CYBERARK

CyberArk University

Privileged Access Security Administration

Exercise Guide

4/4/2019

Contents

Important Notice

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Acknowledgements

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

This product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

This product includes software written by Tim Hudson (tjh@cryptsoft.com).

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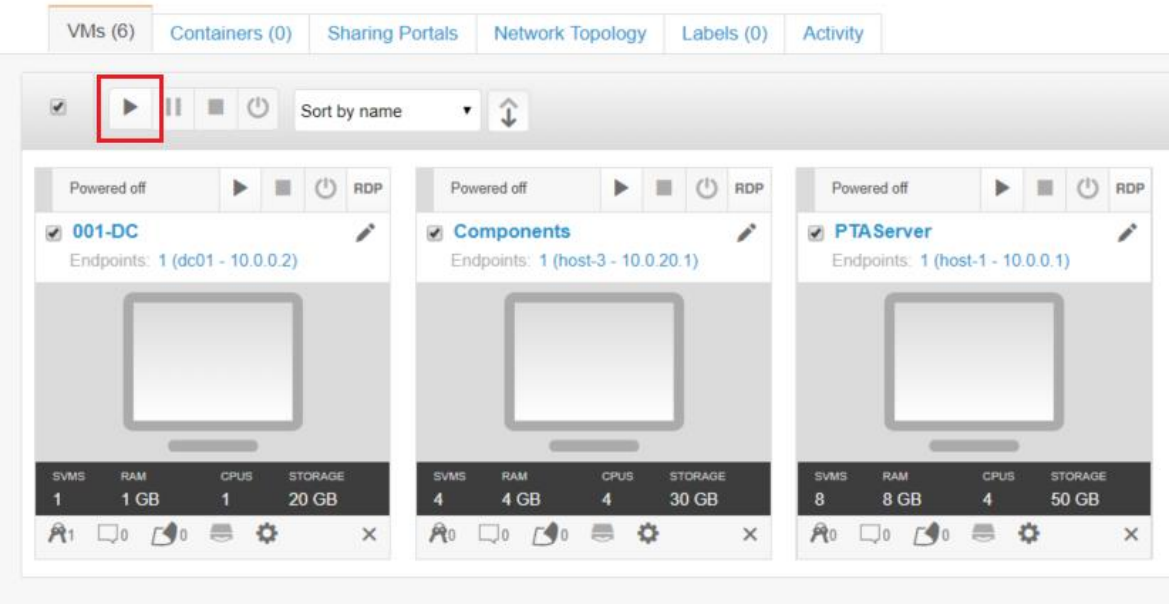
Introduction

Using Skytap

Before beginning exercises, here are a few tips to help you navigate the labs more effectively. You can refer to the section for ***International Users*** for instructions on changing the keyboard.

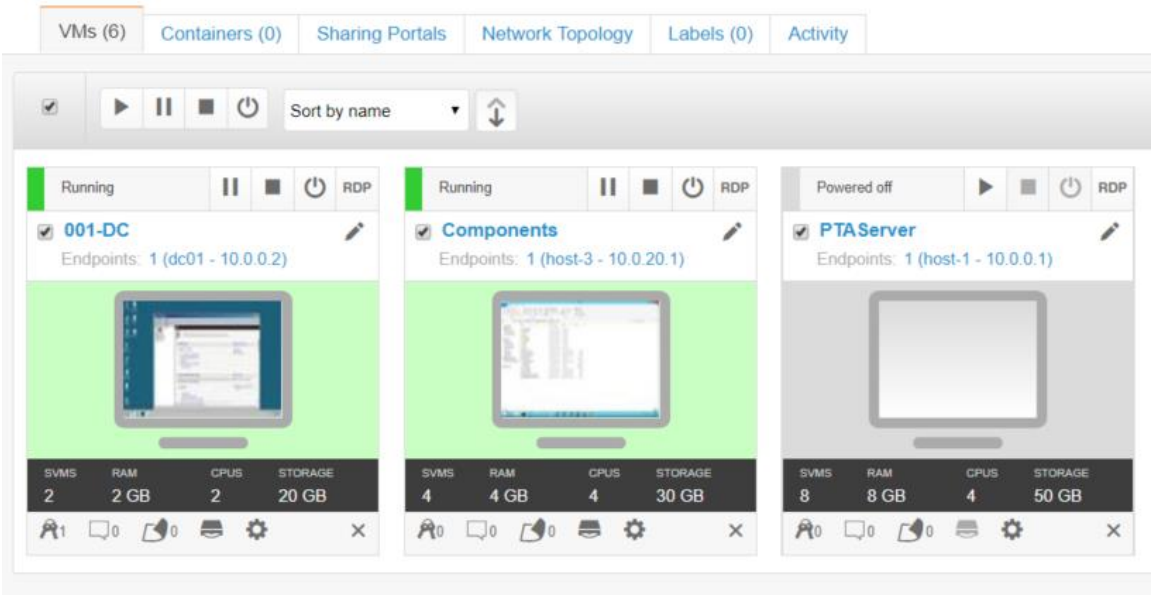
1. The virtual machines need to be running in order for you to be able to do the exercises. You can start all of the virtual machines with one click by pressing the start button (highlighted in red in the image below).



Note: The number and names of virtual machines vary by course. The image above is given as an example and might not match exactly what you see.

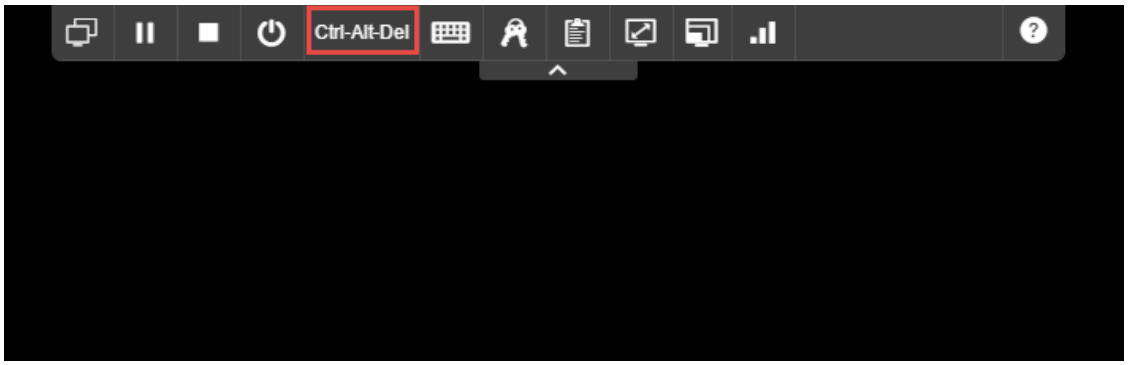
The environments have been set up to start up gradually: first the domain controller, then the Vault, and so on. It will take a few minutes for them to get up and running. Also note, that some machines are designed *not* to start automatically. This is the case of the ***PTAServer*** in the image below. It is not needed until later in the course, so you can start it when instructed in the manual or by the CyberArk trainer.

Occasionally, for reasons outside our control, one or more machine may fail to start up when requested. If you notice that a particular machine is not responding to a ping or if you cannot log in using Active Directory, you should check your virtual machines to make sure they are all running properly.

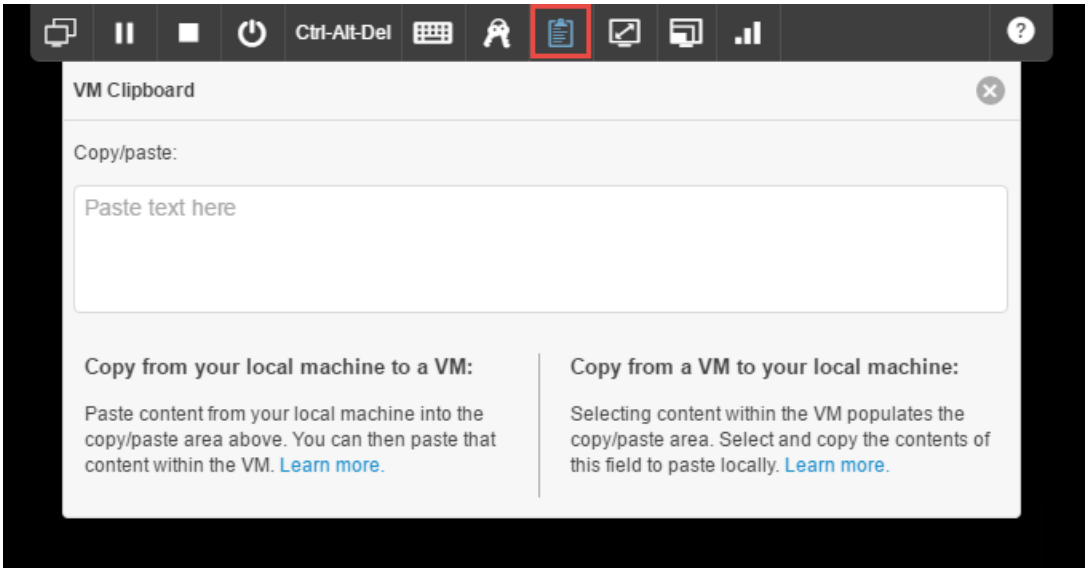


2. Click on the large monitor icon to connect to a virtual machine with the HTML 5 client.

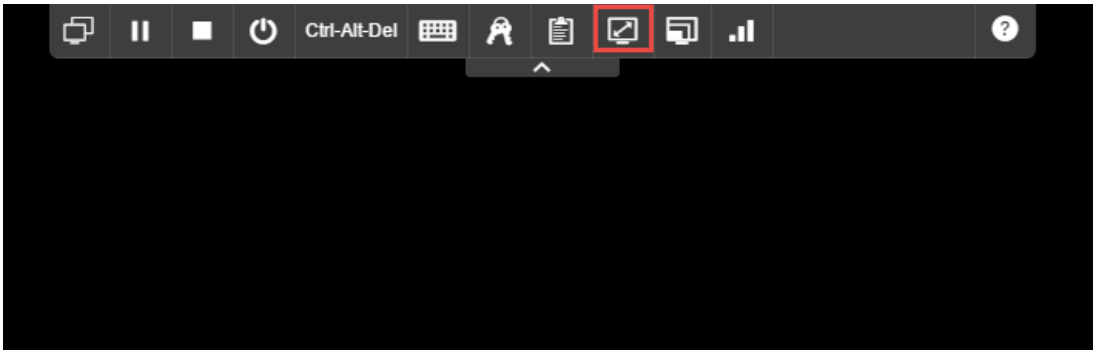
3. Use the **Ctrl-Alt-Del** button on the tool bar to send a Ctrl-Alt-Del to the machine.



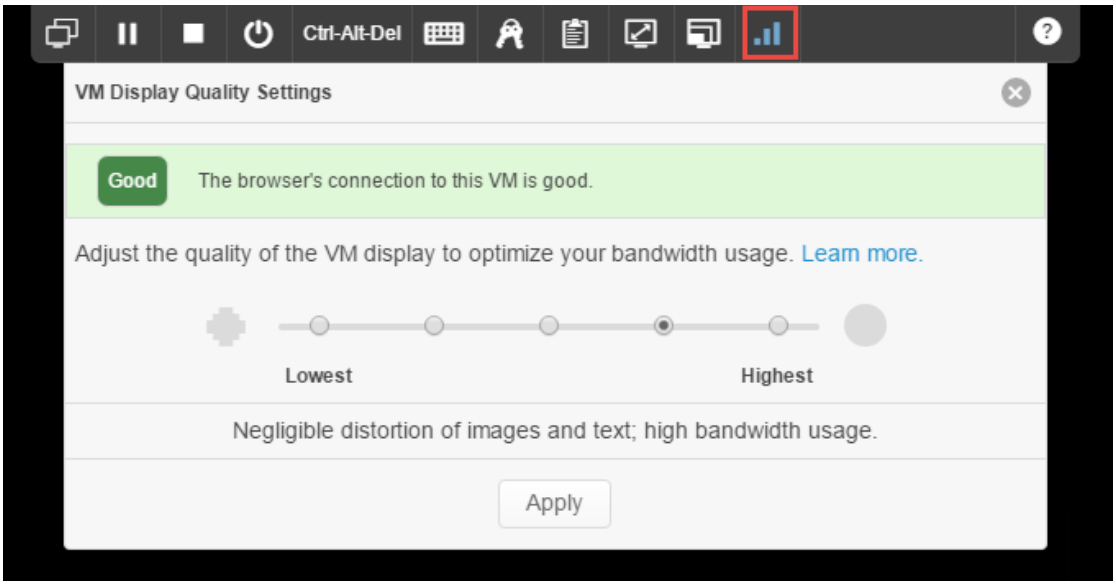
4. The clipboard icon will allow you to copy and paste text between your computer and your lab machine.



5. The full screen icon will resize your virtual screen to adapt to your computer's screen settings to avoid scrolling.



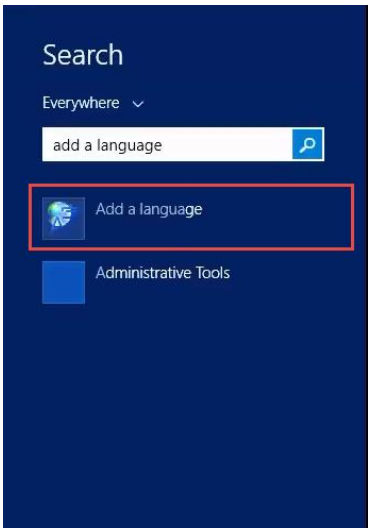
6. You may need to adjust your bandwidth setting on slower connections.



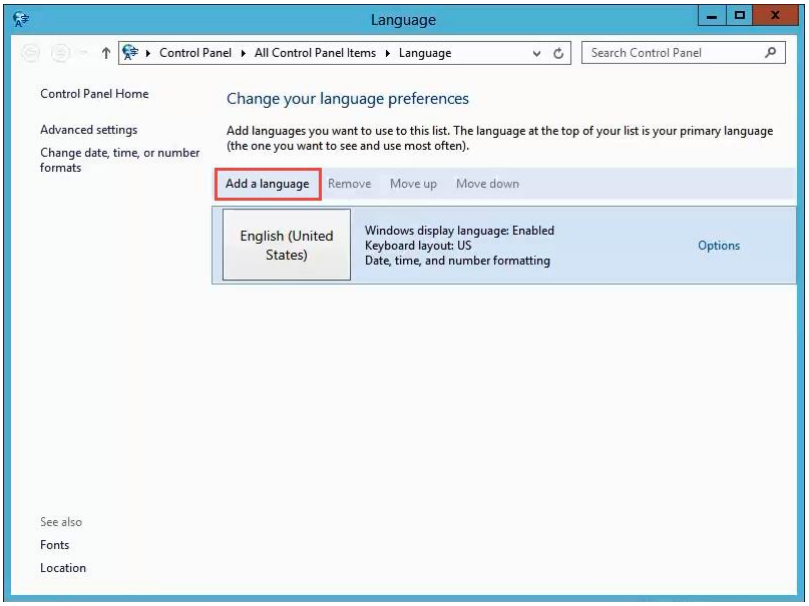
International Users

By default, the lab machines are configured to use a US English keyboard layout. If you use a machine from a country other than the US, you may experience odd behavior from your lab machines. The solution is to install the keyboard layout for your keyboard on our lab machines. Follow the process below to find and configure the correct keyboard layout for your keyboard.

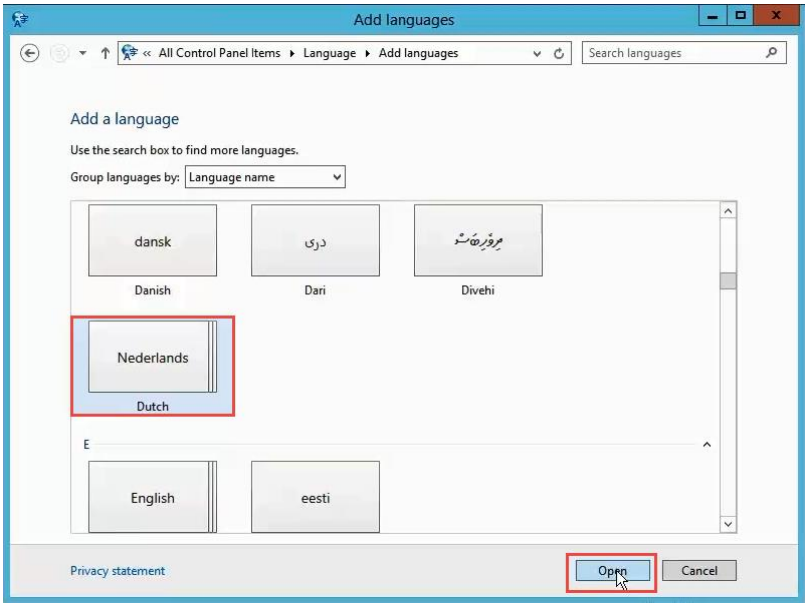
1. From the **Start Menu** launch "Add a language."



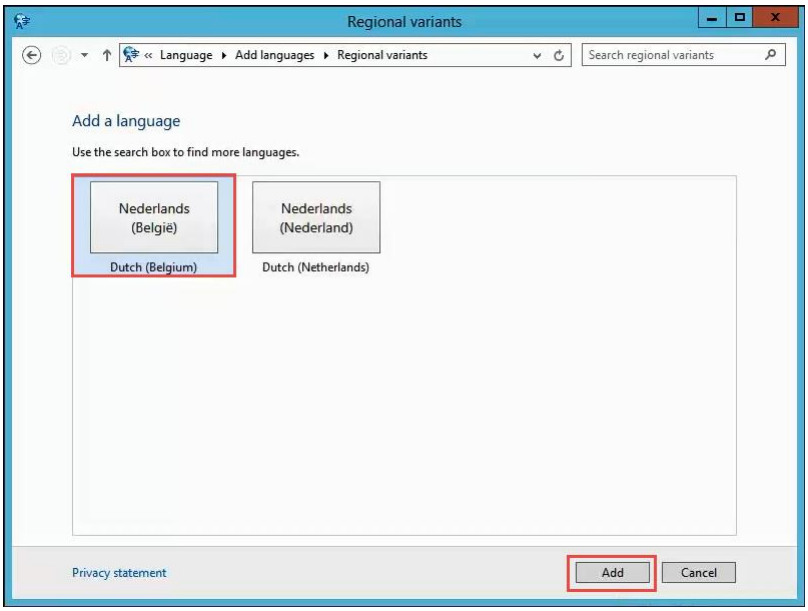
2. Click "Add a language."



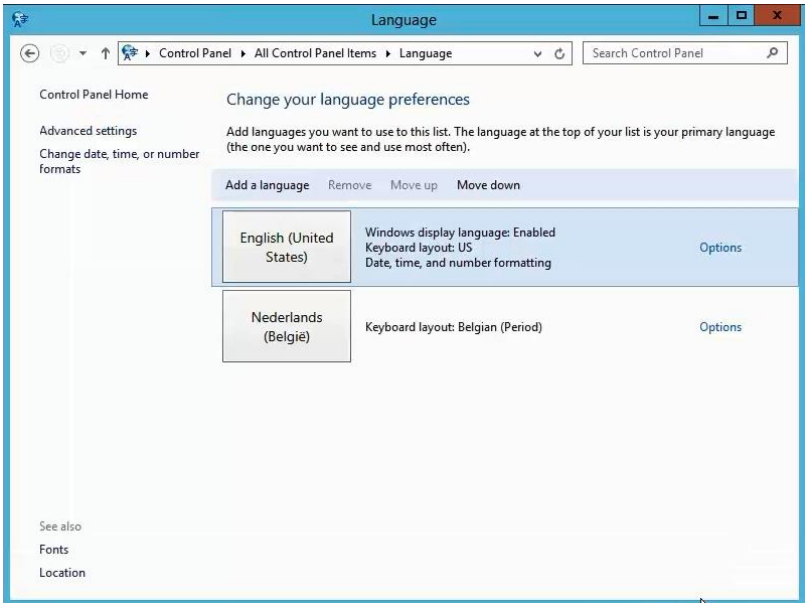
3. Select your language. Click **Open**.



4. Select your specific locality or dialect. Click **Add**.



5. With the option *English (United States)* selected, click the **Move down** button. This will make your language the default. Don't remove US English altogether as your instructor may need it if he/she connects to your machine.



Note:	If you use an alternate keyboard layout (e.g. AZERTY, Dvorak) you can click options next to your language to install that. Otherwise, close the **Language** window.

6. In the system tray, click **ENG**, then choose your keyboard layout. You may switch back and forth between keyboard layouts. Your instructor may need to switch back to ENG to help you with exercises.

User Management

Creating a Custom User Mapping

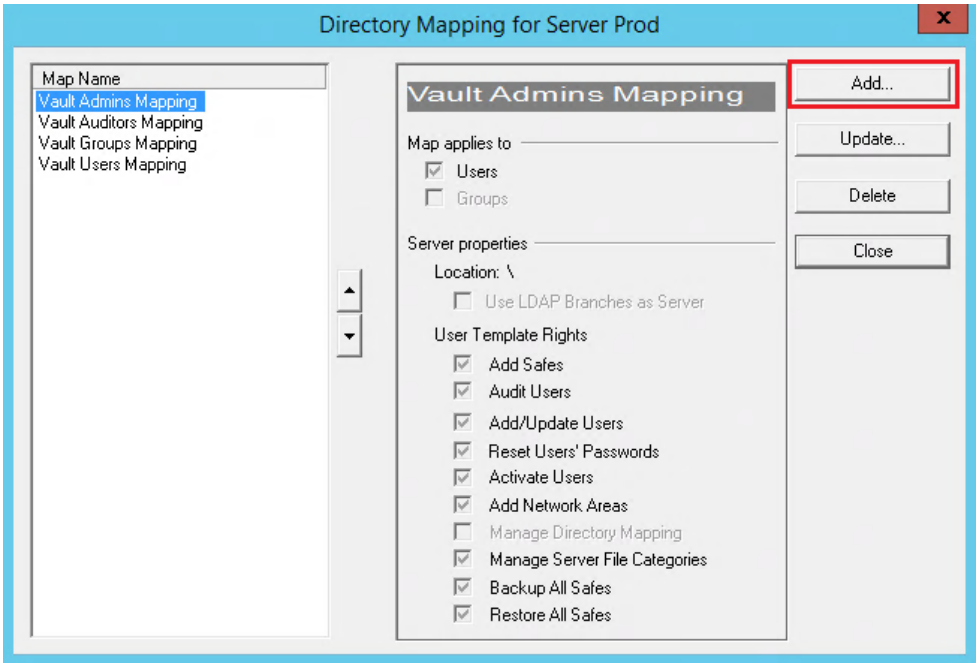
In this first exercise, you will create a custom user mapping that will map a group of 'Power Users'. This group will have the ability to modify the Master Policy and platforms, view reports, and reset users' passwords, but will not be able perform other **Vault** functions, such as adding safes.

1. On the **Components Server**, open the **PrivateArk Client** and log in to the *Prod* Vault as the *Administrator* user with the password *Cyberark1*.

2. You will probably see a message like the one below. This appears because the user *Administrator* has not connected to the system recently. Just click **Yes** to clear expired history.

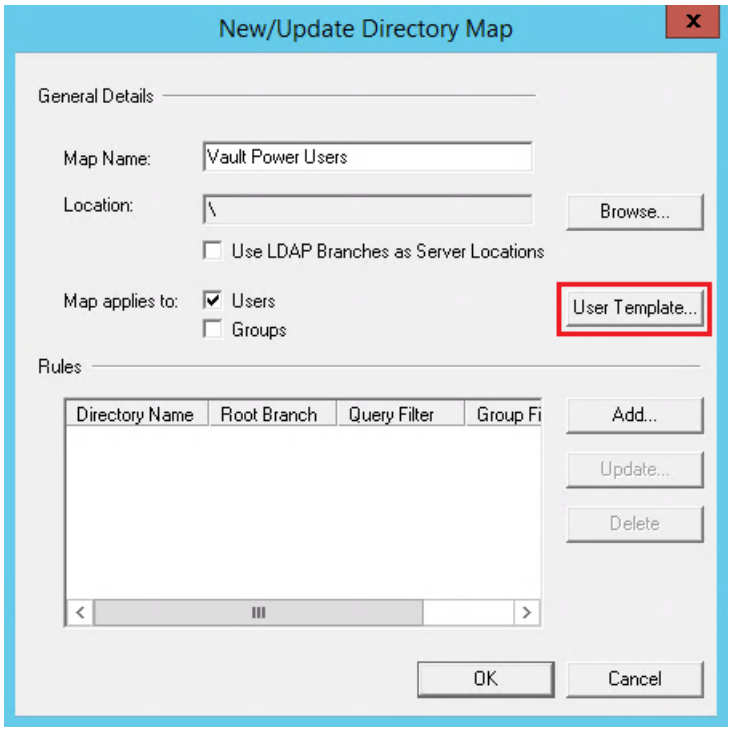
3. Go the **Tools** menu, select **Administrative tools**, then **Directory Mapping**.

4. On the *Directory Mapping for Server Prod* screen, press the **Add** button.



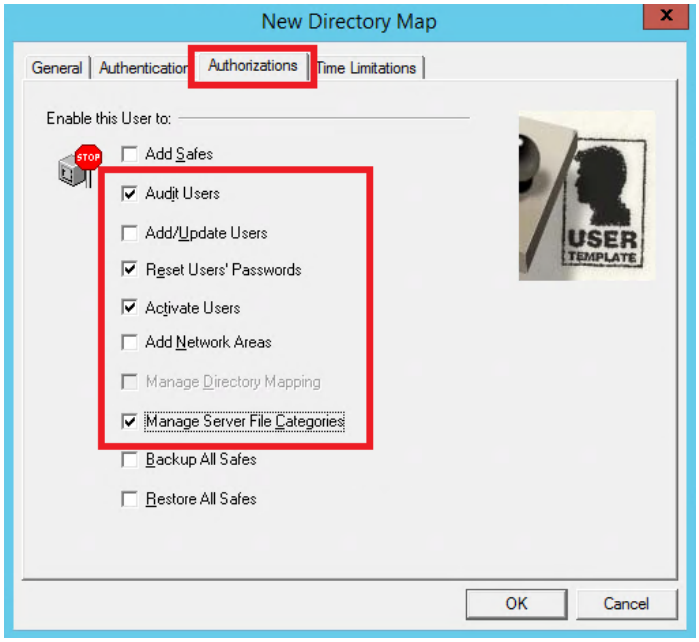
5. On the *New/Update Directory Map* in the **Map Name** field, enter *Vault Power Users* and check the **Users** check box.

6. Click the **User Template…** button.



7. In the *New Directory Map Window*, select the **Authorizations** tab

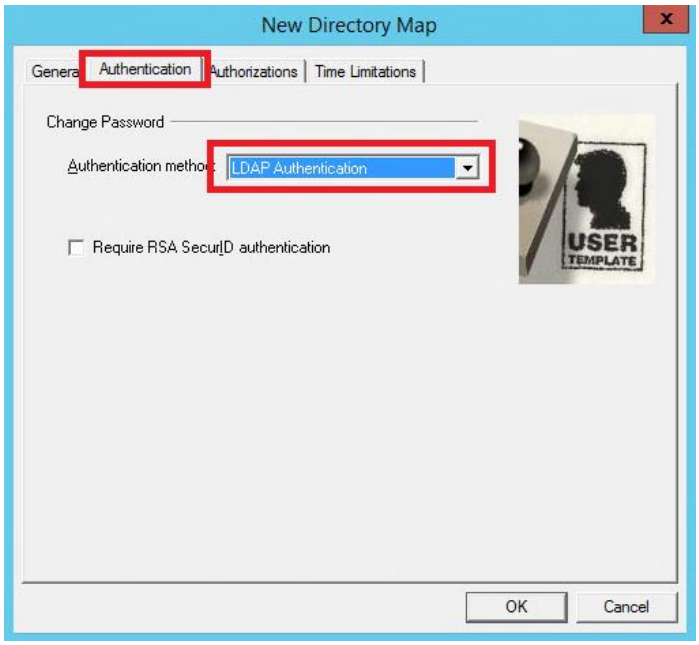
8. Check the following boxes: *Audit Users*, *Reset Users' Passwords*, *Activate Users*, and *Manage Server File Categories*.



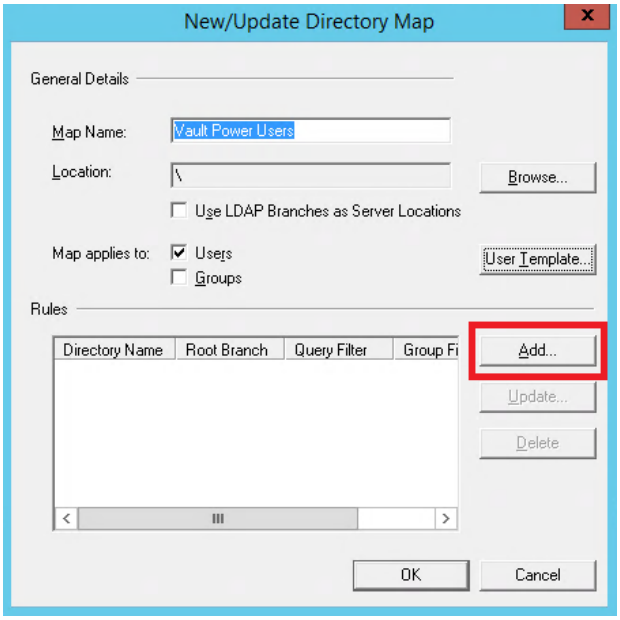
9. Select the **Authentication** tab.

10. Click on the pull-down and examine the *Authentication methods* options available.

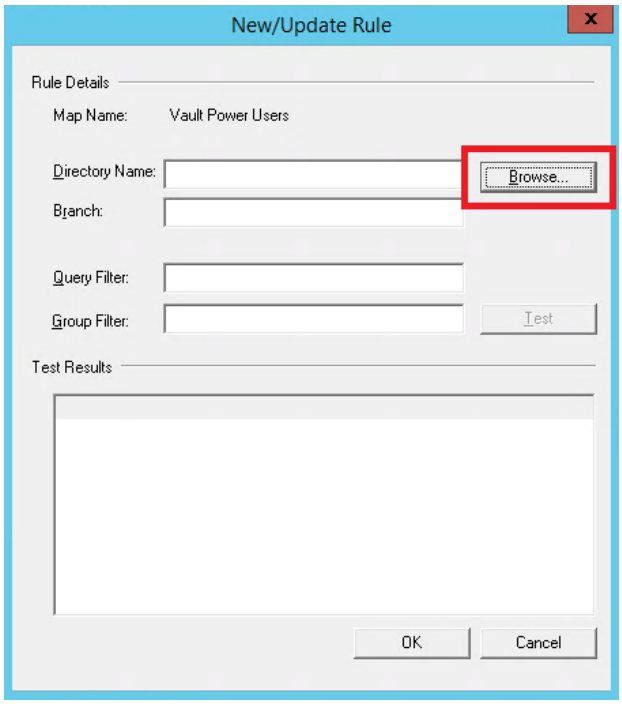
11. Select *LDAP Authentication* and press **OK**.



12. Back on the *New/Update Directory Map*, press the **Add...** button to create a new rule.



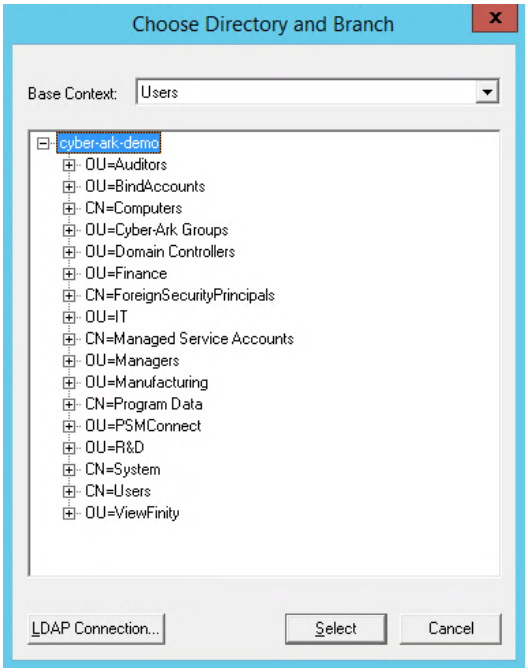
13. Press the **Browse**… button to locate the *Directory Name*.



Hint:	If you cannot see the Active Directory tree structure, you might be performing the exercise on the wrong server.

14. On the *Choose Directory and Branch* window, highlight **cyber-ark-demo**.

15. Expand the directory so that you can see the contents. Then press **Select**.

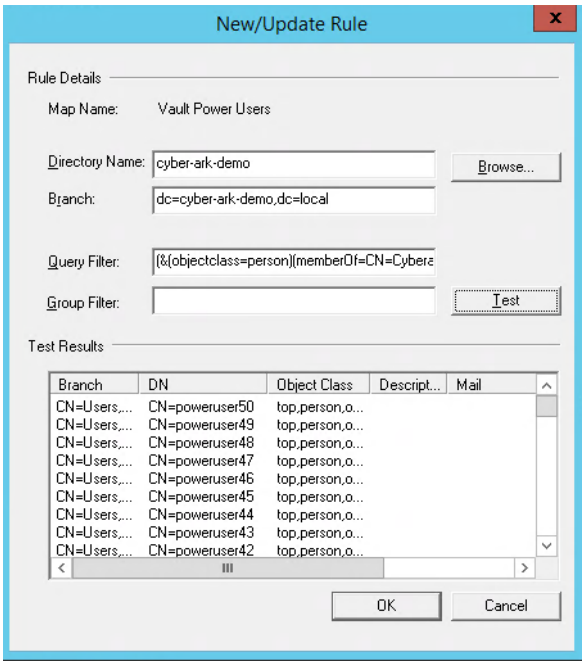


16. In the **Query Filter** field, enter:

```
(&(objectclass=person)(memberOf=CN=CyberArk Power Users,ou=Cyber-Ark Groups,DC=Cyber-Ark-demo,dc=local))
```

Note:	This "Power Users" query is available in the *LDAPQueries.txt* file located on the Desktop of the **Components** server along with other sample queries.

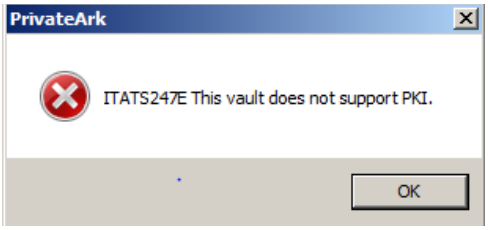
17. Press the **Test** button to confirm that the query returns include "*CN=poweruser01*".



18. If the query results include “power user” entries, continue on to the next step.

19. Press **OK** and then **OK** again to exit the *New/Update Directory Map* window.

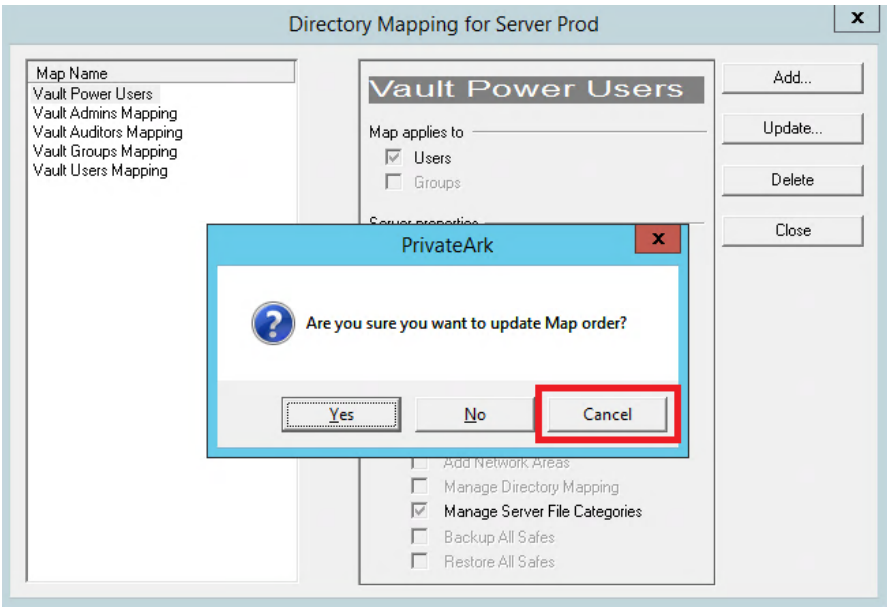
**** You may receive an error message that the Vault does not support PKI ****



If you get the error message above, go back to your user template, select the *Authentication* tab, click on the pull-down and specifically choose **LDAP authentication** for your *Authentication method*, even though it may already be selected.

20. After adding the new mapping, press the **Close** button.

21. You will receive a message asking ‘*Are you sure you want to update Map order?*’ Press **Cancel**.

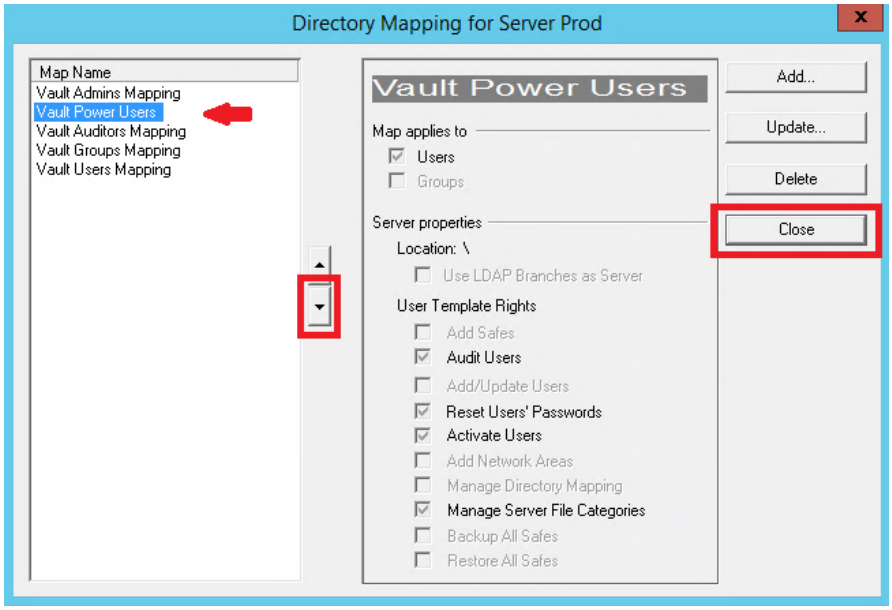


About 'Mapping Order'

The mapping order is important for users who belong to multiple groups/mappings. For example, if a user belongs to both *Power Users* and *Vault Admins* mappings, the user will receive the privileges for the first mapping listed. If *Power Users* was listed first, a user who is also a *Vault Admin* user would only receive the subset of vault authorizations for *Vault Power Users*, instead of the full set provided by the *Vault Admins* mapping.

22. Highlight the *Vault Power Users* mapping and press the **down** button to move it below the *Vault Admins Mapping*.

23. After reordering the map order, press **Close.**



24. This time, you can press **Yes** when asked 'Are you sure you want to update the Map order?'

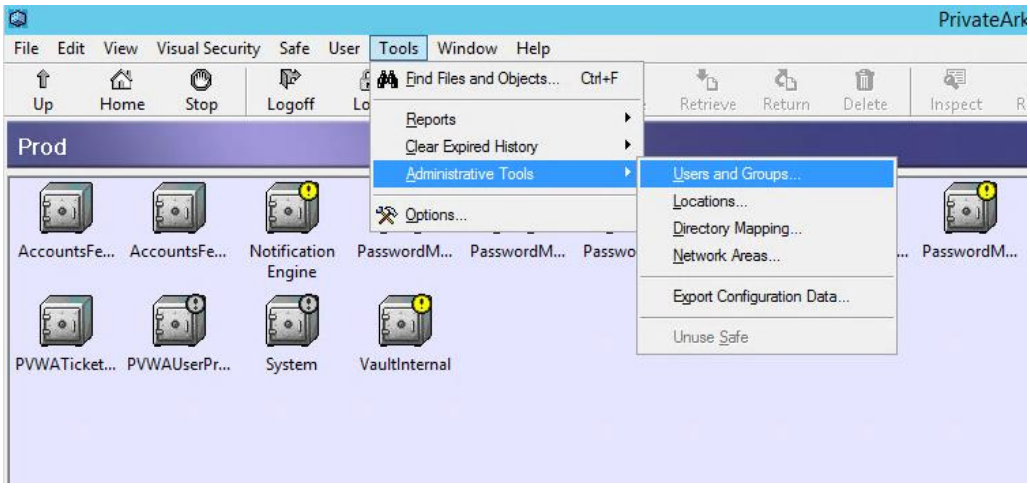
Nesting the Power Users group under the built-in CyberArk groups

In this section, we will place the mapped LDAP group *CyberArk Power Users* under the CyberArk internal groups *Vault Admins* and *PVWAMonitor*. This will give members of the group access to the **POLICIES**, **REPORTS**, and **ADMINISTRATION** tabs in the **PVWA**.

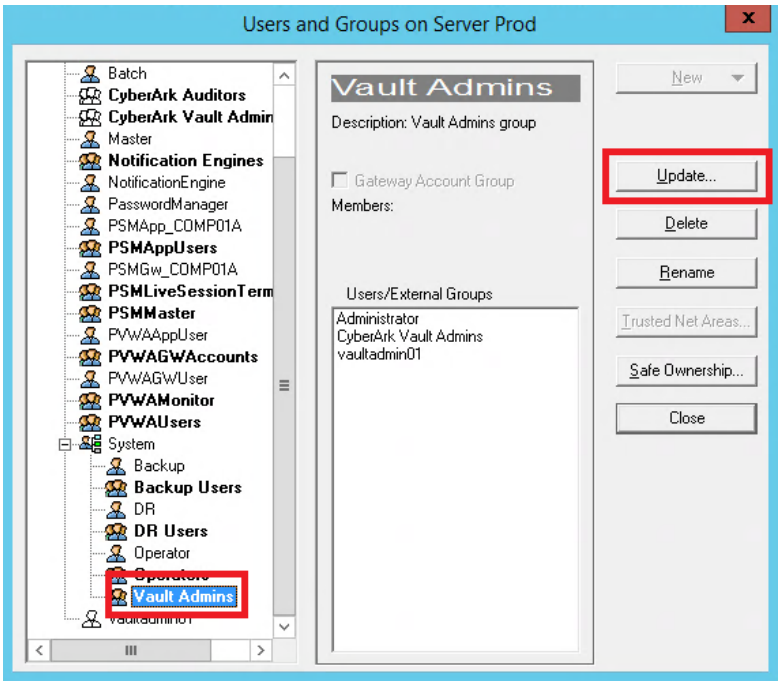
Nesting the Power Users group under Vault Admins

In this step you will nest the LDAP group *CyberArk Power Users* under the internal *Vault Admins* group. This will allow members of the Power Users group to view the **POLICIES** and **ADMINISTRATION** tabs in the **PVWA**.

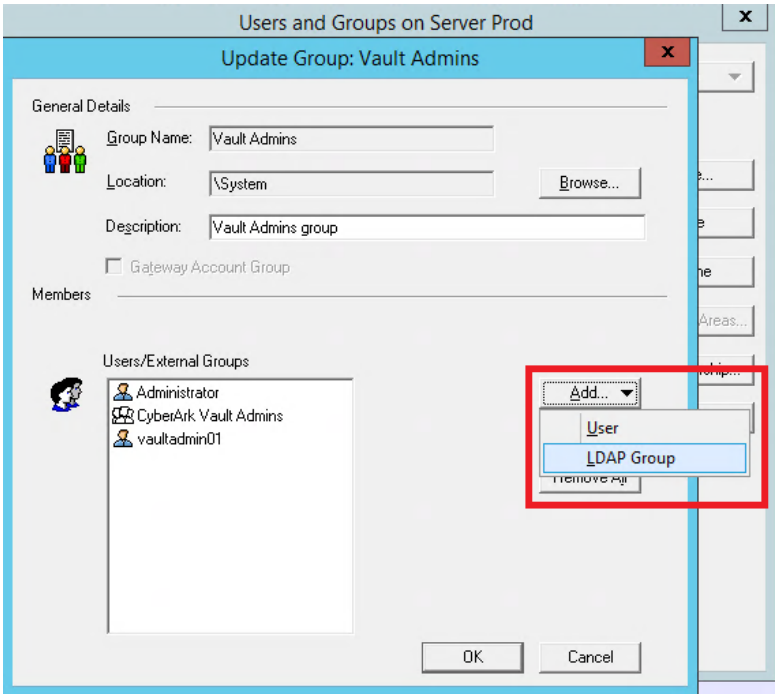
1. Go to **Tools > Administrative Tools > Users and Groups…**



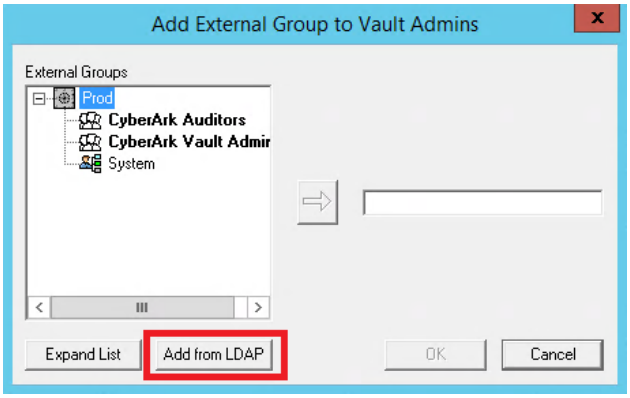
2. Navigate to **System > Vault Admins** and press **Update**…



3. Press **Add… > LDAP Group**.

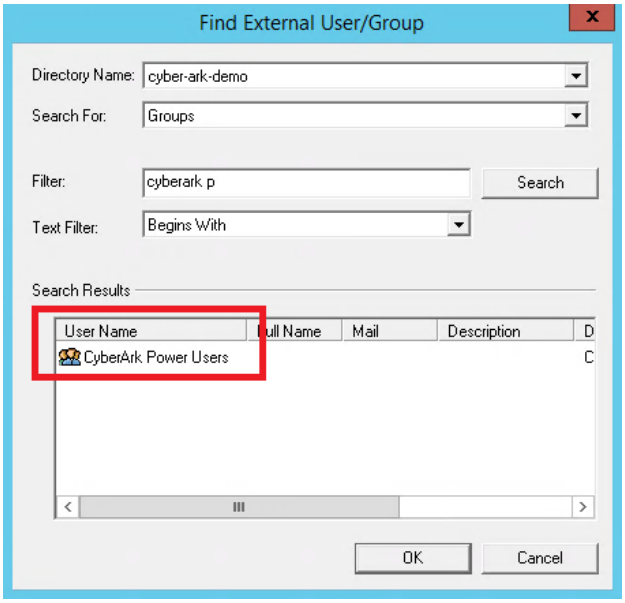


4. Press **Add from LDAP** (You may not see all of the groups shown below).



5. In the **Filter** field of the *Find External User/Group* screen, enter "*cyberark p"*. This will find the Power Users. Press **Search**.

6. Select the *Cyberark Power Users* in the **Search Results**.

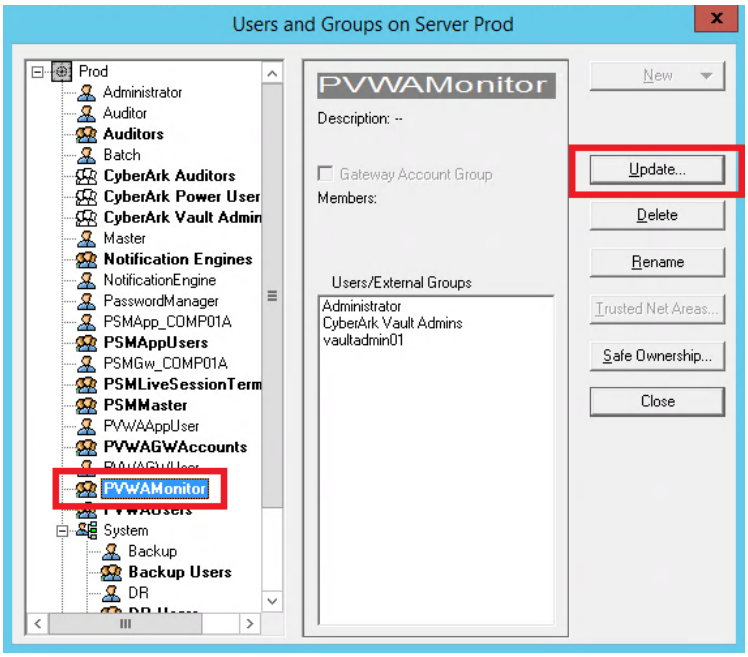


7. Press **OK** until you return to the *Users and Groups on Server Prod* window.

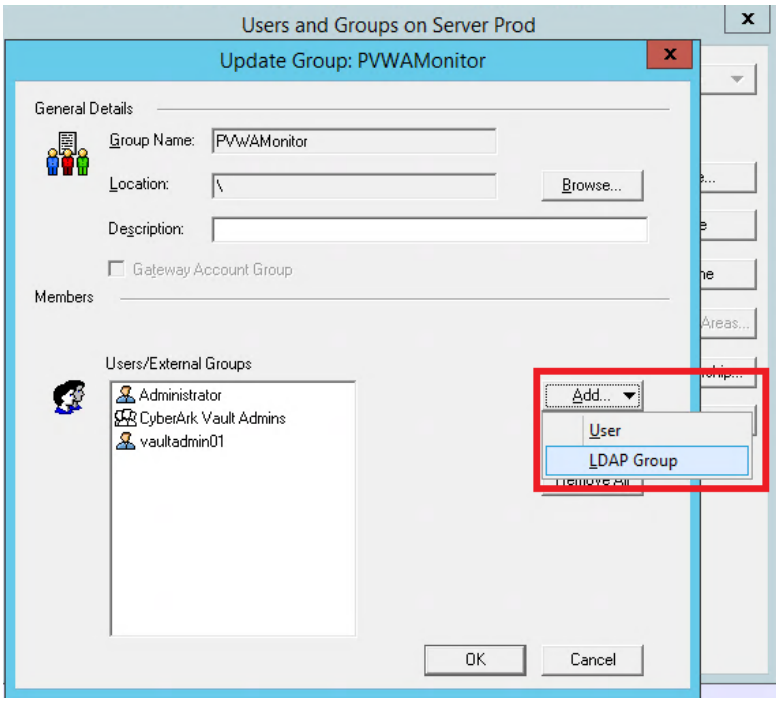
Nesting the Power Users group under the *PVWAMonitor* group

Next you will nest the LDAP group *CyberArk Power Users* under the internal *PVWAMonitor* group. This will allow members of the Power Users group to view the **REPORTS** tab in the **PVWA**.

1. Within the **Users and Groups on Server Prod** window, highlight *PVWAMonitor* and press **Update**…



2. Press **Add** and select **LDAP Group**.

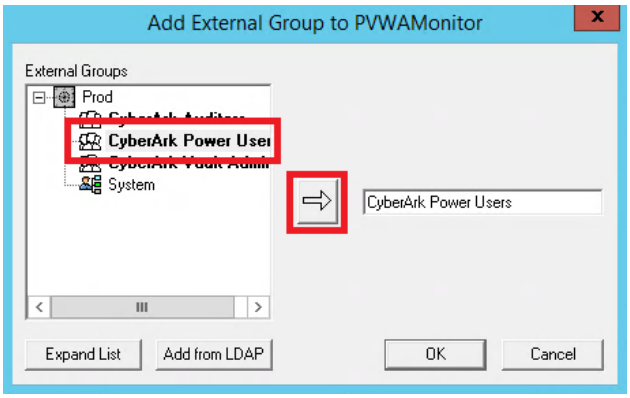


3. Select *CyberArk Power Users*.

4. Press the **Arrow** button to move it to the field on the right.

5. Press **OK**, to confirm the addition of *CyberArk Power Users* to the *PVWAMonitor* group.

6. Press **OK** again to close the *Update Groups: PVWAMonitor* window.



7. Press **Close** to close the 'Users and Groups on Server Prod' window and complete the nesting process.

8. Log off from the **PrivateArk Client**.

Viewing the differences between Vault Admins and Power Users groups

Next, you will login to the **PVWA** to view the differences between *Vault Admins* and *CyberArk Power Users* directory mappings within the **PVWA**.

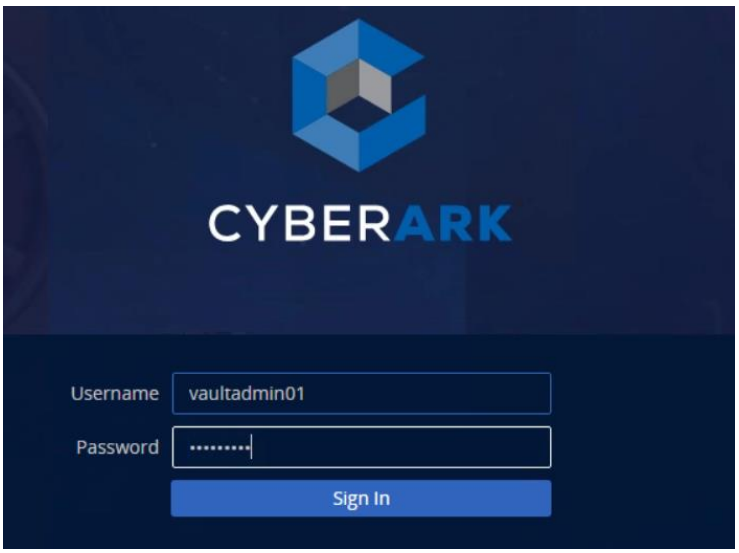
Up to this point we have been logging in with users who were created on the **CyberArk** system and authenticated by **CyberArk**.

Since the LDAP integration has already been configured, we will log in to the **PVWA** with Active Directory credentials and be authenticated with LDAP. From this point forward, you will use LDAP Authentication for all users except *Administrator*. The *Administrator* user will use CyberArk Authentication.

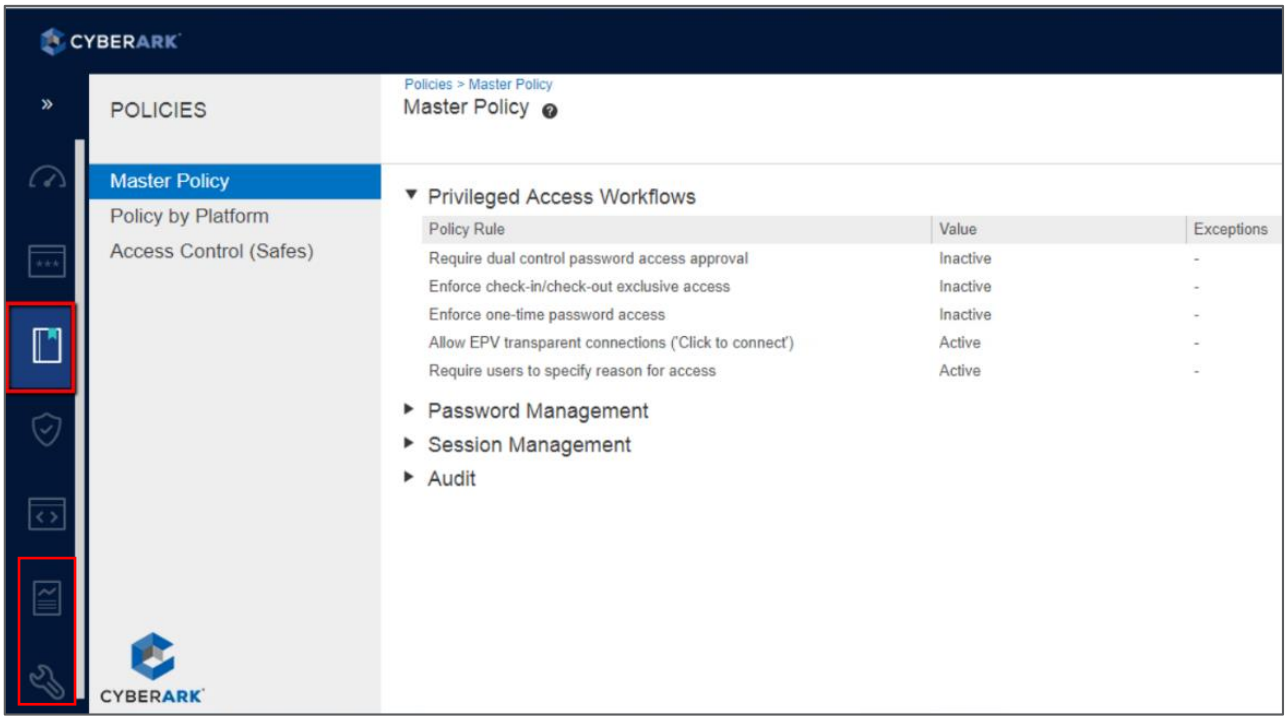
Note:	For the duration of this class, all passwords for all users and accounts will be *Cyberark1*, unless otherwise noted.

1. Open Chrome, go to the **PVWA** and choose **LDAP** as the authentication method.

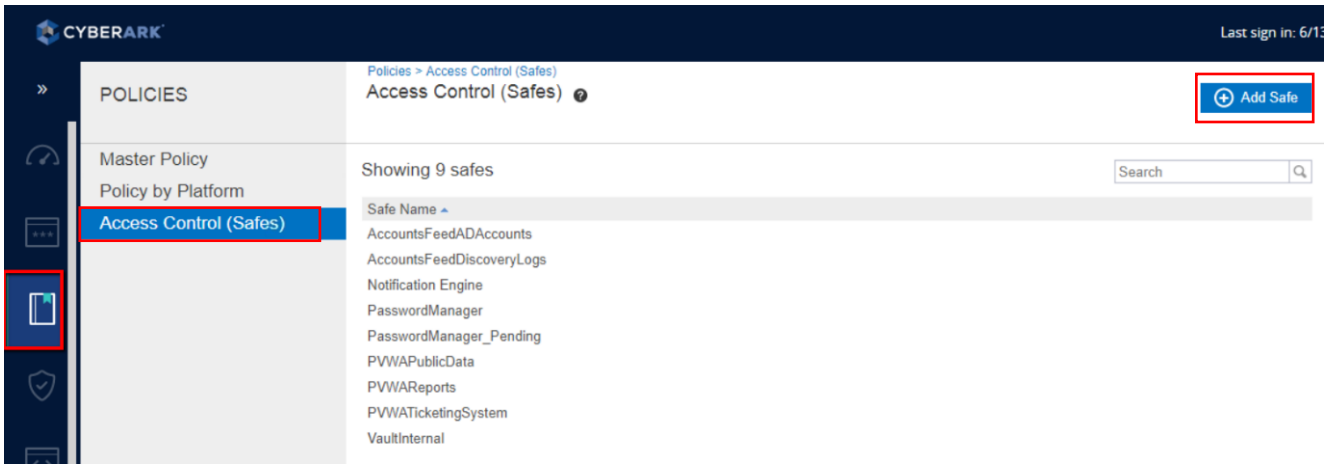
2. Enter the username *vaultadmin01* and *Cyberark1* as the password. Press **Sign in**.



3. Confirm that your LDAP authentication was successful and you are able to view the **Policies**, **Reports**, and **Administration** tabs. This verifies that the LDAP user (vaultadmin01) has the correct *Vault Admins* and *PVWAMonitor* privileges.



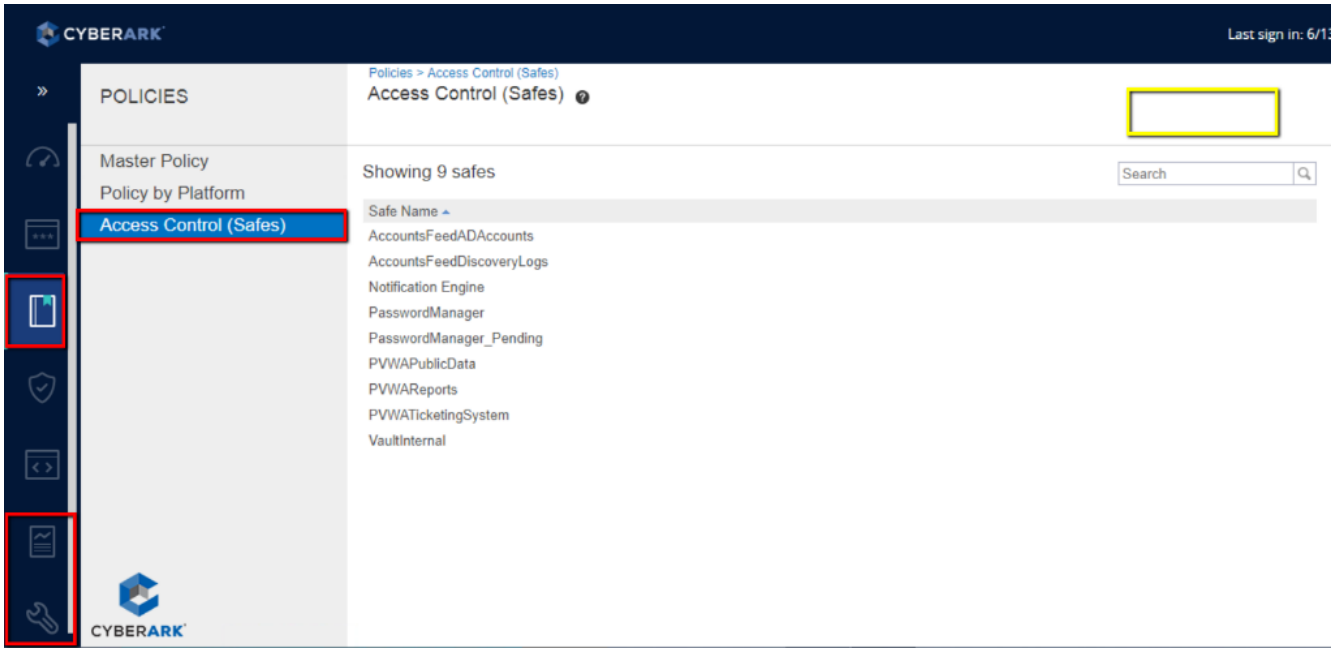
4. Go to **POLICIES > Access Control (Safes)** and verify that you can see the **Add Safe** button in the upper right hand corner of the window. This confirms that the *vaultadmin01* user has been provided the *Add Safes* vault authorization.



5. Log out of the **PVWA** and log back in as *poweruser01* using LDAP as the authentication method.

Note:	This user should have access to the **Policies, Accounts, Applications, Reports,** and **Administration** tabs because the *CyberArk Power Users* group was nested under the *Vault Admins* and *PVWAMonitor* groups. However, it does not have access to the *Add Safe* button because 'Power Users' do not have the authorization to add safes.

6. Go to **POLICIES > Access Control (Safes)** and verify you do not see the **Add Safes** button.



7. Sign out of the **PVWA**.

Password Management – Part 1

In this chapter, we will be performing a number of tasks linked to account password management. Use the Chrome browser on your Components server in order to connect to the **PVWA**.

Note:	Some features may require the use of the UI´s classic interface (pre-version 10). In order to access this, you may need to select "Additional details & actions in classic interface".

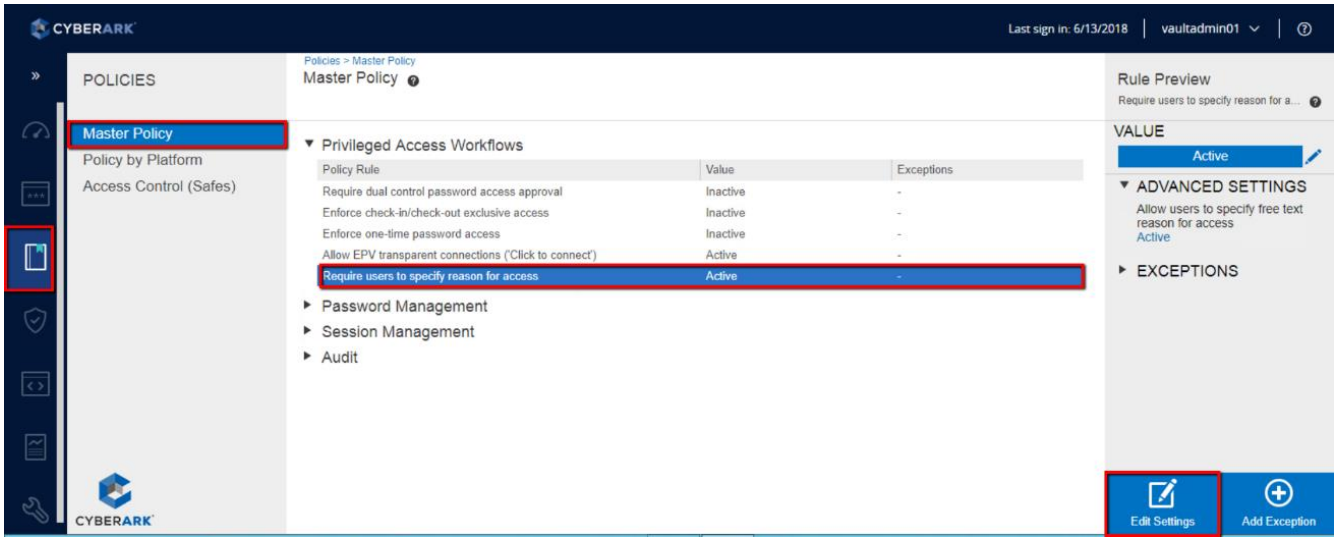
Editing the Master Policy

In this step, you will use the **PVWA** to modify the *Master Policy* to:

- Disable *Require users to specify reason for access*
- Verify passwords daily instead of weekly
- Activate the PSM

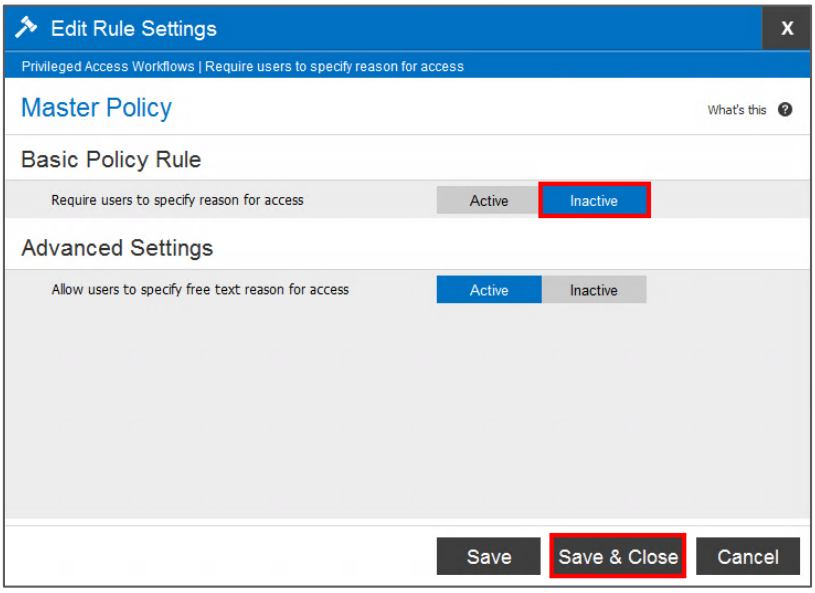
Disable *Require users to specify reason for access*

1. Launch the **PVWA** and using LDAP authentication and log in as *vaultadmin01*.
2. Go to the **POLICIES > Master Policy**.
3. Choose *Require users to specify reason for access* and then click **Edit Settings**.



4. Change the **Basic Policy Rule** *Require users to specify reason for access* from **Active** to **Inactive**.

5. Press **Save & Close**.

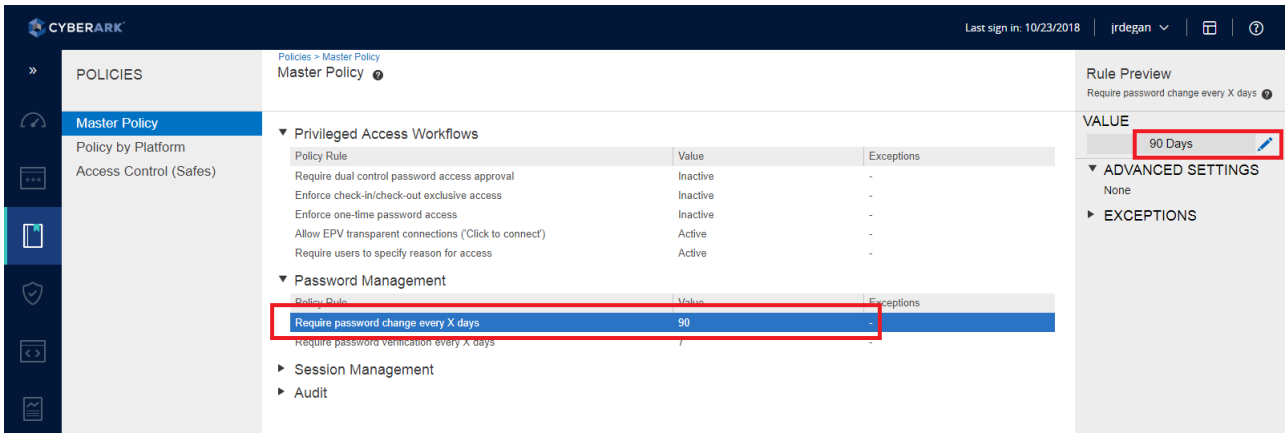


Change passwords daily instead of weekly

We will change the password change baseline policy from 90 days to 1 day in order to be able to see our **CPM** change passwords automatically during the training. This is not a recommended setting.

1. Expand the **Password Management** section. Highlight *Require password change every X days*.

2. In the right-hand pane, click the pencil icon to edit the *Value*.



3. Change the value from **90** days to **1** and click the diskette icon to save the change.

Activate the PSM

The **PSM** is deactivated by default. In order to use it, we will need to activate it.

