Deploying macOS Upgrades and Updates with Jamf Pro

Technical Paper
Jamf Pro 9.96 or Later
15 June 2021

jamf

Contents

Introduction

What's in This Guide

This guide provides instructions on how to deploy macOS 10.13 or later with Jamf Pro or macOS Recovery.

Additional Resources

For more information on Jamf Pro-related topics, see the *Jamf Pro Administrator's Guide*.

Overview

Apple releases a new operating system for computers annually and several minor macOS updates throughout the year. It is recommended that you upgrade or update to the latest macOS version to reduce security vulnerabilities, support greater user efficiency and productivity with new features, and use new computer management capabilities. In the past, administrators have used imaging to upgrade to the latest version of macOS. Apple does not recommend or support monolithic system imaging as an installation method because of recent improvements in macOS security, hardware, management, and deployment. Instead, you can use Jamf Pro or other workflows supported by Apple to upgrade macOS.

Before deploying a macOS upgrade or update, you should test it with your environment to see how it will impact your infrastructure, security, applications, and management. There are several ways to upgrade or update the computer operating system without using imaging. The following flowchart covers best practice methods for upgrading and updating macOS to help you make a decision about which method in this guide to use:
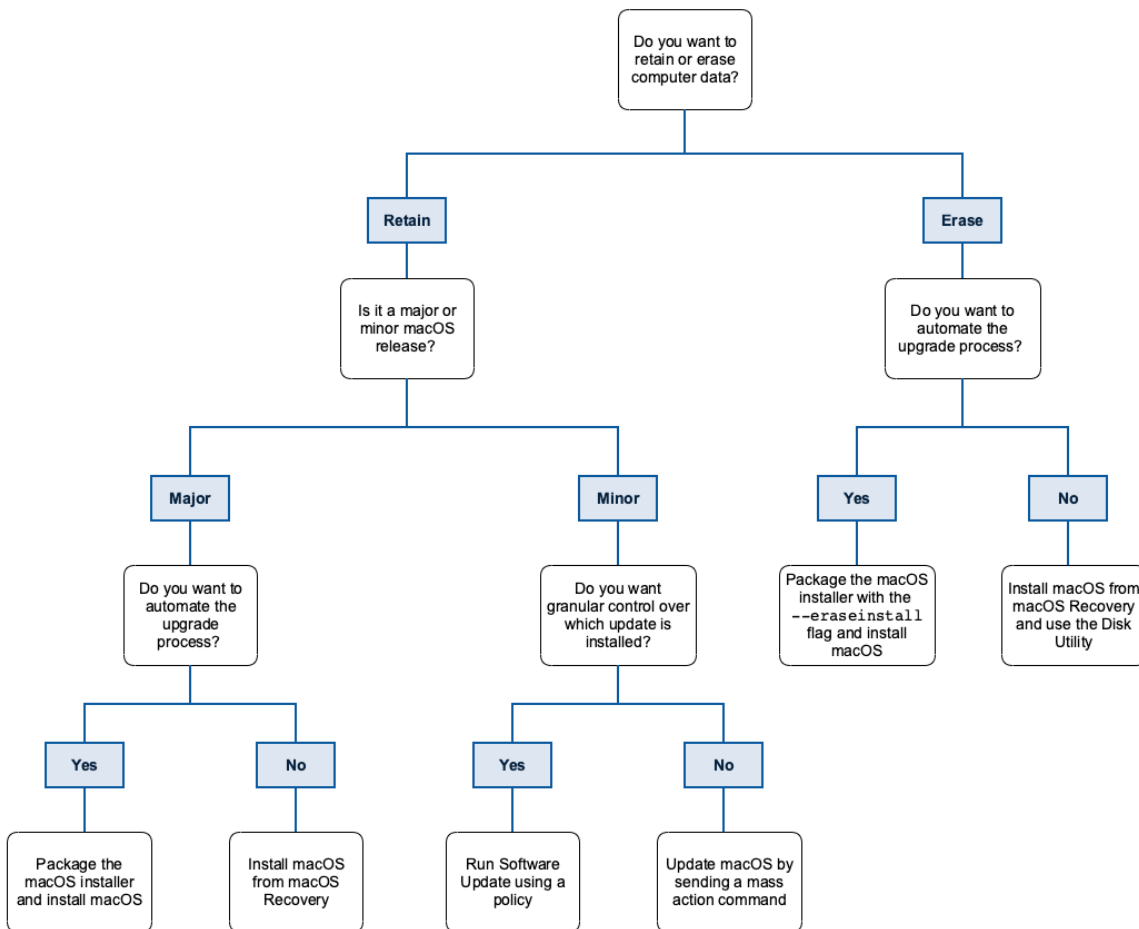
If you want to retain computer data, you can use the following workflows to upgrade or update macOS:

- **Updating macOS by sending a mass action command**—You can use a mass action command to update macOS on computers that are enrolled via automated MDM enrollment (formerly DEP) using a PreStage enrollment in Jamf Pro. This method is recommended for minor macOS releases, and is the workflow recommended by Apple. For more information, see Updating macOS by Sending a Mass Action Command.

