

Hyper-V – VM Storage Live Migration

Starting with the 2012 version, Hyper-V now has a mechanism to relocate the storage for a virtual machine, even while it is turned on. It utilizes some of the same underlying technology that allows differencing virtual hard disks to function and to merge them back into their parents while they are in use. This feature has the following characteristics:

- Does not require the virtual machine to be clustered
- Target storage can be anywhere that the owning host has access to – local or remote
- Despite the name, Storage Live Migration is not a Live Migration. Storage Live Migration does not require the virtual machine to change hosts. Whereas Quick and Live Migrations are handled by the cluster, Storage Live Migrations are handled by the Virtual Machine Management Service (VMMS).
- Storage Live Migration is designed to remove the source files upon completion, but will often leave orphaned folders behind.
- VHD/X files are moved first, then the remaining files.
- If the source files are on a Cluster Disk, that disk will be unassigned from the virtual machine and placed in the cluster's Available Storage category.

'Storage Live Migration' is mainly used to Live Migrate virtual machine's storage within a single Hyper-V Host or across Hyper-V Hosts in a cluster without any downtime.

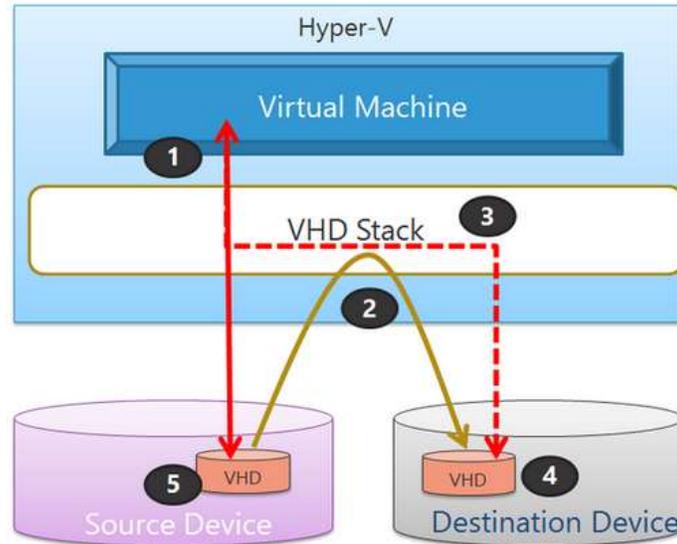
You can perform the 'Storage Live Migration' of virtual machines by either ...

- Using Hyper-V 3.0 Manager
- Using Windows Failover Console
- Using a PowerShell script
- Using System Center virtual machine Manager 2012

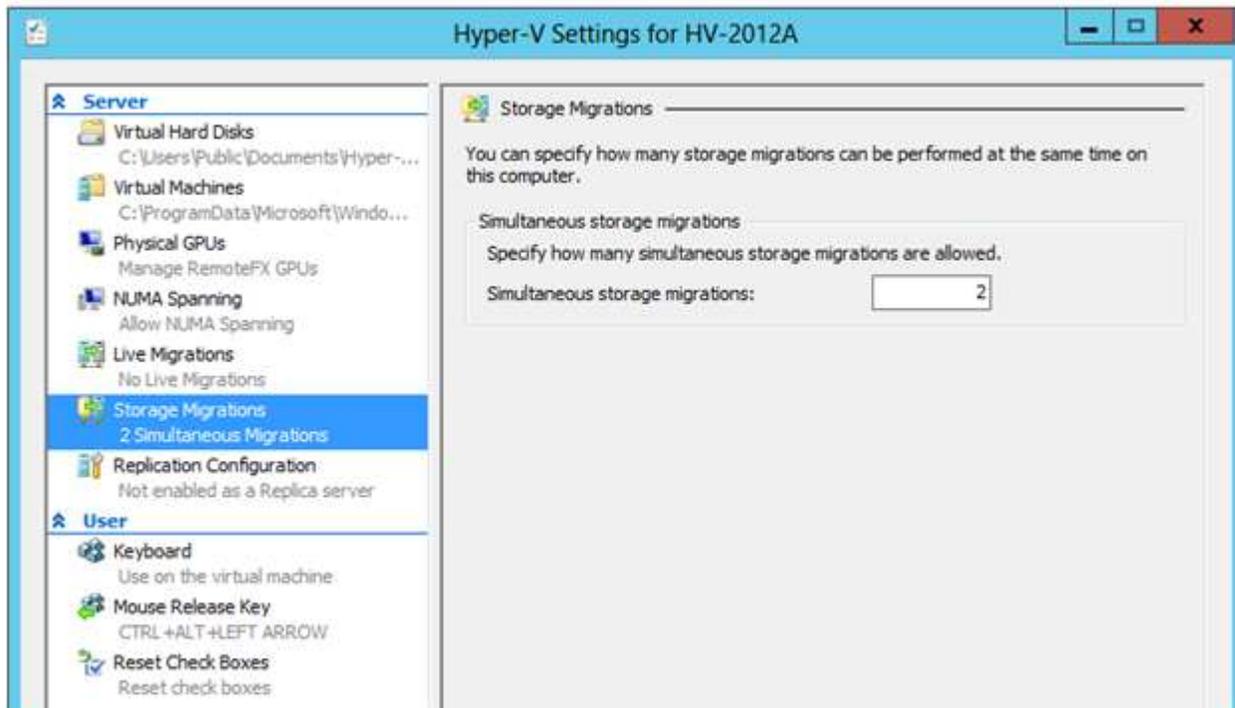
How does 'Storage Live migration' work?

