PUBLISHING APPLICATIONS WITH VMWARE HORIZON 7

VMware Horizon 7 version 7.x

vmware®

Table of Contents

Introduction to Publishing Applications with Horizon 7

Welcome to the *Publishing Applications with VMware Horizon 7 Quick-Start Guide.* This guide shows you how to quickly install and deploy published applications with VMware Horizon® 7. Whether you are new to published applications or run an existing published applications environment, this guide takes you step by step through the installation and configuration of the key software components.

The Horizon 7 Published Applications feature supports a wealth of remote-experience features. These include everything from HTML Access to client-drive redirection, access to locally connected USB devices, file-type association, Windows media redirection, content redirection, printer redirection, location-based printing, 3D rendering, smart card authentication, and more.

Horizon 7 Published Applications can leverage the PCoIP and Blast Extreme display protocols from VMware, providing a rich user experience using zero, thin, laptop, PC, or mobile clients over LAN, WAN, or bandwidth-limited connections.

Figure 1: Remote-Experience Features Available with Horizon 7 Published Applications

With published applications, you install applications on servers with the Microsoft Remote Desktop Session Host (RDSH) role, and entitle applications to corporate users through the Horizon 7 administration console. Once authenticated to Horizon 7, users can launch an application, save files, and use network resources from a remote RDSH server—just as if the users had the application installed on their local computer, tablet, or phone.

Publishing applications using Horizon 7 Published Applications simplifies management of line-of-business applications, allows the delivery of Windows applications to non-Windows devices, and can potentially provide licensing advantages. This strategy can reduce CapEx and OpEx costs, simplifying installation, upgrades, and troubleshooting.

With a VMware implementation, end users launch VMware Horizon Client™, or the HTML Access web client, and log in to the server that brokers connections to published apps. Users then see a catalog of published apps, as well as session-based or single-user virtual desktops, if desktops have been configured.

Selecting an application opens a window for that application on the local client device, and the application looks and behaves as if it were locally installed. For example, on a Windows client computer, an item for the application appears in the taskbar and looks identical to the way it would look if it were installed on the local Windows computer. Users can also create shortcuts for published applications, and the shortcuts appear on the client desktop, just like shortcuts for locally installed applications.

Horizon 7 includes JMP, the next-generation desktop and application delivery platform from VMware.

JMP – Next-Generation Desktop and Application Delivery Platform

JMP (pronounced *jump*), which stands for Just-in-Time Management Platform, represents capabilities in VMware Horizon 7 Enterprise Edition that deliver Just-in-Time Desktops and Apps in a flexible, fast, and personalized manner. JMP is composed of the following VMware technologies:

• VMware Instant Clone Technology for fast desktop and RDSH provisioning

• VMware App Volumes™ for real-time application delivery

• VMware User Environment Manager™ for contextual policy management

JMP allows components of a desktop or RDSH server to be decoupled and managed independently in a centralized manner, yet reconstituted on demand to deliver a personalized user workspace when needed. JMP is supported with both on-premises and cloud-based Horizon 7 deployments, providing a unified and consistent management platform regardless of your deployment topology. The JMP approach provides several key benefits, including simplified desktop and RDSH image management, faster delivery and maintenance of applications, and elimination of the need to manage "full persistent" desktops.

Audience

This guide is intended for IT administrators and media reviewers who want to set up published applications using Horizon 7 Published Applications and Microsoft Remote Desktop Services (RDS). Typical users are system administrators responsible for the delivery of applications to end users by means of software distribution, remote published applications, or a virtual desktop infrastructure (VDI).

Readers should be familiar with VMware vSphere®, VMware vCenter Server®, and VMware technologies for networking and storage in a virtual environment. Readers should also have some familiarity with Microsoft server technology, including Active Directory and RDSH.

Objectives

This guide introduces you to the Horizon 7 Published Applications feature, demonstrating its capabilities through a hands-on, end-to-end set of steps. You install and configure Horizon 7 and then prepare an RDSH server for application pool deployment, set up an automated RDSH farm, create an application pool, launch and use the published application like an end user would, and monitor remote sessions as an administrator.

By the time you complete the steps in this guide, you will be familiar with the following aspects of Horizon 7 Published Applications:

• Easy setup and configuration of the servers in the Horizon 7 private cloud infrastructure

• Quick and advanced application publishing techniques

• User entitlement in just a few clicks

• Integration with other VMware components to manage user profiles, streamline application delivery, and provide secure gateway access

Components of Published Applications in Horizon 7

Figure 2 and corresponding descriptions show the relationships between the major components of a Horizon 7 Published Applications deployment.
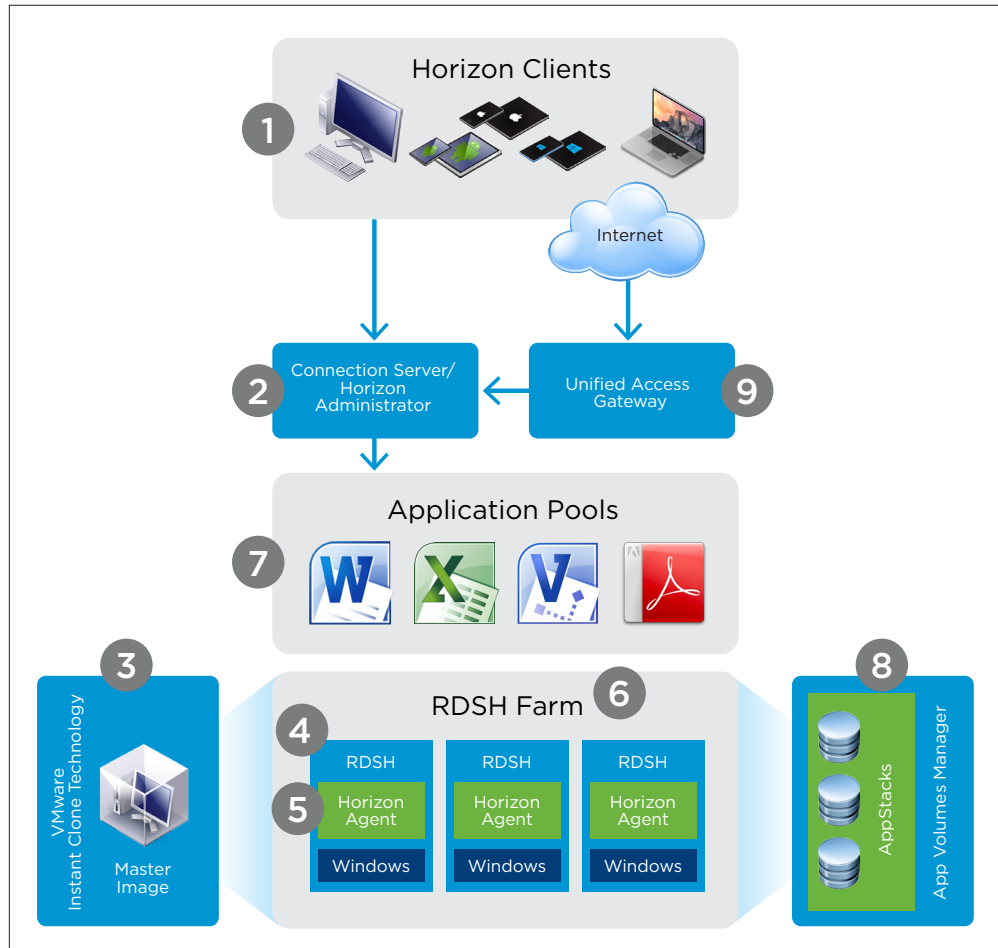
Figure 2: Components of Horizon 7 Published Applications

1. **Horizon Client** – Client software is available from app stores or from VMware for iOS, Android, Chrome, Windows, Linux, and macOS so that users can access published applications from any device. An HTML Access web client is also available, and it does not require installing any software on client devices.

2. **Connection Server/Horizon Administrator** – End users start Horizon Client to log in to the Connection Server. This server, which integrates with Windows Active Directory, provides access to published applications from a Microsoft RDSH server. This server also provides single-image management with automation capabilities.

   Note: Installed with the Connection Server is Horizon Administrator, the browser-based administrative console you use to configure and manage Horizon 7. Wizards with embedded help text guide you through creating automated RDSH farms, adding application pools, and entitling users to applications.

3. **VMware Instant Clone Technology** – This key Horizon 7.1 feature provides single-image management with automation capabilities. You can create automated farms of instant-clone Microsoft RDSH servers.

   Instant Clone Technology accelerates the process of creating cloned virtual machines over the previous View Composer linked-clone technology. In addition, instant clones require less storage and are less expensive to manage and update because the VM is deleted at scheduled intervals and a new RDSH server is created using the latest master image.

4. **RDSH servers** – To provide a published application, you install the application on one or more Microsoft RDSH servers.

5. **Horizon Agent** – You install the Horizon Agent service on all Microsoft RDSH servers that you use as sources for published applications. Horizon Agent communicates with Horizon Client to provide features such as connection monitoring, virtual printing, folder sharing (client-drive redirection), and access to locally connected USB devices.

6. **RDSH farms** – One or more RDSH servers make up a farm, and from that farm administrators create application pools in a similar manner to creating desktop pools. Each individual farm can contain up to 200 RDSH servers.

7. **Application pools** – Each application that you select to publish becomes an application pool. For example, using the Add Application Pool wizard, if you select the Paint and Calculator apps to publish, when you complete the wizard, you will have a Paint application pool and a Calculator application pool.

8. **App Volumes Manager** – Integration with VMware App Volumes, a real-time application delivery system, enables enterprises to deliver and manage applications at scale. Use App Volumes to attach applications to RDSH servers, simplifying application distribution and update.

9. **Unified Access Gateway** – A VMware Unified Access Gateway virtual appliance (formerly known as Access Point) functions as a secure gateway for users to access remote desktops and applications from outside the corporate firewall. Unified Access Gateway appliances typically reside within a network demilitarized zone (DMZ).

Getting Started

To get started, you will verify that you have the appropriate VMware vSphere infrastructure installed and configured, create a virtual machine (VM) template to use for Horizon 7 servers, and download the Horizon 7 software.

Prerequisites

Before you install and configure components of the Horizon 7 Published Applications solution, you must download the Horizon 7 software, set up the required vSphere infrastructure, and create certain security groups and organizational units in Active Directory.

Horizon 7 Installers

Go to the VMware Horizon 7 Product Evaluation Center to download a free 60-day trial version of VMware Horizon 7. From the list of download packages, download the following components listed in the VMware View Binaries section:

• Horizon 7.1 (or later) View Connection Server (64-bit)

• Horizon 7.1 (or later) View Agent (64-bit)

Note: Version 7.1 or later is required for creating automated farms of instant-clone RDSH servers.

Note: In a production environment, you would also download the Horizon 7.x View GPO Bundle, which contains Active Directory Group Policy administrative templates. With these ADM and ADMX files, you can apply component-specific Computer Configuration and User Configuration group policies to optimize and secure published apps.

vSphere 6 Installers

If you do not already have a VMware vSphere infrastructure installed and configured, download the following components from the Hypervisor and Management Server Binaries section of the VMware Horizon 7 Product Evaluation Center:

• VMware vCenter Server Modules for Windows – vCenter Server 6.5 is recommended, though vCenter Server 6.0 Update 2 (and later) is supported

• ESXi ISO image (Includes VMware Tools™) – ESXi 6.5 is recommended, though ESXi 6.0 Update 2 (and later) is supported

vSphere Infrastructure Prerequisites

Before you can perform the exercises in this guide, you must have a VMware vSphere 6 Update 2 (or later) infrastructure that contains at least one VMware ESXi™ host and one vCenter Server. You can download installers for these components from the VMware Horizon 7 Product Evaluation Center. For installation and configuration instructions, see the VMware vSphere 6 documentation.

Active Directory Prerequisites

In the appropriate Active Directory domain:

1. Create a new security group, which will be used to assign administrator access to Horizon 7. For this guide, we use the name **Horizon-Admin**. Add at least one domain administrator account to this group.
2. Create a second security group, which will be used to entitle users to the applications. For this guide, we use **Horizon-User**. Add the same domain administrator account and optionally a normal user account to this group.
3. Create a new organizational unit (OU) and set the minimum required Active Directory domain privileges. When you create an automated farm of RDSH servers, the computer accounts of the servers will be added to this OU.

    In a production environment, you must set certain minimum required permissions on this container. You use the Delegate Control wizard in Active Directory Computers and Groups to create a custom task that adds the Create Computer Objects, Delete Computer Objects, and Write All Properties permissions to the account on the container for the instant-clone computer accounts.

