SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY

Enterprise Standards and Best Practices for IT Infrastructure

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vMotion Requirements

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Weekday – IT

What is 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. And also vMotion can be divided in to two main categories which are hot migration and cold migration.
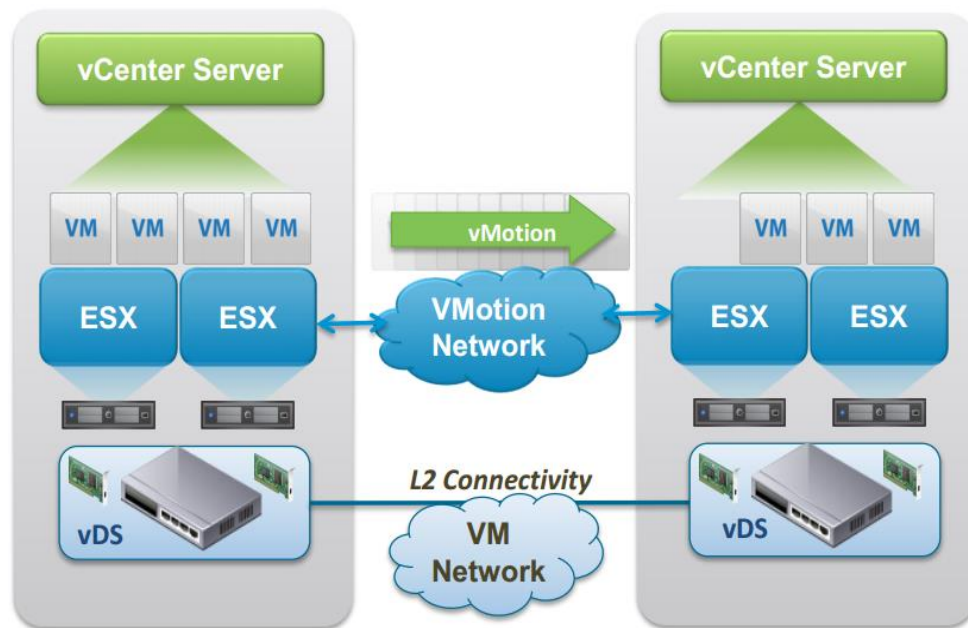

vMotion can be used to:

- Improve overall hardware utilization
- Allow continued virtual machine operation while accommodating scheduled hardware downtime
- Allow VSphere distributed resource scheduler(DRS) to balance virtual machines across hosts

So how does vMotion work?

➢ First, the entire state of a virtual machine is encapsulated by a set of files stored on shared storage. VMware's clustered Virtual Machine File System (VMFS) allows multiple installations of ESX Server to access the same virtual machine files concurrently.
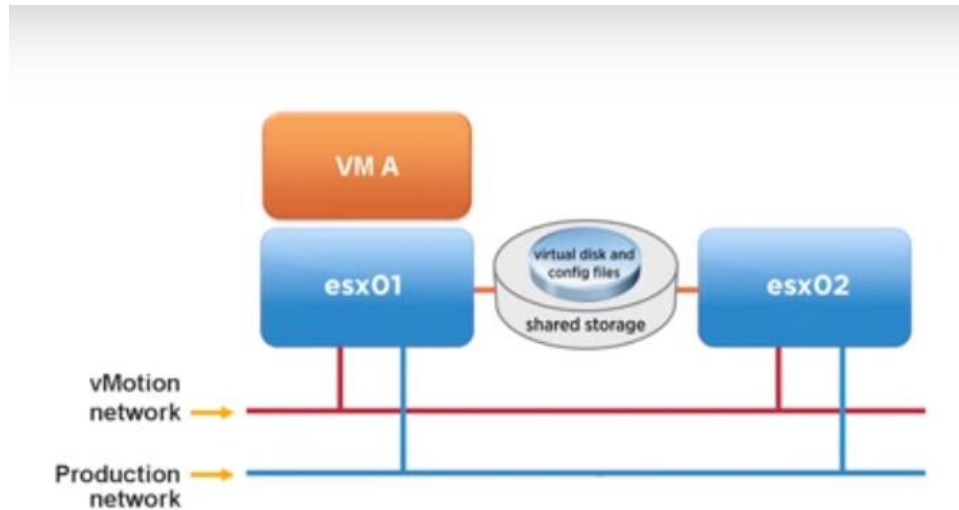
➢ Second, the active memory and precise execution state of the virtual machine is rapidly transferred over a high speed network. This allows the virtual machine to instantaneously switch from running on the source ESX Server to the destination ESX Server. VMotion keeps the transfer period imperceptible 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**.

➢ 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.

Virtual Machine Requirements for vMotion Migration

A virtual machine must meet the following requirements:

- A virtual machine must not have a connection to a virtual device (such as a CD-ROM or floppy drive) with a local image mounted
- A virtual machine must not have a connection to an internal vSwitch (vSwitch with zero uplink adapters)
- A virtual machine must not have CPU affinity (Processor affinity, or CPU pinning enables the binding and unbinding of a process or a thread to a central processing unit (CPU) or a range of CPUs, so that the process or thread will execute only on the designated CPU or CPUs rather than any CPU) configured.

Host Requirements for vMotion Migration

Source and destination hosts must have:

- Visibility to all storage (Fibre channel, iSCSI, or NAS) used by the virtual machine
- Each host must meet shared storage requirements for VMotion
- At least a Gigabit Ethernet network:
  - Four concurrent vMotion migrations on a 1Gbps network
  - Eight concurrent vMotion migrations on a 10Gbps network
- Access to the same physical networks
- Compatible CPUs
- Each host must be correctly licensed for vMotion

vMotion Networking Requirements

Configure the virtual networks on vMotion enabled hosts as follows:

- On each host, configure a VMkernel port group for VMotion
- Ensure that virtual machines have access to the same subnets on source and destination hosts
- If you are using standard switches for networking, ensure that the network labels used for virtual machine port groups are consistent across hosts. During a migration with vMotion, vCenter Server assigns virtual machines to port groups based on matching network labels
- If you are using vSphere Distributed Switches for networking, ensure that source and destination hosts are members of all
- VSphere Distributed Switches that virtual machines use for networking

Storage vMotion Requirements and Limitations

A virtual machine and its host must meet resource and configuration requirements for the virtual machine disks to be migrated with Storage vMotion.

