

VMware Professional Services

Desktop Reference Architecture Workload Simulator (RAWC) Installation and User Guide

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Contents

1.	Introduction.....	4
1.1	Requirements	5
1.2	Installation Files.....	8
1.3	Support	8
2.	Installing and Configuring Desktop RAWC.....	9
2.1	Workflow	9
2.2	Setting Up the Environment	10
2.3	Creating a RAWC Controller and Shared Network Folders	10
2.4	Downloading and Installing the RAWC Installation Package.....	10
2.5	Downloading and Setting Up the Email Server Virtual Machine	11
2.6	Creating Active Directory Users	14
2.7	Creating and Configuring Desktop VMs	14
2.8	Creating Session Launcher VMs.....	19
3.	Configuring and Launching a Test	21
3.1	Configuration Tab.....	21
3.2	Session Launcher Tab.....	25
4.	Conducting a Pre-test.....	29
4.1	RAWC Controller	29
4.2	Pre-test Results	30
5.	Final Configuration	31
5.1	Cloning Target Desktop VMs	31
5.2	Completing Outlook Setup and Verifying Email Messages.....	31
6.	Conducting a Test	32
6.1	Cloning Desktop VMs for the Test.....	32
6.2	Running the Test	32
7.	Comparing and Charting Test Results	33
7.1	Log Files	33
7.2	Graphing Results.....	35
	Appendix A: vdiusers-v1 Script.....	38
	Appendix B: Optimizing a VMware View Test Environment	40

1. Introduction

When validating VMware View™ designs it is important to simulate real world usage as closely as possible. The *Desktop Reference Architecture Workload Simulator* (RAWC) can be used to simulate a user workload in a typical Microsoft Windows® desktop environment.

Desktop RAWC runs on each desktop virtual machine (VM) on one or more VMware ESX™ hosts. Each target desktop VM is equipped to run a RAWC workload that simulates typical user behavior, running an application set commonly used across a broad array of desktop environments. The workload has a set of randomly executed functions that perform operations on a variety of applications.

Each test is configured using the Desktop RAWC UI. The UI enables you to save and retrieve test parameters, create log folders, and define unique workloads based on Active Directory groups. You can use the UI to increase the load or adjust the user behavior, such as the number of words per minute that are typed and the delay between applications being launched.

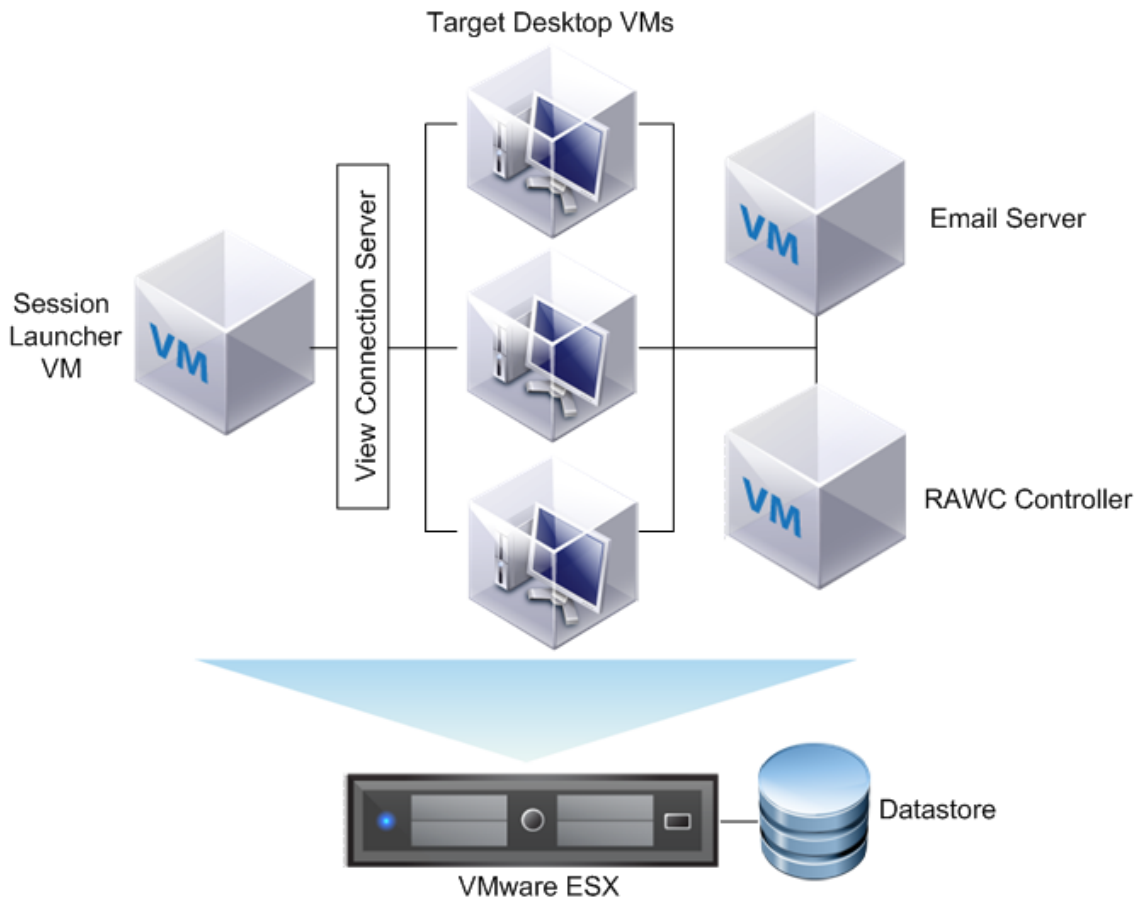
The workload configuration typically used includes Microsoft Word, Excel, PowerPoint, Outlook, Internet Explorer, Windows Media Player, Java, Adobe Acrobat, McAfee Virus Scan, and 7-Zip. During the execution of the workload, multiple applications are opened at the same time and windows are minimized and maximized as the workload progresses, randomly switching between each application. Individual application operations that are randomly performed can include:

- Microsoft Word – Open, minimize, maximize, close, insert text, save modifications
- Microsoft Word (Random) – Open, minimize, maximize, close, write random words/numbers, save modifications
- Microsoft Excel – Open, minimize, maximize, close, write random numbers, insert/delete columns/rows, copy/paste formulas, save modifications
- Microsoft PowerPoint – Open, minimize, maximize, close, conduct a slide show presentation
- Microsoft Outlook – Open, minimize, maximize, close, create/send emails
- Internet Explorer – Open, minimize, maximize, close, browse page
- Windows Media Player – Open, close, view a video
- Java – Compile a java project comprised of several hundred files using the JDK to create a software engineering type of workload
- Adobe Acrobat Reader – Open, minimize, maximize, close, browse pages in PDF document
- McAfee Anti-virus – Real time scanning
- 7-Zip – Open, close, compress a large file

Depending upon the size of the test, you may use multiple ESX hosts and session launcher VMs, and as many target desktop VMs as you want to test.

Figure 1 illustrates the Desktop RAWC architecture used with VMware View.

Figure 1. Desktop RAWC Architecture used with VMware View



1.1 Requirements

VMware Infrastructure or VMware vSphere™ should be installed and operational in a lab (non-production) environment.

1.1.1 Email Server Virtual Machine

If you do not want to run the Microsoft Outlook workload as part of the test, you can ignore this section.

The following software is required for the provided Email Server virtual machine that supports running the Microsoft Outlook workload:

- VMware ESX 3.0 (or later), or VMware VirtualCenter/vCenter 2.0 (or later)
- 15GB hard disk
- 1GB memory (more if you are running a large number of virtual desktops)

You do not have to use the Email Server that is provided with Desktop RAWC—you can supply your own Microsoft Exchange server.

1.1.2 Desktop RAWC Controller

The following are required for the Desktop RAWC Controller:

- Microsoft Windows 2003 Server is required for the RAWC Controller machine that hosts the RAWC UI and shared network folder for log files. The RAWC Controller can be a physical or virtual machine.
- Microsoft .NET 2.0 (or later) framework is also required. The installation program will prompt you if it is not already installed. You can download and install it from <http://www.microsoft.com/.NET/>.

1.1.3 Session Launcher VMs

One or more session launcher VMs must be set up to support the launching of View Client sessions. Each session launcher VM can support up to 20 sessions.

Requirements:

- Windows XP with SP3
- Microsoft .NET 2.0
- Remote Desktop Connection 7.0 client (formerly known as *Microsoft Terminal Service Client*)
- VMware View Client 4.x or later

Note A View Client cannot exist on the same VM as a View agent, so the session launcher VM(s) cannot be managed by VMware View.

1.1.4 Target Desktop VMs

Create a target desktop VM master image and then clone the target desktop VMs you want to use in your test.

The required target desktop VM configuration is:

- 1024MB memory
- 10GB disk space
- Windows 7 (32- or 64-bit), or Windows XP with SP2 or SP3
- Microsoft .NET 2.0
- A View Agent must be installed on each target desktop VM.
- If Microsoft Outlook is part of the workload, use a persistent desktop pool so that users will get the same desktop for every test.

1.1.5 Applications

A set of applications comprise the workload that runs on each target desktop VM. You can select which applications to use for a test from the Desktop RAWC UI.

The customer must supply software and licenses for each of the following applications they want to use in a test:

- Internet Explorer 8
- McAfee VirusScan Enterprise 8.7.0i
- Microsoft Office 2007 (Word, Excel, PowerPoint, Outlook)

Note Desktop RAWC 1.2 works *only* with Office 2007 programs. If you must test with Office 2003, use Desktop RAWC 1.0.

7-Zip is provided and installs automatically when Desktop RAWC is installed.