    The following list shows the required permissions for the user account, including permissions that are assigned by default:

    • List Contents

    • Read All Properties

    • Write All Properties

    • Read Permissions

    • Reset Password

    • Create Computer Objects

    • Delete Computer Objects

    Make sure that the permissions apply to the correct container and to all child objects of the container.

    Important: In a lab environment, where the domain administrator account already has all these permissions, you do not need to go through the process of using the Delegate Control wizard.

Sketch of Quick-Start Steps

After completing the steps in this guide, you will have a small Horizon 7 environment with several published applications. Although all the applications are delivered using RDSH servers, some of the applications are installed directly on the RDSH server and others are attached as AppStacks.

Below is a graphical summary of your accomplishments by the time you reach the end of this guide.
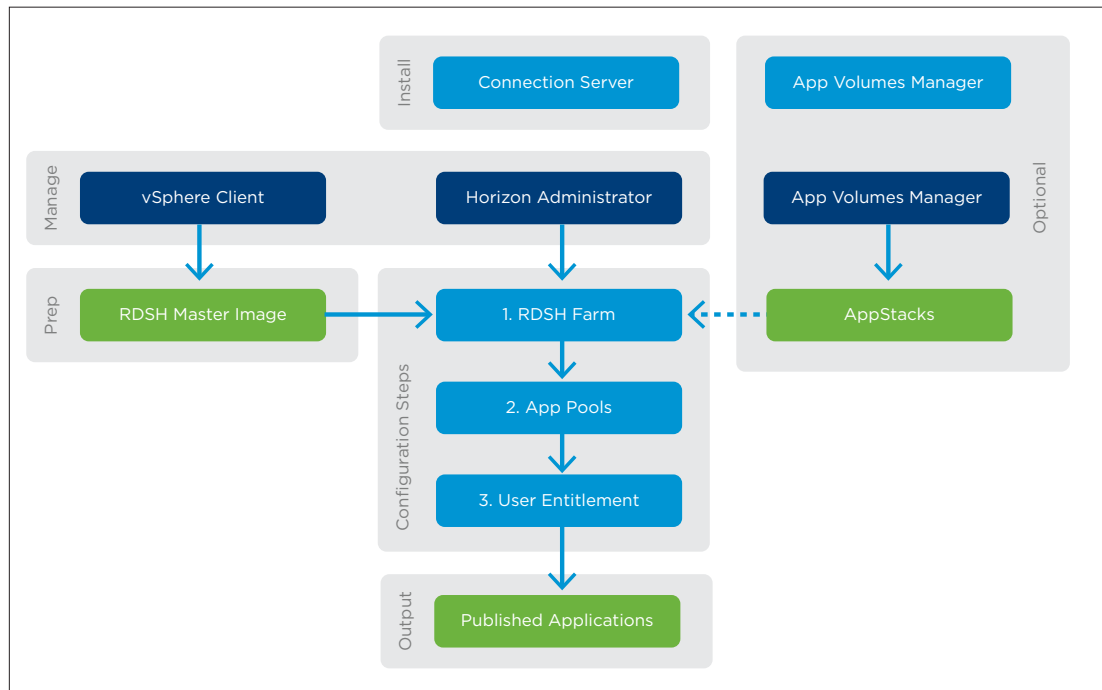
Figure 3: Flowchart of Steps to Publish Applications with Horizon 7

You begin by installing the server software that manages sessions between users and published apps and that enables automation of RDSH server creation. You can also optionally install software for capturing groups of applications that are virtually attached rather than installed on the RDSH server. With this strategy, you can deliver, update, and retire applications without taking the RDSH server out of service.

Next you create the master image of the RDSH server that will be used to host applications. Besides configuring the operating system with the required role and services, and installing the desired apps, as is always required for app hosting, you install the agent software that communicates with the Horizon 7 servers and the clients.

Once these Horizon 7 infrastructure elements are set up, delivering an application is very simple:

1. Create an RDSH farm from the master image, which automatically clones the number of servers you specify.
2. Publish one or multiple application pools with one trip through the Add Application Pool wizard.
3. Entitle users, either as a last step of completing the Add Application Pool wizard, or after you complete the wizard.

On client devices, you can download the free Horizon Client software from app stores or from VMware to install on iOS, Android, Chromebook, Windows, macOS, or Linux clients, or just open a browser and enter the server URL to use the HTML Access web client.

Create a VM Template

For this evaluation, you create a VM template and clone it to create the required VMs for the server components.

To create the VM template, log in to vCenter Server and create a VM with the specifications shown in Table 1.

ATTRIBUTE	SPECIFICATION
Virtual machine hardware	VMware Virtual Hardware version 11
OS	Windows Server 2012 R2
vCPU	4
vMemory	12 GB
vNICs	1
Virtual network adapter 1	VMXNET3 adapter
Virtual SCSI controller 0	LSI Logic SAS
Virtual disk – VMDK (scsi0:x)	Scsi0:1 Windows OS 40 GB

Table 1: Template VM Specifications

After you create the VM, use the vSphere Web Client to

1. Install a Windows Server 2012 R2 operating system.
2. Install VMware Tools.
3. Configure VMware Tools to synchronize the clock in the VM with the clock on the ESXi host.
4. (Optional) Activate Windows using Key Management Service (KMS) and a volume license key, if you have a key.
5. Apply all the latest Windows updates and turn off Windows Updates.
6. Convert the VM to a VM template.
7. Clone the VM template to create two VMs, which will be used in later steps for the following servers.

VM PURPOSE	SUGGESTED VM NAME	VCPU	MEMORY (GB)
Connection Server	horizon-cs	4	12
RDSH master image	rdsh-master	4	30

Table 2: Server Specifications

You can edit the virtual hardware settings for the number of vCPUs and the amount of memory as you complete the Deploy Template wizard.

Detailed instructions for the non-Windows-specific tasks are provided in the VMware vSphere 6 documentation.

Installing the Horizon 7 Servers

After verifying that your environment meets the hardware, server, and installation minimum requirements, you can install the Connection Server.

Important: This evaluation environment should not be used as a template for deploying a production environment. To deploy a production environment, see the VMware Horizon 7 documentation.

Install Connection Server

The Connection Server acts as a broker for client connections by authenticating and directing incoming application requests from end users. When you install Connection Server, the Horizon Administrator console is also installed. Use this web-based administrative UI to manage and provision RDSH servers, and to entitle users to the apps on the RDSH servers. As an administrator, you can centrally manage hundreds of apps from a single Horizon Administrator console.

Preparation

Using the **horizon-cs** VM, which you created in Create a VM Template, log in as an administrator and

1. Join the VM to the domain.
2. Give the VM a static IP address.
3. Copy the VMware Horizon 7 Connection Server installer to the VM.

   Downloading the installers is described in Horizon 7 Installers.

Deployment

To begin, navigate to the VMware Horizon 7 Connection Server installer and launch the installer.

When the Welcome page appears, click **Next**.

On the License Agreement page, accept the terms and click **Next**.

If you are using an evaluation license, the 60-day trial period begins.

Accept the default installation path, and click **Next**.

Select **Horizon 7 Standard Server**, and select the **Install HTML Access** check box to allow web-browser access to applications.

Select the IP protocol version for your environment, and click **Next**.

For this quick start, you will not use the other server types.
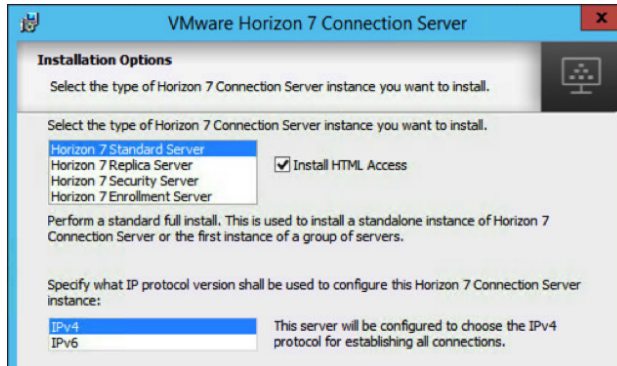
Create a password to protect data backups, and click **Next**.

Accept the default to configure Windows Firewall automatically, and click **Next**.

➜ Alternatively, if you want to configure the ports manually, complete the required port configuration before proceeding to the next wizard page.
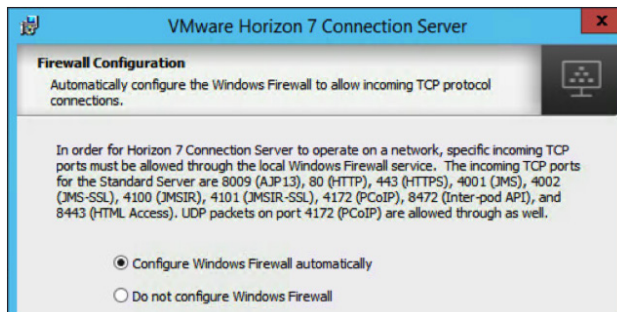
Indicate the administrators group or specific administrator user who will have full administrative rights in Horizon Administrator, and click **Next**.

This can be the **Horizon-Admin** group created in Active Directory Prerequisites.

Indicate the administrators group or specific administrator user who will have full administrative rights in Horizon Administrator, and click **Next**.

This can be the **Horizon-Admin** group created in Active Directory Prerequisites.
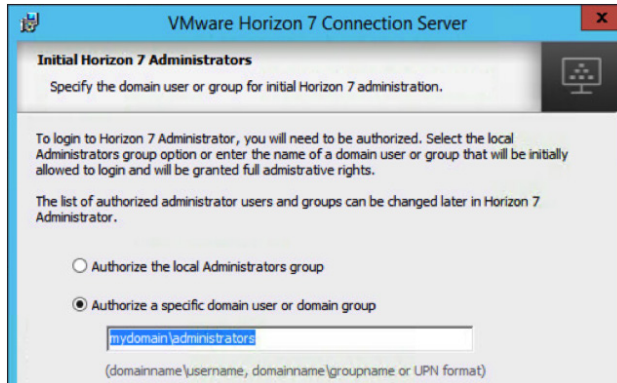
If you choose to participate anonymously in the user experience improvement program, you can select the type, size, and location of your organization from the drop-down menus, and click **Next**.
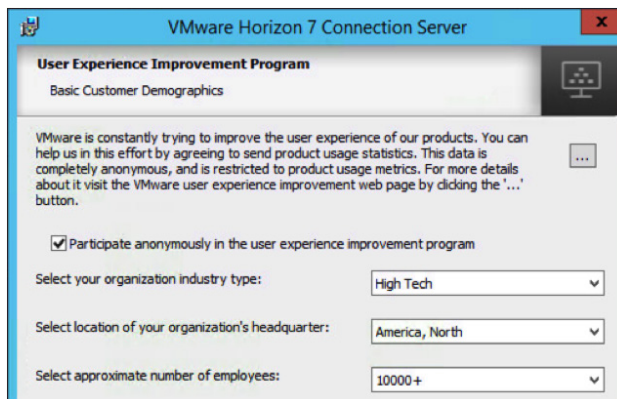
Verify your destination folder (or modify by clicking **Back**), and click **Install**.
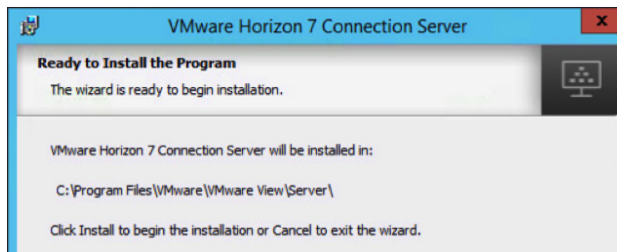
Click **Finish** to complete the installation.
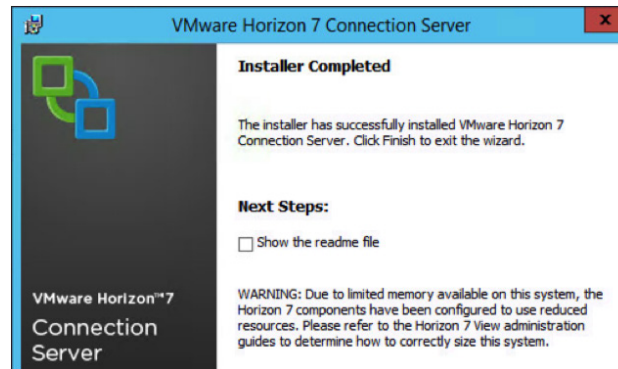
Certificates

By default, and for testing purposes, a self-signed server security certificate is installed in the Connection Server. For a production environment, VMware recommends that you replace the self-signed certificate with an approved certificate signed by a *certificate authority*, a trusted entity that issues digital certificates verifying another digital entity's identity on the Internet. For more information, see *Configuring SSL Certificates for View Servers*, in the View Installation guide.

