



# Live Partition Mobility @ Australia Post

2009 IBM Power Systems Technical Symposium. 10-13th August, Sydney, Australia

# Who is this bloke!?

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- ❑ AIX Specialist @ Australia Post.
- ❑ IBM CATE, System p platform and AIX 5L, technical writer for IBM Systems Magazine, IBM developerWorks and a co-author of the IBM Redbooks publication, "NIM from A to Z in AIX 5L."

## Purpose

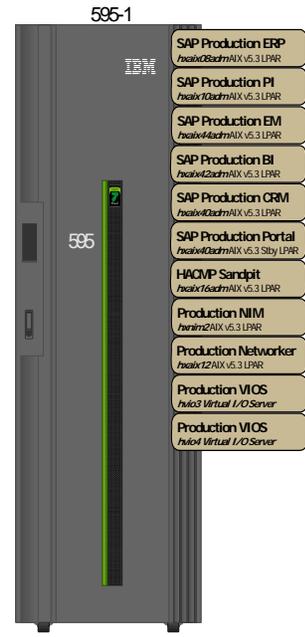
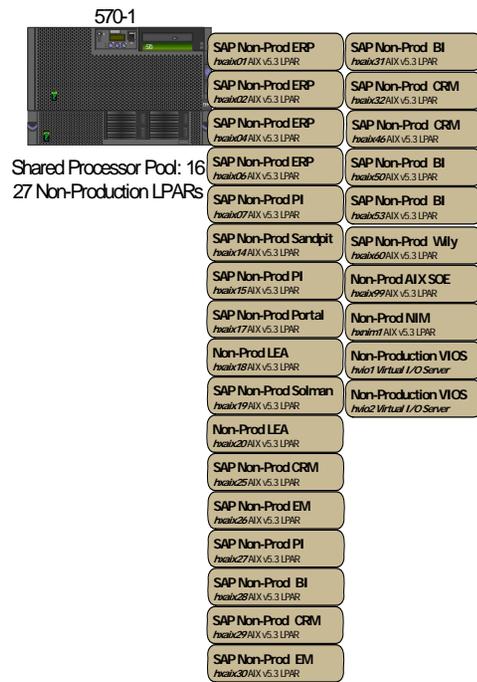
- ❑ Share our LPM experience with AIX community.
- ❑ Discuss configuring LPM on JS22 and 570/595 systems.
- ❑ Exchange ideas with other AIX customers.
- ❑ Demonstrate use of latest technology, outside of IBM.
- ❑ Provide feedback to IBM development.

## Audience

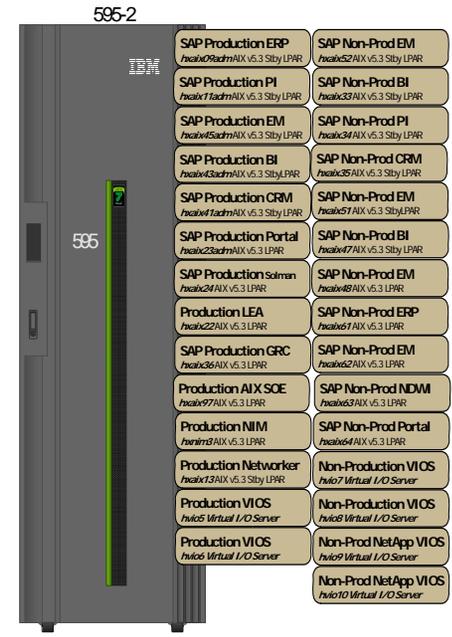
- ❑ Technical
- ❑ AIX
- ❑ SAP

# AIX-POWER6 Landscape @ POST

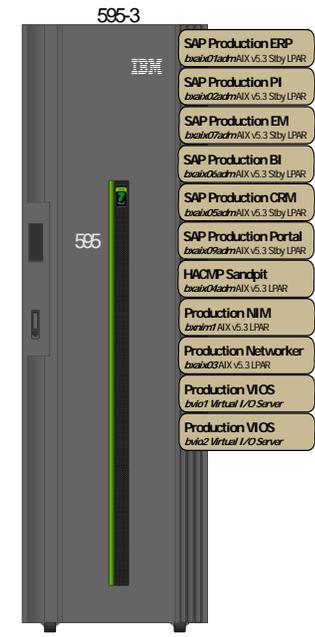
□ ~80 LPARs



Shared Processor Pool: 25  
11 LPARs:  
10 Production  
1 Non-Production



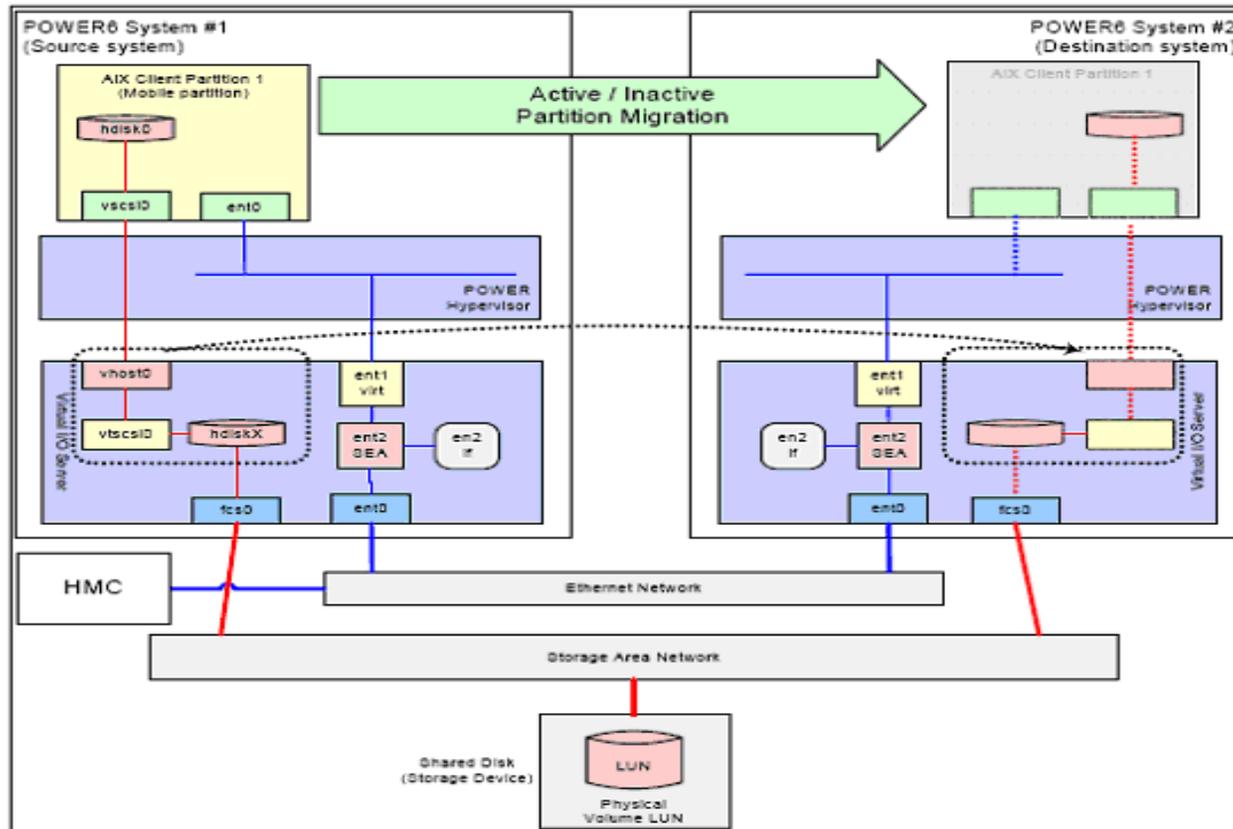
Shared Processor Pool: 20  
29 LPARs:  
13 Production  
16 Non-Production



Shared Processor Pool: 12  
11 Production LPARs

# Partition Mobility in brief...

- ❑ Live Partition Mobility (LPM) allows you to move an active LPAR from one physical server to another without disrupting users or running processes. The migration transfers the entire LPAR (Logical Partition) state, including processor context, memory, connected users, running batch jobs etc. [Attend LPM sessions at this event to learn more!](#)



# Which systems? Benefits of LPM?

- ❑ Live Partition Mobility is available on POWER6 based systems.
- ❑ It enables the migration of an active LPAR from one physical system to another. LPARs must be virtualised i.e. shared processor and VIO.
- ❑ Mobility uses a simple procedure that transfers the LPAR from the source to the destination system without disrupting the hosted application or the operating system.
- ❑ It allows an administrator to perform hardware maintenance, such as disruptive firmware updates, without requiring system downtime. LPARs can be temporarily moved to different physical servers during the maintenance window. They can be easily moved back once the outage is complete.
- ❑ It provides an administrator greater control over the usage of System p resources as workload can be moved dynamically between systems.
- ❑ Live Partition Mobility is targeted for planned activity. It does not protect you from system failures, so it does not replace high-availability software like the IBM HACMP (PowerHA) high-availability cluster technology.

# Australia Posts direction for LPM.

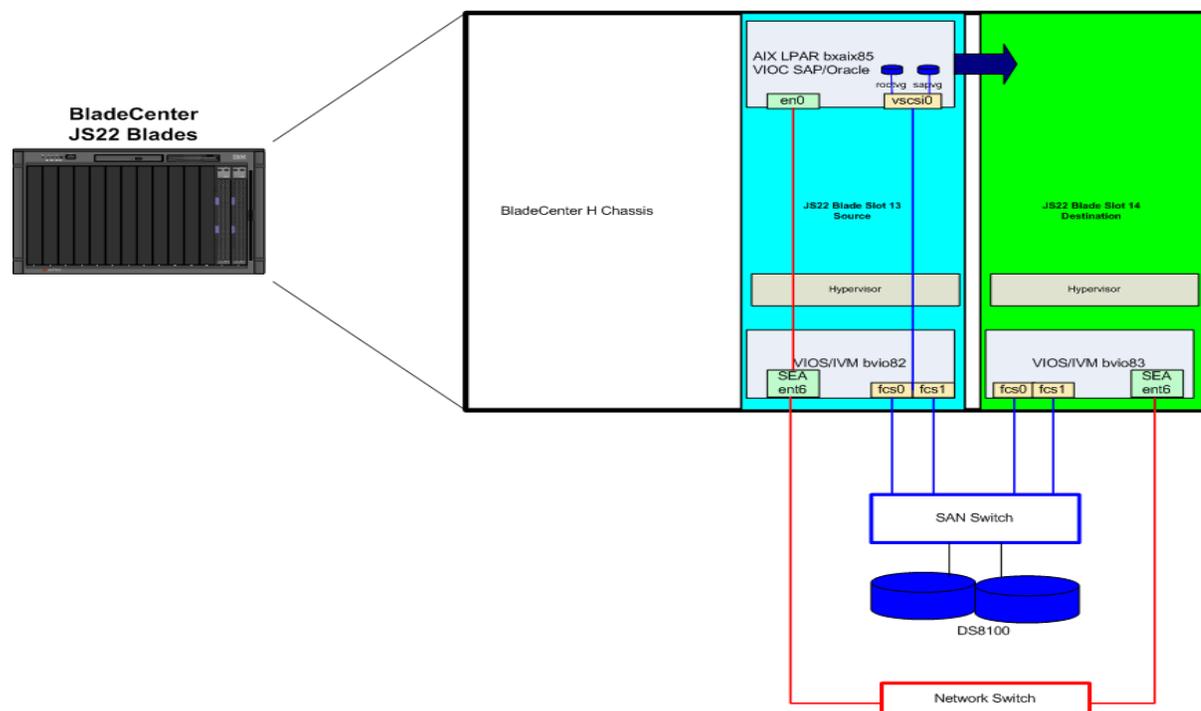
❑ LPM is the latest weapon that Australia Post will use on the road to continuous availability. It will help to:

- Reduce planned down time by dynamically moving running LPAR from one server to another.
- React to increased workloads over month end by moving non essential LPARs from heavily loaded servers to less used servers – leaving spare capacity for critical month end workload.
- Develop an energy reduction program which allows easy consolidation of LPARs.

❑ *But* how do we now it works in our environment? i.e. with our SAP applications? Need a POC project to develop and test.

# Proof of Concept Environment

- ❑ Prove concept in non-production lab. Prior to *real*/non-prod and Production.
- ❑ Two JS22 Blades. Each running VIOS 2.1 and IVM. 16GB Memory and 4 x POWER6 processors.
- ❑ One LPAR running AP AIX SOE v6.1 TL2 SP2\*.
- ❑ One SAP R3 4.7 instance with Oracle 10G.