Some applications must be downloaded from vendor sites and installed or copied to particular locations. Gather the following applications beforehand so that they will be available when you configure Desktop RAWC:

- Sun Java JDK 6 Update 16 (or later)
- Windows Media Player 11 for XP or 12 for Windows 7
- Adobe Reader 9.x
- Video files

1.1.5.1. Sun Java JDK 6 Update

Download Sun Java JDK 6 Update 16 (or later) from

<http://www.oracle.com/technetwork/java/javase/downloads/index.html>

1.1.5.2. Windows Media Player 11 or 12

Download Windows Media Player 11 for Windows XP from

<http://www.microsoft.com/windows/windowsmedia/player/11/default.aspx>

Download Windows Media Player 12 for Windows 7 from

<http://windows.microsoft.com/en-US/windows7/products/features/windows-media-player-12>

1.1.5.3. Adobe Reader

Download Adobe Reader from

<http://get.adobe.com/reader/>

1.1.5.4. Video Files

1. Go to:

<http://www.microsoft.com/windows/windowsmedia/musicandvideo/hdvideo/contentshowcase.aspx>

2. Select and download the following files:

- Super Speedway (720p)
- The Living Sea (1080p) (Be sure to select the 1080 version.)

1.2 Installation Files

The following Desktop RAWC files are provided from a download site.

File Name	Description
DesktopRawcSetup_1.2.0.zip	Contains Desktop RAWC executables and workload files
RAWC-EmailServer-VMX.zip	Contains the Email Server virtual machine (use this file for any version of Desktop RAWC)

1.3 Support

For problems, enhancement requests or feedback send email to rawc-support@vmware.com.

Include a full description of the problem. Also, zip up and send to support the log files from the network shared folders `Log_Folder` and `SessionLauncher_Share`. Only the log files are needed. If input files in the network shared folders are also needed to troubleshoot a problem, scrub them first so that no customer proprietary information such as passwords are included.

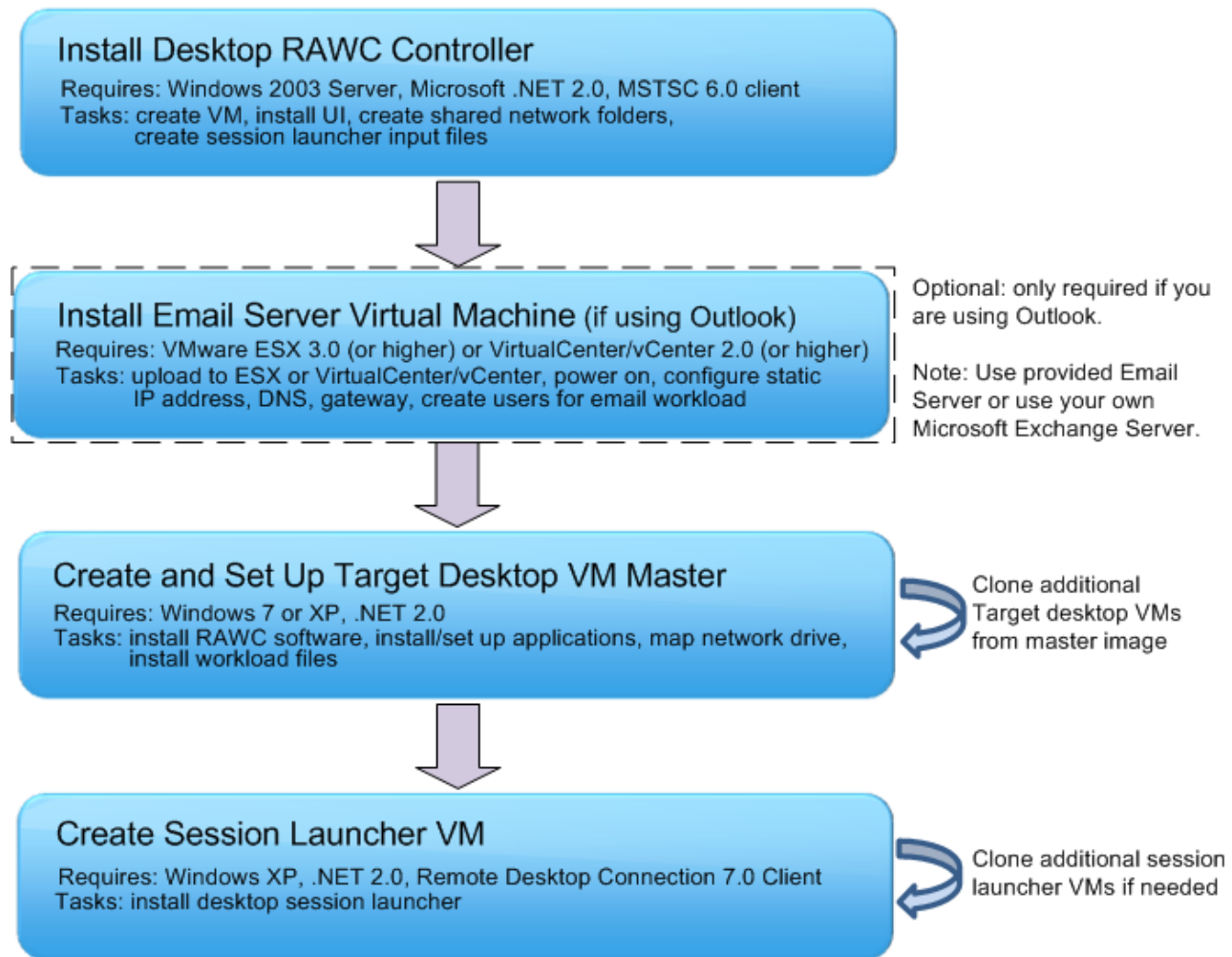
2. Installing and Configuring Desktop RAWC

Perform all installation and configuration tasks as Administrator.

2.1 Workflow

Figure 2 illustrates the Desktop RAWC installation workflow, along with requirements and high-level tasks.

Figure 2. Desktop RAWC Installation Workflow



If you are using Outlook, you can install the Email Server virtual machine before or after installing the Desktop RAWC Controller, but it should be set up before creating the target desktop VM master image. This enables you to include the address of the Email Server in the target desktop VM master image.

The Desktop RAWC Controller must be set up before creating target desktop VMs.

Target desktop VMs must be in place before creating session launcher VMs because you need to know the addresses of the target desktop VMs when you create the session launcher VMs.

2.2 Setting Up the Environment

Set up a VMware Infrastructure or VMware vSphere on compatible hardware in a lab (non-production) environment.

2.3 Creating a RAWC Controller and Shared Network Folders

Desktop RAWC requires two shared network folders:

- `Log_Folder` – Workload input files are located in this folder so that they are available to target desktop VMs. Target desktop VMs write timing and error logs to this folder.
- `SessionLauncher_Share` – Input files needed by session launcher VMs are located in this folder, and session launcher VMs write log files to this folder.

To create the RAWC Controller and shared network folder

1. Create a Microsoft Windows 2003 Server VM (or install a physical machine) to be the RAWC Controller.
2. Create `Log_Folder` under the root the drive on the Desktop RAWC Controller. For example, `C:\Log_Folder`. Select the folder.
 - a. Select **File > Properties**.
 - b. Click the **Sharing** tab.
 - c. Select **Share this folder**.
 - d. For **Share name**, enter the name of the shared folder.
 - e. Click **Permissions**.
 - f. Set permissions for the **Everyone** group to allow **Full Control**.
 - g. Click the **Security** tab.
 - h. Set permissions for the **Everyone** group to allow **Full Control**.
 - i. Click **OK**.
3. Repeat Step 2 to create `SessionLauncher_Share`.

2.4 Downloading and Installing the RAWC Installation Package

Before downloading the Desktop RAWC installation packages and running the installer, set up the RAWC Controller.

Download the Desktop RAWC installation package and install it on the RAWC Controller.

- VMware Solution Providers can download RAWC and associated materials from Partner Central.
- VMware consultants can download RAWC and associated materials from the Services Automation page on VM Vault.

To download Desktop RAWC from Partner Central

1. Log in to Partner Central.
2. Click the **Sales Tools** tab.
3. Scroll to and click **Services IP**.
4. Click the **Desktop** tab.
5. In the **Build** section, click **VMware Desktop RAWC (Setup)**.

To install Desktop RAWC

1. Download the Desktop RAWC installation package, `DesktopRawcSetup_1.2.0.zip`.
2. On RAWC Controller, unzip the installation package.
3. Run `DesktopRawcControllerSetup.msi`.
4. If you have not already installed the Microsoft .NET 2.0 (or later) framework, you are prompted to do it now. Download it from <http://www.microsoft.com/NET/>
5. In the EULA dialog box, select **I agree**, and click **Next**.
6. Browse to select the installation folder or accept the default.
7. Select **Everyone** or **Just me** to specify who should have access to Desktop RAWC, and click **Next**.
8. Click **Next** to start the installation.
9. When the installation is complete, click **Close** to exit.

2.5 Downloading and Setting Up the Email Server Virtual Machine

If you are going to use the Microsoft Outlook workload for the test you need an email server. You can use the email server provided with Desktop RAWC, or use your own Microsoft Exchange server. If you do not want to use the Outlook workload you can skip this section.

The Email Server virtual machine is comprised of the following software:

- CentOS operating system
- Dovecot
- Sendmail

2.5.1 Downloading and Installing the Email Server

To install the Desktop RAWC Email Server

1. Download the Desktop RAWC installation package, `RAWC-EmailServer-VMX.zip` from Partner Central (for partners) or VMware Vault (for VMware consultants).
2. Use VMware vCenter™ Converter 4.x to install the Email Server on VirtualCenter 2.0 (or later), vCenter 4.0, or ESX 3.0 (or later). If you do not have VMware vCenter Converter, you can download it from the VMware Support and Downloads Web page at http://downloads.vmware.com/d/info/datacenter_downloads/vmware_vcenter_converter_standalone/4_0.

VMware Converter is used to install the Email Server virtual machine because it is distributed in VMX format. Alternatively, you can copy the virtual machine files to a location accessible from an ESX host and add the virtual machine from a VI or vSphere Client as follows:

To register the controller appliance on an ESX 3.5 host

1. From the VI Client or vSphere Client, select the desired ESX host.
2. Select the **Configuration** tab.
3. Under **Hardware**, click **Storage**.
4. Double-click the file system where you placed the virtual machine files and navigate to the directory where you placed the virtual machine files.
5. Right-click the `.vmx` file
6. Select **Add to Inventory**, and follow the instructions to add the virtual machine to the VI Client inventory.

