

VMware® Infrastructure 3

Advanced Technical Design Guide

~and~

Advanced Operations Guide

Two books in one!



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Chapter 4: VirtualCenter

In this chapter I will look at the setup and configuration of VMware's VirtualCenter and Licensing Server. VirtualCenter is the most common method of managing many ESX servers and the VMs that run on them. I will also explain how VirtualCenter will enable you to organize your virtual infrastructure in a way that facilitates administration and delegation of responsibility. Additionally, I will discuss the configuration of VirtualCenter in terms of its own fault-tolerance. I will be covering a number of common best practices and addressing all of the most common questions surrounding implementing VirtualCenter.

VirtualCenter is a management application which runs solely on Windows. It allows you to manage several ESX hosts in a single Window. It has a number of key features that makes it a must have for even modest sized- implementations. Without VirtualCenter, these tasks can be completed but frequently they are much harder to execute and less flexible. To appreciate this you really need a list of features that are available only if you have VirtualCenter and the appropriate add-ons:

- Centralized License Management
- Microsoft User Accounts
- Templates and Template Management
- Cold Migrations and Hot Migration (VMotion)
- VMware DRS
- VMware HA

VirtualCenter is a database application, in that it stores its information in a database backend. This can be either:

- Microsoft SQL 2000 with Service Pack 4
- Microsoft SQL 2003 (supported with VirtualCenter 2.0.1 or higher)
- Oracle 9iR2, 10gR1 (versions 10.1.0.3 and higher only, and 10gR2)
- MSDE 2000 (Rel A)

Out of these four different database engines only SQL and Oracle have full support from VMware. MSDE is offered for test and development environments only. It is freely distributable and has been copied to the VirtualCenter CD, so there is no need to download it from Microsoft's website. One big reason to avoid MSDE at all costs (even in a test and development environment) is what happens to the VirtualCenter MSDE database during upgrades from VirtualCenter 2.0.0 to VirtualCenter 2.0.1. The database is re-initialized meaning your previous work in VirtualCenter is lost, and you have to recreate everything you see in VirtualCenter by hand. Perhaps VMware will modify this in future releases but that is the state of play at the time of writing this chapter.

What is VMware License Server?

VMware's licensing server is a MacroVision Flexnet Licensing server which is used by many vendors to license their products. For example, Citrix's licensing server is a highly modified, stripped down version of the full MacroVision product. Theoretically, if you already have a MacroVision Flexnet Licensing server in your shop then you could reuse it with other vendors. In practice this does not always work well precisely because vendors who choose Flexnet tend to make propriety changes which then break the interoperability which we may seek. Additionally, one license server issuing licenses for many different vendors is probably going to create more "service dependency" problems than it resolves.

What is VMware Web-Access?

Web-Access is another service that can be installed along side VirtualCenter. It offers a basic user interface that allows "operator" style access to VMs without the need for the VI Client. It is also required if you wish to develop your own applications with the VirtualCenter Software Development Kit (SDK). If you don't have a requirement for this functionality it is optional. Using a "Custom" install you can choose just to install the core VirtualCenter services and opt out of the web functionality all together.

Database Configuration Issues

Before you run the installation CD for VirtualCenter you must first setup your database backend. The long-term management of the VirtualCenter database files is beyond the scope of this book. I will only address the procedures required to get up and running. You should know that the VirtualCenter database grows incrementally over time, as it continually collects performance data. Care should be taken to make sure that the database has enough free disk space into which it can grow. See chapter 5 in the first section of this book for more information on database sizing.

Configuring Microsoft SQL Server for VirtualCenter

Within your organization you most likely have your own rules about how user accounts are configured for services. It is very common for people to have datacenter policies which decree that local accounts are not allowed, and that only domain-based user accounts can be used.

In Microsoft SQL authentication comes in two flavors; SQL Authentication and Windows Authentication. Windows authentication is the strongest method. However, VMware currently only fully supports SQL authentication. Windows authentication will work but you will have to adjust the user accounts used to run the VirtualCenter services in the Windows Services MMC. However, this deviation from what VMware supports could cause you problems later when you rollout upgrades to VirtualCenter. For this reason I would recommend using SQL Authentication until such time that VMware changes its support policy.

