Safeguard Authentication Services 5.0.5

macOS Administration Guide

Legend

WARNING: A WARNING icon highlights a potential risk of bodily injury or property damage, for which industry-standard safety precautions are advised. This icon is often associated with electrical hazards related to hardware.

CAUTION: A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.

Safeguard Authentication Services macOS Administration Guide
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Privileged Access Suite for Unix

Unix security simplified

Privileged Access Suite for Unix solves the intrinsic security and administration issues of Unix-based systems (including Linux and macOS) while making satisfying compliance requirements easier. It unifies and consolidates identities, assigns individual accountability, and enables centralized reporting for user and administrator access to Unix. The Privileged Access Suite for Unix combines an Active Directory bridge and root delegation solutions under a unified console that grants organizations centralized visibility and streamlined administration of identities and access rights across their entire Unix environment.

Active Directory bridge

Achieve unified access control, authentication, authorization, and identity administration for Unix, Linux, and macOS systems by extending them into Active Directory (AD) and taking advantage of AD's inherent benefits. Patented technology allows non-Windows resources to become part of the AD trusted realm, and extends AD's security, compliance, and Kerberos-based authentication capabilities to Unix, Linux, and macOS. See www.oneidentity.com/products/safeguard-authentication-services/ for more information about the Active Directory Bridge product.

Root delegation

The Privileged Access Suite for Unix offers two different approaches to delegating the Unix root account. The suite either *enhances* or *replaces* sudo, depending on your needs.

- By choosing to enhance sudo, you will keep everything you know and love about sudo while enhancing it with features like a central sudo policy server, centralized keystroke logs, a sudo event log, and compliance reports for who can do what with sudo.

  See www.oneidentity.com/products/privilege-manager-for-sudo/ for more information about enhancing sudo.
- By choosing to replace sudo, you will still be able to delegate the Unix root privilege based on centralized policy reporting on access rights, but with a more granular permission and the ability to log keystrokes on all activities from the time a user logs in, not just the commands that are prefixed with "sudo." In addition, this option

implements several additional security features like restricted shells, remote host command execution, and hardened binaries that remove the ability to escape out of commands and gain undetected elevated access.

See www.oneidentity.com/products/privilege-manager-for-unix/ for more information about replacing sudo.

Privileged Access Suite for Unix

Privileged Access Suite for Unix offers two editions: *Standard* edition and *Advanced* edition. Both editions include the Safeguard Authentication Services patented technology that allows organizations to extend the security and compliance of Active Directory to Unix, Linux, and macOS platforms and enterprise applications. In addition:

- The *Standard* edition licenses you for Safeguard for Sudo.
- The *Advanced* edition licenses you for Privilege Manager for Unix.

About this guide

The *Safeguard Authentication Services macOS Administration Guide* describes the port of the Safeguard Authentication Services for macOS product to the macOS platform. Safeguard Authentication Services for macOS brings the enterprise functionality Safeguard Authentication Services supplies on every other major Unix platform to macOS.

Safeguard Authentication Services supports both macOS and macOS Server. Safeguard Authentication Services recommends that you install all the latest Apple system updates before installing Safeguard Authentication Services.

In this guide you will find step-by-step instructions on installing, configuring, and uninstalling Safeguard Authentication Services along with a detailed explanation of the Safeguard Authentication Services components for macOS.

In addition, the "Group Policy for macOS" section documents each policy supported for this version of Safeguard Authentication Services for macOS.

This guide is not comprehensive and only describes those Safeguard Authentication Services features specific to macOS. Refer to the *Safeguard Authentication Services Administration Guide* for complete documentation on all other Safeguard Authentication Services features.

NOTE: The term "Unix" is used informally throughout the Safeguard Authentication Services documentation to denote any operating system that closely resembles the trademarked system, UNIX.

2

Installation

This section includes instructions for installing and configuring the Safeguard Authentication Services agent on macOS.

Safeguard Authentication Services macOS agent installation

Download Safeguard Authentication Services from the Support Site, Download Software page. Safeguard Authentication Services Software is provided in macOS subdirectory. You can install the Safeguard Authentication Services agent software through the graphical user interface or from the command line, more common in a mass deployment scenario.

Installing using the graphical system installer

To install Safeguard Authentication Services using the graphical system installer

1. Navigate to the macOS folder for your operating system. You will see a folder containing the macos disk image: `macos`.
2. Select the `VAS-<version>.<build number>.dmg` file where `<version>` is the version and `<build number>` is the build number of your Safeguard Authentication Services release.
3. Double-click the `VAS-<version>.<build number>.dmg` file. The .dmg contents mounts on your system.
4. Check the following:
    - The .dmg contents are located in `/Volumes/VAS-Installer` and appear as a mounted volume in the **Finder** window.

- Under the mounted disk image, you will find the Safeguard Authentication Services metapackage (`VAS.pkg`). This metapackage contains all Safeguard Authentication Services client components.

Installing with the wizard

To install Safeguard Authentication Services

1. Double-click the `VAS.pkg` file from **Finder**. The installation wizard starts to guide you through the installation process.
2. On the **Welcome** dialog, you can click the  to see the Certification Authority.
3. On the **Introduction** dialog, click **Continue** to proceed with the installation.
4. On the **License** dialog, click **Continue** then click **Agree** to agree to the license terms.
5. On the **Destination Select** dialog, select the disk where you want to install SAS for macOS software. The space required is shown. After selecting the disk, click **Continue**.
6. On the **Installation Type** dialog, you can install the standard components and, optionally, install additional custom components:
    - Click **Install** to install the standard components and accept the default installation location on the root volume. You must install the packages on the root volume and you can not relocate them. The standard components include Authentication Services Client and Group Policy.
    - Click **Customize** to select additional components from these options:
        - Safeguard Authentication Services Software Development Kit (SDK)
        - Dynamic DNS Update, which supports authenticated A-record and PTR-record updates to the Microsoft DNS servers.
        - Certificate Autoenrollment
        - Smart Card
7. The system installer prompts you for local administrator credentials when the software installation begins.

    Enter administrator credentials and click **OK**.

    NOTE: If you do not have administrator rights for your system, contact your system administrator for assistance.
8. The **Summary** screen confirms a successful Safeguard Authentication Services for macOS installation. Click **Close** to exit the wizard.

Custom installation

A custom installation includes the following options:

- Safeguard Authentication Services Software Development Kit (SDK)
- Dynamic DNS Update, which supports authenticated A-record and PTR-record updates to the Microsoft DNS servers.
- Certificate Autoenrollment
- Smart Card

To perform a custom install

1. On the **Installation Type** screen, click the **Customize** button to select additional components (besides the Safeguard Authentication Services Client and Group Policy) of the product you want to install.

   Once you have selected the additional components to be installed, click **Install**.
2. The system installer prompts you for local administrator credentials when the software begins to install.

   Enter administrator credentials and click **OK**.
3. The **Summary** screen confirms a successful Safeguard Authentication Services for macOS installation. Click **Close** to exit the wizard.

Command line installation

You can either install the Safeguard Authentication Services metapackage, which installs all of the Safeguard Authentication Services packages, or you can install one or more of the individual Safeguard Authentication Services packages contained in the Safeguard Authentication Services metapackage using the system command line installer (`/usr/sbin/installer`).

NOTE: If you do not have administrator rights for your system, contact your system administrator for assistance.

You must launch a **Terminal.app** instance to complete the following tasks.

- Installing the metapackage from command line
- Mounting and unmounting the .dmg from the command line

Installing the metapackage from command line

It is recommended that you use the install script downloaded with the rest of Safeguard Authentication Services instead of using the following steps. However, when you install `vas.pkg`, it installs the SAS client, group policy client, and `dnsupdate` by default. Using the `install.sh` script with the download allows you to choose individual packages to install.

To install all of the Safeguard Authentication Services packages found in the Safeguard Authentication Services metapackage

1. Open a `Terminal.app` window and execute the following commands
2. Change directories to the location where you mounted the Safeguard Authentication Services`.dmg`:

   ```
   $ cd /Volumes/VAS-Installer
   ```

3. Execute the command line installer with the following arguments:

   ```
   $ sudo /usr/sbin/installer -pkg VAS.mpkg -target /
   ```

   This installs all of the Safeguard Authentication Services packages contained in the Safeguard Authentication Services metapackage.
4. Run the following command to install individual Safeguard Authentication Services components.

   ```
   $ cd /Volumes/VAS-Installer/VAS.mpkg/Contents
   $ sudo /usr/sbin/installer -pkg Packages/vasclnt.pkg \ -target /
   ```

NOTE: You must install all Safeguard Authentication Services components into the root file system, so the parameter to the target command line option must be /. Also, you must have local administrator rights to run commands using the sudo utility.

Mounting and unmounting the .dmg from the command line

It is recommended that you use the `install.sh` script versus this process.

To mount and unmount the Safeguard Authentication Services .dmg from the command line

1. Mount the Safeguard Authentication Services agent `.dmg` from the command line and run the following command:

   `hdiutil attach /<path_to_dmg>/VAS-<version>.<build number>.dmg`

   The `.dmg` contents mounts on your system, under

   ```
   /Volumes/VAS-Installer
   ```

2. To unmount the Safeguard Authentication Services agent `.dmg` from the command line, run the following command:

   `hdiutil detach /Volumes/VAS-Installer`

Agent upgrade

To upgrade Safeguard Authentication Services, simply follow the normal installation steps for both the GUI process and the command line process. The Safeguard Authentication Services installation scripts detect when an upgrade is being performed and automatically perform the proper steps to upgrade versions.

macOS agent removal

Safeguard Authentication Services provides an uninstaller that removes the Safeguard Authentication Services packages from the system. The uninstaller is found in `/Applications/Uninstall SAS n.n.n` (where `n.n.n` indicates the product version number).

To uninstall Safeguard Authentication Services

1. In the **Finder** window, navigate to `/Applications`.

   The uninstaller requires administrator credentials.

2. Double click the `Uninstall Safeguard Authentication Services n.n.n` application (where `n.n.n` indicates the product version number).

   The uninstaller displays the packages that you can remove.

NOTE: When removing Safeguard Authentication Services from your system, files owned by accounts supplied by the Safeguard Authentication Services components appear as not having a valid owner since those accounts are no longer available to the system.

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Safeguard Authentication Services macOS components

The following Safeguard Authentication Services Unix components are included in the Safeguard Authentication Services macOS port:

- The vastool command line utility
- The vgptool command line utility
- The uptool command line utility
- The pam_vas PAM module
- The One Identity Ownership Alignment Tool (OAT)

You can use these components inside a Terminal session the same way you use them on any other Unix platform. Man pages for each of these utilities are automatically installed and configured and you can view them with a standard man page viewer. The Safeguard Authentication Services join process automatically configures Unix applications to use the `pam_vas` module where appropriate.

The components described in this section are specific to the macOS platform.

Startup items

A `launchd config plist` file is installed for each Safeguard Authentication Services daemon under `/Library/LaunchDaemons`.

These `.plist` files are used to put the Safeguard Authentication Services daemons under the control of `launchd`. You can use the `launchctl` utility to add or remove any one of these daemons from `launchd` control. For example, to remove the Safeguard Authentication Services caching daemon (vasd) from `launchd` control, run the following command in a Terminal session:

```
$ sudo /bin/launchctl unload /Library/LaunchDaemons/com.quest.vasd.plist
```

You can also stop a daemon using `launchctl`, but the Safeguard Authentication Services daemon configuration is such that `launchd` immediately restarts the stopped daemon

unless you specify the `unload` command. If it is necessary to restart any one of the Safeguard Authentication Services daemons, run a command similar to the following:

```
$ sudo /bin/launchctl stop com.quest.vasd
```

The Safeguard Authentication Services join process automatically runs the necessary `load` commands at join time to put the Safeguard Authentication Services daemons under `launchd` control. Typically, users do not need to directly interact with the Safeguard Authentication Services startup items.

Directory Service plugin

Safeguard Authentication Services provides a plugin for the system DirectoryService daemon.

The Safeguard Authentication Services Directory Service plugin uses the rest of the Safeguard Authentication Services components to provide Active Directory group and user information to the rest of the system, and is installed at `/Library/DirectoryServices/Plugins/VAS.dsplug`.

The Safeguard Authentication Services Directory Service plugin also uses Kerberos authentication for Active Directory users. The plugin operates both when the system is connected to a network where Active Directory is available, and for disconnected scenarios where the macOS system cannot contact Active Directory. The Safeguard Authentication Services Directory Service plugin provides secure authentication and performance identity lookups even in this disconnected mode.

Disconnected mode is available without having to create local Mobile Accounts on each macOS system. The Safeguard Authentication Services caching architecture also minimizes the impact that each macOS system has on the Active Directory environment.

Directory Utility

You use the Directory Utility application to configure the Directory Service Plugins that provide identity information for authenticating to the machine. When installed, Safeguard Authentication Services is one of the plugins.

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Safeguard Authentication Services client configuration

Before you can log in with Active Directory users and manage agent settings for users and computers, you must first join your macOS machine to an Active Directory domain.

Join the Active Directory domain

Safeguard Authentication Services provides both a graphical option and a command line option for joining the domain.

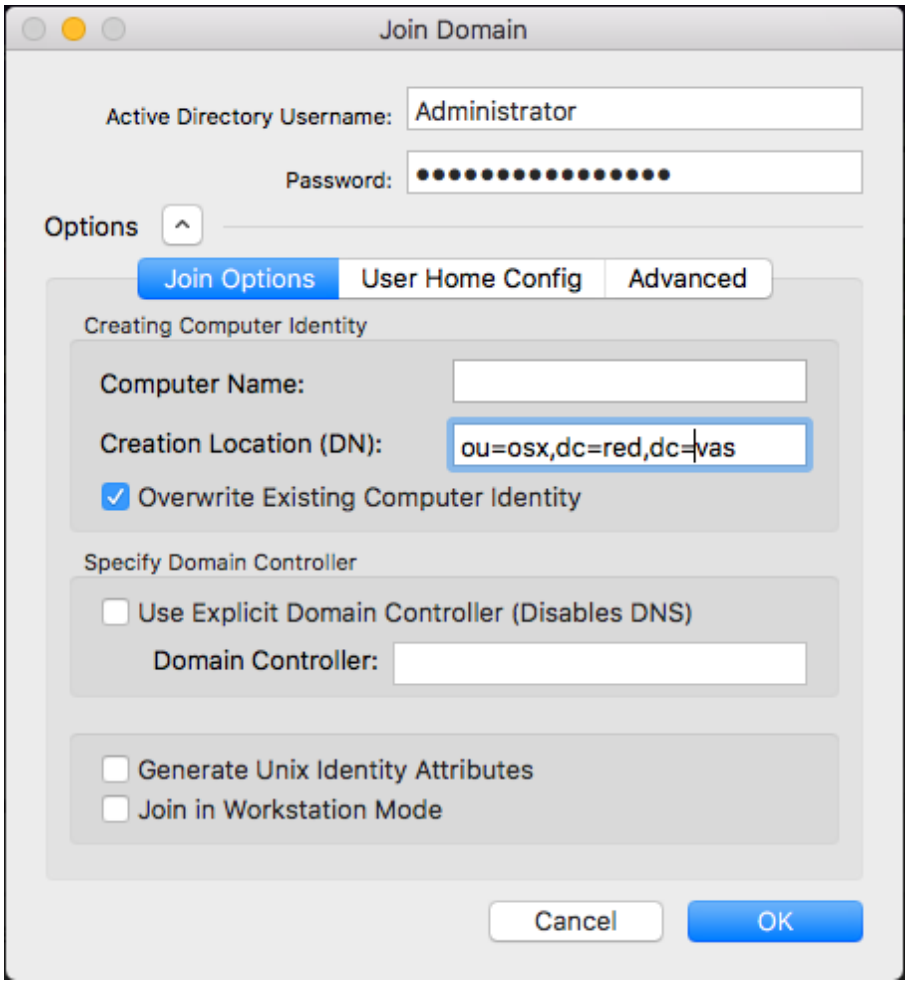
NOTE: You cannot manage agent settings by means of Safeguard Authentication Services Group Policy if you have joined with the Apple-provided Active Directory plug-in. If you are currently bound to the domain using Apple components, unbind before proceeding.

Using QAS Join application

To join the domain using the QAS Join application

1. Open the QAS Join application located at `/Applications/QAS Join`.
2. On the **Authentication Services** dialog, enter the name of the Active Directory Domain you want to join and click **Join Domain**.
3. On the **Join Domain** dialog, enter the Active Directory credentials to be used to join the domain.