\*When first tested, our levels were VIOS 1.5.1.1-FP-10.1 and AIX 5.3 TL7 SP3!

# Non-Prod Live Partition Mobility@POST

❑ POC would assist us defining the requirements, process and execution of Live Partition Mobility across the Australia Post non-production IBM AIX POWER6 systems e.g.

- Gathering requirements for LPM of a non-production LPAR.
- Raising Remedy and Change Requests for LPM.
- Executing an LPM operation in the non-production AIX environment at Australia Post.

❑ Out of scope:

- LPM operations to and from our DR site. All managed systems must be connected to the same HMC.
- LPM for production SAP/Oracle systems. Formal SAP testing with Oracle is on-going. Support announced at a later date (please do not attempt to perform a live partition migration of a production Oracle database partition before the formal support is announced). Refer to SAP Note 1102760\*.
- LPM for HACMP clustered systems. HACMP is supported with LPM but has not been thoroughly tested within Australia Posts environment. Further validation required for HACMP and LPM.
- <http://www-03.ibm.com/support/techdocs/atmastr.nsf/WebIndex/FLASH10640>

\*Has since been announced!

# POC Objective

- ❑ I wanted to be able to move an active AIX LPAR, running SAP and Oracle, from one JS22 Blade to another physical Blade.
- ❑ This would provide me with the ability to perform disruptive hardware and/or software maintenance on a Blade without the need for an outage to my SAP applications.
- ❑ For example, if I had a requirement to upgrade a VIOS on a Blade, I could move the workload to another Blade (without an outage to SAP) , perform the VIOS update, reboot the Blade, and then move the LPAR back once the activity was successfully completed.
- ❑ Likewise, I could take the same action if I needed to update the Blade's firmware.
- ❑ Blades used for Pilot and POC SAP applications. 1-2 users.
- ❑ Once proven we could plan for and verify LPM across the 570 and 595 landscape.

# JS22 Blade Environment

- ❑ IBM BladeCenter H chassis.
- ❑ JS22 Blades in slots 13 and 14, respectively.
- ❑ Both Blades have 16GB of memory installed, 4 x 4GHz POWER6 processors
- ❑ 'PowerVM Enterprise Edition' enabled (required for mobility).
- ❑ Each Blade was installed with a Virtual I/O server (VIOS, version 1.5\*) and Integrated Virtualization Manager (IVM).
- ❑ The SAN disk storage for these systems was an IBM DS8100.
- ❑ VIOS hostnames: bvio82 (slot 13) and bvio83 (slot 14).
- ❑ The Blade in slot 13 had one AIX LPAR (bxaix85) configured and active.
- ❑ The application hosted on this system was a single SAP R3 v4.7 instance with Oracle 10G. SAP was installed and configured by our SAP Basis team.
- ❑ It is important to note that they did not have to do anything special with their SAP (or Oracle) installation to support the mobility feature\*.

\*Note Official Support Statement from Oracle.

# JS22 Blade Environment – continued.

- ❑ There are several prerequisites for partition mobility.
- ❑ All network connectivity from the LPAR must be virtualized, meaning it must communicate using a VIOS.
- ❑ This implies that the VIOS must have a **Shared Ethernet Adapter (SEA)** configured and operational.
- ❑ Both of my VIOS were configured with an SEA, on the same physical VLAN. I used one of the Logical Host Ethernet (LHE) ports to configure the SEA.
- ❑ All of the SEA configuration was performed using the **IVM** and was very straightforward. No need for *mkvdev -sea*, was a nice change!
- ❑ The Virtual I/O Client (VIOC), *bxaix85*, was configured with a virtual ethernet interface configured with the appropriate VLAN ID to communicate with the outside world using the SEA in the VIOS.

# JS22 Blade Environment – continued.

- ❑ Another important prerequisite for partition mobility.
- ❑ All storage connected to the mobile LPAR must be on the [SAN](#).
- ❑ Even the operating system i.e. [rootvg](#).
- ❑ SAN disk must be assigned to both Blades and be detected by both [VIOS](#).
- ❑ This is to allow the target VIOS the ability to "take over" the storage during a migration.
- ❑ I allocated two SAN ([DS8100](#)) disks to both VIOS.
- ❑ One disk was for the OS (AIX *rootvg*)
- ❑ The other was for the SAP/Oracle software and database (*sapvg*).

# Configuring the JS22 environment for partition mobility.

- ❑ First step. Install Virtual I/O Server (VIOS) on each JS22.
- ❑ Accomplished by installing a VIOS [mkysb](#) image using NIM.
- ❑ [Internal disk](#) within the Blade can be used to house the VIO server.
- ❑ May choose to boot the Blade with the SAN, as this is also supported.
- ❑ I chose the internal disk for my Blades.
- ❑ Connect to the Web-based [IVM](#). "HMC-like" GUI.
- ❑ IVM allows administrator to configure LPARs, virtual network, and virtual storage on the Blade and VIOS.
- ❑ Web-based tool. Simply point your Web browser at the VIOS hostname.
- ❑ <http://bvio82>. Presented with the IVM login page.
- ❑ Use the VIOS [padmin](#) userid and password.

# Configuration - continued.

- ❑ Update the [firmware](#) levels of the JS22 and associated components such as the Fibre Channel (FC) adapters.
- ❑ Download the latest firmware images for the JS22 and the FC adapters from the JS22 support site.
- ❑ Install the latest VIOS fix pack.
- ❑ During the build of my VIOS, the latest [fixpack](#) was 1.5.1.1-FP-10.1.
- ❑ Install and update multipath I/O (MPIO) device driver. When connecting to an IBM DS8100 storage device, the supported MPIO software is [SDDPCM](#) v2.2.0.
- ❑ With the correct software and firmware levels installed, prepare the Blade, the VIOS, and the LPAR for partition mobility.
- ❑ Brief checklist of the tasks performed with the IVM:
  1. Enter the PowerVM Enterprise Edition APV key on both Blades. This key is required to enable the mobility feature on the JS22 Blade.
  2. Confirm that the [memory region size](#) is the same on both Blades. This information can be found under "View/Modify System Properties," in the "Memory" tab.

# Configuration - continued.

3. Configure an SEA on both VIOS. Enable the Host Ethernet Adapter for ethernet "[bridging](#)".
4. Required for the virtual ethernet devices to access the physical ethernet adapter and the external network.
5. Performed under the "*View/Modify Host Ethernet Adapter*", "*Properties*" tab.
6. Message appears stating the operation was successful. The SEA is now configured.
7. Create an LPAR ([bxaix85](#)) on the source Blade.
8. Ensure that none of the *physical*/HEA ports are selected. Under "Virtual Ethernet," select the SEA to use (for instance, ent0).
9. Under "Storage Type", select Assign existing virtual disks and physical volumes. Select the *SAN disk* assigned to the VIOS i.e. the DS8100 disks.
10. Next step is to install AIX. Achieved using a NIM mksysb install of AP SOE image.
11. Configure SAP and Oracle.

# Configuration - continued.

- ❑ Review and check. Each VIOS has an SEA. ent6: LHE port, ent0.

```
$ lsmmap -all -net | grep -p ent6
SEA                ent6
Backing device    ent0
Status            Available
Physloc           U78A5.001.WIHO76E-P1-T6

$ entstat -all ent6 | grep PVID
PVID: 1           VIDs: None
```

- ❑ Use *lspv* to check that both VIOS have the same PVID associated with the SAN storage (hdisk1, 2, and 3).

```
gibsonc@hxnim2 /home/gibsonc $ dsh -wbvio82,bvio83 ioscli lspv | dshbak
HOST: bvio82
-----
NAME                PVID                VG                STATUS
hdisk0              000071dacdc1fe09   rootvg           active
hdisk1              000071fabe8efb25   None
hdisk2              000071fabe8f0837   None
hdisk3              000071dadd6c7a7d   None

HOST: bvio83
-----
NAME                PVID                VG                STATUS
hdisk0              000071facb8888a2   rootvg           active
hdisk1              000071fabe8efb25   None
hdisk2              000071fabe8f0837   None
hdisk3              000071dadd6c7a7d   None
```

# Configuration - continued.

- ❑ Ensure that MPIO for the disks is configured and functioning appropriately.
- ❑ Run the *pcmpath* command (from *oem\_setup\_env*)
- ❑ Verify that all paths are operating normally on both VIOS.
- ❑ Confirm that the AIX LPAR, bxaix85, is configured with only virtual devices (meaning no physical adapters, another prerequisite for mobility).
- ❑ LPAR is configured with **virtual Ethernet** and **virtual SCSI** adapters only.

```
gibsonc@bxaix85 /home/gibsonc $ lsdev -Cc adapter
ent0    Available   Virtual I/O Ethernet Adapter (1-lan)
vsa0    Available   LPAR Virtual Serial Adapter
vscsi0  Available   Virtual SCSI Client Adapter
```

# Performing Live Partition Mobility.

- ❑ At this point, two VIOS have been configured, bvio82 and bvio83, one per Blade.
- ❑ One active AIX LPAR (bxaix85) running on the first Blade as a VIO client (VIOC).
- ❑ Ready to perform a live partition migration.
- ❑ First Blade (in slot 13, bvio82) known as *source* system.

The screenshot displays the Integrated Virtualization Manager (IVM) web interface in a Microsoft Internet Explorer browser window. The address bar shows <http://bvio82/main.faces>. The page title is "Integrated Virtualization Manager" and it includes the IBM logo. A navigation menu on the left lists sections: Partition Management, I/O Adapter Management, Virtual Storage Management, and IVM Management. The main content area is titled "View/Modify Partitions" and includes a "System Overview" section with the following data:

| System Overview           |          |                             |             |
|---------------------------|----------|-----------------------------|-------------|
| Total system memory:      | 16 GB    | Total processing units:     | 4           |
| Memory available:         | 9.56 GB  | Processing units available: | 3.4         |
| Reserved firmware memory: | 448 MB   | Processor pool utilization: | 0.03 (0.8%) |
| System attention LED:     | Inactive |                             |             |

Below the system overview is a "Partition Details" table with a toolbar containing "Create Partition...", "Activate", "Shutdown", and "More Tasks". The table lists two partitions:

| Select                   | ID ^ | Name                    | State   | Uptime     | Memory | Processors | Entitled Processing Units | Utilized Processing Units | Reference Code |
|--------------------------|------|-------------------------|---------|------------|--------|------------|---------------------------|---------------------------|----------------|
| <input type="checkbox"/> | 1    | <a href="#">bvio82</a>  | Running | 18.35 Days | 2 GB   | 4          | 0.4                       | 0.01                      |                |
| <input type="checkbox"/> | 3    | <a href="#">bxaix85</a> | Running | 18.36 Days | 4 GB   | 2          | 0.2                       | 0.02                      |                |

# Performing Live Partition Mobility - cont.

- ❑ Second Blade (slot 14, bvio83) the *target* system.