If you are installing Microsoft SQL server for the first time then you can set the system to support *both* SQL and Windows Authentication. You can still create, in Active Directory, a unique user account with a unique password to access that database. SQL Authentication does not stop the use of domain accounts. If you are using an existing SQL server it can have SQL Authentication re-enabled using the Enterprise Administrator management console.

To create the database in Microsoft SQL 2000 and set the permissions you would carry out these steps:

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1. Open Enterprise Admins and Expand + Microsoft SQL Servers, + SQL Server Group, + (Local) (Windows NT).
 2. Right-click the Database folder, and choose New Database and type: vc-db (or something similar/appropriate) – and choose OK.
 3. Expand the + Security tab, right-click Logins, and choose New Login.
 4. Browse with ... button to select the account created for VirtualCenter database.
 5. Choose the option SQL Server Authentication and type in the password for the VirtualCenter Database User.
 6. Set the Default Database to be the database created at point 2.
 7. Click the Database Access tab, Permit access for the database, for VirtualCenter Database User, also enable the permission db_owner – and choose OK.
 8. Click OK and Confirm the password again.

Installing VirtualCenter and License Server with Microsoft SQL Server

In this section I am going to guide you through the important parts of the License VirtualCenter server installation. For the most part, once you have addressed the database issue the installation is very simple. I will be installing license server and VirtualCenter software to the *same* server.

1. Insert the VirtualCenter CD or connect to its ISO.

Note:

If the CD fails to autorun, then you can double-click the file VMware-VirtualCenter-installer.hta.

2. Select **VirtualCenter/Web-Access**.
3. Choose **Typical**, and click **Next**.
4. In the “Database Information” dialog box, choose **Use an existing database server**, and click **Next**.

Note:

At this stage it's the Microsoft ODBC dialog boxes that are on top of the VMware dialog boxes.

5. Click the **ODBC DSN Setup** button.
6. In the **ODBC Data Source Administrator** choose the **System DSN** tab.
7. Click the **Add** button.
8. From the end of the list choose **SQL Server**, and select **Finish**.
9. In name field of the **Create a New Data Source to SQL Server** dialog box, type **VMware VirtualCenter**.
10. From the drop-down list **select your SQL server**, and click **Next**.
11. Select "**With SQL Authentication...**" and type in the user account and password for the database set up in SQL, and click **Next**.
12. Enable "**Change the default database to,**" and select the VirtualCenter Database you created earlier.
13. Click **Next** and **Finish**.

Note:

You should now be able to confirm all the dialog boxes associated with the ODBC setup – and also test that you have connectivity to the database server. This test is nearly always successful. It does *not* test your user account credentials.

14. Back at the VMware "**Database Information**" dialog box – type in the username and password used to authenticate to the SQL server – and click **Next**.
15. In the dialog box choose to "**Install a local VMware License server...**" and click **Next**.
16. In the "**License Info**" dialog box click the **Browse** button to locate the .LIC file.

Note:

This must be located locally on the VirtualCenter server. You cannot map a network drive to it. This .LIC file is copied to a directory in the VirtualCenter system – so the original can be deleted once the install has completed.

17. Click **Next** to the “**VirtualCenter Service Account**” dialog box unless you have configured a separate user account for running this service.
18. Click **Next** to accept the default port numbers used with VirtualCenter.

Note:

VirtualCenter Server uses ports 80, 443, and 902 by default. Therefore, you cannot run VMware Server on the same machine as it currently uses 80 and 902. Running a web server on the same machine is also not recommended because it could conflict with VirtualCenter. You should only enable backwards compatibility support with VirtualCenter 1.x if you require it because this adds an overhead to the VirtualCenter 2.x service.

19. **Set the Apache TomCat service** to both “**Start Automatically**” and to be **started**.
20. Click the **Install** button.

Creating DataCenters, Folders and Adding ESX Hosts to VirtualCenter

By default the “Administrators” group within Windows is used to allow access to VirtualCenter. If your user account is a member of Administrators in Windows then you will also be a full administrator in the VirtualCenter environment.