Storage vMotion is subject to the following requirements and limitations:

- Virtual machine disks must be in persistent mode or be raw device mappings (RDMs). For virtual compatibility mode RDMs, you can migrate the mapping file or convert to thick-provisioned or thin-provisioned disks during migration as long as the destination is not an NFS datastore. If you convert the mapping file, a new virtual disk is created and the contents of the mapped LUN are copied to this disk. For physical compatibility mode RDMs, you can migrate the mapping file only
- Migration of virtual machines during VMware Tools installation is not supported
- The host on which the virtual machine is running must have a license that includes Storage vMotion
- ESX/ESXi 3.5 hosts must be licensed and configured for vMotion. ESX/ESXi 4.0 and later hosts do not require vMotion configuration in order to perform migration with Storage vMotion
- The host on which the virtual machine is running must have access to both the source and target data stores

Methods for addressing CPU Compatibility Requirements

There are several methods which can be used to address vMotion CPU compatibility requirements:

- Procure servers with identical CPUs
- Compatibility masking in the VSphere client
- Enhanced vMotion compatibility (EVC)
  - Automatically masks off CPU incompatibility
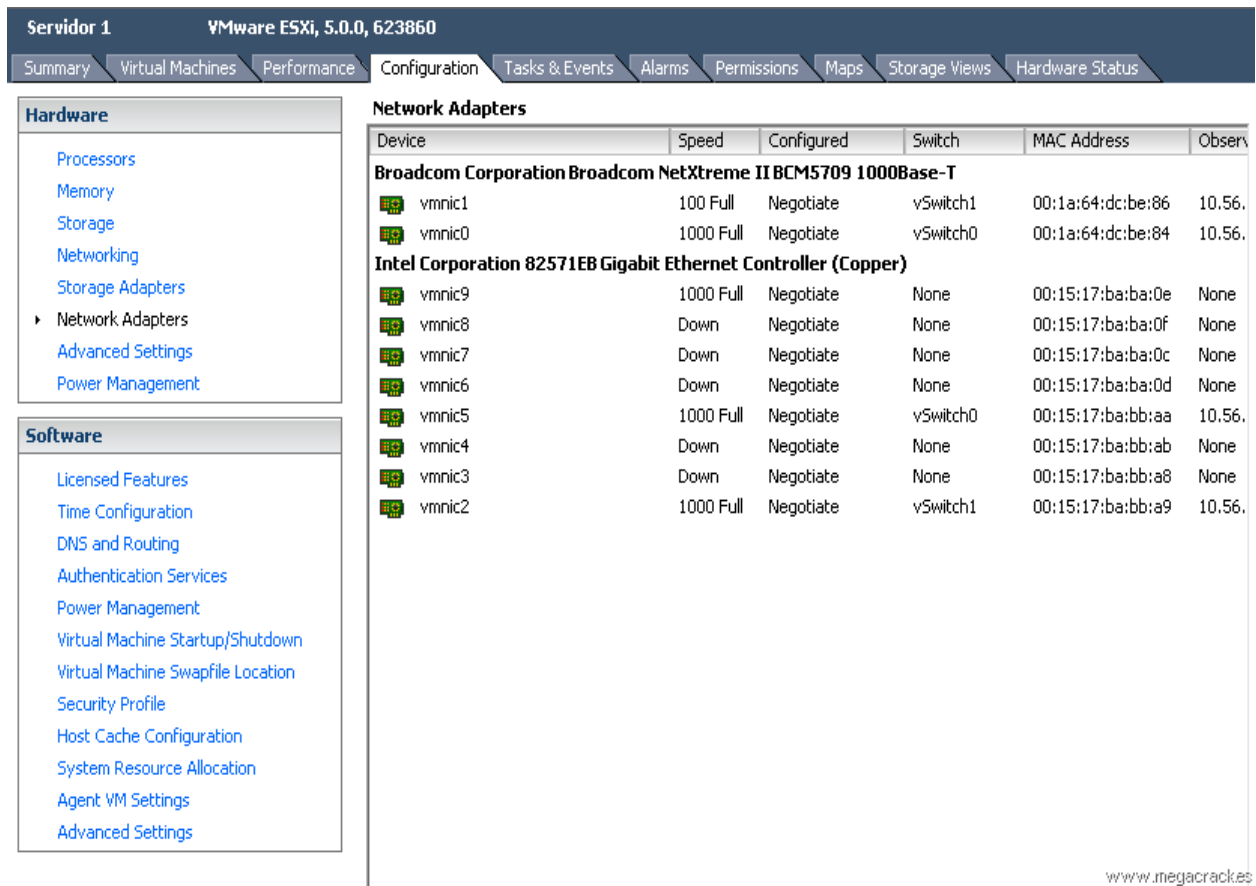 - A feature of DRS clusters

Other requirements & Limitations;

- The hosts must be licensed for vMotion.
- The hosts must be running ESXi 5.1 or later.
- The hosts must meet the networking requirement for vMotion.
- The VMs must be configured properly for vMotion.
- VM disks must be in persistent mode or be raw device mappings (RDMs).
- The destination host must have access to the destination storage.

vMotion in a practical scenario

This shows how to configure vMotion 2 ESXi hosts connected together by a dedicated network cable.

1. Connect to Virtual Center and gain access to one of the servers 2.
2. select the tab **Configuration**-> **Network Adapters** and we see that we have visibility of the new connections. (We, for example to make the article we have connected a single network card as you can see **vmnic9** that has no assigned Virtual Switch (yet).

Servidor 1	VMware ESXi, 5.0.0, 623860

Summary | Virtual Machines | Performance | Configuration | Tasks & Events | Alarms | Permissions | Maps | Storage Views | Hardware Status

Hardware

- Processors
- Memory
- Storage
- Networking
- Storage Adapters
- ▸ Network Adapters
- Advanced Settings
- Power Management

Software

- Licensed Features
- Time Configuration
- DNS and Routing
- Authentication Services
- Power Management
- Virtual Machine Startup/Shutdown
- Virtual Machine Swapfile Location
- Security Profile
- Host Cache Configuration
- System Resource Allocation
- Agent VM Settings
- Advanced Settings

Network Adapters

Device	Speed	Configured	Switch	MAC Address	Observ
Broadcom Corporation Broadcom NetXtreme II BCM5709 1000Base-T					
vmnic1	100 Full	Negotiate	vSwitch1	00:1a:64:dc:be:86	10.56.
vmnic0	1000 Full	Negotiate	vSwitch0	00:1a:64:dc:be:84	10.56.
Intel Corporation 82571EB Gigabit Ethernet Controller (Copper)					
vmnic9	1000 Full	Negotiate	None	00:15:17:ba:ba:0e	None
vmnic8	Down	Negotiate	None	00:15:17:ba:ba:0f	None
vmnic7	Down	Negotiate	None	00:15:17:ba:ba:0c	None
vmnic6	Down	Negotiate	None	00:15:17:ba:ba:0d	None
vmnic5	1000 Full	Negotiate	vSwitch0	00:15:17:ba:bb:aa	10.56.
vmnic4	Down	Negotiate	None	00:15:17:ba:bb:ab	None
vmnic3	Down	Negotiate	None	00:15:17:ba:bb:a8	None
vmnic2	1000 Full	Negotiate	vSwitch1	00:15:17:ba:bb:a9	10.56.

