PEARSON IT CERTIFICATION

Practice Tests

Flash Cards

Review Exercises

Study Planner

Cert Guide

Advance your IT career with hands-on learning

VCP-DCV for vSphere 8.x

JOHN A. DAVIS
STEVE BACA

VCP-DCV for vSphere 8.x Cert Guide

Companion Website and Pearson Test Prep Access Code

Access interactive study tools on this book's companion website, including practice test software, review exercises, Key Term flash card application, a study planner, and more!

To access the companion website, simply follow these steps:

1. Go to **www.pearsonitcertification.com/register**.
2. Enter the **print book ISBN: 9780138169886**.
3. Answer the security question to validate your purchase.
4. Go to your account page.
5. Click on the **Registered Products** tab.
6. Under the book listing, click on the **Access Bonus Content** link.

When you register your book, your Pearson Test Prep practice test access code will automatically be populated with the book listing under the Registered Products tab. You will need this code to access the practice test that comes with this book. You can redeem the code at **PearsonTestPrep.com**. Simply choose Pearson IT Certification as your product group and log into the site with the same credentials you used to register your book. Click the **Activate New Product** button and enter the access code. More detailed instructions on how to redeem your access code for both the online and desktop versions can be found on the companion website.

If you have any issues accessing the companion website or obtaining your Pearson Test Prep practice test access code, you can contact our support team by going to **pearsonitp.echelp.org**.

Cross-vCenter Server Migrations

Moving a virtual machine, whether hot or cold, to a new vCenter Server is considered a cross-vCenter Server migration. To perform a standard, cross-vCenter Server migration with Enhanced Linked Mode, you must meet the following requirements:

Key Topic

- The associated vCenter Servers and ESXi hosts must be Version 6.0 or later.
- The cross-vCenter Server and long-distance vMotion features require an Enterprise Plus license.
- The vCenter Server instances must be time-synchronized with each other for correct vCenter Single Sign-On token verification.
- For migration of compute resources only, both vCenter Server instances must be connected to the shared virtual machine storage.
- Both vCenter Server instances must be in the same vCenter Single Sign-On domain.

With Advanced Cross vCenter vMotion (XVM), you can migrate virtual machines between vCenter Server, without Enhanced Linked Mode, by providing the credentials of the other vCenter Server when prompted by the wizard. To perform a cross-vCenter migration using Advanced Cross vCenter vMotion, you must meet the following requirements:

- The vCenter Sever where you initiate the migration must be Version 7.0 Update 1c or later.
- For powered-on virtual machines, you must have a vSphere Enterprise Plus license.
- For powered-off virtual machines, a vSphere Standard license will suffice.

Virtual Machine Migration Limitations

Key Topic

vCenter Server limits the number of simultaneous virtual machine migration and provisioning operations that occur per host, network, and datastore. Each of the network, datastore, and host limits must be satisfied for the operation to proceed. vCenter Server uses a costing method by which each migration and provisioning operation is assigned a cost per resource. Operations whose costs cause resources to exceed their limits are queued until other operations complete.

Limits depend on the resource type, ESXi version, migration type, and other factors, such as network type. ESXi Versions 6.0 to 8.0 have consistent limits:

- **Network limits**: Network limits apply only to vMotion migrations. Each vMotion migration has a network resource cost of 1. The network limit

depends on the network bandwidth for the VMkernel adapter enabled for vMotion migration. For 1 GigE the limit is 4, and for 10 GigE it is 8.

- **Datastore limits**: Datastore limits apply to vMotion and Storage vMotion migrations. Each vMotion migration has a resource cost of 1 against the shared datastore. Each Storage vMotion migration has a resource cost of 16 against both the source and destination datastores. The datastore limit per datastore is 128.
- **Host limits**: Host limits apply to vMotion, Storage vMotion, and cold migrations. They also apply to virtual machine provisioning operations, including new deployments, and cloning. Provisioning and vMotion operations have a host cost of 1. Storage vMotion operations have a host cost of 4. The host limit per host is 8.

For costing purposes, a hot migration that is both a cross-host and cross-datastore migration (vMotion migration without shared storage) is considered to be a combination of a vMotion and Storage vMotion migration and applies the associated network, host, and datastore costs. vMotion migration without shared storage is equivalent to Storage vMotion migration with a network cost of 1.

