

WHITE PAPER

Automation of SharePoint Provisioning and Deployment on VMware® vSphere

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Introduction

SharePoint products and technologies provide enterprise-scale capabilities to manage content and business processes and simplify how people can find and share information. Microsoft Office SharePoint Server (MOSS) 2007 farm implementations follow the multi-tier web application architectural model using web front ends, application services and database servers. This model supports various scale-up and scale-out options.

MOSS 2007 deployments often grow rapidly in terms of content and users, so supporting this growth can be challenging. Accommodating rapid growth requires developing, testing, staging, and deploying new applications and services within a MOSS 2007 framework, and rolling out production services that can be reliably supported. If these tasks cannot be performed with the resources available, an IT organization may be forced to choose between managing costs and limiting productivity benefits and user adoption.

The purpose of this whitepaper is to describe a process that IT managers can follow to create MOSS 2007 component templates using VMware vSphere. With templates, it is possible to rapidly clone and provision new virtual machines that stage and deploy new SharePoint Servers. The paper provides guidance on automation based on VMware and Microsoft best practices. Examples are used to describe the creation of virtual machine templates for SharePoint web front-end servers, although the same techniques generally apply to templates created for all SharePoint server roles including Query, Index, and Application servers.

Using the techniques described in this paper, IT organizations can expect to dramatically reduce the time to test, stage and deploy new applications and services in a MOSS 2007 Farm using VMware vSphere infrastructure. By using standardized, consistent machine configurations, reliability also increases and management overhead drops. The time saved on these tasks can be allocated toward developing a highly reliable infrastructure, improving disaster recovery capabilities, and reducing the total cost of service.

VMware vSphere is the industry leader in delivering these capabilities, and is the superior platform for running all sizes of MOSS 2007 deployments.

SharePoint Virtualization and Deployment Overview

The Microsoft Office SharePoint Server 2007 best practices resource center web site (<http://technet.microsoft.com/en-us/office/sharepointserver/bb736746.aspx>) provides a wealth of information on installing, deploying, and managing SharePoint 2007 environment. In addition, Microsoft publishes a host of documents on best practice installation and deployment of Microsoft products as part of an *operations framework* (<http://technet.microsoft.com/en-us/library/cc506049.aspx>) for full life-cycle support of IT services. In this document, we take a similar approach to defining best practices for SharePoint server virtualization and deployment. In particular, this document focuses on using VMware vSphere templates to design, deploy, and manage the provisioning of new SharePoint front-end servers, while remaining consistent with Microsoft Best Practices. Most of the techniques discussed in this whitepaper can also be applied to VMware Infrastructure 3.5, the previous version of vSphere.

Traditional deployments of SharePoint servers on physical hardware are usually grossly over-provisioned, with the majority of compute cycles wasted. This increases system power, cooling, and operating costs, even while resources are underutilized. Deployment on physical hardware also is burdened by the need for manual configuration and provisioning for each new application, component or configuration change on a specific hardware platform. This extends provisioning lead times and increases downtime when application reconfiguration and maintenance is necessary. VMware vSphere and virtual machine templates ensure that a consistent configuration is used each time, dramatically reduce provisioning time (typically to minutes) that can usually be shared on currently deployed hardware, and can be adjusted "on the fly" to add CPU or memory when more resources are required. The dynamic platform enabled by VMware vSphere allows MOSS deployments to scale and adapt to changing user and operational requirements.

With VMware vSphere, you create templates, which are copies of a virtual machine that can be used to provision new virtual machines. Templates typically include a specified operating system and configuration that provides virtual counterparts to hardware components. A template includes an installed guest operating system, utility components such as antivirus software, and a set of applications to run in a virtual machine. For SharePoint deployments, you can create various templates corresponding to specific server configurations you will want to deploy when additional resources are needed. The examples in this document show how to create and deploy templates defined for SharePoint front-end servers (for example, query, index, or other server roles). Using the same approach, you can create additional templates such as those needed for a SharePoint Developer System (MOSS with SharePoint Designer/Visual Studio) or SQL Server.