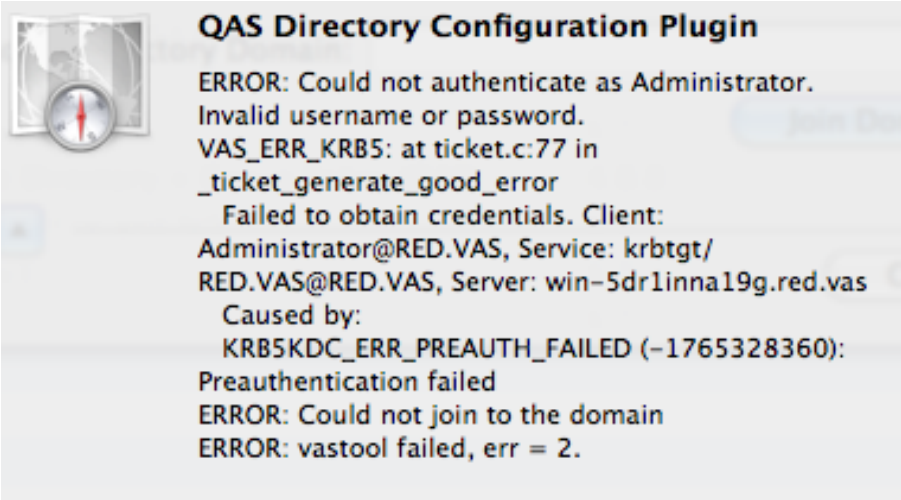
   From this dialog you can also specify a number of optional join arguments before continuing with the join operation. For example, you can specify a specific Active Directory container in which you want to create the new computer object. (By default it is created in the Computers Container). For a detailed explanation of each join option, see the *vastool man page* located in the `docs` directory of the installation media.



4. Click **OK** to run the join operation.

   The join operation may take several seconds, to several minutes depending upon your domain configuration. Domain Join progress is continuously updated as progress proceeds.

5. If any errors occur during join, an error dialog opens with a detailed error message as well as the option to view and save the join process log. As an example, the error message below is seen if you specified an incorrect password for the account you are using to join to the domain.



Unjoining an Active Directory domain

To leave the Active Directory domain, repeat the join steps, except click **Leave Domain** instead. You do not have to supply Active Directory credentials when unjoining if you do not delete the Active Directory computer object. This option is available in the **Leave Domain** dialog options.

Command line join

Use the `vastool` utility to perform a command line join.

At the command line, enter `vastool join` to join the macOS system to an Active Directory domain.

Using Terminal.app to join and unjoin

You can access the same functionality that is available through the QAS Join application using the Safeguard Authentication Services command line utilities.

There are two ways to join your macOS system to an Active Directory domain:

- Run the `vasjoin.sh` script.

  ```
  $ sudo /opt/quest/libexec/vas/scripts/vasjoin.sh
  ```

  This script prompts you for information needed to perform the join operation without requiring you to know the syntax of the `vastool join` command.

-OR-

- Run the `vastool join` command.

```
$ sudo /opt/quest/bin/vastool -u Administrator join -f example.com
```

To leave an Active Directory domain from a Terminal session, use the `vastool unjoin` command.

NOTE: See the *vastool man page* located in the `docs` directory of the installation media for more information about the `vastool join` or `vastool unjoin` commands.

System changes made by the join process

When joining an Active Directory domain, Safeguard Authentication Services automatically modifies the following system configurations:

- Safeguard Authentication Services is added to the DirectoryService search path.
- The Safeguard Authentication Services startup items are configured to start up automatically
- The system Kerberos configuration file is configured to use the Active Directory servers that Safeguard Authentication Services detects.
- Group Policies configured for the macOS system are applied by the Group Policy components if they are installed.

Once you have successfully completed the Safeguard Authentication Services join process, you are immediately able to log in to the macOS system through the macOS Login Window.

When leaving a domain, the Safeguard Authentication Services unjoin process reverts the above changes that were made by the Safeguard Authentication Services join process. Also, uninstalling Safeguard Authentication Services automatically reverts the above changes as well.

NOTE: You can re-join on top of existing computer accounts created with the macOS Active Directory plugin by default using the Safeguard Authentication Services Active Directory plugin, but we recommend disabling the macOS Active Directory plugin so that the domain will not appear in the **Directory Servers** window as not responding.

Verifying the installation and configuration

It is important to verify that your system is configured correctly to use the Active Directory account information provided by Safeguard Authentication Services.

To verify the Safeguard Authentication Services installation and configuration

1. Run the following shell commands.
   - To show a list of the available Unix-enabled Active Directory users, enter

     ```
     dscl /VAS list /Users
     ```

   - To show a list of the available Unix-enabled Active Directory groups, enter

     ```
     dscl /VAS list /Groups
     ```

   - To ensure that the system can read user information for Safeguard Authentication Services users, enter

     ```
     dscl /Search read /Users/<Username>
     ```

     where `<Username>` is the username of a Safeguard Authentication Services user.
   - To perform an authentication for a Safeguard Authentication Services user, enter

     ```
     dscl /Search auth <Username>
     ```

     where `<Username>` is the username of a Safeguard Authentication Services user.

   If any of the previous commands do not work, capture debug information from the Safeguard Authentication Services Directory Service plugin.
2. Add the following items to the `vas.conf` [`vas_macos`] section:

   ```
   [vas_macos]
      dslog-mode = /Library/Logs/vasds.log
      dslog-components = all
   ```

3. After adding those items, run the following shell command in a Terminal session to trigger the Safeguard Authentication Services Directory Services Plugin to reload its logger configuration:

   ```
   $ sudo /opt/quest/libexec/vas/macos/vasdsreload
   ```

4. Execute the previous verification commands that failed and send the contents of `/Library/Logs/vasds.log` to One Identity Support who will assist in resolving the problems.

Log in with Active Directory accounts

Safeguard Authentication Services for macOS allows you to authenticate to your macOS system, but before you can use any given account for authentication, you can prepare it for macOS authentication from a Windows Administrative Console through a process called Unix-enabling. However, if you do not have access or permissions to modify user account information in Active Directory, you can join and specify that you want the Safeguard Authentication Services client to locally generate Unix identity information.

To locally generate Unix identity information, select the **Generate Unix Identity Attributes** option when you join (or, if you are joining using the command line utility, specify the `--autogen-posix-attrs` flag). This allows you to use all the features of the Safeguard Authentication Services client, without requiring any modification to user information in Active Directory. If you plan to manage identity data in Active Directory globally, proceed to Unix-enable a user.

Unix-enable a user

You Unix-enable a user by entering the Unix attributes on the **Unix Account** tab in Active Directory Users and Computers (ADUC) MMC Snapin.

To Unix-enable a user

1. Logon to a Windows Administrative workstation.
2. Start ADUC.
3. Locate the user object that you would like to Unix-enable.
4. Right-click on the user and select **Properties**.
5. Select the **Unix Account** tab.
6. Select the **Unix-enabled** check box.

   Default values are generated for the user.
7. Adjust values as necessary and click **OK**.

Troubleshooting connections to Windows SMB shares

There are some known issues connecting to Windows shares using Finder. If you log in as a domain user, Safeguard Authentication Services obtains Kerberos credentials for your login session. Finder should use these credentials to automatically authenticate when connecting to Windows shares. Instead, Finder prompts you for your password. The two possible causes for these issues are explained in the following topics:

Connecting to SMB shares on domain controllers

Problem:

When connecting to SMB shares on a domain controller, settings on the default domain controller policy can force a macOS client to Digitally Sign all traffic. Since macOS clients do not support digitally signing SMB traffic, this can lead to a failure when attempting to mount an SMB share.

This issue is related to two settings in the Default Domain Controllers Policy.

Resolution:

Disable the Default Domain Controller policy settings to allow macOS machines to connect to SMB shares.

To disable policy settings

1. Open **Active Directory Users and Computers**, select the domain, right-click, and select **Properties**.
2. Click the **Group Policy** tab.

   NOTE: If you are using MS Server 2008, there is an additional menu item, **Policies**, added between **Computer Configuration** and **Windows Settings** in the following sequence.

   a. If the default Domain Controllers Policy is linked to this domain, navigate to **Edit | Computer Configuration | Windows Settings | Security Settings | Local Policies | Security Options**, double-click and disable the following two policies:

      - Microsoft network server: Digitally sign communications (always)
      - Microsoft network server: Digitally sign communications (if client agrees)

   b. If the Default Domain Policy is linked to this domain, navigate to **Edit | Computer Configuration | Windows Settings | Security Settings | Local Policies | Security Options**, double-click and disable the following two policies:

      - Microsoft network server: Digitally sign communications (always)
      - Microsoft network server: Digitally sign communications (if client agrees)

      If these group policies are not currently defined, you can leave them unconfigured. If either policy is enabled and linked to the domain, however, the

macOS computer is not be able to use SMB connections to mount the Windows file shares.

3. If you change these policies on the domain controller, run the `gpupdate` command to refresh the group policies before logging on to macOS computers.

The DNS domain name differs from the Kerberos realm

Problem:

A network trace reveals if a Kerberos TGS request for the CIFS service ticket was sent to a domain controller. If a Mac machine never attempts to get a CIFS service ticket for SSO, it is usually a problem where the machine is not able to connect the host name you are contacting with a Kerberos realm. When this happens Finder, or any other mounting application, assumes that the host is not a part of any Kerberos domain for which you have credentials and prompts you for a user name and password.

This can easily happen if your DNS domain name is not the same as your Kerberos realm (often referred to as a disjoint DNS name space). It might also happen if you were trying to connect to the server using a short-name or some other alias.

Workaround:

Add a domain to realm mapping for your DNS domain, short-name, or alias under the `[domain_realm]` section of the `/Library/Preferences/edu.mit.kerberos` file.

Safeguard Authentication Services automatically adds a mapping similar to the following at join time:

```
[domain_realm]
.example.com = EXAMPLE.COM
```

This maps any DNS names ending in `.example.com` to the KRB5 realm `EXAMPLE.COM`. You must always specify the destination domain realm in upper case. When attempting to connect to the share, you must specify the source exactly as the DNS name is specified.

If you are connecting to a share using an alias that does not have a domain suffix, you can explicitly map that name to a KRB5 realm using a domain realm:

```
[domain_realm]
shortname = EXAMPLE.COM
```

Automatically mount network home folders

When you Unix-enable an Active Directory user with Safeguard Authentication Services, the default configuration for that user is that he or she will use a local home directory. The home directory path is populated with a Unix path (`/home/<username>`).

On macOS systems, `/home` is replaced with `/Users`, aligning with the macOS standard location for local home directories. Safeguard Authentication Services supports the automatic mounting of network shares (SMB or AFP) using Active Directory credentials, but you must specify a server path. You can store this server path in the directory on each user as a UNC path, or as a per machine setting.

You can configure your home folder strategy globally for the entire domain using Group Policy extensions for Unix, or you can configure it on a per machine basis at the time you join your macOS machine to the domain.

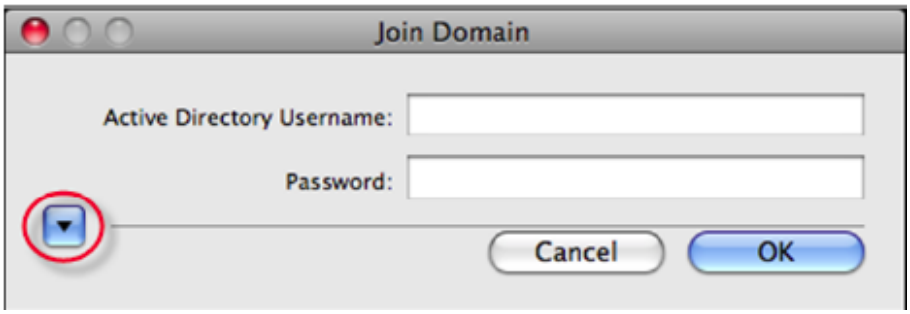
Configuring automatic home folder mounting at join time

To configure automatic home folder mounting at join time

1. When you are prompted for your administrative username and password, click the disclosure triangle.

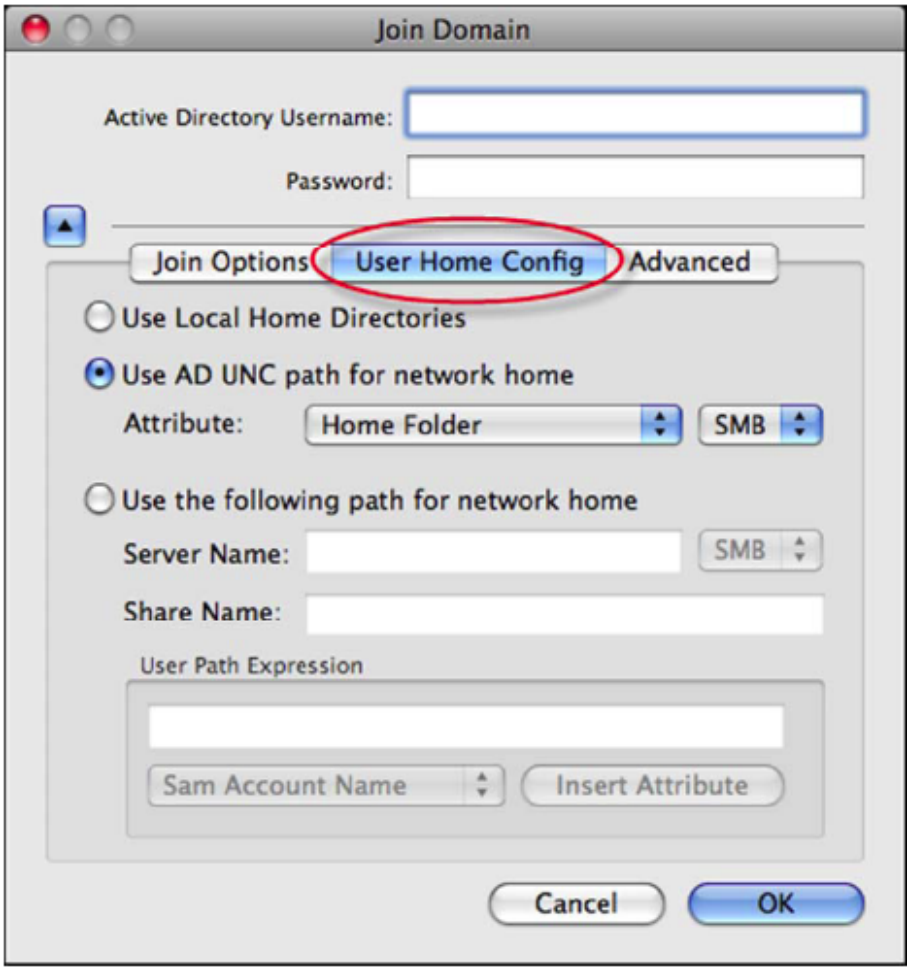
   

   The **Join Domain** dialog displays.

2. Select the **User Home Config** tab to expose all of the home folder mounting

options.



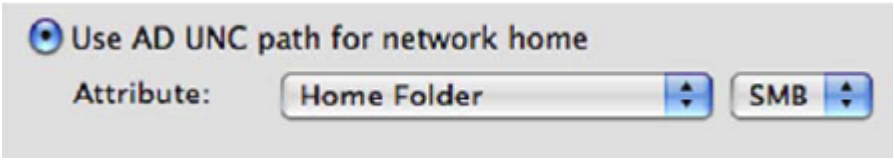
Mounting the Windows home folder or profile path

You can configure Safeguard Authentication Services to mount a share that is specified as a UNC format path and stored on a user. The two most commonly used paths are found on the users **Profile** tab in ADUC.

Use Safeguard Authentication Services to mount either the Home Folder or Profile Path on a macOS agent at log in by selecting **Use AD UNC path for network home** from the **User Home Config** properties.

To mount the Windows Home Folder or Profile Path

1. From the **Join Domain** dialog, click the disclosure triangle to expand the dialog.
2. Select the **User Home Config** tab to display the home folder mounting options.
3. Select the **Use AD UNC path for network home** option.
4. Select the appropriate UNC format path from the **Attribute** drop-downs.

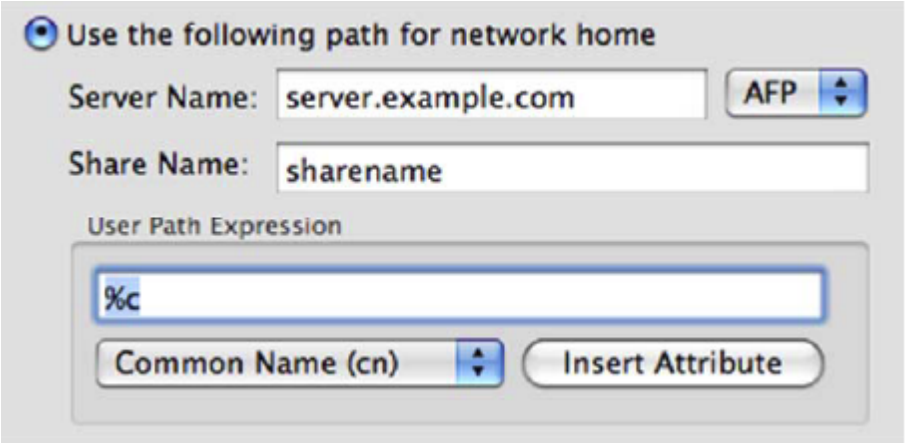


Mounting an alternate share at login

If you cannot use the shares specified in Profile Path or Home Folder for some reason (for example, if your Windows home shares are DFS shares), you can specify an alternate share at join time by specifying a network home path expression.

