VMware® View Composer Design Considerations

VMware View 3

As enterprises explore desktop virtualization, they realize that it offers a simplified IT structure and cost-effective IT utilization and management. VMware View Composer, introduced with VMware View 3, further enhances this value proposition.

VMware View Composer is a component of VMware View. It works with VMware View Manager to reduce storage requirements and enhance the image management capability of virtualized desktops.

This document describes deployment and design considerations you should account for before deploying View Composer in your enterprise. View Composer integrates with various components of your IT and virtualization infrastructure, and it is very important to understand the design choices covered in this paper in order to achieve the desired savings and performance from the system.

This paper is for readers who have a good understanding of the components involved in a View deployment and have some basic knowledge of how VMware View Composer works. For more details about VMware View Composer, see "VMware View Composer Information Guide" (http://www.vmware.com/files/pdf/View_Composer_wp.pdf).

This paper covers the following topics:

Overview of VMware View Composer

VMware View Composer is a software product that is part of the premier bundle of VMware View 3. VMware View Composer offers you key benefits such as storage reduction, better image management, and rapid deployment capabilities for virtualized desktops. Although precise storage savings vary, VMware View Composer reduces duplicate storage footprint of virtual machines in a way that is transparent to the virtual machines. To achieve this result, VMware View Composer allows multiple virtual machines to share common data in a single base disk while maintaining separate storage for the data written by each virtual machine.

This section provides a summary of the architecture of VMware View Composer to help you understand the reasoning behind the recommendations made in later sections of the paper.

Parent Image and Replica

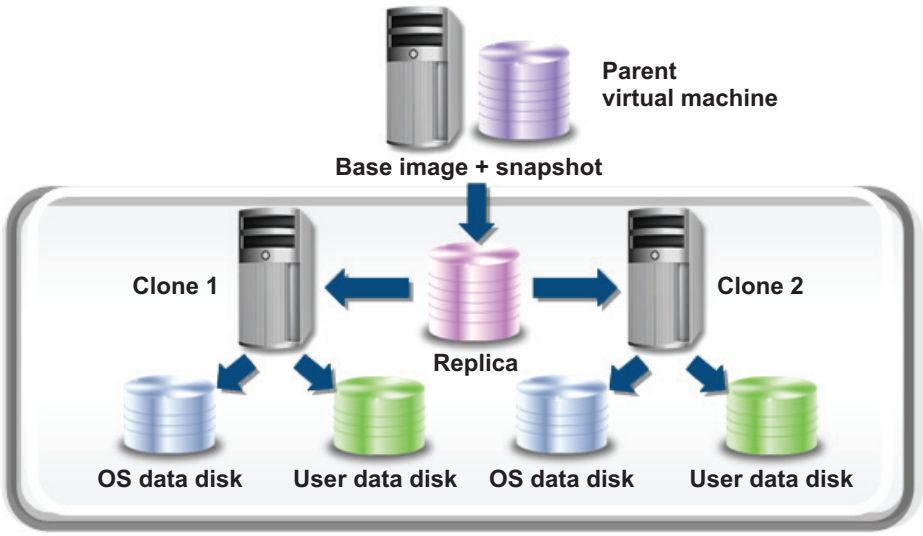
View Composer creates linked clones, which are linked to a full clone virtual disk called a *replica*. View Composer creates replicas on a per-LUN (logical unit number) basis, so that each LUN used for desktop creation and storage holds a replica. Understanding this approach can help you answer many questions, including:

- How many virtual machines can you have per parent image?
- How many virtual images can you have per datastore?
- How large a datastore do you need to store virtual machine system disks and user data disks?
- How do you deliver applications to the virtual desktop?

View Composer creates a replica for each variant of the desktop image used in your deployment. For example, if you deploy two types of desktops, one with Windows XP and other with Windows Vista, on a single LUN, View Composer creates two replica disks on that LUN, one for each image type.

The View Composer replica mechanism helps linked clones to scale up in large environments and makes it easier to install patches by updating the parent virtual machine. The replica is also protected from being erased from VMware vCenter. This protection is critical, because if a replica is deleted, the linked clone desktops based on that replica are no longer available.

Figure 1. Parent and Replica Disks



User Data Disks

When you use View Composer to provision desktops, you have the option of creating a separate *user data disk* for each virtual desktop instance. A user data disk is a separate storage location attached to the desktop image when the image is created.

In a configuration with a user data disk, the guest agent in the virtual machine redirects the user's profile and application data to a second virtual disk and ensures that each user's personal settings and data are restored at boot time. This approach can be useful because after you update a master image, the system restores user profile data to maintain continuity. The user data disk approach resembles a locally cached profile in that the profile is not stored centrally.

Image and Storage Management with View Composer

View Composer offers the following operating system image management capabilities:

- Recompose image—The recompose function allows you to update the parent virtual machine and push the new version of the image out to all or a subset of users and desktops.
- Refresh image—Refresh is the process of resetting linked clones to the initial state of the parent virtual machine without adding additional software or patches or making other changes.
- Rebalance—Rebalance is the process by which selected virtual machines are recreated on a new datastore. This operation also refreshes the desktop.