Consider the following examples for a four-node DRS cluster with a 10 GigE vMotion network:

- If you perform nine simultaneous vMotion migrations, the ninth migration is queued due to the network limit, even if different hosts are involved.
- If you perform nine simultaneous hot cross-host and cross-datastore migrations involving the same datastore, the ninth migration is queued due to the datastore limit, even if the migrations are split as to whether the datastore is the source or the target.
- You can simultaneously perform one Storage vMotion and four vMotion operations involving a specific host.

TCP/IP Stacks

You can use the vMotion TCP/IP stack to isolate vMotion traffic and assign it to a dedicated default gateway, routing table, and DNS configuration. To use the vMotion TCP/IP stack, select vMotion from the TCP/IP Stack drop-down menu when configuring the associated VMkernel virtual network adapter. When you assign a VMkernel virtual network adapter to the vMotion stack, you cannot use the adapter for purposes other than vMotion. Likewise, you can use the provisioning TCP/IP stack to isolate traffic for cold migration, cloning, and snapshots. To use the provisioning TCP/IP stack, select Provisioning from the TCP/IP Stack drop-down menu

when configuring the associated VMkernel virtual network adapter. When you assign a VMkernel virtual network adapter to the provisioning stack, you cannot use the adapter for purposes other than provisioning.

vMotion Details

This section provides details on the vMotion feature in vSphere.

vMotion Overview

A hot cross-host migration is called a ***vMotion*** migration. A hot migration across hosts and datastores is often called a vMotion migration without shared storage. A hot cross-vCenter Server migration is often called a cross-vCenter Server vMotion migration. Although the term *vMotion migration* may be used to describe any hot cross-host migration, this section provides details on just the traditional vMotion migration, in which shared storage is used and cross-datastore migration does not occur.

During a vMotion migration, the entire state of the virtual machine is moved to the new host. The state includes the current memory content and all the information that defines and identifies the virtual machine. The memory content includes the components of the operating system, applications, and transaction data that are in the memory. The state includes all the data that maps to the virtual machine hardware elements, such as BIOS, devices, CPU, MAC addresses for the Ethernet cards, chipset states, and registers. The associated virtual disk remains in the original location on storage that is shared between the source and destination hosts. After the virtual machine state is migrated to the destination host, the virtual machine continues execution on the destination host.

vMotion Requirements

As explained in the section "Enhanced vMotion Compatibility (EVC)" in Chapter 4, vMotion requires that the destination host's processors be compatible with the source host's processors to support live migration. Specifically, the destination processors must come from the same family and provide the same instruction set as the source processors. You can enable EVC in the cluster to broaden the vMotion compatibility.

Starting with vSphere 6.7, you can enable EVC at the virtual machine level to facilitate the migration of the virtual machine beyond the cluster and across vCenter Server systems and data centers. You can change the per-VM EVC mode only when the virtual machine is powered off. The per-VM EVC overrides but cannot exceed the cluster EVC setting.

Before using vMotion, you must address its host configuration requirements. Each host must meet the licensing, shared storage, and networking requirements for vMotion.

For standard vMotion migration, you must configure the source and destination hosts with shared storage to enable the migrated virtual machines to remain in the same datastore throughout the migration. Shared storage may be implemented with Fibre Channel, iSCSI, or NAS storage. The datastore may be VMFS or NFS. You can also leverage a vSAN datastore to meet the shared storage requirement for vMotion migrations between cluster members.

NOTE Hot migrations that are cross-host and cross-datastore migrations do not required shared storage, and they are often called vMotion migrations without shared storage.

For vMotion migration, you must configure each host with a VMkernel virtual network interface connected to a virtual switch with an uplink that uses at least one physical network interface card (NIC). VMware recommends that the network connection be made to a secured network. The vMotion network must provide at least 250 Mbps of dedicated bandwidth per concurrent vMotion session. For long-distance migrations, the maximum supported network round-trip time for vMotion migrations is 150 milliseconds. For faster vMotion migrations, consider using 10 Gbps NICs instead of 1 Gbps NICs. As of vSphere 8.0, you can notify applications running inside the guest OS whenever a vMotion event starts and finishes. This notification allows latency-sensitive applications to prepare and even delay a vSphere vMotion operation.