2.5.2 Configuring the Email Server

Prerequisites:

- A static IP address.
- A valid fully-qualified domain name.

To configure the Email Server

1. Boot the Desktop RAWC Email Server virtual machine.
2. Use VirtualCenter/vCenter to access the console of the Email Server virtual machine and log in to the appliance using default credentials:

Login: **root**

Password: **vmware**

3. Install VMware Tools from the menu or from the command-line:

- a. Click VM > Guest > Install/Upgrade VMware Tools.

- b. From the virtual machine command-line:

```
mkdir /mnt/vmware-tools
mount /dev/cdrom /mnt/vmware-tools
cd /mnt/vmware-tools
cp /mnt/vmware-tools/VMware-Tools*.tar.gz /tmp
cd /tmp
tar zxvf VMware-Tools*.tar.gz
cd vmware-tools-distrib
./vmware-install.pl (follow the prompts)
vmware-config-tools.pl (follow the prompts)
```

Reboot the virtual machine after the installation completes.

4. Verify that the VMware Tools Suite installed correctly:
 - a. In the VI Client or vSphere Client, select the virtual machine.
 - b. On the right-hand pane, select the **Summary** tab
 - c. Confirm that VMware Tools shows a status of **OK**. If it shows any other status, reinstall VMware Tools.
5. Log in to the appliance again.
6. Change directory to `/root/rawc`
7. Set the static IP address and the corresponding settings by running the command:

```
python ./config_appliance.pyc -i <ipaddr> -m <netmask> -g <gateway> -d
<hostname.full-domainname> -n <dnsip1> [,<dnsip2>, ...]
```

Replace <ipaddr>, <netmask>, <gateway>, <full-domainname>, <dnsip1>, and (optionally) additional DNS addresses with appropriate values, including the static IP address and the hostname.domainname. For example:

```
python ./config_appliance.pyc -i 10.17.50.171 -m 255.255.254.0 -g 10.17.50.107 -d
rawc-email-server.vdi-smtp2.rawc.local -n 10.17.50.107,10.10.18.1,10.20.10.1
```

Note To make sure that all target desktop VMs will know the address of the Email Server, on the target desktop master VM XP-VM-00, edit `C:\windows\system32\drivers\etc\hosts` and add a line with the domain name and IP address of the email server. For example, `vd-smt2.rawc.local 10.17.50.171`.

2.5.3 Creating User Accounts on the Email Server

The users created by the following procedure are used by the Email Server for the email workload. (These are not the users that you later need to create in Active Directory which are used to log in to the target desktop VMs.)

Because of the way the `useraddition.sh` script generates user accounts you have to edit and run the script multiple times to generate the correct set of users if the range of IP addresses spans subnets, or if the final octet of the low value is two digits and the final octet of the high value is three digits.

To create user accounts on the Email Server

1. Determine the range of IP addresses for all VMs that will be used for the test. For this example, we use a range from 10.129.1.97 through 10.129.1.109. Because the final octet changes from two to three digits, you have to edit and run the script twice to generate the complete set of email user accounts.
2. From the Email Server virtual machine command-line:

```
cd /root/rawc
```
3. Edit the `useraddition.sh` script:
 - a. On the line that contains `start = 2090`, change the number to the lowest number in the IP address range. For example, if 10.129.1.97 is the lowest IP address in the IP address range, concatenate the values in the third and fourth segments of the IP address, and enter `197`.
 - b. On the line that contains `end = 2103`, change the number to the highest two-digit number in the final octet of the IP address range. For example, if 10.129.1.109 is the highest IP address in the IP address range, enter `199`.
 - c. Save the file.
 - d. Run `useraddition.sh` to generate the first set of users.
 - e. Edit the `useraddition.sh` script:
 - f. On the line that contains `start = 197`, change the number to the lowest number in the second part of the IP address range. For example, if 10.129.1.97 is the lowest IP address, concatenate the values in the third and fourth segments of the IP address, and enter `1100`.
 - g. On the line that contains `end = 199`, change the number to the highest number in the IP address range. For example, if 10.129.1.109 is the highest IP address in the IP address range, enter `1109`.
 - h. Save the file.
 - i. Run `useraddition.sh` to generate the second set of users.

The Outlook function in Desktop RAWC uses “guest” plus the third and fourth segments of the IP address as the user name when sending an email. For example, a VM with an IP address of: 69.110.17.180 will have a user name of: `guest17180`.

Note Though you do not normally need it, the password is defined within the `useraddition.sh` script. Default is `abc123`.

2.5.3.1. Example Using Multiple Subnets and a Two- to Three-Digit Final Octet Range

Your target desktop VMs have address ranges 10.129.132.50 – 10.129.132.249 and 10.129.133.60 – 10.129.133.249. Because of the way `useraddition.sh` generates user accounts, giving a start value of 13250 and an end value of 133249 would generate thousands of guest users—not the desired result!

To properly generate guest users in this case you need to edit and run `useraddition.sh` four times, once for each of the start and end values shown in the following table.

Start and End Value	Generated Guests
Start=13250 End=13299	This generates users guest13250 – guest13299.
Start=132100 End=132249	This generates users guest132100 – guest132249.
Start=13350 End=13399	This generates users guest13350 – guest13399.
Start=133100 End=133249	This generates users guest133100 – guest133249.

2.5.4 Next Step

You still need to run Outlook Setup for every user that will run a workload and verify that email can be sent, but you must first clone target desktop VMs. Section 5 provides information about these final configuration tasks.

2.6 Creating Active Directory Users

Create one user in Active Directory for each target desktop VM you want to use in the test. Appendix A: `vdusers-v1` Script provides a script that you can use to create these users. Alternatively, you can create users manually, or your customer may have procedures or scripts that you can use to create users.

2.7 Creating and Configuring Desktop VMs

You will use the first target desktop VM you create as a master image from which other target desktop VMs can be cloned after it is fully configured. In this guide, the target desktop VM master is named XP-VM-00.

2.7.1 Installing Applications on XP-VM-00

Install the applications to be used for the test on the target desktop VM, XP-VM-00. If an application path or file name does not match what is expected, RAWC will not work. A test script is provided for use during the pre-test (see Section 4) to verify that everything is in the right location.

Some application files are provided with Desktop RAWC and others can be downloaded, but you must provide your own licensed copies of applications such as Microsoft Office, and McAfee AntiVirus. Resolve any licensing issues with the software packages. If you do not install a software package or do not want to include a particular application for the test, verify that the corresponding application option is not selected in the UI.

2.7.1.1. View Agent

A View Agent must be installed on each target desktop VM. Use a 32- or 64-bit agent depending upon whether the target desktop VM runs on a 32- or 64-bit OS.

2.7.1.2. Installing Microsoft Office

Install Microsoft Office 2007 with the latest patches and verify the following paths:

- Windows 7 (32-bit) or XP: C:\Program Files\Microsoft Office\OFFICE12*<application name>*
- Windows 7 (64-bit): C:\Program Files (x86)\Microsoft Office\Office12*<application name>*

Where *application name* is WINWORD.EXE, EXCEL.EXE, POWERPNT.EXE or OUTLOOK.EXE.

2.7.1.3. Installing Microsoft Internet Explorer

Install Microsoft Internet Explorer 8 with the latest patches, and verify the following path:

- Windows 7 (32-bit) or XP: C:\Program Files\Internet Explorer\iexplore.exe
- Windows 7 (64-bit): C:\Program Files (x86)\Internet Explorer\iexplore.exe

Other versions of Internet Explorer might work, but have not been tested.

2.7.1.4. Installing Windows Media Player

1. If you have not already downloaded Windows Media Player 11 for XP, or 12 for Windows 7, go to:

<http://www.microsoft.com/windows/windowsmedia/player/11/default.aspx>

<http://windows.microsoft.com/en-US/windows7/products/features/windows-media-player-12>

2. Install Windows Media Player, and verify this path:

- Windows 7 (32-bit) or XP: C:\Program Files\Windows Media Player\wmplayer.exe
- Windows 7 (64-bit): C:\Program Files (x86)\Windows Media Player\wmplayer.exe

2.7.1.5. Downloading and Installing Adobe Reader

1. If you have not already downloaded Adobe Reader, go to

<http://get.adobe.com/reader/>

Click **Download**.

2. Install Adobe Reader, and verify this path:

- Windows 7 (32-bit) or XP: C:\Program Files\Adobe\Reader 9.0\Reader\AcroRd32.exe
- Windows 7 (64-bit): C:\Program Files (x86)\Adobe\Reader 9.0\Reader\AcroRd32.exe

3. Disable Adobe Updater for all users so that it does not start when you open a PDF file:

- a. Download the file <http://www.adobe.com/support/acrobat/ts/documents/kb402050/disableupdates.zip>.
- b. Unzip and extract the `disableupdates.reg` file to a local folder.
- c. Double-click `disableupdates.reg`.
- d. Click **Yes** to add the registry settings to the registry.

For more information about disabling Adobe Reader updates, see <http://kb2.adobe.com/cps/402/kb402050.html>.

2.7.1.6. Installing McAfee AntiVirus

Install McAfee VirusScan Enterprise 8.7.0i software and verify this path:

- Windows 7 (32-bit) or XP: C:\Program Files\McAfee\VirusScan enterprise\scan32.exe
- Windows 7 (64-bit): C:\Program Files(x86)\McAfee\VirusScan enterprise\scan32.exe

Notes:

- You might not want to install Virus Scan if you are not testing it because it can impact performance.
- The Virus Scan Add-In in Microsoft Outlook causes Outlook to start up slower. If you installed it but decide to not test it, you can remove it by accessing Outlook and selecting **Tools > Options > Advanced > Add-In Manager**.
- Configure VirusScan appropriately—do not allow scanning or updates to occur during testing.

2.7.1.7. Installing Sun Java JDK

If you have not already downloaded it, download Sun Java JDK 6 Update 16 (or later) from <http://www.oracle.com/technetwork/java/javase/downloads/index.html>.

Install the Sun Java JDK and modify the environment variable, `Path`, to include the path to Java JDK bin directory.

