SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY

Enterprise Standards and Best Practices for IT Infrastructure

4th Year 2nd Semester 2016

V-Motion Requirements (Lab06) Assignment

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Date of Evaluation :
Evaluators Signature :

VMware VMotion

VMware VMotion enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. It is transparent to users.

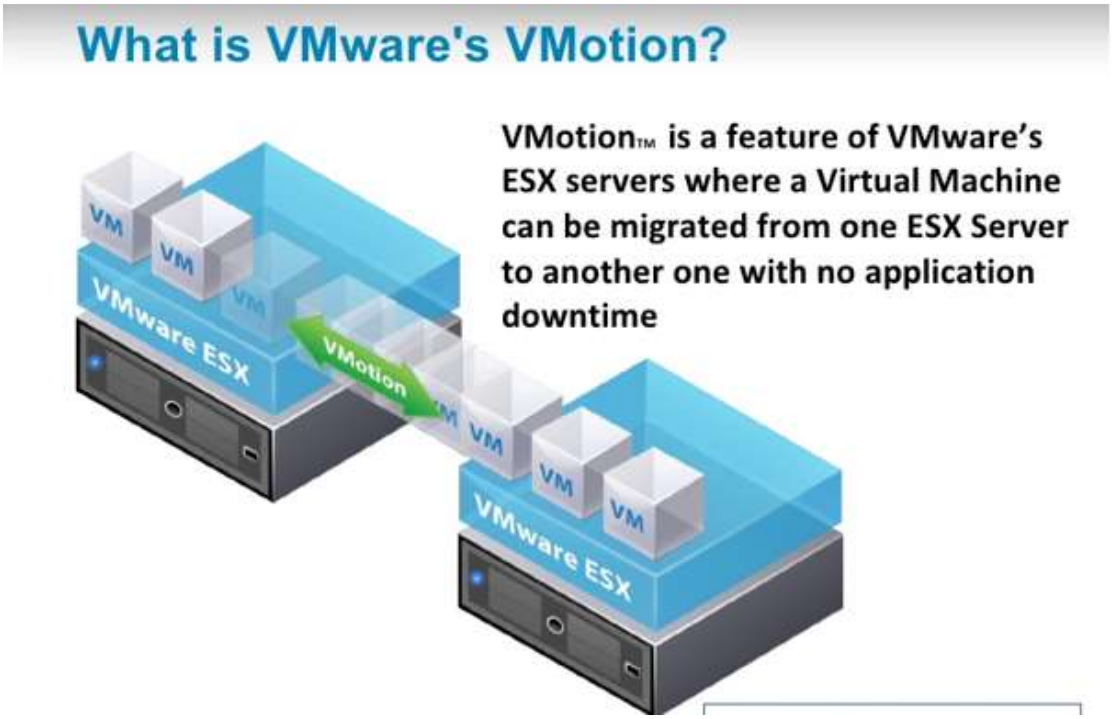


Figure 01

Why we need vMotion

1. The most incredible feature of vSphere
2. vMotion is used to move running virtual machines off of one ESXi server to another ESXi server
3. VMs disk files stay where they are (on shared storage)

Uses for vMotion

1. Balance the load on ESXi Servers(DRS)
2. Save power by shutting down ESXi using DPM
3. Perform patching and maintenance on an ESXi server
    - Update Manager
    - HW maintenance

Software and Hardware Pre Requirements for vMotion

1. vSphere Essentials Plus, Stand, Enterprise, or Enterprise Plus
2. Shared storage between ESXi servers Eg: iSCSI,FC or NFS
3. VMkernel interface on both ESXi servers with vMotion enabled
4. Works with standard switches or dvSwitches (should keep the same network name)
5. CPU compatibility, or family compatibility if using Enhanced vMotion compatibility (EVC) on your cluster

The only point which can sometimes present significant problems is CPU compatibility. In many firms the server infrastructure developed organically and not every server is built on the same hardware components. It is easy to determine if a virtual machine can be migrated between two ESX servers because in the case of an incompatibility vCenter will issue a warning before the actual migration process begins

- **CPU Compatibility**

The CPU compatibility problem is easy to explain. Imagine that a virtual machine is started on an ESX host with an AMD CPU and SSE3 functionality. Since VMware ESX is a virtualizer, the guest operating system sees all of the standard CPU functionality and can be adapted to the hardware with extra drivers to more effectively utilize multimedia functions.

If this virtual machine is simply transferred to another host with a CPU that only supports SSE2, the guest operating system will still want to use the SSE3 functionality. This can cause problems or even a system crash. While these problems can sometimes be managed by so-called “CPU masking”, very large differences between CPUs remain unresolvable. Examples of large differences include switching from an AMD to an Intel CPU, or from a 64-bit to a 32-bit CPU.

Since the ESX server cannot predict which CPU instructions the virtual machine (or rather the guest operating system) will use, the user must pay attention to either use identical CPUs or to configure a proper masking. The VMware’s CPU Identification Utility allows the user to determine which functionality the installed CPU has, including vMotion compatibility, EVC, and 64-bit support. The upgrade from VI3.x to vSphere unfortunately introduces a very serious

issue regarding CPU masking, which was often set automatically in VI3.x in the configuration of the virtual machine. After the upgrade certain virtual machines, no longer support migration via vMotion and return an error message.

This problem has not yet been reported when upgrading from vSphere 4 to vSphere 5.x. The solution is very simple: CPU masking must be set to default by choosing Reset all values to default in the CPU identification mask settings of the virtual machine. The only irritating thing is that the VM must be shut down in order for these settings to go into effect.

- **CPU Masking and EVC**

In the settings for a virtual machine the option CPU-ID -Mask can be activated to hide disabled VM CPU functionality. By hiding certain CPU features, vMotion compatibility between ESX hosts with different CPU generations can be improved.

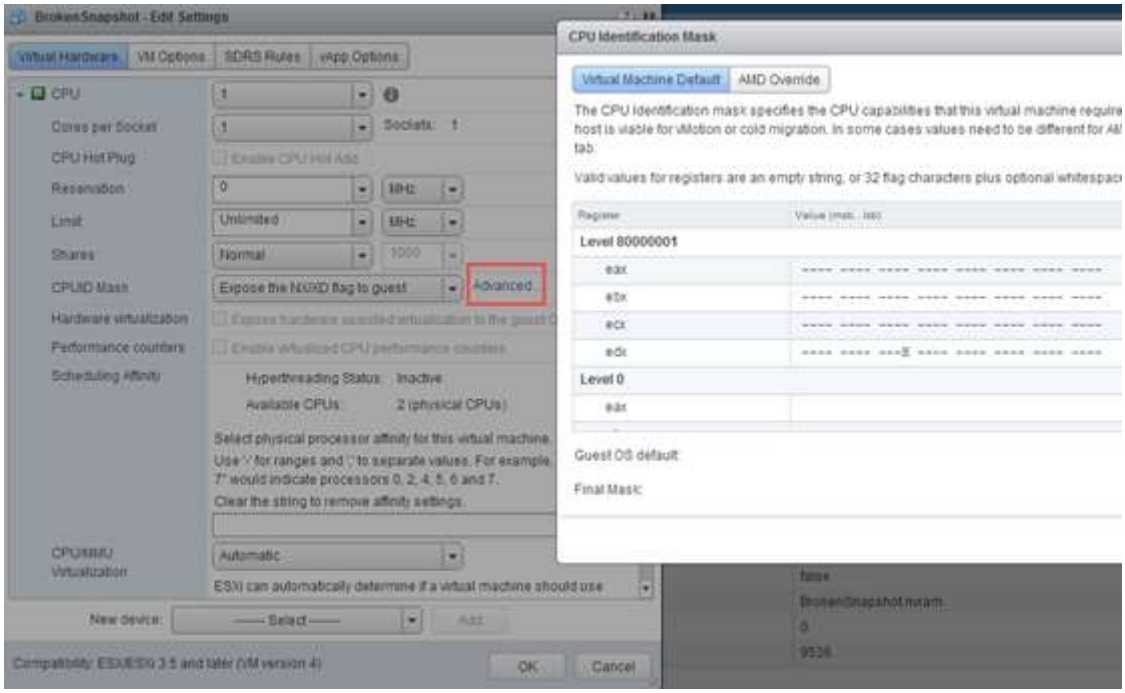


Figure 02

You can configure CPU masking in the settings of the virtual machine.

The standard option is the hiding of non-execution bits, which is only supported by newer CPUs. If this is activated a virtual machine can be migrated between ESX servers where it doesn't matter if the processors provide NX functionality or not, unless there are other CPU instructions which are different and cannot be hidden.

If you want to revert your changes to a specific entry this is done by clicking revert to default values when the row is selected. Or you can set all values to default by selecting revert all values to default values.

- **Convenience or Speed**

When regulating CPU mask settings, you should keep in mind that hiding certain functionality can slow down the guest operating system. Effectively you must decide between convenience and speed, depending on the guest operating system.

- **EVC (Enhanced vMotion Compatibility)**

For users that don't want to define the CPU masking for every virtual machine, EVC-cluster is capable of adjusting CPU functionality globally. This means that a user can define in the cluster options which CPU generations can be seen from the virtual machines within the cluster. This can be configured with the least common denominator of all host CPUs in the cluster.

