



MASTERING VMWARE SNAPSHOT

THE ULTIMATE GUIDE TO MASTER VMWARE SNAPSHOT

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About Mastering VMware Snapshot

VMware vSphere is a key virtualization technology which acts as the base platform for cloud computing. Most of the enterprises are already running their workloads with the virtualization platforms. VMware Snapshot plays real important role in the virtual machine management. It helps us to capture the point in time copies of virtual machine, which simplifies the recovery of virtual machine especially during the Guest OS patching management and other virtual machine management tasks such as virtual machine tools upgrade, VMware Hardware upgrade and make some configuration changes to the operating system and the Virtual machine. Most of the backup solutions designed for virtualization workloads takes the VMware snapshot as the image level backup for the virtual machine.

"Mastering VMware Snapshot" offers a comprehensive understanding of VMware snapshots which includes lot of tips and tricks related to the VMware Snapshot. This books enable the reader to gain deep understanding of VMware Snapshots with different detailed information about the various snapshot related files and snapshot operations such as deleting snapshot, reverting snapshot and snapshot consolidation. It also focuses on how to manage Snapshots from command line and changes made to the snapshot algorithm on vSphere 6.0 and vSphere 6.5

1. What is VMware Snapshot?

VMware Snapshot preserves the state and data of a virtual machine at a specific point in time.

Snapshot state includes the virtual machine's power state (powered-on, powered-off, suspended) and the data includes all the files (disks, <u>memory</u> and other devices, such as virtual network interface cards.) that make up the virtual machine.

Snapshots extremely simplifies the virtual machine OS management and maintenance tasks by preserving the current state of the virtual machine. It allows you to revert to the state of virtual machine prior as same prior to taking snapshot.

Windows patching in Physical Server VS VMware Virtual machine

i. Physical workload

Before performing the operating system patching or software upgrade, you need to take a backup such as OS Image level backup to restore the operating system in a case of any corruption is happened during the patching and it is a time-consuming process.

Restore is not even guaranteed recovery, if in the case of the backup file is corrupted.

ii. VMWare Virtual machine

In Virtual Machine, Snapshots simplifies the process to capture the Point-in-time copy of the virtual machine without the need of any third-party backup software.

It also allows you to take multiple snapshots to preserve the multiple states of the virtual machine. It also simplifies the restore process but keep in mind that snapshot is not a typical backup solution. You cannot preserve the snapshots for longer duration like backups.

You just need to select the snapshot which is taken before patching to revert to the specific state of the virtual machine, in case any issue happened during the patching.

2. How to Create VMware Snapshot

VMware Snapshot can be simply created using <u>vSphere client</u> connected to ESXi host or <u>vCenter</u> <u>Server</u> and through <u>vSphere web client</u>. Even VMware snapshots can be created using the command line and PowerCLI scripts. Let's look at how to create Virtual Machine Snapshot from vSphere Web Client.

Connect to your <u>vCenter Server</u> using vSphere Web Client and **Right-click the virtual machine** and click on **Take Snapshot**



Name: Specify the name for the snapshot. Name of the snapshot should be understandable easily from its name.

Description: Provide a description for this snapshot. You can even specify the date and time to best identify its age.

As of now, just go with the snapshot without Virtual Machine memory. I will explain the difference between the VMware snapshot with Virtual Machine's memory and snapshot without Virtual Machine's memory. Click Ok to create the snapshot.

	(manual data data data data data data data da
Name	Snap_1
Description	
Snapshott	ne virtual machine's memory
	the state of the second state of the second state of the state of the second state of

You can validate that the "Create Virtual Machine Snapshot" tasks under your recent tasks in <u>vSphere Web Client</u>. It is completed and snapshot is created.

Task Name	Target	Status	Initiator	Queued For	Start Time	Completion Time
Create virtual machine snapshot	🗗 vc-demo-1	🖌 Completed	VSPHERE.LOCAL\\	0 ms	5/28/2017 1:12:43 AM	5/28/2017 1:12:44 AM

3. Difference between VM Snapshot with and without Virtual Machine Memory

3.1 Snapshot with Virtual Machine Memory

If you select the checkbox "**Snapshot the virtual machine's memory**" during snapshot creation, then memory flag will be set to 1 or true, a dump of memory state (internal state) of the virtual machine is also included in the snapshot.

It takes a little longer time to create the memory snapshot as compared to snapshots without memory. Virtual Machine needs to be **powered on the state** to take the memory snapshot. If the virtual machine is in powered off state, Memory snapshot option will be grayed out.

This memory snapshot will allow you to restore the virtual machine to the same state as it was when the snapshot was taken. In simple terms, it captures the **live state** of the virtual machine.

For Example, you are modifying an MS Word Document file and memory snapshot is taken at that time. After some time VM goes in a Blue screen. You want to restore the snapshot from the memory snapshot taken prior to the blue screen issue. Snapshot with memory will revert the VM into powered on state along with the opened MS Word file.



3.2 Snapshot without Virtual Machine's Memory option

Snapshot taken without memory option will not capture a live state of the virtual machine. Snapshot creates crash consistent disks, which you can be used to restore the virtual machine to the state prior to a snapshot but it won't revert the VM into same power state as it during snapshot creation.

Virtual Machine can be either in powered on or powered off state to take VM snapshot without memory option.

Let's say I have taken a snapshot when a virtual machine is powered on and before the patch upgrade. After revert to the snapshot taken without memory, the virtual machine will be restored to the same data and state but power state of the virtual machine won't be powered on. It will be powered off. You need to manually power on the VM after reverting the snapshot.

	P-R VCSA5.5	Name	
Number of active connections has changed. There are now 2 active connections to this console	X Snap without Memory	Snap without Memory	VCSA5.5 on esvi2.localdomain
To manage your appliance please brouse to https://192.168.216.153:5480/ Velcome to UMware oCenter Server		Description A	
1 - Open a browser to: https: 2 - Accept the 201A 3 - Select the desired config 4 - Follow the wizard The configured appliance will 1 case of upgrade the applia	Confirm Current state of the Virtua in a snapshot. Revert to sn	I Machine will be lost unless it has been saved hapshot 'Snap without Memory'?	
It's metuork address. SSL thmosprints Uenters Revers: EF:01:182:2D:166:10 Lookup service: unconfigured Cuesc peet Reyten Reed Move Too instaled		Yes No	

4 VM Snapshot with Quiesce Guest File System

If you select the option "Quiesce guest file system" when taking snapshot, <quiesce> flag will set to 1 or true, It quiesces the file system in the virtual machine. Quiescing a file system is a process of bringing the on-disk data of a physical or virtual computer into a state suitable for backups. This process might include such operations as flushing dirty buffers from the operating system's in-memory cache to disk, or other higher-level application-specific tasks.

The virtual machine needs to be "powered on" state to take a snapshot with the quiesce file system option and also it requires <u>VMware Tools</u> to be installed on the Guest OS to quiesce the file system in the virtual machine.

Note: Quiescing indicates pausing or altering the state of running processes on a computer, particularly those that might modify information stored on disk during a backup, to guarantee a consistent and usable backup. Quiescing is not necessary for memory snapshots; it is used primarily for backups.

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Pronchot the	ultus mathina's mathata
	sinual machine sinemuly

5 How VMware Snapshot works?

- When you initiate the request to create, delete or revert snapshot operation via client (<u>Web</u> <u>Client</u>, <u>vSphere Client</u> or <u>Power CLI</u>), Request will be sent from the client to Server using VMware API
- Snapshot create, delete or revert request will be forwarded to the ESXi host, where that virtual machine is running. This process will happen only when initiating the snapshot create, delete or revert request from <u>vCenter Server</u>. This will be skipped, if you sent create snapshot request by directly connecting to the ESXi host.
- If you select snapshot with virtual machine's memory option, ESXi host writes the memory of the virtual machine to the disk. The virtual machine is stunned throughout the duration of time the memory is being written.
- If you select snapshot with the quiesce guest file system option, the ESX host requests the guest operating system to quiesce the disks via <u>VMware Tools</u>. Depending on the guest operating system, the quiescing operation can be done by the sync driver, the VM sync module, or Microsoft's Volume Shadow Copy (VSS) service.
- ESXi host makes the modification to the virtual machine's snapshot database file (.vmsd) and it reflects the changes in the snapshot manager of that virtual machine

ESXi host calls Virtual DISK API functions to make changes to the child disks (-delta.vmdk and .vmdk) files and to the disk chain.

When you create a snapshot, the state of the virtual disk at the time of snapshot is preserved and writes to the VMDK file is not allowed. The system creates an additional <u>VMDK</u> file called delta disk for each <u>VMDK disk</u> in the data store and allows writing any changes to that delta disk. The delta disk represents the difference between the current state of the virtual disk and the state that existed at the time the previous snapshot was taken.

If multiple snapshots are taken, Delta disks will be created for each of VM disk of the every snapshot and it can represent the difference between each snapshot.

When you delete the snapshot, The changes between snapshots and the previous disk states are merged and all the data from the delta disk that contains the information about the deleted snapshot is written to the parent VMDK disk. The amount of time it takes to commit or delete snapshots depends on how much data the guest operating system has written to the virtual disks, since the last snapshot was taken.

6 Virtual Machine Snapshot Files

Virtual machine snapshot consists of multiple files. Virtual Machine snapshot mainly includes the following:

Settings state: Virtual machine's settings (.nvram & .vmx) and power state

Disk State: State of the virtual machine's associated disks

Memory state: Contents of virtual machine's memory (Only if memory snapshot is selected)

Below are the some of the files which comprise of snapshot:

- VM_name.vmsd
- VM_name-snasphot#.vmsn
- VM_name-00000#.vmdk
- VM_name-00000#-delta.vmdk
- VM_name-snapshot#.vmem

Below is the comparison of virtual machine files in the virtual machine directory before and after creating the first snapshot of the virtual machine.