1. In the **Session Management** section, activate the option *Require privileged session monitoring and isolation*.

2. In the upper right-hand corner of the screen, click on the pencil next to the **Inactive** button. Select *Active*, click the diskette icon to save.

3. The **PSM** is now active. Open up the Windows Services (there is a short cut in the task bar) and make sure that the *Cyber-Ark Privileged Session Manager* service is running.

Managing Linux Accounts with SSH

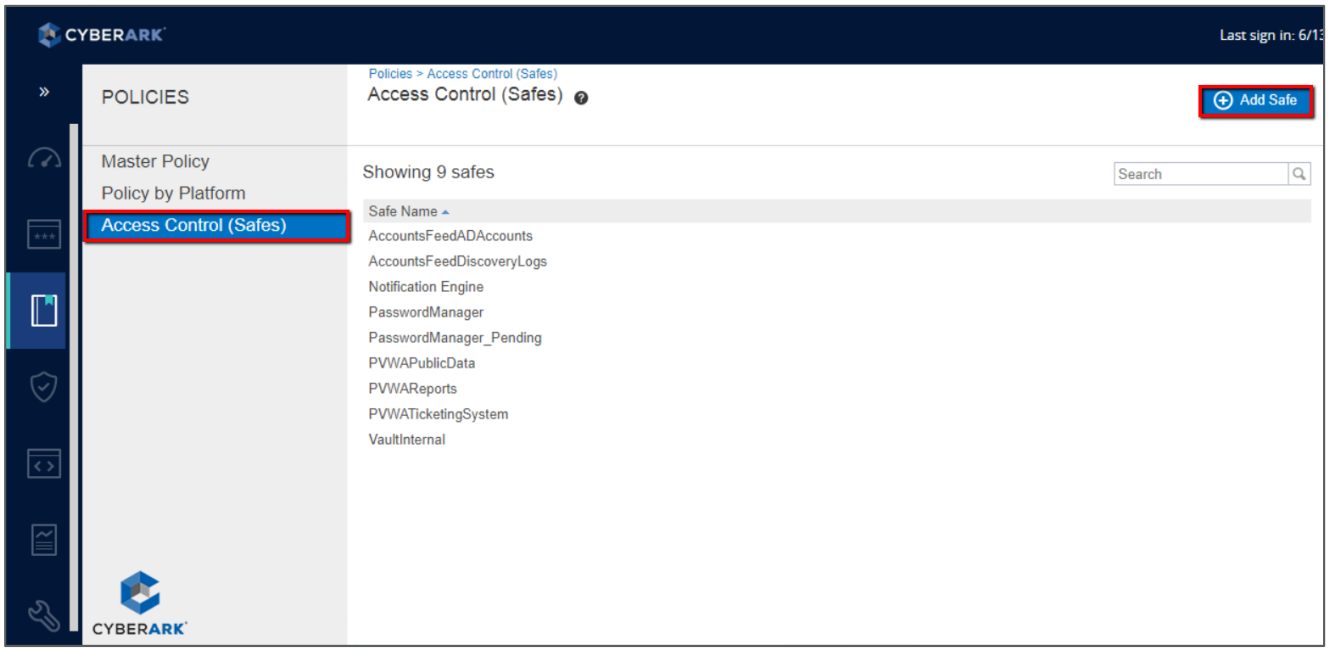
In this section, we will perform the basic tasks required to manage a privileged account on a Linux server that we connect to using SSH. We will create a **Safe** to securely store the account and a **Platform** to manage the account. We will then add the new account, verify that we can connect with it, and see how an auditor can monitor the account activity.

Creating a Safe

1. If you are not already logged in, log in to the **PVWA** as *vaultadmin01*.

2. Go to **POLICIES > Access Control (Safes)**.

3. Click **Add Safe**.

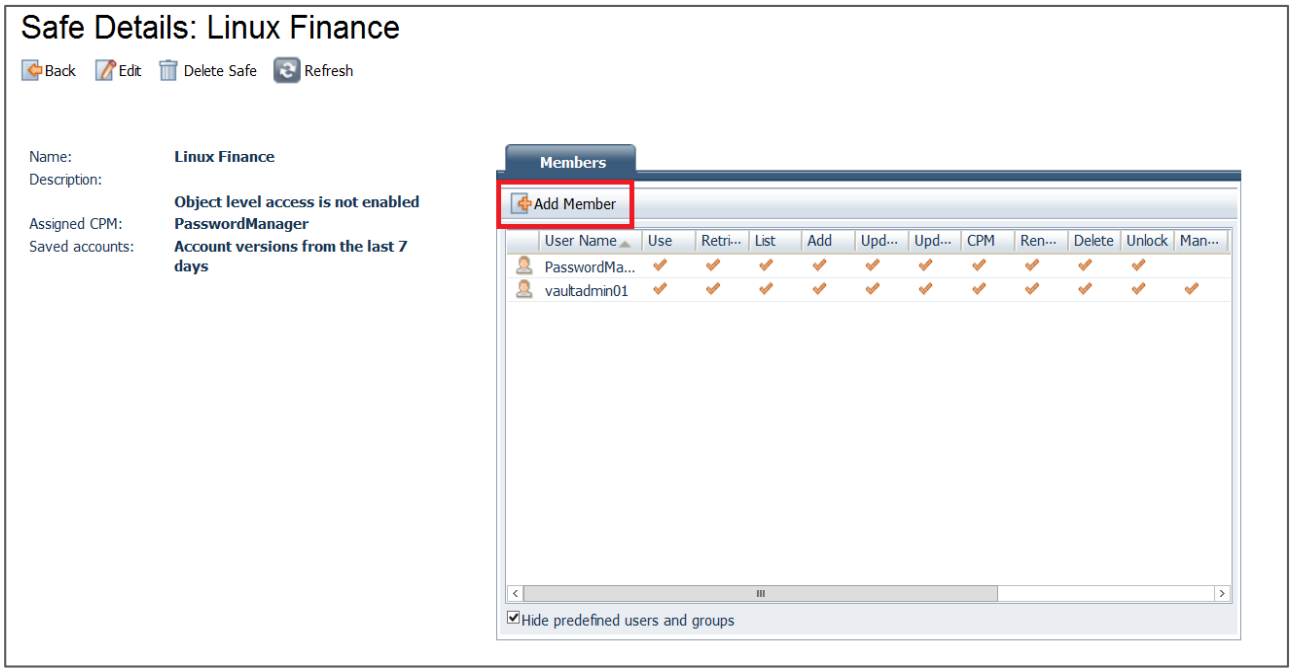


4. Enter *Linux Finance* as the **Safe Name**.

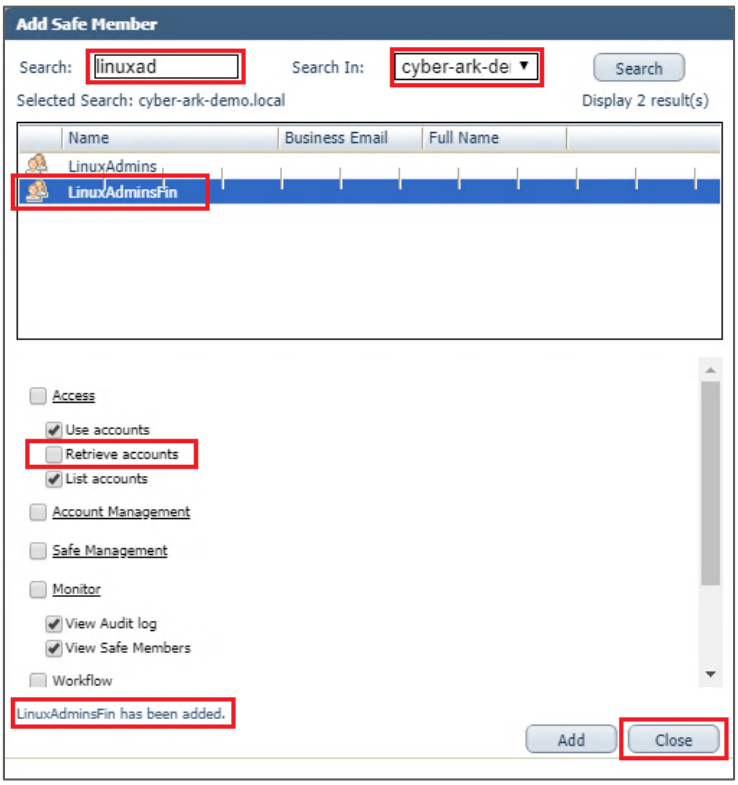
5. Optionally, provide a meaningful description like: "*Linux accounts, access restricted to Linux admins approved by Finance department – LinuxAdminsFin*"

6. Press **Save**.

7. Press **Add Member** to grant other users access to the new safe.

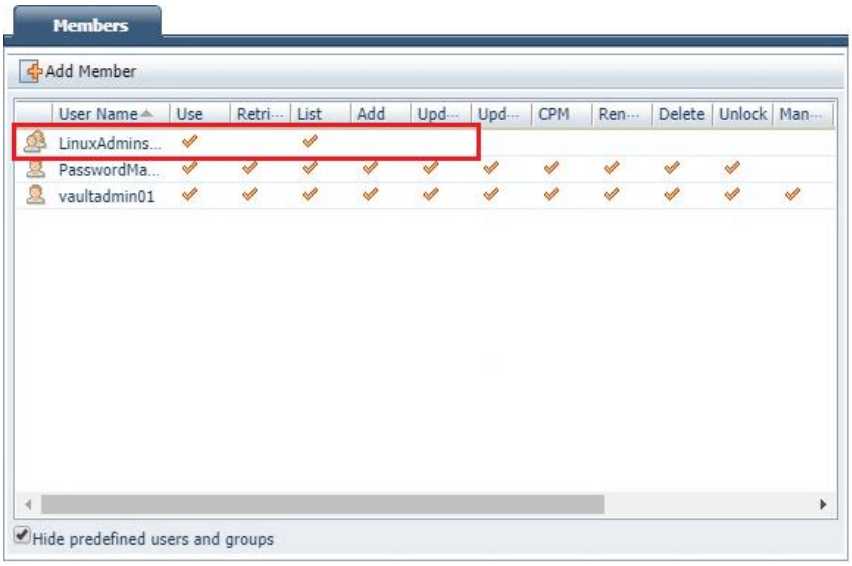


8. Enter *linuxad* in the **Search** field, select *cyber-ark-demo.local* in the **Search In** field and press **Search**. Select *LinuxAdminsFin*, uncheck the option *Retrieve accounts*, and press **Add**.



9. Close the **Add Safe Member** window.

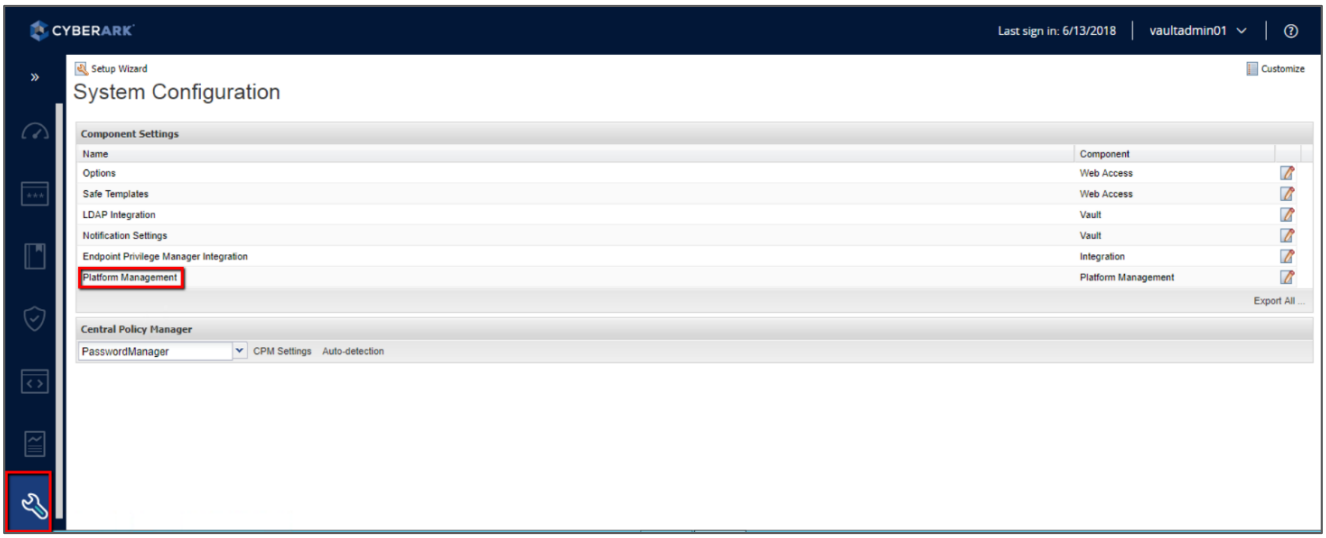
Note:	You should now see that the *LinAdminsFin* group has been added to the newly created *Linux Finance* safe. We removed the 'Retrieve' option so that users will never have access to the password. They can use it to connect, but never actually see it. Also note that the user logged in is the creator of the safe and is granted full permissions to the safe by default.



Duplicating a Platform

Next, you will create a platform to manage Linux accounts that connect with SSH.

1. Go to **ADMINISTRATION** and choose **Platform Management**.

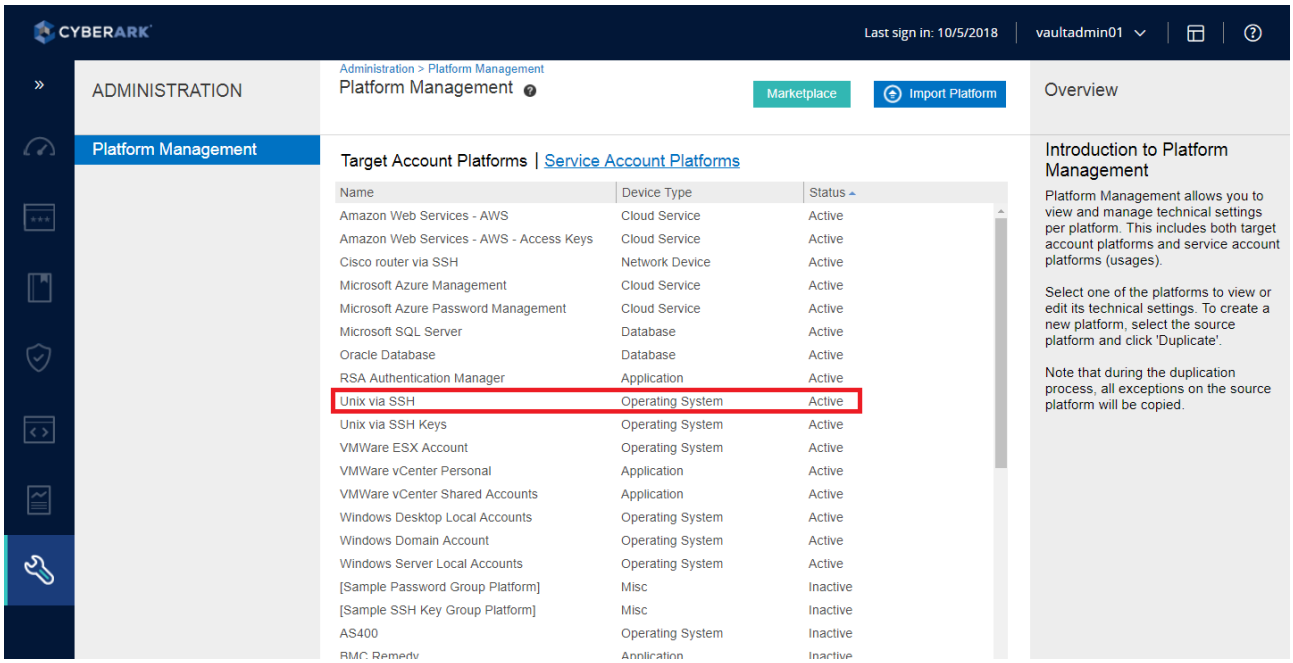


Note: Notice in the image below that some of the Platforms are *Active* while others are *Inactive*. It is recommended to deactivate any Platforms that are not being actively used. The Platforms we will be using in this course are:

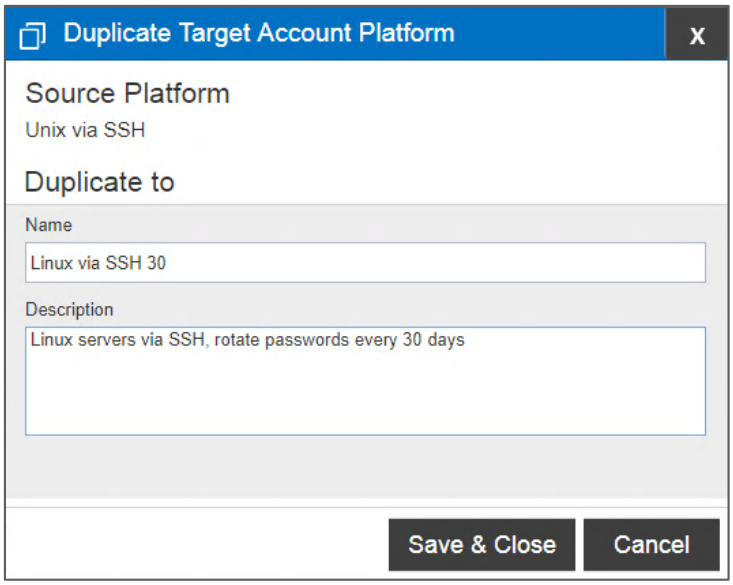
- *Oracle Database*
- *Unix via SSH*
- *Unix via SSH Keys*
- *Windows Domain Account*
- *Windows Server Local Accounts*

You can deactivate all the other Platforms. Doing so is best practice and will help avoid errors.

2. Choose *Unix via SSH* and press **Duplicate.**

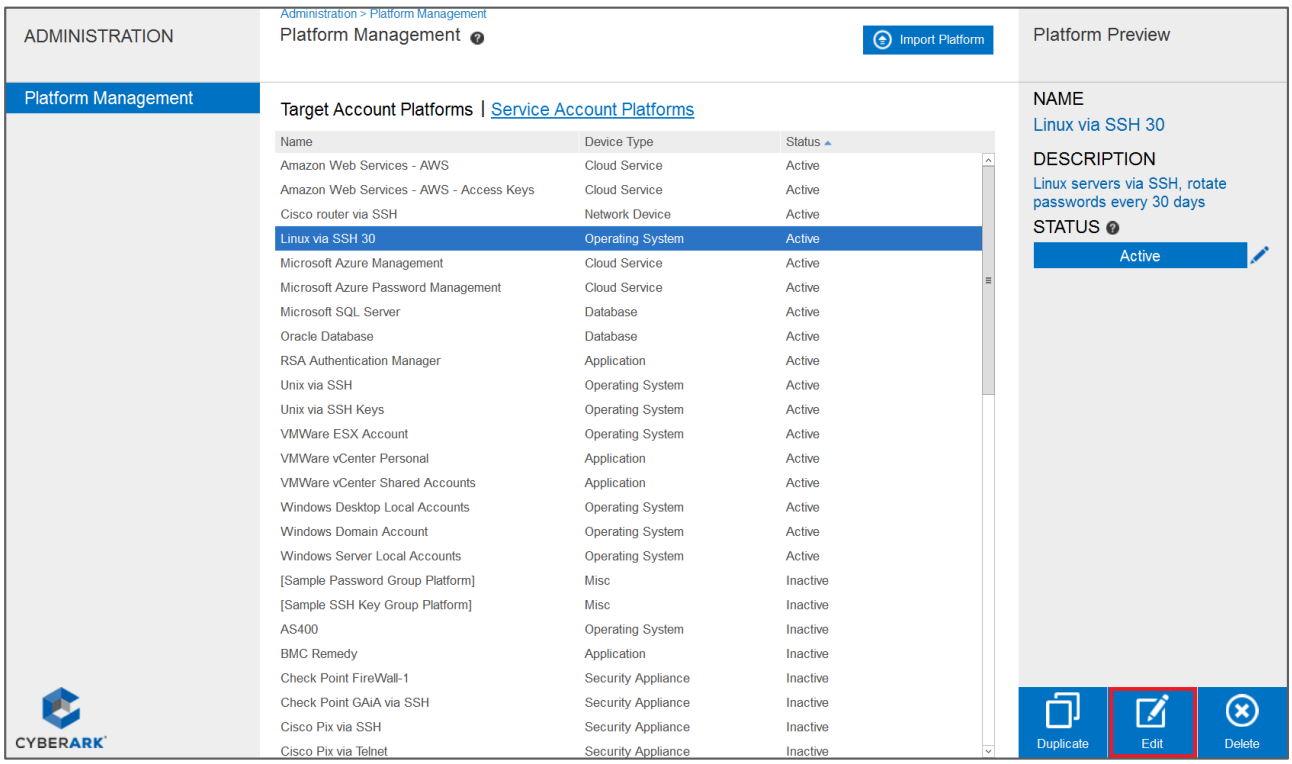


3. Enter *Linux via SSH 30* in the **Name** field and optionally something like *Linux servers via SSH, rotate passwords every 30 days* for a description and then press **Save & Close**.



Important! The name you give your Platform does not matter. You can call it whatever you want. However, for the purposes of this training, the name you give it DOES matter because we will be referring to it later in the course. If you choose not to follow the instructions as they are given, do not be surprised if you struggle to get later exercises working.

4. Highlight the newly created platform and press **Edit**.



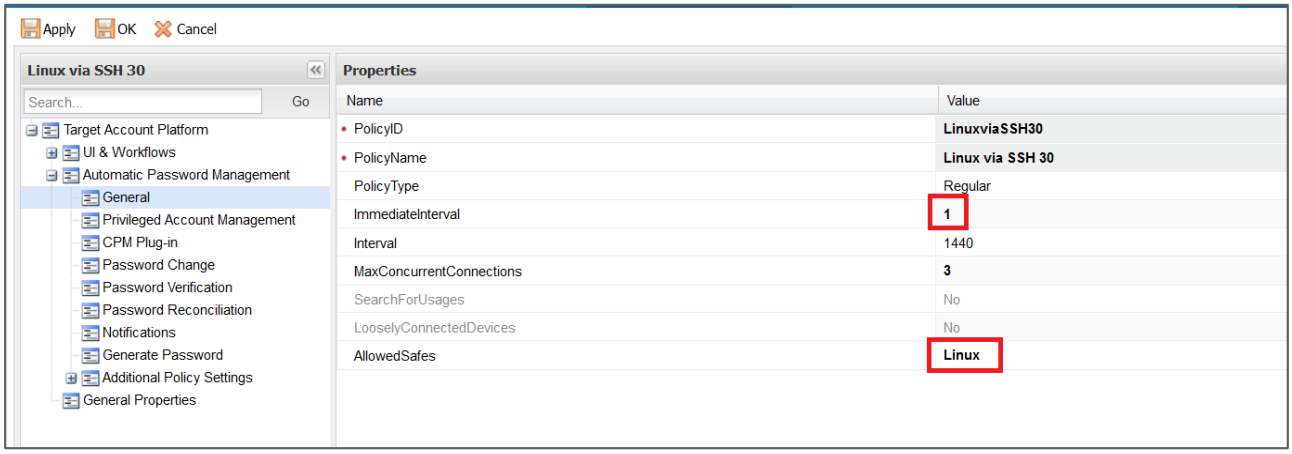
5. Go **Automatic Password Management > General**.

6. Change *ImmediateInterval* to **1**.

Note:	Changing the *ImmediateInterval* field to *1* is only suitable for testing but should set to 5 or higher in a real environment.

7. Change **AllowedSafes** to *Linux* (case sensitive). This determines which safes can use this platform.

8. Click **Apply** to save your changes, but do not exit the platform just yet.



9. Now go to **Password Change** and change the value of the parameter *PerformPeriodicChange* from **No** to **Yes**. This will enable the application of the Master Policy rule *Require password change every X days* to accounts managed by this platform.

10. Within the same window, go to **Password Verification** and change *VFPerformPeriodicVerification* from **No** to **Yes**. This will allow the password to be verified by the **CPM** automatically and without user intervention.

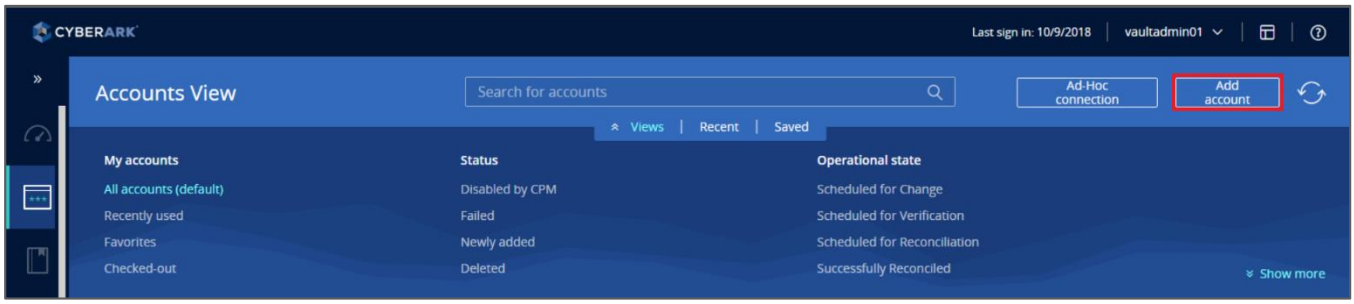
11. Finally, in **Generate Password**, note that the default password length for Unix machines is 8 characters. We might want to set this to a higher value.

12. Click **Apply** and **OK**.

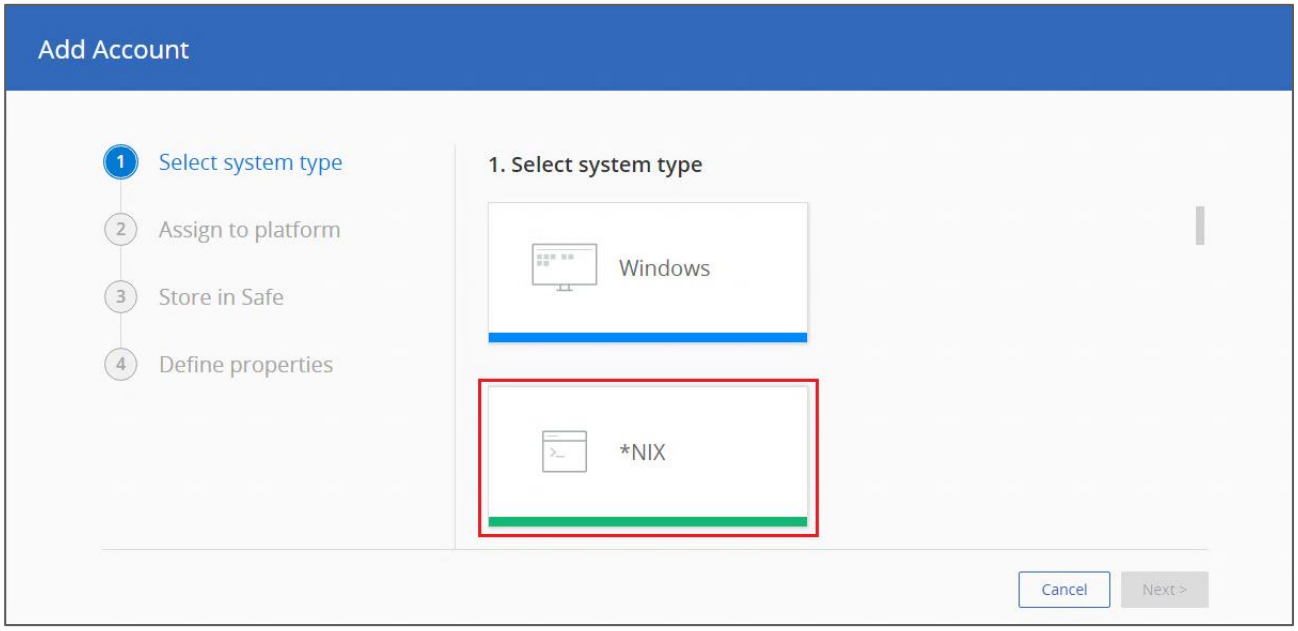
Adding a Linux account

Now you will add your first Linux account and store it in the *Linux Finance* safe and manage it with the *Linux via SSH 30* platform.

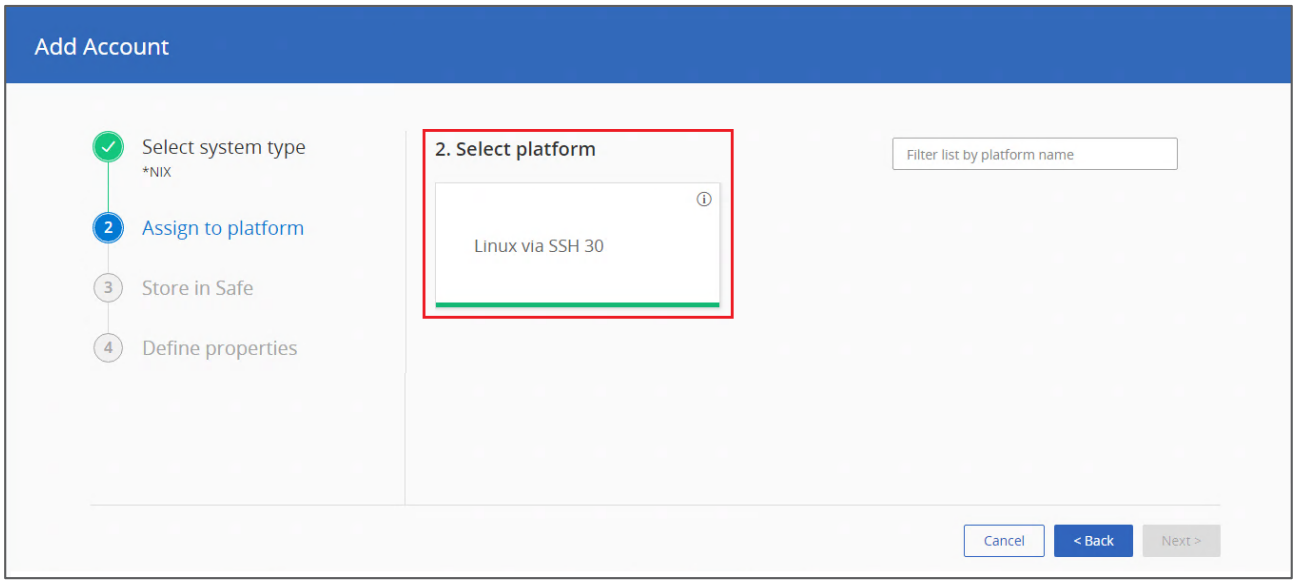
1. Go to **ACCOUNTS** and click **Add Account**.



2. On the *Add Account* page, first select the system type **NIX* and click **Next**:

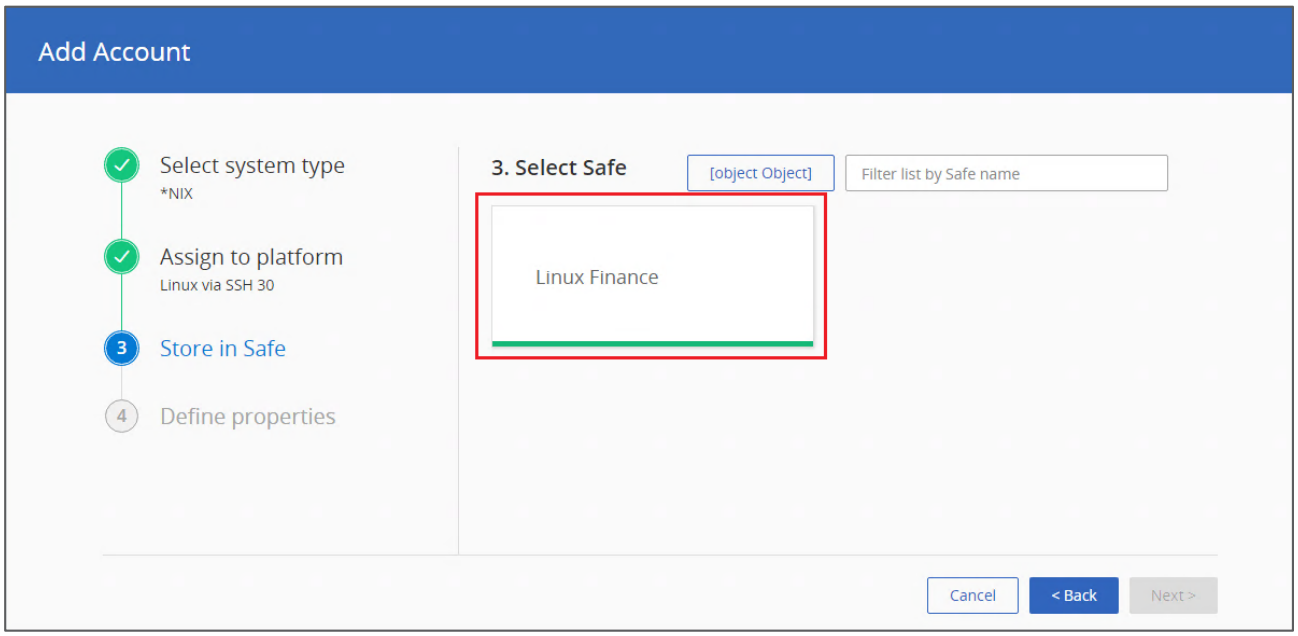


3. Select the *Linux via SSH 30* platform and click **Next**:



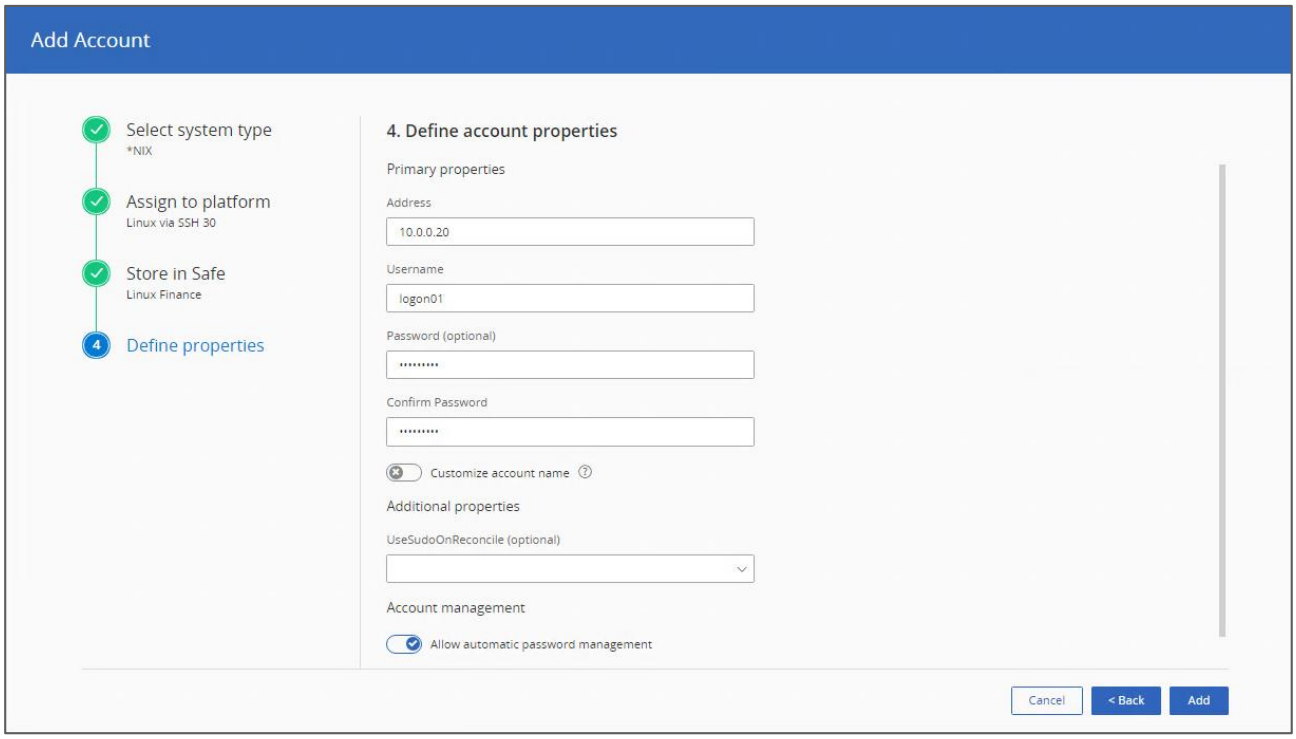
Note:	In the image above, only one platform appears. Why is that?

4. Select the safe we created earlier: *Linux Finance* and click **Next**.

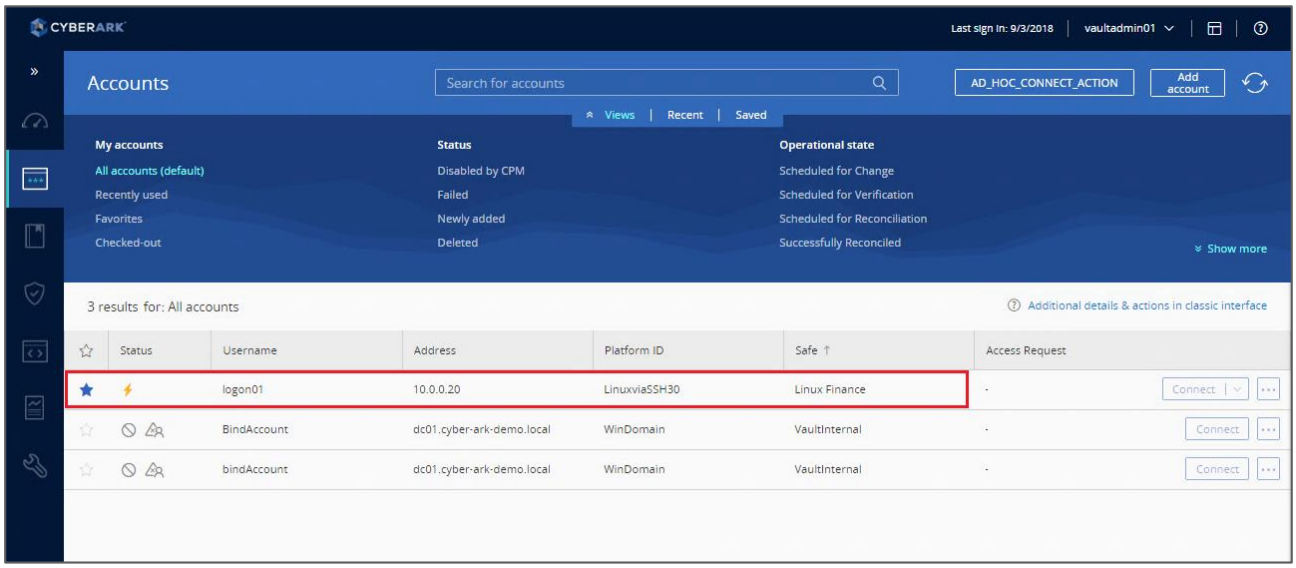


5. Enter the account details shown below and click on **Add**:

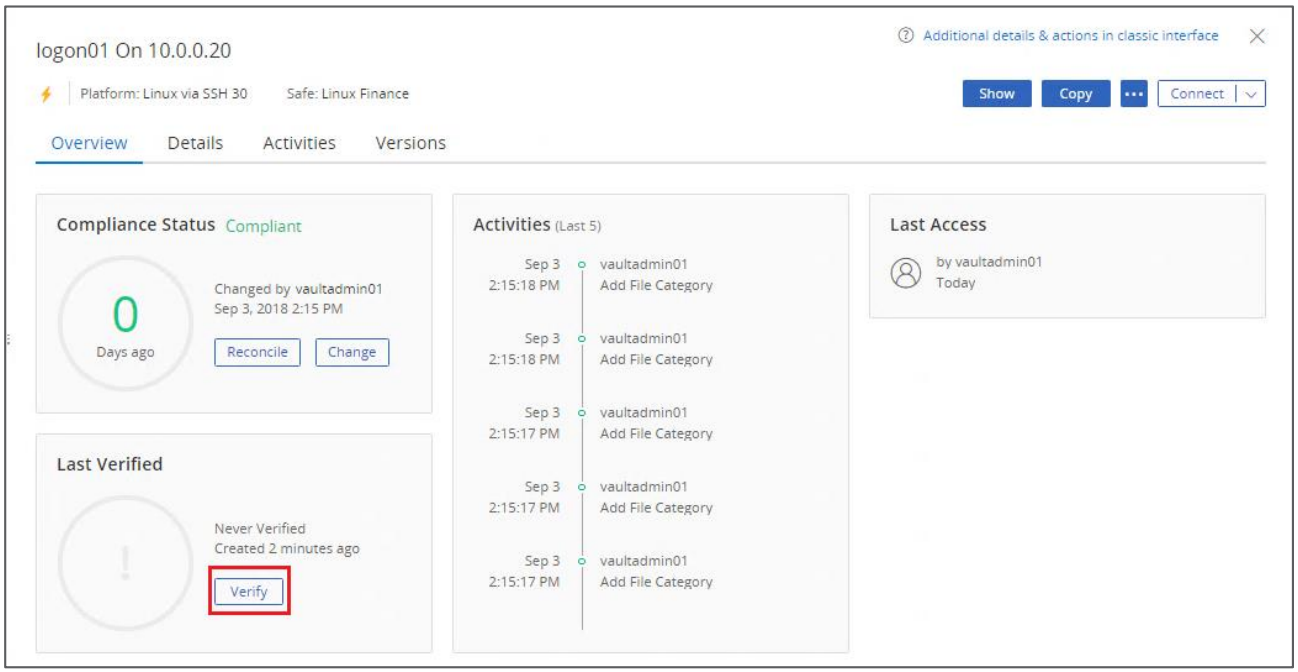
Address:	*10.0.0.20*
User Name:	*logon01*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*



6. On the **Accounts** page, select the newly created account.



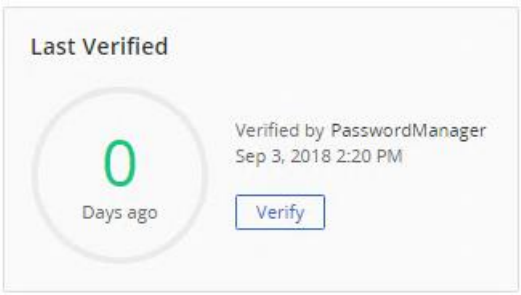
7. On the **Account Details** page, press the **Verify** button to confirm that you have created the account correctly.



8. Press the **Refresh** button.

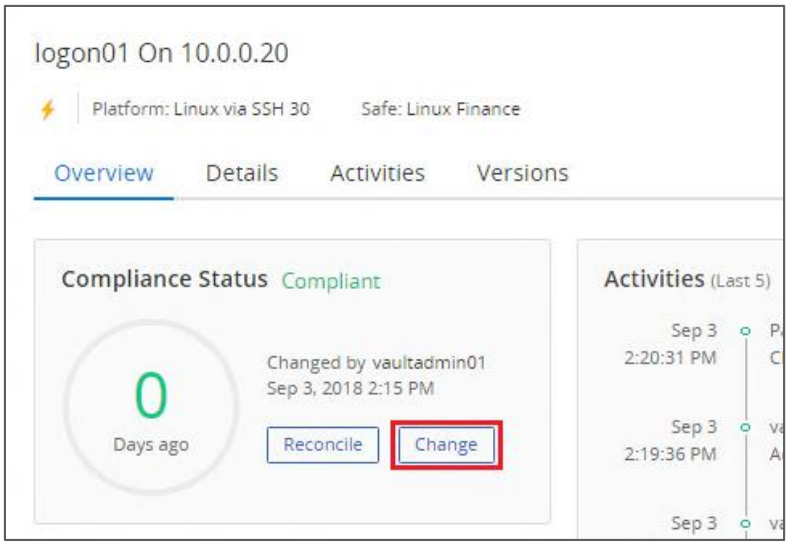
Note: You will see a message saying that '*The account is scheduled for immediate verification*'.

9. After a few minutes, the message should disappear and the *Last verified* field will be updated.

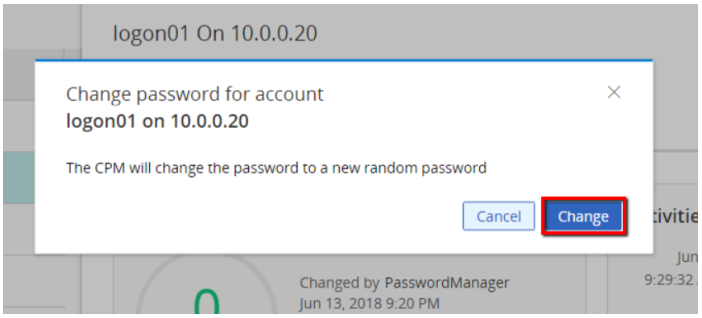


Changing the password

1. On the *Account Details* page, press the **Change** button.

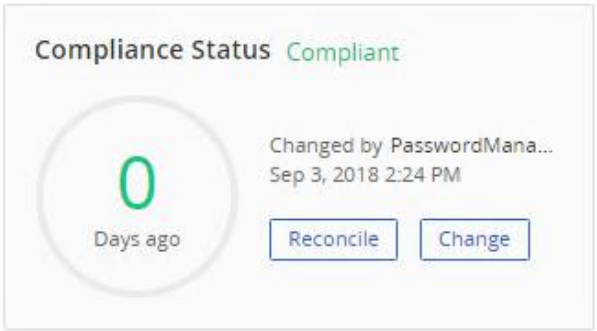


10. Press the **Change** button**.**



Note: You will see a message saying 'Account is marked for change.

11. After a minute or two, press **Refresh**. The message should disappear and you will see the message "Changed by PasswordManager" followed by a recent timestamp.



12. Sign out of the **PVWA**.

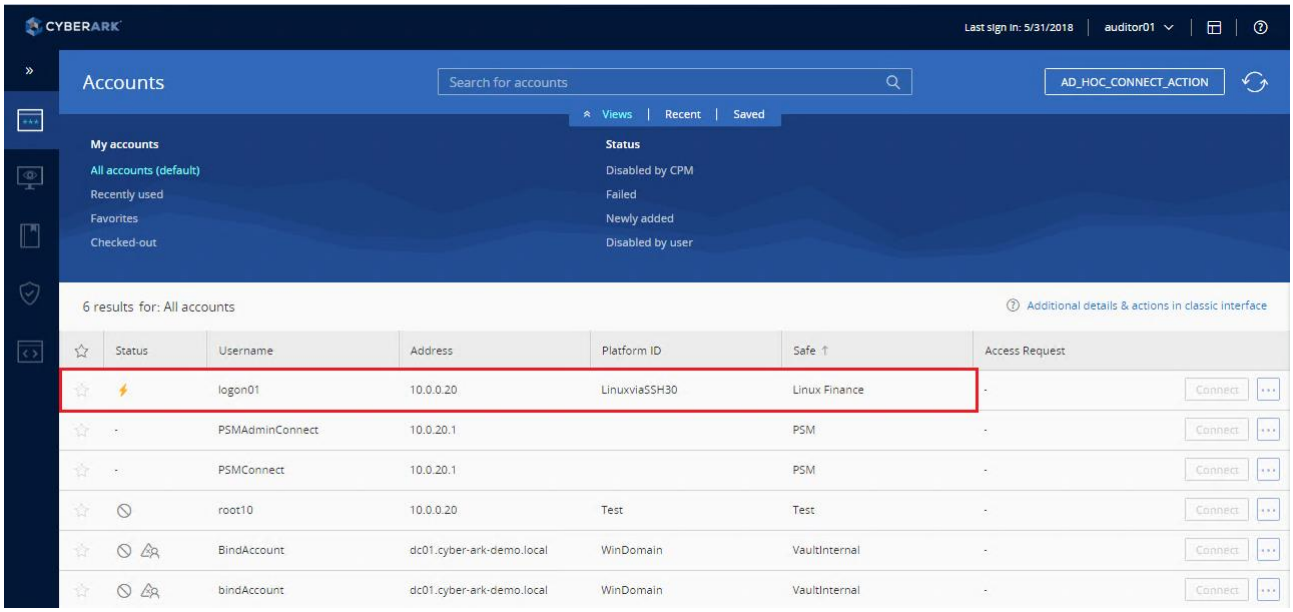
Auditing Account Activity

In this step you will review all of the activity related to the *logon01* account.

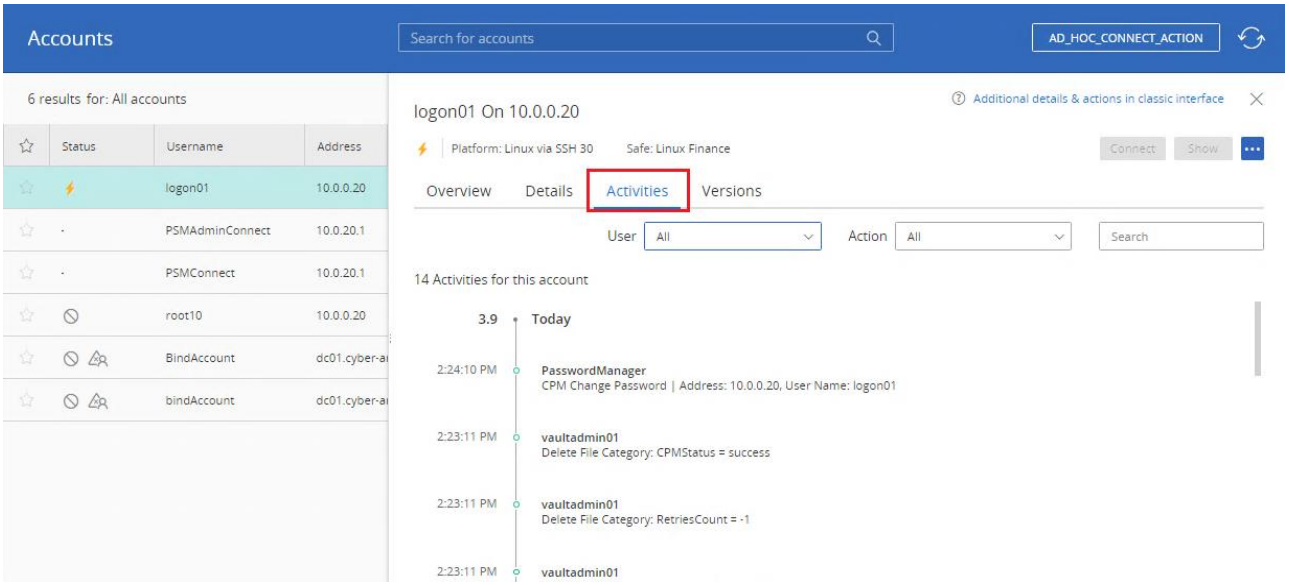
1. Sign out of the **PVWA** and using **LDAP Authentication**, sign back in as *auditor01.*

2. On the **Accounts** page, click on the magnifying glass icon in the top right corner to view all accounts the auditor has permissions to view.

3. Click on the *logon01* account.



4. Click on the **Activities** tab to view the detailed activities log for this account.



5. Sign out of the **PVWA**.

Managing Windows Domain Accounts

In this section, we will be performing the tasks for managing a Windows domain account. We will again duplicate an appropriate platform (though one adapted to managing Windows domain accounts), add a safe, and then add the account.

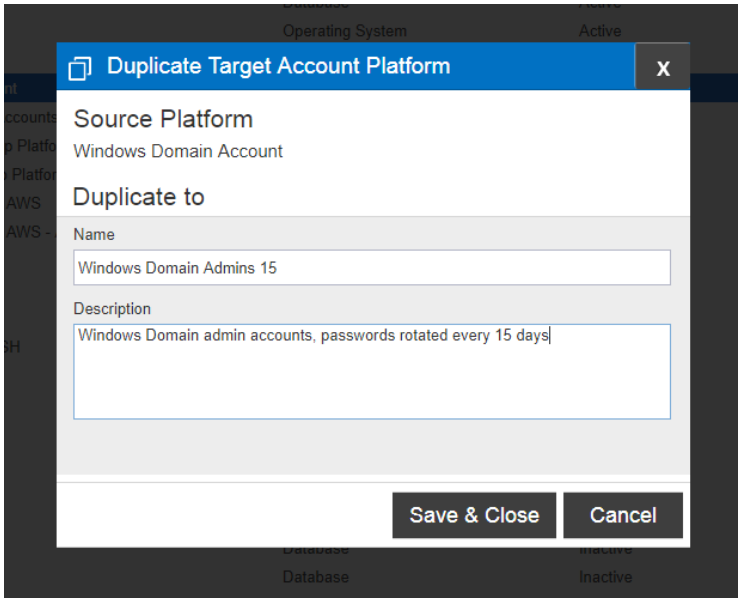
Duplicating a Platform

1. Using LDAP authentication, login to the **PVWA** as *vaultadmin01*.

2. Go to the **Administration** page and click **Platform Management**.

3. Highlight the *Windows Domain Account* platform and press **Duplicate**.

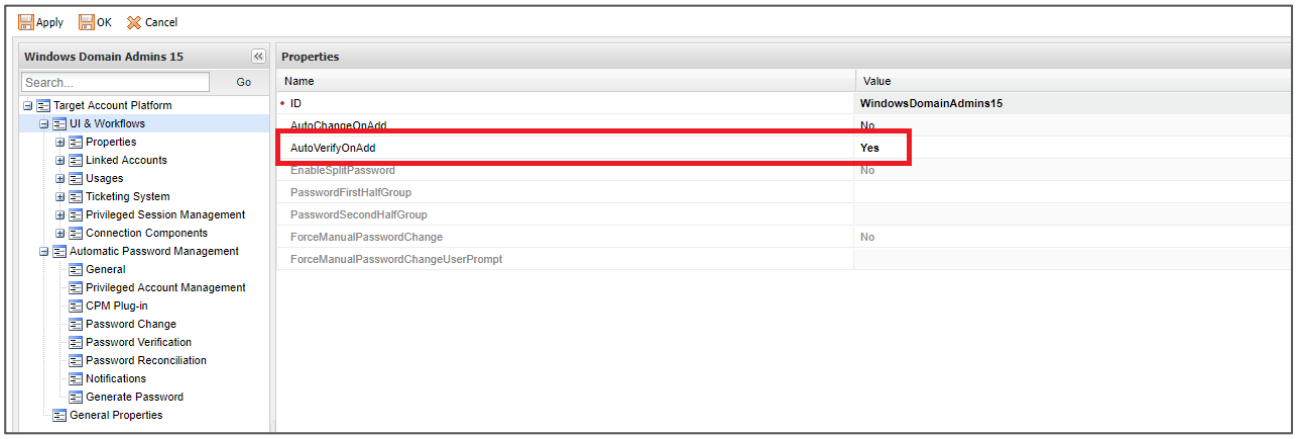
4. Enter as the name *Windows Domain Admins 15* (optionally you can give it a meaningful description) and then press **Save & Close**.



5. Select the *Windows Domain Admins 15* platform and press the **Edit** button.

6. Click on **UI & Workflows**.

7. Change *AutoVerifyOnAdd* from *No* to **Yes**.



Note:	This setting will prompt the **CPM** to automatically verify the password whenever a new account assigned to this platform is added.

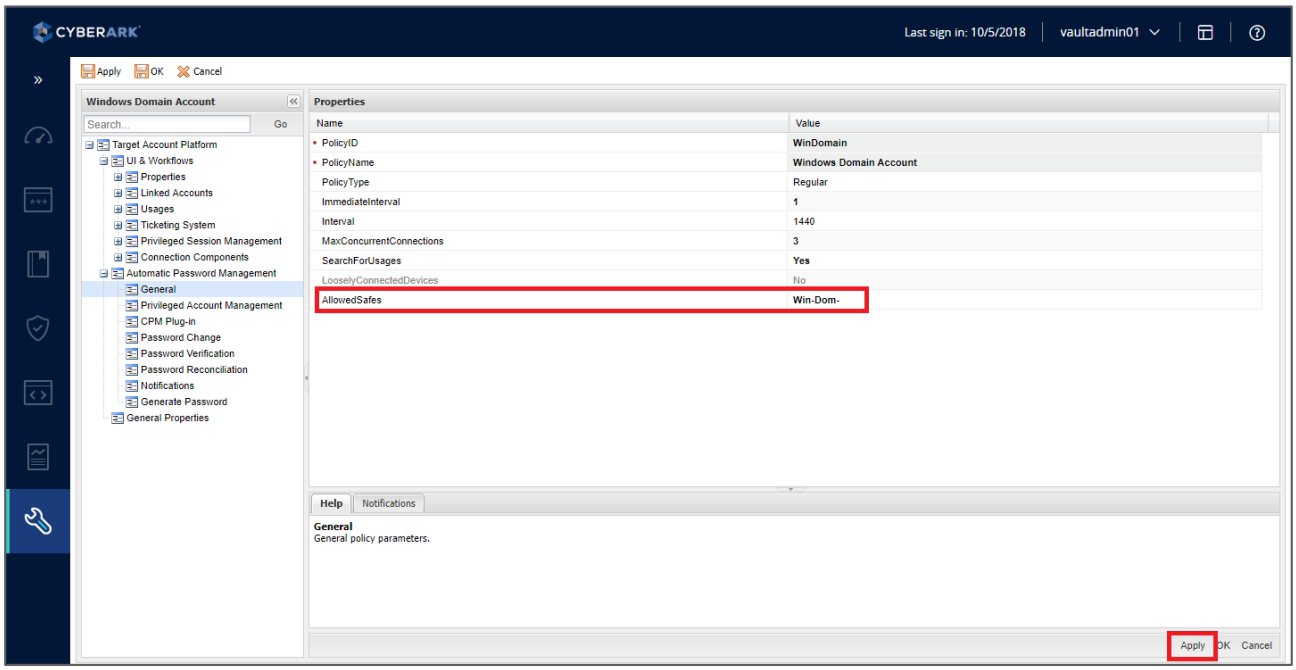
8. Press **Apply**.

9. Go to **Automatic Password Management > General** and set *ImmediateInterval* to 1 (as we did in the first platform).

10. Enter **Win-Dom-** in the *AllowedSafes* field (this is case sensitive).

Reminder: This setting restricts the safes to which this platform can be applied to those safes with the string "*Win-Dom-*" included in the name. This field is case sensitive.

11. Press **Apply**.



12. Go to **Password Change** and set *PerformPeriodicChange* to **Yes**.

13. Go to **Password Verification** and set *VFPerformPeriodicVerification* to **Yes**.

14. Finally, go to **Generate Password**. Here, we are going to modify the password length and complexity to give us more secure passwords for our domain admin accounts. Set the values as follows:

PasswordLength	15
MinUpperCase	1
MinLowerCase	1
MinDigit	1
MinSpecial	1

Note: The sum of the various complexity parameters must be less than or equal to *PasswordLength* in order for password change to function. However, the system does not check the values for you.

15. Press **Apply** and **OK** to close the platform.

Note:	Best practice would suggest that we deactivate the default *Windows Domain Account* platform now that we have duplicated it. We can always reuse it later if we need to, but if it is deactivated, no one will use it by mistake.

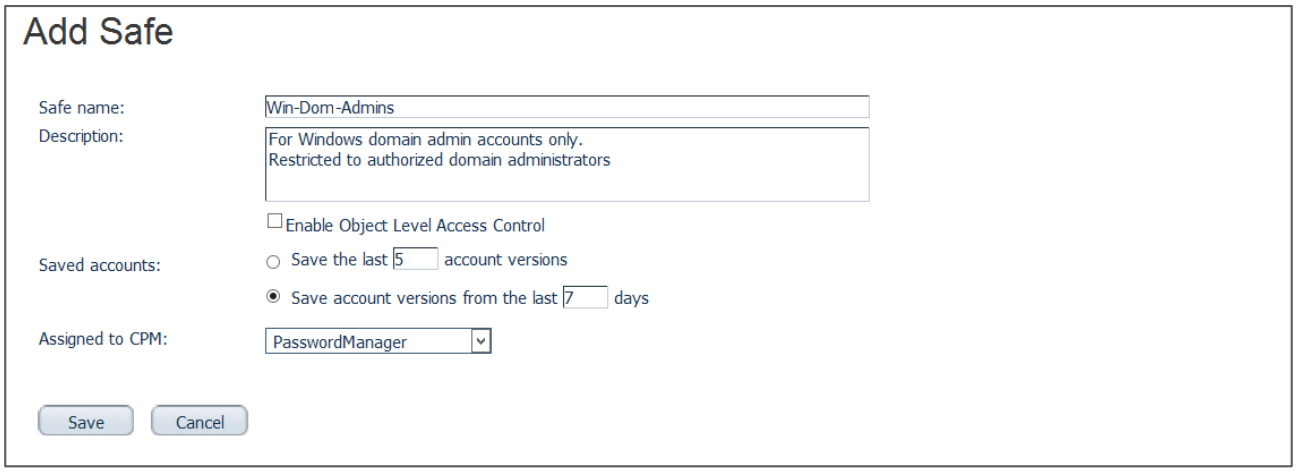
Creating a Safe

Now you will create a safe in which to store Windows domain accounts.

1. Go to **POLICIES > Access Control (Safes)**.

2. Click **Add Safe**.

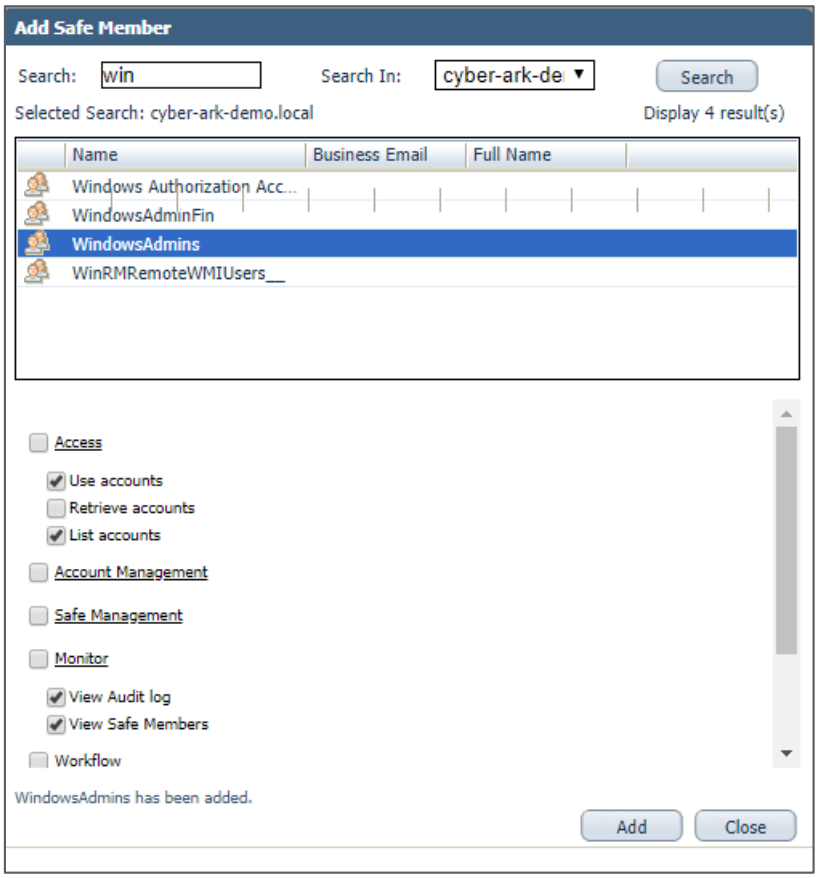
3. Enter **Win-Dom-Admins** the Safe name. You can provide a meaningful description. Leave the other values at their defaults and press **Save**.



4. On the *Safe Details* page, click the **Add Member** button to grant other users access to this safe.

5. Enter *win* in the **Search** field, select *cyber-ark-demo.local* in the **Search In** field, and click **Search**.

6. Select *WindowsAdmins*, uncheck the box for *Retrieve accounts*.



7. Press **Add**, then **Close**.

Adding a Windows Account

In this section, we are going to add an account that already exists in Active Directory and that we will use as our reconcile account.

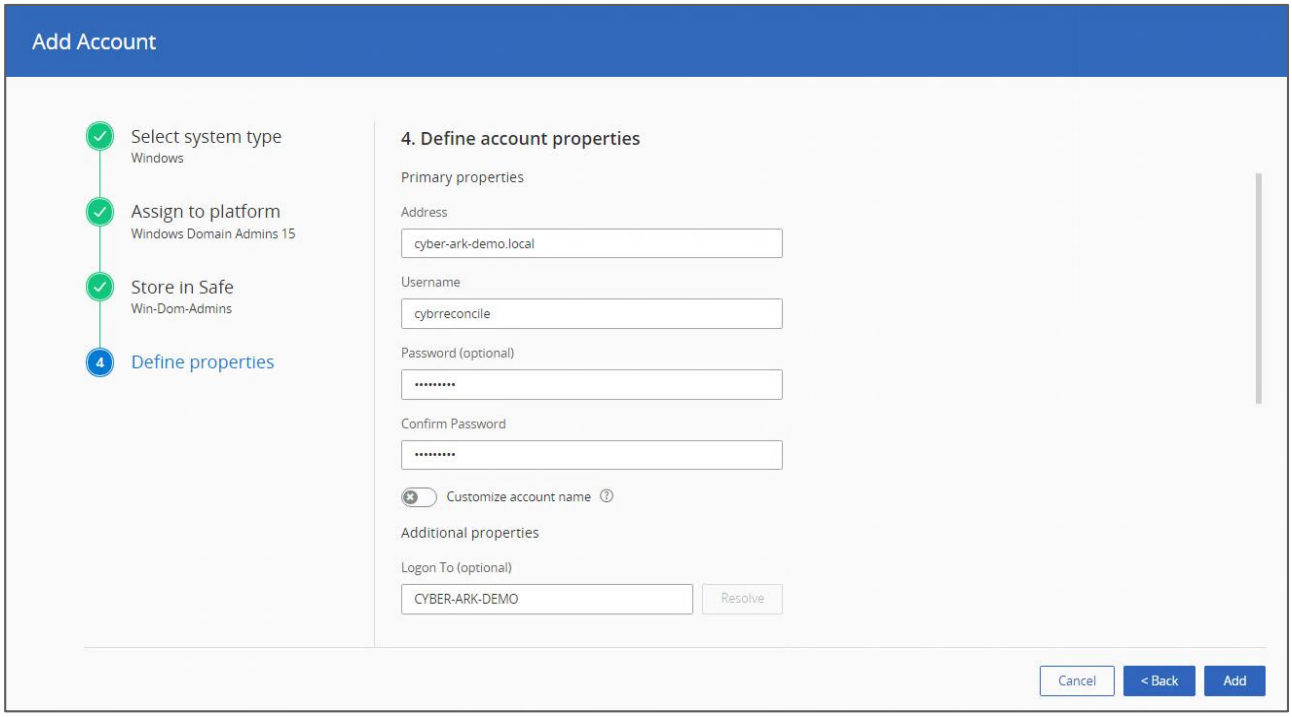
Please note that the account is named *cybrreconcile* (that is cybr, without the "e").

1. Go to the **ACCOUNTS** tab and press the **Add Account** button.

2. Enter the following and then press **Add**:

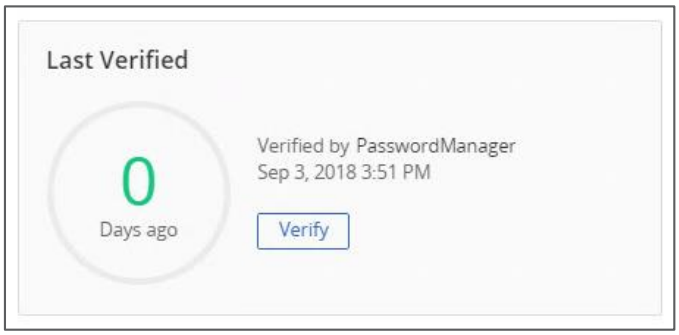
Store in Safe:	*Win-Dom-Admins*
System Type:	*Windows*
Platform Name:	*Windows Domain Admins 15*
Address:	*cyber-ark-demo.local*
User Name:	***cybr**reconcile*

Logon To:	*cyber-ark-demo* *(Click the **Resolve** link after checking the "Logon To:" box)*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*



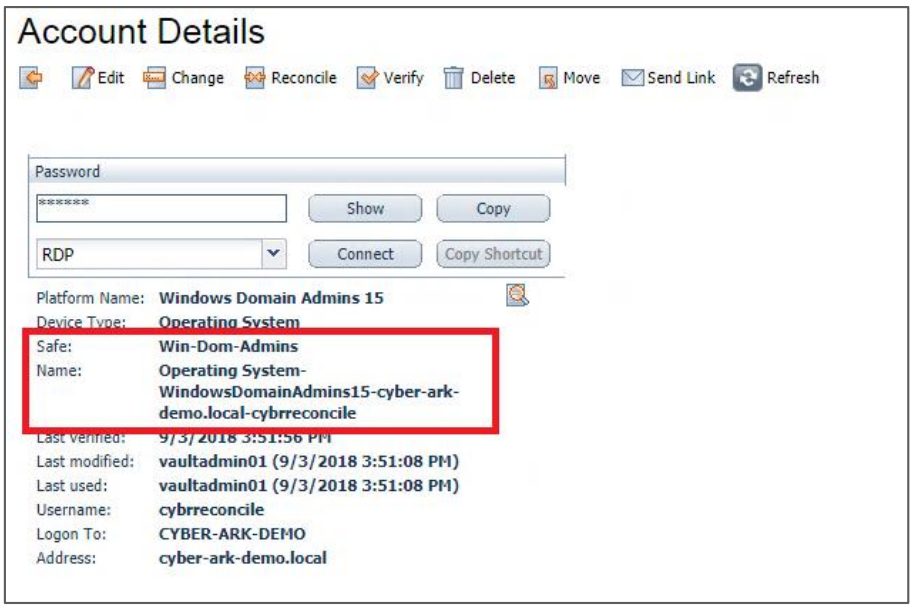
Note: Because *AutoVerifyOnAdd* was set to **Yes**, the account will be scheduled for immediate verification.