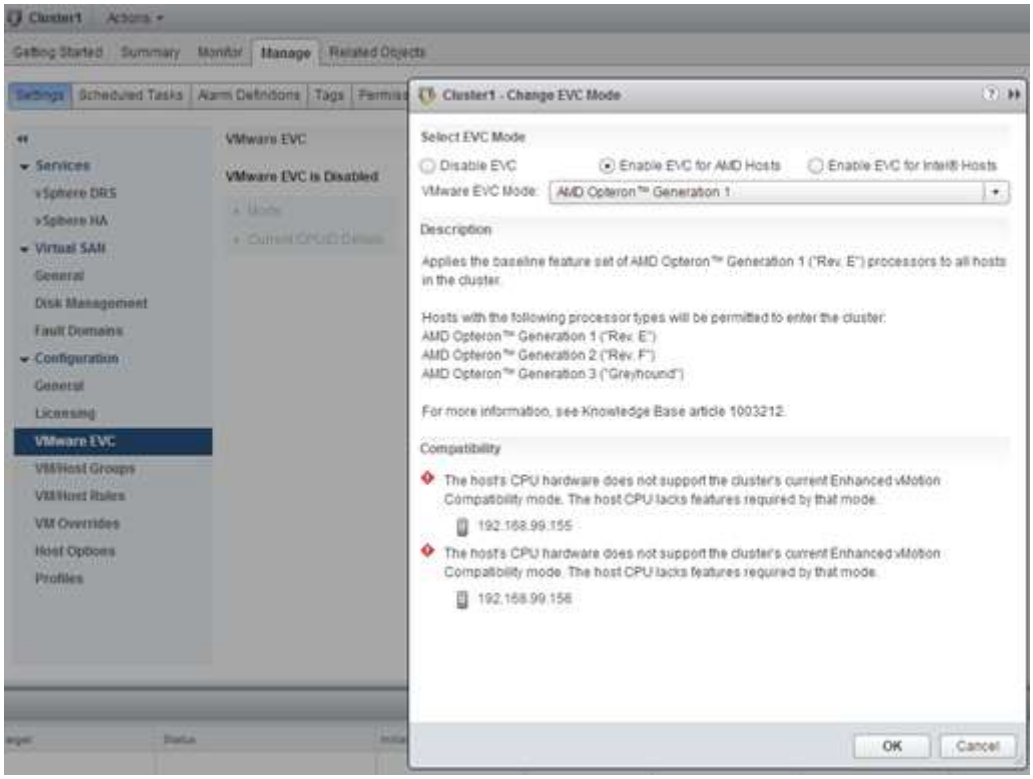


Figure 03

In the cluster settings the CPU generation can be set globally for the entire cluster.

Since vSphere, EVC has supported the incrimination of processor generation during the operation of the virtual machine, for example from CPU generation 1 to 2. However, a downgrade of CPU generation is not possible with this method. If the CPU generation is increased, active virtual machines will receive the new settings at the next power down or reset.

Within the EVC cluster, the EVC function guarantees that no CPU incompatibilities due to differing CPU generations will result from vMotion procedures. This does not suppress, however, other factors that may hinder the use of vMotion, for example the use of local hard disks.

Other Pre Requirements for vMotion

Since vMotion is intervening in an active virtual machine without that virtual machine's knowledge, certain conditions must be fulfilled so that the process can run without problems or failures:

1) VMotion interface (minimum 1 Gb adapter)
2) Shared central mass storage
3) Same naming for virtual port groups
4) Sufficient resources on the target host
5) At least one vSphere Essentials Plus license on the corresponding ESX host

How Does VMotion work?

1. First, the entire state of a virtual machine is encapsulated by a set of files stored on shared storage. VMware's clustered Virtual Machine Filesystem (VMFS) allows multiple installations of ESX Server to access the same virtual machine files concurrently.

2. Second, the active memory and precise execution state of the virtual machine is rapidly transferred over a high speed network. This allows the virtual machine to instantaneously switch from running on the source ESX Server to the destination ESX Server. VMotion keeps the transfer period imperceptible to users by keeping track of on-going memory transactions in a bitmap.

   Once the entire memory and system state has been copied over to the target ESX Server, VMotion suspends the source virtual machine, copies the bitmap to the target ESX Server, and resumes the virtual machine on the target ESX Server. This entire process takes less than two seconds on a Gigabit Ethernet network.

3. Third, the networks used by the virtual machine are also virtualized by the underlying ESX Server. This ensures that even after the migration, the virtual machine network identity and network connections are preserved. VMotion manages the virtual MAC address as part of the process. Once the destination machine is activated, VMotion pings the network router to ensure that it is aware of the new physical location of the virtual MAC address.

   Since the migration of a virtual machine with VMotion preserves the precise execution state, the network identity, and the active network connections, the result is zero downtime and no disruption to users.