1. 'Storage Live Migration' is initiated using one of the following methods:
 1. System Center Virtual Manager 2012
 2. Using Windows Failover Console
 3. Using Hyper-V 3.0 Manager on Windows Server 2012
 4. Using a PowerShell command
2. At this step, Hyper-V prepares itself. As part of the preparation, read and write operations (I/O) occurring on the virtual machine are copied/mirrored to the newly created virtual machine hard disk on the destination Hyper-V Host as follows:
 1. Read operations are occurring at the source virtual machine
 2. Write operations are taking place at both; source and destination virtual machines.
3. The process uses the BITS Service on the Windows to copy the base VHD over the network to the new location you specify in migration wizard.
4. Once the disk copy process is complete, Hyper-V switch virtual machine to run on the destination Hyper-V Server or storage.
5. Finally, delete the virtual machine files and VHD from the source Hyper-V Host.

The 'Storage Live Migration' always provides that the fall back option for any initiated virtual machine storage migration. You can easily switch back to source Hyper-V Host if it need be.



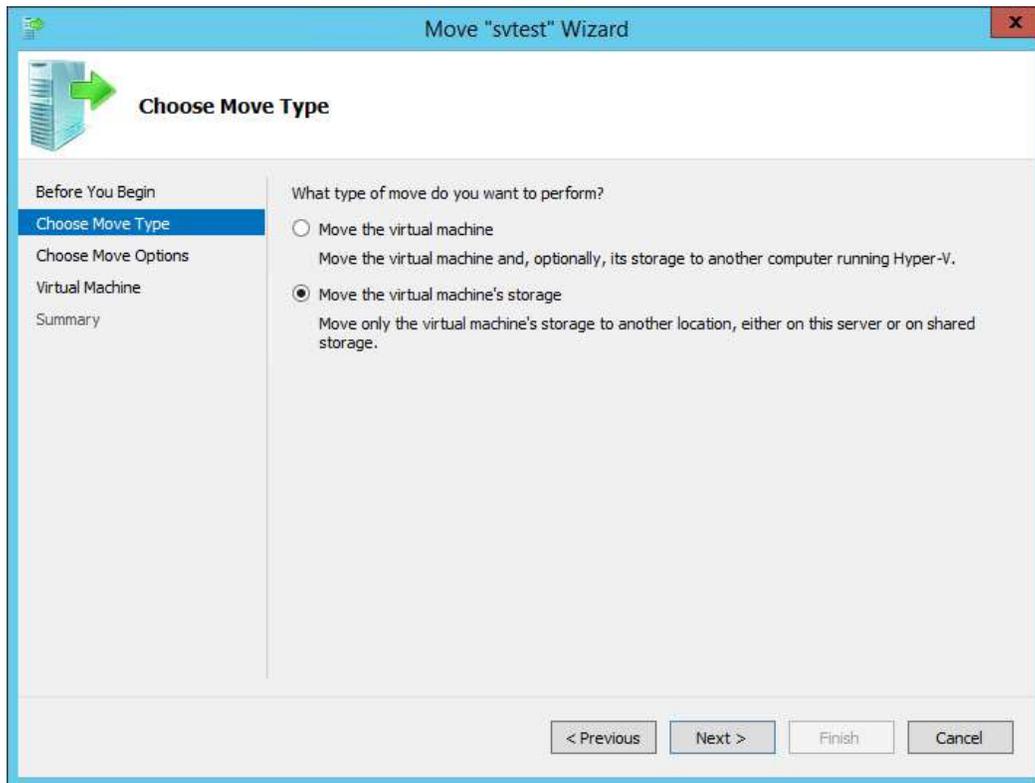
'Storage Live Migration' also allows you to run concurrent live migrations for virtual machines. You cannot multi-select virtual machines to start the concurrent 'Storage Live Migration'. Instead, you must start for each virtual machine manually. By default, two concurrent 'Storage Live Migration' is allowed which can be changed under the property of the Hyper-V Host as shown in the Figure below:



Storage Live Migrations with Hyper-V Manager

For non-clustered virtual machines:

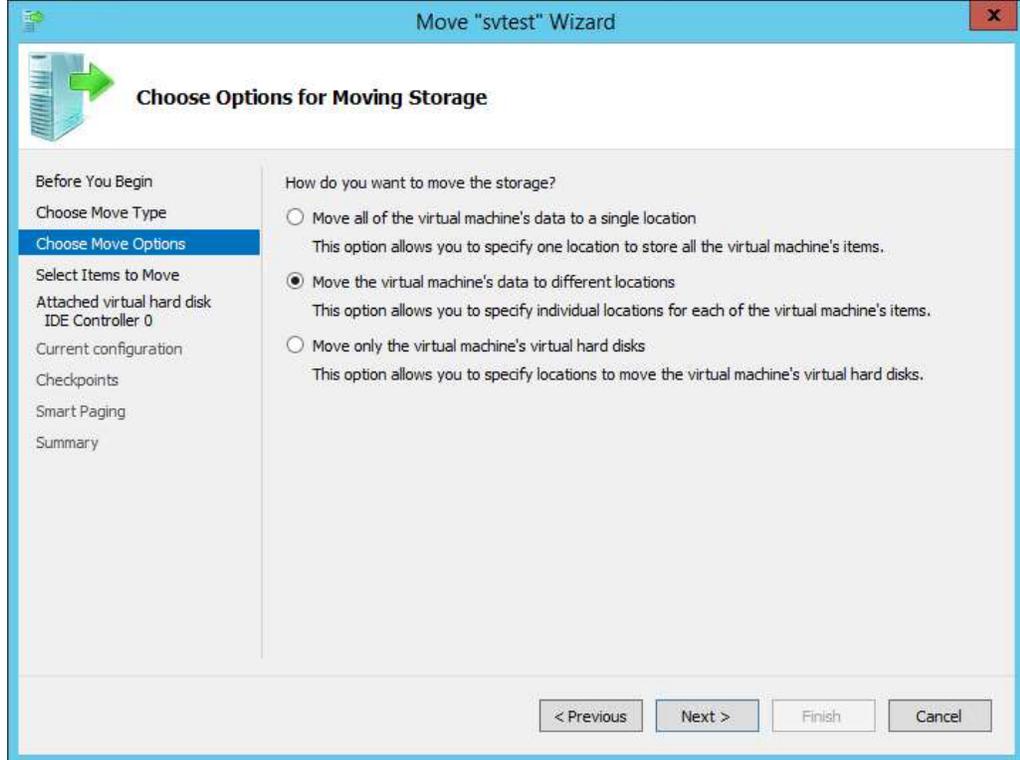
1. Right-click on the virtual machine in the list and select **Move...**
2. The Move Wizard will open. The first screen is informational. Click **Next** when ready.
3. On the **Choose Move Type** screen, choose **Move the virtual machine's storage** and click **Next**.



