvtftp      jfs2        10    10     2   open/syncd    /tftpboot
lvnim       jfs2       900   900     2   open/syncd    /nim
loglv04     jfs2log      1     1     1   open/syncd    N/A
```

13

NIM Resources

- Scripts
  - Scripts can be set to run during a BOS install to ensure that the resulting instance of the operating system is correctly tailored with any post installation items. These can include security requirements, third-party software installation and other customizations related to additional paging or dump space.
- bosinst_data
  - This is a file, not a directory, and it contains the necessary information to allow the installation to take place without manual intervention. It is used to define defaults such as default disk drive, type of installation and so on.
- image_data
  - This is also a file and contains operating system image information related to file systems, mirroring, etc.
- installp_bundles
  - These are files that list additional software to be loaded after AIX is installed. This can be useful when setting up groups of servers. As an example one bundle maybe for DB2 servers while another may be for web servers. Once the Operating System is installed you simply select the post install bundle and apply it.

14

Client Machine Information

- Hardware Platform Type – default is chrp, older rs6k or rspc not supported
- Kernel to use for Network Boot - set to mp (AIX 5.3 discontinued shipment of up kernel – 5.3 ships only MP 32bit or MP 64bit, v6 and higher are MP 64bit only)
- Cable Type - most likely tp, not bnc or dix – N/A for virtual Ethernet
- Network Adapter Hardware Address - optional field
- More flexible to specify IP parameters on SMS menus during nim client boot.
- You must specify IP parameters if nim client and nim master are on different IP subnets
- Network Adapter Logical Device name - optional field - note this is an adapter name (entx) not an interface name (not enx or etx)
- Machines can register themselves. A running AIX instance (machine or LPAR) can become a client, can define itself to this server, by doing a smitty niminit.

15

List resources

- # lsnim