3. Press **Refresh** every few minutes until the account is verified.



4. Select the newly created account from the list and then click on **Additional details & actions in classic interface** to open the account in the classic interface.

5. Copy the *Safe* name and the *Name* values to Notepad (we'll be using these values in a later exercise).



Create a Second Windows Domain Account

We will need another Windows Domain Administrator account for a later exercise – *cybrscan*. Add a second Windows domain account using the information below.

Again, please note that it is CYBR (without the E).

Store in Safe:	*Win-Dom-Admins*
System Type:	*Windows*
Platform Name:	*Windows Domain Admins 15*
Address:	*cyber-ark-demo.local*
User Name:	*cybrscan*
Logon To:	*cyber-ark-demo* *(Click the **Resolve** link after checking the "Logon To:" box)*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*

Best Practice:	After adding a new account, you should rotate the password so that only CyberArk PAS knows the password. Go ahead and change the passwords for both *cybrreconcile* and *cybrscan*.

Configuring the Master Policy

In this section, we will configure the Master Policy with two objectives in mind:

- Configuring **Privileged Access Workflows** in anticipation of implementing *Dual Control*
- Adding the exceptions for the platforms we created in the section **Password Management – Part 1**

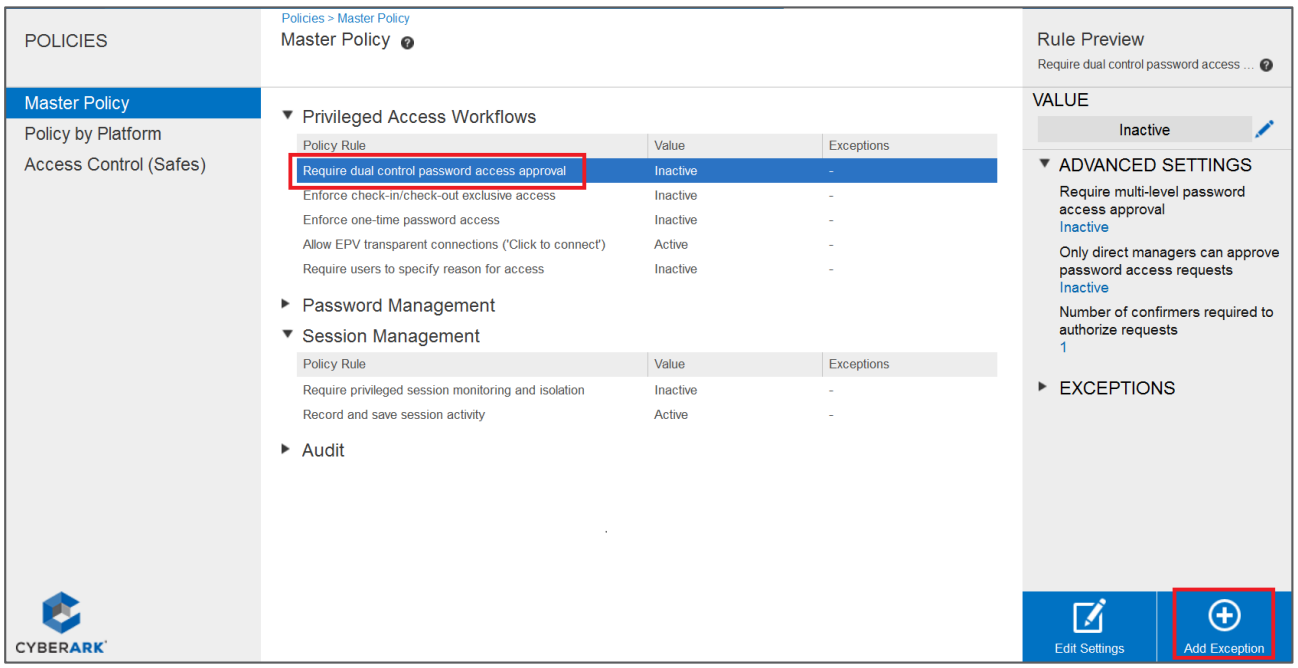
Privileged Access Workflows

In this section we will configure two exceptions to our Master Policy for our platform *Linux via SSH 30*:

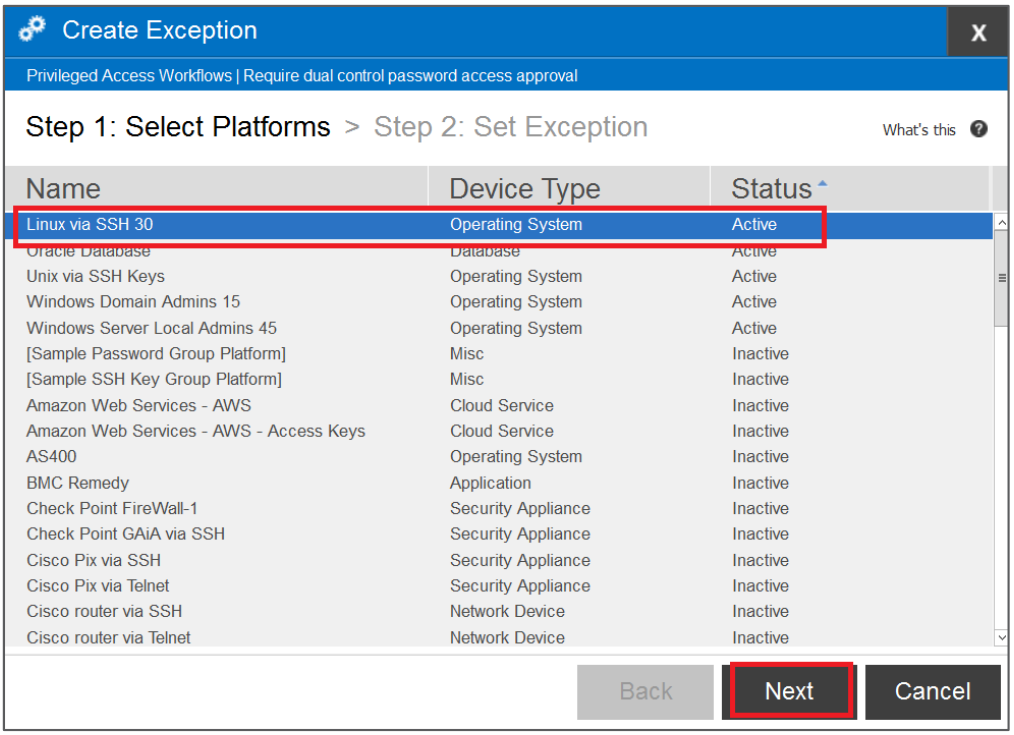
- *Require dual control and access approval*
- *Require users to specify reason for access*

Require dual control access approval

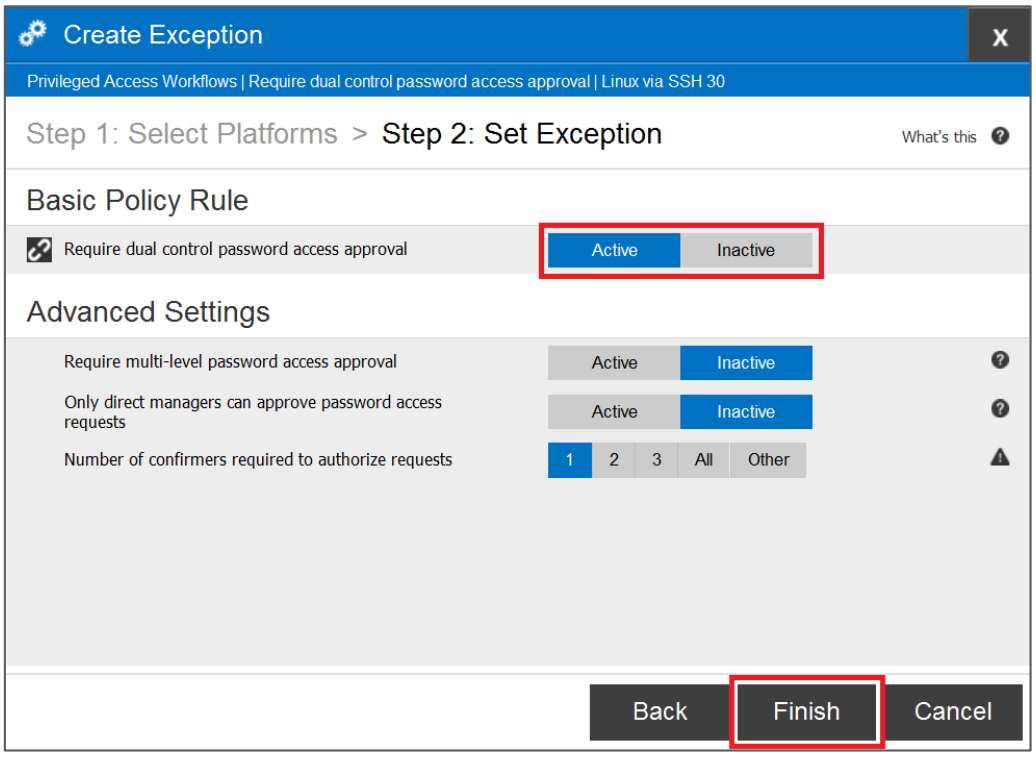
1. Go to **POLICIES > Master Policy > Privileged Access Workflows**, select *Require dual control password access approval*, and press **Add Exception**.



2. Select *Linux via SSH 30* and press **Next**.



3. Click **Active**. Review (but do not modify) the other options available. When ready, press **Finish**.

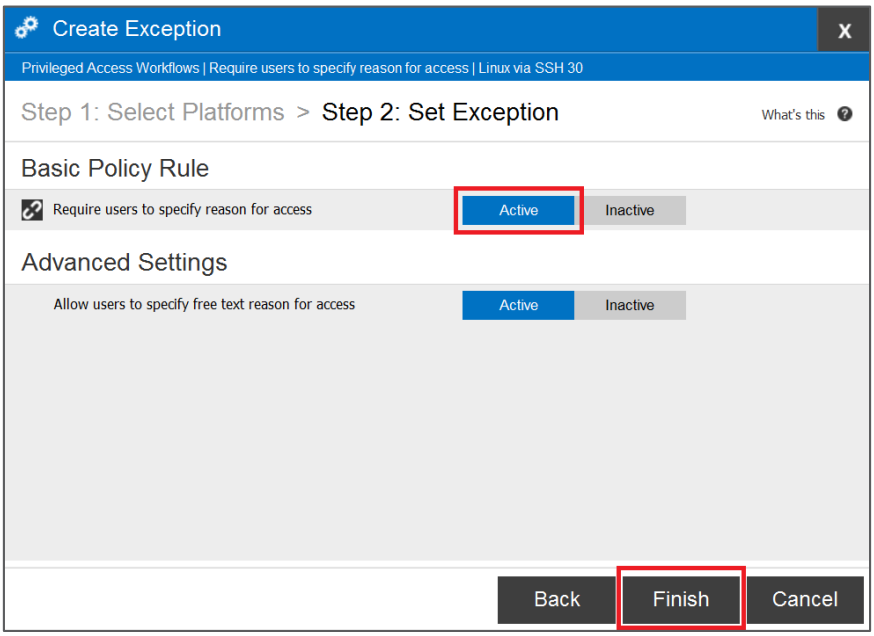


Require users to specify reason

1. Back in the **Master Policy** page, again under **Privileged Access Workflows**, select the option *Require users to specify reason for access* and press **Add Exception.**

2. Again select *Linux via SSH 30* and press **Next**.

3. Set *Require users to specify reason for access* to **Active**.



4. Press the **Finish** button when you are done.

Password Management

Based on what you have already learned, you should now be able to add **Password Management** exceptions for the two platforms we created in the section **Password Management – Part 1**. Add the following exceptions

Linux via SSH 30	Require password change every 30 days
Windows Domain Admins 15	Require password change every 15 days

Password Management – Part 2

In this section, we are going to continue to explore password management options. Specifically, we will look at:

- Log-on accounts
- Windows server local admin accounts with reconciliation
- Dual control workflow
- Exclusive and one-time passwords
- Unix via SSH keys account (optional)

Configuring a Log-on Account

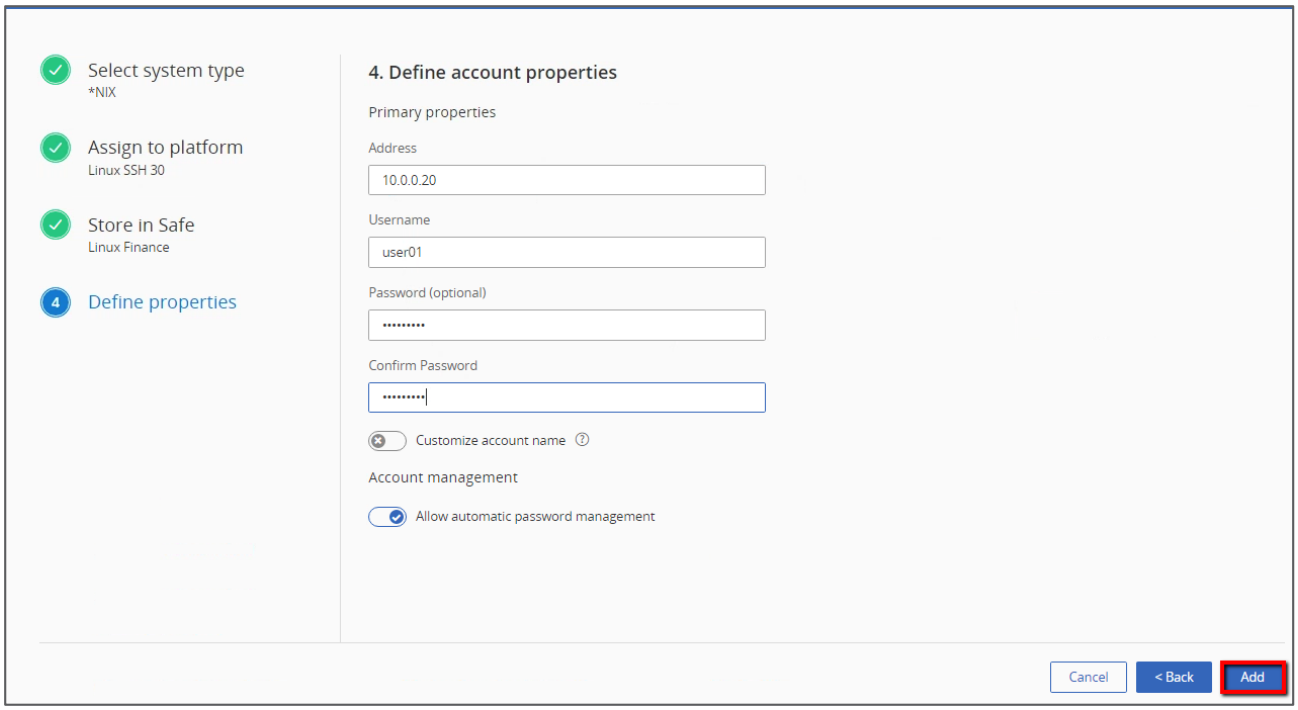
In this exercise you will add to our CyberArk PAS implementation a Linux privileged account that is prevented by the target platform's security policy from accessing the server via SSH, which is a very common restriction for root accounts. You will then associate a 'logon' account with this new account, allowing you to manage the password despite the SSH restriction. The logon account establishes the connection to the target machine and executes a switch-user operation to the privileged account, and then runs the password change.

Note:	In the Unix/Linux world, the account that is typically prevented from connecting to a server remotely is the *root* account. Here in CyberArk training, we are going to use an account named *user01* and we will use the account we created earlier, *logon01*, as the log-on account.

1. Log into the **PVWA** as *vaultadmin01*.
2. Go to the **Accounts** page and press the **Add Account** button.
3. On the **Add Account** screen, enter the following:

System Type:	**NIX*
Platform Name:	*Linux via SSH 30*
Store in Safe:	*Linux Finance*
Address:	*10.0.0.20*
User Name:	*user01*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*

4. Press **Add**.

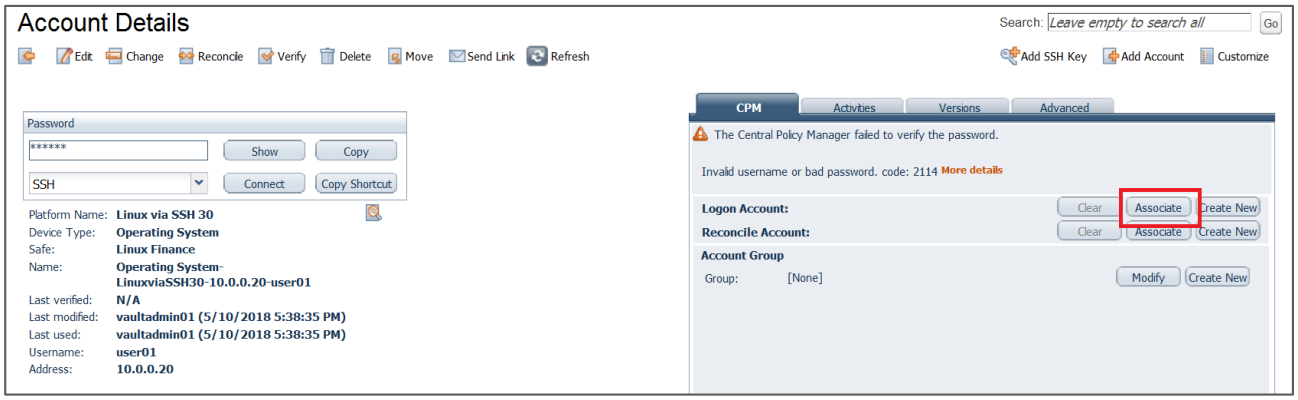


5. On the **Account Details** page, press the **Verify** button and select **OK** to the pop up to confirm. The status will appear as '*This account is scheduled for immediate verification*'.

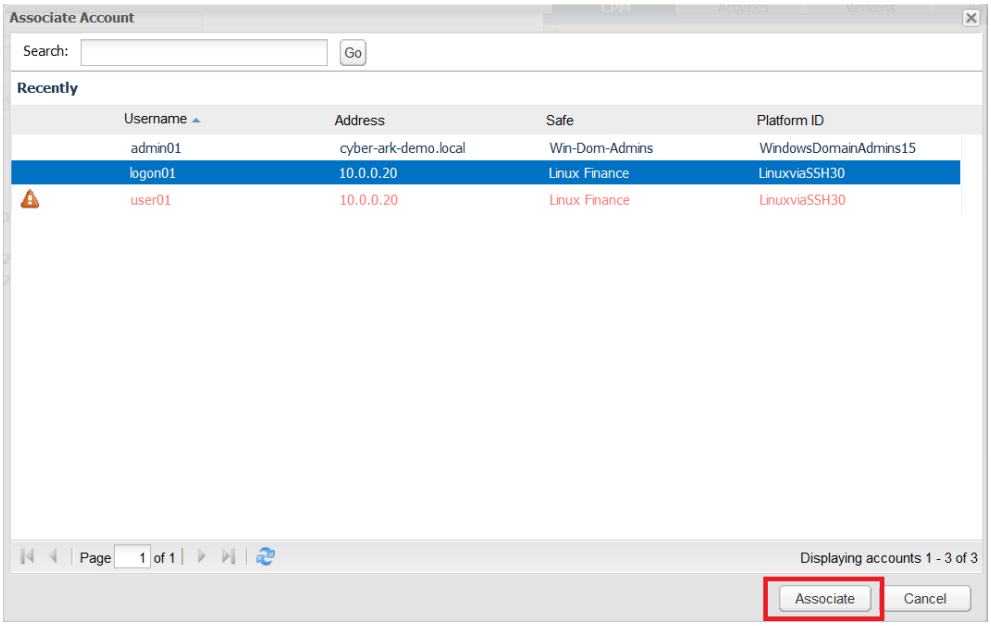
Eventually this will fail because the **CPM** received an 'Access Denied' message due to the restriction on *user01*.

6. Open the account details page using the **Additional details & actions in classic interface** link.

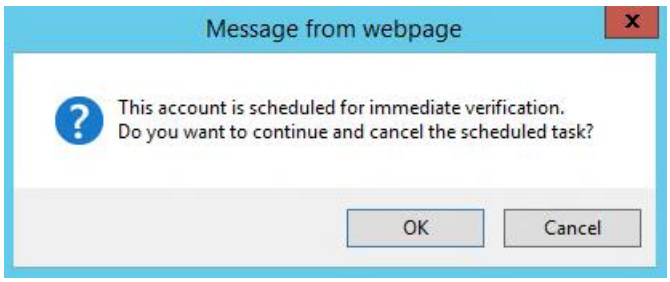
7. Press the **Associate** button next to *Logon Account*.



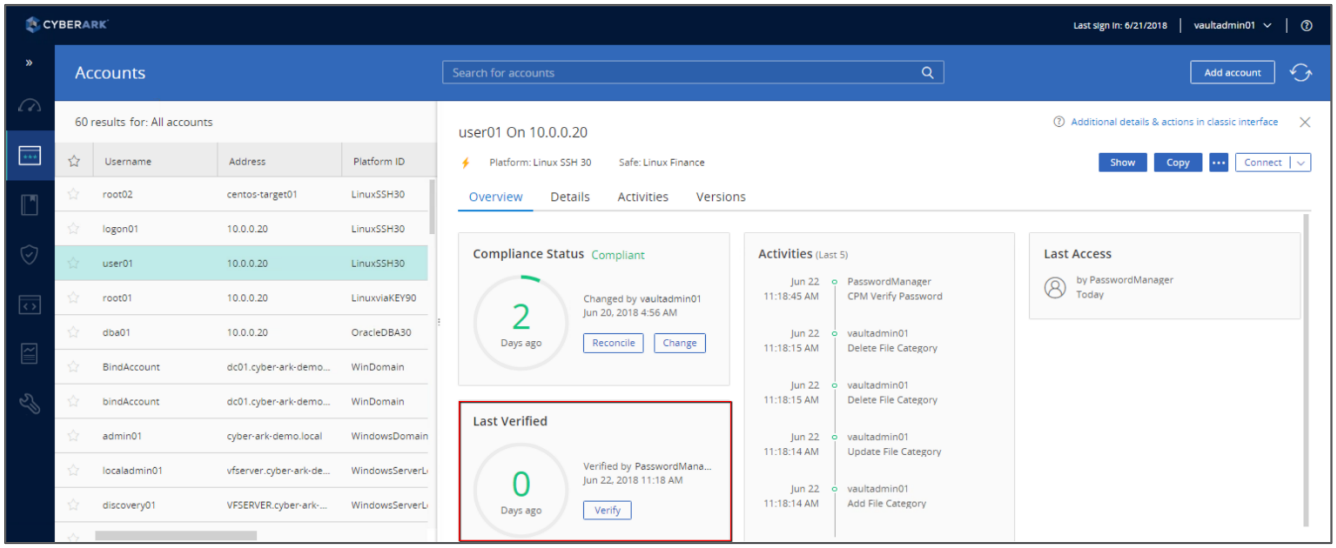
8. Select the *logon01* account created earlier – you may need to search to see this user – and click **Associate**.



9. Press the **Verify** button and click **OK** to confirm. If you receive the following message, press **OK.**



Note:	After a few minutes, the account should be verified. In the background the **CPM** connected to the server as *logon01* and switched to the *user01* account to verify the password.

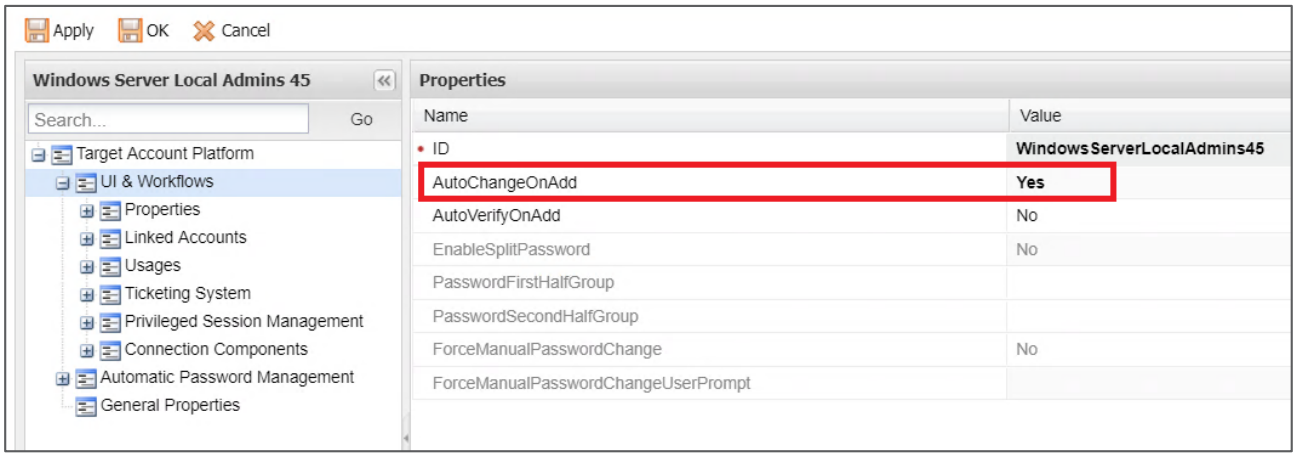


Managing a Windows Local Server Account with Reconciliation

In this exercise you will add a Windows local server account for which the correct password is unknown. In order to bring this account under management, you will associate it with a domain administrator account (*cybrreconcile*) that can perform a password change.

Duplicating a Platform

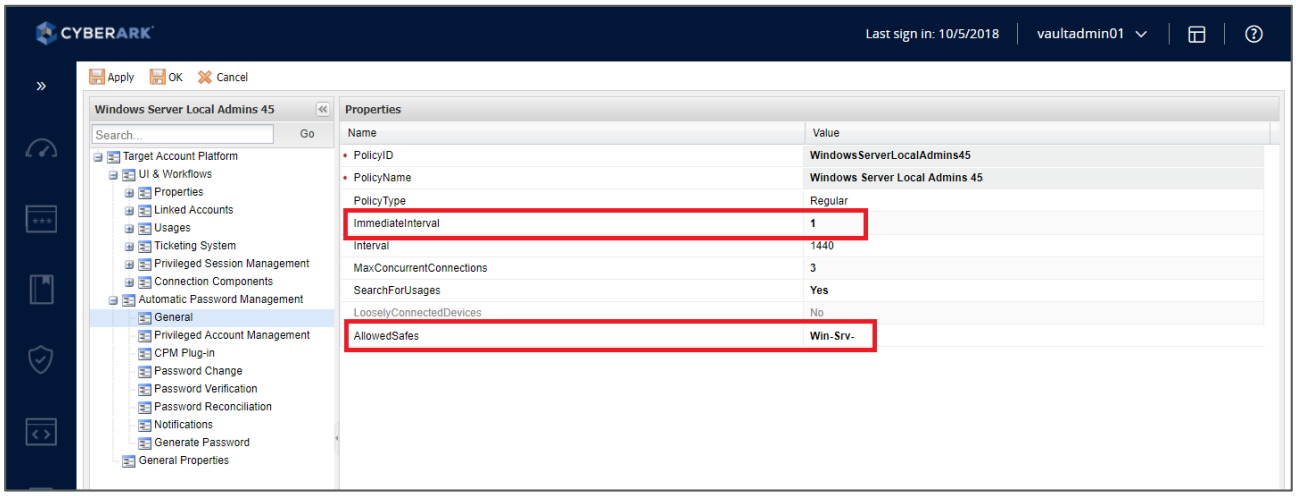
1. Go to **ADMINISTRATION > Platform Management**.
2. Highlight *Windows Server Local Accounts* and click **Duplicate**.
3. Enter *Windows Server Local Admins 45* as the platform name, you may optionally add a description like “Rotate password every 45 days”, and press **Save & Close**.
4. Highlight the newly created platform and press **Edit.**
5. Go to **UI & Workflows**.
6. Change *AutoChangeOnAdd* from **No** to **Yes**. This causes the **CPM** to initiate a password change whenever a new account that uses this policy is created. Select **Apply** to save your change.



7. Go to **Automatic Password Management > General** and set both the *Interval* and *ImmediateInterval* to 1.

Note:	Once again, we are modifying these values for training purposes only, enabling us to move a little faster. A one-minute immediate interval is suitable for testing but should be set to five in a production environment. The *Interval* parameter should never be set to 1 in a production environment.

8. Enter **Win-Srv-** in the *AllowedSafes* field to limit the accounts with which this platform can be used. Click **Apply** to save your change.

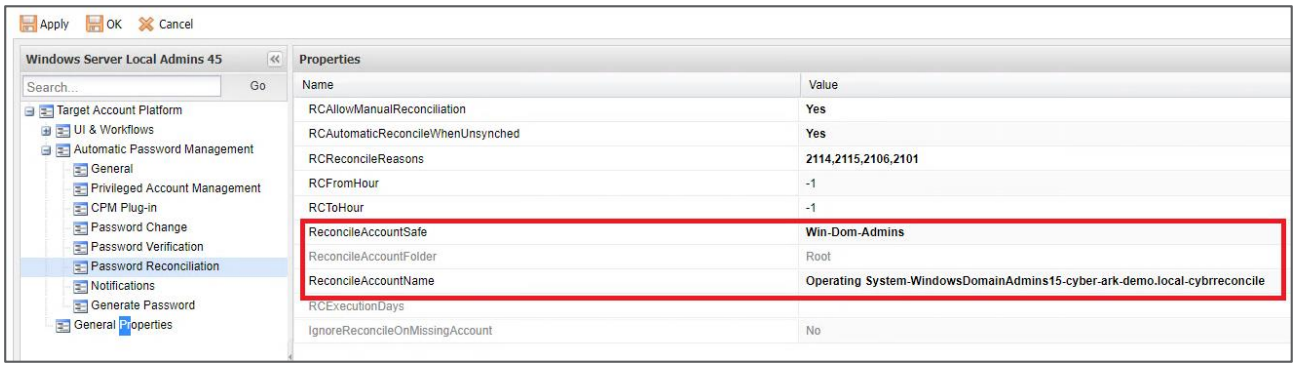


9. Go to **Password Reconcilation** and enter following:

RCAutomaticReconcileWhenUnsynced:	*Yes*
ReconcileAccountSafe:	*Win-Dom-Admins*

ReconcileAccountName:	*Operating System-WindowsDomainAdmins15-cyber-ark-demo.local-cybrreconcile* (you can copy this from the notepad file that you created earlier, do *NOT* copy from this PDF)

Note: The values for the parameters as they appear above assume that you have followed all previous instructions *to the letter*. If you haven't, then these values will not work. Also, copying and pasting from the PDF into the virtual machine causes problems, so the safest approach is to do as instructed earlier and copy the values from the **PVWA**, paste them into Notepad, and then copy them into the appropriate fields in the Platform.



Note: Don't forget to enable automatic password change and verification. Also, think about what would be appropriate values for password length and complexity.

10. Press **Apply** and **OK** to close the platform.

11. Log out and exit the **PVWA** browser session.

12. Double-click the **restart-services.bat** on the desktop of your Components server. This will cause the **CPM** server to reload all policies and force your configuration changes to to take affect immediately (as well as restarting the **PVWA** and the **PSM**).

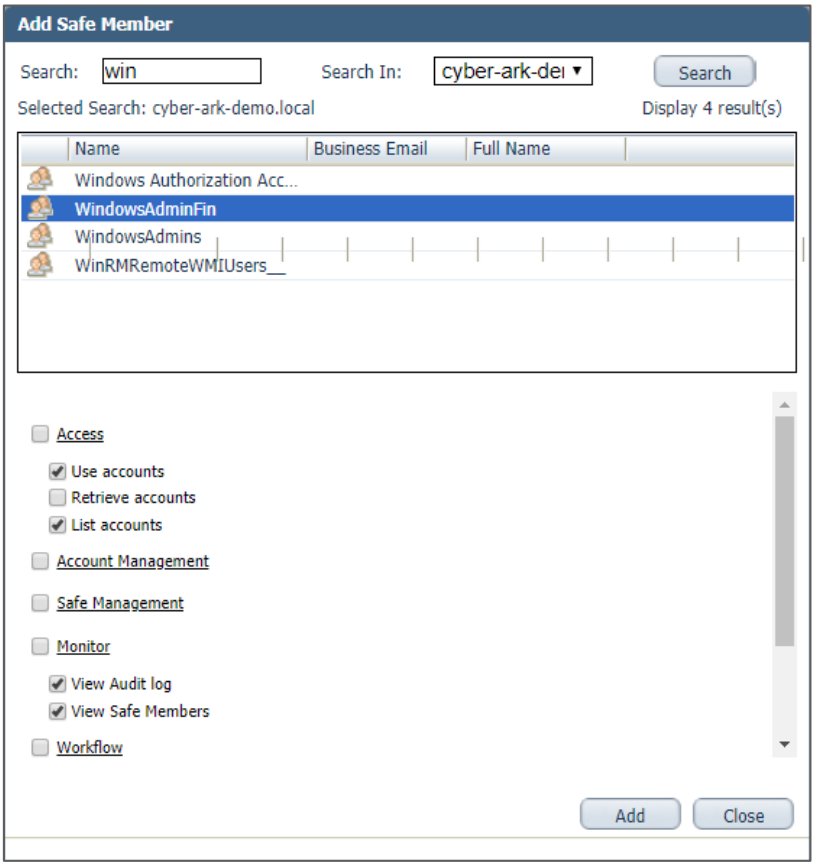
Creating a Safe

Now we are going to create a Safe for our Windows server local administrator accounts. To comply with data protection regulation, we are going to organize our safes so that only US admins can access the passwords for US safes.

1. Go to **POLICIES > Access Control (Safes)** and click **Add Safe**.

2. Name the Safe *Win-Srv-Fin-US*. Leave the default values for the rest.

3. Add the AD group **WindowsAdminFin** to the Safe, but remove the check for *Retrieve Accounts* – we don't want our local administrators to view passwords).

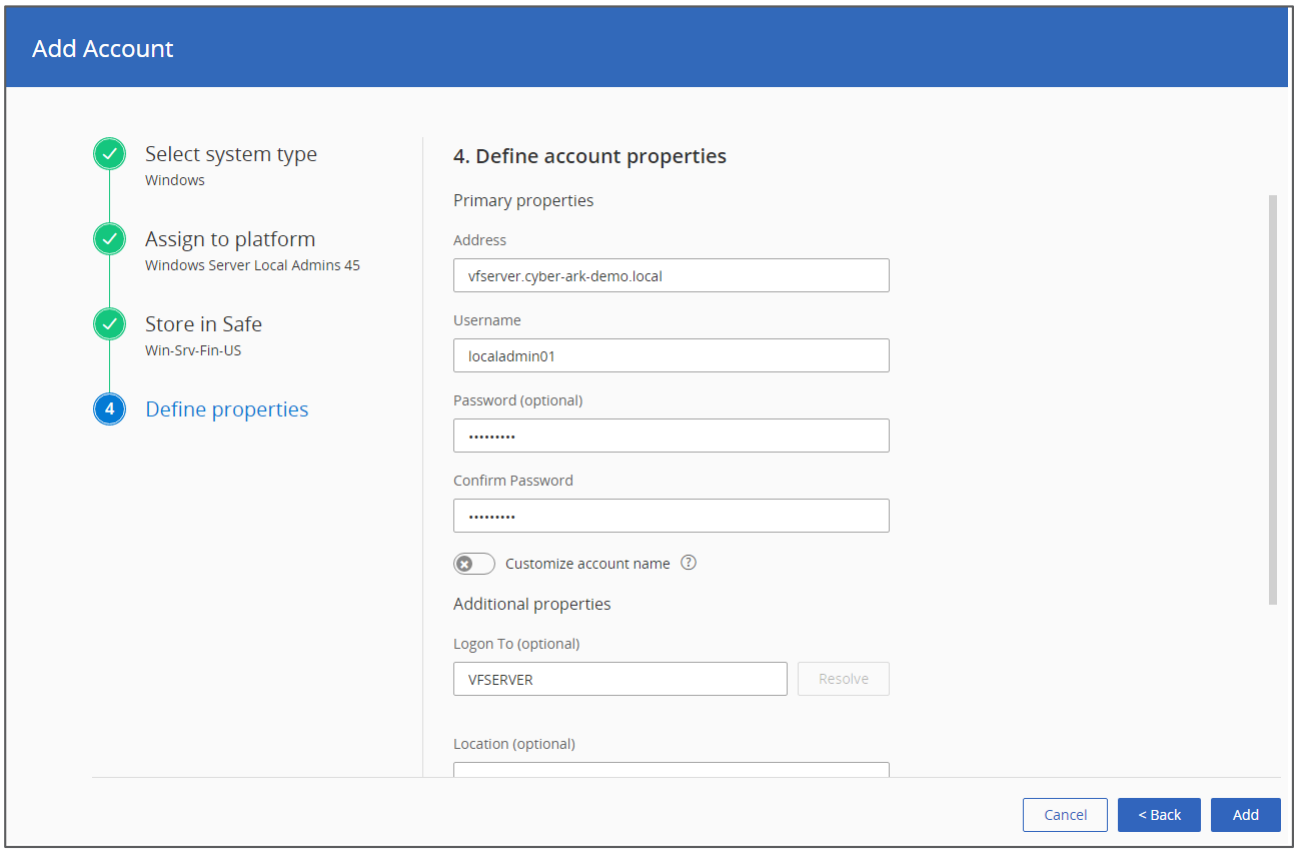


Adding an Account

Here we will add a local administrator account for your target Windows server. Remember, we don't know what the password is, so you could put anything in the password fields (although they must match).

1. Log in again to the **PVWA** as *vaultadmin01*, go to the **ACCOUNTS** page, and press **Add Account**. Enter the following and press the **Add** button:

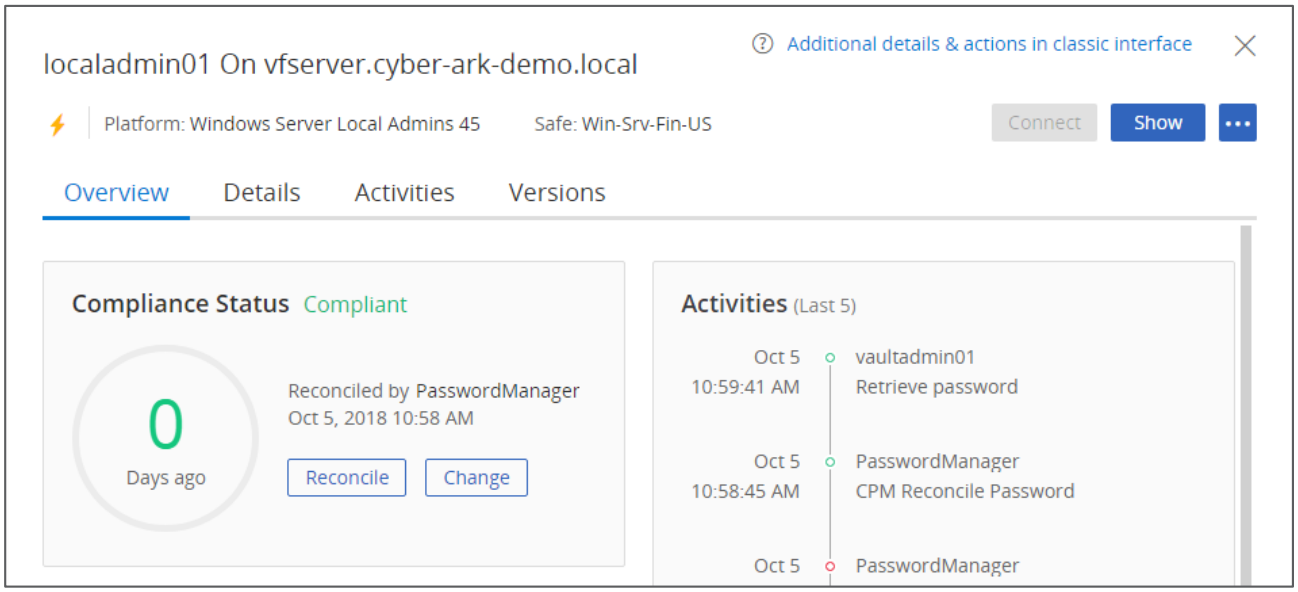
Store in Safe:	*Win-Srv-Fin-US*
System Type:	*Windows*
Platform Name:	*Windows Server Local Admins 45*
Address:	*vfserver.cyber-ark-demo.local*
User Name:	*localadmin01*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*
Logon To (optional)	<click the *Resolve* button>



Note: After adding the account, when you select it you should see a message stating '*The password for this account has been manually scheduled for change*. This is because you set *AutoChangeOnAdd* to **Yes** in the policy. Also note that there is a reconcile account already associated with this new account.

2. Press **Refresh**. Because the password for this account was not *Cyberark1*, **the password change will fail**.

3. Press **Refresh** again and after a short time and you should receive a message saying that the account was successfully reconciled. The first time an account is reconciled it can take a little while, so be patient.



Configure and Test Dual Control

In this section, we will configure dual control for access to Linux accounts. The ability to receive e-mails is required in order to test the full functionality of dual control.

Dual control is configured in the *Master Policy*. To enable it for Linux machines only, we will add an exception to the *Master Policy* for the appropriate Platform.

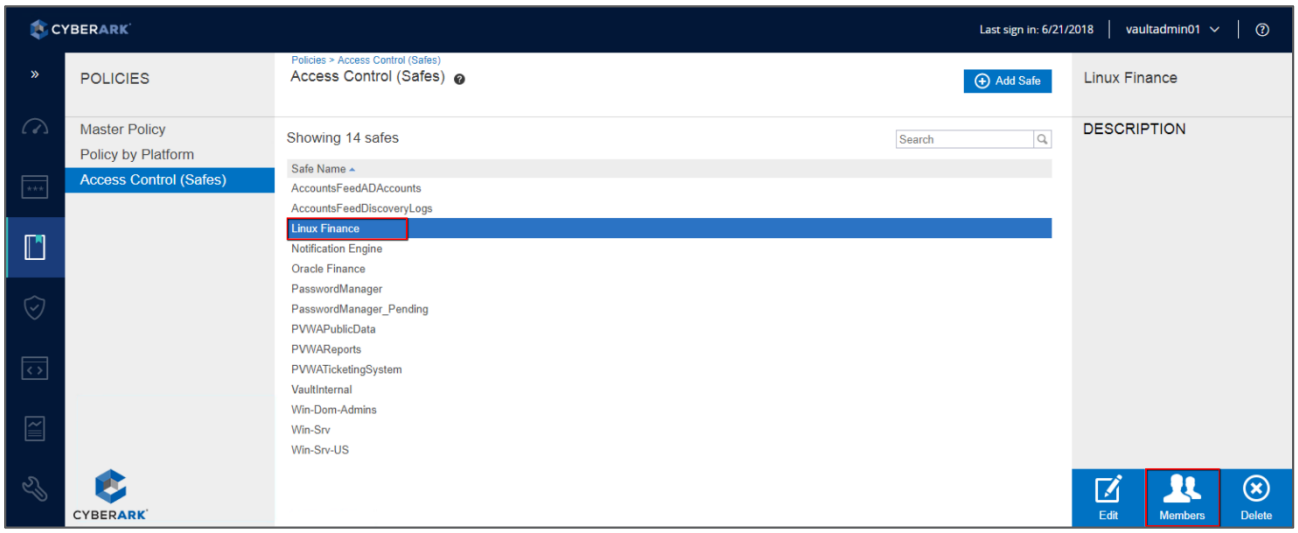
Adding a manager to an existing safe

The workflow process is configured through safe membership. We will need to add a manager to the existing safe so that he/she can approve requests. IT Managers will be able to view the passwords and use the passwords to access the safe without approval.

What might be the result if no one has been assigned the responsibility to respond to a workflow request?

1. Go to **POLICIES > Access Control (Safes)**.

2. Highlight *Linux Finance* and press the **Members** button.

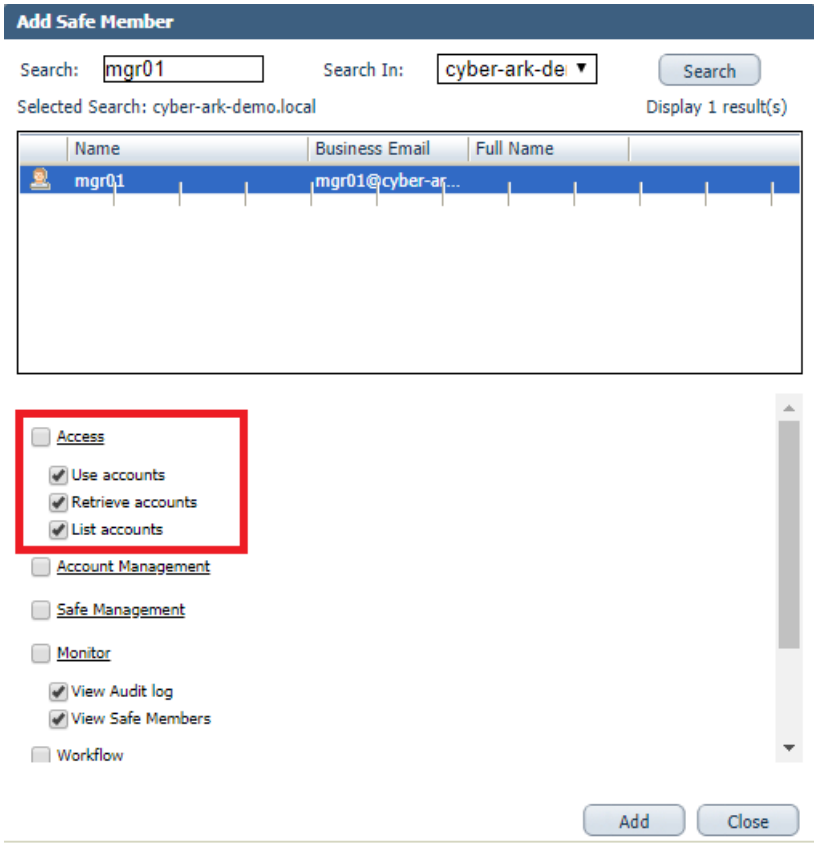


3. Click **Add Member**.

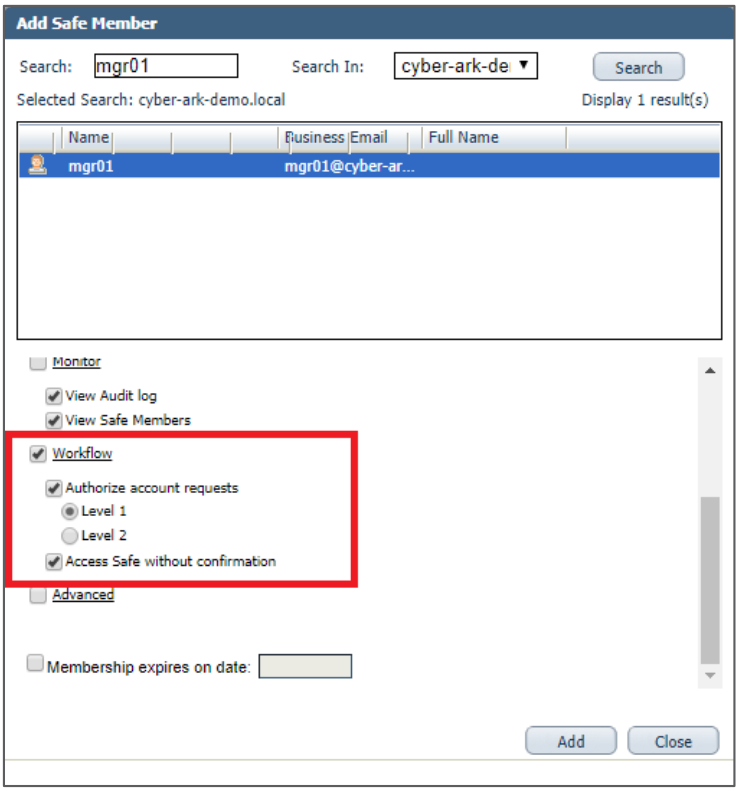
4. Enter *mgr01* in the **Search** field, select *cyber-ark-demo.local* in the **Search In** field, and press **Search**.

5. Select the *mgr01* user.

6. Under **Access**, leave the checks for *Use accounts*, *Retrieve accounts*, and *List account* for this group.



7. Scroll down and expand the *Workflow* link to access the *Authorize account requests* check box. Check the **Authorize account requests** authorization box with **Level 1** and **Access Safe without confirmation**.



8. Press **Add**.

9. In preparation for a later exercise, please also add the Active Directory group "ITManagers" as a member of this safe with the same rights as *mgr01* for both *Access* and *Workflow*.

Testing Dual Control

Testing this workflow requires us to wear a number of hats. We configured the system as a vault administrator – *vaultadmin01* – now we are going to become ordinary users of the system.

- We will first log in as a user who has the right to use a password, but only with manager approval – *linuxuser01*.
- We will then put on our manager hat and check our email, notice that we have a notification for an approval request pending, log into the **PVWA** as that manager user – *mgr01* – using the link provided, and approve the request.
- Finally, we will return to the **PVWA** as *linuxuser01*, find the approval notification, and access the target system with the password.

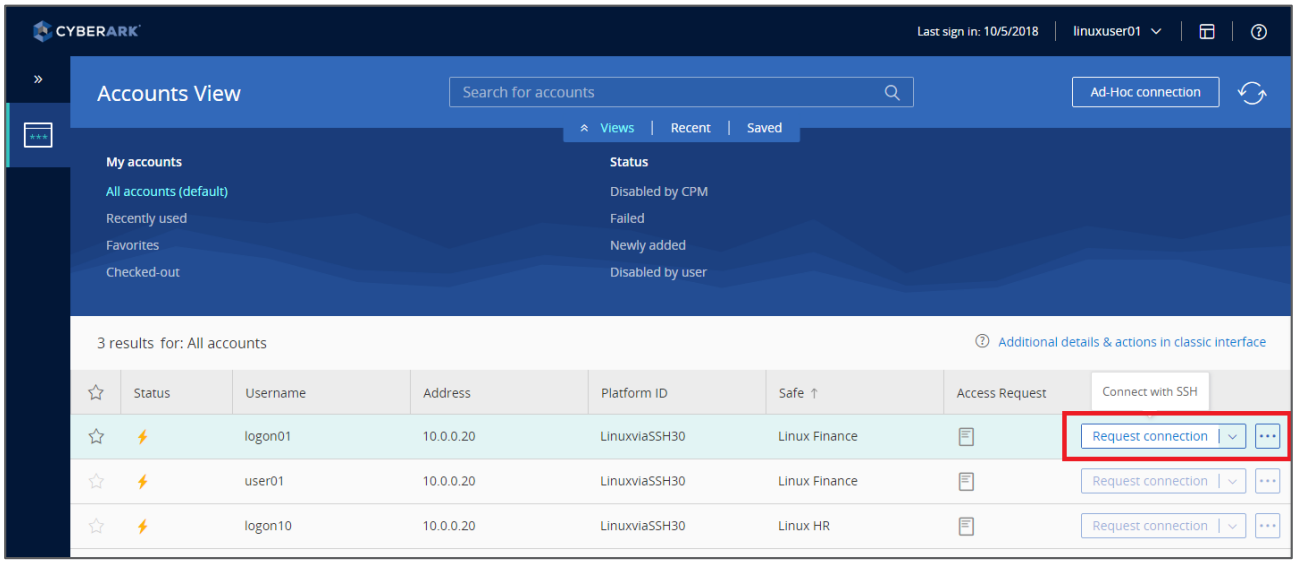
Note:	Because we will be changing users, you might want to use two browsers or separate browser sessions. You can use incognito mode to open two separate sessions with two separate users.

1. Log out of the **PVWA**.

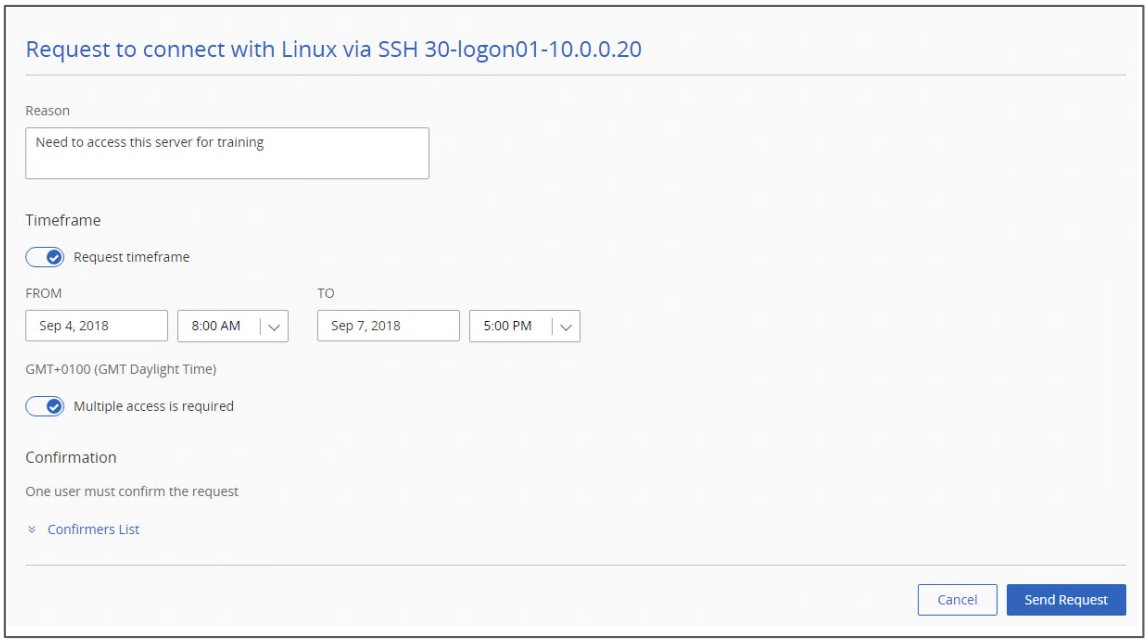
2. Log back in as the LDAP user *linuxuser01* with the password *Cyberark1*.

3. Leaving the **Search** field blank, click on the magnifying glass icon to search for all accounts.

4. Locate *logon01* and select the **Request Connection** button.



5. Enter a *reason* to access. Activate the **Timeframe** and specify *FROM* the current date in the morning *TO* the end of the last day of the class. Also activate *Multiple access is required* and then press on the **Send Request** button.

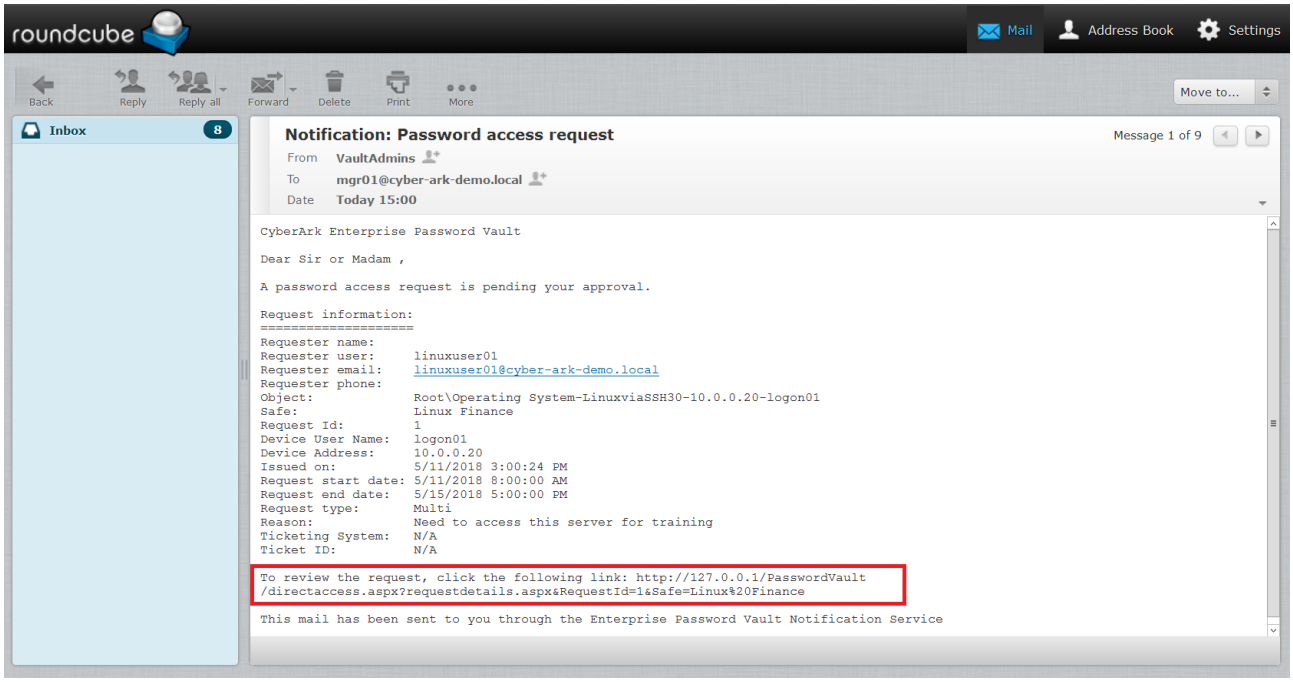


6. **Sign out of this session** and close the browser, to ensure that the *linuxuser01* session has ended (otherwise the next steps will not work properly). Alternatively, you can use a different browser or a private session.

7. Launch a new browser session and open the email client at http://cyber-ark-demo.local:8073/webmail/ (there is a short cut in the browser toolbar).

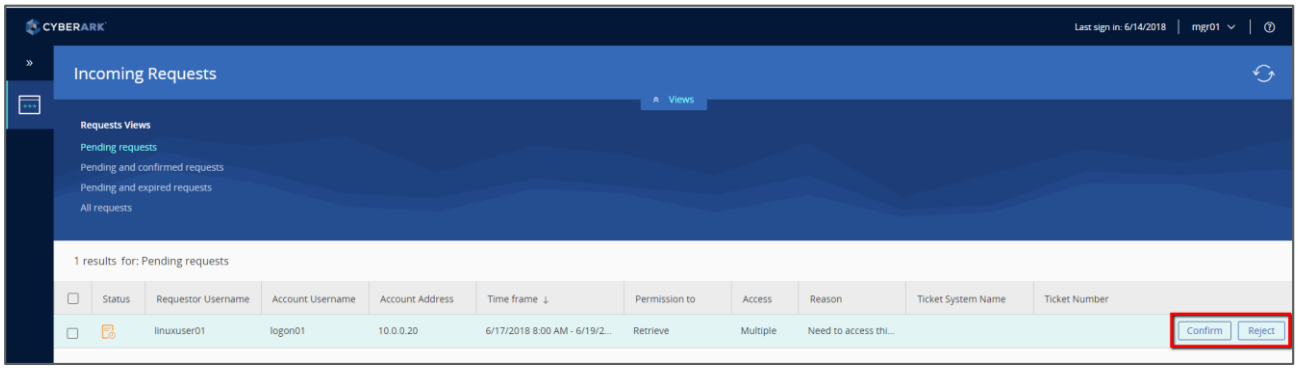
8. Login as *mgr01*. You should have received an e-mail with the new request (if you do not receive an email, make sure the ENE service is running on the **Vault**).

Note:	Our email server is currently unable to convert URLs to clickable links, so you will have to copy and paste the URL into your browser's address window. This is not an issue with most commercial email clients.

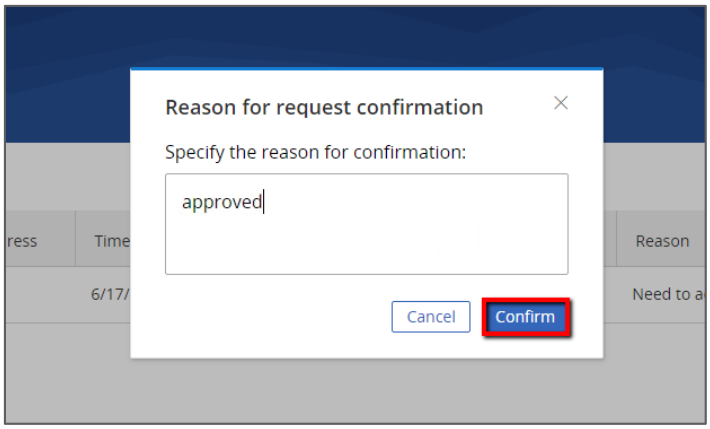


9. Login to the **PVWA** as *mgr01* password *Cyberark1*.

10. Go to **Accounts** and select **Incoming Requests**. Locate the incoming request from *linuxuser01* and press the **Confirm** button.



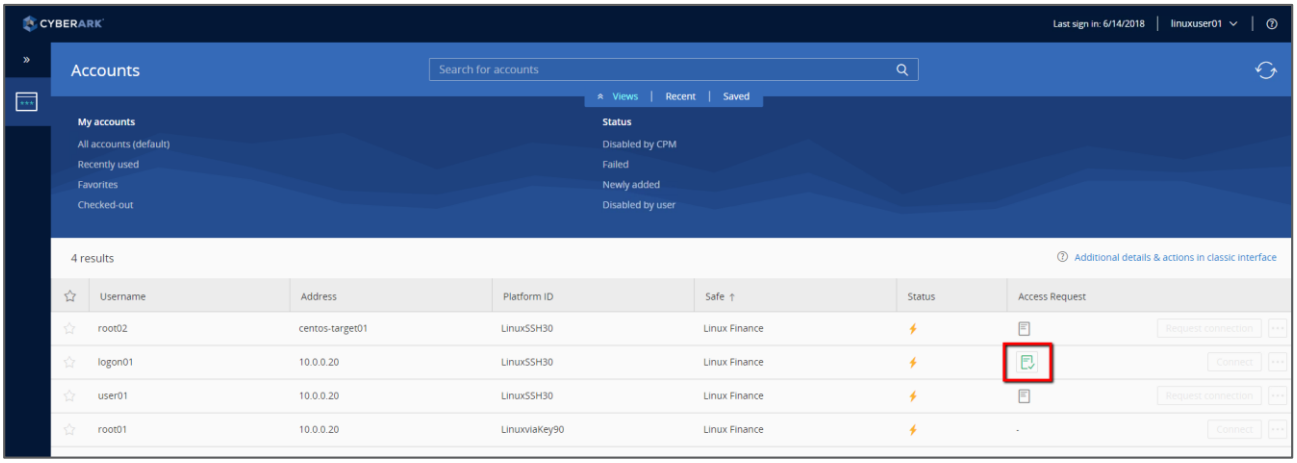
11. Enter a reason and press **Confirm**.



12. **Sign out, and close the browser** to terminate the *mgr01* session.

13. Browse to the email client at http://cyber-ark-demo.local:8073/webmail/ and login as *linuxuser01*. You should receive an e-mail stating the request has been confirmed.

14. Login to the **PVWA** as *linuxuser01*, password *Cyberark1* to see the **Account Details** page. Notice the **Status** of the request is now confirmed. You can now use the password and connect to the previously requested account.



15. Sign out of the *linuxuser01* session.

Exclusive Passwords with Automated Release and One-time Use

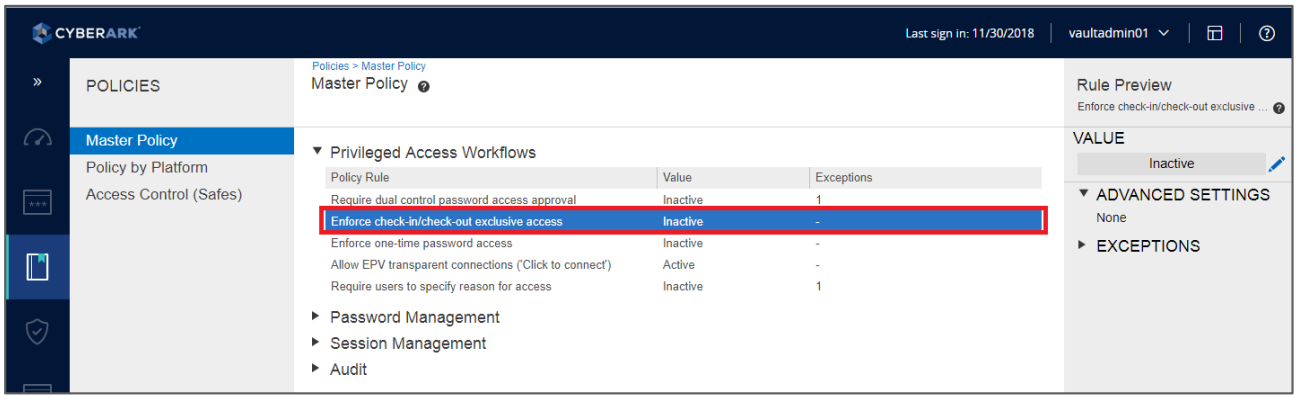
In this exercise, you will configure the Windows Server Local accounts added earlier for exclusive access with an automatic release based on the Minimum Validity Period.

Adding a Master Policy exception for Exclusive Passwords

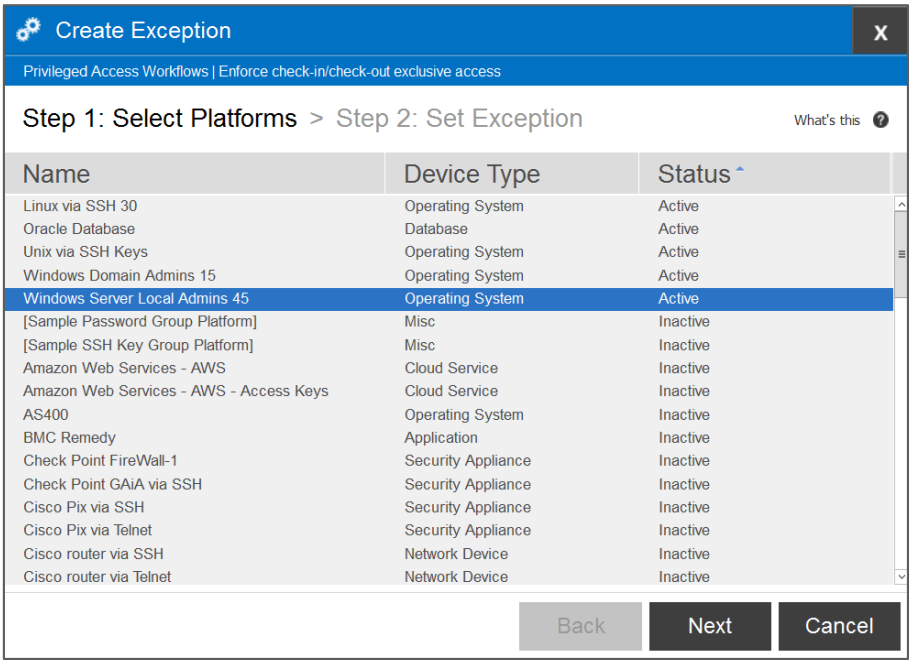
Exclusive Passwords are configured in the *Master Policy*.

1. Using **PVWA**, login as *vaultadmin01*.

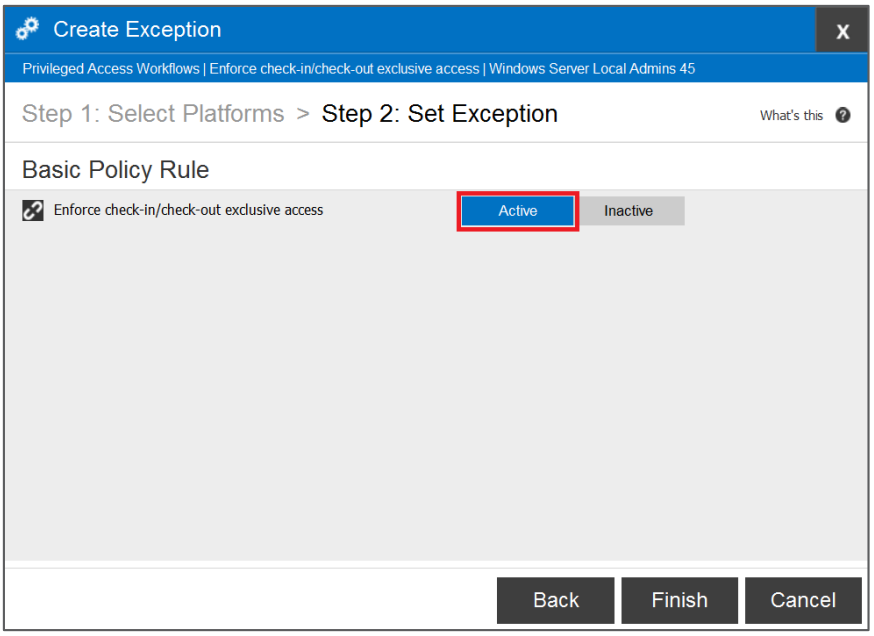
2. Go to **POLICIES > Master Policy** and select *Enforce check-in/check-out exclusive access* and click **Add Exception**.



3. Select *Windows Server Local Admins 45* and press **Next**.



4. Press the **Active** button to enable *Enforce check-in/check-out exclusive access* and click **Finish**.



Adding a Master Policy exception for One-Time Passwords

To allow for an automatic release of a checked-out password, you will need to enable the policy *Enforce one-time password access* for the platform *Windows Server Local Admins 45*.