Complete Post-Installation Configuration

Now that you have installed the Connection Server, you can use Horizon Administrator to perform an initial configuration. Gather the following information, which you will enter into the configuration pages:

• URL for accessing Horizon Administrator, which uses the following format:

`https://<Connection Server FQDN or IP>/admin`

You created this VM and assigned a static IP as part of the Install Connection Server step.

• Credentials for an account that belongs to the Horizon 7 Administrators group, which you specified during Connection Server installation.

• Horizon 7 license key, as described in Horizon 7 Installers.

• Fully qualified domain name (FQDN) of vCenter Server. Having vCenter Server installed and configured is part of the prerequisites, as described in vSphere Infrastructure Prerequisites.

Important: Using the FQDN of vCenter Server rather than the IP address when configuring Horizon 7 is required for creating an automated farm of RDSH servers.

• Credentials for an account that has the Administrator role in vCenter Server.

• A domain user account that has permission to create computer objects, delete computer objects, and write properties in the domain.

Open a browser and log in to the VMware Horizon 7 Administrator console as a Horizon 7 administrator.
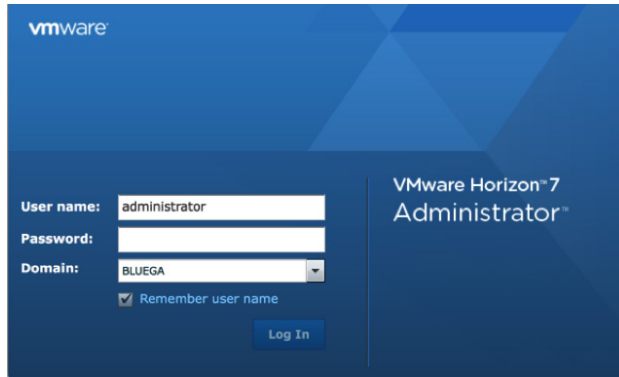
The Product Licensing and Usage window is displayed when you log in for the first time.

Click **Edit License**.

➜ On subsequent logins, to navigate to this window, click **Product Licensing and Usage** under **View Configuration** on the left.
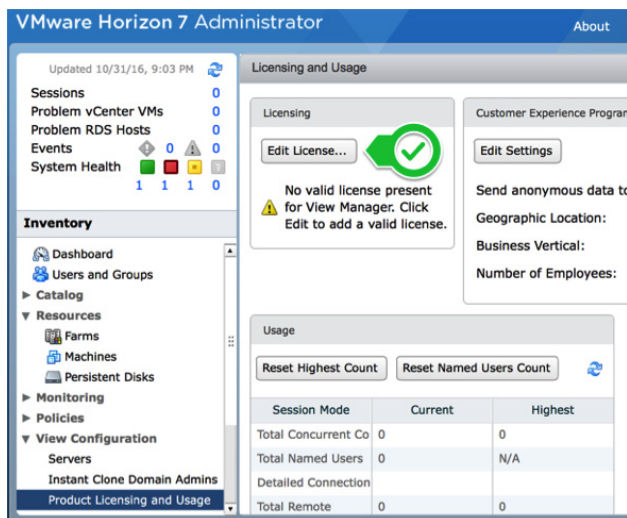
Enter a valid license serial number, and click **OK**.

This can be the evaluation license, as described in Horizon 7 Installers.

Verify that the license is enabled.
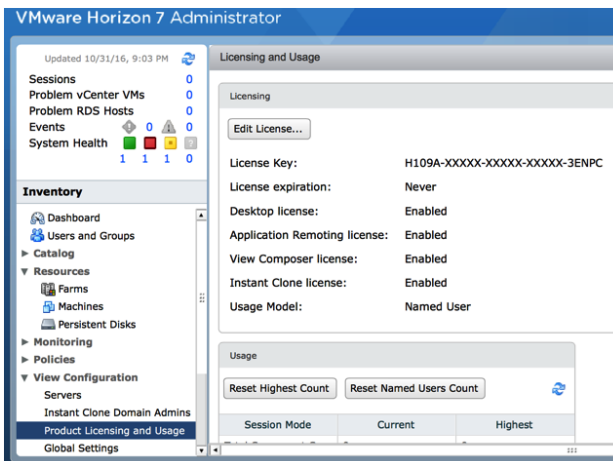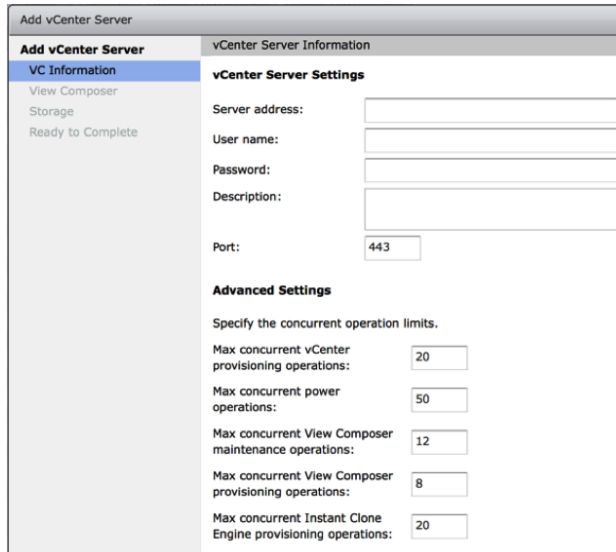
Under **View Configuration** on the left, select **Servers** > **vCenter Servers** > **Add**.
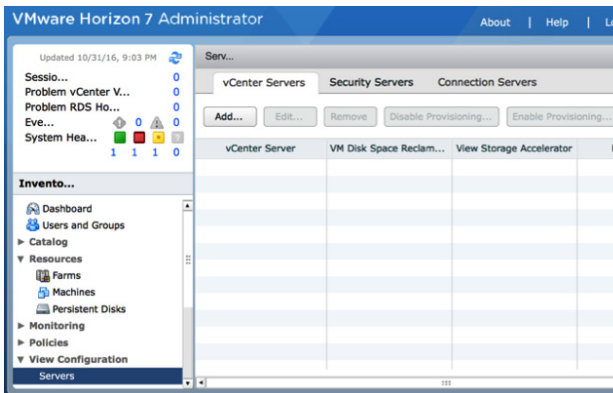
In the **Server address** text box, enter the FQDN of your vCenter Server instance, and enter credentials for a user with the Administrator role in vCenter.

Accept or modify the default values for the other settings, and click **Next**.

If you see this window, click **View Certificate**.

You can use the default self-signed certificate generated when you installed vCenter Server.

For a production environment, it is best to replace the default certificate with a certificate from a Certificate Authority.
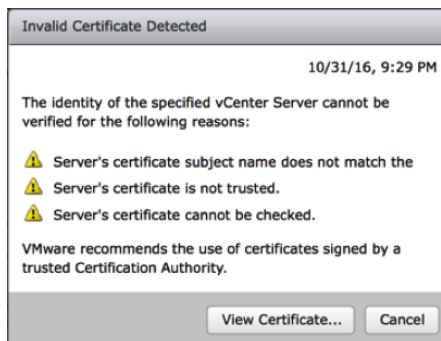
Review the thumbprint of the default self-signed certificate, and click **Accept**.
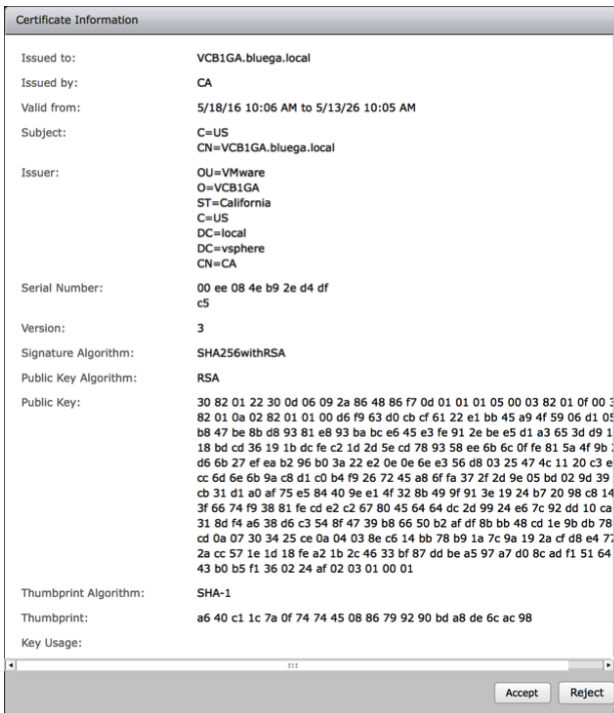
Select **Do not use View Composer**, and click **Next**.
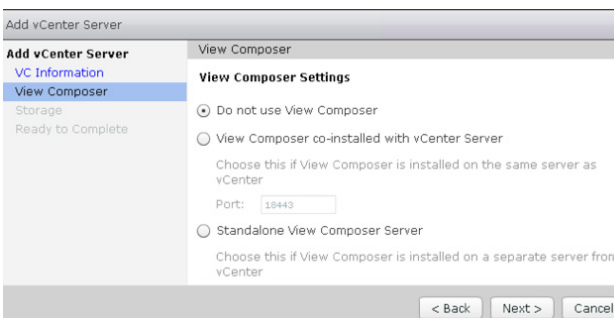
Accept the defaults for the storage options, and click **Next**.

If you enable View Storage Accelerator, accept the default or enter a new host cache size.
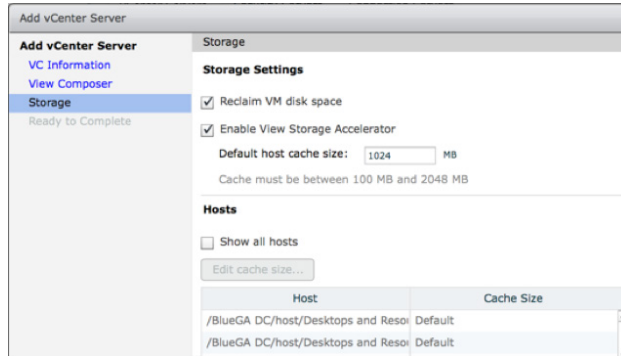
Click **Finish**.

vCenter Server is now added to the environment.
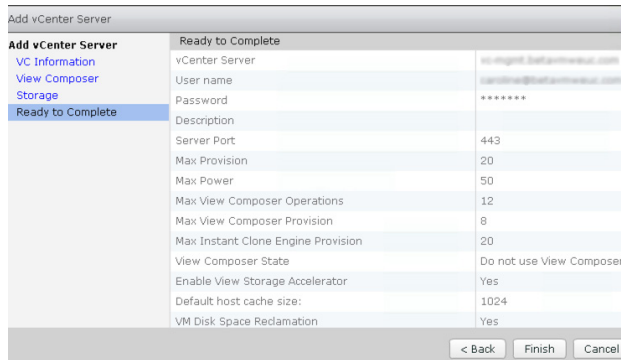
On the **vCenter Servers** tab, verify the vCenter Server that you just added to your environment.

To make changes to the connection information or settings, select the vCenter Server instance and click **Edit**.
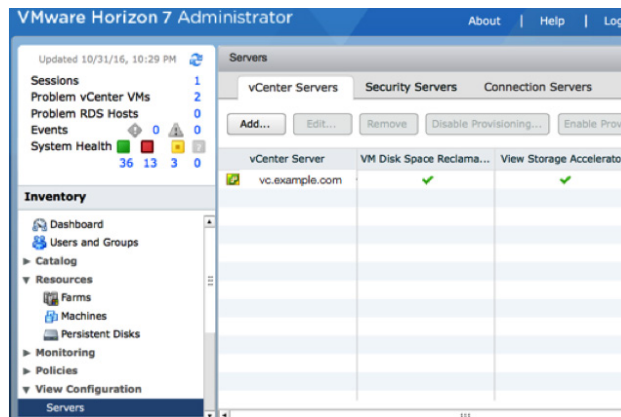
Go to **View Configuration** >
Instant Clone Domain Admins,
and click **Add**.
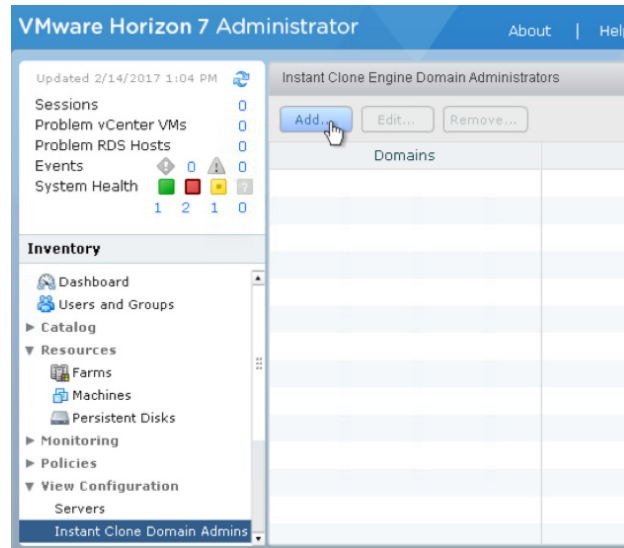
Enter the login name and
password for the instant-clone
domain administrator account,
and click **OK**.