```
master                      machines     master
boot                        resources    boot
nim_script                  resources    nim_script
master_net                   networks     ent
master_net_conf              resources    resolv_conf
7200-01bid_ow               resources    bosinst_data
721lpp_res                  resources    lpp_source
721spot_res                 resources    spot
basic_res_grp               groups       res_group
bosinst72                   resources    bosinst_data
netapphak60                 resources    installp_bundle
xxmksysb-apr2417             resources    mksysb
xxmksysb-apr2417_mig_72      resources    mksysb
gandalf                     machines     standalone
spot7212                    resources    spot
xxmksysb-apr2417_mig_72_1    resources    mksysb
xxmksysb-apr2417_mig_72_2    resources    mksysb
lpp7212                      resources    lpp_source
spot7211                    resources    spot
```

16

List resources

- #showmount -e
- export list for nimsrvr:
- /export/nim/scripts/b750nr1.script b750nr1
- /software b750nr1
- /backups b750nr1
- /nim/lpp_source/lpp_7100tl00sp3 b750r1
- /nim/spot/spot_71tl00sp3/spot_tl00sp3/usr b750nr1

- #lsnim -l b750nr1
- b750nr1:
- class = machines
- type = standalone
- connect = nimsh
- platform = chrp
- netboot_kernel = 64
- if1 = master_net b750nr1 0
- cable_type1 = N/A
- Cstate = Base Operating System installation is being performed
- prev_state = BOS installation has been enabled
- Mstate = in the process of booting
- info = prompting_for_data_at_console
- boot = boot
- lpp_source = lpp_71tl00sp3
- nim_script = nim_script
- spot = spot_tl00sp3
- cpuid = 00F693484C00
- control = master
- Cstate_result = success

17

Update resources

- Put update CD in or change into fixes directory
- Update SPOT and lpp_source
- smitty nim
- Perform nim administration tasks
- Manage resources
- Perform operations on resources
- Select the SPOT
- Select update_all
- Point it to the update CD or directory

- OR
- nim -o define -t lpp_source -a server=master -a location=/nim/lpp_source/lpp_71tl01sp1 -a source=/software/aixv7/aix71-base lpp_71tl01sp1

- nim -o update -a packages=all -a source=/software/aixv7/aixv7-tl01-sp1 lpp_71tl01sp1

- nim -o define -t spot -a server=master -a location=/nim/spot -a source=lpp_71tl01sp1 spot_71tl01sp1

- nim -o check spot_71tl01sp1
- nim -o check lpp_71tl01sp1

- nim -o reset -a force=yes b740nl1

18

Setup a client to restore from a mksysb

- Make sure gandalf (client) is in /etc/hosts or in DNS and that the name can be resolved
- Create the client (gandalf) machine to nim as a machine object
- The first step is to define gandalf as a client machine
- smitty nim, perform admin tasks, manage machines
- Define gandalf as a machine
- Select 64 as kernel, nimsh as shell, N/A as network i/face

19

Image_data

- Template is /usr/lpp/bosinst/image.template
- Copy and modify
- Specify things like
  - logical volume policy
  - SHRINK=no
  - EXACT_FIT=no
  - lv_data: (an lv_data stanza for each logical volume in rootvg)
    - COPIES= 1 (or 2, 3 to mirror. make sure you have enough target disk stanzas in the bosinst_data resource)
    - LPs= nn (the number of logical partitions)
    - PP= nn (if mirroring, this is an exact 2x or 3x of LPs)
- If you don't specify an image_data resource, NIM will use the file embedded in the mksysb image.
- Typical use of a "side" image.data file is when mksysb is mirrored, but the new install is to be nonmirrored, or vice-versa.

20

Setup mksysb as a resource

smitty nim
Perform nim administrative tasks
Manage resources
Define a resource

Select mksysb resource and then fill in the following fields
name = aix61tl2sp2_mksysb
server = master
location = /nim/images/aix61tl2sp2-golden.mksysb

nim -o define -t mksysb -a server=master -a location=/nim/images/aix71tl01sp1-nov2811.mksysb mksysb_71tl01sp1

21

Tell NIM to use the mksysb for this machine

smitty nim_bosinst
Select gandalf
install source = aixtl2sp2_mksysb
select mksysb and spot as resources (also select the lpp)
Select yes to accept licenses
Select no to initiate now

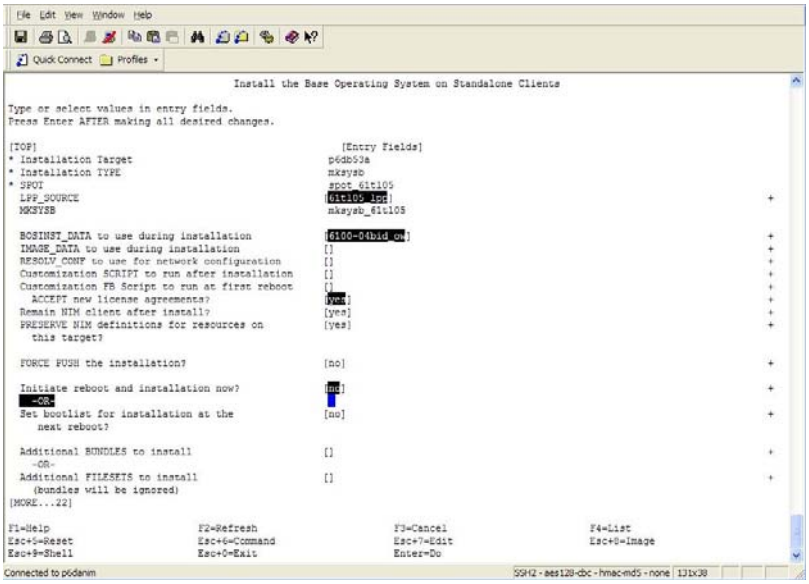
Initiate now = no means this is a pull resource and must be initiated at the client

nim -o allocate -a spot=spot_61tl05 -a lpp_source=61tl05_lpp -a mksysb=mksysb_61tl05 p6datst1
OR
nim -o allocate -a lpp_source=lpp7212 -a spot=spot7212 -a mksysb=xxmksysb-may0417 -a bosinst_data=bosinst72 -a installp_bundle=netapphak60 gandalf

nim -o bos_inst -a source=mksysb -a accept_licenses=yes -a boot_client=no -a installp_flags='-agX' p6datst1

22

Tell NIM to use the mksysb for this machine



23

Checks

- showmount –e
- /nim/lpp_source/61tl05_lpp gandalf
- /nim/spot/spot_61tl05/spot_61tl05/usr gandalf
- /nim/images/aix61-tl05sp1-golden.mksysb gandalf
- # cat /etc/bootptab
- gandalf:bf=/tftpboot/gandalf:ip=10.152.10.124:ht=ethernet:sa=10.152.10.203:sm=255.255.255.0:

24

Checks

- # ls -al /tftpboot
- lrwxrwxrwx 1 root system 18 May 14 16:14 10.152.10.124 -> /tftpboot/gandalf
- lrwxrwxrwx 1 root system 18 May 14 16:14 10.152.10.124.boot -> /tftpboot/gandalf
- lrwxrwxrwx 1 root system 23 May 14 16:14 10.152.10.124.info -> /tftpboot/gandalf.info
- lrwxrwxrwx 1 root system 28 May 14 16:14 10.152.10.124.iplrecord -> /tftpboot/gandalf.iplrecord
- lrwxrwxrwx 1 root system 33 May 14 16:14 gandalf -> /tftpboot/spot_61tl05.chrp.64.ent
- -rw-r--r-- 1 root system 1156 May 14 16:14 gandalf.info
- lrwxrwxrwx 1 root system 35 May 14 16:14 gandalf.iplrecord -> /tftpboot/spot_61tl05.iplrecord.ent
- -rw-r--r-- 1 root system 16958976 Apr 29 12:52 spot_61tl05.chrp.64.ent
- -rw-r--r-- 1 root system 512 Apr 29 12:52 spot_61tl05.iplrecord.ent
- -rw-r--r-- 1 root system 16752640 Mar 16 2010 spot_aix61tl04sp3.chrp.64.ent
- -rw-r--r-- 1 root system 512 Mar 16 2010

25

Useful NIM commands

- Recover missing simages if needs be:
- nim -o update -a recover=yes -a source=/software/aixv7/aix71-base lpp_71tl01sp1
- ALLOCATIONS
- nim -o deallocate -a spot=spot_71tl01sp1 -a lpp_source=lpp_71tl01sp1 -a mksysb=mksysb_71tl01sp1 b740nl1
- nim -o allocate -a spot=spot_71tl01sp1 -a lpp_source=lpp_71tl01sp1 -a mksysb=mksysb_71tl01sp1 b740nl1
- nim -o bos_inst -a source=mksysb -a accept_licenses=yes -a boot_client=no -a installp_flags='-agX' b740nl1
- OTHER
- To add the bos.games 5.2.0.0 and bos.terminfo filesets to lpp_source1, type:
- nim -o update -a packages="bos.games 5.2.0.0 bos.terminfo" \
- -a source=/dev/cd0 lpp_source1
- To remove bos.games from lpp_source1, type:
- nim -o update -a rm_images=yes -a packages="bos.games" lpp_source1

26

Backout

- If you have a machine enabled for install, and need to back out...
  - nim -o reset –a force=yes <nimclienthostname>
  - nim -Fo deallocate –a subclass=all <nimclienthostname>
  - nim -o change -a cpuid="" <nimclienthostname>

27

Start the install from the client

- Boot client into SMS mode either from the HMC or the server

Select 2 for setup remote IPL
Select 1 for first ethernet
Select 1 for IPV4
Select 1 for bootp
Select 1 for IP parameters

1 - client – 10.0.1.5	Use the client IP here
2 - server - 10.0.1.9	Use the NIM server IP here
3 - Gateway - 10.0.1.1	You may need to leave this as 0.0.0.0
4 - Subnet - 255.255.255.0	

Esc
Select 2 for adapter config
2 spanning tree - ensure it is disabled (this can speed things up)
ESC
3 - protocol - set it to standard
ESC and ESC
3 Ping test then 1 to execute ping test
If the ping test is successful return to main menu
Select 5 - boot options
1 select boot device
6 select network
1 bootp
1 select first ethernet
2 normal mode boot
1 yes I want to exit

28

Next steps

- LPAR/Server should boot and you should see tftp start up
- After around 30,000 to 50,000 packets the console prompt should appear
    - F1 and enter for console
    - 1 for english during install
    - An error message that "all LVs are being created exactly as they were but the disks are not the same" may appear. Unless there is a reason not to, go ahead and:
    - Choose 1 to continue with install
    - 2 Check install settings
    -
    - Make sure that only 1 disk is chosen here and that it is the correct one for rootvg:
    - Choose hdisk0
    - Use maps for installation – I tend to choose no
    - Check that importvgs defaults to n
    - 0 to continue with choices
- Note make sure the mksysb you are using is not of a mirrored system – if it is mirrored then you will need to provide 2 disks to restore to
- After the system reboots you can import volume groups, remirror rootvg and perform further tailoring

29

Continuing on

- After reboot install should start
- Monitor using lsnim –l lparname
- This will show you how far it has gone

30

Useful commands

- lsnim
- lsnim –l lparname
- nim -o reset –a force=yes clientnode
- nim -Fo deallocate –a subclass=all clientnode
- nim -o change -a cpuid="" clientnode
- bootlist -m normal –o (check bootlist)
- arp and ping
- oslevel –s
- Instfix
- showmount –e
- ls –al /tftpboot

31

Useful commands on master

