Management

Virtual Desktop Service

NetApp
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Deployments

Provisioning Collections

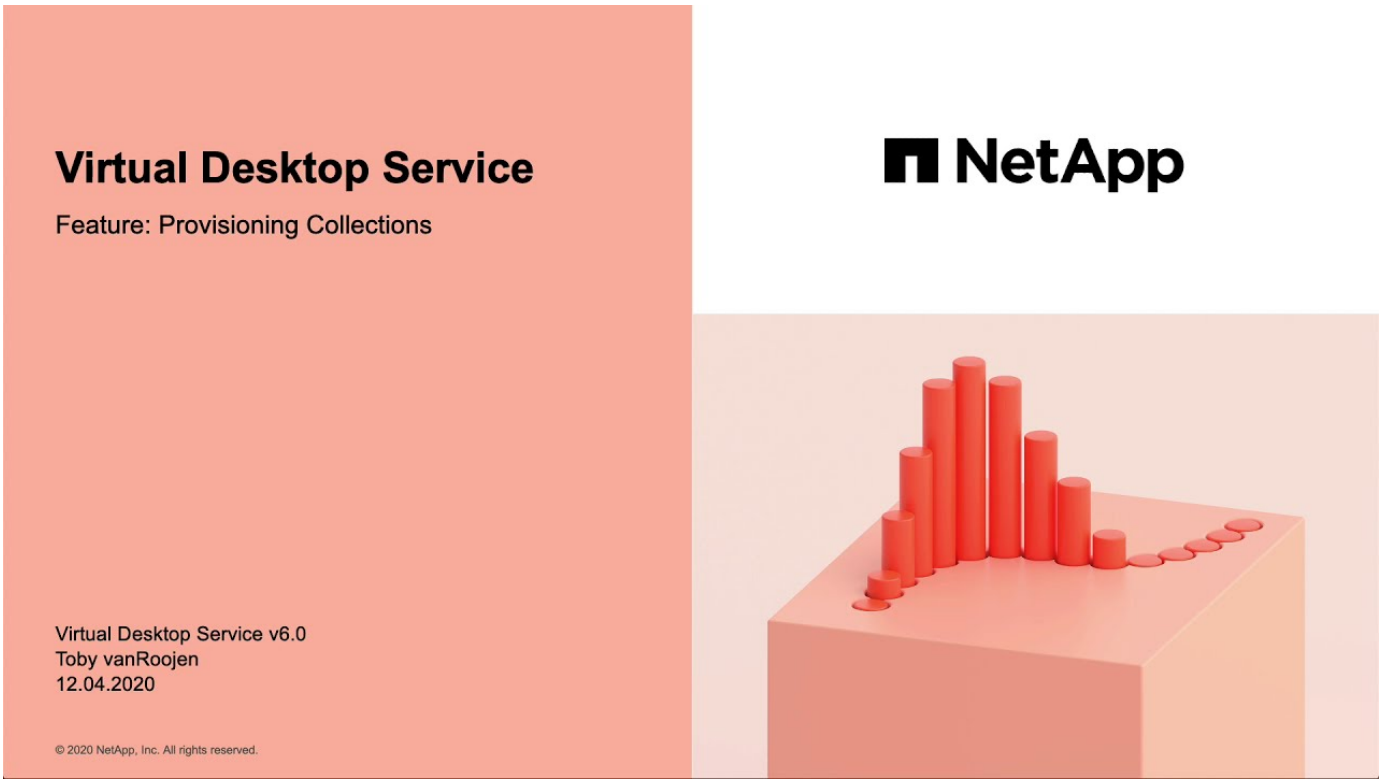
Overview

Provisioning Collections is a function of VDS related to the creation and management of VM images.

At a high level, the Provisioning Collection workflow is as follows:

1. A temporary VM (e.g. "CWT1") is built based on an existing image (either a stock image or a previously saved Provisioning Collection).
2. The VDS Administrator customizes the temporary VM to match their requirements using Scripted Events, Connect to Server and/or 3rd party management tools.
3. Once customized, the VDS Admin click **Validate** and triggers a validation process that automates finalizing the image, running SysPrep, deleting the temporary VM and making the image available for deployment throughout VDS.

Video Demo - Managing VM images for VDI Session Hosts



Provisioning Collection Types

There are two distinct types of collection with specific use cases, ***Shared*** and ***VDI***.

Shared

The ***Shared*** type is a collection of VM images(s) designed to deploy an entire environment with multiple, distinct VM images and VM roles.

VDI

The ***VDI*** type is a single VM image designed to be used and reused to deploy multiple identical VMs, typically as for hosting user sessions.

Creating a new Provisioning Collection

Provisioning Collections are found in the VDS interface within each deployment, under the ***Provisioning Collections*** sub-tab.

To create a new collection

1. Click the + ***Add Collection*** button.
2. Complete the following fields:
    a. **Name**
    b. **Description**(Optional)
    c. **Type** - Shared or VDI
    d. **perating System**
    e. **Share Drive** - If this VM will be used to host users profiles or company share data, pick the drive letter on which is will be hosted. If not, leave as "C"
    f. **Minimum Cache** - IF you and VDS to create VMs to hold for instant deployment, specify the minimum number of cached VMs that should be maintained. If deploying new VMs can wait for as long as it takes the hypervisor to build a VM, this can be set to "0" to save costs.
    g. **Add Servers**
        i. **Role** (If "Shared" type is selected)
            A. **TS** - This VM will act only as a session host
            B. **Data** - This VM will not host any user sessions
            C. **TSData** - This VM will be both the session host and the storage host (Maximum: one TSData per workspace)
        ii. **VM Template** - Select from the available list, both stock hypervisor images and previously saved Provisioning Collections are available to select.
            A. NOTE: By using an existing Provisioning Collection you can update and re-deploy

existing images as part of a planned image upgrade process.

iii. **Storage Type** - Select the speed of the OS disk considering cost and performance

iv. **Data Drive** - Optionally enable a 2nd disk attached to this image, typically for the data storage layer referenced above in 2.e.

A. **Data Drive Type** - Select the speed of the 2nd (data) disk considering cost and performance

B. **Data Drive Size (GB)** - Define the size of the 2nd (data) disk considering capacity, cost and performance

h. **Add Applications** - Select any application from the Application Library that will be (1) installed on this image and (2) managed by VDS application entitlement. (This is only applicable to RDS deployments. It should remain empty for WVD workspaces)

Customizing the Temporary VM

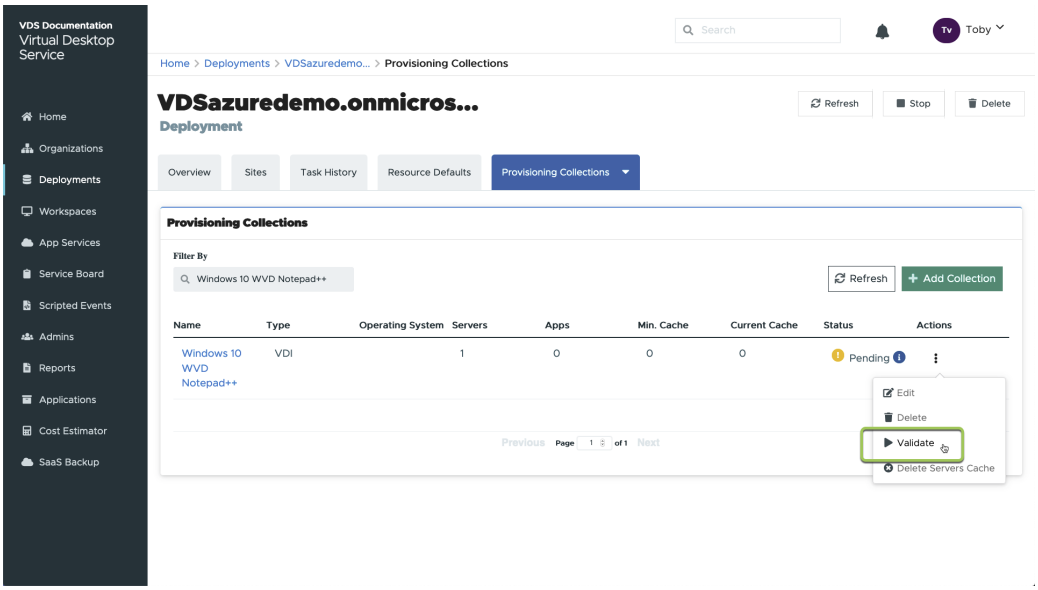
VDS includes functionality that will allow remove VM access from within the VDS web interface. By default a local Windows admin account is created with a rotating password and passed through to the VM allowing the VDS admin local admin access without needing to know local admin credentials.

The Connect to Server function has an alternative setting where the VDS admin will be prompted for credentials with each connection. This setting can be enabled/disabled by editing the VDS admin account from within the "Admin" section of VDS. the functionality is called *Tech Account* and checking the box will require credential to be entered when using Connect to Server, unchecking this box will enable the automatic injection of local Windows admin credentials at each connection.

The VDS Admin simply needs to connect to the temporary VM using Connect to Server or another process and make the changes required to meet their requirements.

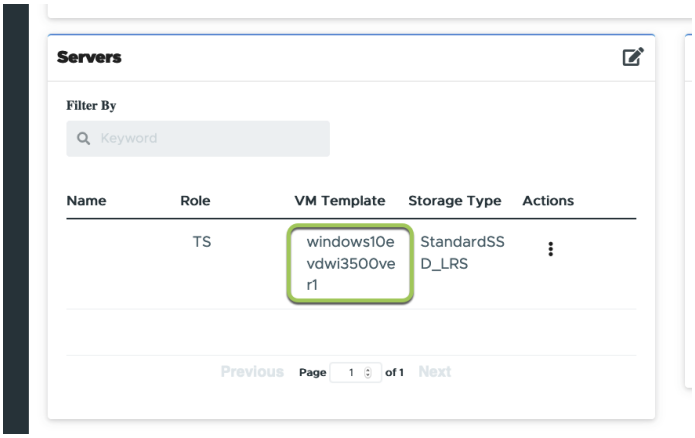
Validating the Collection

Once customization is complete, the VDS Admin can close the image and SysPrep it by clicking **Validate** from the Actions icon.



Using the Collection

After validation has completed, the Status of the Provisioning Collection will change to **Available**. From within the Provisioning Collection the VDS Admin can identify the **VM Template** name which is used to identify this provisioning collection throughout VDS.



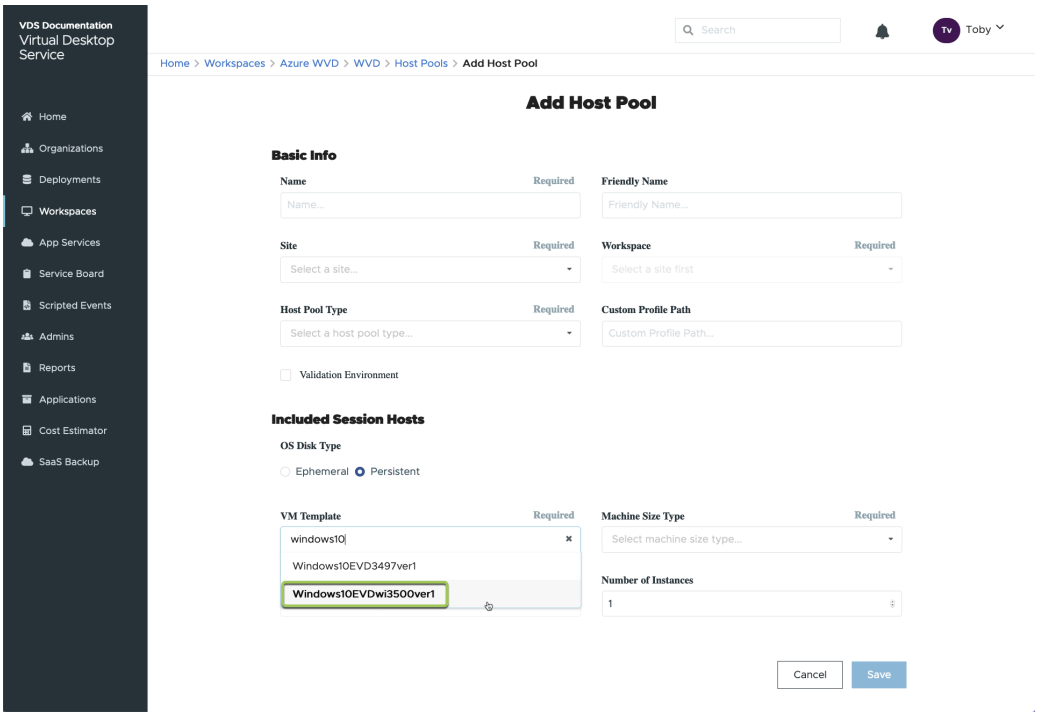
New Server

From the Workspace > Servers page, a new server can be created and the dialog box will prompt for the VM Template. The template name from above will be found on this list:

VDS provides for an easy way to update session hosts in an RDS environment by using Provisioning Collections and the **Add Server** functionality. This process can be done without impacting end users and repeated over and over with subsequent image updates, building on previous image iterations. For a detailed workflow on this process, see the **RDS Session Host Update Process** section below.

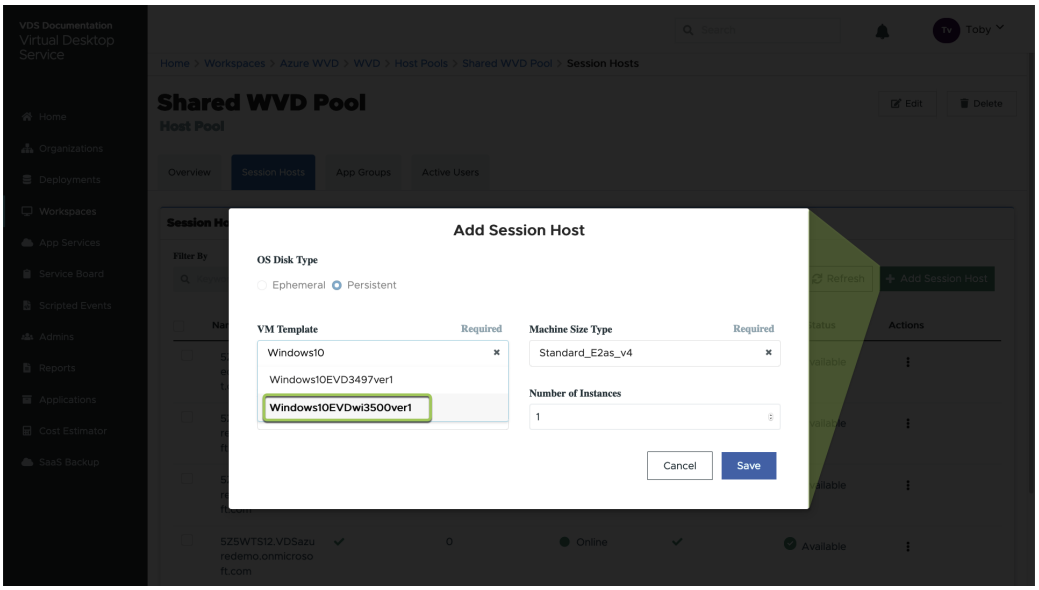
New WVD Host Pool

From the Workspace > WVD > Host Pools page, new WVD Host Pool can be created by clicking + **Add Host Pool** and the dialog box will prompt for the VM Template. The template name from above will be found on this list:



New WVD Session Host(s)

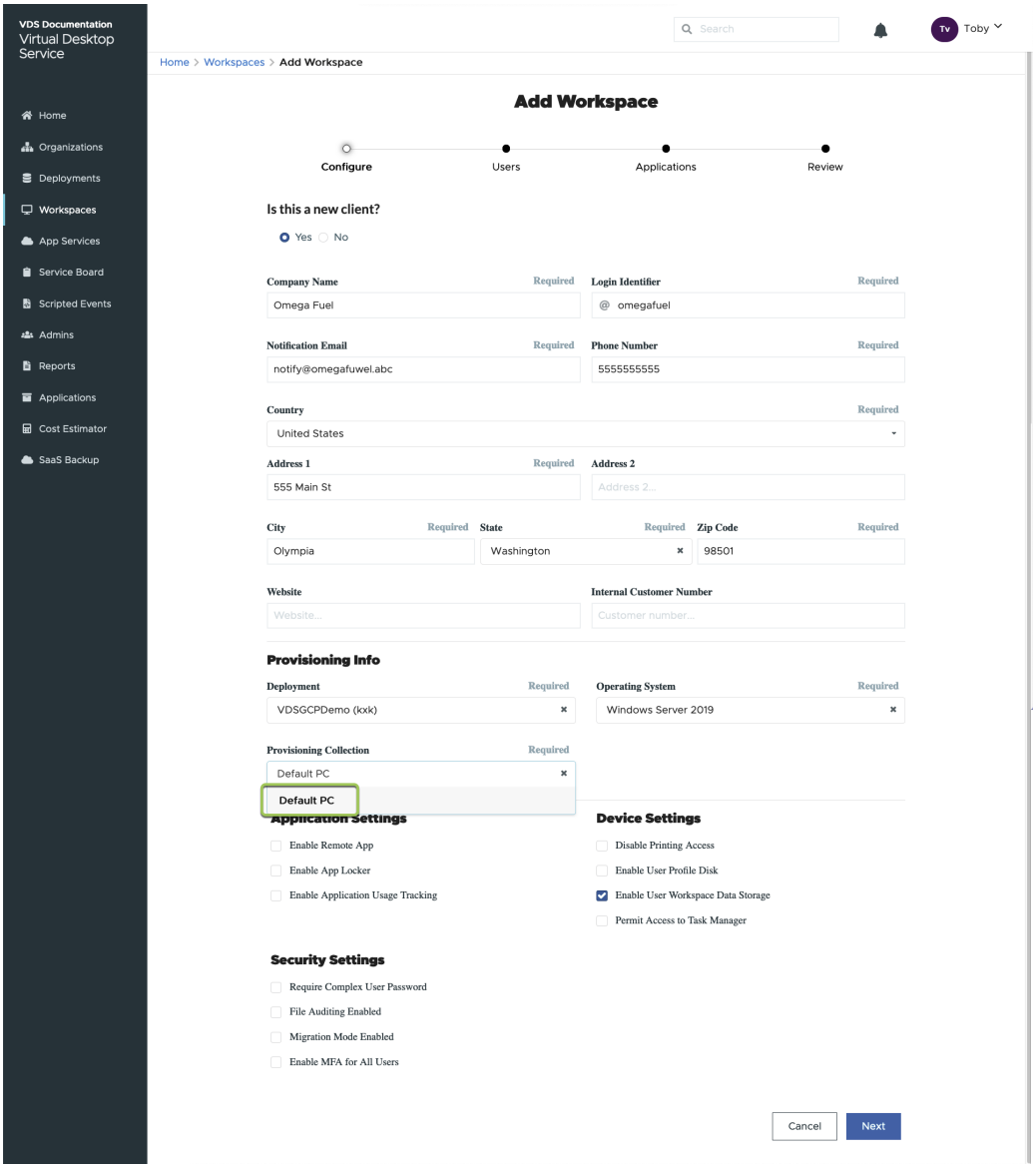
From the Workspace > WVD > Host Pool > Session Hosts page, new WVD session host(s) can be created by clicking + **Add Session Host** and the dialog box will prompt for the VM Template. The template name from above will be found on this list:



VDS provides for an easy way to update session hosts in a WVD Host Pool by using Provisioning Collections and the **Add Session Host** functionality. This process can be done without impacting end users and repeated over and over with subsequent image updates, building on previous image iterations. For a detailed workflow on this process, see the **WVD Session Host Update Process** section below.

New Workspace

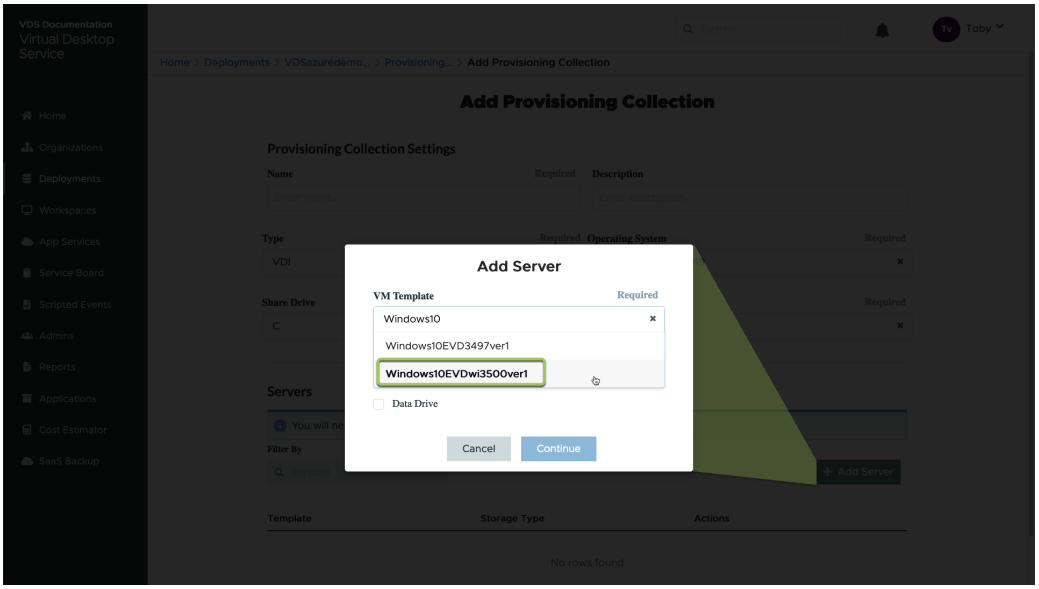
From the Workspaces page, a new workspace can be created by clicking + **New Workspace** and the dialog box will prompt for the Provisioning Collection. The Shared Provisioning Collection name will be found on this list.



New Provisioning Collection

From the Deployment > Provisioning Collection page, a new Provisioning Collection can be created by clicking + **Add Collection**. When adding servers to this collection the dialog box will prompt for the

VM Template. The template name from above will be found on this list:



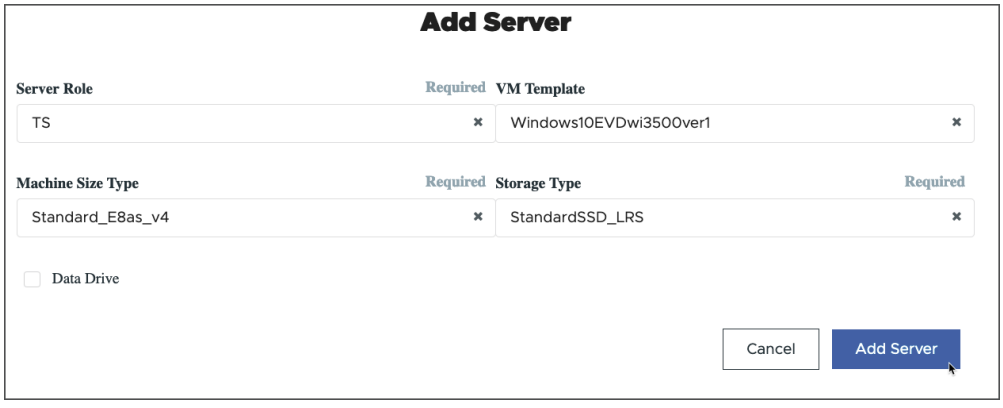
Addendum 1 - RDS Session Hosts

RDS Session Host Update Process

VDS provides for an easy way to update session hosts in a RDS environment by using Provisioning Collections and the **Add Server** functionality. This process can be done without impacting end users and repeated over and over with subsequent image updates, building on previous image iterations.