This could be the same domain
administrator account you
added to the **Horizon-Admin**
security group.

You have now connected to vCenter Server and added an instant-clone domain administrator, and you
are ready to create the RDSH master image.

Creating the RDSH Master Image

Each automated RDSH farm uses a master VM that serves as the model for the hosts in the farm. Creating the master VM includes installing the RDSH components, configuring the guest operating system, and installing Horizon Agent and the applications you want to provide to your end users.

Using the **rdsh-master** VM, which you created in Create a VM Template, log in as an administrator and

1. Join the VM to the domain.
2. Configure network connection IP properties:
    • Specify that an IP address is assigned by a DHCP server.
    • Specify that the DNS server address is obtained automatically.
3. Add the users from the **Horizon-User** group to the local Remote Desktop Users group on the VM.

    Setting up the **Horizon-User** group is described in Active Directory Prerequisites.
4. Configure the Windows Firewall service to restart after failures.

    For instructions, see *Configure the Windows Firewall Service to Restart After Failures* in Setting Up Published Applications and Desktops in Horizon 7.
5. Go to the Services applet and verify that Remote Desktop Services are started in the guest.

    Remote Desktop Services are required for Horizon Agent installation, SSO, and other operations.
6. Configure Windows Firewall to allow remote desktop connections to the VM.
7. Set the power option **Turn off the display** to **Never**, and do not specify a sleep timer, standby, hibernation, or any other power option that could make the operating system unreachable.

    Important: For application deployment in a production environment, VMware recommends that you download and use the VMware OS Optimization Tool. This tool includes customizable templates to enable or disable many additional Windows system services and features according to VMware recommendations and best practices.
8. If your network environment has a proxy server, configure network proxy settings.
9. Copy the VMware Horizon Agent installer to the VM.

    Downloading the installers is described in Horizon 7 Installers.

Install Windows RDSH Features

Although the VM you created for the RDSH master image has Windows Server 2012 R2 installed as the operating system, you must additionally install the RDS role, the RSDH service, and the Desktop Experience feature in order to create an RDSH image.

Log in to the **rdsh-master** VM as an administrator and start the Server Manager tool. Use the Add Roles and Features wizard, and follow a role-based installation to install the following components:

• **Server Role** – From the Roles list, select **Remote Desktop Services**.

• **Features** – From the Features list, select **User Interfaces and Infrastructure** > **Desktop Experience**, and confirm that you want to add the applicable required role services, features, and management tools.

• **Role Services** – From the Role Services list, select **Remote Desktop Session Host**, and confirm that you want to add the applicable management tools.

Install Horizon Agent

The Horizon Agent enables Horizon 7 servers to communicate with and manage the RDSH servers you deploy. Horizon Agent also provides features such as connection monitoring, virtual printing, and access to local folders and locally connected USB devices.

Note: After installing Horizon Agent, you can also use the Horizon Migration Tool Fling to migrate published applications and desktops from Citrix XenApp to Horizon 7. Run from just a single XenApp server in each farm, the tool migrates the configuration required to publish each application and shared desktop into Horizon 7, along with the inventory of users and groups entitled to access them.

To begin Horizon Agent installation, log in to the **rdsh-master** VM as an administrator, navigate to the VMware Horizon Agent installer, and launch the installation wizard.

When the Welcome page appears, click **Next**.

On the License Agreement page, accept the terms, and click **Next**.

Select the IP protocol version for your environment, and click **Next**.
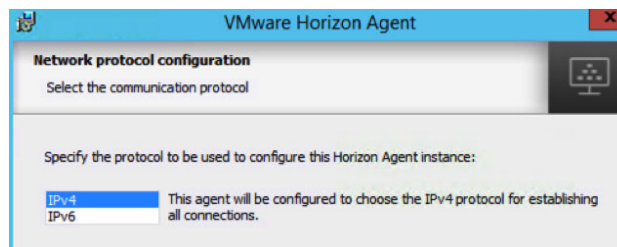
Enable most features to be installed, as shown. You can use policies to configure settings or disable features later.

➜ Enabling **VMware Horizon Instant Clone Agent** allows you to create an automated farm of RDS hosts.

Accept the default installation path, and click **Next**.
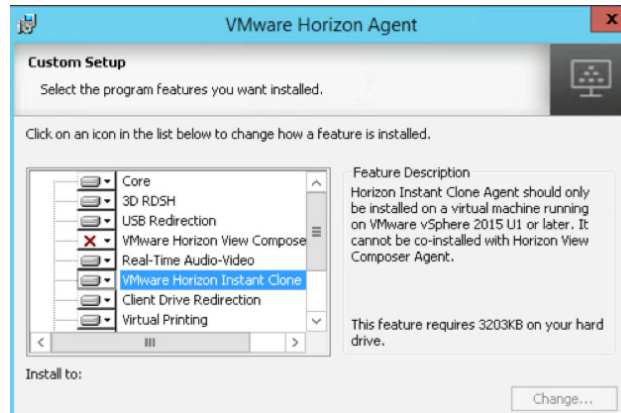
Click **OK**.

You can use group policies to restrict USB access if desired.
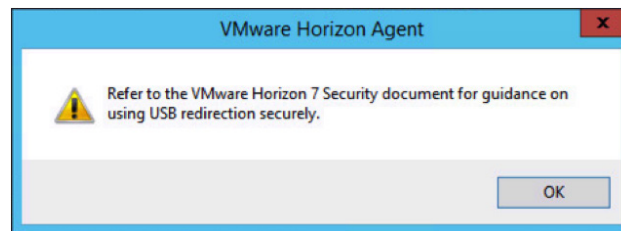
Click **Install**.

After installation is complete, click **Finish**.

Reboot as directed.
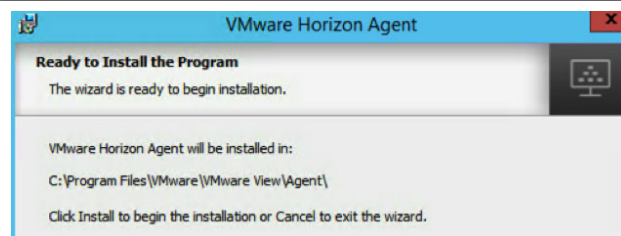
Install Applications

The applications you provide to end users can be either installed directly on the RDSH server, or dynamically attached, as described in Install the App Volumes Agent on Your Master RDSH VM (Optional).

To install applications directly onto an RDSH server

1. Place the host into RD-install mode.
2. Install the desired applications.
3. Place the host back into RD-Execute mode.

For more information, see the Microsoft TechNet article Learn How To Install Applications on an RD Session Host Server.

Install the App Volumes Agent on Your Master RDSH VM (Optional)

App Volumes allows you to deliver applications that are not installed in the master RDSH server image. Instead, applications are stored in read-only virtual disks that you attach to an individual RDSH server or to groups of RDSH servers.

App Volumes is a real-time application delivery and life-cycle management tool. With App Volumes, you capture and group applications into AppStacks based on the requirements of each use case. The AppStacks are then assigned to the machine account of the RDSH server so that AppStacks are mounted when the App Volumes service starts on the RDSH server.

Important: Install the App Volumes Agent in the master RDSH server image only if you plan to also create and configure an App Volumes Manager server, as described in the advanced topic Streamlined Application Delivery with App Volumes. Installing the App Volumes Agent without having a management server will cause boot delays and error messages in your RDSH VMs.

To begin App Volumes Agent installation, log in to the **rdsh-master** VM as an administrator, open a browser, and go to the VMware App Volumes Product Evaluation Center. Download a free 60-day trial version of VMware App Volumes.

In the Installation folder of the App Volumes installation media, double-click **setup.exe**.

When the Welcome page appears, click **Next**.

On the License Agreement page, accept the terms, and click **Next**.

Select **Install App Volumes Agent**, and click **Install**.
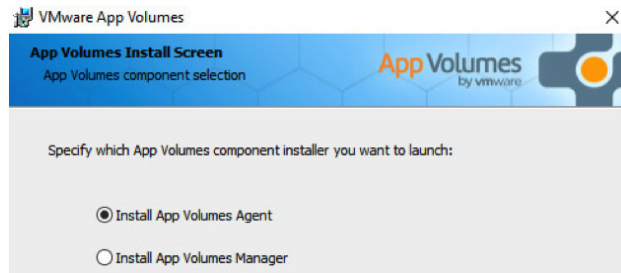
Enter the address and port number of the App Volumes Manager, and click **Next**.

➔ If you have not yet created the App Volumes Manager server, provide the IP or FQDN you intend to use. Be sure to use this address when you create the server, as described in Install and Configure App Volumes Manager.
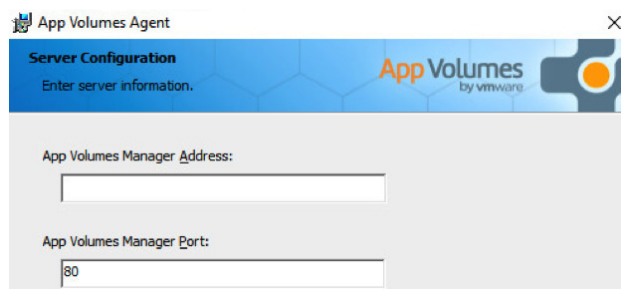
Complete the wizard and restart your computer when prompted.

Finalize the Master Image

Finalizing the master VM includes releasing the DHCP IP address lease and taking a VM snapshot of the master VM.

1. Log in to the **rdsh-master** VM as an administrator.
2. Open a command prompt and type the `ipconfig /release` command to release the leased IP address.
3. Shut down Windows.
4. In vSphere Web Client, select the VM and take a VM snapshot.

Creating the Application Catalog

To create an application catalog from which end users can launch published applications, administrators

1. Create a farm of RDSH servers, if one does not already exist.
2. Create app pools that include one or more applications installed on the RDSH server or attached to the host as part of an App Volumes AppStack.
3. Entitle users to the applications.

Create the RDSH Resource Farm

Use Horizon Administrator to create the RDSH farm. To log in, open a browser and enter the Horizon Administrator URL, which has the following format:

`https://<FQDN or IP address>/admin`

When you complete the Add Farm wizard, the instant-clone feature creates an instant-clone pool of RDSH servers. With this feature, you do not need to create and configure each RDSH server separately.

Log in to Horizon Administrator, go to **Resources** > **Farms**, and click **Add**.
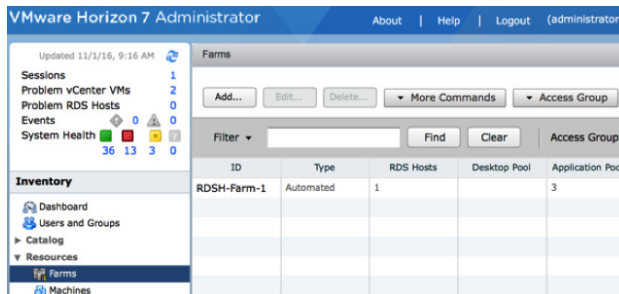
Select **Automated Farm**, and click **Next**.

➜ With automated farms, instant-clone VMs are created from the master RDSH image.
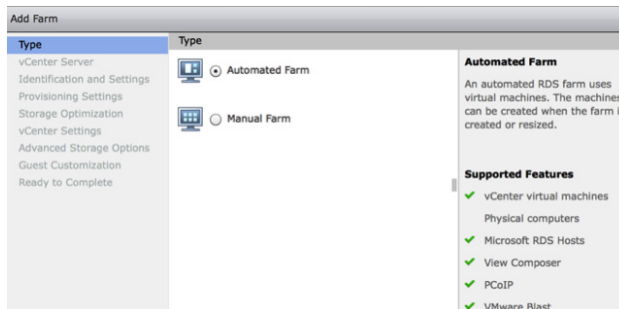
Select **Instant clones**, select the vCenter Server instance, and click **Next**.
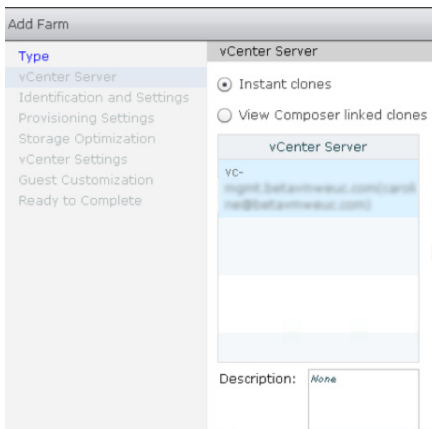
Enter a name for the farm, select **VMware Blast** as the display protocol, and select the check box to **Allow HTML Access** using a web browser.