```
lsnim -l xxmksysb-apr2417
xxmksysb-apr2417:
  class        = resources
  type         = mksysb
  creation_date = Mon Apr 24 09:48:59 2017
  Rstate       = ready for use
  prev_state    = unavailable for use
  location      = /nim/images/xxmksysb-apr2417
  version      = 7
  release      = 1
  mod          = 4
  oslevel_r     = 7100-04
  oslevel_s     = 7100-04-03-1642
  alloc_count   = 0
  server       = master
```

```
lsnim -l xxmksysb-apr2417_mig_72_2
xxmksysb-apr2417_mig_72_2:
  class        = resources
  type         = mksysb
  comments     = Created by nimadm on Fri May 5 13:04:37
CDT 2017
  creation_date = Fri May 5 13:05:46 2017
  Rstate       = ready for use
  prev_state    = unavailable for use
  location      = /nim/mksysb/xxmksysb-may0517
  version      = 7
  release      = 2
  mod          = 1
  oslevel_r     = 7200-00
  oslevel_s     = 7100-04-03-1642
  alloc_count   = 0
  server       = master
```

32

Useful commands on master - LPP

```
# lsnim -l lpp7212
lpp7212:
   class      = resources
   type       = lpp_source
   arch       = power
   Rstate     = ready for use
   prev_state  = verification is being performed
   location    = /nim/lpp_source/lpp7212
   simages     = yes
   alloc_count = 0
   server      = master
```

33

Useful commands on master - SPOT