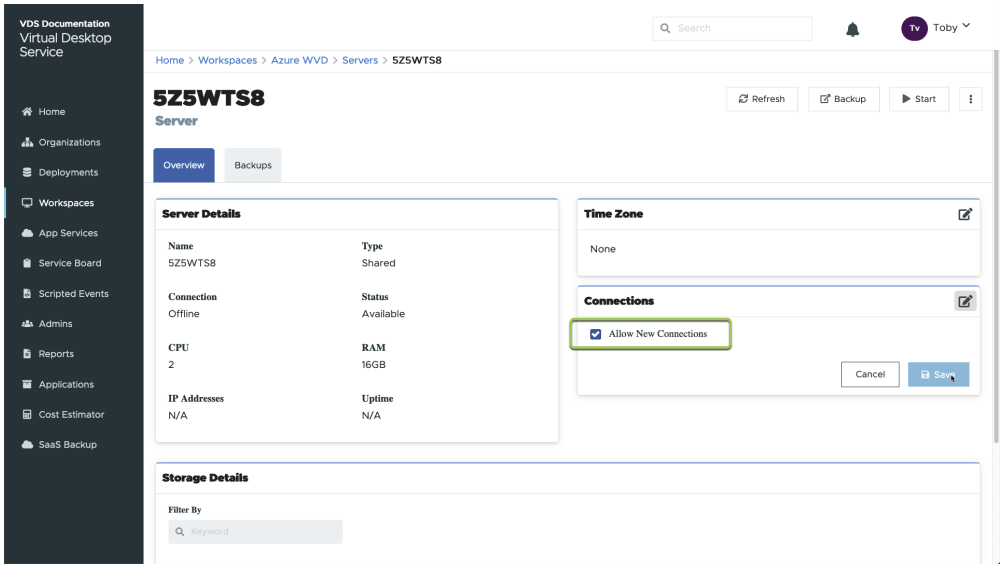
The RDS Session Host update process is as follows:

1. Build a new VDI Provisioning Collection, customize and validate the collection per the instructions above.
    a. Generally this Provisioning Collection will be built on the previous VM Template, emulating an "Open, Save As" process.
2. Once the Provisioning Collection has validated, navigate to the *Workspace* > *Servers* page, click + **Add Server**

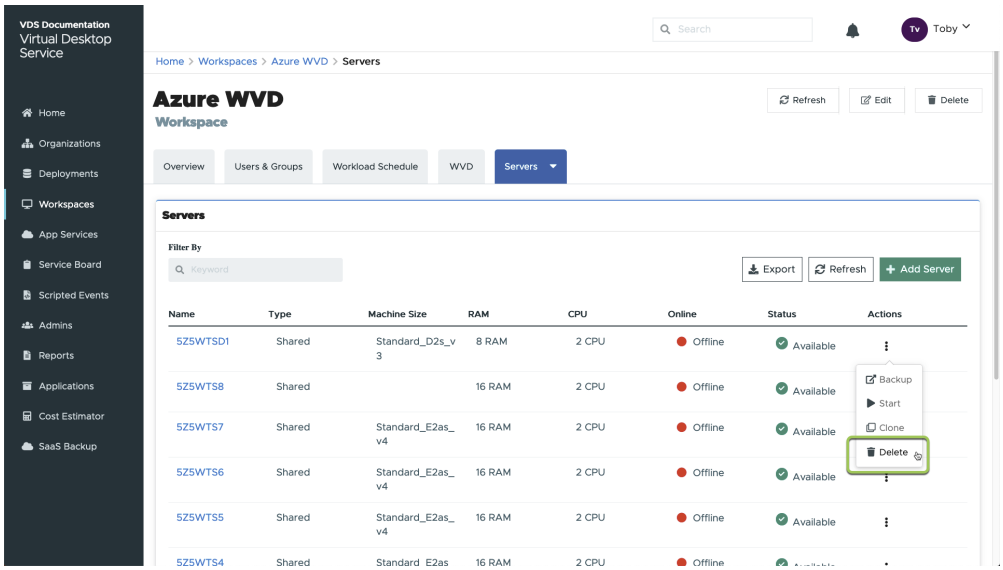


3. Select **TS** as the **Server Role**

4. Select the latest **VM Template**. Make the appropriate **Machine Size** and **Storage Type** selections based on your requirements. Leave **Data Drive** unchecked.
5. Repeat this for the total number of Session Hosts required for the environment.
6. Click **Add Server**, the session hosts will build based on the selected VM Template and starting coming online in as soon as 10-15 minutes (depending on the hypervisor).
    a. Note that the Session Hosts currently in the environment will ultimately be decommissioned after these new host come online. Plan to build enough new hosts to be sufficient to support the entire workload in this environment.
7. For each session host, the **Allow New Sessions** toggle can be used to manage which hosts can receive new user sessions. This setting is accessed by editing the settings of each individual session host server. Once sufficient new hosts have been built and functionality has been confirmed, this setting can be managed on both the new and old hosts to route all new sessions to the new hosts. The old hosts, with **Allow New Sessions** set to **disabled**, can continue to run and host existing user sessions.



8. As users log off of the old host(s), and with no new user sessions joining the old host(s), the old host(s) where **Sessions** = **0** can be deleted by clicking the **Actions** icon and selecting **delete**.



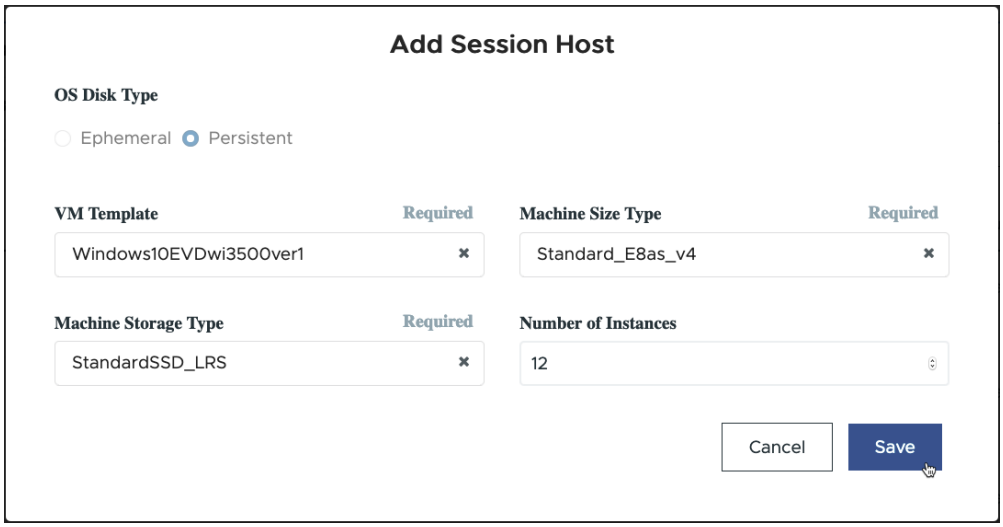
Addendum 2 - WVD Session Hosts

WVD Session Host Update Process

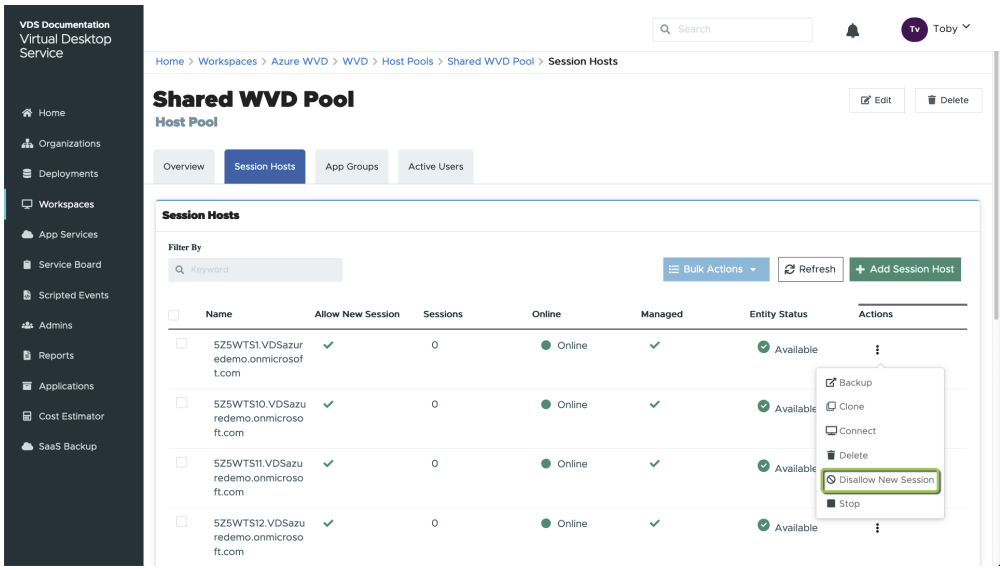
VDS provides for an easy way to update session hosts in a WVD Host Pool by using Provisioning Collections and the **Add Session Host** functionality. This process can be done without impacting end users and repeated over and over with subsequent image updates, building on previous image iterations.

The WVD Session Host update process is as follows:

1. Build a new VDI Provisioning Collection, customize and validate the collection per the instructions above.
    a. Generally this Provisioning Collection will be built on the previous VM Template, emulating an "Open, Save As" process.
2. Once the Provisioning Collection has validated, navigate to the *Workspace* > *WVD* > *Host Pools* page and click the name of the Host Pool
3. From within the *Host Pool* > *Session Hosts* page, click + **Add Session Host**

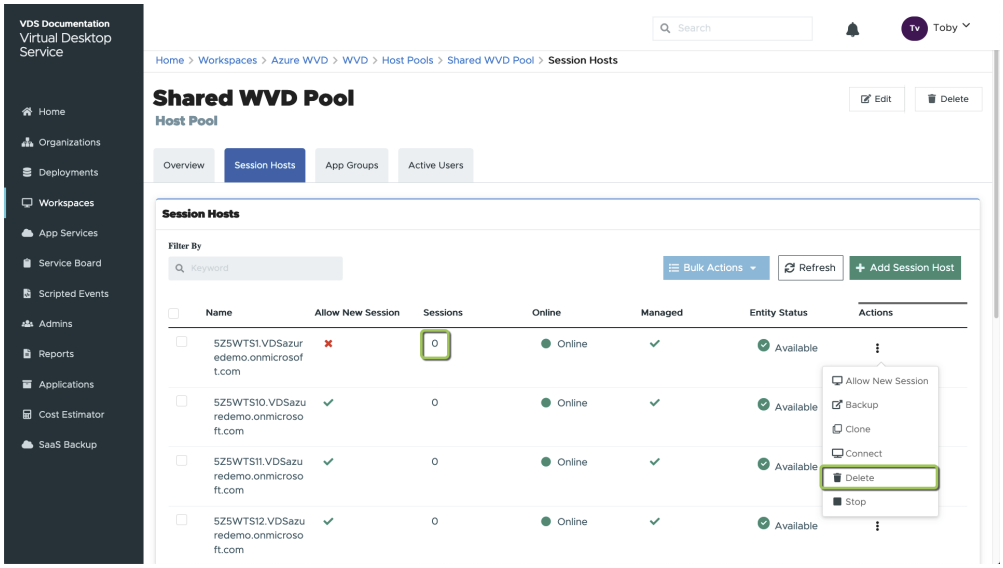


4. Select the latest **VM Template**. Make the appropriate **Machine Size** and **Storage Type** selections based on your requirements.
5. Enter the **Number of Instances** equal to the total number of required Session Hosts. Typically this will be the same number as are currently in the Host Pool but it can be any number.
    a. Note that the Session Hosts currently in the Host pool will ultimately be decommissioned after these new host come online. Plan for the **Number of Instances** entered to be sufficient to support the entire workload in this Host Pool.
6. Click **Save**, the session hosts will build based on the selected VM Template and starting coming online in as soon as 10-15 minutes (depending on the hypervisor).
7. For each session host, the **Allow New Sessions** toggle can be used to manage which hosts can receive new user sessions. Once sufficient new hosts have been built and functionality has been confirmed, this setting can be managed on both the new and old hosts to route all new sessions to the new hosts. The old hosts, with **Allow New Sessions** set to **disabled**, can continue to run and host existing user sessions.



8. As users log off of the old host(s), and with no new user sessions joining the old host(s), the old

host(s) where **Sessions** = **0** can be deleted by clicking the **Actions** icon and selecting **delete**.



Applications

Application Entitlement

Overview

VDS has a robust application automation and entitlement functionality built-in. This functionality allows users to have access to different applications while connecting to the same session host(s). This is accomplished by some custom GPOs hiding shortcuts along with automation selectively placing shortcuts on the users' desktops.

Applications can be assigned to users directly or via Security groups managed in VDS.

At a high level, the application provisioning process follows these steps.

1. Add App(s) to App Catalog
2. Add App(s) to the workspace
3. Install the Application on all Session Hosts
4. Select the Shortcut path
5. Assign apps to users and/or groups

Steps 3 & 4 can be fully automated with Scripted Events as illustrated below

Video Walkthrough

Video Page

Add applications to the App Catalog

VDS Application Entitlement starts with the App Catalog, this is a listing of all the applications available for deployment to end user environments.

To add applications to the catalog, follow these steps

1. Log in to VDS at https://manage.cloudworkspace.com using your primary admin credentials.
2. In the upper right, click the arrow icon next to your User Name and select Settings.
3. Click the App Catalog tab.
4. Click the Add App option in the Application Catalog title bar.
5. To add a group of applications, choose the Import Apps option.
    a. A dialog will appear that provides an Excel template to download that creates the correct format for the application list.
    b. For this evaluation NetApp VDS has created a sample application list for import it can be found here.
    c. Click on the Upload area and choose the application template file, click the Import button.
6. To add individual applications, choose the Add App button and a dialog box will appear.
    a. Enter the name of the application.
    b. External ID can be used to enter an internal tracking identifier such as a product SKU or billing

tracking code (optional).

c. Check the Subscription box if you want to report on the applications as a Subscription product (optional).

d. If the product does not install by version (for example Chrome) check the Version Not Required checkbox. This allows “continuous update” products to be installed without tracking their versions.

e. Conversely, if a product supports multiple named versions (ex: Quickbooks) you need to check this box so that you can install multiple versions and have VDS specific each available version in the list of applications that can be entitled for and end user.

f. Check “No User Desktop Icon” if you don’t want VDS to provision a desktop icon for this product. This is used for “backend” products like SQL Server since end users don’t have an application to access.

g. “App Must be Associated” enforces the need for an associated app to be installed. For example, a client server application may require SQL Server or mySQL to be installed as well.

h. Checking the License Required box indicates that VDS should request a license file to be uploaded for an installation of this application before it sets the application status to active. This step is performed on the Application detail page of VDS.

i. Visible to All – application entitlement can be limited to specific subpartners in a multi-channel hierarchy. For evaluation purposes, click the Check Box so that all users can see it in their available application list.

Add the application to the Workspace

To start the deployment process you’ll add the app to the workspace.

To do this, follow these steps

1. Click Workspaces
2. Scroll down to Apps
3. Click Add
4. Check box the application(s), enter required information, click Add Application, click Add Apps.

Manually install the application

Once the application has been added to the Workspace you’ll need to get that application installed on all session hosts. This can be done manually and/or it can be automated.

To manually install applications on session hosts, follow these steps

1. Navigate to Service Board.
2. Click on the Service Board Task.
3. Click on the Server Name(s) to connect as a local admin.

4. Install the app(s), confirm the shortcut to this app is found in the Start Menu path.
    a. For Server 2016 and Windows 10: C:\ProgramData\Microsoft\Windows\Start Menu\Programs.
5. Go back to the Service Board Task, click Browse and choose either the shortcut or a folder containing shortcuts.
6. Whichever you select is what will be displayed on the end user desktop when assigned the app.
7. Folders are great when an app is actually multiple applications. e.g “Microsoft Office” is easier to deploy as a folder with each app as a shortcut inside the folder.
8. Click Complete Installation.
9. If required, open the created Icon Add Service Board Task and confirm the icon has been added.

Automate application installation

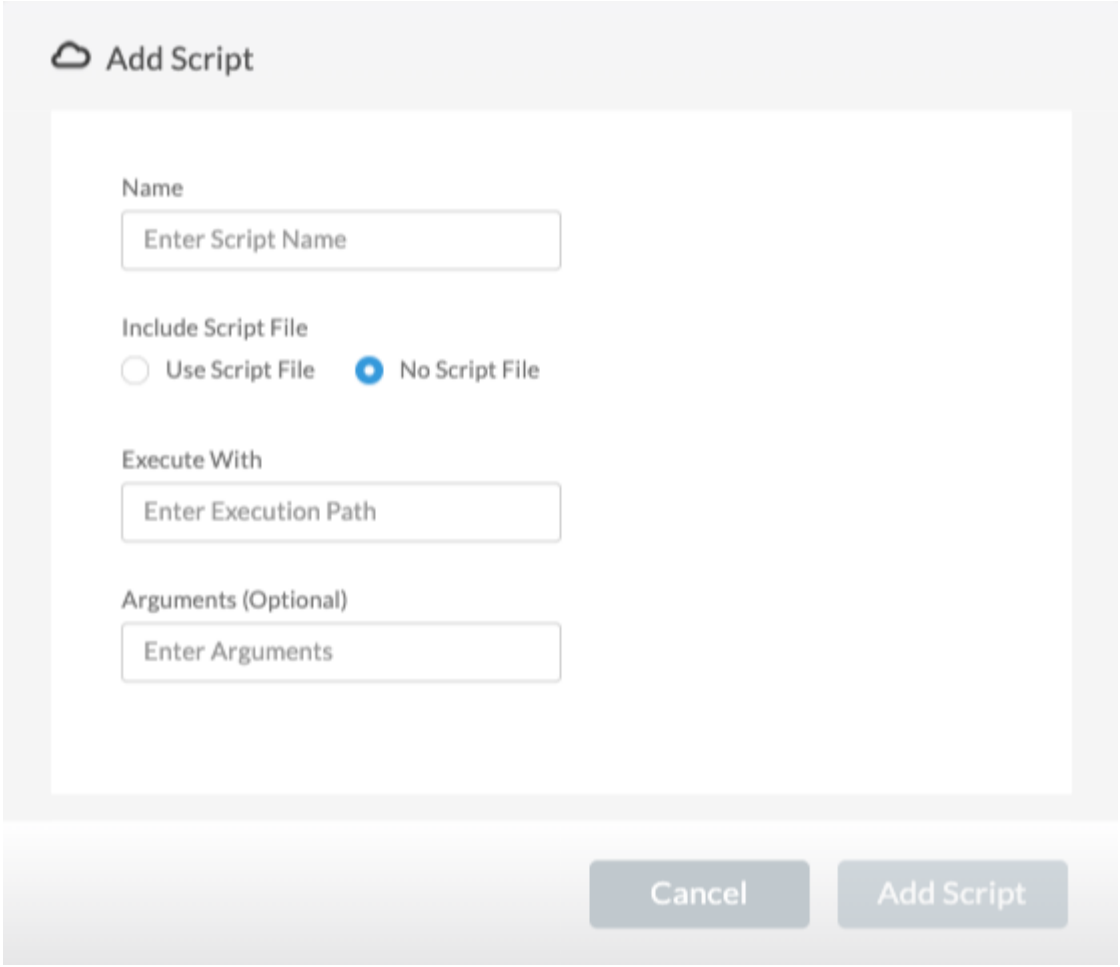
For reoccurring tasks or to perform the task across many hosts, the Scripted Events functionality in VDS can be used to fully automate installs. This automation can be performed with any number of scripting technologies, in this example we’ll use Chocolatey.

First, any host where you’ll automate installs will need Chocolatey pre-installed, this can be added to the VM image or automated as shown below.

To automate the install of Chocolatey, follow these steps

1. Installing Chocolatey is the first step, this utility can then be used to automate app installs. To do so, you’ll build a scripted event that executes Powershell.exe with the following arguments:
   ```
   Set-ExecutionPolicy Bypass -Scope Process -Force; iex New-Object System.Net.WebClient).DownloadString(‘https://chocolatey.org/install.ps1’))
   ```
2. Once the script is built it can be triggered in a variety of ways. The simplest is to manually run it but there are other options such as running this at *server create*.

Once the host(s) has Chocolatey, autoamte with Scripted events can install a wide variety of applications from the Chocolatey repository. A complete list of available applications can be foudn at https://chocolatey.org/packages



To automate the install of an applications, follow these steps (using 7-Zip as an example)

1. Navigate to Scripted Events > Script Repository > Add
2. Select `No Script File`
3. Execute With: `c:\programdata\chocolatey\choco.exe`
4. Arguments (Optional): *leave blank*
5. Once the Script is saved, the next step is to associate that script with a Trigger. Navigate to Scripted Events > Activities > Add
   a. Enter a name for the activity (e.g. *choco install 7-Zip*)

      Develop a consistent naming convention as the library of Scripts can get large

   b. Optionally give a description
   c. Select the script created in the previous section
   d. In *Enter Arguments (Optional):* enter `install 7zip -y -f` (which is found here: https://chocolatey.org/packages/7zip)
      i. `-y` is required to unattended installs
      ii. `-f` forces the install, even if the app was previously installed and is optional

e. Select the deployment

f. Check the enable checkbox

g. under *Trigger On* select *Application install*

h. Click *Add Application*

i. Select the application name (e.g. *7-Zip File Manager*)

j. Enter the shortcut path for the application icon (e.g. \\shortcuts\7-Zip File Manager.lnk)

You'll need to know the shortcut path during this creation wizard. This can be found by looking at other installs of the app or by doing a manual install on the machine and browsing to it from the service board entry.

k. Click Update > Add Activity

Going forward, the act of adding that application to the Workspace will trigger the install of that application across all session hosts.

Assign applications to users

Application entitlement is handled by VDS and application can be assigned to users in three ways

Assign Applications to Users

1. Navigate to the User Detail page.
2. Navigate to the Applications section.
3. Check the box next to all applications required by this user.

Assign users to an application

1. Navigate to the Applications section on the Workspace Detail page.
2. Click on the name of the application.
3. Check the box next to the users the application.

Assign applications and users to user groups

1. Navigate to the Users and Groups Detail.
2. Add a new group or edit an existing group.
3. Assign user(s) and application(s) to the group.

Scripted Events

Scripted Events

Overview

Scripted Events provides the advanced administrator with a mechanism to create custom automation for system maintenance, user alerts, group policy management, or other events. Scripts can be designated to run as an executable process and accept arguments, or can be used as arguments for a different executable program. This functionality allows for scripts to be combined and nested to support complex customization and integration needs.

A detailed example of scripted events in action is found in the Application Entitlement Guide.

Additionally, Scripted Events allows for the creation of automation that does not require a script to process, rather the automation flow is launched by a system trigger and executes an existing program or system utility with optional arguments.

Script repository

This section displays all scripts available. Scripts are executed by activities, covered in the next section.

Clicking on the Add button allows for the creation of a new Script.

Clicking Name of a script opens a dialog box for editing the script.

Activities

Activities are the way to execute one or more scripts. Activities can be triggered on many system actions. More on automating app installs is found here.

- Application Install
  - This is triggered when the VDS Admin clicks "+ Add..." from the *Workspace* > *Applications* page.
  - This selection allows you to select an application from the Application Library and to pre-define the shortcut of the application.
  - Detailed instructions for this trigger are highlighted in the *Install Adobe Reader DC* script documentation.
- Application Uninstall
  - This is triggered when the VDS Admin clicks **Actions › Uninstall** from the *Workspace* > *Applications* page.
  - This selection allows you to select an application from the Application Library and to pre-define the shortcut of the application.
  - Detailed instructions for this trigger are highlighted in the *Uninstall Adobe Reader DC* script documentation.
- Create Cache
  - This is triggered anytime a new VM is built by VDS for a provisioning collection cache
- Create Client

    - This is triggered anytime a new Client organization is added to VDS
- Create Server
    - This is triggered anytime a new VM is built by VDS
- Create User
    - This is triggered anytime a new user is added via VDS
- Delete User
    - This is triggered anytime a new user is deleted via VDS
- Manual
    - This is triggered by a VDS admin manually from within the **Scripted Events › Activity** page
- Manual Application Update
  **
- Scheduled
    - This is triggered when the defined date/time is reached
- Start Server
    - This is triggered on a VM each time it boots up

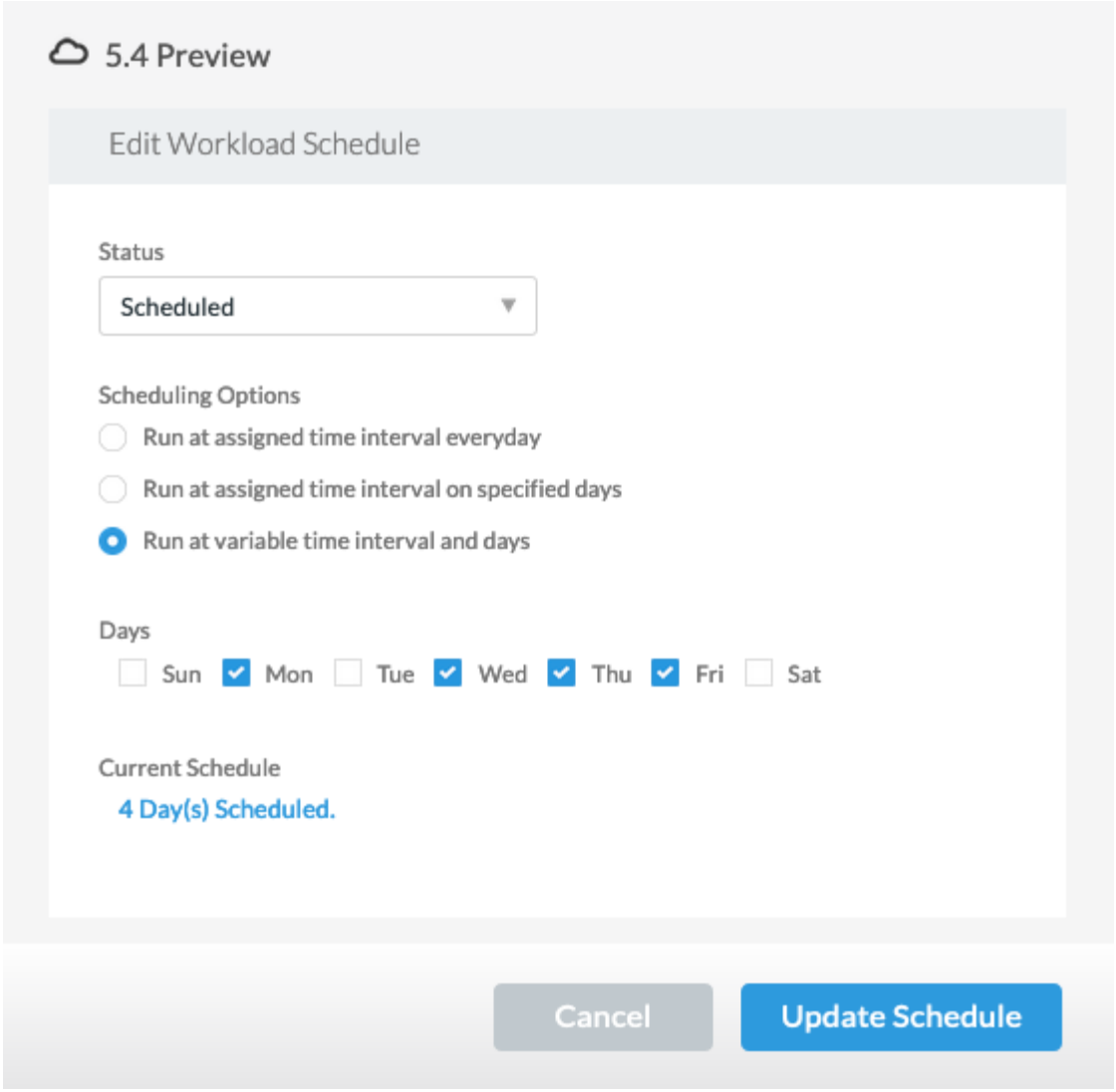
Clicking on the *Name* opens a dialog box where the activity can be edited.

