Technical white paper

# How to migrate HP-UX workloads between physical and virtual servers easily

HP-UX fluid, cross-technology, and offline moves

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# Introduction

With the increasing success of cloud adoption, your IT department is under tremendous pressure to keep pace with business demand. Your IT directors are concerned about the challenges associated with the rush to cloud-based services. How can IT maintain adequate security, ensure service levels, and integrate cloud-based services with existing traditional IT systems? HP offers a solution providing flexibility for automated migrations of HP-UX workloads between physical and virtual systems, helping IT departments to develop proactive strategies and better sustain customer demands.

Understand the components and mechanisms involved in system migrations (OS, applications, and data) within HP Matrix Operating Environment (Matrix OE) infrastructures with a specific focus on HP-UX, HP Integrity Virtual Machines, and HP Integrity Blade Servers. Virtual to physical (V2P), physical to virtual (P2V), and physical to physical (P2P) offline migrations are discussed. The required configuration steps for achieving such migrations are also presented.

For a better understanding of the content of this document, you should be familiar with the HP Insight Management software stack and its terminology. Insight Management and Matrix OE documentation can be found at **hp.com/go/matrixoe/docs**. A basic knowledge of the HP Virtual Connect technology is also required to leverage the information in this white paper. See **hp.com/go/virtualconnect** for more information.

# Use cases

With virtual to physical moves, you can speed up the migration of projects from the development phase into a test or qualification phase or a pre-production state. Then use the efficient physical to virtual migration facility to easily and quickly come back into a development state.

Also use physical to virtual moves for consolidation purposes or during a maintenance campaign where firmware and low-level drivers have to be upgraded.

Use physical to physical moves during maintenance campaigns and when it is desirable to move workloads from an older server onto a more recent hardware, such as during a migration from Integrity blades BL860c to BL860c i2. We call this type of migration physical to physical prime (P2P') because the physical target server is not identical to the source.

Such moves (V2P, P2V, and P2P') are also called “cross-technology or unlike” moves, since the source and target are different by nature.

**Note:** Virtual to virtual migrations (V2V) do not belong to cross-technology migrations. They are not included in the scope of this document. V2V moves are explained in the HP Integrity VM installation and administrator guide located at **hp.com/go/hpux-hpvm-docs**.

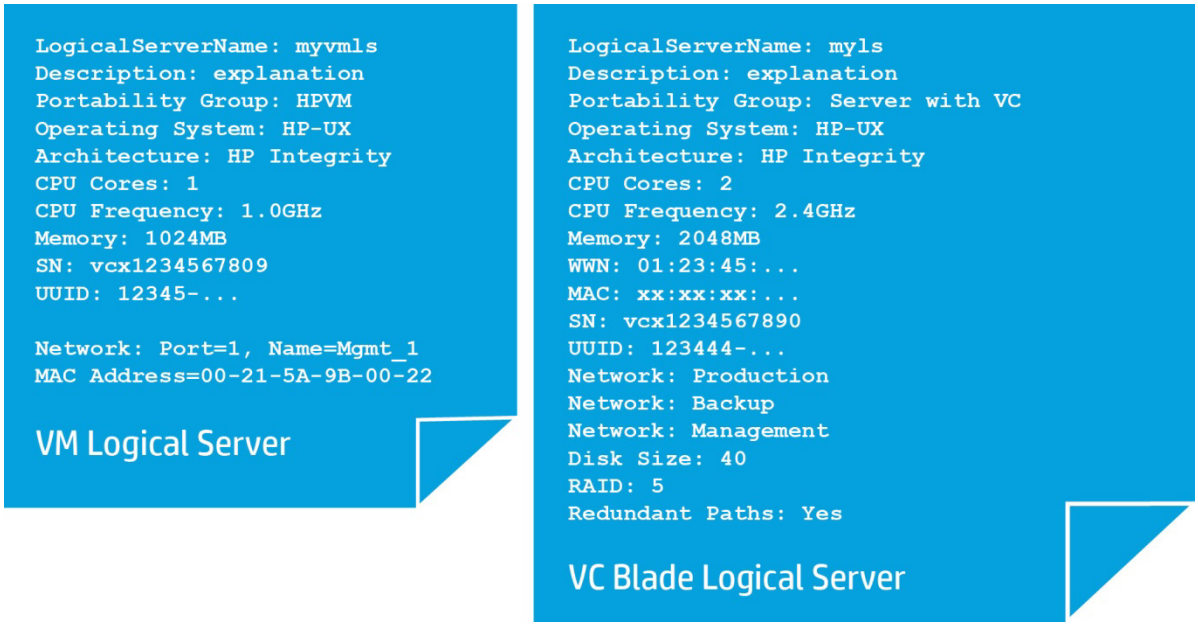
# Logical servers and portability groups

Logical servers and portability groups are key concepts in the Matrix OE and are heavily used for achieving HP-UX OE migrations. A brief review is necessary to understand their role and how they are used in such operations.

## Logical servers

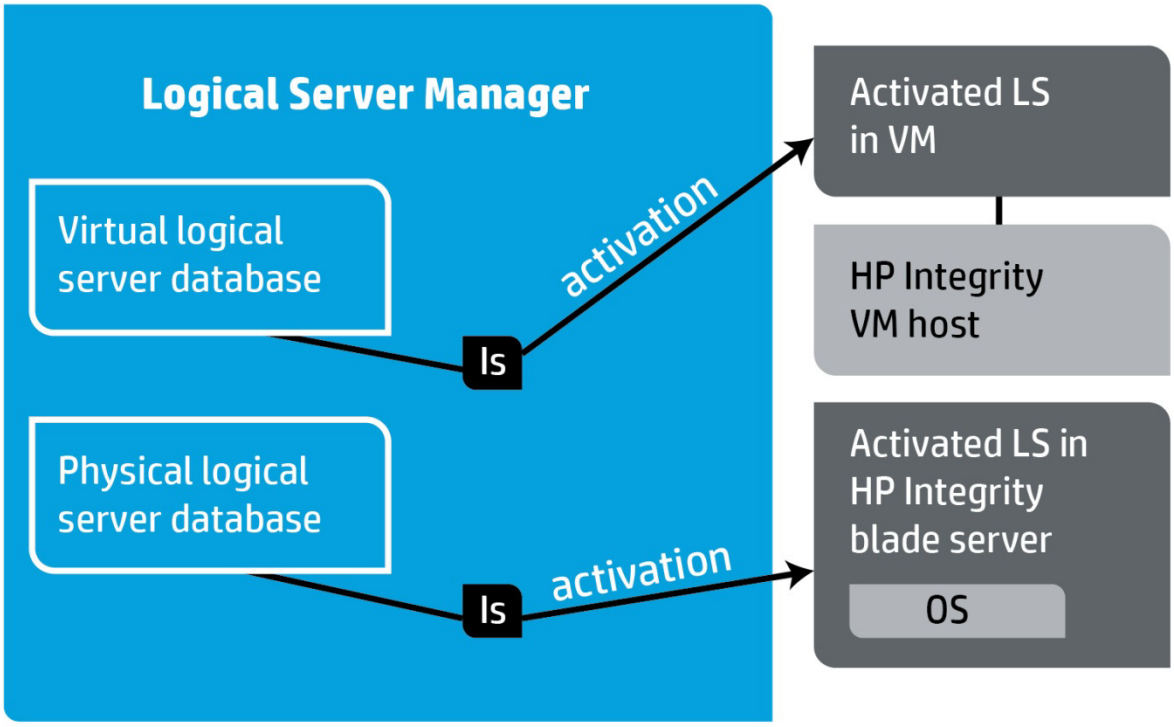
A logical server is a set of configuration information that you create, activate (instantiate), and move across physical and virtual machines. It contains the logical server definition and description including the server resources (number of CPU cores, and amount of memory), and the server connections to storage fabrics and networks. A logical server does not contain any boot image or data. Figure 1 shows the type of information stored in the logical servers.

**Figure 1.** Inactive logical servers




When activated (instantiated), a logical server is applied to the creation of a virtual machine using hypervisor-based software or to a bare-metal server blade using HP Virtual Connect technology (profiles). Figure 2 shows the relationship between the logical server manager, logical servers, and their activation.

**Figure 2.** Activated logical server




Logical servers can be divided into two categories:

- Physical logical servers: to be activated on blade servers in an infrastructure with Virtual Connect modules.
- Virtual logical servers: to be activated in a virtual machine hosted by a blade server or rackmount or a HP Superdome 2 Server.

With this new level of abstraction, cross-technology move operations in an Insight Management environment are performed by automated migration of a virtual logical server to a physical logical server or vice versa.

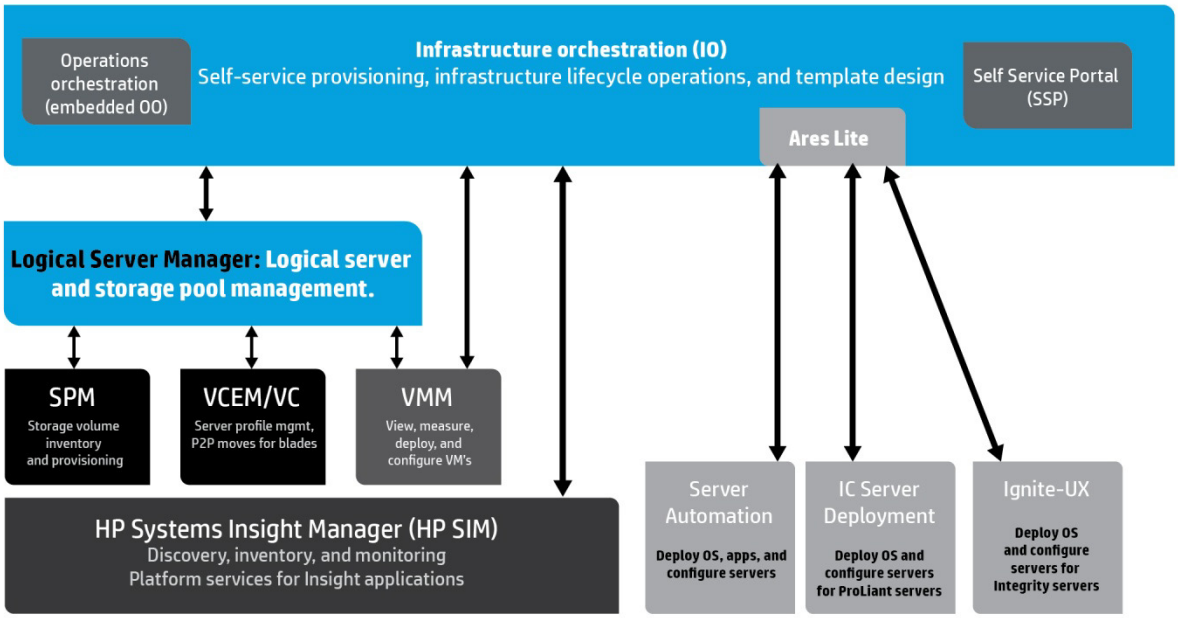
## Portability groups

Use a portability group to define the move and portability constraints of a logical server. During the installation of Matrix OE, create default portability groups like “each virtual connect domain group” and “all HP Integrity VM hosts.” Logical servers can migrate within the members of the same portability group.