Storage Live Migration Selection

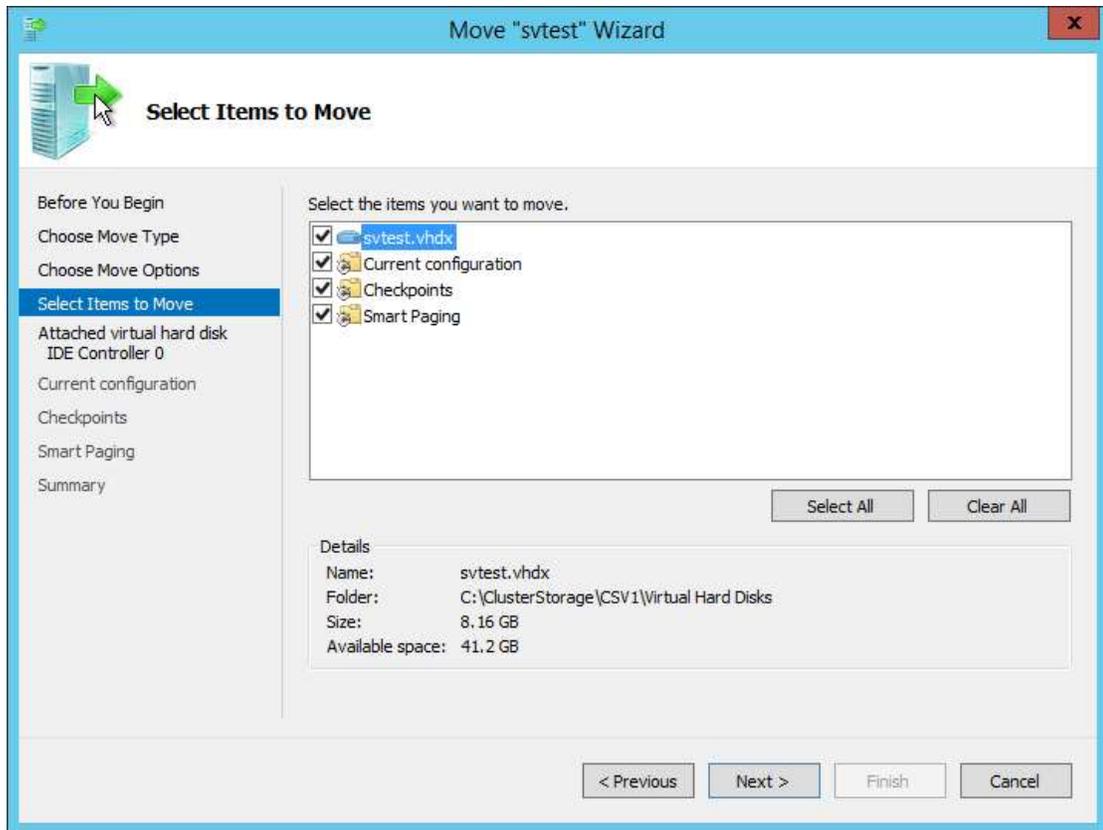
4. Now, you will need to make a generic choice of what you want to move. There are three options:
 1. **Move all of the virtual machine's data to the same location.** This will place all of the virtual machine's files except its VHD/Xs in a 'Virtual Machines' folder at the target location. All of the hard disks will be placed in a 'Virtual Hard Disks' subfolder.
 2. **Move the virtual machine's data to different locations.** You'll be prompted for the location of each component. This is the only option we'll go through in this walk-through as it is a superset of the other two.

3. **Move only the virtual machine's hard disks.** This will skip the component section and have you pick which VHD/X files to move and where to put them.