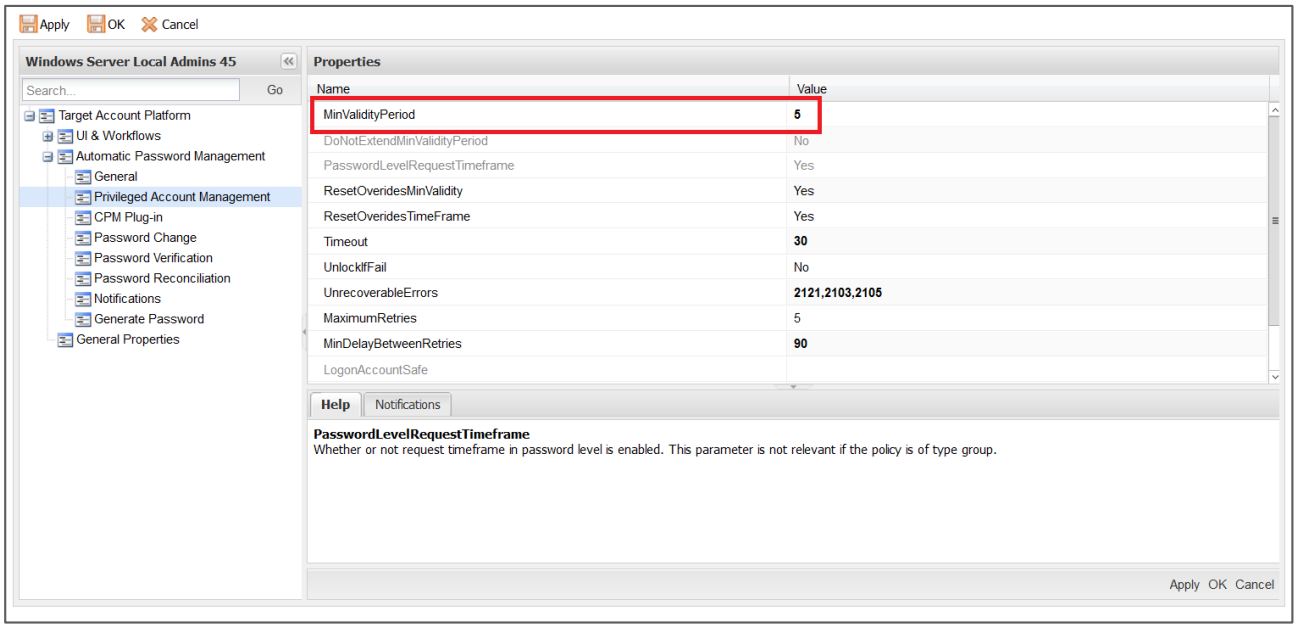
1. Highlight *Enforce one-time password access* and press **Add Exception**.
2. Select *Windows Server Local Admins 45* and press **Next**.
3. Press **Active** to enable one-time password access for this platform and then click **Finish**.

Reducing the Minimum Validity Period

Note:	This next step is for testing/training purposes only and should not be used in a production environment.

We will set the *Minimum Validity Period* to 5 minutes, so that we can see our results more quickly. The *MinValidityPeriod* parameter is configured in the Platform.

1. Go to **ADMINISTRATION > Platform Management**, select *Windows Server Local Admins 45*, and click **Edit**.
2. Go to **Automatic Password Managment > Privileged Account Management**.
3. Set *MinValidityPeriod* to **5**.



4. Press **Apply** and **OK** to close the Platform and then sign out of the **PVWA**.

Testing Exclusive Passwords

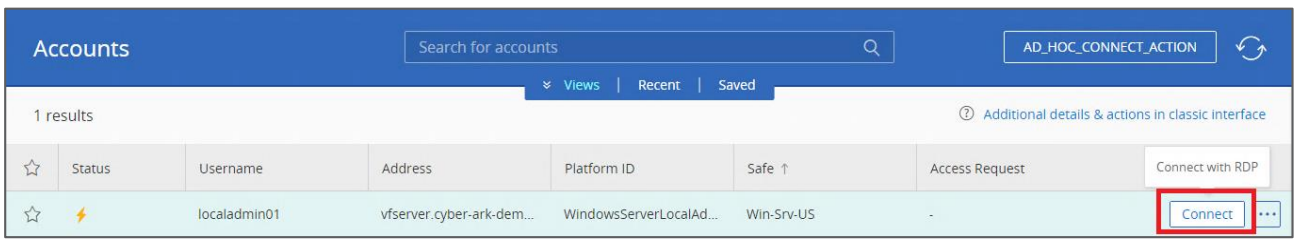
In this section, we will test our configuration of exclusive passwords with automatic release. We will use the user *bill.* Bill is a member of the Active Directory group *WindowsAdminsFin*.

1. Double-click the **restart-services.bat** on the desktop of your components server. This will cause the **CPM** server to reload all policies and force your configuration changes to to take affect immediately.

2. Login to the **PVWA** as the **LDAP** user '*bill*' with the password *Cyberark1*.

3. Go to **ACCOUNTS** and press the magnifying glass to search for all accounts.

4. Click on the *localadmin01* account and click the **Connect** button. Bill has now checked out the password.

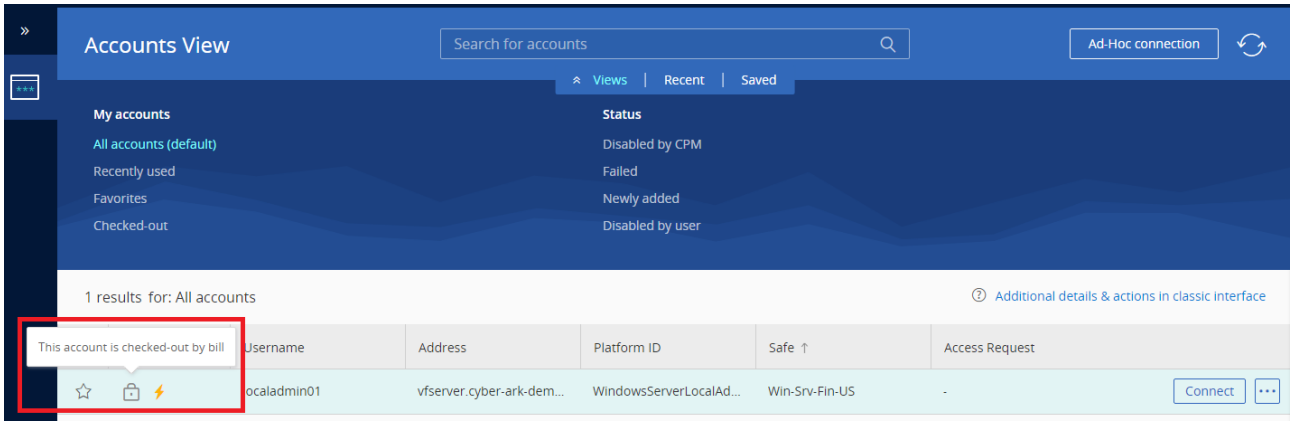


5. Launch the RDP session to the target Windows server. This will check out the account and lock it. Leave the RDP session open.

Note:	Bill or an admin can release the account manually by using the "**Check-in**" option, however we will not use this option as we want to see the system release it automatically at the end of the Minimum Validity Period.

6. Log out out of the **PVWA** and log back in as *vaultadmin01*. You should notice a lock icon next to the *localadmin01* account.

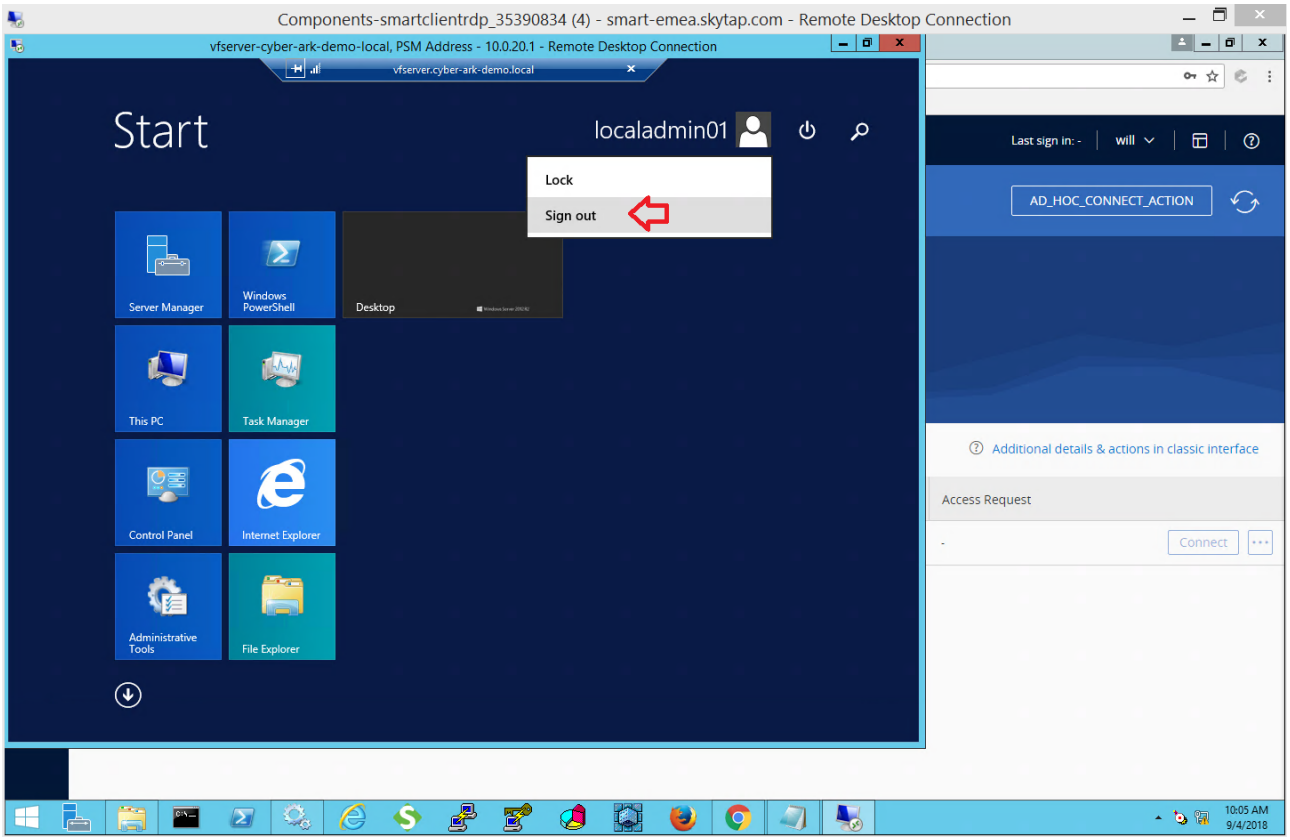
7. Hover over the lock icon, it should say "The account is checked-out by bill".



8. If you press **Show**, you will receive an error message.

After several minutes (remember the minimum validity period was set to 5 min), the vaultadmin01 user will be able to access the password and the **CPM** will have changed the password.

If the account is not released after several minutes, run the *restart.bat* file and check again.

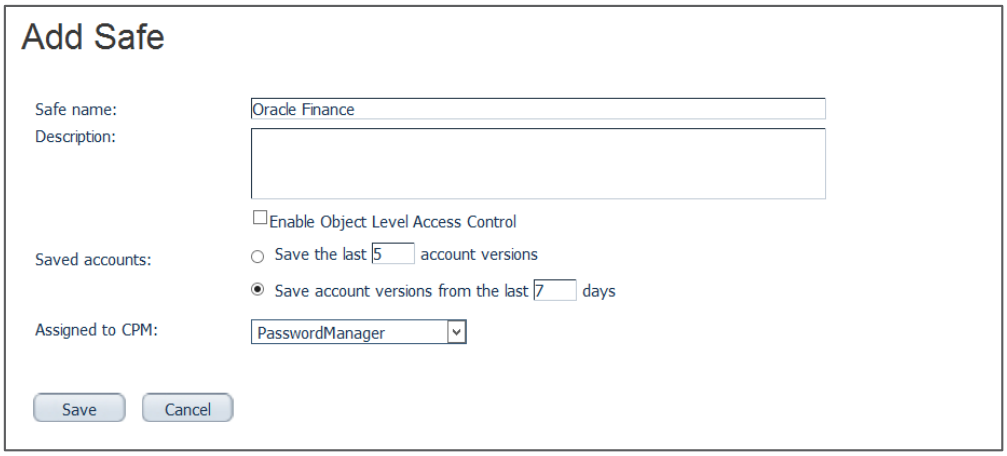


Managing an Oracle Account

In this section, we will configure CyberArk to manage an Oracle DBA account. As in previous exercises, we will create a Safe, duplicate a Platform, and then add the account.

Creating a Safe

1. Log in as *vaultadmin01* and go to **POLICIES > Access Control (Safes)**.
2. Press the **Add Safe** button.
3. Enter *Oracle Finance* as the **Safe** name and press **Save**.



4. Add the Active Directory group *OracleAdmins* to the safe with default permissions.

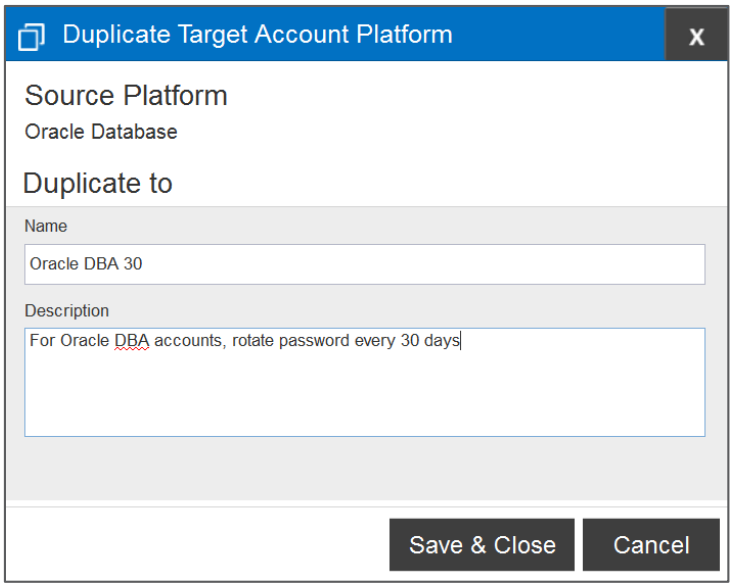
Duplicating a Platform

In this section, we are going to create a Platform dedicated to managing accounts used to access Oracle databases, such as a DBA account.

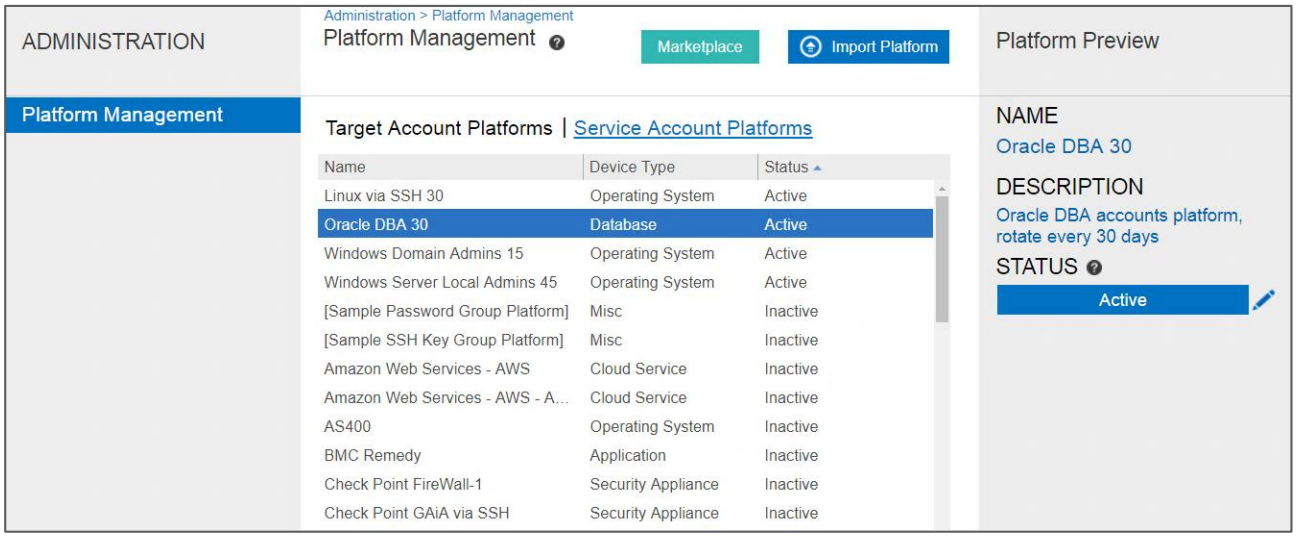
1. Go to **ADMINISTRATION > Platform Management**.

2. Choose *Oracle Database* and press **Duplicate**.

3. Enter *Oracle DBA 30* and press **Save & Close.**



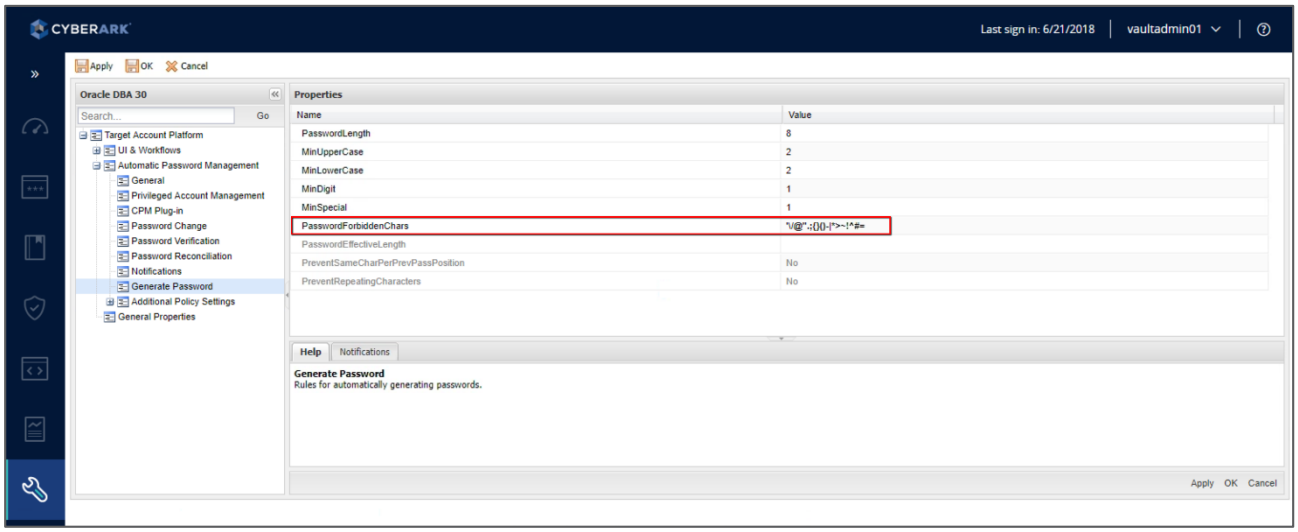
4. Select *Oracle DBA 30* and press **Edit.**



Note: Take a good look at the image above. You may notice that the only active platforms are those that we have created. This image illustrates why it is a good idea to deactivate unused platforms. Furthermore, the inactive platforms are not shown when adding accounts, so you don't have to scroll through a long list to find the one you want (and possibly make a mistake).

5. Go to **UI & Workflows** and set *AutoChangeOnAdd* to **Yes**.
6. Go to **Automatic Password Management > General**.
7. Set *ImmediateInterval* to **1**.
8. Set *AllowedSafes* to **Oracle**.
9. Press **Apply**.

10. In the **Generate Password** section, add the equal sign character ('=' without the quotes) to the *PasswordForbiddenChars* field. Make sure you add the new character without deleting any of the existing characters.



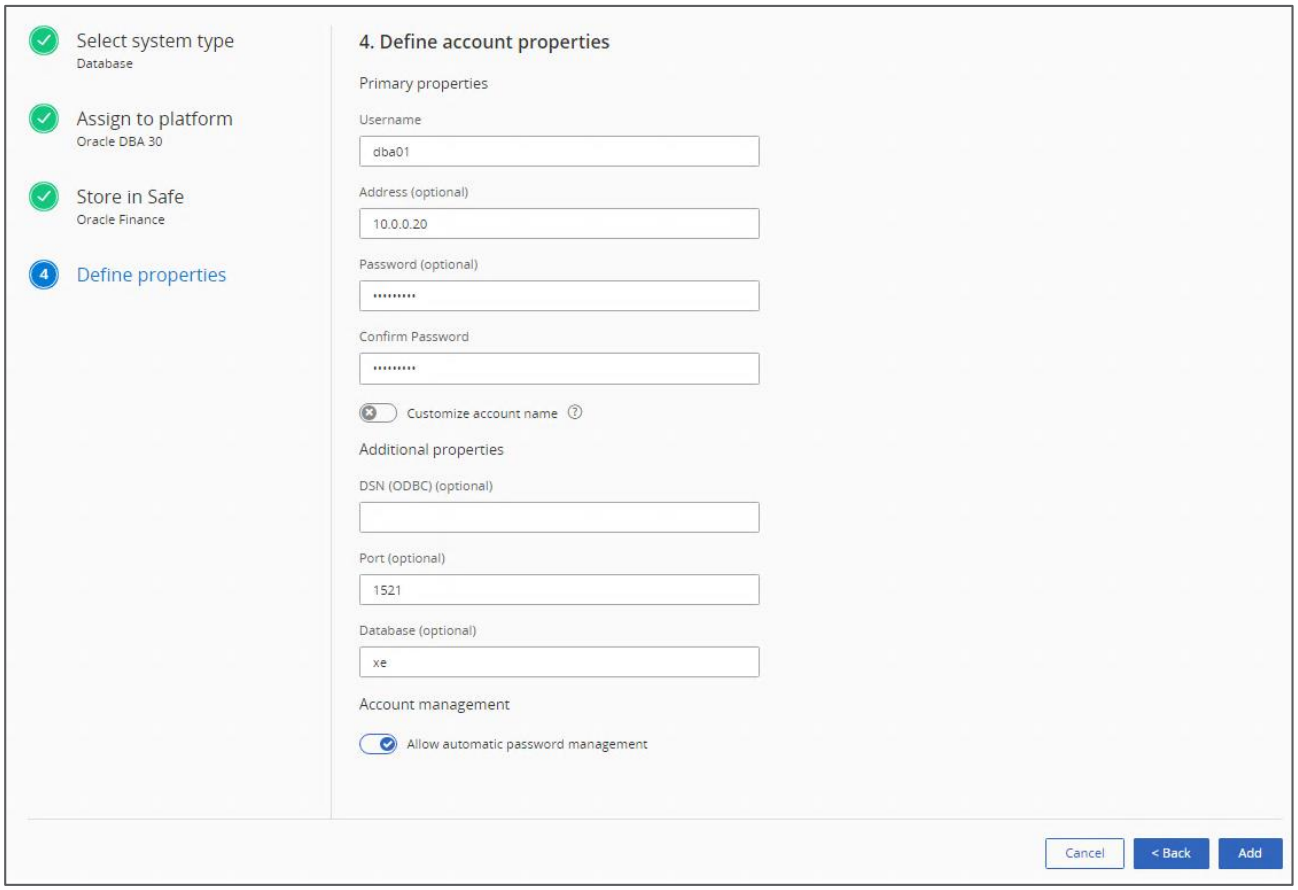
11. Click **OK** to save the changes and close the Platform.

Adding an Account

1. Go the **ACCOUNTS** tab, click **Add Account** and enter the following:

Store in Safe:	*Oracle Finance*
Device Type:	*Database*
Platform Name:	*Oracle DBA 30*
User Name:	*dba01*
Address:	*10.0.0.20*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*
Port:	*1521*
Database:	*xe*

2. Press **Add**.



Note:	Because the policy was set to *AutoChangeOnAdd=Yes*, the account will be set for immediate change.

3. Press refresh and you will see the message: '*The password for this account has been manually scheduled for change*'.

4. After a minute or two, press the **Show** button to display the new password.

Note:	If you want to test the new account, you can log in to the **PVWA** as the user *larry*, who is a member of the *OracleAdmins* group in Active Directory.

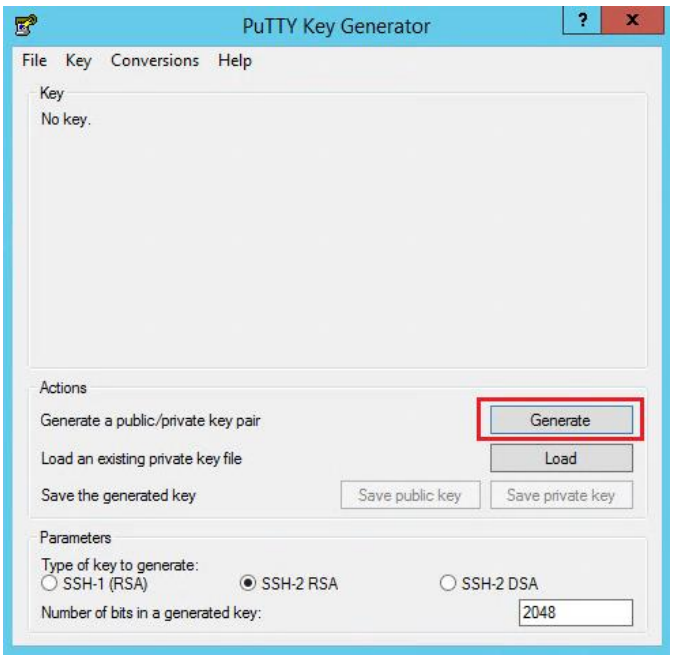
OPTIONAL: Managing a Linux Account with SSH Key

Note:	Not all organizations use SSH keys with their *nix servers, while others have only Windows machines. As such, if you feel that this particular exercise is not relevant to your work, feel free to skip it.

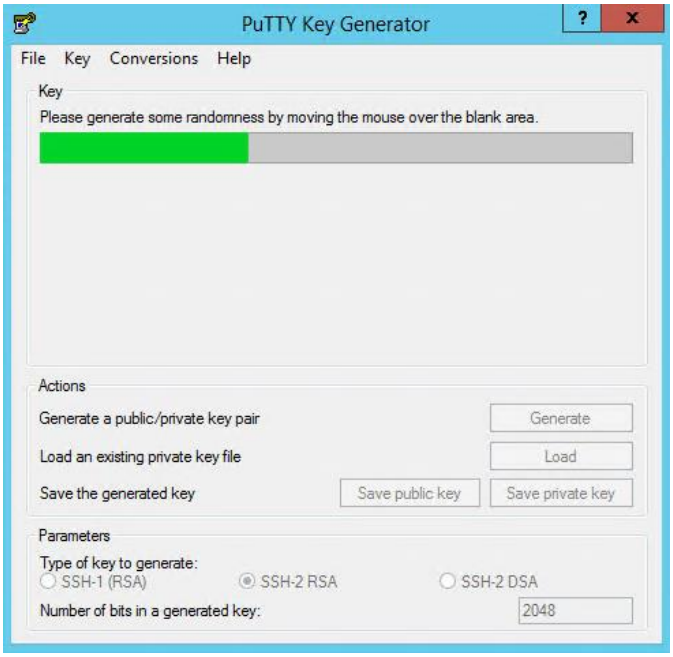
In this section, we will perform the tasks required to manage a Linux account that connects to its target server with a public-private key-pair.

Generating a Key-Pair

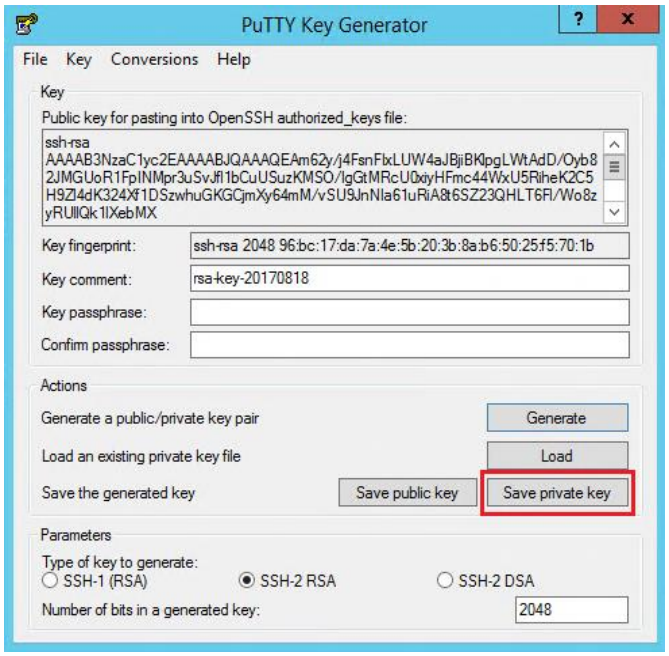
1. On the **Components** server launch **puttygen** from the **Taskbar** and click **Generate**.



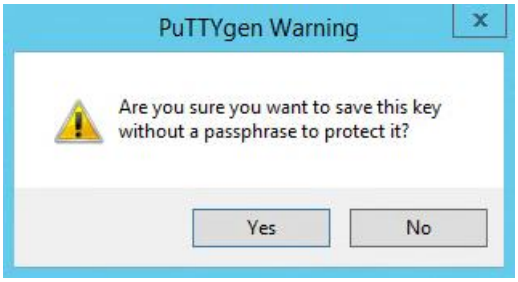
2. As instructed, you need to make mouse movements in the blank area to generate random data for the key.



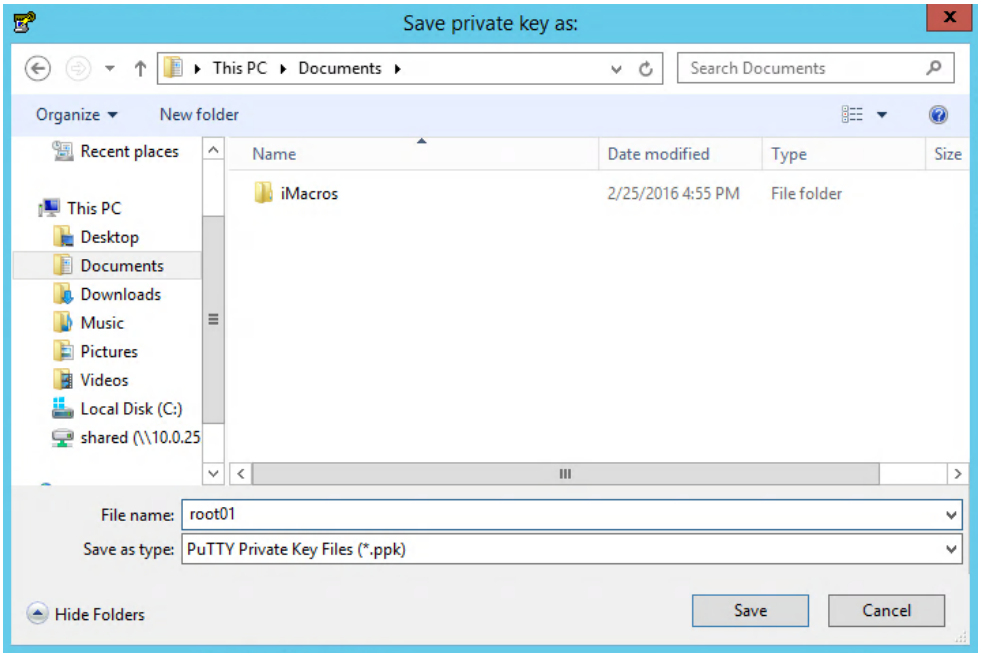
3. When the key is generated click **Save Private Key**.



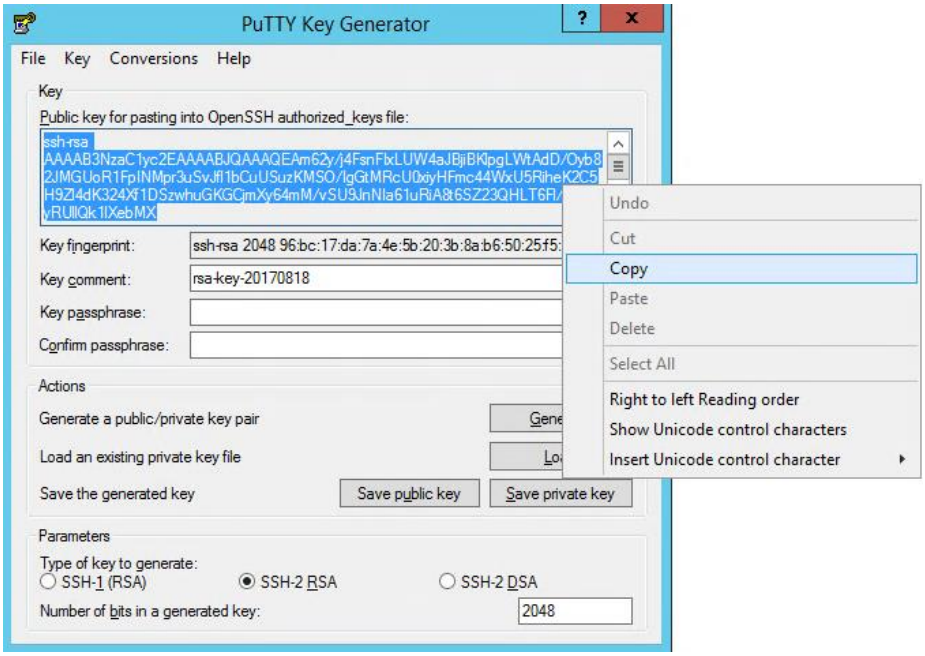
4. Click **Yes** to store they key without a passphrase. The **CPM** does not support private keys with passphrases.



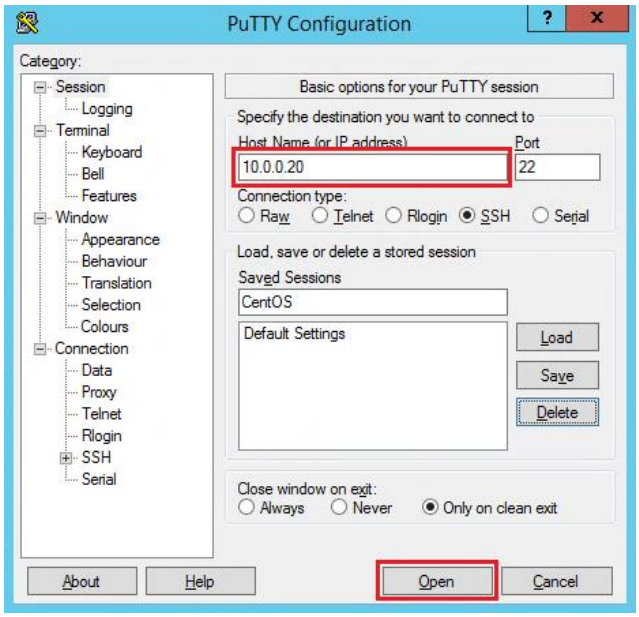
5. Name the key ***root01.ppk*** and save it to your ***Documents*** directory.



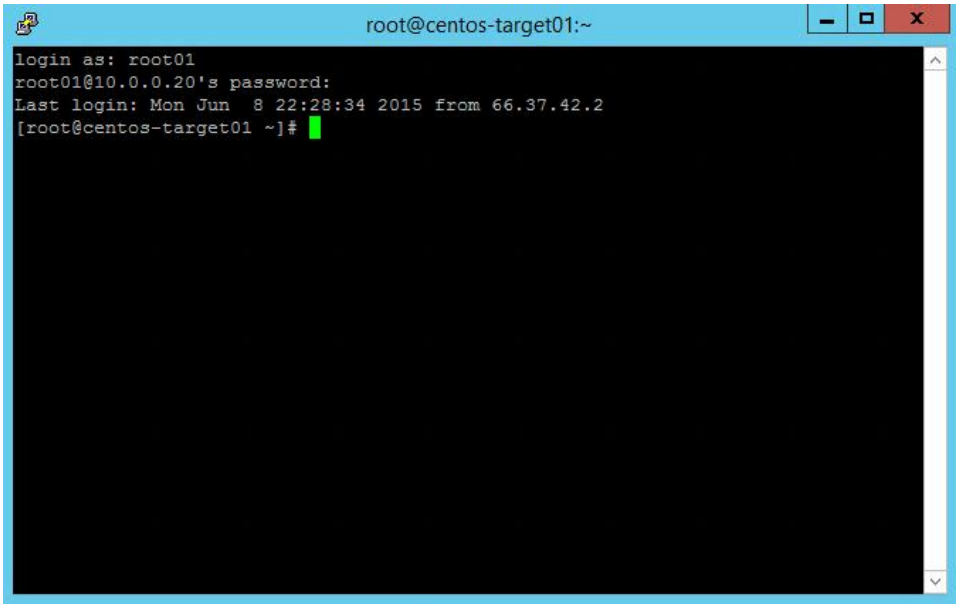
6. Select all the text in the '*Public key for pasting into Open SSH authorized keys file*' box and **copy** it to your clipboard.



7. Use **putty** to connect to **10.0.0.20**.



8. Log in as *root01* with the password *Cyberark1*.

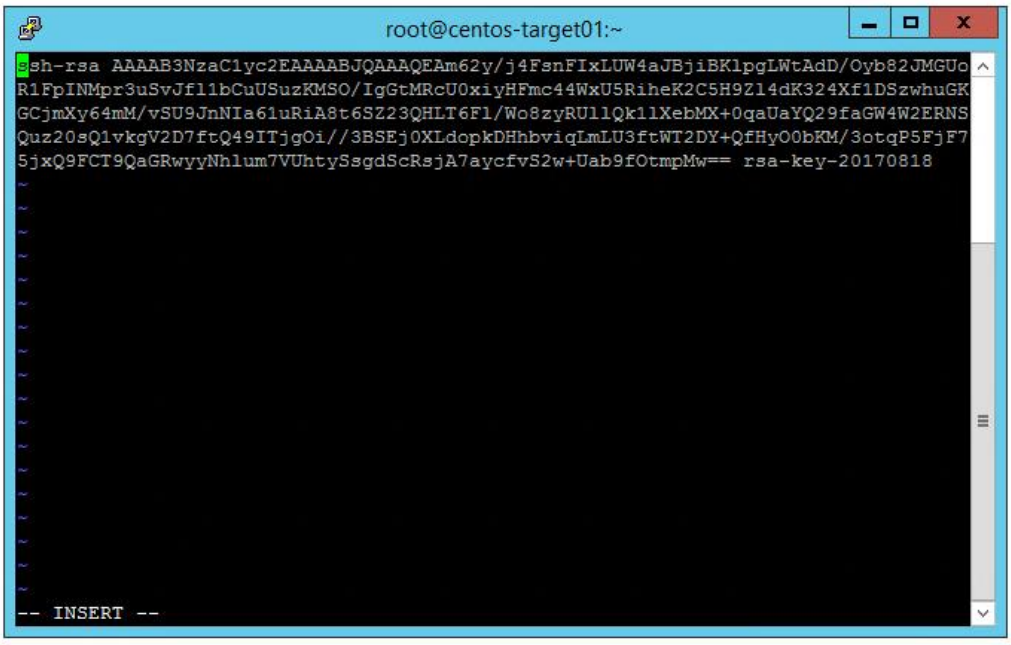


9. Edit your authorized key file with vi.

```
vi ~/.ssh/authorized_keys
```

10. Press **i** (or the **Insert** button on your keyboard) to enter insert mode.

11. Right click inside the editor to paste the key. Verify that the key pasted correctly.



Warning!	It can be a bit tricky to copy and paste into a terminal window. Make sure that your key text begins with the string “ssh-rsa” and that it ends with “rsa-key-***date***” where ***date*** is today’s date.

12. Press **ESC** and then enter **`:wq`** -- (colon) (w) (q)

13. Press **ENTER** to exit and save.

14. Make sure the Key appears in the *authorized_keys* file (and that all characters were pasted properly) by using the *cat* command:

    ```
    cat ~/.ssh/authorized_keys
    ```

15. Exit your **putty** session.

Note:	If you need help with the ***vi*** editor, you can read the tutorial at: *http://www.tutorialspoint.com/unix/unix-vi-editor.htm*

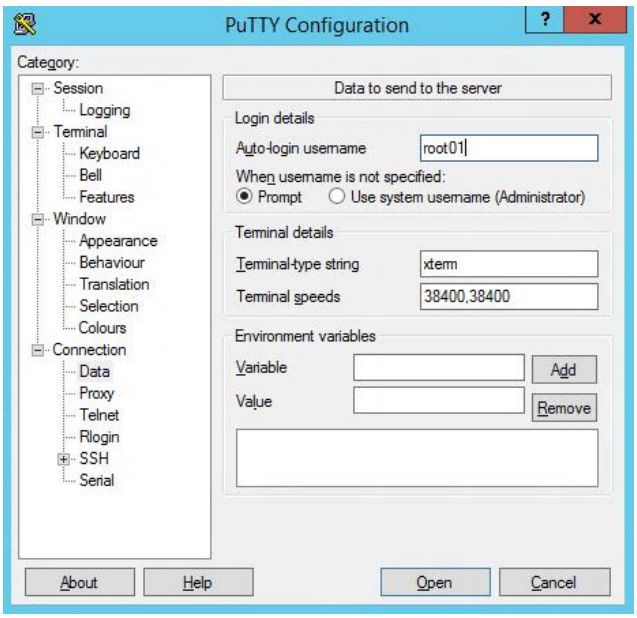
Verify You Are Able to Log in with the Private Key

Now we will test that we are able to authenticate with the private key.

1. Open **putty** again.

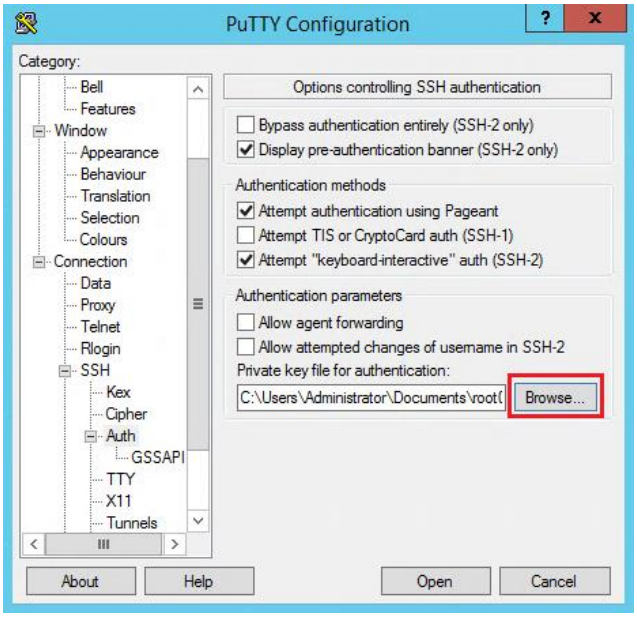
2. Type *10.0.0.20* in the **Host Name** box, but do not connect yet. Navigate to **Connection > Data**.

3. Enter *root01* in the **Auto-login username** field.

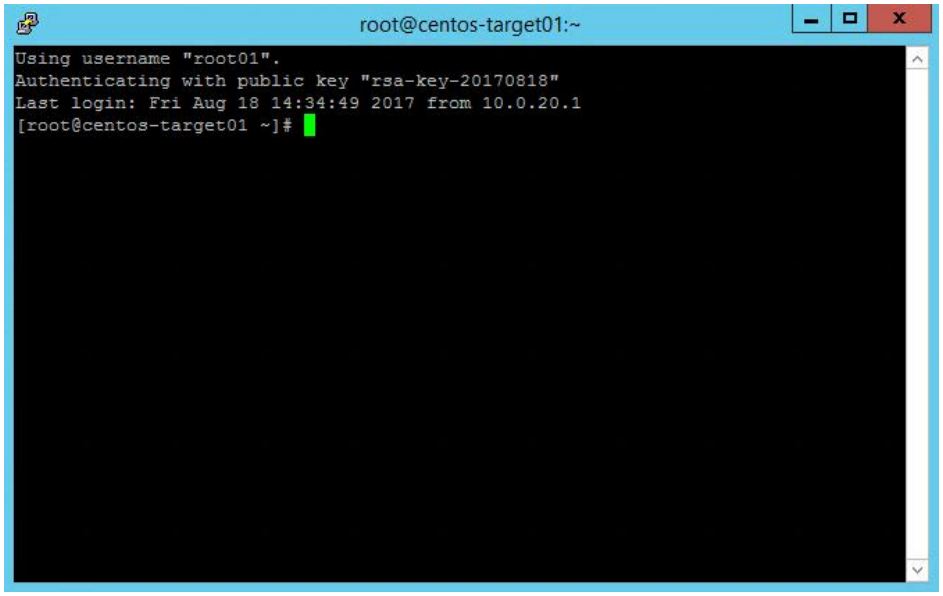


4. Navigate to **Connection > SSH > Auth**.

5. Click **Browse** and browse to the *ppk* file you created earlier.



6. Now click **Open** and verify that you are able to log on without supplying a username and password.

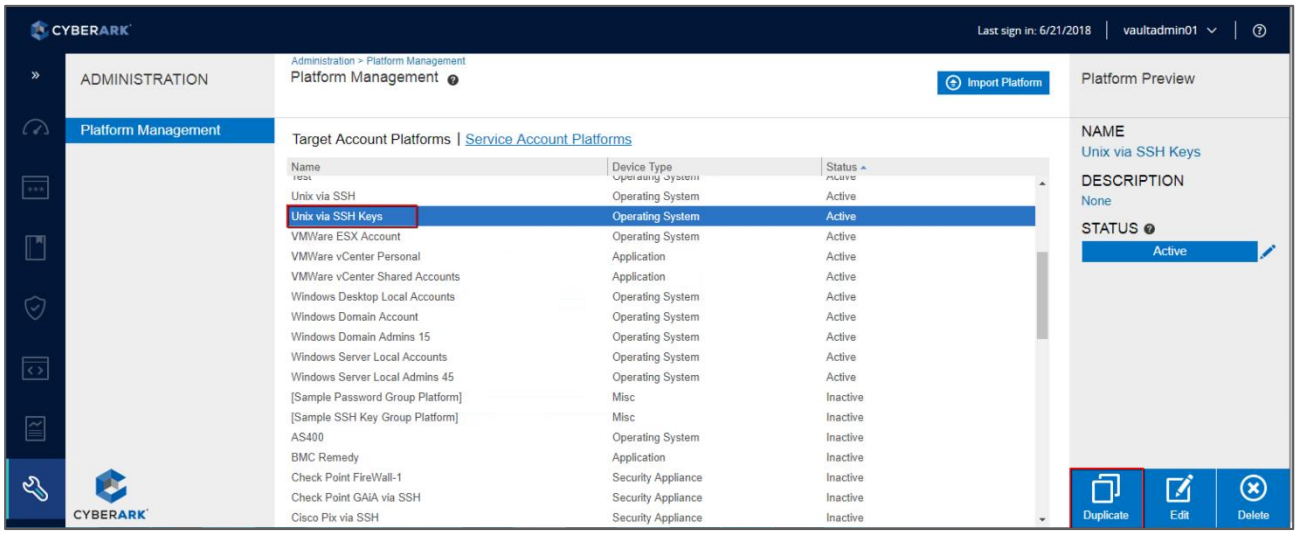


Duplicating a Platform

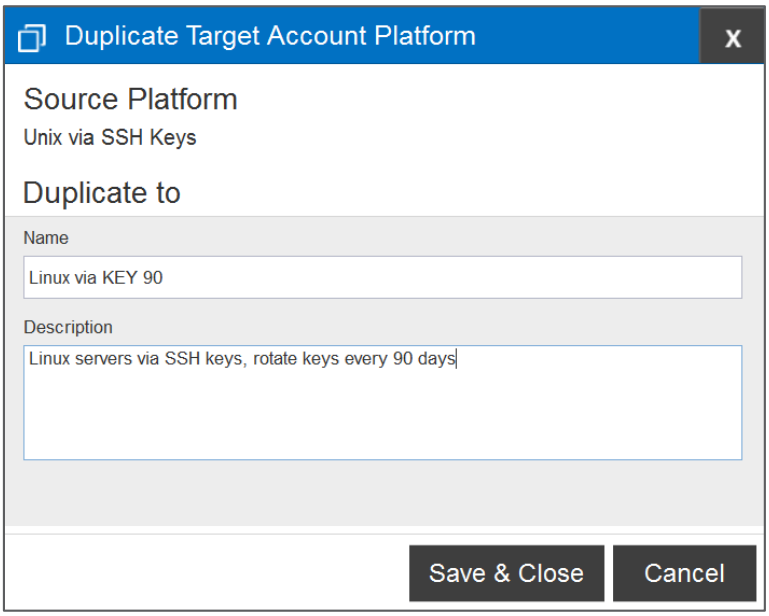
1. Login to **PVWA** as *vaultadmin01* and go to **ADMINISTRATION > Platform Management**.

2. Highlight **Unix via SSH Keys** (make sure that you choose the “Unix via SSH **Keys**” platform, not the “Unix via SSH” platform).

3. Press **Duplicate**.

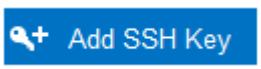


4. Name your platform **Linux via Key 90** and click **Save & Close**. We won't make any modifications to this platform.



Add an Account with an SSH key

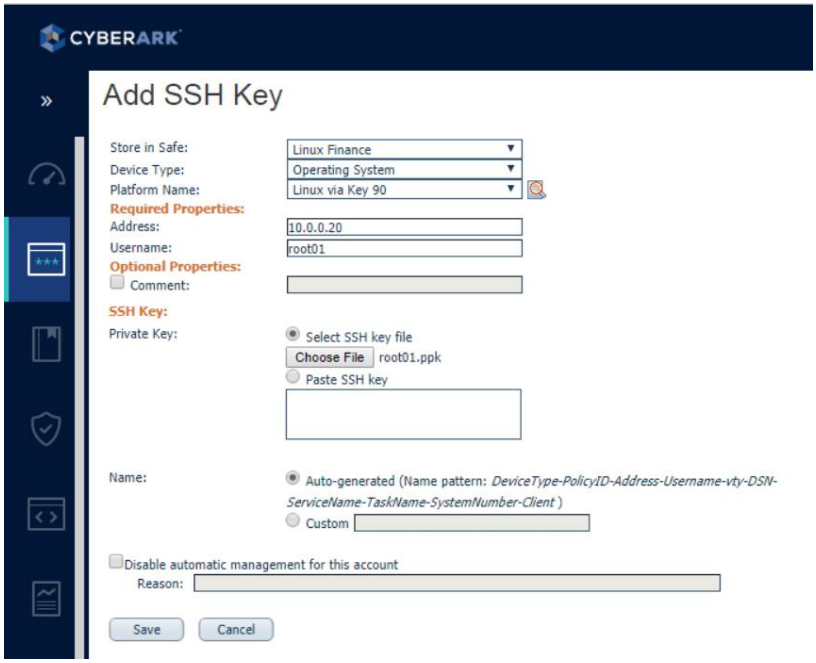
1. Using the classic interface, go to the **ACCOUNTS** tab and click the **Add SSH Key** button.



2. Add an account with the following properties. If you do not see the SSH Key configuration area, you may have duplicated the wrong platform.

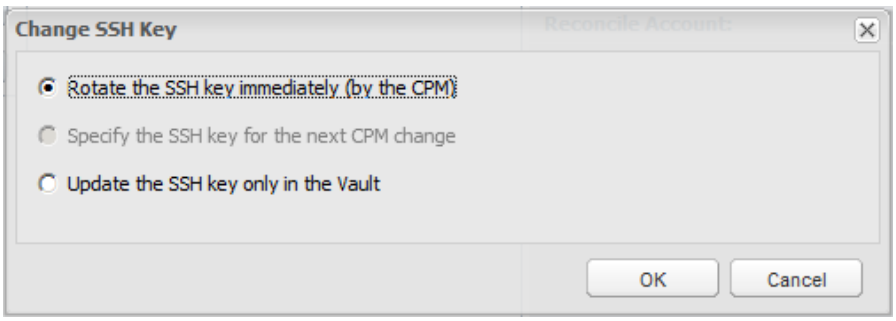
Store in Safe:	*Linux Finance*
Device Type:	*Operating System*
Platform Name:	*Linux via Key 90*
Address:	*10.0.0.20*
Username	*root01*
Private Key:	Browse to find the *root01.ppk* file you created earlier.

3. Click **Save**.



4. Click **Change** and select *Rotate the SSH key immediately (by the CPM).*

5. Click **OK**. This process can take a few minutes.



6. Once the change completes verify that you are NOT able to connect with **putty** using the SSH key.

Onboarding Accounts

In the following exercises you will use the **Accounts Feed** feature as well as the **Password Upload Utility** to onboard accounts to the system.

Accounts Feed

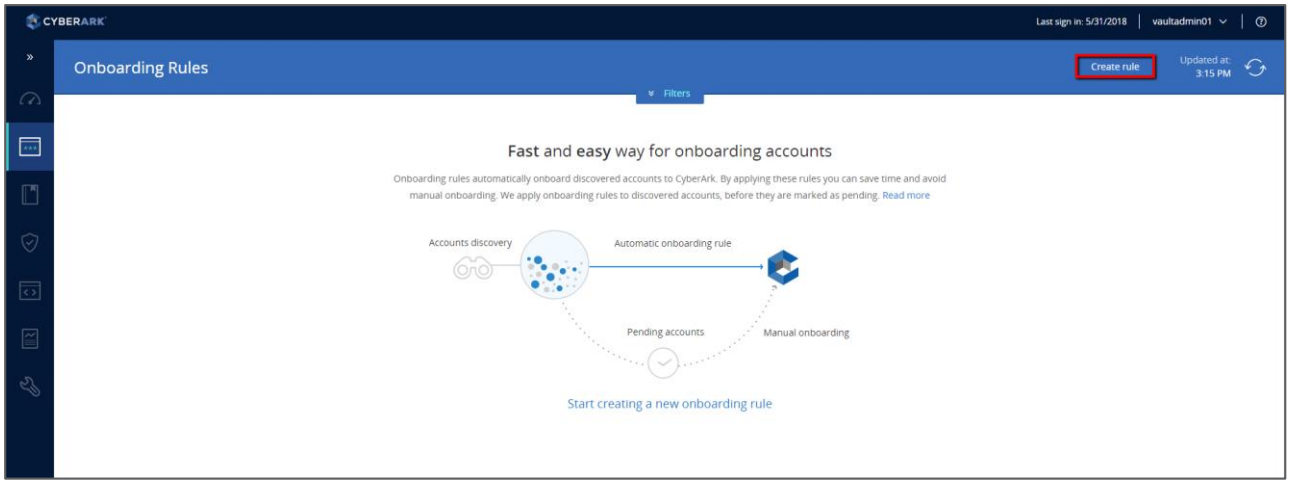
In the next exercise you will configure rules for automatically onboarding accounts discovered using the Accounts Feed feature and then run a Windows Discovery to discover and automatically onboard accounts.

Configure Automatic Onboarding Rules

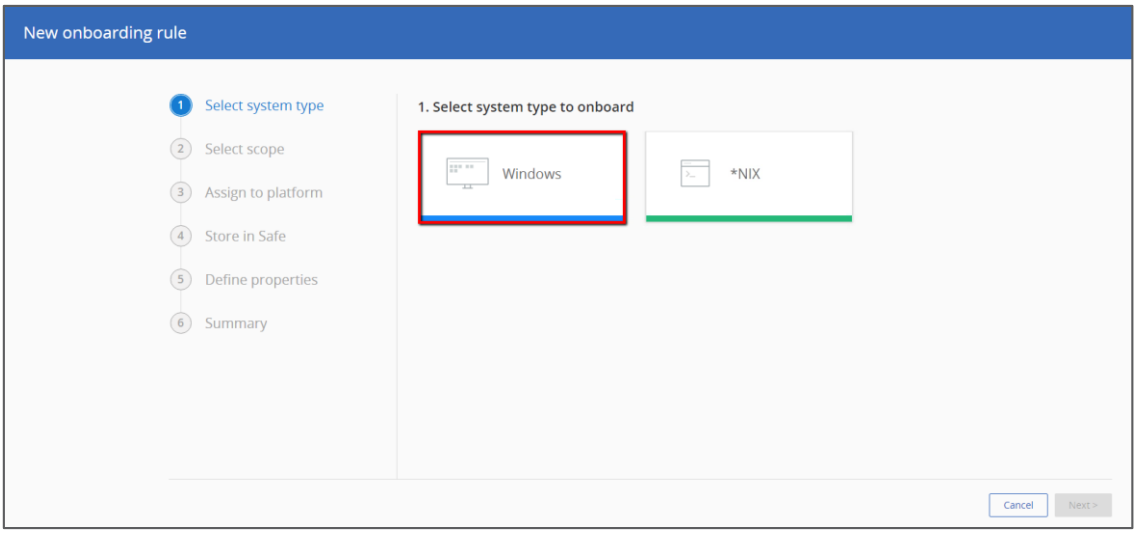
In this section, you will configure Onboarding Rules in order to add newly discovered accounts to the **Vault** without any human intervention.

1. On the **Components** server, open Chrome and go to the **PVWA**.

2. Go to **Accounts** > **Accounts Feed** > **Onboarding Rules** and click on **Create rule**.

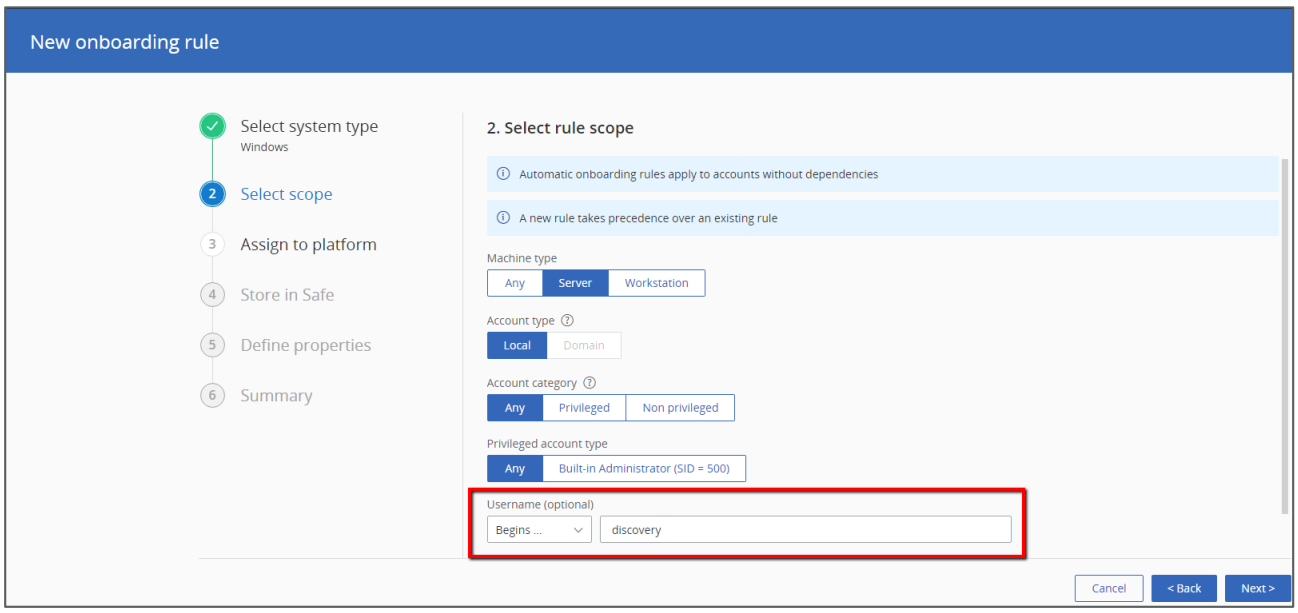


3. In **Select system type** select **Windows**.



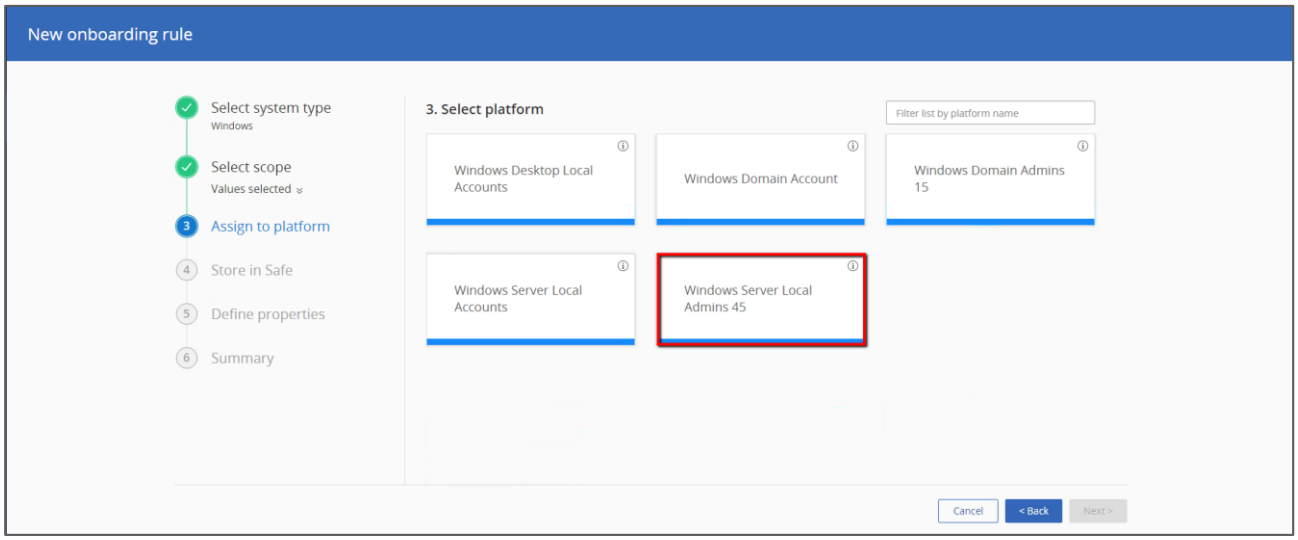
4. In **Select Scope** select the following:

Machine Type:	*Server*
Account Type:	*Local*
Account Category:	*Any*
Privileged Account Type:	*Any*
Username (begins…):	*discovery*



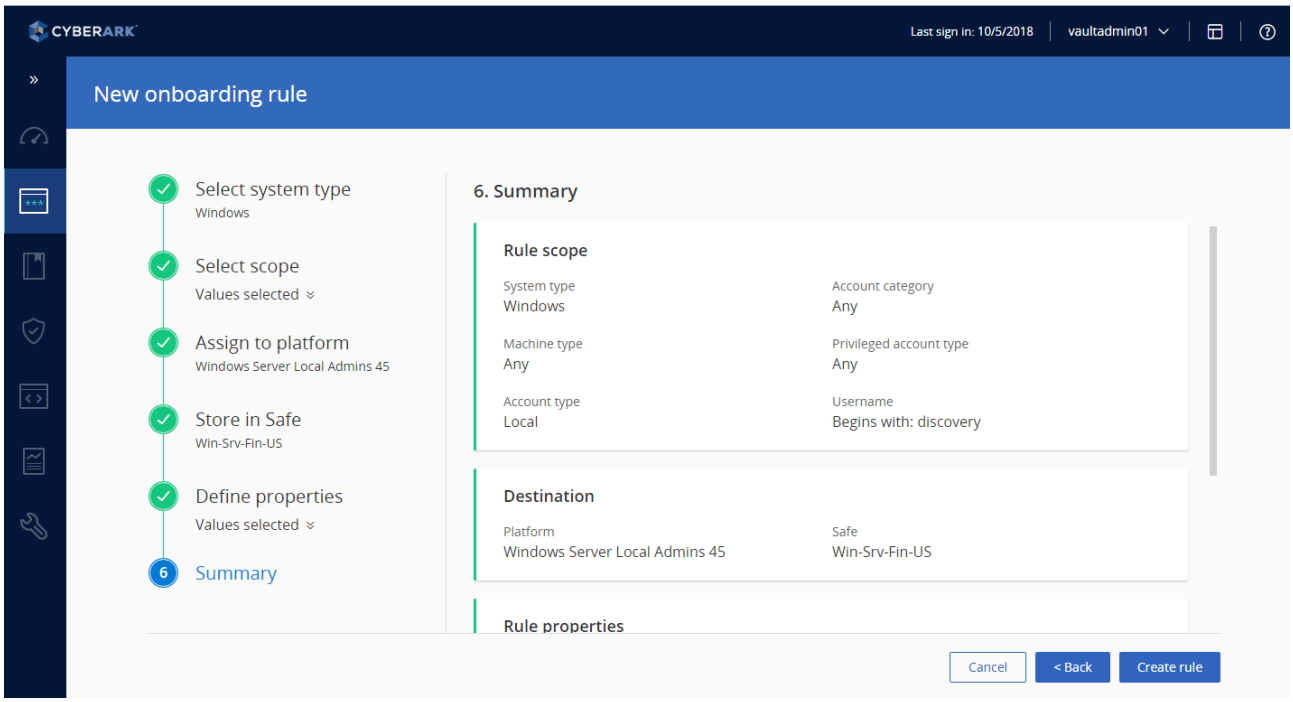
5. Click **Next**.

6. In **Assign to platform** select *Windows Server Local Admins 45*.



7. In **Store in Safe** select *Win-Srv-Fin-US*.

8. In **Define rule** properties enter the following name: *Discovery users*.

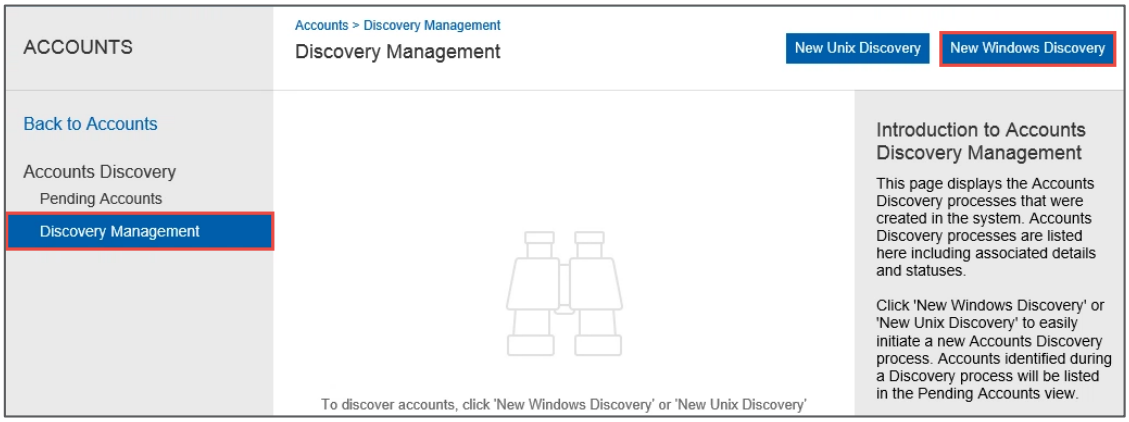


9. Review your rule and if everything seems to be in order click on **Create rule**.

Configure and Run Windows Accounts Discovery

The Accounts Discovery process requires an account to log in to the domain and scan the individual machines. You can use the existing *cybrscan* account.

1. Go to **Accounts > Pending & Discovery > Discovery Management** and click **New Windows Discovery**.

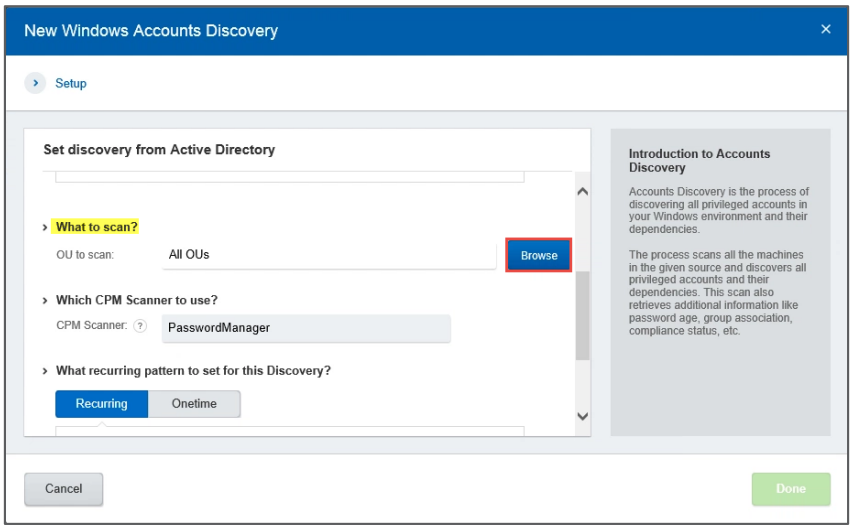


2. Enter *cyber-ark-demo.local* in the **Domain** field.

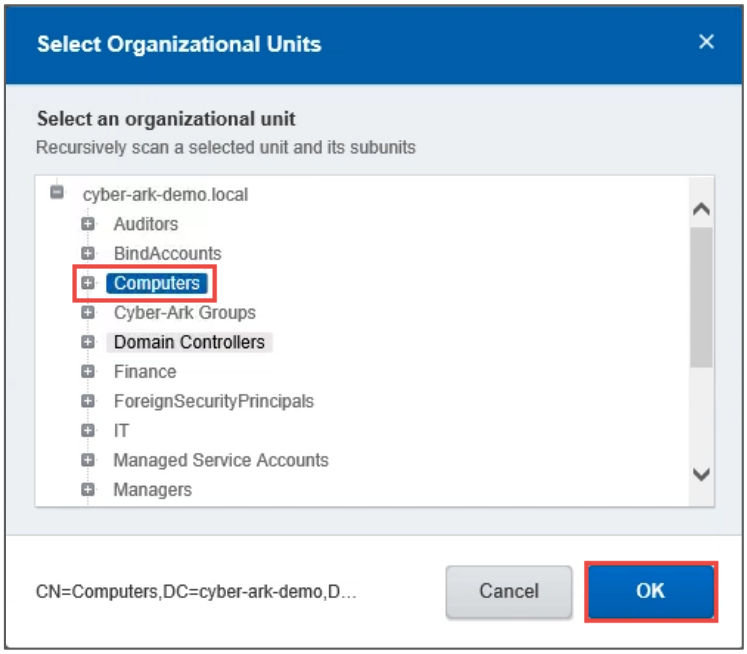
3. Use the **Click to select an account from the Vault** link and select the *cybrscan* account.