Integrated Virtualization Manager - bvio83 - Microsoft Internet Explorer

Address: <http://bvio83/main.faces>

### Integrated Virtualization Manager

Welcome padmin [Edit my profile](#) | [Help](#)

#### Partition Management

- [View/Modify Partitions](#)
- [View/Modify System Properties](#)

#### I/O Adapter Management

- [View/Modify Host Ethernet Adapters](#)
- [View/Modify Virtual Ethernet](#)
- [View/Modify Physical Adapters](#)

#### Virtual Storage Management

- [View/Modify Virtual Storage](#)

#### IVM Management

- [View/Modify User Accounts](#)
- [View/Modify TCP/IP Settings](#)

### View/Modify Partitions

To perform an action on a partition, first select the partition or partitions, and then select the

#### System Overview

|                           |          |                             |      |
|---------------------------|----------|-----------------------------|------|
| Total system memory:      | 16 GB    | Total processing units:     | 4    |
| Memory available:         | 13.62 GB | Processing units available: | 3.6  |
| Reserved firmware memory: | 384 MB   | Processor pool utilization: | 0.01 |
| System attention LED:     | Inactive |                             |      |

#### Partition Details

\* Create Partition... Activate Shutdown --- More Tasks ---

| Select                   | ID ^ | Name                   | State   | Uptime     | Memory | Processors | Entitled Processing Units | Utilized Processing Units |
|--------------------------|------|------------------------|---------|------------|--------|------------|---------------------------|---------------------------|
| <input type="checkbox"/> | 1    | <a href="#">bvio83</a> | Running | 18.37 Days | 2 GB   | 4          | 0.4                       | 0.01                      |

# Performing Live Partition Mobility - cont.

- ❑ **Objective** here is to move the LPAR, bxaix85, from the Blade in slot 13 to the Blade in slot 14.
- ❑ At the end of the migration, bxaix85 will be running as a VIOC from bvio83 on the other physical Blade.
- ❑ AIX, SAP, and Oracle will **continue to function** throughout the entire migration.
- ❑ Prior to the migration, run the *lsconf* command from AIX, and note the system serial number:

```
gibsonc@bxaix85 /home/gibsonc $ lsconf | grep 'Serial Number'  
Machine Serial Number: 10071DA
```

# Performing Live Partition Mobility - cont.

- ❑ During the migration, there are **SAP jobs** running on the LPAR.
- ❑ Monitor the system using the *topas*
- ❑ SAP (disp+work) and Oracle processes are consuming processor during the migration. Running an *SGEN*.

```

Topas Monitor for host:      bxaix85          EVENTS/QUEUES      FILE/TTY
Thu Sep 18 13:48:06 2008  Interval:  2          Cswitch    12312  Readch    1945.9K
                               Syscall    32659  Writech    1880.8K
Kernel   19.7   |#####|          Reads      6178   Rawin     0
User     75.7   |#####|          Writes     6134   Ttyout    681
Wait     0.1   |#|          Forks      0      Igets     0
Idle     4.5   |##|          Execs      0      Namei     95
Physc = 0.98          %Entc= 488.8  Runqueue   2.0   Dirblk    0
                               Waitqueue   0.0

Network  KBPS   I-Pack  O-Pack  KB-In  KB-Out
lo0      3689.6  6120.5  6120.5  1844.8  1844.8
en0      1.0    2.5    2.0    0.1    0.9

Disk     Busy%   KBPS     TPS  KB-Read  KB-Writ
hdisk0   2.5    818.0   82.5   444.0   374.0
hdisk2   0.0    0.0    0.0    0.0    0.0
hdisk1   0.0    0.0    0.0    0.0    0.0

Name      PID    CPU%  PgSp  Owner
disp+wor  725172  67.3  34.8  cgladm
oracle    643170  21.6  14.1  oracgl
topas     475228  0.8   2.2  gibsonc
xmwlrm    278664  0.2   0.9  root
aioserve  421908  0.2   0.4  root
aioserve  458884  0.2   0.4  root

PAGING
Faults    3996
Steals    0
PgspIn    0
PgspOut   0
PageIn    14
PageOut   70
Sios      84

MEMORY
Real,MB   4096
% Comp    98.8
% Noncomp 1.1
% Client  1.1

PAGING SPACE
Size,MB   20480
% Used    3.3
% Free    97.7

NFS (calls/sec)
ServerV2  0
ClientV2  0
ServerV3  0
ClientV3  0

Press:
"h" for help
"q" to quit
    
```

# Performing Live Partition Mobility - cont.

- ❑ All tasks to perform partition mobility will be executed from the IVM, on the source Blade.
- ❑ To start the migration, check the box next to the LPAR (bxaix85).
- ❑ Choose **Migrate** from the "More Tasks" drop-down menu.

The screenshot shows the Integrated Virtualization Manager (IVM) web interface. The browser address bar shows <http://bvio82/main.faces>. The page title is "View/Modify Partitions". The main content area displays system overview information and a table of partitions. The partition 'bxaix85' is selected, and the 'More Tasks' dropdown menu is open, showing the 'Migrate' option.

**System Overview**

|                           |          |                             |             |
|---------------------------|----------|-----------------------------|-------------|
| Total system memory:      | 16 GB    | Total processing units:     | 4           |
| Memory available:         | 9.56 GB  | Processing units available: | 3.4         |
| Reserved firmware memory: | 448 MB   | Processor pool utilization: | 0.03 (0.8%) |
| System attention LED:     | Inactive |                             |             |

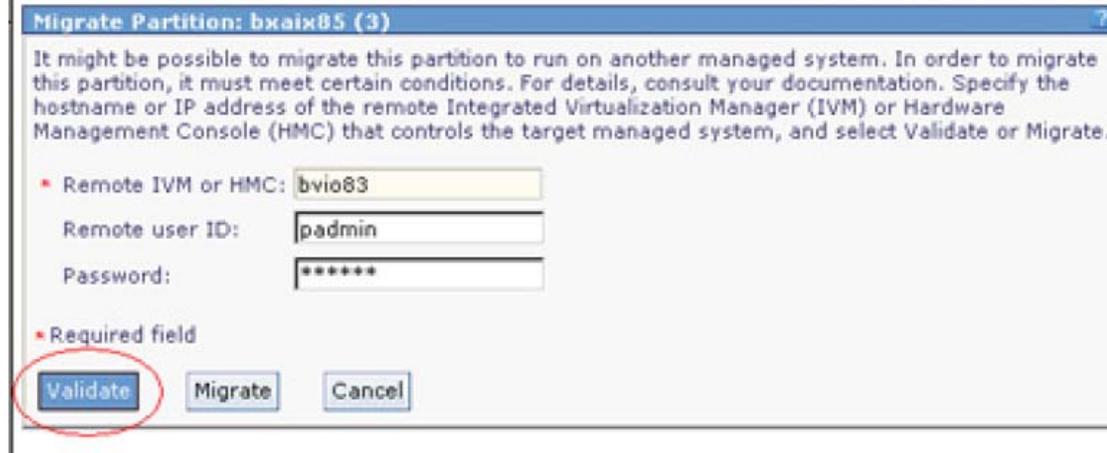
**Partition Details**

| Select                              | ID ^ | Name    | State   | Uptime     | Memory | Processor |
|-------------------------------------|------|---------|---------|------------|--------|-----------|
| <input type="checkbox"/>            | 1    | bvio82  | Running | 18.35 Days | 2 GB   | 4         |
| <input checked="" type="checkbox"/> | 3    | bxaix85 | Running | 18.36 Days | 4 GB   | 2         |

The 'More Tasks' dropdown menu is open, showing the following options: --- More Tasks ---, Open terminal window, Delete, Create based on, Operator panel service functions, Reference Codes, --- Mobility ---, **Migrate**, Status, Properties.

# Performing Live Partition Mobility - cont.

- ❑ Presented with a screen to enter the [target system details](#).
- ❑ Enter the details and then click on [Validate](#).



Migrate Partition: bxaix05 (3)

It might be possible to migrate this partition to run on another managed system. In order to migrate this partition, it must meet certain conditions. For details, consult your documentation. Specify the hostname or IP address of the remote Integrated Virtualization Manager (IVM) or Hardware Management Console (HMC) that controls the target managed system, and select Validate or Migrate.

▪ Remote IVM or HMC:

Remote user ID:

Password:

▪ Required field

- ❑ During the validation phase, several configuration checks are performed. Some of the checks include:
  - Ensuring the target system has [sufficient memory and processor](#) resources to meet the LPAR's current entitlements.
  - Checking there are [no dedicated physical adapters](#) assigned to the LPAR.
  - Verifying that the LPAR does not have any virtual SCSI disks defined as [logical volumes](#) on any VIOS. All virtual SCSI disks must be mapped to whole LUNs on the SAN.
  - [RMC](#) connections to the LPAR and the source and target VIOS are established.
  - The partition state is active i.e. *Running*. The [LPAR's name is not already in use on the target](#) system.
  - A [virtual adapter map](#) is generated that maps the source virtual adapter/devices on to the target VIOS. Used during the actual migration

# Performing Live Partition Mobility - cont.

- ❑ Validation completes successfully.
- ❑ Message stating it "*might be possible*" to migrate the LPAR.
- ❑ Click [Migrate](#) and the migration to the other Blade begins.

Migrate Partition: bxaix85 (3)

**i** The operation completed successfully.

It might be possible to migrate this partition to run on another managed system. In order to migrate this partition, it must meet certain conditions. For details, consult your documentation. Specify the hostname or IP address of the remote Integrated Virtualization Manager (IVM) or Hardware Management Console (HMC) that controls the target managed system, and select Validate or Migrate.

▪ Remote IVM or HMC:

Remote user ID:

Password:

▪ Required field

# Performing Live Partition Mobility - cont.

- New LPAR created on the **target** Blade
- Same name as the LPAR on the source Blade.
- State of *Migrating - Running*.

The screenshot shows the 'View/Modify Partitions' window. It includes a 'System Overview' section with the following data:

|                           |          |                             |             |
|---------------------------|----------|-----------------------------|-------------|
| Total system memory:      | 16 GB    | Total processing units:     | 4           |
| Memory available:         | 9.56 GB  | Processing units available: | 3.4         |
| Reserved firmware memory: | 448 MB   | Processor pool utilization: | 0.07 (1.6%) |
| System attention LED:     | Inactive |                             |             |

Below this is the 'Partition Details' section, which contains a table of partitions. The table has columns for Select, ID, Name, State, Uptime, Memory, Processors, Entitled Processing Units, Utilized Processing Units, and Reference Code. Two partitions are listed:

| Select                   | ID | Name   | State               | Uptime     | Memory | Processors | Entitled Processing Units | Utilized Processing Units | Reference Code |
|--------------------------|----|--------|---------------------|------------|--------|------------|---------------------------|---------------------------|----------------|
| <input type="checkbox"/> | 1  | bxio83 | Running             | 18.37 Days | 2 GB   | 4          | 0.4                       | 0.07                      |                |
| <input type="checkbox"/> | 3  | bxix85 | Migrating - Running |            | 4 GB   | 2          | 0.2                       |                           | C20025FF       |

The 'bxix85' partition and its 'Migrating - Running' state are circled in red in the original image.

# Performing Live Partition Mobility - cont.

- ❑ What happens during the partition migration phase?
  - **State information is transferred** from the source to the target system.
  - This "state information" includes such things as partition memory, processor state, virtual adapter state, NVRAM.
  
- ❑ Just *some* of the events and actions that occur during the migration:
  - A partition **shell** is created on the target system.
  - Shell partition **reserves resources** required to create the inbound LPAR i.e CPU, memory, virtual adapters.
  - A connection between the source and target systems and their respective Hypervisor is established through a device called the Virtual Asynchronous Service Interface (**VASI**) on the VIOS.
  - The source and target VIOS use this virtual device to **communicate** with the **Hypervisor** to gain access to the LPAR's state and to coordinate the migration.
  - You can confirm the existence of this device with the `lsdev` command on the VIOS.

```
$ lsdev -type adapter | grep vasi  
vasi0          Available Virtual Asynchronous Services Interface (VASI)
```

# Performing Live Partition Mobility - cont.

## ❑ What happens during the partition migration phase - cont?

- The *vasistat* command displays the statistics for the VASI device.
- Run this command on the source VIOS during the migration.
- Observe "*Total Bytes to Transfer*" indicates the size of the memory copy and that "*Bytes Left to Transfer*" indicates how far the transfer has progressed.

```
$ vasistat -all vasi0 | more
-----
VASI STATISTICS (vasi0) :
Device Type: Virtual Asynchronous Services Interface (VASI)
Elapsed Time: 21 days 22 hours 2 minutes 7 seconds

Transmit Statistics:                               Receive Statistics:
-----
Packets: 11508441                                  Packets: 22427345
Bytes: 63442033217                                 Bytes: 58347415033
Transmit Errors: 0                                  Receive Errors: 0
Bad Packets: 0                                       Bad Packets: 0
No Buffers: 0                                        No Buffers: 0
Interrupts: 11508441                                Interrupts: 25020140
                                                    System Buffers: 0

Interrupt Processing Exceeded: 253841
Offlevel Interrupt Scheduled: 242986

Driver Flags: Up Running 64BitSupport

Maximum Operations: 8
Maximum Receive Pools: 3
Active Operations: 1

Statistics for each operation:
=====

Operation #0 (ACTIVE):
-----
    Operation Type: Migration (Source)
    Stream ID: DDD1EED073EF6BB1
    TOP/BOTTOM: 00000000/00070000
    Elapsed Time: 0 days 0 hours 0 minutes 1 seconds
    Flags: <RUNNABLE>
    Operation State: Operational
    Stream State: Enabled
    Total Bytes to Transfer: 4364697600
    Bytes Left to Transfer: 4348395520
```