There are three different ways to create a new virtual machine template from vSphere Client:

- Using an existing virtual machine in place. This process converts the original virtual machine to a template.
- Cloning a virtual machine to a template.
- Cloning an existing template.

Using vSphere Client and VirtualCenter, you can use the New Virtual Machine Wizard to create a new virtual machine, which you can then copy or clone as a virtual machine template. Alternatively, you can use the VMware Lab Manager application, which works with virtual machines registered with VirtualCenter and VMware Infrastructure hosts, to create and manage ESX virtual machines as well as virtual machine templates. Refer to the following web page for more information on using VMware Lab Manager for template creation:

<http://pubs.vmware.com/labmanager3/wwhelp/wwhimpl/js/html/wwhelp.htm>

Creating and Deploying SharePoint Templates

In this section, we describe the basic steps of setting up a virtual machine that is configured as a SharePoint front-end web server, which you can then save as a virtual machine template. (It is assumed that you are already running Active Directory/DNS and you have all necessary Microsoft licenses to run MOSS.)

The basic steps are:

1. Create a new virtual machine (VM) using vSphere Client (or running the VMware Lab Manager application). In this document we will focus on using vSphere Client.
2. Configure virtual machine resource settings for CPU, network, memory, disk size, and datastore selection.
3. Install the guest operating system (Windows 2003 or 2008) in workgroup mode for the virtual machine to use when deployed as a SharePoint server; then power on the virtual machine.
4. Install VMware Tools on the new virtual machine.
5. Install additional software required to use the new virtual machine as a SharePoint front-end server.
 - a. Configure IIS.
 - b. Install .NET framework 3.0.
 - c. Configure ASP.NET 2.0.
 - d. Install MOSS 2007 SP1.
 - e. Install PowerShell (optional).

6. Customize the virtual machine guest operating system to add “run once” scripts when the virtual machine is deployed. Place scripts in a well known location for the following tasks:
 - a. Configure the NewSID tool to run once on the first virtual machine poweron after creating an instance from template.
 - b. Configure MOSS configuration scripts to run once, after the instance is joined to the Domain.
7. Save the SharePoint server virtual machine as a template.

The following sections provide more detailed information on each step for creating virtual machines to be deployed as SharePoint front-end servers.

Create a new Virtual Machine for a SharePoint Server

VMware vSphere Client provides several different ways to create virtual machines:

- **Importing** – You can import a virtual machine stored in OVF format.
- **Consolidate** – You can consolidate existing physical systems by converting them to virtual machines and importing those into VirtualCenter.
- **Create New** – You can manually configure entirely new virtual machines. The vSphere Client provides a *New Virtual Machine Wizard* that takes you step-by-step through the process of setting up and configuring a new virtual machine.
- **Clone** – You can create and save exact replicas of existing virtual machines as clone virtual machines or as VM templates you can deploy whenever needed.
- **Deploy from Templates** – You can create virtual machines from templates that provide a base configuration you can customize.

In this paper, we will use the New Virtual Machine Wizard menu option to configure a new virtual machine for use as a SharePoint front-end server. For other methods, refer to the VMware *Basic System Administration Guide* (http://www.vmware.com/pdf/vsphere4/r40/vsp_40_admin_guide.pdf). After creating, configuring, and testing the new virtual machine, we will save the virtual machine as a template that we can later use to deploy and configure other SharePoint servers.