To set the Path environment variable:

1. Open Windows Explorer, right-click and select **My Computer > Properties**.
2. Click the **Advanced** tab.
3. Click **Environment Variables**.
4. Under **System variables**, double-click the **Path** variable
5. Append the pathname to the `bin` folder under the Java JDK installation location to the end of the **Variable value**. For example, C:\Program Files\Java\jdk1.6.0_18\bin. (This location varies depending upon the installer used.)
6. Click **OK** repeatedly until all dialog boxes are closed.
7. To confirm the path is set correctly, open a command prompt window and type `javac`. Usage information for `javac` should be displayed. If you get an error that indicates that `javac` is not recognized, try again to set the path.

2.7.2 Installing Workload Files on XP-VM-00

Most of the applications you install on the target desktop VM XP-VM-00 use provided files or files you can download and install for the test. This section shows how to install the RAWC workload application and download or install other necessary workload files.

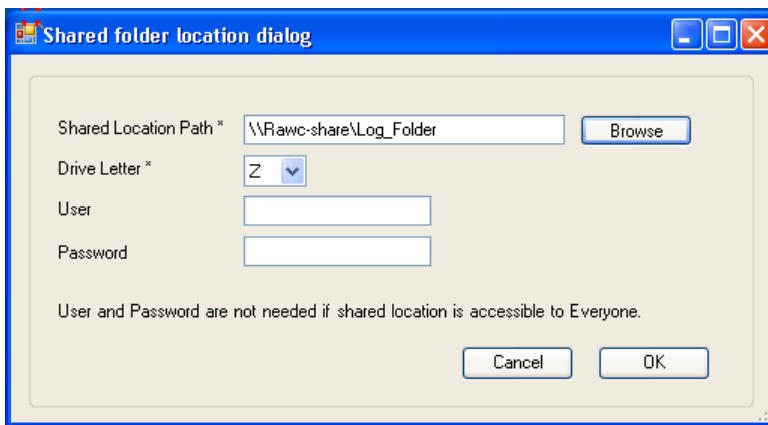
2.7.2.1. Installing the Desktop RAWC Workload Application

The files required for the following procedures were in the `DesktopRawcSetup.zip` file that you previously downloaded and unzipped.

To install the Desktop RAWC workload application

1. Run the workload application setup program, `DesktopRawcWorkloadSetup.msi`.
2. If you have not already installed the Microsoft .NET 2.0 (or later) framework, you are prompted to do it now. Download it from <http://www.microsoft.com/.NET/>.
3. Click **Browse** to select the installation folder, or accept the default.
4. Select **Everyone** and click **Next**.
5. Click **Next** to start the installation. The Shared folder location dialog box is displayed.

Figure 3. Shared Folder Location Dialog Box



6. In the Shared folder location dialog box:
 - a. **Shared Location Path *** – Click **Browse** to select the `Log_Folder` created during RAWC Controller setup.
 - b. **Drive Letter *** – Select from the drop-down menu the drive to which the `Log_Folder` will be mapped.
 - c. **User** and **Password** – If the folder is shared to **Everyone** you can leave these fields empty. Some customer environments might require that you enter a user and password if access is needed to shared folders not present on the Desktop RAWC Controller.

The installer tests share access by mapping and un-mapping the shared location using the provided information. This information is stored in a text file and is used to map the drive to shared folder when the workload is run and the user logs in.

7. When the installation is complete, click **Close** to exit.

2.7.2.2. Copying Video Files

To install the Video files

1. If you have not already downloaded the video files, go to:
<http://www.microsoft.com/windows/windowsmedia/musicandvideo/hdvideo/contentshowcase.aspx>
2. Select and download the following files to the C:\Temp directory:
 - Super Speedway (720p)
 - The Living Sea (1080p) (Be sure to select the 1080 version.)
3. Unzip the downloaded files and place them in C:\Temp\WMdownloads.
 - SuperSpeedway.exe
 - The_Living_Sea_1080.exe
4. Verify the following paths:
 - C:\Temp\WMdownloads\SuperSpeedway.wmv
 - C:\Temp\WMdownloads\The_Living_Sea_1080.wmv

The XP-VM-00 master is now complete, but conduct a pre-test to validate the setup before cloning to create additional target desktop VMs. Section 4 provides information about conducting a pre-test.

2.7.3 Executables and File Locations on RAWC VM XP-VM-00

To verify that executables and files are in the right locations and suppress pop-ups

1. Login to XP-VM-00 as Administrator and stop the RAWC workload application by right-clicking on the AutoIT icon on the bottom-right in the status bar of the VM. The workload application starts automatically after the user logs in.
2. Add the test users' Active Directory group to the local Administrators group. This ensures that test users have full permission to run the workload.
3. Add the test users' Active Directory group to Remote Desktop Users to allow View sessions to these desktops
4. To verify your setup before cloning other VMs from VM XP-VM-00, select **Start > All Programs > VMware > VMware Desktop RAWC Workload Test Locations**. This script verifies that all executables and files are in the proper locations. If you have installed Sun Java JDK 16 Update 16 (or later), the `Test Locations` script may give a warning message. You can safely ignore this message as later versions of the Java JDK will also work with the RAWC workload.

Resolve any issues for the applications you are using for the test and re-run the script until all files are in the proper place.

5. Open applications using the test user account(s) to satisfy any user-specific prompts and verify that each application can run without any issues:
 - Open Microsoft Word, Excel and PowerPoint, and respond to all user customization prompts. Close and open them again to verify that no prompts are displayed when the user runs these applications.
 - Open Internet Explorer and respond to all user customization prompts. Close and open them again to verify that no prompts are displayed when the user runs it.
 - Open Adobe Acrobat Reader and respond to any user or EULA prompts. Close and re-open the application to verify that no prompts are displayed when the user runs this application.

- Manually run the anti-virus software to verify that it can be opened and run without any issues.
 - Open Windows Media Player and run the race car video you downloaded to verify that Windows Media Player can be opened and run without any issues.
6. Configure Group Policy Settings locally to suppress user customization pop-ups for Windows Media Player.
 - a. Click **Start > Run**.
 - b. Enter `gpedit.msc`, and click **OK**.
 - c. Select **Local Computer Policy > Computer Configuration > Administrative Templates > Windows Components > Windows Media Player**, and double-click **Do Not Show First Use Dialog Boxes**.
 - d. Select **Enabled**.
 - e. Click **OK** to close window and close the group policy editor window.
 7. Configure Group Policy Settings locally to suppress user customization pop-up windows for IE8.
 - a. Click **Start > Run**.
 - b. Enter `gpedit.msc`, and click **OK**.
 - c. Select **Local Computer Policy > User Configuration > Administrative Templates > Windows Components > Internet Explorer**, and double-click **Prevent performance of First Run Customize settings**.
 - d. Select **Enabled**.
 - e. From the drop-down menu under **Select your choice**, select **Go directly to home page**.
 8. Log off from the VM.

2.7.4 Suppressing the UAC Prompt on Windows 7 Target Desktop VMs

When a user logs into a Windows 7 target desktop VM, a User Account Control (UAC) setting sends a prompt asking if the Windows registry can be modified. This should be suppressed so that it does not occur during your test.

To suppress the UAC prompt

1. Select **Control Panel > All Control Panel Items > User Account Control Settings**.
2. Drag the slide bar to **Never notify**.

2.8 Creating Session Launcher VMs

Set up one or more session launcher VMs to launch desktop sessions. Each session launcher VM can support up to 20 target desktop VMs. The session launcher VMs should be on a different ESX host than the target desktop VMs so that the session launcher VMs do not impact performance data.

Install a View Client on each session launcher VM. A View Connection Server is also required.

To install the Desktop Session Launcher

1. On every session launcher VM, run `DesktopSessionLauncherSetup.msi`. (This file is included in the `DesktopRawcSetup.zip` file that you previously downloaded.)
2. Click **Browse** to select the installation folder, or accept the default.
3. Select **Everyone** or **Just me** to specify who should have access to Desktop RAWC, and click **Next**.
4. Click **Next** to start the installation.

5. In the Shared Folder Location dialog box:
 - a. **Shared Location Path** * – Click **Browse** to select the `SessionLauncher_Share` created during RAWC Controller setup.
 - b. **Drive Letter** * – Select from the drop-down menu the drive to which `SessionLauncher_Share` will be mapped.
 - c. **User** and **Password** – If the folder is shared to **Everyone** you can leave these fields empty.

The installer tests share access by mapping and un-mapping the shared location using the provided information. This information is stored in a text file and is used to map the drive to shared folder when the workload is run and the user logs in.

6. When the installation completes, click **Close** to exit.

The installer places the Desktop Session Launcher executable in the Startup folder so that desktop sessions are automatically launched when you log in to a session launcher VM.

Caution You can disconnect from a session launcher VM after logging in, but do not log off. If you log off the sessions will close and end the test.

3. Configuring and Launching a Test

Use the Desktop RAWC UI to configure and launch the pre-test and the full test. This section shows you how to use the UI, but you do not actually use it until you are ready to configure a pre-test or full test.