# HP Matrix Operating Environment architecture

Logical severs and portability groups are typical entities of the HP Matrix OE software stack. Figure 3 explains its global architecture, with the basement consisting of HP Systems Insight Manager (HP SIM) performing discovery, inventory, and monitoring of managed nodes.

**Figure 3.** Matrix OE architecture




As an associated plug-in, the Logical Server Manager (LSM) gets information to and from the Storage Provisioning Manager (SPM), the Virtual Connect Enterprise Manager (VCEM) and the Virtual Machine Manager (VMM).
For the scope of this white paper, we will concentrate only on the interaction of LSM with VCEM and VMM.

Consider LSM as an abstraction module between low-level components (VMM, VCEM, and SPM) and the ultimate infrastructure orchestration (IO) layer. IO is made of several components, allowing the design of service templates, self-service provisioning, and operating system deployment.

# Cross-technology moves: a complex problem

Moving a complete OE (OS, applications, and data) to an unlike type of server may require the translation of meta-information not present in the logical server specification. This meta-information cannot be present in the logical server definitions since it is either specific to the underlying server where the OE is running or specific to the kernel of the activated OE. Either keep them "as-is" during the move or translate them to match the target. The following two examples are typical meta-information:

- Network instance numbers (also known as physical point of attachment [PPAs])
- Extended Firmware Interface (EFI) variables (i.e., boot entries)

During a cross-technology migration, the probability of getting a different hardware path for the network interfaces on the target is very high. The result is that PPAs in the target kernel can change and the network configuration of the source becomes inadequate for the target. As an example, if the first network interface (`lan0`) has `0/0/0/1/0/0/0` for hardware path in a physical system, it may become `0/0/1/0` in a target virtual machine. If no specific action is performed during the migration, the kernel will bind a PPA different than `0` to `0/0/1/0` when booting on the "V" target. As a consequence the network configuration file (`/etc/rc.config.d/netconf`) will not match the operational PPAs on the target.

Similar to network interface card paths, EFI boot entries are different, depending on the underlying type of server, although they point to the same bootable device. In a physical environment, we can imagine that the boot device is reachable at `0/4/0/0/0/0`. This location may become `0/0/2/0` after a P2V migration. If the corresponding EFI boot entry has not been translated accordingly during the move, the operating system of the target virtual machine will not boot.

The following HP-UX components and features are used to solve the above problems and automate fluid cross-technology moves:

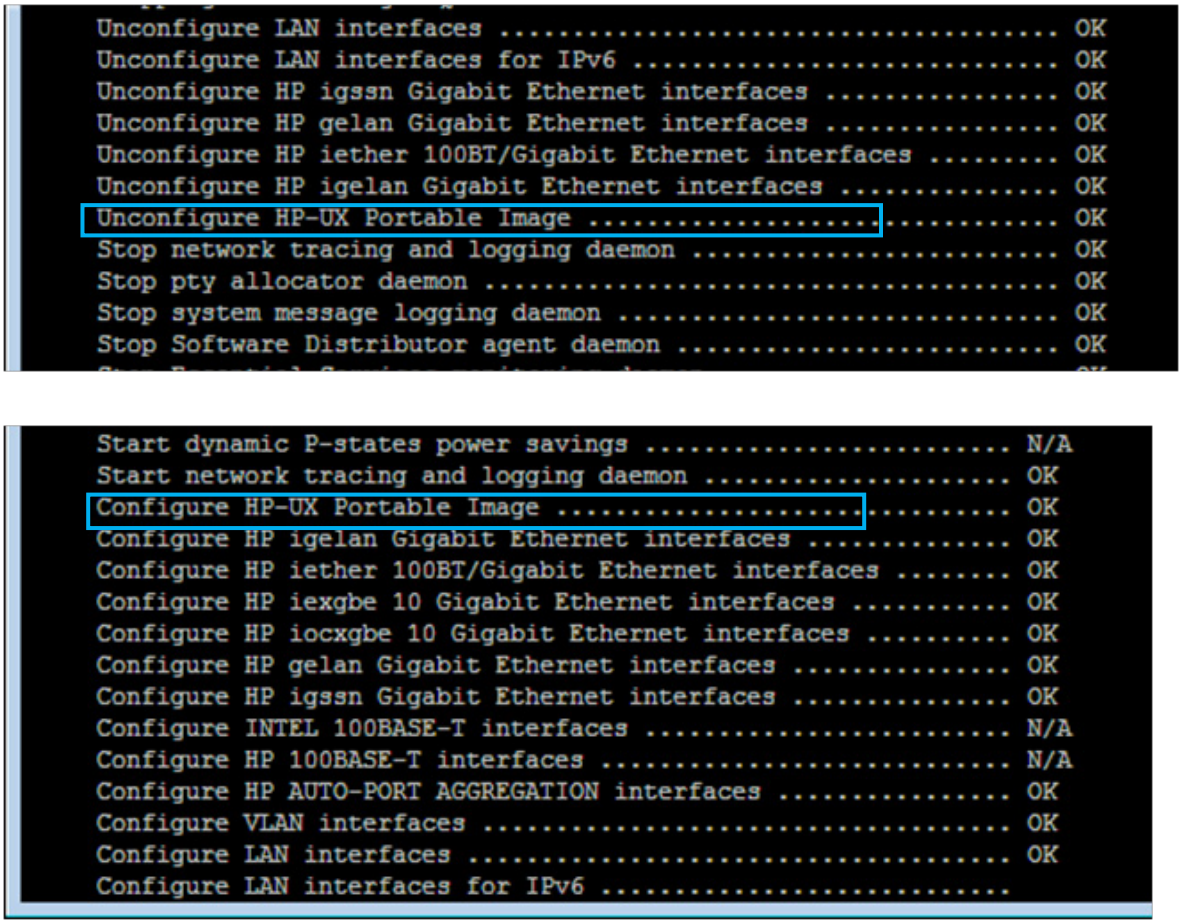
- `HPPortableImage` product
- `vmVirtProvider` WBEM provider product.
- N-Port ID Virtualization (NPIV) technology support

## HPPortableImage

The `HPPortableImage` depot is selected and installed by default in the different HP-UX OEs since March 2012. For the previous HP-UX versions, you must select it manually from the OE distribution media or Ignite-UX server. It contains a binary executable (`hpuxpitool`) launched during shutdown and boot times by `sbin/init.d/hpuxpi` when the kernel parameter `gio_portable_image` is set to 1. During shutdown operations, `hpuxpi` takes a snapshot of the network configuration in terms of MAC addresses and PPA associations and saves it in the persistent Kernel Registry Services (KRS) (see `krs(5)`) database. During boot time, this saved configuration is restored. Figure 4 shows the corresponding output on the console.

**Note:** The `hpuxpitool` executable is not documented on purpose and should not be used manually. It has been designed to run automatically or for troubleshooting purposes by HP technicians.

**Figure 4.** Portable image execution during shutdown and boot phases




**Note:** You can also use the `HPPortableImage` product to retain PPAs when performing a vPar/VM type transformation in an HP Integrity VM/vPar 6.x environment. Before changing the virtual server type (`vm_type`), issue `kctune gio_portable_image=1` in the virtual server and shut it down gently. For more information on vPar/VM virtual server types, consult the HP-UX vPars and Integrity VM 6.1 administrator guide at **hp.com/go/hpux-hpvm-docs**.

## vmVirtProvider

The WBEM `vmVirtProvider` product is an interface between HP Integrity VM hosts and the Virtual Machine Manager (VMM). Among other things, it is responsible for executing requests coming from the VMM (i.e., virtual machine creation) and for sending back various status and configuration information. In HP Integrity VM 4.x, it is a product part of the T2767CC bundle. In HP Integrity VM 6.x, it is part of the BB068AA bundle.