To specify a network home path expression

1. From the **Join Domain** dialog, click the disclosure triangle to expand the dialog.
2. Select the **User Home Config** tab to display the home folder mounting options.
3. Select **Use the following path for network home** and enter the **Server Name** and **Share Name** to be used.



   Selecting this option configures the network home for all users on the machine. Because of this you must specify how the path name will be resolved for each user.

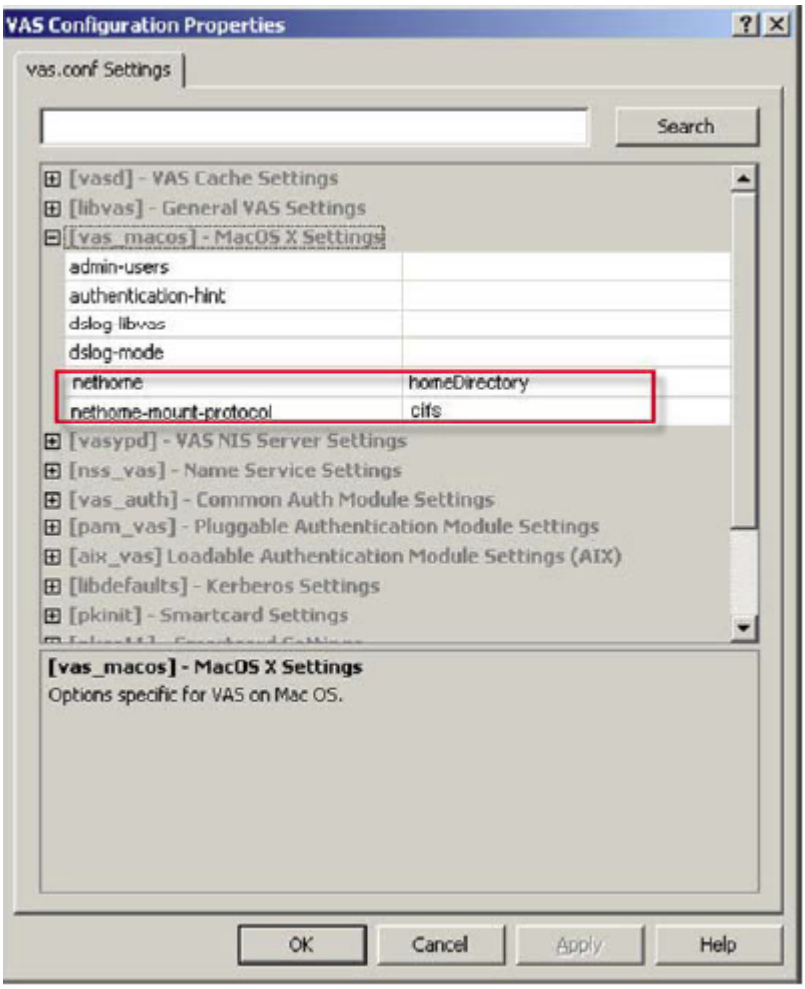
4. Under **User Path Expression**, use the drop-down and **Insert Attribute** button to specify the appropriate user attributes in the path portion of the server URL.

   For example, if you selected **Common Name (cn)** and then clicked **Insert Attribute**, the expansion macro for Common Name (**%c**) is inserted into your path expression. The path expression may have text and expansion macros, or it may just be a single expansion macro with no other text.

Configure automatic home folder mounting using Group Policy

During deployment, installation and join usually happen in a scripted fashion from the command line. It is still possible to configure home folder mounting without using the graphical join interface, either through modification of the `vas.conf` file or by setting the appropriate options in group polices that apply to your macOS machines.

The two options that have bearing upon home directory mount behavior are `nethome` and `nethome-mount-protocol`. These options are set in the `vas.conf` policy.



The `nethome` is either the name of the user attribute where the UNC path is stored ("homeDirectory" or "profilePath"), or it is the server URL expression for all users (that is, `cifs://servername/sharename/%c`).

If the `nethome` is specified as an attribute name, you can specify whether the path is mounted by means of AFP or CIFS using the `nethome-mount-protocol` setting.

Setting either of these options has no effect on any Safeguard Authentication Services platform other than macOS, so you can safely set it on a domain-wide Unix settings policy. Creation or modification of group policies is accomplished using the Microsoft GPOE on any Windows administrative workstation.

Group permissions on auto-mounted home directories

For Safeguard Authentication Services to resolve to a Windows SID to a Unix UID or GID, the user or group to whom that SID belongs must have had a UID or GID manually assigned to them. Or, in other words, you must Unix-enable the user or group on the **Unix**

Account tab in Active Directory Users and Computers. If a group or user has not been Unix-enabled, the macOS machine will still assign a UID or GID to the user or group, but the Safeguard Authentication Services agent software will not be able to resolve the a UID or GID.

To log in to a macOS machine, all users must be Unix-enabled so this normally only causes problems when dealing with group permissions on SMB-mounted home directories. It is not uncommon for the group owner of a network home location to be a group WITHOUT a Unix GID assigned. When a user's ability to access this directory relies on correct group membership, problems can arise. It is, therefore, best practice to Unix-enable all groups that are used for SMB File level permissions on network mounted home directories.

Mounting AFP shares

To mount AFP shares, you must have an AFP file server that knows about all your Active Directory users and credentials. You can easily accomplish this using third-party software that shares files from a Windows machine joined to your domain.

5

Special macOS features

This section details special macOS features:

- Local administrator rights for users
- Active Directory user password hint
- Configuring Apple FileVault disk encryption

Local administrator rights for users

Safeguard Authentication Services allows you to give local administrator rights to Safeguard Authentication Services users on individual macOS systems. This gives a user the ability to administer his own system while still using Active Directory for authentication. It also allows macOS system administrators "admin" access on macOS systems without a shared local account.

Granting accounts administrator rights

To grant Safeguard Authentication Services accounts administrator rights

1. Modify the `/etc/opt/quest/vas/vas.conf` file and add the following section to the Safeguard Authentication Services configuration using a text editor:

   ```
   [vas_macos]
   admin-users = pats@example.com
   ```

   For example, with the pico text editor, enter:

   ```
   $ sudo pico /etc/opt/quest/vas/vas.conf
   ```

NOTE: If there is already a [vas_macos] section in the `vas.conf` file, just add or modify the `admin-users` key following the existing section. You can also manage this option through Group Policy.

For the value of the admin-users key, use a comma-separated list of Active Directory User Principal Names (UPN) for Safeguard Authentication Services users with administrator rights. The Domain Users option also supports groups of users.

2. Specify the group in the form, Domain\groupname.

   Either step ensures that Safeguard Authentication Services processes the new configuration.

3. Verify that the configured users have administrator rights by checking their group memberships using the following command line (the example is for a user called *pspencer*):

   ```
   $ groups pspencer
   ```

   If *pspencer* was correctly configured to have local administrator rights, you see the *local admin*, *appserveradm*, and *appserverusr* groups listed in the output. The *pspencer* user is then able to use his user credentials for authorizing administrative tasks started from the System Preferences application.

Active Directory user password hint

The password hint is displayed for all Active Directory users when you have macOS configured to provide password hints. The password hint is used to notify a user of a website where they can reset their password, or to remind a user that the account they are using requires a domain password. The default value for the authentication-hint is "Windows Domain Password".

Before macOS will display authentication hints, you must enable the **Show password hints** option through the log in options.

After enabling password hints, after several incorrect login attempts, the password hint displays.

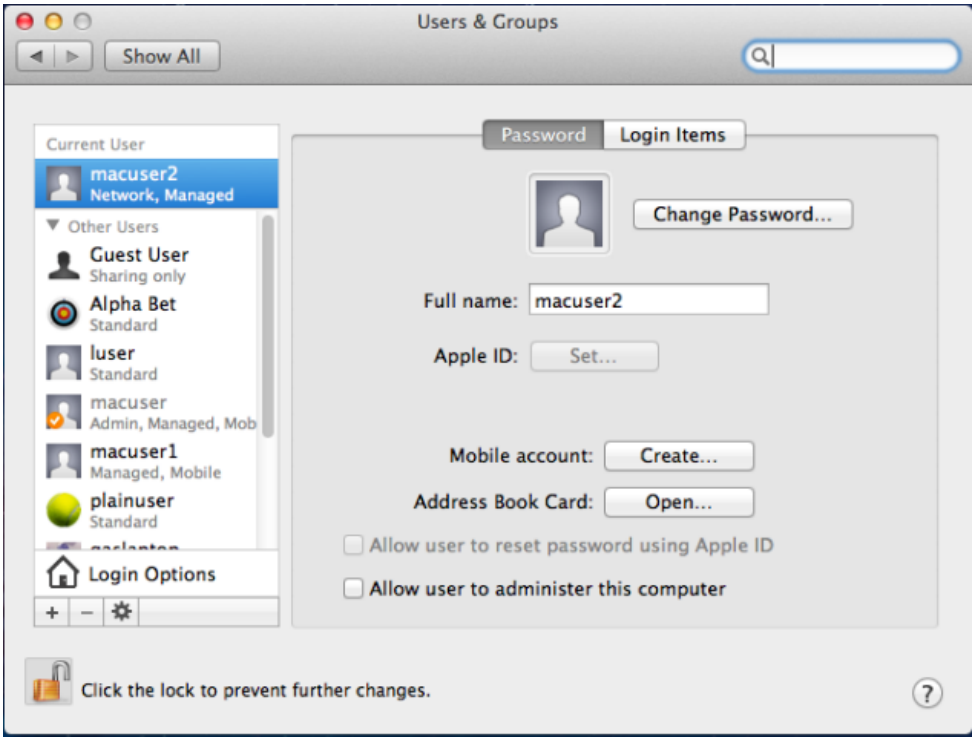
You can manage this hint centrally on the domain controller through Group Policy.

NOTE: For security reasons, if a mapped user changes his password hint, it is intentionally reset to the generic Windows domain password hint the next time he logs in.

Configuring Apple FileVault disk encryption

Safeguard Authentication Services is compatible with Apple's FileVault disk encryption, introduced in macOS 10.7. In order to use FileVault with an Active Directory user, you must

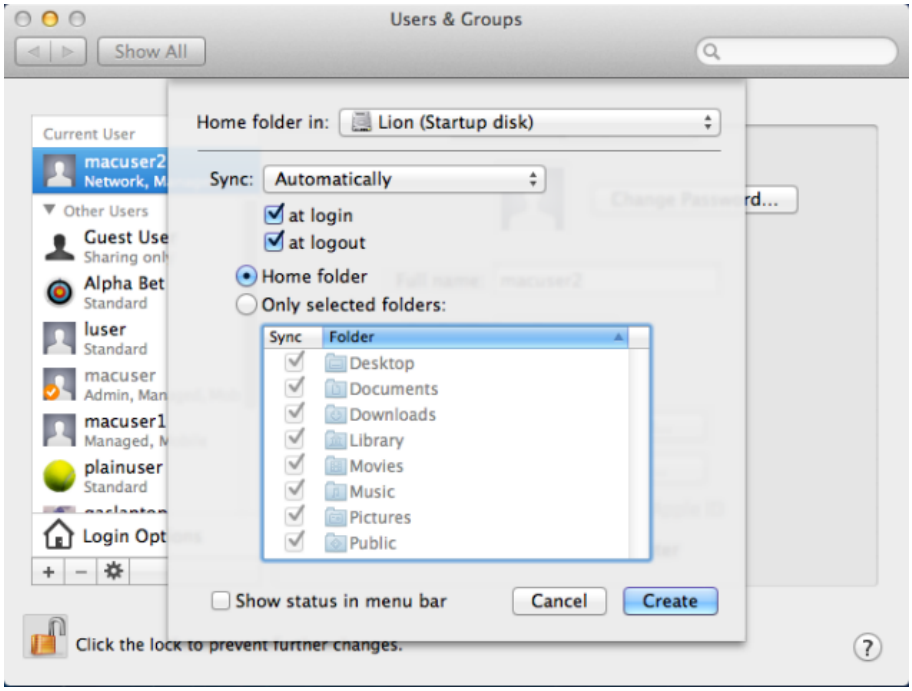
first create a mobile account for that user on the macOS client. A macOS mobile account has a local home directory that can automatically sync with the user's network home directory.



To encrypt your disk

1. As an Active Directory user, open **System Preferences** and navigate to **Users & Groups**.
2. Click the **Lock** icon and enter administrator credentials to enable preference changes.

3. Click the **Create** button next to **Mobile account**.



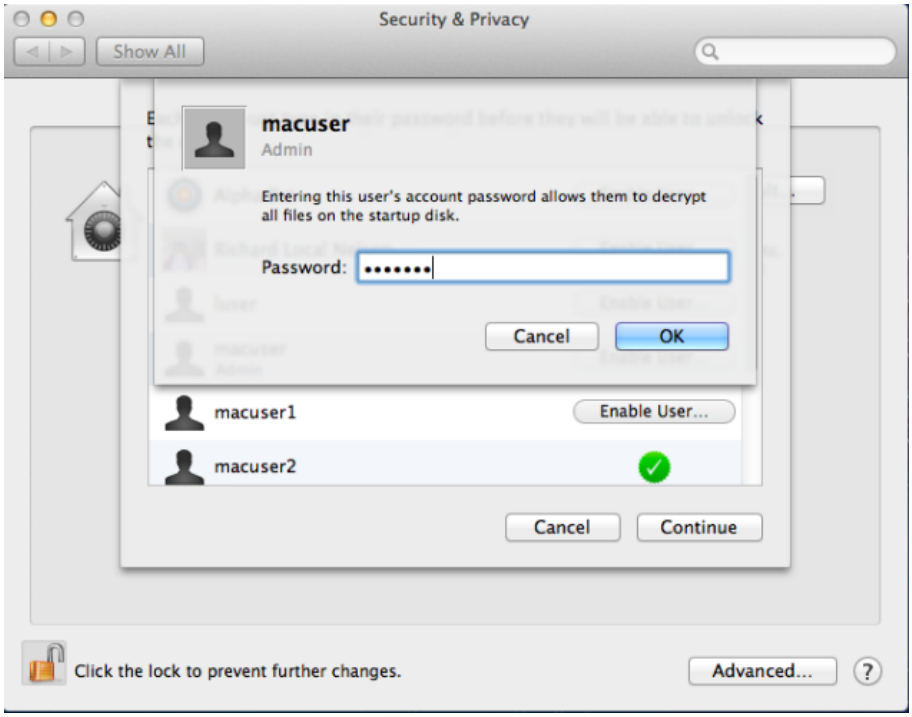
4. Select your preferred syncing and home folder location preferences in the pop-up menu and click **Create**.

   A popup message displays explaining that you must log out and log back in to create the local home folder.

5. Click **Create** and enter your password at the prompt.

6. Log back in and configure FileVault encryption.

7. From **System Preferences**, navigate to **Security & Privacy** and open the **FileVault** tab.
8. Click **Turn on FileVault** to begin the encryption process.



9. Select users (local users and mobile accounts) to enable them to unlock the encrypted disk at system startup.

   NOTE: Once you enable FileVault unlock for a user account, if you subsequently delete the account from Active Directory, you must also delete the local user account to disable FileVault unlock for that user.

10. Enter a password for each user you enable.

11. Take note of the recovery key on the following screen; store it somewhere yourself, and store it with Apple Support.

12. Restart your system to begin encrypting the drive.

    The encryption can take several hours, depending on the size of your disk, during which time you can continue using your computer. You can monitor the encryption process by returning to the **FileVault** tab in **Security & Privacy** preferences.

    After you enable FileVault, your macOS will initially boot to an unencrypted disk partition and ask for your password to unlock the encrypted partition. Because this separate partition does not have access to Safeguard Authentication Services and Active Directory, you must use your most recent locally cached password. Before the local cache is updated, if you need to unlock the encrypted disk after a password change, either use your old password or click the **Recover Key** to unlock the drive. Once the drive is unlocked, although it says you must reset your password, you can ignore the prompt and log in with your recently changed account password.

6

Limitations on macOS

There is some Safeguard Authentication Services functionality that is limited by the macOS system.