Move Options

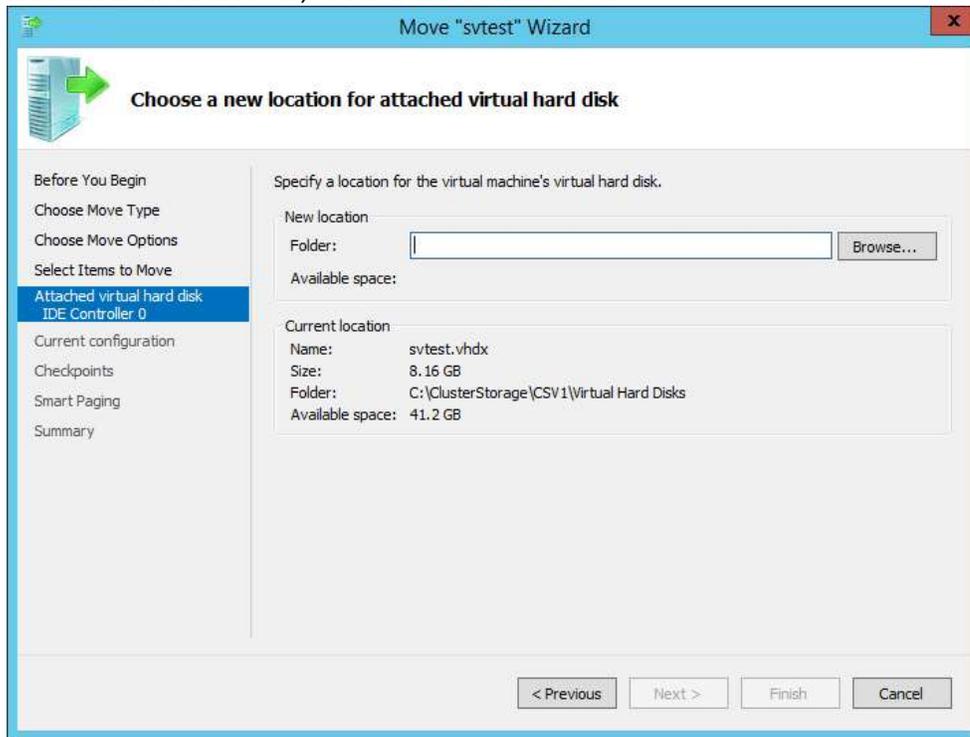
5. After that, you'll make more specific decisions about what to move. If you picked the first option in step 4, you'll just have a single target location. Otherwise, you'll have the screen as shown in the following screen shot. Whether or not the components are visible depends on whether you chose the second or third option in step 4. Uncheck anything that you want to leave behind.



Move Components

6. You will now progress through a series of screens that ask you where to place each individual item. How many of these screens you see depends on your selections in steps 4 and 5. Each looks similar to the following, and you will not be allowed to proceed until you have selected a suitable destination for the current item. When the wizard validates the target location, it will fill in the **Available space** field. If you're manually typing, it attempts to validate the storage

location after each letter, so results are immediate.



Destination Path Selection

7. Once you have made all of your selections, you will be presented with a summary screen. If all of your selections are correct, click **Finish** to start the move.

Storage Live Migrations with Failover Cluster Manager

Failover Cluster Manager is the tool to use for clustered virtual machines.

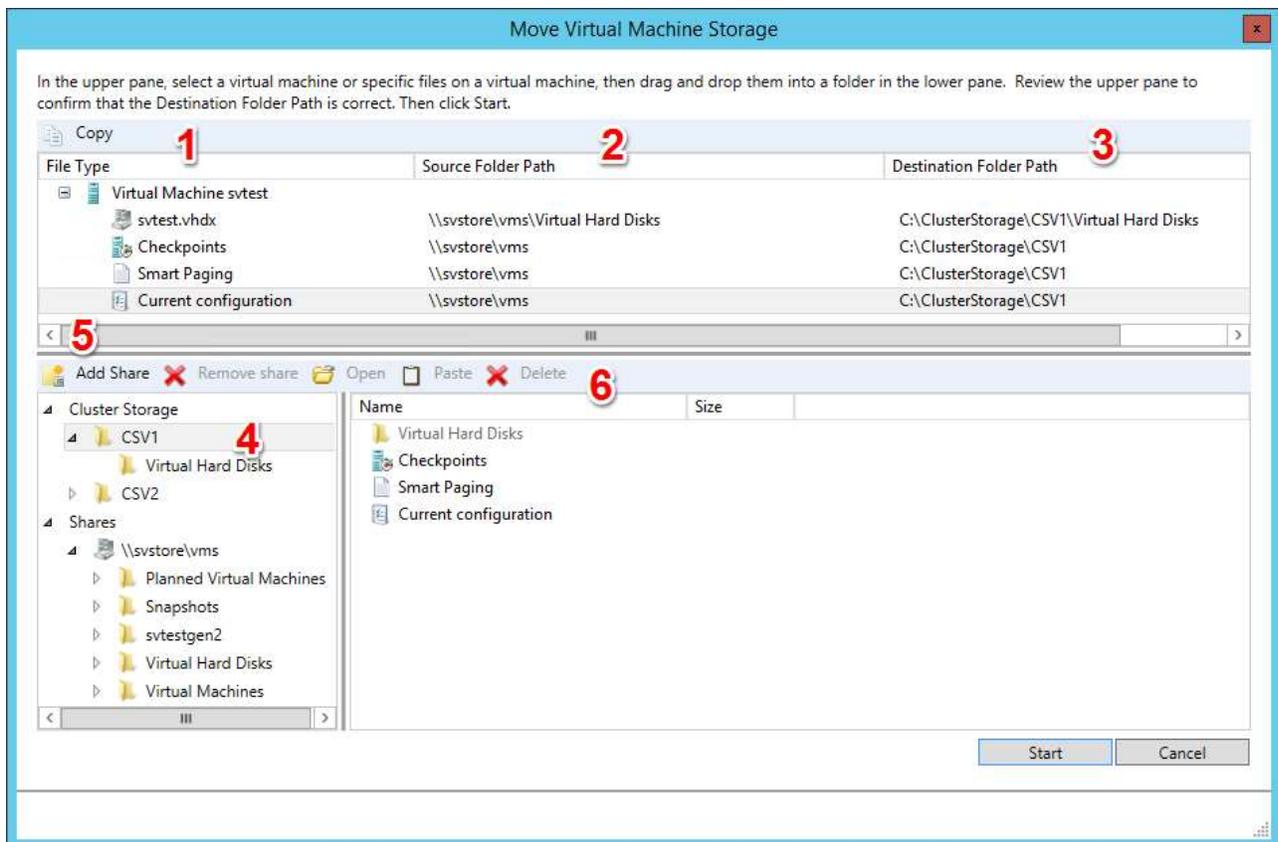
1. Switch to the **Roles** tree node.
2. To move multiple VMs, use CTRL+Click to select them.
3. Right-click the VM(s) to be moved.
4. In the context menu, go to **Move** and **Virtual Machine Storage**.