View Composer Deployment Considerations and Best Practices

Follow the guidelines in this section for best results in designing and implementing your View Composer deployment.

Storage Considerations with View Composer

Take the following points into consideration when you plan storage for your VMware View deployment:

- VMware recommends that you run a maximum of 64 virtual machines per replica. Having more virtual machines may cause storage bottlenecks in the storage I/O subsystem. You should allocate enough space on the datastore to accommodate 64 virtual machines. You need to account for virtual machine growth when choosing the size for this datastore. A virtual machine can grow for various reasons, including growth of the page file and temporary files. You may need to do some modeling during the pilot phase to understand system growth in your environment.
- It is a best practice to refresh the virtual machines regularly to maintain healthy desktop performance. Growth in the system disk can cause performance to drop below optimal levels. You can perform the refresh operation to clean up the bloated system disk based on:
  - Percentage growth of the system disk—Select this option if storage space is limited and needs to be replenished quickly.
  - Time since last refresh—Select this option if you are not worried about exhausting the disk space between your refresh operations.

  VMware recommends that you stagger refresh and recompose operations. View Composer is designed to perform image management (refresh and recompose) operations on only a few desktops at a time. If you perform these operations on a large number of desktops and a failure occurs, the whole operation is halted. By breaking the image management operation into smaller chunks, you allow the desktops to recover if there is a failure while you are performing a refresh on a batch of desktops.VMware recommends a batch of up to 100 desktops for a refresh and recompose.
- VMware recommends that you keep all the desktops in a particular desktop pool (for example, the finance pool) contained within the same datastore (LUN). Splitting desktops from a particular pool across LUNs reduces the total storage saving you can gain by using View Composer because View Composer must create multiple replicas, one for each datastore.
- You can use local disks in View Composer as inexpensive disk space, but you can do this only when the ESX host is not in cluster mode. This configuration can be useful if you want to use the local drives built into the server.
- You should take care not to allow free space on the datastore to fall below 5 percent. Inadequate free space can cause the virtual machines to halt when the virtual machines do not have enough space to grow.

Storage Overcommitment

VMware recommends that you use a conservative setting for storage overcommitment in most deployments. Modeling and sizing your environment is the best way to understand when you can use the other options, based on the data presented below.

Storage overcommitment settings determine how aggressively View Composer allocates virtual machines to available free space. The more aggressive the overcommitment setting, the higher the number of virtual machines that are placed on a datastore. As more virtual machines are assigned to the available free space, less space remains available to accommodate the growth of virtual machines over time, so you need to manage your storage environment actively to ensure that you do not run out of space. In nonpersistent desktop use cases, this is less of an issue than it is in use cases with persistent desktops.

Infrastructure Optimization with View Composer

Take the following points into consideration when you configure the environment in which you use View Composer:

- Create a separate Active Directory container for virtual desktops based on the organizational unit (OU) for those desktops. If the desktop administrator has OU administrator privileges, the desktop administrator can provision desktops without domain administrator privileges. If there is a change in the active directory administrator credentials, the desktop administrator must update the credential information in View Composer, as well.
- Once you create the path and folder information for the virtual machines, you should not change it within vCenter. Any changes you make in vCenter will cause problems for VMware View Manager when it attempts to look up virtual machines in vCenter. If changes are needed, it is a best practice to change the folder information from View Manager administrator interface.
- When creating more than 120 virtual machines as desktops, make sure to edit the vSwitch settings on the ESX host to accommodate the number of ports needed for the virtual machines. By default ESX is configured for 120 ports.
- View Composer relies on dynamic name resolution for communicating with other hosts. Making sure that DNS resolution is operating correctly will help overcome intermittent issues that might otherwise be seen because of DNS errors. As a test, ping the AD server and the View Connection Server host by name to test DNS operation.
- VMware highly recommends that you use such VMware Infrastructure features as VMware Distributed Resource Scheduler (DRS). DRS ensures that virtual machines are distributed efficiently among your hosts.
- VMware recommends that you stagger run times for your antivirus software. If the antivirus software runs inside all linked clones at the same time, you see excessive IOPS in your storage subsystem.
- When deploying the desktops in a resource pool, be sure that your VMware Infrastructure environment has enough compute resources (CPU and memory) to host the required number of desktops. Currently there is no way to tell if a resource pool is available or full from the VMware View Administrator portal.
- When using View Composer, pay attention to the limit of eight hosts per cluster. You may need to build many such eight-host clusters for a larger environment.
- VMware recommends that you back up the ADAM database manually on a regular basis.

Guest Operating System Optimization with View Composer

Take the following points into consideration to optimize the guest operating systems you use with View Composer:

- Applications are best delivered to users via VMware ThinApp™ application virtualization or by installing them inside the parent image for that desktop pool. If you need to personalize particular applications so they perform correctly, you can use the customization script functionality in View Composer or use profile management tools that are provided by VMware technology partners.