Limitations lists

- When using the command line su utility to become a Safeguard Authentication Services user, the Safeguard Authentication Services PAM module will not create a ticket cache for the new session because Safeguard Authentication Services uses the CCacheServer process for Kerberos ticket cache management. Creating this ticket cache would inadvertently destroy any existing Kerberos tickets.
- If Safeguard Authentication Services users who have custom home directory paths log into the system through the system login window and the parent directories for their home directory do not exist, the system home directory creation code incorrectly sets the ownership mode of all the home directory parent directories. This causes subsequent Safeguard Authentication Services user logins to fail if they share the same home directory path. Their home directory will be created but it will be inaccessible to the user.

  Administrators should ensure that if they are using custom home directory paths, the parent directories are pre-created with a valid ownership and mode that allows all Safeguard Authentication Services users to access those paths.
- The automatic ticket feature of Safeguard Authentication Services does not currently work with non-file-based ccaches. Because macOS uses API based ccaches, the ticket renewal utility will not work.

  NOTE: You can manually renew tickets with any utility that supports renewing tickets, such as Apple's Ticket Viewer.
- When using the Safeguard Authentication Services mapped user feature, if a local user is mapped to a Safeguard Authentication Services user and, at some point the user is unmapped (returned to a local account) you must reset the user's password.

7

Group Policy for macOS

With Safeguard Authentication Services you can manage your macOS clients using Group Policy. Safeguard Authentication Services includes Group Policy extensions to manage preferences just as you would with Workgroup Manager. In addition, Safeguard Authentication Services supports custom policies based on Preference Manifests.

Safeguard Authentication Services Group Policy includes support for macOS. Using Safeguard Authentication Services you can manage your macOS through Group Policy. This eliminates the need to set up additional macOS Servers for macOS client management. macOS policy settings are applied using Profile-based policies.

Profile-based policy takes advantage of the Configuration Profile infrastructure provided by Apple. Policy settings are defined in Group Policy and downloaded to macOS clients where the settings are assigned to Configuration Profiles, which apply the settings to various configuration files on the macOS.

Profile-based policy

Profile policy settings are divided into two categories: Workgroup Manager Settings and Preference Manifest Settings.

The Workgroup Manager settings are designed to look and feel like the Workgroup Manager application. If you are familiar with Workgroup Manager from macOS server, it should be easy to transition to Group Policy. Settings for Applications, Classic, Dock, Energy Saver, Finder, Login, Media Access, Network, Parental Controls, Printing, Software Update, System Preferences, Time Machine and Universal Access are included. Safeguard Authentication Services supports the *Never*, *Always* and *Once* policy application options. You can apply settings to users or computers. With standard Group Policy security filtering, you can restrict settings to specific groups of users or computers.

Safeguard Authentication Services also includes support for Preference Manifest files. Preference Manifest files describe application settings you can manage centrally. Many standard macOS Preference Manifest files are included by default such as iChat, Mail, Sidebar, Time Zone and iTunes. You can import additional Preference Manifest files at any time, increasing the number of applications and features that you can manage.

On the macOS agent, Group Policy integrates with the Configuration Profile subsystem according to macOS best practices. This ensures that policy settings are applied correctly and appropriately to each new release of macOS.

macOS management modes

The following management modes exist for macOS policy settings:

Table 1: macOS: Management modes

Mode	Description
Never	This mode means that the settings do not apply. This is equivalent to disabling the policy. This is the default mode.
Once	In this mode, policy settings are applied one time. Users can remove the Configuration Profile. This mode functions as a default value.
Always	In this mode, policy settings will always apply. Users cannot remove the Configuration Profile.

Installing profiles on macOS 11.0 and later

Safeguard Authentication Services for macOS relies on the `/usr/bin/profiles` command to install configuration profiles. Starting in macOS version 11.0, this command can no longer be used to add profiles. To create a profile on macOS 11.0, use the **System Preferences** pane.

When installing profiles with system preferences, the agent installs both Device (also known as Machine profiles in the Group Policy plugin) and user profiles.

To install a profile on macOS 11.0 (and later):

1. Log in to a macOS system.
   A prompt appears, asking you to install a new profile.
2. Open **System Preferences** and click **Profiles**.
3. In the **Profiles** pane that appears, click **Install**.
4. **Device profiles only**. In the dialog box that appears, type the user name and password of the device administrator account.

NOTE: You must specify administrative credentials when creating Device profiles. Any standard user can create a User profile without providing administrative credentials. An **Always** profile must have a password unique to that profile in order to remove it. A **Once** profile can be removed at any time.

The new profile is successfully installed and it appears available for selection.

Workgroup Manager settings

Safeguard Authentication Services provides Group Policy extensions that mirror the functionality available in Apple Workgroup Manager console. Workgroup Manager Settings are located in the **Mac OS X Settings** folder (or in the **Policies** folder, if you are using the new **Group Policy Management Editor**.)

To open the properties of the Workgroup Manager settings

1. Start the **Group Policy Management Editor**.
2. Navigate to **Computer Configuration** | **Mac OS X Settings** or **User Configuration** | **Mac OS X Settings**.
3. Double-click the **Workgroup Manager Settings** to open its properties.

Applications Properties

The Applications Properties settings allow you to control access to specific applications and paths to applications using digital signatures.

You can apply Application Properties settings under both **Computer Configuration** and **User Configuration**.

There are two tabs:

- Applications tab
- Options tab

Applications tab

The **Application** settings control which applications are allowed to execute on macOS.

1. Select the **Manage** mode: **Never**, **Once**, or **Always**.
2. Select **Restrict which applications are allowed to launch** if you want to disallow applications thus restricting the applications the user can access.
3. Application restrictions are controlled by means of folder paths. Group Policy does not currently support application management using digital signatures, therefore to allow or prevent users from launching an application, add the application or the path to the application to one of two lists:
    - **Disallow applications within these folders**.

      Add folders containing applications that you want to prevent users from opening. All applications in sub-folders of disallowed applications are also disallowed.
    - **Allow applications within these folders**.
      Add folders containing applications that you want users to launch. If an

application or path to the application appears in both the **Disallow** and the **Allow** lists, then the **Disallow** list takes precedence and the user is not allowed to launch the application.

If an application does not appear in either of these lists, the user can not launch the application.

4. Click **Add** to open the **New Application Item** dialog. You can type the absolute Unix path or you can click **Remote Browse** to log into a remote macOS machine (by means of SSH) and browse for the target folder. It displays recently specified paths. To reuse a recently specified path, double-click the item in the list.

NOTE: Both disallow and allow paths support the %HOME% macro-expansion to the user's Unix home directory. For example, to restrict a user from running applications in their home directory, specify %HOME%. This macros is only supported by user policies; machine policies do not support this macro type.

Options tab

The **Options** settings control macOS server settings. For example, you can choose whether to allow a user to use the App Store. If set to false, a user that attempts to use the app store will receive a message like the following: `You don't have permissions to use the App Store`.

1. Select the **Manage** mode: **Never**, **Once**, or **Always**.
2. Select the check boxes to enable the features you want to enable.
    - **Allow use of Game Center**
        - **Allow multiplayer gaming**
        - **Allow adding Game Center friends**
        - **Allow Game Center account modifications**
    - **Allow App Store app adoption**
    - **Allow Safari AutoFill**
    - **Allow software update notifications**
    - **Require admin password to install or update apps**
    - **Restrict App Store to MDM installed apps and software updates**

Dock Properties

On macOS, the Dock is similar to a tool bar on other operating systems. In addition to showing which applications are running, the dock provides quick shortcuts to applications, folders and documents as well as system controls. Dock settings allow you to adjust the behavior of the user's Dock and specify which items appear in it.

You can apply Dock Properties settings under both **Computer Configuration** and **User Configuration**.

Dock Items tab

Dock Items tab settings control the applications, files and folders that are displayed on the user's Dock and support the following management modes: *Never*, *Once*, *Always*.

You can insert three types of items into the user's Dock: Applications, Documents and Folders. The **Applications** list controls which applications are inserted. The **Documents and Folders** list controls documents and folders that are inserted into the user's Dock. Click **Add** to select the items to insert in the Dock. You can drag the items within the list to change the order in which they appear on the Dock.

In addition to standard Unix paths, you can specify a network share by using the following syntax:

```
cifs://<server hostname>/<share name>
```

Folder paths support two types of macro-expansions. First, the %@ macro expands to the user's Unix name. Additionally, you can expand any active directory attribute using the %<*attributename*>% macro. For example, to add the user's network home directory to the dock, specify %homeDirectory%. You can get the value for any user attribute using the %<*attributename*>% macro. These macros are only supported by user policies; machine policies do not support either of these macro types.

The following options are also supported:

- **Merge with the user's Dock**

  Select to merge the specified items into the user's Dock. If you do not select this option, the specified items replace the user's Dock.

- **Add other folders:**

  Select to add predefined folders to the user's Dock. Safeguard Authentication Services supports `My Applications` and `Documents`.

Dock Display tab

Dock Display tab settings allow you to configure options that affect the visual display of the user's Dock and support the following management modes: *Never*, *Once*, *Always*.

The following options are supported:

- **Dock Size**

  Select to control the size of the **Dock** window on the user's Desktop.

- **Magnification**

  Select to control the size of magnification when the mouse cursor hovers over an item on the Dock.

- **Position on screen**

  Select this option to control where on the screen the Dock is anchored. Options include Bottom, Left and Right.

- **Minimize Using**

Select to control the visual effect used when applications are minimized to the Dock. Options include Genie and Scaled.

- **Animate opening applications**

  Select to animate (bounce) the application icons on the Dock as the application loads.

- **Automatically hide and show the dock**

  Select to hide the Dock automatically. When you position the cursor over the Dock it displays itself automatically. Leave this option deselected leave the Dock visible at all times.

Energy Saver Properties

The Energy Saver Properties settings helps you save energy and battery power by managing wake, sleep, and restart timing.

You can apply Energy Saver Properties settings only under **Computer Configuration**.

Desktop tab

Desktop tab settings control energy usage settings for macOS and supports the following management modes: *Never*, *Always*.

You can use preset settings by moving the slider anywhere from **Minimum Energy Usage** to **Maximum Performance**. When you set the slider to **Custom** you can customize all aspects of the energy usage settings.

The following Desktop settings options are supported for both macOS and macOS Server. Settings on the **OS X** tab apply to macOS workstations. Settings on the **OS X Server** tab apply to macOS Servers.

- **Put the computer to sleep when it is inactive for**

  Configure how long you want the system to wait before putting the computer to sleep to save power. Inactivity means no keyboard or mouse input.

- **Put the display to sleep when the computer is inactive for**

  Select to control how long you want the system to wait before putting the display to sleep. Inactivity means no keyboard or mouse input.

- **Wake when the modem detects a ring**

  Select to configure the computer to wake from sleep when the modem detects a ring.

- **Wake for Ethernet network administrator access**

  Select to configure the computer to wake from sleep if an administrator attempts remote access.

- **Restart automatically after a power failure**

  Select to configure the computer to automatically start when power is restored after a power failure.

- **Put the hard disks to sleep when possible**

  Select to configure the system to attempt to power down hard disks.
- **Allow the power button to sleep the computer**

  Select to configure the computer to go to sleep when a user presses the power button.

Portable tab

Portable tab settings control energy usage settings for macOS portable devices and support the following management modes: *Never*, *Always*.

You can use preset settings by moving the slider anywhere from **Minimum Energy Usage** to **Maximum Performance**. When you set the slider to **Custom** you can customize all aspects of the energy usage settings.

Safeguard Authentication Services supports the following Portable Settings options for both Adapter and Battery powered situations. Settings on the **Adapter** tab apply when the portable device's power adapter is plugged in. Settings on the **Battery** tab apply when the portable device is running on battery power.

- **Put the computer to sleep when it is inactive for:**

  Select to control how long you want the system to wait before putting the computer to sleep to save power. Inactivity means no keyboard or mouse input.
- **Put the display to sleep when the computer is inactive for:**

  Select to control how long you want the system to wait before putting the display to sleep. Inactivity means no keyboard or mouse input.
- **Wake when the modem detects a ring**

  Select to configure the computer to wake from sleep if the modem detects a ring.
- **Wake for Ethernet network administrator access**

  Select to configure the computer to wake from sleep if an administrator attempts remote access.
- **Restart automatically after a power failure**

  Select to configure the computer to automatically start when power is restored after a power failure.
- **Put the hard disks to sleep when possible**

  Select to configure the system to attempt to power down hard disks.
- **Processor Performance**

  Select to control the processor performance. The higher the performance setting the more power used. Options include: Highest, Automatic and Reduced. Automatic will attempt to use reduced power when the computer is running on battery power.

Battery tab

Battery tab settings control battery status display and support the following management modes: *Never*, *Always*.

To show the battery status in the menu bar select the **Show battery status in the menu bar** option.

Schedule tab

Schedule tab settings control automatic startup and shutdown for macOS workstations and servers; and, support the following management modes: *Never*, *Always*.

Schedule Settings allow you to configure managed computers to start up or shutdown according to a specific schedule. For example, you might configure certain computers to sleep on Friday night and wake up early Monday morning.

To force the computer to start up or wake, select the **Startup or wake** option and set the frequency and the time of day.

To force the computer to shut down or sleep check the box and select either **Shutdown** or **Sleep** option from the drop-down then set the frequency and time of day.

Finder Properties

Finder is the macOS Window manager and file system browser. Finder Settings allow you to configure the way Finder works.

You can apply Finder Properties settings under both **Computer Configuration** and **User Configuration**.

Preferences settings control features and functionality of Finder.

1. Select the **Manage** mode: **Never**, **Once**, or **Always**.
2. Select whether to have Finder operate in normal or simple mode:
    a. **Use normal Finder**.
    b. **Use Simple Finder**. In simple mode, users cannot launch applications or files from a Finder window. They are limited to what is accessible from the Dock. In addition, users cannot create folders, delete files or mount network volumes in simple mode. If you select **Use Simple Finder**, you can not specify any other options because they do not apply to a simplified Finder environment.
3. Select items under **Show these items on the desktop** to display an icon on the user's Desktop for each selected item. Options include: **Hard disks**, **External disks, CDs, DVDs, and iPods**, and **Connected servers**.
4. For **New Finder window shows**, set the default view for **New Finder** windows. To show the user's home directory, select **Home**. To show the computer view including mounted volumes select **Computer**.
5. Additional selections include:

- **Always open folders in a new window**: Select to open a **New Finder** window each time a user opens a new window.
- **Always open windows in column view**: Select to automatically open new windows in column view.
- **Show warning before emptying the Trash**: Select to prompt users to confirm before moving items to the Trash.
- **Always show file extensions**: Select to display file extensions in Finder views.

Login Properties

The Login settings control the appearance and behavior of the macOS login window.

You can apply Login Properties settings under both `Computer Configuration` and `User Configuration`. However, the Items tab is only available in `Users Configuration`.

Window tab

The **Window** tab settings of the **Login Properties** control the appearance of the login window such as the heading, message, which users are listed if the "List of users" is specified, and the ability to restart or shut down. Window tab settings supports the following management modes: *Never*, *Once*, *Always*.

The following options are supported:

- **Heading**

  Selecting this box allows the user to click the time area of the menu bar to toggle through various computer information values such as hostname, IP address, and system version.

  Apparently this changed around 10.10, but I don't think anyone realized it.
- **Message**

  Enter a message to display in the login Window.
- **Style**

  Set the following options to modify the login window style:
  - **Name and password text fields**

    To only display the user name and password text boxes.
  - **List of users able to use these computers**

    To display a graphical list of users that are allowed to log in.

    NOTE: Users can click the account to use for log in and will be prompted for a password. You can set additional options to control which users are displayed in the list.
  - **Show Other**

To allow users to log in using the name and password text fields.

- **Show Restart**

  To display the restart button in the login window.

- **Show Shut Down**

  To display the shut down button in the login window.

- **Show Sleep**
  To display the sleep button in the login window.

Options tab

The **Options** tab of the **Login Properties** controls miscellaneous login-related options and support the following Manage Modes: *Never*, *Always*.

The following options are supported:

- **Show password hint when needed and available**

  All Safeguard Authentication Services users always have a password hint of "Active Directory Domain Password" by default. This hint is configurable in the Safeguard Authentication Services configuration policy. Users are never allowed to set a password hint on a Safeguard Authentication Services account. Local or non-Safeguard Authentication Services accounts may have a password hint which was intentionally set by the user to remind them of their password.

- **Enable automatic login**

  Select to configure the operating system to boot directly to the desktop without presenting the user with a login screen. The operating system boots using the automatic login account configured locally under **System Preferences**, **Accounts**.

- **Enable console login**

  By default users can type **>console** at the login window to drop to a terminal login. This setting allows you to disable the ability to drop to a terminal login.

- **Enable Fast User Switching**

  Select to display the logged in user's name in the right-hand corner of the desktop. Selecting on the user name allows the user to switch to another account without logging out of their current desktop session.