Steps

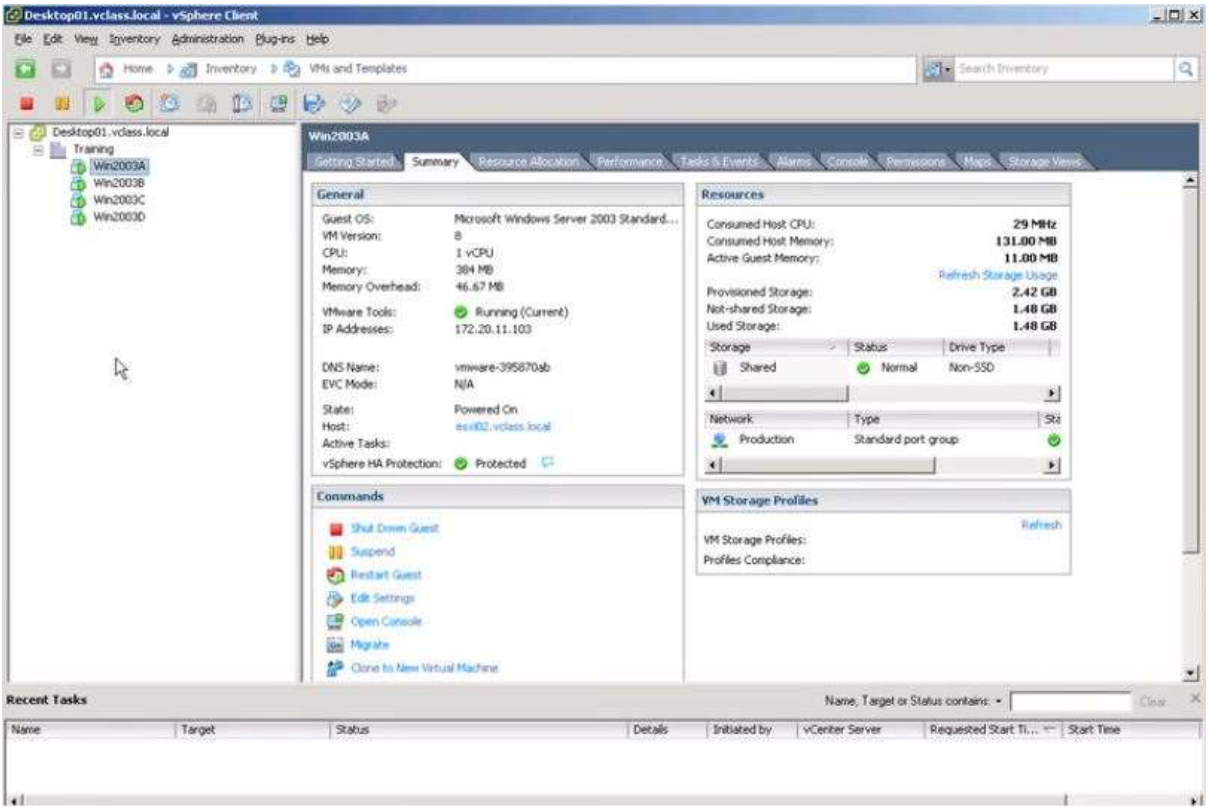


Figure 04

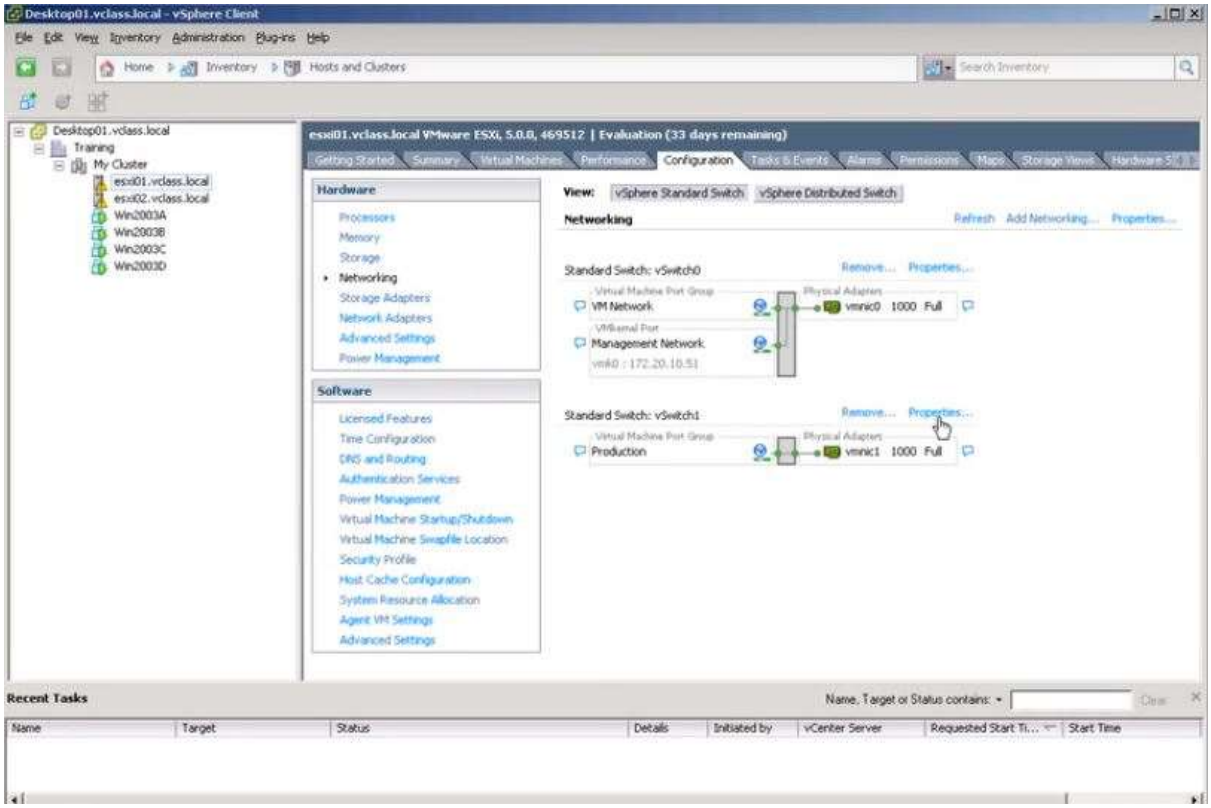


Figure 05

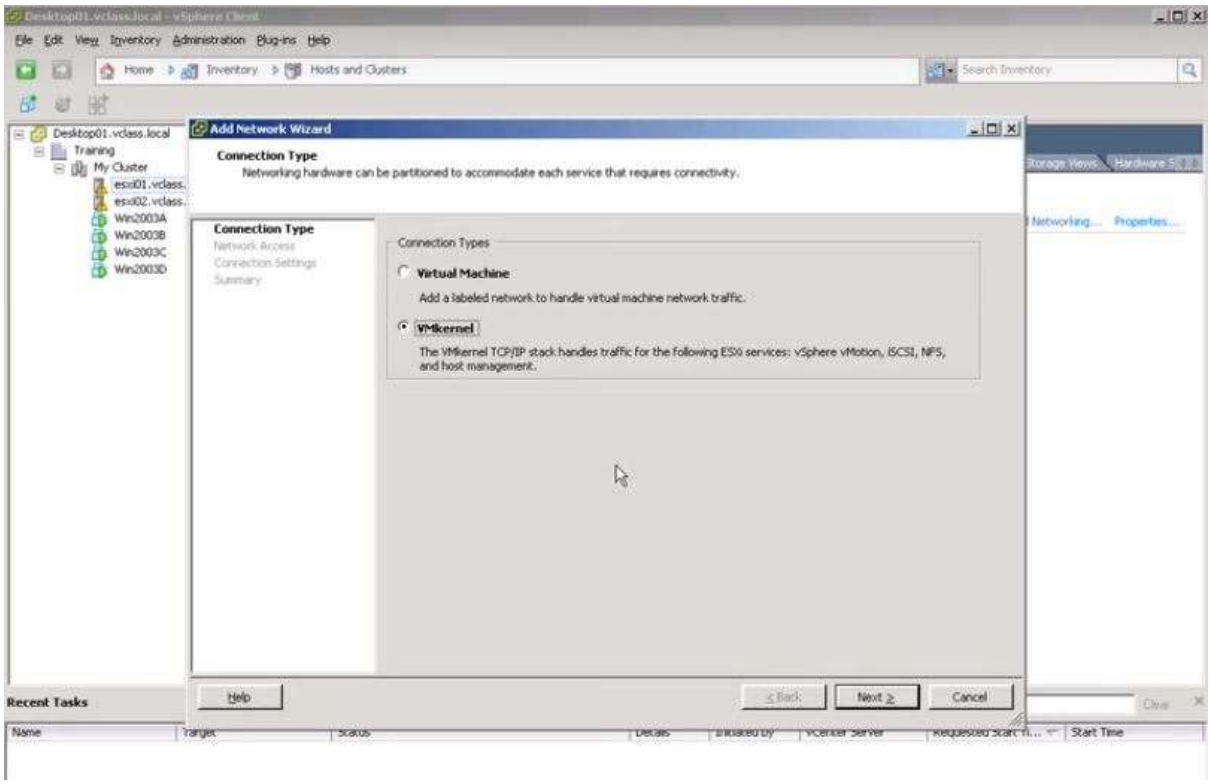
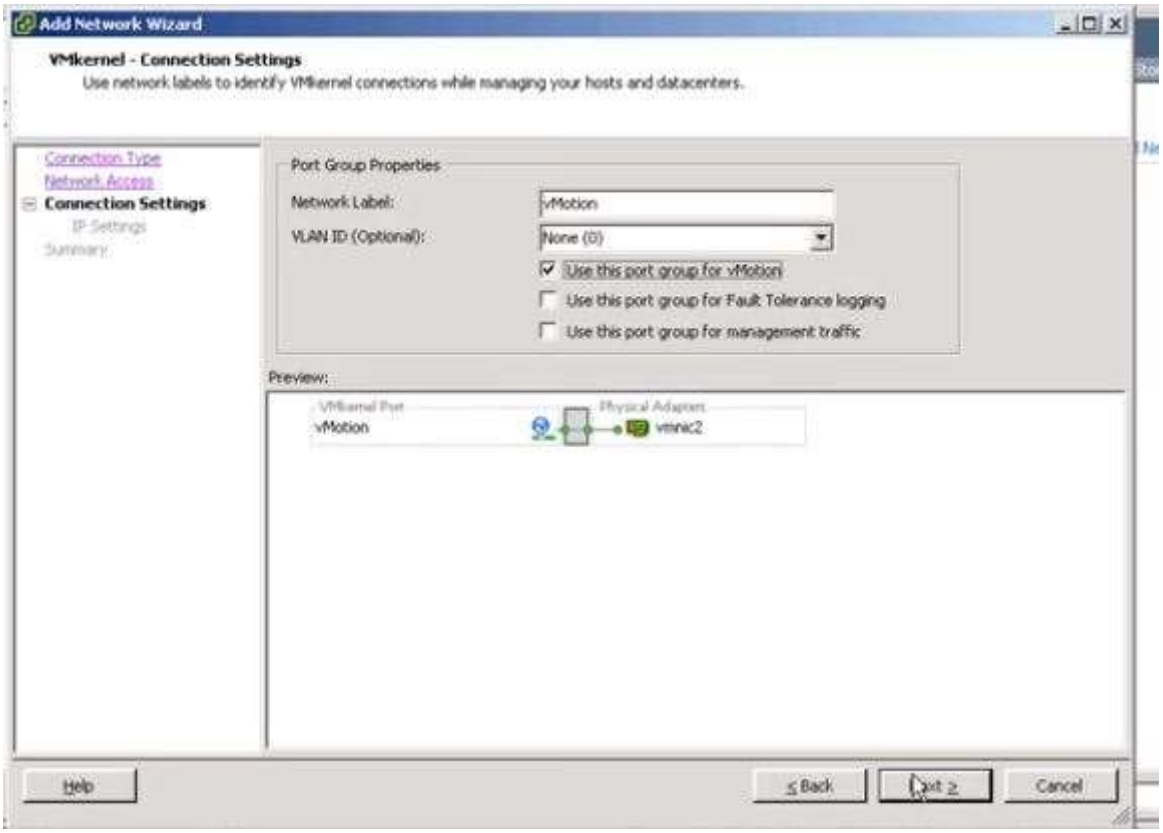


Figure 06



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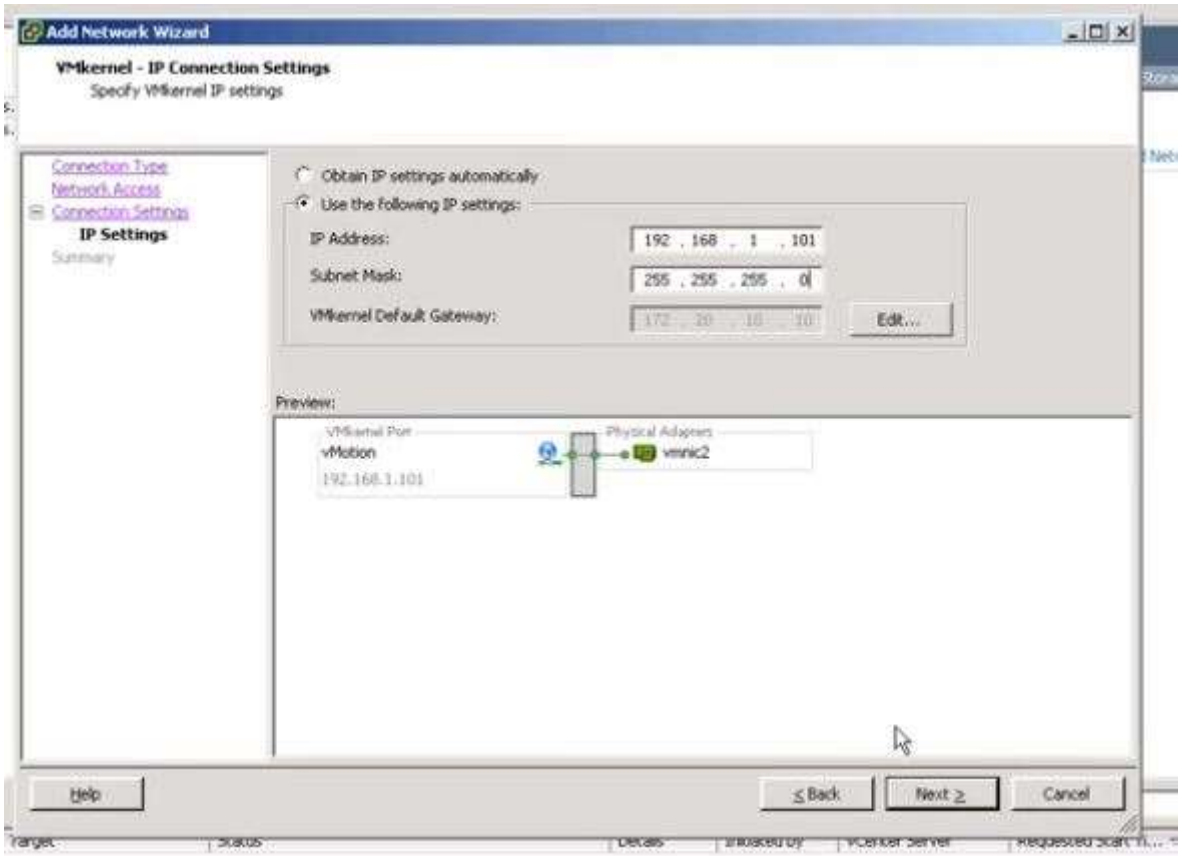