- **Running Software Update using a policy**—You can run Software Update using a policy to update to a minor macOS release. When used with a software update server, this process provides more control over which update is installed. For more information, see Running Software Update Using a Policy.

- **Installing macOS from macOS Recovery**—If you want to manually upgrade to the latest macOS compatible with your computer, you can use macOS Recovery. This method requires an internet connection during the upgrade process and is only for major macOS releases. For more information, see Installing macOS from macOS Recovery.

- **Packaging the macOS installer and installing macOS**—If you want to automate the upgrade process, you can package the macOS installer and install it automatically or allow users to install it via Self Service. Additionally, you have the option of using a script to customize the end user experience. This method is recommended for major macOS releases. For more information, see Packaging and Deploying the macOS Installer.

If you want to erase computer data, you can use the following workflows to upgrade macOS:

- **Installing macOS from macOS Recovery**—If you want to manually upgrade to the latest macOS compatible with your computer, you can use macOS Recovery. To erase computer data before installing macOS, you can use the Disk Utility. This method requires an internet connection during the upgrade process and is only for major macOS releases. For more information, see Installing macOS from macOS Recovery.

- **Packaging the macOS installer and installing macOS**—(macOS 10.13.4 or later only) If you want to automate the upgrade process, you can package the macOS installer with the `--eraseinstall` flag included and install it automatically or allow users to install it via Self Service. Additionally, you have the option of using a script to customize the end-user experience. This method is recommended for major macOS releases. For more information, see Packaging and Deploying the macOS Installer.

If you are not prepared to upgrade or update macOS, you can restrict a software upgrade or update by creating a restricted software record, or defer an update by using a configuration profile. For more information on how to restrict a software upgrade or update, see Restricted Software in the *Jamf Pro Administrator's Guide* or the Deferring a macOS Update *Best Practice Workflow for Jamf Pro*.

Related Information

For related information on the methods available for installing macOS, see the following article from Apple's support website: https://support.apple.com/HT208020

Updating macOS by Sending a Mass Action Command

This workflow covers how to update macOS on an individual computer or group of computers by sending an MDM command to computers using a mass action. You can use a mass action command to update macOS on computers that are enrolled via automated MDM enrollment (formerly DEP) using a PreStage enrollment in Jamf Pro. To identify the target computers for a mass action command for this workflow, you need to perform an advanced computer search. This method is recommended for minor macOS releases, and is the workflow recommended by Apple.

> **Note:** Using a cache server can decrease the update time.

Requirements

To update macOS, you need the following:

- Jamf Pro 9.96 or later
- Computers with macOS 10.11 or later enrolled via automated MDM enrollment (formerly DEP) using a PreStage enrollment in Jamf Pro
- A valid push certificate in Jamf Pro

> **Note:** To have the update for computers with Apple silicon (i.e., M1 chip) installed automatically without user interaction, a Bootstrap Token for target computers must be escrowed with Jamf Pro.
>
> For more information about how Jamf Pro manages software updates, see Managing software updates for Apple devices in Apple's *Mobile Device Management Settings*.

Performing an Advanced Computer Search

You can use an advanced computer search to find and target managed computers that are not using the current macOS version and are enrolled in Jamf Pro via automated MDM enrollment.

1. Log in to Jamf Pro.
2. Click **Computers** at the top of the page.
3. To search for computers using an advanced computer search, click **Search Inventory**.
4. Click **New** (+ New) .
5. To save the search, select the **Save this Search** checkbox and create a display name in the **Display Name** field.
6. Click the **Criteria** tab.

7. Click **Add** `+ Add` .

8. Click **Show Advanced Criteria** at the top of the pane.

9. Do one of the following:

   - (macOS 10.13.2 or later) Find the "Enrolled via Automated Device Enrollment" criteria and click **Choose**. For the " Enrolled via Automated Device Enrollment " criteria, choose "is" from the **Operator** pop-up menu, and then click **Browse** ⬚ . From the values, select **Choose** for "Yes".

   - (macOS 10.13.1 or earlier) Find the "Enrollment Method: PreStage enrollment criteria" and click **Choose**. For the "Enrollment Method" criteria, choose "is" from the **Operator** pop-up menu, and then click **Browse** ⬚ . From the values, select the PreStage enrollment that the computers belong to.