Resource Optimization

Workload scheduling

Workload Scheduling is a feature that can schedule the time window in which the environment is active.

Workload scheduling can be set to "Always On", "Always Off" or "Scheduled". When set to "Scheduled" the on and off times can be set as granularly as a different time window for each day of the week.



When scheduled to be off, either via "Always Off" or "Scheduled", all tenant virtual machines will shut down. Platform servers (such as CWMGR1) will remain active to facilitate functionality such as wake on demand.

Workload Schedule works in conjunction with other resource optimization features including Live Scaling and Wake on Demand.

Wake on demand

Wake on Demand (WoD) is patent-pending technology that can wake the appropriate VM resources for an end user in order to facilitate unattended access 24/7, even when resources are scheduled to be inactive.

WoD for Remote Desktop Services

In RDS, the VDS Windows Client has built-in Wake on Demand integration and can wake the appropriate resources without any additional end-user actions. They simply need to initiate their normal login and the client will notify them of a short delay which the VM(s) are activated. This client

(and thus this automate wake on demand functionality) is only available when connecting from a Windows device to an RDS environment.

Similar Functionality is built into the VDS Web client for RDS deployments. The VDS Web Client is found at: https://login.cloudworkspace.com

Wake on Demand functionality is not built into the Microsoft RD client (for Windows or any other platform) nor any other 3rd party RD clients.

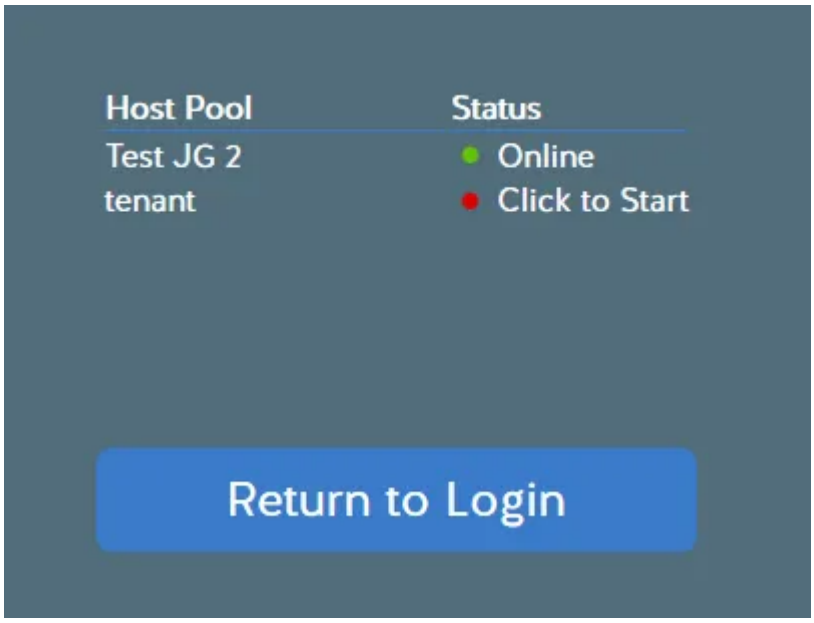
Wake on demand for Windows Virtual Desktop

In WVD, the only clients that can be used to connect are Microsoft provided and thus do not contain the Wake on Demand functionality.

VDS does include a self-service Wake on Demand function for WVD via the VDS Web Client. The web client can be used to wake the appropriate resources, then the connection can be initiated via the standard WVD client.

To wake VM resources in WVD:

1. Connect to the VDS Web Client at https://login.cloudworkspace.com
2. Login with the user WVD credentials
    - A warning message will prompt *"You have Microsoft's WVD services available. Click HERE to view the status and start offline Host Pools."*
3. After clicking "*HERE*" you'll see a list of available Host Pools along with a link to "Click to Start" link under the status column



4. *Click to Start* the link and wait 1-5 minutes for the status to change to "Online" and show a green status icon
5. Connect to WVD using your normal process

Live Scaling

Live Scaling works in conjunction with Workload Scheduling by managing the number of online session hosts during the scheduled active time as configured in Workload Scheduling. When scheduled to be offline, Live Scaling won't control session host availability. Live scaling only impacts Shared Users and Shared Servers in RDS and WVD environments, VDI Users and VDI VMs are excluded from these calculations. All other VM types are unaffected.

The WVD *load balancer type* setting interacts with this configuration, so care should be taken in choosing that setting as well. Cost savings are maximized with a depth-first type while end user performance is maximized with a breadth-first type.

Enabling Live Scaling with no options checked, the automation engine will automatically select values for the Number of Extra Powered on Servers, Shared Users Per Server, and Max Shared Users Per Server.

- The *Number of Extra Powered on Servers* defaults to 0, meaning 1 server will run 24/7.
- The *Shared Users Per Server* defaults to the number users in the company divided by the number of servers.
- The *Max Shared Users Per Server* defaults to infinite.

Live Scaling turns the servers on as users log on and turns them off as users log off.

Powering an additional server is automatically triggered once the total active users reaches the number of Shared Users per Server multiplied by the total number of Powered On Servers.

```
e.g. With 5 Shared Users per Server set (this is the default # we'll use for all examples
in this article) and 2 servers running, a 3rd server won't be powered up until server 1 &
2 both have 5 or more active users.  Until that 3rd server is available, new connections
will be load balanced all available servers.  In RDS and WVD Breadth mode, Load balancing
sends users to the server with the fewest active users (like water flowing to the lowest
point). In WVD Depth mode, Load balancing sends users to servers in a sequential order,
incrementing when the Max Shared Users number is reached.
```

Live Scaling will also turn off servers to save costs. When a server has 0 active users, and another server has available capacity below *Shared Users per Server* the empty server will be powered down.

Powering on the next server can take a few minutes. In certain situations the speed of logins can outpace the availability of new servers. For example, if 15 people login in 5 minutes they'll all land on the first server (or be denied a session) while a 2nd and 3rd power up. There are two strategies that can be used to mitigate overloading a single server in this scenario:

1. Enable *Number of Extra Powered on Servers* so that the additional server(s) will be on and available to accept connections and allow time for the platform to spin up additional servers.

a. When activated, the number is added to the calculated need. For example, if set to 1 extra server (and with 6 users connected) two servers would be active because of the users count, plus a 3rd due to the *Extra Powered on Servers* setting.

2. Enable *Max Shared Users Per Server* to place a hard limit on the number of users allowed per server. New connections that would exceed this limit will be refused, the end user will get an error message and need to try again in a couple minutes once the additional server is available. If set, this number also defines the depth of WVD Shared servers.

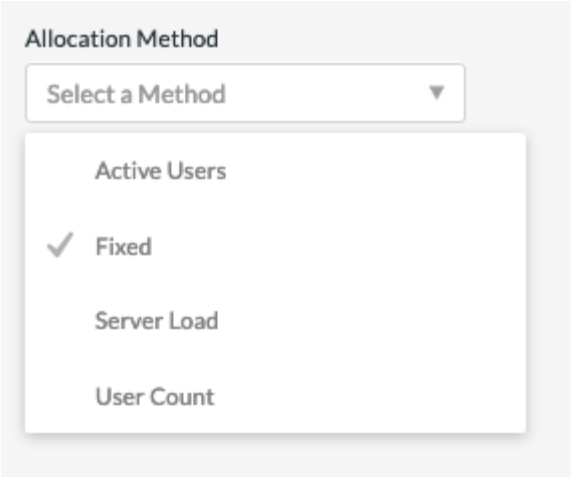
    a. Assuming the delta between *Shared Users Per Server* and *Max Shared Users Per Server* is appropriate, the new servers should become available before the max is reached in all but the most extreme situations (unusually large login storms).

VM resource scaling

VM Resource scaling is a optional feature that can change the size and quantity of session host VMs in an environment.

When activated, VDS will calculate the appropriate size and quantity of session host VMs based on your selected criteria. These options include: Active Users, Named Users, Server Load, and Fixed.

The size of the VMs is contained with the family of VMs selected in the UI which can be changed by dropdown. (e.g. *Standard Dv3 Family* in Azure)

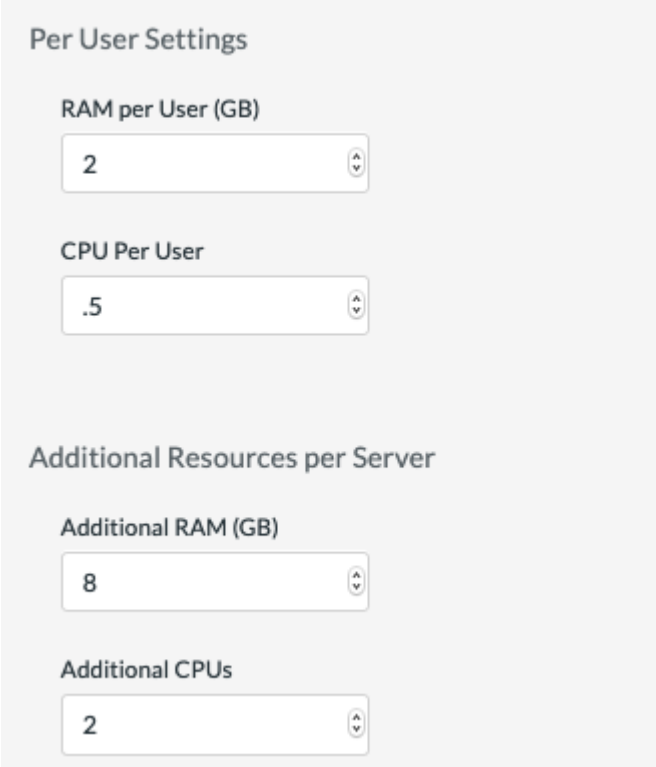


Scaling based on users

The function below behaves the same for either "Active Users" or "User Count". User Count is a simply count of all users activated with a VDS desktop. Active Users is a calculated variable based on the previous 2 weeks of user session data.

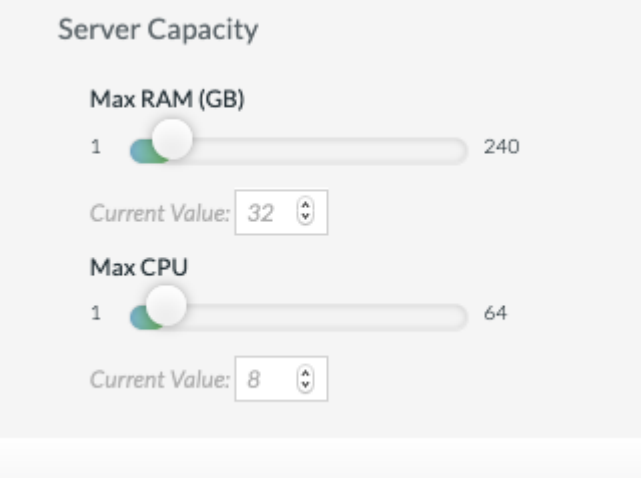
When calculating based on users, the size (and quantity) of the session host VMs is calculated based on the defined RAM and CPU requirements. The administrator can define the GB of RAM, and number of vCPU cores per user along with additional non-variable resources.

In the screenshot below, each user is allocated 2GB RAM and 1/2 of a vCPU core. Additionally, the server starts with 2 vCPU cores and 8GB RAM.



Additionally, the administrator can define the maximum size a VM can reach. When reached, environments will scale horizontally by adding additional VM session hosts.

In the screenshot below, each VM is limited to 32GB Ram and 8vCPU cores.



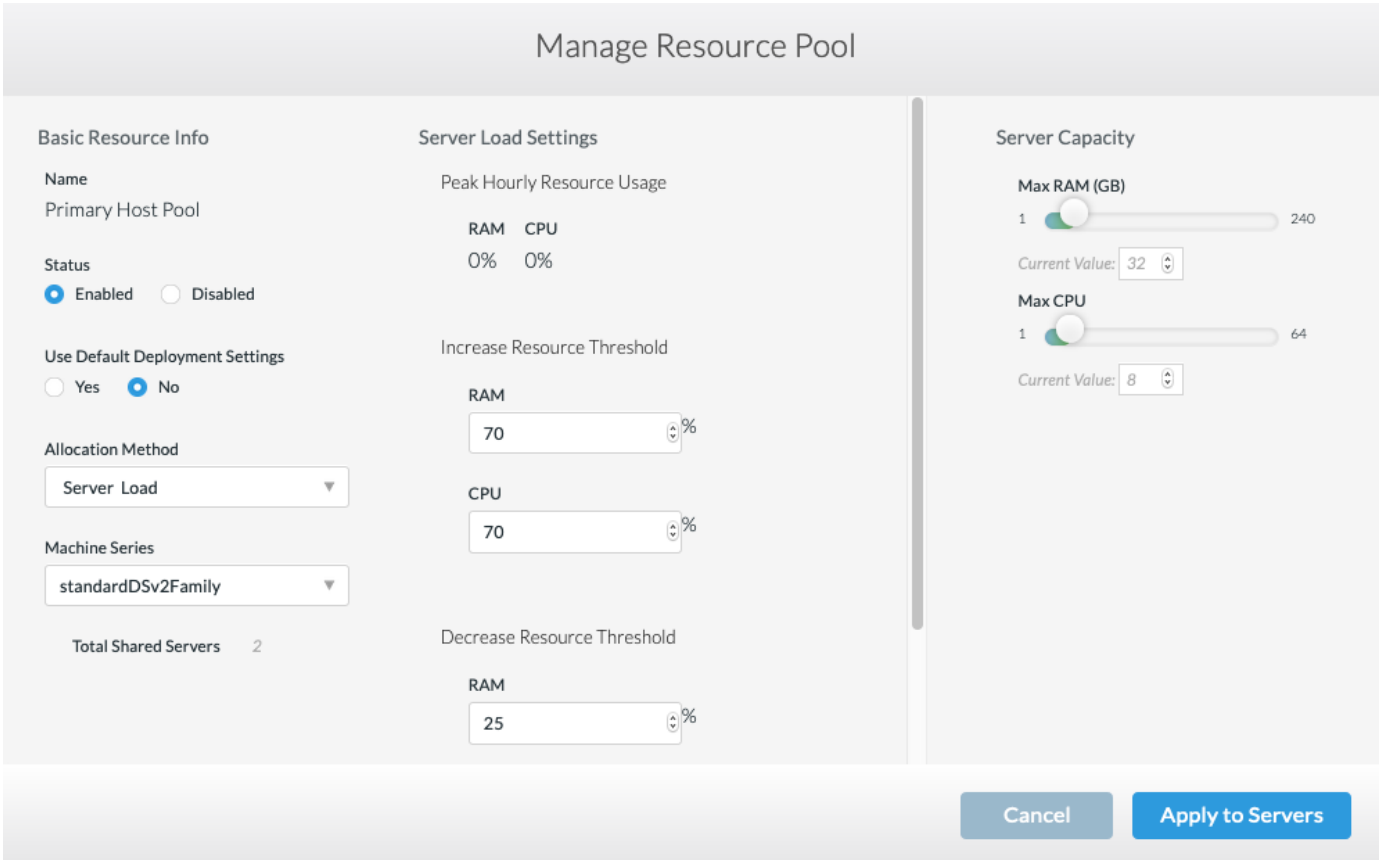
With all of these variables defined, VDS can calculate the appropriate size and quantity of session host VMs, greatly simplifying the process of maintaining appropriate resource allotment, even as users are added and removed.

Scaling based on server load

When calculating based on server load, the size (and quantity) of session host VMs is calculated based on the average CPU/RAM utilization rates as observed by VDS over the previous 2-week period.

When the maximum threshold is exceeded, VDS will increase the size or increment the quantity to bring average usage back within range.

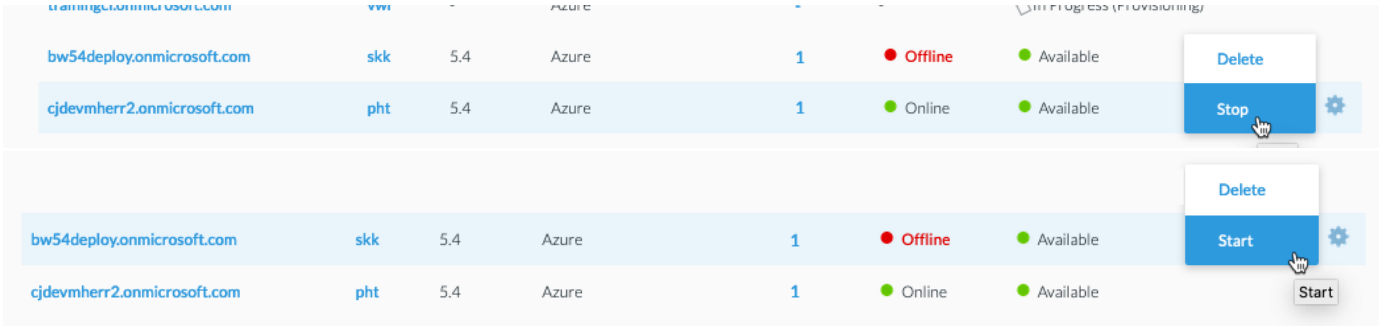
Like user based scaling, the VM Family and the maximum VM size can be defined.



Other active resources

Workload Scheduling does not control the platform servers such as CWMGR1 as they are needed to trigger the Wake on Demand functionality and facilitate other platform tasks and should run 24/7 for normal environmental operation.

Additional saving can be achieved by deactivating the entire environment but is only recommended for non-production environments. This is a manual action that can be performed in the Deployments section of VDS. Returning the environment to a normal status also requires a manual step on the same page.



User Administration

Managing User Accounts

Create New User(s)

Admins can add Users by clicking Workspaces > Users and Groups > Add/import

Users can be added individually or with a bulk import.

> Including accurate email and mobile phone # at this stage greatly improves the process of enabling MFA later.

Once you have created Users, you can click on their name to see details like when they were created, their connection status (whether they're currently logged in or not) and what their specific settings are.

Activating the Virtual Desktop for existing AD users

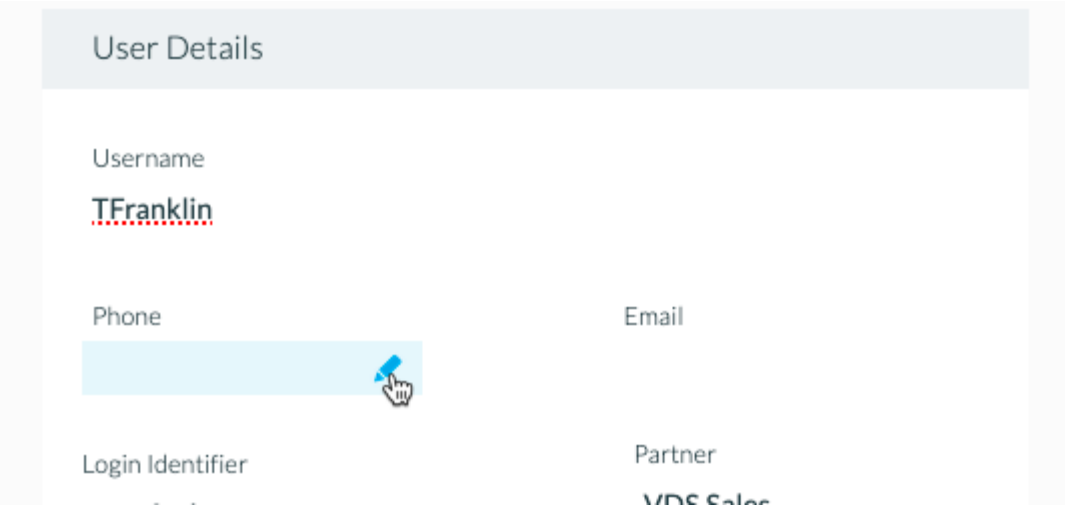
If users are already present in AD, you can simple activate the users' Virtual Desktop by clicking on the gear next to their name and then enabling their desktop.

> For Azure AD Domain Service only: In order for logins to work, the password hash for Azure AD users must be synced to support NTLM and Kerberos authentication. The easiest way to accomplish this task is to change the user password in Office.com or the Azure portal, which will force the password hash sync to occur. The sync cycle for Domain Service servers can take up to 20 minutes so changes to passwords in Azure AD typically take 20 minutes to be reflected in AADDS and thus in the VDS environment.

Delete user account(s)

Edit user info

On the user detail page changes can be made the the user details such as username and contact details. The email and phone values are used for the Self Service Password Reset (SSPR) process.



Edit user security settings

- VDI User Enabled – an RDS Setting that, when enabled, builds a dedicated VM session host and assigned this user as the only user that connect to it. As part of activating this checkbox the CWMS administrator is prompted to select the VM Image, Size and Storage Type.
  - WVD VDI users should be managed on the WVD page as a VDI hostpool.
- Account Expiration Enabled – allows the CWMS administrator to set an expiration date on the end user account.
- Force Password Reset at Next Login – Prompts the end user to change their password at next login.
- Multi-Factor Auth Enabled – Enables MFA for the end user and prompts them to setup MFA at next login.
- Mobile Drive Enabled – A legacy feature not used in current deployments of RDS or WVD.
- Local Drive Access Enabled – Allows the end user to access their local device storage from the cloud environment including Copy/Paste, USB Mass storage and system drives.
- Wake on Demand Enabled – For RDS users connecting via the CW Client for Windows, enabling this will give the end user permission to take their environment when connecting outside of normal working hours as defined by Workload Schedule.

Locked Account

By default, five failed login attempts will lock the user account. The user account will unlock after 30 minutes unless *Enable Password Complexity* is enabled. With password complexity enabled, the account will not automatically be unlocked. In either case, the VDS admin can manually unlock the user account from the Users/Groups page in VDS.

Reset user password

Resets the user password.

Note: When resetting Azure AD user passwords (or unlocking an account) there can be a delay of up to

20 minutes as the reset propagates through Azure AD.

Admin Access

Enabling this give the end user limited access to the management portal for their tenant. Common uses include providing an on-site employee access to reset peers' passwords, assign application or allow manual server wakeup access. Permissions controlling what areas of the console can be seen is set here as well.

Logoff user(s)

Logged on users can be logged off by the VDS admin from the Users/Groups page in VDS.

Applications

Displays the application deployed in this workspace. The check box provisions the apps to this specific user. Complete Application Management documentation can be found here. Access to applications can also be granted from the App interface or to Security Groups.

View/kill user processes

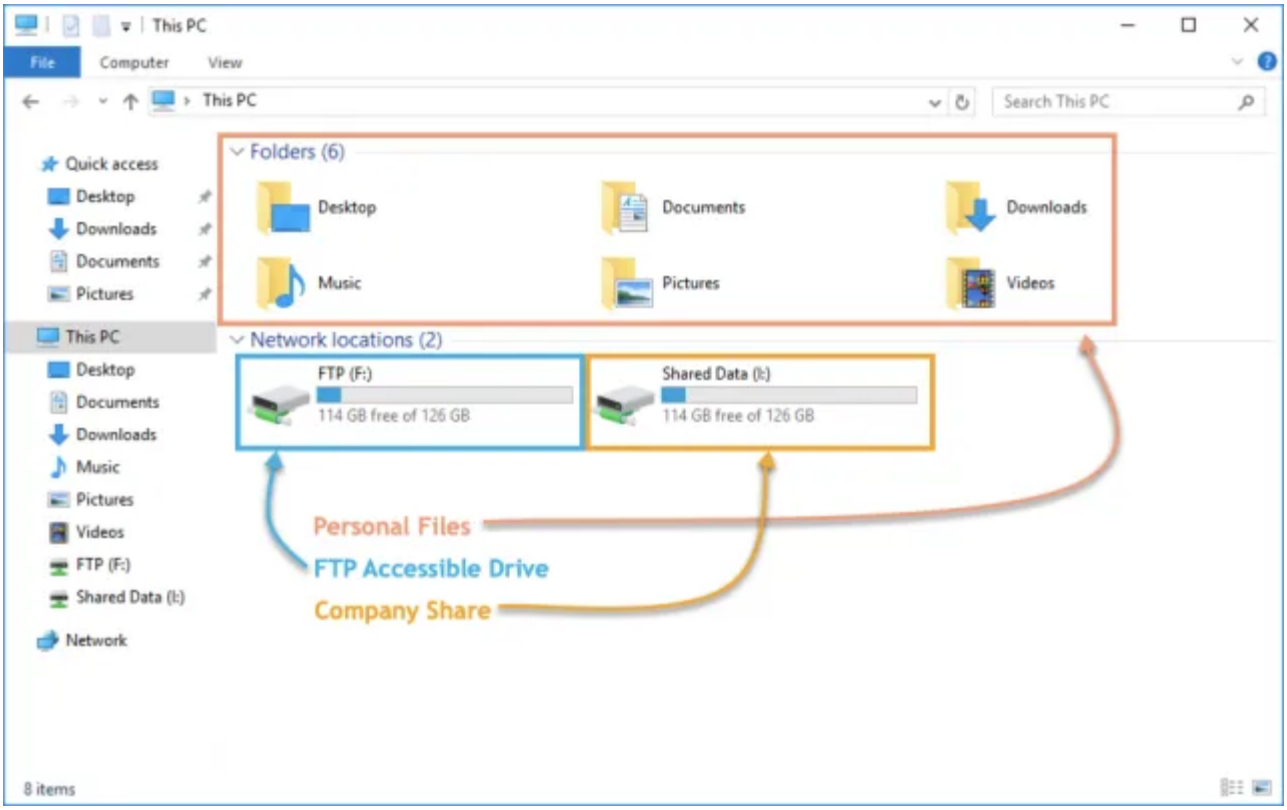
Displays the processes currently running in that user's session. Processes can be killed from this interface as well.