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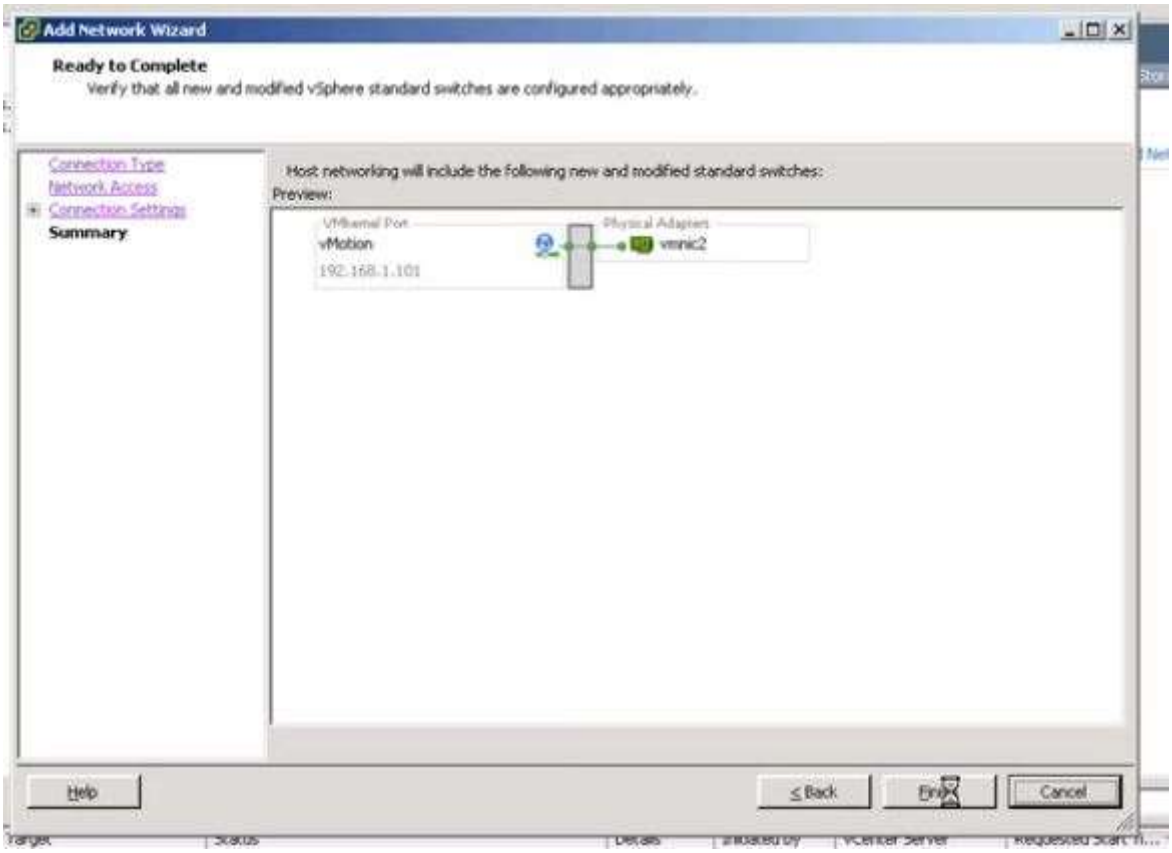


Figure 09

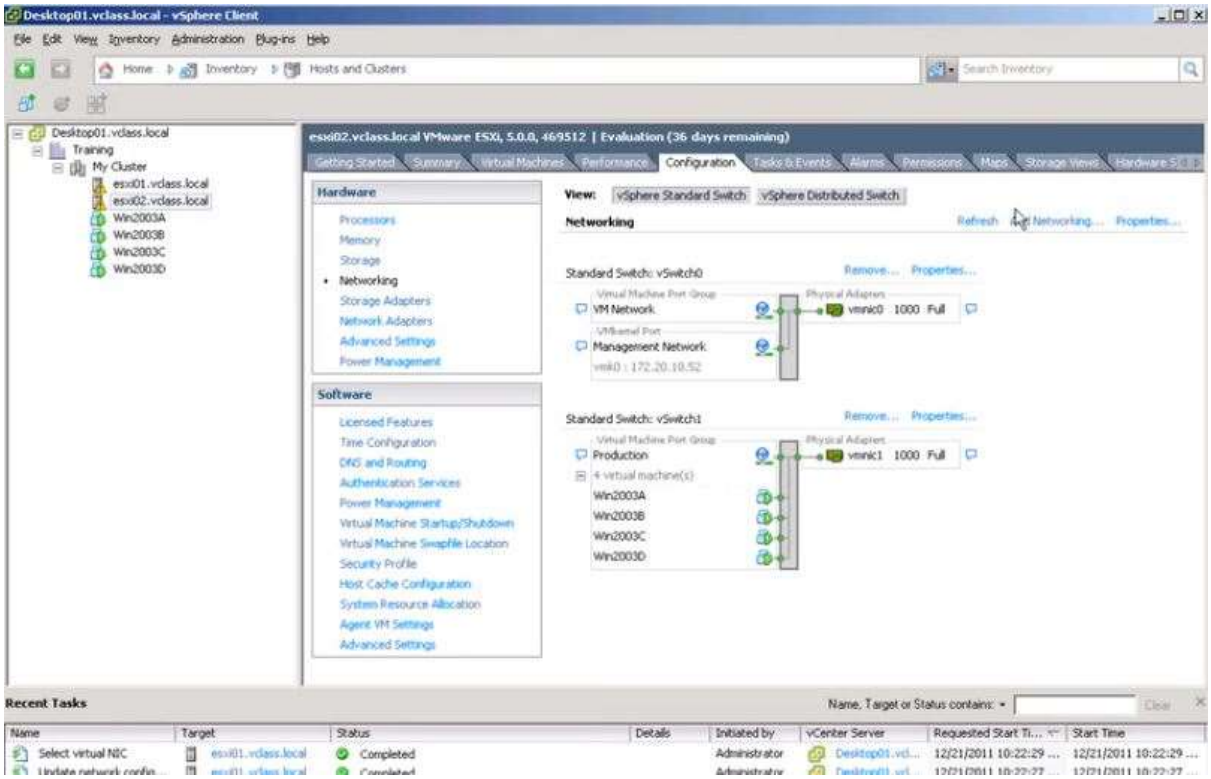
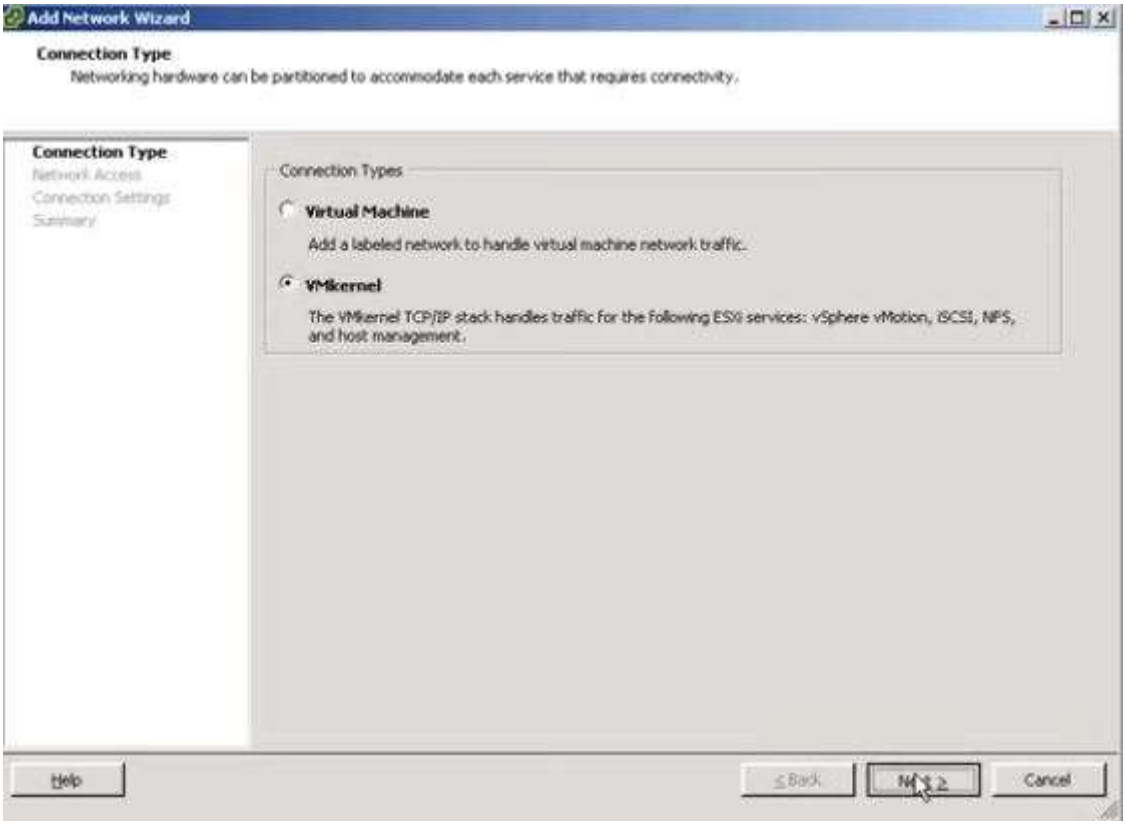


Figure 10



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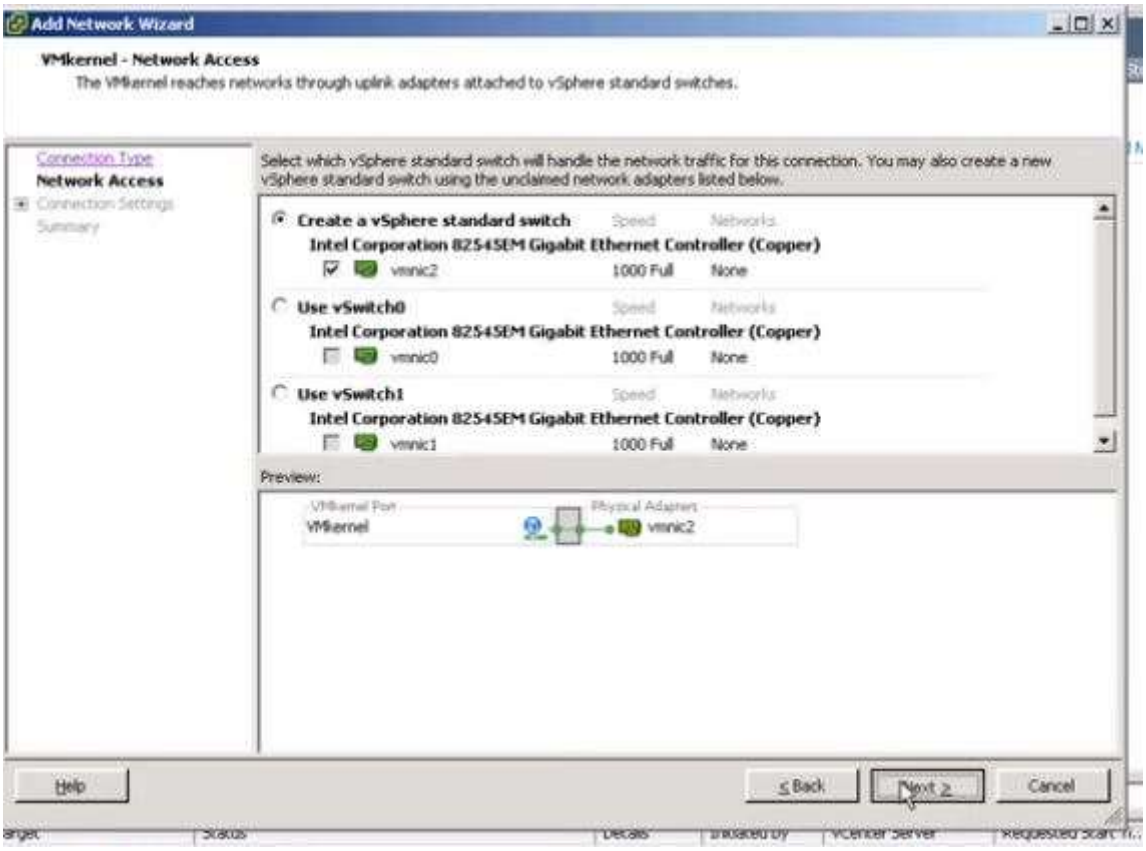