You can use the following command to list the status of `vmVirtProvider` and verify it is operating correctly:

```
/opt/wbem/bin/cimprovider -l -s | grep -i virtp
VirtProviderModule       OK
```

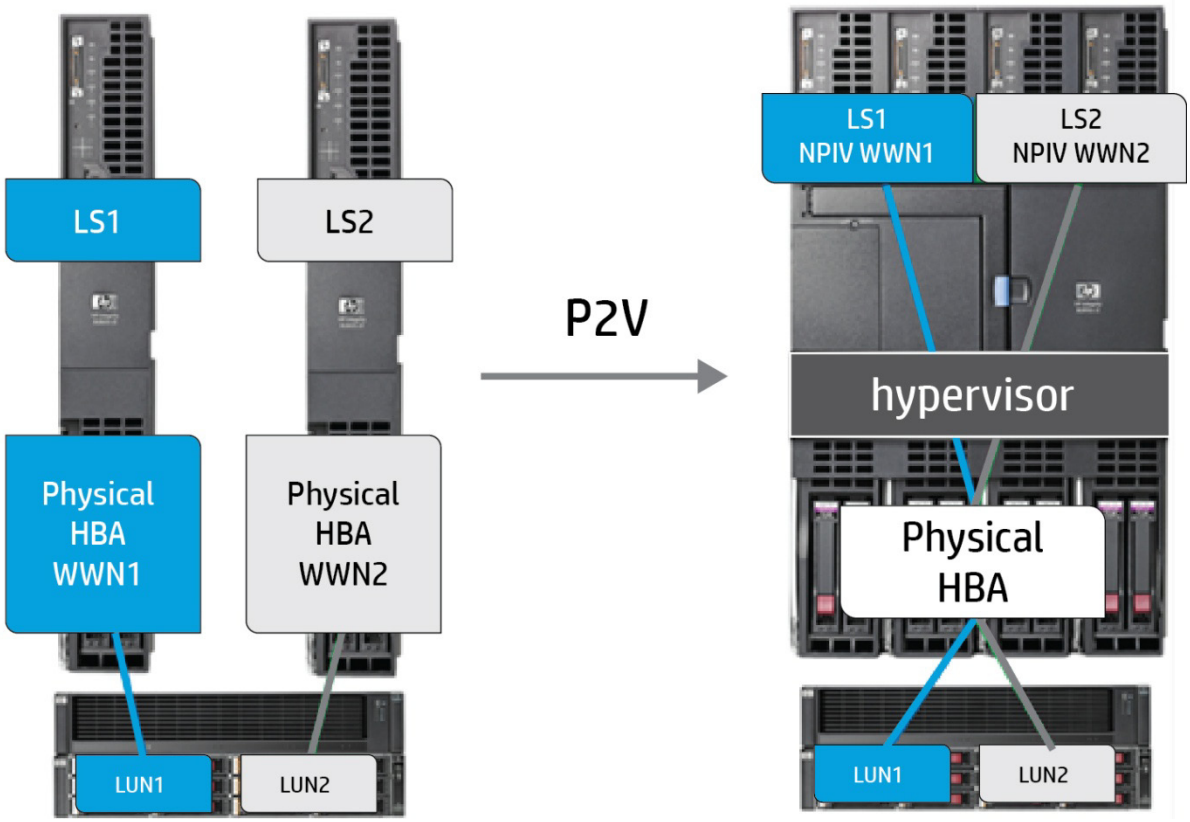
## N-Port ID Virtualization (NPIV) support

Traditionally, in virtualized infrastructures, hypervisors present SAN disks as SCSI devices to virtual machines and perform a protocol translation (SCSI/FC), so virtual machines can communicate seamlessly with their SAN storage. In this context, virtual logical servers characterize their storage with SCSI IDs as storage attributes. In a physical environment, logical servers need World Wide Name (WWN) identifiers, in addition to SCSI IDs to be able to access the SAN storage using the Fiber Channel protocol. Having different attributes for storage characterization in virtual and physical environments adds complexity to unlike moves.

The NPIV technology provides a unique and identical way for storage characterization in both physical and virtual infrastructures, by allowing virtual machines to use the Fiber Channel protocol for accessing the SAN. In a virtual context, WWNs are assigned to virtual Host Based Adaptors (vHBA) by the hypervisor. When activated on a physical HP blade server, the same WWNs can be associated to the physical HBAs by Virtual Connect modules.

Figure 5 illustrates the use of identical WWNs in both physical and virtual contexts.

**Figure 5.** NPIV: Use of identical WWNs in physical and virtual logical servers



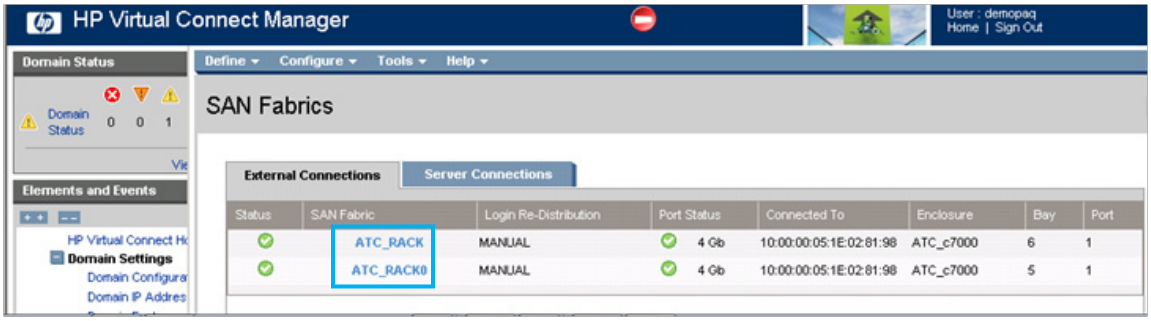

On the left side of Figure 5, logical servers LS1 and LS2 are activated in physical servers, with respectively WWN1 and WWN2 used for accessing the SAN. After a P2V migration, they can still use WWN1 and WWN2 through NPIV devices, while activated in a virtual machine host.

## SAN fabric connections

In Insight Management environments with Virtual Connect modules, the Virtual Connect Manager manages Fiber Channel SAN connections. Such connections are identified by a SAN fabric name and various other parameters like the bay number of the VC module taking care of that particular connection.

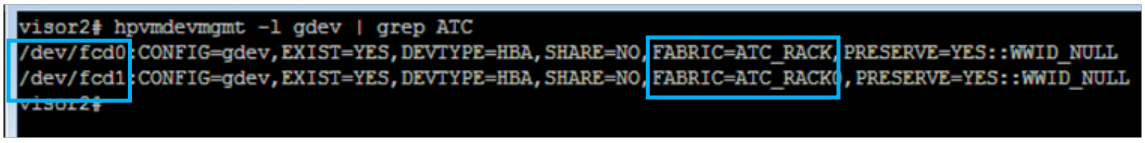
Figure 6, shows 2 SAN fabric connections: `ATC_RACK` and `ATC_RACK0`. The first one uses port 1 of the VC module in Bay6 and the second, port 1 of the VC located in Bay5.

**Figure 6.** SAN fabric connections defined in VC modules




To perform a P2V move of a physical logical server with `ATC_RACK` and `ATC_RACK0` SAN fabrics connections, the LSM needs to find an NPIV capable device on the possible target hosts for both SAN fabrics. All eligible target hosts of the portability group have in their hardware database (Figure 7), records mapping SAN fabrics to physical NPIV capable devices (`/dev/fcd0 and /dev/fcd1` in Figure 7).

**Figure 7.** Mapping of NPIV capable devices with SAN fabrics in an HP Integrity VM host




The mapping of NPIV capable devices and SAN fabric names is used as well for V2P moves. In the case of Figure 7, when the move of a virtual logical server having NPIV connections on `/dev/fcd0` and `/dev/fcd1` is triggered, the LSM will provide the `ATC_RACK` and `ATC_RACK0` SAN fabric names to the Virtual Connect modules (via VCEM) for creating the server profile of the target physical server.

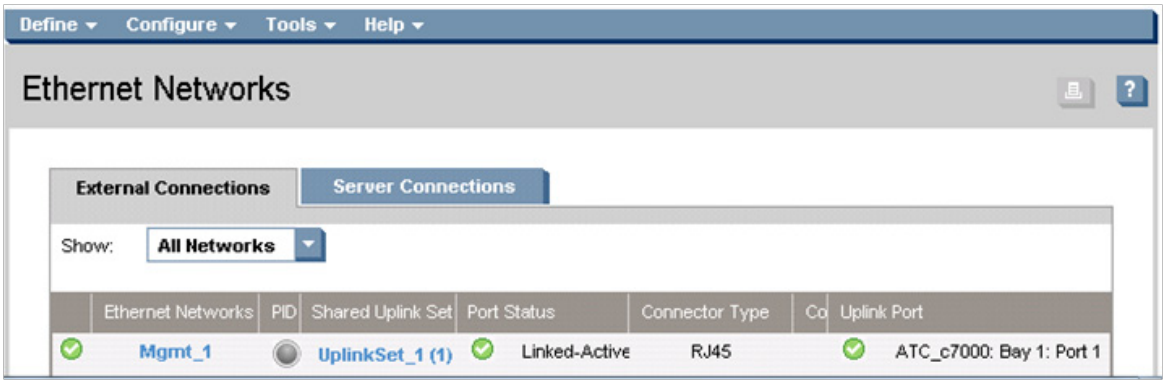
**Note:** Servers located in environments with no Virtual Connect modules (i.e., rackmount servers) are not eligible for hosting physical logical servers because the concept of server profile is missing. However, the activation of virtual logical servers with NPIV connectivity in HP Integrity VM hosts present in such environments is possible because the hosts can communicate SAN fabric connections to LSM via the `vmVirtProvider`. Hence, P2V migrations toward such HP Integrity VM hosts are supported.

## Network connections

A similar mapping mechanism between physical and virtual networks (networks used by virtual machines) must exist to enable fluid, cross-technology migrations.

Physical networks are defined in Virtual Connect modules by a record containing a name and various dynamic or static parameters like the state of the connections, as shown in Figure 8.