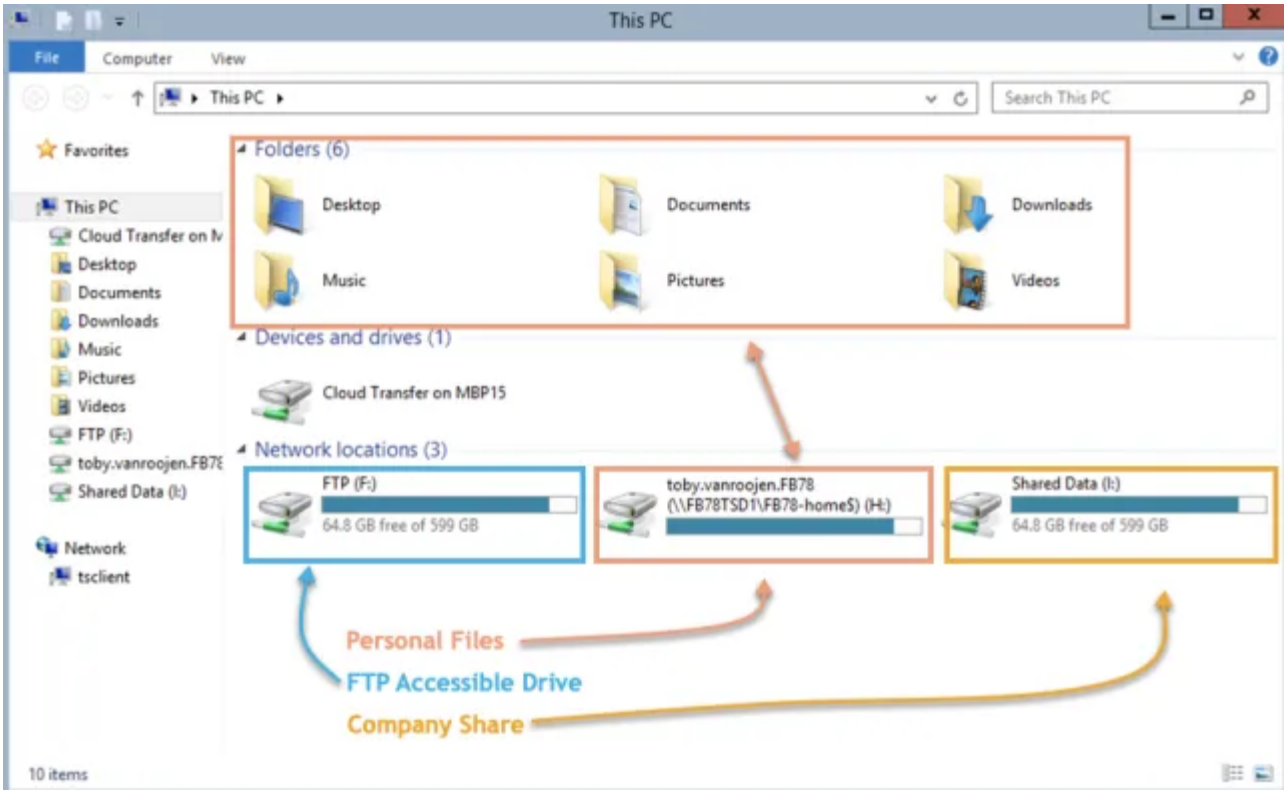
Managing Data Permissions

End user perspective

Virtual Desktop end users can have access to several mapped drives. These drives includes an FTPs accessible team share, a Company File Share and their Home drive (for their documents, desktop, etc…) . All of these mapped drives reference back to a central storage layer on either a storage services (such as Azure NetApp Files) or on a file server VM.

Depending on the configuration the user may of may not have the H: or F: drives exposed, they may only see their Desktop, Documents, etc… folders. Additionally, different Drive letters are occasionally set by the VDS administrator at deployment.





Managing permissions

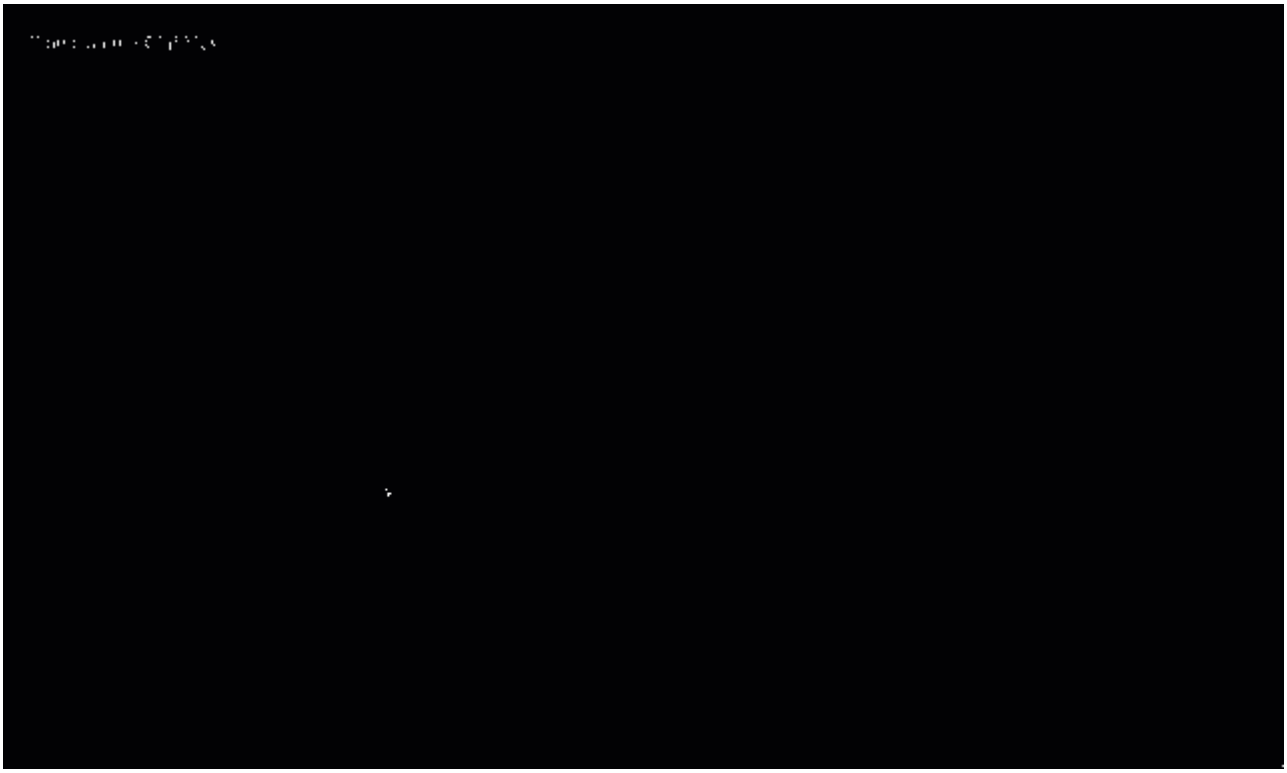
VDS allows admins to edit security groups and folder permissions, all from within the VDS portal.

Security groups

Security groups are managed by clicking: Workspaces > Tenant Name > Users & Groups > under the Groups Section

In this section you can:

1. Create new security groups
2. Add/Remove users to the groups
3. Assign applications to groups
4. Enable/Disable Local Drive access to groups



Folder permissions

Folder Permissions are managed by clicking: Workspaces > Tenant Name > Manage (in the Folders section).

In this section you can:

1. Add/Delete Folders
2. Assign permissions to user or groups
3. Customize permissions to Read Only, Full Control & None

Application Entitlement

Overview

VDS has a robust application automation and entitlement functionality built-in. This functionality allows users to have access to different applications while connecting to the same session host(s). This is accomplished by some custom GPOs hiding shortcuts along with automation selectively placing shortcuts on the users' desktops.

Applications can be assigned to users directly or via Security groups managed in VDS.

At a high level, the application provisioning process follows these steps.

1. Add App(s) to App Catalog
2. Add App(s) to the workspace
3. Install the Application on all Session Hosts
4. Select the Shortcut path
5. Assign apps to users and/or groups

Steps 3 & 4 can be fully automated with Scripted Events as illustrated below

Video Walkthrough

Video Page

Add applications to the App Catalog

VDS Application Entitlement starts with the App Catalog, this is a listing of all the applications available for deployment to end user environments.

To add applications to the catalog, follow these steps

1. Log in to VDS at https://manage.cloudworkspace.com using your primary admin credentials.
2. In the upper right, click the arrow icon next to your User Name and select Settings.
3. Click the App Catalog tab.
4. Click the Add App option in the Application Catalog title bar.
5. To add a group of applications, choose the Import Apps option.
    a. A dialog will appear that provides an Excel template to download that creates the correct format for the application list.
    b. For this evaluation NetApp VDS has created a sample application list for import it can be found here.
    c. Click on the Upload area and choose the application template file, click the Import button.
6. To add individual applications, choose the Add App button and a dialog box will appear.
    a. Enter the name of the application.
    b. External ID can be used to enter an internal tracking identifier such as a product SKU or billing

tracking code (optional).

c. Check the Subscription box if you want to report on the applications as a Subscription product (optional).

d. If the product does not install by version (for example Chrome) check the Version Not Required checkbox. This allows “continuous update” products to be installed without tracking their versions.

e. Conversely, if a product supports multiple named versions (ex: Quickbooks) you need to check this box so that you can install multiple versions and have VDS specific each available version in the list of applications that can be entitled for and end user.

f. Check “No User Desktop Icon” if you don’t want VDS to provision a desktop icon for this product. This is used for “backend” products like SQL Server since end users don’t have an application to access.

g. “App Must be Associated” enforces the need for an associated app to be installed. For example, a client server application may require SQL Server or mySQL to be installed as well.

h. Checking the License Required box indicates that VDS should request a license file to be uploaded for an installation of this application before it sets the application status to active. This step is performed on the Application detail page of VDS.

i. Visible to All – application entitlement can be limited to specific subpartners in a multi-channel hierarchy. For evaluation purposes, click the Check Box so that all users can see it in their available application list.

Add the application to the Workspace

To start the deployment process you’ll add the app to the workspace.

To do this, follow these steps

1. Click Workspaces
2. Scroll down to Apps
3. Click Add
4. Check box the application(s), enter required information, click Add Application, click Add Apps.

Manually install the application

Once the application has been added to the Workspace you’ll need to get that application installed on all session hosts. This can be done manually and/or it can be automated.

To manually install applications on session hosts, follow these steps

1. Navigate to Service Board.
2. Click on the Service Board Task.
3. Click on the Server Name(s) to connect as a local admin.

4. Install the app(s), confirm the shortcut to this app is found in the Start Menu path.
    a. For Server 2016 and Windows 10: C:\ProgramData\Microsoft\Windows\Start Menu\Programs.
5. Go back to the Service Board Task, click Browse and choose either the shortcut or a folder containing shortcuts.
6. Whichever you select is what will be displayed on the end user desktop when assigned the app.
7. Folders are great when an app is actually multiple applications. e.g “Microsoft Office” is easier to deploy as a folder with each app as a shortcut inside the folder.
8. Click Complete Installation.
9. If required, open the created Icon Add Service Board Task and confirm the icon has been added.

Automate application installation

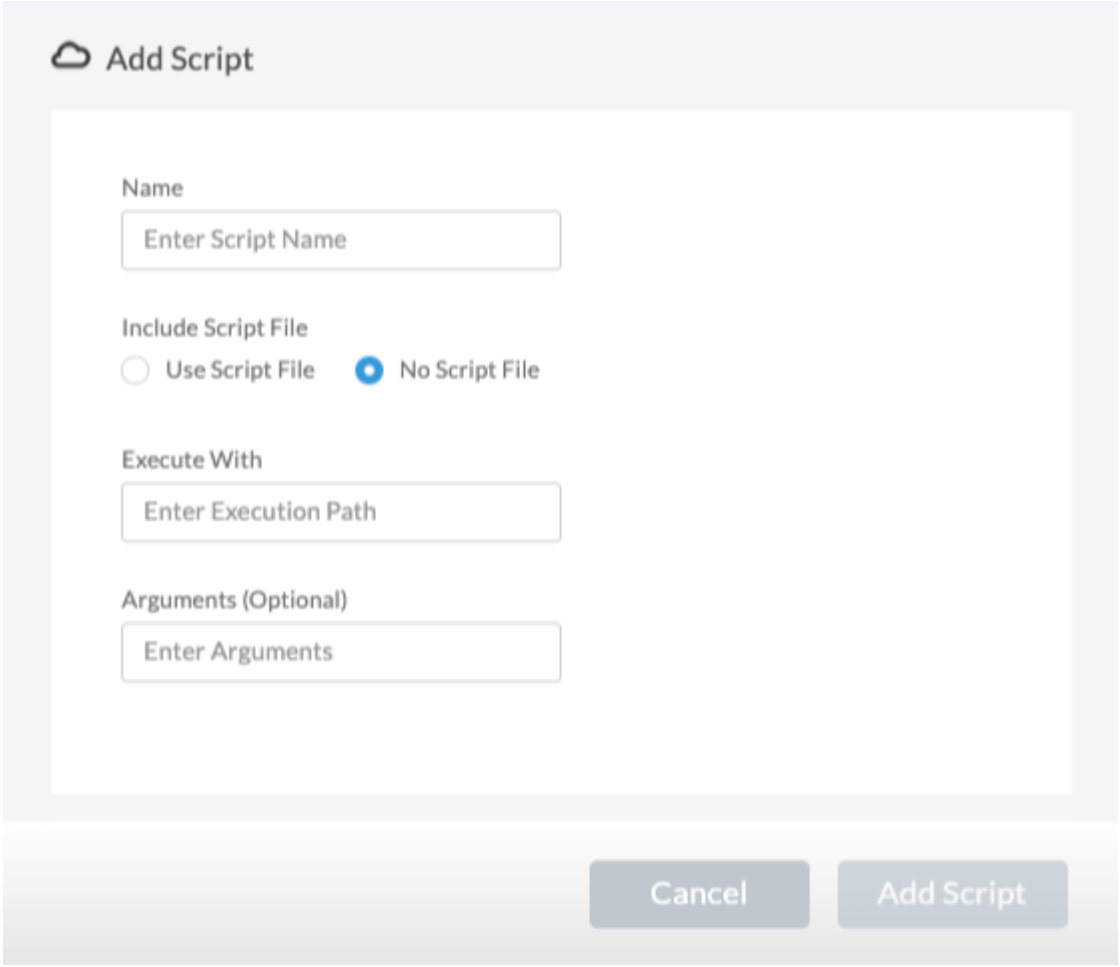
For reoccurring tasks or to perform the task across many hosts, the Scripted Events functionality in VDS can be used to fully automate installs. This automation can be performed with any number of scripting technologies, in this example we’ll use Chocolatey.

First, any host where you’ll automate installs will need Chocolatey pre-installed, this can be added to the VM image or automated as shown below.

To automate the install of Chocolatey, follow these steps

1. Installing Chocolatey is the first step, this utility can then be used to automate app installs. To do so, you’ll build a scripted event that executes Powershell.exe with the following arguments:
   ```
   Set-ExecutionPolicy Bypass -Scope Process -Force; iex New-Object System.Net.WebClient).DownloadString(‘https://chocolatey.org/install.ps1’))
   ```
2. Once the script is built it can be triggered in a variety of ways. The simplest is to manually run it but there are other options such as running this at *server create*.

Once the host(s) has Chocolatey, autoamte with Scripted events can install a wide variety of applications from the Chocolatey repository. A complete list of available applications can be foudn at https://chocolatey.org/packages



To automate the install of an applications, follow these steps (using 7-Zip as an example)

1. Navigate to Scripted Events > Script Repository > Add
2. Select `No Script File`
3. Execute With: `c:\programdata\chocolatey\choco.exe`
4. Arguments (Optional): *leave blank*
5. Once the Script is saved, the next step is to associate that script with a Trigger. Navigate to Scripted Events > Activities > Add
   a. Enter a name for the activity (e.g. *choco install 7-Zip*)

      Develop a consistent naming convention as the library of Scripts can get large

   b. Optionally give a description
   c. Select the script created in the previous section
   d. In *Enter Arguments (Optional):* enter `install 7zip -y -f` (which is found here: https://chocolatey.org/packages/7zip)
      i. `-y` is required to unattended installs
      ii. `-f` forces the install, even if the app was previously installed and is optional

e. Select the deployment

f. Check the enable checkbox

g. under *Trigger On* select *Application install*

h. Click *Add Application*

i. Select the application name (e.g. *7-Zip File Manager*)

j. Enter the shortcut path for the application icon (e.g. \\shortcuts\7-Zip File Manager.lnk)

You'll need to know the shortcut path during this creation wizard. This can be found by looking at other installs of the app or by doing a manual install on the machine and browsing to it from the service board entry.

k. Click Update > Add Activity

Going forward, the act of adding that application to the Workspace will trigger the install of that application across all session hosts.

Assign applications to users

Application entitlement is handled by VDS and application can be assigned to users in three ways

Assign Applications to Users

1. Navigate to the User Detail page.
2. Navigate to the Applications section.
3. Check the box next to all applications required by this user.

Assign users to an application

1. Navigate to the Applications section on the Workspace Detail page.
2. Click on the name of the application.
3. Check the box next to the users the application.

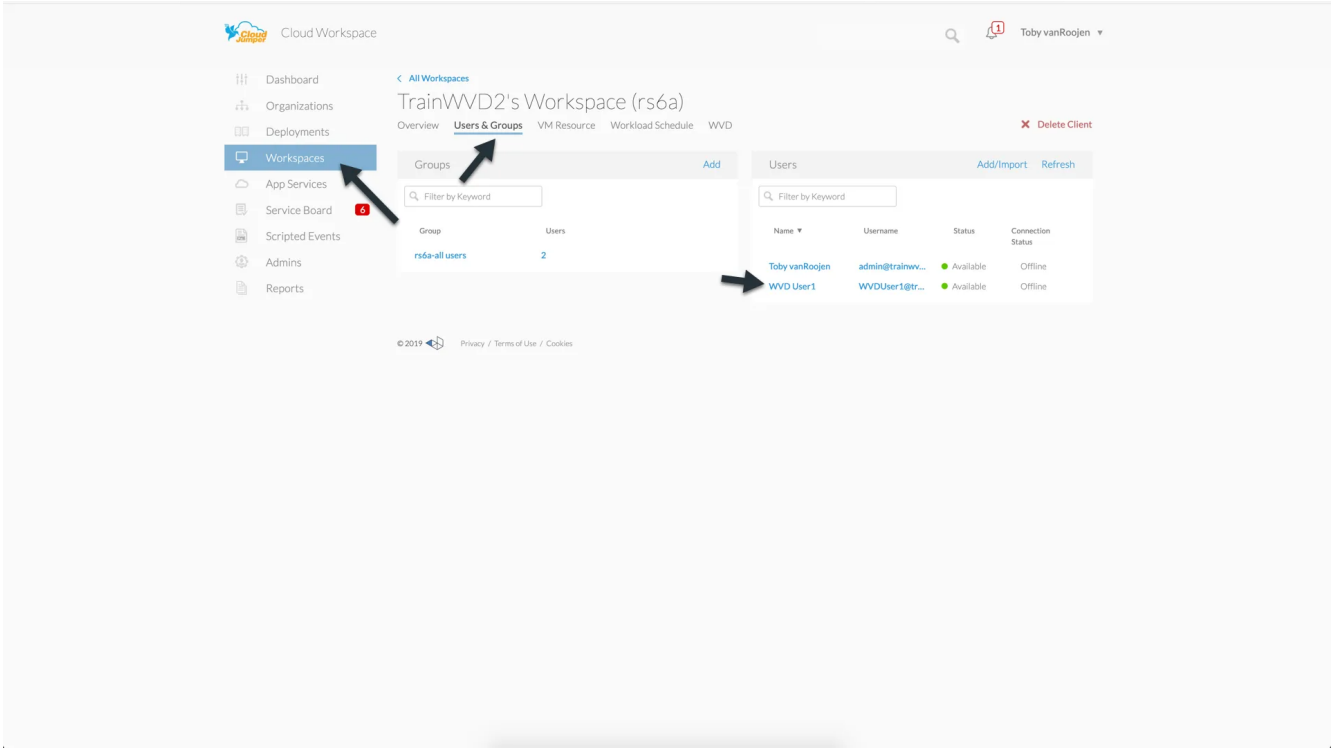
Assign applications and users to user groups

1. Navigate to the Users and Groups Detail.
2. Add a new group or edit an existing group.
3. Assign user(s) and application(s) to the group.