Starting the New Virtual Machine Wizard

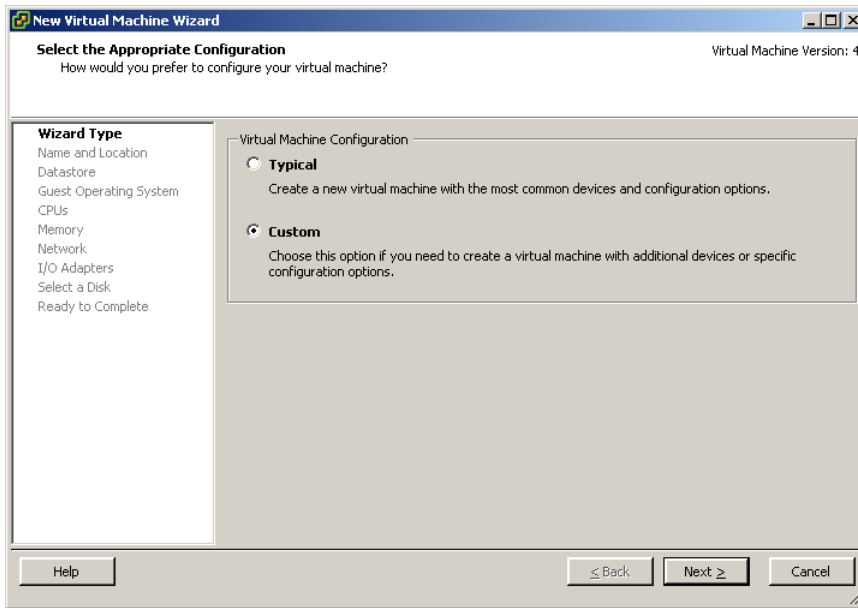
You can access the New Virtual Machine wizard from many different locations in the vSphere Client user interface. Most commonly, you can start the wizard by right-clicking the mouse on an object location where you want to create the new virtual machine, that is:

- Resource pools
- Clusters
- Hosts
- Virtual machine folders

Optionally, you can choose the **File > New > Virtual Machine** option to start the New Virtual Machine Wizard.

1. From the vSphere Client, and accessing the VirtualCenter server where you want to create a new virtual machine, start the New Virtual Machine Wizard.

The wizard displays a sequence of steps to configure the new virtual machine. The first step of the wizard lets you choose either the *Typical* or *Custom* option to specify standard or custom configuration of the new virtual machine.



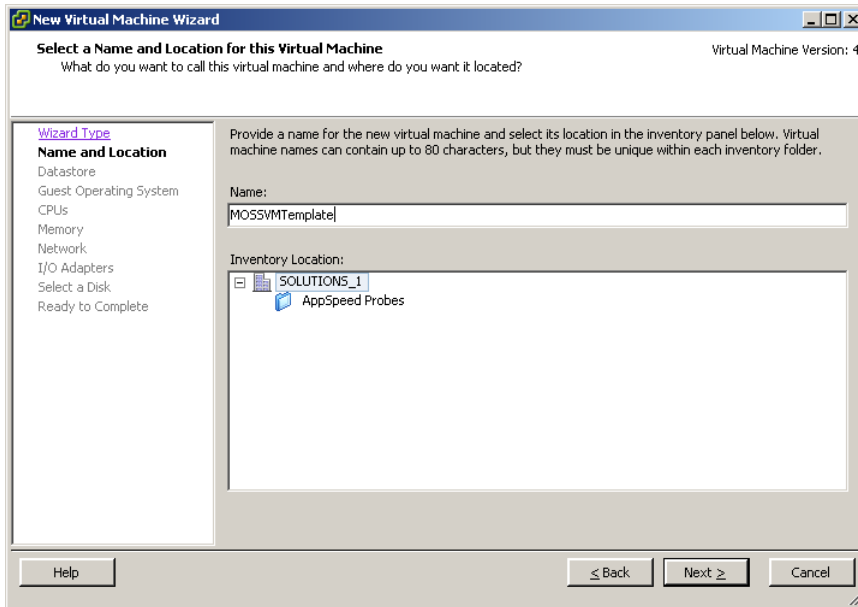
2. Choose **Custom**.

In this paper, we will describe configuration of virtual machine settings for a SharePoint server, so the Custom option provides more control and option settings to do that.

Configuring VM Settings in the Wizard

From the next custom steps of the wizard, we will configure virtual machine resource settings such as CPU, network, memory, disk size and datastore selections for a SharePoint server virtual machine, in this case, to be used as a front-end server.

After selecting the wizard type, you are prompted to specify the name and location of the new virtual machine.