```
#  lsnim -l spot7212
spot7212:
   class        = resources
   type         = spot
   plat_defined  = chrp
   arch         = power
   bos_license   = yes
   Rstate       = ready for use
   prev_state    = verification is being performed
   location     = /nim/spot/spot7212/spot7212/usr
   version      = 7
   release      = 2
   mod          = 1
   oslevel_r     = 7200-01
   oslevel_s     = 7200-01-02-1717
   alloc_count   = 0
   server       = master
   if_supported  = chrp.64 ent
   Rstate_result = success
```

34

Useful commands on master - niminfo

```
ls -al /etc/niminfo
-rw-r--r--    1 root     system          167 Feb 17 11:16 /etc/niminfo


cat /etc/niminfo
# nimconfig
export NIM_NAME=master
export NIM_CONFIGURATION=master
export NIM_MASTER_PORT=1058
export NIM_REGISTRATION_PORT=1059
export NIM_MASTER_HOSTNAME=nimsrvr1
```

35

Useful commands on master

```
#  ls -al /etc/objrepos/nim*
-rw-rw-r--    1 root     system        16384 May 09 12:51 /etc/objrepos/nim_attr
-rw-rw-r--    1 root     system        12288 May 09 12:51 /etc/objrepos/nim_attr.vc
-rw-rw-r--    1 root     system         4096 May 09 12:51 /etc/objrepos/nim_object
-rw-rw-r--    1 root     system         4096 May 09 12:51 /etc/objrepos/nim_object.vc
-r-xr-x---    1 root     system        28672 Aug 25 2016  /etc/objrepos/nim_pdattr
-r-xr-x---    1 root     system        28672 Aug 25 2016  /etc/objrepos/nim_pdattr.vc
```

36

Backing up and restoring NIM

- Save the following NIM files on the master
- /etc/niminfo
- /etc/objrepos/nim_attr
- /etc/objrepos/nim_attr.vc
- /etc/objrepos/nim_object
- /etc/objrepos/nim_object.vc
- You can restore the NIM database and activate the NIM master using the Web-based System Manager, SMIT, or the command line.
- Restore the files saved in Backing up the NIM database.

37

Recovering /etc/niminfo

- /etc/niminfo is required on master and running NIM clients to run NIM operations and commands
- You can rebuild it on the master:
- nimconfig -rTo
- You can rebuild it from a running NIM client:
- niminit -a master_port= PortNumber -a master= MasterHostName -a name= ClientMachineObjectName

38

/etc/niminfo on the client