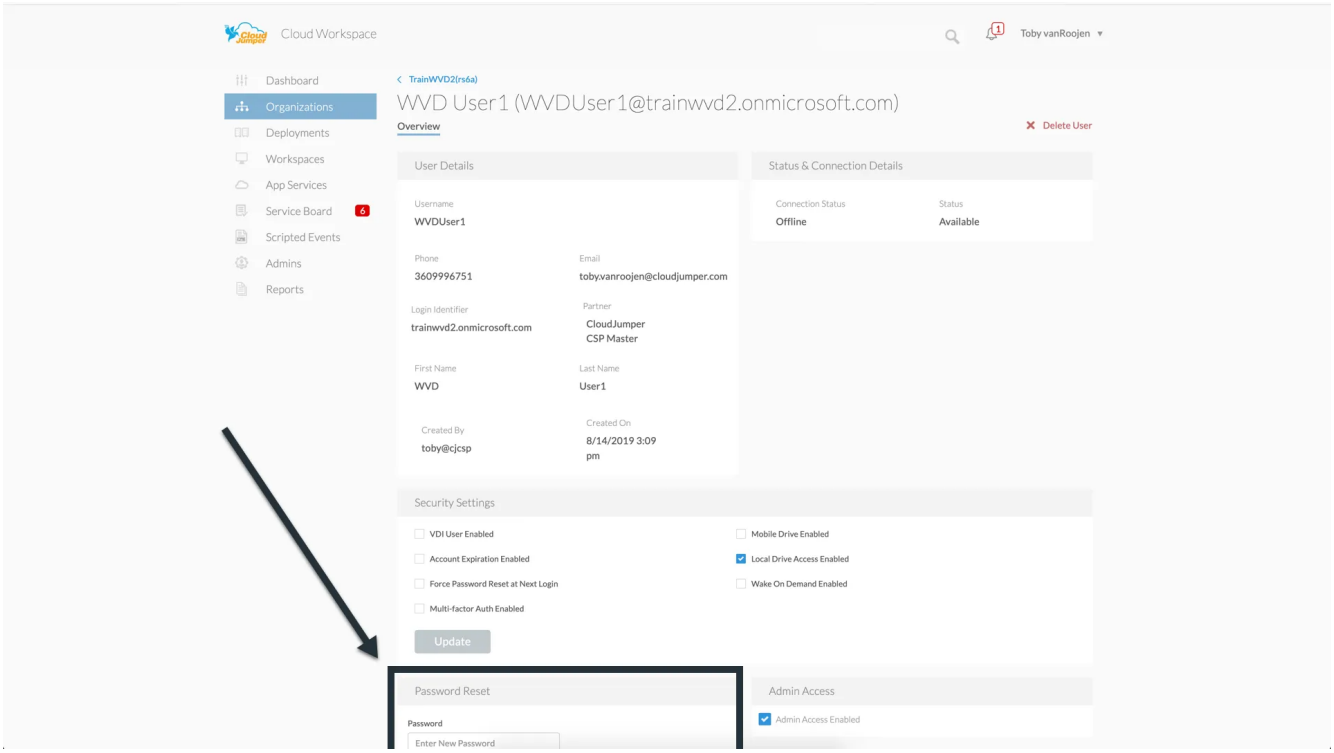
Reset User Password

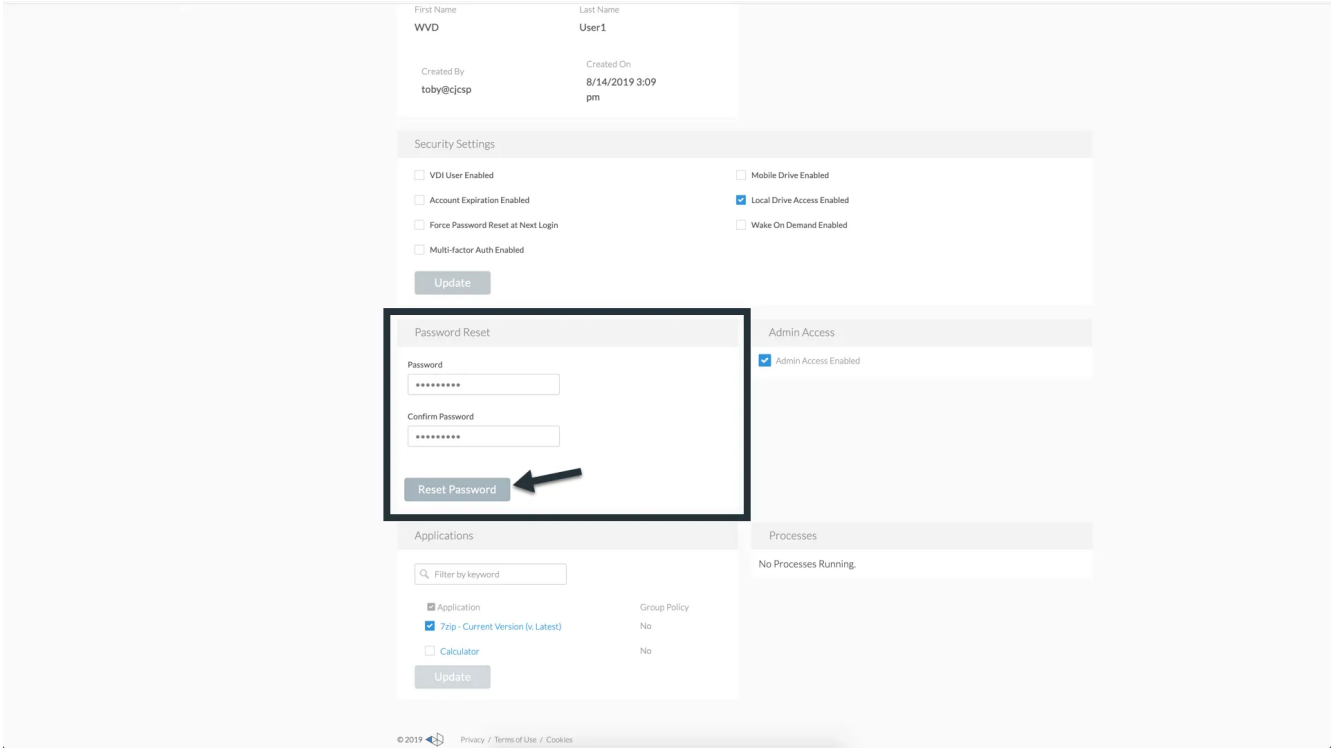
Reset user password steps

1. Navigate to the Used Detail page in VDS



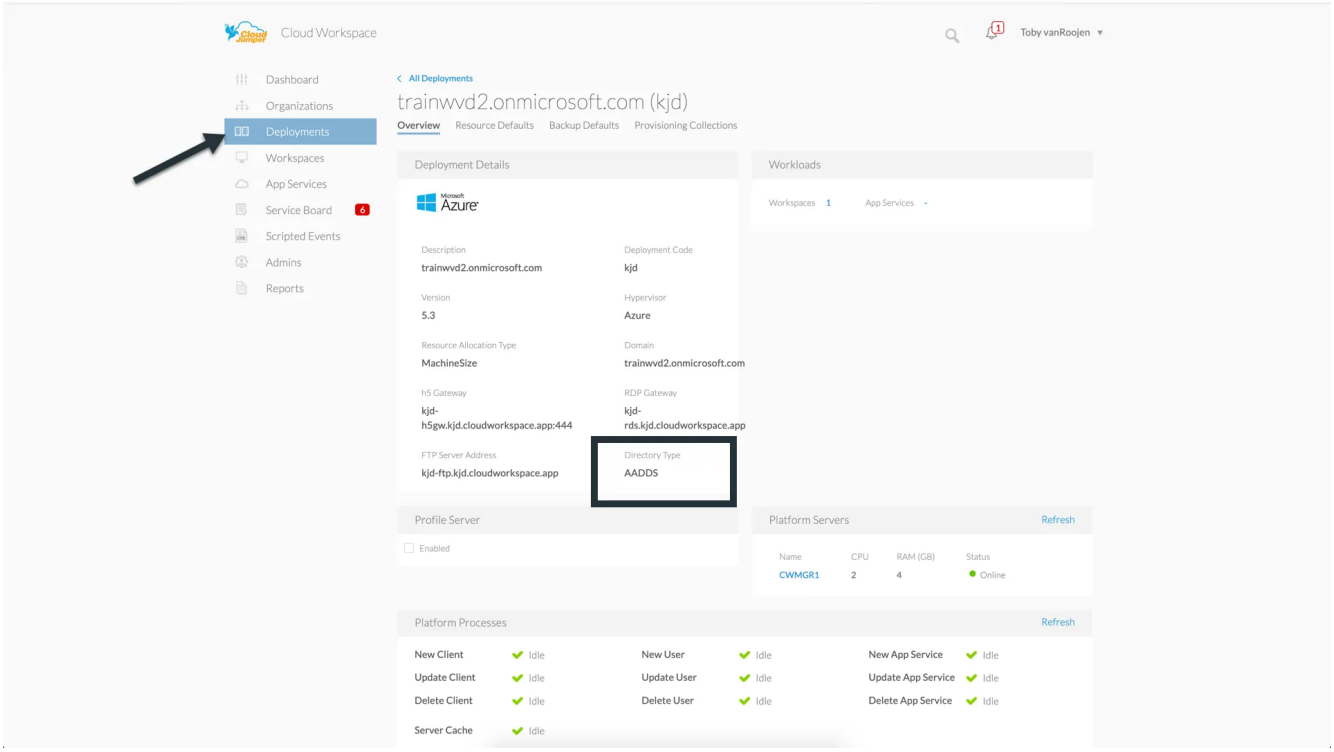
2. Find the Password Section, enter the new PW twice and click





Time to take effect

- For environments running an “Internal” AD on VMs in the environment the password change should take effect immediately.
- For environments running Azure AD Domain Services (AADDS) the password change should take about 20 minutes to take effect.
- The AD type can be determined on the Deployment Details Page:



Self service password reset (SSRP)

The NetApp VDS Windows client and the NetApp VDS web client will provide a prompt for users that enter an incorrect password when logging into a v5.2 (or later) virtual desktop deployment. In the event that the user has locked their account, this process will unlock a user's account as well.

Note: users must have already entered a mobile phone number or an email address for this process to work.

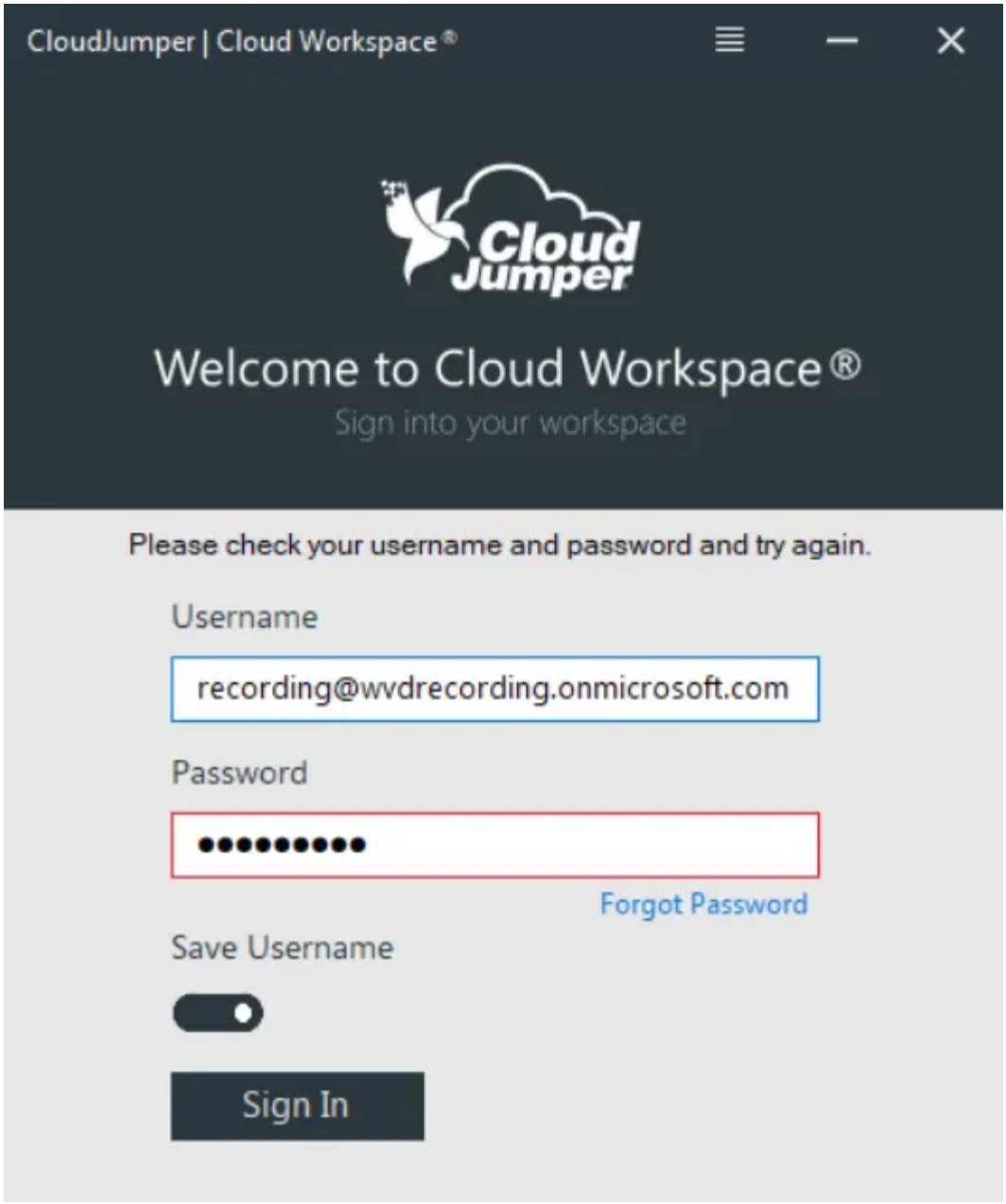
SSPR is supported with:

- NetApp VDS Window Client
- NetApp VDS Web Client

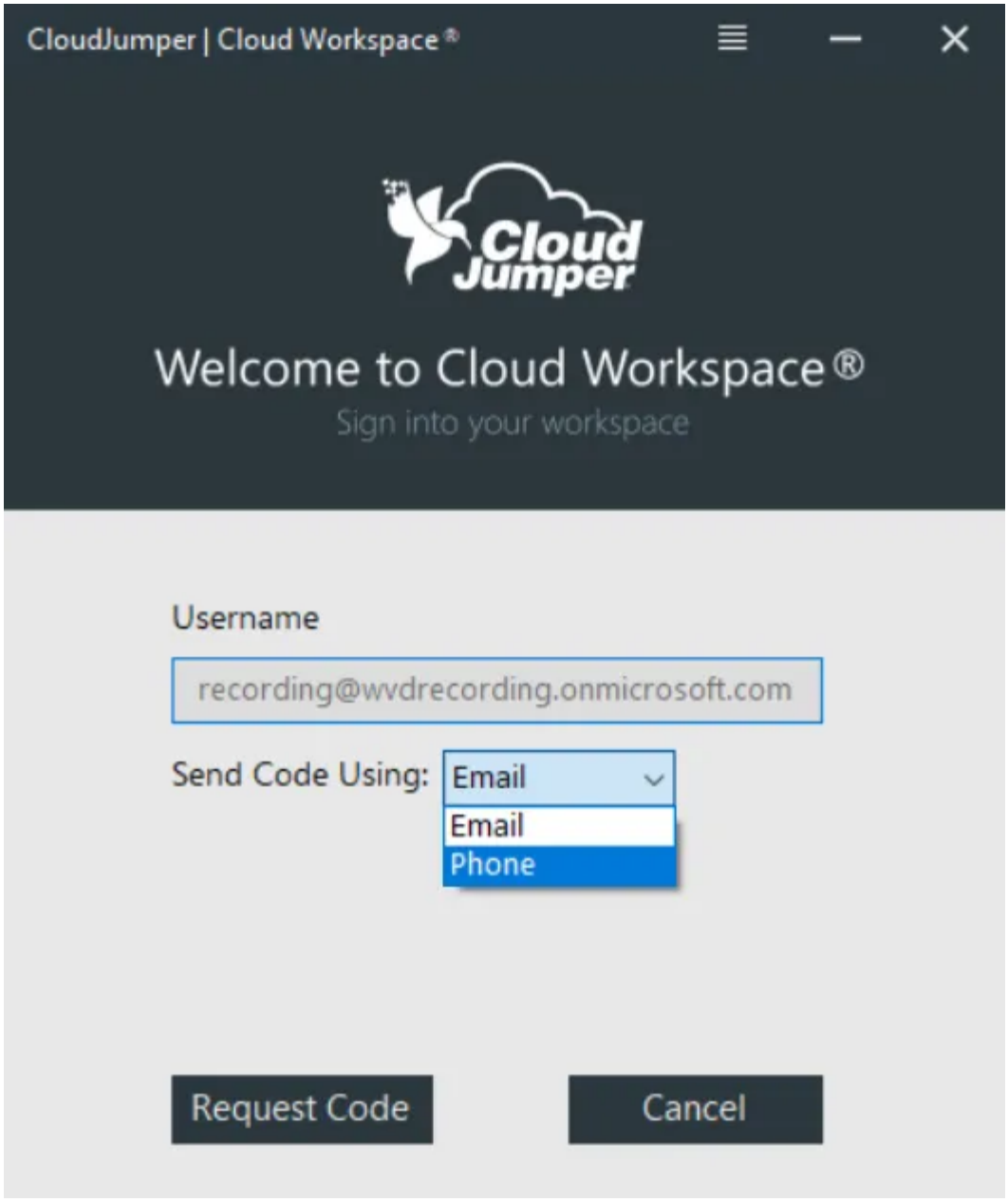
In this set of instructions, you will walk through the process of using SSPR as a simple means to enable users to reset their passwords and unlock their accounts.

NetApp VDS Windows client

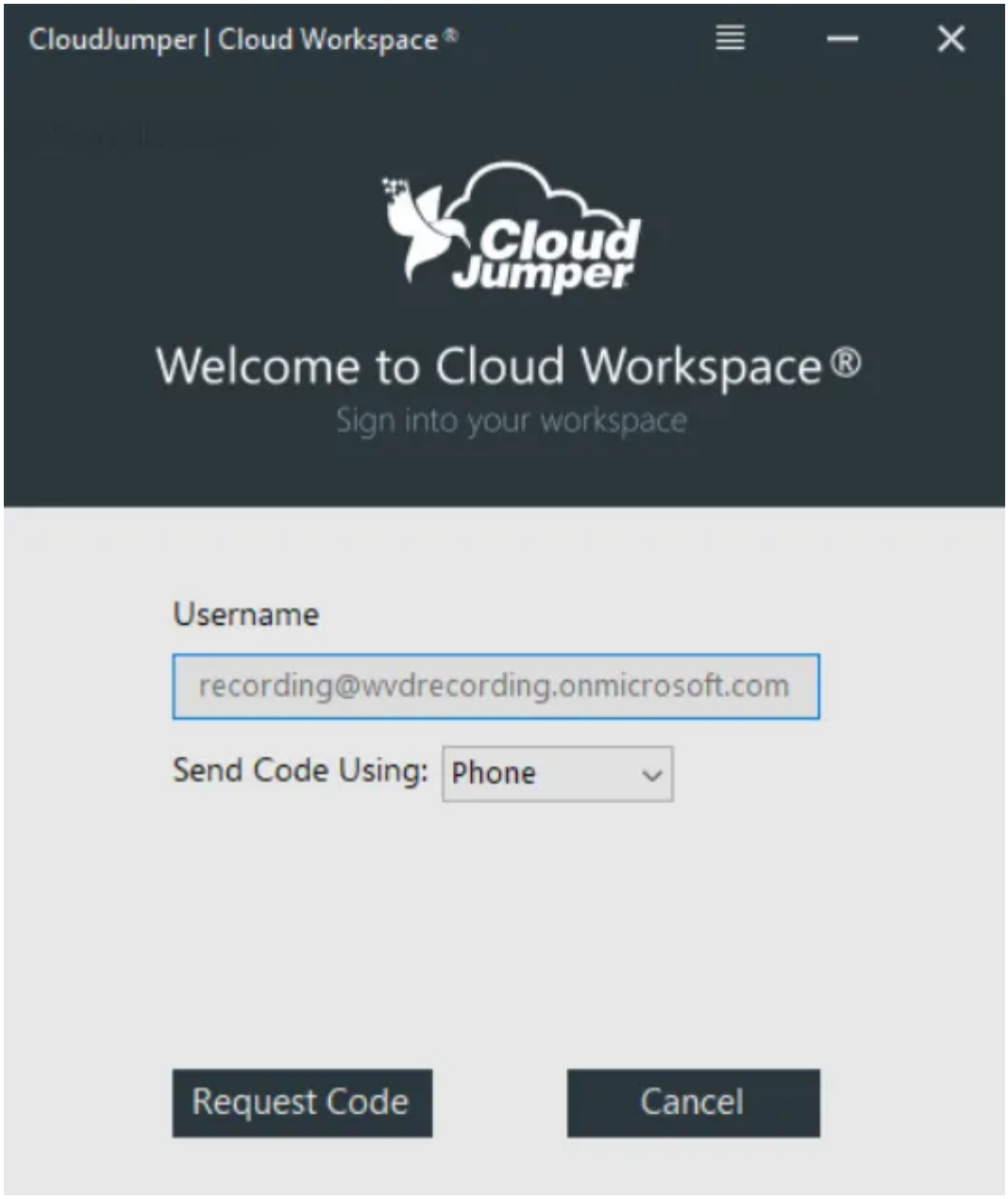
1. As an end user, click the Forgot Password link to continue.



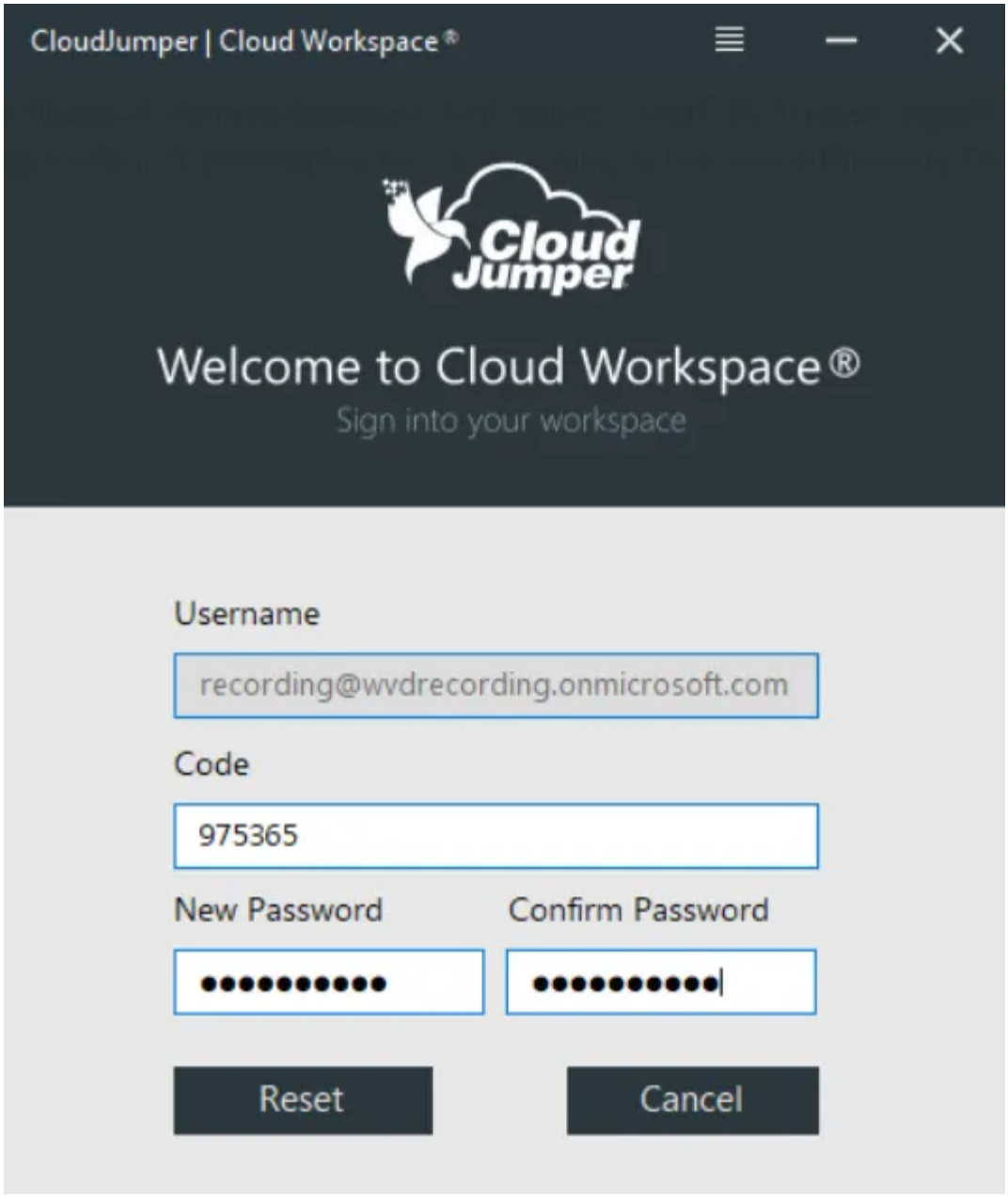
2. Select whether to receive your code via your mobile phone or via email.



3. If an end user has only provided one of those contact methods, that will be the only method displayed.

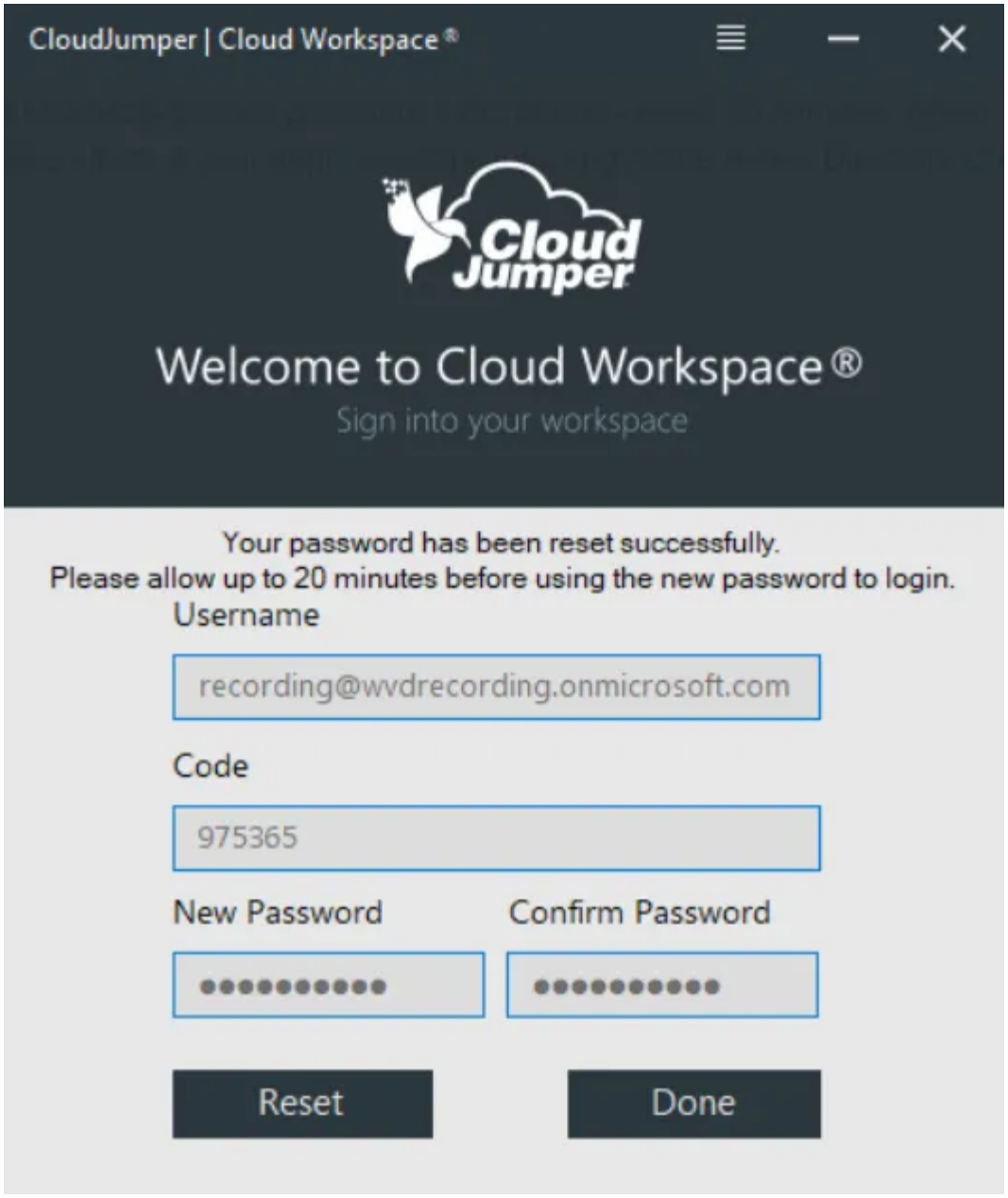


4. After this step, users will be presented with a Code field where they should enter the numeric value received either on their mobile device or in their inbox (depending which was selected). Enter that code followed by the new password and click Reset to proceed.