# Performing Live Partition Mobility - cont.

## ❑ What happens during the partition migration phase - cont?

- Virtual target devices and virtual SCSI adapters are **created on the target** system.
- Using the *lsmmap* command on the *target* VIOS, before the migration.
- Notice that there are no virtual SCSI or virtual target device mappings.

```
login as: padmin
padmin@bvio83's password:
Last unsuccessful login: Fri Aug 15 15:19:24 EET 2008 on ssh from 10.0.118.181
Last login: Tue Aug 26 21:24:50 EET 2008 on ssh from 10.0.9.201
$ lsmmap -all
$ █
```

# Performing Live Partition Mobility - cont.

- ❑ What happens during the partition migration phase - cont?
  - Running the same command after the migration shows that the virtual disk mappings have been **automatically created**, as part of the migration process.

```
login as: padmin
padmin@bvio83's password:
Last unsuccessful login: Fri Aug 15 15:19:24 EET 2008 on ssh from 10.0.118.181
Last login: Tue Aug 26 21:21:23 EET 2008 on ssh from 10.3.29.156
$ lsmmap -all
SVSA                Physloc                Client Partition ID
-----
vhost0              U7998.61X.10071FA-V1-C11  0x00000002

VTD                 vtscsi0
Status              Available
LUN                 0x8200000000000000
Backing device      hdisk1
Physloc             U78A5.001.WIHO74C-P1-C6-T1-W500507630603059A-L4000402D0000
0000

VTD                 vtscsi1
Status              Available
LUN                 0x8300000000000000
Backing device      hdisk2
Physloc             U78A5.001.WIHO74C-P1-C6-T1-W500507630603059A-L4001402D0000
0000

VTD                 vtscsi2
Status              Available
LUN                 0x8100000000000000
Backing device      hdisk3
Physloc             U78A5.001.WIHO74C-P1-C6-T1-W500507630603059A-L4000402E0000
0000
```

# Performing Live Partition Mobility - cont.

## ❑ What happens during the partition migration phase - cont?

- The LPAR's **physical memory pages** are copied to the *shell*/LPAR on the target system.
- Using the *topas* command on the *source* VIOS, observe network traffic on the SEA (*ent6*) as a result of the memory copy.

```
Topas Monitor for host:   bvio82          EVENTS/QUEUES  FILE/TTY
Thu Sep 18 13:47:36 2008 Interval: 2      Cswitch  26317  Readch   1148
                               Syscall  2362   Writech  6532
Kernel  90.0  |#####| Reads    19   Rawin    0
User    0.6  |#      | Writes   40   Ttyout   223
Wait    0.0  |      | Forks    0   Igets    0
Idle    9.4  |###   | Execs    0   Namei    81
Phyisc = 1.36          *Entc= 339.8 Runqueue  1.5   Dirblk   0
                               Waitqueue 0.0
Network  KBPS  I-Pack  O-Pack  KB-In  KB-Out  PAGING  MEMORY
en6      80.4K  32.6K  64.0K  3433.1  77.1K  Faults  112  Real,MB  2048
lo0      0.0    0.0    0.0    0.0    0.0    Steals  0    * Comp   52.2
Disk     Busy%  KBPS    TPS  KB-Read  KB-Writ  PgpsIn  0    * Noncomp 40.0
hdisk2   0.0    8.0    0.5    0.0    8.0    PgpsOut 0    * Client  40.0
hdisk0   0.0    0.0    0.0    0.0    0.0    PageIn  0
Name      PID  CPU%  PgSp  Owner  PageOut 0  PAGING SPACE
ctrlproc  31887534  29.6  0.9  root  Sios    0  Size,MB  1536
seaproc   131174  28.1  1.0  root  NFS (calls/sec) * Used    9.9
accesspr  282772  7.5  1.1  root  ServerV2  0
java      286882  3.6  101.9  root  ClientV2  0  Press:
topas     31940832  3.3  51.6  root  ServerV3  0  "h" for help
syslogd   393422  1.0  0.2  root  ClientV3  0  "q" to quit
```

# Performing Live Partition Mobility - cont.

## □ What happens during the partition migration phase - cont?

- LPAR is still active. SAP still running. *State continues to change* while the memory is copied.
- Memory *pages* modified during the transfer *marked as dirty*.
- Process is repeated until dirty pages *no longer decreasing*.
- At this point *target* system instructs *Hypervisor* on *source* to *suspend* LPAR.
- During suspension, *source* LPAR continues to send state information to *target*.
- LPAR is then *resumed*.
- Resumes execution on the *target* system.
- If LPAR requires a page not yet been migrated, will be "*demand-paged*" from the *source* system.
- The LPAR recovers its I/O operations.
- A *gratuitous ARP* request is sent on all virtual Ethernet adapters to update the *ARP caches* on all external switches and systems on the network.
- The LPAR is now *active* again.
- Target system receives the last dirty page from the source system, the migration is complete.
- Period between suspension and resumption lasts just a *few seconds*.
- During my tests, I did not notice *any* disruption to the LPAR as a result of this operation.

# Performing Live Partition Mobility - cont.

- ❑ Memory copy complete. VIOS on *source* removes virtual SCSI server adapters and device to LUN mapping that existed previously.
- ❑ LPAR is automatically deleted from the *source* Blade.

The screenshot shows the 'View/Modify Partitions' window. At the top, it says 'To perform an action on a partition, first select the partition or partitions, and then select the task.' Below this is the 'System Overview' section with the following data:

|                           |          |                             |             |
|---------------------------|----------|-----------------------------|-------------|
| Total system memory:      | 16 GB    | Total processing units:     | 4           |
| Memory available:         | 13.62 GB | Processing units available: | 3.6         |
| Reserved firmware memory: | 384 MB   | Processor pool utilization: | 0.01 (0.2%) |
| System attention LED:     | Inactive |                             |             |

Below the system overview is the 'Partition Details' section, which includes a toolbar with buttons for 'Create Partition...', 'Activate', 'Shutdown', and 'More Tasks'. Below the toolbar is a table with the following data:

| Select                   | ID | Name   | State   | Uptime     | Memory | Processors | Entitled Processing Units | Utilized Processing Units | Reference Code |
|--------------------------|----|--------|---------|------------|--------|------------|---------------------------|---------------------------|----------------|
| <input type="checkbox"/> | 1  | bxio82 | Running | 18.36 Days | 2 GB   | 4          | 0.4                       | 0.01                      |                |

# Performing Live Partition Mobility - cont.

- ❑ LPAR is now in a *Running* state on the *target* Blade.

The screenshot displays the 'View/Modify Partitions' window. At the top, it instructs the user to select a partition and then a task. Below this is the 'System Overview' section, which provides key system metrics. The 'Partition Details' section features a toolbar with actions like 'Create Partition...', 'Activate', and 'Shutdown', followed by a table listing active partitions.

**System Overview**

|                           |          |                             |              |
|---------------------------|----------|-----------------------------|--------------|
| Total system memory:      | 16 GB    | Total processing units:     | 4            |
| Memory available:         | 9.56 GB  | Processing units available: | 3.4          |
| Reserved firmware memory: | 448 MB   | Processor pool utilization: | 1.36 (34.0%) |
| System attention LED:     | Inactive |                             |              |

**Partition Details**

| Select                   | ID ^ | Name   | State   | Uptime     | Memory | Processors | Entitled Processing Units | Utilized Processing Units | Reference Code |
|--------------------------|------|--------|---------|------------|--------|------------|---------------------------|---------------------------|----------------|
| <input type="checkbox"/> | 1    | bxio83 | Running | 18.37 Days | 2 GB   | 4          | 0.4                       | 1.20                      |                |
| <input type="checkbox"/> | 3    | bxax85 | Running | 18.37 Days | 4 GB   | 2          | 0.2                       | 1616.56                   |                |

# Performing Live Partition Mobility - cont.

- ❑ The migration is 100% complete.

The following partitions are currently migrating. You may stop this operation or continue to monitor it. If the migration status shows an error, you should select Recover, which will attempt to complete the migration, or stop it as appropriate.

**Partitions Migrating From This System**

| Select                   | Partition ^ | Migration Status   | Percent Complete | Remote Platform Manager | Remote System             |
|--------------------------|-------------|--------------------|------------------|-------------------------|---------------------------|
| <input type="checkbox"/> | bxaix85 (3) | Migration Complete | 100%             | bvio83                  | Server-7998-61X-SN10071FA |

OK Cancel

# Verifying Live Partition Mobility.

- ❑ Now that the LPAR is running on the other Blade, run the *lsconf* command again to confirm that the [serial number has changed](#) with the physical hardware:

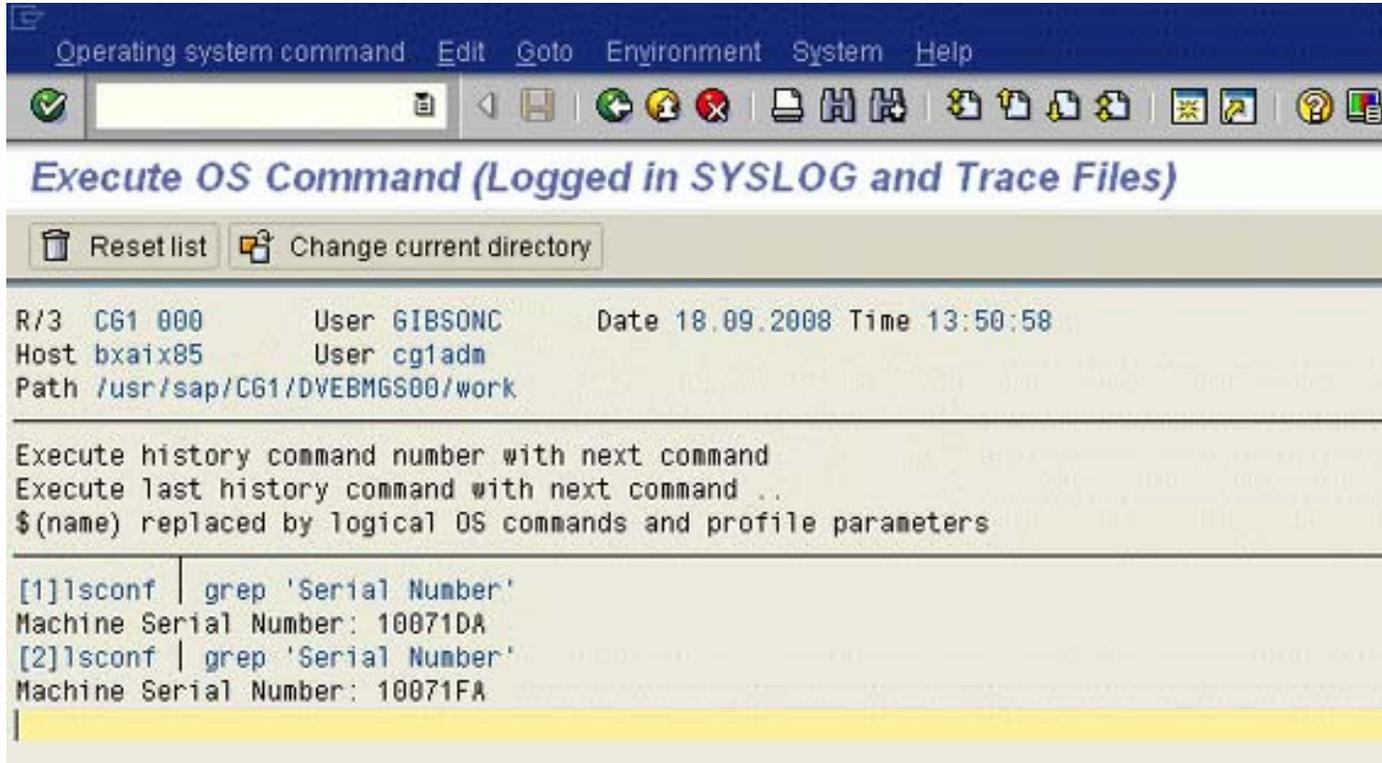
```
gibsonc@bxaix85 /home/gibsonc $ lsconf | grep 'Serial Number'  
Machine Serial Number: 10071FA
```

- ❑ In order to confirm and verify that SAP and Oracle are not impacted by the migration, check the [Oracle alert log](#) for any errors. No errors are found.

```
root@bxaix85 / # tail -f /oracle/CG1/saptrace/background/alert_CG1.log  
Current log# 4 seq# 1396 mem# 1: /oracle/CG1/mirrlogB/log_g14m2.dbf  
Thu Sep 18 13:45:52 2008  
Completed checkpoint up to RBA [0x572.2.10], SCN: 9878246  
Thu Sep 18 13:47:15 2008  
Beginning log switch checkpoint up to RBA [0x575.2.10], SCN: 9907535  
Thread 1 advanced to log sequence 1397  
Current log# 1 seq# 1397 mem# 0: /oracle/CG1/origlogA/log_g11m1.dbf  
Current log# 1 seq# 1397 mem# 1: /oracle/CG1/mirrlogA/log_g11m2.dbf  
Thu Sep 18 13:48:31 2008  
Completed checkpoint up to RBA [0x573.2.10], SCN: 9888598
```