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3. Now look at the tab **Configuration**-> **Networking**
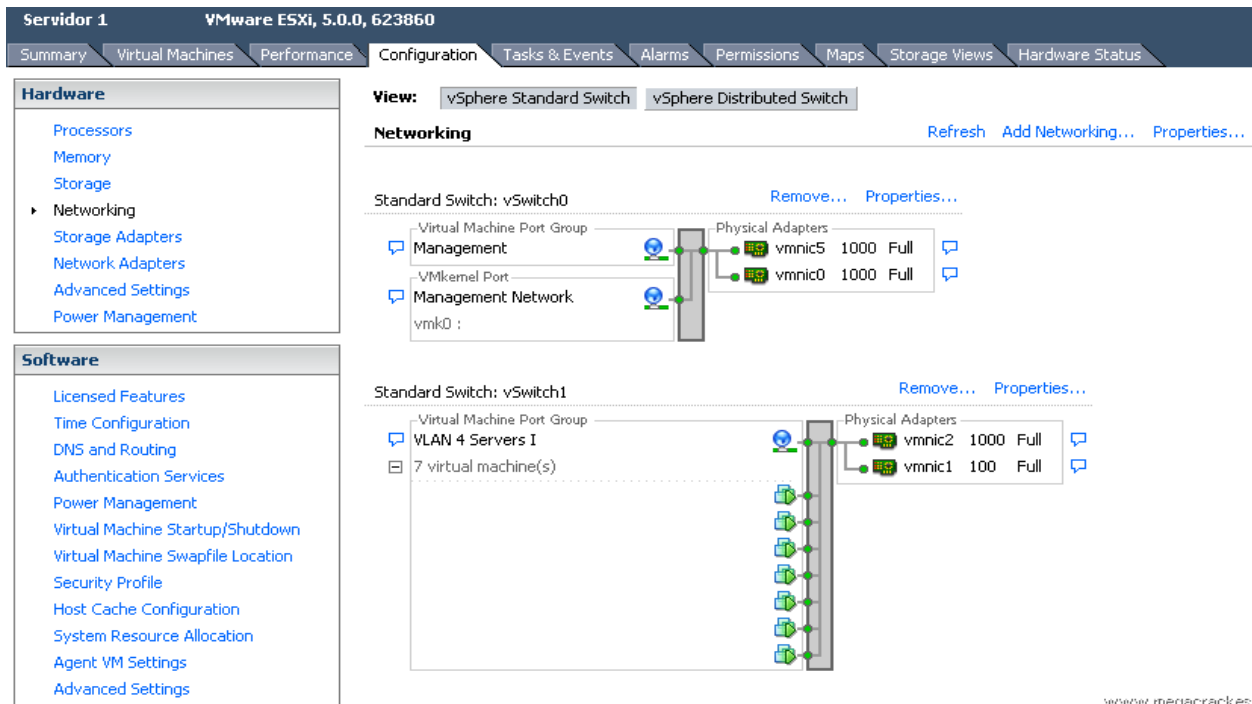
4. Click on Add Networking to create the vSwitch.
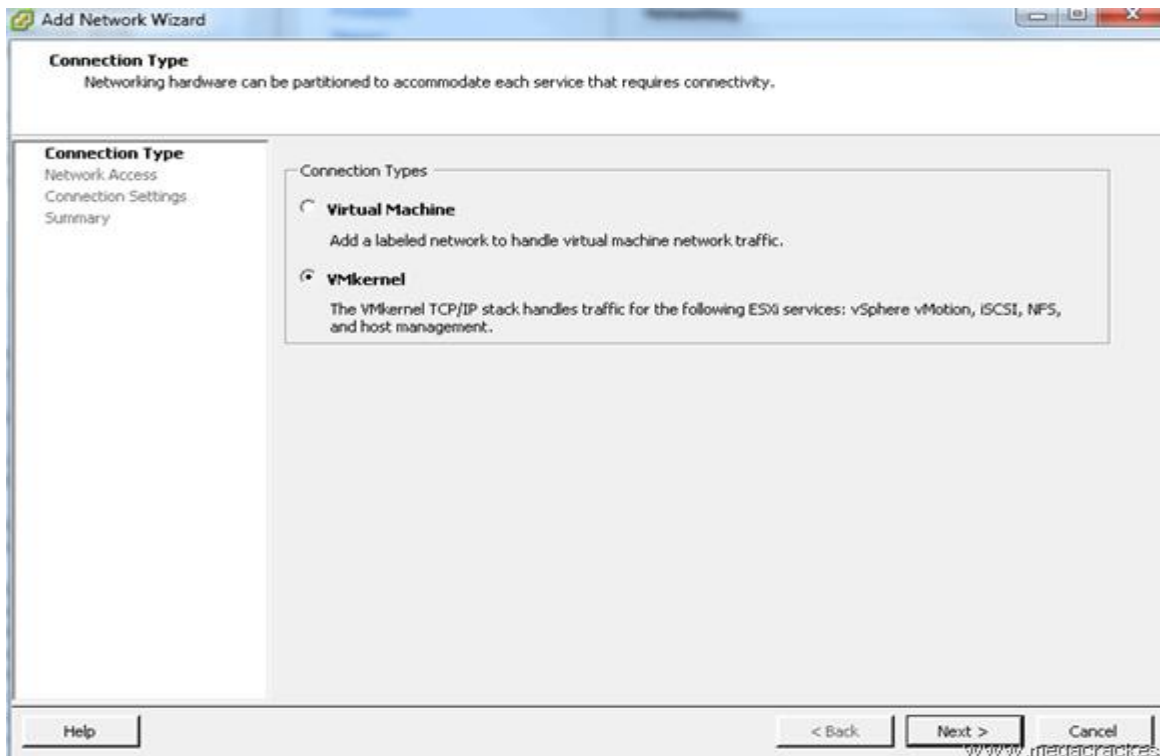
5. Select VMKernel and click on Next.
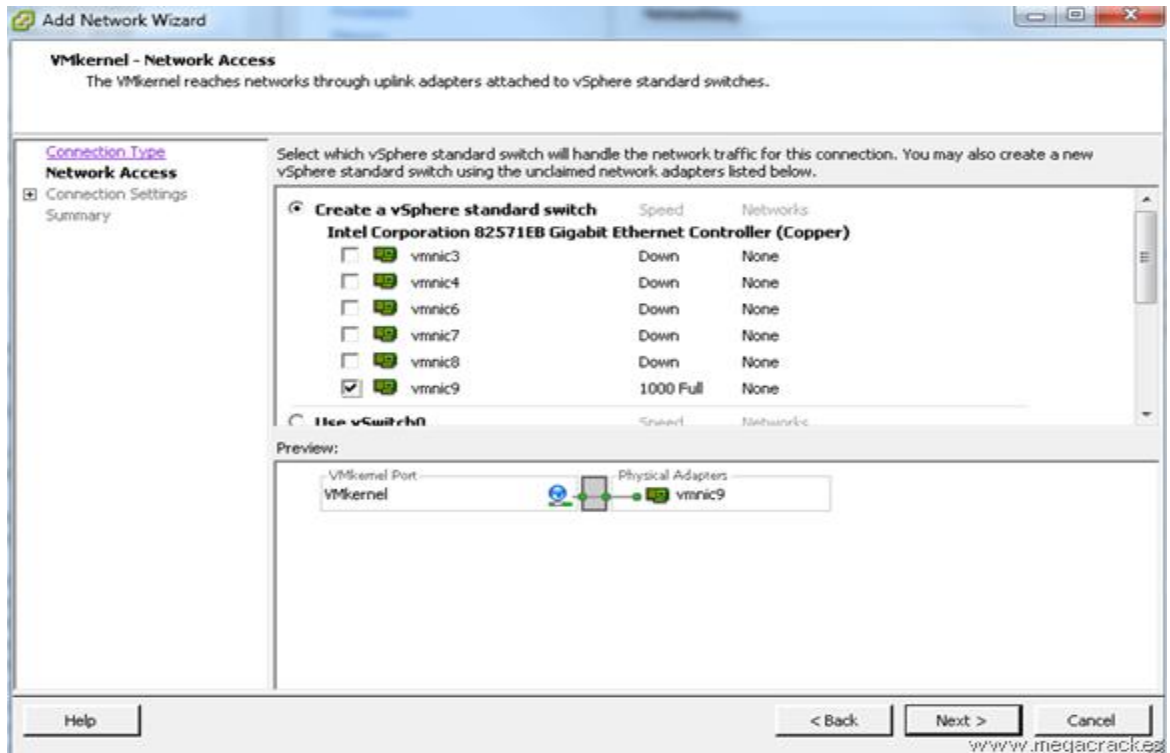