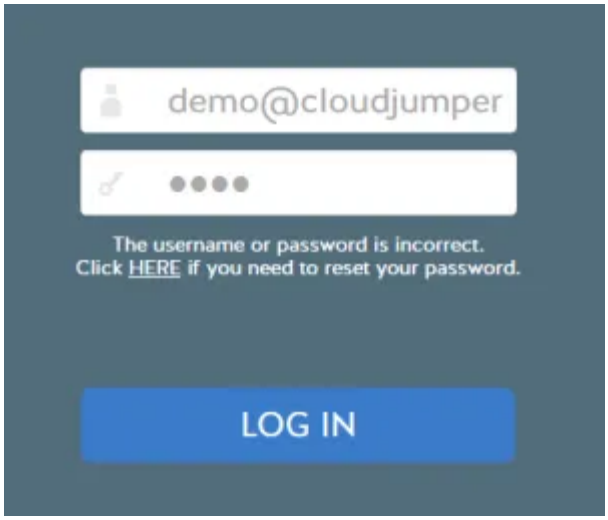
5. Users will see a prompt informing them that their password reset has been completed successfully – click Done to proceed to complete the logon process.

> If your deployment is using Azure Active Directory Domain Services, there is a Microsoft-defined password sync period – every 20 minutes. Again, this is controlled by Microsoft and cannot be changed. With this in mind, VDS displays that the user should wait for up to 20 minutes for their new password to take effect. If your deployment is not using Azure Active Directory Domain Services, the user will be able to log in again in seconds.

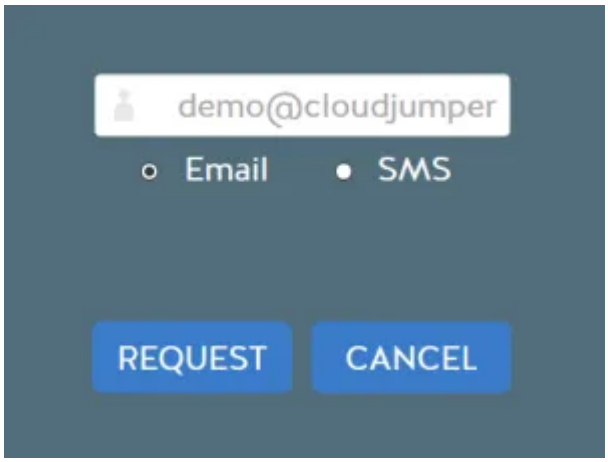


HTML5 portal

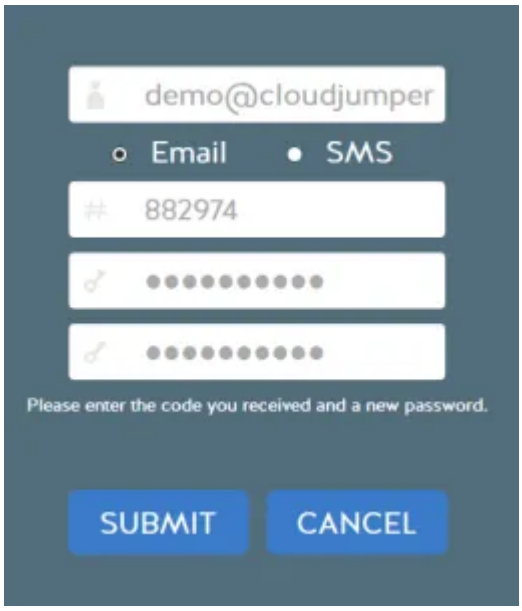
1. If the user fails to enter the correct password when attempting to login through the HTML5, they will now be presented with an option to reset the password:



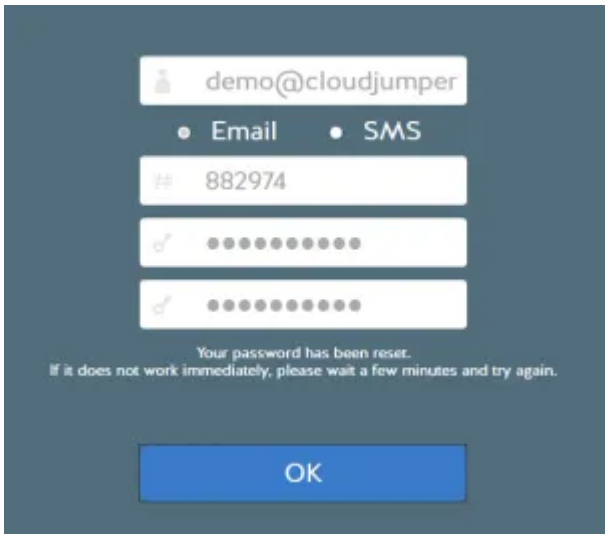
2. After clicking on the option to reset their password, they will be presented with their reset options:



3. The ‘Request’ button will send a generated code to the option selected (in this case the user’s email). The code is valid for 15 minutes.



4. The password has now been reset! It is important to remember that Windows Active Directory will often need a moment to propagate the change so if the new password does not work immediately, just wait a few minutes and try again. This is particularly relevant for users residing in an Azure Active Directory Domain Services deployment, where a password reset could take up to 20 minutes to propagate.



Enabling self service password reset (SSPR) for users

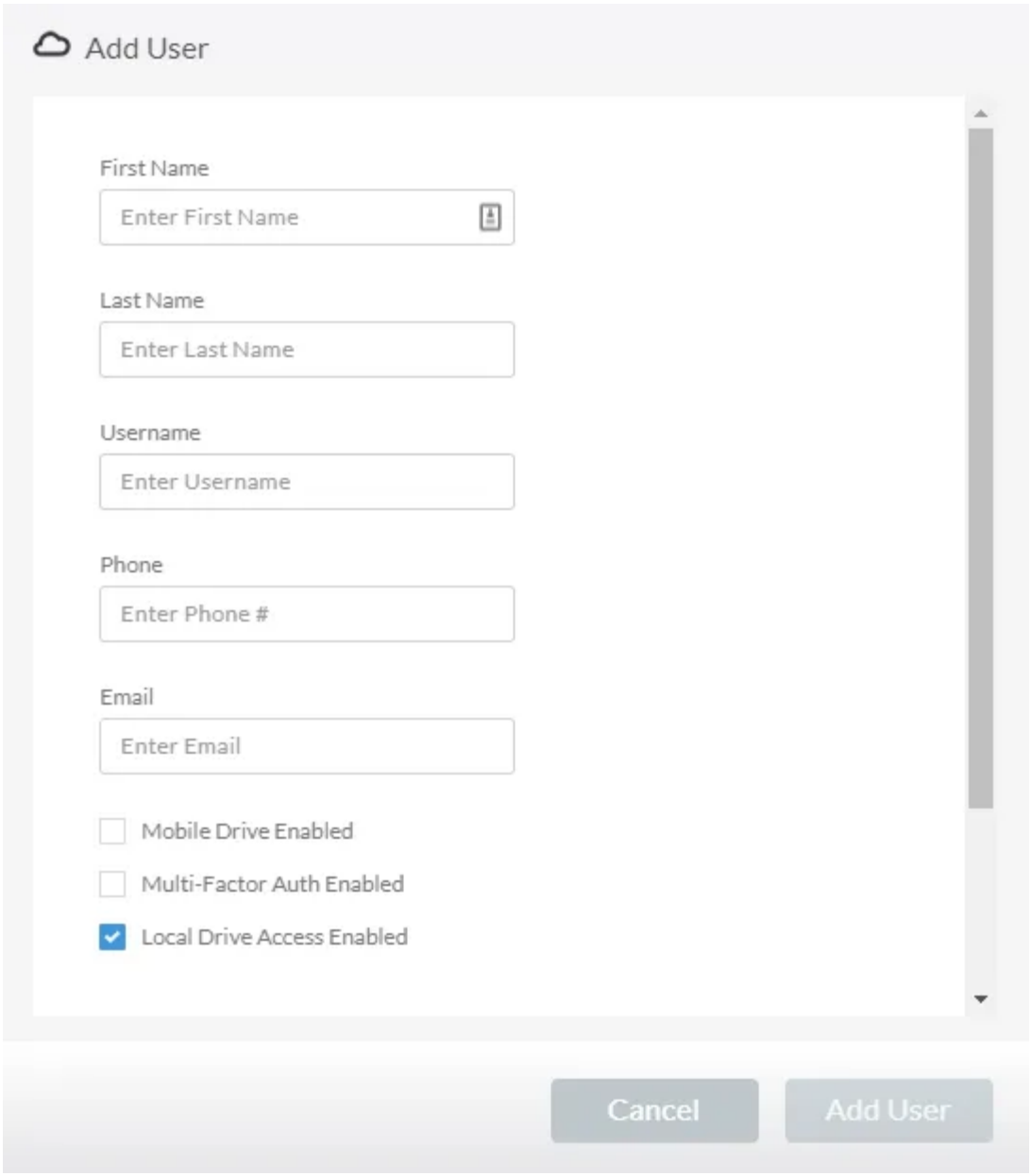
To use Self Service Password Reset (SSPR), administrators must first enter a mobile phone number and/or an email account for an end user There are two ways to enter a mobile number and email addresses for a virtual desktop user as detailed below.

In this set of instructions, you will walk through the process of configuring SSPR as a simple means for end users to reset their passwords.

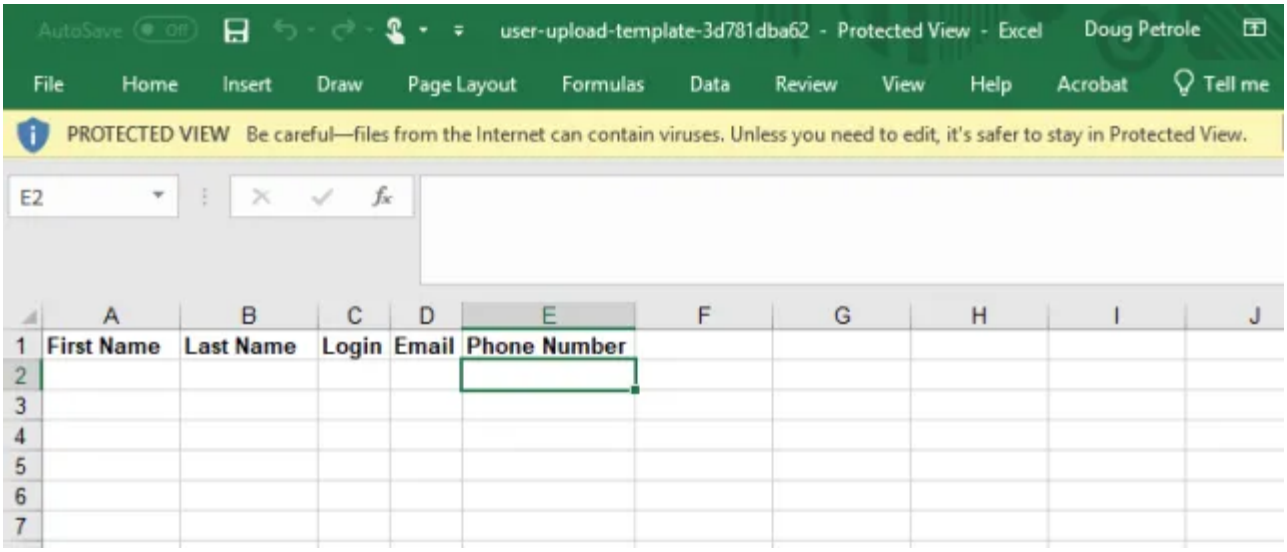
Bulk importing users via VDS

Start by navigating to the Workspaces module, then Users & Groups and then clicking Add/Import.

You can enter these values for users when creating them one by one:



Or you can include these when bulk-importing users downloading and uploading the preconfigured Excel XLSX file in with this content filled out:



Supplying the data via the VDS API

NetApp VDS API – specifically this call https://api.cloudworkspace.com/5.4/swagger/ui/index#!/User/User_PutUser – provides the ability to update this information.

Updating existing user phone

Update the users' phone number on the User Detail Overview page in VDS.

Using other consoles

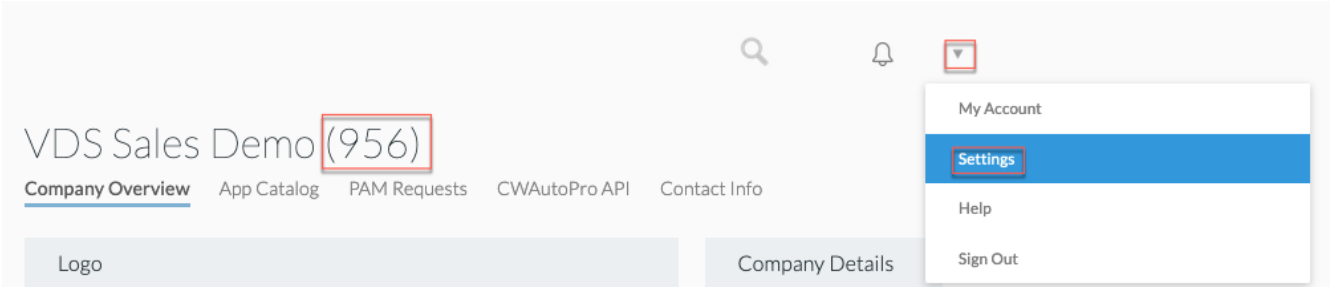
Note: you currently cannot provide a phone number for a user via the Azure Console, Partner Center or from the Office 365 Admin console.

Customize SSPR sending address

NetApp VDS can be configured to send the confirmation email *from* a custom address. This is a service provided to our service provider partners who wish for their end users to receive the reset password email to be sent from their own customized email domain.

This customization requires some additional steps to verify the sending address. To start this process, please open a support case with VDS support requesting a custom "Self Service Password Reset Source Address". Please define the following:

- Your partner code (this can be found by clicking on *settings* under the upper-right down arrow menu. See screenshot below)



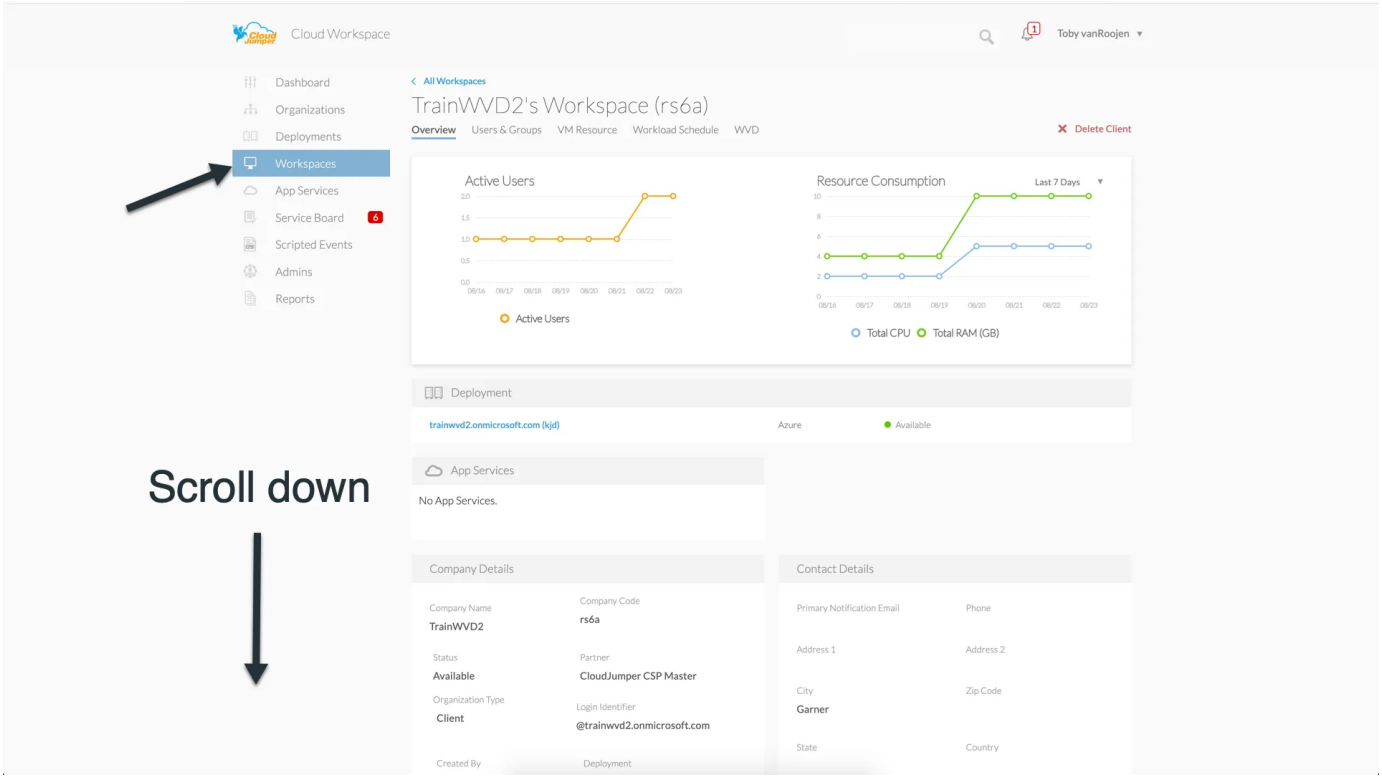
- Desired "from" address (which must be valid)
- To which clients the setting should apply (or all)

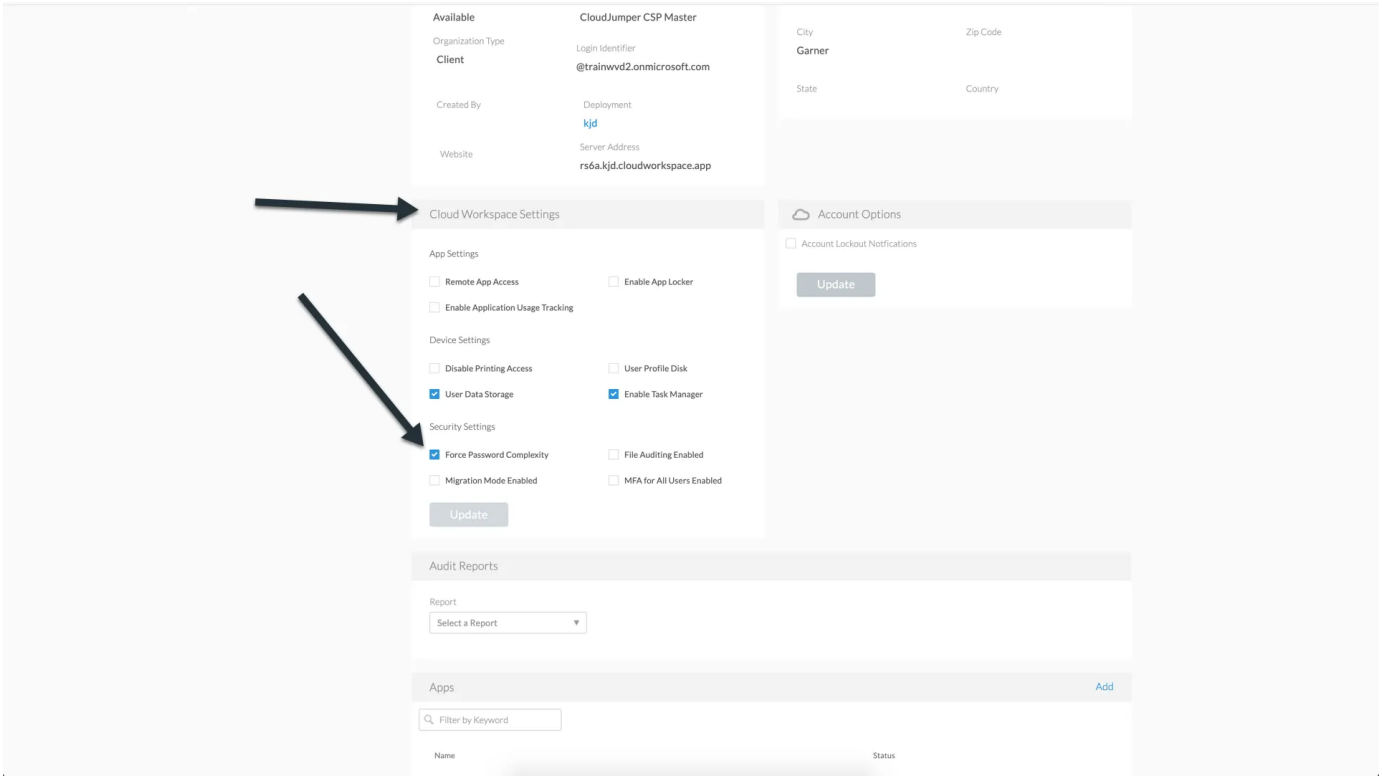
Opening a support case can be done by emailing: VDSsupport@netapp.com

Once received, VDS support will work to validate the address with our SMTP service and activate this setting. Ideally you'll have the ability to update public DNS records on the source address domain to maximize email deliverability.

Password complexity

VDS can be configured to enforce password complexity. The setting for this is on the Workspace Detail Page in the Cloud Workspace Settings section.





Password complexity: Off

Policy	Guideline
Minimum Password Length	8 characters
Maximum Password Age	110 days

Policy	Guideline
Minimum Password Age	0 days
Enforce Password History	24 passwords remembered
Password Lock	Automatically lockout will occur after 5 incorrect entries
Lock Duration	30 minutes

Password complexity: On

Policy	Guideline
Minimum Password Length	8 characters Not contain the user's account name or parts of the user's full name that exceed two consecutive characters Contain characters from three of the following four categories: English uppercase characters (A through Z) English lowercase characters (a through z) Base 10 digits (0 through 9) Non-alphabetic characters (for example, !, $, #, %) Complexity requirements are enforced when passwords are changed or created.
Maximum Password Age	110 days
Minimum Password Age	0 days
Enforce Password History	24 passwords remembered
Password Lock	Automatically lock will occur after 5 incorrect entries
Lock Duration	Remains locked until administrator unlocks

Multi-Factor Authentication (MFA)

Overview

NetApp Virtual Desktop Service (VDS) includes an SMS/Email based MFA service at no additional charge. This service is independent of any other services (e.g. Azure Conditional Access) and can be used to secure administrator logins to VDS and user logins to virtual desktops.

MFA basics

- VDS MFA can be assigned to admin users, individual end users or applied to all end users
- VDS MFA can send SMS or Email notifications
- VDS MFA has a self-service initial setup and reset function

Guide scope

This guide walks you thru the setup of MFA along with an illustration of the end user experience

This guide covers the following subjects:

1. Enabling MFA for Individual Users
2. Requiring MFA for All Users
3. Enabling MFA for Individual Administrators
4. End User Initial Setup

Enabling MFA for individual users

MFA can be enabled for individual users on the user detail page by clicking *Multi-factor Auth Enabled*

Workspaces > Workspace Name > Users & Groups > User Name > Multi-factor Auth Enabled > Update

MFA can also be assigned to all users, if this setting is in place, the checkbox will be checked and *(via Client Settings)* will be appended to the checkbox label.

Requiring MFA for all users

MFA can be enabled and enforced across all users on the workspace detail page by clicking *MFA for All Users Enabled*

Workspaces > Workspace Name > MFA for All Users Enabled >Update

Enabling MFA for individual administrators

MFA is also available for administrator accounts accessing the VDS portal. This can be enabled per administrator on the admin detail page.
Admins > Admin Name > Multi-Factor Auth Required > Update

Initial setup

On the first login after enabling MFA, the user or admin will be prompted to enter an email address or mobile phone number. They'll receive a confirmation code to enter and confirm successful enrollment.

System Administration

Create a Domain Admin ("Level 3") Account

Overview

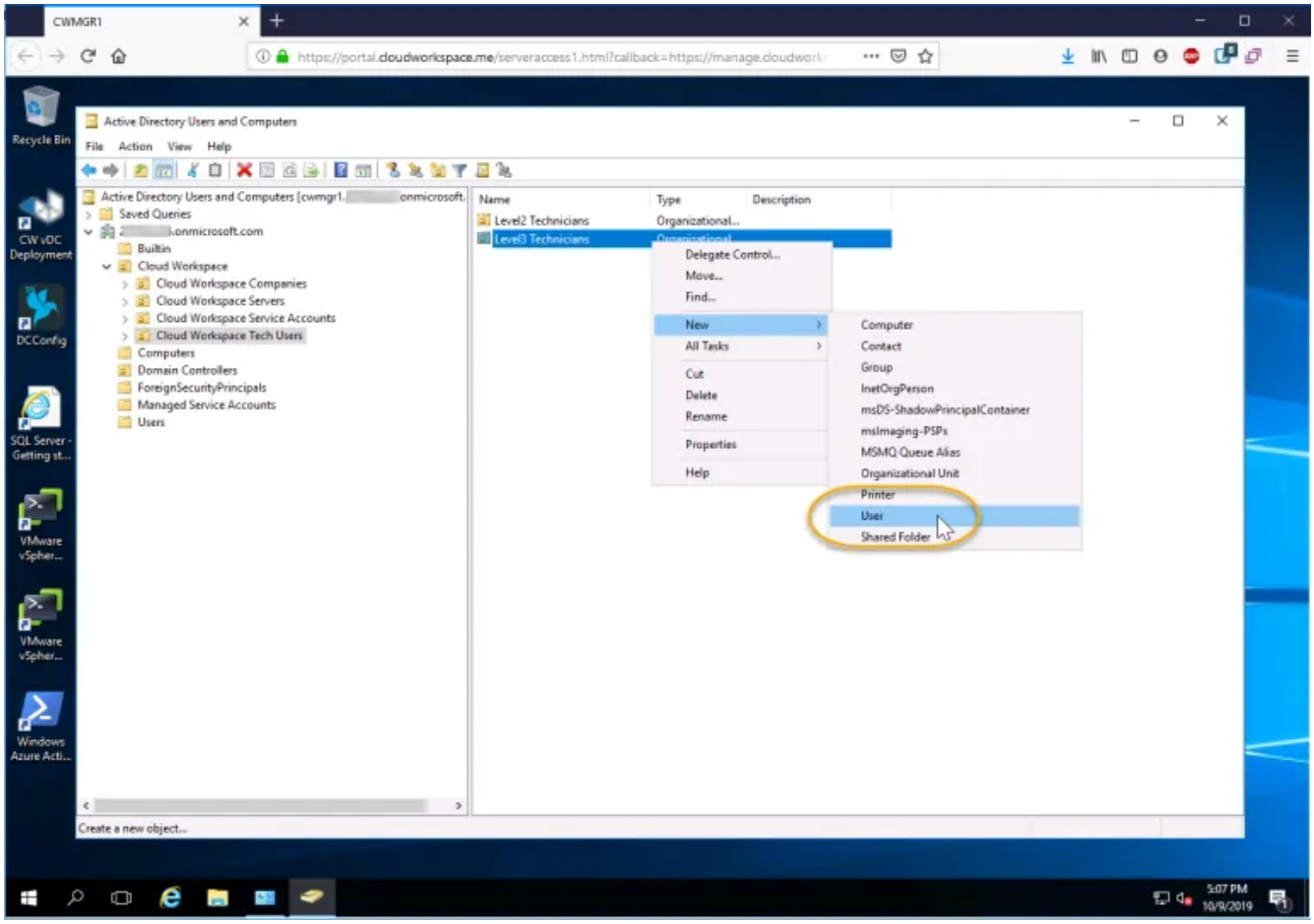
Occasionally VDS administrators will need domain-level credentials to manage the environment. In VDS these are called "Level 3" or ".tech" account.