# Verifying Live Partition Mobility - cont.

- ❑ From within SAP, run the *lsconf* command before and after the migration to confirm that the physical server has changed:



The screenshot shows a window titled "Execute OS Command (Logged in SYSLOG and Trace Files)". The window contains the following text:

```
Operating system command  Edit  Goto  Environment  System  Help
Execute OS Command (Logged in SYSLOG and Trace Files)
Reset list  Change current directory
R/3  CG1 000      User GIBSONC      Date 18.09.2008 Time 13:50:58
Host bxaix85     User cgladm
Path /usr/sap/CG1/DVEBMGS00/work
Execute history command number with next command
Execute last history command with next command ..
$(name) replaced by logical OS commands and profile parameters
[1]lsconf | grep 'Serial Number'
Machine Serial Number: 10071DA
[2]lsconf | grep 'Serial Number'
Machine Serial Number: 10071FA
```

# Post Migration.

- ❑ My ssh login sessions on bxaix85 remained active.
- ❑ SAP team **did not notice any disruption** to their SAP GUI client sessions or jobs running on the LPAR.
- ❑ Mobility activity is logged on the LPAR and the source and target VIOS.
- ❑ Review the logs with the errpt (AIX) and errlog (VIOS) commands.
- ❑ On AIX you'll notice messages similar to **CLIENT\_PMIG\_STARTED** and **CLIENT\_PMIG\_DONE**.
- ❑ Additional information from DRMGR, on AIX, is also logged to syslog,
- ❑ For instance, **Starting CHECK phase for partition migration**.
- ❑ On the VIOS you'll find messages relating to the suspension of the LPAR and the migration status (**Client partition suspend issued** and **Migration completed successfully**).
- ❑ The final objective has been achieved. LPAR running on a different physical server. Can now perform scheduled maintenance activities on the Blade.
- ❑ SAP will not suffer any down time as a result of this activity.

# LPM POC complete.

- ❑ POC successful. Migration took roughly two minutes to complete.
- ❑ LPAR being moved had 4GB of memory. Time required for copying of the LPAR's memory from the source to the target.
- ❑ The "suspend" of the LPAR itself lasted no more than two seconds.
- ❑ Considerations:
  - Using a [high-performance network](#) between the source and target systems.
  - Prior to migration, recommend reducing the LPAR's memory update activity.
  - These steps will help to improve the overall performance of the migration.
  - We used a 1GB network within our Blade environment.
  - For larger System p servers (570 and 595), we are considering using a 10GB network when we start moving systems with a large amount of memory (80GB or more). Are we likely to do this?
- ❑ LPM enormous potential for reducing [scheduled downtime](#) for maintenance activities.
- ❑ No disruption to user applications.
- ❑ Power to adjust resource usage. LPARs can be moved to different servers to [balance workload](#).
- ❑ [Migration/consolidation](#) (POWER6 to POWER7) easier. Simply move the LPAR to POWER7.

# Verifying LPM on the 570 and 595s

- ❑ Procedures defined from our POC. Verify them with 570 and 595.
- ❑ Prior to executing a LPM request, the following requirements **must be met**:
  - LPAR must be a non-production system.
  - LPAR must be fully virtualised. No physical devices.
  - Virtual disk devices must be connected via the SAN.
  - The VIOC storage must be zoned appropriately on all participating VIOS.
  - UNIX health check scripts must be disabled in root's **crontab**. They should be enabled again after the migration.
  - VIOS VLAN ids should **match** on both the source and destination VIOS.
  - Disable virtual SCSI disk **health checks** prior to the migration. Re-enable the check after the migration.
  - Sufficient **spare CPU** capacity to cater for the LPAR. 'lparstat -i'
  - Sufficient **spare Memory** capacity to cater for the LPAR. 'lparstat -i'
  - Recommended LPM performed during "**quiet**" period i.e. off peak workload.
  - An approved Remedy and/or Change Request.

# Verifying LPM on the 570 and 595s - cont

## ❑ Disable UNIX health check scripts in root's crontab:

```
#00 19 * * * /usr/local/bin/saveskelvg >> /var/log/saveskelvg.log 2>&1
#00 01 * * 0,3 /usr/local/bin/mksysb2nim >> /var/log/mksysb2nim.log 2>&1
#00 05 * * 0 /usr/local/bin/AIXinfo -repos >> /var/log/chksys.log 2>&1
#00 07 * * * /home/nmon/nmon.ksh > /dev/null 2>&1
#0 16 * * 0 /usr/local/adm/backup.ksh -online -unix -archive 1>/dev/null 2>&1
#0,30 * * * * /usr/local/adm/health_check -check 1>/dev/null 2>&1
```

## ❑ Disable virtual SCSI disk health checks prior to the migration:

```
# chdev -l hdiskX -a hcheck_interval=0 -P
```

# Performing LPM on the 570 and 595s

- ❑ Move LPAR from 595-2 to 570-1.
- ❑ Validation via HMC similar to IVM. Select the LPAR to migrate e.g. hxaix26.

The screenshot shows the Hardware Management Console (HMC) interface. The main window displays a table of LPARs under the path 'Systems Management > Servers > SN8379A80\_p595-2'. The table has columns for Name, ID, Status, Processing Units, Memory (GB), Active Profile, Environment, and Reference Code. The LPAR 'hxaix26' is selected, and a context menu is open over it, showing options like Properties, Change Default Profile, Operations, Configuration, Hardware Information, Dynamic Logical Partitioning, Console Window, and Serviceability. The 'Operations' menu is expanded, showing options like Restart, Shut Down, Deactivate Attention LED, Schedule Operations, and Mobility. The 'Migrate' option is highlighted. The bottom of the console shows a 'Tasks: hxaix26' section with a tree view of the available operations.

| Select                              | Name       | ID | Status  | Processing Units | Memory (GB) | Active Profile | Environment        | Reference Code |
|-------------------------------------|------------|----|---------|------------------|-------------|----------------|--------------------|----------------|
| <input type="checkbox"/>            | hxaix6     | 3  | Running |                  | 0.5         | 2 default      | Virtual I/O Server |                |
| <input type="checkbox"/>            | hxaix7     | 10 | Running |                  | 0.5         | 2 default      | Virtual I/O Server |                |
| <input type="checkbox"/>            | hxaix8     | 11 | Running |                  | 0.5         | 2 default      | Virtual I/O Server |                |
| <input type="checkbox"/>            | hxaix09adm | 4  | Running |                  | 2           | 100 default    | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix11adm | 5  | Running |                  | 1.7         | 13 default     | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix13    | 6  | Running |                  | 0.2         | 2 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix22    | 7  | Running |                  | 0.2         | 2 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix23    | 8  | Running |                  | 0.2         | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix24    | 9  | Running |                  | 0.2         | 8 default      | AIX or Linux       |                |
| <input checked="" type="checkbox"/> | hxaix26    | 26 | Running |                  | 0.2         | 2 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix33    | 33 | Running |                  | 0.2         | 8 Default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix34    | 34 | Running |                  | 8 default   | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix35    | 35 | Running |                  | 8 default   | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix36    | 36 | Running |                  | 8 default   | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix41ad  | 41 | Running |                  | 8 default   | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix43ad  | 43 | Running |                  | 0.1         | 2              | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix45adm | 13 | Running |                  | 0.1         |                | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix47    | 23 | Running |                  | 0.2         | 6 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix48    | 24 | Running |                  | 0.2         | 1 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix51    | 21 | Running |                  | 0.6         | 48 default     | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix52    | 14 | Running |                  | 0.3         | 32 default     | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix97    | 22 | Running |                  | 0.1         | 1 default      | AIX or Linux       |                |

# Performing LPM on 570 and 595s – cont.

- ❑ Confirm the destination system is correct e.g. SN1001C70\_p570-1 is 570-1. Select Validate.

hhmc01: Validate - Windows Internet Explorer provided by Australia...

**Partition Migration Validation - SN8379A80\_p595-2 - hxaix26**

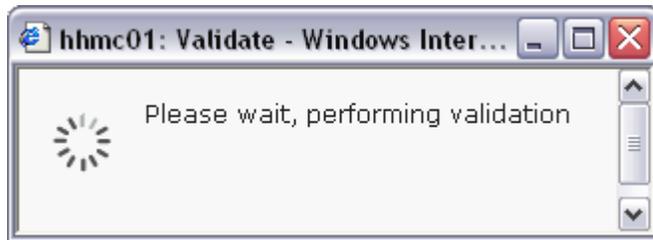
Fill in the following information to set up a migration of the partition to a different managed system. Click Validate to ensure that all requirements are met for this migration. You cannot migrate until the migration set up has been verified.

Source system : SN8379A80\_p595-2  
Migrating partition: hxaix26  
Remote HMC:   
Remote User:   
Destination system: SN1001C70\_p570-1   
Destination profile name:   
Destination shared:   
processor pool:  
Source mover service:   
partition:  
Destination mover service partition:  
Wait time (in min):   
Virtual Storage assignments :

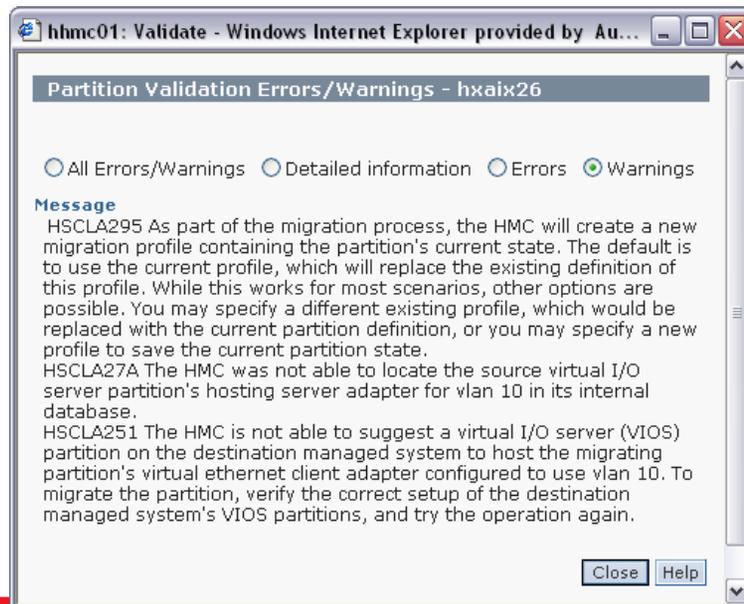
| Select | Source Slot ID | Slot Type | Destination VIOS |
|--------|----------------|-----------|------------------|
|--------|----------------|-----------|------------------|

# LPM Validation – continued.

- ❑ The validation may take several minutes.



- ❑ Ignore messages relating to creating a **profile** and *vlan 10*. Other messages should be investigated.



# LPM Validation – continued.

- ❑ Verify that the appropriate VIOS and virtual storage slots have been selected e.g. Destination VIOS hvio1, slot 38 and hvio2, slot 48.

Partition Migration Validation - SN8379A80\_p595-2 - hxaix26

Fill in the following information to set up a migration of the partition to a different managed system. Click Validate to ensure that all requirements are met for this migration. You cannot migrate until the migration set up has been verified.