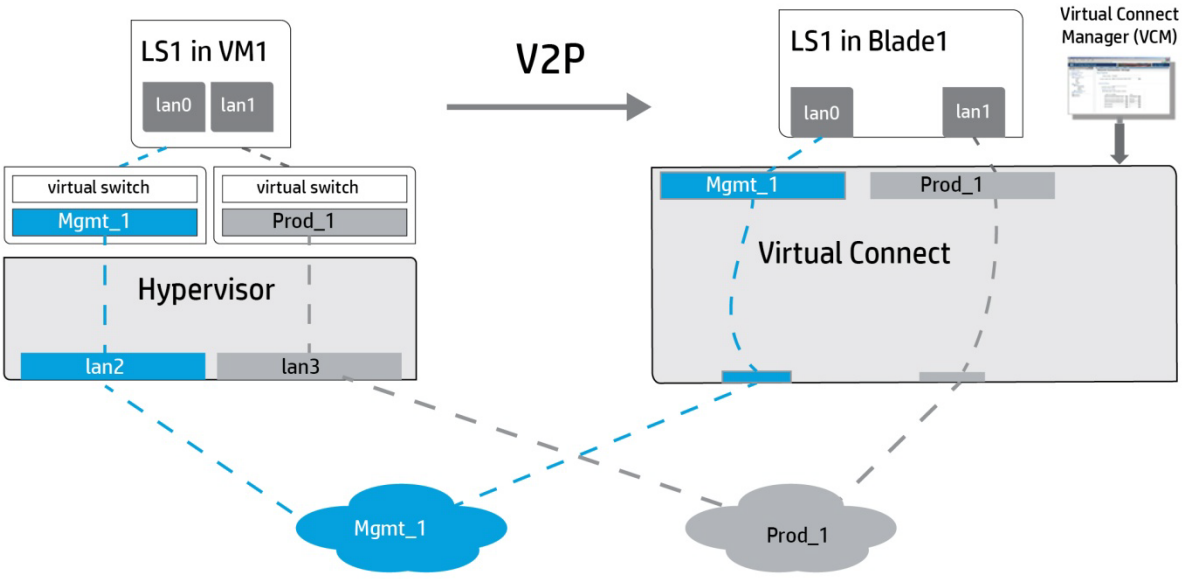
**Figure 8.** Virtual Connect Ethernet networks




Networks connected to virtual machines can be defined and characterized by the virtual switches that they are connected to. Figure 9 shows virtual logical server LS1 connected to virtual switches `Mgmt_1` and `Prod_1`. A move of this logical server toward a physical blade is possible only if LSM finds a target blade connected to the same physical networks. By assigning the exact same names to virtual switches and Virtual Connect networks, there is no ambiguity and LSM can proceed to the move.

Figure 9 shows such a configuration where Virtual Connect has the `Mgmt_1` and `Prod_1` networks, defined the same way as the virtual switches in the host.

**Figure 9.** Physical and virtual networks representations




**Note:** With HP Integrity VM version 4.3 Patch Kit 2 (January 2012), virtual switches can have a name containing more than 8 characters, allowing long VC network names.

# Infrastructure requirements for cross-technology moves

Fluid cross-technology offline moves, in a Matrix OE environment, are possible when the following requirements are met:

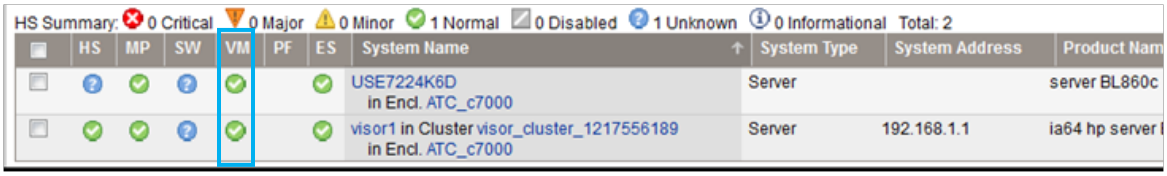
- Potential HP Integrity VM hosts and physical Integrity blade targets are registered in the VMM.
- NPIV technology is supported by HP Integrity VM hosts' targets.
- HP Integrity VM hosts' hardware database is populated with SAN fabrics and registered in Matrix OE.
- Existence of portability group(s) with both servers with Virtual Connect and HP Integrity VM hosts.
- One or more Storage Pool Entries (SPE) associated to unlike portability groups.
- SAN fabric connectivity (zoning) between SPEs and SAN controllers.

To illustrate the verification of the above requirements, we take a concrete example where we want to perform a V2P move of a logical server called `v2p2v_ls` from an HP Integrity VM host (`visor1`) toward a physical blade server named Bay4.

## Verifying that potential source and target are registered in Matrix OE

Cross-technology offline moves can only happen between servers (Integrity blades or HP Integrity VM hosts) fully registered in the Matrix OE. We perform this operation by running the `Configure →Managed System Setup Wizard tool (MSSW)`. Consult the HP Matrix OE getting started guide for more details about the MSSW at **hp.com/go/matrixoe/docs**.

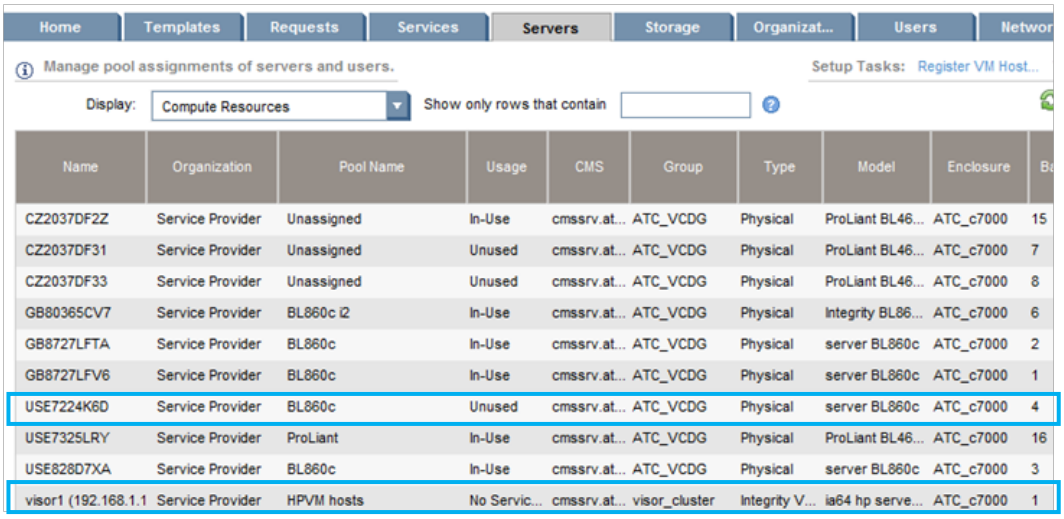
**Figure 10.** Systems registered in VMM




A sanity check can be obtained by looking for the VMM status, green icon from the VM column of the `All Systems view`. Figure 10 shows our physical target (`USE7224K6D`) and HP Integrity VM host (`visor1`) fully registered in VMM.

Another level of verification can be performed at the `Servers` tab of HP infrastructure orchestration.
The `Compute Resources` view must explicitly list the potential servers used for cross-technology moves (figure 11).

**Figure 11.** Servers seen by IO




| Name | Organization | Pool Name | Usage | CMS | Group | Type | Model | Enclosure | B |
|---|---|---|---|---|---|---|---|---|---|
| CZ2037DF2Z | Service Provider | Unassigned | In-Use | cmssrv.at... | ATC_VCDG | Physical | ProLiant BL46... | ATC_c7000 | 15 |
| CZ2037DF31 | Service Provider | Unassigned | Unused | cmssrv.at... | ATC_VCDG | Physical | ProLiant BL46... | ATC_c7000 | 7 |
| CZ2037DF33 | Service Provider | Unassigned | Unused | cmssrv.at... | ATC_VCDG | Physical | ProLiant BL46... | ATC_c7000 | 8 |
| GB80365CV7 | Service Provider | BL860c i2 | In-Use | cmssrv.at... | ATC_VCDG | Physical | Integrity BL86... | ATC_c7000 | 6 |
| GB8727LFTA | Service Provider | BL860c | In-Use | cmssrv.at... | ATC_VCDG | Physical | server BL860c | ATC_c7000 | 2 |
| GB8727LFV6 | Service Provider | BL860c | In-Use | cmssrv.at... | ATC_VCDG | Physical | server BL860c | ATC_c7000 | 1 |
| USE7224K6D | Service Provider | BL860c | Unused | cmssrv.at... | ATC_VCDG | Physical | server BL860c | ATC_c7000 | 4 |
| USE7325LRY | Service Provider | ProLiant | In-Use | cmssrv.at... | ATC_VCDG | Physical | ProLiant BL46... | ATC_c7000 | 16 |
| USE828D7XA | Service Provider | BL860c | In-Use | cmssrv.at... | ATC_VCDG | Physical | server BL860c | ATC_c7000 | 3 |
| visor1 (192.168.1.1 | Service Provider | HPVM hosts | No Servic... | cmssrv.at... | visor_cluster | Integrity V... | ia64 hp serve... | ATC_c7000 | 1 |

## Verifying NPIV support in an HP Integrity VM host

The following explains how to verify the support of the NPIV technology on `visor1` that will host the `v2p2v_ls` logical server:

List all Fiber Channel capable devices:

```
visor1# ioscan -funC fc | grep dev
                        /dev/fcd0
                        /dev/fcd1
```

Verify the support of NPIV by the Fiber Channel devices:

```
visor1# fcmsutil /dev/fcd0 | grep NPIV
                     NPIV Supported = YES
visor1# fcmsutil /dev/fcd1 | grep NPIV
                     NPIV Supported = YES
```

Detailed NPIV information can be obtained relative to a specific FC device:

```
visor1# fcmsutil /dev/fcd0 npiv_info
PFC Hardware Path               = 0/0/0/7/0/0/0
PFC DSF                         = /dev/fcd0
PFC Class Instance              = 0
PFC Driver state                = ONLINE
PFC Port WWN                    = 0x5001438002a3000c
PFC Node WWN                    = 0x5001438002a3000d
PFC Switch Port WWN             = 0x200600051e028198
PFC Switch Node WWN             = 0x100000051e028198

FlexFC Virtual Fibre Channel (VFC)
----------------------------------
Maximum Supported FlexFC VFC    = 8
```

```
Number Active FlexFC VFC       = 0


HPVM Virtual Fibre Channel (VFC)
---------------------------------
Maximum Supported HPVM VFC     = 16
Number Active HPVM VFC         = 0
```

## Populating an HP Integrity host database with SAN fabrics

As explained earlier, the hardware database of potential HP Integrity VM host targets must be populated with the SAN fabrics defined in the Virtual Connect modules. We can obtain the list of the SAN fabrics from the Virtual Connect Manager with the show `fabric` command issued on the VCM of the infrastructure:

```
visor1# ssh user@vcm show fabric
================================================
Name        Bay   Ports   Status   Speed   LinkDist
================================================
ATC_RACK    6     1       OK       Auto    Manual
ATC_RACK0   5     1       OK       Auto    Manual
```

Populating the host hardware database with ATC_RACK and ATC_RACK0 is performed using the `hpvmdevmgmt` command:

```
visor1# hpvmdevmgmt -a gdev:/dev/fcd0:attr:FABRIC=ATC_RACK,PRESERVE=YES
visor1# hpvmdevmgmt -a gdev:/dev/fcd1:attr:FABRIC=ATC_RACK0,PRESERVE=YES
```