Note:	The user ***cybrscan*** is an Active Directory account created especially for the purposes of running Accounts Discovery scans. It is a member of the Domain Admins AD group.

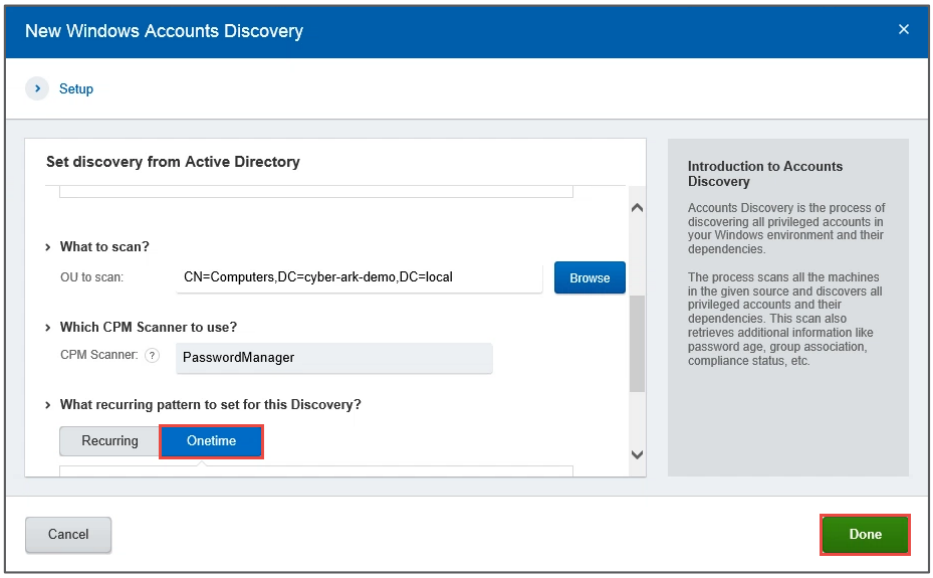
4. In the *What to scan?* section, click **Browse**.



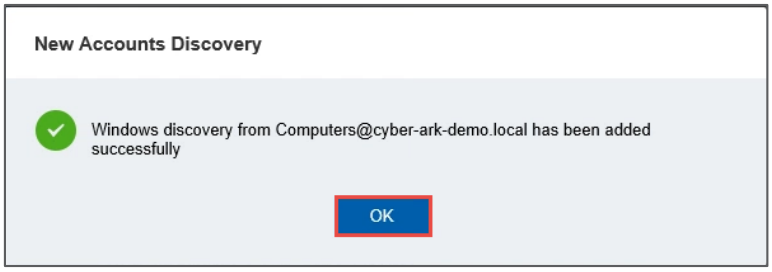
5. Select the *Computers* container and press **OK**.



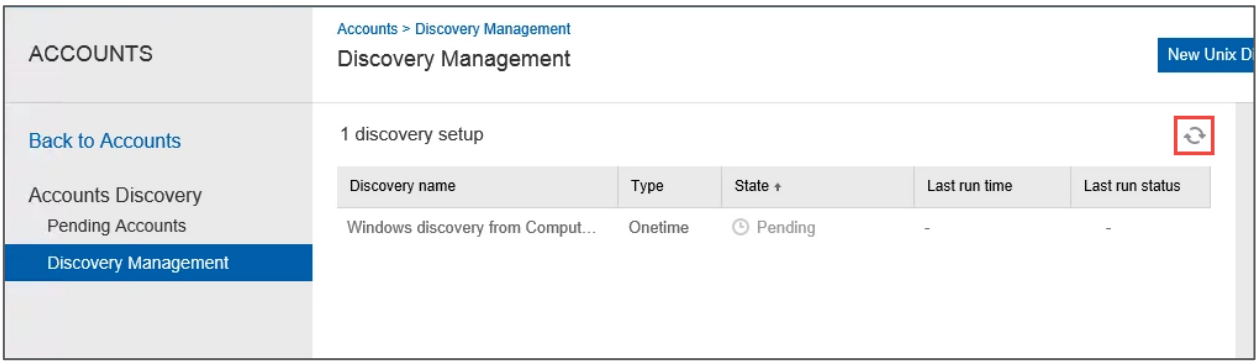
6. Under **What recurring pattern to set for this Discovery?** Select *Onetime*, then click **Done**.



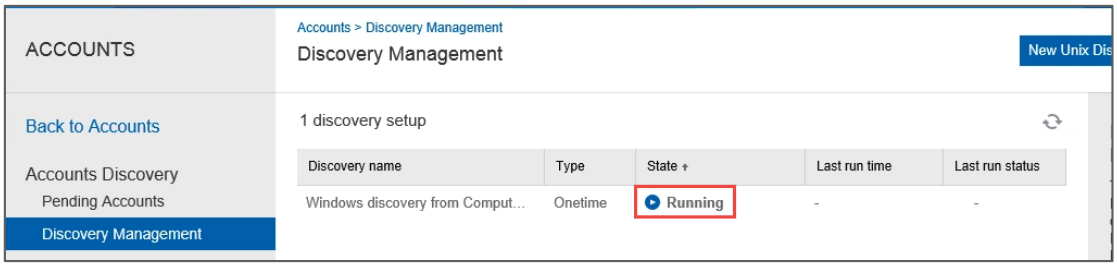
7. You will receive a message saying that the Windows discovery has been added. Press **OK**.



8. Press the **Refresh** icon to update the status. You may need to back out of the window and go back in to see the state change. This can take a few minutes.

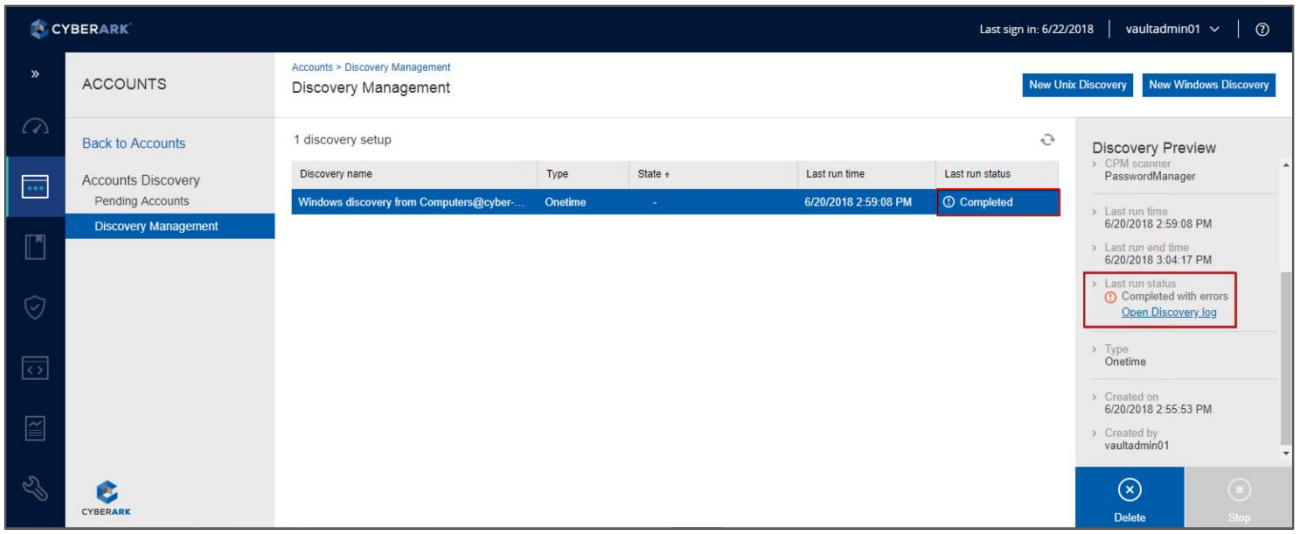


9. You should see the status change from *Pending* to *Running*.



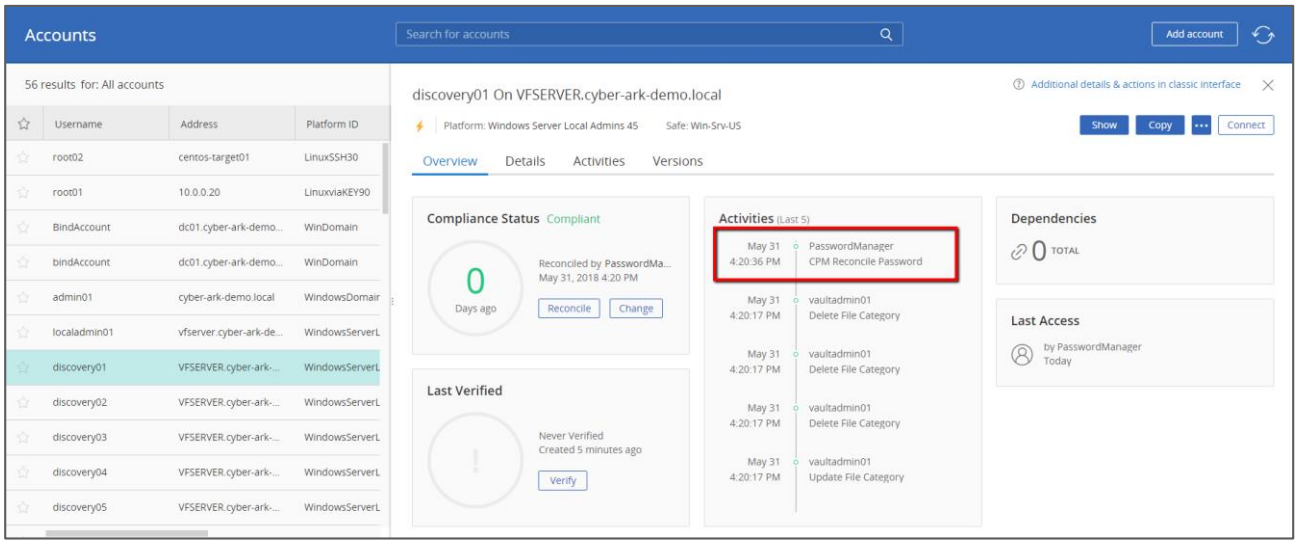
10. After several minutes, the process should appear as *Completed*.

Note: **You will get an error message** - Because some of the machines in the lab environment are **not** running (or don't exist at all), the Accounts Discovery will fail to access them and will return an error. However, the machines that we need should be available and successfully scanned.



Verify Automatically Onboarded Accounts

1. Go to **Accounts > Accounts View**. If you configured your automatic rules properly, you should be able to see all the "discoveryXX" accounts in the accounts view. If you assigned a reconcile account to the platform, the accounts added should also be scheduled for immediate reconciliation.

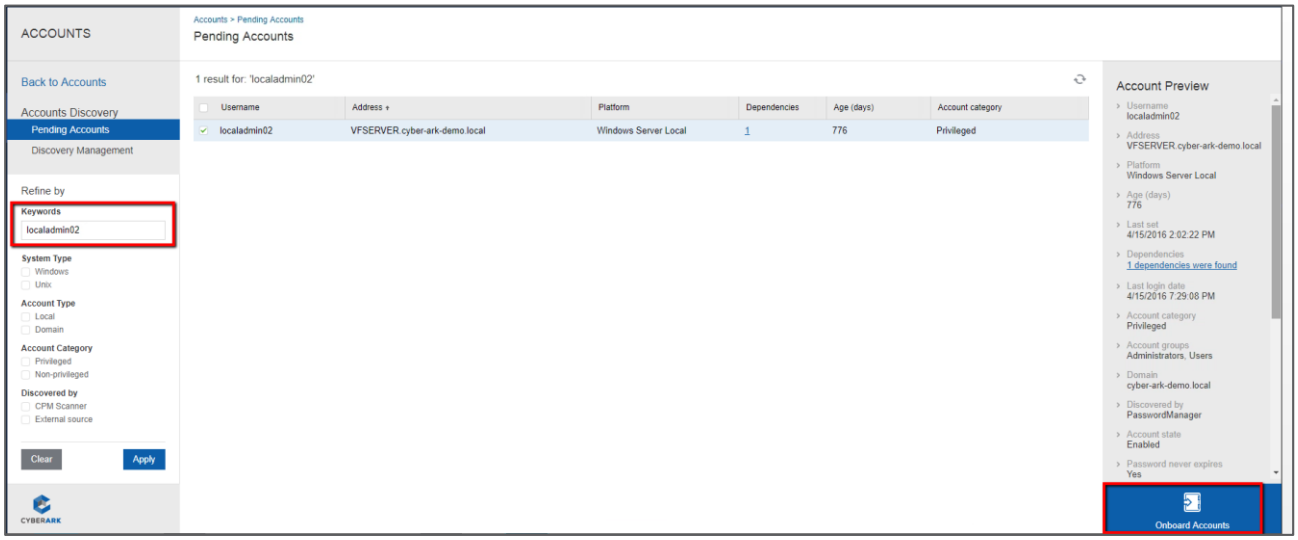


Manually onboard discovered accounts

In this section, we will manually onboard an account that was discovered but for which there was no automatic onboarding rule.

1. Go to the **Pending Accounts** list, enter *localadmin02* in the **Keywords** field and run a search.

2. Select the resulting *localadmin02* account and press the **Onboard Accounts** button

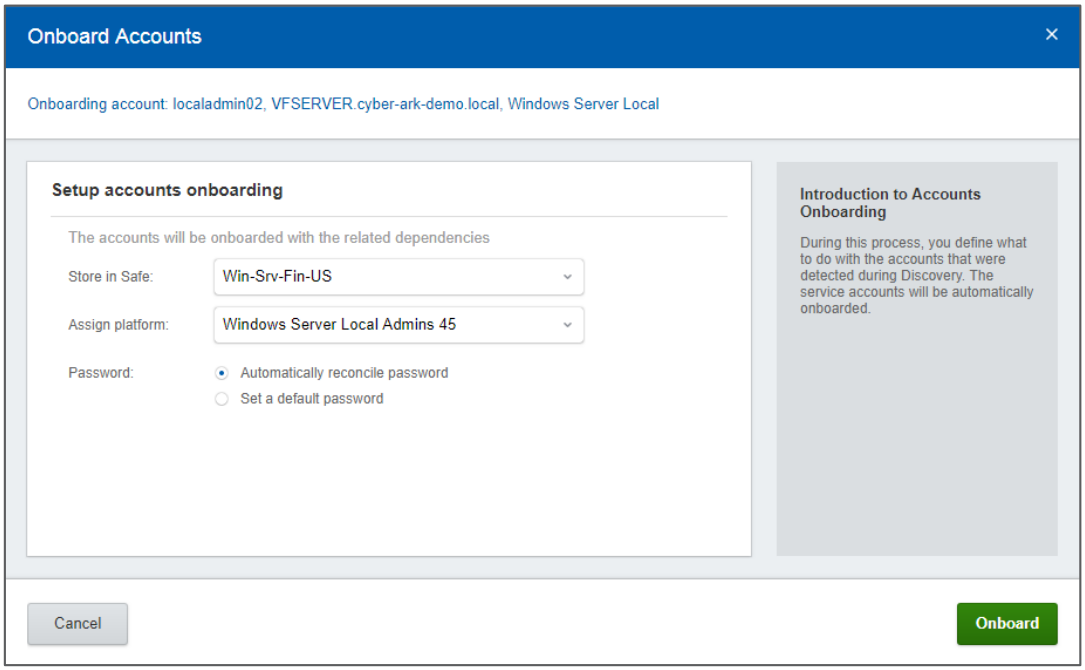


3. In the **Onboard Accounts** window, enter the following:

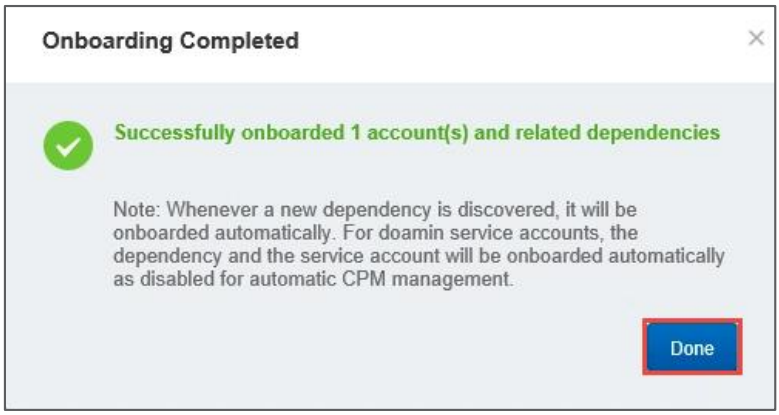
Store in Safe	*Win-Srv-Fin-US*

Assign platform	*Windows Server Local Admins 45*
Password	*Automatically reconcile password* (this will only be available if the assigned platform contains a reconcile account)

4. Press **Onboard**.



5. You should receive a message saying "Successfully onboarded 1 account(s) and related dependencies. Press **Done**.



6. Go to the **ACCOUNTS** page and search **(press the magnifying glass icon top right)** for the newly created account. Because the platform was configured for automatic reconciliation, you will see that the account has been successfully reconciled.

Password Upload Utility

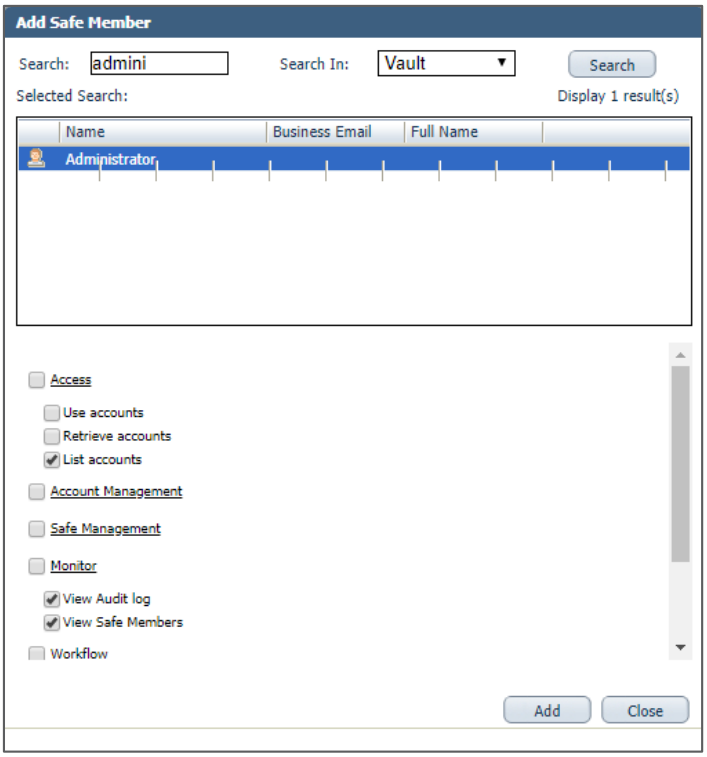
In this exercise, we are going to run the **CyberArk Password Upload Utility** (or PUU for short), a command-line tool for performing bulk uploads of accounts into the system. For convenience, we will run the **Password Upload Utility** using the CyberArk *administrator* account.

We will be adding the new accounts to a new Safe that we create with the PUU – **LinuxPU**.

The *administrator* does not have any custom safe authorizations and so cannot even see the safes that we have created so far. We want to use our existing **Linux Finance** safe as a *template safe* (basically a standard safe that provides parameters not given during the execution of the PUU), so we just need to add the *administrator* to the **Linux Finance** safe as a member before starting the Password Upload Utility process.

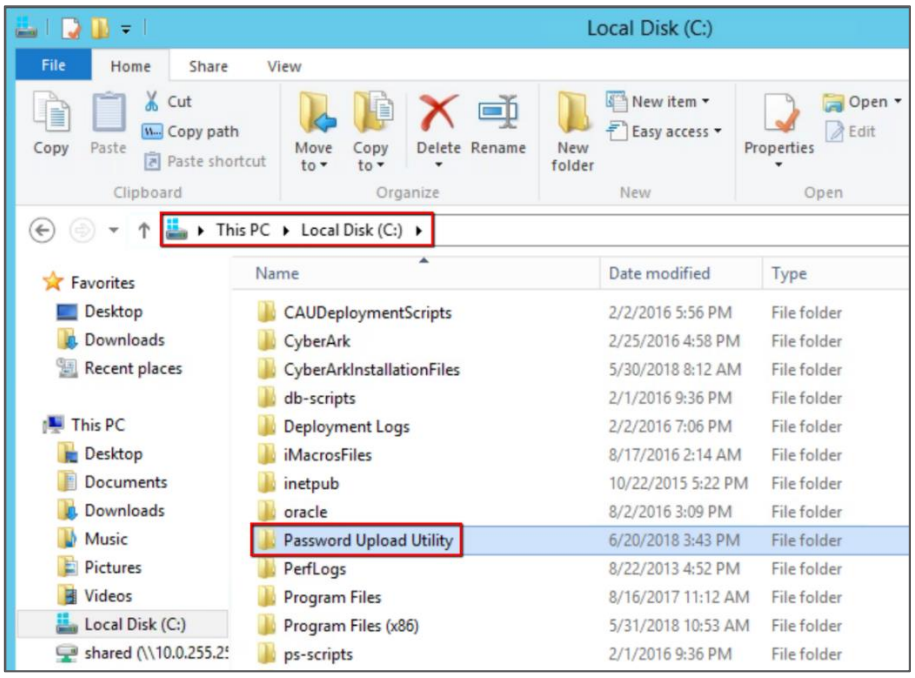
Add the Administrator as a member of template safe

1. Login to the **PVWA** via LDAP as *vaultadmin01*.
2. Go to **POLICIES > Access Control (Safes)**.
3. Select *Linux Finance* and click the **Members** button.
4. Click **Add Member**.
5. Enter *admin* in the search field, **leave *Vault*** as the option for **Search In**, and press the **Search** button. If you search in cyber-ark-demo, you will also find an Administrator account. **That account will not work**.
6. Select *Administrator* **(NOT Administrators)**, uncheck the options for *Use accounts* and *Retrieve accounts*, click **Add**, and then **Close.**

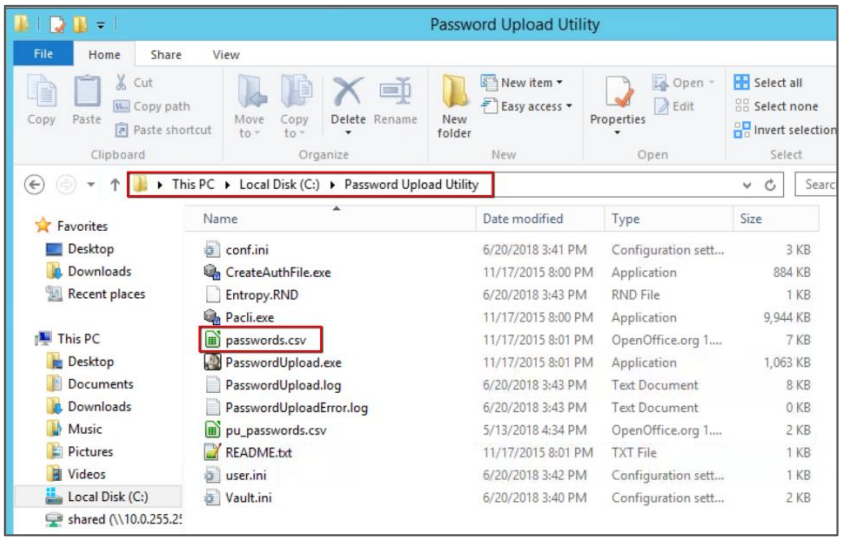


Configure and run PUU

1. Go to the *C:\Password Upload Utility* directory.

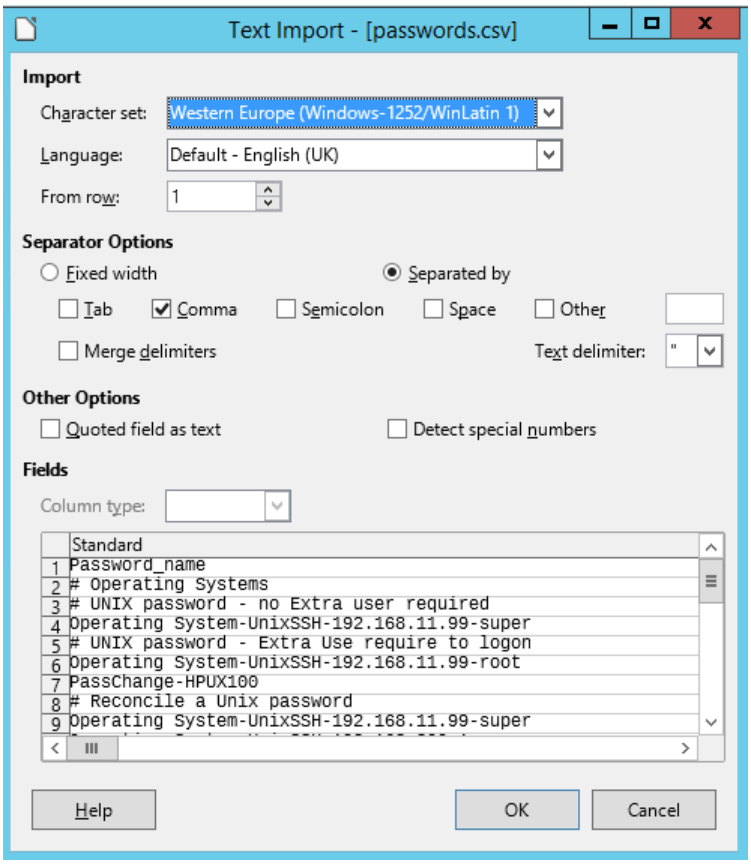


2. First let's look at the sample file provided with the **PUU**. Double-click the **passwords.csv** file.

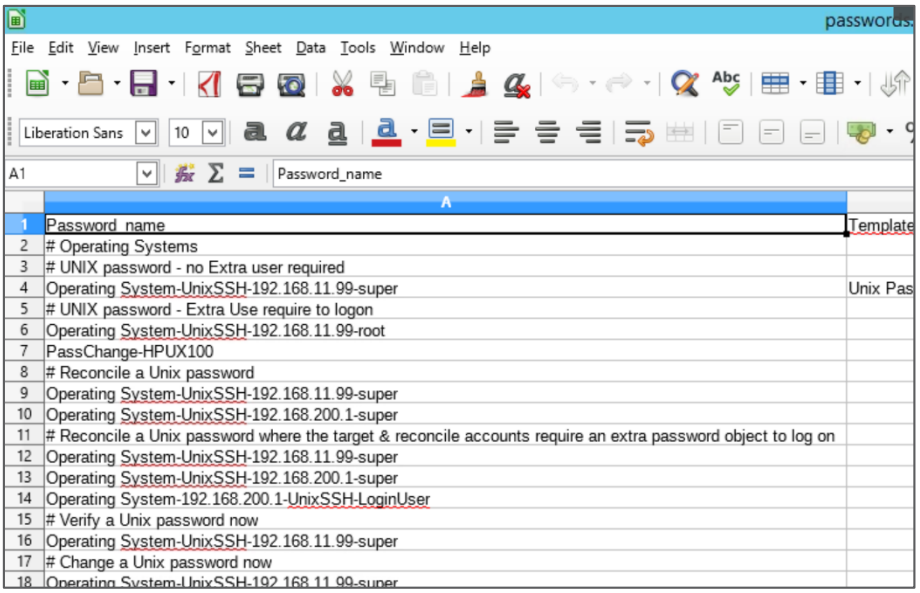


3. On the *Text Import* screen make sure that the file is only *Separated by…Comma.*

4. Press **OK.**

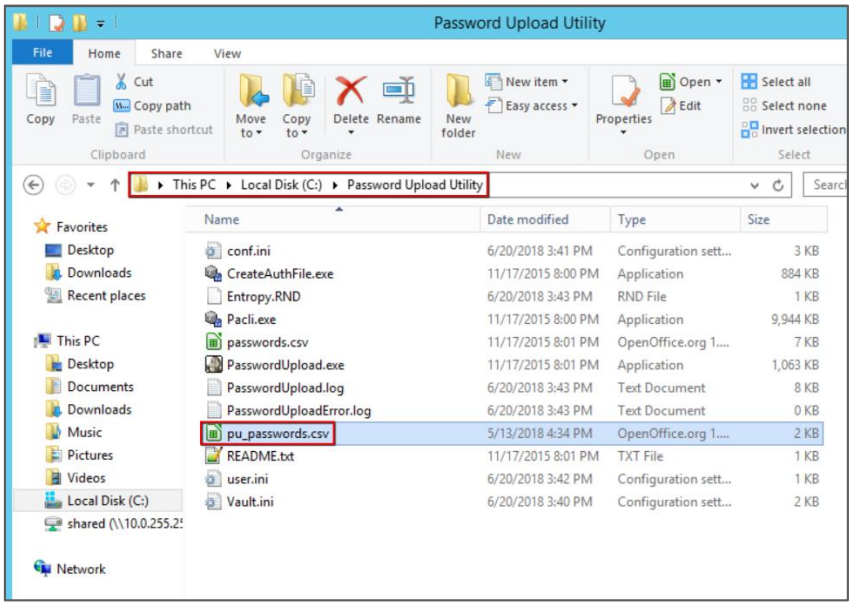


5. Review the contents of this file to see the options available for uploading accounts.

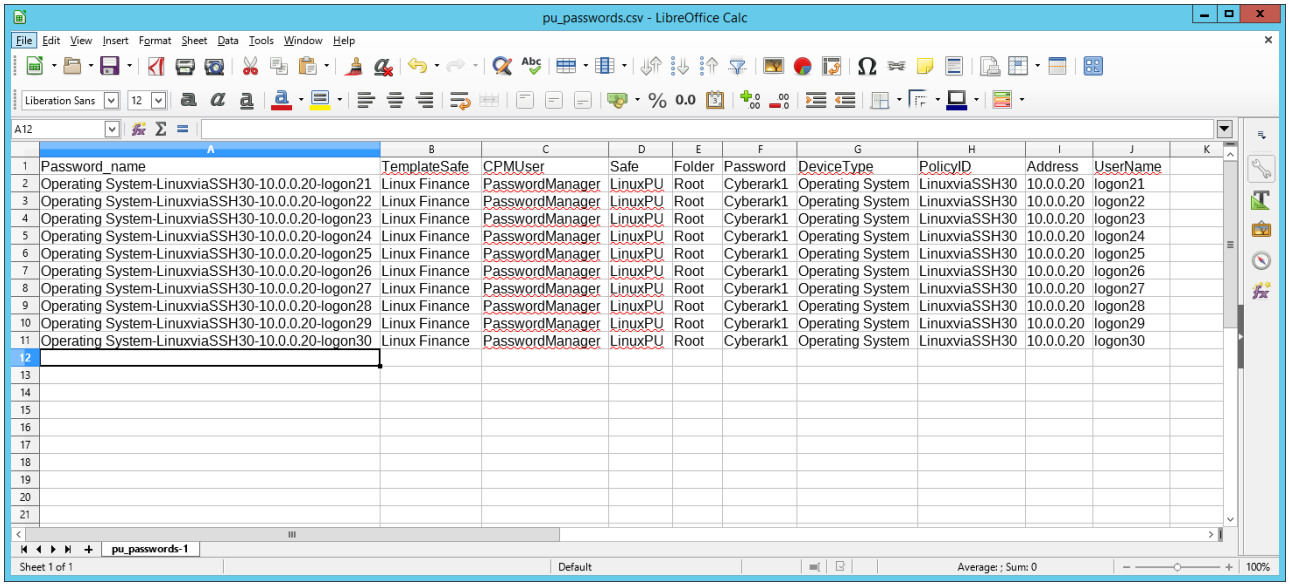


6. Close the file when you are done (we will use a preformatted file to perform the actual import).

7. In the same folder, double-click the **pu_passwords** file.



8. Make sure that the file is *Separated by…Comma* and press **OK**.



Password_name	TemplateSafe	CPMUser	Safe	Folder	Password	DeviceType	PolicyID	Address	UserName
Operating System-LinuxviaSSH30-10.0.0.20-logon21	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon21
Operating System-LinuxviaSSH30-10.0.0.20-logon22	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon22
Operating System-LinuxviaSSH30-10.0.0.20-logon23	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon23
Operating System-LinuxviaSSH30-10.0.0.20-logon24	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon24
Operating System-LinuxviaSSH30-10.0.0.20-logon25	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon25
Operating System-LinuxviaSSH30-10.0.0.20-logon26	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon26
Operating System-LinuxviaSSH30-10.0.0.20-logon27	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon27
Operating System-LinuxviaSSH30-10.0.0.20-logon28	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon28
Operating System-LinuxviaSSH30-10.0.0.20-logon29	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon29
Operating System-LinuxviaSSH30-10.0.0.20-logon30	Linux Finance	PasswordManager	LinuxPU	Root	Cyberark1	Operating System	LinuxviaSSH30	10.0.0.20	logon30

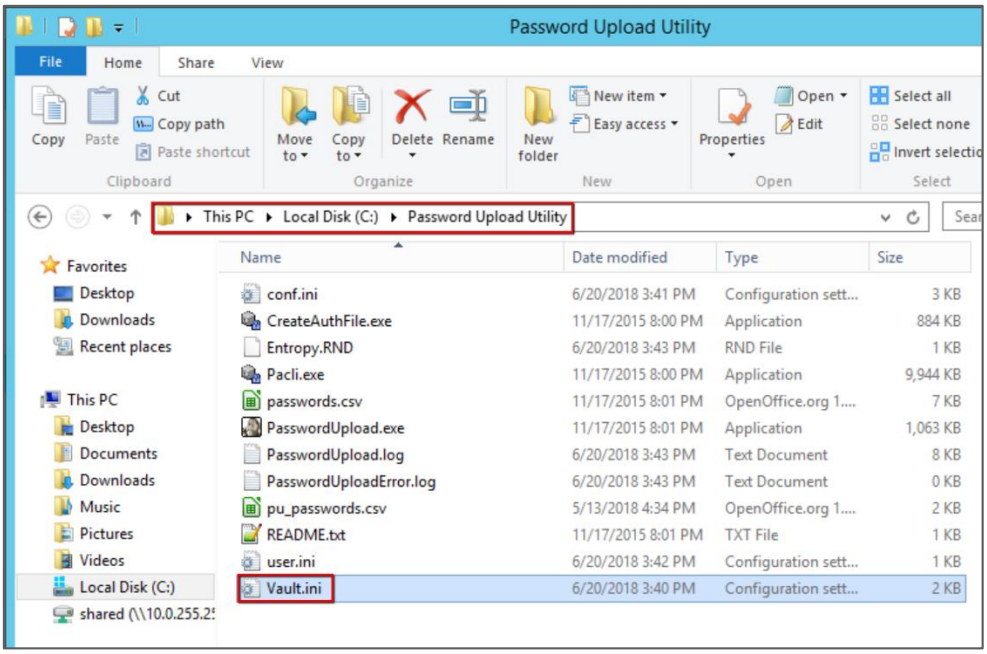
Note: This is a pre-formatted file with all the necessary information to upload into **CyberArk**.

9. If you would like to experiment, you can add a line or two to the file. Adding the information below would add a single new account in a separate Safe named **LinuxPU2**.

Password_name:	*linuxadmin01*
TemplateSafe:	*Linux Finance*
Folder:	*Root*
CPMUser:	*PasswordManager*
Safe:	*LinuxPU2*
Password:	*Cyberark1*
DeviceType:	*Operating System*
PolicyID:	*LinuxviaSSH30*
Address:	*10.0.0.20*
UserName:	*linuxadmin01*

10. Save and close the file when done. **Be sure to maintain the same CSV format**.

11. Double-click the *Vault.ini* file

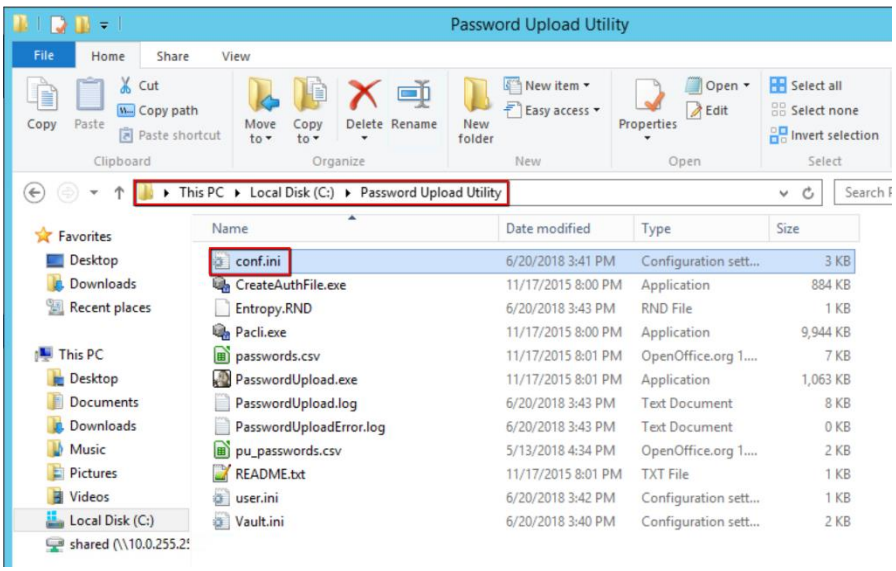


12. In the **address** field, enter the **IP address** your vault server (make sure you use the IP address of **your** Vault Server).

```
VAULT = "My Vault".
ADDRESS=10.0.10.1
PORT=1858
#----------------------------------
# Additional parameters (optional)
#----------------------------------
```

13. Save and close the file.

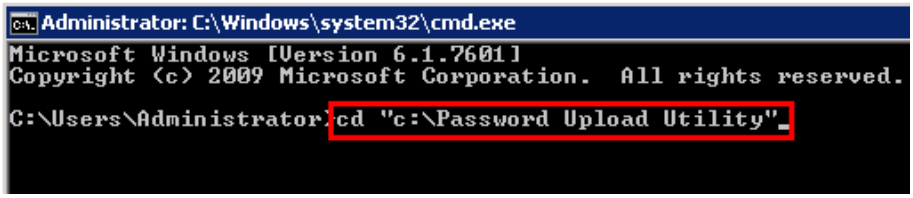
14. Double-click the *conf.ini* file.



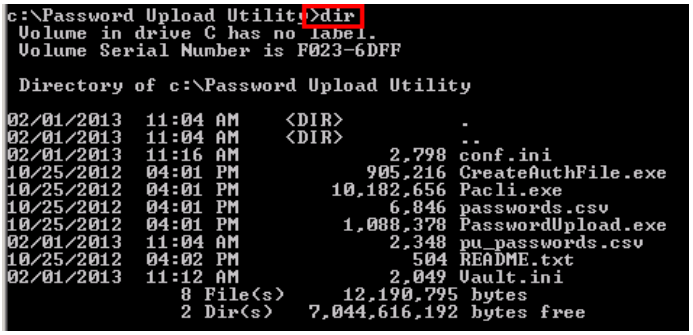
15. Scroll down to **bottom** of the file to the second *Mandatory parameters* section, enter the following:

PasswordFile:	*pu_passwords.csv*
DefaultTemplateSafe:	*Linux Finance*

16. Open a command prompt. Change directories to *c:\Password Upload Utility*.

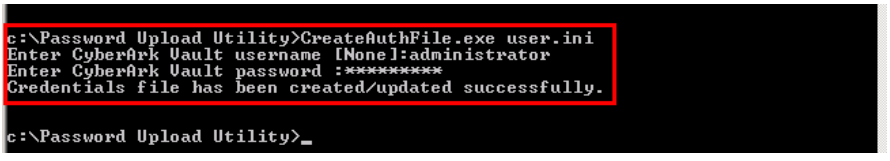


17. Enter **dir** to display the contents of the folder.



18. Run the following:

```
C:\Password Upload Utility> CreateAuthFile.exe user.ini
Enter CyberArk Vault username [None]: administrator
Enter CyberArk Vault password : Cyberark1
```

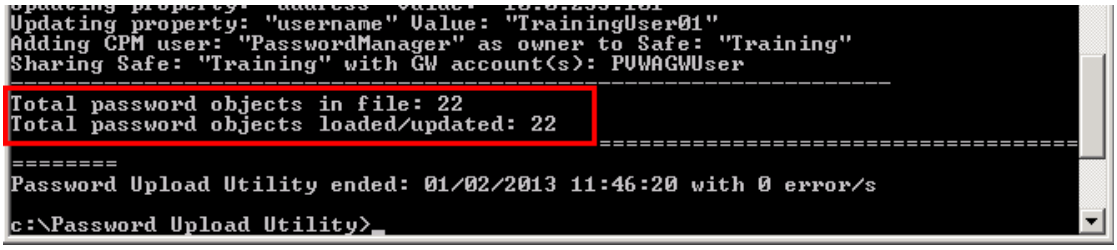


19. Run the following command:

```
PasswordUpload.exe conf.ini
```

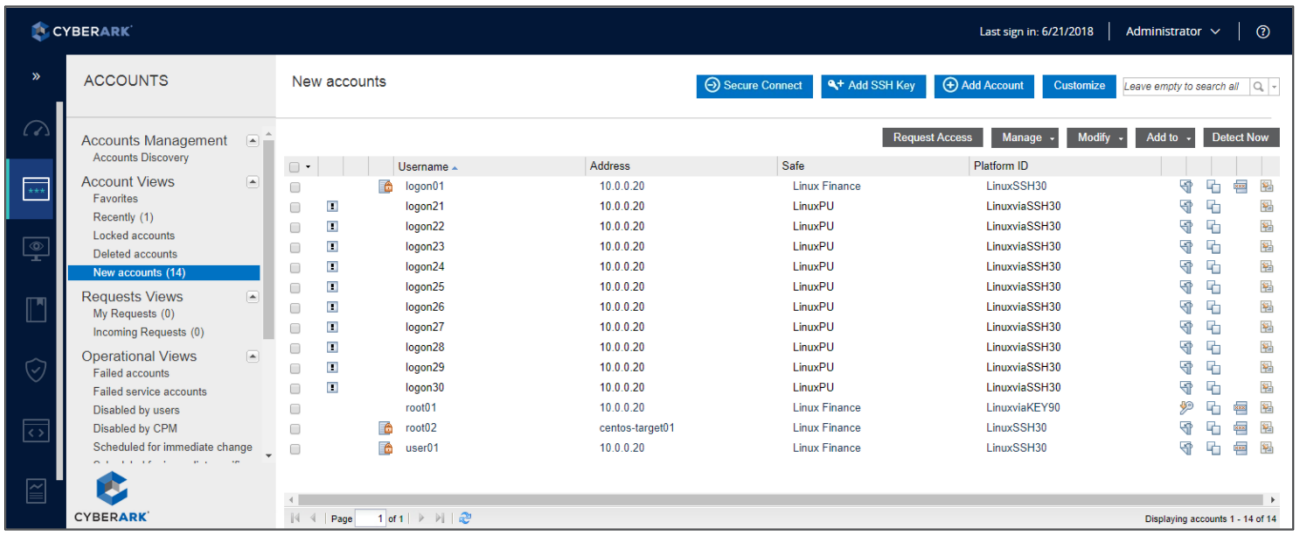
20. If configured correctly, you will see messages indicating that each password is being stored.

21. When complete, you will receive a message displaying the total number of passwords uploaded or updated.



22. Log in to the **PVWA** as *Administrator* using CyberArk authentication.

23. Go to the **ACCOUNTS** view and search for all accounts to verify that the new users have been added.



24. Sign out of the **PVWA** session.

Privileged Session Management

In this section, we will perform a number of tests to see the various privileged session management options that are available with CyberArk Core PAS.

First, we will disable the **PSM** globally and then activate it for specific platforms using exceptions.

We will then perform a number tests to ensure that privileged session management is functioning properly using the various connection methods available:

- Privileged Session Manager (PSM)
- Privileged Session Manager for SSH (PSM for SSH)
- Privileged Session Manager for Windows (PSM for Windows)

Privileged Session Manager

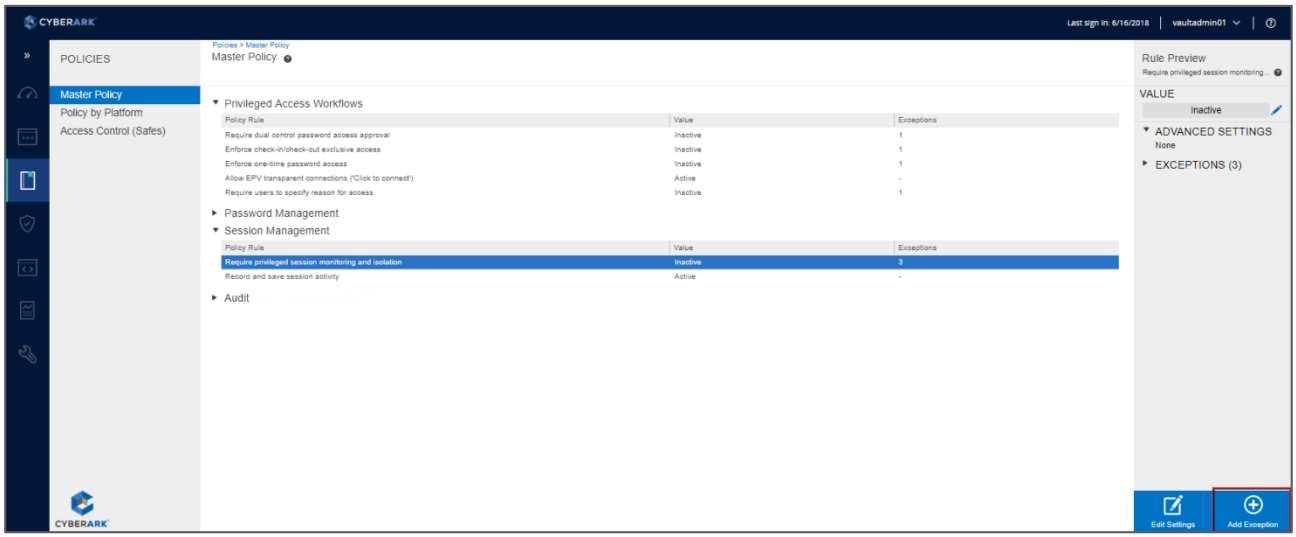
This method allows users to connect securely via the PSM to all types of systems and applications through the unified PVWA web portal user interface

Enabling PSM

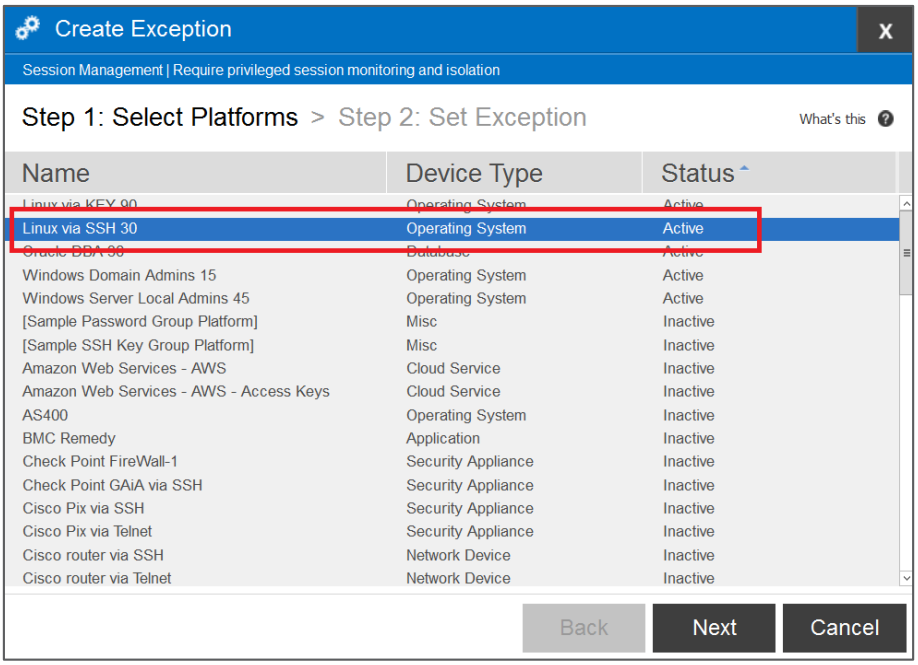
The **PSM** is enabled through the **Master Policy**. PSM can be enabled either globally for all platforms or disabled globally and only activated through exceptions, which is what we will test here.

If your PSM is *Active*, switch it to *Inactive* before performing this exercise.

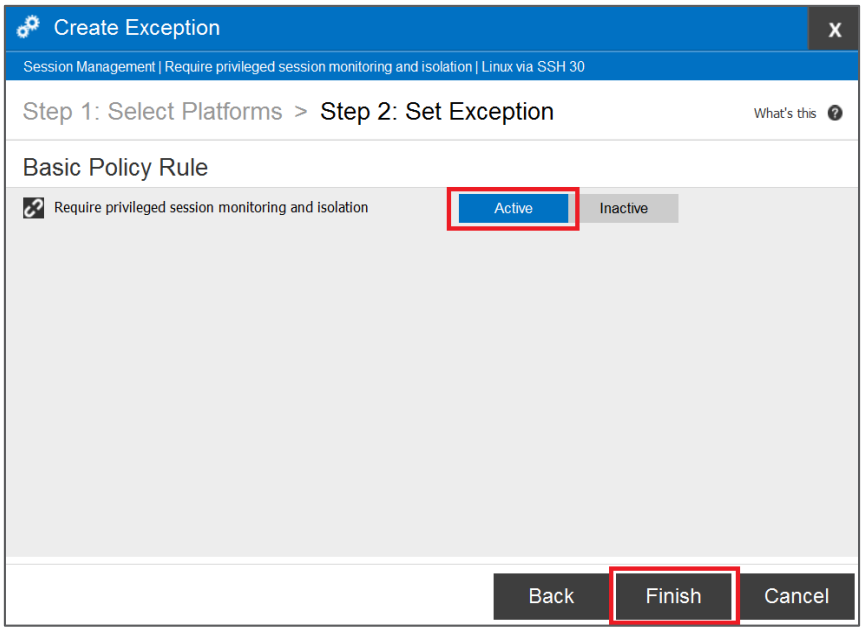
1. Login to the **PVWA** as *vaultadmin01* using LDAP authentication.
2. Go to **POLICIES > Master Policy**.
3. In the **Session Management** section, highlight *Require privileged session monitoring and isolation* and deactivate it.
4. Once deactivated, with *Require privileged session monitoring and isolation* still selected, press **Add Exception**.



5. Select *Linux via SSH 30* and press **Next**.



6. Press the **Active** button and press **Finish**.



Now, add an exception for the *Oracle DBA 30* platform.

7. Press **Add Exception** again. Select *Oracle DBA 30* and press **Next**.

8. Select *Active* and press **Finish**.

Note:	Prior to testing **PSM**, you can choose to wait approximately 20 minutes for all components to refresh their configurations or you can restart all the **CyberArk** services so that the **PSM** and **PVWA** will see all the configuration changes immediately.

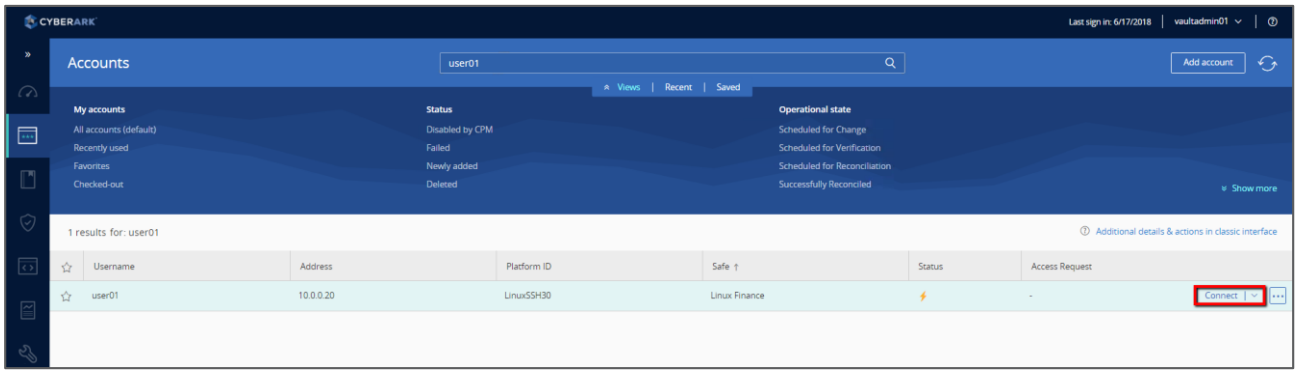
9. Sign out of the **PVWA**, and double-click the *restart-services* batch file on the desktop of the components server.

Connect with a Linux Account

We will first test securely connecting to a Linux machine using SSH via the PSM. In this exercise, you will connect to the PSM using RDP, and the PSM will run PutTTy to connect you to the target Linux machine

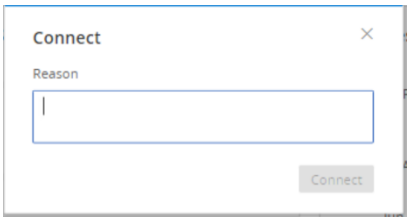
1. After restarting the services, login as *vaultadmin01*.

2. Go to the **ACCOUNTS** page and locate *user01*. Press the **Connect** button.

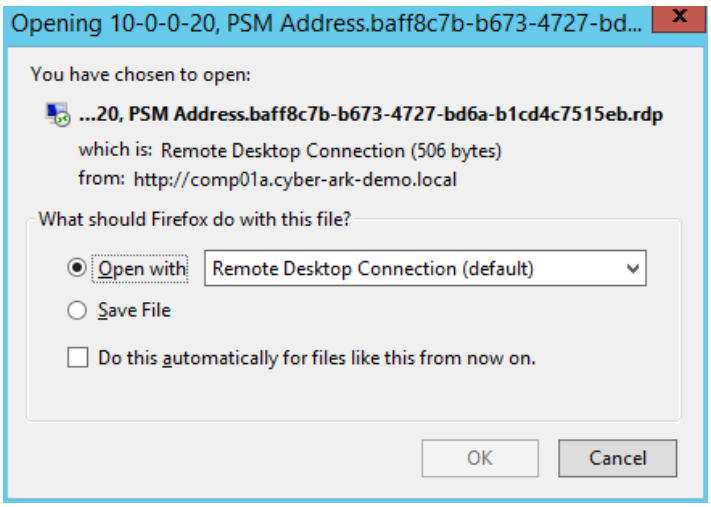


Note: You should be prompted to enter a reason for the connection.

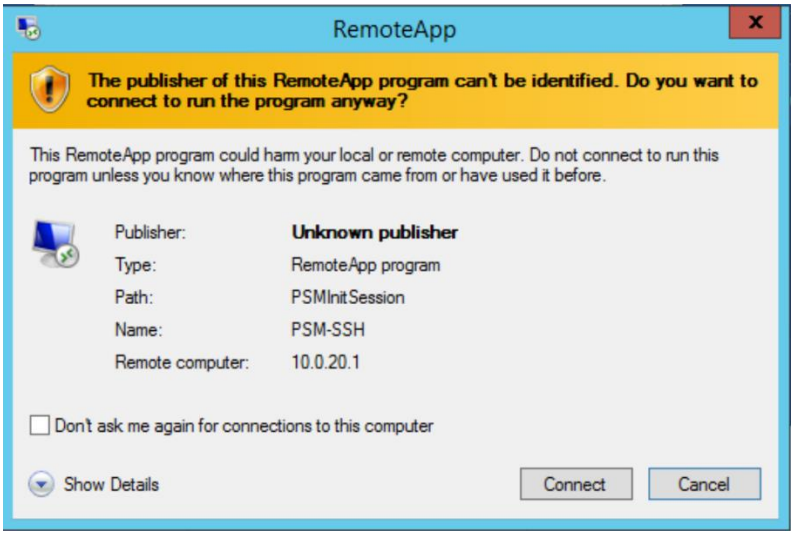
3. If you are, enter something in the box provided.



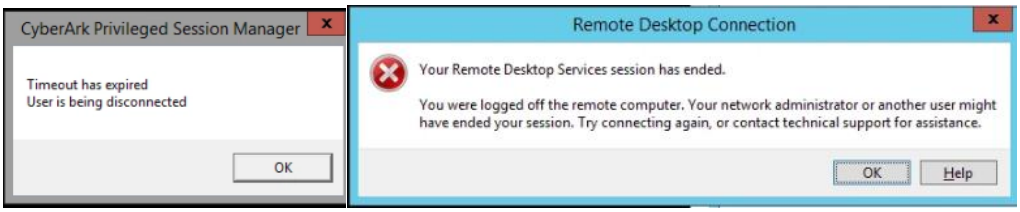
4. After pressing **OK**, you will notice an RDP file has been downloaded to your desktop. Choose to open it with *Remote Desktop Connection (default)* and press **OK**.



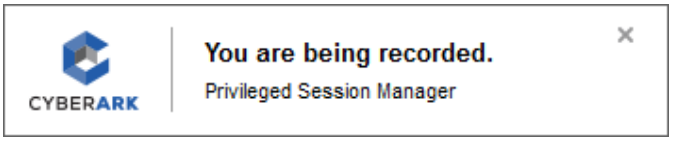
5. At the **Remote Desktop Connection** window, press the **Connect** button



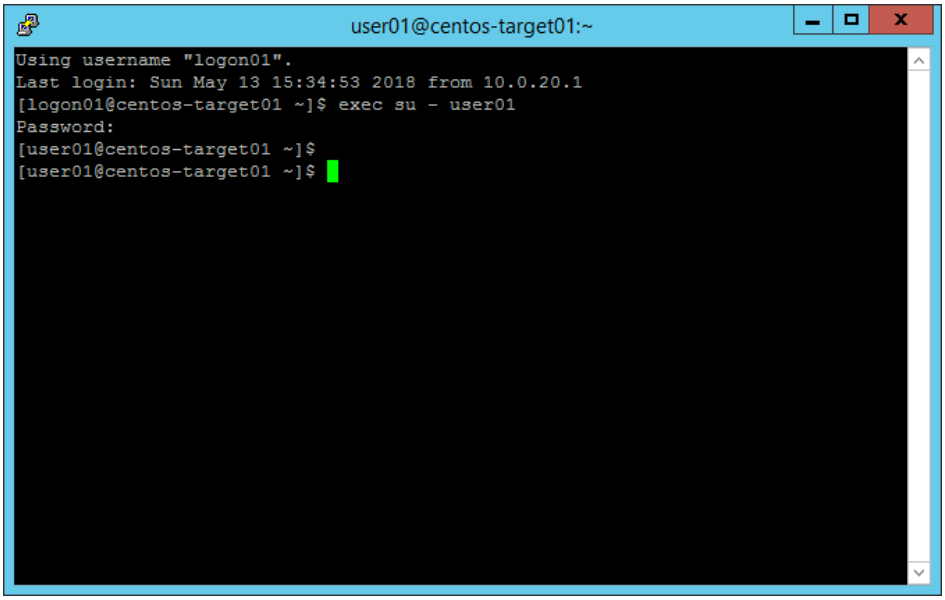
You may receive the following pop-up error messages. Clear the pop-ups and retry the connection component.



If everything was configured correctly, you should see a message that your session is being recorded.



6. Press **Yes** to accept the host key.



Optionally, run some Linux commands. In the example below the user is running:

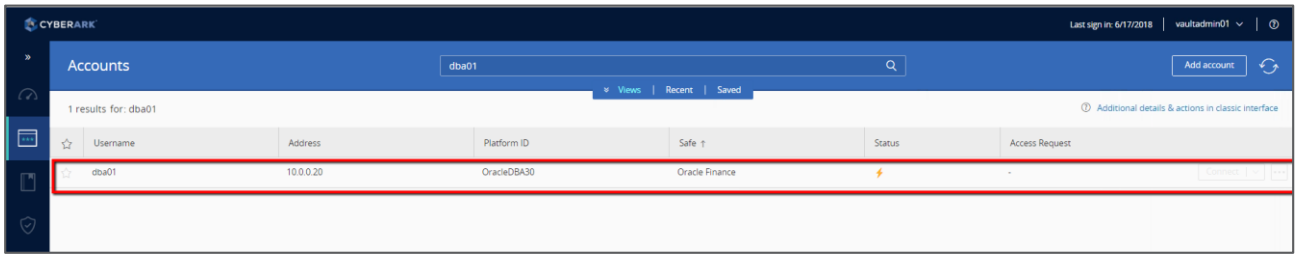
```
cat /var/log/messages
mkdir user16
rm –R user16
```

7. Type **Exit** to end this session.

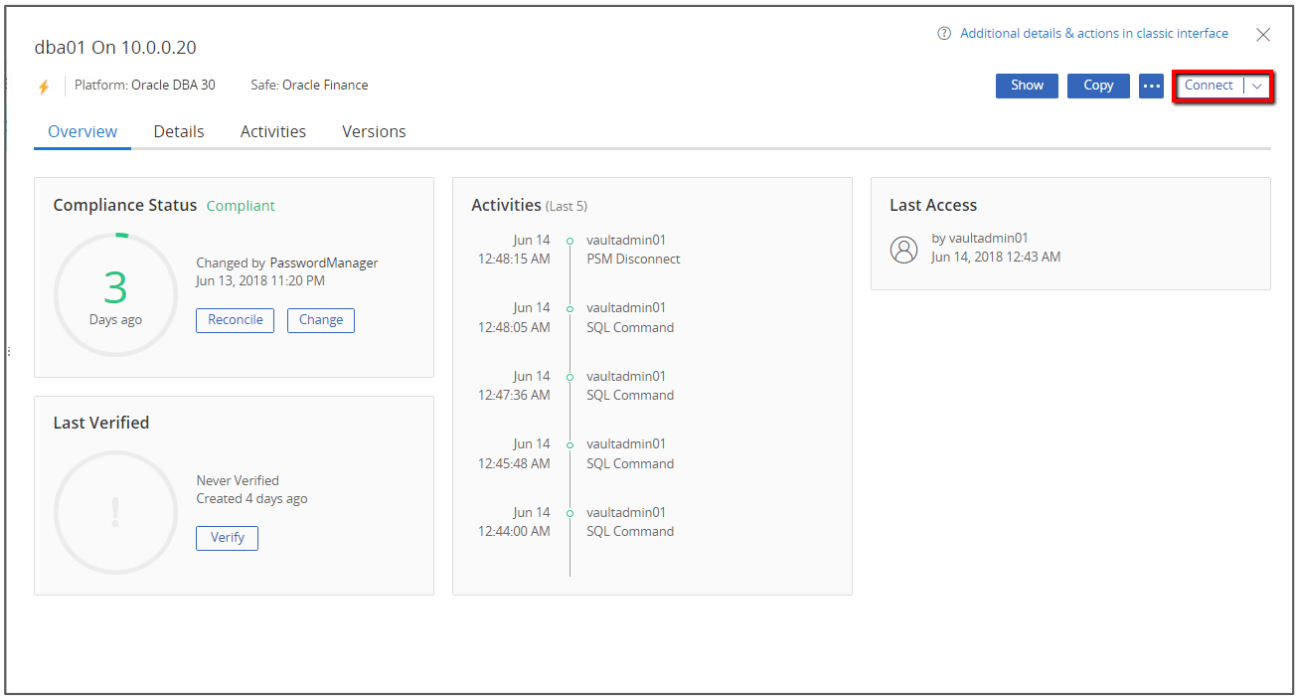
Connect with an Oracle Account

1. Press the **Back** button to return to the main **Accounts** window.

2. At the **ACCOUNTS** page, select *dba01*.



3. Press the **Connect** button.

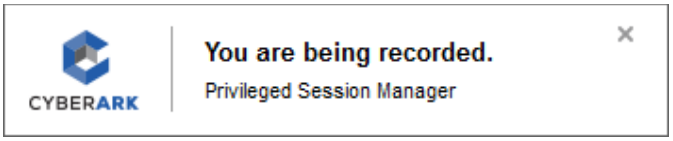


4. On the **Remote Desktop Connection** window, press **Connect**.

5. You should see a message stating that your session is being recorded.

If you receive a Remote Desktop Connect pop-up, “Your Remote Desktop Services session has ended”, retry the connection component. You may have to connect a couple of times before seeing the message.

Note:	You may see an additional prompt.



Later in the lab exercise, you will be logging in as an auditor and looking for any sessions that issued commands with the word salary.

Note:	The commands below will not produce any results because the table “scott.salary”, does not exist. The purpose of this step is to allow the auditor to see someone tried to access a salary table.

6. Run the following commands:

```
select * from dual;
create table psm01 (id01 int, psm01 varchar(40));
select * from scott.salary;
```

```
update scott.salary set salary =’1,000,000’ where id01 =1;
```

7. Type **`exit`** to end the session.

Connect via HTML5 Gateway

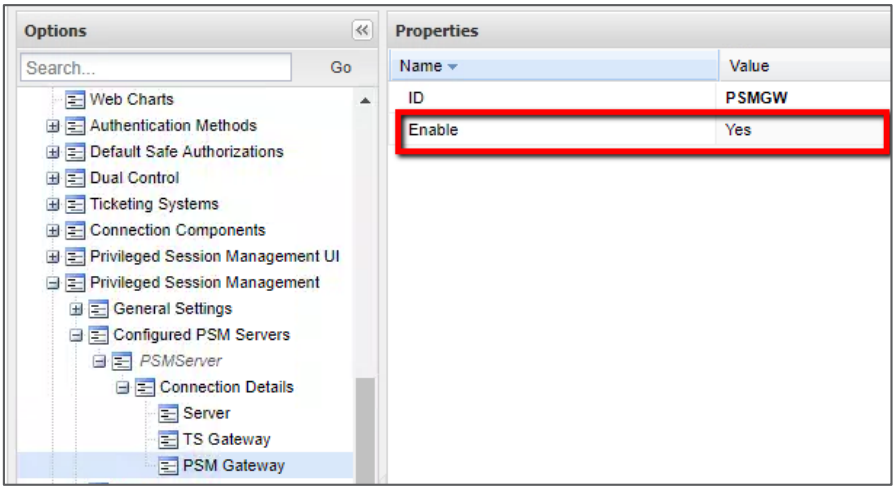
In this exercise you will configure the PSM to provide secure remote access to a target machine through an HTML5 gateway. The HTML5 gateway tunnels the session between the end user and the PSM proxy machine using a secure WebSocket protocol (port 443). This eliminates the requirements to open an RDP connection from the end user's machine. Instead, the end user only requires a web browser to establish a connection to a remote machine through PSM.

Note:	in this environment the HTML5 Gateway has already been installed for you. The HTML5GW is installed on the same Linux machine as the PSM for SSH.

1. First, login to the **PVWA** as *vaultadmin01*, go to **ADMINISTRATION > Configuration Options > Options**

2. Next, go to **Privileged Session Management > Configured PSM Servers > PSMServer > Connection Details > PSM Gateway**

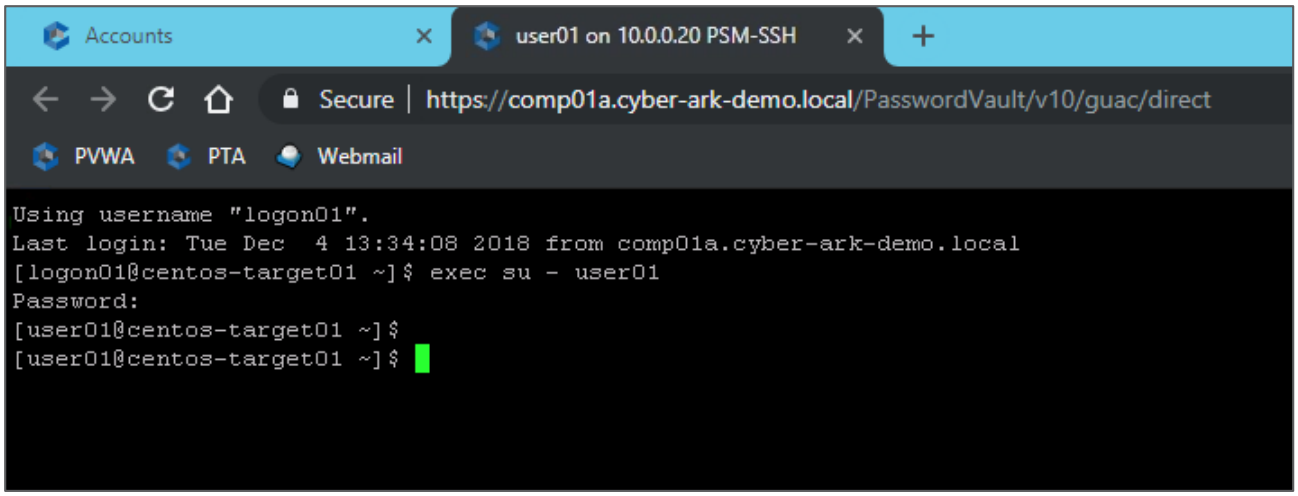
3. Set the *Enable* parameter to Yes and click **OK**.



4. Go back to the **ACCOUNTS** page and locate *user01*. Press the **Connect** button. This time, instead of downloading an RDP file, you should be able to see the secure connection being established in a new tab in the Chrome browser.

IF you can't connect but instead see a white screen, connect to the PSMP/PSMGW VM in your environment. Run ***service tomcat stop and then service tomcat start.*** *To manually startup the service.*

Note:	Press **Yes** to accept the host's RSA key if asked



5. You may leave the HTML5 GW enabled or disable it in order to return to the previous method of downloading an RDP file.

Connect using PSM Ad-Hoc Connection

Next, you will configure a **PSM Ad-Hoc Connection** (previously known as Secure Connect), which allows you to launch a **PSM** connection using unmanaged accounts.