➜ Blast Extreme is the new display protocol released with Horizon 7.

Set the maximum number of sessions to **No More Than** 30 per host, and click **Next**.
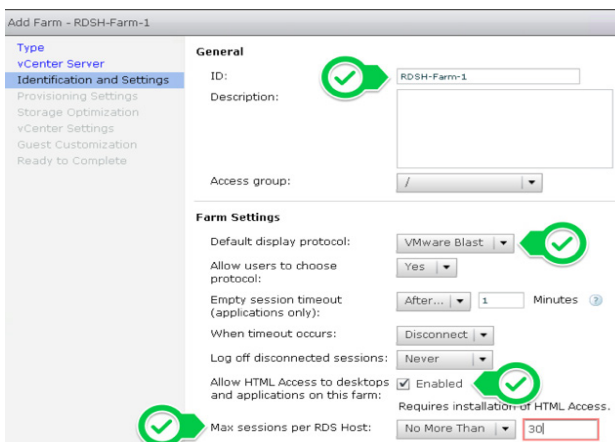
Enter a naming pattern, set **Max number of machines** to 2, and click **Next**.
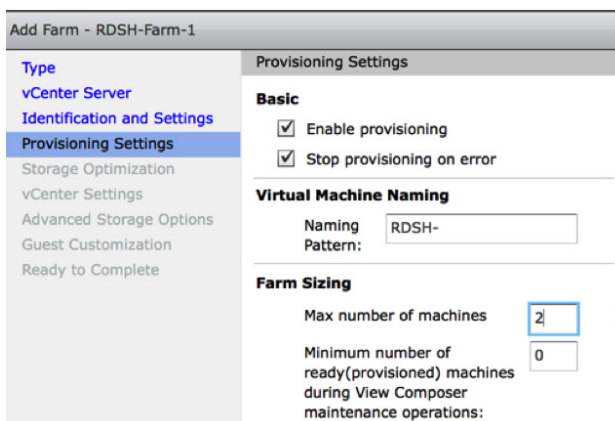
On the Storage Optimization page, click **Next**.
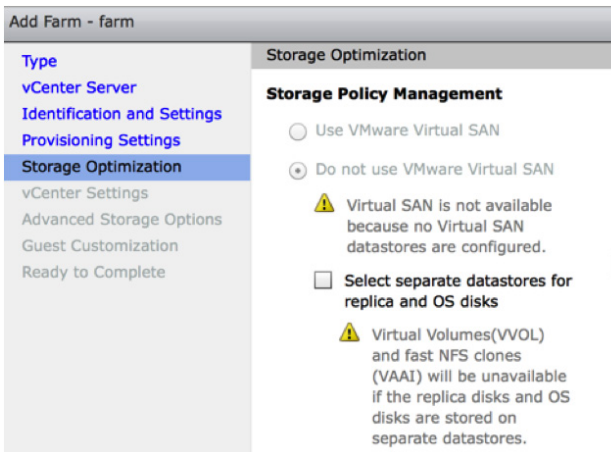
Click **Browse** next to each text box to make your selections, and click **Next**.

For **Parent VM**, select the **rdsh-master** VM created earlier.

For **VM folder location**, if you do not have a folder created, select the data center, and click **OK**.
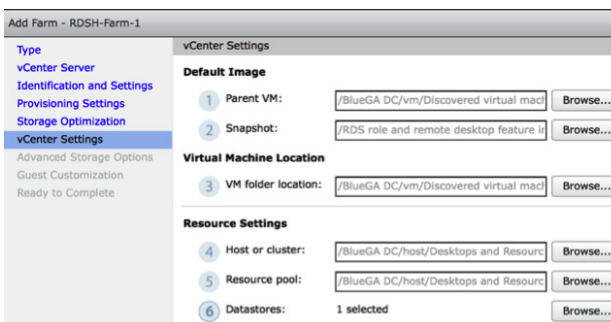
For **Domain**, select the domain administrator that you added, and select the **AD container** that matches the OU that you created in the Active Directory prerequisites step.

Click **Next**.
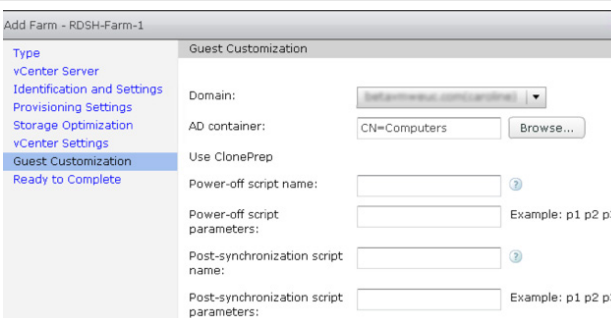
Click **Finish**.
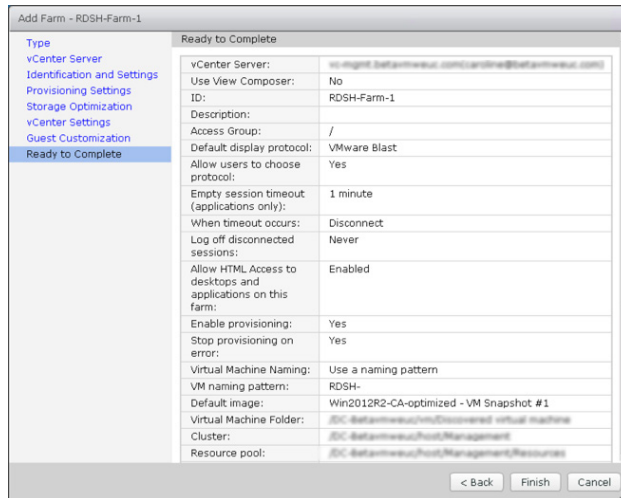
To monitor progress, go to **Resources** > **Farms**.

➜ You can also monitor the initial copy operations in the vSphere Client.
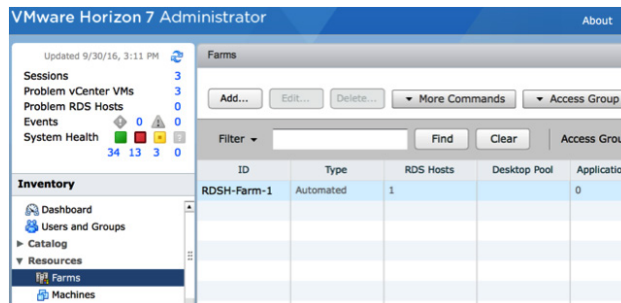
Double-click the farm, to go to farm details, and click the **RDS Hosts** tab.

Click the Refresh icon. The status changes to `Available` when the process is complete.
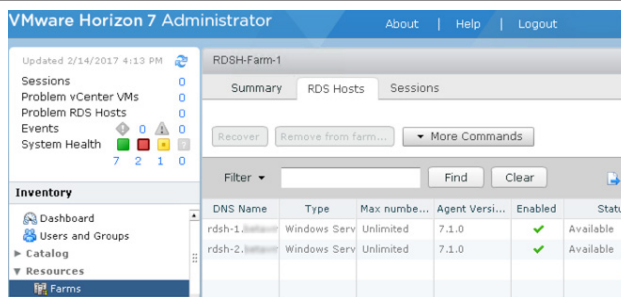
Publish the Applications

Publishing applications includes creating an application pool. Horizon 7 automatically enumerates the installed applications on the RDSH servers. You can select which of the applications to deploy and entitle users to.

In Horizon Administrator, go to **Catalog** > **Application Pools**, and click **Add**.
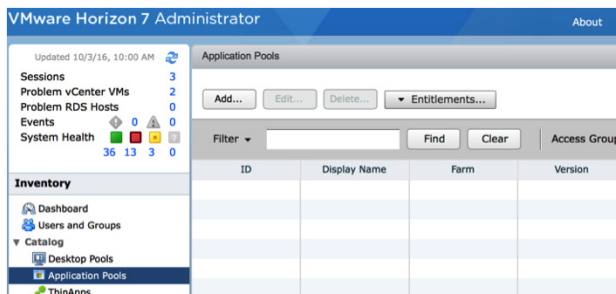
Select the automated farm you created, select one or more applications in the list, and click **Next**.

➜ Installed applications are listed, as are App Volumes AppStacks if you use them.
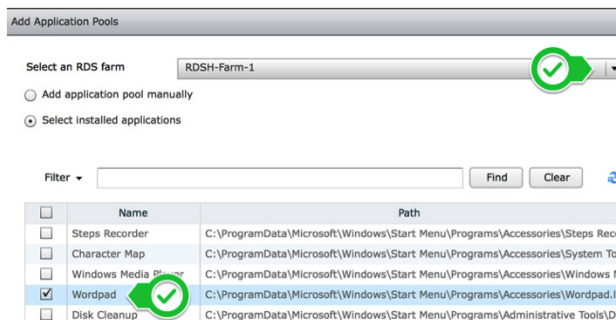
(Optional) Edit the IDs and display names of the applications.

Leave the **Entitle users after this wizard finishes** check box selected, and click **Finish**.
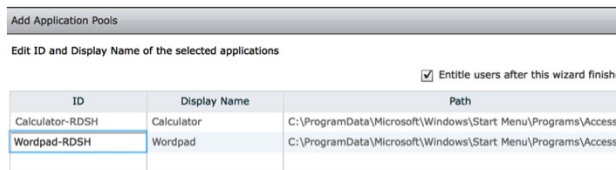
The application pool is created, and the Add Entitlements dialog box appears.

Entitle End Users

This step picks up where the previous step left off. Because you selected the **Entitle users after this wizard finishes** check box in the Add Application Pools wizard, you are automatically prompted to select the users who are entitled to receive the published applications.

If you did not select the check box, you could alternatively select the pool and select **Entitlements** > **Add entitlement**.
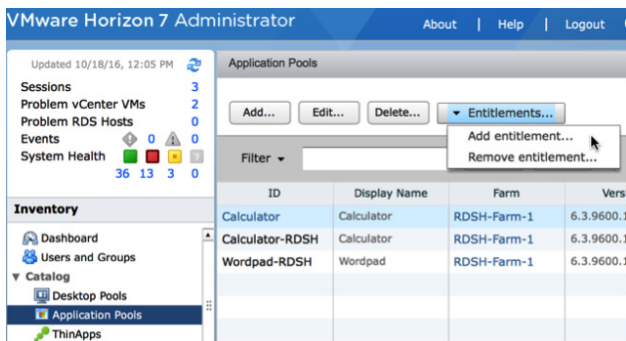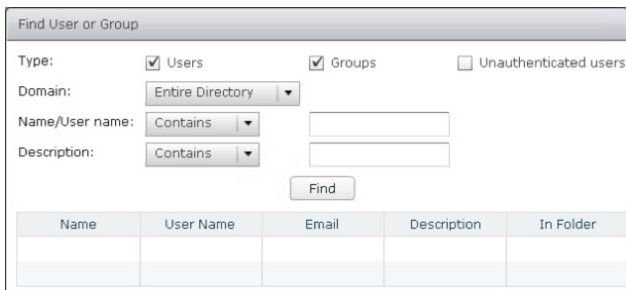
In the Add Entitlements window, click **Add**.
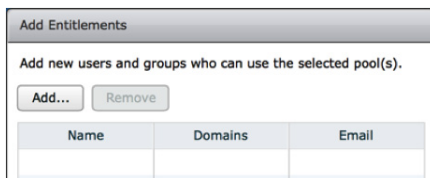
Enter `Horizon-User` into the **Name/User name** text box, and click **Find**.

(This is the group created in the Active Directory prerequisites.)

Select **Horizon-User** from the list, and click **OK**.
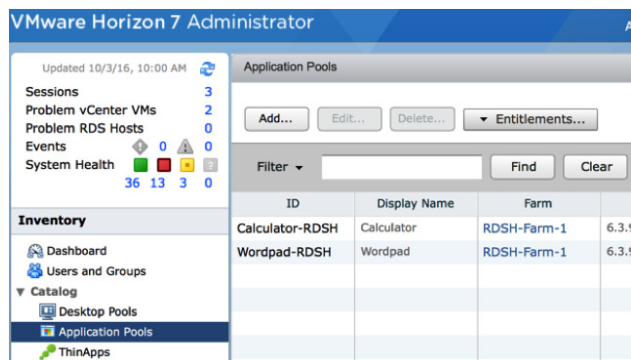
You are returned to the Add Entitlements dialog box.