1. Specify the name and inventory location for the new virtual machine.

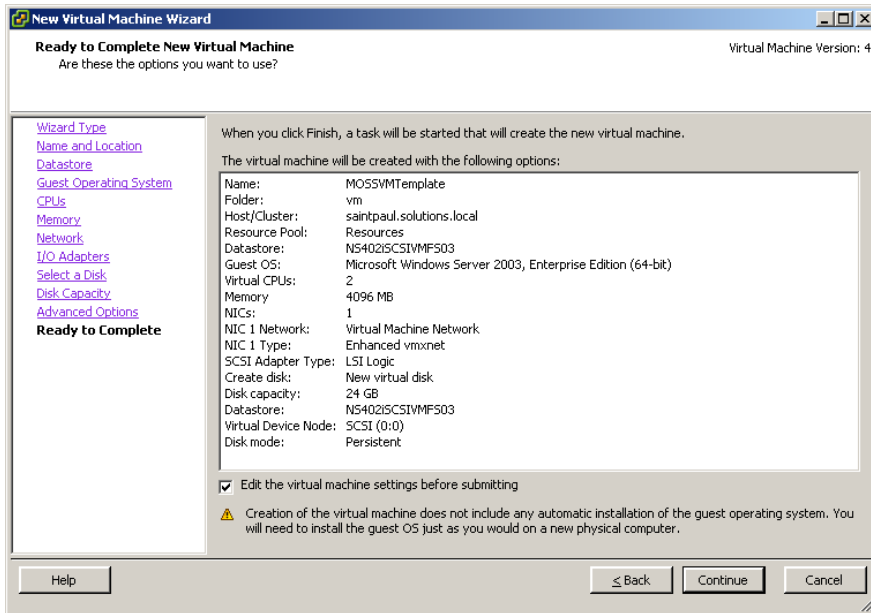
You will later save the virtual machine as a template that you can use to configure and deploy other SharePoint servers, so it is a good idea to choose a name that reflects the virtual machine's eventual use, purpose, or configuration.

The name you enter in the Virtual Machine Name field is the name that is listed in the VirtualCenter client inventory. It is also used as the name of the virtual machine's files. The name can be up to 80 characters long and may contain alphanumeric characters and the underscore (_) and hyphen (-) characters. This name should be unique across the entire datacenter and must be unique within the folder. Names are case-insensitive. For example: the name "my_vm" is identical to "My_VM".

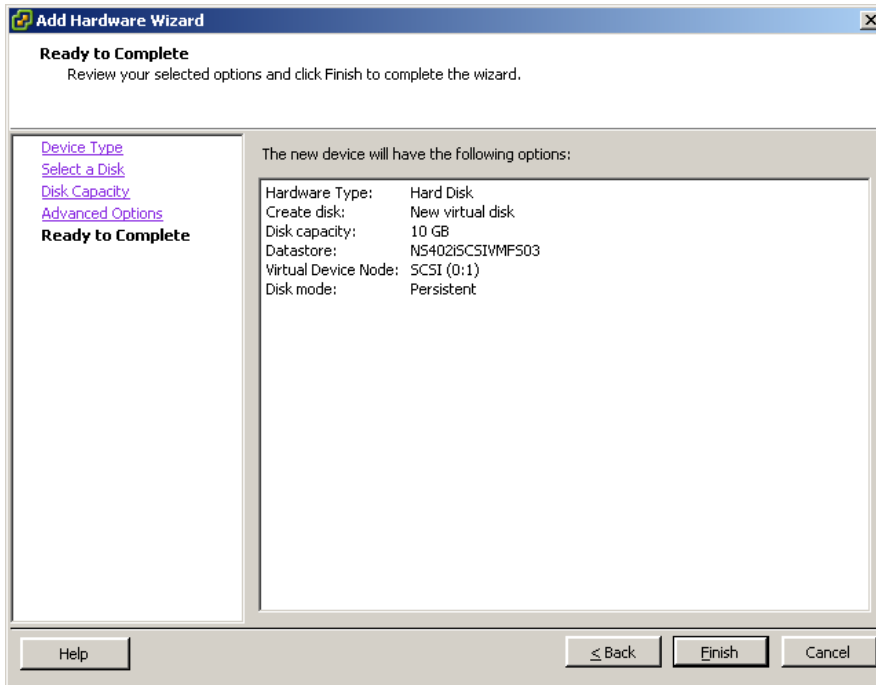
2. Select a folder or the root of a datacenter. If the resource pool option is available, expand the tree until you locate the resource pool in which you want to run the virtual machine; then highlight the location and click **Next**.