These instructions show how these accounts can be created with the appropriate permissions.

Traditional domain controller

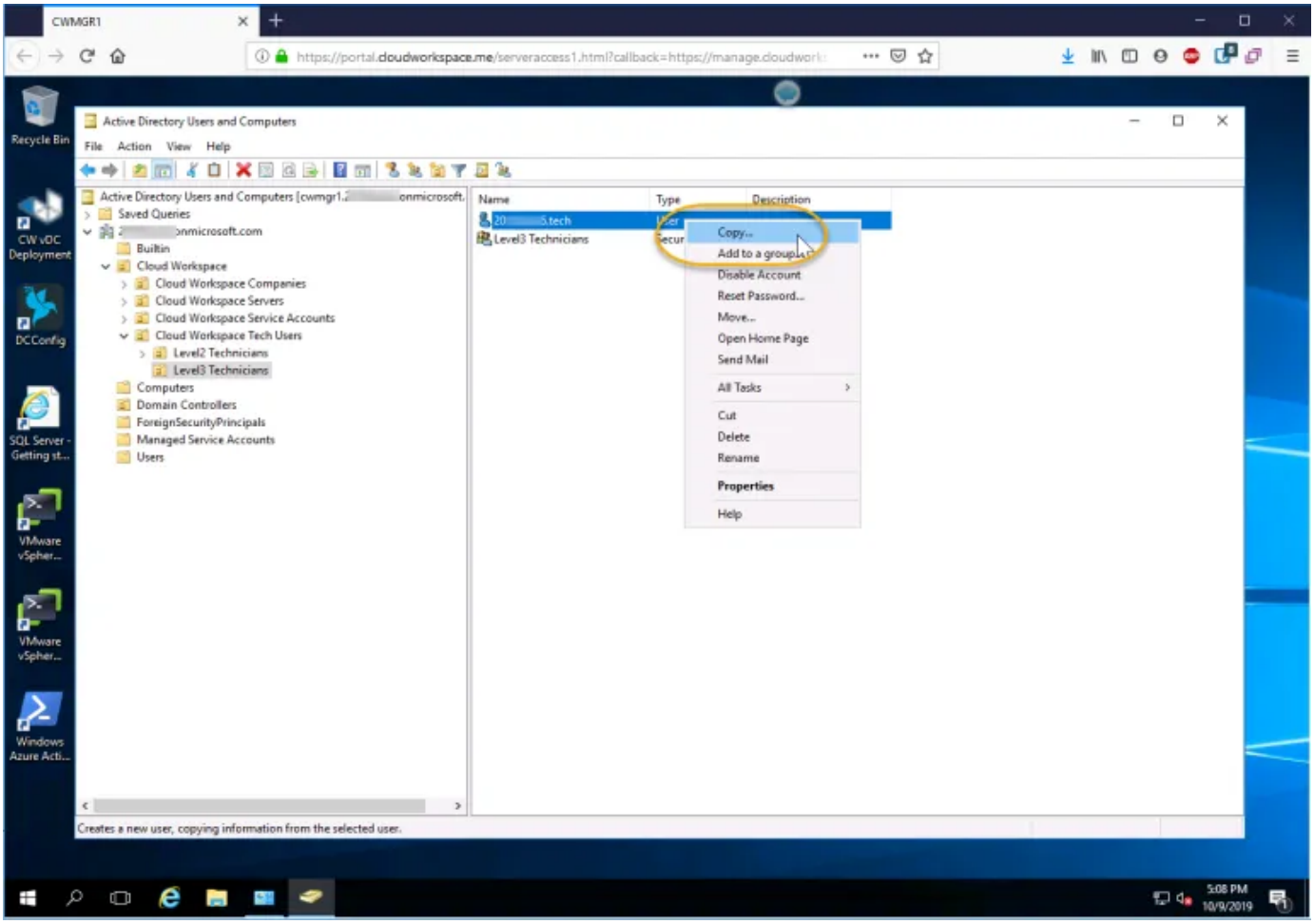
When running an internally hosted Domain Controller (or a local DC linked to Azure via a VPN/Express Route) managing .tech accounts can be done directly in Active Directory Manager.

1. Connect to the Domain Controller (CWMGR1, DC01 or the existing VM) with a domain admin (.tech) account.
2. Open Active Directory Users and Computers, Navigate to Cloud Workspace > Cloud Workspace Tech Users. Right click on the Level3 Technicians entry and select New > User.



3. Alternatively you can select an existing .tech account inside of the Level3 Technician directory and copy it to create a new user.

> Adding “.tech” to the end of the username is a recommended best practice to help delineate admin accounts from end user accounts.



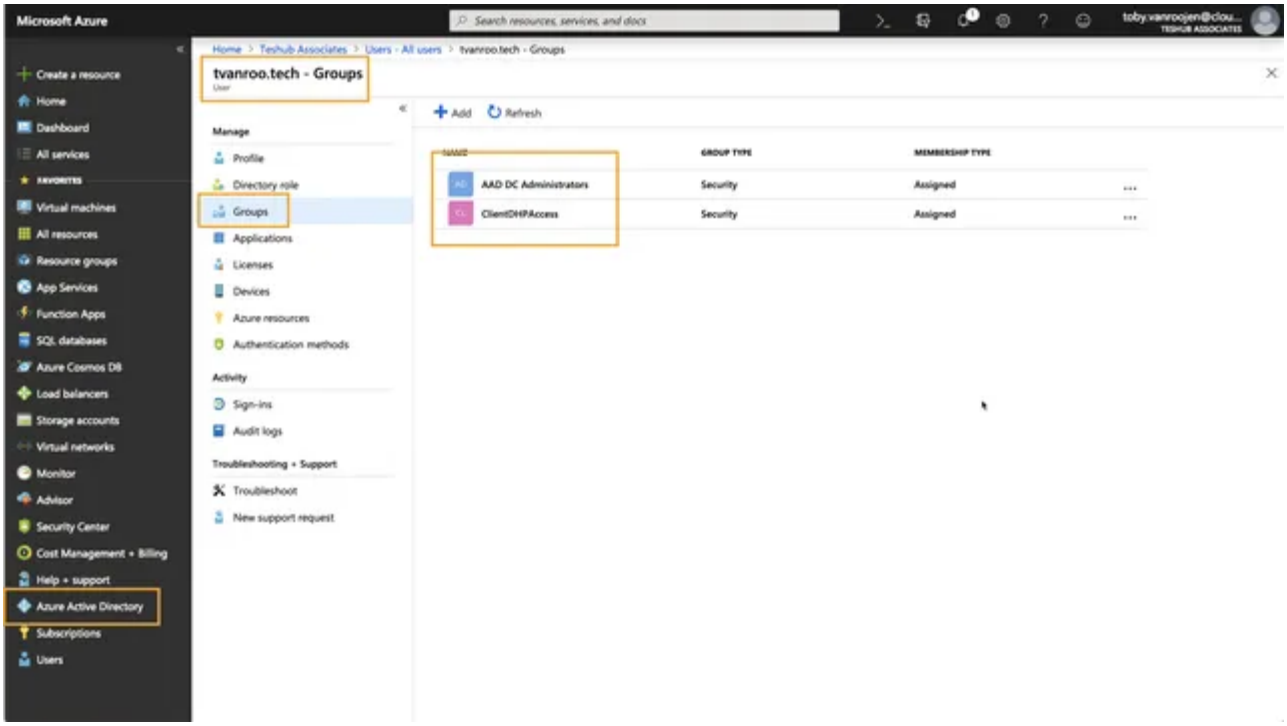
Azure AD Domain Services

If running in Azure AD Domain Services or managing user in Azure AD, these accounts can be managed (i.e. password change) in the Azure Management Portal as a normal Azure AD user.

New accounts can be created, adding them to these roles should give them the permissions required:

1. AAD DC Administrators
2. ClientDHPAccess
3. Global Admin in the directory.

Adding ".tech" to the end of the username is a recommended best practice to help delineate admin accounts from end user accounts.



Providing Temporary Access to 3rd Parties

Overview

Providing access to 3rd parties is a common practice when migrating to any cloud solution.

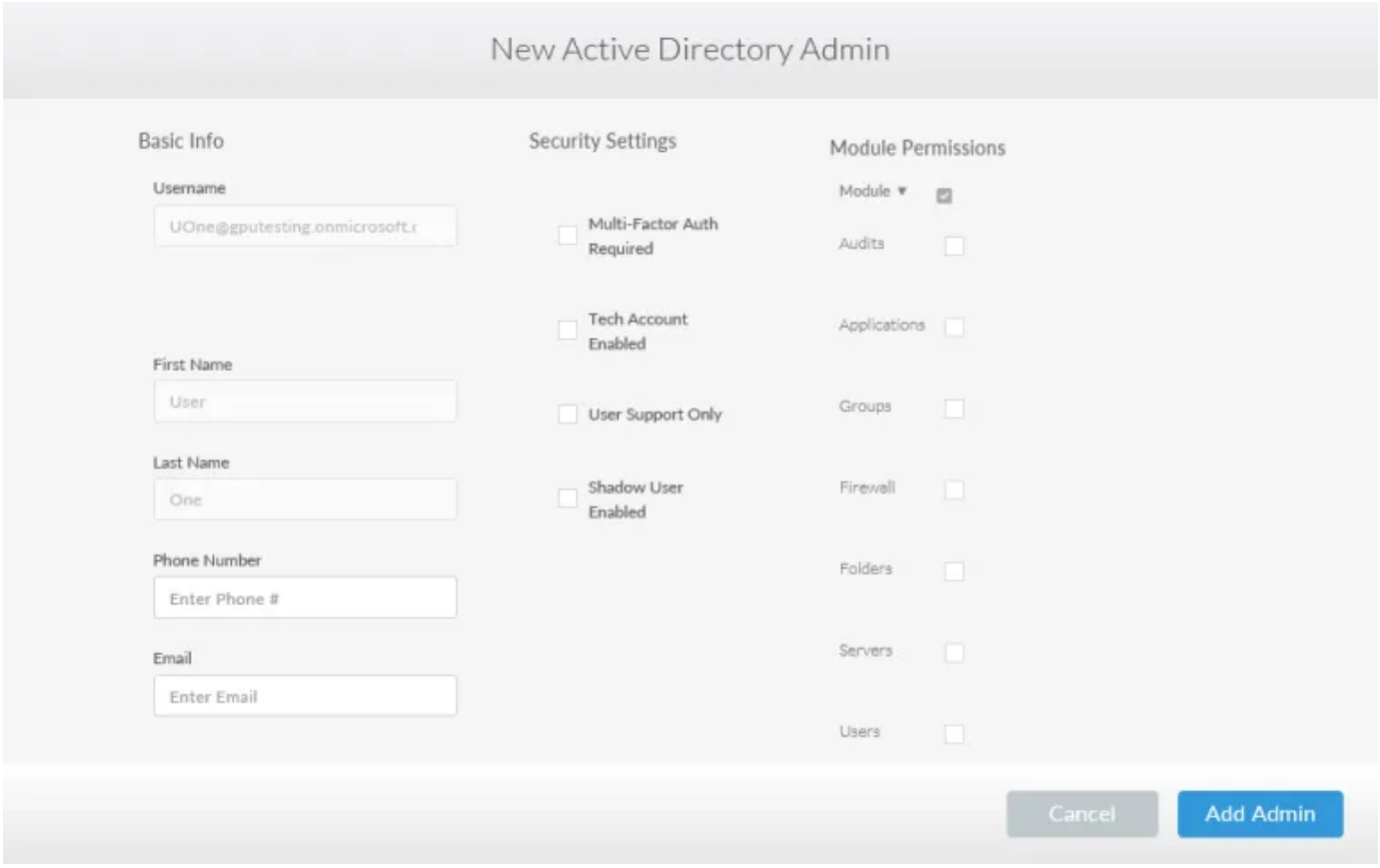
VDS Admins often elect to not give these 3rd parties the same level of access that they have, to follow a “least required” security access policy.

To set up admin access for 3rd parties, log into VDS and navigate to the Organizations module, click into the organization and click Users & Groups.

Next, create a new User account for the 3rd party and scroll down until you see the Admin Access section and check the box to enable admin rights.

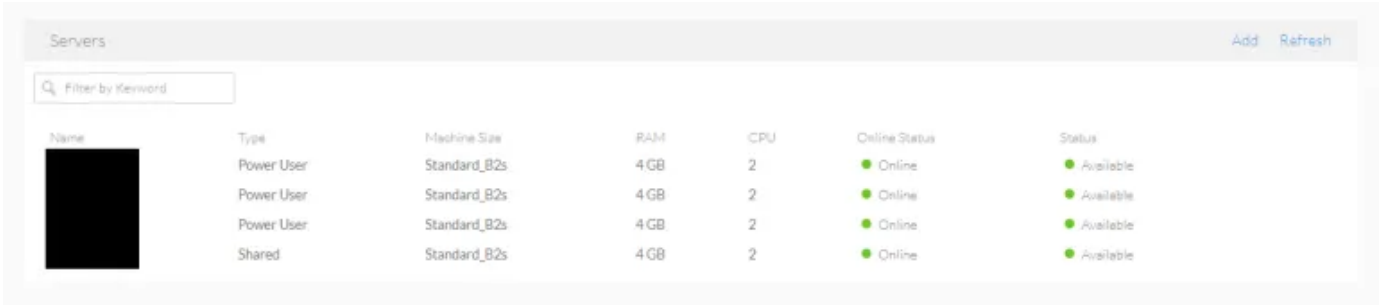
The VDS Admin is then presented with the Admin Access setup screen. There is no need to change user’s name, login or password – just add phone number and/or email if you want to enforce Multi-Factor Authentication and select the level of access to grant.

For database administrators like a VAR or ISV, *Servers* is commonly the only access module required.



Once saved, the End User gains access to self-management functions by logging into VDS with their standard Virtual Desktop user credentials.

When the newly created User logs in, they will only see the modules you have assigned to them. They can select the organization, scroll down to the Servers section and connect to the server name you tell them to (say, <XYZ>D1, where XYZ is your company code and D1 designates that the server is a Data server. In the example below, we would tell them to connect to the TSD1 server to perform their assignments.



Configure Backup Schedule

Overview

VDS has the ability to configure and manage native backup services in some infrastructure providers

including Azure.

Azure

In Azure, VDS can automatically configure backups using native Azure Cloud Backup with locally redundant storage (LRS). Geo-redundant storage (GRS) can be configured in the Azure Management Portal if needed.

- Individual backup policies can be defined for each Server Type (with default recommendations). Additionally, individual machines can be assigned a schedule independent (from their server type) from within the VDS UI, this setting can be applied by navigating to the Server Detail View by clicking on the Server name on the Workspace page (See Video Below: Setting Individual Backup Policies)
  - Data
    - Backup with 7 daily, 5 weekly & 2 monthly backups. Increase retention periods based on business requirements.
    - This is true for both a dedicated Data server and for add-on VPS VMs for Apps and Databases.
  - Infrastructure
    - CWMGR1 – Backup Daily and keep 7 daily, 5 weekly, 2 monthly.
    - RDS Gateway – Backup weekly and keep 4 weekly.
    - HTML5 Gateway – Backup weekly and keep 4 weekly.
  - PowerUser (aka VDI User)
    - Don’t backup the VM as data should be stored on a D1 or TSD1 server.
    - Be aware that some applications do store data locally and special considerations should be taken if this is the case.
    - In the event of a VM failure, a new VM can be built via Cloning another. In the event there is only one VDI VM (or one unique VM build) it it advisable to back it up so that a complete rebuild of that VM is not required.
    - If needed, rather than backing up all VDI servers, costs can be minimized by manually configuring a single VM to backup directly in the Azure Management portal.
  - TS
    - Don’t backup the VM as data should be stored on a D1 or TSD1 server.
    - Be aware that some applications do store data locally and special considerations should be taken if this is the case.
    - In the event of a VM failure, a new VM can be built via Cloning another. In the event there is only one TS VM it it advisable to back it up so that a complete rebuild of that VM is not required.
    - If needed, rather than backing up all TS servers, costs can be minimized by manually

configuring a single VM to backup directly in the Azure Management portal.

    - TSData
        - Backup with 7 daily, 5 weekly & 2 monthly backups. Increase retention periods based on business requirements.

- Policies can be set to take backups daily or weekly, Azure does not support more frequent schedules.
- For daily schedules, enter the preferred time to take the backup. For weekly schedules, enter the preferred day and time to take the backup. Note: Setting the time to exactly 12:00 am can cause issues in Azure Backup so 12:01 am is recommended.
- Define how many daily, weekly, monthly and yearly backups should be retained.

Setting deployment defaults

In order to setup Azure backup for the entire deployment, follow these steps:

1. Navigate to the Deployments detail page, select Backup Defaults
2. Select a server type from the drop-down menu. The server types are:

```
Data: these are for LOB/database server types
Infrastructure: these are platform servers
Power User: these are for Users with a TS server dedicated solely to them
TS: these are terminal servers that Users launch sessions on
TSData: these are servers doubling as terminal and data servers.
```

- This will define the overarching backup settings for the entire Deployment. These can be overridden and set at a server-specific level later if desired.

3. Click the settings wheel, then the Edit popup that appears.
4. Select the following backup settings:

```
On or off
Daily or weekly
What time of day backups take place
How long each backup type (daily, weekly, etc.) should be retained
```

5. Finally, click Create (or Edit) Schedule to put these settings in place.

Setting individual backup policies

To apply server-specific integrated backup settings, navigate to a Workspace detail page.

1. Scroll down to the Servers section and click on a server's name
2. Click Add Schedule
3. Apply backup settings as desired and click Create Schedule

Restoring from backup

To restore backups of a given VM, begin by navigating to that Workspace detail page.

1. Scroll down to the Servers section and click on a server's name
2. Scroll down to the Backups section and click the wheel to expand your options, then select either
3. Restore to Server or Restore to Disk (attach a drive from the backup so that you can copy data from the backup to the existing version of the VM).
4. Proceed with your restore from this point on as you would in any other restore scenario.

Costs depend on what schedule you want to maintain and is entirely driven by the Azure backup cost. Backup pricing for VMs is found on the Azure Cost Calculator: https://azure.microsoft.com/en-us/pricing/calculator/

Cloning Virtual Machines

Overview

Virtual Desktop Service (VDS) provides the ability to clone an existing virtual machine (VM). This functionality designed to automatically increase server unit count availability as defined user count grows OR additional servers to available resource pools.

Admins use cloning in VDS in two ways:

1. On demand automated creation of new server from an existing client server
2. Proactive automated creation of new client server(s) for auto-scaling of resources based-on rules defined and controlled by partners

Cloning to add additional shared servers

A clone is a copy of an existing virtual machine. Cloning functionality saves time and helps admins scale because Installing a guest operating system and applications can be time consuming. With clones, you can make many copies of a virtual machine from a single installation and configuration process. This typically looks like:

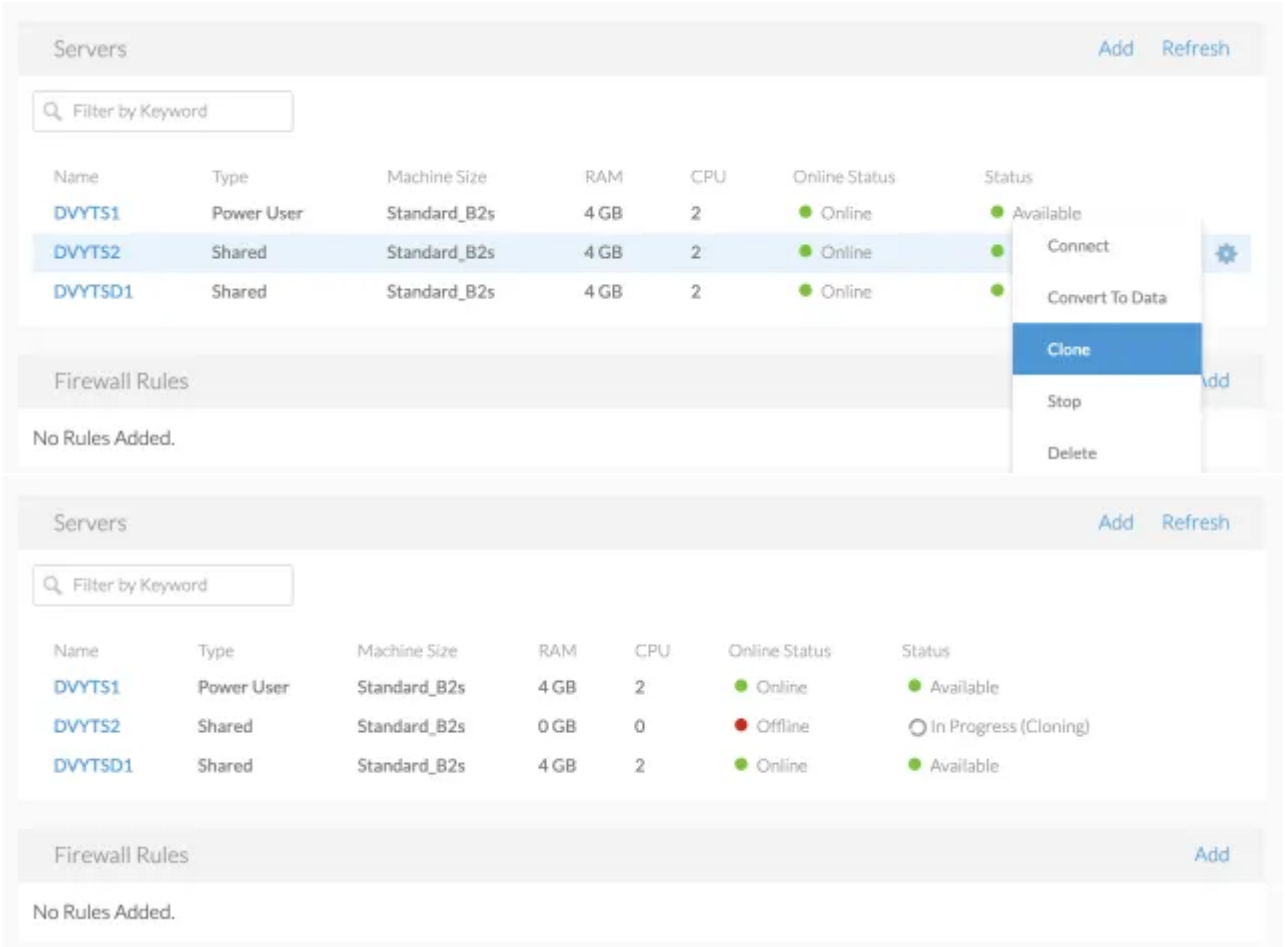
1. Install all desired applications and settings onto a TS or TSD server
2. Navigate to: Workspaces > Servers Section > Gear Icon for the Source Server > Click Clone
3. Allow the clone process to run (typically 45-90 minutes)
4. The final step activate the cloned server, putting it into the RDS pool to accept new connections. Cloned servers may require individual configuration after being cloned so VDS waits for the Administrator to manually put the server into rotation.

Repeat as many times as necessary.