```
#----------------- Network Install Manager ---------------
# warning - this file contains NIM configuration information
#       and should only be updated by NIM
export NIM_NAME=gandalf
export NIM_HOSTNAME=gandalf.jaqui.local
export NIM_CONFIGURATION=standalone
export NIM_MASTER_HOSTNAME=nimsrvr1.jaqui.local
export NIM_MASTER_PORT=1058
export NIM_REGISTRATION_PORT=1059
export NIM_SHELL="nimsh"
export NIM_MASTERID=00FA866E4C00
export NIM_FIPS_MODE=0
export NIM_LICENSE_ACCEPT=yes
export RC_CONFIG=rc.bos_inst
export NIM_BOSINST_ENV="/../SPOT/usr/lpp/bos.sysmgt/nim/methods/c_bosinst_env"
export NIM_BOSINST_RECOVER="/../SPOT/usr/lpp/bos.sysmgt/nim/methods/c_bosinst_env -a
hostname=gandalf.jaqui.local"
export SPOT=nimsrvr1.jaqui.local:/nim/spot/spot71tl04sp3/spot71tl04sp3/usr
export NIM_CUSTOM="/../SPOT/usr/lpp/bos.sysmgt/nim/methods/c_script -a
location=nimsrvr1.jaqui.local:/export/nim/scripts/gandalf.script"
export NIM_BOS_IMAGE=/NIM_BOS_IMAGE
export NIM_BOS_FORMAT=mksysb
export NIM_HOSTS=" 127.0.0.1:loopback:localhost  10.128.16.16:gandalf.jaqui.local
10.128.16.13:nimsrvr1.jaqui.local "
export NIM_MOUNTS=" nimsrvr1.jaqui.local:/nim/lpp_source/lpp71tl04sp3:/SPOT/usr/sys/inst.images:dir
nimsrvr1.jaqui.local:/nim/images/xx.mksysb
:/NIM_BOS_IMAGE:file "
export ROUTES=" default:0:10.128.16.1 "
```

39

Migrations and Updates

Migration

- Changes version or release

Update

- Preserves version and release
- Basically changes a TL or SP

Both migrations and updates can use alternate copies of rootvg if there is an unused disk available

After changes, boot from altinst_rootvg and test

Migrate or update NIM Master first
Then update LPP_SOURCE and SPOT

Use nimadm for migrations, to install a down level mksysb and then migrate it or to install a new golden image

Use nim_alt_clone with update_all to update a TL or SP
With multibos the standby copy of AIX can be on the same physical disk as the current rootvg

40

NIMADM

nimadm (Network Install Manager Alternate Disk Migration) command

Utility that allows the system administrator to:

Create a copy of rootvg to a free disk (or disks) and simultaneously migrate it to a new version or release level of AIX.

Using a copy of rootvg, create a new NIM mksysb resource that has been migrated to a new version or release level of AIX.

Using a NIM mksysb resource, create a new NIM mksysb resource that has been migrated to a new version or release level of AIX.

nimadm -T xxmksysb-apr2417 -O /nim/mksysb/xxmksysb-may0417 -s spot7212 -l lpp7212 -j nimvg -Y -N

Using a NIM mksysb resource, restore to a free disk (or disks) and simultaneously migrate to a new version or release level of AIX.

Once upgraded mksysb is there you can either boot from it over the network or copy it to the client and use alt disk install to restore the mksysb to the alt disk.

41

nim_alt_clone

Clone rootvg to another disk – can use this for VIO servers as well as regular LPARs

alt_disk_copy –d hdisk2
bosboot –a –d hdisk2
bootlist –m normal hdisk2

Update within the same version/release (i.e update a TL or SP)

Build the lpp_source at the desired level with simages-yes
Update NIM master from this lpp_source and reboot master

On client

Unmirror rootvg and cleanup (chpv –c and reducevg)
bosboot –a and bootlist –m

Master

smitty nim_alt_clone
Specify target client and target disks
Setc FIXES to install to “update_all”
Point to lpp_source from above and accept licenses

The clone and update will take place on altinst_rootvg while still running on rootvg
Boot from altinst_rootvg and test
Either reboot from old rootvg or make this the production one

42

MULTIBOS

Creates, updates, and manages multiple versions of the Base Operating System (BOS) on a rootvg.

The multibos command allows the root level administrator to create multiple instances of AIX(R) on the same rootvg.

The multibos setup operation creates a standby Base Operating System (BOS) that boots from a distinct boot logical volume (BLV).

This creates two bootable sets of BOS on a given rootvg and the administrator can boot from either instance of BOS by specifying the respective BLV as an argument to the bootlist command or using system firmware boot operations.

Two bootable instances of BOS can be simultaneously maintained.

43

Alternate Disk Install

- http://pic.dhe.ibm.com/infocenter/aix/v7r1/topic/com.ibm.aix.install/doc/insgdrf/HT_insgdrf_altdiskinstall_clone.htm

- Make sure you have a spare hard disk or LUN
- Install bos.alt_disk_install.rte and update it
- Create a bundle to install to the new disk and any custom scripts
  - Or take a mksysb of the system to a file
- Clone rootvg using smitty alt_clone
- lspv now shows a disk as rootvg and one as altinst_rootvg
- Check your bootlist as the alt disk install process changes it
  - bootlist –m normal –o
- Correct the bootlist back to normal until you are ready
- Now you can use smitty alt_disk_install to do the upgrades to then new hard drive
- When happy with the upgrade you update the bootlist and reboot on the new image
- If having problems with nimadm you can create the migrated mksysb then copy it to the client and use alternate disk install to restore the mksysb on a separate disk

44

Alt Disk from mksysb

Commands to look at:
alt_disk_copy
alt_disk_install
alt_disk_mksysb
alt_rootvg_op

```
                                Alternate Disk Installation

Move cursor to desired item and press Enter.

  Install mksysb on an Alternate Disk
  Clone the rootvg to an Alternate Disk
  NIM Alternate Disk Migration

F1=Help          F2=Refresh       F3=Cancel        F8=Image
F9=Shell         F10=Exit         Enter=Do
```

```
#
# lspv
hdisk0          00f6934c642af030                    rootvg          active
hdisk1          none                                None
# lsdev -Ccdisk
hdisk0 Available  Virtual SCSI Disk Drive
hdisk1 Available  Virtual SCSI Disk Drive
#
# lslpp -l | grep bos.alt
  bos.alt_disk_install.boot_images
  bos.alt_disk_install.rte  7.1.4.30  COMMITTED  Alternate Disk Installation
  bos.alt_disk_install.rte  7.1.4.30  COMMITTED  Alternate Disk Installation
```

45

Alt Disk from mksysb

```
                    Install mksysb on an Alternate Disk

Type or select values in entry fields.
Press Enter AFTER making all desired changes.

                                                  [Entry Fields]
* Target Disk(s) to install                      [hdisk1]                 +
* Device or image name                           [/usr/local/backups/b7> +
  Phase to execute                                all                     +
  image.data file                                 []                       /
  Customization script                            []                       /
  Set bootlist to boot from this disk
  on next reboot?                                 no                      +
  Reboot when complete?                           no                      +
  Verbose output?                                 yes                     +
  Debug output?                                   no                      +
  resolv.conf file                                []                       /


F1=Help             F2=Refresh          F3=Cancel           F4=List
Esc+5=Reset         F6=Command          F7=Edit             F8=Image
F9=Shell            F10=Exit            Enter=Do
```

46

Alt Disk from mksysb

```
                                COMMAND STATUS

Command: running       stdout: yes           stderr: no

Before command completion, additional instructions may appear below.