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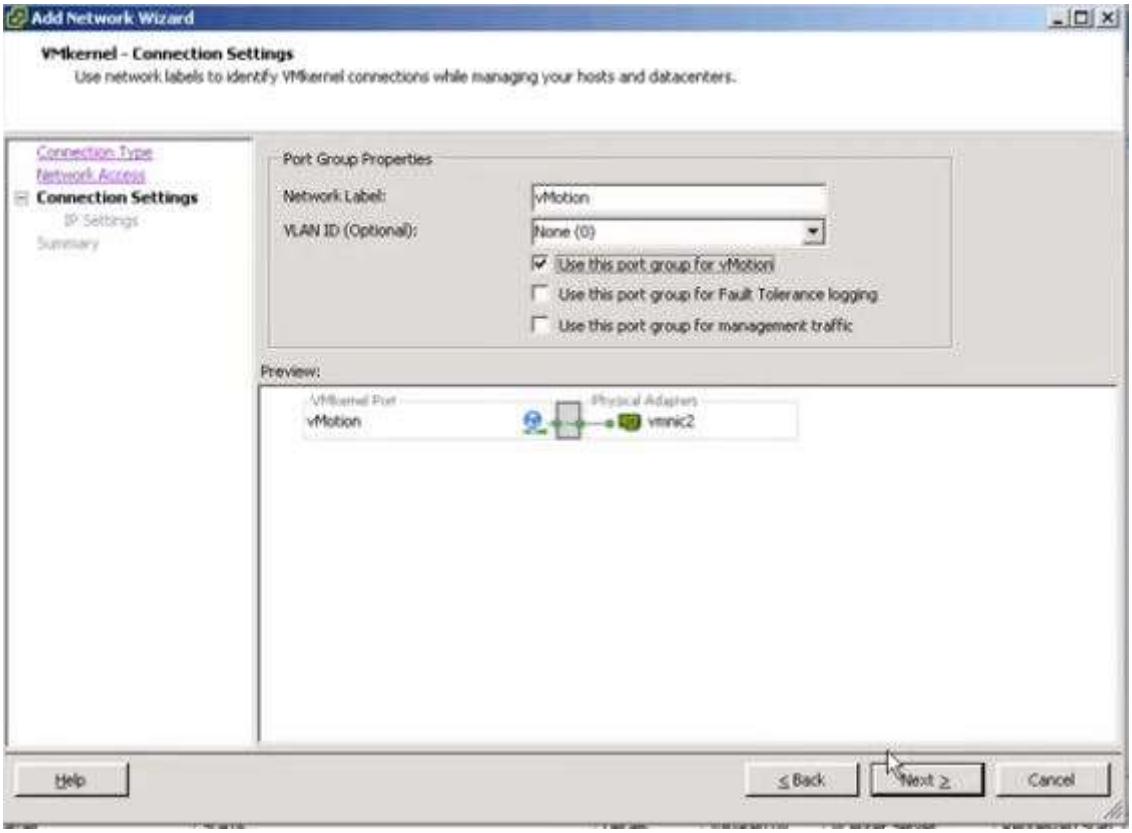
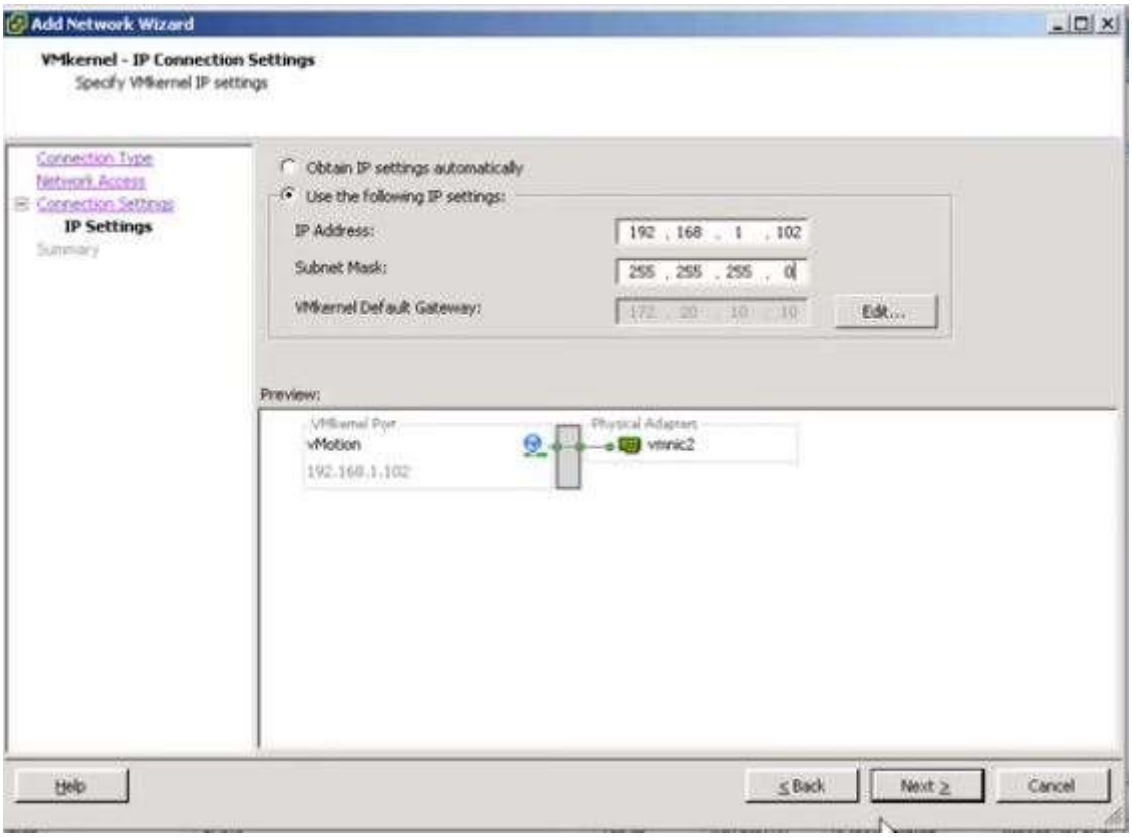


Figure 13



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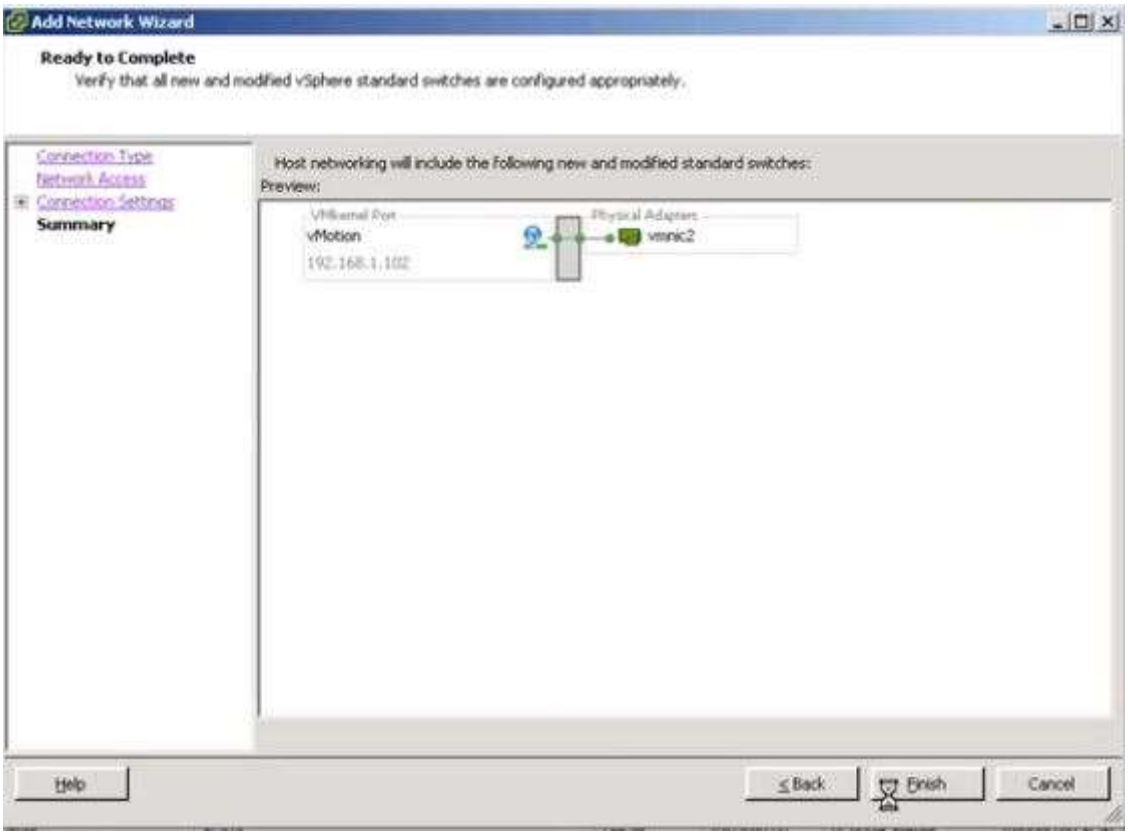