1. First, logged into the **PVWA** as *vaultadmin01*, go to **ADMINISTRATION > Platform Management**.

2. Select *PSM Secure Connect* and activate it.

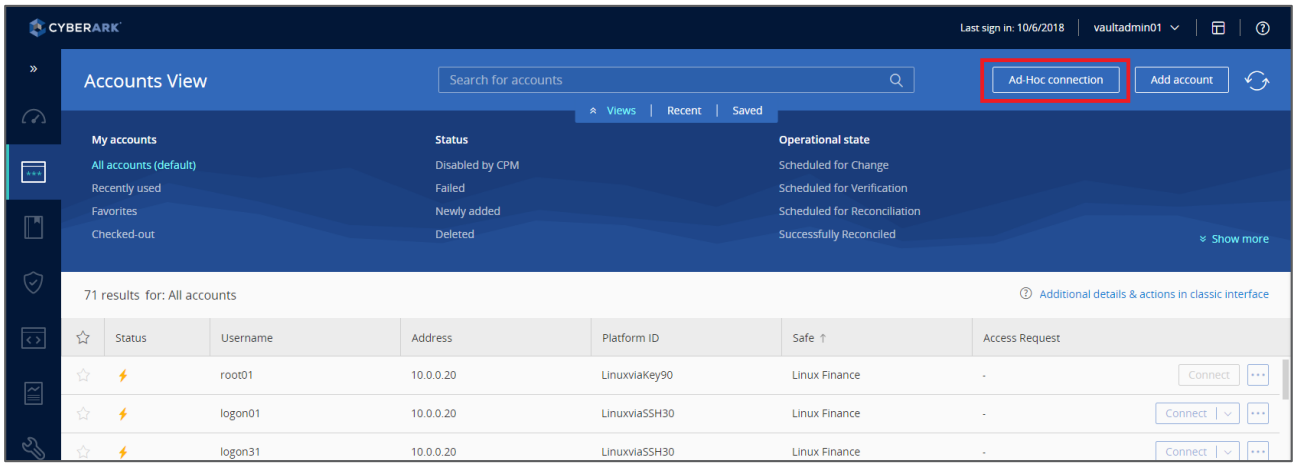
3. Go to **POLICIES > Master Policy**.

4. In the *Session Management* section, select *Require privileged session monitoring* and press **Add Exception**.

5. Select *PSM Secure Connect* and press **Next**.

6. Select *Active* and press **Finish**.

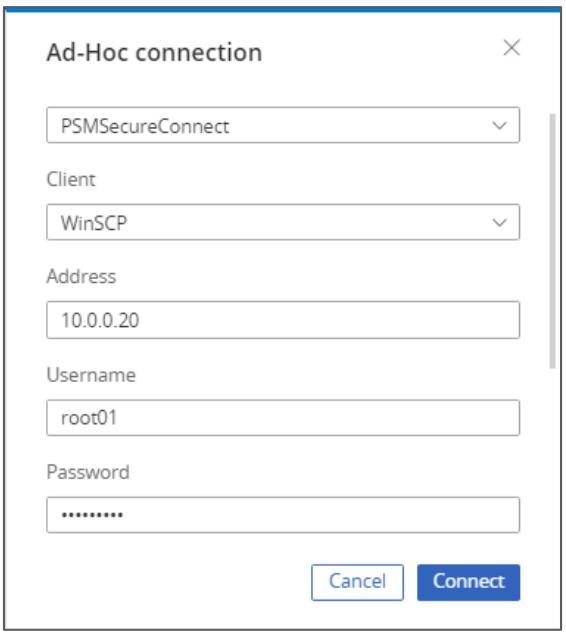
7. Go to the **ACCOUNTS** page and click on **Ad-Hoc connection**.

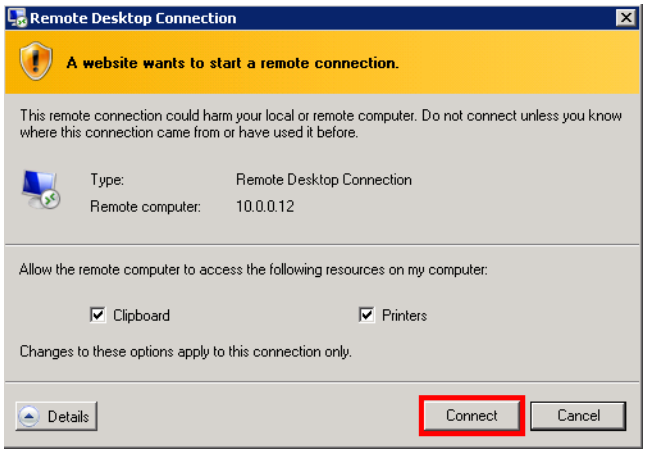


8. Enter the following:

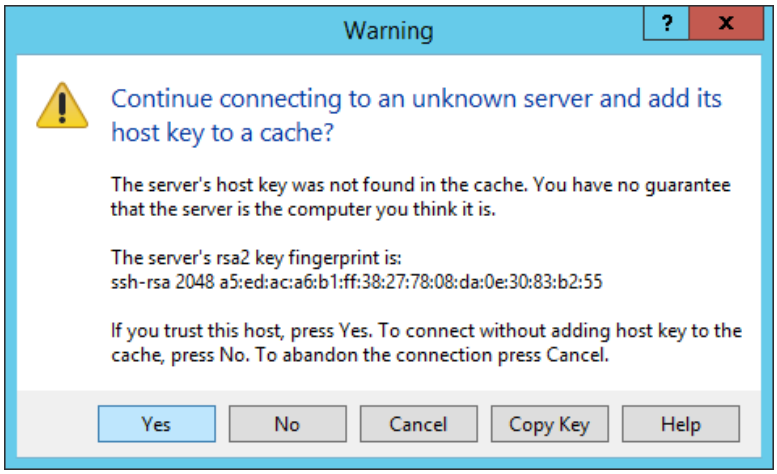
Client:	*WinSCP*
Address:	*10.0.0.20*
User Name:	*root01*
Password:	*Cyberark1*
Map Local Drives:	*Checked* (scroll down)

9. Press **Connect**.



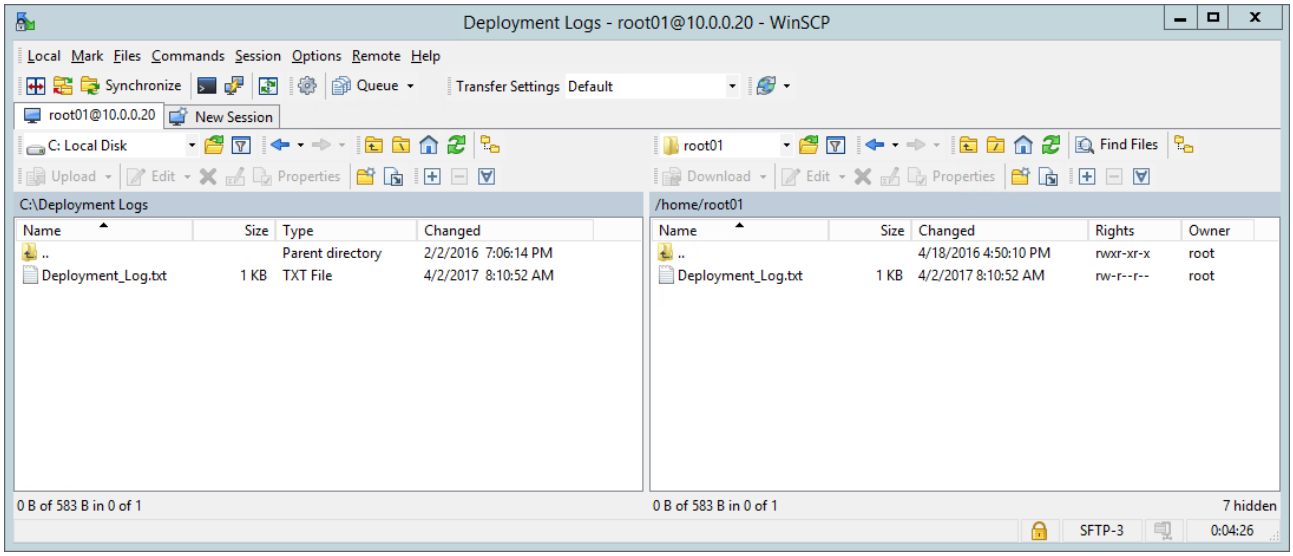


10. Press **Yes** to accept the host's RSA key if asked.



11. **Optional:** When you have connected to WinSCP, copy a file from the PSM server to target machine the local client.

    Suggestion: *C:\Deployment Logs\Deployment_Logs.txt.*



12. Press **F10** to exit and quit the application.

Privileged Session Manager for Windows

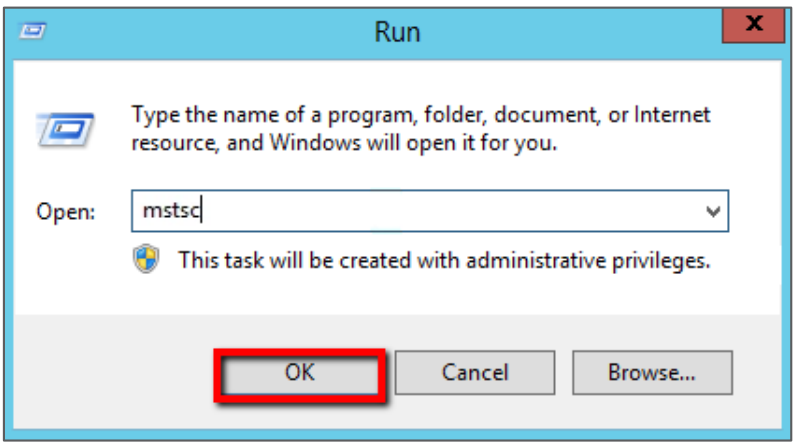
PSM for Windows (previously known as "RDP Proxy") enables users to connect through PSM to any remote target securely with a standard remote desktop client application like mstsc or a connection manager.

Note: Prior to testing PSM for Windows make sure the PSM is enabled in the Master Policy for all the relevant platforms you test.

Make sure "Require users to specify reason" is **disabled** for all relevant platforms you test.

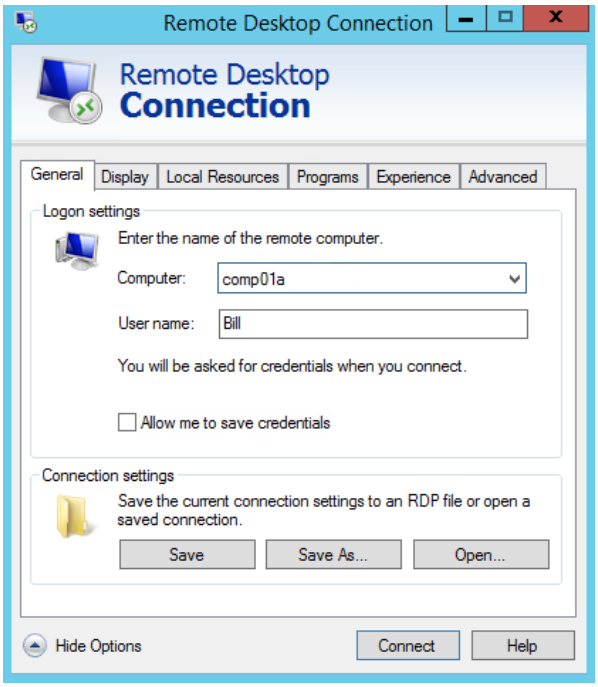
Make sure "Require dual control password access approval" is **disabled** for all platforms you test.

1. First, use run to launch mstsc.exe



2. Click on *Show Options* and specify the following under *General*

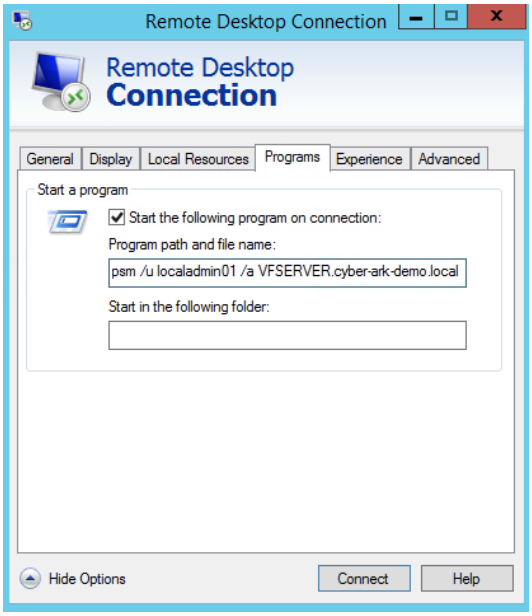
Computer:	*Comp01a*
User name:	*Bill*



3. Next, go to Programs and specify the following command:

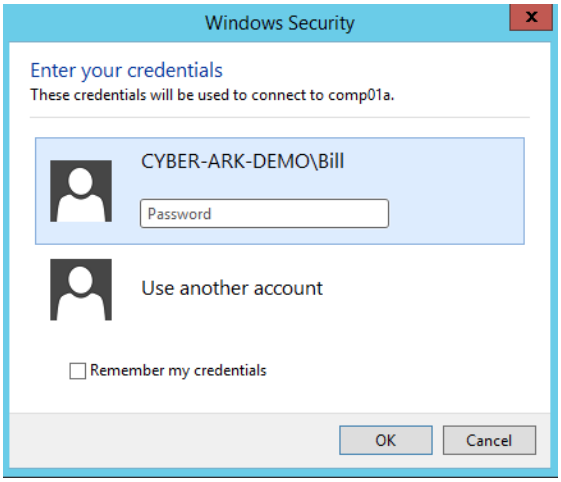
```
psm /u localadmin01 /a VFSERVER.cyber-ark-demo.local /c PSM-RDP
```

Note: the above command instructs the PSM to launch an RDP connection to the VFSERVER target machine, using the localadmin01 account.

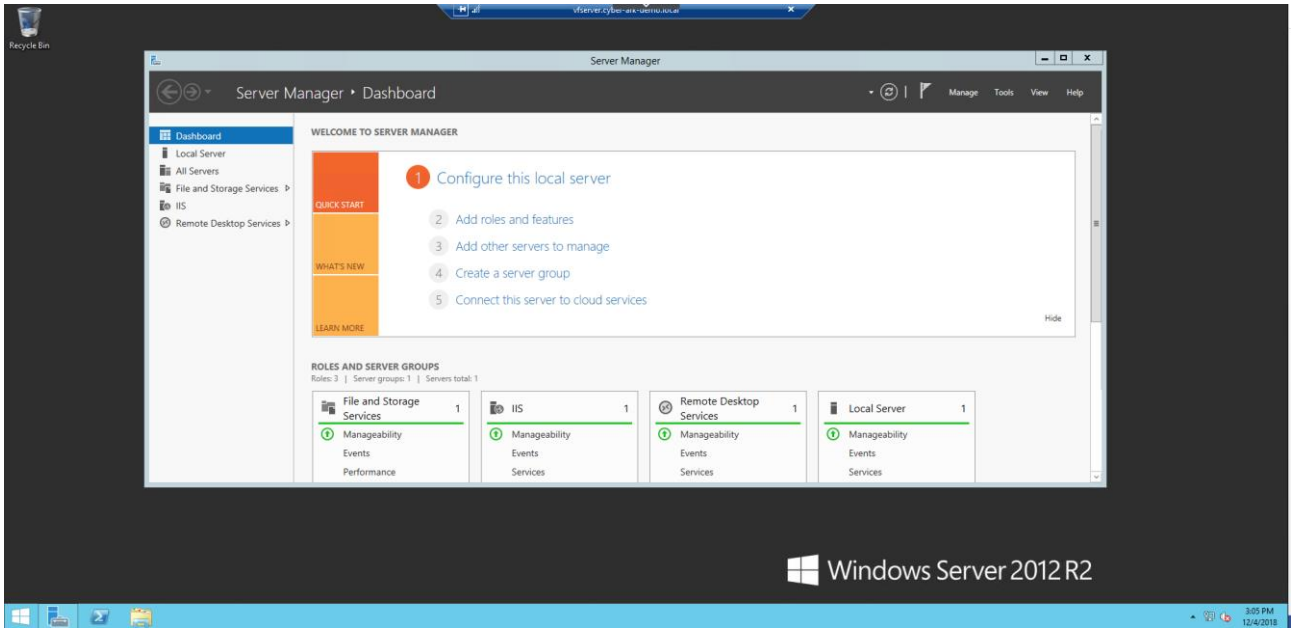


Make sure the platform associated with the localadmin01 account (*Windows Server Local Admins 45) has an exception added in the Master Policy for Require privileged session monitoring*.

4. When prompted, authenticate as Bill (password is Cyberark1).



5. If everything was configured correctly, you should be able to see a secure RDP connection established to the target Windows Machine where are you logged in as localadmin01.



Privileged Session Manager for SSH

PSM for SSH (previously known as PSM SSH Proxy or PSMP) is designed to provide a native Unix/Linux user experience, connecting to any SSH target.

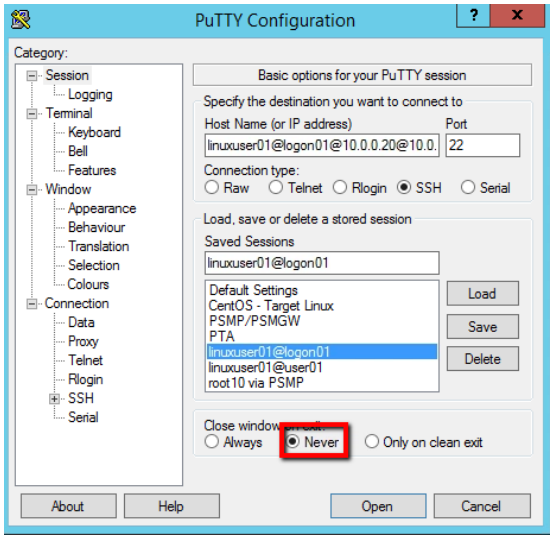
Note:	in this environment the PSM for SSH has already been installed for you. The PSM for SSH is installed on the same Linux machine as the HTML5 Gateway
Note:	Prior to testing PSM for SSH make sure "Require dual control password access approval" is disabled for all platforms you test.

1. On the Components server, open PuTTy. You can find a shortcut for PuTTy in the task bar.

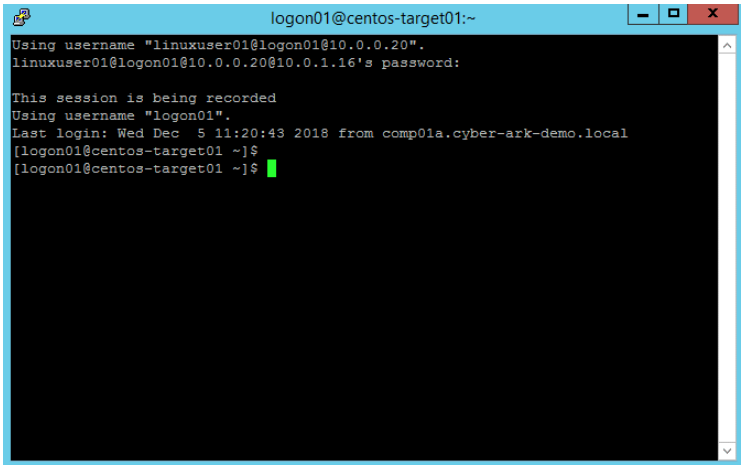
2. Use the following connection string to connect to the Target Linux machine using the *logon01* account where the Vault user is *linuxuser01*.

```
linuxuser01@logon01@10.0.0.20@10.0.1.16
```

Hint: to be able troubleshoot easily, make sure you mark "Never" under "Close window on exit"



3. When prompted for a password, enter the password for *linuxuser01* (password: *Cyberark1*)



Auditing user activity in the PSM (Monitoring)

In this section, we are going to look at some of the audit information that was gathered by **CyberArk PAS** during our **PSM** testing. To do so, we will need to connect as a user who is a member of the Auditors group – *auditor01*.

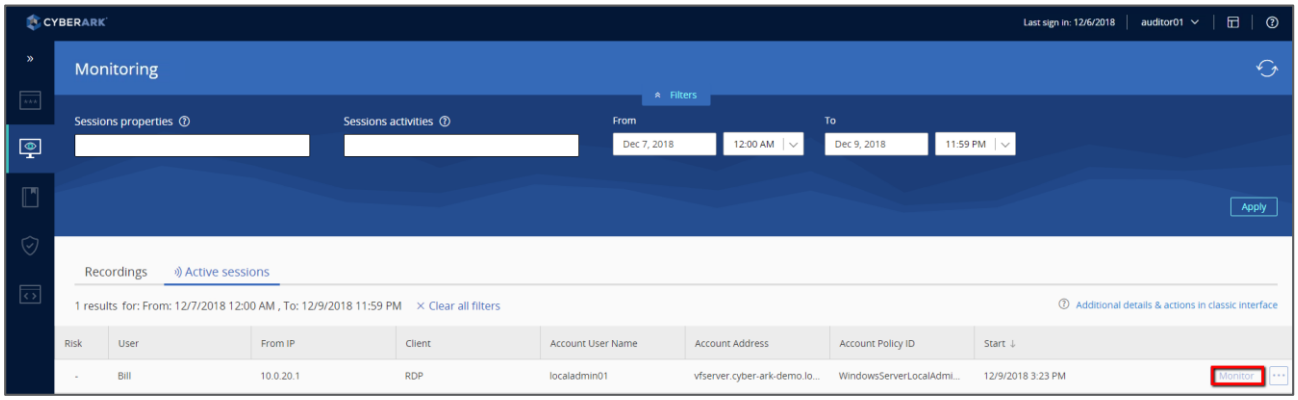
Monitor Active Sessions

1. Login to the **PVWA** as *Bill* and open a privileged session using the *localadmin01* account via the PSM.

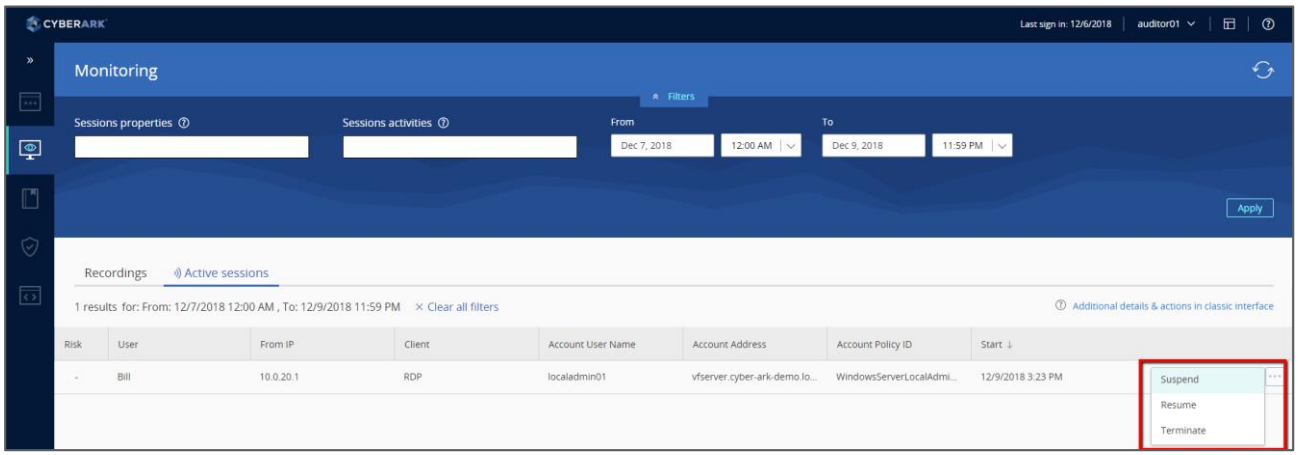
2. Logout of the **PVWA** and log back in via LDAP as *auditor01*.

3. Go to the **MONITORING** pane.

4. Go to **Active Sessions** and locate the session opened by *Bill* and click on **Monitor**. You should now be able to monitor *Bill's* session as it happens.

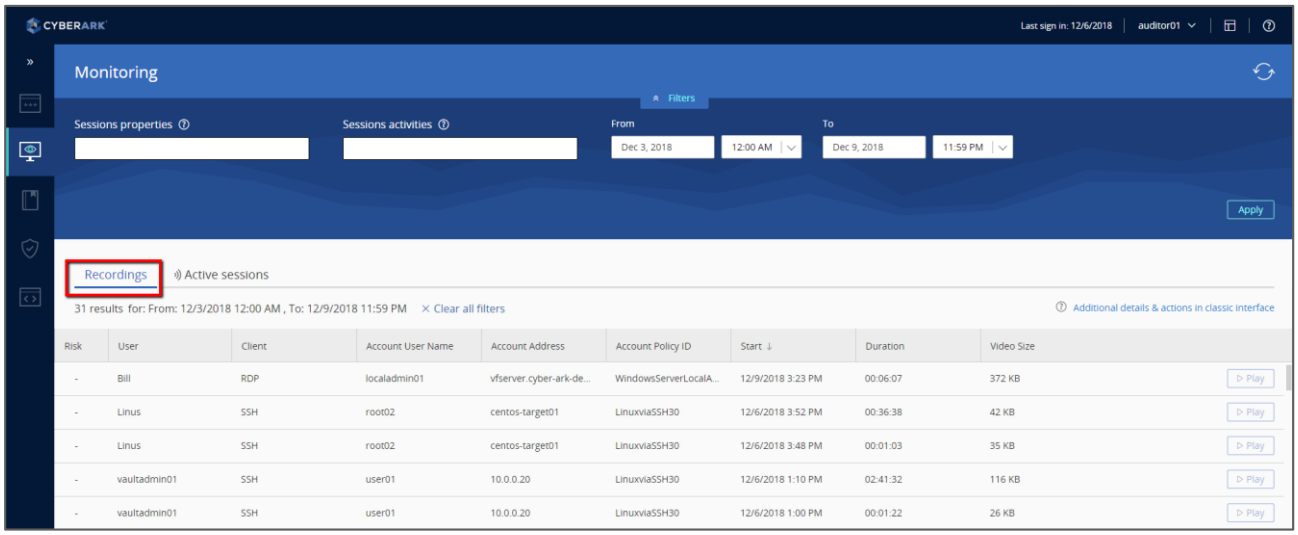


5. As *auditor01*, try to *Suspend*, *Resume* and ultimately *Terminate* the session.

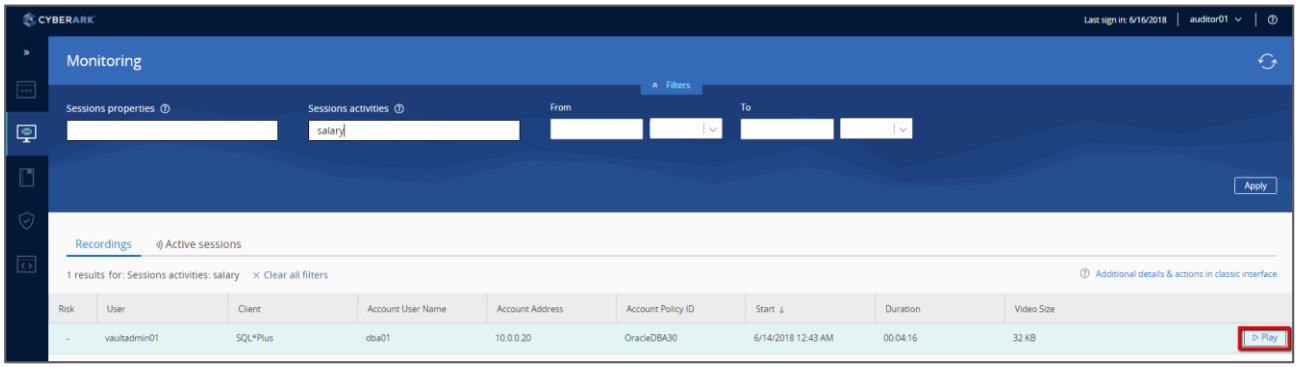


Monitor Recordings

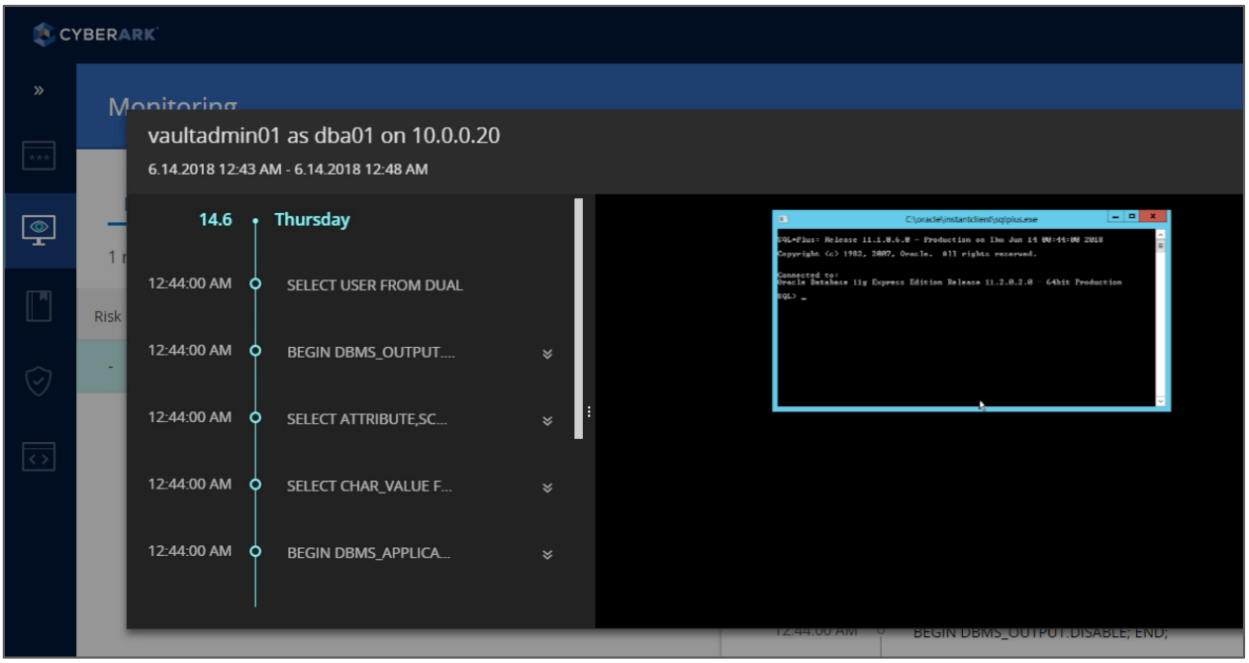
6. As *auditor01*, verify that you can see the recordings related to your prior sessions and try to play some of these recordings. Note that recordings related to PSM for SSH are presented in the classic UI.



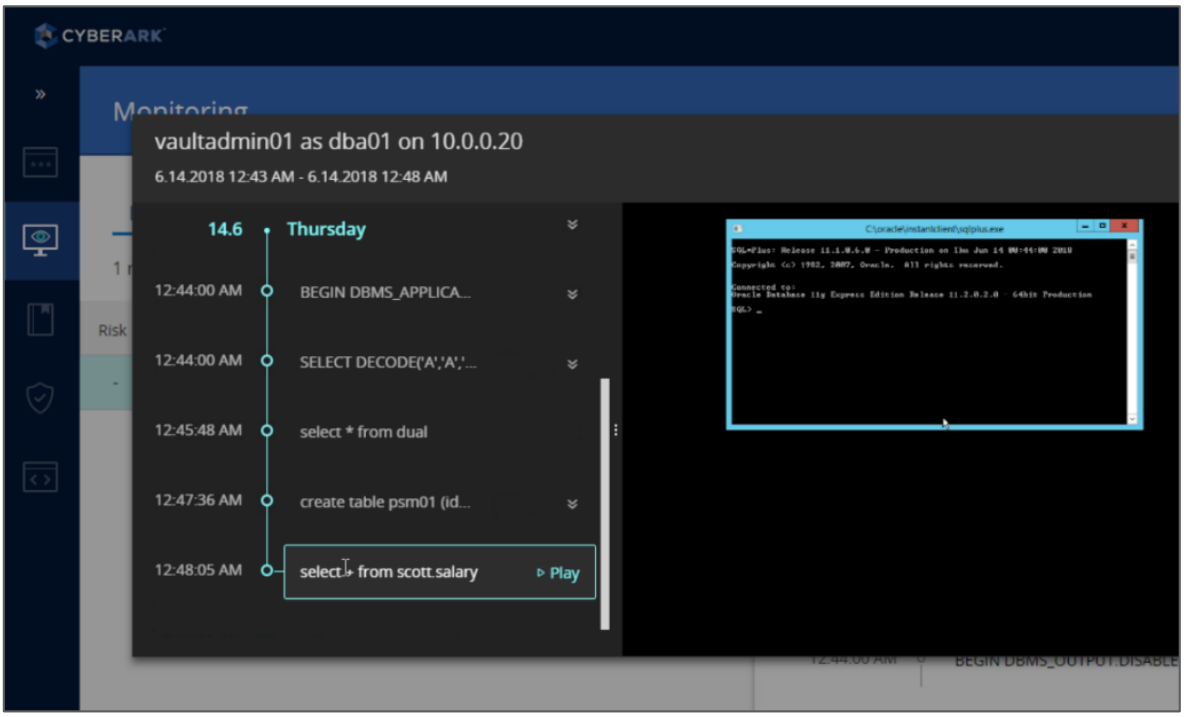
7. You can also search recordings by activities in a privileged session. For example, Enter *salary* in the **Session activities** field and press **Apply**. Once you locate the SQL recording, click on **Play**.



8. Review the recording. Click **Close** when you are done.



9. Click on the session line for more detail and find the command “select * from scott.salary”. Note that the recording will now start at the command selected.



Privileged Threat Analytics

In this section, we will be looking at the CyberArk Privileged Threat Analytics component. Both the target CentOS and Windows servers have been configured to forward security information to the PTA.

We will be looking at:

- Unmanaged Privileged Access
- Suspected Credential Theft and Automatic Password Rotation
- Suspicious Password Change and Automatic Reconciliation
- Suspicious activities in a session and automatic suspension
- Security Rules Exceptions

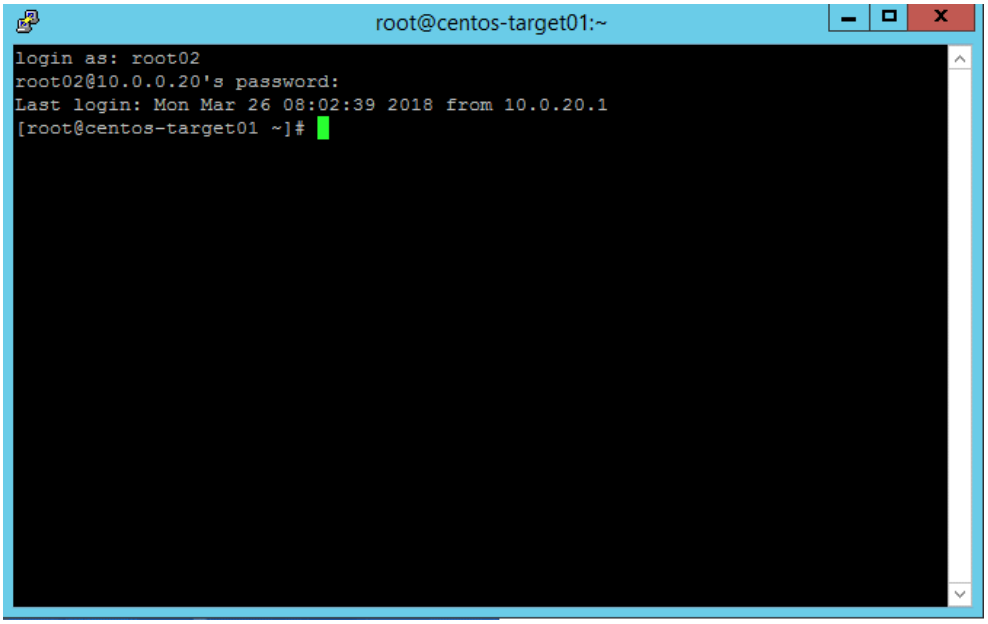
Unmanaged Privileged Access

Note:	Because the PTA server can become unpredictable in the Skytap environment if it gets suspended, it has been configured not to start automatically. To perform these next steps, you will need to start your PTA server manually in Skytap.

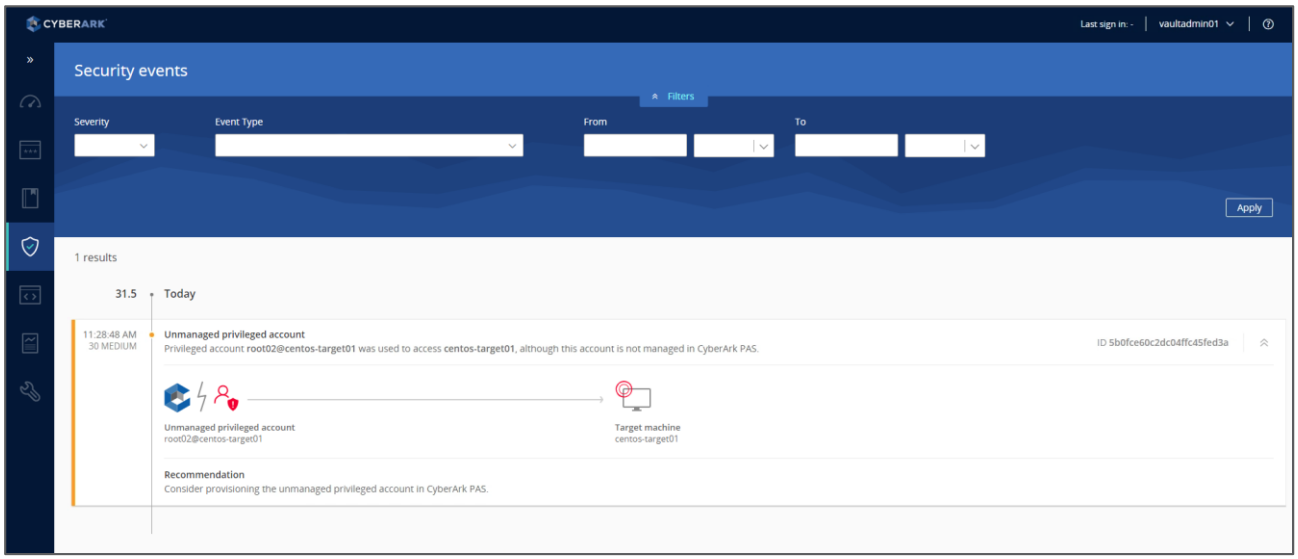
In this section you will observe how the **PTA** detects when privileged accounts are being used and then check if they are being managed by **CyberArk**. If the account is not managed, the **PTA** will generate a security alert and add the account to the list of **Pending Accounts**. The Vault Administrator can then onboard the account to the relevant safe. Automatic Onboarding Rules can also be applied starting from v10.4.

First, we need to establish an SSH session to the target Linux server to create an alert on the **PTA**, which we will review using the new **Security** pane in the **PVWA**.

1. Open ***PuTTy*** from the **Components** server and open an SSH session to 10.0.0.20 as *root02* (password: *Cyberark1*).



2. Login to the **PVWA** as *vaultadmin01* and go to **Security > Security Events** and verify that you can see the "**Unmanaged privileged account**" alert related to *root02*.



3. Go to **Accounts Feed > Pending Accounts**. Select *root02* from the list (use "Refine By" to search for the account if needed) and click on **Onboard Accounts**.

4. Onboard the account to the **Linux Finance** safe and associate the account with the **Linux via SSH 30** platform.

5. Enter "*Cyberark1*" as the default password.

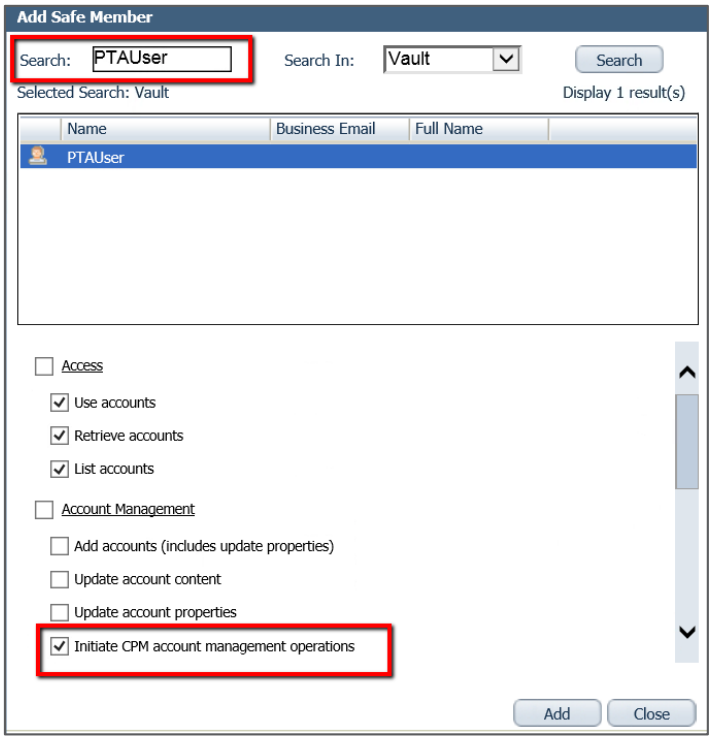
Note: "root.*" is defined by default as a privileged user in the PTA. You can add other usernames (using regular expressions) that should also be detected by the **PTA** as privileged accounts which should be managed by CyberArk PAS. To add additional usernames login to the **PTA** administrative interface and go to **SETTINGS > Privileged Groups and Users**.

Suspected Credential Theft and Automatic Password Rotation

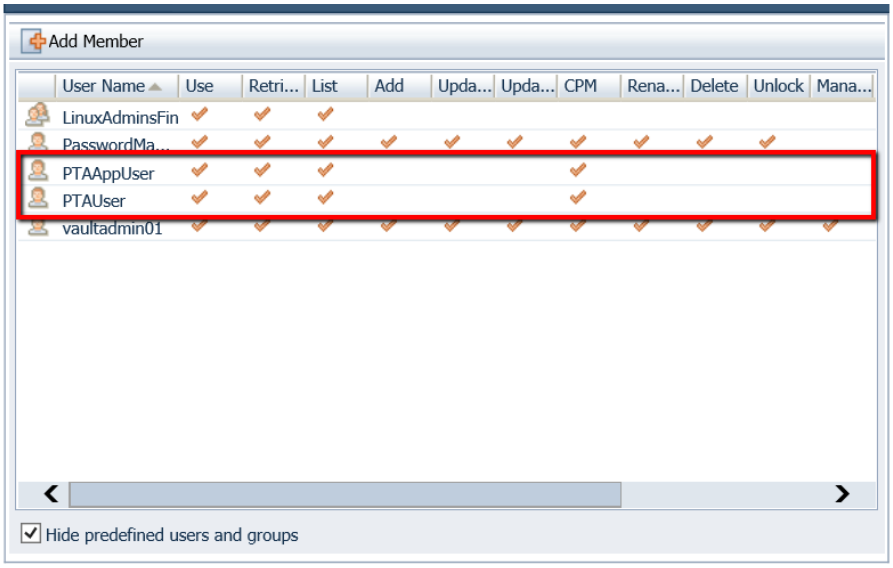
In this section you will configure the **PTA** to detect when privileged accounts are being used without first retrieving the password from PAS, and trigger the **CPM** to initiate a password change.

1. Login to the **PVWA** as *vaultadmin01* and go to **POLICIES > Access Control (Safes)**. Select the *Linux Finance* safe and click on **Members**.

2. Click on **Add Member** and search for the *PTAUser* in the Vault. Select the *PTAUser*. Keep the default permissions and expand **Account Management**. Select "Initiate CPM account management operations" and click on **Add**.



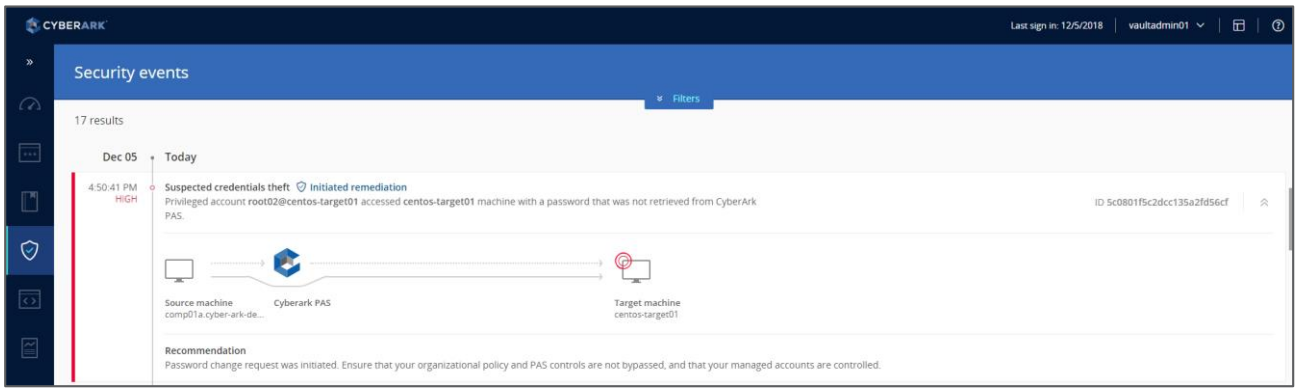
3. Repeat the above step to add the *PTAAppUser* to the *Linux Finance* safe as well (including the "Initiate CPM account management operations" permission).



4. Close and exit from your putty session to 10.0.0.20 if it is still open.

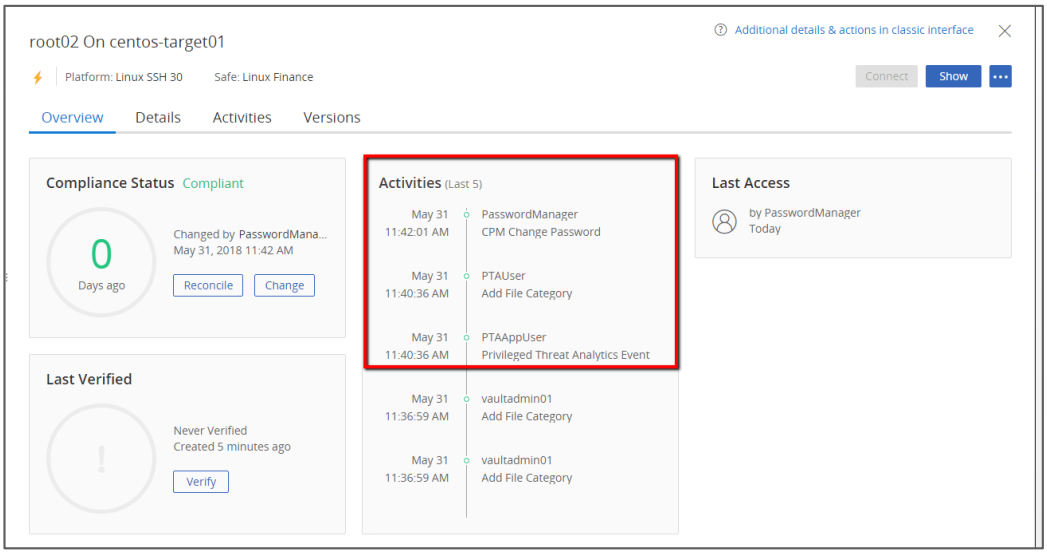
5. Once again, open ***PuTTy*** from the **Components** server and open an SSH session to 10.0.0.20 as *root02* (password: *Cyberark1*).

6. Login to the **PVWA** as *vaultadmin01* and go to **Security > Security Events** and verify that you can see the "**Suspected Credentials Theft**" alert related to *root02*.



7. In the **PVWA**, go to the *root02* account and verify that the **CPM** changed the password.

8. Open the **Activities** tab to verify that the **CPM** changed the password after the **PTA** detected the suspected credential theft alert and under **Activities** added the relevant file category for *Immediate Change*.



Note:	To detect *Suspected Credential Theft*, the PTA compares the login time on the target machine with the last time the password was retrieved from the Vault. By default, the PTA creates a *Suspected Credential Theft* event if the password was not retrieved within the last 8 hours. For the purpose of this lab, we have configured the PTA to raise an alert if the password was not retrieved within the last 5 minutes.

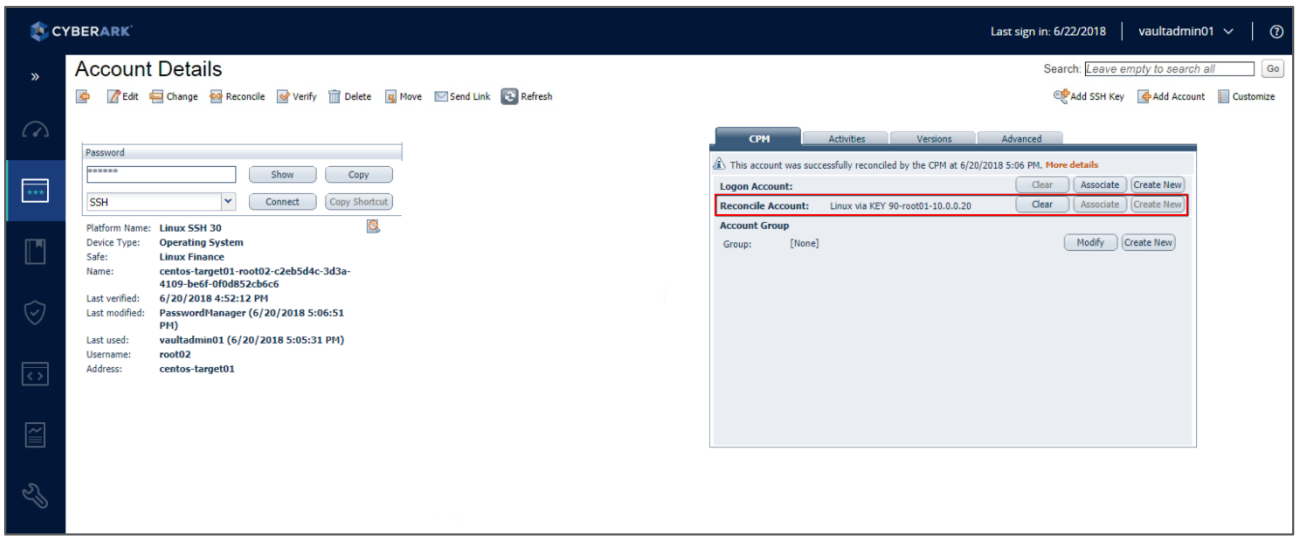
Suspicious Password Change and Automatic Reconciliation

In this section you will configure the **PTA** to detect when a password is being changed manually, bypassing the **CPM**, and have the **PTA** trigger the **CPM** to reconcile the password.

For this exercise to work, you must associate a reconcile account with *root02*.

Note:	If you performed the optional exercise on SSH key, you can use the ***root01*** account you created previously. If you have not already added the ***root01***, do so now, creating it as a normal password account (exactly like ***logon01,*** *page 35*).
Note:	If you configured SSH Command Access Control to block the **`passwd`** command, disable SSH Command Access Control in the *Linux via SSH 30* platform before performing this exercise and then restart the PSM service.

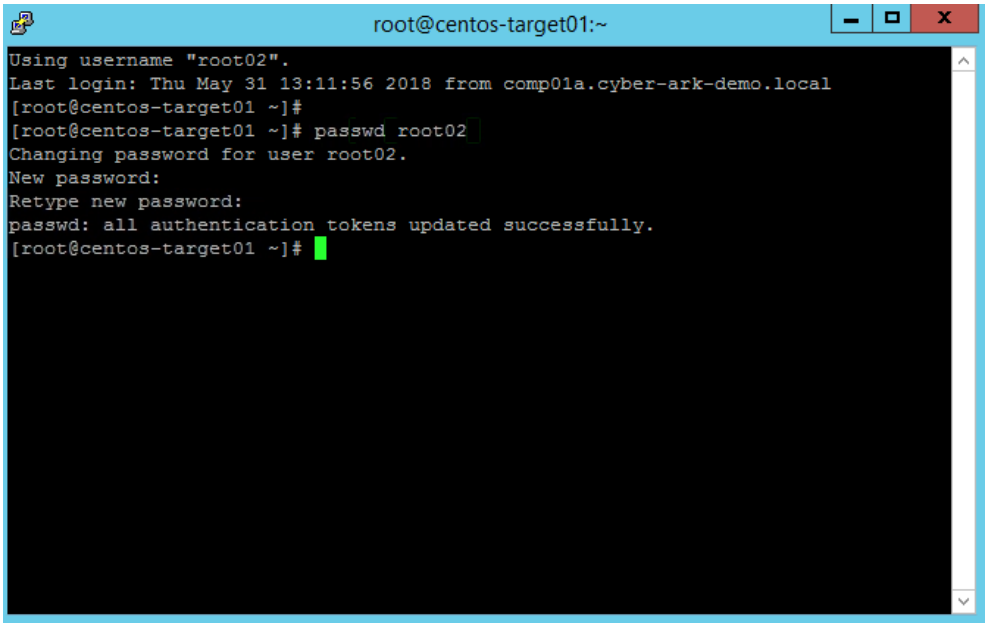
1. Login to the **PVWA** as *vaultadmin01* and go to **Accounts** > **Accounts View** and select the *root02* account. Using the classic UI, associate *root01* as the reconcile account for *root02*.



2. Go to **Accounts** > **Accounts** View and select *root02* again and launch an SSH connection via the PSM.

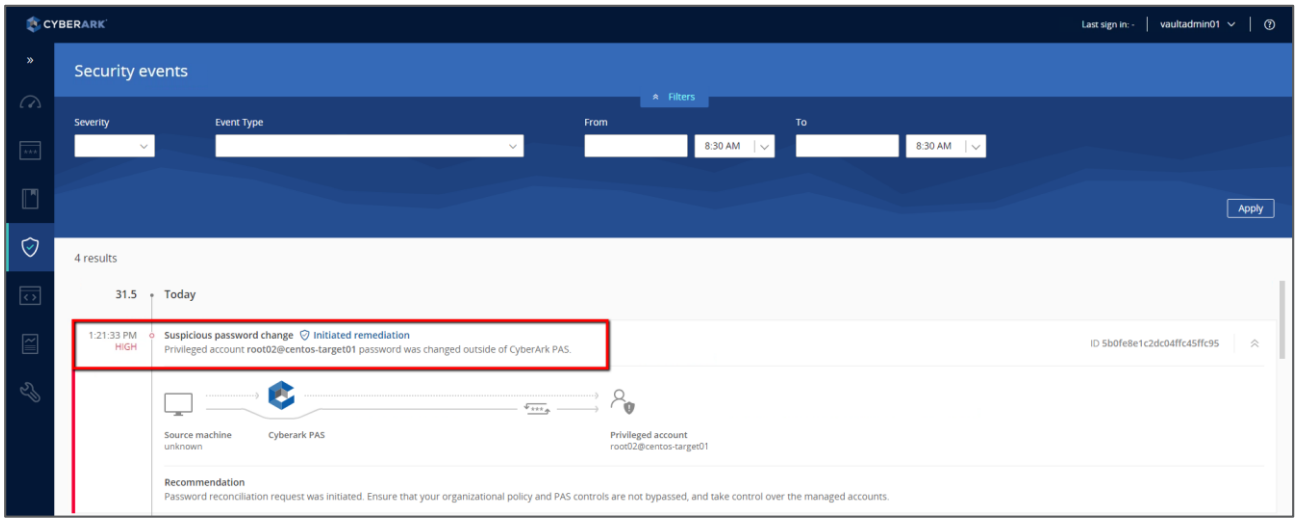
3. Type the following command to change the password of *root02* back to *Cyberak1:*

```
passwd root02
```

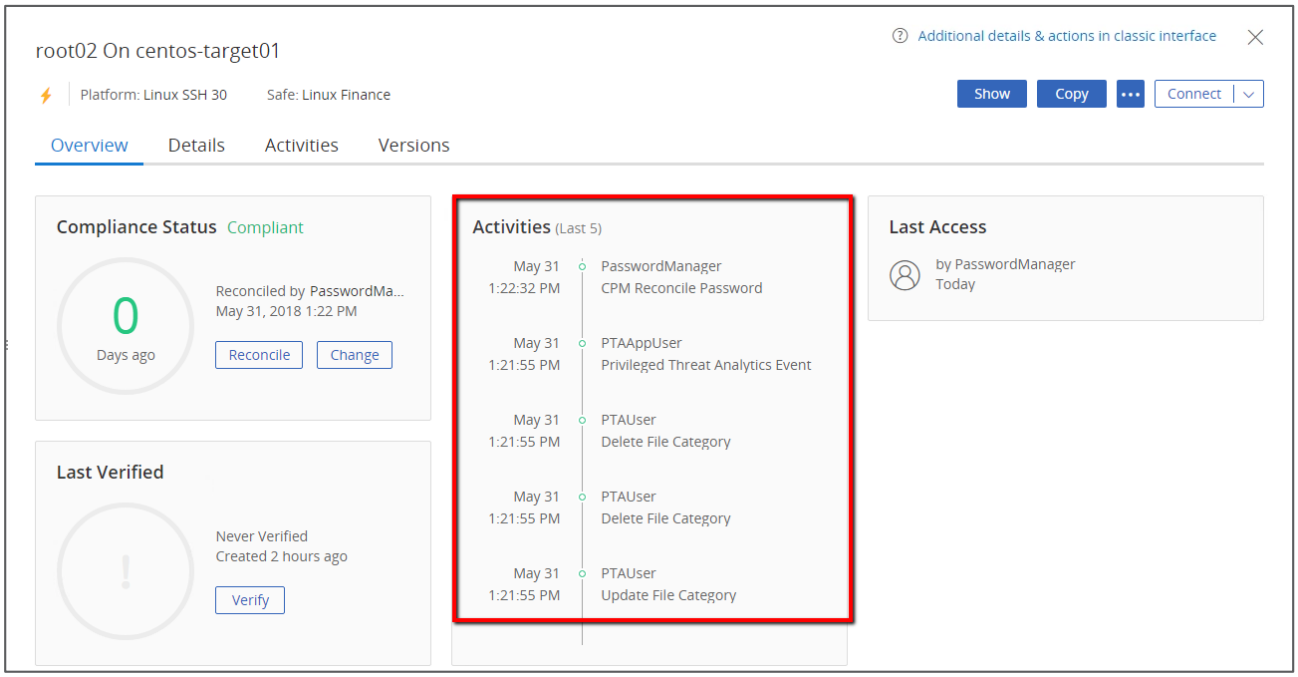


4. Go back to the **PVWA** as *vaultadmin01* and go to **Security > Security Events**. You should be able to see two new alerts. One for a "**Suspicious activities detected in a privileged session**", and one for "**Suspicious password change**".

5. Verify that you can see the "**Suspicious password change**" alert and that an automatic password reconciliation was initiated.



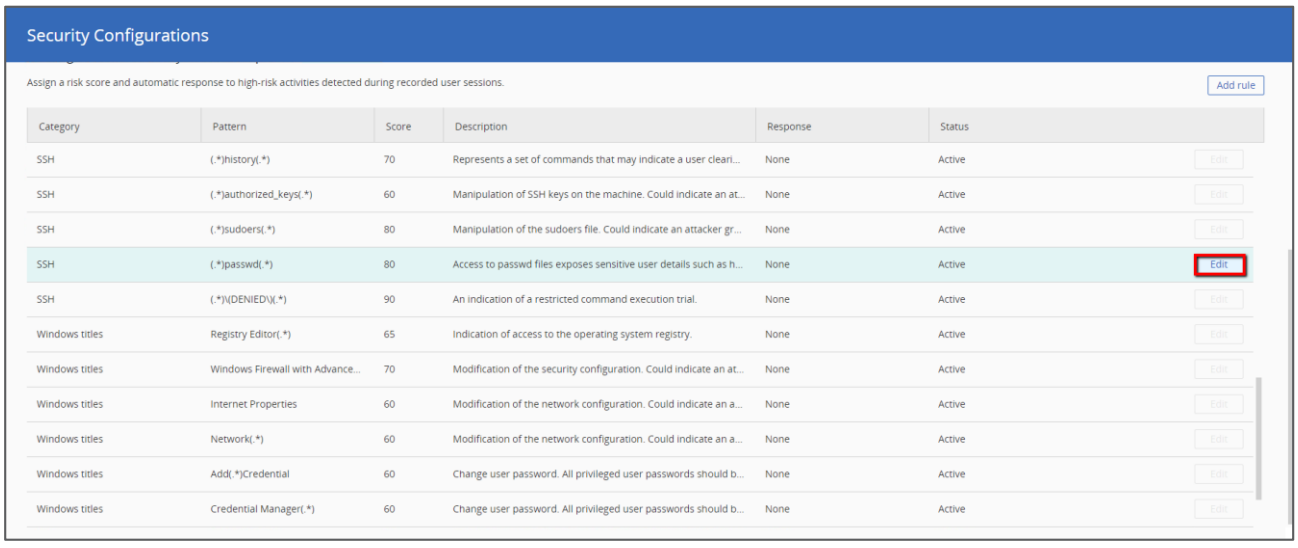
6. Go to **Accounts** > **Accounts View** and select *root02*. Verify that *root02* was indeed reconciled by the **CPM**.



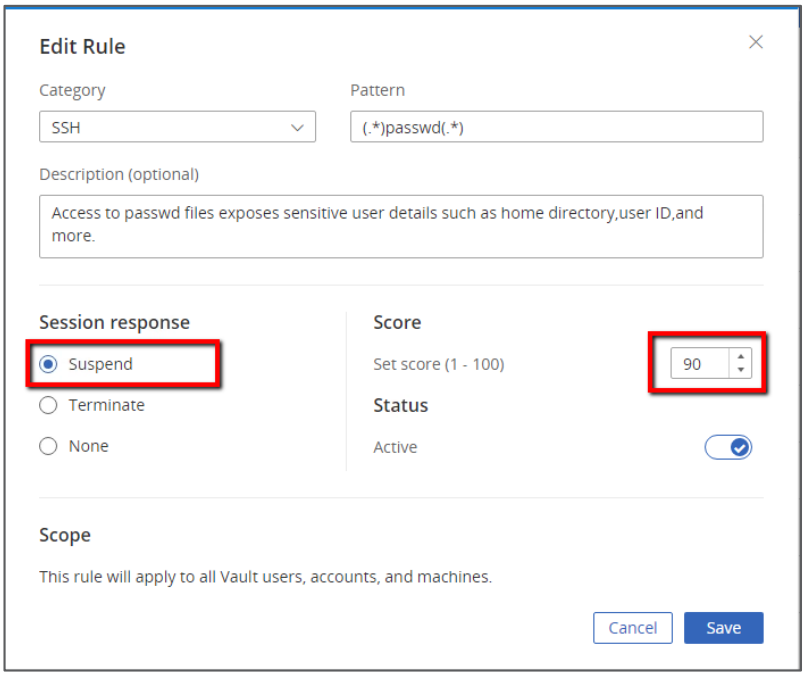
Suspicious activities in a session and automatic suspension

In this section you will configure the **PTA** to detect when a risky command is used in a privileged session and to suspend the session automatically.

1. Login to the **PVWA** as *vaultadmin01* and go to **Security > Security Configurations > Privileged Session Analysis and Response**. Find the SSH *passwd* command (the command is used to change the password manually) and click on **Edit**.

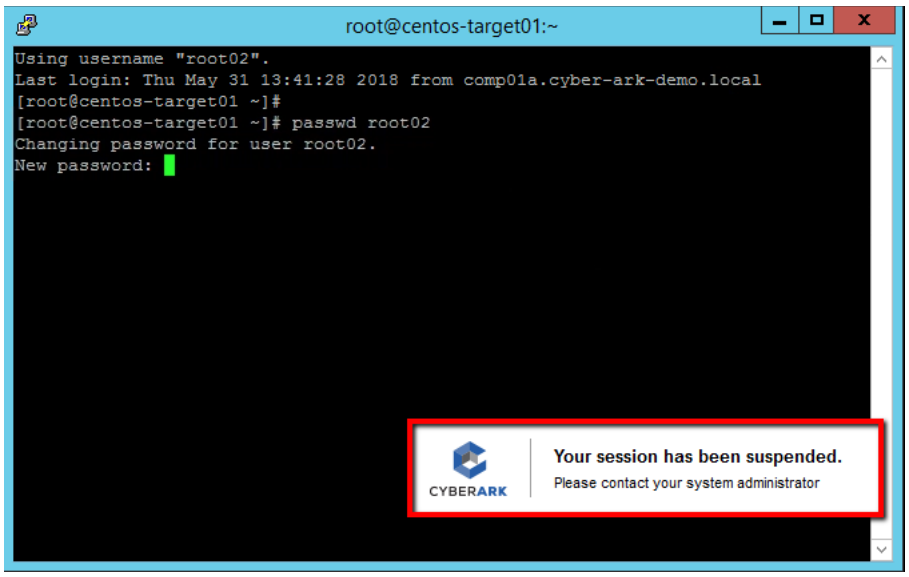


2. Configure the risk to a score of *90* and the response to "**Suspend Session**". Click on **Save**.



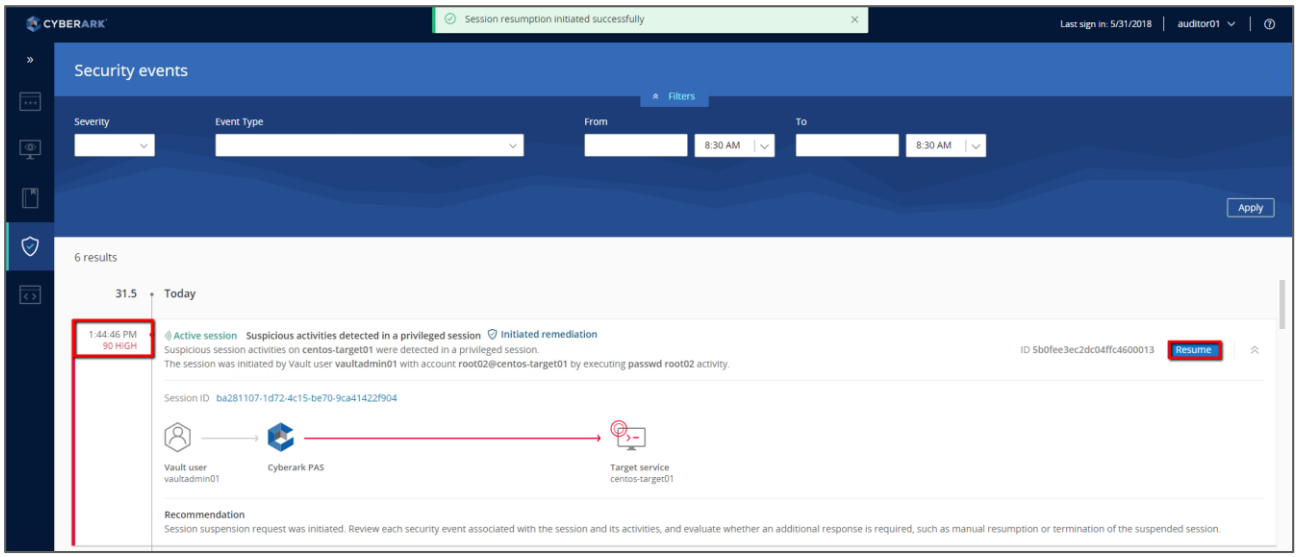
3. Go to **Accounts > Accounts View** and select the *root02* account. Launch a privileged session by clicking on the connect button. (If the session does not open, make sure the **Cyber-Ark Privileged Session Manager** service is running).

4. After the session opens, try to run the **`passwd root02`** command again. The session should be suspended immediately and a message should appear letting the user know the session is suspended.

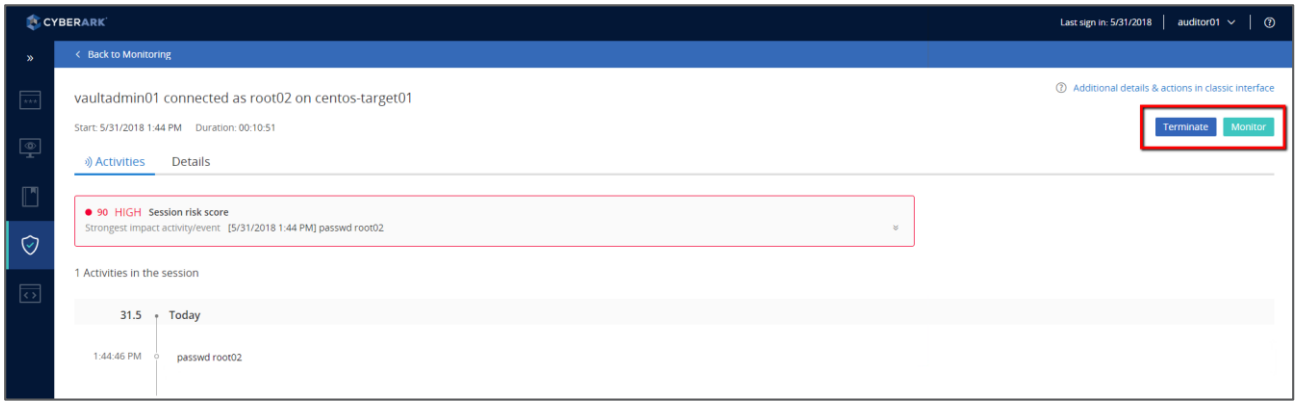


5. Login to the **PVWA** as *auditor01*. Go to **Security > Security Events** and verify you can see the "**Suspicious activities detected in a privileged session**" alert. Verify that the session got a score of 90.

6. Click on **Resume** to resume the suspended session.



7. Click on the session link and verify that it takes you to the session details in the **Monitoring** pane. If the session is still in progress, you should see the options to terminate or monitor the session. If you already closed the session, you should be able to play the recording.