6. Making a network card or cards that have connected from one server to another (in our case vmnic9) And click on Next.
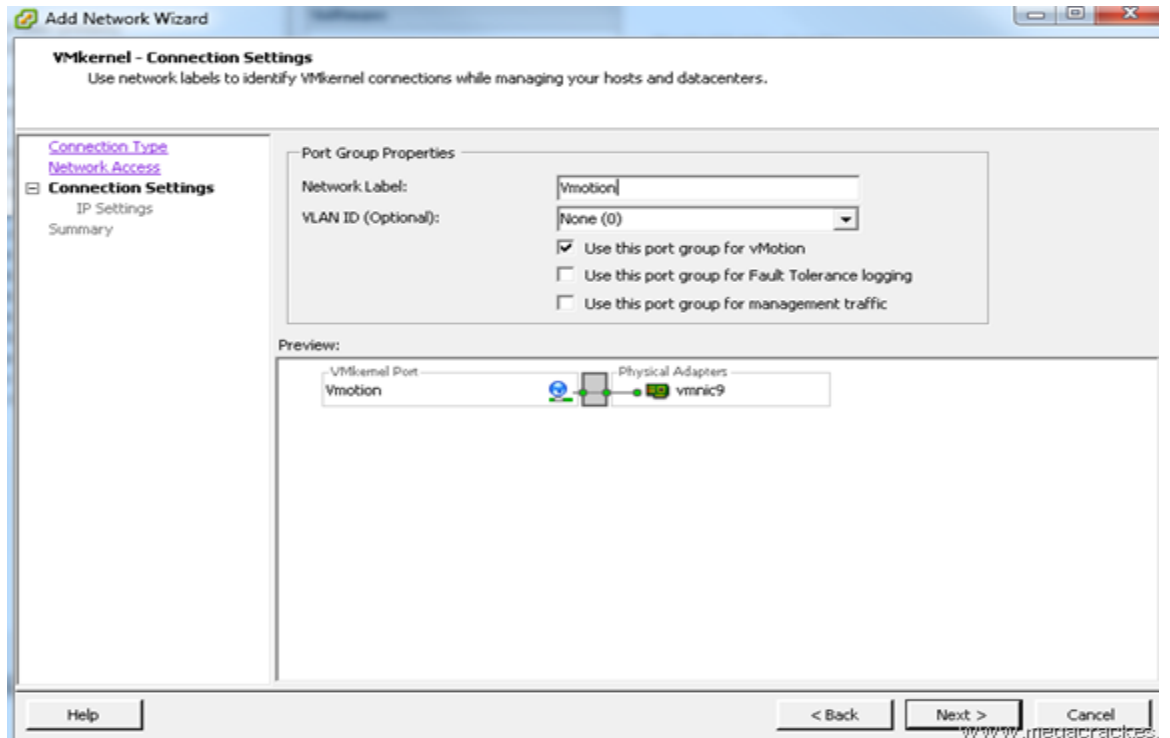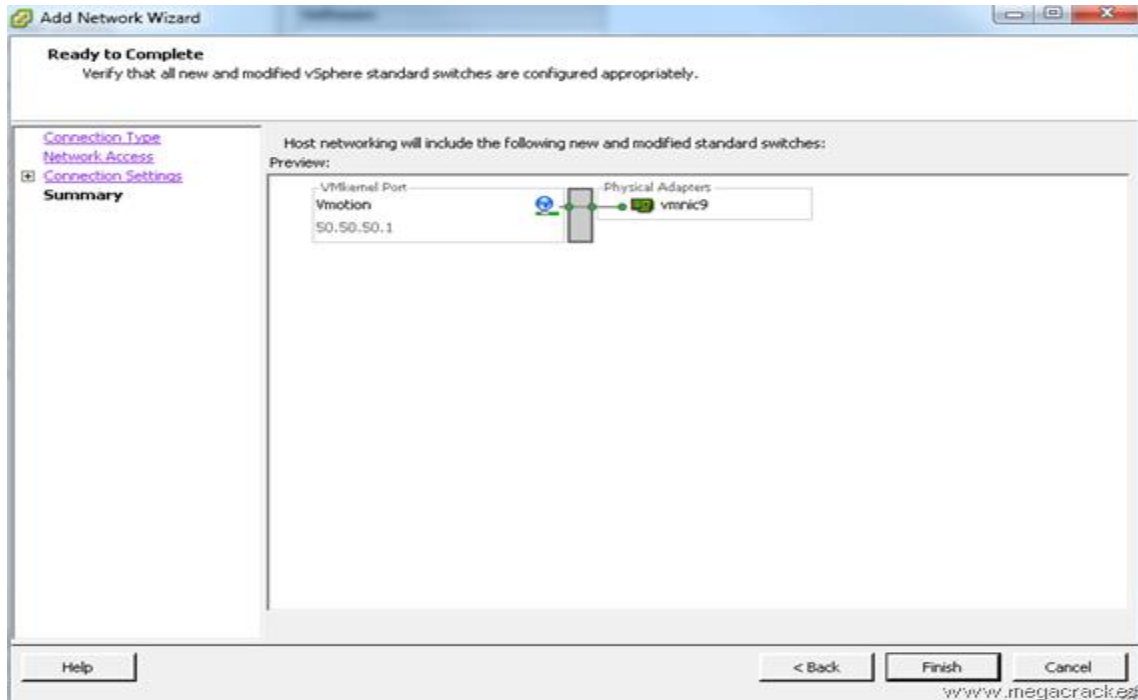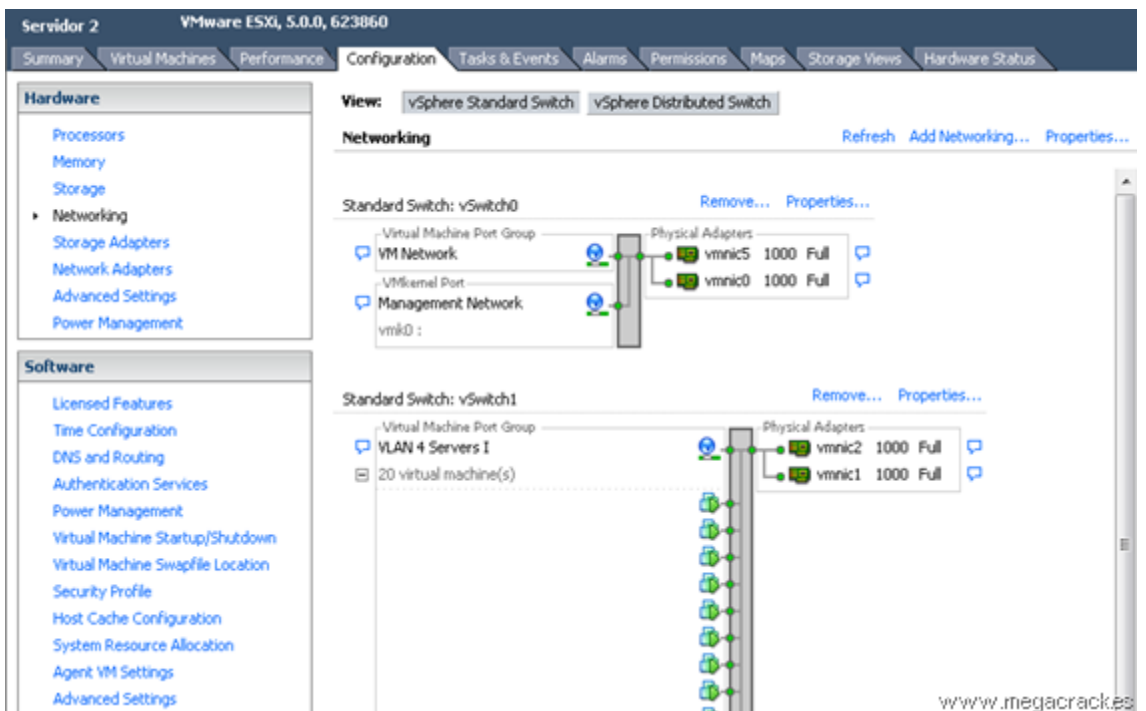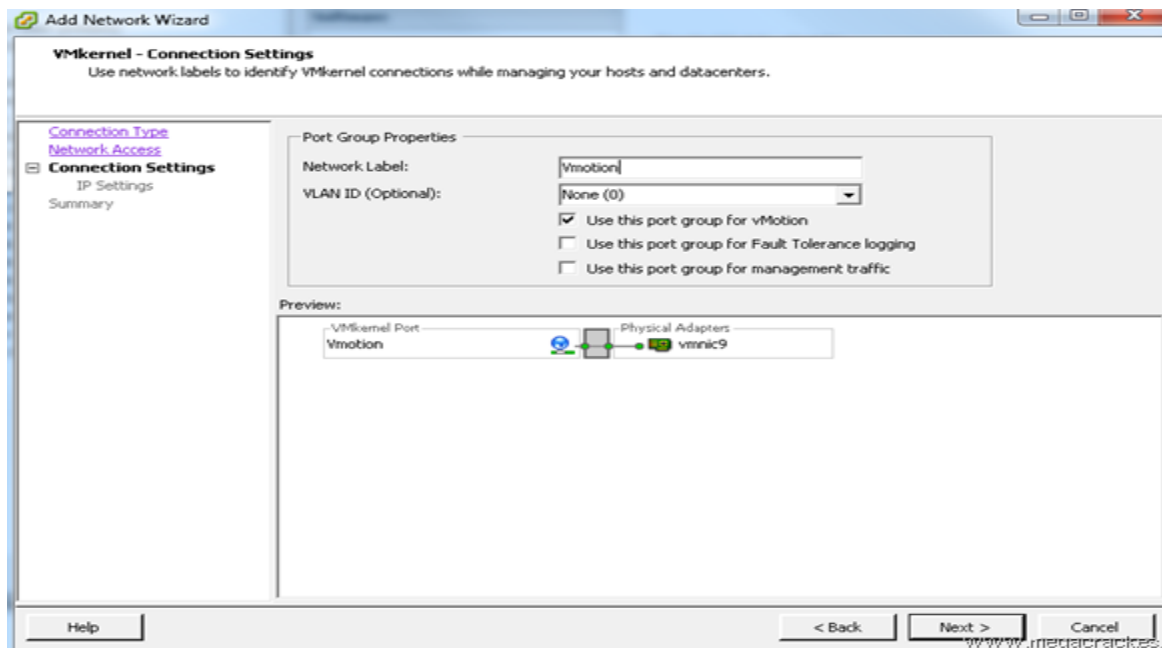
7. Set Use this port group for vMotion.

