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Simplifying with NIM
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Server consolidation is a major issue at many businesses with larger servers running multiple LPARs, all of which need to be installed, backed up and maintained over long periods of time. Since it takes several hours just to install one server from scratch using CDs or DVDs, clearly there has to be a better way to perform these mundane tasks. Implementing on demand capabilities means that the necessary resources are available to quickly build an LPAR from either a backup or a master image and to repeat this process whenever necessary.

Additionally, cost effectiveness for backups becomes a major issue when dealing with multiple clients. The cost of the client software alone can be prohibitive when trying to backup the OS on multiple client systems. The answer to these problems (for the OS at least) is to use the Network Installation Manager (NIM) to install and maintain the LPAR images as well as to take care of mksysb backups of the images. This article will explain what NIM is and how it can be used. (Note: In a future article, I'll discuss setting up a basic NIM server.)

What is NIM?
NIM has been around for a long time on AIX, and I have not-so-fond memories of it from the beginning of my SP days. However, in AIX 5L v5.3 several improvements have been made to NIM, including the ability to support Linux clients.

NIM basically provides a central point of management for installing and maintaining AIX images for both LPARs and individual servers. It also facilitates the installation of all of those instances from either the same master image (also called the golden image or gold master), from different images, from installation media or from a previous mksysb of that instance (instance refers to an OS image, regardless of whether it's an LPAR or on a dedicated machine). Additionally, NIM can group instances and install multiple instances at the same time across the network or by using the Virtual Ethernet facilities provided by POWER5 hardware and AIX 5L v5.3.

NIM 101
Setting up a NIM environment requires a NIM master and the number of client instances. The NIM master owns and provides the resources necessary for the clients to be serviced. All NIM operations on clients will require one or more of these resources. The master stores information about NIM and its setup in its own NIM database, which must be backed up regularly, and it stores the resources in ordinary AIX file systems. These file systems are available to clients using NFS.

NIM depends on certain protocols and network services in order to function correctly. These include NFS, bootp or DHCP, and tftp. Previously it also required the use of rsh and the other rcmd commands, but in AIX v5.3 it's now possible to use either basic nimsh or Openssl—either of which is more secure than the r-commands. These new services come as part of the bos.sysmgt.nim.client fileset, and the old rcmds are still supported in AIX 5L v5.3 for compatibility purposes.

The NIM master has certain minimum requirements. For example, it must always be at the highest level of AIX that it's required to support. That means that if you want to support a NIM client at AIX v5.3 ML3, then the NIM master must be installed with at least that level of AIX. The master can be at a higher level but it can't be at a lower level. The master can be an LPAR or a stand-alone server. Either way, it requires access to sufficient memory and processor power to support the required systems, and it requires a fast network to allow network installations to proceed quickly and smoothly. The master needs access to a CD or DVD and some kind of tape system to back itself up to. The CD/DVD is required to copy installation media into the necessary directories for pushing out installations. The master also requires sufficient disk space to provide space for the necessary resources for the clients, as well as the backups of their rootvgs.

NIM Resources
NIM resources are defined in the NIM database on the master, and those that are file-system-based are served out to the clients using Network File System (NFS). There are many NIM resources that must be defined. Some of the more critical ones include:

lpp_source—The Licensed Program Product source (lpp_source) directory contains the images that AIX uses to load software. These are typically the backup file format (BFF) 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 Shared Product Object Tree (SPOT) is a directory 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 one for AIX. It may be necessary to

create multiple SPOTs depending on the maintenance levels and versions that must 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.

Additional resources may include the following:

Scripts—Scripts can be set to run during a BOS install to ensure that the resulting instance of the OS 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, etc.

image_data—This is also a file and contains OS image information related to file systems, mirroring, etc.

installp_bundles—These files 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 may be for DB2 servers, while another may be for Web servers. Once the OS is installed, you simply select the post-install bundle and apply it.

New in NIM

One of the new features with NIM on AIX 5L v5.3 is that it's now possible to set up the NIM server to support Linux installations to both pSeries servers and Intel servers. This is possible because of enhancements to tftp in AIX 5L v5.3. The main requirement for this to work is to switch to using DHCP instead of bootp as the netboot method for the clients. It's also possible to set up a Linux server as a basic NIMOL server that can administer AIX servers, as well as installing Linux servers. See the references below for more information.

Growing Numbers

Installation management and ongoing maintenance are becoming major issues as environments become more complex and involve multiple systems. While it's easy to manually administer four or five OS images, it turns into a nightmare as the number grows. Additionally, the ability to clone LPARs and rapidly deploy them is a critical component of IBM's On Demand strategy. On demand has no real value if it takes two days to build the OS. NIM tackles the challenge here and provides many additional features.

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NIM References:

- How to install AIX 5L (www- 128.ibm.com/developerworks/eserver/library/es-install-aix.html#cfgnimeznim)
- The secret of NIM (http://swexpert.com/C8/RS.C4.FEB.97.pdf)

References for NIM and Linux:

- Install AIX from a Linux server using NIM on Linux (http://publib.boulder.ibm.com/infocenter/pseries/v5r3/index.jsp?topic=/com.ibm.aix.doc/infocenter/howto/HT_insgdrf_aix_on_linux.htm)
- Linux network installation service for multiple platforms provided by an AIX 5L Version 5.3 NIM server (www-03.ibm.com/servers/eserver/pseries/hardware/whitepapers/network_install.pdf)