You can see the Delta disk information from the SSH session of ESXi host, when browsing towards the virtual machine directory.

total 557496	48		
-rw	1 root	root	69632 May 29 13:46 Redhat-1-000001-delta.vmdk
-rw	1 root	root	319 May 29 13:46 Redhat-1-000001.vmdk
-rw	1 root	root	4294967296 Apr 11 13:47 Redhat-1-06989cld.vswp
-rw-rr	1 root	root	552 Mar 12 03:22 Redhat-1-3c16a365.hlog
-rw	1 root	root	20535 May 29 13:46 Redhat-1-Snapshot1.vmsn
-rw	1 root	root	35433480192 May 29 13:02 Redhat-1-flat.vmdk
-rw	1 root	root	8684 May 29 13:46 Redhat-1.nvram
-rw	1 root	root	518 Apr 11 13:48 Redhat-1.vmdk
-rw-rr	1 root	root	448 May 29 13:46 Redhat-1.vmsd
-rwxr-xr-x	1 root	root	3520 May 29 13:46 Redhat-1.vmx
-rw	1 root	root	0 Apr 11 13:47 Redhat-1.vmx.lck
-rwxr-xr-x	1 root	root	3506 May 29 13:46 Redhat-1.vmx~
-rw	1 root	root	36864 May 29 13:46 Redhat-1 1-000001-delta.vmdk
-rw	1 root	root	323 May 29 13:46 Redhat-1 1-000001.vmdk
-rw	1 root	root	17179869184 May 29 13:45 Redhat-1 1-flat.vmdk
-rw	1 root	root	472 May 29 13:45 Redhat-1 1.vmdk
-IW	1 root	root	126888 Mar 12 03:22 vmware-1.log
-IW	1 root	root	151651 Mar 12 03:22 vmware-2.log
-rw-rr	1 root	root	158805 May 29 13:48 vmware.log
-IW	1 root	root	171966464 Apr 11 13:47 vmx-Redhat-1-110664733-1.vswp
·		1 - 1 -	

Let's discuss in detail about what does each of the snapshot file means and purpose of the each file.

6.1 .vmsd

- VM_name.vmsd is the snapshot list file and is created at the time that the virtual machine is created. It will be present in the virtual machine directory regardless of the snapshot is present or not for that virtual machine.
- .vmsd file **stores the names, description, and relationships** for all of the virtual machine's snapshots.

- It maintains snapshot information for a virtual machine so that it can create a snapshot list in <u>vSphere Web Client</u>. This information includes the name of the snapshot .vmsn file and the name of the virtual disk file.
- You can validate the size of the .vmsd file is grown after the snapshot is taken from the above screenshot which compares the files before and after VMware snapshot creation.

```
[root@mohammed-itlab-2:/vmfs/volumes/53a13705-230d87a8-0680-f4ce46b74698/Redhat-1] cat Redhat-1.vmsd
.encoding = "UTF-8"
snapshot.lastUID = "1"
snapshot.current = "1"
snapshot0.uid = "1"
snapshot0.filename = "Redhat-1-Snapshot1.vmsn"
snapshot0.displayName = "snap 1"
snapshot0.displayName = "snap 1"
snapshot0.createTimeHigh = "348329"
snapshot0.createTimeLow = "-370389417"
snapshot0.numDisks = "2"
snapshot0.disk0.fileName = "Redhat-1.vmdk"
snapshot0.disk0.fileName = "Redhat-1_1.vmdk"
snapshot0.disk1.fileName = "Redhat-1_1.vmdk"
snapshot0.disk1.fileName = "Redhat-1_1.vmdk"
```

6.2 -snasphot#.vmsn

- VM_name-snasphot.vmsn is the **snapshot state file** and is used to store the state of the virtual machine when a snapshot is taken.
- New .vmsn will be created for every snapshot and will be deleted when that snapshot is deleted
- Size of the .vmsn varies based on the option selected during snapshot creation. For example, If you have selected virtual machine's memory during snapshot creation, it increases the size of .vmsn file
- I have 2 snapshots called "Snap_1" & "Snap_2" for the virtual machine named "Redhat-1". It has 2 .vmsn files (Redhat-1-snapshot1.vmsn & Redhat-1-snapshot2.vmsn) is created in the virtual machine directory

napsnots for Reunat-1			
E-Cosnap_1	Redhat-1-Snapshot2.vmsn	20.07 KB	Snapshot file
🖻 🕜 snap_2	💿 Redhat-1-Snapshot1.vmsn	20.05 KB	Snapshot file

6.3 VM_name-00000#.vmdk

- VM_name-00000#.vmdk is the **disk descriptor file**. This small text file contains information about the snapshot and snapshot disks.
- It gets created for each of the VMDK files, when you take the snapshot. For example, In the below screenshot, I have VM called "Redhat-1" has 2 VMDK's (Redhat-1.vmdk & Redhat-1_1.vmdk), After taking the first snapshot called "Snap_1", It has created "Redhat-1-000001.vmdk & Redhat-1_1-000001.vmdk" and after second snapshot "Snap_1", It created "Redhat-1-000002.vmdk & Redhat-1_1-000002.vmdk"

Snapshots for Redhat-1	VM has 2 VMDK)	virtual disks (2	
🖻 🕜 snap_1 🛛 🙆 Redh	at-1_1.vmdk	16,777,220.00 K	Virtual Disk
🖻 🕜 snap_2 🛛 🚈 Redh	at-1.vmdk	34,603,010.00 K	Virtual Disk
	Totally 4 Snap created for 2	shot VMDK descriptor file disk and for 2 snapshots	e
🐣 Redhat-1_1-000001.vmdk	1,024.00 KB	16,777,220.00 KB Virtual Disk	
📇 Redhat-1_1-000002.vmdk	1,024.00 KB	16,777,220.00 KB Virtual Disk	
📇 Redhat-1-000001.vmdk	17,408.00 KB	34,603,010.00 KB Virtual Disk	
Redhat-1-000002.vmdk	17,408.00 KB	34,603,010.00 KB Virtual Disk	

Each VM_name-00000#.vmdk updates the information about its Parent disk information. For example, For the First snapshot, "Redhat-1-000001.vmdk" updated its **ParentFileNameHint** as the actual base disk (actual VMDK file).

After Second Snapshot, "Redhat-1-000002.vmdk" is updated with the ParentFileNameHint as "Redhat-1-000001.vmdk" which is the disk descriptor file created for a snapshot. So for the second Snapshot, Parent is the first snapshot and for the first snapshot, the parent is base disk.



When you checked from the **virtual machine properties** -> **Click on Hard Disk** -> you can see the Hard disk is mapped with the latest snapshot disk descriptor (VM_name-00000#.vmdk)

Redhat-1 - Virtual Machine	Properties	Virtual Machine Ver		
Show All Devices	Add Remove	Disk File	Redhat-1/Redhat-1-000002.vmdk	
Hardware	Summary			
Memory CPUs Video card VMCI device SCSI controller 0 CD/DVD drive 1	4096 MB 2 Video card Deprecated LSI Logic Parallel Client Device	Disk Provisioning Type: Provisioned Size: Maximum Size (GB):	Thick Provision Lazy Zeroed	
 Hard disk 1 Floppy drive 1 Network adapter 1 Hard disk 2 	Virtual Disk Floppy drive 1 DVPG-Isolated (DSwitc Virtual Disk	SCSI (0:0) Hard disk 1 Mode Independent	<u></u>	

6.4 VM_name-00000#-delta.vmdk

- VM_name-00000#-delta.vmdk is the **delta disk file**.
- State of each virtual disk of virtual machine is preserved, when you take a snapshot of a virtual machine.
- Virtual machine stops writing to its VM_name-flat.vmdk file and all the writes will be redirected to delta disk "VM_name-00000#-delta.vmdk.
- It gets created for each of the flat-vmdk file, when you take the snapshot.
- For example, In the below screenshot, I have VM called "Redhat-1" has 2 VMDK's (Redhat-1-flat.vmdk & Redhat-1_1-flat.vmdk), After taking first snapshot called "Snap_1", It has created "Redhat-1-000001-delta.vmdk & Redhat-1_1-000001-flat.vmdk" and after second snapshot "Snap_1", It created "Redhat-1-000002-delta.vmdk & Redhat-1_1-000002-delta.vmdk #

[^ ^		'vmfs/vol	.umes/53a13705-230d87a8-0680-f4ce46b74698/Redhat-1] ls -l grep delta
-rw	1 root	root	16846848 May 30 11:01 Redhat-1-000001-delta.vmdk
-rw	1 root	root	16846848 May 30 11:02 Redhat-1-000002-delta.vmdk
-rw	1 root	root	36864 May 29 13:46 Redhat-1 1-000001-delta.vmdk
-rw	1 root	root	36864 May 30 11:01 Redhat-1_1-000002-delta.vmdk

6.5 VM_name-snapshot#.vmem

- .vmem file will be created only you have selected the option "Snapshot Virtual machine's memory" during the snapshot creation.
- This file contains the **entire contents of the virtual machine's memory** at the time of snapshot creation

Vane Snap_3	
Description Description [/vmfs/vol -rw 1 root	umes/57e387f9-5aa5223a-c071-f4ce46b786d0/vc-demo-11 ls -1 grep mem 8589934592 May 28 08:33 vc-demo-1-Snapshot4.vmem
Snapshot the virtual machine's memory Quiesce guest file system (Needs VMware Tools installed) OK Cancel	

7 Managing VMware Snapshots

Snapshots tab allows you to manage the virtual machine snapshots such as Revert to (Go To), Edit Snapshot, Delete Snapshot, and Delete All Snapshots



In the Snapshot tab, you can perform the following actions:

• Edit Snapshot: Edit the snapshot name and description.

• **Delete Snapshot**: Removes the snapshot from the Snapshot Manager and consolidates the snapshot files to the parent snapshot disk and merge with the virtual machine base disk.

• **Delete All Snapshots**: Commits all the intermediate snapshots before the current-state icon (You Are Here) to the VM base VMDK file and removes all snapshots for that virtual machine.

• **Revert to**: Enables you to restore, or revert to, a particular snapshot. The snapshot that you restore becomes the current Snapshot.