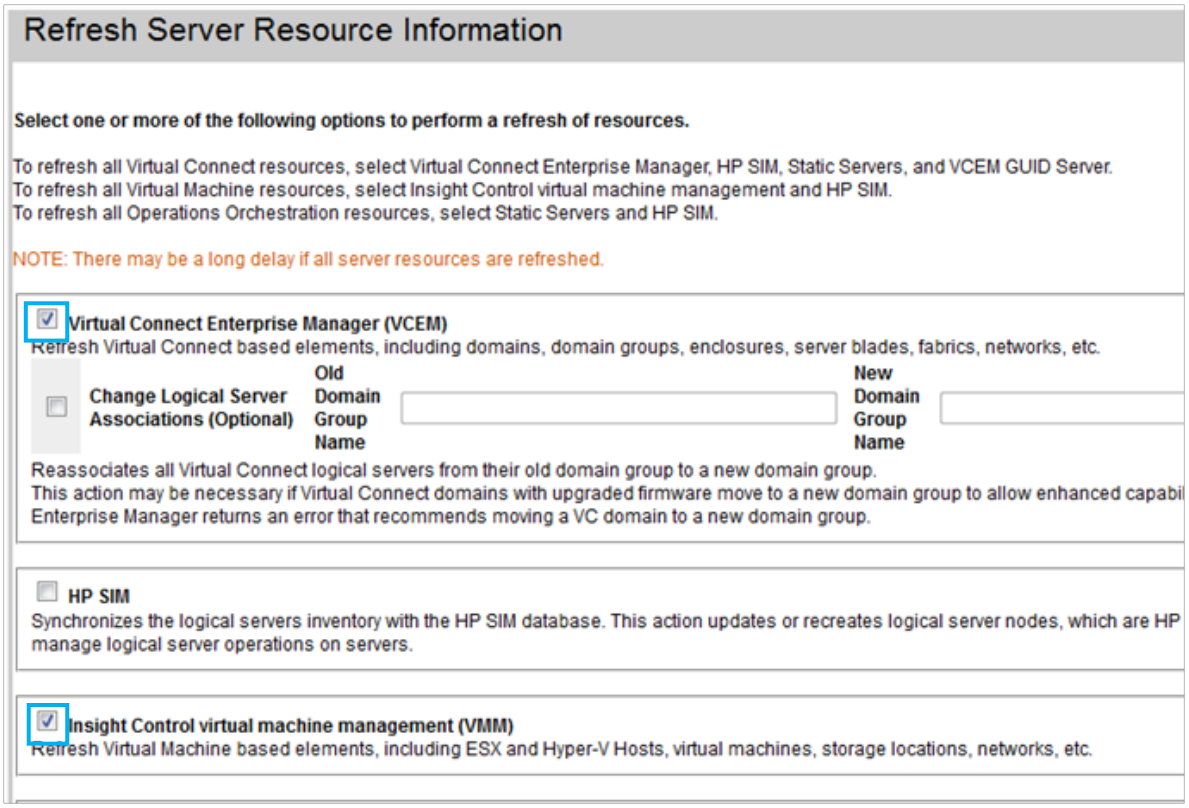
Verify that the database is populated correctly:

```
visor1# hpvmdevmgmt -l gdev | grep fcd
/dev/fcd0:CONFIG=gdev,EXIST=YES,DEVTYPE=HBA,SHARE=NO,FABRIC=ATC_RACK,PRESERVE=YES:
:WWID_NULL
/dev/fcd1:CONFIG=gdev,EXIST=YES,DEVTYPE=HBA,SHARE=NO,FABRIC=ATC_RACK0,PRESERVE=YES
::WWID_NULL
```

**Note:** The above output does not contain any space characters around commas or colons. A corrupted hardware database makes it impossible to activate logical servers on HP Integrity VM hosts.

The content of this modified hardware database must now be communicated to the Matrix OE database using the `Refresh Server Resource Information` page. From the `Tools` → `Matrix OE Visualization` tab, select `Tools` → `Logical Servers` → `Refresh`. Select both `Virtual Connect Enterprise Manger (VCEM)` and `Insight Control VMM` as shown in figure 12. Click on the `Refresh` button and wait for completion of the job.

**Figure 12.** Refresh of VCEM and VMM information



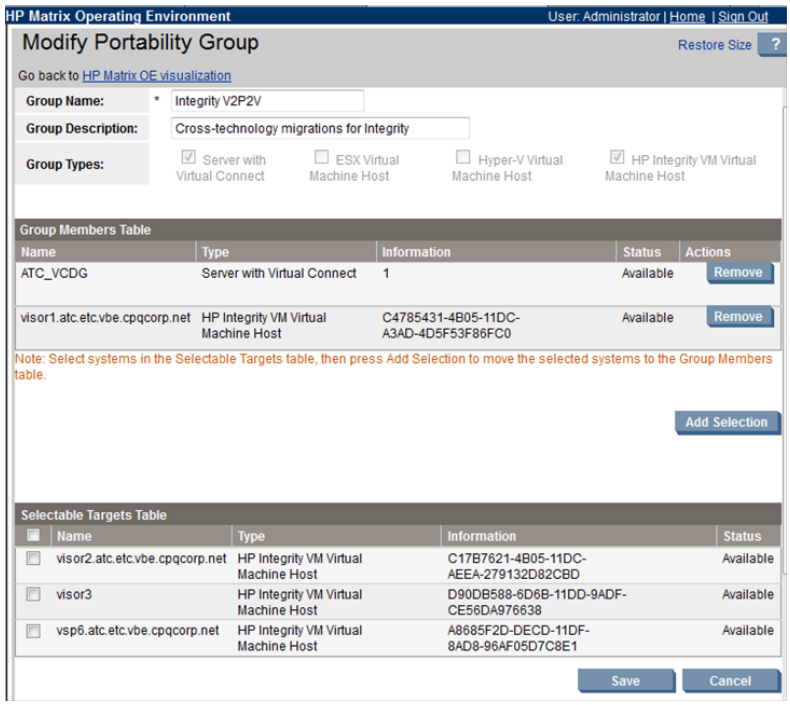
# Creating a portability group with Virtual Connect Servers and HP Integrity VM hosts

The potential physical servers and HP Integrity VM hosts' targets for V2P and P2V migrations must be part of the same portability group. From the `HP Matrix OE Visualization`, select `Modify` → `Logical Server Portability Groups`, and click on Create Group.

Fill the `Group Name` and `Group Description` fields and then, in the `Targets Table`, tick the `Server with Virtual Connect` domain group as well as desired `HP Integrity VM hosts`. Click on the `Add Selection` button; review the configuration of this new Portability Group; `Save` it; and exit with `Done`.

Figure 13 shows a portability group called `Integrity V2P2V` containing physical blades from the `ATC_VCDG` VC domain group and HP Integrity VM host `visor1`.

**Figure 13**. Creating an unlike portability group




# Creating SPE in unlike portability groups

Logical servers take their storage information from the SPE defined in the Matrix OE database. During logical server activation, the LSM will use information contained in SPEs and ask the underlying layers to setup the SAN connections. By definition, SPEs are tied to portability groups and for achieving V2P or P2V migrations, we need to create at least one SPE in our unlike `Integrity V2P2V` Portability Group.

**Note:** To keep this document simple, easy to read, and for didactic purpose the example below may not strictly follow storage best practices.

From the HP Matrix OE visualization, open the `Modify` → `Logical Server Storage Pools`. In the portability group pull down menu, select `Integrity V2P2V`. Click on the `Add Entry` button (bottom right)

Supply a `Storage Entry` Name if the default one does not fit your need. Also supply a `Storage Entry Description` and select `HP-UX` in the `Storage Entry Operating System` pull down menu. Click on the `Add Port` button and select `ATC_RACK(FC)` in the `Fabric` column. Click again on the `Add Port` button and select `ATC_RACK0(FC)` in the `Fabric` column.

Click on the `Add Volume` button; specify a `Size` (i.e., `31 GB`) and the RAID level (i.e., `RAID 5`). Then, provide a `Storage Port WWN` identifying the SAN controller that will provide storage capacity for this SPE. To keep this example simple, we will supply only one SAN controller WWN.

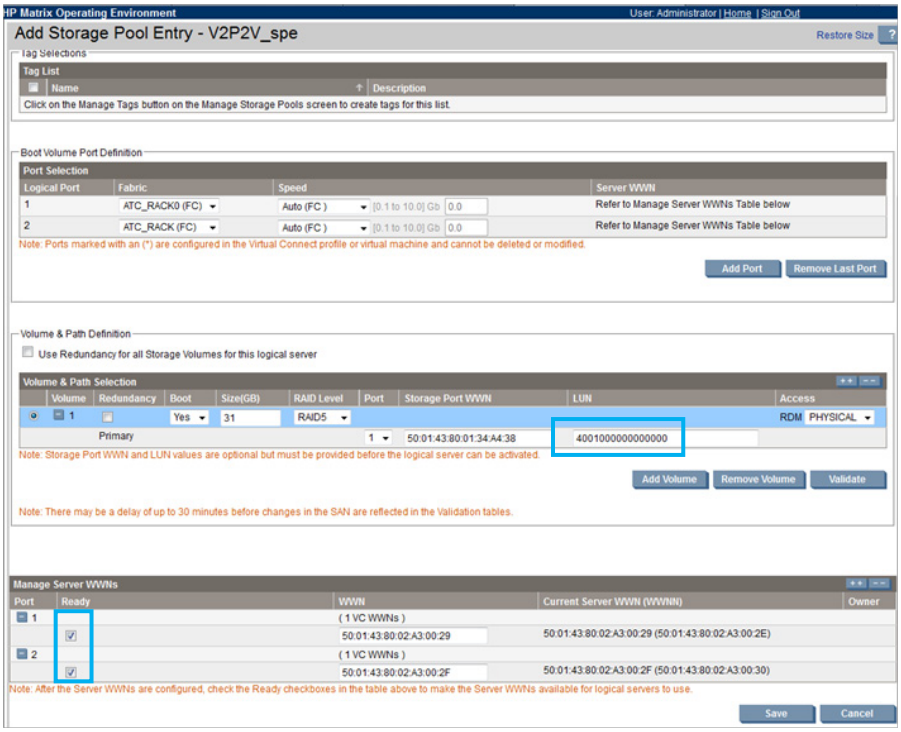
In the LUN field, provide the LUN identifier that will be used by the SAN controller during the logical server activation. Use the 16 hexadecimal digits *Volume Set Addressing* (VSA) format for this field. In this format, LUN Identifier `1` becomes `4001000000000000` and LUN Identifier `23` is represented by `4017000000000000`.