NOTE: Resource pools allow you to manage your computing resources within a host or hosts by setting up resources in a meaningful hierarchy. Virtual machines and child resource pools share the resources of the parent resource pool. For more information on resource pools, see the VMware *Resource Management Guide*.

3. Click **Next** and then make sure you adhere to the following additional setting guidelines in the wizard:
 - a. In the *CPU* section of the wizard, select option 2 if you are planning to use Windows 2003 Server to support SMP and HAL. If you are planning to use Windows 2008, you can choose options 1, 2, or 4, depending on your requirements.
 - b. In the *Memory* section of the wizard, provision 2 GB or more of memory for the virtual machine.
 - c. In the *Network* section of the wizard, select the Enhanced vmxnet adapter option.
 - d. In the *Disk Capacity* section of the wizard, make sure that you have reserved at least 16 GB of disk space for the boot drive on Windows 2003, or 40 GB disk space for Windows 2008.
4. After reviewing the New Virtual Machine Wizard settings, select the **Edit the virtual machine settings before submitting** option.



5. Click **Continue**.
6. Using the Add Hardware Wizard, choose the **Add Hard Disk for Query LUN** option to create a new virtual hard disk based on your specific sizing requirements for Index Catalog:



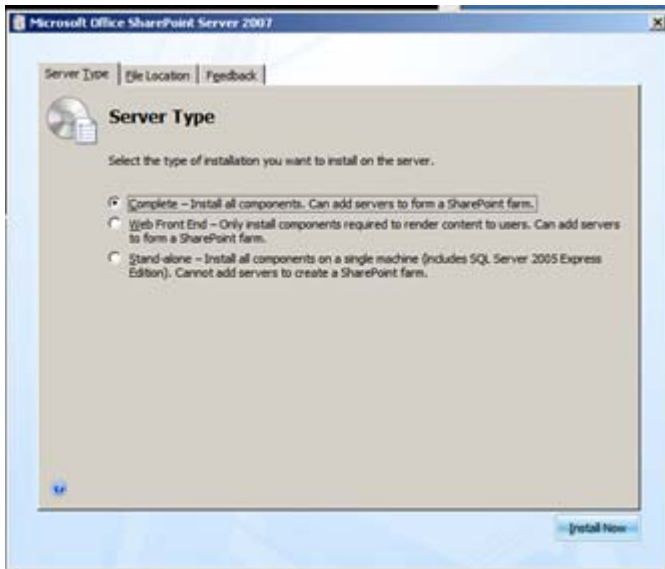
7. Install and configure operating system settings, service packs and hotfixes.
For installing and configuring Windows Server 2003, follow the installation instructions provided at:

http://pubs.vmware.com/guestnotes/guestos_win2003.html

To install and configure Windows Server 2008, follow the installation instructions provided at:

http://pubs.vmware.com/guestnotes/guestos_win2008.html

8. During template creation, install Windows Server in Workgroup mode with the following options:
 - a. Use DHCP for network settings.
 - b. Install VMware Tools and Update drivers.
 - c. Install additional tools like anti-virus software, PowerShell, etc.
 - d. Based on your organization's internal compliance policies, disable the IE enhanced security feature if it is not enforced.
 - e. Install and configure IIS, .NET Framework 3.0, and ASP.NET 2.0 as described in the Microsoft TechNet article: <http://technet.microsoft.com/en-us/library/cc262243.aspx>
9. Run MOSS 2007 setup with the **Complete – Install all components** option. Install MOSS components as shown below:



When the setup is finished, a dialog box appears that prompts you to complete the configuration of your server.

10. Make sure that the **Run the SharePoint Products and Technologies Configuration Wizard now** checkbox is not selected and click **Close** to complete the setup.