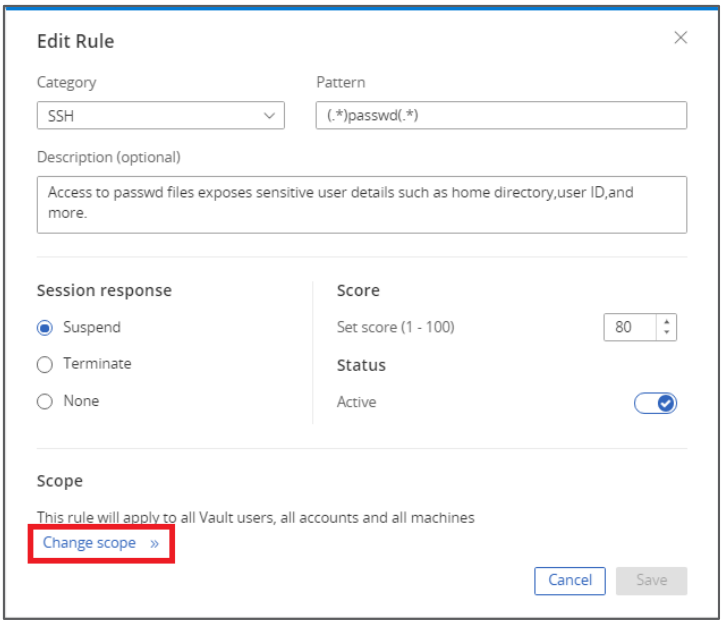
Note:	*Auditor01* has access to the **Security** pane as it was added manually by us to the *Security Admins* and *Security Operators* groups. *Auditor01* was able to resume the session as it was added manually by us to the *PSMLiveSessionTerminators* group.

Security Rules Exceptions

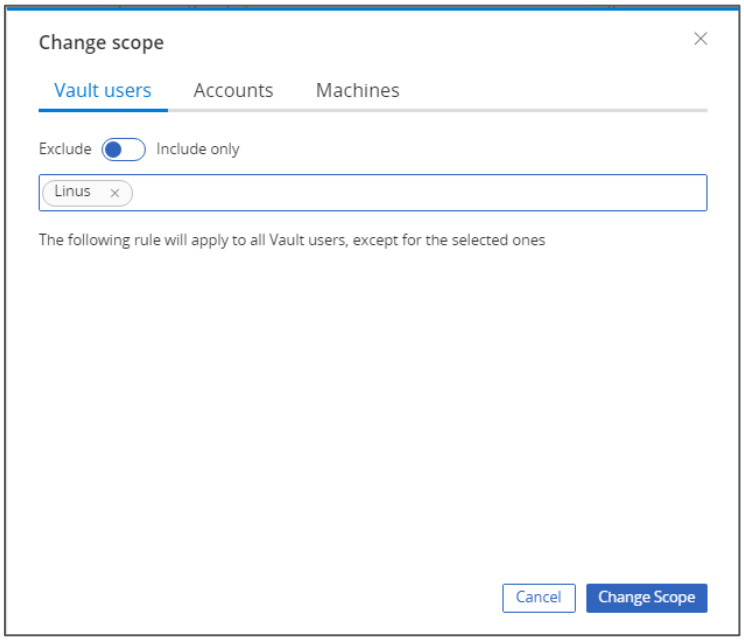
In this section, we will tweak the rule we created in the last section so that if a designated user needs to execute **`passwd`** during a session, their session will not be suspended out.

1. Go back to **Security > Security Configurations**, select the *passwd* rule and click the **Edit** button.

2. To create an exception to the rule, click on **Change scope**.



3. Enter the user name *Linus* in the field, hit **Enter**, and then click the **Change scope** button. You will then be returned to **Edit Rule** dialogue. Click **Save** to close the dialogue.



4. To test the rule, you can log in to the **PVWA** as the user *Linus* and connect using any of the accounts in the *Linux Finance* safe. Your session should not be suspended.

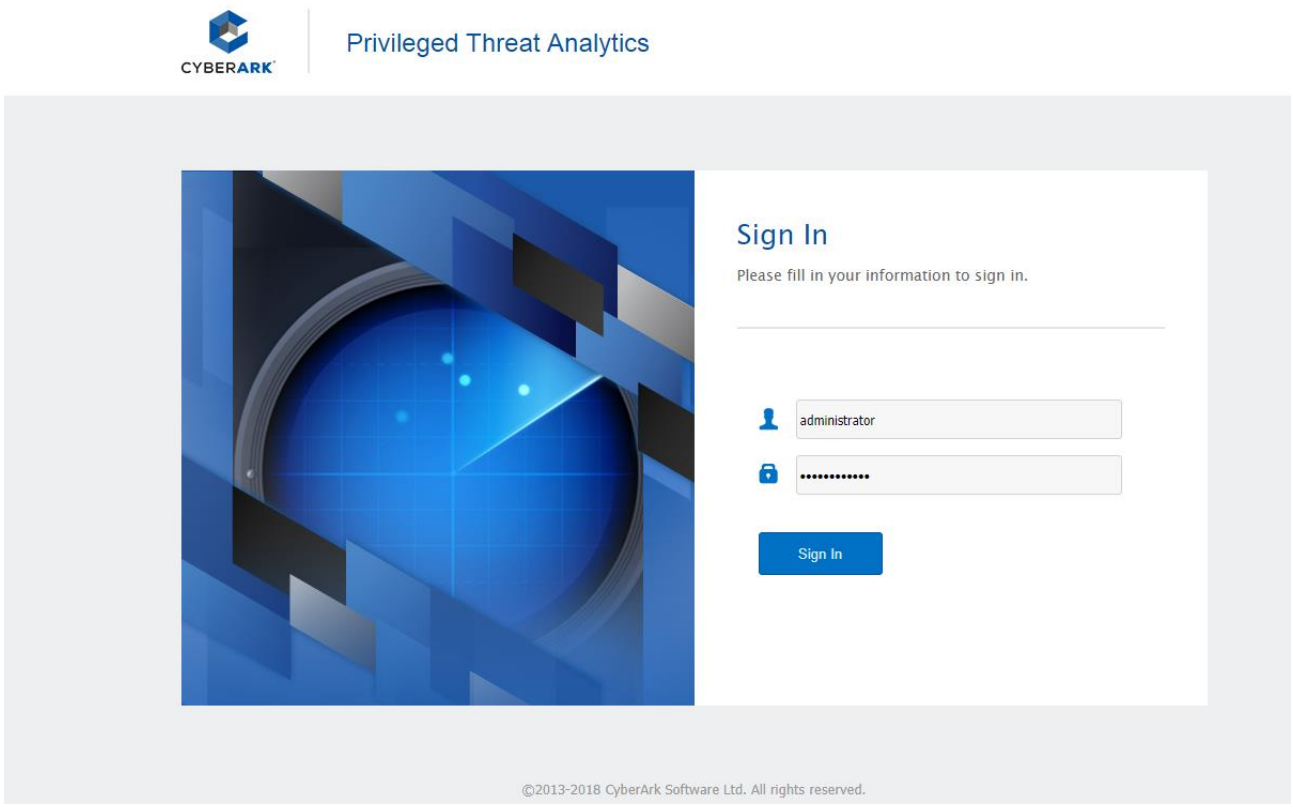
Note:	As Linus is a member of the *ITManagers* Active Directory group, he does not have to submit a request to access the accounts.

Connect to the PTA Administration Interface

The **PTA** has a separate administration interface that is used for initial configuration and can be used to monitor threats and run reports.

In our environment, you can access the **PTA** Administration interface with the following:

Address:	https://10.0.0.1:8443/login
User name:	administrator
Password:	CyberArk123!

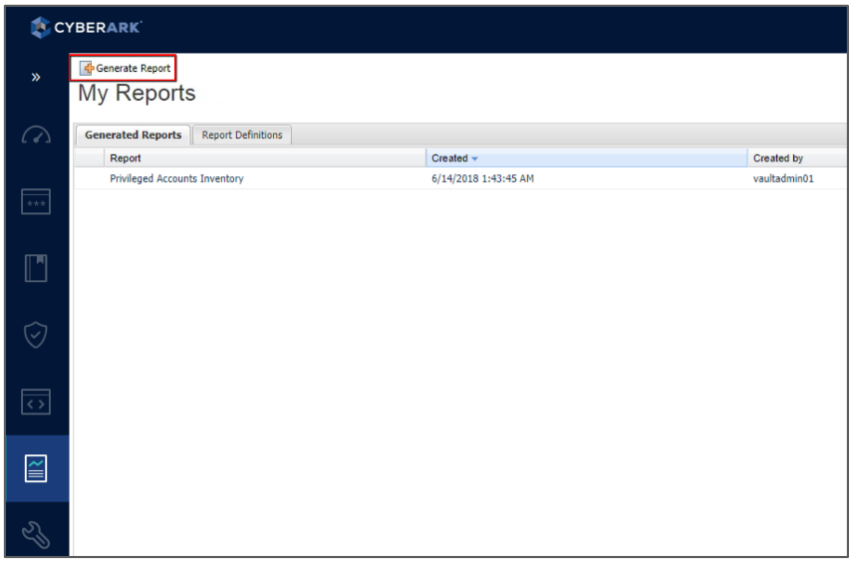


Reports

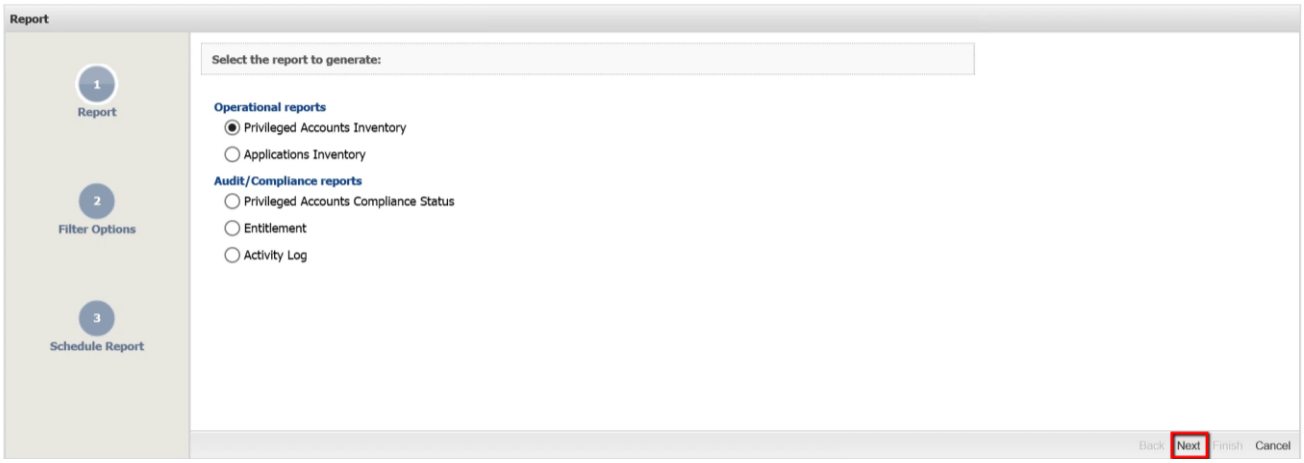
In this section you will be asked to create three types of reports.

Generate "Privileged Accounts Inventory" report

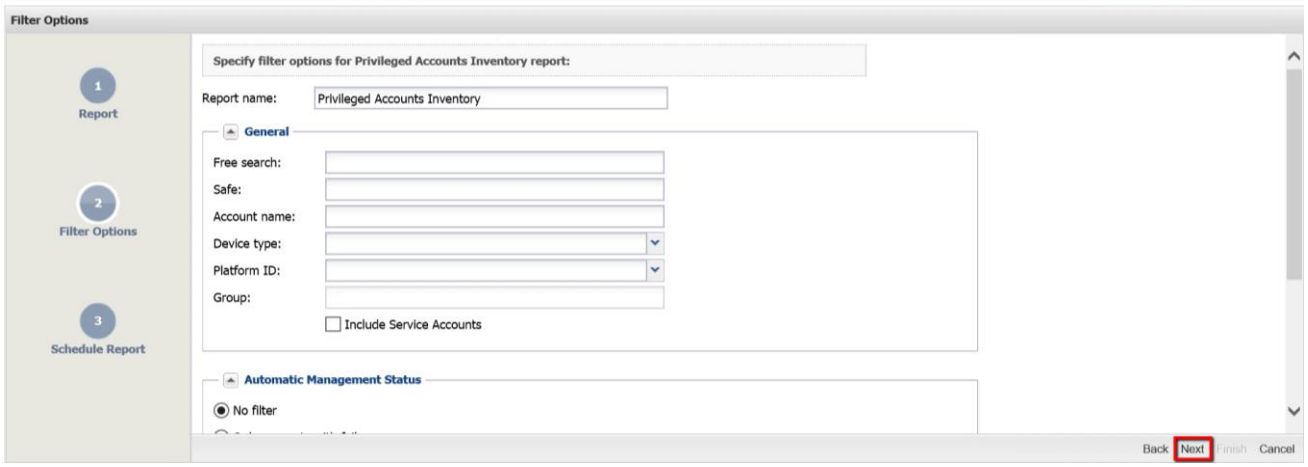
1. Login to the **PVWA** as *vaultadmin01*, go to the **Reports** tab, and then click on **Generate Report**.



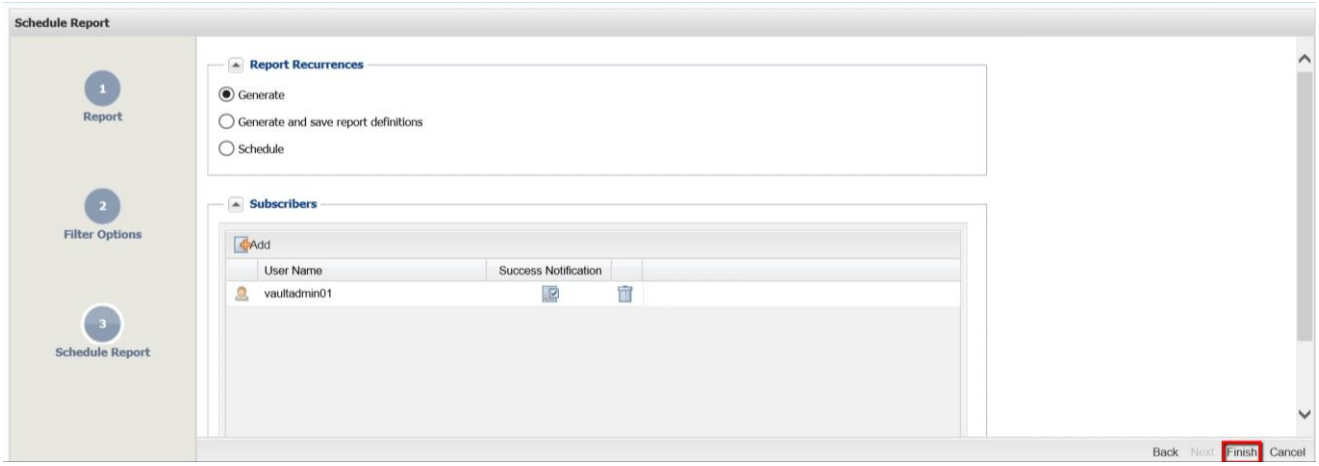
2. Click **Next** to generate the "Privileged Accounts Inventory" report.



3. Review the options to filter the report but keep the default values, then click **Next**.

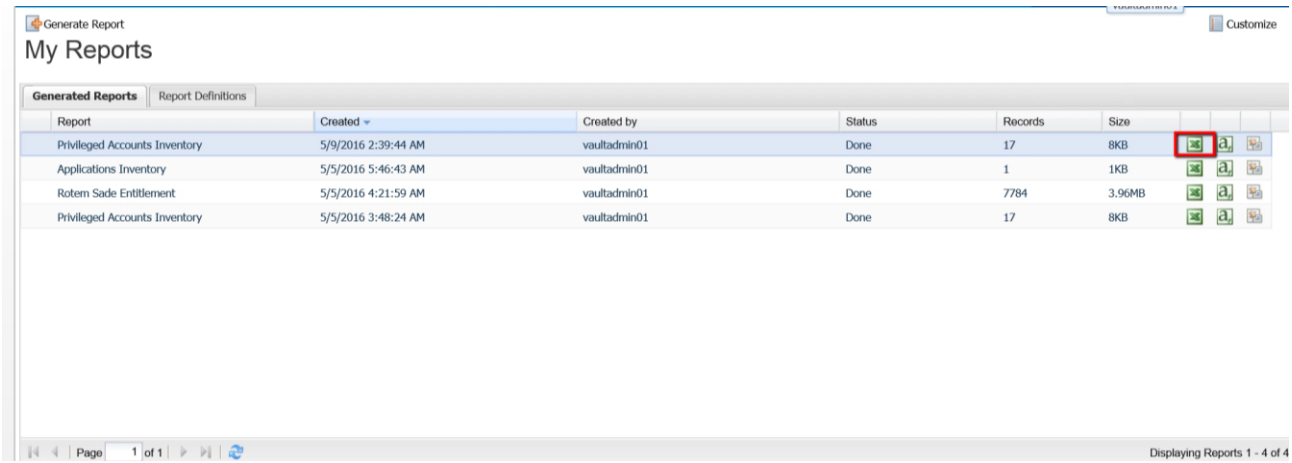


4. Click **Finish** generate the report**.**

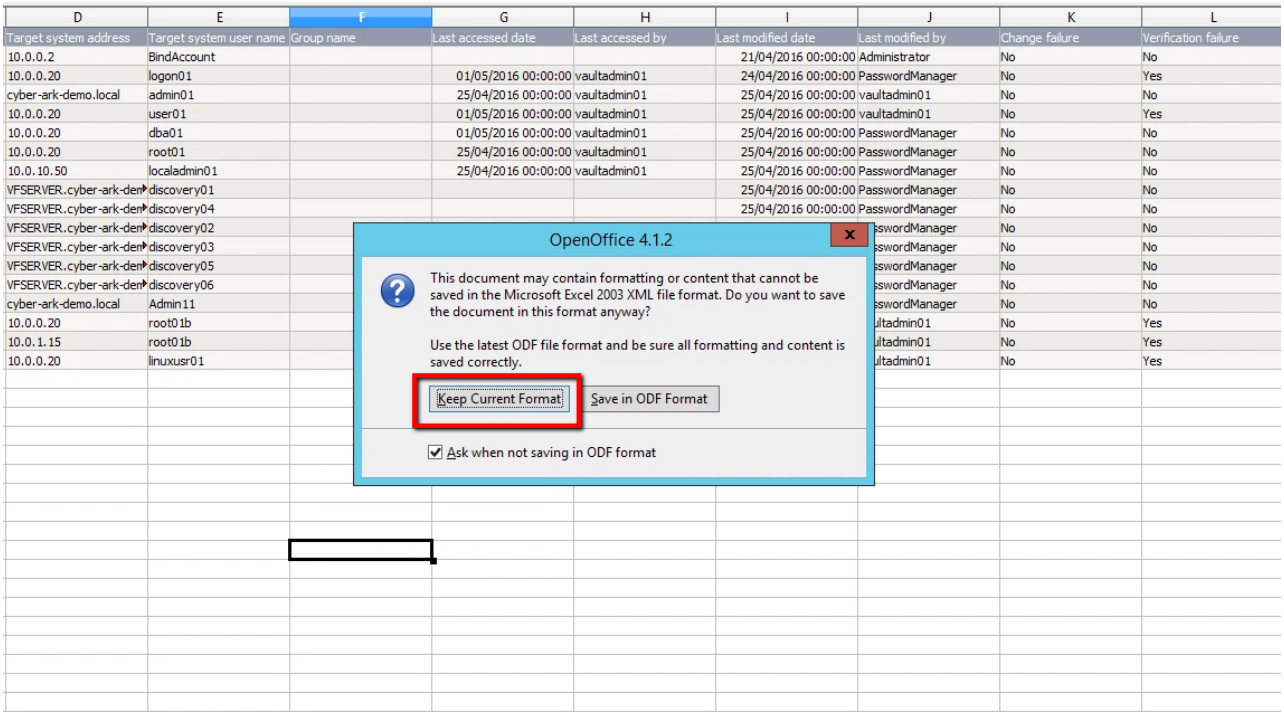


5. Select the refresh icon  at the bottom of the page until the report status shows "Done". Open the report by clicking on the **Excel** icon.

6. Click **OK** to open with the default ***LibreOffice Calc***.



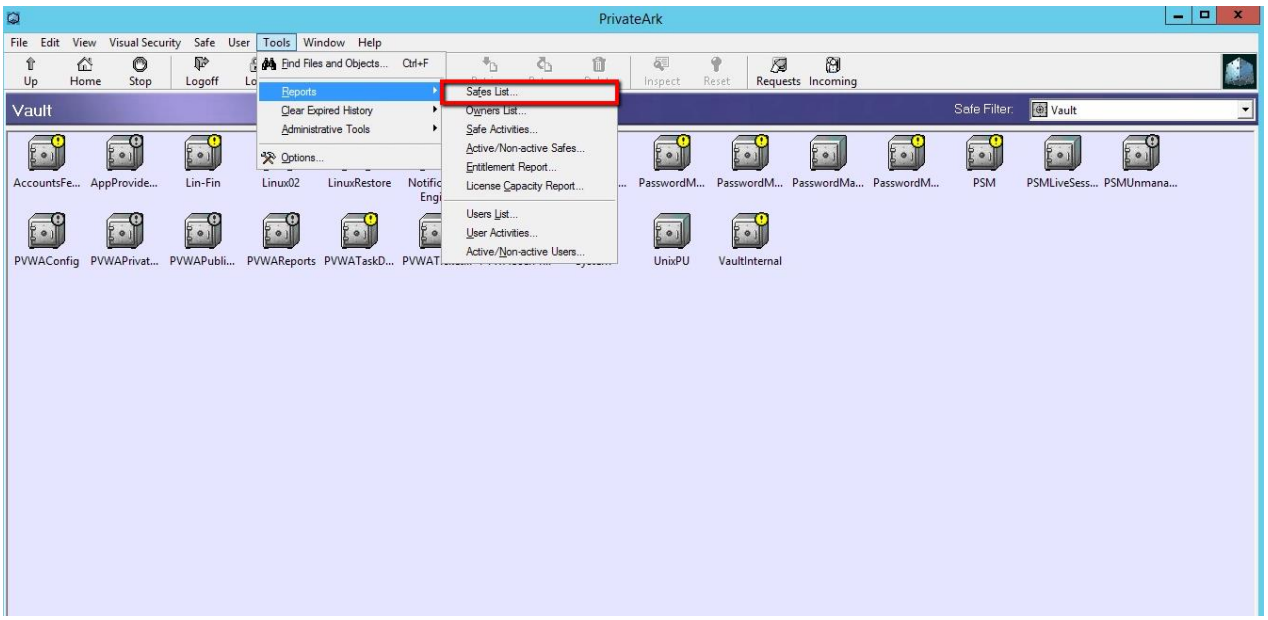
7. After going over the report, save the new report to the desktop of the Components server. If you are asked if you want to save the document in its current format, click **Keep Current Format.**



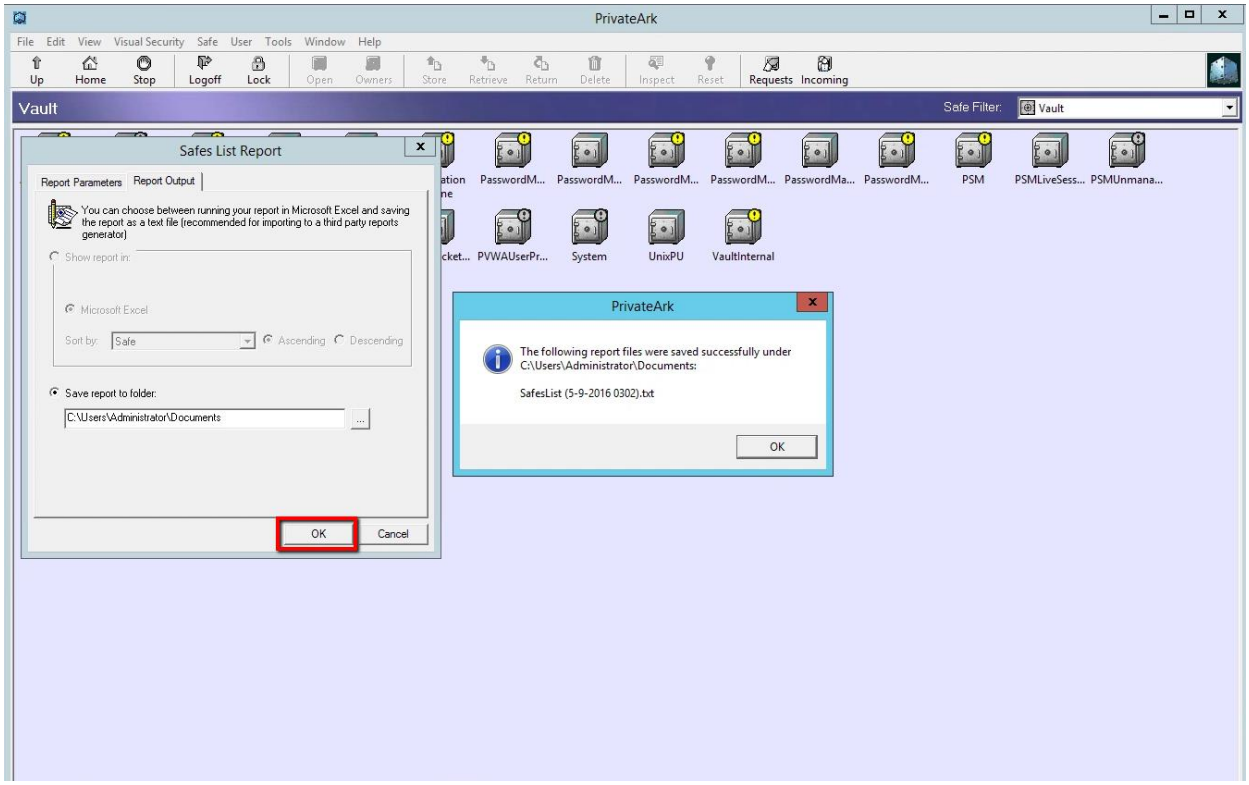
Generate "Safes List" Report and "Users List" report

1. On the **Components** server, open the **PrivateArk Client** and login as *Administrator*

2. Under **Tools > Reports**, click on **Safes List** to generate a safes list report



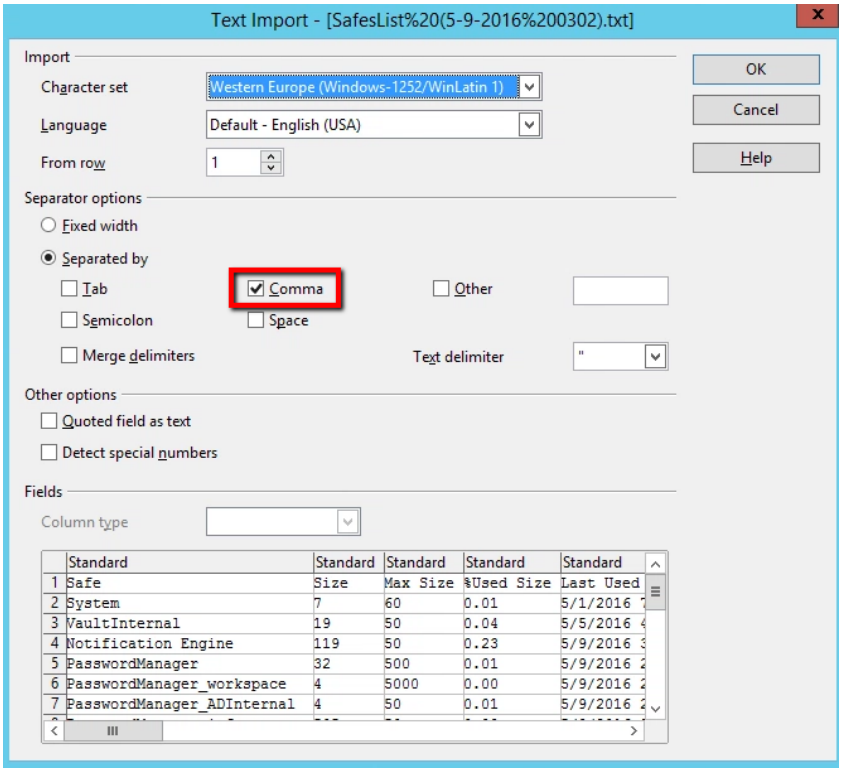
3. Click **Report Output** and save the new report to the desktop of the Components server.



4. Right click on the report and open with ***LibreOffice Calc***.

5. Under “Separator options” choose **Seperated by: Comma**

6. Click **OK**.



7. After reviewing the report, save a copy of the report to the desktop of the Components server.

8. Select *Keep Current Format*.

9. Repeat these steps creating a **Users List** report and copy the report to the desktop of the Components server.

10. By the end of this exercise you should have 3 reports on the desktop. These reports are "**Privileged Accounts Inventory**", "**Safes List**" and "**Users List**".

Common Administrative Tasks

Backup and Restore

Again, for the sake of convenience, we will be using our *Administrator* account to perform a number of tasks during backup and restore.

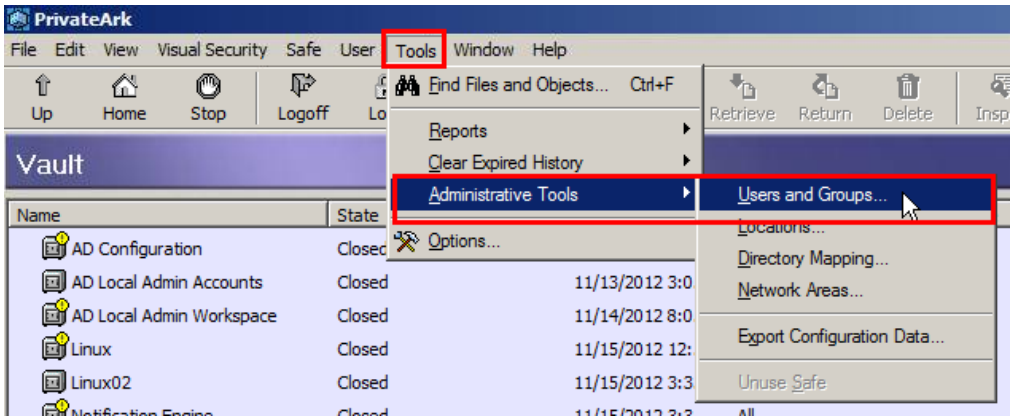
We will begin by enabling two additional CyberArk accounts: *Backup*, which we will use to execute the back up; and *DR*, the disaster recovery account that has authority to restore objects, create Safes, etc.

Enabling the Backup and DR users

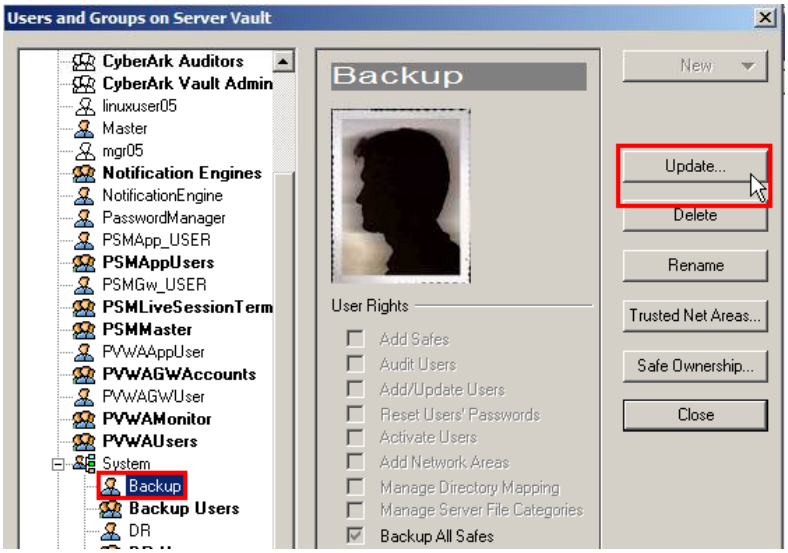
For this section of the exercise, you will log in to the **PrivateArk Client** on the **Components** server in order to enable the users required to run a backup.

1. Use the **PrivateArk Client** to log into the **Vault** as *administrator*.

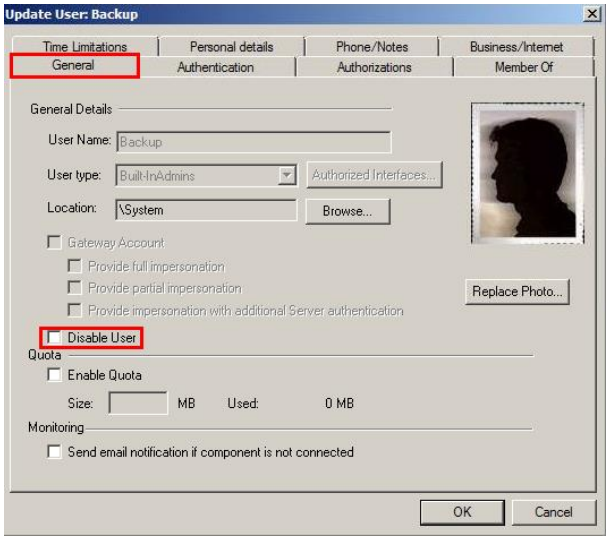
2. Go to **Tools > Administrative Tools > Users and Groups**.



3. Highlight the **Backup** user (located under *System*) and press **Update.**

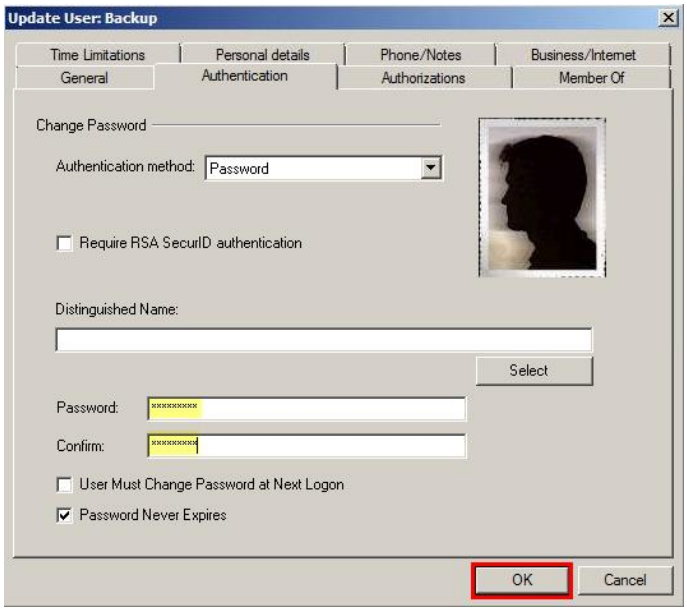


4. On the **General** tab uncheck the *Disable User* checkbox.



5. On the **Authentication** tab enter *Cyberark1* in the **Password** and **Confirm** fields.

6. Press **OK**.



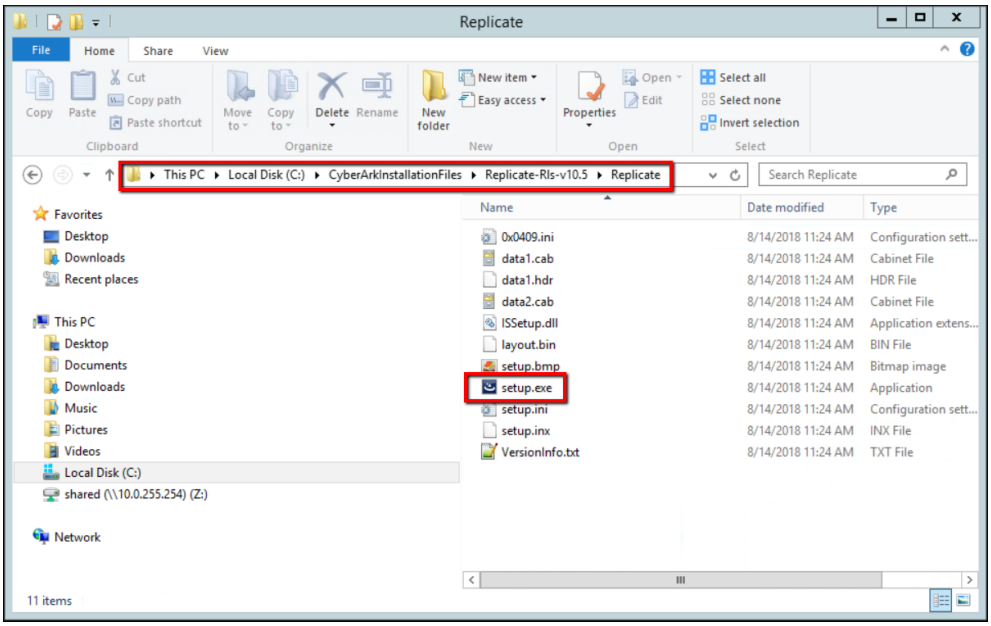
7. Repeat the above steps in order to enable the **DR** user as well. For convenience, the **DR** user will be used to restore the safes.

8. Log out of **PrivateArk Client**.

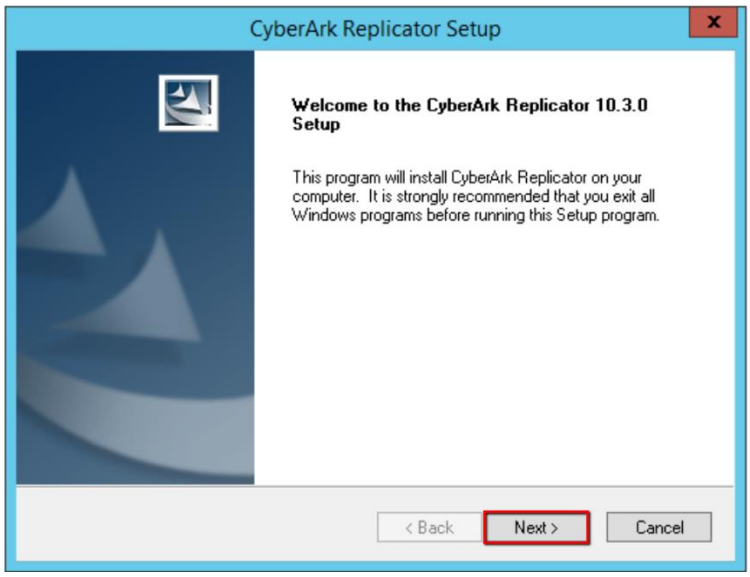
Installing the PrivateArk Replicator

1. On the **Component Server**, open Windows ***File Explorer*** and go to *C:\CyberArkInstallationFiles\Replicate*.

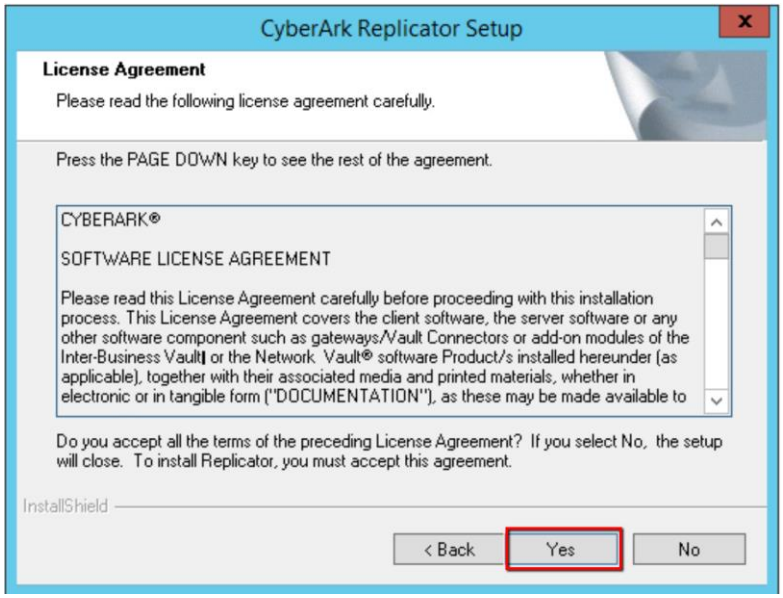
2. Double-click *setup.exe*.



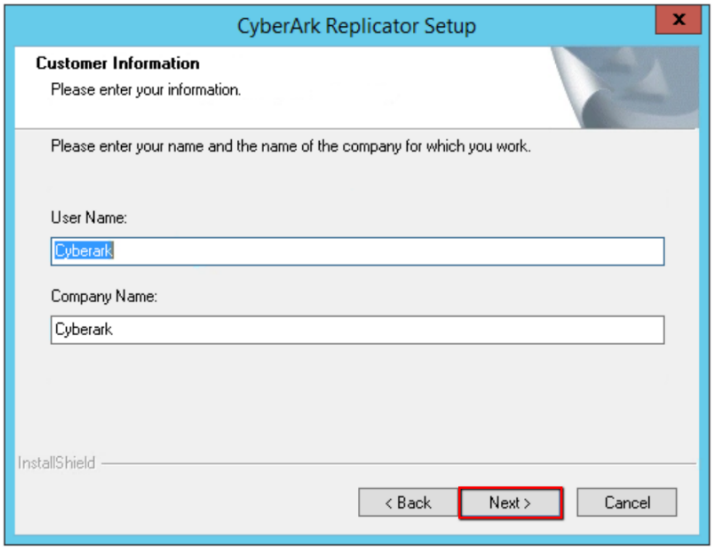
3. On the first screen enter **Next.**



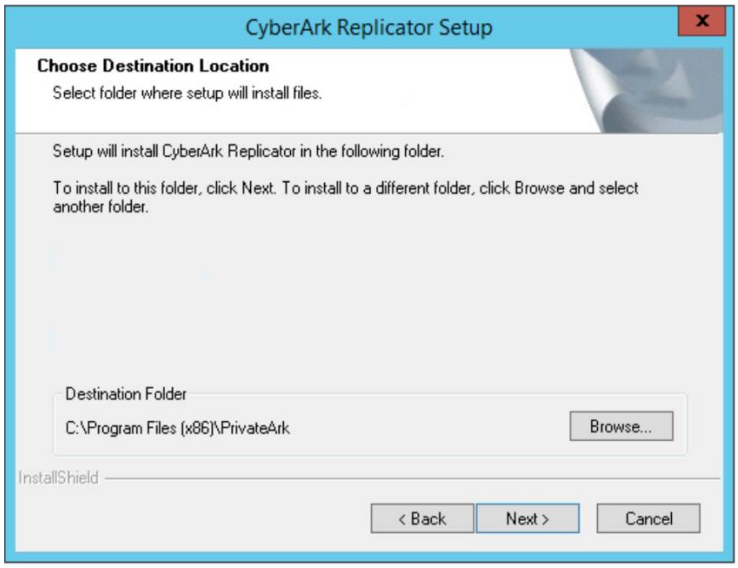
4. Click **Yes** to accept the license agreement.



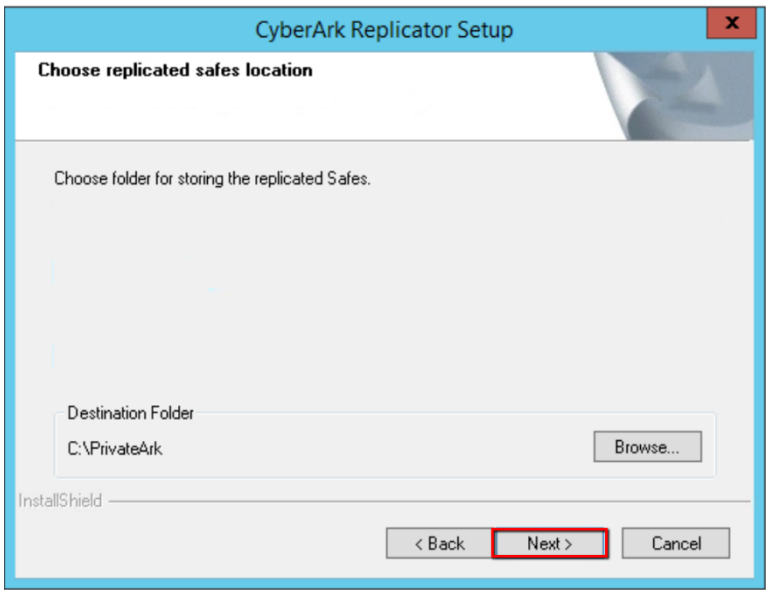
5. Enter *CyberArk* for the user and company names and press **Next.**



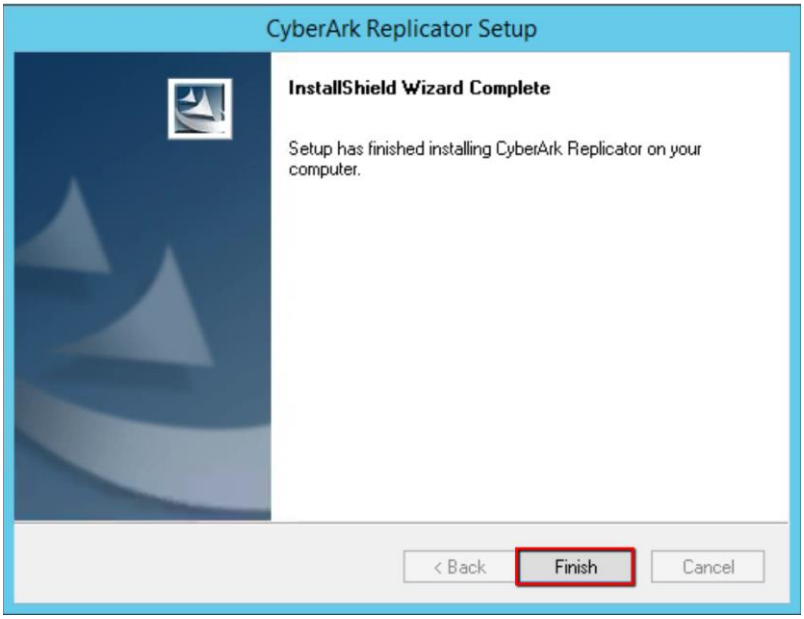
6. Press **Next** to accept the default destination location.



7. Press **Next** to accept the default safes location.

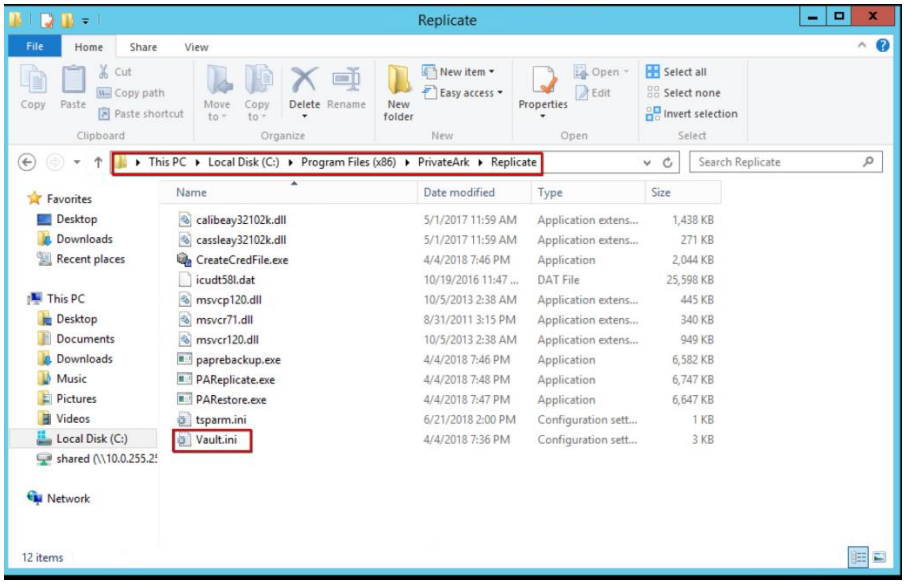


8. Click the **Finish** button.



9. In Windows ***File Explorer*** go to *C:\Program Files (x86)\PrivateArk\Replicate*.

10. Double-click the *Vault.ini* file.



11. In the *Vault.ini* file, enter "Vault" for the **VAULT** parameter.

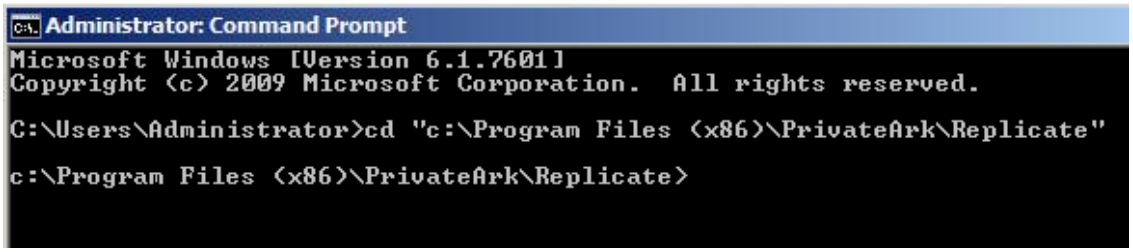
12. Enter the IP address of your **vault** server in the **address** parameter: *10.0.10.1*

```
VAULT = "Vault"
ADDRESS=10.0.10.1
PORT=1858
```

13. Save and close the file.

14. Open a Command Prompt.

15. Enter cd *c:\Program Files (x86)\PrivateArk\Replicate*.



16. Run the following:

```
CreateCredFile.exe user.ini
Vault Username [mandatory] ==> backup
```

```
Vault Password…==> Cyberark1
```

17. Press enter to accept the defaults for the remaining questions as they are not relevant in our environment.

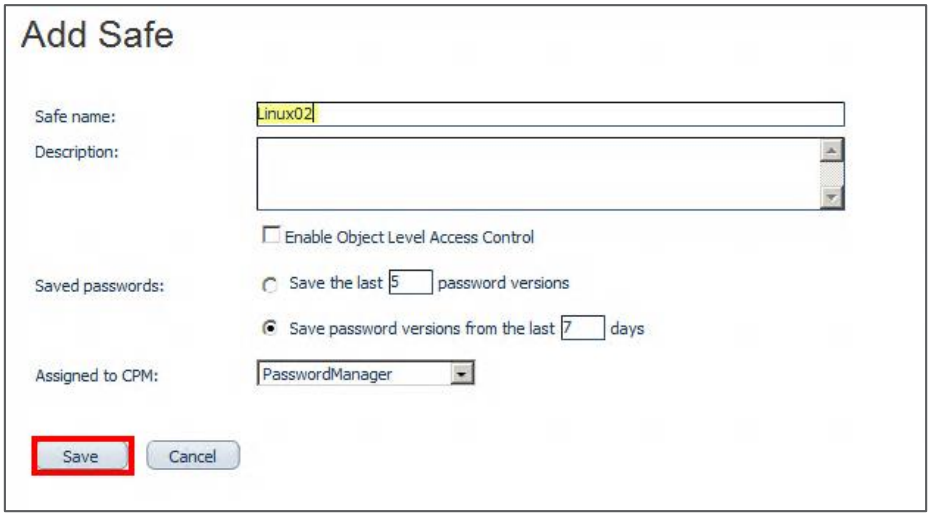
```
c:\Program Files (x86)\PrivateArk\Replicate>CreateCredFile.exe user.ini
Vault Username [mandatory] ==> backup
Vault Password (will be encrypted in credential file) ==> **********
Disable wait for DR synchronization before allowing password change (yes/no) [No
] ==>
External Authentication Facility (LDAP/Radius/No) [No] ==>
Restrict to Application Type [optional] ==>
Restrict to Executable Path [optional] ==>
Restrict to current machine IP (yes/no) [No] ==>
Restrict to current machine hostname (yes/no) [No] ==>
Restrict to OS User name [optional] ==>
Display Restrictions in output file (yes/no) [No] ==>
Command ended successfully

c:\Program Files (x86)\PrivateArk\Replicate>
```

Create a Safe and an Account to test Backup

Log in to the **PVWA** as *Administrator* (don't forget to choose *CyberArk authentication*). First we will create a Safe and an account that we will later delete in order to test the restore process.

1. Go to the **POLICIES > Access Control (Safes)**.

2. Press **Add Safe**. Enter *Linux02* as the **Safe Name** and press **Save**.



3. Using the classic interface, go to the **Accounts** page and click **Add Account**.

4. Enter the following:

Store in Safe:	*Linux02*
Device Type:	*Operating System*

Platform Name:	*Linux via SSH 30*
Address:	*10.0.0.21*
User Name:	*root*
Password:	*Cyberark2*
Confirm Password:	*Cyberark2*
Name (Custom):	*root.backup.test*

Note:	The target machine ***10.0.0.21*** does not exist. This is just a dummy account to test Back-up and Restore.

5. Press **Save** and logout of the **PVWA**.

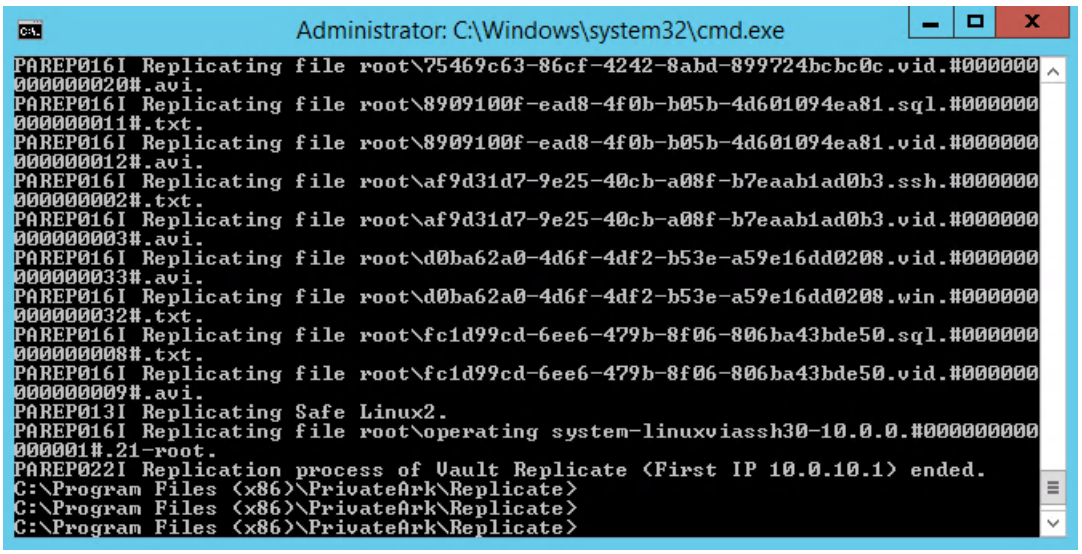
Running a Backup

To perform a backup, run the following command from the Replicate installation folder:

```
PAReplicate.exe vault.ini /logonfromfile user.ini /FullBackup
```

If the backup is successful, you should see a number of messages indicating that files are being replicated with a final message stating that the replication process has ended.

If the replicate was successful, proceed to the next steps. If not, verify the configuration information and try again.

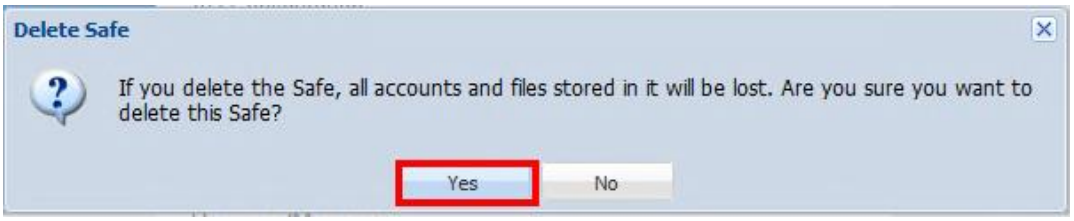


Delete the *Linux02* Safe

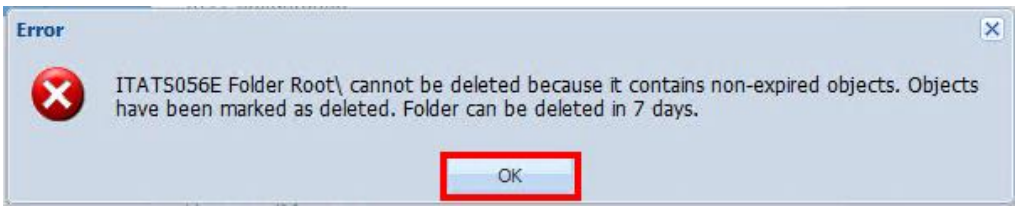
1. Making sure you are logged into the **PVWA** as the *administrator* user, go to **POLICIES > Access Control (Safes)**.

2. Highlight *Linux02* and click the **Delete** button.

3. Press **Yes** to confirm that you would like to delete the safe and contents.



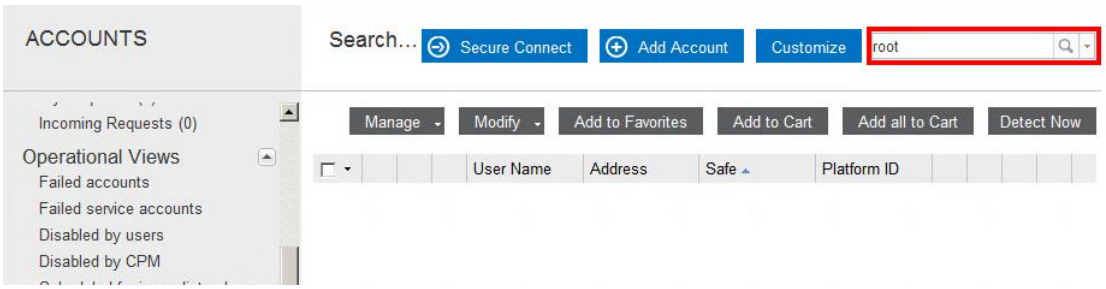
4. You will receive a message that the *Root* folder cannot be deleted for 7 days. However, the contents of the safe should have been removed.



5. To confirm that the contents of the *Linux02* safe have been deleted go to the **Accounts** page.

6. Enter *root* in the search box and press the **Search** button.

7. The *root* account that you created earlier in this exercise using address *10.0.0.21,* should not appear.



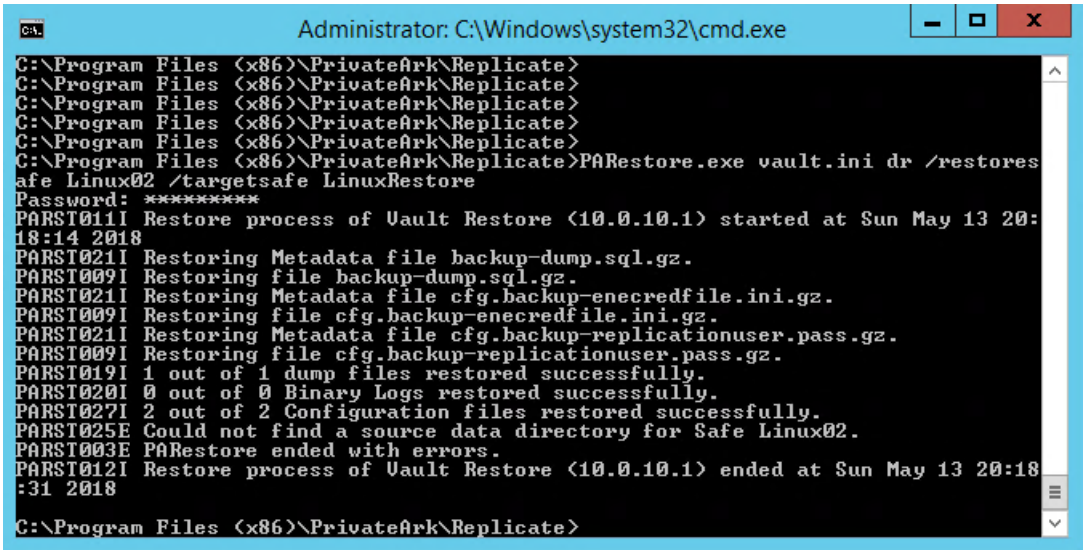
Running a Restore

1. Go back to the command prompt and run the following command:

   `PARestore.exe vault.ini dr /RestoreSafe Linux02 /TargetSafe LinuxRestore.`

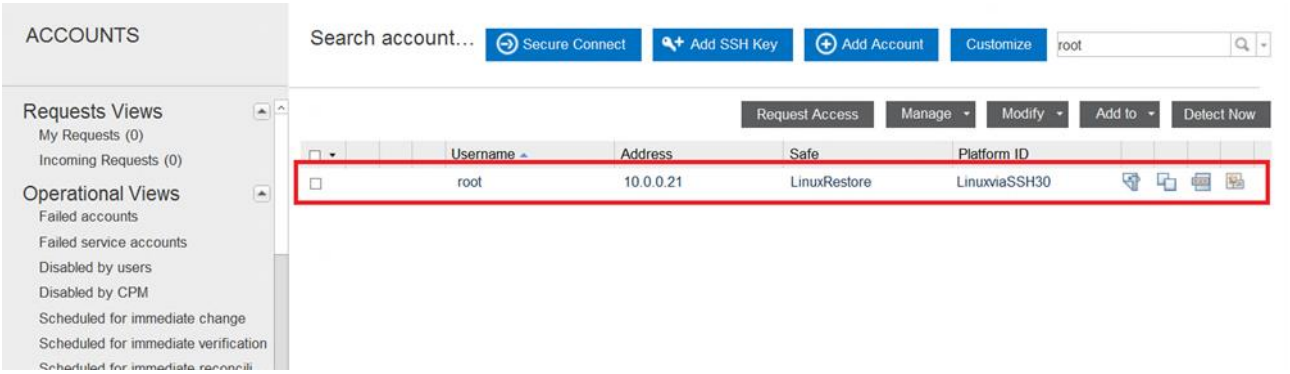
   You will be prompted for the password for the **DR** user, which should be *Cyberark1*.

2. You will receive a message stating that the restore process has ended.



3. Go back to the **PVWA** and search for root again.

4. You should now see the *root* account using address *10.0.0.21,* residing in safe **LinuxRestore**.



Note:	The Target Safe (**`/LinuxRestore`**) is the name of the restored Safe to create. The restore process does not overwrite an existing Safe – it creates a new one. Therefore, this name must not correspond with an existing Safe.

Remote Control Client

Configuring the Remote Control Client on the Vault:

1. Logon to the **Vault** server with the local user *Administrator* and password *Cyberark1*.

2. Navigate to the **Vault** server *Conf* folder (By default: *C:\Program Files (x86)\PrivateArk\Server\Conf*).

3. Open the *PARagent.ini* file and add the IP address of your Components server to the "RemoteStationIPAddress" parameter. (10.0.20.1) and save the file.

4. Open a command line window from this location. You can do this by holding the *Shift* key and right-clicking in a blank space in the folder, then selecting "Open command window from here".

5. Move up one directory level and run:

```
PARagent.exe setpassword Cyberark1
```

6. You should now have a new file in the *\Conf* directory called: *paragent.pass*.

7. Go to the **Services** window in the **Server Manager** and restart the *PrivateArk Remote Control Agent* Service:

Connecting with the Remote Control Client from the Components server:

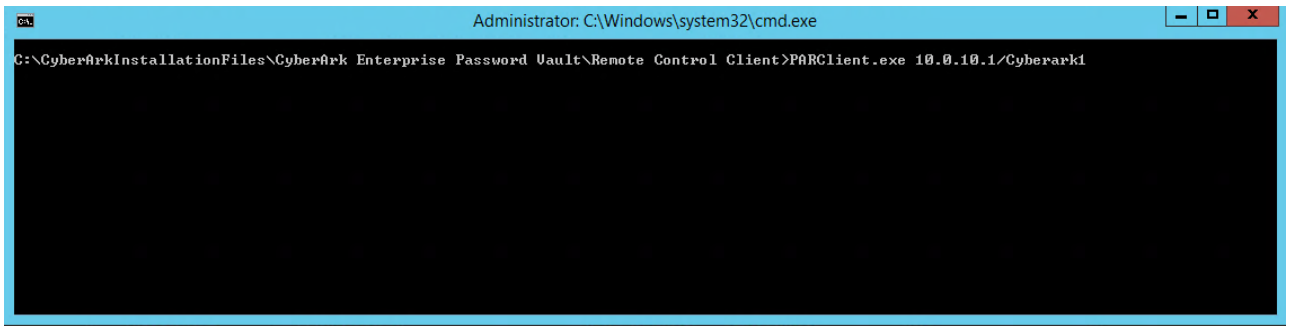
1. Logon to the **Components server** and navigate to:

C:\CyberArkInstallationFiles\ Remote Control Client

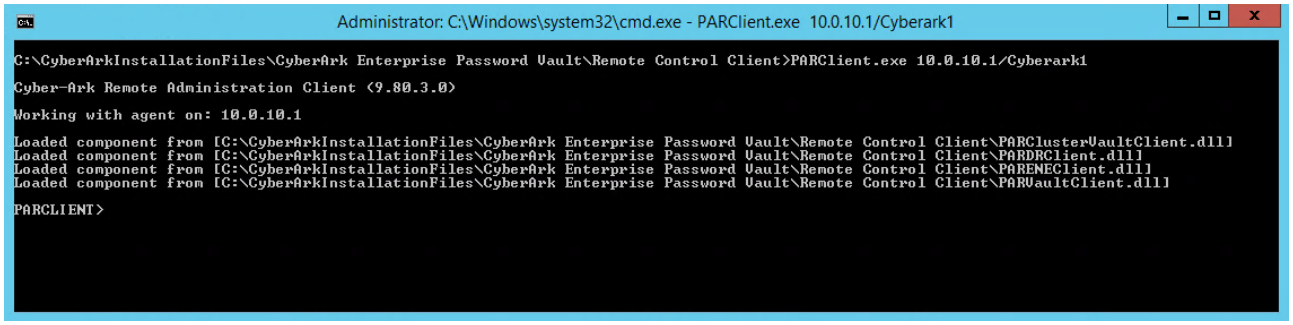
2. Open a command line window from this location. You can do this by holding the Shift key and right clicking in a blank space in the folder, then selecting "Open command window from here. You may need to expand the window to find a large enough blank space.

3. Run the following command:

```
PARClient.exe 10.0.10.1/Cyberark1
```



4. After the DLLs have loaded you should see the **PARCLIENT** prompt:



5. Run the following command to see the status of the Vault

```
status Vault
```

6. Run the following command to set the debug level of the Vault:

```
SetParm Vault DebugLevel=PE(14) /Immediate
```

7. Type **exit** to quit PARClient

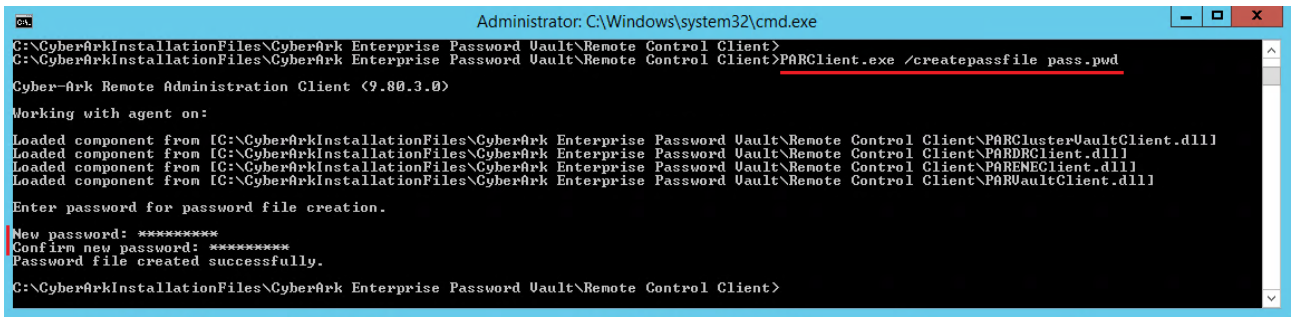
Create a password file for the Remote Agent

You can also connect to the Remote Agent using a password file instead of typing the password in clear text.

1. Run the following command in order to create a password file:

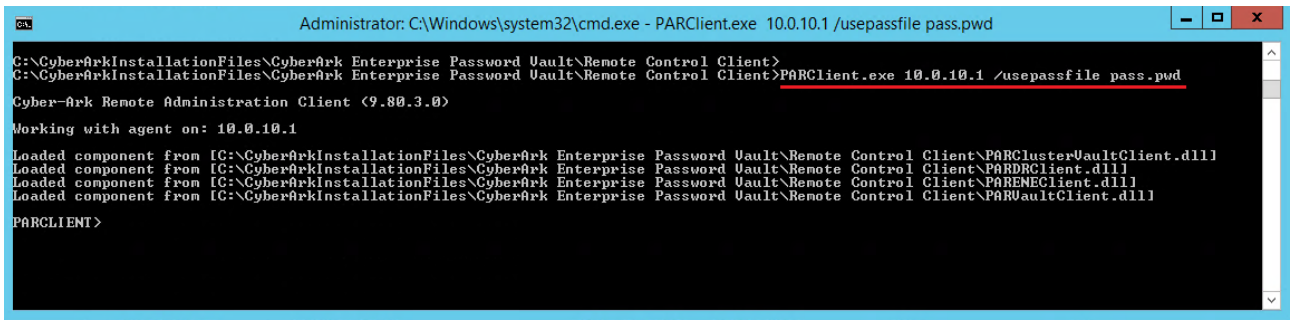
```
PARClient.exe /createpassfile pass.pwd
```

2. Enter the same password you used before (*Cyberark1*) and confirm.



3. In order to connect to the **PARAgent** on the Vault Server using the newly created password file, run the following command:

```
PARClient.exe <IP Address of Vault Server> /usepassfile
<filename>
```



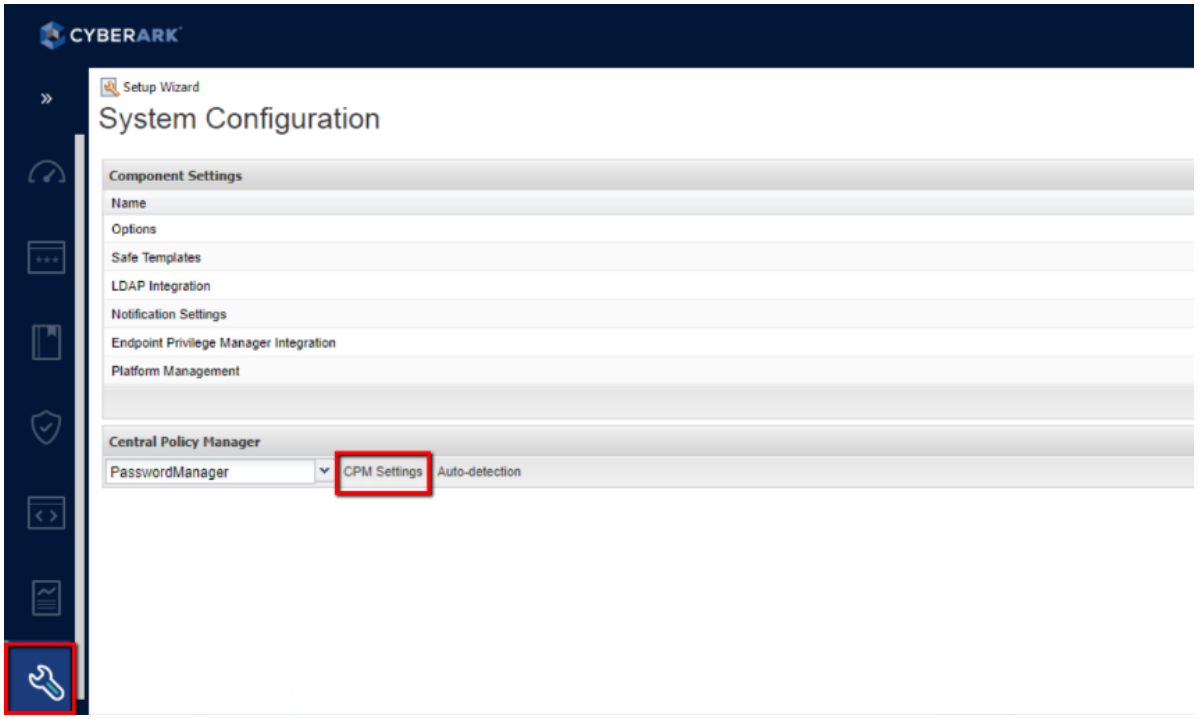
Verify the changes made with the Remote Control Client

1. Connect to your **Vault** server.
2. Click on the **PrivateArk Server** icon.
3. Examine the ITA log and verify the Debug level settings have been applied.