8. Write a Label Network different if you want (optional) and click on Next. For example, put vMotion.
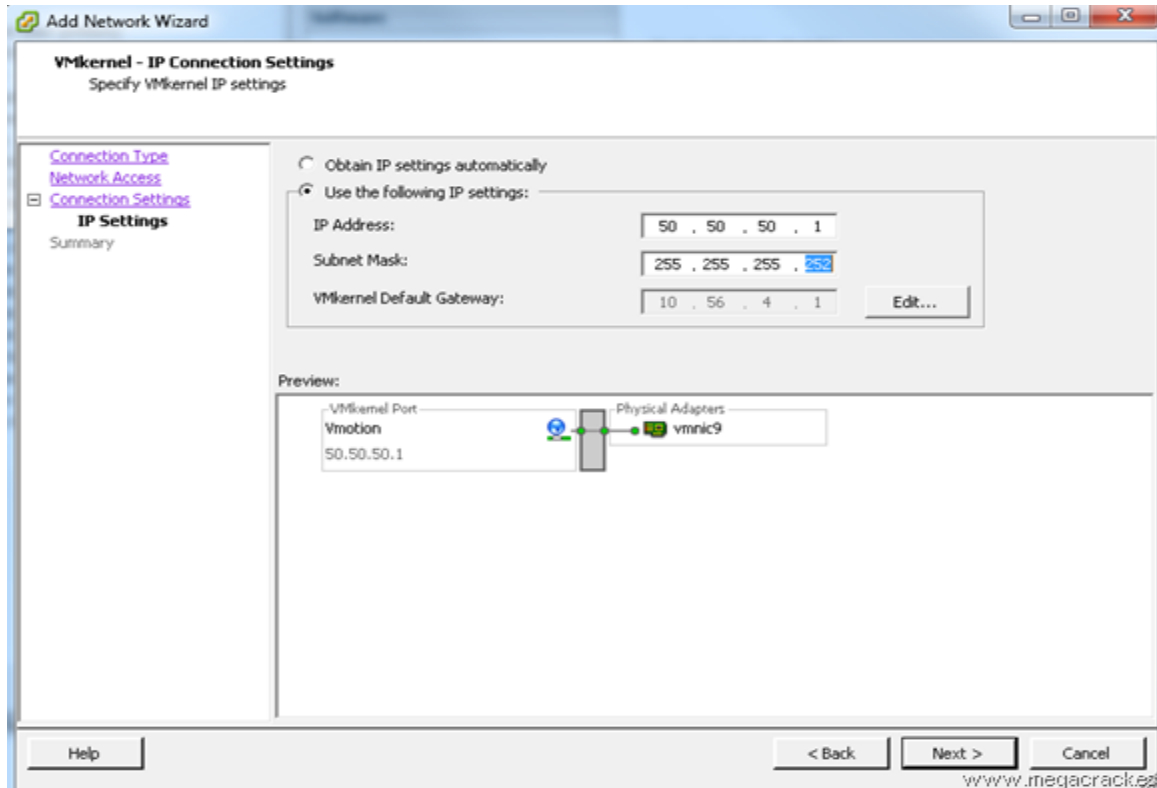
We set Use the following IP settings:

- IP Address: 50.50.50.1
- Subnet Mask: 255.255.255.252 (Since we will use only 2 ip's
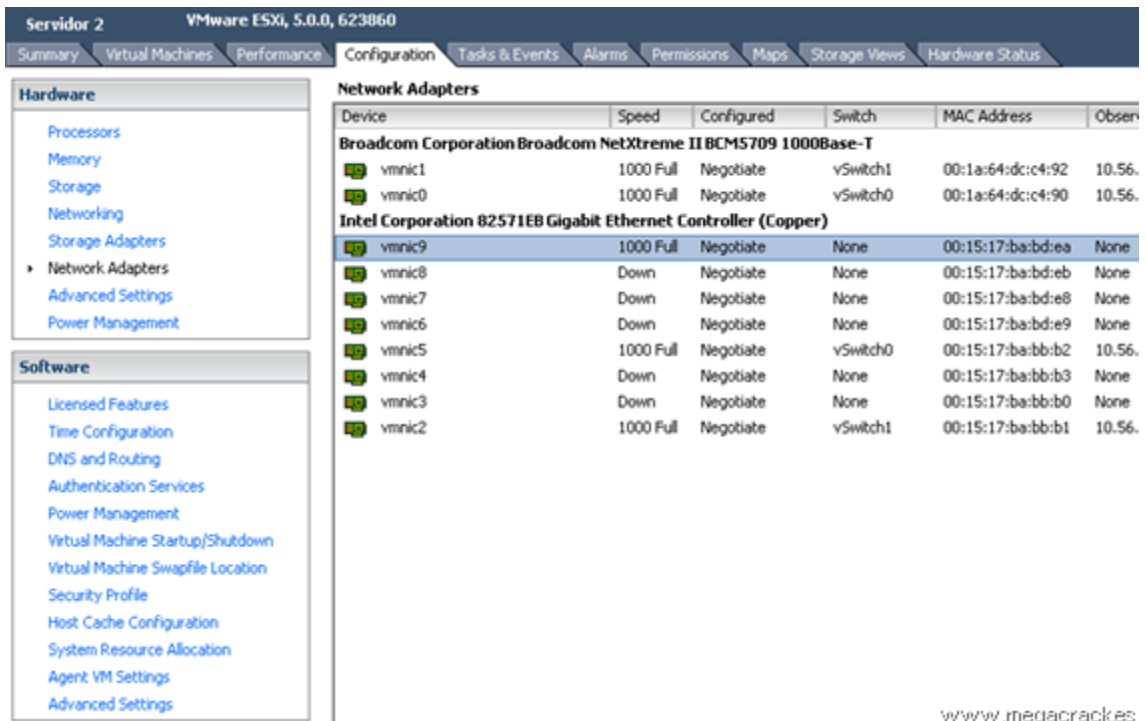
9. Click on Next.