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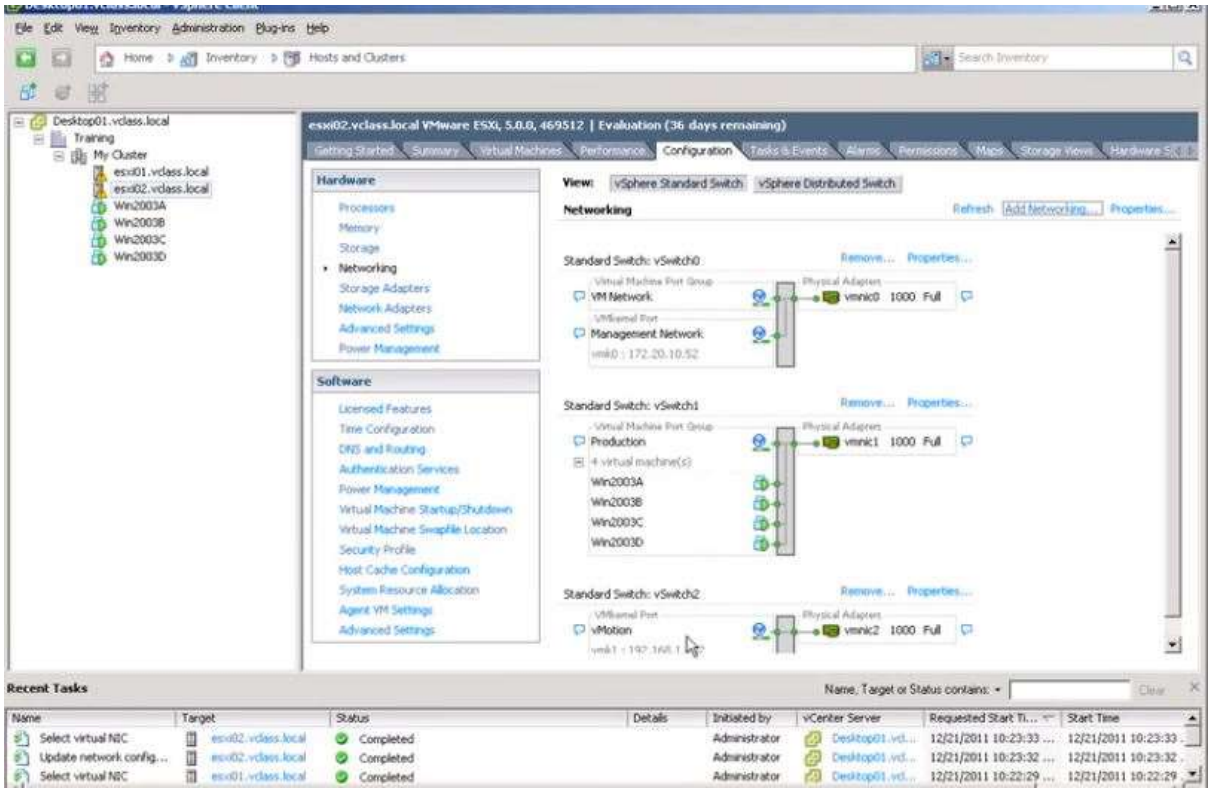

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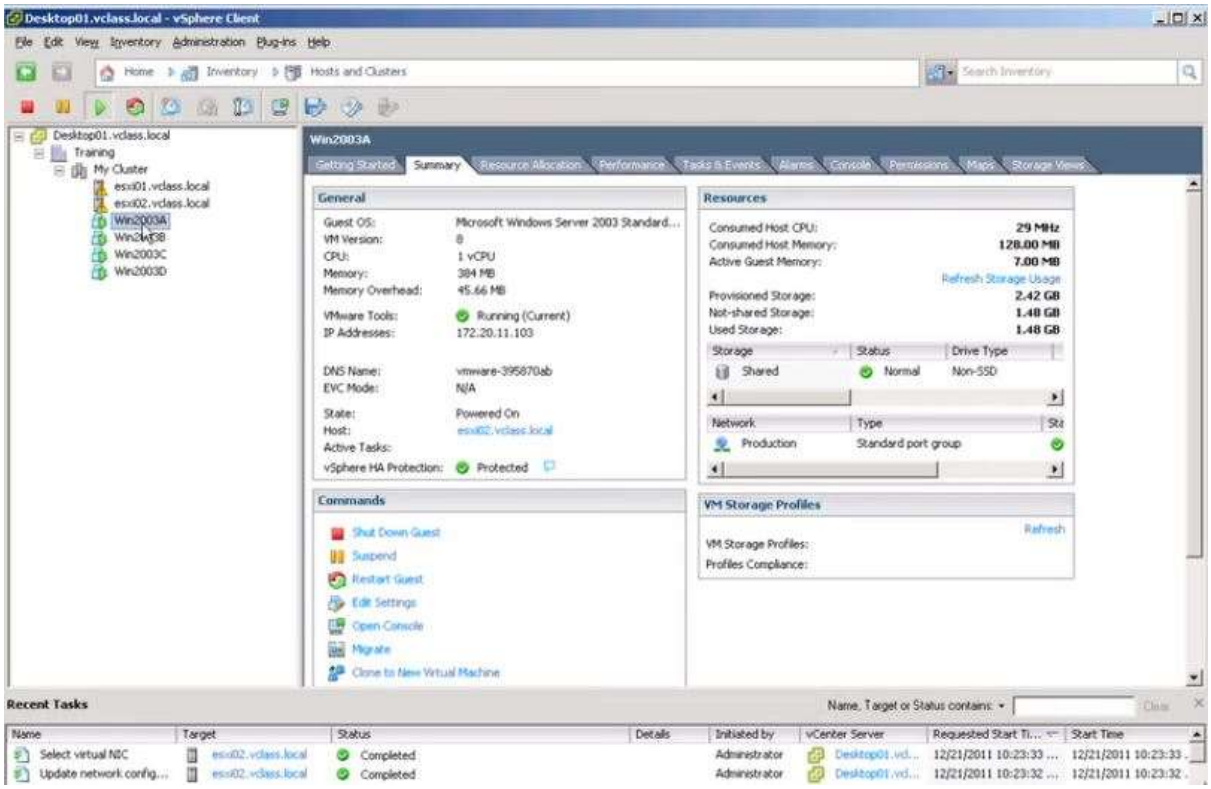

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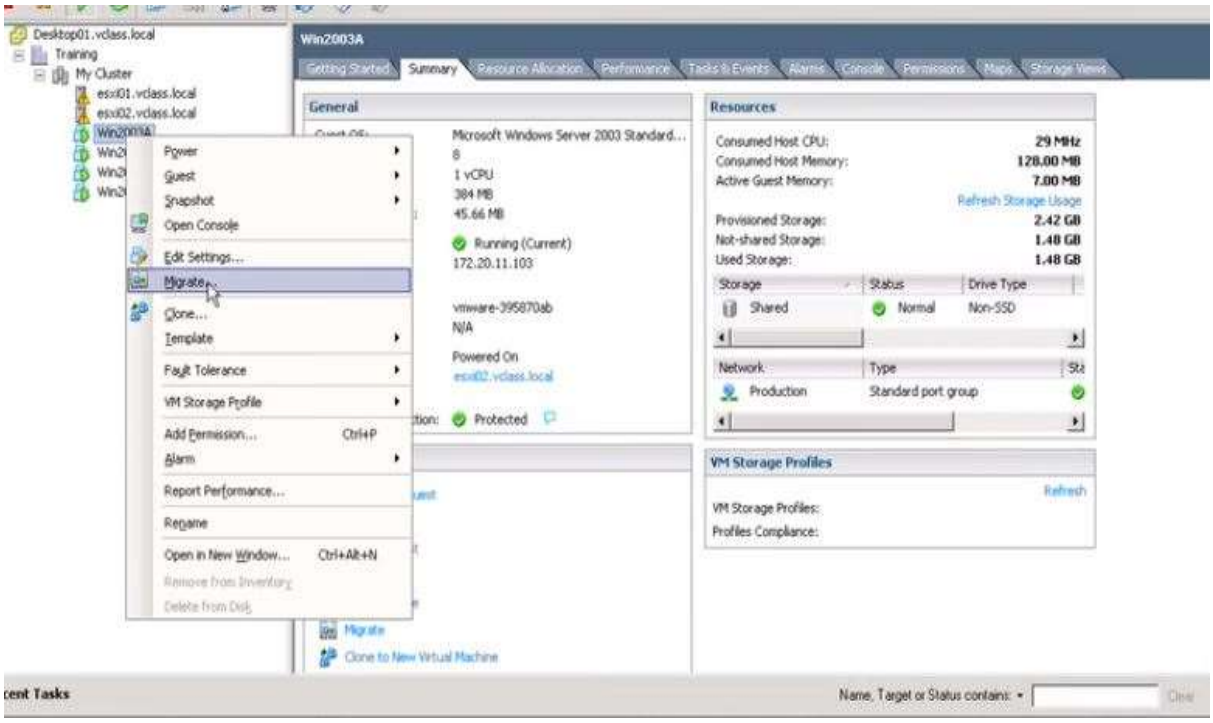