Rotating CPM Logs

The **CPM** log files can be automatically uploaded to a Safe in the **Vault** according to a predefined period of time in the **CPM** parameters file. Each time a log file is uploaded to the **Vault**, it is copied to the *History* subfolder in the *Log* folder, and the **CPM** begins writing to a new log file.

1. Log into the **PVWA** as *vaultadmin01*.
2. On the **ADMINISTRATION** tab, you should see that *PasswordManager* is already selected as the **CPM**. If there were multiple CPMs you would select the appropriate CPM from the pulldown list
3. Click **CPM Settings**.



4. Select **Configuration > General** and scroll down to set the following parameters.

LogCheckPeriod:	*1*
LogSafeName:	*CPM_Logs*

5. Click **OK**.

6. Create a safe called **CPM_Logs** and assign **PasswordManager** as the assigned **CPM**.

7. Modify the *Members* list to add the *Vault Admins* group.

8. Grant the *Vault Admins* group **all** safe permissions.

9. The *Vault Admins* group will now be able to access the **CPM** logs.

Log in with Master

There are some cases where you will need to log in to the **Vault** with the *Master* user. This can be in the event of an emergency or to give permissions to a user for safe when there are no active users with the necessary permissions.

In order to use the Master user, the dbparm.ini file must point to the location of the Recovery Private Key. By default, this is the CD-ROM drive of the server.

1. On the **Vault** server, open *C:\Program Files (x86)\PrivateArk\Server\Conf\dbparm.ini*.

2. Because we do not have a CD-ROM drive (we are using VMs for our lab exercises), you will need to point it to the relevant location.

3. Update the *RecoveryPrvKey* parameter to point to the location of the file called ***recprv.key*** in the ***Master CD*** folder:

```
RecoveryPrvKey=C:\CyberArk Installation Files\Master CD\recprv.key
```

4. Restart the **Vault** service (using the **PrivateArk Server** console with the stop light) as any change to the *dbparm.ini* file requires a restart of the service.

5. Open the **PrivateArk Client** from the **Vault** server machine.

6. In the *User name* field, enter: *Master*.

7. In the *Password* field enter the password that was configured during the installation process (*Cyberark1*).

Question: How many safes are listed?

8. Close the **PrivateArk Client** session.

9. Open the **PrivateArk Client** session and login as *Administrator*

Question: How many safes are listed?

10. You should notice that there are many more safes displayed when you were logged in as the *Master* user.

Optional Exercises

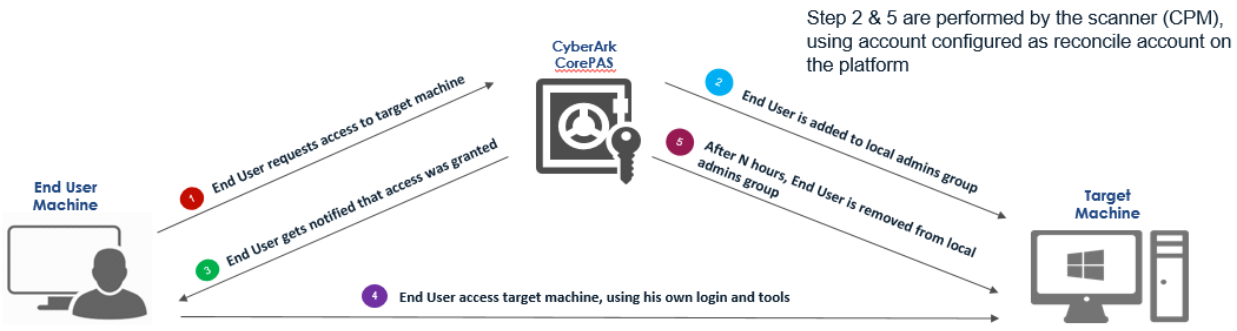
Ad Hoc Access

A major step in the Privilege Access Security program is to secure the Windows local administrators. This is essential to reduce the risk of lateral movement. CyberArk enables securing local administrator credentials, as well as using PSM to access those accounts.

There are cases, however, where managing the local administrator passwords is not possible at the initial stage of deployment, whether because of objection from the IT users, or other reasons. Ad hoc access allows you to smoothen out your local administrators' security. It can be used as an intermediate step towards full implementation of Vaulting the local administrators. You can grant Windows admins on-demand, ad hoc privileged access to Windows targets, for 4 hours.

During this time, domain users can request to access a system as local administrator. If authorized, the system temporarily adds the logged-on Windows users into the target system's local administrator group, without the need to manage the credentials of the local administrator on that target. This allows for a frictionless and lightweight solution that enables your organization to introduce privileged controls and help establish habitual security, before moving into a robust Privileged Access Security program.

The workflow, as exhibited in the following diagram, starts when an end user requests access to a designated ad hoc target machine, and is subsequently added to the local admin groups. The end user is notified that they have been granted access (or not), and once granted, is able to access the target machine using their own login for 4 hours. After this period, the user is automatically removed from the local admin group

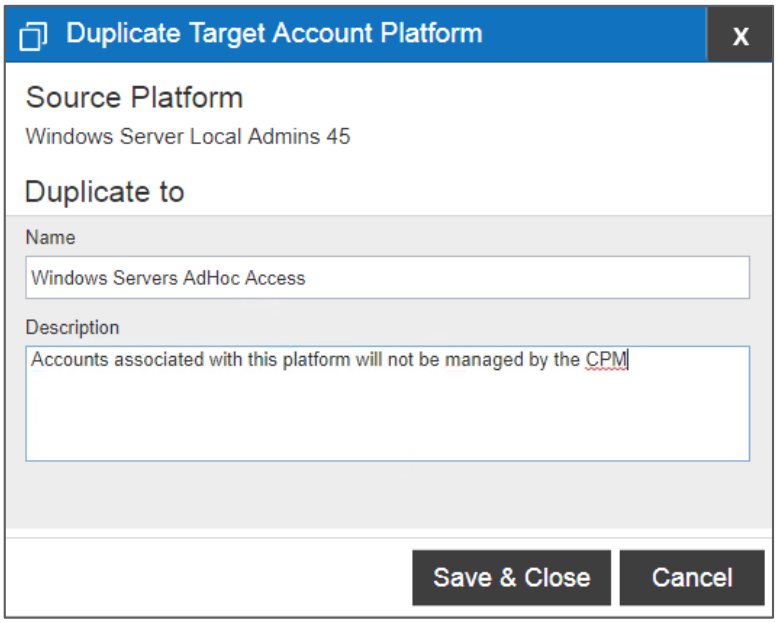


In this exercise, you will set up Ad Hoc access for the Windows admin user (Bill), allowing Bill to be added to the local admin group on the target system for 4 hours.

Set up the Ad Hoc Access Platform

1. Log into the **PVWA** as *vaultadmin01*.

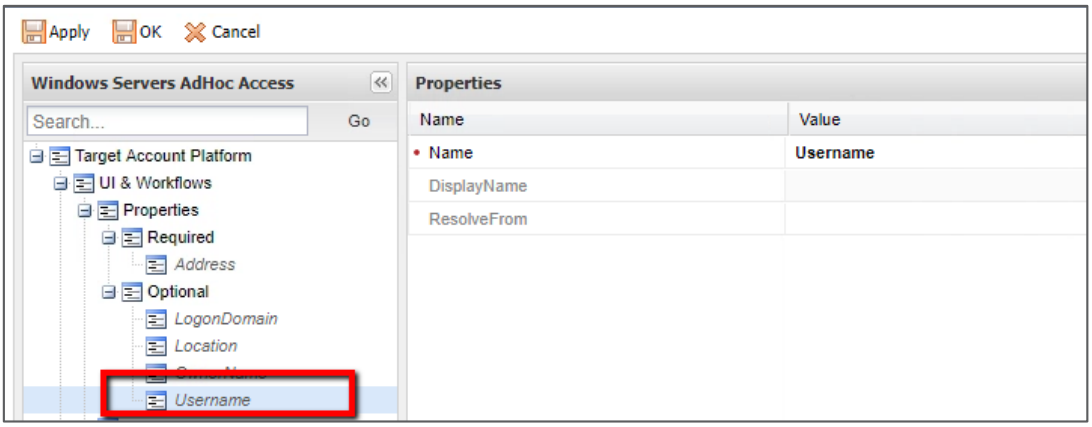
2. Go to **ADMINISTRATION** > **Platform Management**, and duplicate the *Windows Server Local Admins 45* Platform to a new platform called *Windows Servers AdHoc Access*. You may add description stating accounts associated with this platform are not managed by the **CPM**.



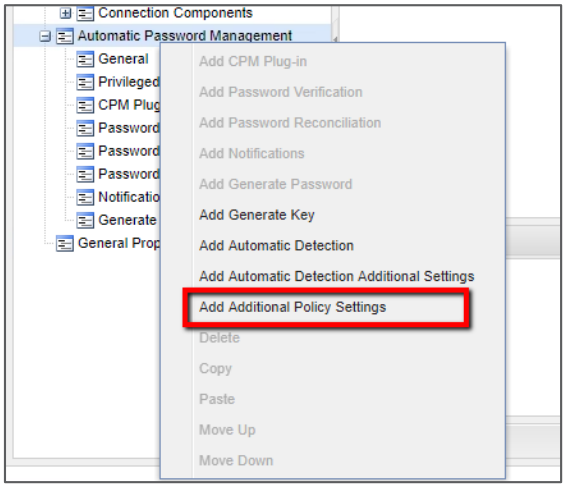
3. Click on **Edit** to edit the new platform. In the new platform set the following parameters to **NO**.

   - AllowManualChange
   - PerformPeriodicChange
   - VFAllowManualVerification
   - VFPerformPeriodicVerification
   - RCAllowManualReconciliation
   - RCAutomaticReconcileWhenUnsynched

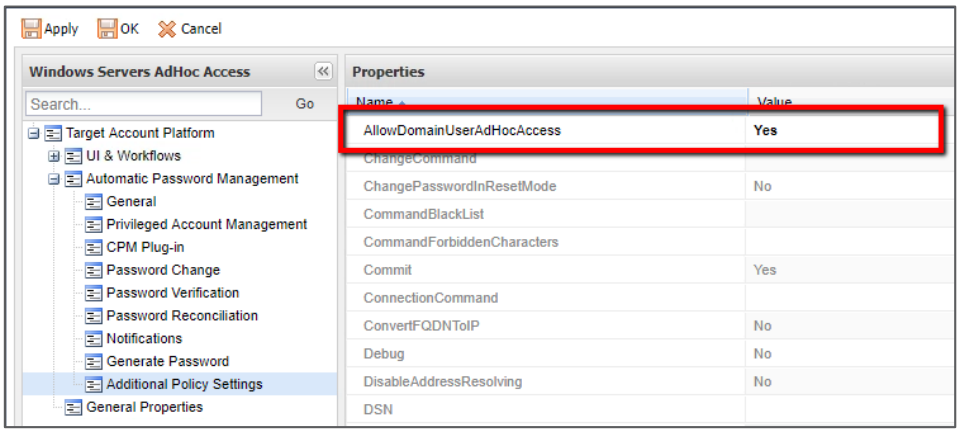
4. In the new platform, go to **UI & Workflows > Properties**. Remove the *Username* property from *Required*, and add a new property called *Username* under *Optional*.



5. In the new Platform, right-click on **Automatic Password Management**, and select **Additional Policy Settings**.



6. Under **Additional Policy Settings**, set **AllowDomainUserAdHocAccess** to Yes.



Note:	For for Ad Hoc access, a Domain Account which is used as a reconcile account should be associated with the platform. In our case, this has already been defined in the base platform we duplicated: *Windows Server Local Admins 45*

Note:	For security best practice, you need to limit the Safes that are required for ad hoc access, by setting the AllowedSafes parameter with a regular expression that lists the Safes that this platform can be applied to. This too has already been defined in the base platform we duplicated: *Windows Server Local Admins 45*

Add the Local Administrator Account

7. Go to Accounts View and click on Add Account. Add the local administrator account of the Target Windows server:

Store in Safe:	*Win-Srv-Fin-US*
System Type:	*Windows*
Platform Name:	*Windows Server AdHoc Access*
Address:	*vfserver.cyber-ark-demo.local*
User Name:	*Administrator*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*
Logon To (optional)	<click the *Resolve* button>

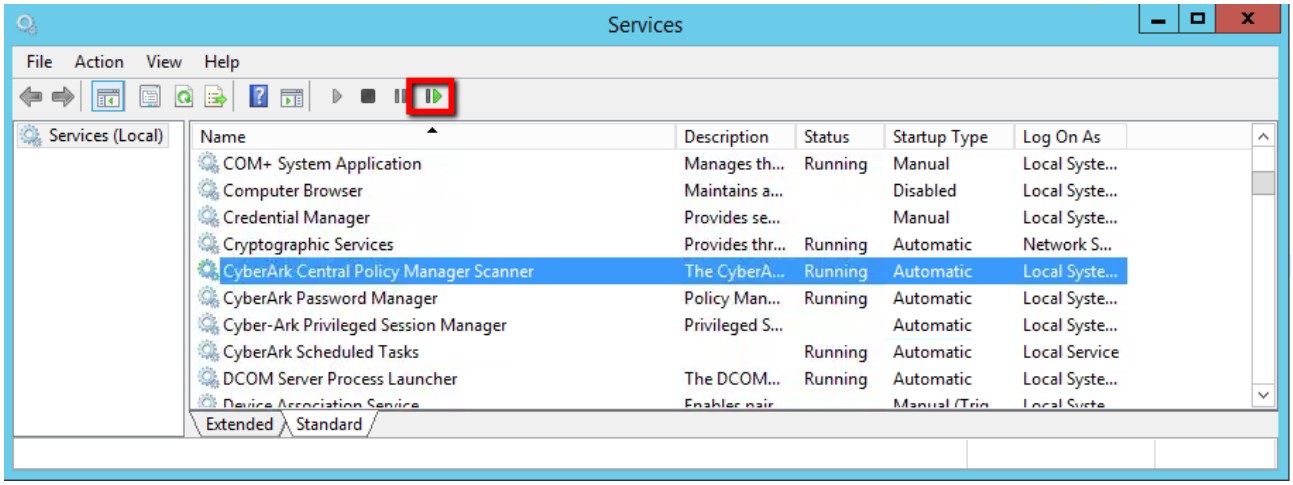
CPM Scanner Configuration

8. On the Comp01A server, navigate to C:\Program Files (x86)\CyberArk\Password Manager\Scanner. Using Notepad++, edit the **CACPMScanner.exe.config** using and add the following line:

   - <add key="IsAdHocEnabled" value="true" />

```
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <configSections>
    <section name="quartz" type="System.Configuration.NameValueSectionHandler, System, Version=1.0.5000.0,Culture=neu
  </configSections>
  <quartz>
    <add key="quartz.scheduler.instanceName" value="ScannerScheduler" />
    <add key="quartz.threadPool.type" value="Quartz.Simpl.SimpleThreadPool, Quartz" />
    <add key="quartz.threadPool.threadCount" value="1" />
    <add key="quartz.jobStore.type" value="Quartz.Simpl.RAMJobStore, Quartz" />
  </quartz>
  <appSettings>
    <add key="IsAdHocEnabled" value="true" />
    <add key="VaultFile" value="C:\Program Files (x86)\CyberArk\Password Manager\Vault\Vault.ini" />
    <add key="ConfigurationCredentialFile" value="C:\Program Files (x86)\CyberArk\Password Manager\Vault\User.ini" />
    <add key="LogFolder" value="C:\Program Files (x86)\CyberArk\Password Manager\Logs\" />
    <!-- Valid values: "" - use temp folder  -->
    <add key="MultiLingualSupport" value="No" />
    <!-- DNA configuration  -->
    <add key="MaxThreadNumber" value="10" />
```

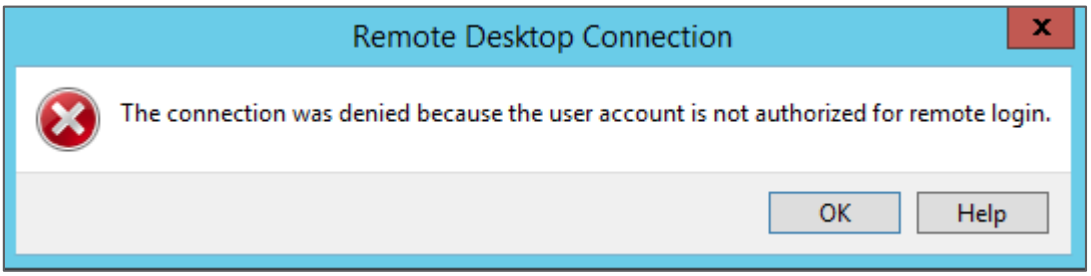
9. Save the file and then restart the CPM Scanner service.



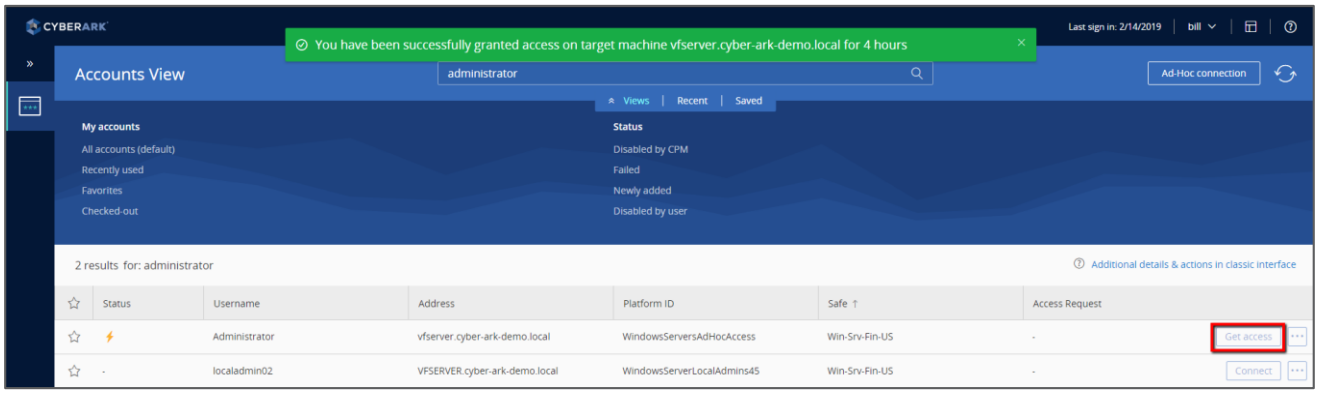
Test Ad Hoc Access

10. First, open MSTSC and attempt to connect to the target windows machine as cyber-ark-demo\bill.

11. You should receive an error stating that bill is not authorized for remote login:

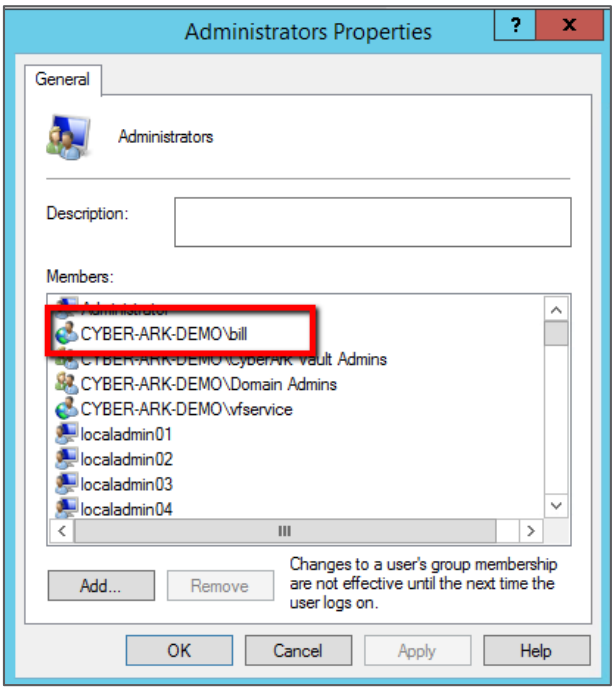


12. Next, login to the PVWA as Bill. Search for the Target Windows local Administrator account and click on ***Get Access***. If you configured everything successfully, you should receive a notification saying you've been granted admin access for 4 hours.



13. Now try to launch another RDP connection to the Target Windows server as cyber-ark-demo\bill. You should be able to login this time.

14. After successfully connecting to the Target Windows server, go to Computer Management > Local Users and Groups > Groups and open the local Administrators group. Verify that cyber-ark-demo\bill was added to the group.



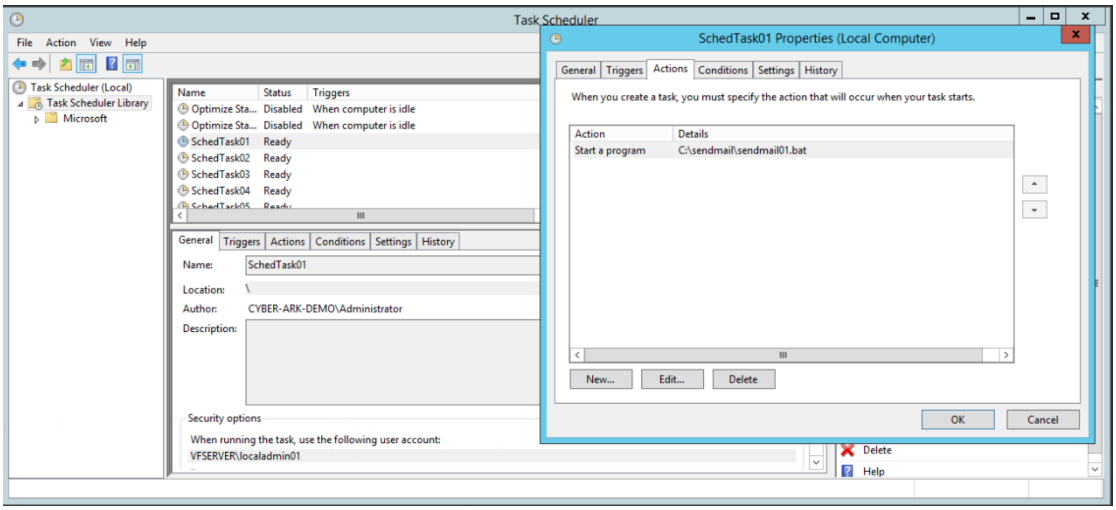
15. Disconnect from the Target Windows server.

Usages

Manage a Scheduled Task Usage

In this exercise, you will configure a usage, which allows you to manage applications (services, scheduled tasks) that are dependent on the main account.

The virtual machine "Target Windows" (*vfserver* - 10.0.10.50) server contains a scheduled task, **SchedTask01**. The scheduled task is configured to send an email to the *vaultadmin01* account every time it is run.



We will be using the *localadmin01* account for testing. We will modify the ***MinValidityPeriod*** setting so that the password does not change while we are trying to use it by resetting it to its default value.

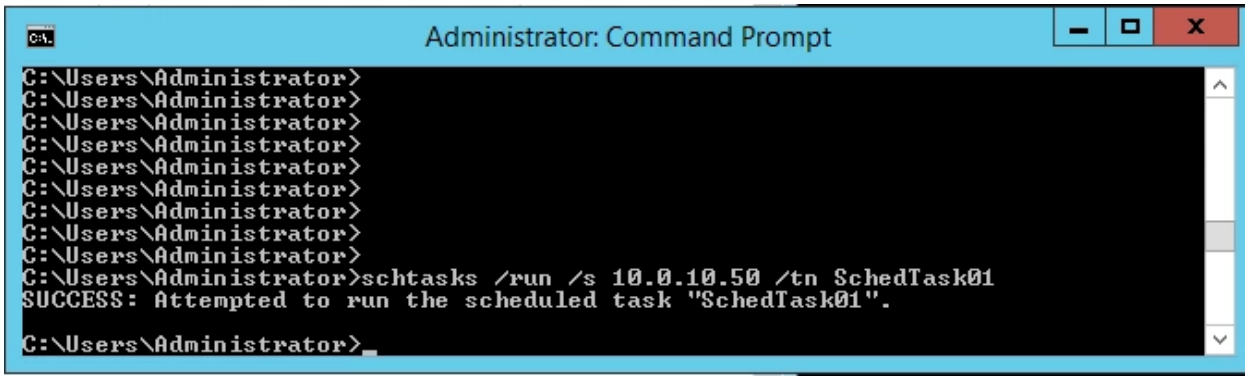
1. Logged in to the **PVWA** as *vaultadmin01*, navigate to **Administration > Platform Management**, select *Windows Server Local Admins 45* platform and press **Edit**

2. Go to **Automatic Password Management > Privileged Account Management** and change *MinValidityPeriod* to **60**.

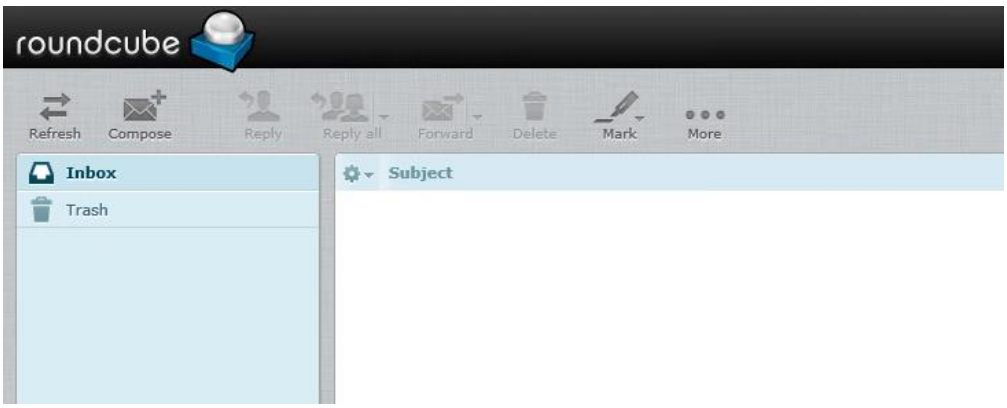
3. Press **Apply** and **OK**.

4. To test the scheduled task, run the following command from a command prompt.

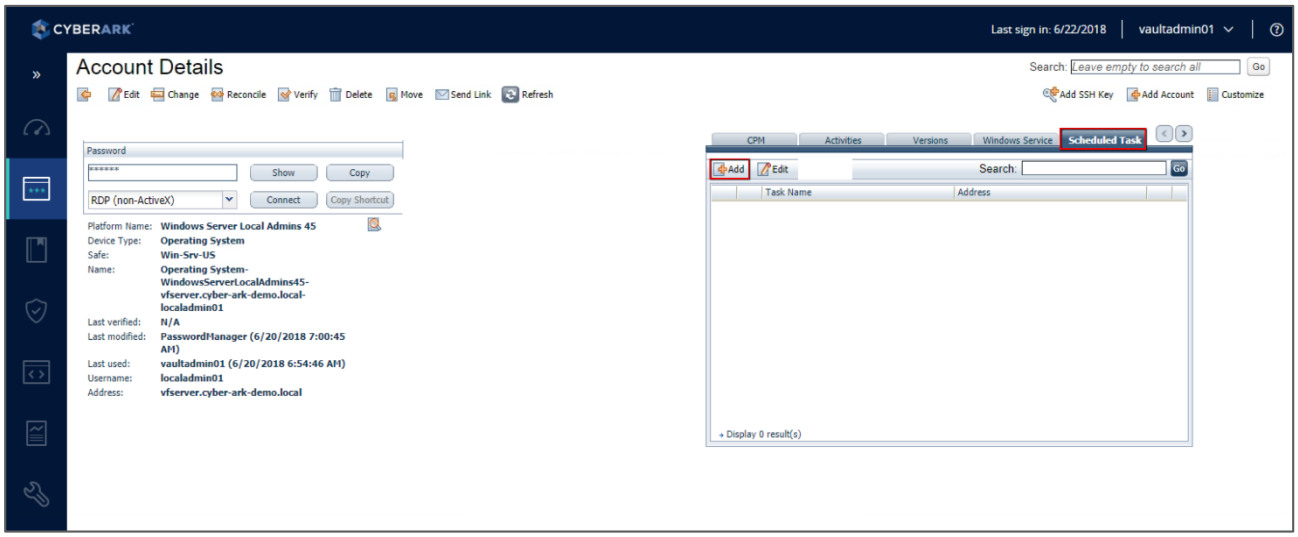
```
schtasks /run /s 10.0.10.50  /tn SchedTask01
```



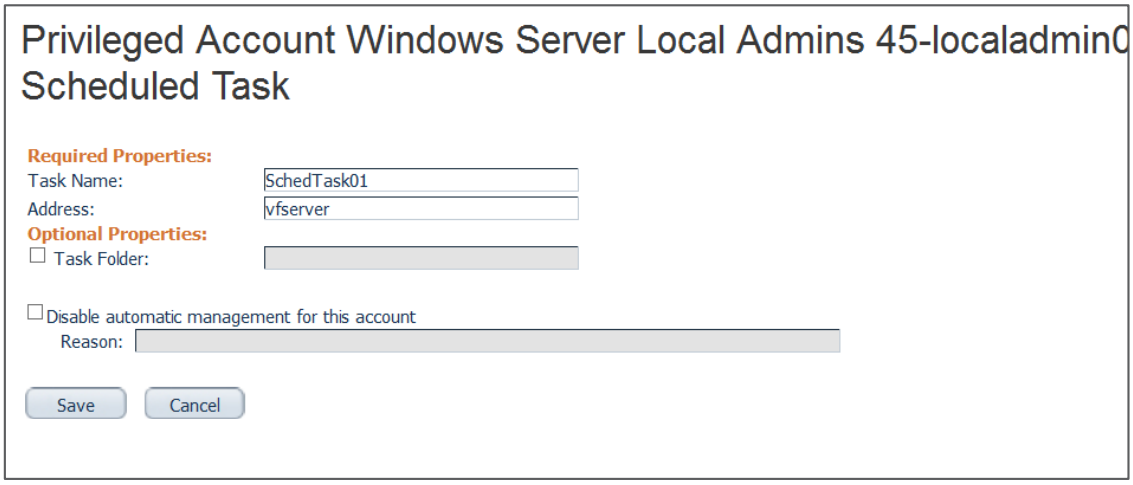
5. Because the *localadmin01* account password was changed in an earlier exercise without accounting for the associated scheduled task, **the scheduled task will not run properly (even though the return message says "SUCCESS").** You can confirm that the schedule task did not complete properly by checking your email client as ***vaultadmin01@cyber-ark-demo.local*** and seeing that you do not have any messages referring to "scheduled task".



6. Now, go to the *localadmin01* **Account Details** and locate the *Scheduled Task* tab. Press **Add**.



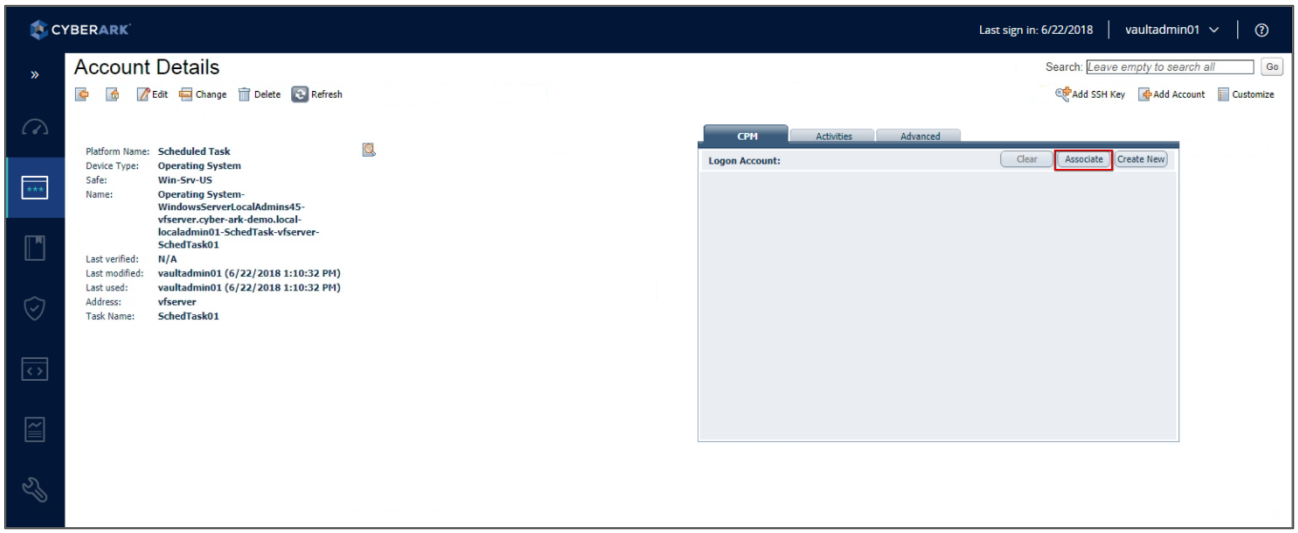
7. Enter **SchedTask01** in the *Task Name* field and enter **vfserver** in the *Address* field. Press **Save**.



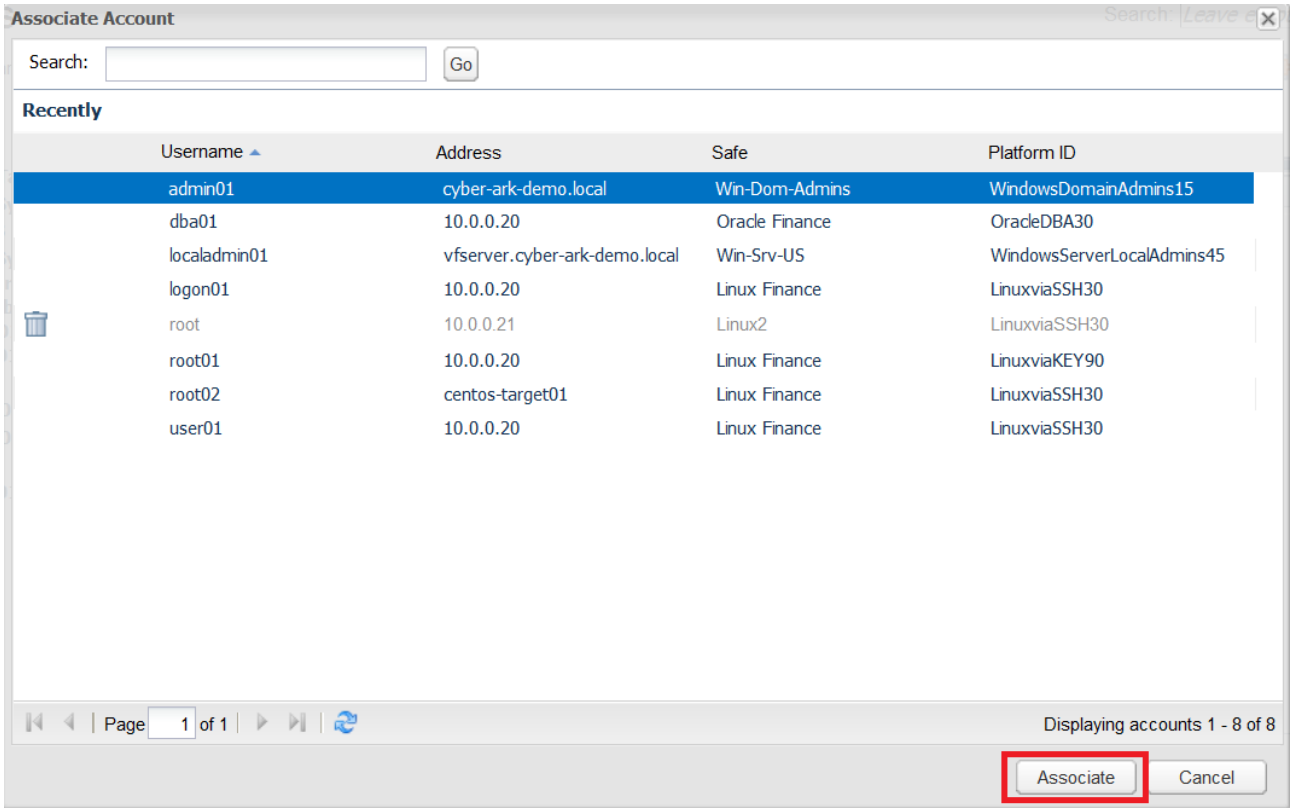
8. After pressing **Save**, click on the newly created scheduled task.

Note:	The *localadmin01* account cannot update the scheduled task remotely, so you will associate the usage with a domain account that contains the required privileges to act as the logon account.

9. We are now looking at the Account Details for the Scheduled Task. Press the **Associate** button.



10. Select *cybrreconcile* and press **Associate** to associate the scheduled task with the *cybrreconcile* domain account as a logon account.



11. Next, go back to the *localadmin01* **Account Details** window and change the *localadmin01* password.

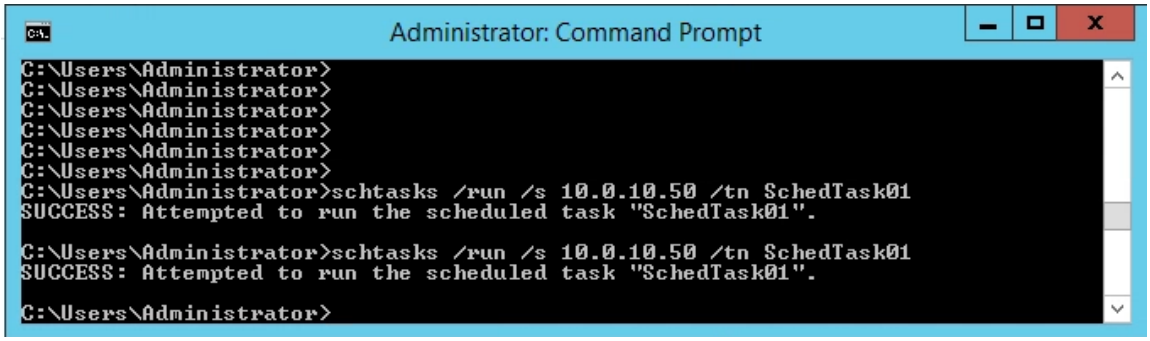
12. Select *Change the password immediately (by the CPM)* and press **OK.**

13. Wait for the *localadmin01* password to change.

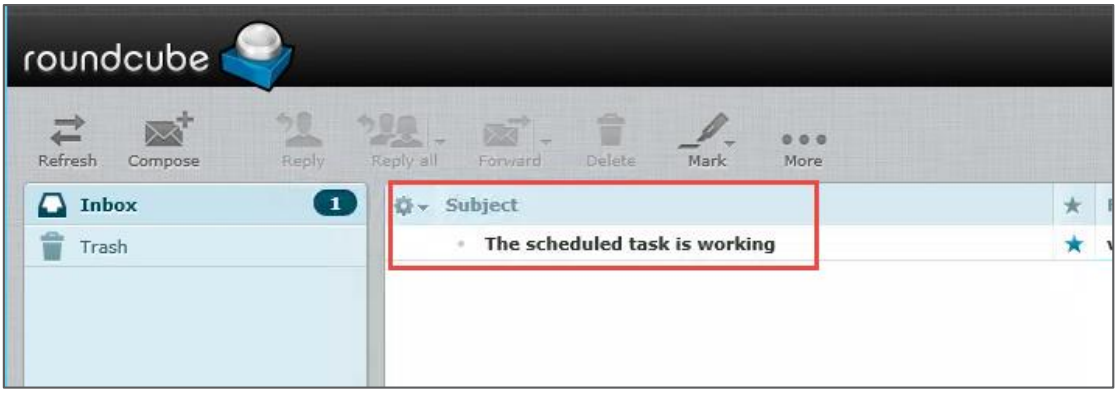
Note:	The scheduled task is associated with a different platform than the *localadmin01* account. After the *localadmin01* account has been changed, the flag will be set for the scheduled task to be changed. The entire process could take in excess of 10 minutes to complete.

14. After the Windows password has been changed, select the scheduled task and open the Account Details. You will see that the usage password is now scheduled for immediate change.

15. Wait for the usage password to change and then re-run the scheduled task from the command prompt.



16. Now check your email. You should receive a message stating that “The scheduled task is working”.

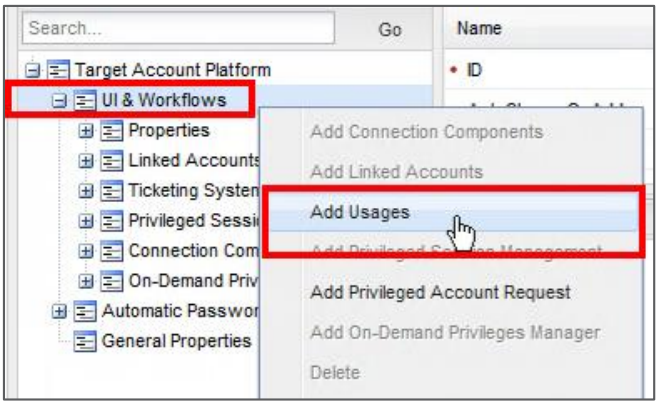


Managing a Configuration File Usage

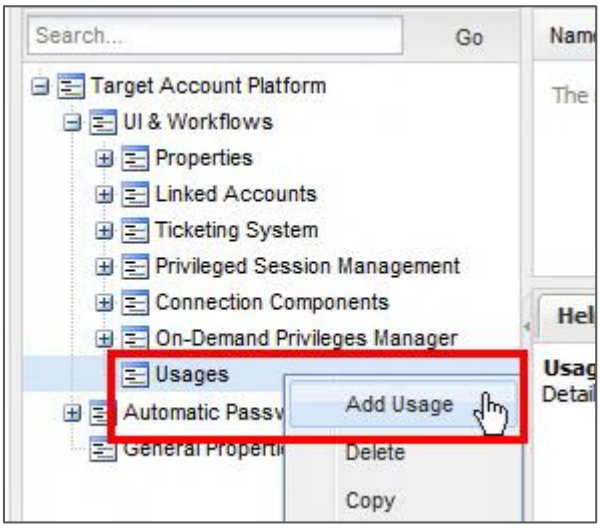
In this exercise you will be using a usage to update a password in a text file whenever the specified account's password is changed.

The file *app01.ini* is located on the Linux server IP address 10.0.0.20 in the */var/opt/app* directory.

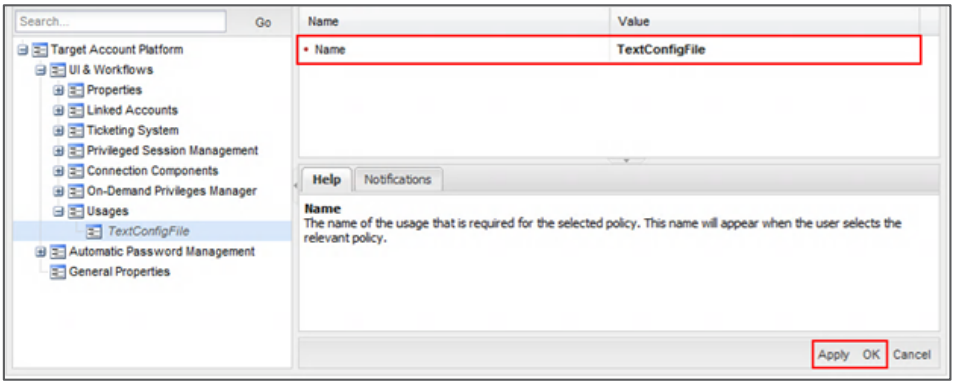
1. On your **Components** server, log in to the **PVWA** as *vaultadmin01.*
2. Navigate to the **ADMINISTRATION** tab and click **Platform Management**.
3. Select *Linux via SSH 30* and press **Duplicate**. Enter *Linux Apps via SSH 90* as the name and click **Save**.
4. Select the newly-created platform and choose **Edit**.
5. Go to **Automatic Password Management > General**, set *SearchForUsages* to *Yes* and press **Apply**.
6. Right-click **UI & Workflows** and choose **Add Usages**.



7. After selecting *Add Usages*, you will have a new 'Usages' entry at the end of the *UI & Workflows* section. Right click **Usages** and select **Add Usage**.



8. Enter *TextConfigFile* as the **Value**. Press **Apply** and **OK**.



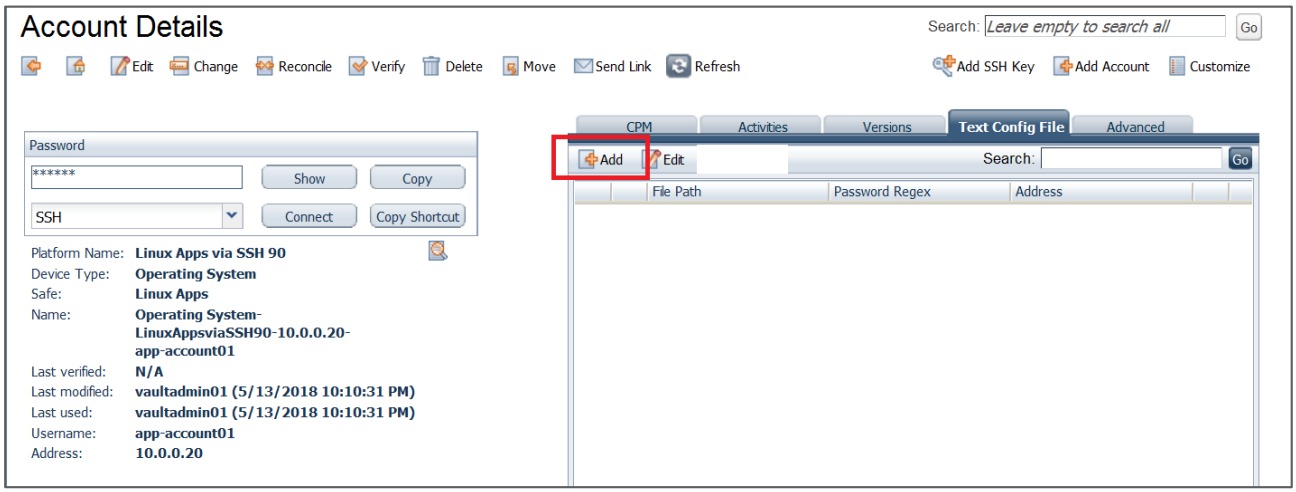
9. In the interest of good practice, create a dedicated Safe for this purpose called **Linux Apps**.

10. Go to **ACCOUNTS** and press **Add Account** and enter the following:

Store in Safe:	*Linux Apps*
Device Type:	Operating System
Platform Name:	*Linux Apps via SSH 90*
Address:	*10.0.0.20*
User Name:	*app-account01*
Password:	*Cyberark1*
Confirm Password:	*Cyberark1*

11. Press **Save**.

12. Go to the **Text Config File** tab and press **Add**.

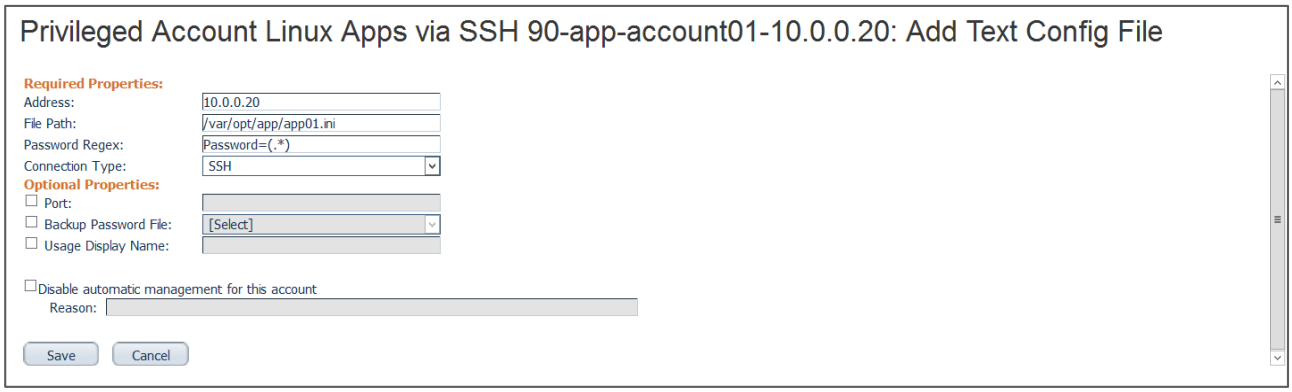


Note: This tab is visible because we activated the *TextConfigFile* Usage in the platform with which this account is associated.

13. Enter the following:

Address:	*10.0.0.20*
File Path:	*/var/opt/app/app01.ini*
Password Regex	*Password=(.*)*
Connection Type:	*SSH*

14. Press **Save**.

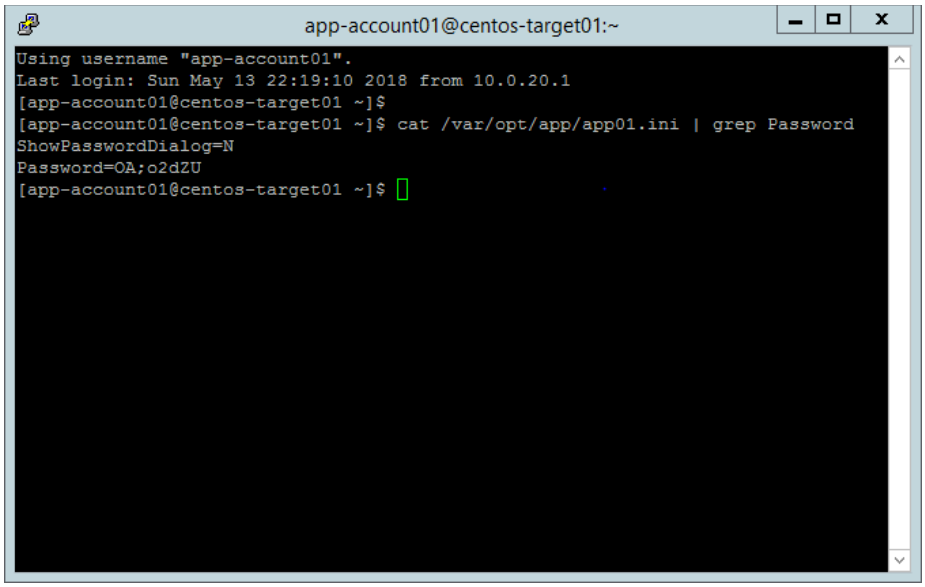


15. Go to the **Account Details** for the primary account (*app-account01*), click the **Change** button page.

Note:	This process can take several minutes to complete. The usage has interval settings, just like the account. When the account changes, it scans the vault for usages, marks those usages for change, and then, according to those intervals, the changes take effect. So it will be a few minutes between when the password changes and the file changes.

16. After the password change is complete, connect to 10.0.0.20 with the *app-account01*.

17. Enter the following:
    `cat /var/opt/app/app01.ini | grep Password`
    You should see that the password matches the new password in the **Vault**.



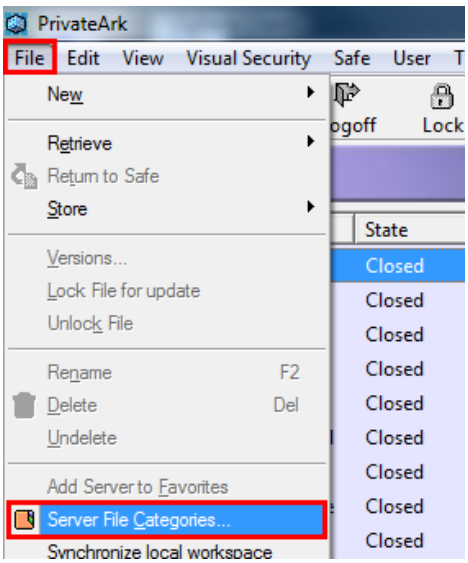
Custom File Categories

File category is the CyberArk term for the attributes or fields available on accounts (Address, User Name, etc.). This section will detail the steps required to create and use custom file categories, allowing you to categorize accounts based your organization's requirements.

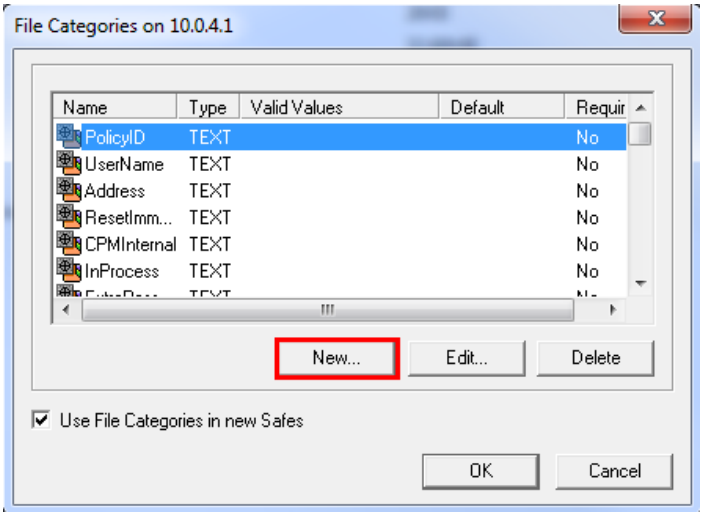
In this final exercise, we will create a custom file category called *BusinessUnit* and provide a list of possible choices: *International, Retail,* and *Corporate*. We will then modify our Oracle platform so that when users add new accounts, they will be required to associate the new account with one of these business units. Finally, we will make the new parameter searchable within the **PVWA** and, of course, we will test what we have done.

Creating the Custom File Category

1. Using the **Components** server, from the **PrivateArk Client**, log onto the **Vault** and go to **File > Server File Categories.**



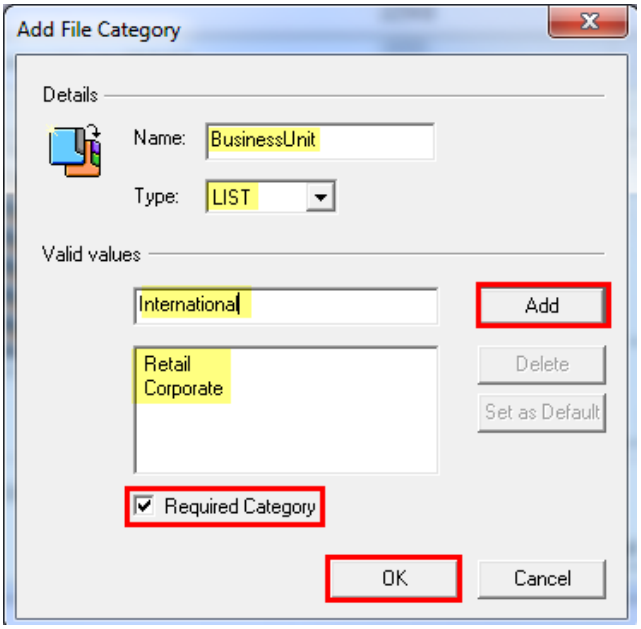
2. Press the **New…** button.



3. In the *Add File Category* window, enter the following:

Name:	*BusinessUnit*
Type:	*List*
Valid values:	*International, Retail,* and *Corporate*

4. After each value is added, select the *Required Category* checkbox and click **OK.**

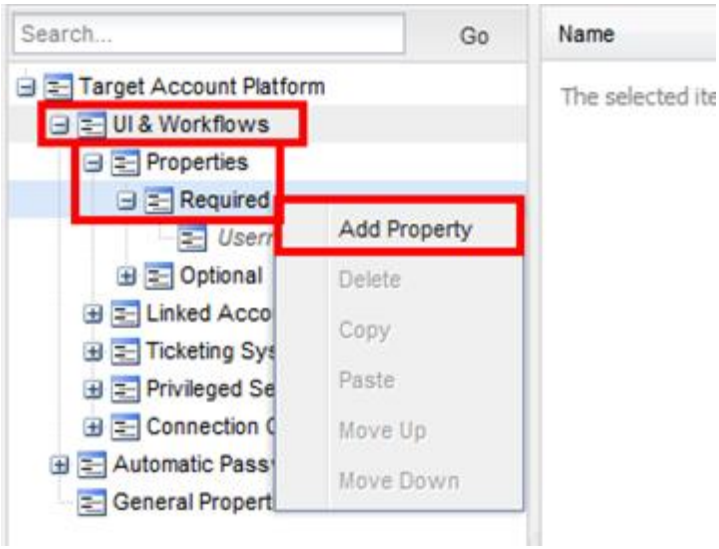


5. Log out of the **PrivateArk Client**.

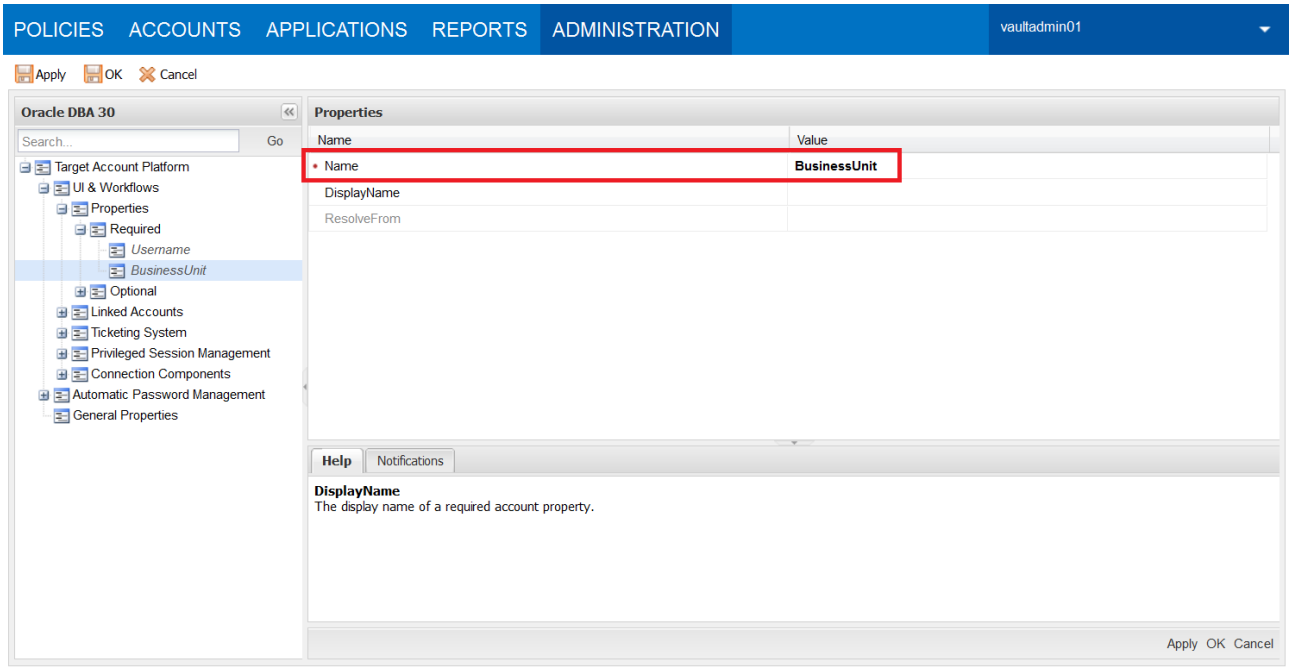
Adding the Custom File Category to the Platform

Now we'll make the new *BuinessUnit* **File Category** a required field for accounts assigned to the *Oracle DBA 30* platform.

1. Log into the **PVWA** as *vaultadmin01*.
2. Go to the **ADMINISTRATION** tab and click **Platform Management**.
3. Highlight *Oracle DBA 30* and press **Edit**.
4. Go to **UI & Workflows > Properties > Required.** Right-click and select **Add Property** from the context menu.



5. Enter *BusinessUnit* in the **Name** field and press **Apply** and **OK**. This will make *BusinessUnit* a required field on any accounts attached to the *Oracle DBA 30* policy.

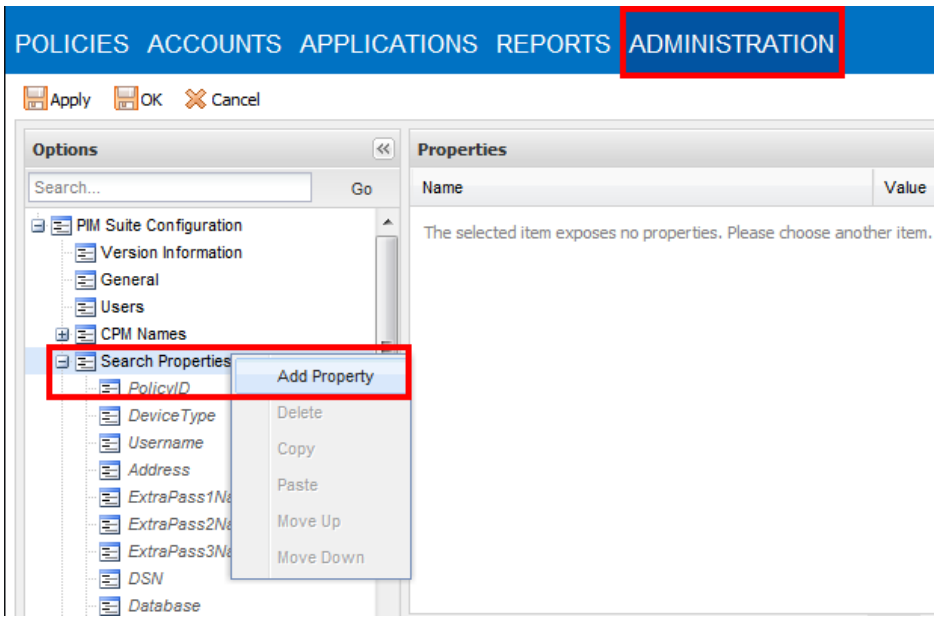


Making the File Categorical Searchable

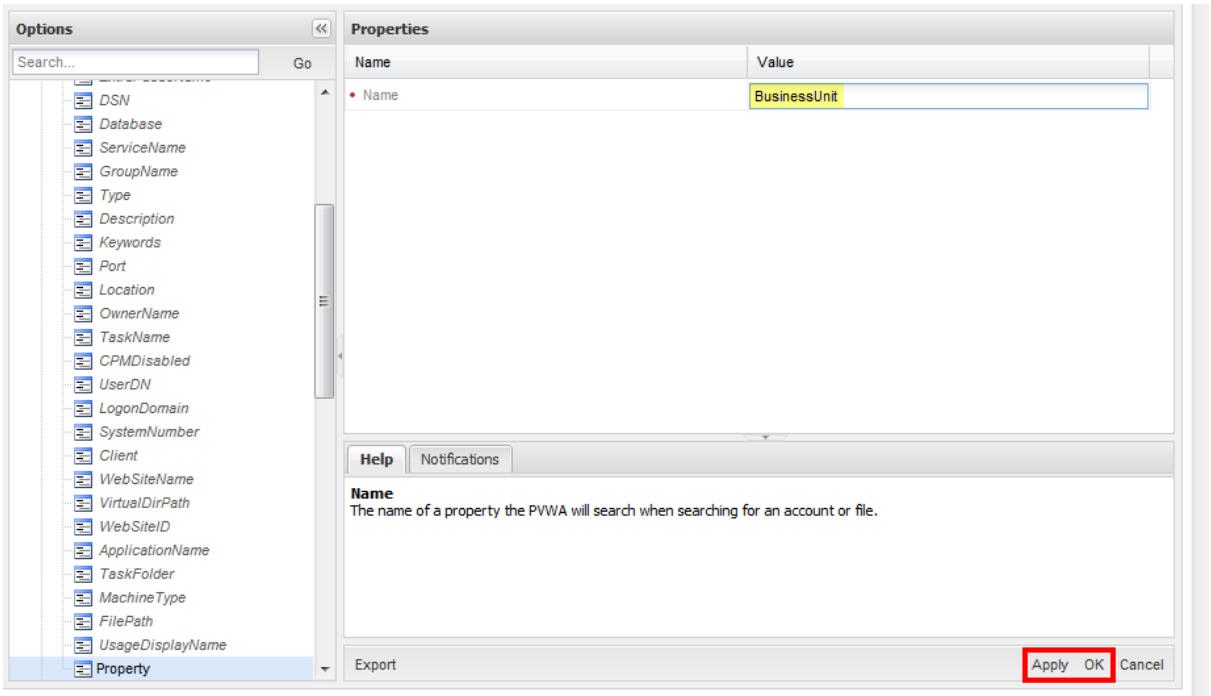
Now we will make the new *BusinessUnit* file category searchable.

1. Go to **ADMINISTRATION > Options**.

2. Right-click on **Search Properties** and select **Add Property**.



3. Enter *BusinessUnit* in the **Name** field and press **Apply** and **OK**. This will allow the new file category to be searchable.



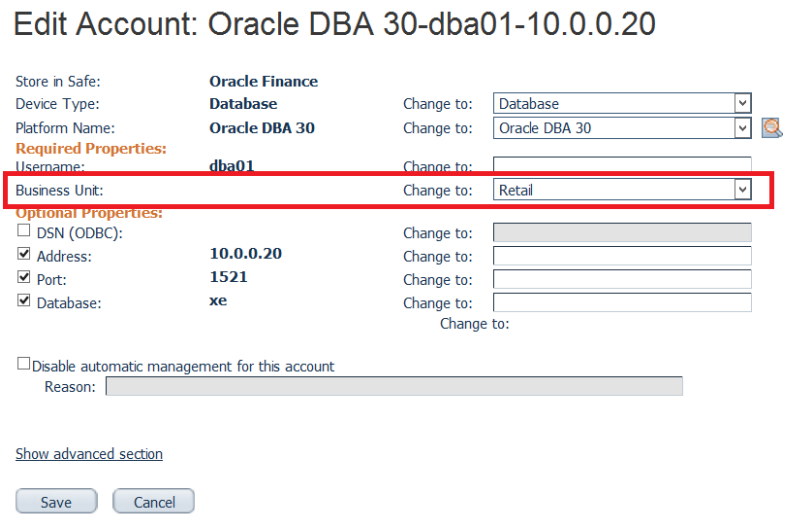
4. Sign out of the **PVWA** session.

5. Run the restart-services batch file on the **Components** server Desktop.

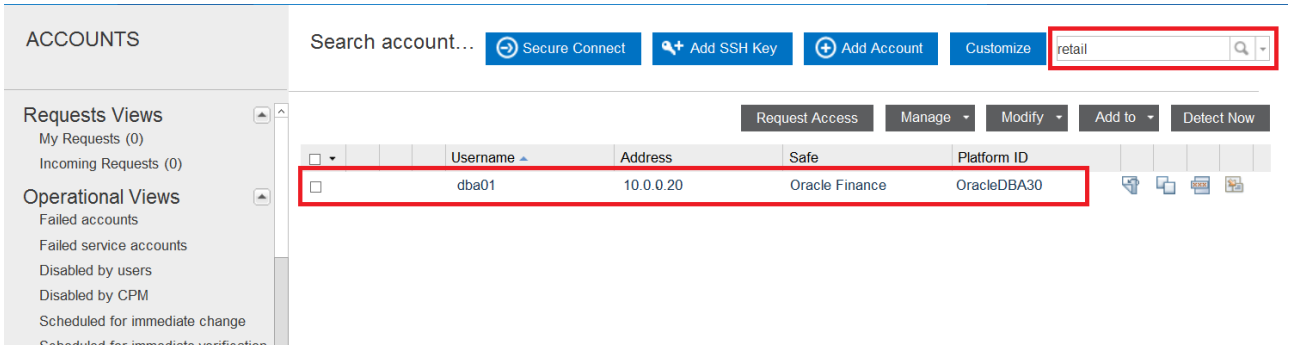
Testing the New File Category

1. Login to the **PVWA** as *vaultadmin01*, go to the **ACCOUNTS** tab and open the *dba01* account.

2. Click on the **Edit** button. Select *Retail* and press **Save**.



3. Enter *retail* in the Search field on the **ACCOUNTS** tab and press **Go**.



4. *dba01* should be returned based on the new file category.