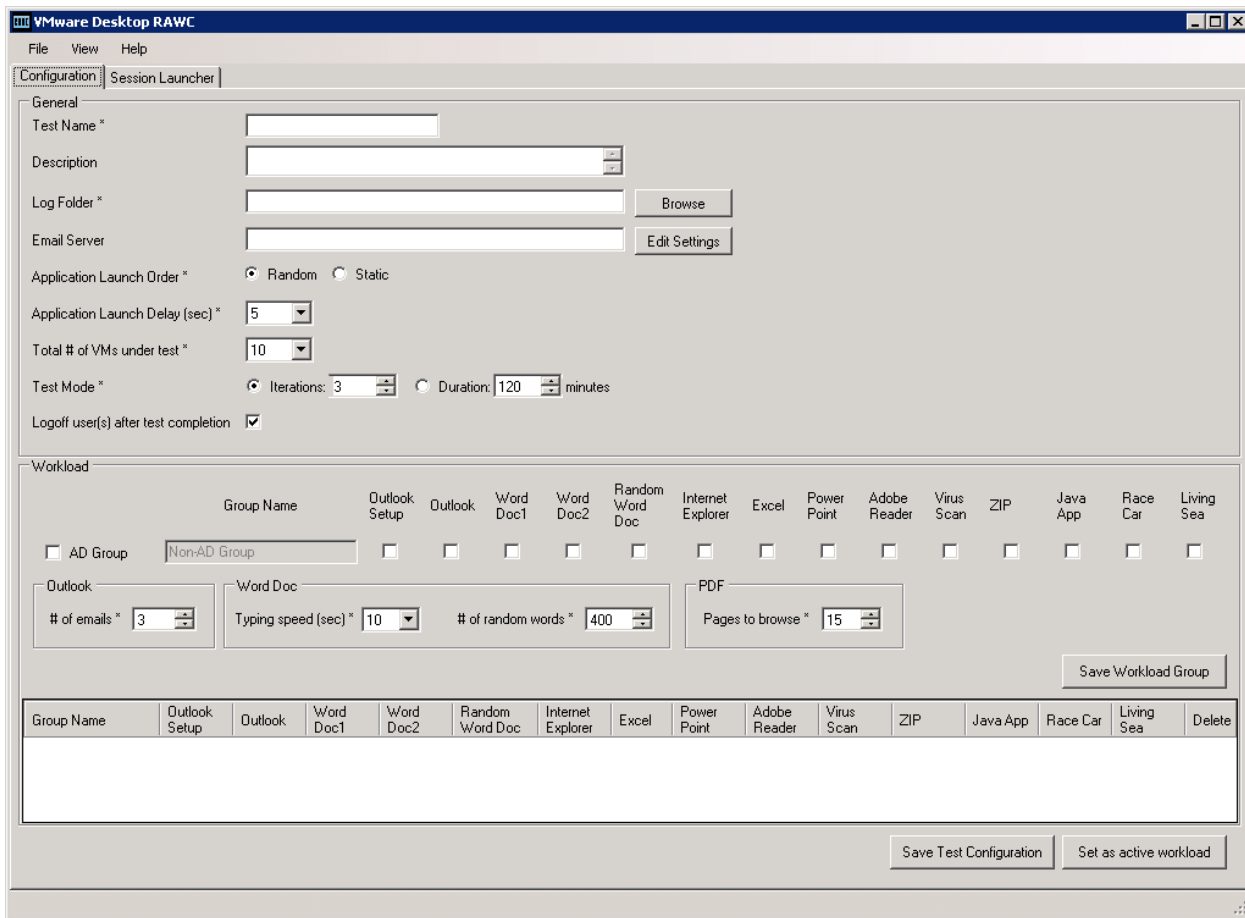
3.1 Configuration Tab

Use the Desktop RAWC UI **Configuration** tab to configure the test. Default values are populated when the UI is displayed. Do not change the default values if you are not using them.

To configure a test

1. On the RAWC Controller, double-click the icon or file name to open the Desktop RAWC UI. Figure 4 shows the **Configuration** tab.

Figure 4. Configuration tab



2. Complete the **General** section (asterisks indicate required fields):

- **Test Name *** – Enter the test name (maximum = 50 alphanumeric characters). The test name is written to the configuration file, and is then written to the first line in the error and timing logs.
- **Description** – Enter a description of the test (200-character limit). For example, “Pre-test of a single VM.” The test description is written to the configuration file.
- **Log Folder *** – Click **Browse** to find and enter the name of the log folder to be used for the test.
- **Email Server** – Click **Edit Settings** to configure the Email Server for the test. If you are not running Microsoft Outlook or Outlook Setup, do not change these values.
 - **Email domain name** – Enter the domain name of the Email Server.
 - **Incoming mail server** – Enter the IP address or fully qualified domain name of the Email Server.
 - **Outgoing mail server** – Enter the IP address or fully qualified domain name of the SMTP server.
 - **Password** – Enter the password that you used when the guest users were configured (default = abc123).

Click OK.

- **Application Launch Order** – Select **Random** or **Static**. This determines whether application workloads are launched randomly or in a static order.
 - **Random** – This is the standard mode in RAWC. By running applications in a random order, applications are executed in a different (random) order on different virtual machines. When running applications in a random order:
 - A varying start delay is in effect, depending on number selected for **Total # of VMs under test**.
 - The random delay between applications (**Application Launch Delay**) is calculated on the fly. When running applications in random mode, you choose the upper limit number used in the random delay calculation.
 - **Static** – By running applications in a static order, all virtual machines run the exact same test, including applications running in the same order and with fixed delays between the applications. This feature gives you the ability to repeat a test over and over. When running applications in a static order:
 - The applications selected run in the exact same order for each iteration on each virtual machine.
 - There is no start delay in effect. A varying start delay in this situation is irrelevant as the exact same applications are running on each virtual machine. So, regardless of whether the test started in 1 minute or 12 minutes or 40 minutes, all virtual machines would start together.
 - The random delay between applications (**Application Launch Delay**) is now a fixed delay. When running applications in static order, the upper limit number that is selected becomes the actual delay between the applications.
- **Application Launch Delay** – Select the launch delay in seconds. The application launch delay is used to either increase or decrease the load on the server by running the applications closer or further apart.
 - When running applications in a random order, the number selected for the application launch delay becomes the upper limit of a random delay that is calculated on the fly. For example, the random delay that is calculated could be 1 second or 119 seconds or any number in-between if 120 seconds is selected.
 - When running applications in a static order, the number selected for the launch delay becomes the actual fixed delay between applications.

- Typically, the greater the number of virtual machines under test, the larger a number you should select (above 120 seconds).
- By selecting a lower number, you can generate a heavier load by making the applications run closer together.
- **Total # of VMs under test *** – Select the number that is closest to the total number of target desktop VMs involved in the test. Default is **10**. This feature enables you to simulate a normal login scenario or create a more intensive boot storm.

A normal login scenario allows virtual machines to start their workloads over a period of time. Select the number of virtual machines that is closest to the number of virtual machines you have under test. This determines the staggered start delay of the VMs as follows:

- 10 VMs – No delay
- 64 VMs 0-12 minute delays
- 250 VMs 0-24 minute delays
- 500-1000 VMs 0-54 minute delays

A boot storm occurs when more virtual machines start their workloads closer together, thus creating a larger load on the server. A boot storm scenario may occur after systems have recovered from a power outage or when users log in first thing in the morning. A boot storm scenario can be created by selecting a lesser number of virtual machines under test. For example: if you are running a 500 VM test, select **250**. That causes 500 virtual machines to start within 0 to 24 minutes of each other.

- **Test Mode** – Select **Iterations** and enter the number of iterations you want the target desktop VMs to run (default = 3, maximum = 1000), or select **Duration** and enter the number of minutes (default = 120).
 - **Iterations** – Select the number of iterations you want the virtual machines to run. If you are interested in the open and close times of applications, run at least three iterations. Applications take longer to open the first time—by the second iteration, applications/pages have been cached and the open times are much shorter.
 - **Duration** – Select the number of minutes you want the test to run. When using duration:
 - Virtual machines do not finish at exactly the same time or exactly at the end of the specified duration.
 - Time checks are performed before and after random (or static) delays between applications.
 - Time checks are performed at certain points while an application is performing. For example: a time check occurs before and after an email is sent, but not during the creation of an email. A time check also occurs before and after the slide presentation.
 - When the duration time has elapsed, the log files are closed and the desktop is cleaned up of any open applications.

If you are using Active Directory groups and running in the duration test mode, you might notice that lighter workloads (2-3 applications) run more iterations of the applications than a heavier workload (5+ applications). This is reasonably accurate as task workers are limited in the number of applications they run, and more often than not use these applications more often.

- **Logoff User(s) after Test Completion** – Select to automatically log off desktop users after the test completes. Otherwise, you have to logoff every user using the View Client or Terminal Services Manager, or you can restart the VMs from vSphere Client

