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NIM 101

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Presentation can be downloaded from link at bottom of:
http://www.circle4.com/papers/nim101.pdf

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Agenda

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

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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

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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

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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

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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

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NIM on my 7.1 system

```
#lslpp -l | grep bos.sysmgt.nim
  bos.sysmgt.nim.client    7.1.1.0  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.master    7.1.1.0  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.spot      7.1.0.15 COMMITTED  Network Install Manager - SPOT
  bos.sysmgt.nim.client    7.1.1.0  COMMITTED  Network Install Manager -

#df -g /nim
Filesystem    GB blocks    Free %Used   Iused %Iused Mounted on
/dev/fslv05    165.25    81.51   51%  182982    1% /nim

#ls -al /nim
total 24
drwxr-xr-x   9 root    system      256 Aug 26 2011  .
drwxr-xr-x  42 root    system     4096 Apr 04 23:41 ..
drwxr-xr-x   2 root    system      256 Apr 11 2011 bosinst_data
drwxr-xr-x   2 root    system     4096 Nov 28 17:06 images
drwxr-xr-x   2 root    system      256 Mar 22 2011 lost+found
drwxr-xr-x  10 root    system      256 Nov 28 17:22 lpp_source
drwxr-xr-x   2 root    system      256 Apr 18 2011 scripts
drwxr-xr-x  13 root    system     4096 Nov 28 17:47 spot
drwxr-xr-x   3 root    system      256 Apr 15 2011 spotspot_53tl12sp2
```

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NIM Command output after setup (6.1 system)

```
# lslpp -l | grep nim
  bos.sysmgt.nim.client   6.1.5.2  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.master   6.1.5.2  COMMITTED  Network Install Manager -
  bos.sysmgt.nim.spot     6.1.5.1  COMMITTED  Network Install Manager - SPOT
  bos.sysmgt.nim.client   6.1.5.2  COMMITTED  Network Install Manager –

# df -g /nim
Filesystem    GB blocks    Free   %Used   Iused %Iused Mounted on
/dev/lvnim     125.00      56.33   55%   76032    1%    /nim

 # ls –al /nim
total 16
drwxr-xr-x   8 root    system      256 Jan 06 2010  .
drwxr-xr-x  26 root    system     4096 Sep 07 11:02 ..
drwxr-xr-x   2 root    system      256 Jan 06 2010 bosinst_data
drwxr-xr-x   3 root    system     4096 May 05 14:32 images
drwxr-xr-x   2 root    system      256 Jan 05 2010 lost+found
drwxr-xr-x   6 root    system      256 Apr 29 08:42 lpp_source
drwxr-xr-x   2 root    system      256 Jan 06 2010 resolv_conf
drwxr-xr-x   6 root    system      256 Apr 29 09:07 spot
```

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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

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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 .

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NIM Resources 1/2

```
#ls /nim/lpp_source
lpp_53tl12sp2  lpp_61tl06sp2  lpp_61tl06sp5  lpp_7100tlsp2
lpp_61tl05sp1  lpp_61tl06sp3  lpp_7100tl00sp3 lpp_71tl01sp1
```

```
# ls /nim/spot
53tl12sp2      spot_61tl05sp1 spot_61tl06sp3 spot_71tl00sp2 spot_71tl01sp1 vio212sp4spot
spot_53tl12sp2 spot_61tl06sp2 spot_61tl06sp5 spot_71tl00sp3 spot_vio
```

```
#ls /nim/images
aix53.golden.mksysb        aix61tl06.mksysb          aix7101sp3.mksysb
aix53tl12sp2.golden.mksysb  aix61tl06sp5-golden.mksysb  aix71tl01sp1-nov2811.mksysb
aix61tl05sp1.mksysb  aix71-tl00-sp3.golden.mksysb  b740vio1.mksysb
```

```
#lspv | grep nimvg
hdisk0    00f6934bdeb1713b        nimvg    active
hdisk5    00f6934be0630676        nimvg    active
```