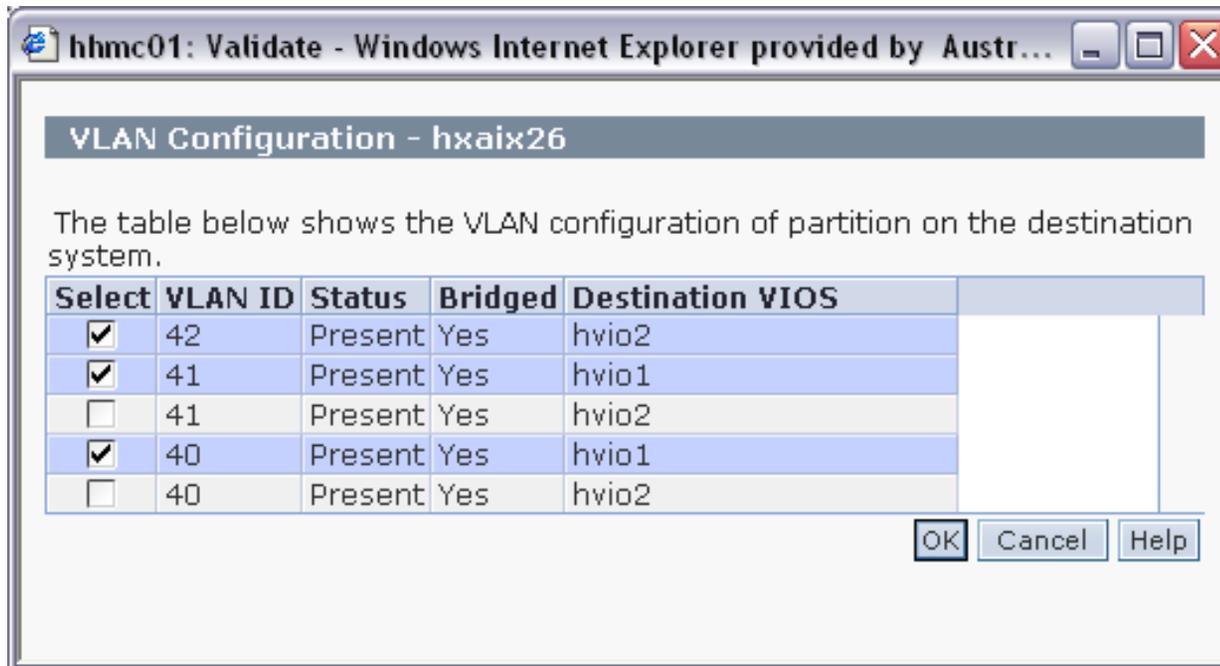
Source system : SN8379A80\_p595-2  
Migrating partition: hxaix26  
Remote HMC:   
Remote User:   
Destination system: SN1001C70\_p570-1   
Destination profile name: default  
Destination shared processor pool: DefaultPool (0)   
Source mover service partition: hvio7  
Destination mover service partition: hvio1  
Wait time (in min): 5

Virtual Storage assignments :

| Select                              | Source Slot ID | Slot Type | Destination VIOS |
|-------------------------------------|----------------|-----------|------------------|
| <input checked="" type="checkbox"/> | 38             | SCSI      | hvio1            |
| <input type="checkbox"/>            | 38             | SCSI      | hvio2            |
| <input type="checkbox"/>            | 48             | SCSI      | hvio1            |
| <input checked="" type="checkbox"/> | 48             | SCSI      | hvio2            |

# LPM Validation – continued.

- ❑ Verify that the correct virtual I/O VLANs have been selected e.g. destination VIOS hvio1, vlan 40 & 41 and hvio2, vlan 42.



# LPM – Migration.

- Execute the Migration.
- Select *Migrate*.

hhmc01: Validate - Windows Internet Explorer provided by Australia...

Partition Migration Validation - SN8379A80\_p595-2 - hxaix26

Fill in the following information to set up a migration of the partition to a different managed system. Click Validate to ensure that all requirements are met for this migration. You cannot migrate until the migration set up has been verified.

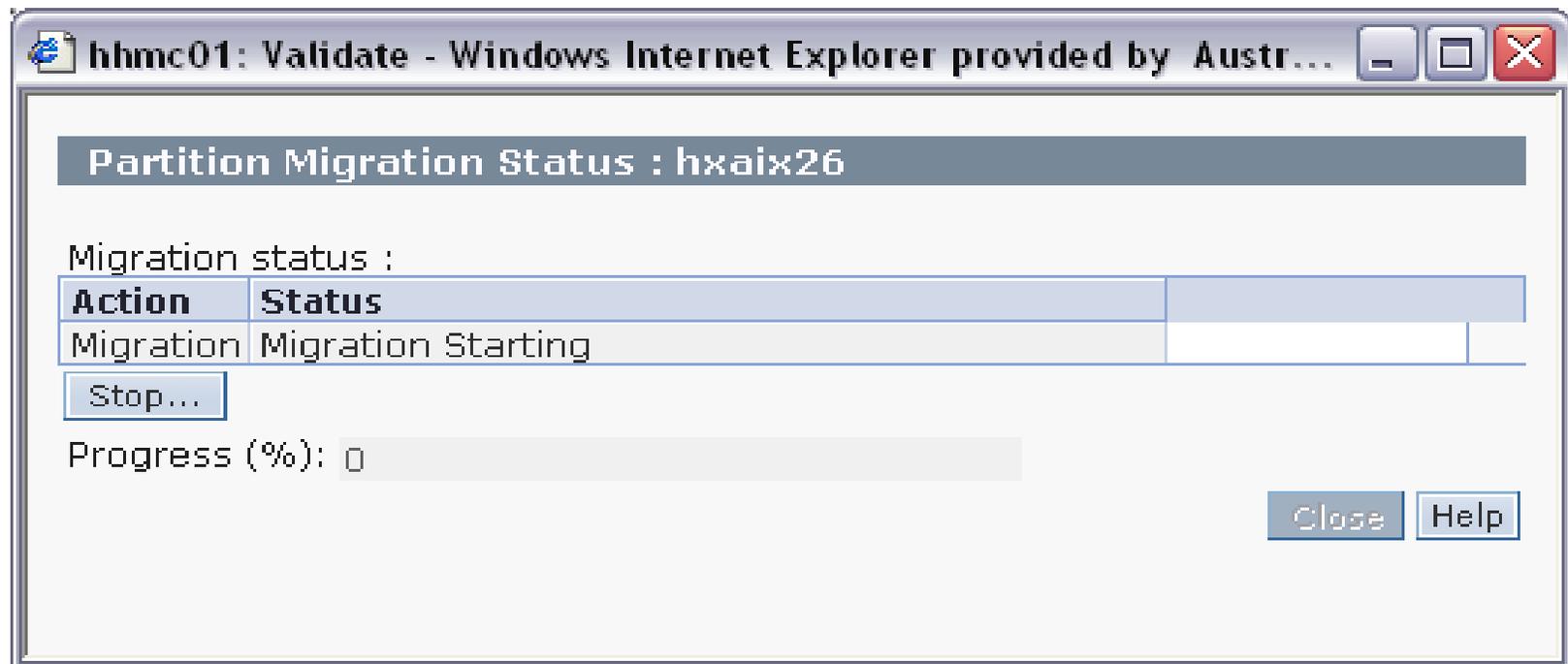
Source system : SN8379A80\_p595-2  
Migrating partition: hxaix26  
Remote HMC:   
Remote User:   
Destination system: SN1001C70\_p570-1   
Destination profile name: default  
Destination shared processor pool: DefaultPool (0)   
Source mover service partition: hvio7  
Destination mover service partition: hvio1  
Wait time (in min): 5

Virtual Storage assignments :

| Select                              | Source Slot ID | Slot Type | Destination VIOS |
|-------------------------------------|----------------|-----------|------------------|
| <input checked="" type="checkbox"/> | 38             | SCSI      | hvio1            |
| <input type="checkbox"/>            | 38             | SCSI      | hvio2            |
| <input type="checkbox"/>            | 48             | SCSI      | hvio1            |
| <input checked="" type="checkbox"/> | 48             | SCSI      | hvio2            |

# LPM – Migration – continued.

- ❑ The migration may take several minutes e.g. 5 minutes or more.



# LPM – Migration – continued.

- ❑ View the current (source) systems serial number. This will change after the migration.

```
root@hxaix26 / # lsattr -El sys0 -a systemid
systemid IBM,028379A80 Hardware system identifier False
```

- ❑ The state of the LPAR, hxaix26, on the source system (595-2) will show 'Migrating –Running'.

The screenshot shows the Hardware Management Console (HMC) interface. The main window displays a table of LPARs under the path 'Systems Management > Servers > SN8379A80\_p595-2'. The table has columns for Name, ID, Status, Processing Units, Memory (GB), Active Profile, Environment, and Reference Code. The LPAR 'hxaix26' is selected and its status is 'Migrating - Running'. Below the table, there is a 'Tasks: hxaix26' section with expandable properties like Operations, Configuration, Hardware Information, Console Window, and Serviceability.

| Select                              | Name       | ID | Status              | Processing Units | Memory (GB) | Active Profile | Environment        | Reference Code |
|-------------------------------------|------------|----|---------------------|------------------|-------------|----------------|--------------------|----------------|
| <input type="checkbox"/>            | hvio6      | 3  | Running             | 0.5              | 2           | default        | Virtual I/O Server |                |
| <input type="checkbox"/>            | hvio7      | 10 | Running             | 0.5              | 2           | default        | Virtual I/O Server |                |
| <input type="checkbox"/>            | hvio8      | 11 | Running             | 0.5              | 2           | default        | Virtual I/O Server |                |
| <input type="checkbox"/>            | hxaix09adm | 4  | Running             | 2                | 100         | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix11adm | 5  | Running             | 1.7              | 13          | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix13    | 6  | Running             | 0.2              | 2           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix22    | 7  | Running             | 0.2              | 2           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix23    | 8  | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix24    | 9  | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input checked="" type="checkbox"/> | hxaix26    | 16 | Migrating - Running | 0.2              | 2           | default        | AIX or Linux       | 2005           |
| <input type="checkbox"/>            | hxaix33    | 17 | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix34    | 18 | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix35    | 19 | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix36    | 20 | Running             | 0.2              | 8           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix41adm | 20 | Running             | 0.2              | 1           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix43adm | 12 | Running             | 0.1              | 1           | temp2          | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix45adm | 13 | Running             | 0.1              | 1           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix47    | 23 | Running             | 0.2              | 6           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix48    | 24 | Running             | 0.2              | 1           | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix51    | 21 | Running             | 0.6              | 48          | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix52    | 14 | Running             | 0.3              | 32          | default        | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix97    | 22 | Running             | 0.1              | 1           | default        | AIX or Linux       |                |

# LPM – Migration – continued.

- ❑ The state of the *shell*/LPAR, hxaix26, on the destination system (570-1) will also show '*Migrating –Running*'.

The screenshot displays the Hardware Management Console (HMC) interface for system SN1001C70\_p570-1. The main window shows a table of LPARs with the following columns: Select, Name, ID, Status, Processing Units, Memory (GB), Active Profile, Environment, and Reference Code. The LPAR hxaix26 is selected and its status is 'Migrating - Running'. Other LPARs are in 'Running' status.

| Select                              | Name    | ID | Status              | Processing Units | Memory (GB) | Active Profile | Environment        | Reference Code |
|-------------------------------------|---------|----|---------------------|------------------|-------------|----------------|--------------------|----------------|
| <input type="checkbox"/>            | hvio2   | 2  | Running             |                  | 0.5         | 4 default      | Virtual I/O Server |                |
| <input type="checkbox"/>            | hxaix01 | 4  | Running             |                  | 0.5         | 5 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix02 | 5  | Running             |                  | 0.5         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix04 | 7  | Running             |                  | 0.5         | 9 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix06 | 10 | Running             |                  | 0.5         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix07 | 11 | Running             |                  | 0.5         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix14 | 12 | Running             |                  | 0.5         | 27 default     | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix15 | 13 | Running             |                  | 0.5         | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix17 | 14 | Running             |                  | 2           | 6 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix18 | 15 | Running             |                  | 0.4         | 1 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix19 | 16 | Running             |                  | 0.3         | 6 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix20 | 17 | Running             |                  | 0.5         | 1 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix25 | 19 | Running             |                  | 0.2         | 6 default      | AIX or Linux       |                |
| <input checked="" type="checkbox"/> | hxaix26 | 20 | Migrating - Running |                  | 0.2         | 2 default      | AIX or Linux       | C20025FF       |
| <input type="checkbox"/>            | hxaix27 | 21 | Running             |                  | 0.2         | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix28 | 18 | Running             |                  | 0.3         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix29 | 22 | Running             |                  | 0.2         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix30 | 23 | Running             |                  | 0.2         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix31 | 24 | Running             |                  | 0.2         | 7 Default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix32 | 8  | Running             |                  | 0.2         | 8 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix46 | 6  | Running             |                  | 0.2         | 7 default      | AIX or Linux       |                |
| <input type="checkbox"/>            | hxaix50 | 25 | Running             |                  | 0.6         | 30 default     | AIX or Linux       |                |