Utilizing VMware ThinApp in conjunction with View Composer gives you the option of using user data disks to provide logical separation of application and user storage from the operating system. By default, VMware ThinApp places the application sandbox in the `%AppData%` location to be stored on the user data disk. For applications that write specifically to the `C:` drive, use the **Write-Copy Isolation** mode setting to contain those writes to the users sandbox on the user data disk. This approach redirects the dynamic changes of the applications and user-specific settings into the sandbox where they persist through a refresh of the operating system. For details, see the ThinApp product documentation (http://www.vmware.com/support/pubs/thinapp_pubs.html).

- Patching is best done using the recompose feature. If you patch using any other mechanism, you run the risk of increasing the size of the virtual machine system disk more quickly than necessary. Also, using any other method limits your ability to use refresh and recompose tools because any patches applied using other means are lost after a refresh or recompose.
- Consider either moving the page file off of the system disk or disabling the page file if you believe that it has minimal impact on application performance. This change helps slow the growth of the virtual machine. Some applications perform poorly when the page file does not exist.
- You should disable the user privileges that allow users to defragment disks in the virtual machine. Defragmentation can increase the size of the system disk quickly.

User Data Disk and Backup

Take the following points into consideration when you configure and manage user data disks:

- View Composer creates the user data disk when the desktop is provisioned and destroys it when the desktop is deleted from the datacenter. Take care to preserve the user data and profiles stored on this disk in case they are needed after the desktop is removed. As a best practice, you should keep the user data disk on a datastore separate from the virtual machine system disk. This allows you to back up the whole LUN that holds user data disks. You should back up the datastore that holds user data disks regularly.
- You should save data on the mapping of users to virtual machines on a regular basis. This information is also available in the ADAM database, and you can achieve the goal of saving the mapping data by backing up the ADAM database at regular intervals.
- You should use scripting tools to prepare for the possibility of virtual machine failure. If one virtual machine fails, your script should associate the user data disk with the new virtual machine created to replace it. For steps to restore the user data disk, see "Appendix: Associating a User Data Disk with a New Linked Clone" on page 6.
- Size the user data disk before creating desktop pools. View Composer allows only one user data disk per virtual machine. Once the user data disk is provisioned, it cannot be expanded dynamically.

NOTE Although most applications write to the redirected folder to save their settings, some applications might continue to write application settings to the system disk (`C:\`). These applications do not function properly after a refresh and recompose operation. You should test the applications used in your desktops to avoid problems in production.

View Composer and Array-based Cloning

Many storage vendors have developed deduplication technologies that can create similar linked clones—and in some cases, virtual machines—within a storage array. This cloning technology offers rapid provisioning of a large number of individual virtual machine desktops. These array-based solutions are not currently integrated with View Manager and require several manual steps or scripting to create and integrate virtual machines with VMware View before the virtual machines are ready for use. Virtual machine images must be created within the array, registered with vCenter, and then added to View Manager as a manual desktop pool. Some VMware storage partners provide management tools that automate the creation of these clones for import into VMware View Manager. See your storage vendor for details.

Conclusion

View Composer provides capable image management tools that help you perform patch and operating system management. Features such as refresh and recompose offer extra flexibility. Because View Composer is integrated with View Manager, it is easy to use as well as powerful.

To best take advantage of the very powerful tools in View Composer, you should invest time and thought in planning before you deploy View Composer. Understanding the way View Composer interacts with the rest of the infrastructure helps you leverage these tools without causing problems after the deployment is fully operational.

About the Author

Anjan Srinivas is part of the Technical Marketing team in the Desktop Business Unit, where he is chartered to enable customer adoption of desktop virtualization technologies. Anjan's VMware Infrastructure expertise includes the areas of security, networking, View Composer, and View Manager. In the past he worked with Cisco Systems and Aruba Networks.

Appendix: Associating a User Data Disk with a New Linked Clone

Take the following steps to associate an existing user data disk with a new linked clone desktop. You can script all of these steps if you know the mapping of user to virtual machine.

1 Power down the original linked clone that is using the user data disk.

2 Power down a spare linked clone in the same pool.

3 In vCenter, detach the user data disk from the original clone.

4 Remove the blank user data disk in the spare linked clone and attach the original user data disk.

5 In View Manager, delete the original linked clone

6 Use the `vdmadmin` command line option to assign the spare virtual machine to the user directly. The format of the command is:

```
vdmadmin –L –d <desktopname> –m <machinename> –u <username>
```

7 Perform a refresh operation on the newly assigned virtual machine in View.

8 Power on the new linked clone.

9 Log in as the user. The desktop of the new linked clone appears with profile redirection working. The files on the original user data disk show up under My Documents.

If you have comments about this documentation, submit your feedback to: docfeedback@vmware.com

VMware, Inc. 3401 Hillview Ave., Palo Alto, CA 94304 www.vmware.com

Revision: 20090312 Item: BP-088-PRD-01-01