NIM Resources 2/2

```
# lsvg nimvg
VOLUME GROUP:      nimvg          VG IDENTIFIER:  00f6934b00004c000000012ee06306b7
VG STATE:          active         PP SIZE:        256 megabyte(s)
VG PERMISSION:     read/write     TOTAL PPs:      2234 (571904 megabytes)
MAX LVs:           256            FREE PPs:       32 (8192 megabytes)
LVs:               4              USED PPs:       2202 (563712 megabytes)
OPEN LVs:          4              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
```

```
#lsvg -l nimvg
nimvg:
LV NAME          TYPE    LPs  PPs  PVs  LV STATE     MOUNT POINT
loglv00          jfs2log  1    1    1   open/syncd   N/A
fslv04           jfs2    920  920   1   open/syncd   /software
fslv05           jfs2    661  661   2   open/syncd   /nim
fslv06           jfs2    620  620   2   open/syncd   /backups
```

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.

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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.

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List resources

- # lsnim

- master   machines   master
- boot   resources   boot
- nim_script   resources   nim_script
- master_net   networks   ent
- 7100-00bid_ow   resources   bosinst_data
- lpp_61tl06sp3   resources   lpp_source
- spot_61tl06sp3   resources   spot
- mksysb_aix61tl06sp3   resources   mksysb
- basic_res_grp   groups   res_group
- lpp_71tl00sp3   resources   lpp_source
- spot_tl00sp3   resources   spot
- mksysb_71tl00sp3   resources   mksysb
- mksysb_53tl12sp2   resources   mksysb
- lpp_53tl12sp2   resources   lpp_source
- spot_53tl12sp2   resources   spot
- ent-Network1   networks   ent
- b750nr1   machines   standalone
- changepw   resources   script
- viomksysb   resources   mksysb
- b750ns1   machines   standalone
- lpp_71tl01sp1   resources   lpp_source
- spot_71tl01sp1   resources   spot
- mksysb_71tl01sp1   resources   mksysb

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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

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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

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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

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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.

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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

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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

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

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Tell NIM to use the mksysb for this machine

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List resources

- # lsnim -l gandalf
- gandalf:
- class   = machines
- type   = standalone
- connect   = nimsh
- platform   = chrp
- netboot_kernel = mp
- if1   = master_net gandalf 0
- cable_type1   = N/A
- Cstate   = ready for a NIM operation
- prev_state   = not running
- Mstate   = not running
- lpp_source   = 61tl05_lpp
- mksysb   = mksysb_61tl05
- spot   = spot_61tl05
- cpuid   = 00C20AE54C00
- control   = master
- Cstate_result   = failure

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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:

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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
-