We will discuss in In-depth Details of each of the above actions with various Scenarios.

7.1 Delete Snapshot

Delete Snapshot operation removes the snapshot from the snapshot manager and consolidates the snapshot files to the parent snapshot disk and merge with the virtual machine base disk. Let's look into the detailed information of delete Snapshot operation.

I have 2 VM snapshots "Snap_1" & "Snap_2" for the virtual machine "winsvr". If i delete the snapshot "Snap_2", It will consolidate the snapshot data to its parent snapshot (Snap_1) disk. In this Example, "Snap_1" is the Parent of Snapshot "Snap_2".

Before Deleting the Snapshot "Snap_2", Below are the size of each disks

Base Disk (Winsvr-flat.vmdk) -> 21.4 GB

Snap_1 Delta disk (winsvr-000001-delta.vmdk) -> 2.7 GB

Snap_2 Delta disk (winsvr-000002-delta.vmdk) -> 3.4 GB



To delete the Snapshot "Snap_2" Select the snapshot and click on "Delete"



Snapshot "Snap_2" is deleted and now VM has only one Snapshot "Snap_1"

🛃 Snapshots for winsvr	
Image: Singer and	

After the snapshot removal, Snap_2 data (3.4 GB) is consolidated into its parent snapshot disk (Snap_1 delta disk) and Snap_1 Delta disk (winsvr-000001-delta.vmdk) is grown from 2.7 GB to 6.3 GB.





7.2 Delete Intermediate Snapshot

When you delete a snapshot one or more levels above "You Are Here", The snapshot state is deleted and that data will be committed to the virtual machine base disk. Refer the Below example:

If you delete the snapshot "Snap_1", Snap_1 data (*winsvr-000001-delta.vmdk*) is committed to the Base disk (*winsvr-flat.vmdk*) and the foundation for the snapshot "Snap_2" will be retained.



Let's take a look at the step by step demo of deleting snapshot one or more level above "You are Here" state. I have currently 2 snapshots (Snap_1 & Snap_2) for the virtual machine "winsvr".

I also have created Folder "File1" before taking snapshot "Snap_1" and also created folders after creating each of the snapshots.

	Snapshots for winsvr	
	□-∰ winsvr □-@ Snap_1 □-@ Snap_2	Name Snap_2
File1		- Description
File after snap_1 File after snap_2		
	Go to Delete Delete All	Edit
		Close

In the below Screenshot, You can notice the 2 delta disks created as part of the Snapshot creation

Base disk -> winsvr-flat.vmdk

Snap_1 -> winsvr-000001-delta.vmdk

Snap_2 -> Winsvr-000002-delta.vmdk

I have also validated the actual usage of each of the above flat.vmdk and delta.vmdk using the below command:

du -h servername-flat.vmdk

total 310907	12		
-rw-rr	1 root	root	626736 Jun 1 12:52 vmware.log
rw	1 root	root	171966464 Jun 1 10:32 vmx-winsvr-3114084818-1.vswp
rw	1 root	root	2969653248 Jun 1 12:52 winsvr-000001-delta.vmdk
rw	1 root	root	315 Jun 1 12:29 winsvr-000001.vmdk
rw	1 root	root	2969653248 Jun 1 14:31 winsvr-000002-delta.vmdk
rw	1 root	root	322 Jun 1 12:52 winsvr-000002.vmdk
rw	1 root	root	32074 Jun 1 12:29 winsvr-Snapshot1.vmsn
rw	1 root	root	32065 Jun 1 12:52 winsvr-Snapshot2.vmsn
rw	1 root	root	8589934592 Jun 1 10:32 winsvr-b99d29d2.vswp
rw	1 root	root	42949672960 Jun 1 12:29 winsvr-flat.vmdk
rw	1 root	root	8684 Jun 1 12:53 winsvr.nvram
rw	1 root	root	521 Jun 1 10:52 winsvr.vmdk
rw-rr	1 root	root	668 Jun 1 12:52 winsvr.vmsd
rwxr-xr-x	1 root	root	3042 Jun 1 12:52 winsvr.vmx
rw	1 root	root	0 Jun 1 10:32 winsvr.vmx.lck
rw	1 root	root	3764 Jun 1 10:53 winsvr.vmxf
rwxr-xr-x	1 root	root	3042 Jun 1 12:52 winsvr.vmx~
root@mohamm	ed-itlab-3	:/vmfs/vol	lumes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-flat.vmdk
6.0G wins	vr-flat.vm	dk	
root@mohamm	ed-itlab-3	:/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000001-delta.vmdl
.8G wins	vr-000001-0	delta.vmdl	c
root@mohamm	ed-itlab-3	:/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000002-delta.vmdl
.8G wins	vr-000002-0	delta.vmdl	c · · · · · · · · · · · · · · · · · · ·
root@mohamm	ed-itlab-3	:/vmfs/vol	umes/57e38820_8c5f315a_b63b_f4ce46b786d0/winsvr1

du -h servername-00000#-delta.vmdk

To delete the Snap_1, Select the "Snap_1" and click on **Delete**.

Snapshots for winsvr	
□∰ winsvr □ⓒ Snap_1 □ⓒ Snap_2	Name Snap_1
You are here	Description
Go to Delete Delete All	Edit.
	Close

Once the snapshot "Snap_1" is deleted, I don't see the "Snap_1" delta disk "winsvr-000001delta.vmdk". As we stated earlier, When you delete a snapshot one or more levels above "You Are Here", The snapshot state is deleted and that data will be committed to the virtual machine base disk.

I have deleted the Snapshot "Snap_1" which had 2.8 GB of data. After the Snap_1 deletion, Snap_1

data is committed into the Base disk (winsvr-flat.vmdk) which was grown from 16 GB + 2.8 GB (Snap_1 data) = 18.7 GB



7.3 Delete VM Snapshot below "You are Here"

When you delete a snapshot one or more levels below "You Are Here", Subsequent snapshots are deleted and you can no longer return to those states. The snap_2 data is deleted.

For example, you have 2 snapshots (Snap_1 & Snap_2) and your current snapshot is Snap_2, When you revert your virtual machine to snap_1, Snap_2 snapshot data will be deleted and the virtual machine can no longer return to the state of Snap_2.



Recycle Bin	💕 Snapshots for winsvr	
File before Snap_1	Image: Singer 2 Image: Singer 2	*
	Go to Delete All	Edit

7.4 Delete All VM Snapshots

Prior to vSphere 4 update 2, **Delete All** Snapshots option from the Snapshot Manager would require additional space to perform the operation, in a case of committing multiple snapshots. When using **Delete All** in the Snapshot Manager, the snapshot furthest from the base disk is committed to its parent, causing that parent snapshot to grow. When that commit is complete, that snapshot is removed and the process starts over on the newly updated snapshot to its parent. This continues until every snapshot has been committed. This can lead to an aggressive use of additional disk space if the snapshots are large.

VMware Updated the algorithm of Delete All Snapshots, **Delete all** snapshots operation to commit every snapshot of the chain directly to the Base Disk(s) of the virtual machine. With this new **Delete all** algorithm,

- If the Base Disk is thick provision (pre-allocated), no extra space is required for the **Delete all** operation. The Base Disk will not grow as it is pre allocated or thick.
- If the Base Disk is thin provision (non-pre allocated), the base disk will grow only on committing information from the snapshots. Each thin provision disk may grow up to its maximum size as mentioned in the **Provisioned Size** option in the virtual machine settings for the disk.



All flat and delta files that are used by the chain of snapshots are locked.

I have 2 snapshots called "Snap_1" & "Snap_2". You can notice the delta files related to the snapshots. Before performing delete all operation of 2 snapshots. I have checked the actual usage of base disk and each delta disk of both snapshots

Base disk (winsvr-flat.vmdk) -> 23.4 GB

Snap_1 delta disk (winsvr-000001-delta.vmdk) -> 6.8 GB

Snap_2 delta disk (winsvr-000002-delta.vmdk) -> 3.4 Gb



To perform Delete All VMware Snapshot, Click on Delete All.

Recycle Bin		🛃 Snapshots for winsvr	_ 🗆 🗙
		Name Name Snap_1 Snap_2 Name Snap_2	
Snap_1	Snap_1	Description	1
File before Snap_2	File after Snap_2		<u> </u>
		Go to Delete All	Edit
			Close

Once Delete All operation is completed, I can notice that all the snapshot disks are committed to the virtual machine base disk (winsvr-flat.vmdk) and size of the base disk is grown from 23.4 GB to 33.2 GB (6.8 GB Snap_1 data + 3.4 GB Snap_2 data)

total 433408	24		
-rw-rr	1 root	root	739995 Jun 2 03:40 vmware-1.log
-rw	1 root	root	329700 Jun 2 10:31 vmware-2.log
-rw	1 root	root	406597 Jun 3 08:48 vmware.log
-rw	1 root	root	171966464 Jun 2 10:31 vmx-winsvr-3114084818-1.vswp
-rw-rr	1 root	root	13 Jun 3 08:47 winsvr-aux.xml
-rw	1 root	root	8589934592 Jun 2 10:31 winsvr-b99d29d2.vswp
-rw	1 root	root	42949672960 Jun 3 08:48 winsvr-flat.vmdk
-rw	1 root	root	8684 Jun 3 08:48 winsvr.nvram
-rw	1 root	root	544 Jun 3 08:47 winsvr.vmdk
-rw-rr	1 root	root	44 Jun 3 08:47 winsvr.vmsd
-rwx	1 root	root	3053 Jun 3 08:47 winsvr.vmx
-rw	1 root	root	0 Jun 2 10:31 winsvr.vmx.lck
-rw	1 root	root	3764 Jun 2 10:31 winsvr.vmxf
-rwx	1 root	root	3060 Jun 3 08:47 winsvr.vmx~
[root@mohamm	ed itlab 3	:/vmfs/vol	lumes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-flat.vmdk
33.2G wins	vr-flat.vm	dk	
[root@mohamm	od itlab 3	:/wmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvrl
			e na principal de la constance e

7.5 Revert to Snapshot

Revert to snapshot will restore your virtual machine to the state that they were in at the time when you took the snapshot. If you revert to the VMware snapshot, your virtual machine will be in a powered off state, unless you took the memory snapshot. Reverting the memory snapshot will revert the virtual machine to state and it also maintains the live power state also.