Total: 27 Filtered: 27 Selected: 0

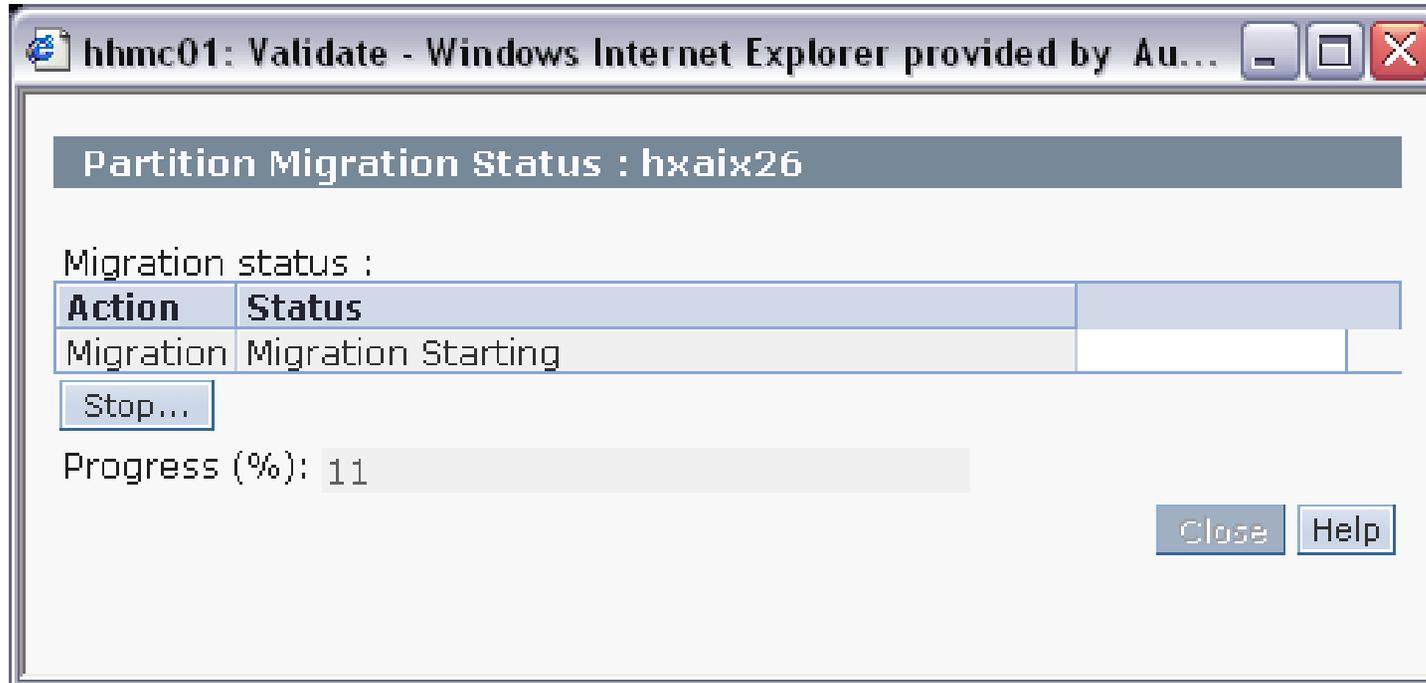
Tasks: SN1001C70\_p570-1

- Properties
- Operations
- Configuration
- Connections
- Hardware Information
- Updates
- Serviceability
- Capacity On Demand (CoD)

Status: Attentions and Events

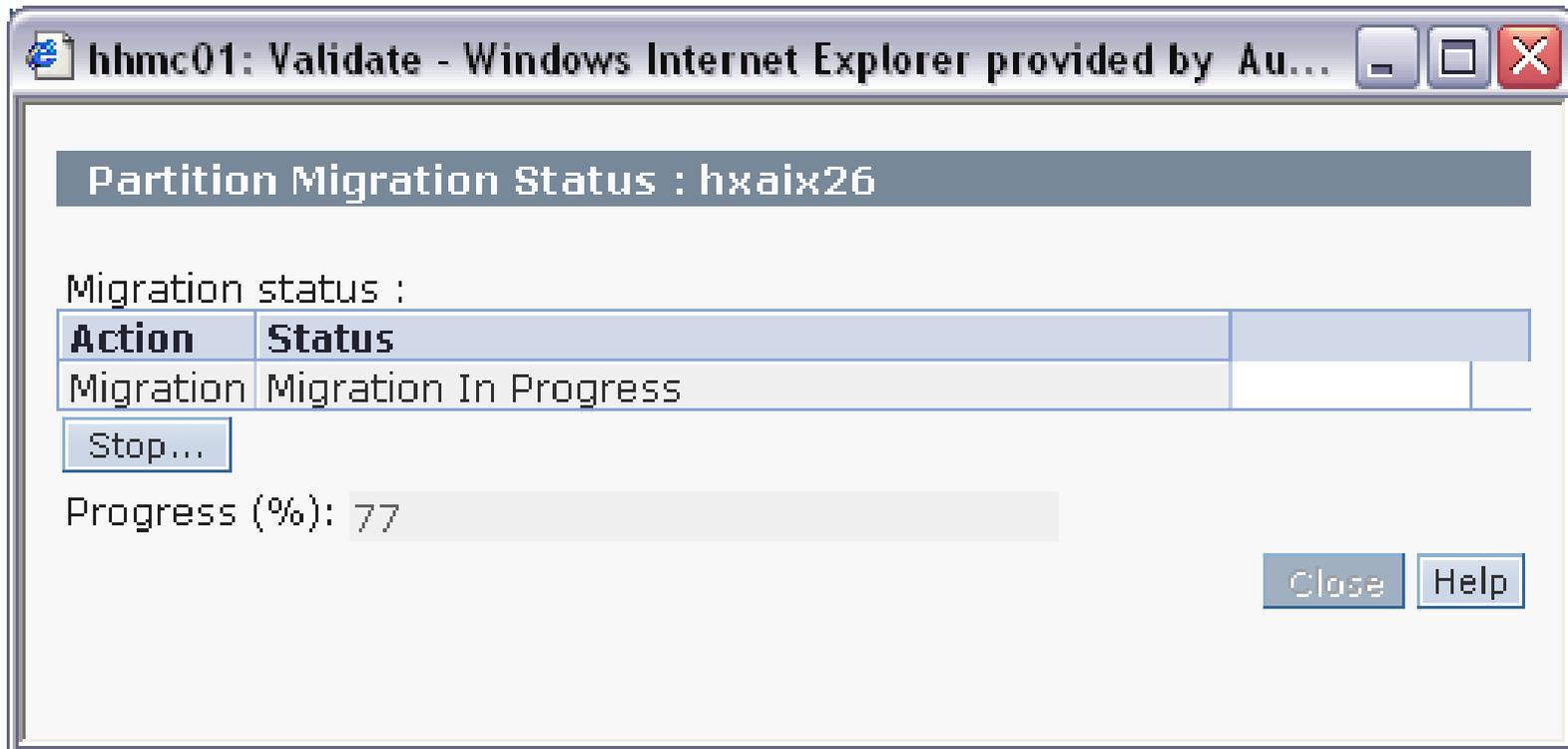
# LPM – Migration – continued.

- ❑ Monitor the progress and status of the migration.



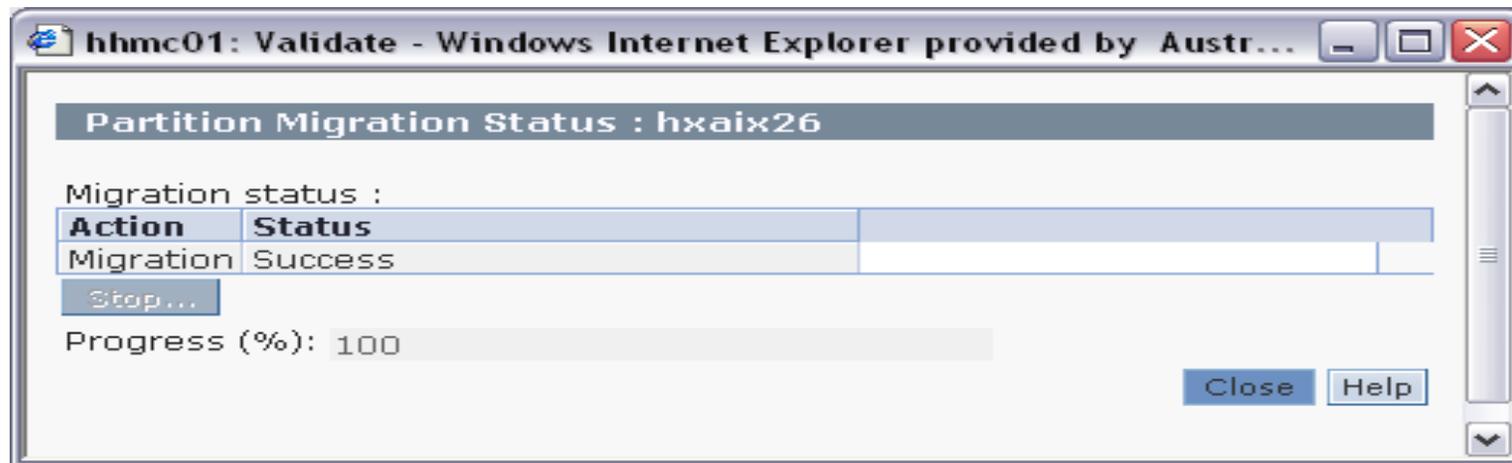
# LPM – Migration – continued.

- ❑ When the status shows 'Migration In Progress', the LPAR will be active on the destination system momentarily. A slight pause may be observed on the LPAR.



# LPM – Migration complete.

- ❑ The migration is complete, once the status changes to 'Success'. Click 'Close'.



## Verification

- ❑ Confirm that the LPAR has moved to the destination system. The systems serial number should have changed accordingly.

```
root@hxaix26 / # lsattr -El sys0 -a systemid
systemid IBM,021001C70 Hardware system identifier False
```

- ❑ The LPAR is removed from the source system (595-2). Now in "Running" state on the destination system (570-1).

# Post Migration

- ❑ The following errors may appear in the AIX error report. Messages relating to **path failures** and the **system planar** are expected.

```
root@hxaix26 / # errpt
IDENTIFIER  TIMESTAMP  T C RESOURCE_NAME  DESCRIPTION
DE3B8540   0210141209 P H hdisk10        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk7        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk9        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk8        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk3        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk2        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk6        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk1        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk5        PATH HAS FAILED
DE3B8540   0210141209 P H hdisk4        PATH HAS FAILED
A5E6DB96   0210141209 I S pmig         Client Partition Migration Completed
CC40E579   0210141109 P H sysplanar0    ELECTRICAL POWER RESUMED
```

# Post Migration – continued.

- ❑ The following messages will appear in `syslog`.

```
root@hxaix26 / # tail -f /var/log/syslog
Feb 10 13:59:26 hxaix26 user:info syslog: ~~~~ Start: DR PMIG operation ~~~~
Feb 10 13:59:26 hxaix26 user:info syslog: Starting partition migration PRE phase
Feb 10 14:11:37 hxaix26 local1:info DRMGR: Starting phase PRE for kernel.
Feb 10 14:11:37 hxaix26 local1:info DRMGR: Starting PRE phase for scripts.
Feb 10 14:11:39 hxaix26 local1:info DRMGR: Completed the phase for Scripts.
Feb 10 14:11:39 hxaix26 local1:info DRMGR: Starting phase PRE for signal delivery.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Completed signal delivery phase.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Completed PRE signal phase.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Starting phase PRE for kernel extensions.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Completed the phase for kernel extensions.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Starting Kernel phase.
Feb 10 14:11:40 hxaix26 local1:info DRMGR: Starting phase KERNEL for kernel.
Feb 10 14:11:57 hxaix26 daemon:warn|warning inetd[225476]: Server /usr/bin/xmtpas
    has ended with exit status 0x4100.
Feb 10 14:12:10 hxaix26 local1:info DRMGR: Starting POST phase.
Feb 10 14:12:10 hxaix26 local1:info DRMGR: Starting phase POST for kernel.
Feb 10 14:12:10 hxaix26 local1:info DRMGR: Starting phase POST for kernel extensions.
Feb 10 14:12:10 hxaix26 local1:info DRMGR: Completed the phase for kernel extensions.
Feb 10 14:12:10 hxaix26 local1:info DRMGR: Starting phase POST for signal delivery.
Feb 10 14:12:20 hxaix26 local1:info DRMGR: 1 applications have not handled signals
    yet
Feb 10 14:12:21 hxaix26 local1:info DRMGR: Completed signal delivery phase.
Feb 10 14:12:22 hxaix26 local1:info DRMGR: Starting POST phase for scripts.
Feb 10 14:12:49 hxaix26 local1:info DRMGR: Completed post notification for DLPAR
    scripts.
Feb 10 14:12:49 hxaix26 local1:info DRMGR: ~~~~ End: DR PMIG operation ~~~~
```

# Post Migration – continued.

- ❑ Enable UNIX health check scripts in root's crontab.

```
00 19 * * * /usr/local/bin/saveskelvg >> /var/log/saveskelvg.log 2>&1
00 01 * * 0,3 /usr/local/bin/mksysb2nim >> /var/log/mksysb2nim.log 2>&1
00 05 * * 0 /usr/local/bin/AIXinfo -repos >> /var/log/chksys.log 2>&1
00 07 * * * /home/nmon/nmon.ksh > /dev/null 2>&1
0 16 * * 0 /usr/local/adm/backup.ksh -online -unix -archive 1>/dev/null 2>&1
0,30 * * * * /usr/local/adm/health_check -check 1>/dev/null 2>&1
```

- ❑ Re-enable virtual SCSI disk health checks after the migration.

```
# chdev -l hdiskX -a hcheck_interval=60 -P
```

- ❑ A tip regarding performance tools (i.e. topas) & LPM.
- ❑ Can run tools during migration but be aware data reported may not be meaningful.
- ❑ Underlying server hardware changes, performance counters are likely to be reset.
- ❑ I observed my topas session reset itself when the migration had completed.

```
Partition migration is over.....restarting topas
```

# Known Problems.

## ❑ Problem

- Following a migration the `lsmmap -all` command does not show the correct partition ID.
- If the ID of the Mobile partition changes as part of migration, the connected partition ID is not updated to show the correct number.
- There is no functional problem caused, rebooting the mobile partition will cause the correct partition ID to be displayed.