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

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>

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
```

Next steps

- LPAR/Server should boot and you should see tftp start up
- After around 30,000 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

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Continuing on

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

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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

Useful commands on master

- # lsnim -l mksysb_61tl05

- mksysb_61tl05:
- class   = resources
- type   = mksysb
- Rstate   = ready for use
- prev_state   = unavailable for use
- location   = /nim/images/aix61-tl05sp1-golden.mksysb
- version   = 6
- release   = 1
- mod   = 5
- oslevel_r   = 6100-05
- alloc_count = 2
- server   = master
- creation_date = Thu Apr 29 09:35:47 2010

Useful commands on master

- # lsnim -l 61tl05_lpp

- 61tl05_lpp:
- class   = resources
- type   = lpp_source
- comments   = AIX 61 tl05 sp1 lpp
- arch   = power
- Rstate   = ready for use
- prev_state = unavailable for use
- location   = /nim/lpp_source/61tl05_lpp
- simages   = yes
- alloc_count = 2
- server   = master

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Useful commands on master

- # lsnim -l spot_61tl05
- spot_61tl05:
- 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/spot_61tl05/spot_61tl05/usr
- version   = 6
- release   = 1
- mod   = 5
- oslevel_r   = 6100-05
- alloc_count = 2
- server   = master
- if_supported = chrp.64 ent
- Rstate_result = success

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Useful commands on master

- # ls -al /etc/niminfo

- -rw-r--r--   1 root   system   164 Jan 06 2010 /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=pnimmstr

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Useful commands on master

- # ls -al /etc/objrepos/nim*
- -rw-rw-r--   1 root   system   24576 Sep 28 10:20
  /etc/objrepos/nim_attr
- -rw-rw-r--   1 root   system   36864 Sep 28 10:20
  /etc/objrepos/nim_attr.vc
- -rw-rw-r--   1 root   system   4096 Sep 28 10:20
  /etc/objrepos/nim_object
- -rw-rw-r--   1 root   system   8192 Sep 28 10:20
  /etc/objrepos/nim_object.vc
- -r-xr-x---   1 root   system   28672 Sep 06 09:48
  /etc/objrepos/nim_pdattr
- -r-xr-x---   1 root   system   36864 Sep 06 09:48
  /etc/objrepos/nim_pdattr.vc

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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.

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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

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/etc/niminfo on the client

- export NIM_NAME=gandalf
- export NIM_HOSTNAME=gandalf
- export NIM_CONFIGURATION=standalone
- export NIM_MASTER_HOSTNAME=pnimmstr
- export NIM_MASTER_PORT=1058
- export NIM_REGISTRATION_PORT=1059
- export NIM_SHELL="nimsh"
- export NIM_MASTERID=00C20AE54C00
- export RC_CONFIG=rc.bos_inst
- export NIM_BOSINST_RECOVER="/../SPOT/usr/lpp/bos.sysmgt/nim/methods/c_bosinst_env -a hostname=gandalf"
- export SPOT=pnimmstr:/nim/spot/spot_61tl05/spot_61tl05/usr
- export NIM_CUSTOM="/../SPOT/usr/lpp/bos.sysmgt/nim/methods/c_script -a location=pnimmstr:/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 10.152.10.124:gandalf 10.152.10.203:pnimmstr "
- export NIM_MOUNTS=" pnimmstr:/nim/lpp_source/61tl05_lpp:/SPOT/usr/sys/inst.images:dir pnimmstr:/nim/images/aix61-tl05sp1-golden.mksysb:/NIM_BOS_IMAGE:file "
- export ROUTES=" default:0:10.152.10.1 "

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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

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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.

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

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Nim_alt_clone

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

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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.

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Alternate Disk Install

- http://pic.dhe.ibm.com/infocenter/aix/v7r1/topic/com.ibm.aix.install/doc/insg drf/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
  - o 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
  - o 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

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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  7.1.0.15  COMMITTED  Alternate Disk Installation
 bos.alt_disk_install.rte  7.1.0.15  COMMITTED  Alternate Disk Installation
```

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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
```

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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

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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.

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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

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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
```

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```
# 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
```

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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

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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

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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

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References for NIM

- 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

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Upcoming Forsythe Talks

- March 21   PowerSystem COD Update   Charle Cler
-
    - o   Types of CoD (Trial, Reserve, On/Off, Permanent)
    - o   How to activate CoD resources
    - o   Available CoD options for each model
    - o   Bundled On/Off CoD for 780/795
    - o   PowerSystems Pools
-
- April 18   AIX Performance Tuning   Jaqui Lynch
- May 16   Virtualization Concepts   Charlie Cler
- June 20   Puresystems Experiences   Andrew Goade
- July 18   TBD   Jaqui Lynch
- August 15   Virtualization Architecture   Charlie Cler
- September 19   NPIV and P2V   Andrew Goade
- October 17   TBD
- November 21   TBD

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Questions???

Send questions to lynchj@forsythe.com

Handout is at: http://www.circle4.com/papers/nim101.pdf

Information on further talks can be found at:
http://www.circle4.com/forsythetalks.html

Movies will be at:
http://www.circle4.com/movies

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