Starting Failover Cluster Storage Live Migration

5. The **Move Virtual Machine Storage** dialog will open. Select destination(s) for the virtual machine's files and click **Start** to begin the move. This dialog and its components are explained below.

The Storage Live Migration window has quite a few pieces to give you fine-grained control over the placement of your virtual machine's files. The following is an index that matches with the numbers I've super-imposed on the screenshot:



Failover Cluster Manager Storage Live Migration Window

One of Storage Live Migration's powers is that the virtual machine does not need to have all of its components in a single place. This window allows you to design the precise layout of its constituent files. However, remember that:

- The **Checkpoints** location does not affect AVHD/X files. Those will **always** be placed in the same location as their parent VHD/X files.
- If a **Virtual Machines** folder does not exist at the designated target location for **Current configuration** and **Smart Paging**, it will be created.
- If a **Snapshots** folder does not exist at the designated target location for **Checkpoints**, it will be created.
- Virtual disk files will be placed exactly where they are targeted without creation of any subfolders.
- The source folder structure will not be altered.

Using Move-VMStorage to Relocate All of VM's Files to a Single Location

Move-VMStorage svtest -DestinationStoragePath G:

Using Move-VMStorage to Separate a VM's Files

```
@(@{'SourceFilePath' = 'G:\Virtual Hard Disks\svtest_os.vhdx'; 'DestinationFilePath' = 'C:\ClusterStorage\CSV1\Virtual Hard Disks\svtest_os.vhdx'}, @{'SourceFilePath' = 'G:\Virtual Hard Disks\svtest_data.vhdx'; 'DestinationFilePath' = 'C:\ClusterStorage\CSV1\Virtual Hard Disks\svtest_data.vhdx'})
```

```
Move-VMStorage svtest -VirtualMachinePath C:\ClusterStorage\CSV1 -Vhds @(@{'SourceFilePath' = 'G:\Virtual Hard Disks\svtest_os.vhdx'; 'DestinationFilePath' = 'C:\ClusterStorage\CSV1\Virtual Hard Disks\svtest_os.vhdx'}, @{'SourceFilePath' = 'G:\Virtual Hard Disks\svtest_data.vhdx'; 'DestinationFilePath' = 'C:\ClusterStorage\CSV1\Virtual Hard Disks\svtest_data.vhdx'})
```

Notice that I used neither the `SnapshotFilePath` nor the `SmartPagingFilePath` parameter. Whereas the Failover Cluster Manager tool will leave any files that you did not specifically instruct it to move in their original location, the cmdlet the way that I have issued it will move all unspecified components to the same location as the `VirtualMachinePath` parameter, if it is specified.