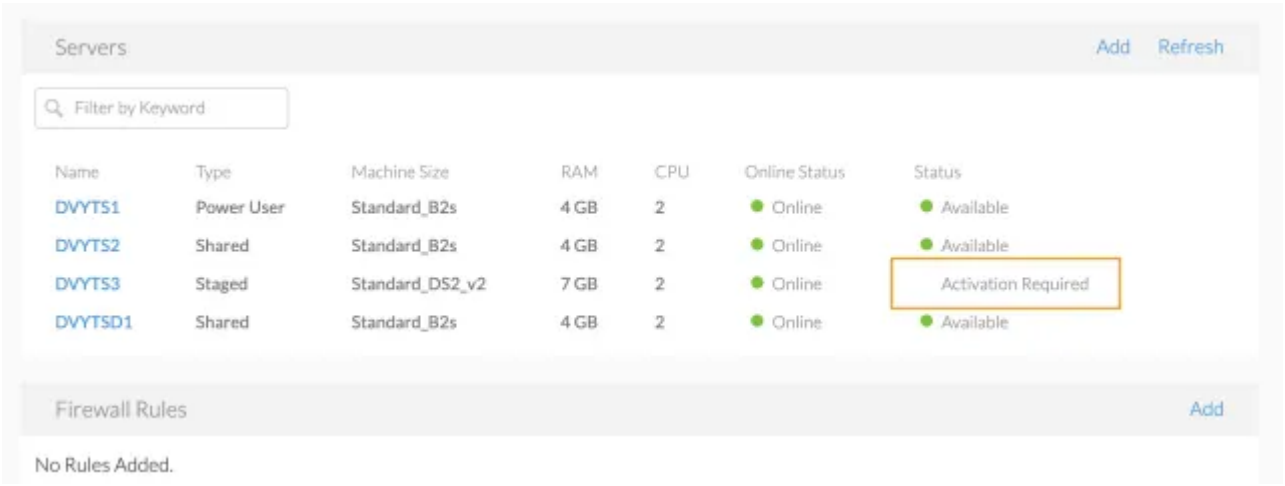
To increase the capacity for users in a shared session host environment, cloning a session host is an easy process requiring only a few steps.

1. Select a session host to clone, verify no users are currently logged in to the machine.
2. In VDS, navigate to the Workspace of the target client. Scroll to the Servers section, click the Gear Icon and select Clone. This process takes significant time and will take the source machine offline.

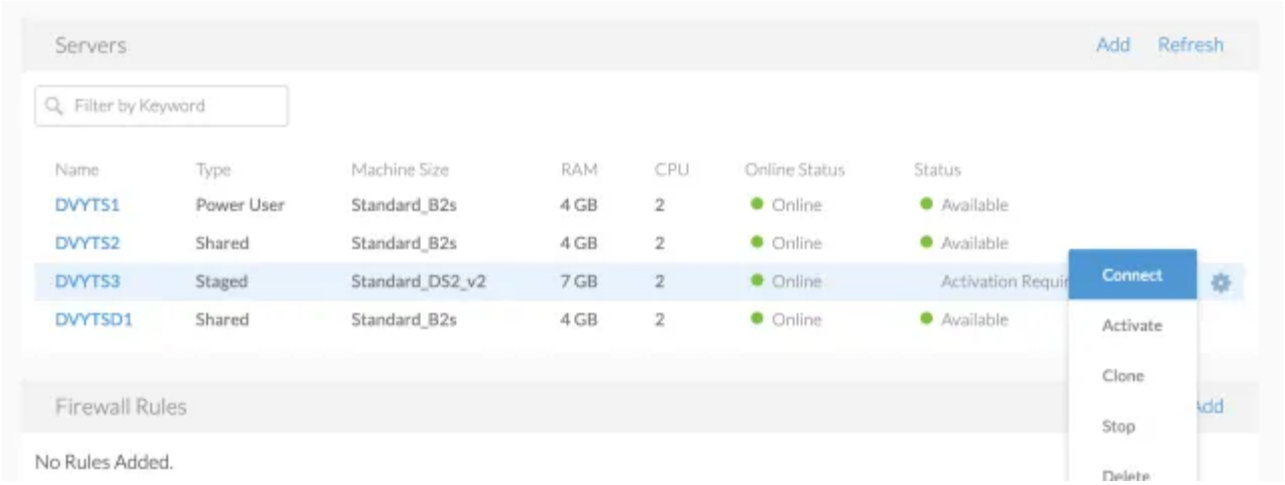
Expect 30+ minutes to complete.



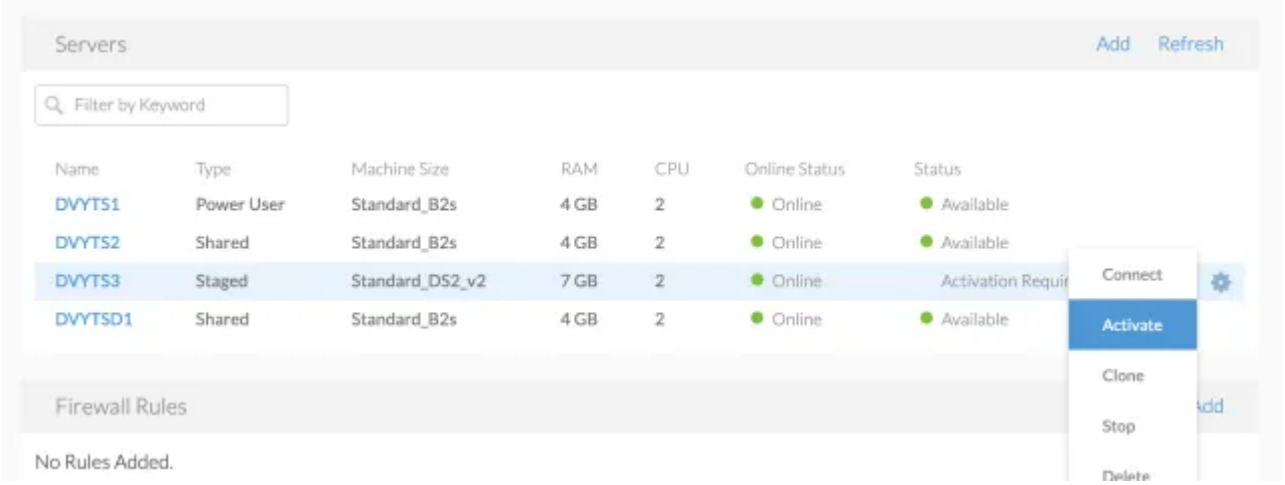
3. The process will shut down the server, clone the server to another image and SysPrep the image to the next TS# for the customer. The server shows as *Type=staged* and *Status=Activation Required* in the Servers list.



4. Logon to the server and verify that the server is ready for production.



5. When ready, click Activate to add the server into the session-host pool to start accepting user connections.



VDS cloning process definition

The step-by-step process is detailed in VDS > Deployment > Task History under any Clone Server operations. The process has 20+ steps, which start with accessing the hypervisor to start the clone process & ends with activating the cloned server. The cloning process includes key steps such as:

- Configure DNS & set server name
- Assign StaticIP
- Add to Domain
- Update Active Directory
- Update VDS DB (SQL instance on CWMGR1)
- Create Firewall rules for the clone

As well as Task History, the detail steps for any cloning process can be viewed in CwVmAutomationService log on CWMGR1 in each partner's Virtual Desktop Deployment. Reviewing

these log files is documented here.

Automated creation of new server(s)

This VDS functionality designed to automatically increase server unit count availability as defined user count grows.

The partner defines and manages via VDS (https://manage.cloudworkspace.com) > Client > Overview – VM Resources > Auto-Scaling. Several controls are exposed to allow partners to Enable/Disable Auto Scaling as well as create custom rules for each client such as: number/users/server, additional RAM per user & number of users per CPU.

Above assumes automated cloning is enabled for the entire Virtual Desktop Deployment. For example, to stop all automated cloning, use DCConfig, in the Advanced window, uncheck the Server Creation→Automated Cloning Enabled.

When does the automated clone process run?

The automated clone process executes when the daily maintenance is configured to run. The default is midnight, but this can be edited. Part of the daily maintenance is to run the Change Resources thread for each resource pool. The Change Resources thread determines the number of shared servers required based-on the number of users the pool's configuration (customizable; can be 10, 21, 30, etc users per server).

"On demand" automated creation of new server

This VDS functionality allows automated "on demand" cloning of additional servers to available resource pools.

The VDS Admin logs into VDS and under the Organizations or Workspaces Modules, finds the specific Client & opens the Overview tab. The Servers Tile lists all servers (TSD1, TS1, D1, etc). To clone any individual server, simply click on the cog to far-right of server name & select Clone option.

Typically, the process should take about an hour. However, the duration depends on the size of VM and the available resources of the underlying hypervisor. Please note the server being cloned will need to be rebooted, so partners typically perform after hours or during a scheduled maintenance window.

When cloning a TSData server, one of the steps is deleting the c:\Home, c:\Data, and c:\Pro folders so they're aren't any duplicate files. In this case, the clone process failed there were problems deleting these files. This error is vague. Typically, this means the clone event failed because there was an open file or process. Next attempt, please disable any AV (because that might explain this error).

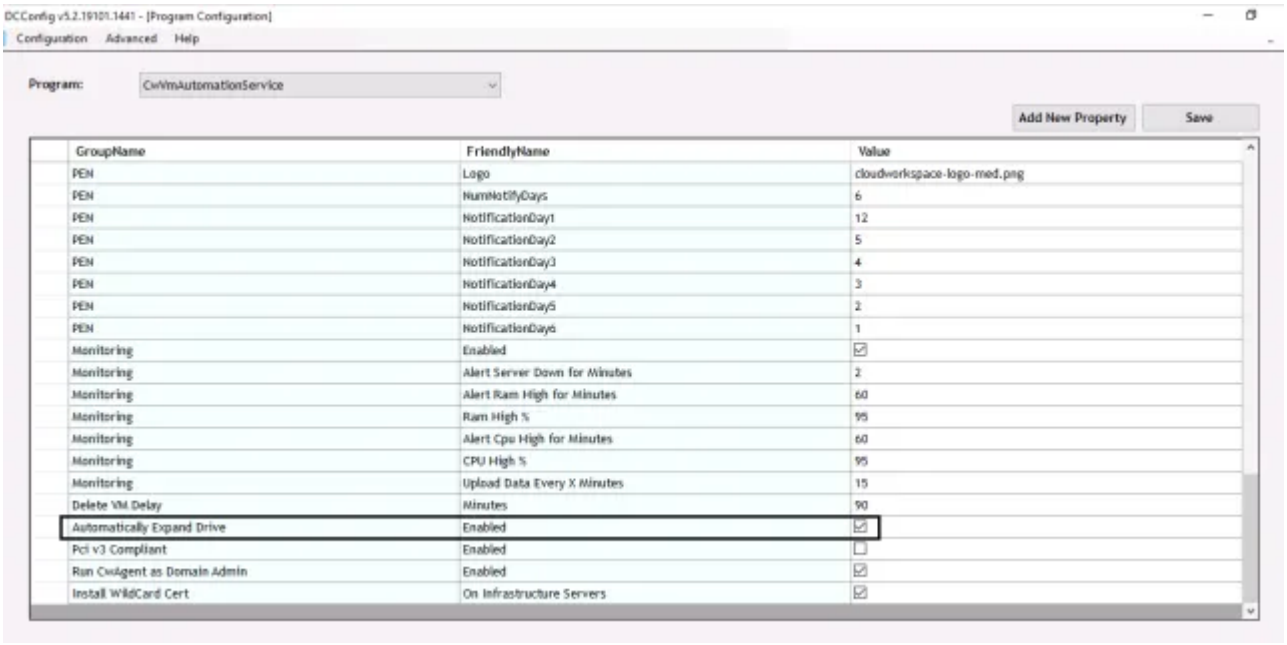
Auto-increase Disk Space Feature

Overview

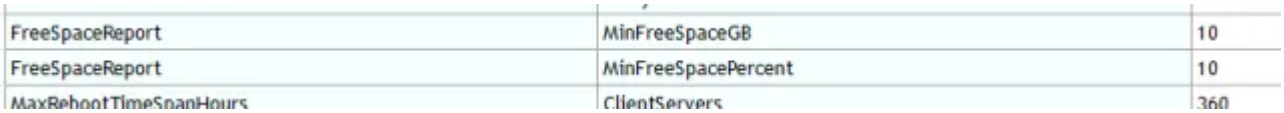
NetApp recognizes the need to give Administrators an easy way to make sure that users always have space to access and save documents. This also ensures that VMs have enough free space to complete backups successfully, enabling and empowering Administrators and their Disaster Recovery and Business Continuity plans. With this in mind, we built a feature that automatically expands the managed disk in use to the next tier when a drive is running short on space.

This is a setting that is applied by default on all new VDS deployments in Azure, ensuring that all deployments protect users and the tenant's backups by default.

Administrators can validate this is in place by navigating to the Deployments tab, then selecting a deployment and then connecting to their CWMGR1 server from there. Next, open the DCConfig shortcut on the desktop and click Advanced and scroll down to the bottom.



Administrators can change the amount of free space desired in either GB free or percent of the drive that should be free before moving to the next tier of managed disks in the same Advanced section of DCConfig.



A few practical application examples:

- If you want to ensure that at least 50 GB is available on your drive, set MinFreeSpaceGB to 50
- If you want to ensure that at least 15% of your drive is free, set MinFreeSpacePercent from 10 to 15.

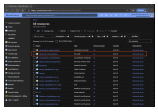
This action takes place at midnight on the server's time zone.

Accessing VDS credentials in Azure Key Vault

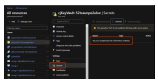
Overview

CWASetup 5.4 is a departure from previous Azure deployment methods. The configuration and validation process is streamlined to reduce the amount of information required to begin a deployment. Many of those removed prompts are for credentials or accounts such as Local VM Admin, SMTP account, Tech account, SQL SA, etc. These accounts are now automatically generated and stored in an Azure Key Vault. By default, accessing these automatically generated accounts requires an additional step, described below.

- Find the 'Key vault' resource and click into it:



- Under ‘Settings’, click ‘Secrets’. You’ll see a message stating that you are unauthorized to view:



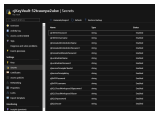
- Add an ‘Access Policy’ to grant an Azure AD account (like a Global Admin or System Administrator) access to these sensitive keys:

- A Global Admin is used in this example. After selecting the principal, click ‘Select’, then ‘Add’:

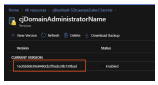
- Click ‘Save’:

- Access policy has been successfully added:

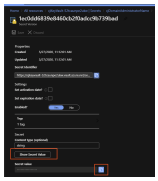
- Revisit the ‘Secrets’ to verify the account now has access to the deployment accounts:



- For example, if you required the Domain Administrator credential to login to CWMGR1 and update Group Policy, check the strings under cjDomainAdministratorName and cjDomainAdministratorPassword by clicking on each entry:



- Show or Copy the value:



Apply Monitoring and Antivirus

Overview

Virtual Desktop Service (VDS) Administrators are responsible for monitoring both their platform infrastructure (which will consist of CWMGR1 at minimum) and all other infrastructure and virtual machines (VMs). In most cases, Administrators arrange infrastructure (hypervisor/SAN) monitoring directly with their Data Center/IaaS provider. Administrators are responsible for monitoring terminal servers and data servers, typically by deploying their preferred Remote Management and Monitoring (RMM) solution.

Anti-Virus is the responsibility of the administrator (for both platform infrastructure and terminal/data server VMs). To streamline this process, VDS for Azure servers have Windows Defender applied by default.

When installing 3rd party solutions, be sure not to include Firewalls or any other components which might interfere with VDS automation.

More specifically, when very specific Anti-Virus policies are in place by default this can result in adverse effects when these Anti-Virus agents are installed on a server managed by Virtual Desktop Service.

Our overall guidance is that while VDS platform automation is generally not impacted by Anti-Virus or Anti-Malware products, it is a best practice to add exceptions/exclusions for the following processes on all platform servers (CWMGR1, RDGateways, HTML5Gateways, FTP, etc):

```
*\paexec.exe
*\paexec_1_25.exe
C:\Program Files\CloudWorkspace\CwAgent\CwAgent.exe
C:\Program Files\CloudWorkspace\CW Automation Service\cw.automation.service.exe
C:\Program Files\CloudWorkspace\CwVmAutomationService\CwVmAutomationService.exe
```

Additionally, we recommend white-listing the following processes on client servers:

```
C:\Program Files\CloudWorkspace\CwAgent\paexec.exe
C:\Program Files\CloudWorkspace\CwAgent\CwAgent.exe
C:\Program Files\CloudWorkspace\CwRemoteApps\cwra.exe
C:\Program Files\CloudWorkspace\Pen\Pen.exe
C:\Program Files\CloudWorkspace\MfaAgent\MFAAgent.exe
C:\Program Files\CloudWorkspace\MfaAgent\MFAAgentMonitor.exe
```

Adding and Moving Mapped Drives

Overview

By default there are three shared folders exposed to end user sessions. These folders are found on the defined storage layer. This could be on the file server (TSD1 or D1) or a storage service such as Azure Files, Azure NetApp Files, NetApp CVO and NetApp CVS.

To assist with clarity, this article will use an example customer with the company code “NECA.” This example assumes a single TDS1 server has been deployed, named NECATSD1. We’ll work through the process of moving a folder to another VM (Named “NECAD1”). This strategy can be used to move between partition on the same machine or to another machine as shown in the following example…

Folders Starting Location:

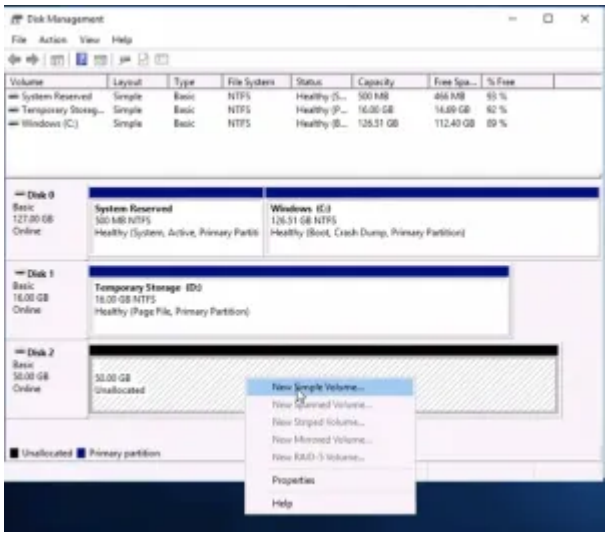
- Data: NECATSD1\C:\data\NECA\ (TSD1means it is the first Terminal Server and also functions as the Data Server)
- FTP: NECATSD1\C:\ftp\NECA\
- Home: NECATSD1\C:\home\NECA\

Folders Ending Location:

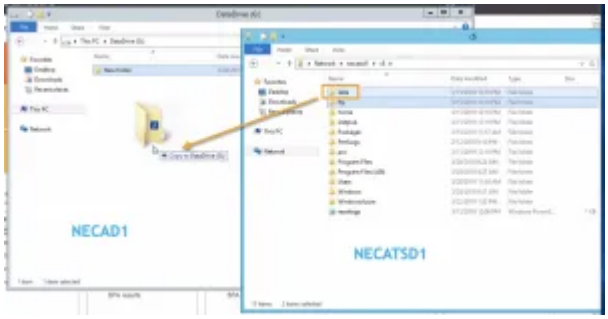
- Data: NECAD1\G:\data\NECA\ (the D1means it is the 1st Data Server)
- FTP: The same process applies, no need to describe it 3x
- Home: The same process applies, no need to describe it 3x

Add disk for G: on NECAD1

1. In order to put the shared folder on the E: drive we'll need to add one via the hypervisor (e.g. Azure Management Portal), then initialize and format it

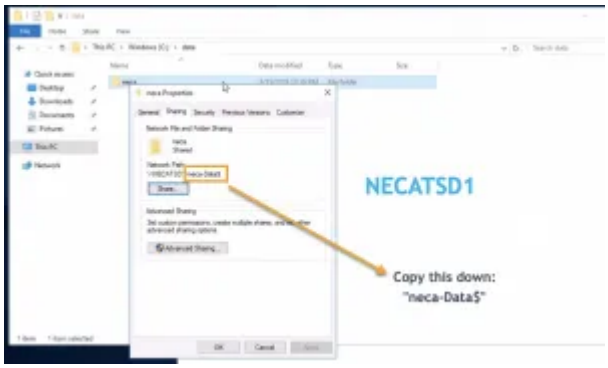


2. Copy the existing folder (on NECATSD1, C:\) path to the new location (on NECAD1, G:\)
3. Copy the folder(s) from the original location to the new location.

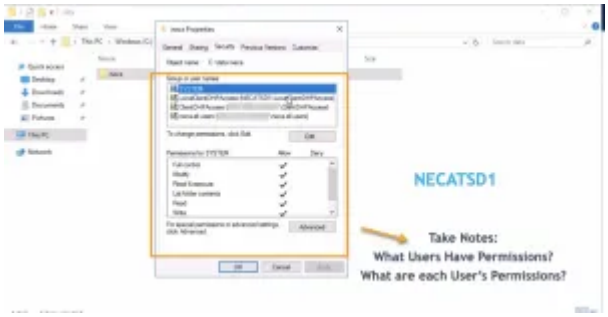


Gather Information From the Original Folder Share (NECATSD1, C:\data\NECA\)

1. Share the new folder using the exact same path as the folder in the original location.
2. Open the new NECAD1, G:\data\ folder and you'll see a folder named the company code, "NECA" in our example.



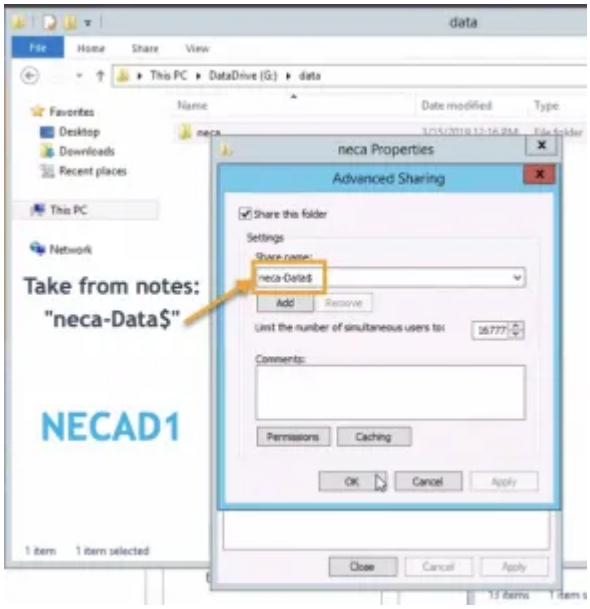
3. Note the security permissions of the original folder share:



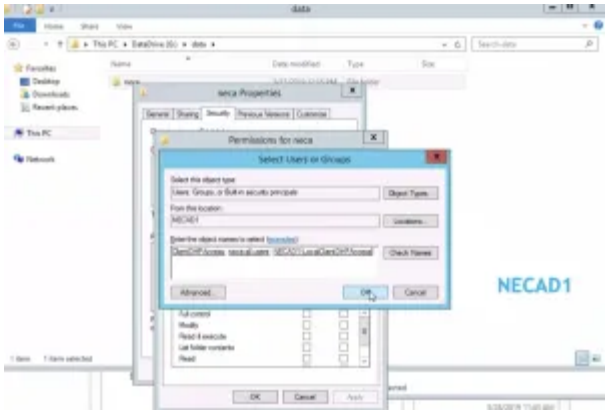
4. Here is the typical setup, however it is important to copy the original settings in case there are existing customizations we need to preserve. All other user/group permissions should be removed from the new folder share
    - SYSTEM:All permissions allowed
    - LocalClientDHPAccess (on the local machine):All permissions allowed
    - ClientDHPAccess (on the domain): All permissions allowed
    - NECA-all users (on the domain): All permissions except “Full Control” allowed

Replicate the Sharing Path and Security Permissions to the New Shared Folder

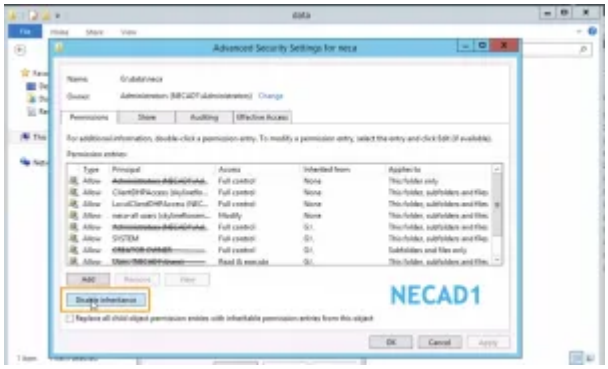
1. Go back to the new location (NECAD1, G:\data\NECA\ and share the NECA folder with the same network path (excluding the machine), in our example “neca-data$”



2. For user security add all the users, set their permissions to match.



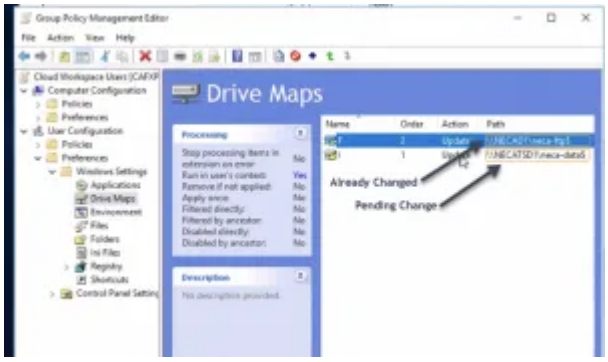
3. Remove any other user/group permissions that may already exist.



Edit Group Policy (Only if the folder moved to a new Machine)

1. Next you'll edit the Drive Maps in Group Policy Management Editor. For Azure AD Domain Services, the mapping is located in:

```
"Cloud Workspace Users > User Configuration > Preferences > Windows Settings> Drive Maps"
```



2. Once Group Policy updates, the next time each user connects, they'll see the mapped drives which are pointed back to the new location.
3. At this point you can delete the original folders, on NECATSD1, C:\.

Troubleshooting

If the end user sees the mapped drives with a red X, right click the drive and select disconnect. Log out and back in the drive will be present correctly.