VMware’s friendly name for everything that VirtualCenter stores is the “Inventory.” There are four main VirtualCenter Inventory views:

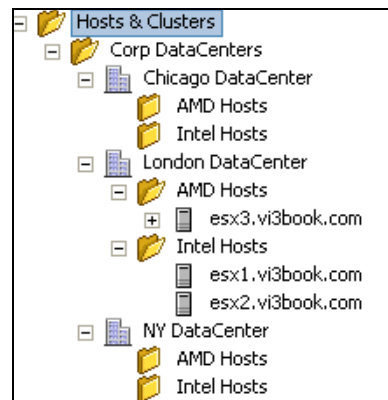
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- Hosts and Clusters
 - Virtual Machines and Templates
 - Networks
 - Datastores

The “hosts and clusters” is a very “physical” view which allows you to see stand-alone ESX hosts, ESX hosts in DRS or HA Clusters together with the VMs that they are running. The Virtual Machines and Templates view is a very “logical” view showing just VMs and templates – but not the physical hosts that they are running on. The folder structures in Virtual Machines and Templates can be totally different from the structures you create in the Host and Clusters view. The networks and datastore views, in turn, show you the vSwitch port group names currently in use and the datastore names (SAN, iSCSI, and NAS). All four of the views share the common object called the “datacenter.”

VirtualCenter has a hierarchical format which is akin to Active Directories domains and organizational units. The container types available are the “datacenter” and a “folder.” The primary container in VirtualCenter is the “datacenter.” Previous versions of VirtualCenter used the term “Farm” instead. Whatever term you prefer, we generally see these management units as reflecting distinct collections of ESX servers that share common SAN, iSCSI, or NAS storage and common LAN connectivity. Only datacenter can contain ESX hosts, although once a datacenter has been created any folder can contain an ESX host. Folders can contain practically anything – other folders, VMs, datacenters, and ESX hosts.

Figure 4.1 illustrates some of the possible permutations of datacenters and folders.

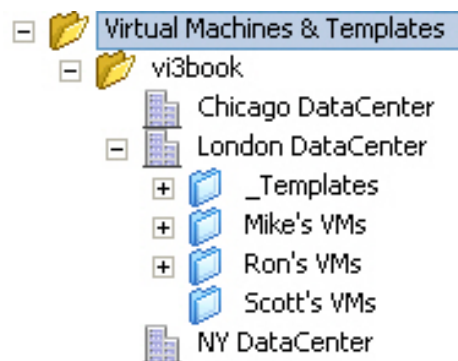
Figure 4.1



Note: If you wish to put an ESX host into a folder, you must first create a folder with a datacenter.

Similarly, in the Virtual Machine and Templates View it's possible to create folders that more accurately reflect the structure of your organization from an IT perspective. So you can create folders based on department (accounts, management, distribution), by location (New York, Paris, London), or even by person (Scott, Mike, and Ron). Figure 4.2 shows the folder structure I will be using while I write this book.

Figure 4.2



GOTCHA:

You cannot create a folder in the “Host and Cluster” view where the parent object is a VMware DRS or HA cluster.

Creating a Datacenter and Adding ESX Hosts

When you first add in an ESX host to VirtualCenter this can take some time to complete. While your ESX host is being added to VirtualCenter two critical changes are taking place. Firstly, the VirtualCenter Management Agent is installed to your ESX host. This allows VirtualCenter to communicate to the ESX host being added and therefore manage it. The agent communicates to the primary management service in ESX called `hostd` (its service name is `mgmt_vmware`) and has four main tasks:

- Relay ESX host configuration changes to `hostd`
- Relay VM create and change requests to `hostd`
- Relay resource allocations to VMs to `hostd`
- Gather performance information, alarms, and alerts from `hostd`

Secondly, a user account called `vpxuser` is generated. This user account is used by the VirtualCenter service to authenticate to the ESX host when it sends instructions. The actual actions themselves are executed by the root account at the ESX host. VMware uses this method to make sure that the root account credentials are never transmitted across the network during normal operations. You only need the root account and password when you first add an ESX host to VirtualCenter. This event that happens only once and the credentials of root are not stored either at the VirtualCenter server or in the database. It is therefore entirely safe to reset the root user's password without fear of complications or problems in Virtualcenter.

When you add an ESX host to the list you can use IP addresses instead of a FQDN. I personally would not recommend this. The license service and VMware HA require DNS. It is well worth resolving any name resolution problems at this stage than bypassing them with an IP address. During the adding of the ESX host to VirtualCenter, the ESX host is informed of the FQDN of your license server. If your ESX servers do not have name resolution to this license

server you cannot simply enter an IP address for it. FQDN DNS name resolution is a requirement for the Flexnet License service to run.