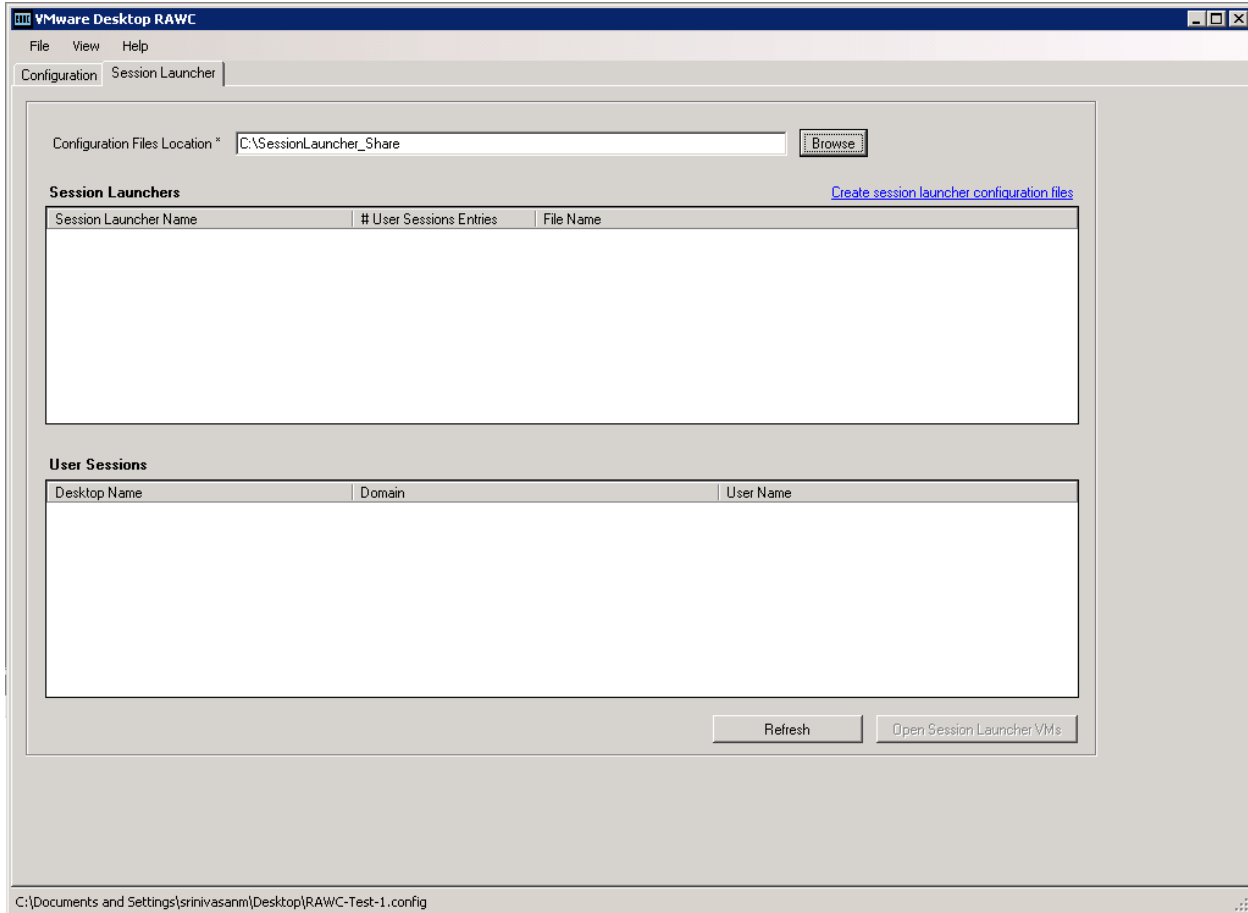
3. In the **Workload** section, configure one or more Active Directory group workloads, or a non-Active Directory group workload. You cannot run both Ad and non-AD group workloads at the same time.
 - To configure an Active Directory group, select **AD Group**, enter the Active Directory group name, and select the applications to run for the group.
 - To configure a non-AD group, make sure that the **AD Group** check box is *not* selected, and select the applications to run for the test. Leave Outlook Setup unselected as this was previously run for each user. The group name defaults to **Non-AD Group**. Only one non-AD group can be configured for a test.
4. In the **Outlook** part of the **Workload** section, in the **# of emails** field, if you are running Outlook enter the number of emails you want to generate. Outlook opens, sends one email, and then minimizes. Outlook is maximized at a later point during the test and generates the number of emails specified.
5. In the **Word Doc** part of the **Workload** section, enter the typing speed and number of random words to generate:
 - **Typing speed** – Select one of the values.
 - **# of random words** – If you selected **Random Word Doc**, select the number of random words to be generated. The default is **400**.
6. In the **PDF** part of the **Workload** section, in the **Pages to browse** field, select the number of PDF pages for Adobe Reader to browse. If you are not running Adobe Reader, leave it at **15** (default).
7. When you are done configuring a group, click **Save Workload Group**. If you are configuring multiple AD groups, repeat steps 4-8 until all groups are configured and saved.
8. When you are done setting up all of the groups you want (one non-AD group, or one or more AD groups), click **Save Configuration** to validate and save the entire configuration.
9. After setting up all of the groups you want, click **Set as active workload** to copy the group and configuration files to the shared network folder on the RAWC Controller.

Note Clicking **Set as active workload** automatically backs up any existing configuration files in the shared `Log_Folder` to a subfolder with a folder name in the format: <backup date/time>.

3.2 Session Launcher Tab

Use the Session Launcher tab to create session launcher configuration files and to launch the sessions. Figure 5 shows the Session Launcher tab.

Figure 5. Session Launcher Tab



3.2.1 Creating Session Launcher Configuration Files

To create session launcher configuration files

1. Click the **Session Launcher** tab.
2. Click **Browse** to select the `SessionLauncher_Share` folder to create session launcher configuration files.
3. Click **Create session launcher configuration files** to create one or more session launcher configuration files.

Figure 6. Create Session Launcher Configuration Files Screen

1. Enter a session launcher host name or IP address, and click **Add**. The session launcher you enter is pinged to verify that it can be reached from the Desktop RAWC controller. If it cannot be pinged, the entry cannot be added.
2. In the Section, **Target Desktop VM View User Session**:
 - **View Desktop Name** – Enter a unique name for the View desktop.
 - **Domain** – Enter the FQDN for the domain.
 - **User Name Prefix** – Enter a prefix for the user name. A numeric suffix is added to the prefix to create a full user name. For example, DesktopUser1, Desktop User2, and so on.
 - **Suffix Begin #** – Enter a value for the first user in the range of users for this user name prefix.
 - **Suffix End #** – Enter a value for the last user in the range of users for this user name prefix.
 - **Password** – Enter the password for the session launcher.
 - **View Connection Server** – Enter the host name or IP address of the View connection server.
 - **View Connection Protocol** – Select **PCoIP** or **View RDP**. This is the protocol that View client sessions will use to connect to target desktop VMs.
 - **Session Launch Delay** – Use the drop-down menu to select a value in seconds for the launch delay (default = 15 seconds). This is the delay between target VM session launches from a session launcher.
3. Click **Create Configuration Files**.

Repeat this procedure for each session launcher configuration file you want to create.

Notes:

- If you want to use fullscreen desktop for the View Client window, in the `SessionLauncher_Share` folder, edit `view-commandline.txt` and add the option `-desktopLayout fullscreen`.
- You can optionally add other View Client command-line options as specified in the *VMware View Manager 4.x Administration Guide*.

3.2.2 Launching Desktop Sessions

To launch VMware View desktop sessions

1. On the **Session Launcher** tab, click **Browse** to select the folder `SessionLauncher_Share`. This reads all input configuration files created for each session launcher and displays the datagrids.
2. To launch the target desktop sessions, click **Open Session Launcher VMs**.

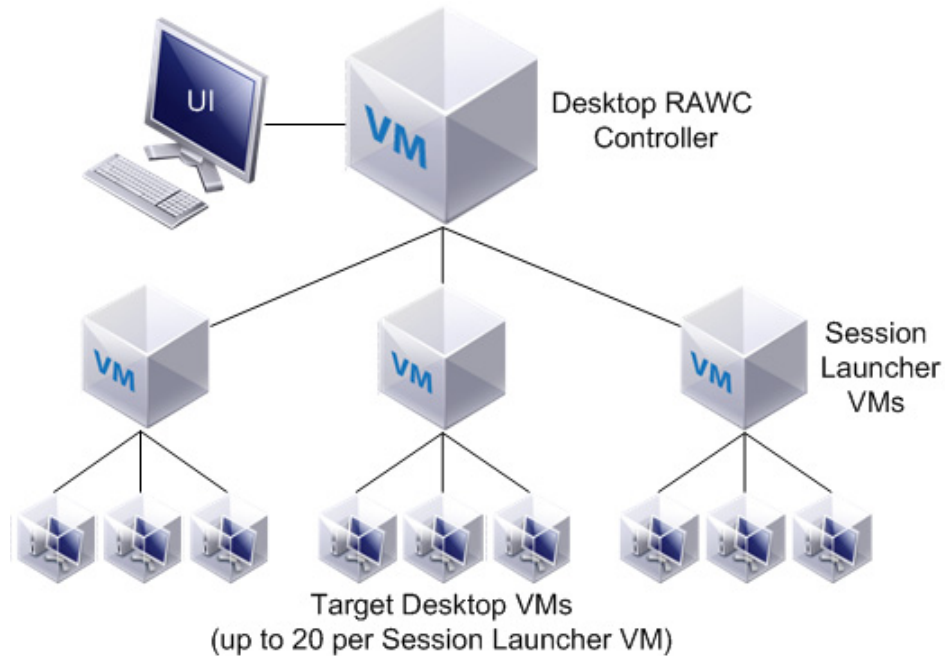
Note For View RDP, an RDP session to the session launcher VM opens in a window. To use full screen mode, change `screen mode id:i:1` to `screen mode id:i:0` in the file `template.rdp` under Desktop RAWC UI install location.

3. Click **OK** on the message pop-up indicating how many sessions will be launched, or click **Cancel** to cancel the launch and return to UI.
4. Enter user login information to open RDP sessions to the session launcher VMs. The same user information is used to open RDP sessions to all session launcher VMs.

3.2.2.1. Opening Session Launcher VMs

Session launcher VMs are zombie VMs that are used to launch user sessions to the target desktop VMs where the workload is executed. On the Desktop RAWC UI **Session Launcher** tab, click **Open Session Launcher VMs** to open the session launcher VMs, which in turn launch user sessions on target desktop VMs.

Figure 7. Opening Session Launcher VMs



When an RDP session is opened to a session launcher VM, the session launcher is automatically executed because there is a shortcut to the desktop session launcher executable in the Startup folder. The session launcher then maps the drive to `SessionLauncher_Share`, reads the input file associated with each session launcher VM from the network share, and sequentially launches one user session to each target desktop VM.

4. Conducting a Pre-test

The objective of conducting a pre-test is to:

- Verify that log folders can be created in the shared network folder on the RAWC Controller.
- Verify that the target desktop VM can deposit error and timing log files in the shared network folder.
- Verify that the configuration file for a group can be created and launched.
- Verify that the selected applications can run on the target desktop VM, including that the Email user can be set up, and Email can be created and sent (Email Server is functioning correctly).
- Verify that Microsoft Word, Excel and PowerPoint can be opened without additional user-specific customization prompts.
- Verify that Internet Explorer and Windows Media Player can be opened without additional user-specific customization prompts.
- Verify that Adobe Acrobat Reader can be opened without any additional EULA acceptance prompts.
- After the test is completed, verify that the error and timing log files have data.

Always run a pre-test to verify the setup is valid before running a test.

4.1 RAWC Controller

Verify that the Desktop RAWC UI can create the log folders on the RAWC Controller.

To verify that the UI can create log folders

1. Set up the pre-test and configure the workload you want to run by selecting the appropriate applications using the **Configuration** tab. Setting up a pre-test is the same as setting up a test, but you only use one session launcher VM and the XP-VM-00 target desktop VM.
2. Click **Set as active workload**.
3. On the **Session Launcher** tab, click **Open Session Launcher VMs** to start the workload on XP-VM-00.
4. Verify that the AutoIT icon (small, gray, round icon) is present on the bottom-right of the status bar for the VM.
5. XP-VM-00 writes a text file to the `started` folder in the shared network folder on the RAWC Controller. The file is named with the IP address of the VM. The presence of `<IPAddress>.txt` indicates that the script has been started.
6. After the configuration and group (if using groups) files have been launched from the RAWC UI, verify that the following test files were created in the log folder on the RAWC Controller:
 - `Timinglog.IPAddress.txt` – captures open, save, close times
 - `Errorlog.IPAddress.txt` – captures any errors
7. Depending on the number of target desktop VMs under test, there may be a start delay on the VM. An Information box displays a countdown until the test starts.
8. Close the console on XP-VM-00.
9. Close the VM.