**Note:** VSA is an HP proprietary format removing certain SCSI limitations when accessing devices over Fiber Channel. This format is used extensively by the EFI.

In the `Manage Server WWNs` table, tick the `Ready boxes` corresponding to the WWNs provided by the Globally Unique Identifier (GUID) Manager embedded in VCEM and corresponding to the 2 ports requested earlier (`ATC_RACK` and `ATC_RACK0`). Those server WWNs will be assigned to the physical or virtual HBAs during logical server migration.

Figure 14 highlights the LUN identifier in VSA format and the ready boxes ticked. `Save` this configuration and hit the `Done` button.

**Figure 14.** Creating a storage pool entry within an unlike portability group




## SAN connectivity with unlike portability group storage pools

The deployment of an operating environment on logical servers activated in this unlike portability group will be successful if an effective SAN connectivity exists between the disk arrays and the logical severs' HBAs. With the help of administrators from the storage department, adapt the zoning in the different SAN switches according to the WWNs provided by the Storage Pool Entry, in the `Manage Server WWNs` table.

Verify that the information provided in the SPE match a host and a LUN in the ad hoc SAN controller.

# Virtual to physical and physical to virtual offline moves

In this paragraph, we will discuss the different steps needed to perform virtual to physical and then physical to virtual moves. The first operation consists of creating a logical server called `v2p2v_ls` in the unlike portability group created earlier. It will be activated first in a virtual machine. After the deployment of HP-UX in this virtual machine, we will perform a V2P offline move.

## Creating and activating a cross-technology Integrity logical server

### Creating logical server `v2p2v_ls`

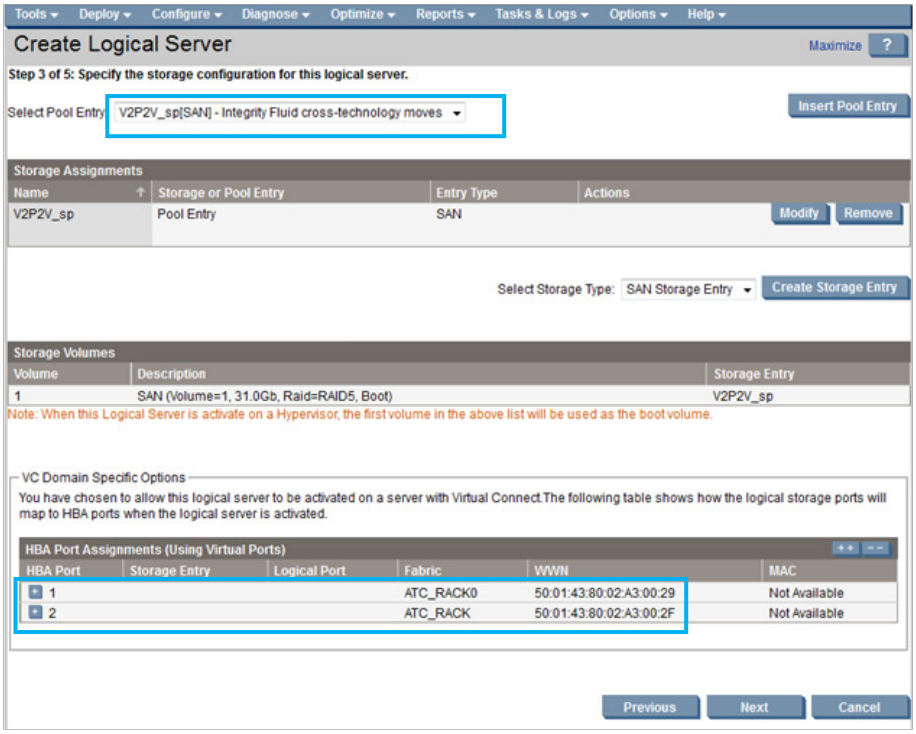
From the `Matrix OE Visualization` select `Create`→`Logical Server` and fill the different fields as the following:

`Logical Server name:` **`v2p2v_ls`**
`Logical Server Description:` **`HP-UX v2p2v`**
`Portability Group:` **`Integrity V2P2V`**
`Logical Server Architecture:` **`HP Integrity`**
`Logical Server Operating System:` **`HP-UX`**
`Managed Resource Name:` **`v2p2v`**

Click on `Next` and specify suitable values in the `compute resources` screen.

Step 3 asks to specify the storage configuration for this logical server. Select the `V2P2V [SAN]` storage pool entry and click on the `Insert Pool Entry` button. This action calls the VCEM embedded GUID for providing worldwide numbers. They are displayed at the bottom of figure 15.

**Figure 15.** Creating a cross-technology virtual server

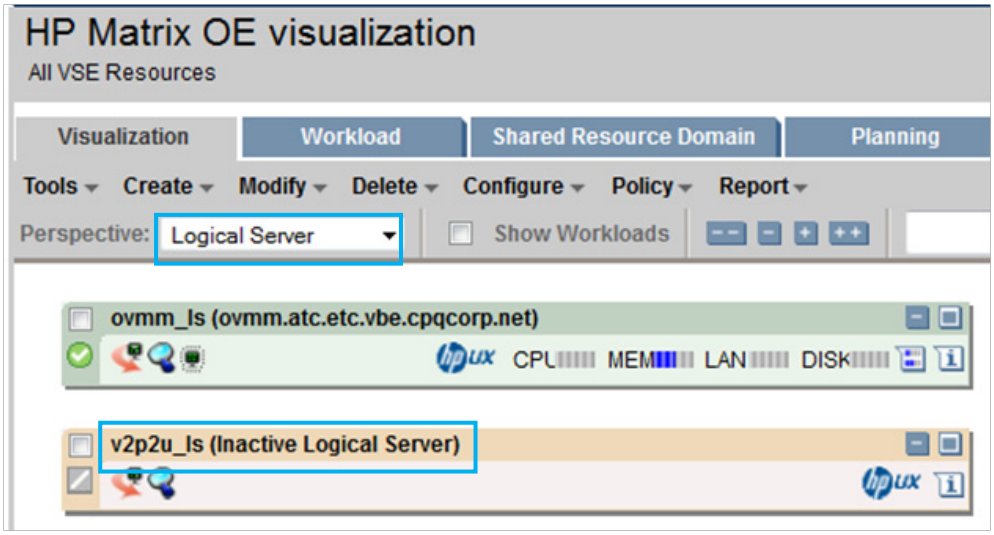


In the next step, click the `Add Network` button; select an Ignite-UX bootable network in `port 1` from the `Network Name` pull down list. Add other networks at your convenience and click on `Next`.

**Note:** The `PXE Enable/Disabled` switch has no action on HP-UX logical servers and can be left with the default (`Disabled`).

In step 5, review the logical server summary carefully and click on Finish. When created, the logical server appears in orange in the Logical Server perspective of the HP Matrix OE visualization (figure 16).

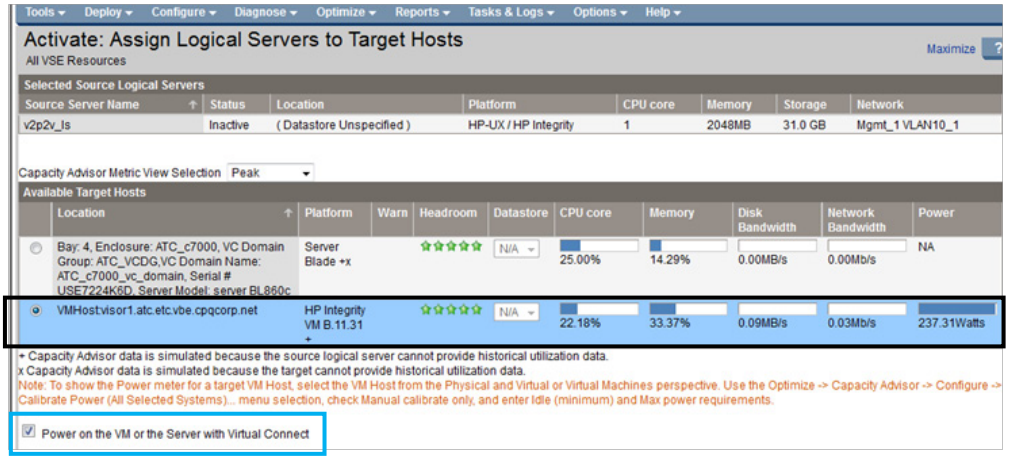
**Figure 16:** Inactive logical server




## Activate the logical server in an HP Integrity VM host

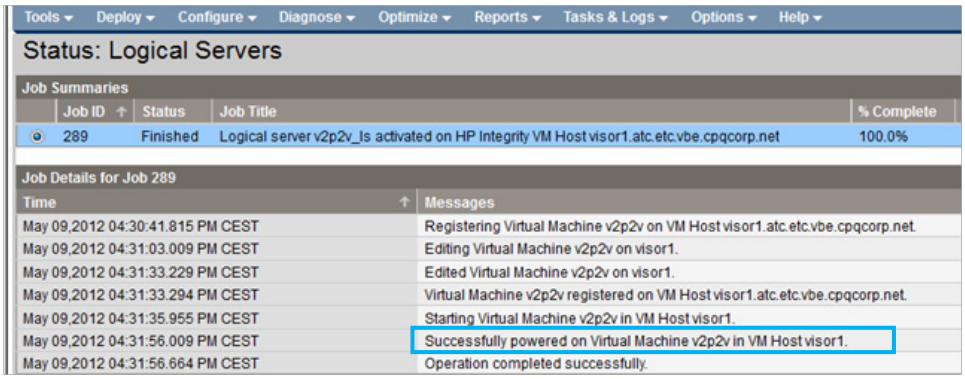
When the logical server is created, instantiate it by clicking on the `Activate` button. A list of possible targets from the `Integrity V2P2V` portability group appears. In figure 17, this list is composed of a physical Integrity blade server located in Bay4 of the enclosure and an HP Integrity VM host (`visor1`). Select visor1 to activate.