[MORE...6]
Restoring /image.data from mksysb image.
Checking disk sizes.
Creating cloned rootvg volume group and associated logical volumes.
Creating logical volume alt_hd5.
Creating logical volume alt_hd6.
Creating logical volume alt_hd8.
Creating logical volume alt_hd4.
Creating logical volume alt_hd2.
Creating logical volume alt_hd9var.
Creating logical volume alt_hd3.
Creating logical volume alt_hd1.
Creating logical volume alt_hd10opt.
Creating logical volume alt_hd11admin.
Creating logical volume alt_lg_dumplv.
[BOTTOM]
```

Plus many more as it restores from the mksysb image

47

Alt Disk from mksysb

Now we see:

```
# lspv
hdisk0          00f6934c642af030                    rootvg          active
hdisk1          00f6934c75816830                    altinst_rootvg  active

# bootlist -m normal -o
hdisk0 blv=hd5 pathid=0
```

Phase 1 Creates the **altinst_rootvg** volume group, the **alt_** "logical volumes", the **/alt_inst** file systems, and restores the mksysb or rootvg data.

Phase 2 Runs any specified customization script, installs updates, new filesets, fixes or bundles (cloning only), copies a **resolv.conf** file if specified, and copies files over to remain a NIM client if specified.

Phase 3 Unmounts the **/alt_inst** file systems, renames the file systems and logical volumes, removes the **alt_ logical** volumes, names ODM and varies off the altinst_rootvg. It sets the bootlist and reboots if specified.

48

Alt Disk from mksysb

```
# lspv -l hdisk0
hdisk0:
LV NAME       LPs   PPs   DISTRIBUTION      MOUNT POINT
hd8           1     1     00..00..01..00..00   N/A
hd6           64    64    00..64..00..00..00   N/A
hd2           80    80    00..00..80..00..00   /usr
hd4           10    10    00..00..10..00..00   /
hd3           48    48    00..00..48..00..00   /tmp
hd9var        12    12    00..00..12..00..00   /var
hd10opt       32    32    00..32..00..00..00   /opt
hd1           4     4     00..00..04..00..00   /home
hd5           1     1     01..00..00..00..00   N/A
lg_dumplv2    16    16    00..16..00..00..00   N/A
fslv00        80    80    80..00..00..00..00   /usr/local
fslv01        16    16    00..16..00..00..00   /usr/local/logs
lg_dumplv     16    16    00..16..00..00..00   N/A
livedump      4     4     00..04..00..00..00   /var/adm/ras/livedump
hd11admin     4     4     00..00..04..00..00   /admin
```

```
# lspv -l hdisk1
hdisk1:
LV NAME       LPs   PPs   DISTRIBUTION      MOUNT POINT
alt_hd10opt   32    32    00..32..00..00..00   /alt_inst/opt
alt_hd1       4     4     00..00..04..00..00   /alt_inst/home
alt_hd3       48    48    00..00..48..00..00   /alt_inst/tmp
alt_hd9var    12    12    00..00..12..00..00   /alt_inst/var
alt_hd2       80    80    00..00..80..00..00   /alt_inst/usr
alt_hd4       10    10    00..00..10..00..00   /alt_inst
alt_hd8       1     1     00..00..01..00..00   N/A
alt_hd6       64    64    00..64..00..00..00   N/A
alt_hd5       1     1     01..00..00..00..00   N/A
alt_lg_dumplv 16    16    00..16..00..00..00   N/A
alt_hd11admin 4     4     00..00..04..00..00   /alt_inst/admin
alt_lg_dumplv2 16   16    00..16..00..00..00   N/A
alt_fslv01    16    16    00..16..00..00..00   /alt_inst/usr/local/logs
alt_fslv00    80    80    80..00..00..00..00   /alt_inst/usr/local
alt_livedump  4     4     00..04..00..00..00
/alt_inst/var/adm/ras/livedump
```

You can display the above during the mksysb clone
At the end altinst_rootvg is varied offline and these (the alt ones) are all unmounted

49

Alt Disk from mksysb

You can wake up the altinst_rootvg to mount the filesystems and put it back to sleep:

```
# alt_disk_install -W hdisk1
+-----------------------------------------------------------------------------+
ATTENTION: calling new module /usr/sbin/alt_rootvg_op. Please see the
alt_rootvg_op man page and documentation for more details.
Executing command: /usr/sbin/alt_rootvg_op -W -d hdisk1
+-----------------------------------------------------------------------------+
Waking up altinst_rootvg volume group ...
```