Caution You can watch the test by keeping the console open, but do not perform any work or click the mouse in the console as this will take focus away from the application and jeopardize the test.

4.2 Pre-test Results

After completing an initial test run on XP-VM-00, check the following files on the RAWC Controller:

- `Errorlog.<IP address>.txt` – file used to collect errors if a VM fails
- `Timinglog.<IP address>.txt` – file used to capture open and close times on the applications—the timing that is measured is guest OS timing.

Resolve any problems found and re-run the pre-test until everything is in place.

5. Final Configuration

After completing a successful pre-test but before running a full test, clone target desktop VMs, prepare input files for session launcher VMs and complete Outlook Setup.

5.1 Cloning Target Desktop VMs

From the XP-VM-00 master, clone as many target desktop VMs as you need for a full test.

5.2 Completing Outlook Setup and Verifying Email Messages

Run Outlook Setup once per user per desktop VM, and confirm that email messages are being successfully sent and received. This must be done after the pre-test, but before running a full test.

Caution If Microsoft Outlook is part of the workload, use a persistent desktop pool so that users will get the same desktop for every test. Otherwise, Outlook Setup for users becomes unmanageable.

To run Outlook Setup for users

1. On the Desktop RAWC UI, click the **Configuration** tab.
2. Select **Outlook Setup** (only). Verify that no other workloads are selected.
3. Click **Set as active workload**.
4. Click the **Session Launcher** tab.
5. Click **Open Session Launcher VMs**. Outlook Setup is run for each user on every target desktop VM. The setups run in parallel.
6. After Outlook Setup has completed on all target desktop VMs, log off the user session on each target desktop VM. You can use the VMware View Manager UI to disconnect user sessions.

To verify that the Outlook workload can send email

1. On the Desktop RAWC UI, click the **Configuration** tab.
2. Select **Outlook** (only). Verify that no other workloads are selected.
3. Click **Set as active workload**.
4. Click the **Session Launcher** tab.
5. Check the Outlook Inbox for a sampling of users to verify that messages have been received.
6. After Outlook has completed on all target desktop VMs, log off the user session on each target desktop VM. You can use the VMware View Manager UI to disconnect user sessions.

6. Conducting a Test

After cloning target desktop VMs and performing Outlook Setup (if you are using the Outlook workload), you can run a full test.

6.1 Cloning Desktop VMs for the Test

If the pre-test results indicate that the pre-test run was successful, shut down XP-VM-00 and use it to clone as many VMs as you need for a full test.

6.2 Running the Test

To run a test

1. On the RAWC Controller, open the RAWC UI.
2. Use the **Configuration** tab to set up the test and configure workloads.
3. From the RAWC UI, click **Open Session Launcher VMs** to log in to session launcher VMs which, in turn, causes each session launcher VM to launch desktop sessions.
4. On the RAWC Controller, when the test finishes review error and timing log files.

7. Comparing and Charting Test Results

You can use a Microsoft Excel spreadsheet and Windows performance tools such as the System Monitor to compare data and graph results.

7.1 Log Files

The log files contain the data you need for comparisons.

7.1.1 Error Log

Locate the `Errorlog<IPAddress>.txt` file on the RAWC Controller and open it. This file includes the following information if the test compiles successfully:

```
Line1: Group,NA, Test Name, Run 2 - August 2nd 2009
Line2: 192.168.1.171, Date: 8/2/2009, Time: 6:44:14 PM
Line3: Test finished: Date: 8/2/2009, Time: 8:39:46 PM, Completed 3 iterations
```

If the RAWC workload exited on the VM prior to completing all the iteration, line 3 is left blank.

If an error occurs on the VM, the error is written to the Errorlog. The Errorlog is then filled with characters to create a 3KB file and moved to the `A_Error_Folder` folder in the same directory, and the test program exits. Errorlogs with errors are now located in one folder for easier viewing.

```
Line1: Group, Test Name,
Line2: IP Address, Date: Time: (Date and time the workload on the VM was started)
Line3: Exiting Program – Error Code: 0 Time: Iteration #:
Line4: Return Code: 0 WinWaitActive () Timeout occurred-Window not found or not activated
Line5: Line #: Function: C01_A_Open() Command: WinWaitActive
```

A return code of 0 (zero) indicates that the command failed. In this case, the `WinWaitActive()` command failed to find the window it was looking for, or it found the window but could not activate it. This typically occurs when the system is overloaded. Additional information is provided as to the function and case number where the failure occurred and the iteration in which the error occurred. If the system is overloaded, errors will occur in the first couple of iterations for some of the VMs, while others do not fail.

Information about interpreting esxstop statistics can be found at <http://communities.vmware.com/docs/DOC-9279>.

7.1.2 Timing Log

Locate the `Timinglog.<IPAddress>.txt` file on the RAWC Controller and open it. This file includes header and timing information from the VM. For example:

```
Line1: Group, Test Name,
Line2: IP Address, Date: Time: (Date and time the workload on the VM was started)
Line3: Current Time, IP Address, Application-Operation, Iteration #, Host Time
Line1: Group, NA, Test Name, Run 2 - Test August 2nd 2009
Line2: 192.168.1.171,Date: 8/2/2009,Time: 6:44:14 PM
Line3: Current Time, IP Address,Application-Operation,Iteration #,Host Time
Line4: 6:45:10 PM,IP192.168.1.171,MSOutlook-Open,1,27391.1344979085
```

Line5: 6:48:00 PM,IP192.168.1.171,PDF-Open,1,6934.88948726298
Line6: 6:49:36 PM,IP192.168.1.171,MSWord-Doc01-Open,1,2077.19432206999
Line7: 6:49:39 PM,IP192.168.1.171,MSWord-Doc02-Open,1,1140.30020289056
Line8: 6:49:43 PM,IP192.168.1.171,MSIntExplorer-Open,1,2815.07249855973
Line9: 6:49:59 PM,IP192.168.1.171,MSPowerPT-Open,1,1858.84360794529
Line10: 6:50:08 PM,IP192.168.1.171,MSExcel-Open,1,3139.62444405481
Line11: 6:52:14 PM,IP192.168.1.171,MSExcel-Save_1,1,420.779655837487
Line12: 7:08:39 PM,IP192.168.1.171,MSWord-Doc01-Save_1,1,113.148008416201
Line13: 7:16:02 PM,IP192.168.1.171,MSWord-Doc02-Save_1,1,84.1901219848208
Line14: 7:16:04 PM,IP192.168.1.171,MSMediaPlayer1-Open,1,851.031559752524
Line15: 7:18:14 PM,IP192.168.1.171,MSMediaPlayer1-Close,1,484.792674899181
Line16: 7:18:57 PM,IP192.168.1.171,PDF-Close,1,407.337935024923
Line17: 7:19:04 PM,IP192.168.1.171,MSWord-Doc01-Close,1,498.902556421111
Line18: 7:19:12 PM,IP192.168.1.171,MSWord-Doc02-Close,1,254.819589710192
Line19: 7:19:29 PM,IP192.168.1.171,MSIntExplorer-Close,1,442.595853017058
Line20: 7:19:44 PM,IP192.168.1.171,MSOutlook-Close,1,424.457078876838
Line21: 7:22:16 PM,IP192.168.1.171,MSPowerPT-Close,1,45.959218495604
Line22: 7:22:40 PM,IP192.168.1.171,MSExcel-Save_2,1,83.4779099767052
Line23: 7:22:42 PM,IP192.168.1.171,MSExcel-Close,1,30.0663557347895
Line24: Test finished: Date: 8/2/2009, Time: 7:22:42 PM, Completed 1 iterations

This data was selected from a timing log file to show a majority of the functions that are part of the test. To perform additional analysis and comparisons, this data can be moved into an Excel spreadsheet so that you can manipulate it, depending on the comparisons you want to do.

To compare like applications and operations, and chart the timing log

1. Open a `timinglog` file on the RAWC Controller.
2. Open an empty Excel spreadsheet.
3. Copy and paste all data from the timinglog into an Excel spreadsheet.
4. Close the `timinglog` file.
5. Repeat this process for each VM, either into the same or a different Excel spreadsheet.
6. In the Excel spreadsheet, delete line 1 containing the IP address, date and time. This information is not part of the header information and cannot be parsed. Also, delete the last line ending at iteration number `##`, or do not include this line when converting text to columns.
7. Select all the data and select **Data > Text to Columns** to convert to columns.
 - a. Select the file type that best describes your data: **Delimited**.
 - b. Click **Next**.
 - c. Select the appropriate delimiters: **Comma**.
 - d. Click **Next**.
 - e. Click **Finish**.
8. Widen columns to view the data.

9. Select all of the data and select **Data > Sort** to perform a sort.
 - a. Sort by: Application-Operation (ascending order).
 - b. Then, sort by: Iteration # (ascending order).
 - c. Click **OK**.
10. Optional: Insert a column and formula to convert the Host Time (in milliseconds) to seconds by dividing the Host Time by 1000. (=SUM(E2/1000))
11. Insert a blank line between the various applications and operations such as; Explorer-Open, Explorer-Close, MSWord-Open, 7-Zip-Compress, and so on.
12. Copy and paste the header information into each blank line.
13. To chart, select only the Host Time header and timings you want to chart and select: **Insert > Chart**.
 - a. Select the chart type you want: **Line**.
 - b. Select **Next**.
 - c. Review the data range and select **Next**.
 - d. Change the titles as necessary:
 - Chart Title: **Explorer Close – 32 VMs – Run 1**
 - Category (X) axis: **Number of Iterations**
 - Value (Y) axis: **Seconds** (or milliseconds, if you did not add the formula)
 - e. Click **Next**.
 - f. Select the chart placement, either **As new sheet** or **As object in**.
 - g. Click **Finish**.
 - h. Repeat these steps for each separate application and operation.