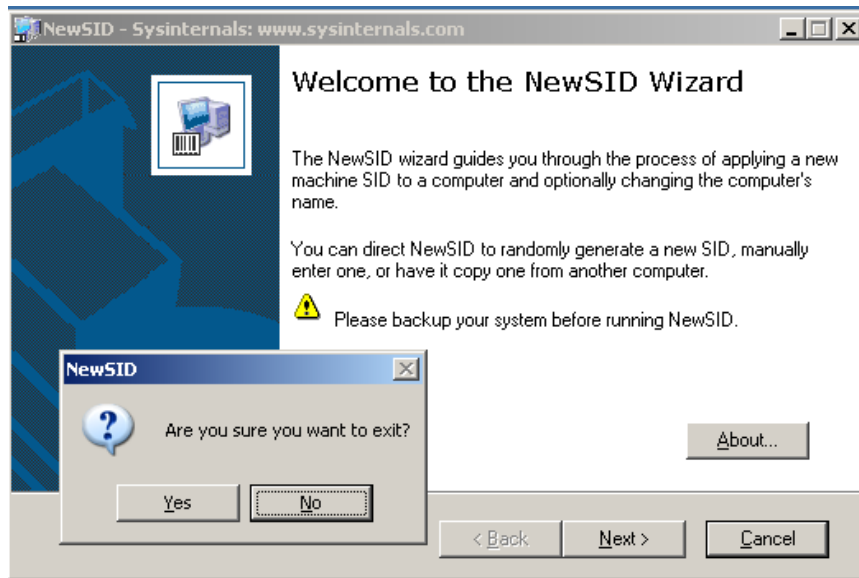
NOTE: We will be running the SharePoint configuration wizard when we create an instance of the template and join the domain, which is why we are just installing MOSS 2007 and not configuring MOSS 2007 at this stage.

11. Create a temporary folder on the root drive, for example, c:\temp, and then copy SharePoint configuration scripts to the new folder location. Scripts can be created based on information published in the Microsoft article <http://technet.microsoft.com/en-us/library/dd335964.aspx>. A typical configuration script for configuring a SharePoint Web and Search server would contain the following commands:

```
"C:\Program Files\Common Files\Microsoft Shared\Web Server
Extensions\12\BIN\psconfig.exe" -cmd configdb -connect -server SQLServerName -database
SP_ConfigDB -user domain\SP_Farm_Svc -password PASSWORD -cmd helpcollections -installall
-cmd secureresources -cmd services -install -cmd installfeatures -cmd applicationcontent -
install
```

```
"C:\Program Files\Common Files\Microsoft Shared\Web Server
Extensions\12\BIN\STSADM.EXE" -o osearch -action start -role Query -farmcontactemail
administrator@domain.contoso -farmperformancelevel PartlyReduced -farmserviceaccount
DOMAIN\SP_Search_Acct -farmservicepassword PASSWORD -defaultindexlocation
"d:\data\index"
```

12. Download the NewSID tool from Microsoft Technet (<http://technet.microsoft.com/en-us/sysinternals/bb897418.aspx>) and place the NewSID.exe executable in a well-known location, for example: c:\windows\system32. If NewSID use is not approved in your organization, please refer to the following web site for an alternative approach: http://kb.vmware.com/selfservice/microsites/search.do?cmd=displayKC&docType=kc&externalId=827&sliceId=1&docTypeID=DT_KB_1_1&dialogID=22218520&stateId=1%200%2022220543
13. Run **NewSid.Exe**, accept the license agreement, and then cancel the NewSid setup wizard.