```
# lspv
hdisk0          00f6934c642af030                    rootvg          active
hdisk1          00f6934c75816830                    altinst_rootvg  active
```

Back to sleep

```
# alt_disk_install -S hdisk1
+-----------------------------------------------------------------------------+
ATTENTION: calling new module /usr/sbin/alt_rootvg_op. Please see the
alt_rootvg_op man page and documentation for more details.
Executing command: /usr/sbin/alt_rootvg_op -S hdisk1
+-----------------------------------------------------------------------------+
Putting volume group altinst_rootvg to sleep ...
forced unmount of /alt_inst/var/adm/ras/livedump
forced unmount of /alt_inst/var/adm/ras/livedump
forced unmount of /alt_inst/var
forced unmount of /alt_inst/var
forced unmount of /alt_inst/usr/local/logs
forced unmount of /alt_inst/usr/local/logs
forced unmount of /alt_inst/usr/local
forced unmount of /alt_inst/usr/local
forced unmount of /alt_inst/usr
forced unmount of /alt_inst/usr
forced unmount of /alt_inst/tmp
forced unmount of /alt_inst/tmp
forced unmount of /alt_inst/opt
forced unmount of /alt_inst/opt
forced unmount of /alt_inst/home
forced unmount of /alt_inst/home
forced unmount of /alt_inst/admin
forced unmount of /alt_inst/admin
forced unmount of /alt_inst
forced unmount of /alt_inst
Fixing LV control blocks...
Fixing file system superblocks...
```

```
# lspv
hdisk0          00f6934c642af030                    rootvg          active
hdisk1          00f6934c75816830                    altinst_rootvg
```

50

Alt Disk from mksysb

```
# df -g
Filesystem    GB blocks      Free %Used    Iused %Iused Mounted on
/dev/hd4           0.62      0.41   35%    10330    10% /
/dev/hd2           5.00      2.37   53%    62100    11% /usr
/dev/hd9var        0.75      0.47   38%     5785     5% /var
/dev/hd3           3.00      3.00    1%       72     1% /tmp
/dev/hd1           0.25      0.25    1%       11     1% /home
/dev/hd11admin     0.25      0.25    1%        5     1% /admin
/proc                 -         -    -         -     -  /proc
/dev/hd10opt       2.00      1.41   30%    13901     5% /opt
/dev/livedump      0.25      0.25    1%        4     1% /var/adm/ras/livedump
/dev/fslv00        5.00      4.93    2%      231     1% /usr/local
/dev/fslv01        1.00      0.98    2%       39     1% /usr/local/logs

/dev/alt_hd4       0.62      0.53    1%       13     1% /alt_inst
/dev/alt_hd11admin 0.25      0.25    1%        5     1% /alt_inst/admin
/dev/alt_hd1       0.25      0.25    1%       11     1% /alt_inst/home
/dev/alt_hd10opt   2.00      1.41   30%    13900     5% /alt_inst/opt
/dev/alt_hd3       3.00      3.00    1%       61     1% /alt_inst/tmp
/dev/alt_hd2       5.00      2.37   53%    62100    11% /alt_inst/usr
/dev/alt_fslv00    5.00      4.93    2%      230     1% /alt_inst/usr/local
/dev/alt_fslv01    1.00      0.98    2%       39     1% /alt_inst/usr/local/logs
/dev/alt_hd9var    0.75      0.47   38%     5761     5% /alt_inst/var
/dev/alt_livedump  0.25      0.25    1%        4     1% /alt_inst/var/adm/ras/livedump
```

51

Quick alt_disk_copy Example

alt_disk_copy -d hdisk1 -F 5300-01_AIX_ML -l /updates

The above copies the current 5300-00 rootvg to hdisk1
It applies the updates from /updates to bring the cloned rootvg to 5300-01
It also sets the bootlist to boot from hdisk1

Allows you to copy the running system and apply maintenance in one step
After reboot the old rootvg will be named old_rootvg
Use alt_rootvg_op to remove it later
Use bootlist to go back if needs be

OR
alt_disk_copy –d hdisk2
Above just copies rootvg across to hdisk2
https://www.ibm.com/support/knowledgecenter/en/ssw_aix_71/com.ibm.aix.cmds1/alt_disk_copy.htm

52

Migrating a 7.1 mksysb to 7.2

Take a mksysb on the client to be updated

Copy it to /nim/images and add it as a resource

Check the mksysb

```
listvgbackup -f'/nim/images/jlmksysb-may2317' | grep  rc.tcpip
listvgbackup -f'/nim/images/jlmksysb-may2317' | grep  inetd.conf
```

Convert the mksysb to 7.2

```
nimadm -T jlmksysb-may2317 -O /nim/mksysb/jlmksysb72-may2317 -s spot7212 -l
lpp7211 -j nimvg -Y -N
```

Check the converted mksysb

```
listvgbackup -f'/nim/mksysb/jlmksysb72-may2317' | grep  rc.tcpip
listvgbackup -f'/nim/mksysb/jlmksysb72-may2317' | grep  inetd.conf
```

If all good on master then copy it to the client:

```
cp /nim/mksysb/jlmksysb72-may2317  /usr/local/backups
```

And on client in stall in this case to hdisk11:

```
alt_disk_mksysb -m /backups/jlmksysb72-may2317 -d hdisk11 –k
```

NOTE: Ensure your /etc/inetd.conf and /etc/inittab are pristine. We had a bug where a line in inetd.conf went over 2 lines and it caused the resulting converted mksysb to drop over 2000 filesets

5/23/2017 53

VIOS and NIM

- Add VIOS partition as a client
- Copy the VIOS mksysb image from the CD to your NIM master
  - On VIOS 2.2 media there are 3 images now – the 3rd is on DVD 2
  - Copy all 3 images individually to a directory and then use cat to combine them
  - cat /export/mksysb/vios2.2/mksysb_image /export/mksysb/vios2.2/mksysb_image2 /export/mksysb/vios2.2/mksysb_image3 >/export/mksysb/nim_vios2.2mksysb
- Define mksysb resource to NIM master
- Define spot on NIM master
  - The source for the SPOT will be the combined mksysb
- Copy the bosinst.data from the DVD and create a viosbosinst resource
- You can now use bos_inst to do a mksysb install once the partition profile is defined
- http://www-01.ibm.com/support/docview.wss?uid=isg3T1011386

54

Backing up VIOS

- Use viosbr to backup user defined virtual resources on the VIO
- Make sure to save that backup in rootvg
  - viosbr –backup –file /tmp/viosabkupbr
  - You can also use viosbr to view or restore
  - http://publib.boulder.ibm.com/infocenter/systems/scope/hw/topic/p7hcg/viosbr.htm
- Mount NFS filesystem to backup to (in my case /backups)
- mkdir /backups/viosa
- Then as padmin:
- backupios –file /backups/viosa
- The above creates a nim_resources.tar package in that directory and it can be used to clone VIO servers
- You can also back it up as a mksysb file that is easy to restore from the NIM server
- backupios -file /backups/viosa.mksysb -mksysb

55

IBM

Your Opinion Matters!

Your feedback about this session is very important to us.

Submit a survey at:

ibmtechu.com

Thank you for your time

If you have questions please email me at:
jaquilynch@gmail.com

Also check out:
http://www.circle4.com/movies/

57

NIM Specific Useful Links

- How to install AIX 5L (look for EZNIM)
  - http://www.ibm.com/developerworks/aix/library/au-install-aix.html
- SG24-7296 – NIM from A-Z in AIX 5L Redbook – 30 May 2007
  - http://www.redbooks.ibm.com/redbooks/pdfs/sg247296.pdf
- The Power of Network Install Manager
  - http://www.ibm.com/developerworks/aix/library/au-nim/index.html?S_TACT=105AGX20
- Simplifying with NIM – article from IBM Systems Magazine 2006
  - http://www.circle4.com/jaqui/eserver/aixtra-FebMar06-SimplifyingwithNIM.pdf
- NIM Concepts
  - http://publib.boulder.ibm.com/infocenter/aix/v6r1/topic/com.ibm.aix.install/doc/insgdrf/nim_concepts.htm
- Backing up the NIM Database
  - http://publib.boulder.ibm.com/infocenter/aix/v6r1/topic/com.ibm.aix.install/doc/insgdrf/adv_config_backup_db_cmd_line.htm
- AIX v6.1 NIM Pages
  - http://publib.boulder.ibm.com/infocenter/aix/v6r1/topic/com.ibm.aix.install/doc/insgdrf/basic_config.htm

58

Useful Links

- Jaqui Lynch Articles
  - http://www.circle4.com/jaqui/eserver.html
- Jay Kruemke Twitter – chromeaix
  - https://twitter.com/chromeaix
- Nigel Griffiths Twitter – mr_nmon
  - https://twitter.com/mr_nmon
- Gareth Coates Twitter – power_gaz
  - https://twitter.com/power_gaz
- Jaqui's Movie Replays
  - http://www.circle4.com/movies
- IBM US Virtual User Group
  - http://www.tinyurl.com/ibmaixvug
- Power Systems UK User Group
  - http://tinyurl.com/PowerSystemsTechnicalWebinars

59

Useful Links

- HMC Scanner
  - https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power%20Systems/page/HMC%20Scanner
- Workload Estimator
  - http://ibm.com/systems/support/tools/estimator
- Performance Tools Wiki
  - https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power%20Systems/page/AIX%20Performance%20Commands
- Performance Monitoring
  - https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power%20Systems/page/Performance%20Monitoring%20Tips%20and%20Techniques
- Other Performance Tools
  - https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power+Systems/page/Other+Performance+Tools
  - Includes new advisors for Java, VIOS, Virtualization
- VIOS Advisor
  - https://www.ibm.com/developerworks/community/wikis/home?lang=en#/wiki/Power%20Systems/page/VIOS%20Advisor

60