- **Log out users after X minutes of inactivity**

  Select to automatically log out a user if he has been inactive for the specified number of minutes.

- **Local administrators may refresh or disable management**

  Select to allow administrators to disable or refresh login window management settings.

- **Set computer name to computer record name**

This setting affects the computer's Bonjour name. The new Bonjour name is name-#.local where name is the computer record name you specify and # uniquely identifies the computer if there are several computers with the same Bonjour name.

- **Enable external accounts**

  Select to store external accounts on removable storage devices such as a thumb-drive. You must insert the removable device before an external account can log in.

- **Enable guest account**

  Select to enable a guest account to log in without a password. When the guest user logs out, the home directory, documents and settings are removed from the system.

- **Start screen saver after X minutes**

  Select to modify your screen saver setting.

Access tab

The **Access** tab settings of the **Login Properties** control which users are allowed to log in and support the following management modes: *Never*, *Always*.

Safeguard Authentication Services provides unified access control across all supported Unix platforms including macOS. Because of this, you should use the Safeguard Authentication Services access control policies to manage access control. The access control policies are found in the `Access Control` node in the `Quest Software` folder under `Unix Settings`.

The following option is supported:

- **Local-only users may login**

  Select to allow local users to log in; leave this option deselected to only allow Active Directory users to log in.

Scripts tab

The **Scripts** tab settings of the **Login Properties** control scripts that run at login and logout; and, support the following management modes: *Never*, *Always*.

You can specify shell scripts that you want to execute when a user logs in or out on macOS. Scripts are stored in the policy settings so you can browse to local files or remote hosts to select the script to use. Scripts configured through Group Policy run as root with the trust value of FullTrust.

NOTE: Test scripts thoroughly before deploying them with Group Policy.

The following options are supported:

- **Login script**

  Specify the script to execute when the user logs in.

- **Also execute the client computer's LoginHook script**

  Select to allow the LoginHook script to execute. The LoginHook script is a locally configured script that runs at login.

- **Log-Out script**

  Specify the script to execute when the user logs out.

- **Also execute the client computer's LogoutHook script**

  Select to allow the LogoutHook script to execute. The LogoutHook script is a locally configured script that runs at log-out.

Items tab

The **Items** tab settings of the **Login Properties**, control items that are started automatically when a user logs in and support the following management modes: *Never*, *Once*, *Always*.

NOTE: The **Items** tab is only available in **Users Configuration**.

Refer to Adding login items to run items automatically when a user logs in.

The following options are supported:

- **User may add and remove additional items**

  Select to allow users to add and remove additional items by means of local configuration. You can only configure this option if the management mode is set to **Always**.

- **User may press Shift to keep items from opening**

  Select to allow users to press shift to prevent items from opening automatically. You can only configure this option if the management mode is set to **Always**.

- **Merge with user's items**

  Select to merge the configured items with the user's items. You can only configure this option if the management mode is set to **Once**.

Adding login items

NOTE: This procedure shows you how to add an item that starts automatically from the **Items** tab.

To add login items

1. Click **Add** to type the full path to the volume, document, folder or application. Alternatively, you can click **Browse** to browse for the path to the item on a remote macOS system. Items open in the order they are listed.
2. Select the **Hide** option and to start the item in a minimized state on the Dock. This prevents screen clutter when starting several items while still making the items easily accessible.
3. Click **Apply**.

Media Access Properties

The Media Access Properties settings allows you to control settings for and access to AirDrop, CDs, DVDs, the local hard disk, and external disks (for example, floppy disks and FireWire drives).

You can apply Media Access Properties settings under both **Computer Configuration** and **User Configuration**.

Media Access tab

The **Media Access** tab settings control access to media devices.

For the media settings, select the **Manage** mode: **Never**, **Once**, or **Always**.

The following options are supported:

- **Disc Media**

  Select which removable disc media devices you want to allow users to access. If you select **Require Authentication**, the user needs to provide credentials before he can access the disc media.

  Select if you want to **Allow file transfer (to and from iOS and iPadOS) using Finder or iTunes**.

  Select whether to **Eject all removable media at logout**.

- **Other Media**

  Select other media devices you want to allow users to access. If you select **Require Authentication**, the user needs to provide credentials before he can access the media. If you select **Read-Only**, the user cannot write to the media.

  Select if you want to **Allow file transfer (to and from iOS and iPadOS) using Finder or iTunes**.
  Select whether to **Eject all removable media at logout**.

- **Network Access**

  Select to allow **Air Drop**.
  Select if you want to **Allow file transfer (to and from iOS and iPadOS) using Finder or iTunes**.
  Select whether to **Eject all removable media at logout**.

Network Properties

Network Properties settings allow you to configure settings for hosts and domains to bypass and disable Internet Sharing, AirPort, and Bluetooth.

You can apply Network Properties settings under both **Computer Configuration** and **User Configuration**. However, you can only apply the **Sharing & Interfaces** functionality in the **Computer Configuration** node.

Sharing & Interfaces tab

The **Sharing & Interfaces** tab settings of the **Network Properties** control access to network features and support the following management modes: *Never*, *Always*.

Sharing & Interfaces settings are only configurable in the **Group Policy Computer Configuration** node.

The following options are supported:

- **Disable Internet Sharing**
- **Disable AirPort**
- **Disable Bluetooth**

Parental Controls Properties

The Parental Controls Properties allow you to hide profanity in Dictionary, limit access to websites, or set time limits or other constraints on computer usage.

You can apply Parental Controls Properties settings under both **Computer Configuration** and **User Configuration**.

1. For content filtering, the **Manage** mode of **Always** is typically selected. Also available are the modes of: **Never** or **Once**.
2. Select the following check boxes, as desired:
    - **Hide profanity in Dictionary**: Select to hide profanity in the Dictionary application.
    - **Limit access to websites by**: Select to filter websites explicitly or by using the built-in adult content filter.
3. If you selected **Limit access to websites by**, you can filter content in one of two ways: explicitly or with the built-in adult content filter.
    - To filter explicitly:
        a. Select **allowing access to the following websites only** from the drop-down box. The view now shows a single box with buttons on the right side.
        b. Allowed websites will be displayed in the user's browser. You can organize the websites using folders. Click **Add folder** to add a folder. Type the name of the folder and press **Enter**.
        c. Click **Add website**. The **Web Site** dialog appears. Here you can type the display name for the web site and the Web address.
        d. Type the web site display name in the box labeled **Web site title** type the web site URL in the box labeled **Address**.
        e. Click **OK**. he new website is displayed under the folder. You can drag items to move them to different folders.

f. Add additional folders and websites as needed, then click **OK** to save settings and close the **Parental Controls** dialog.

- To filter with the built-in adult content filter.
  a. Select **trying to limit access to adult websites** from the drop-down box. The view now shows two list boxes with buttons on the right.
  b. The system tries to limit access to adult websites using a built-in algorithm. You can override the behavior of the system filter by specifying websites that should always be allowed or always be denied.
  c. To allow a site, click the **Add** button under the **Always allow sites at these URLs** heading. Type the URL of the website and press **Enter**.

     A new website is added to the allow list.
  d. To deny a site, click the **Add** button under the **Never allow sites at these URLs** heading. Type the URL of the website and press **Enter**.
  e. Click **OK** to save settings and close the **Parental Controls Properties** dialog.

4. Click **OK**.

Printing Properties

Printing properties allow you to specify network printers you want to configure for use on client computers.

You can apply Printing Properties settings under both **Computer Configuration** and **User Configuration**.

Printers tab

The **Printers** tab settings of the **Printing Properties**, control printers that are configured for use on client computers and support the following management modes: *Never*, *Always*.

Printers tab settings allow you to set up printers that will be available on client computers.

The following options are supported:

- **Allow printers that connect directly to user's computer**

  Select to allow printing to printers that connect directly to the user's computer through FireWire or USB ports etc.

- **Require an administrator password**

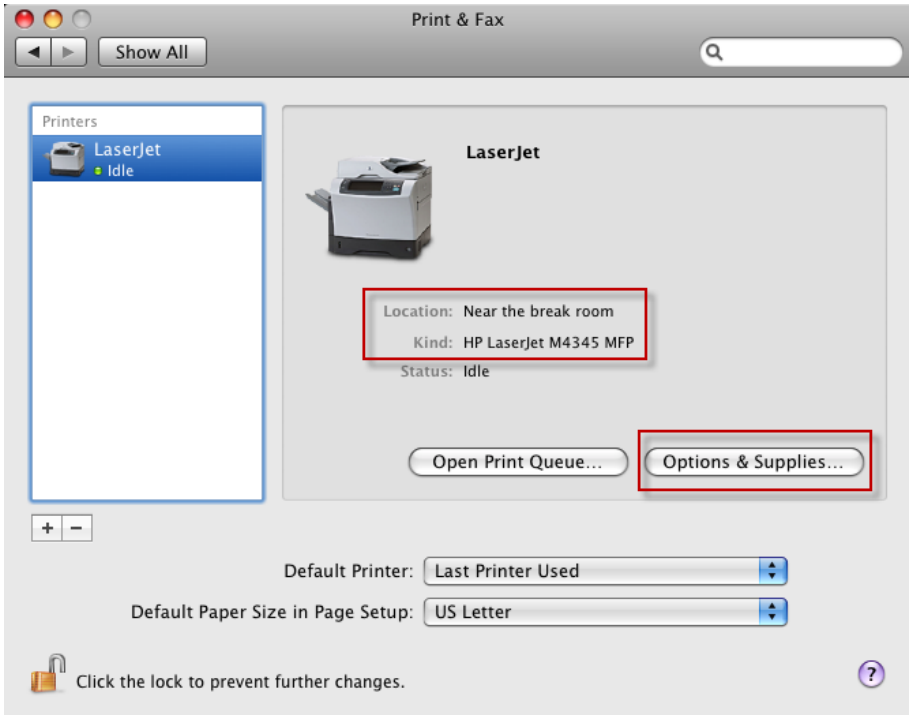
  If you have selected the **Allow printers that connect directly to user's computer** option, select this option to require an administrator password in order to print to a printer that is connected directly.

Adding a printer

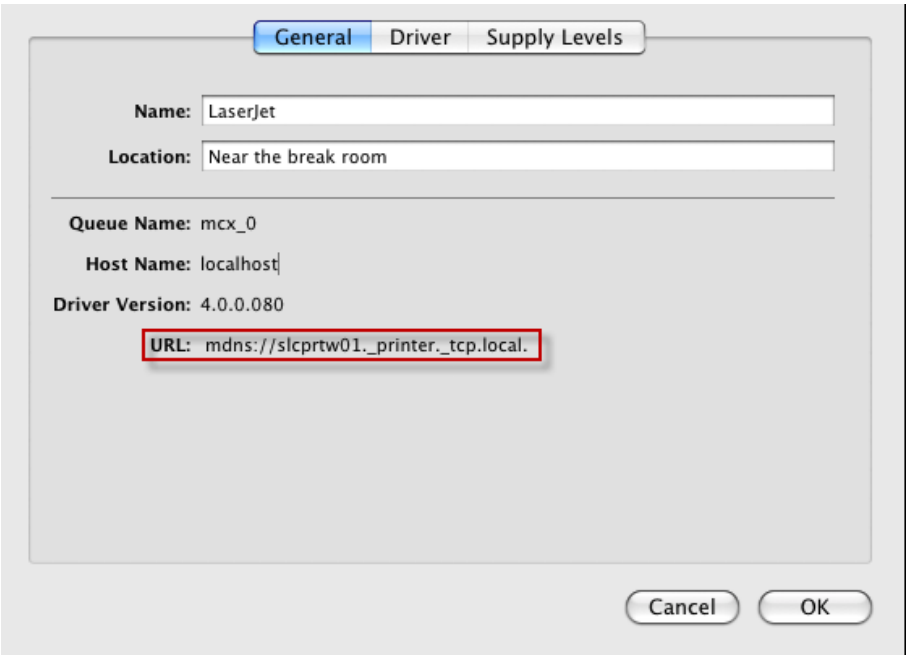
NOTE: This procedure shows you how to add a printer that will be available on macOS clients.

To add a printer

1. In order to determine the proper printer settings the best practice is to first configure the printer on a single macOS host system. Add the printer as instructed in the macOS documentation and verify that you can print to it. Once you have set up the printer open the printer properties and make a note of the following settings: Name, Location, Kind and URL. The following screen shots show where to find these settings:

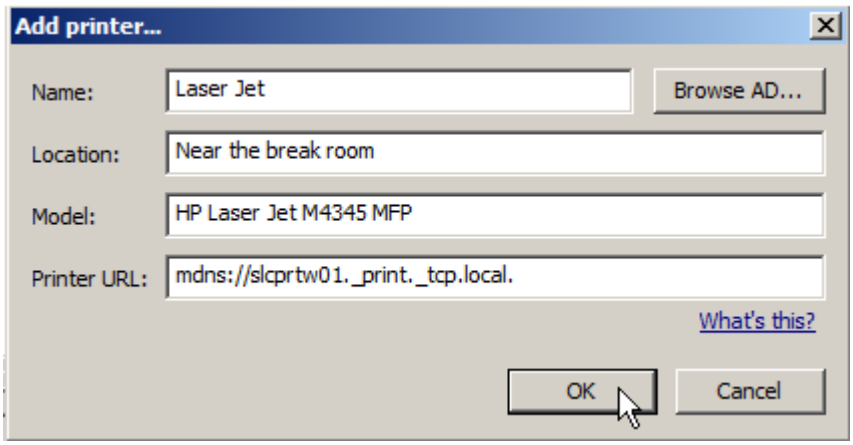


Click the **Options & Supplies** button to determine the URL:



This is all of the information you will need in order to configure the printer for all of your macOS systems using Group Policy.

2. In Group Policy Management Editor, open the **Printing** policy (**Computer Configuration** | **Policies**| **Mac OS X Settings** | **Workgroup Manager Settings**) and select the **Printers** tab.
3. Select the **Always** management mode.
4. Click **Add** to add a new printer to the policy. The **Add printer** dialog appears. Enter the Name, Location, Model and Printer URL, then click **OK**. The best way to determine the printer URL is to configure a printer on a macOS client and enter the URL specified in the **Options and Supplies** dialog. See step 1.



You can also add SMB printers by browsing for the printer in Active Directory.

5. If you want the selected printer to be the default printer click **Make Default**.

6. If you want to require the user to enter an administrator password before printing to the selected printer, click the **Require an administrator password** option.
7. Click **OK** to save settings and close the **Printing** dialog.

Footer tab

The **Footer** tab settings of the **Printing Properties** control footer display and formatting; and, support the following management modes: *Never*, *Always*.

Footers are additional information appended at the bottom of each printed page containing the date and the name of the user that initiated the print job.

The following options are supported:

- **Print Page Footer**

  Select to enable page footers.
- **Include MAC address**

  Select to include the client computer's network card MAC address in the footer information when page footers are enabled.
- **Font name**

  Select the page footers font name.
- **Font size**

  Select the page footers font size.

Software Update Properties

The Software Update properties allows you to configure the Software Update server that managed clients use for downloading updates and purchasing or installing apps.

You can apply Application Properties settings under both both **Computer Configuration** and **User Configuration**.

Software Update tab

The **Software Update** tab settings of the **Software Update Properties** control the Software Update server that managed clients use to download updates.

You can cache software updates on your local intranet using a local Software Update server. This can help reduce network bandwidth usage and speed update deployment in your network. Use this setting to instruct managed clients to use the local Software Update server.

Select the **Manage** mode: **Never**, **Once**, or **Always**.

The following options are supported:

- **Software Update server to use**

  Specify the URL of the software update server. The URL must be in the form `http://<server hostname>:< port >/index.sucatalog`
- **Allow installation of macOS beta releases**
- **Allow non-admin users to purchase apps and install software updates**
- **Automatically install macOS updates**
- **Automatically install app updates from the App Store**

System Preferences Properties

The System Preferences Properties allow you to control which items appear in the System Preferences of managed clients. This allows you to restrict which System Preferences configurations users can access.

You can apply System Preferences Properties settings under both **Computer Configuration** and **User Configuration**.

System Preferences tab

The **System Preferences** tab settings of the **System Preferences Properties** control which items appear in System Preferences on managed clients.

You can control which items appear in System Preferences on managed clients. The **System Preferences** tab displays a list of System Preferences items.

- Select the **Manage** mode: **Never**, **Once**, or **Always**.
- Select whether the items in the preferences pane that are checked are **Enabled** or **Disabled**. For example, if you select the checked items are **Disabled** then select **Users & Groups**, the **User & Groups** item is disabled and the selection is unavailable on the System Preference pane.
- Click **Show All** to select and display all items.
- Click **Show None** to clear and hide all items.

Time Machine Properties

The Time Machine Properties allow you to control the Time Machine application which provides network backups of installed applications, preferences, documents and local account data. For more information about Time Machine, refer to documentation provided by Apple.