You can click **Add** again to add additional users or groups.

When you are finished adding users and groups, click **OK**.
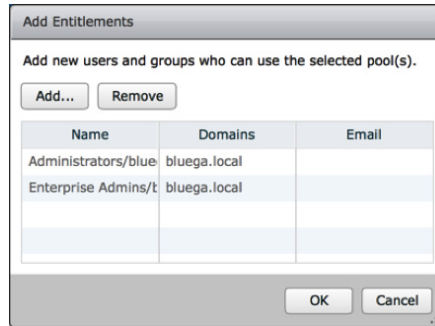
You are returned to the Application Pools window, and the apps that you specified appear in the list.

The applications are now published, entitled to users, and ready for use.

Launching Apps from End-User Devices

If you do not already have Horizon Client installed, you can download the client software from http://vmware.com/go/viewclients. You can install Horizon Client on a physical endpoint device or in a VM. VMware provides native Horizon Clients for iOS, Android, Chrome, macOS, Windows, Linux, and Windows 10 UWP.

Alternatively, you can use the HTML client by entering the URL of your Connection Server, using the following format:

`https://<FQDN or IP address>`

On the VMware Horizon Web portal page that appears, you can click either the icon that takes you to the Horizon Clients download page or the icon for logging in using the HTML Access Web client.
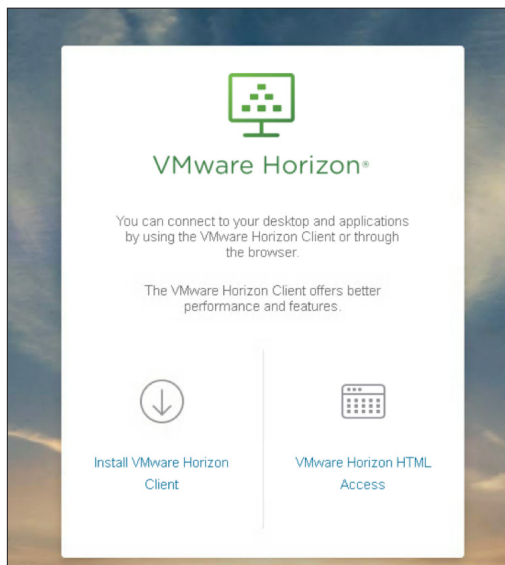
Figure 4: VMware Horizon Web Portal Page

For this quick start, you will use a Windows client device. From a Windows laptop or PC, go to http://vmware.com/go/viewclients to download and run the Windows-based Horizon Client installer.
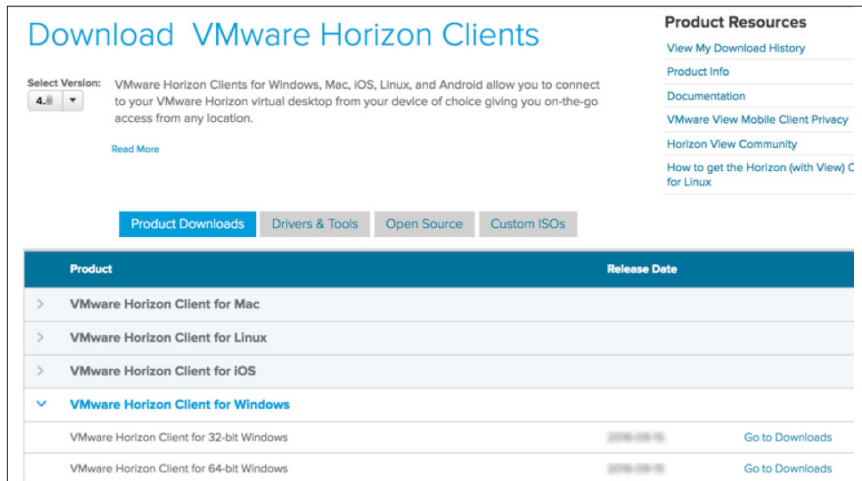

Figure 5: Download VMware Horizon Clients

To begin, log in to the Windows client system as an administrator, navigate to the Horizon Client installer, and launch the installation wizard.
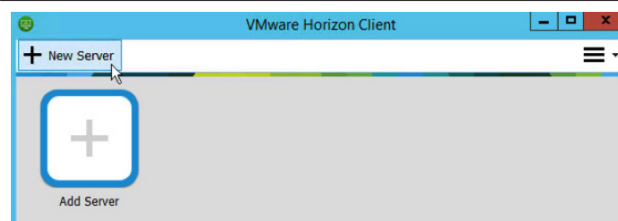
If you select the typical installation and click **I Agree & Install**, the Finish page appears.
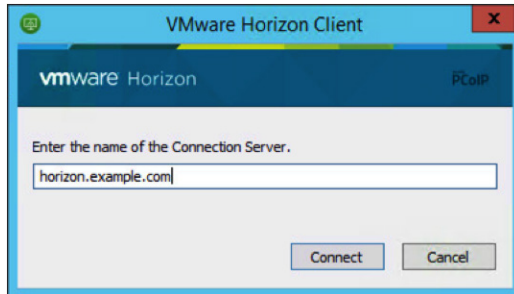
Click **Finish** and you are done!

Depending on your system, you might be prompted to restart the system.
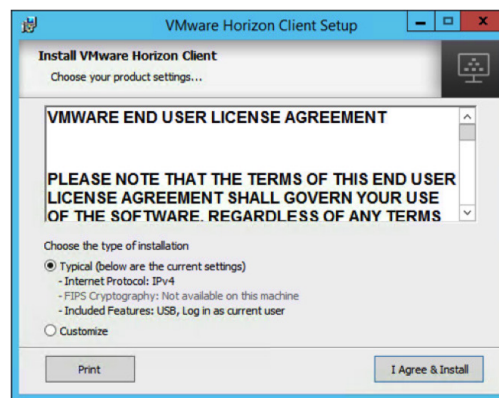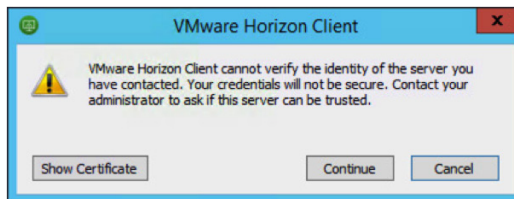

To start Horizon Client, double-click the **VMware Horizon Client** desktop shortcut, and click **New Server**.

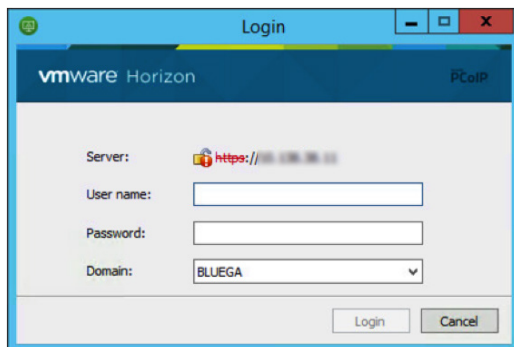Enter the Connection Server name or IP address, and click **Connect**.

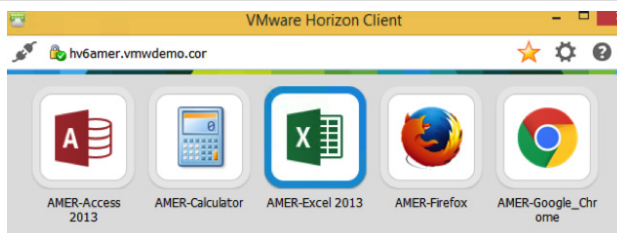Click **Continue** to bypass the certificate warning.

Enter credentials of a user who is entitled to the published apps, and click **Login**.
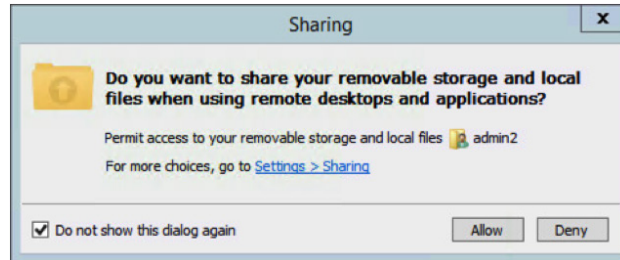
The app selector page appears.

To launch an app, double-click the app icon.

Click **Allow** in the Sharing dialog box to allow access to files on your client device while using published apps.

The selection you make here applies to all published apps you use.

The app appears and looks just like it would if it were a locally installed app.

In this example, the application icon for the published app Excel appears in the taskbar just as it would for a locally installed app.
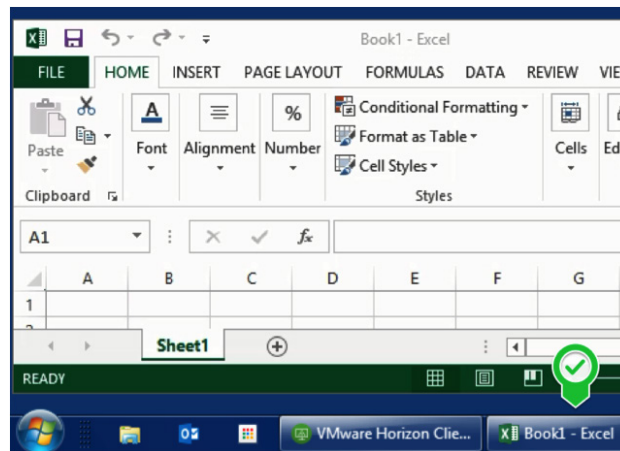
This step described using the Windows-based client and seamless integration into the Windows user experience. If you install Horizon Client on other operating systems, such as a macOS or an Android tablet, the experience of using published apps is likewise integrated into those operating systems and their OS-specific features.

Performing Ongoing Administrative Tasks

When you use automated instant-clone RDSH server farms, you can rapidly change the size of the farm, refresh the servers back to their original state and disk size, or update the servers to use a new master image.

Monitor Remote Sessions

You can use Horizon Administrator to monitor remote sessions. To log in, open a browser and enter the Horizon Administrator URL, which has the following format:

`https://<FQDN or IP address>/admin`

To monitor session information, go to **Resources** > **Farms** in the inventory, and click the farm name. You can then click the **Sessions** tab to see the following information about each session:

• User name

• Host name

• Start and duration time

• Session state

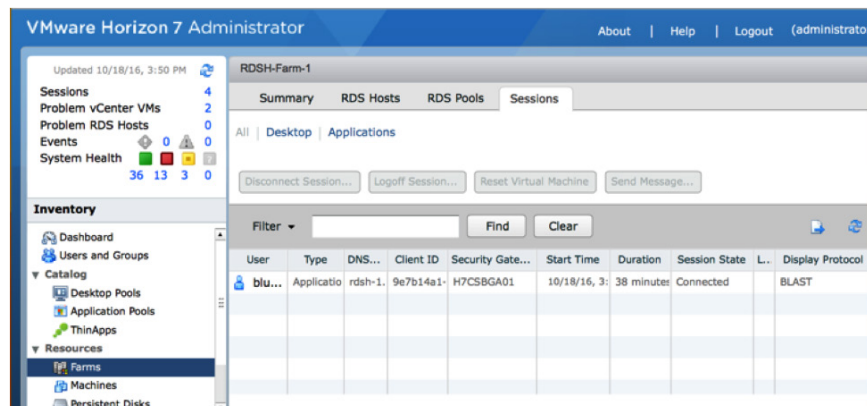• Display protocol; for example: Blast Extreme, PCoIP, RDP

Figure 6: Session Details of a Selected RDSH Farm

If you need to perform emergency maintenance tasks, you can select one or more users on the **Sessions** tab for the farm, or go to the Users and Groups item in the inventory, and use the **Filter** text box to quickly find a user or group. Select the users or groups in the list on the **Sessions** tab, and click a button to

• Disconnect the session.