Figure 18

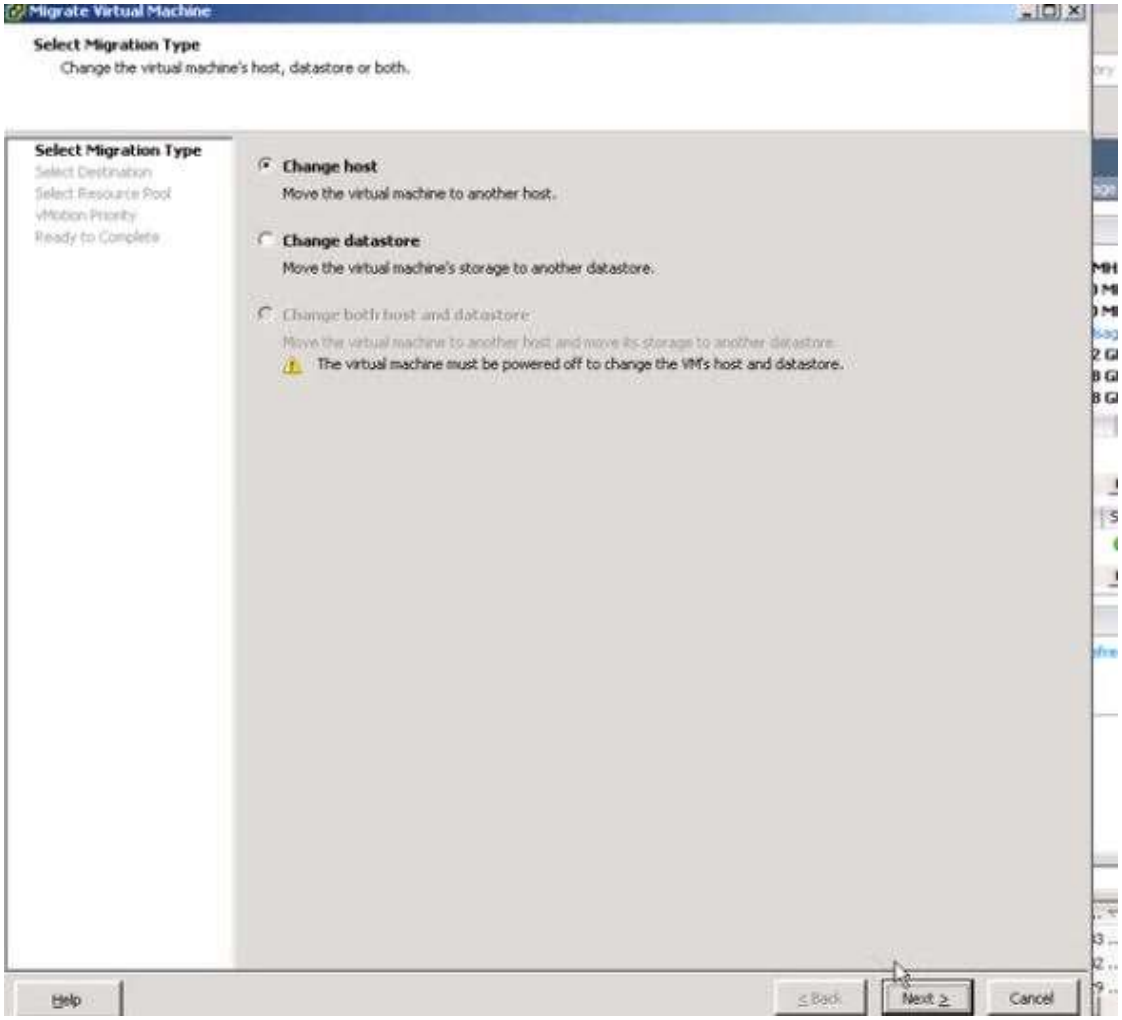

Migrate Virtual Machine
Select Migration Type
Change the virtual machine's host, datastore or both.
Select Migration Type
Select Destination
Select Resource Pool
vMotion Priority
Ready to Complete
Change host
Move the virtual machine to another host.
Change datastore
Move the virtual machine's storage to another datastore.
Change both host and datastore
Move the virtual machine to another host and move its storage to another datastore.
The virtual machine must be powered off to change the VM's host and datastore.
Help
< Back
Next >
Cancel

Figure 19

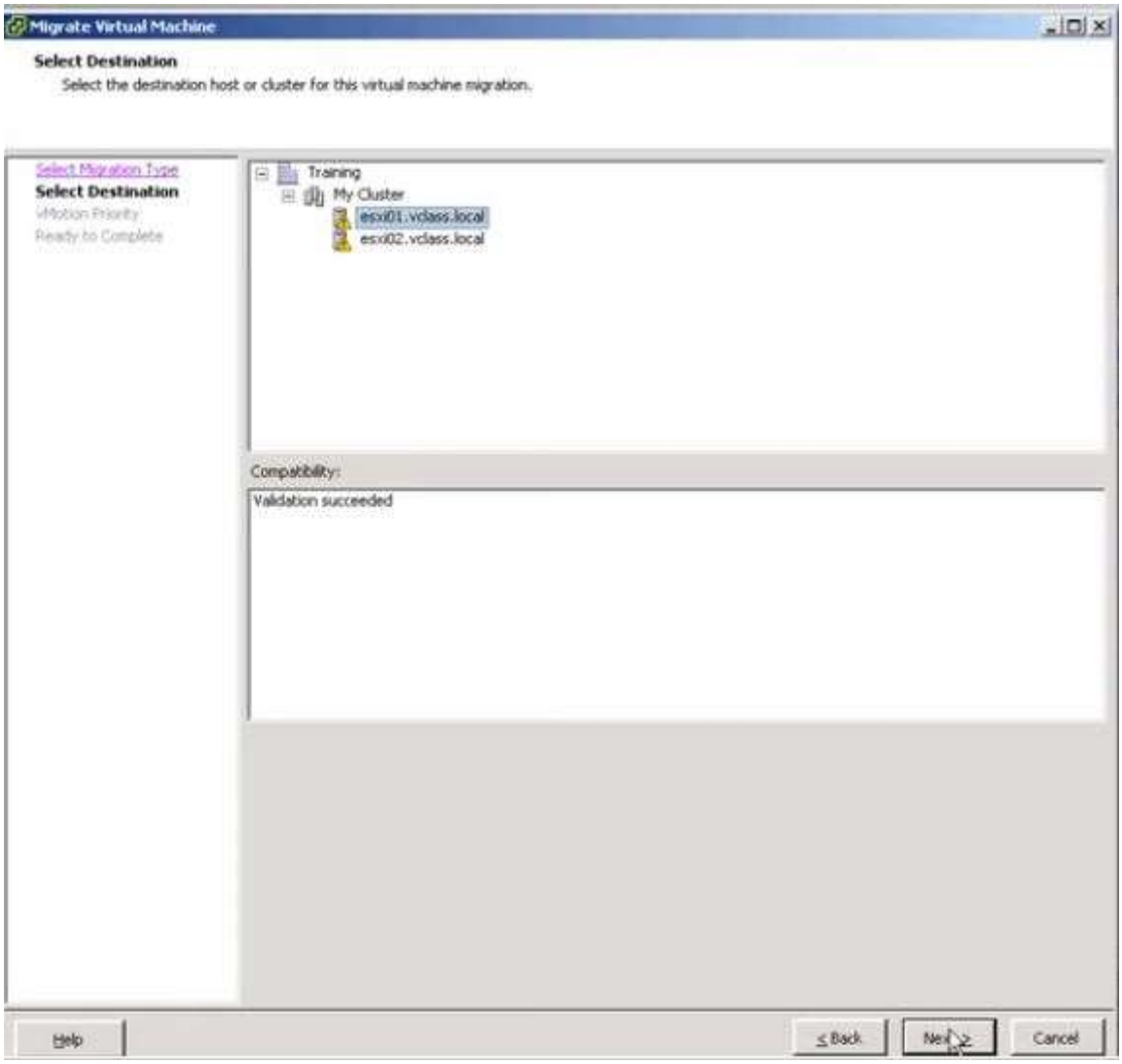

Migrate Virtual Machine
Select Destination
Select the destination host or cluster for this virtual machine migration.
Select Migration Type
Select Destination
vMotion Priority
Ready to Complete
Training
My Cluster
esxi01.vclass.local
esxi02.vclass.local
Compatibility:
Validation succeeded
Help
< Back
Next >
Cancel

Figure 20

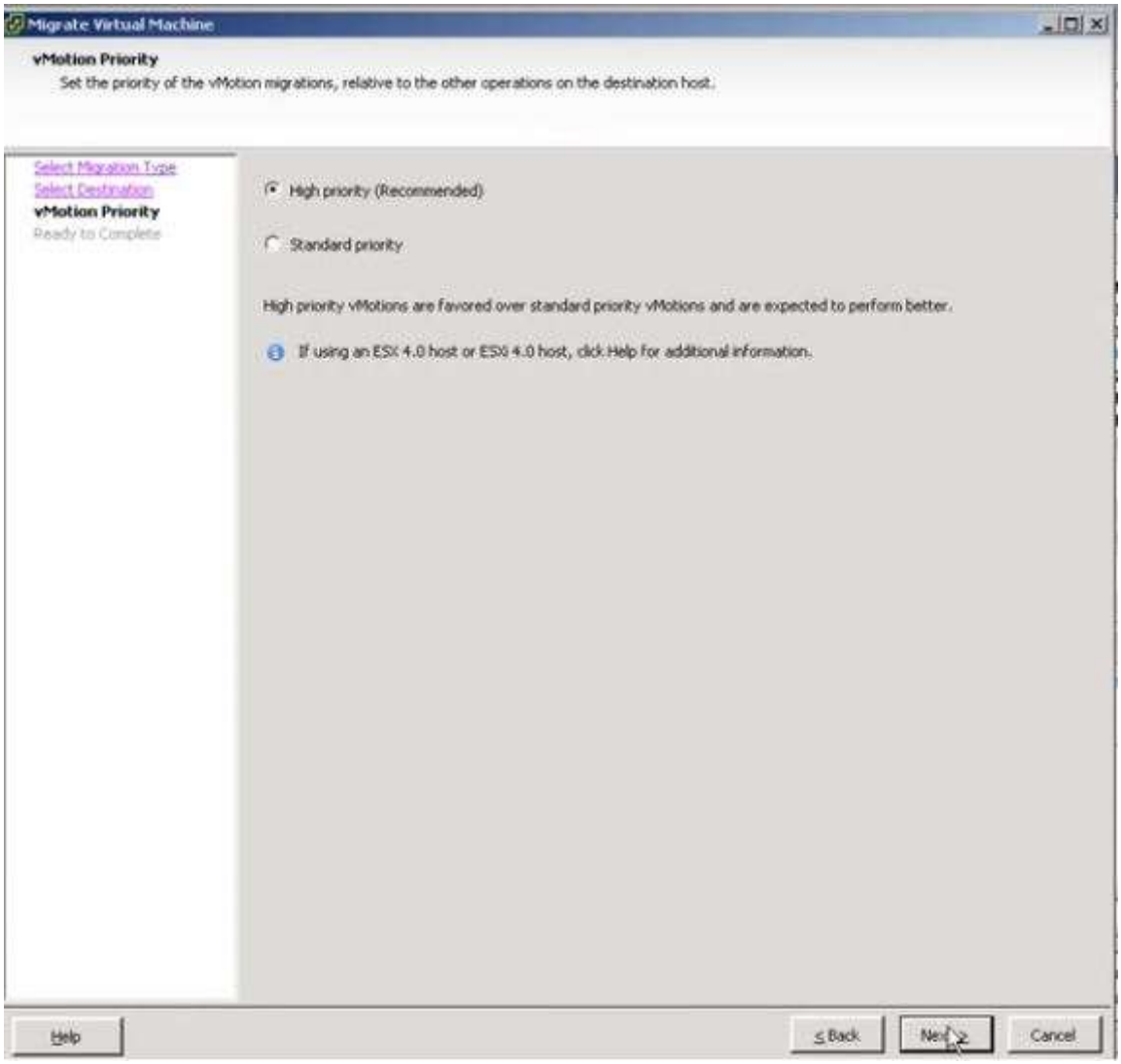

Migrate Virtual Machine
vMotion Priority
Set the priority of the vMotion migrations, relative to the other operations on the destination host.
Select Migration Type
Select Destination
vMotion Priority
Ready to Complete
High priority (Recommended)
Standard priority
High priority vMotions are favored over standard priority vMotions and are expected to perform better.
If using an ESX 4.0 host or ESXi 4.0 host, click Help for additional information.
Help
< Back
Next >
Cancel