## ❑ Workaround

- Create an ID for the partition that is **unique** across all systems

# Known Problems - continued.

## ❑ Problem

- Refresh of IBM.ManagementServer resource failed. Error report shows:  
DD42A684 I S DRMGR DR script related Message.

## ❑ Workaround

```
# chown root.system /usr/lib/dr/scripts/all/IBM.CSMAgentRM_dr.sh
```

# Limitations and Restrictions.

- ❑ Virtual target device names
  - Custom **names** for virtual target devices in VIOS are **lost** when a partition is migrated. If custom names have been assigned to devices that belong to a partition that is migrated, the migrated virtual target devices will use **default** names.
- ❑ Virtual SCSI Server adapter IDs
  - When a partition is migrated, the VSCSI Server adapters are automatically assigned adapter numbers. Currently it is not possible to specify the slots to be used. The adapters are assigned to **use the next available slot**.
- ❑ Refer to the following IBM website for further information:  
<http://www14.software.ibm.com/webapp/set2/sas/f/pm/known.html>

# SAP License Keys

- ❑ The SAP Instance Hardware key will change after a successful LPM. As long as the SAP instance is not re-started the existing SAP license key will be retained in the SAP memory buffer, therefore no licence key problems are expected.
- ❑ Should an additional license key be required, please register the new hardware key (after LPM) via the SAP Service Marketplace <http://service.sap.com/licensekey>, and then apply the new license key to the SAP instance using the SLICENSE transaction. The whole process should take less than 30 minutes.

The screenshot shows the SAP License Administration interface. The 'Current Settings' section has the 'Active Hardware Key' field circled in red, containing the value 'W0966640307'. Below this is a table of 'Installed Licenses' with two rows. The 'Remote Hardware Key' section shows a 'Determined HW Key' table with one row. The 'Request License Key' section contains a text block and a button with the URL 'http://service.sap.com/licensekey', which is also circled in red.

**SAP License Administration # Digitally-Signed License Keys**

Current Settings

|                         |                  |
|-------------------------|------------------|
| Active Hardware Key     | W0966640307      |
| Installation Number     | 0020282007       |
| License Expiration Date | 31.12.9999       |
| System Number           | 0000000031112809 |

Installed Licenses

| Stat. | SID | Hardware Key | Sware Prod      | Valid From | Valid To   | Type | Inst. No |
|-------|-----|--------------|-----------------|------------|------------|------|----------|
| CC    | VB0 | W0966640307  | NetWeaver_ORA   | 15.12.2008 | 31.12.9999 | Perm | 002028   |
| CC    | VB0 | W0966640307  | Maintenance_ORA | 11.01.2009 | 12.04.2009 | Perm | 002028   |

Remote Hardware Key

| Host    | Hardware Key |
|---------|--------------|
| hxaix42 | M0926191512  |

Request License Key

You can request a license key on the SAP Service Marketplace at <http://service.sap.com/licensekey>. There is also more information available about the license key there.

<http://service.sap.com/licensekey>

# SAP License Keys – cont.

- Transaction SLICENSE in SAP system after LPM

License Keys for SAP Business Suite and SAP Business Objects

1 Select Installation 2 Select System 3 System Data 4 Hardware Data 5 Submit

**Installation**

|                     |                                |                   |
|---------------------|--------------------------------|-------------------|
| Installation number | 0020124524                     | Customer          |
| Installation name   | WEB AS : Australian Postal Cor | Location          |
| Product             | SAPWEB AS                      | Number of systems |

**License Requests**

Please enter the hardware key for each server.  
For details on retrieving the hardware key, please see the documentation [License Keys for SAP Systems](#) (Adobe PDF, 672kB).

Hardware key (HWD) \*

License type \*

Valid until \*

\* Marked fields are required

**Hardware Overview**

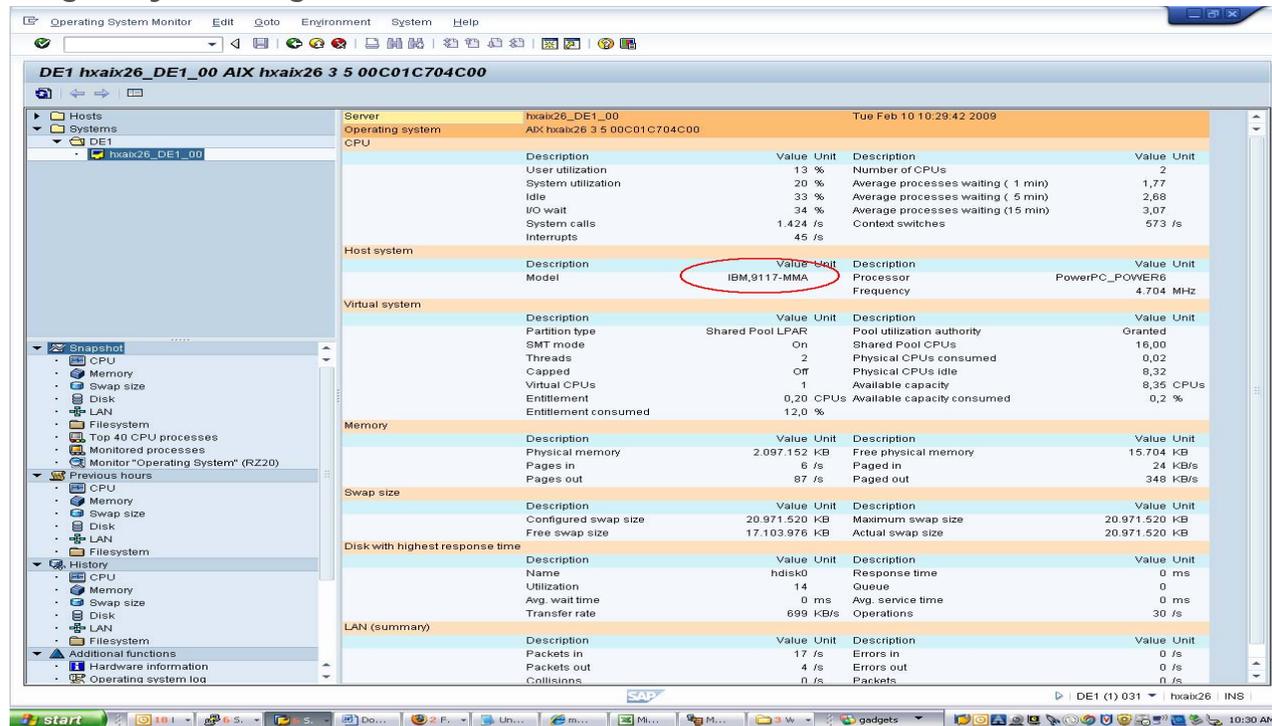
To change an existing system, select it from the list and click the *Change selected entry* button

| Hardware key (HWD)                   | License type | Valid until |
|--------------------------------------|--------------|-------------|
| <input type="checkbox"/> V0966640307 | Maintenance  | 11.05.2009  |
| <input type="checkbox"/> V0966640307 | Standard     | 31.12.9999  |

- Requesting new licence key on the SAP Service Marketplace
- Please Note: Please thoroughly check all non-SAP third party products for hardware key problems following LPM.

# SAP Verification after LPM

- ❑ Before and after the LPM is completed, the SAP Basis person should verify the hardware key changes by running transaction ST06n.



- ❑ Once the LPM is completed, the following transactions must be checked to verify a successful migration: SM21 – Check the SAP system log for any obvious errors, ST06 → OS Collector Log – check the SAP operating system collector, ST06 → Operating System Log – check the Unix log, ST04n – check the Oracle alert log for all DBMS errors

# NIM and LPM

- ❑ There is a potential problem if you initiate a NIM operation on a client after a migration.
- ❑ The CPU ID of a NIM client is stored in the NIM database so that the master can perform a check that NIM client requests are coming from the **same machine** that was originally registered as a client.
- ❑ This id changes with a migration and subsequent NIM client requests would **fail**.
- ❑ As a workaround the client **CPU ID check** can be **disabled** using the fastpath "*smitty nim\_cpuid\_validate*".
- ❑ More details about this attribute can be found here:  
[http://publib.boulder.ibm.com/infocenter/systems/index.jsp?topic=/com.ibm.aix.install/doc/nsgdrf/addl\\_disable\\_client.htm&tocNode=int\\_8662](http://publib.boulder.ibm.com/infocenter/systems/index.jsp?topic=/com.ibm.aix.install/doc/nsgdrf/addl_disable_client.htm&tocNode=int_8662)
- ❑ This check is only relevant for client initiated NIM operations. NIM operations are typically initiated by the NIM master, in that case the physical processor validation never happens.
- ❑ Reset a NIM client with the */usr/local/bin/resetnimclient* script, before performing a NIM operation on the client. This is an Australia Post local script.

# VIOS and LPAR Documentation

- ❑ If the mobile partition is to remain **permanently** on the destination system, the VIOS and LPAR **documentation** must be **updated** to reflect the change to the landscape.
- ❑ For example if you move an LPAR from 570-1 to 595-2 and you plan on leaving the LPAR on 595-2 indefinitely, then you must update your VIOS configuration documentation and LPAR layout diagrams.
- ❑ The UNIX team AIX/VIOS related documentation can be found here:
  - <http://esbinfo:8090/display/MIO/AIX+Configuration+management>
  - Reconfigure backups – Legato, mksysb, etc.

# To do list.

- Test LPM with **HACMP**. Supported but I have not tried it yet!
- Test LPM with **AMS** and dual VIOS. Same as above.
- Has anyone tried these yet?

# LPM Live Demo with JS22 Blades

❑ As long as my VPN connections works! ;-)

❑ JS22 Live Partition Mobility

<http://www.ibm.com/developerworks/aix/library/au-js22lpm>

❑ Oracle DB 10gR2 Certified with IBM PowerVM Live Partition Mobility on AIX

[http://blogs.oracle.com/OIIS/2009/07/oracle\\_db\\_10gr2\\_certified\\_with.html](http://blogs.oracle.com/OIIS/2009/07/oracle_db_10gr2_certified_with.html)

❑ Using Live Partition Mobility with SAP Instances

<https://www.sdn.sap.com/irj/scn/weblogs?blog=/pub/wlg/13150>

❑ SAP Note 1102760 - POWER6 Live Partition Mobility:

- The required minimum software levels are:
  - Oracle DB 10gR2 (10.2.0.4) - Single Instance only, no RAC
  - AIX 5.3 TL8 SP4, or
  - AIX 6.1 TL2 SP3
- Please note that Live Partition Mobility is certified for single Oracle database instances only.
- Oracle RAC is not yet supported. Formal testing with Oracle RAC is still ongoing and support will be announced at a later date.