• Log the user out of the session.
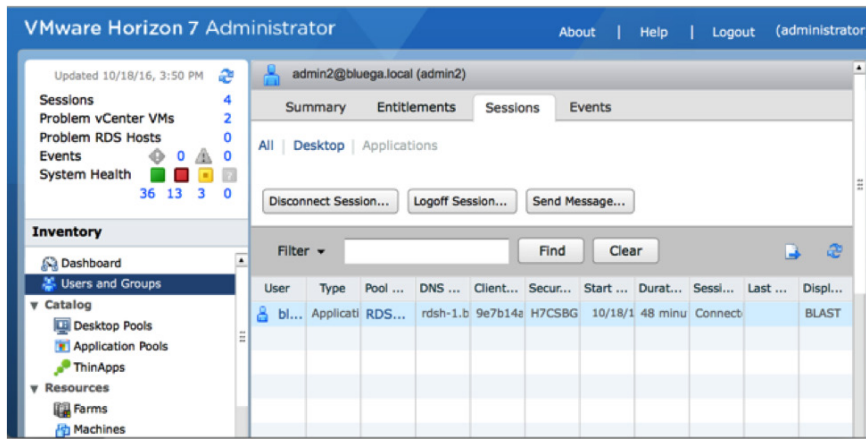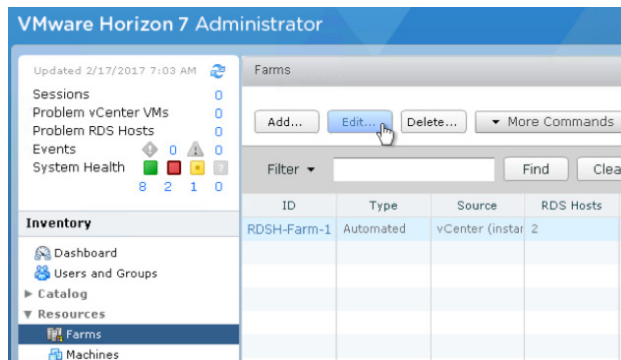
• Send a message to the user.

Figure 7: Session Details for a Specific User

## Change the Number of Servers in a Farm

After the instant-clone server farm is created, you can edit farm settings to increase or decrease the size of the farm. Additional RDSH servers are created almost instantly.

Go to **Resources** > **Farms**, select the farm, and click **Edit**.

On the **Provisioning Settings** tab in the Edit dialog box, in the Farm Sizing section, set the **Max number of machines** to `4` and click **OK**.

You are returned to the Farms list. Double-click the farm name in the list.
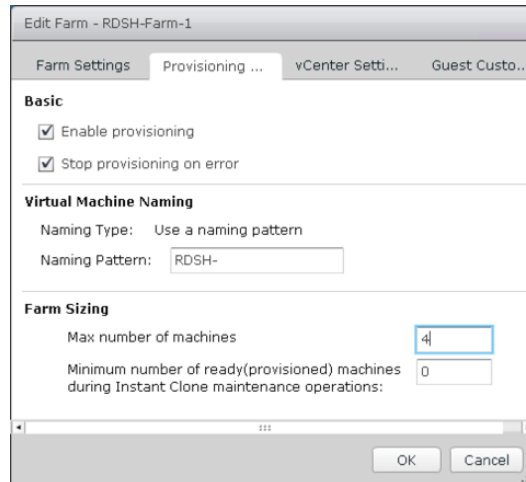
On the RDS Hosts tab, you can see that additional hosts are being created.

Click the **Refresh** icon to update the status.
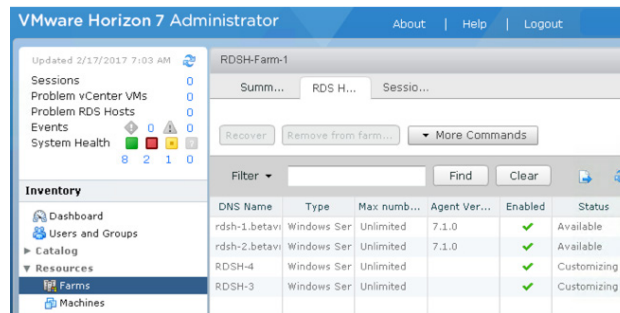
When the status changes to `Available`, the RDSH server is ready to use. Because instant clones are provisioned so quickly, the new RDSH servers typically become available within a minute.

Perform Maintenance on a Server Farm

Performing maintenance on an instant-clone farm means deleting the VMs in the farm and either recreating them from the current master image or creating VMs from a new master image or snapshot.

• Create a recurring maintenance schedule to restore the operating system disk of each VM in the farm to its original state and size, reducing storage costs. The VM is deleted and recreated from the currently selected master image.

• Schedule immediate maintenance to change the master image used by the VMs in the farm, such as to apply an urgent security patch.

You can use both types of schedules at the same time, and if you specified a minimum number of provisioned servers to be available during maintenance operations, your end users might never have their work interrupted.

Navigate to **Resources** > **Farms**, and double-click the farm ID.
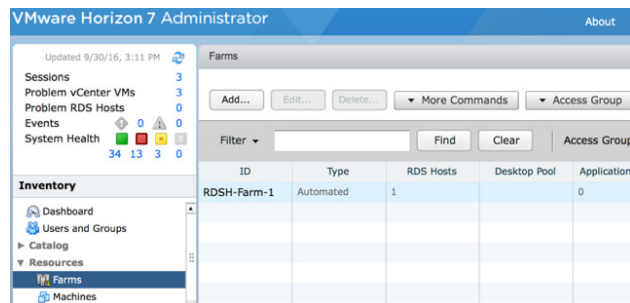
On the **Summary** tab, select **Maintenance** > **Schedule**.
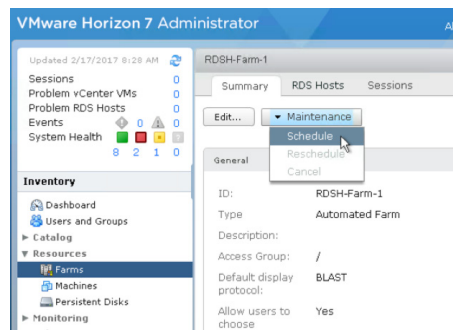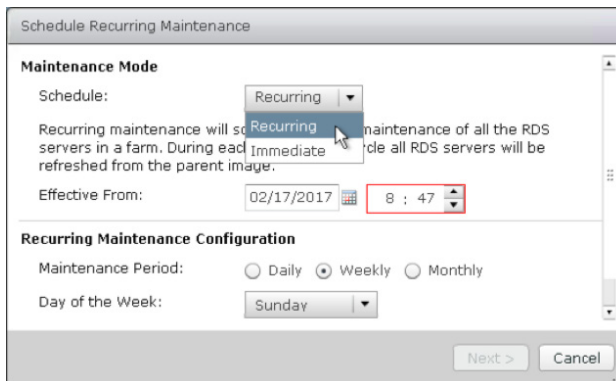
Make the following selections:

• For **Schedule**, select **Recurring**.

• For **Maintenance Period**, select **Weekly**.

Click **Next**.

On the Image page, click **Next**.

➜ The default is to use the current master image. To select a different master VM and snapshot, you can de-select the check box, browse to a new master VM, and select one of its snapshots.
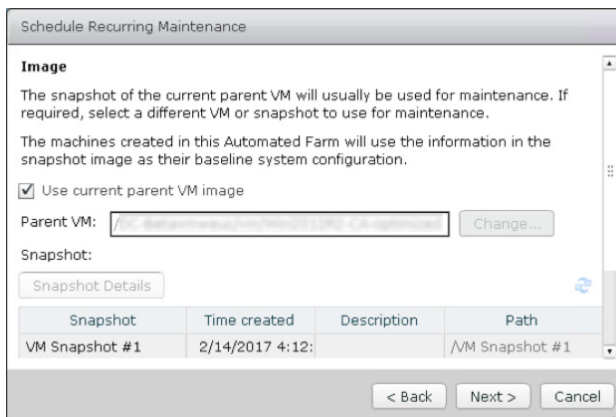
Click **Next**.

➜ The default is **Force users to log off**, but you can give users a warning and a grace period. To edit this setting, after you finish creating the schedule, navigate to **View Configuration** > **Global Settings**, and click **Edit** in the General settings section.
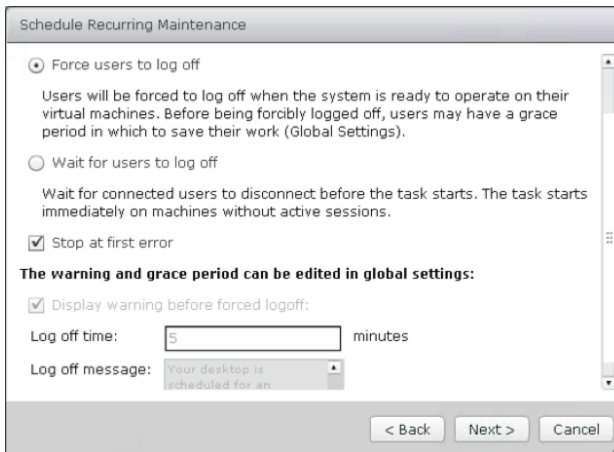
Click **Finish**.

You are returned to the **Summary** tab for the farm.
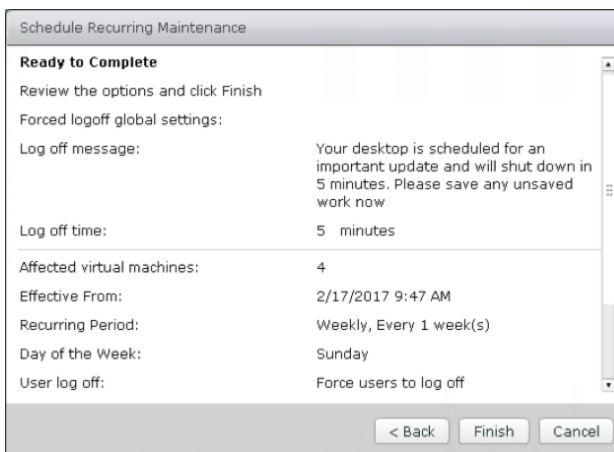
The schedule you set appears in the Farm Maintenance section.

If, in addition to this recurring schedule, you find you need to schedule an immediate push of a new master image, you can repeat this process, selecting **Maintenance** > **Immediate** rather than **Recurring**. The farm would then have both a recurring and an immediate maintenance schedule.

Conclusion

This quick-start guide demonstrated just how quickly and easily you can publish applications using a Horizon 7 on-premises infrastructure. You completed simple wizards to install and configure a Connection Server, which streamlines provisioning of RDSH servers.

You then created a master image of an RDSH server, from which you created an automated RDSH farm. With one simple wizard, you created application pools and entitled end users to applications. In addition, this guide provided an overview of features, architecture, and components.

Finally, you enjoyed the end-user experience of launching published apps from the Windows-based Horizon Client. You can launch published apps from a natively installed Horizon Client or from a browser. The native client software can be installed on Windows, Windows UWP, macOS, Linux, Chromebook, iOS, and Android endpoint devices.

Because this guide is meant to get you started quickly, it does not delve into details of all the options and features that provide a rich user experience:

• Support for use cases such as graphics-intensive 3D applications with NVIDIA GRID vGPU and Unified Communications with Microsoft Lync 2013
• Quick and easy access to a user's files from their RDS applications with file-type association
• Support for the most commonly used peripherals, including printers, scanners and imaging devices, smart cards, and USB storage devices
• Performance optimizations to increase application responsiveness

For more information about these and other topics, see the VMware Horizon 7 documentation.

Advanced Topics

The Horizon 7 Published Applications feature integrates with other VMware components and products to give you a comprehensive set of tools for streamlining app publishing, gaining fine-grained control of policy settings at the user account level, granting secure access from outside the corporate network, and more. The following advanced topics provide more detail about these components.

Profile Management with User Environment Manager

VMware User Environment Manager simplifies end-user profile management by offering personalization and dynamic policy configuration across any virtual, physical, and cloud-based Windows environment.

VMware User Environment Manager captures environment, application, and user settings for the operating system and applications. It maps environmental settings such as networks and printers, and dynamically applies end-user security policies and personalization.

With User Environment Manager, you can configure fine-grained policies for folder redirection, mapping the user's home drive, configuring location-based printers, and application blocking—all based on user accounts. You can use the Horizon 7 Smart Polices feature to enable or disable client features based on user device, location, and other defined conditions.

The User Environment Manager software components include

• The User Environment Manager agent, which is called the VMware UEM FlexEngine. You install the agent on the master RDSH VM.
• The administration console, which is called the VMware UEM Management Console. You can install the User Environment Manager Management Console component on any desktop from which you want to manage the User Environment Manager environment.

Go to the VMware User Environment Manager Product Evaluation Center to download a free 60-day trial version.

Following is an overview of the tasks you must perform to install and configure User Environment Manager:

1. Create file shares for configuration data and user data.
2. In Active Directory, import ADMX templates for User Environment Manager.
3. Create Group Policy settings for User Environment Manager.
4. Install the FlexEngine agent on the RDSH servers to be managed.
5. Install the User Environment Manager Management Console and point to the configuration share.
6. Use the Easy Start feature to do initial configuration of settings.

   Easy Start installs many common configuration and application settings as well as Microsoft Office profiles.

For complete installation and configuration instructions, see the VMware User Environment Manager Administration Guide, and see the instructions in the *Group Policies* appendix and the *Smart Policies* appendix in the Horizon 7 Enterprise Edition Reference Architecture: Validated Integration Design.