Figure 21

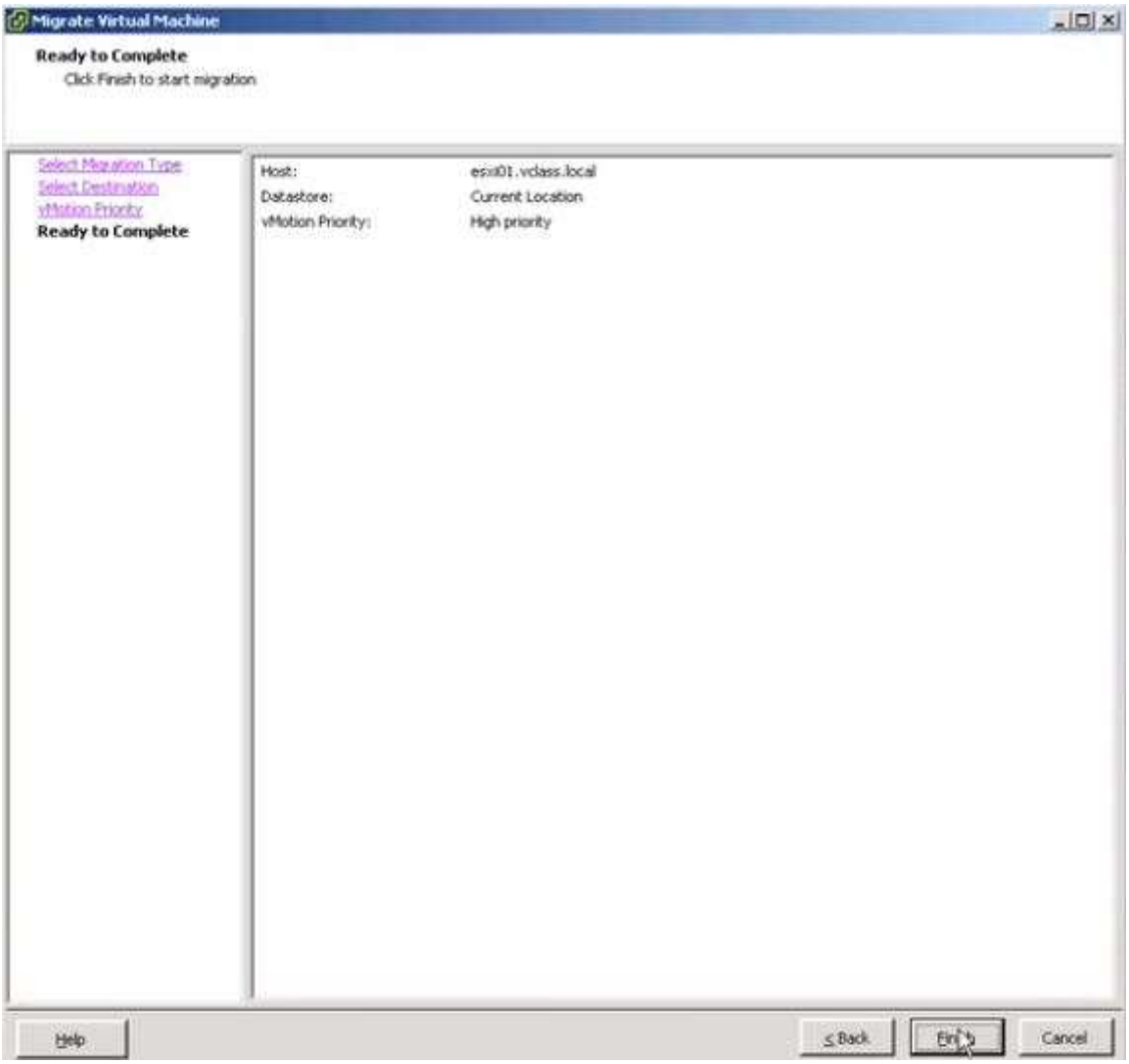
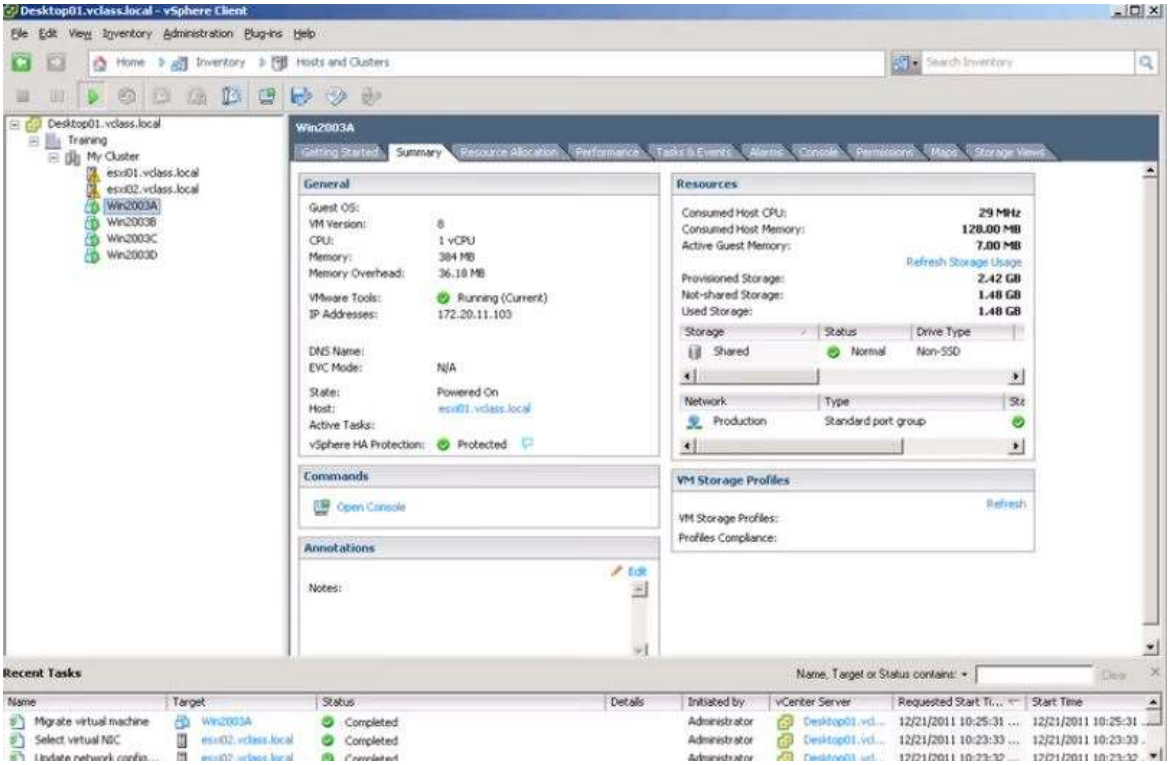

Migrate Virtual Machine
Ready to Complete
Click Finish to start migration
Select Migration Type
Select Destination
vMotion Priority
Ready to Complete
Host:
esxi01.vclass.local
Datastore:
Current Location
vMotion Priority:
High priority
Help
< Back
Finish
Cancel

Figure 22



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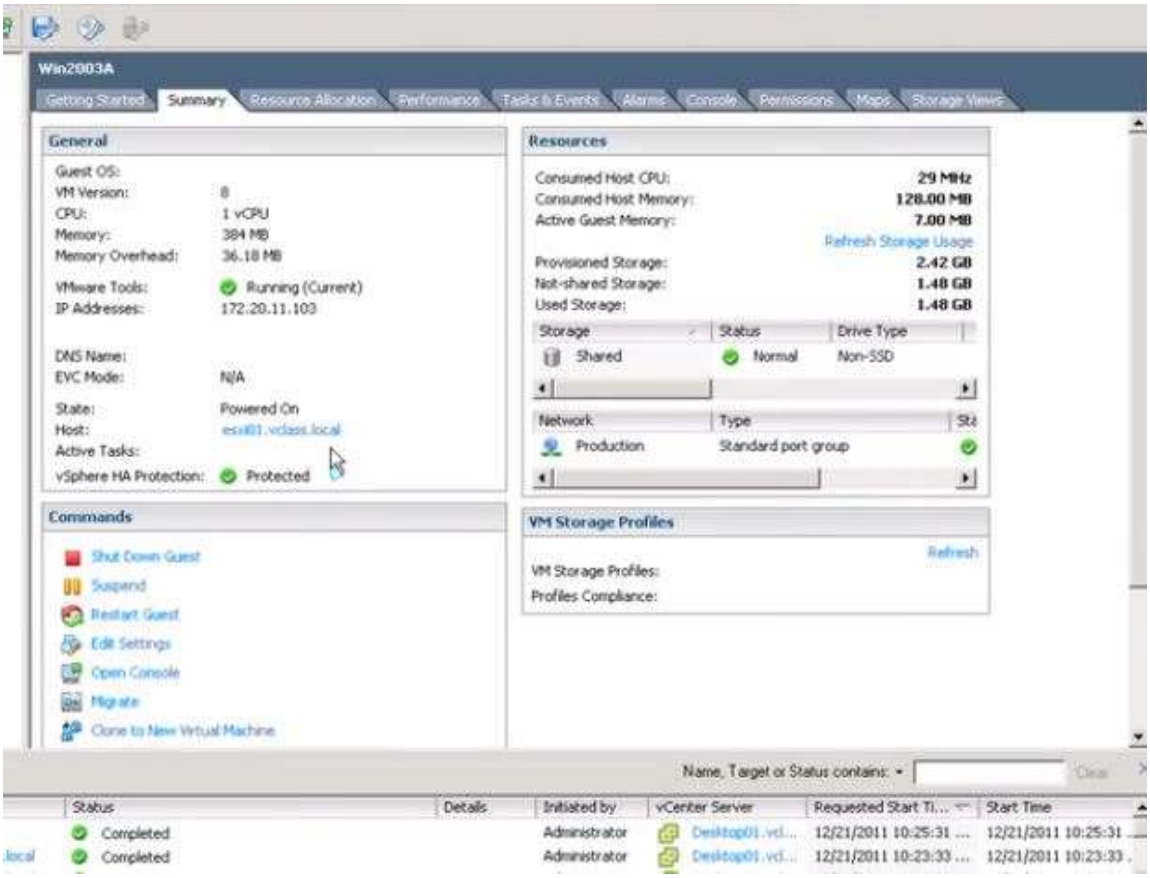

Figure 24