Let's see the step by step demo to understand the Revert to Snapshot option. I have created a Folder called "File 1" created on the desktop of the virtual machine. File 1 folder is 6.48 GB of Size before taking the snapshot.



I am creating the snapshot called "Snap_1"

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win2k12	Ĩ.		
insvr 🚮	Actions - winsvr	>	 Notes
Lab-B-isolated	Power Guest OS		
Other Labs	Snapshots	• 🔞	Take Snapshot
vSphere 6.5	🛃 Open Console	4	Revert to Latest Snapshot
🚯 Esxid-lab-2		G	Manage Snapshots

Specify the Snapshot name and description. I am taking the memory snapshot of the virtual machine to revert to live state of the virtual machine.

escription	Snapshot before deleting File 1 folder
Snapshot the	virtual machine's memory

Once the snapshot "Snap_1" is created the virtual machine, I am deleting the folder "File 1" from the desktop.



I have deleted the folder "File 1". Let's revert the virtual machine to the snapshot "Snap_1". To revert to the snapshot "Snap_1", Select the snapshot "Snap_1" and Click on "**Revert To**" to revert to the snapshot.

🔞 Manage VM Snapshots for winsvr		(?)
v 🖻 winsvr	Name	Snap_1
orig Snap_1 O You are nere	Description	Snapshot before deleting File 1 folder
	Created	Wednesday, May 31, 2017 9:20:15 PM
	Disk Usage	40.00 GB
	Console	
	Edit	
×		
Revert to Delete Delete All		Close

Click on "Yes" to confirm to revert to snapshot "Snap_1"



Revert to snapshot is completed successfully.

Task Name	Target	Status	
Revert snapshot	🗗 winsvr	✓ Completed	

Once Revert to the snapshot "Snap_1" is completed, Virtual machine "winsvr" is reverted to the state when you to took a snapshot. Since I have created a folder "File 1" prior to creating snapshot. File 1 reappeared on the desktop.

📒 File 1 Pro	perties	Snapshots for winsvr	
General Sh	aring Security Previous Versions (□-∰ winsvr	Name
1	File 1	Snap_1	Snap_1
Type:	File folder		Description
Location:	C:\Users\Administrator\Desktop		Snapshot before deleting File 1 folde
Size:	6.48 GB (6,966,008,380 bytes)		
Size on disk	:: 6.48 GB (6,968,410,112 bytes)		
Contains:	1,123 Files, 106 Folders		L

When you revert a virtual machine with snapshot, the current snapshot (delta disk) will be removed and a new one will be created linking to the parent disk.

For Example, I have only one snapshot "Snap_1" and it has its delta file called "winsvr-000001-delta.vmdk". After reverting the virtual machine to snapshot "Snap_1", winsvr-000001-delta.vmdk got deleted and new delta file called "winvr-000002-delta.vmdk is created.

-rw-rr	1 root	root	739995 Jun	2 03:40 vmware-1.log
-rw	1 root	root	329700 Jun	2 10:31 vmware-2.log
-rw	1 root	root	413686 Jun	4 06:43 vmware.log
-rw	1 root	root	171966464 Jun	2 10:31 vmx-winsvr-3114084818-1.vswp
-rw	1 root	root	Before Revening the Virtual Machine to	4 06:43 winsvr-000001-delta.vmdk
-rw	1 root	root	Snap 1, I have delta file	4 06:43 winsvr-000001.vmdk
-rw	1 root	root	called "winsvr-000001-	4 06:43 winsvr-Snapshot13.vmsn
-rw-rr	1 root	root	delta.vmdk	3 08:47 winsvr-aux.xml
-rw	1 root	root	8589934592 Jun	2 10:31 winsvr-b99d29d2.vswp
-rw	1 root	root	42949672960 Jur	n 4 06:43 winsvr-flat.vmdk
-rw	1 root	root	8684 Jun	4 06:43 winsvr.nvram
-rw	1 root	root	544 Jun	3 08:47 winsvr.vmdk
-rw-rr	1 root	root	371 Jun	4 06:43 winsvr.vmsd
-rwx	1 root	root	3060 Jun	4 06:43 winsvr.vmx
-rw	1 root	root	0 Jun	2 10:31 winsvr.vmx.lck
-rw After F	Dougating the	Virtual Ma	phine to enabel	2 10:31 winsvr.vmxf
[root@n"Cnon	1" Evicting	e vintual ivia	"wine to snapshot	5f315a-b63b-f4ce46b786d0/winsvr] ls -l
total 3 Shap		deleta nie	winsvi-000001-	
-rw-rdeita.v	mak is no i	onger exist	is and new delta	2 03:40 vmware-1.log
-rw file ca	lied "winsvr-	000002-de	Ita.vmdk" will get	2 10:31 vmware-2.log
-rw create	d			4 06:44 vmware.log
-rw				4 06:44 winsvr-000002-delta.vmdk
-rw	I TOOL	LOOL	SIS UUN	4 06:44 winsvr-000002.vmdk
-rw	1 root	root	32076 Jun	4 06:43 winsvr-Snapshot13.vmsn
-rw-rr	1 root	root	13 Jun	3 08:47 winsvr-aux.xml
-rw	1 root	root	42949672960 Jur	n 4 06:43 winsvr-flat.vmdk
-rw	1 root	root	8684 Jun	4 06:44 winsvr.nvram

7.6 Reverting VMware Snapshot One level above the Current Snapshot

Let's look at the scenario of Revert to the snapshot One level above the current snapshot. For Example, You have a virtual machine with 2 Snapshots "Snap_1" & "Snap_2". Snap_2 is the current snapshot. This scenario talks about reverting your virtual machine to Snapshot 1 "Snap_1" instead of recent snapshot "Snap_2".

-rw-rr		root	root	739995 Jun 2 03:40 vmware-1.log
-rw		root	root	303262 Jun 2 08:37 vmware.log
-rw		root	root	171966464 Jun 2 03:40 vmx-winsvr-3114084818-1.vswp
-rw		root	root	5788225536 Jun 2 08:35 winsvr-000001-delta.vmdk
-rw		root	root	315 Jun 2 08:14 winsvr-000001.vmdk
-rw		root	root	3758182400 Jun 2 09:28 winsvr-000002-delta.vmdk
-rw		root	root	322 Jun 2 08:36 winsvr-000002.vmdk
-rw		root	root	32060 Jun 2 08:14 winsvr-Snapshot6.vmsn
-rw		root	root	32110 Jun 2 08:35 winsvr-Snapshot7.vmsn
-rw		root		8589934592 Jun 2 03:40 winsvr-b99d29d2.vswp
-rw		root		42949672960 Jun 2 08:14 winsvr-flat.vmdk
-rw		root		8684 Jun 2 08:36 winsvr.nvram
-rw		root	root	544 Jun 2 08:08 winsvr.vmdk
-rw-rr		root		668 Jun 2 08:35 winsvr.vmsd
-rwx		root	root	3062 Jun 2 08:36 winsvr.vmx
-rw		root		0 Jun 2 03:40 winsvr.vmx.lck
-rw		root		3764 Jun 2 03:40 winsvr.vmxf
-rwx		root	root	3087 Jun 2 08:36 winsvr.vmx~
[root@mohamm	ed-i	tlah-3	·/wmfs/volu	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-flat.vmdk
21.4G wins	vr-f	lat.vm	dk	
[root@mohamm	ed-i	tlab-3	:/vmfs/volu	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000001-delta.vmdk
5.4G wins	vr-0	00001-	delta.vmdk	
[root@mohamm	ed-i	tlab-3	:/vmfs/volu	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000002-delta.vmdk
3.5G wins	vr-0	00002-	delta.vmdk	
[root@moltanum	ed-i	tlab-3	./vmfs/volu	mmes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr]

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Mastering VMware Snapshot www.vmwarearena.com Let's revert to the Snapshot 1 "Snap_1". Select the snapshot "Snap_1" and Click on "Go To" to revert the virtual machine to Snapshot 1.

		Papshots for winsvr	_ 🗆 ×
File before Snap_1	File after Snap_1	Image: Shap_1 Shap_1 Image: Shap_2 Shap_1 Image: Shap_2 Shap_1	
		Description —	-
File before Snap_2	File after Snap_2		
		Go to Delete All	dit
		C	lose

When reverting to the Snapshot 1 "Snap_1", All the files, folders and changes made after the Snapshot 1 will be lost. I don't see any of the folders created after Snapshot 1.