This is just one way to chart the data. After the data is in a spreadsheet you can manipulate it, including finding the average of a particular application operation.

7.2 Graphing Results

You can use the Microsoft System Monitor to graph results. The following procedure shows how to graph the data, using disk usage as an example.

To graph test results

1. Click **Start > Control Panel > Administrative Tools > Performance** to bring up the System Monitor.
2. Click in the graph window and press Ctrl-I (I as in load) to bring up the **System Monitor Properties** window.
3. On the **Source** tab, select **Log Files**.
4. Click **Add**.
5. In the **Select Log file** dialog box, select the source log file and click **Open**.
6. Click **Time Range** to display the time range and verify that it corresponds to the time period during which the test was run.
7. Click the **Data** tab, then click **Add**.

8. Select the data you want to graph:
 - a. In the **Add Counters** dialog box **Performance object** section, select **Physical Disk**.
 - b. Select **Select counters from list**.
 - c. Select **MBytes Read/sec** and click **Add**.
 - d. Select **MBytes Written/sec** and click **Add**.
 - e. Click **Select instances from list**:
 - f. Select **DEV-vmhba1:0:0** (for example) and click **Add**.
 - g. Select **DEV-vmhba32:0:0** (for example) and click **Add**.
 - h. Click **Close**.
9. On the **Data** tab, remove any counters that are not needed.
10. Select the **Graph** tab and enter title and parameters:
 - a. In the **Title** field, enter a title for the graph. For example, **4 VM Test Disk Usage (Run_09_11_09)**.
 - b. In the **Vertical axis** field, specify a value for the vertical axis. For example, **100**.
 - c. In the **Maximum** field, specify a maximum value for the vertical scale. For example, **15**.
 - d. In the **Minimum** field, specify a minimum value for the vertical scale. For example, **0**.
 - e. Click **OK**.
 - f. Click **File > Save As** and save the graph with a descriptive name (for example **4 VM Test Disk Usage (Run_09_11_09).msc**) as a Microsoft Management Console file (.msc).
 - g. Right-click and select **Save Data As**, enter a descriptive file name, select **Text File [Comma delimited][*.csv]**, and click **Save** to save the data as a comma-separated values (.csv) file.

7.2.1 Graphing Other Data

The following shows the types of counters and instances you should add to graph various performance objects:

- Performance Object: **Physical CPU**
 - Counter: **% Processor Time**
 - Instances: Select **All instances**
- Performance Object: **Physical Disk**
 - Counters: **MBytes Read/sec, Mbytes Written/sec** (total reads, total writes - add formula)
 - Instance: **DEV-vmhba32:0:0** (for example)
- Performance Object: **Memory**
 - Counters: **PShare Shared, PShare Savings**
 - Instances: n/a
- Performance Object: **Memory**
 - Counter: **PShare Common**
 - Instances: n/a

- Performance Object: **Memory**
 - Counters: **Memctl Current, Memctl Max, Memctl Target**
 - Instances: n/a
- Performance Object: **Memory**
 - Counters: Swap **MBytes Read/sec, Swap MBytes Write/sec**
 - Instances: n/a
- Performance Object: **Memory**
 - Counters: **Swap Used, Swap Target**
 - Instances: n/a

Appendix A: vdiusers-v1 Script

add-vdiusers-v1.ps1

This add-vdiusers script creates users in Active Directory for test purposes. The script and a sample `add-users.csv` file are provided with Desktop RAWC.

This script requires the following software:

- Windows PowerShell
- QAD cmdlets

The following is a printout of the `add-vdiusers-v1.ps1` script:

```
#-- This script automatically creates, configures and enables users in Active Directory for the VMware VDI Testing Tool Kit
#-- The script depends on PowerShell and QAD cmdlets from Qwest both are free tools – download from
#--
#-- PowerShell from Microsoft - http://www.microsoft.com/windowsserver2003/technologies/management/powershell/download.msp
#-- PowerShell Commands for AD - http://www.quest.com/powershell/activeroles-server.aspx
#--
#-- Both will need to be installed on a Windows host that has access to the AD controller in your VMware Testing Environment
#-- Environment specific variables can be changed to handle any deviations from the VDI testing standard and examples
#-- This script uses the vdi-adusers.csv file provided for input parameters when creating each VDI test users the most common object attributes
have already been set. These can easily be changed for environment specific situations

#-- Set Environment specific variables
$ADserver='192.168.1.21:389'
$vdiOU="DC=wadingdog,DC=com"
$vdiusers="CN=VDI Users,CN=Users,DC=wadingdog,DC=com"

#-- Read user information from the vdi-adusers.csv file
$userinfo = Import-csv "C:\vdi-adusers.csv"
$userinfo |foreach {

#-- Create the new users in Active Directory
New-QADUser -Service $ADserver -ParentContainer $vdiOU -Name $_.Name -UserPrincipalName $_.UserPrincipalName -UserPassword
$_.UserPassword -FirstName $_.givenName -LastName $_.sn -PhoneNumber $_.PhoneNumber -PostalCode $_.PostalCode -
SamAccountName $_.samaccountname -StateOrProvince $_.StateorProvince -StreetAddress $_.StreetAddress -DisplayName $_.CN

#-- Enable the users, set additional attributes and set passwords
Enable-QADUser $_.Name -Service $ADserver | Set-QADUser -objectattributes @{mail=$_.emailaddress} -UserPassword 'vdiptest'

#-- Add each user to the restricted vdi-users group
add-QADGroupmember -identity $vdiusers -Service $ADserver -Member $_.Name

}
```

Figure 8 shows an `add-vdiusers.csv` file that provides data to the script (see the included sample script for details).

Figure 8. Sample add-vdiusers.csv File

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	CN	SN	GivenN	Name	UserPassv	Title	Description	Postal (PhoneNui	Department	Company	St	Cc	SamAccou	usi	Emailaddress		Ho	mc	MemberO
2	vdiuser1	User1	VDI	vdiuser1	vdiuser	Test User	VDI desktop User	83644 555-1212	VDI-Testing	VDI-DEMO						vdiuser1@domainname.com			VDI Users
3	vdiuser2	User2	VDI	vdiuser2	vdiuser	Test User	VDI desktop User	83644 555-1213	VDI-Testing	VDI-DEMO						vdiuser2@domainname.com			VDI Users
4	vdiuser3	User3	VDI	vdiuser3	vdiuser	Test User	VDI desktop User	83644 555-1214	VDI-Testing	VDI-DEMO						vdiuser3@domainname.com			VDI Users
5	vdiuser4	User4	VDI	vdiuser4	vdiuser	Test User	VDI desktop User	83644 555-1215	VDI-Testing	VDI-DEMO						vdiuser4@domainname.com			VDI Users
6	vdiuser5	User5	VDI	vdiuser5	vdiuser	Test User	VDI desktop User	83644 555-1216	VDI-Testing	VDI-DEMO						vdiuser5@domainname.com			VDI Users
7	vdiuser6	User6	VDI	vdiuser6	vdiuser	Test User	VDI desktop User	83644 555-1217	VDI-Testing	VDI-DEMO						vdiuser6@domainname.com			VDI Users
8	vdiuser7	User7	VDI	vdiuser7	vdiuser	Test User	VDI desktop User	83644 555-1218	VDI-Testing	VDI-DEMO						vdiuser7@domainname.com			VDI Users
9	vdiuser8	User8	VDI	vdiuser8	vdiuser	Test User	VDI desktop User	83644 555-1219	VDI-Testing	VDI-DEMO						vdiuser8@domainname.com			VDI Users
10	vdiuser9	User9	VDI	vdiuser9	vdiuser	Test User	VDI desktop User	83644 555-1220	VDI-Testing	VDI-DEMO						vdiuser9@domainname.com			VDI Users
11	vdiuser10	User10	VDI	vdiuser10	vdiuser	Test User	VDI desktop User	83644 555-1221	VDI-Testing	VDI-DEMO						vdiuser10@domainname.com			VDI Users

Appendix B: Optimizing a VMware View Test Environment

Some of the following tips may be useful.

Master Desktop VM

On the target desktop VM from which you clone other VMs:

- If you want to see system failures and send an administrative alert when they occur: select **Control Panel > System > Advanced > Startup and Recovery > Settings** and, in the **System failure** section, select **Send an administrative alert** and deselect **Automatically restart**.
- Check that VMs have proper memory size: usually 512MB or 1024MB.
- Upgrade VM Tools on VMs, if needed.
- Modify Windows registry settings as needed, such as disk timeout value (how long OS will wait for a hard disk to respond to a command before generating errors). Recommended value is **180**.
- HKEY_LOCAL_MACHINE/System/CurrentControlSet/Services/Disk/TimeOutValue
- Update Golden Master image with patches (OS, IE, Java), virus scan definitions, other software updates.
- Disable unneeded services such as automatic updates, remote registry, Secondary Logon, SSDP Discovery Service, Wireless Zero, and so on.
- Turn off System Restore.
- Set virtual memory size properly. Click **Control Panel > System > Advanced**. Then, under **Performance**, click **Advanced**, and under **Virtual Memory**, click **Change** and specify virtual memory values. Usually, the **Initial size** and **Maximum size** values should be the same. A good starting point for a VM is to set it equal to the memory size. Increasing this value makes the Linked Clones grow in size, so it should be set to the smallest value that provides adequate virtual memory for the guest OS.

VMware vCenter

- Enable the DRS cluster setting before powering on VMs. If DRS has trouble meeting requirements for VMs it will move them around if DRS is set to **fully automated**.
- Make sure VMs are balanced across the ESX settings if you are not using aggressive DRS setting. Migrate VMs to a different ESX host, if necessary.
- Increase the ESX host console memory, if necessary. A user report indicates that a value of 800MB helps to stabilize the environment. On vCenter, select **Configuration > Memory > Properties**. This change requires an ESX host reboot.

Other Optimization

Before deploying the virtual images, the master target desktop VM image from which the desktops are created should be tuned and optimized. Additional optimizations are discussed in the following documents.

- [Windows XP Deployment Guide](#)
- [Optimized XP Virtual Machine for VDI Template Checklist](#)