1. Login to the VirtualCenter server using the VI Client.
2. **Right-click** "Host and Clusters," and Choose **New Datacenter**.
3. **Type in a name for your datacenter** such as Vi3book Datacenter.
4. To add-in a ESX host, **right-click the Datacenter created**, and Choose **Add Host**.
5. In the dialog box **type in the FQDN of the ESX host** and the **root account** and **password** for that ESX host.

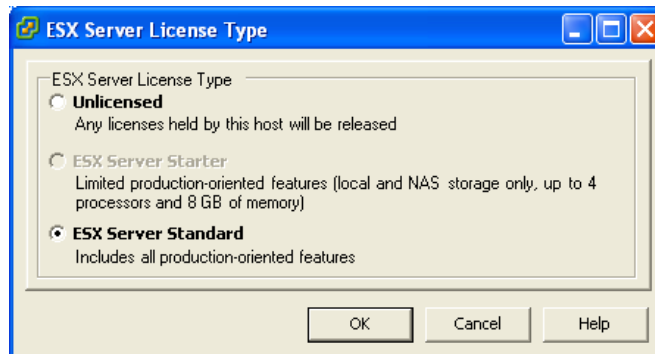
Setting your host edition

Once your ESX host is added into the list we have to set its host edition. Virtual Infrastructure 3 can be purchased in "Starter" or "Standard;" these editions represent a bundling of different flavors with different features. To set what edition your host is using:

6. Select your ESX host from the list.
7. Select the **Configuration** Tab.
8. In the **Software Pane**, choose **Licensing Features**.
9. Next to **Host Edition**, click **Edit...**

Figure 4.3 shows me setting the host edition of ESX Server Standard.

Figure 4.3



Installing a Second VirtualCenter Server for Fault-Tolerance

One concern you will have will be protecting the VirtualCenter server and the database backend to which it has been configured. The biggest single point of failure for VirtualCenter is its Oracle or SQL database, so you must back it up frequently. Depending on cost and the level of your concern there are a number of options to protect it. By far the cheapest and easiest to configure is some kind of network replication of the database files with a second database server. Alternatively, if you desired it, you could even setup your database to be protected by clustering services. Remember that if the VirtualCenter database fails, the ESX hosts carry on running and so do the VMs. However, from management perspective you would be in a tricky situation.

There are a number of ways of protecting the installation we have of VirtualCenter using conventional techniques. We could backup VirtualCenter with our backup software or we could clone the disk of the VirtualCenter server using something like Symantec Ghost or Drive Image Pro.

If you have two VirtualCenter servers they cannot be clustered; in fact they can't even be powered on at the same time when configured to use the same database. However, we can use a second VirtualCenter server (perhaps running in a VM) which would act as a "hot standby" should the "primary" VirtualCenter server fail. The setup of this "hot-standby" does alter very slightly to the setup routine outlined in this chapter. The three main stages are:

1. Power off the "Primary" VirtualCenter Server.

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2. Install the “Secondary” VirtualCenter – creating a new System DSN settings.
 3. Answer correctly the “existing database” dialog box.

Stages 1 and 2 are very simple. Stage 3 is straightforward as well, as long as you read the dialog box properly – and select the correct option.

1. Power off the “**Primary**” VirtualCenter server.
2. Start the installation of the “**Secondary**” server following the instructions previously discussed.
3. Choose **NO** to the dialog box that asks

The DSN “VMware VirtualCenter points to an existing VMware VirtualCenter repository. Would you like to overwrite the data?”

Note:

You can proceed normally with the remainder of the installation. If you are running your primary VirtualCenter within a VM you could power it off and use the clone option to duplicate it. In my case, I opted to run VirtualCenter (Primary) on a physical server and did a clean installation of VirtualCenter to a VM from hot-standby.

Conclusion

In this chapter we looked at the setup and configuration of VMware's VirtualCenter and Licensing Service. I also demonstrated how VirtualCenter will enable you to organize your virtual infrastructure in a way that facilitates administration.

Now that our ESX host is properly configured for networking and storage and our management system is in place, we can proceed to the whole point of VMware Virtual Infrastructure – creating and managing virtual machines.