You can apply Time Machine Properties settings only under the **Computer Configuration**.

Time Machine tab

The **Time Machine** tab settings control the Time Machine application and support the following management modes: *Never*, *Always*.

Time Machine is an application that performs network backup of local machine applications and data.

The following options are supported:

- **Backup Server**

  Specify the URL of the Time Machine backup server in the form: afp://someserver.company.com/Backups/. Refer to the Apple documentation for more information about AFP and Time Machine backup servers.

- **Back up**

  Specify which volumes to back up. You can choose to back up **Startup volume only** or **All local volumes**.

- **Skip system files**

  Select to skip system files. System files are operating system files installed when you install macOS. Selecting this option significantly reduces the amount of storage space used for backups. However, if you do not back up system files, you will need to install the operating system when performing a full restore.

- **Backup automatically**

  Select this option to force automatic backups.

- **Limit total backup storage to**

  Enter the backup storage limit in megabytes. If the backup limit is reached, no more data is backed up.

Wireless Profile Properties

Wireless settings allow you to configure networks and profiles used by AirPort on macOS systems. The Wireless Profile Properties settings allow you to control wireless user profiles for macOS.

To open the Wireless Profile properties page

1. In the Group Policy Object Editor, navigate to **User Configuration | Policies | Mac OS X Settings | Profile Manager Settings**.

   Wireless Networks apply only to users.

2. Double-click the **Wireless Networks** node.

Adding wireless profiles

The **Wireless Profiles** tab settings control user options associated with wireless networks.

For the AD certificate and certificates profile, you can use a certificate created by `vascert` to work with Network preferences. One scenario for this is for a computer to use QoS supportive adaptive polling (QAP) protocol for wirelesswireless network. For more information, see vascert command reference on page 71..

To add wireless profiles

Click the **Up** or **Down** buttons to reorder the wireless profiles. Wireless profiles are added to the user profiles list on macOS systems in the order listed in the policy.

1. From the **Wireless Networks** tab, click **Add** to open the **Wireless Profiles** dialog.
2. On the **Networks** tab:
    a. Enter the name of the wireless profile in the **Name** box.
    b. Enter the SSID of the wireless network to which this profile applies in the **SSID** box.
    c. Select the type of wireless network from the **Security Type** drop-down list.
    d. Select the authentication type options that apply to this profile from the **Protocols** list.
    e. Select **Hidden Network** to allow users to join a network whose name is not broadcast.
    f. Select **Auto Join** so the network is joined automatically. If unselected, the user must click the network name to join it.
3. On the **Proxy** tab:
    a. Select the **Proxy settings** from the drop-down list. **None** is the default.
    b. Enter the **Proxy server and port**.
    c. Enter the **Username** (optional).
    d. Enter the **Password** (optional).
    e. Enter the **Proxy Server URL**.
    f. Select **Allow direct connection if PAC is unreachable**, if desired.
4. On the **Protocols** tab:
    a. In the **EAP-FAST** section, identify the configuration of Protected Access Credentials (PAC) by selecting any combination of the following:
        - **Use PAC**
        - **Provision PAC**
        - **Provision PAC Anonymously**
    b. Select **Allow only two RAND values with EAP-SIM,** if desired.
    c. Select the **TTLS authentication protocol** from the drop-down list.
    d. Identify **Externally visible**.
    e. Select the **TLS minimum version** from the drop-down list.
    f. Select the **TLS maximum version** from the drop-down list.

5. On the **Identity and Authentication** tab:
    a. Select **Use two factor authentication**, if you will use a second authentication.
    b. Select **Authenticate with host's directory credentials**, if desired. If selected, enter the **Username** and **Password**.
    c. In **Identity Certificate**, note that you must have vascert on the client to use certificate identity. Select any combination of check boxes, as appropriate:
        - **Create a certificate identity with vascert**
        - **Allow all apps to access the private key**
        - **Allow a user to extract the private key from the keychain**

Preference Manifest settings

The **Preference Manifests** node lists applications and settings that you can manage using preference manifests. Policy items contained in this node are specific to the Macintosh operating system. A preference manifest is a file that describes application settings and makes them manageable. Application developers create preference manifest files to make their application's settings available for management through the **Preference Manifests** node.

When you install Group Policy console extensions, it creates preference manifests in `sysvol` at the following location:

```
Policies\Quest Software\Preference Manifest
```

In order to reduce GPO size, Preference Manifest files are stored in the GPT under the `Policies\Quest Software\Preference Manifest` folder. All of the Preference Manifest files found there are displayed in the **Preference Manifests** node. If the folder does not exist in the GPT, Preference Manifest files are loaded from the local installation directory.

Apple provides preference manifests for many built-in applications and systems. Group Policy includes preference manifests for Microsoft Office applications and other common third-party applications. You can also import custom preference manifests for policy configuration. The Safeguard Authentication Services installation process adds macOS, Workgroup Manager, and Preference Manifest Settings nodes to both the Computer Configuration and User Configuration nodes and stores all the Safeguard Authentication Services for macOS Desktop policies there.

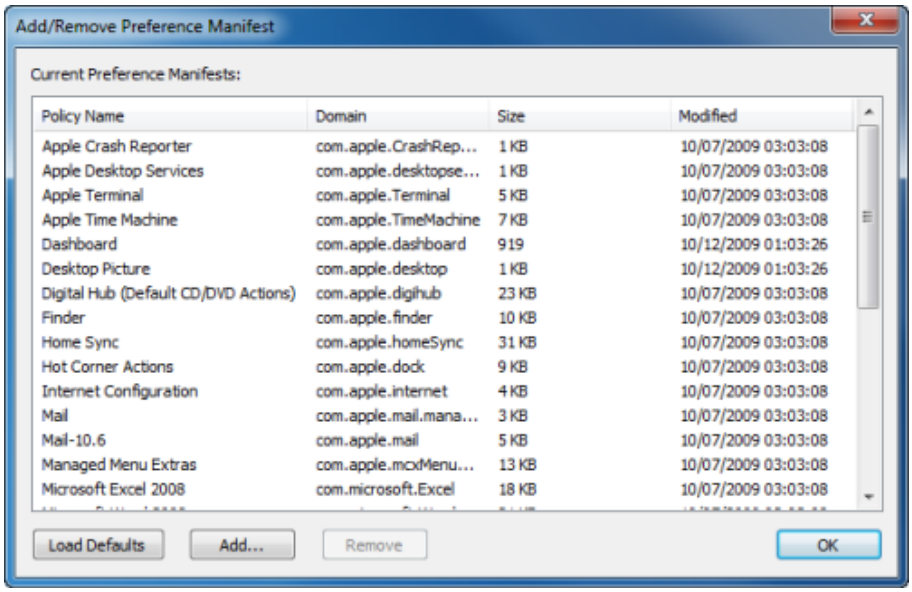
Adding a preference manifest

You can add a preference manifest file to the **Preference Manifests** node in Group Policy Object Editor (GPOE)

To add a preference manifest

1. Right-click on the **Preference Manifests** node and select **Add/Remove Preference Manifests** from the menu.

   The **Add/Remove Preference Manifest** dialog is displayed.



2. Click **Add** to browse for the preference manifest file that you want to load.
3. Click **Load Defaults** to reset the list to the default set of preference manifests.
4. Click **Remove** to remove the selected preference manifests.
5. Click **OK** to save changes and close the **Add/Remove Preference Manifest** dialog.

   The **Preference Manifest** view is updated to reflect the changes.

8

Certificate Autoenrollment

Certificate Autoenrollment is a feature of Safeguard Authentication Services based on Microsoft Open Specifications. Certificate Autoenrollment allows macOS/macOS® clients to take advantage of existing Microsoft infrastructure to automatically enroll for and install certificates. Certificate policy controls which certificates are enrolled and what properties those certificates will have.

With Certificate Autoenrollment, a public/private key pair is automatically generated according to certificate template parameters defined in Group Policy. The public key is sent to the Certification Authority (CA), and the CA responds with a new certificate corresponding to the public key, which is installed along with the private key into the appropriate system or user keychain on the Mac client.

You can use Group Policy to automatically configure which certificate enrollment policy servers to use for Certificate Autoenrollment and to periodically run Certificate Autoenrollment.

This section explains the system requirements for Certificate Autoenrollment and walks you through policy setup as well as client-side usage and troubleshooting.

Certificate Autoenrollment on macOS

Most of the Certificate Autoenrollment code is implemented in Java. After this code has successfully requested a certificate from a CA, it invokes platform-specific code to store the private key and certificate in a suitable way for the operating system or for particular applications. This platform-specific code is implemented as a shell script, `certstore.sh`, in the `/var/opt/quest/vascert/script` directory.

The `certstore.sh` script is a platform-agnostic front end that chooses and loads a platform-specific back end script. For macOS, the back end script is `certstore-mac.sh`. This script provides a fully functional implementation that uses the `/usr/bin/security` tool to integrate with macOS keychains.

Certificate Autoenrollment requirements and setup

Prior to installing One Identity Certificate Autoenrollment, ensure your system meets the following minimum hardware and software requirements.

Table 2: Certificate Autoenrollment: Minimum requirements

Component	Requirements
Operating system	macOS 10.13 (or later)
Java unlimited strength policy files	For more information, see Java requirement: Unlimited Strength Jurisdiction Policy Files on page 62..
Authentication Services	One Identity Authentication Services version 4.1.2 (or later).
Additional software	Certificate Autoenrollment depends on services provided by a Microsoft Enterprise Certificate Authority (CA) in your environment. In addition to Active Directory and an Enterprise CA, you must install the following software in your environment: • Microsoft Certificate Enrollment Web Services In order for Certificate Autoenrollment to function on client computers, you must configure the following policies: • Certificate Services Client - Auto-Enrollment Group Policy • Certificate Services Client - Certificate Enrollment PolicyGroup Policy • Certificate Templates Additionally, you must configure Java 1.6 (or later) as the default JVM for your system. NOTE: Install JRE (Java Runtime Environment) on all platforms other than macOS; macOS requires JDK (Java Development Kit). Typing `java` on the command line provides instructions. • For Linux/UNIX operating systems, install JRE 1.6 (or later). • For Mac OS X (that is, your operating system tells you to get it from Apple), install what Apple provides (JRE). • For macOS (that is, your operating system tells you to get it from Oracle), install the JDK.
Rights	Enterprise Administrator rights to install software and configure Group

Component	Requirements
	Policy and Certificate Template policy (only if Certificate Autoenrollment is not already configured for Windows hosts in your environment.)

Java requirement: Unlimited Strength Jurisdiction Policy Files

By default, most JRE and JDK implementations enforce limits on cryptographic key strengths that satisfy US export regulations. These limits are often insufficient for Certificate Autoenrollment and may lead to "java.security.InvalidKeyException: Illegal key size" failures. The "Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files" can be installed to remove these limits and enable Certificate Autoenrollment to function properly.

Do I need the Java Cryptography Extension (JCE) Unlimited Strength Jurisdiction Policy Files?

In general the answer is: Yes, these files are needed.

Java 9 and above do not require these files, but Java 6, 7, and 8 rely on these files.

Obtaining and installing the policy files

For Java implementations from IBM, the policy files are usually bundled with the JDK but not the JRE, so it may be more convenient to install the JDK rather than just the JRE. Once the JDK is installed its `demo/jce/policy-files/unrestricted` directory should contain two JAR files:

- `local_policy.jar`
- `US_export_policy.jar`

Use these files to replace the corresponding JAR files in the `jre/lib/security` directory of the JDK. Alternatively, the "Unrestricted SDK JCE policy files" can be downloaded from ibm.com.

For Java implementations from Sun, Oracle and Apple and for OpenJDK implementations, the policy files must be downloaded from Oracle. Each major Java version requires its own policy files:

- Java 6: http://www.oracle.com/technetwork/java/javase/downloads/jce-6-download-429243.html
- Java 7: http://www.oracle.com/technetwork/java/javase/downloads/jce-7-download-432124.html
- Java 8: http://www.oracle.com/technetwork/java/javase/downloads/jce8-download-2133166.html

Each of these downloads is a zip file that includes a README.txt and two JAR files, `local_policy.jar` and `US_export_policy.jar`. Use these JAR files to replace the corresponding files in the JRE or JDK:

- JRE: The `lib/security` directory usually holds these files.
- JDK: The `jre/lib/security` directory usually holds these files.

Installing certificate enrollment web services

The following procedures walk you through the installation and configuration of the required components. If Certificate Autoenrollment is already configured for Windows hosts in your environment, you can skip to Using Certificate Autoenrollment on page 66.

To perform these procedures, you need Enterprise Administrator rights to install software and configure Group Policy and Certificate Template policy.

NOTE: Microsoft has documented all of the steps to install and configure certificate enrollment Web services.

To set up certificate enrollment web services

1. Review the requirements as specified by Microsoft at: http://technet.microsoft.com/en-us/library/dd759243.aspx.
2. Follow the instructions at: http://technet.microsoft.com/en-us/library/dd759241.aspx to install the Certificate Enrollment Web Service.
3. Follow the instructions at: http://technet.microsoft.com/en-us/library/dd759214.aspx to install the Certificate Enrollment Policy Web Service.
4. Follow the instructions at: http://technet.microsoft.com/en-us/library/dd759140.aspx to configure server certificates for HTTPS.

Certificate enrollment Web services are now installed. Next, you will configure policy settings to enable Certificate Autoenrollment.

Configuring Certificate Services Client - Certificate Enrollment Policy Group Policy

If you are using Group Policy, you must configure the Certificate Enrollment Policy Web Service group policy setting to provide the location of the web service to domain members. Otherwise, you must manually configure the server URL on each system as explained in Using Certificate Autoenrollment.

To configure certificate enrollment policy

1. On the web server that hosts the Certificate Enrollment Policy Web Service, open Server Manager.
2. In the console tree, expand **Roles**, and then expand **Web Server (IIS)**.
3. Click **Internet Information Services (IIS) Manager**.
4. In the console tree, expand **Sites**, and click the web service application that begins with *ADPolicyProvider_CEP*.

   NOTE: The name of the application is ADPolicyProvider_CEP_*AuthenticationType* , where *AuthenticationType* is the web service authentication type.
5. Under **ASP.NET**, double-click **Application Settings**.
6. Double-click **URI**, and copy the URI value.
7. Click **Start**, type `gpmc.msc` in the **Search programs and files** box, and press **ENTER**.
8. In the console tree, expand the forest and domain that contain the policy that you want to edit, and click **Group Policy Objects**.
9. Right-click the policy that you want to edit, and then click **Edit**.
10. In the console tree, navigate to **User Configuration | Policies | Windows Settings | Security Settings** and click **Public Key Policies**.
11. Double-click **Certificate Services Client – Certificate Enrollment Policy**.
12. Click **Add** to open the **Certificate Enrollment Policy Server** dialog.
13. In the **Enter enrollment policy server URI** box, type or paste the certificate enrollment policy server URI obtained earlier.
14. In the **Authentication type** list, select the authentication type required by the enrollment policy server (Kerberos).
15. Click **Validate**, and review the messages in the **Certificate enrollment policy server properties** area.
16. Click **Add**.

    The **Add** button is available only when the enrollment policy server URI and authentication type are valid.
17. In the Group Policy Object Editor, navigate to **Computer Configuration | Policies | Windows Settings | Security Settings** and click **Public Key Policies**.
18. Repeat steps 11-16 for machine configuration.

Configuring Certificate Services Client - Auto-Enrollment Group Policy

If you are using Group Policy, you must enable Certificate Autoenrollment in Group Policy, otherwise, Group Policy may disable Certificate Autoenrollment. If you are not using Group

Policy, Certificate Autoenrollment is enabled on each host by default.

To enable Certificate Autoenrollment using Group Policy

1. On a domain controller running Windows Server 2008 R2 open the **Start** menu and navigate to **Administrative Tools | Group Policy Management**.
2. In the console tree, double-click **Group Policy Objects** in the forest and domain containing the Group Policy Object (GPO) that you want to edit.
3. Right-click the GPO, and click **Edit**.
4. In the Group Policy Object Editor, navigate to **User Configuration | Policies | Windows Settings | Security Settings** and click **Public Key Policies**.
5. Double-click **Certificate Services Client - Auto-Enrollment**.
6. Next to **Configuration Model**, select **Enabled** from the drop-down list to enable autoenrollment.
7. Click **OK** to accept your changes.
8. In the Group Policy Object Editor, navigate to **Computer Configuration | Policies | Windows Settings | Security Settings** and click **Public Key Policies**.
9. Repeat steps 5-7 for machine configuration.

Configuring Certificate Templates for autoenrollment

Certificate enrollment is based on templates which define the properties of certificates generated by the Certificate Authority (CA) when clients request certificates.