**Figure 17.** Choosing a target host for logical server activation




After clicking on the `Activate` and then `Confirm` buttons, the different steps of the activation process are displayed in the `Job Details` table (figure 18). The LSM requests the activation to the target host via the Virtual Machine Manager and the `vmVirtProvider`.

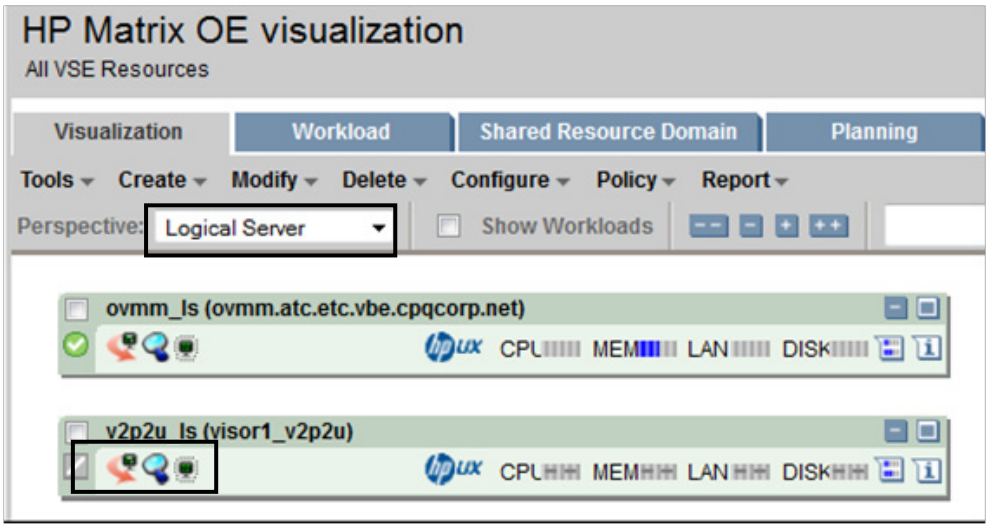
**Figure 18.** Virtual logical server activation




**Note:** The different steps of logical server activation on a HP Integrity VM host can be viewed on the host with the command:
`tail -f /var/opt/hpvm/common/command.log`

The activated logical server appears in green from the `Logical Server` perspective of the `HP Matrix OE visualization` as shown in figure 19. The status is grayed and the utilization bars don't mention any activity, since there is no operating system running yet in the virtual machine.

**Figure 19.** Activated logical server

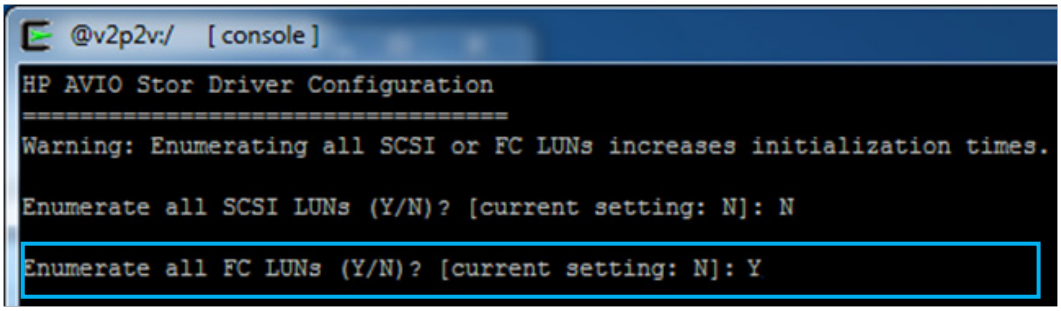



## Deploying and configuring HP-UX in the logical server

At the end of the activation process, a power-on operation is performed as requested in the target selection screen (shown at the bottom of figure 16). This brings the logical server at the EFI level. Before deploying an HP-UX OE, we may need to configure the HP AVIO Stor EFI driver to enumerate all Fiber Channel SAN devices. By default and to save initialization times only SCSI and FC LUNs matching an EFI boot entry are listed by the map command. Since this is the first time we boot this virtual machine, no boot entry is present and as a result no device is visible from the EFI shell.

To make FC LUNs visible, connect to the HP Integrity VM console and, at the EFI prompt, type `drvcfg -s` and answer `Y` to the `Enumerate all FC LUNs (Y/N):?` question (Figure 20), and then `reset` the virtual machine.

**Figure 20.** Configuring HP AVIO Stor EFI drive to enumerate all FC LUNs




Verify that the HP-UX OE, which is going to be installed on this system, contains the `HPPortableImage` bundle, then proceed to the installation using your preferred method.

**Note:** The `HPPortableImage` bundle is selected by default starting with HP-UX 11i v3, March 2012. For previous HP-UX versions, manually select it or download it from **software.hp.com**.

Once the OE is deployed and the network is fully configured and operational, then you can login as a privileged user and modify the `gio_portable_image` kernel parameter as follow:

```
# kctune gio_portable_image=1
```

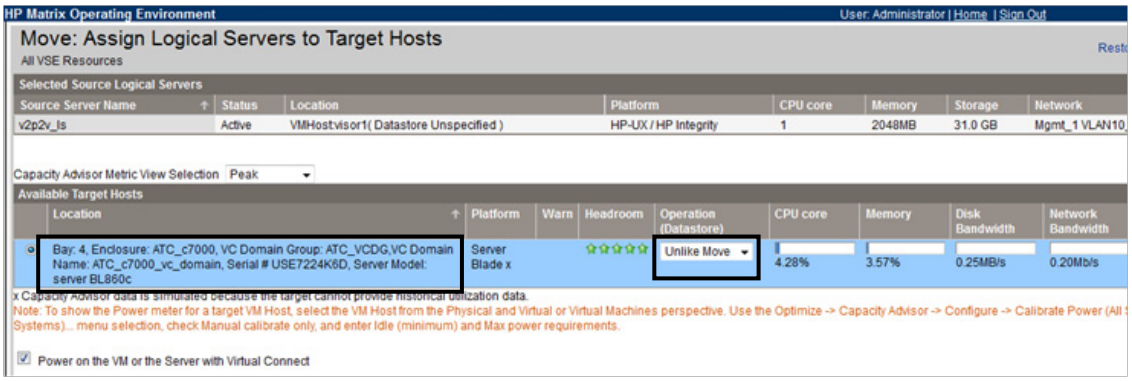
This command will trigger a snapshot of the network configuration in the persistent KRS database during next clean shutdown as shown in Figure 4.

## V2P offline move

The first step to perform, in order to achieve a V2P cross-technology move, is to gently shutdown the logical server (`shutdown -hy now`). This is needed to gently close the running applications and to save the network configuration in the persistent KRS database.

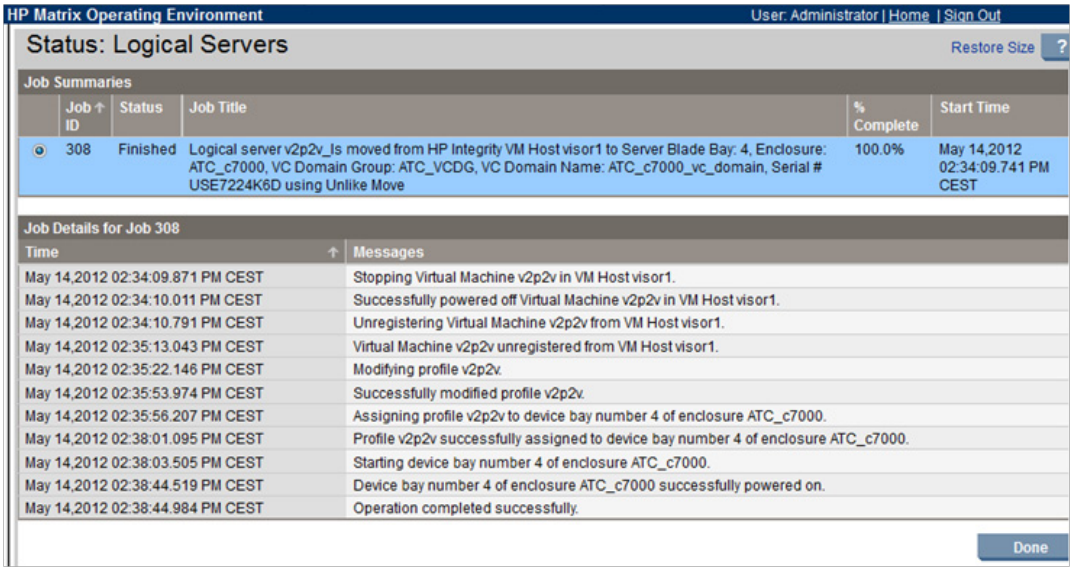
Then, select the logical server from the `Logical Server` perspective in the `HP Matrix OE visualization` and click on `Tools`→ `Logical Servers`→`Move`. The list of all possible targets is displayed. Select a physical target (Figure 21), click on `Move` and then `Confirm`.

**Figure 21.** Physical V2P targets




The following screen (Figure 22) lists the different steps achieved by LSM, VMM, VCEM/VCM, and the `vmVirtProvider` during the V2P offline move operation. The first step is an abrupt power-off of the server in case it has not been done previously. The virtual machine is then *unregistered* (placed in a *Non-Runnable* state) in the source host. The logical server definition and meta-information (i.e., EFI boot entry) are passed to the VCM, which creates a suitable profile and assigns it to the target physical server. The physical server is powered on and boots automatically from the SAN. During boot time, the `HPPortableImage` bundle forces the system to use the saved network instances.