Streamlined Application Delivery with App Volumes

VMware App Volumes takes application and desktop environments to the next level by providing radically faster application delivery and unified application and user management, while reducing IT costs by up to 70 percent. App Volumes fundamentally shifts how applications are installed, making it easy to deliver, update, manage, and monitor applications and users across published application environments.

App Volumes allows you to separate the Windows OS image from the application images. Groups of applications can be installed into virtual disks called AppStacks. The appropriate AppStack can then be assigned to the RDSH farm to personalize the applications delivered.

App Volumes can also be used in Horizon 7 published apps and virtual desktops, Citrix XenApp and XenDesktop, and RDSH virtual environments.

This advanced topic provides an overview for installing and configuring App Volumes for use with your Horizon 7 RDSH implementation. For more detailed instructions, see the App Volumes Reviewers Guide.

Provision VMs for App Volumes

Use the VM template created earlier to create two additional VMs. These will host App Volumes Manager and provide a provisioning machine from which to capture applications.

VM PURPOSE	SUGGESTED NAME	VCPU	MEMORY (GB)
App Volumes Manager	appvol	2	8
RDSH provisioning machine	rdsh-provision	4	12

Table 3: App Volumes Server Specifications

Install and Configure App Volumes Manager

To install the App Volumes Manager service, you must download and run the App Volumes Manager installer on the **appvol** VM.

Go to the VMware App Volumes Product Evaluation Center to download a free 60-day trial version of VMware App Volumes. From the list of download packages, download the `VMware_App_Volumes_v211_Eval.iso` file.

1. Install App Volumes Manager on the **appvol** server you created.
2. Choose the option to install a local SQL Server Express database, which will be installed automatically.
3. Log in to the App Volumes Manager web-based console and follow the first-run wizard to configure App Volumes for Active Directory, vCenter, and AppStack storage. To log in, open a browser and enter the App Volumes Manager URL, which has the following format:

   `http://<App Volumes Manager FQDN or IP address>/`

Create a Provisioning VM

1. On the **rdsh-provision** VM you created earlier, install the App Volumes Agent following the same procedure used for your master RDSH VM.

   See Install the App Volumes Agent on Your Master RDSH VM (Optional).
2. Restart the provisioning VM and log in to it as a local administrator.
3. Power off and take a snapshot of this VM.

Create (Provision) an AppStack

Applications are captured to virtual disks (VMDK files), called *AppStacks*, and provisioned to RDSH servers through computer-based assignments in Active Directory.

1. Use the App Volumes Manager console to create a new AppStack.
2. Prepare **rdsh-provision** for application installation by changing it to RD-Install mode.

   For more information about this special installation mode, see the Microsoft TechNet article Learn How To Install Applications on an RD Session Host Server.
3. Provision the AppStack to your **rdsh-provision** VM.
4. Switch to the **rdsh-provision** VM and install applications on it as you normally would.
5. Change the **rdsh-provision** VM from RD-Install mode to RD-Execute mode.

Once the application installation and configuration process is complete, you can complete the provisioning process.
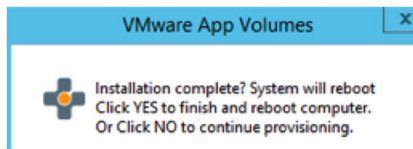
Complete the Provisioning Process

Log in to the **rdsh-provision** VM.

Click **OK** only after the application installation and configuration process is complete and Windows is in RD-Execute mode.
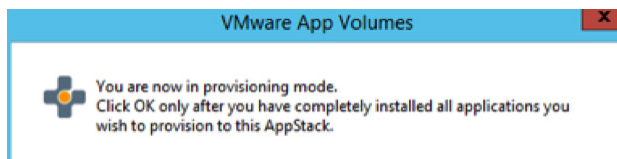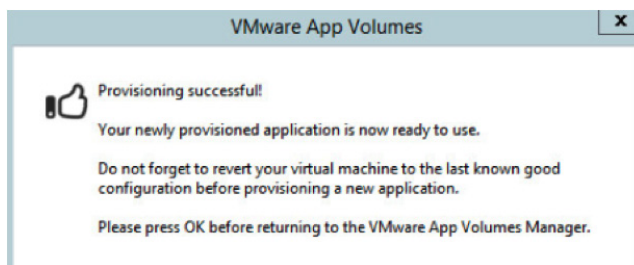

Click **Yes** to allow **rdsh-provision** to reboot.

After rebooting, log in to the **rdsh-provision** VM again.
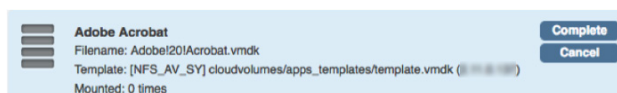

When you see this message, the provisioning process on **rdsh-provision** is complete.

Click **OK**.

Return to App Volumes Manager, and click **Complete**.

Assign the AppStack to RDSH Servers

AppStacks can be assigned to User, Group, OU, and Computer objects in Active Directory. When delivering applications to RDSH servers, either assign AppStacks to the RDSH servers (computer objects) directly, or assign AppStacks to the OU where the RDSH server computer objects reside.

1. Use the App Volumes Manager console to assign the AppStack to the RDSH server or servers.

   Important: If you are assigning App Volumes AppStacks to OUs, contact Global Support Services for the App Volumes 2.12.3 hot patch. This fix will also be included in general releases of App Volumes later than 2.12.

2. Reboot the RDSH servers.

   During this process, the AppStack is attached and the applications become available for use.

Publish the Applications

Whether you natively install applications on your RDSH servers or use App Volumes to streamline the delivery using AppStacks, the process to publish applications within Horizon Administrator is the same as described in Publish the Applications in the Creating the Application Catalog section.

Workspace ONE and VMware Identity Manager

VMware Identity Manager™ is deployed as a virtual appliance and integrated with the rest of the VMware Horizon suite to enable access to the resources that are being enabled for end users.
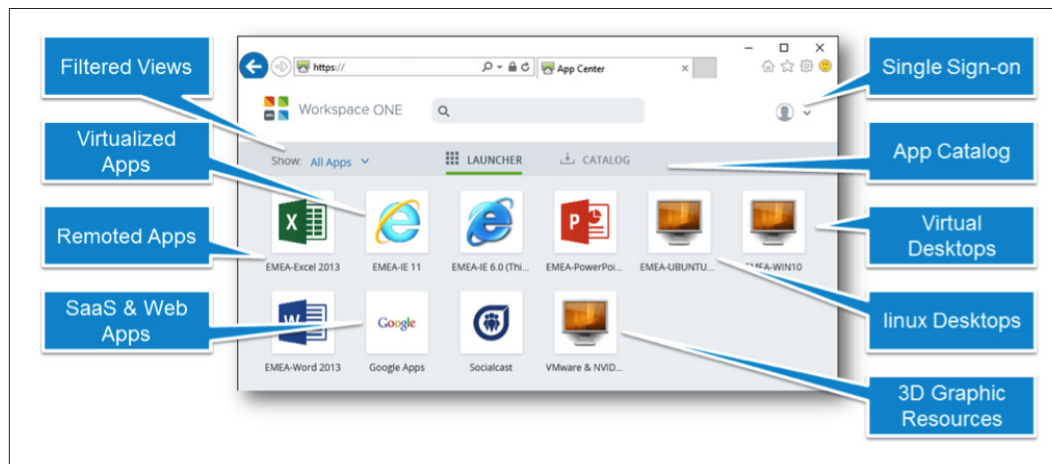
**Figure 8:** User Workspace Delivered by VMware Identity Manager

VMware Identity Manager provides a Web portal, called VMware Workspace™ ONE™, from which users can access different types of applications, including SaaS-based Web applications (such as Salesforce.com, Dropbox, Concur, and many others), VMware Horizon-based applications and desktops, RDSH-based applications and desktops, VMware ThinApp® packaged apps, and Citrix-based applications and desktops. The portal is designed to make application access simple for end users.

For more information, go to the VMware Identity Manager documentation, and select the **On-Premises** option. Go to the VMware Identity Manager Free Trial page to download a copy.

External Access with Unified Access Gateway

A VMware Unified Access Gateway virtual appliance functions as a secure gateway for remote access to virtual desktops and published applications. Unified Access Gateway appliances are typically set up in a network DMZ and act as a proxy host for connections inside your trusted corporate network. This approach shields virtual desktops, servers, and applications from the public Internet with an extra layer of security.
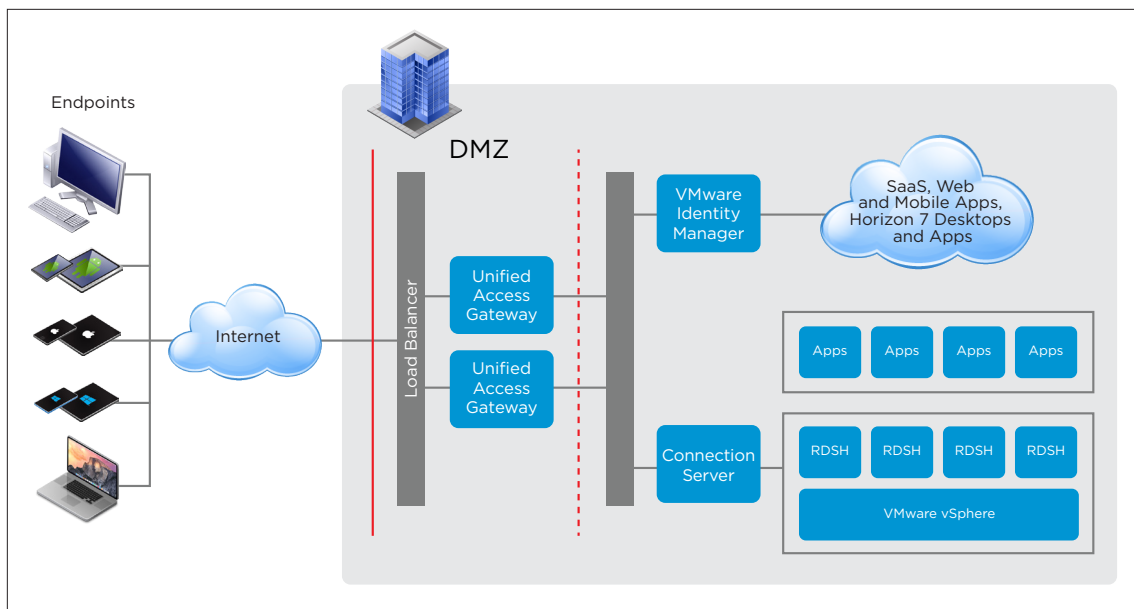
Figure 9: Unified Access Gateway Topology

For more information, see Using PowerShell to Deploy VMware Unified Access Gateway and the Unified Access Gateway documentation. You can download the virtual appliance from the VMware Horizon 7 Product Evaluation Center.

Load Balancing

By default, the Connection Server uses the current session count and limit to balance the placement of new application sessions on RDSH servers. You can override this default load-balancing behavior, however. With the advanced load-balancing feature, you can use one or both of the following approaches for selecting which RDSH server to use for a new session:

• You can limit the number of application instances running on an RDSH server by defining an application count policy, or anti-affinity rule. Pre-allocating the capacity for specific applications in this way is useful for applications such as AutoCAD, which do not consume much CPU or memory when running without any content or data loaded.

For information about creating an application count policy in Horizon Administrator, see *Configure an Anti-Affinity Rule for an Application Pool* in the View Administration document.

• You can also write scripts that use information collected by the Microsoft Windows Perfmon tool. Load-balancing decisions can be based on CPU or memory utilization, or any other load value that Perfmon can collect. For more information, see *Configuring Load Balancing for RDS Hosts* in the View Administration document.

Note: You are not required to use the advanced load-balancing feature. The default behavior is to load balance between the RDSH servers in a farm based on session count.

Additional Resources

Horizon 7 Enterprise Edition Reference Architecture: Validated Integration Design

Horizon Migration Tool Fling

Setting Up Published Desktops and Applications in Horizon 7

View Installation

VMware App Volumes documentation

VMware App Volumes Reviewer's Guide

VMware Workspace ONE and VMware Horizon: Packaging and Licensing

VMware OS Optimization Tool

VMware Product Evaluation

VMware User Environment Manager documentation

About the Authors

Caroline Arakelian is a Senior Technical Marketing Manager, End-User-Computing Technical Marketing, VMware.

Josh Spencer is an EUC Architect, EUC Technical Marketing, VMware.

Graeme Gordon is a Senior EUC Architect, EUC Technical Marketing, VMware.

To comment on this paper, contact VMware End-User-Computing Technical Marketing at euc_tech_content_feedback@vmware.com.

vmware®