To create a new certificate template

1. On the server hosting your Enterprise CA, click **Start**, select **Administrative Tools**, and click **Certification Authority**.
2. In the console tree, expand the CA root node, select **Certificate Templates**, and click **Manage**.
3. In the **Certificate Templates** console, select the template that you would like to enable for autoenrollment, or create a new template.
4. Double-click the template to open its properties and select the **Security** tab.
5. Add the users and machines that you want to automatically enroll for the certificate and select the **Autoenroll** permission option.
6. Click **Apply**.

Using Certificate Autoenrollment

Certificate Autoenrollment is an automatic process that runs as-needed on client systems according to Group Policy or according to manual configuration if you are not using Group Policy. Certificate Autoenrollment typically requires no user interaction. After Certificate Autoenrollment is complete, certificates appear in the user's keychain for user-based enrollment or in the system keychain for machine-based enrollment.

Certificate Autoenrollment runs when:

- A user logs in
- Group Policy machine processing occurs (at machine startup and periodically thereafter)
- `vascert trigger` runs manually (for machine-based enrollment)

If Group Policy is in use and a **Certificate Services Client - Auto-Enrollment** Group Policy indicates that Certificate Autoenrollment should occur, then the Certificate Autoenrollment client runs. The Certificate Autoenrollment client then downloads and evaluates Certificate Autoenrollment policy and uses this information to determine whether any certificates should be enrolled.

Each of these steps can be invoked manually for testing and troubleshooting. To start Group Policy manually, use the `vgptool` command. To run Certificate Autoenrollment, use the `vascert` command. These command are installed in `/opt/quest/bin`.

Configuring Certificate Autoenrollment manually

Once Certificate Autoenrollment is installed, you must configure your machine to use it. If you are using One Identity Safeguard Authentication Services with Group Policy, then skip the manual configuration described in this section as Group Policy performs these tasks automatically.

NOTE: Group Policy functionality is not available when used with the Apple Directory Services plug-in. When Group Policy is not available, you must manually configure certificate enrollment policy servers and schedule machine certificate enrollment to run on an interval if desired.

Configure a machine for Certificate Autoenrollment

Use the `vascert` command line utility to configure your machine for Certificate Autoenrollment. Your computer must be joined to the Active Directory domain where your certificate enrollment policy server resides.

NOTE: Unless you are using Group Policy, machine processing must be triggered manually using the `vascert trigger` command. You can schedule this command to run at an interval.

To configure your machine for Certificate Autoenrollment

- As `root` (or using sudo), run the following command to configure a machine for Certificate Autoenrollment:

  `/opt/quest/bin/vascert server add -r <policy server URL>`

  Where `<policy server URL>` is the actual http URL for your certificate enrollment policy server.

  For example: `https://example.com/ADPolicyProvider_CEP_Kerberos/service.svc/CEP`

  NOTE: You can configure more than one certificate enrollment policy server. Certificate Autoenrollment will choose the most appropriate server automatically when performing certificate enrollment.

Configure a user for Certificate Autoenrollment

Use the vascert command line utility to configure a user for Certificate Autoenrollment. The user must be an Active Directory user. Certificate Autoenrollment is not supported for local users. Your computer must be joined to the Active Directory domain where your certificate enrollment policy server resides.

NOTE: Certificate Autoenrollment will run automatically when users log in based on the `/Library/LaunchAgents/com.quest.qcert.UserApply.plist` file. You can change this behavior by modifying this file.

To configure a user for Certificate Autoenrollment

- As `root` (or using sudo), run the following command to configure a user for Certificate Autoenrollment:

  `/opt/quest/bin/vascert server add -u <username> -r <policy server URL>`

  Substitute the actual http URL for your certificate enrollment policy server for example:

  `https://example.com/ADPolicyProvider_CEP_Kerberos/service.svc/CEP`

  NOTE: You can configure more than one certificate enrollment policy server. Certificate Autoenrollment will choose the most appropriate server automatically when performing certificate enrollment.

Trigger machine-based Certificate Autoenrollment

Normally Group Policy triggers Certificate Autoenrollment. If you are not using Group Policy, use the `vascert` command line utility to manually trigger Certificate Autoenrollment processing for the machine. This will result in certificates being added to the System.keychain according to enrollment policy. You can schedule this command to run periodically if desired.

To manually trigger Certificate Autoenrollment

- As `root` (or using sudo), run the following command to manually trigger Certificate Autoenrollment:

  ```
  /opt/quest/bin/vascert trigger
  ```

Certificate Autoenrollment will proceed in the background. When complete, newly enrolled certificates will be installed in the System.keychain automatically. To troubleshoot Certificate Autoenrollment, run the `vascert pulse` command as `root`.

Troubleshooting Certificate Autoenrollment

To help you troubleshoot Certificate Autoenrollment, One Identity recommends the following resolutions to some of the common errors, and methods for finding and correcting configuration problems.

Certificate Autoenrollment process exited with an error

As mentioned in the Certificate Autoenrollment on macOS section, some important Certification Autoenrollment commands, such as `vascert pulse`, will NOT work until the necessary platform-specific functionality has been implemented in `certstore-DEV.sh`. For more information on modifying `certstore-DEV.sh` and a simple example script, see the Examples and further explanation for modifying certstore-DEV.sh on Linux and Unix (284711) KB article.

Until the `certstore-DEV.sh` script is modified, the following issues will happen when running `vascert pulse`:

```
<VASCERT PULSE COMMAND>

$ vascert pulse

vascert: One Identity Certificate Autoenrollment version 1.1.0.750
```

```
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Processing enrollment policy: dc1.domain.com

Process exited with an error (Exit value: 1), command was:
[/var/opt/quest/vascert/script/certstore.sh, export-machine-certs,
/tmp/6353628018779558796pk12, mdzDFXBD7znDYDO8B]

</VASCERT PULSE COMMAND>
```

The output shows which script `vascert` ran and the parameters passed to the script. As previously mentioned, `certstore.sh` calls (on all platforms other than macOS) `certstore-DEV.sh`. In the example above, `certstore.sh` calls into `certstore-DEV.sh`'s `exportMachineCerts` function. By default, that function only returns a 1 indicating an error as shown here:

```
exportMachineCerts()

{

   echo "=== UNIMPLEMENTED exportMachineCerts'()' ==="

   exit 1

}
```

See the Examples and further explanation for modifying certstore-DEV.sh on Linux and Unix (284711) KB article for a deeper understanding of that function, expected parameters, and an example for using that function. As long as that function returns '1', autoenrollment will cease at this point and `vascert` will not enroll for a new certificate. Because this is the first step of many, see the KB article for other functions that need to be modified and examples on how to do so.

Enable full debug logging

You can enable full debug logging for all Certificate Autoenrollment components using the `vascert` command line utility.

If debug logging is configured, Group Policy extensions, the vascert tool, and `launchd` write log files in /Library/Preferences/com.quest.X509Enrollment/log for machine enrollment and ~/Library/Preferences/com.quest.X509Enrollment/log for user enrollment. You can enable debug logging for all of these components.

To enable debug logging

1. As `root`, run the following command to configure debug logging for all users:

   ```
   /opt/quest/bin/vascert configure debug
   ```

2. To configure debug logging for a specific user, log in as that user and run the same command.

   NOTE: Enabling debug logging causes the `vascert` command to write debug messages to a file in addition to `stdout`. Even after you enable debug logging, you

must set the debug level using the `-d` command line option when running `vascert` commands manually.

3. When you are finished debugging, run the following command as `root` to turn off debug logging for all users. One Identity recommends that you turn off debug logging to improve performance and conserve disk space.

   ```
   /opt/quest/bin/vascert unconfigure debug
   ```

4. To turn off debug logging for a specific user, log in as that user and run the same command.

Pulse Certificate Autoenrollment processing

Use the `vascert` command line utility to manually perform Certificate Autoenrollment.

To perform Certificate Autoenrollment processing manually

1. Decide whether you want to pulse Certificate Autoenrollment for the machine or a specific user.
2. To pulse Certificate Autoenrollment for the machine, run the following command as `root` (or using sudo):

   ```
   /opt/quest/bin/vascert pulse
   ```

   NOTE: To pulse certificate enrollment for the machine, you must run the command with `root` privileges. This is mostly useful for troubleshooting. In some cases (such as when logging in by means of SSH), this will not result in successful certificate enrollment because the System.keychain cannot export existing private keys required for certificate renewal processing. If you just want to run Certificate Autoenrollment processing for the machine and you are not interested in the output, use `vascert trigger` instead.

3. To pulse Certificate Autoenrollment for a specific user, log in as that user and run the following command:

   ```
   /opt/quest/bin/vascert pulse
   ```

   NOTE: Use the GUI to log in as the user. This ensures that the user's keychain is unlocked so that enrolled certificates can be exported and imported. Logging in by other means, such as SSH, is generally not sufficient and may lead to errors when the `certstore-mac.sh` script invokes the `/usr/bin/security` tool.

Manually apply Group Policy

If you are using One Identity Authentication Services 4.1 (or later), Certificate Autoenrollment is configured automatically by Group Policy. Use the `vgptool` command line utility to manually apply Group Policy.

To manually apply Group Policy

1. Decide whether you want to apply machine policy or user policy.

   NOTE: Machine policy affects the entire system; User policy only affects the specified user.

2. To apply machine policy, enter the following command as `root` (or using sudo):

   ```
   /opt/quest/bin/vgptool apply
   ```

   The terminal displays policy processing results.

3. To apply user policy, enter the following command as `root` (or using sudo):

   ```
   /opt/quest/bin/vgptool apply -u <username>
   ```

   The terminal displays policy processing results.

Command line tool

`vascert` is the Certificate Autoenrollment command line tool for certificate enrollment. With `vascert` you can configure various aspects of Certificate Autoenrollment. You can manually trigger certificate enrollment processing. `vascert` is also helpful for troubleshooting various network and authentication problems that may occur.

This command reference details the command line usage for `vascert`.

`vascert` command reference

vascert is the Certificate Autoenrollment processor.

Name

vascert

Synopsis

```
vascert [-d <debug level [1-6]>] [-b] [-h <command>] <command [command options]>
```

Overview

`vascert` is the Certificate Autoenrollment processor for Unix clients.

Commands

To run `vascert`, specify one or more general options, then specify a specific command which may have further options and arguments.

Table 3: `vascert` commands

Command	Description
clean	Clears certificate enrollment state information.
configure	Allows you to configure Certificate Autoenrollment settings.
importca	Imports trusted root CA certificates based on policy.
info	Dumps the contents of a policy template.
list	Lists all configured policy template names.
pulse	Performs Certificate Autoenrollment processing.
renew	Renews an existing certificate based on a policy template.
server	Manages local policy server configuration.
trigger	Triggers machine-based Certificate Autoenrollment policy processing.
unconfigure	Allows you to un-configure Certificate Autoenrollment settings.

Common options

The following options can be passed to all `vascert` commands. Specify these options before the command name.

`[-d <debug level [1-6]> ]`

Prints additional information according to debug level, higher debug level prints more output.

`[-b]`

Do not display banner text.

`[-h <command>]`

Display help for a particular command.

`vascert` commands and arguments

The following is a detailed description of all the available `vascert` commands, their usage and arguments.

vascert clean

Clears certificate enrollment state information.

```
vascert [common options] clean [-u <username>] [-x]
```

Arguments:

`[-u <username>]` is the name of the user to perform the operation.

[-x] removes all local state information.

Additional Information:

This command causes Certificate Autoenrollment to remove all previous configuration and downloaded policy. When run as root with the `-x` option, this command removes all local state information returning the system to the state it had just after package install.

vascert configure

Allows you to configure Certificate Autoenrollment settings.

```
vascert [common options] configure <sub-command> <command>
```

Sub-commands:

debug enables debug logging for all Certificate Autoenrollment components.

Debug command arguments:

```
vascert [common options] configure debug [-u <username>]
```

[-u <username>] is the name of the user to perform the operation.

vascert importca

Imports trusted root CA certificates based on policy.

```
vascert [common options] importca [-u <username>] [-p]
```

Arguments:

[-u <username>] is the name of the user to perform the operation.

[-p] simulates policy-based CA import.

vascert info

Dumps the contents of a policy template.

```
vascert [common options] info <policy template name>
```

vascert list

Lists all configured policy template names.

```
vascert [common options] list [-p]
```

Arguments:

[-p] lists pending enrollment requests.

vascert pulse

Performs Certificate Autoenrollment processing.

```
vascert [common options] pulse [-p]
```

Arguments:

[-p] simulates policy-based pulse.

vascert renew

Renews an existing certificate based on a policy template.

```
vascert [common options] renew -t <template name>
```

Arguments:

-t <template name> is the name of the policy template for which certificates are to be renewed.

vascert server

Manages local policy server configuration.

```
vascert [common options] server <sub-command>
```

Sub-commands:

remove removes a policy server configuration by URL.

list lists policy servers that are configured locally.

add adds a new local server configuration.

Remove command arguments:

```
vascert [common options] server remove [-u <username>] [-a] <URL>
```

[-u <username>] is the name of the user to perform the operation.

[-a] removes all server configurations.

List command arguments:

```
vascert [common options] server list [-u <username>]
```

[-u <username>] is the name of the user to perform the operation.

Add command arguments:

```
vascert [common options] server add [-u <username>] [-c <cost> ] -r <URL> [-n <name> ]
```

[-u <username>] is the name of the user to perform the operation.

[-c <cost>] specifies the cost associated with this server. Servers with lower cost are preferred when performing server selection.

-r <URL> specifies the service endpoint to contact to object enrollment policy.

[-n <name>] specifies the display name of this server.

vascert trigger

Triggers machine-based Certificate Autoenrollment policy processing.

```
vascert [common options] trigger
```

vascert unconfigure

Allows you to un-configure Certificate Autoenrollment settings.

```
vascert [common options] unconfigure <sub-command> <command>
```

Sub-commands:

debug disables debug logging for all Certificate Autoenrollment components.

Debug command arguments

```
vascert [common options] unconfigure debug [-u <username>]
```

[-u <username>] is the name of the user to perform the operation.

About us

One Identity solutions eliminate the complexities and time-consuming processes often required to govern identities, manage privileged accounts and control access. Our solutions enhance business agility while addressing your IAM challenges with on-premises, cloud and hybrid environments.

Contacting us

For sales and other inquiries, such as licensing, support, and renewals, visit https://www.oneidentity.com/company/contact-us.aspx.

Technical support resources

Technical support is available to One Identity customers with a valid maintenance contract and customers who have trial versions. You can access the Support Portal at https://support.oneidentity.com/.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request
- View Knowledge Base articles
- Sign up for product notifications
- Download software and technical documentation
- View how-to videos at www.YouTube.com/OneIdentity
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product

Glossary

A

access control
A set of procedures performed by hardware, software, and administrators to monitor access, identify users requesting access, record access attempts, and grant or deny access. Compare with authorization. See also ACL.

Access Control List (ACL)
A set of data that informs a computer's operating system which permissions, or access rights, that each user or group has to a specific system object, such as a directory or file. Each object has a unique security attribute that identifies which users have access to it, and the ACL is a list of each object and user access privileges such as read, write, or execute.

ACE
Acronym for Access Control Entry.

ACL
Acronym for Access Control List.

ACL Filtering
Access Control Lists can be applied to Group Policy objects that determine whether or not the policy will be applied on a system.

Active Directory
Microsoft's network directory service for computers.

ADAM
Active Directory Application Mode, a Windows 2003 service in which LDAP runs as a user service rather than as a system service.

ADSI
Active Directory Services Interface, an editor (browser), scripting language, and so on.

ADUC
Active Directory Services Interface, an editor (browser), scripting language, and so on.

affinity
With respect to a directory, the organization of the accounts relies on properties they have in common. This similarity may be due to departmental structure or

geographical location of the people that use the accounts.

ARC4
See RC4.

ARCFOUR
See RC4.

ARS
ActiveRoles Server is a product installed on a Windows server that uses SQL Server for configuring data and publishing itself as a connection point object within Active Directory. It is a cross-platform, roles-based provisioning system that allows additional attributes to be stored for an object. For example, ARS can put a newly hired engineer into all the appropriate groups on all platforms relevant to their job description.

authentication
Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be. In private and public computer networks (including the Internet), authentication is commonly done through the use of logon passwords. Knowledge of the password is assumed to guarantee that the user is authentic. Each user registers initially (or is registered by someone else), using an assigned or self-declared password. On each subsequent use, the user must know and use the previously declared password. The weakness in this system for transactions that are significant (such as the exchange of money) is that passwords can often be stolen, accidentally revealed, or forgotten. Logically, authentication precedes authorization (although they may often seem to be combined).

authoritative source
In migrating identities from disparate NIS domains, identities from the first source repository are migrated without any changes to their internal identity (ID) and the first repository becomes the authoritative source. In case of ID conflict or mismatch, IDs in all remaining sources are changed to match those in the first source.

authorization
Authorization is the process of giving someone permission to do or have something. In multi-user computer systems, a system administrator defines for the system which users are allowed access to the system and what privileges of use (such as access to which file directories, hours of access, amount of allocated storage space, and so on). Assuming that someone has logged in to a computer operating system or application, the system or application may want to identify what resources the user can be given during this session. Thus, authorization is sometimes seen as both the preliminary setting up of permissions by a system administrator and the actual checking of the permission values that have been set up when a user is getting access. Logically, authorization is preceded by authentication.