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An interesting fact is There is no longer "Winsvr-000002-delta.vmdk" delta file present and New delta file called "Winsvr-000003-delta.vmdk" is created.

	an Castalana		
-rw-rr	1 root	root	739995 Jun 2 03:40 vmware-1.log
-rw	1 root	root	329700 Jun 2 10:31 vmware-2.log
-rw	1 root	root	232912 Jun 2 10:33 vmware.log
-rw	1 root	root	171966464 Jun 2 10:31 vmx-winsvr-3114084818-1.vswp
-rw	1 root	root	5788225536 Jun 2 08:35 winsvr-000001-delta.vmdk There is no more "Winsvr-
-rw	1 root	root	315 Jun 2 08:14 winsvr-000001.vmdk
-rw	1 root	root	50417664 Jun 2 10:33 Winsvr-000003-delta.vmdk New delta file called "Winsvr-
-rw	1 root	root	315 Jun 2 10:31 winsvr-000003.vmdk 000003-delta.vmdk" is
-rw	1 root	root	32060 Jun 2 08:14 winsvr-Snapshot6.vmsn created
-rw	1 root	root	32110 Jun 2 08:35 winsvr-Snapshot7.vmsn
-rw	1 root	root	8589934592 Jun 2 10:31 winsvr-b99d29d2.vswp
-rw	1 root	root	42949672960 Jun 2 08:14 winsvr-flat.vmdk
-rw	1 root	root	8684 Jun 2 10:31 winsvr.nvram
-rw	1 root	root	544 Jun 2 08:08 winsvr.vmdk
-rw-rr	1 root	root	668 Jun 2 10:31 winsvr.vmsd
-rwx	1 root	root	3042 Jun 2 10:31 winsvr.vmx
-rw	1 root	root	0 Jun 2 10:31 winsvr.vmx.lck
-rw	1 root	root	3764 Jun 2 10:31 winsvr.vmxf
-rwx	1 root	root	3018 Jun 2 10:31 winsvr.vmx~
[root@mohamm		/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-flat.vmdk
21.4G wins	vr-flat.vm	dk	
[root@		/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000001-delta.vmdk
5.4G wins	vr-000001-0	delta.vmdk	
[root@		/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000003-delta.vmdk
[root@n		/vmfs/vol	umes/57e38820-8c5f315a-b63b-f4ce46b786d0/winsvr] du -h winsvr-000003-delta.vmdk
49.0M wins	vr-000003-0	delta.vmd	
[root Amohamm	od_i+lab_2	· / 100 Fc / 110]	11000/5700000 02540153 h63h f/20/6/70620/11100000 =

Virtual Machine VMDK also mapped with the newly created disk "winsvr-000003.vmdk"

🚰 winsvr - Virtual Machine Pre	operties	
Hardware Options Resources	vServices	Virtual Machine Version: 11 🥼
Show All Devices	Add Remove	Disk File
Hardware	Summary	
Memory CPUs Video card VMCI device SCSI controller 0 CD/DVD drive 1	8192 MB 2 Video card Deprecated LSI Logic SAS [Mohammed-ITlab-VPL	Disk Provisioning Type: Thin Provision Provisioned Size: 40 GB N/A Maximum Size (GB): N/A
Hard disk 1 Floppy drive 1 Network adapter 1	Virtual Disk Client Device DVPG-Isolated (DSwitc	SCSI (0:0) Hard disk 1

All the active writes to the virtual machine are passed to the newly created virtual machine. You can notice the new delta file 000003-delta.vmdk. New delta file is growing when new writes are coming. It has grown from 49 MB to 2.8 GB.

7.7 Snapshot Consolidation

Snapshot Consolidation is intended to resolve the problems that might occur with the snapshots. Snapshot consolidation is a **method to commit a chain of snapshots to base disks when Snapshot manager shows no snapshots** exist but the delta files are present in the virtual machine directory on the <u>datastore</u>.

Snapshot consolidation is a way to clean unneeded snapshot delta files from a datastore. Left out delta files may continue to grow until the virtual machine runs out of <u>datastore</u> space.

With snapshot consolidation, <u>vCenter Server</u> displays a warning when the descriptor and the snapshot files do not match. After the warning is displayed, the user can use <u>vSphere Web Client</u> or <u>vSphere Client</u> to commit the snapshots.

Getting S	Started Sumr	mary	Monitor	Configure	Permissions	Snapshots	Datastores	Netw
Issues	Performance	Task	ks & Events	Policies	Utilization			
44 All Io								
All IS	sues		Issue			Туре		
Trigg	jered Alarms		Virtu	al machine Cor	solidation Needed stat	tus Trigger	ed Alarm	
Aları	n Definitions		Virtu	al machine dis	ks consolidation is nee	ded. Configu	iration Issue	

To perform consolidation, Click on **Snapshot -> Consolidate**

File View	VM	Power Guest		b			
Recycle Bir		Snapshot Edit Settings Migrate		 Take Snapshot Revert to Current Snapshot Snapshot Manager 			
	6 8	Clone Template	F	Consolidate			

Click on "Yes" to confirm the consolidated operation.



8 Limitations of VMware Snapshot

Keeping snapshots for a **longer duration than recommended can affect the virtual machine performance** and VM snapshot is not supported for some disk types and VM configured with bus sharing. Let's understand what the limitation of Virtual Machine Snapshots is:

- VMware Snapshot is not supported for raw disks and RDM Physical mode disks. Snapshot is supported for RDM with virtual compatibility mode.
- VMware Snapshot does not support for independent disks. Virtual machines with independent disks must be powered off before you take a snapshot. Snapshots of powered-on or suspended virtual machines with independent disks are not supported.



- > Snapshots are not supported with PCI vSphere Direct Path I/O Devices
- VMware does not support snapshot for the guest operating systems that use an iSCSI initiator in the guest.
- > VMware Snapshots are not supported for a Virtual machine configured with bus sharing.

Show All Devices		Add Remove	SCSI Controller Type
Hard	ware	Summary	
an in	Memory	8192 MB	SCSI Bus Sharing
	CPUs	2	Set a policy to allow virtual disks to be used
	IDE 0	(No Settings)	simultaneously by multiple virtual machines.
	IDE 1	(No Settings)	
	PS2 controller 0	(No Settings)	Internet de la seconda de l
	PCI controller 0	(No Settings)	virtual disks cannot be shared between virtual machines
	SIO controller 0	(No Settings)	
	Keyboard	(No Settings)	C Virtual
	Pointing device	(No Settings)	Virtual disks can be shared between virtual machines
	Video card	Video card	On the Same Server
	VMCI device	Deprecated	C Physical
0	SCSI controller 0	LSI Logic SAS	Virtual disks can be shared between virtual machines
Q.	CD/DVD drive 1	[Mohammed-ITlab-VPL	on any server.

- Virtual machine with VMDK larger than 2 TBs, snapshot operations can take significantly longer to finish.
- Snapshot can negatively affect the virtual machine performance and Performance degradation is based on How long you keep the snapshot, depth of the snapshot tree and also based on the write rate of the virtual machine and its guest operating system have changed from the time you took the snapshot.
- Snapshots are not meant for a method of backup and recovery. The snapshot only provides a Point-in-time image. If the files containing a virtual machine are lost, its snapshot files are also lost.

9 Best Practices for VMware Snapshots

- VMware recommends only a maximum of 32 snapshots in a snapshot chain. However, for a better performance, use only 2 to 3 snapshots.
- Do not use a single snapshot for more than 24-72 hours. Keeping VMware snapshot for longer duration will negatively affect the virtual machine performance
- Snapshot file continuous to grow in size and when keeping snapshot for a longer duration, this can cause the data store to grow and even sometimes it causes outage due to datastore space issues.
- > Ensure snapshots are deleted after every backup, when using a third-party backup software.
- Effectively use vCenter Alarms to monitor the virtual machine snapshot and <u>monitor datastore</u> <u>space usage</u>
- You can also make use of <u>PowerCLI script</u> to report the virtual machine usage and the age of the virtual machine snapshot.

- Do not attempt to increase the disk space of the virtual machine disk, when Snapshot is present. Increasing the disk size, when snapshots are still available can corrupt snapshots and result in data loss.
- If you using vSphere version prior to <u>vSphere 5.0</u>, Ensure there are no snapshots prior to performing storage vMotion. <u>Storage vMotion</u> is supported for VM with snapshot after vSphere 5.0

10 VMware Snapshot Advanced Operations

10.1 Exclude Virtual Machine disk from VMware snapshot

We need to set the virtual disk to independent mode to exclude the disk from any snapshots. Power off the virtual machine and delete any existing snapshots before you change the virtual disk mode to Independent. Deleting a snapshot involves committing the existing data on the snapshot disk to the parent disk.

One of the real time uses I can think is ORACLE RAC. Oracle RAC VM's will have multiple disks and it will be shared between the cluster nodes and it will be kind of <u>Multi-writer enabled virtual</u> <u>disks</u>. When performing patching for the ORACLE RAC VM's, we used to configure all the shared disks as Independent persistent to exclude from the snapshot. So only OS disk will be included as part of snapshot operation.

To configure the virtual disk as Independent disk, **Right-click the virtual machine** -> **Edit Settings** -> **Virtual Hardware** ->Expand the Hard Disk -> **Select Independent -Persistent or Independent-Nonpersistent** -> Click on **OK**.

🔁 winsvr - Edit Settings		
Virtual Hardware VM Options	SDRS Rules vApp Options	
🕨 🛄 Hard disk 1	40 + GB +	
👻 🚐 *Hard disk 2	10 GB 👻	
Maximum Size	729.79 GB	
VM storage policy	Datastore Default	
Туре	Thick provision lazy zeroed	
Sharing	No sharing	
Disk File		
Shares	Normal 🚽 1000	
Limit - IOPs	Unlimited ·	
Virtual flash read cache	0 GB 🔹 Advanced	
Virtual Device Node	SCSI controller 0 🔹 SCSI(0:1) 💌	
Disk Mode (*)	Independent - Per 🔹 🕕	
▶ 🛃 SCSI controller 0	Dependent	
🕨 🧰 Network adapter 1	Independent - Persistent Independent Neprospint N8X-1)	
▶ i CD/DVD drive 1	Connect	
🕨 📻 Floppy drive 1	Client Device	
New device:	Select 🔻 Add	
Compatibility: ESXi 6.0 and later	(VM version 11) OK	Cancel

Independent-Persistent: Changes to the disk are immediately and permanently written to the disk as same like a conventional disk in the physical computer.

Independent-NonPersistent: Changes to the disk are discarded, when you power off or reset the virtual machine. Changes to the disk are written to and read from a redo log file that is deleted, when you power off or reset.

Show All Devices	Add Remove	Disk File
lardware	Summary	U winsvr,winsvr_1.vmak
Memory CPUs Video card VMCI device SCSI controller 0 CD/DVD drive 1 Hard disk 1 Floppy drive 1	8192 MB 2 Video card Deprecated LSI Logic SAS [Mohammed-ITlab-VPL Virtual Disk Client Device	Disk Provisioning Type: Thick Provision Lazy Zeroed Provisioned Size: 10 🔂 GB 💌 Maximum Size (GB): 739.79 Virtual Device Node SCSI (0:1) Hard disk 2
Hard disk 2	VPG-Isolated (DSwitc	 Mode Independent Independent disks are not affected by snapshots. Persistent Changes are immediately and permanently written the disk. Nonpersistent Changes to this disk are discarded when you power off or revert to the snapshot.