To improve vMotion migration times even further, consider implementing multi-NIC vMotion. With multi-NIC vMotion, multiple paths are used simultaneously to carry the vMotion workload. To configure multi-NIC vMotion, you can enable vMotion traffic for two VMkernel virtual network adapters that are configured to use separate paths. For example, you can follow these steps to enable multi-NIC vMotion, as illustrated in Figure 5-5:

Step 1. On a virtual switch, attach two uplink adapters connected to the vMotion network.

Step 2. Connect two VMkernel adapters enabled for vMotion.

Step 3. For the first VMkernel adapter, set the first uplink path to Active and the second uplink path to Standby.

Step 4. For the second VMkernel adapter, set the first uplink path to Standby and the second uplink path to Active.

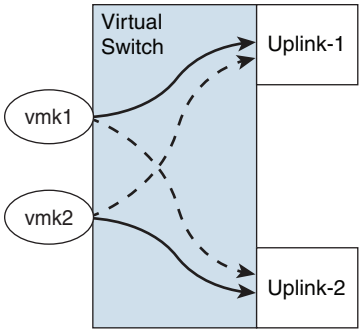

Figure 5-5 Multi-NIC vMotion

For more vMotion performance improvements, you can use Network I/O Control (NIOC) to guarantee network bandwidth to vMotion traffic. You can also use jumbo frames. To avoid network saturation, you can use traffic shaping to limit the average and peak bandwidth available to vMotion traffic.

By default, you cannot use vMotion to migrate a virtual machine that is attached to a standard switch with no physical uplinks. To change this behavior, you can set the vCenter Server advanced setting config.migrate.test.CompatibleNetworks.VMOnVirtualIntranet to False.

NOTE During a vMotion migration without shared storage, the virtual disk data is transferred over the vMotion network.

In vSphere 8.0, if you enable network offloads to a data processing unit (DPU) device, you can use vMotion when both hosts have DPU devices, but you must prepare the vCenter Server system and VMware NSX as follows:

- Enable network offload compatibility on the vSphere Distributed Switch (vDS).
- Connect hosts to the vDS according to the DPU model.
- Deploy NSX and configure an NSX transport node for the vDS.
- Enable Universal Pass Through (UPT) support on the virtual machine that is to be migrated.

vMotion Migration and Data Flow Details

During a vMotion migration, the state of the running virtual machines is copied to the destination host over the designated vMotion network, the virtual machine is

stopped on the source ESXi host, and the VM is resumed on the target ESXi host. The process involves the following phases:

- **Compatibility check**: Intended to ensure that requirements are met and that the destination host can run the virtual machine.
- **Pre-copy**: Briefly stuns the source memory and starts memory trackers. Copies memory page from source to target. Tracks which source pages are modified after the pre-copy so these pages (dirty pages) can be re-sent later.
- **Iterations of pre-copy**: If dirty pages exist, repeats the pre-copy of just the dirty pages and scans for new dirtied pages. Continues iteration until no dirty pages exist or until vMotion determines that the final page copy can be completed in less than 500 ms.
- **Switchover**: Quiesces and suspends the virtual machine execution on the source host, transfers checkpoint data, and starts the execution of the virtual machine using the checkpoint data on the target host.

The stun time (that is, the time at which the virtual machine is not running anywhere) is typically between 100 ms and 200 ms. Stun time is much higher than this when vGPUs are involved.

Encrypted vMotion

When migrating encrypted virtual machines, vSphere vMotion always uses encryption. For non-encrypted virtual machines, you can select one of the following vMotion encryption options:

- **Disabled**: Do not use encryption.
- **Opportunistic**: Use encryption if the source and destination hosts support it.
- **Required**: If the source or destination host does not support encrypted vMotion, do not allow the migration.

NOTE Only ESXi Versions 6.5 and later use encrypted vSphere vMotion. To use vMotion to migrate encrypted virtual machines across vCenter Server instances, you must use the vSphere API.

Storage vMotion Details

This section provides details on the Storage vMotion feature in vSphere.