B

Block Inheritance
When Block Inheritance is set on a GPO link, all GPOs above the link level are excluded from GPO processing unless the GPO is enforced.

C

CAC
Common Access Card, a smart card issued by the United States Department of Defense (DoD) for active-duty military, civilian employees and contractors.

Cadence
[[[Undefined variable TemplateGuideVariables.OneIdentityNameShort]]] font that contains standard icons used in the user interfaces for various [[[Undefined variable TemplateGuideVariables.OneIdentityNameShort]]] products.

canonical name
Essentially the distinguished name in reverse; generally, a software-internal representation, such as acme.com/engineering/jim.

CIFS
Common Internet File System, a Microsoft technology. See also SMB.

CN
Common Name, a component of a distinguished name (DN).

COM
Component Object Model, a Microsoft technology that enables components to communicate, used by developers to create reusable software components, link components together to build applications, and take advantage of Windows services like Active Directory.

credential
A proof of qualification or competence attached to a user or session, an object verified during an authentication transaction. In Kerberos parlance, a message containing the random key along with a service name and the user's long-term key.

D

DC
Domain Controller.

DES
Data Encryption Standard is a cypher selected as an official Federal Information Processing Standard (FIPS) for the United States in 1976. It is characterized by a relatively short key length (56 bits) and is considered less secure for many application environments than some alternatives.

disconnected authentication
Provisory authentication based on prior login and used in case of network failure. The maximum duration of a stored password hash is configurable.

DN
Distinguished Name.

domain
In Active Directory, a centrally-managed group of computers.

domain controller (DC)
The server that responds to security authentication requests in the Active Directory domain.

Drop-down
Flare default style, that can be used to group content within a topic. It is a resource to structure and collapse content especially in non-print outputs.

DSE
Directory-specific entry in an LDAP environment.

E

Enforced
If a GPO is enforced, then it will be applied regardless of block inheritance settings.

F

firewall
A piece of hardware, software, or both that sets rules about what network traffic can cross it. These rules can focus on the protocols used by the traffic and ports in use. Authentication Services, for instance, requires a set of ports by which it implements its services. Those ports must not be blocked. However, if a host has access to Active Directory, to its domain controllers, and so on, then the ports needed by Authentication Service are open. For Authentication Services specifically, this means 88 (TCP/UDP for Kerberos ticket services), 389 (LDAP queries and ping), 464 (TCP/UDP for Kerberos passwords), and 3268 (TCP for Global Catalog access); optionally, 53 (UDP for DNS SRV records) and 123 (UDP for time-synchronization with Active Directory). For Authentication Services Group Policy, port 445 (TCP for Microsoft DS).

forest
The collection of all objects and their attributes and rules in Active Directory. It is named "forest" because it holds one or more trust-linked trees, allowing users in one domain to access resources in another domain.

FQDN
Fully Qualified Domain Name; a domain name specified exhaustively, such as CN=jim,OU=engineering,DC=acme,DC=com.

FSMO
Flexible Single Master Operations; a multi-master-enabled database such as Active Directory that provides the flexibility of allowing changes at any domain controller in the enterprise, but also gives rise to the possibility of conflicts and the need to resolve them, especially for certain tasks. Collectively, FSMO tasks are used where standard data transfer and update methods on multiple peer domain controllers are ill-adapted to multi-master replication, for example: schema update and modification domain naming (addition or removal of domains in the forest), relative ID assignment (including SIDs), infrastructure (security) maintenance (including GUIDs, SIDs, and reference object DN in cross-domain references), and PDC emulation. These tasks are handled in a single master model by Windows 2000/2003.

G

GC
Global Catalog.

GECOS
(also in lower case) A field in the Unix /etc/passwd file that contains general information about the user including things like full name, telephone number, and so on, depending completely on the host implementation.

gid
group identity, standard C library object, represented by gid_t, identifying a group.

GID
Group identity; broad term referring to the underlying number that identifies a group of users or other objects in a directory service.

Glossary
List of short definitions of product specific terms.

GPMC
Group Policy Management Console; a Microsoft tool.

GPO
Group Policy Object; an actual directory object tied to system volume instance. The group policy object is a collection of settings that define what a system looks like and how it behaves for a defined group of users. A GPO is created, using the Group Policy Management Console when there are such settings. GPOs are associated with a container such as a site, domain, or organizational unit (OU). GPOs are very powerful and can be used to distribute software and updates such as Tivoli (IBM). See also group policy.

group policy
A Microsoft technology that reduces the cost of supporting Windows users by providing centralized management of computers and user in Active Directory. Group Policy controls various aspects of an object including security policy,

software installation, login, folder redirection, and software settings. Such policies are stored on group policy objects (GPOs).

GSS
Generic Security Service; security services provided atop underlying, alternative cryptographic mechanisms such as Kerberos. According to RFC 2744, the GSS API allows a caller application to authenticate a principal identity associated with a peer application to delegate rights to another peer, and to apply security services such as confidentiality and integrity on a per-message basis.

GUID
Globally Unique Identifier; a number, address, or other cookie used to represent an object uniquely in a directory service, file system, and so on. In Active Directory, the GUID is a unique, unchanging 128-bit string used for search and replication.

J

joining
Describes the action of a Unix or Linux workstation being incorporated into an Active Directory domain by means of the vastool join command.

K

KDC
The Key Distribution Center in Kerberos. Part of a cryptosystem to reduce the intrinsic risk of exchanging keys, basically consisting of the authentication server (AS) and the ticket-granting server (TGS).

Kerberized application
A software application that requires or performs Kerberos authentication.

Kerberos
A computer network authentication protocol that proves the identity of intercommunicating points on an insecure network like a LAN or the Internet in a secure manner. Guards against eavesdropping and replay attacks. There are different Kerberos encryptions including DES and ARC4, the latter being more secure as well as the default in Authentication Services since release 2.6 SP4.

Kerberos authentication
An authentication system developed at the Massachusetts Institute of Technology (MIT). Kerberos is designed to enable two parties to exchange private information across an otherwise open network. It works by assigning a unique key, called a ticket, to each user that logs on to the network. The ticket is then embedded in messages to identify the sender of the message.

keytab
A file containing authentication credentials used, usually in place of a password, for authentication.

L

LAM

Loadable Authentication Module, IBM's precursor to PAM on the AIX (Unix) operating system. Authentication Services provides a LAM-based implementation on AIX. LAMs are configured in /usr/lib/security/methods.cfg.

LDAP

Lightweight directory access protocol, a networking protocol for working with a directory service running over TCP/IP. Such a directory service would usually adhere to X.500, a tree of entries each possessing attributes and values for those attributes. LDAP deployments typically use DNS for simple structure most useful for casual access, but full-scale directory services are more complex with hierarchical organizational units and wide-ranging services from printers and documents themselves to groups of people, company divisions, groups, etc.

LDIF

LDAP Data Interchange Format. See also Lightweight Directory Access Protocol (LDAP).

libvas

Prefix associated with Authenticaiton Services runtime libraries and interfaces.

Lightweight Directory Access Protocol (LDAP)

A software protocol for enabling anyone to locate organizations, individuals, and other resources such as files and devices in a network, whether on the public Internet or on a corporate intranet. LDAP is a "lightweight" version of Directory Access Protocol (DAP), which is part of X.500, a standard for directory services in a network. Netscape includes it in its latest Communicator suite of products. Microsoft includes it as part of what it calls Active Directory in a number of products including Outlook Express. The Novell NetWare Directory Services inter-operates with LDAP. Cisco also supports it in its networking products.

M

Mapped Users

Mapped User allows Authentication Services to authenticate against Active Directory while taking identity and Unix attributes from local files. It is implemented by replacing the 'x' placeholder in /etc/passwd with the user principal name (UPN) (Linux and Unix only), or by creating a local-to-AD user map file and specifying the location of that file in /etc/opt/quest/vas/vas.conf (Linux, Unix, or Mac).

MIIS

Microsoft Identity Integration Server; a server that manages the flow of data between all connected data sources and automates the process of updating identity information (for example, of employees, and so on) in the implementing environment.

MMC
Microsoft Management Console, for which Authentication Services has a snap-in used when browsing users or groups and getting their properties.

N

NAS
Network-Attached Storage; file-level data storage connected, often remote, but not appearing as a local volume/disk. This is in opposition to SAN.

Native Mode
Native Active Directory mode refers to a network being serviced completely by either Windows 2000 or Windows 2003 servers, but not both. If servers from both versions are present, the services offered can only be a common subset of the two. If all servers are running Windows 2003 Server, then all the features that this operating system offers over its predecessor are available. Not being in native mode has ramifications for various components, that is, local groups are not added to the PAC of the Kerberos ticket; group membership is not available.

NIS
Network Information Services; a Unix client-server directory service protocol, originally Sun Microsystems' "Yellow Pages." It provides centralized control over many types of network objects including users, groups, and network services like printers. NIS arose as a solution to each Unix host having its own /etc/passwd and groups files as the resident authority on users and groups when these notions needed to be extended over a network. NIS domains are flat (no hierarchy), use no authentication and the NIS map files are limited to 1024 bytes in size.

Note
Circumstance, that needs special attention.

nscd
Name service caching daemon; provides a cache for the most common name service request on Linux and Unix from the passwd, group, and hosts databases through standard C library interfaces including getpwnam, getpwuid, getgrnam, getgrgid, gehostbyname, and others. The configuration file is /etc/nscd.conf.

NSS
Name Service Switch; interface to nsswitch.conf that controls how look-ups are done for users (/etc/passwd), groups (/etc/grps), hosts (/etc/hosts), and so on. For example, getpwnam goes through NSS, which is extensible and configurable (just as is PAM), to reach variably passwd, vasd, NIS, or LDAP.

NTP
Network Time Protocol, as implemented by a server that keeps time on the network and is accessible to other nodes for the purpose of all keeping the same notion of time.

O

Organizational Unit (OU)
An Active Directory container object used within domains. An organizational unit is a logical container into which users, groups, computers, and other organizational units are placed. It can contain objects only from its parent domain. An organizational unit is the smallest scope to which a group policy object can be linked, or over which administrative authority can be delegated.

OU
Organization Unit. See also Personality container.

Override
If a GPO specifies a policy and another GPO further down in the GPO application chain is allowed to overwrite the previously specified policy, then the policy supports override.

P

PAC
Privileged Attribute Certificates, used by Kerberized applications for fine-grained access control to services, a feature of Microsoft's Kerberos implementation.

PAM
Pluggable Authentication Module; an architecture and shared libraries created by Sun Microsystems for the Solaris operating system that permits intervention into and specialization of the authentication process. PAMs are configured in /etc/pam.conf or in individual files off /etc/pam.d/.

PDC
Primary Domain Controller; an NT concept, emulated on Windows 2000/2003, that performs a number of crucial tasks in an enterprise including time synchronization, password replication, recording of password failures, account lock-out, and modification or creation of GPOs.

Personality container
An Active Directory organization unit (OU) designated to contain user and group personalities. Unix clients specify a Unix personality container (vastool join -p) in order to join the domain in Unix Personality Management (UPM) mode.

Personality scope
Consists of a primary Personality container, along with any secondary Personality containers. Only the Personalities, Active Directory users, and Active Directory groups that reside within that Personality scope will be usable on the Unix system.

PKI
Public Key Infrastructure; a way to ensure secure transactions over the wire; an arrangement providing for third-party vetting of user identities typically placing

any keys within a certificate. Not yet a standard; there are myriad implementations.

POSIX
Portable Operating System Interface; the open operating interface standard accepted worldwide. It is produced by IEEE and recognized by ISO and ANSI.

principal
In Kerberos, this is basically a simple account including name, password, and other information stored in the database and encrypted using a master key.

provisioning
The process of providing customers or clients with accounts, the appropriate access to those accounts, all the rights associated with those accounts, and all of the resources necessary to manage the accounts. When used in reference to a client, provisioning can be thought of as a form of customer service.

Q

QAS
Quest Authentication Services.

R

RC4
(pronounced "arcfour") The most widely used stream cipher in such popular protocols as secure sockets layer (SSL). RC4 generates a pseudo random stream of bits XOR'd with the clear-text password, for example. RC4 is more secure than DES.

realm
A Kerberos term that usually maps to an Active Directory domain, not because they are the same thing, but because for implementation, it is a natural alignment.

S

SaaS
Software-as-a-Service.

Samba
A free software implementation of Microsoft's networking protocol that runs on *nix systems and is capable of integrating with an Active Directory (Windows) domain as either a primary domain controller or as a domain member. See also SMB.

SAN
Storage Area Network; an architecture for attaching remote storage devices (disk arrays, tape libraries, optical jukeboxes, and so on) to servers in such a way that to

the operating system these appear as locally attached. This is in opposition to NAS where it is clear that the storage is remote.

Sarbanes Oxley Act (SOX)
Reference to legislation enacted in response to recent and spectacular financial scandals, to protect shareholders and the general public from accounting errors and fraudulent practices. The act is administered by the Securities and Exchange Commission, which sets deadlines for compliance and publishes rules on requirements. SOX defines which records are to be stored and for how long. It also affects IT departments whose job it is to store electronic records.

schema master
A domain controller that holds the schema operations master role in Active Directory. The schema master performs write operations to the directory schema and replicates updates to all other domain controllers in the forest. At any time, the schema master role can be assigned to only one domain controller in the forest.

Secure Sockets Layer (SSL)
The Secure Sockets Layer (SSL) is a commonly used protocol for managing the security of message transmission on the Internet. SSL uses a program layer located between the Internet's Hypertext Transfer Protocol (HTTP) and Transport Control Protocol (TCP) layers. SSL is included as part of both the Microsoft and Netscape browsers and most web server products. Developed by Netscape, SSL also gained the support of Microsoft and other Internet client/server developers, becoming the de facto standard until evolving into Transport Layer Security (TLS). The sockets part of the term refers to the sockets method of passing data back and forth between a client and a server program in a network or between program layers in the same computer. SSL uses the public/private key encryption system from RSA, which also includes the use of a digital certificate.

security principal
An entity that can be positively identified and verified by means of a technique known as authentication.

Simple and Protected GSS-API Negotiation Mechanism (SPNEGO)
A GSSAPI mechanism that allows the secure negotiation of the mechanism to be used by two different GSSAPI implementations. In essence, SPNEGO defines a universal but separate mechanism, solely for the purpose of negotiating the use of other security mechanisms. SPNEGO itself does not define or provide authentication or data protection, although it can allow negotiators to determine if the negotiation has been subverted, once a mechanism is established.

Single Sign-On (SSO)
An authentication process in a client/server relationship where the user, or client, can enter one name and password and have access to more than one application or access to a number of resources within an enterprise. Single sign-on removes the need for the user to enter further authentications when switching between applications.

Skin
Used to design the online output window.

SMB
Server Message Block; a protocol that exists primarily for trust relationships, the concept upon which NetBIOS is based and hence, used by DOS and Windows. The message format is used for sharing files, directories and devices. CIFS (Common Internet File System) is a synonym for SMB. See also Samba.

Snippet
Flare file type that can be used to reuse content. The One Identity Safeguard Authentication Services contains various default snippets.

T

Tattooing
When files or settings are left on the system after group policy has been un-applied, the files and settings are said to be tattooed. Unless otherwise documented a policy should remove all associated settings and files when the policy is unlinked. A policy that supports non-tattooing will not leave any files or settings behind after it is un-applied.

TGS
Ticket-granting server, part of a key-distribution server (KDC).

TGT
Ticket-granting ticket, the initial ticket given by the Kerberos authentication server permitting the TGS to be contacted

Ticket
A voucher that isn't easily forged and proves that the bearer has properly applied for authentication to a service. In Kerberos parlance, a message containing a random key, the same one that was passed in the credential, plus the user's name, the whole being encrypted using the service's long-term key. Tickets obviate the inconvenience of using a password in that they can be supplied to different services rather than performing separate authentication of the password with each service. See credential.

Tip
Additional, usefull information.

U

UID
User identity, broad term referring to the underlying number that identifies a user in a directory.

V

VAS
Vintela Authentication Services.

vas.conf
Configuration file on the path /etc/opt/quest/vas/vas.conf that is Authenticaiton Services' equivalent (and more) to Kerberos' krb5.conf.

vasd
The name of the Autentication Service daemon.

VGP
Quest Group Policy, Unix group policy product.

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