Even though I have virtual disks (Hard Disk 1 & Hard Disk 2) in the virtual machine "winsvr", It created only one delta file for the Hard Disk 1 and no delta file is created for the Hard Disk 2 because it is configured as Independent disk.

-rw-rr	1 root	root	739995 Jun 2 03:40 vmware-1.log
-rw	1 root	root	329700 Jun 2 10:31 vmware-2.log
-rw	1 root	root	439981 Jun 4 06:44 vmware-3.log
-rw	1 root	root	268460 Jun 4 07:07 vmware-4.log
-rw	1 root	root	280265 Jun 4 08:24 vmware.log
-rw	1 root	root	86016 Jun 4 16:40 winsvr-000001-delta.vmdk
-rw	1 root	root	315 Jun 4 16:40 winsvr-000001.vmdk
-rw	1 root	root	32280 Jun 4 16:40 winsvr-Snapshot15.vmsn
-rw-rr	1 root	root	13 Jun 4 07:30 winsvr-aux.xml
-rw	1 root	root	42949672960 Jun 4 08:24 winsvr-flat.vmdk
-rw	1 root	root	8684 Jun 4 08:24 winsvr.nvram
-rw	1 root	root	544 Jun 4 07:30 winsvr.vmdk
-rw-rr	1 root	root	472 Jun 4 16:40 winsvr.vmsd
-rwx	1 root	root	3264 Jun 4 16:40 winsvr.vmx
-rw	1 root	root	3764 Jun 4 07:07 winsvr.vmxf
-rw	1 root	root	10737418240 Jun 4 16:37 winsvr_1-flat.vmdk
-rw	1 root	root	470 Jun 4 16:37 winsvr 1.vmdk

10.2 Control Maximum of VMware Snapshot Per Virtual Machine

Even though The maximum supported amount of snapshots in a chain is **32**, It is recommended not to take more than 2 or 3 snapshots for production virtual machines. How do you control a maximum number of VMware snapshot per virtual machine? Currently, there is no way to control the maximum number of snapshot per virtual machine. There is an undocumented VMX entry as per <u>William Lam's article</u>, which can control the maximum number of snapshots per virtual machine.

To add the advanced configuration entry to control the maximum number of VMware Snapshot per Virtual Machine, **Right-click the Virtual Machine** -> **VM Options** ->**Edit Configuration**

🗇 winsvr - Edit Settings				?	1
Virtual Hardware	VM Options	SDRS Rules	vApp Options		
Power management		Exj	Expand for power management settings		
▶ Boot Options		Exp	oand for boot options		
+ Advanced					
Settings		Disable :	acceleration		
Debugging and	Istatistics	Run norma	illy	•	
Debugging and statistics Swap file location		 Default Use the machine Virtual m Store the machine Datastor Datastor Store the used for same di is not vis 	settings of the cluster or host containing the vir , achine directory swap files in the same directory as the virtual , e specified by host swap files in the datastore specified by the ho swap files. If not possible, store the swap files ectory as the virtual machine. Using a datasto ible to both hosts during vMotion might affect th performance for the affected virtual machines.	tual ost to be s in the re that he	Ð
Configuration P	'arameters		Edit Configuration		
Latency Sensitiv	vity	Normal	•		I
Fibre Channel N	NPIV	Ex	oand for Fibre Channel NPIV settings		

Mastering VMware Snapshot www.vmwarearena.com Click on Add Row -> Enter "**snapshot.maxSnapshots**" in the Field and Enter the number of snapshots in a unit in the Value column.

snapshot.maxSnapshots = n

In the below Screenshot, I have enter 3 to control the maximum number of a snapshot for the virtual machine to 3.

Configuration Parameters		-
Modify or add configuration parameters as ne support. Entries cannot be removed.	eded for experimental features or as instructed by	technical
Name	Value	
vmotion.checkpointFBSize	4194304	
vmotion.checkpointSVGAPrimarySize	4194304	
toolsInstallManager.lastInstallError	0	
svga.guestBackedPrimaryAware	TRUE	
tools.remindInstall	FALSE	
toolsInstallManager.updateCounter	1.	
vm.genid	-8789600715004459992	
vm.genidX	1744553582608019590	
sched.scsi0:1.throughputCap	off	
snapshot.maxSnapshots	3	
		*
		Add Row
	ок	Cancel

I already created 3 snapshots for the virtual machine "Winsvr".

Snapshots for winsyr		_ 🗆 >
⊡ ∰ winsvr ⊡ ∰ snap_1 ⊡ ∰ Snap_2	Name Snap_3	
You are here	Description	A
		_

When I tried to create the 4 snapshot for the virtual machine "winsvr". It throws the error "msg.snapsot.error-MAXSNAPSHOTS"

An error o See the e	An error occurred while taking a snapshot: msg.snapshot.error-MAXSNAPSHO See the error stack for details on the cause of this problem.						
Time:	6/4/2017 8:29:32	PM					
Target:	winsvr						
vCenter Se	erver:	1					
Error Stack	141 14 1 1						
1	while taking a snapshot: msg.sr	napshot.error-MAXSNAPSHOTS.					
n error occurred (
n error occurred v							
n error occurred (

So we are clear that we are able to control the maximum number of VMware snapshots per virtual machine using this advanced parameter.

10.3 Change default VMware Snapshot Location

In ESXi 5.0 and later, virtual disk redolog (-delta.vmdk) files for snapshots are placed in the same directory as the parent virtual disk (.vmdk) file. There are some situations like your <u>VMFS</u> <u>datastore</u> don't have enough storage to accommodate the **VM Snapshot** or you may not able to power on the VM due to insufficient space to hold your Swap file in the <u>VMFS datastore</u>. You may need to change the default location of your **VM snapshot** and point it to the different

datastore, where it has enough space to store your snapshot related files (virtual disk redolog (delta.vmdk). <u>Specifying the working directory for the virtual machine</u> will ensure that subsequently created VM snapshots cause new virtual disk redolog (-delta.vmdk) files to be created in the defined datastore.

We need to make the advanced configuration entry in.VMX file of your virtual machine. I have written detailed article to change the default snapshot location.

11 Monitor & Report VMware Machine Snapshots

11.1 Creating a vCenter Alarm to Monitor VMware Snapshot Usage

In a production environment, it is necessary to monitor and report the virtual machine snapshots usage information. I will explain the procedure the configure the <u>vCenter Server</u> alarm to monitor the usage of VMware Snapshot and what actions need to perform when a particular alarm is triggered. Let's see the step by step procedure how to configure vCenter alarm for snapshot usage.

To Configure vCenter Alarm -> Login to the vSphere Web Client -> Right-click the object you want to add the alarm -> Navigate to **Alarms** > **New Alarm Definition**.



Enter an alarm name and description. Select **Virtual Machines** from the Monitor drop-down. Select "**specific conditions or state, for example, CPU usage**" in the Monitor for an option. Select the checkbox " Enable this alarm" Click on Next.

name: Virtual Machine Snapshot Usage ription: or: Virtual Machines or or • • • • • • • • •
or: Virtual Machines v or for: • specific conditions or state, for example CPU usage
Specific event occurring on this object, for example VM Power On
able this alarm
n

In the Trigger Type drop-down, click VM Snapshot Size (GB).

New Alarm Definition				(?) >>
 ✓ 1 General ✓ 2 Triggers 	Trigger if ANY of the	following conditions are satis	fied:	
3 Actions	Trigger	Operator	Warning Condition	Critical Condition
	VM CPU Usage	▼ is above	75 % for 5 minutes	90 % for 5 minutes
	VM Hearbeat VM Max Total Disk Latency VM Memory Usage VM Network Usage VM Snapshot Size VM State			
			Back Next	Finish Cancel

Select "Is above" in the operator and Specify the Size in GB for warning condition and critical condition. Click on Next.

100.000					
1 General	Trigger if ANY 🔹 of t	ne following conditions are satis	sfied:		
2 Triggers	+ ×				
3 Actions	Trigger	Operator	Warning Co	ondition	Critical Condition
	VM Snapshot Size	is above	20	•	30 GB

Select the action you want to occur when the alarm is triggered. I am specifying the action to "send a notification email"

2 Triggers		ien uie	alarin state changes.				
3 Actions	Action		Configuration	⊘→⚠	<u>∧</u> +•	♦→ <u>∧</u>	<u>∧</u> →⊘
	Send a notification email	•			Once		
	Reset VM	*					
	Run a command						
	Send a notification email	2					
	Send a notification trap						
	Shutdown guest on VM						
	Suspend VM						
	Repeat actions every: 5	4 	minutes.				
	Email sender is not confi To receive an email when	gured. I the ala	arm triggers, configure vCen	ter Server and set the	mail sender.		

Specify the email address to send a notification email. You can specify the frequency of email for each of the change of alarm condition. Specify the duration of the repeat actions. Click on Finish to complete the alarm configuration.

New Alarm Definition						?		
1 General 2 Triggers	Specify the actions to take when the alarm state changes.							
3 Actions	Action	Configuration	⊘→▲	<u>∧</u> + ♦	0 → <u>/</u>	<u>^</u> +		
	Send a notification email	admin@vmwarearena.com	Once	Repeat	Once	Once		
	Repeat actions every: 30 Repeat actions every: 30 Email sender is not config To receive an email when t	 minutes. ured. he alarm triggers, configure vCenter \$ 	Server and set th	e mail sender.	Einis	cance		

11.2 Power CLI Script – Report Virtual Machines with 3 days older VM Snapshots

I have written an excellent article for the <u>PowerCLI script</u> which helps us to report the <u>Virtual</u> <u>Machines with 3 days older VM snapshots</u> and export the output in Excel (.CSV) file. It is always recommended not to keep VM snapshots more than 24- 72 hours. The VM snapshot file continues to grow in size when it is retained for a longer period. This can cause the snapshot storage location to run out of space and impact the system performance. This <u>PowerCLI script</u> could be really useful to identify the <u>Virtual machines with 3 days older snapshot</u> and delete them immediately or raise a concern to the respective team for the VMware snapshot deletion before VM snapshots cause outage to your production infrastructure.