**Figure 22.** Steps achieved during a V2P offline move




P2V offline move

Performing a P2V offline move is very similar to a V2P migration since the same components are involved, but in a different order. Start by making sure that the `gio_portable_image` kernel parameter is set to `1` (set it to `1` if needed) in the physical system:

```
# kctune gio_portable_image
Tunable              Value  Expression  Changes
gio_portable_image       1  1           Immed
```

Gently shutdown the system to let the `HPPortableImage` depot take a snapshot of the network configuration and to avoid the abrupt power-off ordered by LSM/VMM.

Select the virtual server from the `HP Matrix OE visualization` and start the move by selecting `Tools`→ `Logical Servers`...→`Move`.... In the potential virtual target list (Figure 23), select one, click `Move` and then `Confirm`.

**Figure 23.** Virtual P2V targets

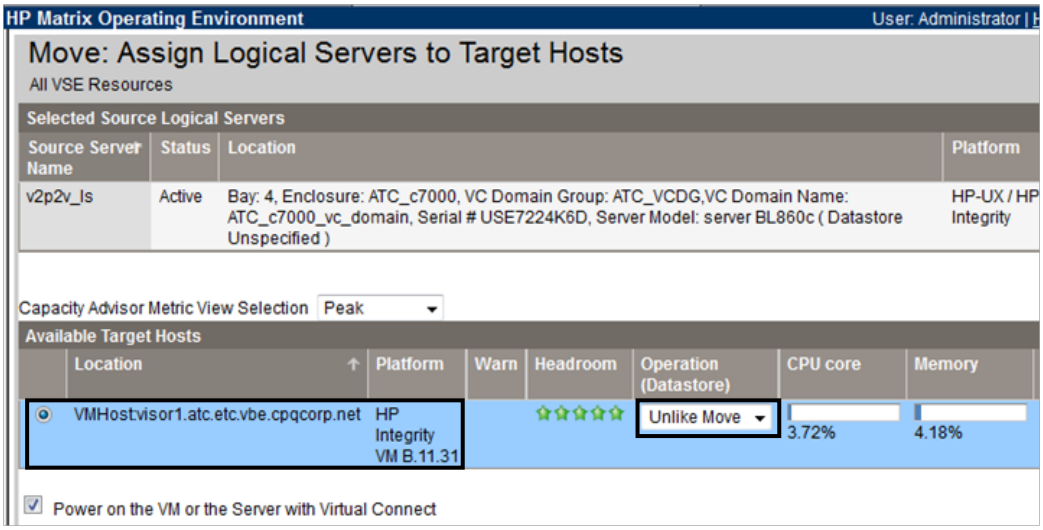
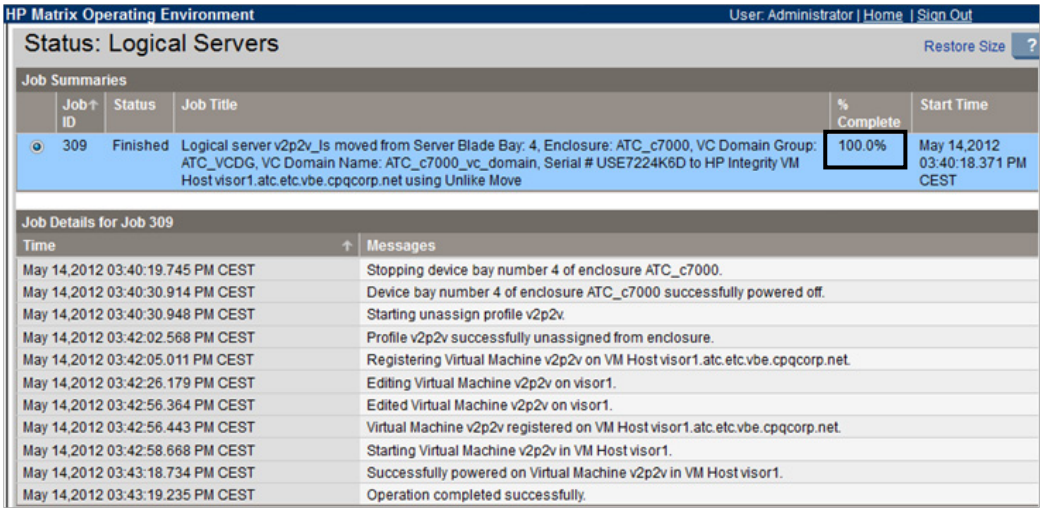


Figure 24 lists the different steps performed by the `vmVirtProvider`, LSM/VMM, and VCEM/VCM. The physical server is powered-off and its associated Virtual Connect profile is unassigned. Meta-information (i.e., EFI boot entries) and the logical server definition are sent to the `vmVirtProvider` of the target HP Integrity VM host. It adapts and translates this information to a virtual environment (i.e., boot hardware path) and creates a virtual machine (or *register* if already existing in NR mode). The last step is the power-on as requested in the target hosts' screen.

**Figure 24.** Steps achieved during a P2V offline move




# Physical to physical (P2P') offline moves

Physical to Physical (P2P) offline moves represent the migration of a logical server activated on a physical Integrity blade to another physical Integrity blade. The target physical Integrity blade server may or may not have the same hardware characteristics (CPU, mezzanines cards, and memory) as the source server. To reflect the fact that source sand target have different hardware characteristics, we call this type of move: P2P' (P to P-prime). In a Matrix OE 7.0 environment, supported P2P' moves are BL8x0c to BL8x0c i2, BL8x0c i2 to BL8x0c, BL8x0c to BL8x0c, and BL8x0c i2 to BL8x0c i2.

When achieving such a cross-technology move using the `HP Matrix OE visualization` menus, the following tasks are performed automatically by the different Matrix OE components:

1. Power down of the source system (if not already done by a system administrator)
2. Backup of the EFI configuration and meta-information
3. Un-assignment of the Virtual Connect profile of the source server
4. Assignment of the Virtual Profile on the target server
5. Restore of EFI configuration
6. Boot the server

**Note:** HP recommends to gently shutdown all applications, as well as the underlying server, before proceeding with a P2P' offline move.

## Achieving a P2P' offline move

Assuming an existing physical logical server activated on an Integrity Blade BL860c, we propose to move it to an Integrity blade BL860c i2, and discuss the different steps. The activation of a physical logical server is identical to the activation of a virtual logical server and is explained in the **HP Matrix Operating Environment 7.0 Logical Server management user guide**.

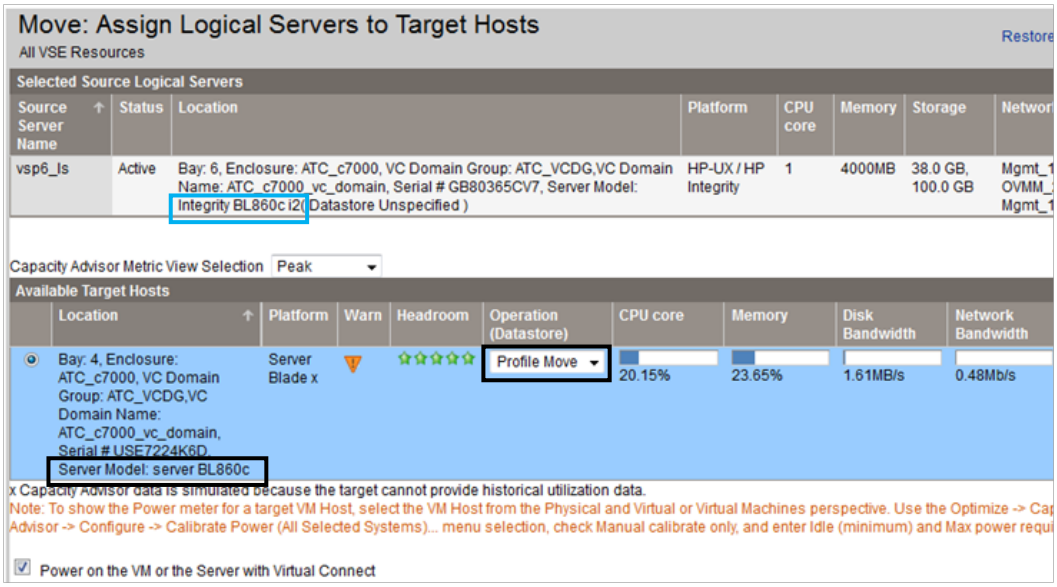
Log into the source physical logical server, verify that the `HPPortableImage` depot is installed (install it if needed) and set the `gio_portable_image` kernel parameter to `1`:

```
kctune gio_portable_image=1
```

Perform a clean shutdown to save the network instances in the persistent KRS database.

From the HP Matrix OE Visualization, select the physical logical server to move and click on the `Tools`→`Logical Servers…`→`Move…` menu. The list of all potential targets appears with `Profile Move` as Operation type (Figure 25).

**Figure 25.** P2P' targets




Select the desired target, click on `Move` and then `Confirm`. The status of the different operations is displayed in the Logical Server Job Status screen (Figure 26). The operating system in the target physical server boots as requested in the target list screen.

**Figure 26.** Steps achieved during a P2P' offline move


During boot time, the saved network instances are restored and the network configuration becomes identical to what it was on the source physical server.

# Summary

HP Converged Infrastructure constantly improves and includes new features and capabilities helping IT departments to sustain customer demands. Leveraging HP Matrix Operating Environment and its ability to perform seamless migrations of HP-UX workloads in the data center dramatically increases the flexibility of the placement of those workloads, while preserving a constant level of service and simplifying development lifecycles.

# For more information

For more information on HP Insight Management and HP Matrix Operating Environment, visit the following locations and read the associated documents:

- Understanding the HP CloudSystem Matrix Technology
  **http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-5550ENW.pdf**

- HP Insight Management 7.0 getting started guide
  **http://h20000.www2.hp.com/bc/docs/support/SupportManual/c03169039/c03169039.pdf**

- HP Matrix Operating Environment 7.0 Logical Server Management user guide
  **http://h20000.www2.hp.com/bc/docs/support/SupportManual/c03132774/c03132774.pdf**

- HP Integrity VM 4.3 N-Port ID Virtualization white paper
  **http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-9195ENW.pdf**

**Next step**
For flexible, fast, and automated migrations of HP-UX workloads between physical and virtual systems, visit
**hp.com/go/insightmanagement**
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4AA4-2169ENW, Created July 2012