SRI LANKA INSTITUTE OF INFORMATION TECHNOLOGY

Enterprise Standards and Best Practices for IT Infrastructure

4th Year 2nd Semester 2016

Lab Report

vMotion - VMware vSphere Migration

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Date of Submission: 16/09/2016

Git web URL:

https://github.com/HariniUPinnawalage/vMotion.git

What is vMotion?

vMotion is the live migration of a running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity.

vMotion can be used to:

- Automatically optimize and allocate entire pools of resources for maximum hardware utilization and availability.
- Allow vSphere Distributed Resource Scheduler (DRS) to balance virtual machines across hosts.
- Allow continued virtual machine operation while accommodating scheduled hardware downtime.
- Proactively migrate virtual machines away from failing or underperforming servers.

How vMotion Migration Works
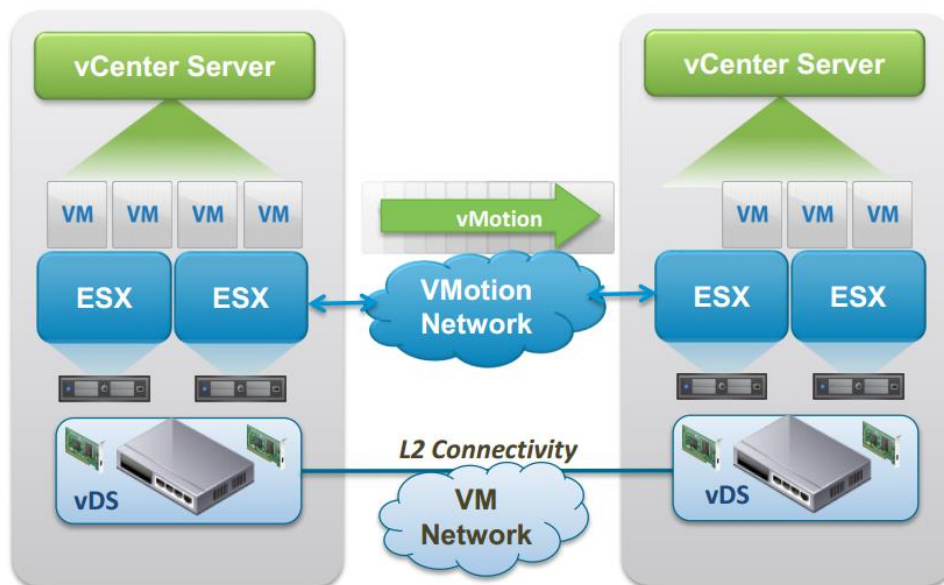
There should be a shared storage between the two hosts involved in vMotion migration. Virtual machine files need to be stored in this shared storage. So the migration is very quick because it does not need to copy any of the file. It need to copy from one host to another host is only the memory state of the virtual machine. There should be a proper network connection and both the hosts need to be in one LAN (Local Area Network). That virtual machine state copy is performed across the network called vMotion network. vMotion network is a private, faster network connection between the two hosts involved in vMotion migration.

Prerequisites

Virtual Machine requirements for VMotion Migration

- Cannot use migration with vMotion to migrate virtual machines using raw disks for clustering purposes.
- Cannot use migration with vMotion to migrate a virtual machine that uses a virtual device backed by a device that is not accessible on the destination host. Disconnect these devices before migrating the virtual machine.
    - o For example, Cannot migrate a virtual machine with a CD drive backed by the physical CD drive on the source host.
- Cannot use migration with vMotion to migrate a virtual machine that uses a virtual device backed by a device on the client computer. Disconnect these devices before migrating the virtual machine.
- A virtual machine must not have a connection to a vSwitch (vSwitch with zero uplink adapters).
    - o Virtual switches (vSwitches) are the core networking component on a vSphere host, connecting the physical NICs (pNICs) in the host server to the virtual NICs (vNICs) in virtual machines.
- A virtual machine must not have CPU affinity configured.
    - o CPU affinity enables binding a process or multiple processes to a specific CPU core in a way that the processes will run from that specific core only.

Host requirements for VMotion Migration

Source and destination hosts must have:

- Each host must be correctly licensed for vMotion.
- Each host must meet shared storage requirements for vMotion.
    - o Configure hosts for vMotion with shared storage to ensure that virtual machines are accessible to both source and target hosts.
    - o During a migration with vMotion, the migrating virtual machine must be on storage accessible to both the source and target hosts. Ensure that the hosts configured for vMotion use shared storage. Shared storage is typically on a storage area network (SAN), but can also be implemented using iSCSI and NAS shared storage.
- Each host must meet the networking requirements for vMotion
- Access to the same physical networks.
- Compatible CPUs.

vMotion Networking Requirements

- Migration with vMotion requires correctly configured network interfaces on source and target hosts.
- vMotion requires a Gigabit Ethernet (GigE) network between all vMotion enabled hosts. Each host enabled for vMotion must have a minimum of two Ethernet adapters, at least one of which must be a GigE adapter.
- Recommended networking best practices:
  - Use one dedicated Ethernet adapter for the service console (on ESX hosts).
  - Use one dedicated GigE adapter for vMotion.
  - If only two Ethernet adapters are available:
    - For best security, dedicate the GigE adapter to vMotion, and use VLANs to divide the virtual machine and management traffic on the other adapter.
    - For best availability, combine both adapters into a bond, and use VLANs to divide traffic into networks: one or more for virtual machine traffic, one for the service console (on ESX hosts), and one for vMotion.
- Configure the virtual networks on vMotion enabled hosts:
  - 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 vSwitches 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 vNetwork Distributed Switches for networking, ensure that source and destination hosts are members of all vNetwork Distributed Switches that virtual machines use for networking.

Pros and Cons of vMotion

Pros
- Zero downtime (no downtime).
- Continuous service availability.
- Useful when performing maintenance on the ESXi host.
- Maximum hardware utilization and availability.
- Load balancing.

Cons
- Does not allow migration with vMotion between Intel and AMD processors.
- BIOS settings of the hosts need to enable hardware virtualization and execute protection.

Implementation of vMotion

Vmware vSphere is a platform that manages the services offered in the vmware virtualization. For simulate vMotion in a lab environment minimum two ESXi servers are needed. These servers should available in a same cluster.

To setup a server cluster,

- Minimum two ESXi servers.
- A shared storage.
- vCenter server to link ESXi cluster.
- Windows domain service.

1. Install VMware workstation on Host PC. This PC need to cater the minimum required performance, to run two ESXi servers, vCenter server and domain controller server.
   - At least dual core processor with intel VT enabled to install 64bit operating systems.
   - 10 GB RAM minimum.
   - VMware workstation 7.x
   - Minimum 100 GB storage.
2. Install two hypervisors (ESXi servers) on VMware workstation.
3. To enable domain controller services, install windows server 2008 R2 or 2012.
4. Register both ESXi servers under created domain name.
5. A cluster can be created using vCenter server with an IP address.
6. Using domain IP address of the vCenter, vSphere client can access both servers in the cluster.
7. Do the necessary configurations to enable the vMotion function.