The powerCLI script provides an output in CSV file in the below format. It provides the VM information, snapshot name and dates it is created. It reports the virtual machine with snapshots which are older than 3 days. As per VMware best practices, It is not recommended to keep the snapshots more than 24-72 hours. This script helps you to achieve the best practices for VMware Snapshot.

VM	Snapshot Name	Date Created
MD-lab-vc2	without vCenter Installation	3/4/2015 10:07
MD-sql-vc2	after SQL patching	6/19/2015 9:57

12 Managing VMware Snapshot from Command Line

vSphere Web Client and vSphere Client were always helpful but we need to also understand how to manage VMware snapshots operation from the ESXi host CLI. In this part, I will explain few of the general snapshot related operations from a command line. All the below operations are based on "vim-cmd". Before performing any operation on the virtual machine, we need to get the vmid of the virtual machine. To get the vmid of the virtual machine, Execute the below command

vim-cmd /vmsvc/getallvms

It will list the vmid, name of the virtual machine, vmx file location, Guest OS, hardware version and annotation if any. We need to make note of vmid to perform VMware snapshot related operation on that particular virtual machine.

				and the second	
Vmid	Name	File	Guest OS	Version	Annotation
10	MD-VC-1	[ISCSI-Datastore2] MD-VC-1/MD-VC-1.vmx	other3xLinux64Guest	vmx-10	VMware vCenter Server Appliance
3	vcsa-demo-1	[ISCSI-Datastore2] vcsa-demo-1/vcsa-demo-1.vmx	other3xLinux64Guest	vmx-10	VMware vCenter Server Appliance
7	App-1	[ISCSI Datatsore-1] App-1/App-1.vmx	windows7Server64Guest	vmx-13	
9	MD-PSC-1	[ISCSI-Datastore2] MD-PSC-1/MD-PSC-1.vmx	other3xLinux64Guest	vmx-10	VMware vCenter Server Appliance

12.1 Get Snapshot Details

To get the VMware snapshot details of the virtual machine, execute the below command:

vim-cmd /vmsvc/snapshot.get vmid

vim-cmd/vmsvc/snapshot.get 7

It will list the Snapshot name, Snapshot ID, Snapshot description, Date created on and snapshot state. We need Snapshot ID to any operation related to that snapshot.



12.2 Delete Snapshot

To delete the snapshot, first get the snapshot details using "snapshot.get" command and note down the snapshot ID. Execute the below command to delete the snapshot called "Snap_1" and Snapshot ID is "1".

vim-cmd /vmsvc/snapshot.remove VMID snapshotID

vim-cmd /vmsvc/snapshot.remove 7 1

Snapshot Name : Snap_1 Snapshot Id : 1 Snapshot Desciption : 6/5/2017 4:28:46 Snapshot State : powered off	
-Snapshot Id : 1 -Snapshot Desciption : -Snapshot Created On : 6/5/2017 4:28:46 -Snapshot State : powered off	
Snapshot Desciption : Snapshot Created On : 6/5/2017 4:28:46 Snapshot State : powered off	
-Snapshot Created On : 6/5/2017 4:28:46 -Snapshot State : powered off	
-Snapshot State : powered off	
root@esxid-lab-2:/vmfs/volumes/57e92b62-00e73b23-a484-005056be42f4/App-1] vim-	cmd /vmsvc/snapshot.remove 7 1
emove Snapshot:	
root@esxid-lab-2:/vmfs/volumes/57e92b62-00e73b23-a484-005056be42f4/App-1] vim-	cmd /vmsvc/snapshot.get 7

12.3 Create Snapshot

We can create the snapshot from the command line. Below is the command line format. We need to specify the snapshot name, snapshot description to create the snapshot. Optionally you can specify the snapshot option such as include memory snapshot and Quiesce file system. Use the below command to create the snapshot.

vim-cmd /vmsvc/snapshot.create vmid [snapshotName] [snapshotDescription] [includeMemory] [quiesced]

vim-cmd/vmsvc/snapshot.create 7 "snap_1" "snapbefore patching" 1 1



I can also confirm from the vSphere web client that "snap_1" is created from the above command.

🚯 App-1 🛛 💣 🕞 🔲 🧐 📇 🛛 🎯 Actions 🕶		±*
Getting Started Summary Monitor Configure Permissions	Snapshots Datastores Network	s Update Manager
🙀 🥒 🗙 🄯 All Actions 🗸	Snapshot details	
⇔los Snap_1	Name	Snap 1
o You are here	Description	snapbefore patching
	Created	Monday, June 5, 2017 5:12:17 AM
	Diskusage	10.00 GB
	Snapshot the virtual machine's memory	Yes
	Quiesce guest file system	No
	Console	

12.4 Revert to Snapshot

You can also revert to the snapshot from the command line. Execute the below command to revert to the snapshot. You need to specify the vmid snapshot ID and option to suppress the PowerOn of the VM.

vim-cmd vmsvc/snapshot.revert vmid snapshotID suppressPowerOn

vim-vmd vmsvc/snapsot.revert 7 2 1 or 0

Revert Snapshot:	
-ROOT	
Snapshot Name	: Snap_1
Snapshot Id :	2
Snapshot Desciption	: snapbefore patching
Snapshot Created On	: 6/5/2017 12:12:17
Snapshot State	: powered on

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12.5 Delete All Snapshots

You can perform the Delete All operation from command line as same as vSphere Web client and vsphere client. Just specify the VMID to delete all the snapshot of the virtual machine. No need to specify any snapshot related information.

vim-cmd /vmsvc/snapshot.removeall vmid

vim-cmd /vmsvc/snapshot.removeall 7

That's it. We are done with Delete All option. It consolidates all the snapshot data to the base disk.



13 What's new with Snapshot in vSphere 6 & vSphere 6.5

13.1 Changes to Consolidation procedure in vSphere 6.0

Prior to <u>vSphere 6.0</u>, Consolidation of virtual machine snapshot will create an additional helper snapshot and all the new I/Os will be redirected to this newly created snapshot. Once all the changes are stored in the snapshot disk have been merged into the base disk, the helper snapshot was also committed. Helper snapshot will also grow considerably during the consolidation operation. If the time to consolidate the helper is within a certain time-frame (12 seconds), the Virtual machine will be stunned and consolidate the helper snapshot into the base disk. If it was outside the acceptable time-frame (12 seconds), then the process will be repeated to create new helper snapshot while consolidation of helper snapshot is happening until the helper could be committed to the base within the acceptable time-frame.

If the Virtual machine has more I/O, This process could never successfully consolidate the snapshot chain and helpers.

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In <u>vSphere 6.0</u>, VMware introduced a new process for consolidation process which uses the mirror driver (which is same as in the <u>storage vMotion</u>). With this mirror driver mechanism, changes to the virtual machine are written to the active VMDK and the base disk (while protecting the written order) during consolidation. Snapshot consolidation will be completed now in 1 pass with minimal or indeed no helper disks. Consolidation duration is dramatically shorter stun time of the virtual machine. There is an excellent article from Cormac Hogan talking about this Consolidation changes in <u>vSphere 6.0</u>

13.2 Changes to Snapshot Format on VMFS 6 on vSphere 6.5

In vSphere 5.5 & <u>vSphere 6.0</u>, Snapshots taken on VMDK's larger than 2 TB are Space-Efficient Virtual Disk (SESPARSE) format. No user interaction is required. The redo logs are automatically created as SESPARSE instead of VMFSSPARSE (delta) when the base flat VMDK is larger than 2 TB. VMFS5 uses the VMFSsparse format for virtual disks smaller than 2 TB.

VMFSsparse is implemented on top of VMFS, and I/Os issued to a snapshot VM are processed by the VMFSsparse layer. Technically, VMFSsparse is a redo-log that starts empty, immediately after a VM snapshot is taken. The redo-log grows to the size of its base vmdk, when the entire vmdk is rewritten with new data after the VM snapshotting. This redo-log is just a file in the VMFS datastore. Upon snapshot creation, the base vmdk attached to the VM is changed to the newly created sparse vmdk. This is nothing but the Delta files.

From <u>vSphere 6.5</u>, SEsparse is a default format for all delta disks on the VMFS6 datastores. If you have VMFS 5 datastore on ESXi 6.5 hosts, Still it will be VMFSsparse (delta files). SEsparse is a format similar to VMFSsparse with some enhancements. This format is space efficient and supports space reclamation. With space reclamation, blocks that are deleted by the guest OS are marked and commands are issued to the SEsparse layer in the hypervisor to unmap those blocks. This helps to reclaim space allocated by SEsparse once the guest operating system has deleted that data.