10. Click on Finish.

11. Select the tab **Configuration-> Network Adapters** and we see that we have visibility of the new connections.

12. Now look at the tab **Configuration**-> **Networking**.

13. Click on Add Networking to create the vSwitch.

14. Select VMKernel and click on Next.
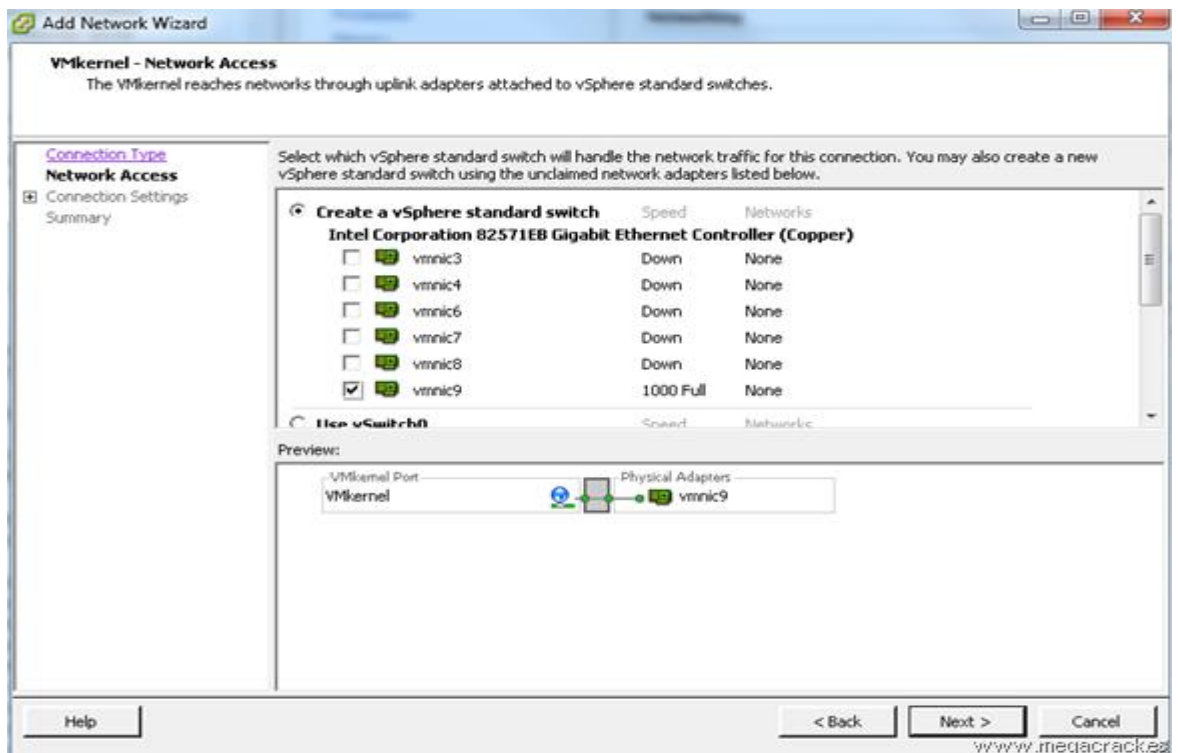
15. Making a network card or cards that have connected from one server to another (in our case vmnic9) And click on Next.
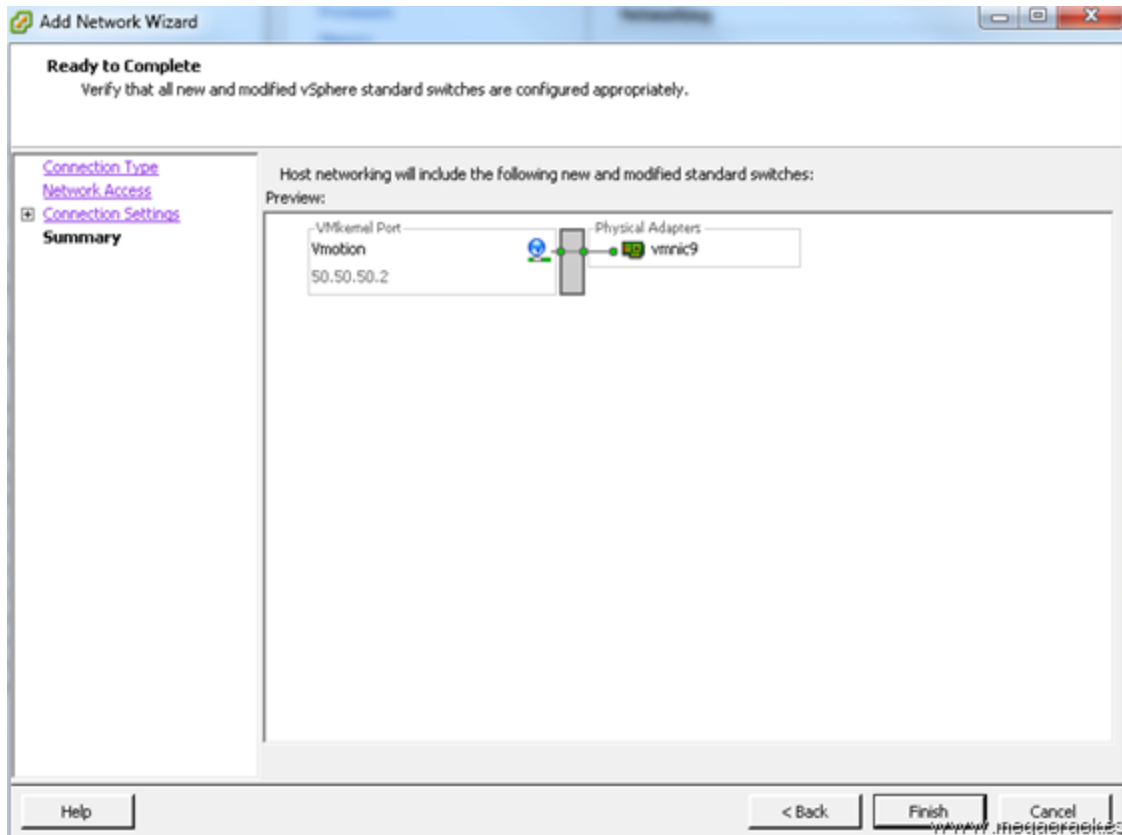

16. Set Use this port group for vMotion. Write a Label Network different if you want (optional) and click on Next. For example, put vMotion.
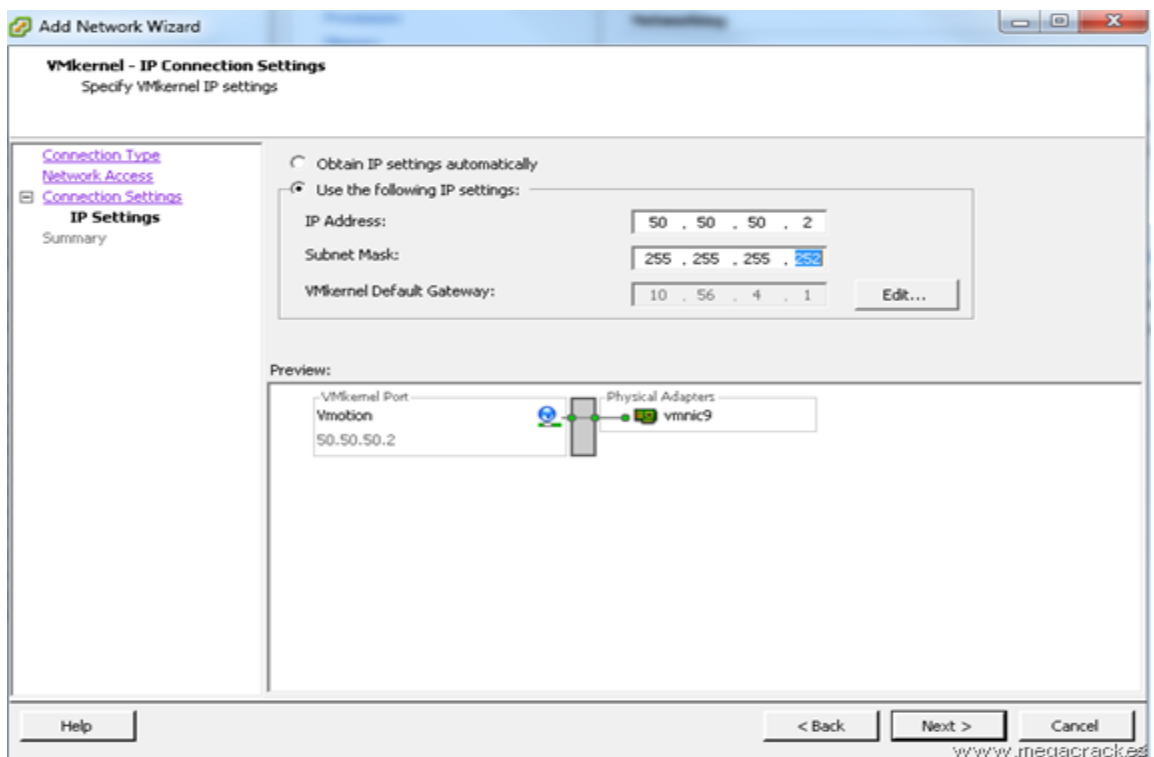
We set Use the following IP settings:

- IP Address: 50.50.50.2 (This ip must be different from the server that we configured   earlier 1).
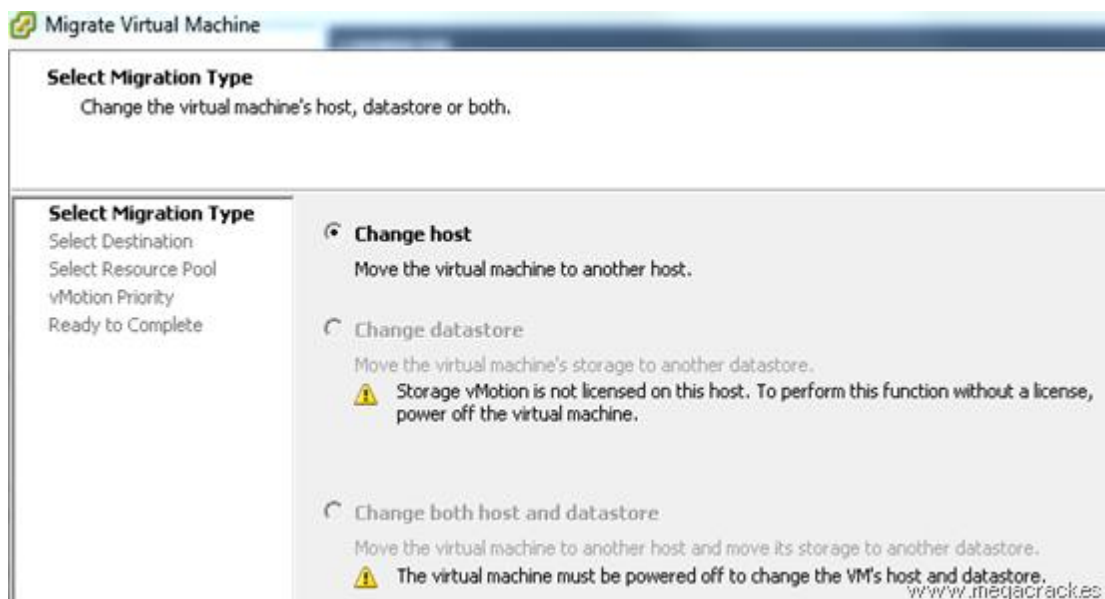- Subnet Mask: 255.255.255.252 (Since we will use only 2 ip's)

17. Click on Next.

18. Click on Finish.And now what we will do to ensure that the entire system is working properly migrate a VM from one ESXi to the other using Vmotion functionality you just configured.

19. Press the right mouse button on a virtual machine.
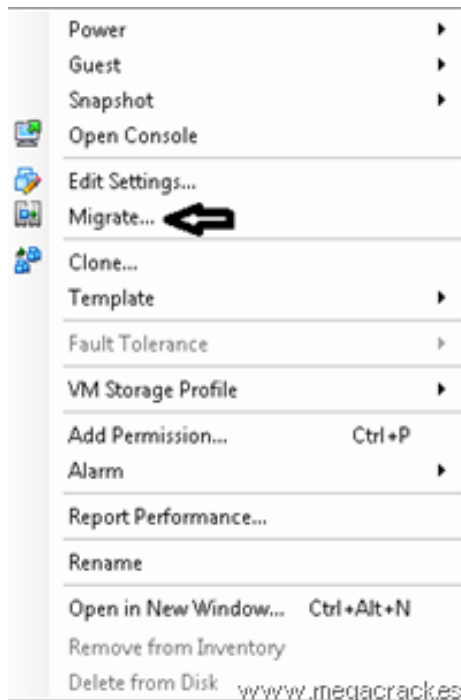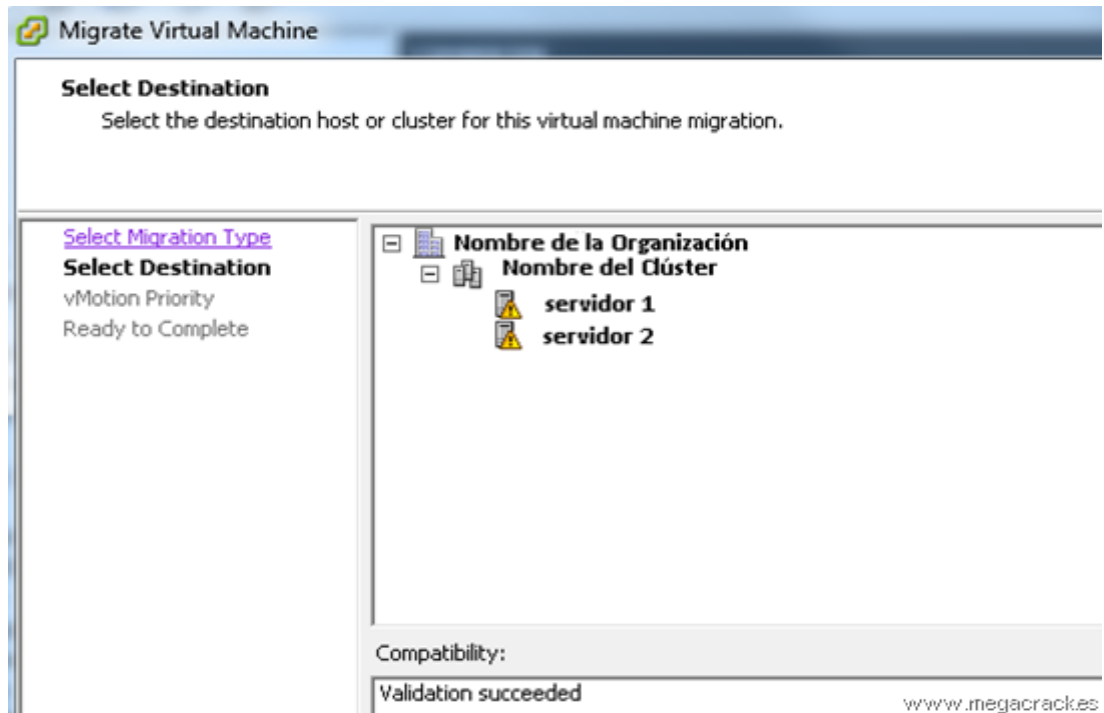

20. Click on Migrate.
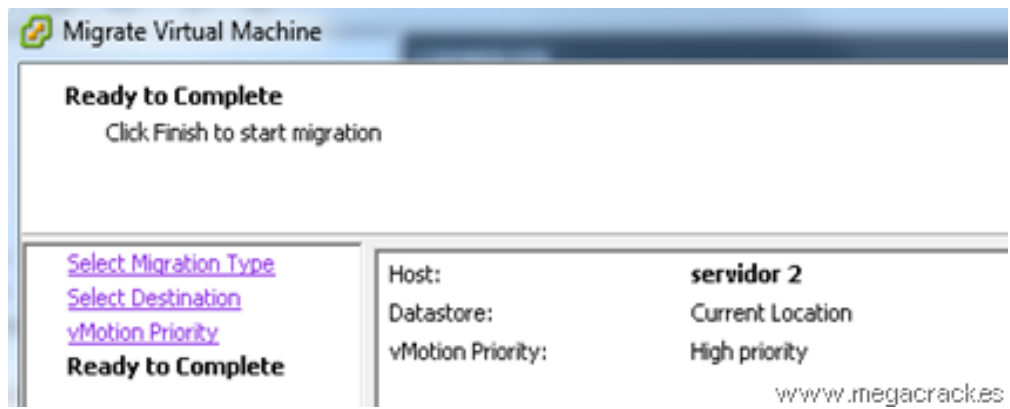
21. Click on Next.

22. Select the target server where we will move the virtual machine.

23. Click on Next.

24. Click on Next.

25. Click on Finish to start the migration.

Now perfectly we have migrated the virtual machines.