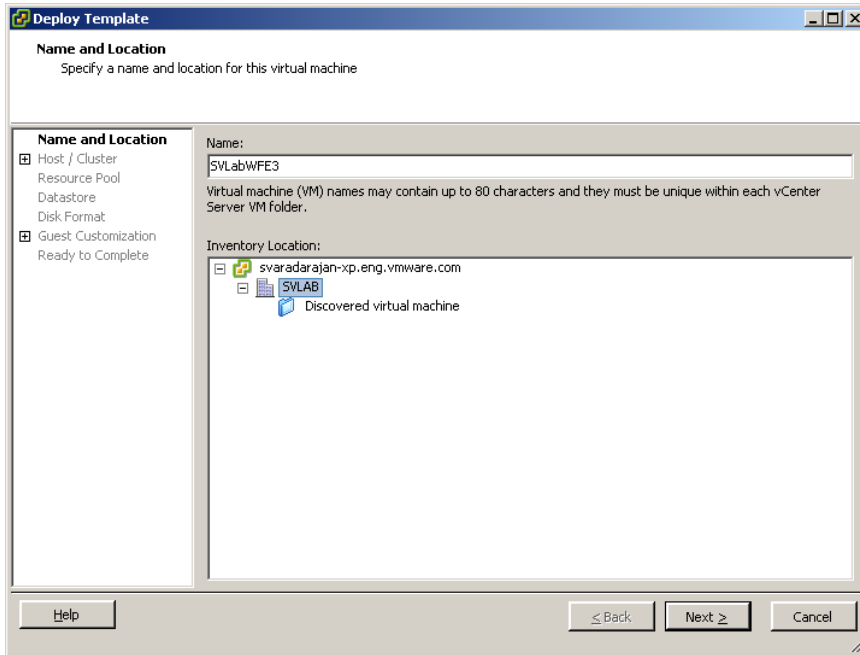
NOTE: Cancelling the setup wizard is a requirement for run-once to execute without any prompts.

14. Open **regedit** from the command prompt and navigate to the system registry node:
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\RunOnce
15. Create a new string value with a value name of **NewSid** and Value data set to the following:
c:\windows\system32\newsid.exe /a
16. Clear all log files, empty the recycle bin, and then run the **ipconfig/release** command before shutting down the workstation.
17. Convert this virtual machine to a template by selecting the **Template > Convert to Template** menu option.

Deploying New SharePoint Servers from a Template

To provision a new SharePoint web front-end server virtual machine from a template:

1. Click the **Template > Deploy Virtual Machine** menu option and specify a name for the new virtual machine.



2. Logon to the new instance using the WorkStation administrator credentials; provide the required IP settings, and join this computer to the domain using System settings.
3. On re-start, logon to the Guest using the Domain SharePoint Account and execute the MOSS Configuration script in the c:\temp folder created earlier.

NOTE: The above steps can be automated using:

- VMware vSphere PowerCLI cmdlets:
http://www.vmware.com/support/developer/windowstoolkit/wintk40/doc/viwin_admg.pdf
- Virtual Appliances and OVF:
<http://www.vmware.com/appliances/learn/faq.html>
- VMware Lab Manager 3.0:
<http://pubs.vmware.com/labmanager3/wwhelp/wwhimpl/js/html/wwhelp.htm>

You can follow the same steps, or run the same script, anytime you need to deploy a new SharePoint server with the same configuration. And you can create and deploy templates with different configurations for provisioning all the other servers in your environment, for example, SQL Server and SharePoint Development. You can also use other VirtualCenter tools to monitor and manage SharePoint Server virtual machines, once they are deployed. After creating the original SharePoint server templates required for your site, it is recommended that you keep templates updated for the latest software patches. Make sure the run-once scripts are also updated if you are performing this action.

Summary

In this document, we described the process by which customers can use tools provided with VMware vSphere to create virtual machine templates that encapsulate and automate all the setup steps of MOSS 2007 server configuration. Administrators can use these templates to quickly and easily provision and deploy consistent new SharePoint servers anytime they need to add capacity to an existing MOSS installation to accommodate increased demands of users and greater system capacity requirements.

Additional References

VMware template usage and best practices:

http://www.vmware.com/pdf/vc_2_templates_usage_best_practices_wp.pdf

VMware Lab Manager Online Library:

<http://pubs.vmware.com/labmanager3/wwhelp/wwhimpl/js/html/wwhelp.htm>

Using scripts to automate SharePoint 2007 installation:

<http://technet.microsoft.com/en-us/library/dd335964.aspx>



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