When I create the Snapshot of the Virtual machine "vcsa-demo-1" which is running on ESXi 6.5 and VMFS 6, You can notice that delta disk format is "VMname-000001-sesparse.vmdk". I cannot find any delta disk with "vmname-000001-delta.vmdk"

total 249395	392		
-rw	1 root	root	54525952 Jun 5 04:23 vcsa-demo-1-000001-sesparse.vmdk
-rw	1 root	root	340 Jun 5 04:23 vcsa-demo-1-000001.vmdk
-rw-rr	1 root	root	90 Nov 23 2016 vcsa-demo-1-8c0e76be.hlog
-rw	1 root	root	8589934592 Nov 24 2016 vcsa-demo-1-8c0e76be.vswp
-rw	1 root	root	20713 Jun 5 04:23 vcsa-demo-1-Snapshot1.vmsn
-rw	1 root	root	12884901888 Feb 4 16:35 vcsa-demo-1-flat.vmdk
-rw	1 root	root	8684 Nov 23 2016 vcsa-demo-1.nvram
-rw	1 root	root	527 Nov 23 2016 vcsa-demo-1.vmdk
-rw-rr	1 root	root	1277 Jun 5 04:23 vcsa-demo-1.vmsd
-rwxr-xr-x	1 root	root	3768 Jun 5 04:23 vcsa-demo-1.vmx
-rw	1 root	root	12582912 Jun 5 04:23 vcsa-demo-1 1-000001-sesparse.vmdk
-rw	1 root	root	343 Jun 5 04:23 vcsa-demo-1 1-000001.vmdk
-rw	1 root	root	1845493760 Nov 22 2016 vcsa-demo-1_1-flat.vmdk
-rw	1 root	root	527 Nov 22 2016 vcsa-demo-1 1.vmdk
-rw	1 root	root	46137344 Jun 5 04:23 vcsa-demo-1 10-000001-sesparse.vmdk
-rw	1 root	root	346 Jun 5 04:23 vcsa-demo-1_10-000001.vmdk
-rw	1 root	root	10737418240 Jan 31 03:43 vcsa-demo-1_10-flat.vmdk
-rw	1 root	root	530 Nov 29 2016 vcsa-demo-1 10.vmdk
-rw	1 root	root	426770432 Jun 5 04:23 vcsa-demo-1_11-000001-sesparse.vmdk
-rw	1 root	root	347 Jun 5 04:23 vcsa-demo-1_11-000001.vmdk
-rw	1 root	root	107374182400 Jan 31 03:43 vcsa-demo-1_11-flat.vmdk
-rw	1 root	root	532 Nov 29 2016 vcsa-demo-1 11.vmdk
-rw	1 root	root	109051904 Jun 5 04:23 vcsa-demo-1 2-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_2-000001.vmdk
-rw	1 root	root	26843545600 Feb 4 16:18 vcsa-demo-1_2-flat.vmdk
-rw	1 root	root	529 Nov 23 2016 vcsa-demo-1_2.vmdk
-rw	1 root	root	109051904 Jun 5 04:23 vcsa-demo-1_3-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_3-000001.vmdk
-rw	1 root	root	26843545600 Feb 3 17:02 vcsa-demo-1_3-flat.vmdk
-rw	1 root	root	529 Nov 24 2016 vcsa-demo-1_3.vmdk
-rw	1 root	root	46137344 Jun 5 04:23 vcsa-demo-1_4-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_4-000001.vmdk
-rw	1 root	root	10737418240 Feb 4 16:35 vcsa-demo-1_4-flat.vmdk
-rw	1 root	root	529 Nov 23 2016 vcsa-demo-1_4.vmdk
-rw	1 root	root	46137344 Jun 5 04:23 vcsa-demo-1_5-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_5-000001.vmdk
-rw	1 root	root	10737418240 Feb 4 16:35 vcsa-demo-1_5-flat.vmdk
-rw	1 root	root	529 Nov 23 2016 vcsa-demo-1_5.vmdk
-rw	1 root	root	67108864 Jun 5 04:23 vcsa-demo-1_6-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_6-000001.vmdk
-rw	1 root	root	16106127360 Feb 4 16:35 vcsa-demo-1_6-flat.vmdk
-rw	1 root	root	529 Nov 23 2016 vcsa-demo-1_6.vmdk
-rw	1 root	root	46137344 Jun 5 04:23 vcsa-demo-1_7-000001-sesparse.vmdk
-rw	1 root	root	344 Jun 5 04:23 vcsa-demo-1_7-000001.vmdk
-TM	1 root	root	10/3/418240 Feb 4 16:33 vcsa-demo-1 7-flat.vmdk

I took the snapshot of the virtual machine "App-1" which is running on ESXi 6.5 but on datastore with VMFS 5. It has delta file with the format "vmname-000001-delta.vmdk". For sparse, We need to have VMFS 6 datastore even running on ESXi 6.5

total 104878	16			
-rw	1	root	root	24576 Jun 5 04:28 App-1-000001-delta.vmdk
-rw	1	root	root	313 Jun 5 04:28 App-1-000001.vmdk
-rw-rr	1	root	root	297 Feb 24 11:26 App-1-33d8a0a0.hlog
-rw	1	root	root	10299 Jun 5 04:28 App-1-Snapshot1.vmsn
-rw	1	root	root	10737418240 Feb 24 11:26 App-1-flat.vmdk
-rw	1	root	root	490 Feb 24 11:26 App-1.vmdk
-rw-rr	1	root	root	364 Jun 5 04:28 App-1.vmsd
-rwxr-xr-x	1	root	root	1990 Jun 5 04:28 App-1.vmx
[root@esvid-	1ah	-2 · / 17mf :	s/volumes/	57e92b62-00e73b23-a484-005056be42f4/App-1] vmware -v
Mware ESXi	6.5	0 build	4-4564106	

13.3 Storage vMotion of VM with Snapshot from VMFS 5 to VMFS 6 Datastore

I took the snapshot of the virtual machine "App-1" which is running on ESXi 6.5 but on datastore with VMFS 5. It has delta file with the format "vmname-000001-delta.vmdk"

-rw	1	root	root	24576 Jun 5 04:28 App-1-000001-delta.vmdk
-rw	1	root	root	313 Jun 5 04:28 App-1-000001.vmlk
-rw-rr	1	root	root	297 Feb 24 11:26 App-1-33d8a0a0.hlog
-rw	1	root	root	10299 Jun 5 04:28 App-1-Snapshot1.vmsn
-rw	1	root	root	10737418240 Feb 24 11:26 App-1-flat.vmdk
-rw	1	root	root	490 Feb 24 11:26 App-1.vmdk
-rw-rr	1	root	root	364 Jun 5 04:28 App-1.vmsd
-ruyr-yr-y	1	root	root	1990 Jun 5 04:28 App-1. vmx

VM "App-1" is running on the Datastore with VMFS 5.

Navigator 📕	🚯 App-1 🛛 🛃 🕞 🔲	🐑 📇 🔯 Actions	*	
A Back	Getting Started Summary	Monitor Configure	Permissions Snapsho	s Datastores
Image: Constraint of the second s	Datastores			
esvid-lab_1 md lab	Name	1 A Status	Туре	
sxid-lab-2.md.lab	ISCSI Datatsore-1 Solution VMFS 5			
App-1				

Let's migrate the VM with a snapshot from VMFS 5 to VMFS 6 datastore.

1 Select the migration type 2 Select storage	Select storage Select the destination stor	age for the virtual machine	migration.					
3 Ready to complete	Select virtual disk format:	Same format as source		•)			
	VM storage policy:	Keep existing VM storage	policies		0			
	The following datastores virtual machine configurat	are accessible from the de tion files and all of the virtu:	stination resou al disks.	urce	that yo	u selected. Selec	the destination d	atastore for the
	Name	Capacity	Provisione	d		Free	Туре	Cluster
	Compatible	999.75 GB	405.62 0	ЗB		653.13 GB	VMFS 5	
	ISCSI-Datastore2	799.75 GB	799.75 GB 784.72 GE			252.93 GB	VMFS 6	
	datastore1 (1)	32.50 GB	972.00 N	1B		31.55 GB	VMFS 5	
	4					1977		
								Advanced
	Compatibility							
	Compatibility checks	succeeded.						

Storage vMotion of the virtual machine "App-1" is completed.

Task Name	Target	Status	
Relocate virtual machine	App-1	 Completed 	

Virtual machine with snapshot is running on VMFS 6

Back	Getting Started Summary	Monitor Configure	Permissions Snapsho	batastores
Image: Image of the second	Datastores	e Files 😋 Refresh C	apacity Information 🛭 🗃 Inc	rease Datastore (
≂ 🗐 Demo-Cluster	Name	1 A Status	Туре	Da
强 esxid-lab-1.md.lab	ISCSI-Datastore2	📀 Normal	VMFS 6	
🚮 App-1				
局 DB-1				

Prior to Storage vMotion to VMFS 6 datastore, delta files was in VMFSsparse format (VMname-000001-delta.VMDK). After Storage vMotion to VMFS 6 datastore, delta file is changed to SEsparse (VMname-000001-sesparse.VMDK)

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total 147978	88					
-rw	1 root	root	46137344 J	un	6 05:	:26 App-1-000001-sesparse.vmdk
-rw	1 root	root	328 J	un	6 05:	:26 App-1-000001.vmdk
-rw-rr	1 root	root	946 J	un	6 05:	:26 App-1-241118c2.hlog
-rw	1 root	root	4294967296	Jun	6 05	5:26 App-1-8c028400.vswp
-rw	1 root	root	19811 J	un	6 05:	:26 App-1-Snapshot1.vmsn
-rw	1 root	root	13 J	un	6 05:	:26 App-1-aux.xml
-rw	1 root	root	10737418240	Jun	6 0	05:26 App-1-flat.vmdk
-rw	1 root	root	8684 J	un	6 05:	:26 App-1.nvram
-rw	1 root	root	490 J	un	6 05:	:26 App-1.vmdk
-rw	1 root	root	364 J	un	6 05:	:26 App-1.vmsd
-rwxr-xr-x	1 root	root	2789 J	un	6 05:	:26 App-1.vmx
-rw	1 root	root	0 J	un	6 05:	:26 App-1.vmx.lck
-rwxr-xr-x	1 root	root	2765 J	un	6 05:	:26 App-1.vmx~
-rw	1 root	root	208506 J	un	6 05:	:26 vmware-0.log
-rw	1 root	root	184104 J	un	6 05:	:26 vmware-1.log
-rw-rr	1 root	root	159938 J	un	6 05:	:26 vmware.log
-rw	1 root	root	115343360 J	un	6 05:	:26 vmx-App-1-2348975104-1.vswp

Similar to that, When a VM with a vmdk of the size smaller than 2 TB is migrated to VMFS5, the snapshot format changes to VMFSsparse. You cannot mix VMFSsparse redo-logs with SEsparse redo-logs in the same hierarchy.

We are reaching the end to this deep dive eBook to master VMware Snapshot. I hope that I have covered almost all aspects of VMware Snapshots and its terminologies and will update the eBook regularly if any new changes to VMware Snapshot. I hope this is informative for you. Thanks for Reading!!!. Be social and share it with social media, if you feel worth sharing it.









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