10. Click **Add** `+ Add` .

11. Find the "Operating System Version" criteria and click **Choose**.

   > **Note:** Only your 30 most frequently used criteria are listed. To display additional criteria, click **Show Advanced Criteria**.

12. For the "Operating System Version" criteria, choose an appropriate operator from the **Operator** pop-up menu:

   - To update a specific macOS version, choose "is" from the **Operator** pop-up menu.

   - To update more than one macOS version, choose "greater than", "less than", "greater than or equal", or "less than or equal" from the **Operator** pop-up menu. For example, to update all versions of macOS greater than 10.12, you would choose the "greater than" operator and enter "10.12" in the **Value** field.

13. Enter a macOS version in the **Value** field, or browse for a macOS version by clicking **Browse** ⬚ .

14. (Optional) To update a range of macOS versions, repeat steps 14 through 17.

15. Choose "and" from the **And/Or** pop-up menu to specify the relationship between criteria.

16. Choose parentheses from the pop-up menus around the criteria to group them.

17. Click **Save.**

Updating macOS by Sending a Mass Action Command

You can use a mass action command to update the operating system for computers not using the current macOS version targeted by the advanced computer search.

> **Note:** If a new, major macOS release is available in the Mac App Store, computers could download the installer to upgrade macOS regardless of the update OS version mass action sent.

1. Log in to Jamf Pro.
2. Click **Computers** at the top of the page.
3. Click **Search Inventory**.
4. Select the name of the advanced computer search you created.
5. Click **View** at the bottom of the pane.
6. Click **Action** at the bottom of the pane.
7. Select **Send Remote Commands**.
8. Click **Next**.
9. Under Remote Commands, select **Update OS version and built-in apps (v10.11 or later computers enrolled with DEP only)**.
10. At the bottom of the pane, select one of the following for Update Action:
    - To download the update on computers for users to install themselves, select **Download the update for users to install**.
    - To download and install the update on computers automatically, select **Download and install the update, and restart computers after installation**.

    > **Note:** Selecting this option will cause any computers to download and install the update after the remote command is sent and they are connected to the network. If the computer has a passcode, the user is prompted to enter the passcode after the computer reboots.

11. To issue the remote command, click **Next**.

    > **Note:** Computers will not download or install the update if they have limited storage space and will not install the update if they have low battery.

12. Click **Done**.

    Computers in the advanced search check for updates as soon as the mass action command is sent.

Running Software Update Using a Policy

You can run Software Update using a policy to update to a minor macOS release. This method will update your computer to the latest point release of that particular major macOS release. For example, a computer with macOS 10.14.1 will update to 10.14.3 if it is the latest minor macOS release. When used with a software update server, this process provides more control over which update is installed. When you run Software Update using a policy on computers, you can choose whether updates are installed from Apple's Software Update server or an internal software update server. To have computers install updates from an internal software update server, the software update server must be in Jamf Pro. For more information, see Software Update Servers in the *Jamf Pro Administrator's Guide*.

> **Note:** Using a cache server can decrease the update time.

> **Note:** Computers with Apple silicon (i.e., M1 chip) cannot be updated using a policy if a restart is required. Use the **Download/Download and Install Updates** remote command to update the computer. For more information, see Updating macOS by Sending a Mass Action Command.

Running Software Update Using a Policy

1. Log in to Jamf Pro.

2. Click **Computers** at the top of the page.

3. Click **Policies**.

4. Click **New** (+ New) .

5. Use the General payload to configure basic settings for the policy, including the trigger and execution frequency.
   For an overview of the settings in the General payload, see Policy Payload Reference in the *Jamf Pro Administrator's Guide*.

6. Select the Software Updates payload and click **Configure**.

7. Specify a server for computers to install software updates from.

8. Use the Restart Options to configure the following:

   a. Choose the disk to boot computers to from the **Startup Disk** pop-up menu.

   b. Choose "Restart if a package or update requires it" from the **No User Logged In Action** pop-up menu.

   c. Choose "Restart if a package or update requires it" from the **User Logged In Action** pop-up menu.

   d. (Optional) Configure the rest of the settings as needed.

9. Click the **Scope** tab and configure the scope of the policy.
   For more information, see [Scope](#) in the *Jamf Pro Administrator's Guide*.

10. (Optional) Click the **Self Service** tab and make the policy available in Self Service.
    For more information, see [Items Available to Users in Jamf Self Service for macOS](#) in the *Jamf Pro Administrator's Guide*.

11. (Optional) Click the **User Interaction** tab and configure messaging and deferral options.
    For more information, see [User Interaction with Policies](#) in the *Jamf Pro Administrator's Guide*.

12. Click **Save**.

    The policy runs on computers in the scope the next time they check in with Jamf Pro and meet the criteria in the General payload.

Installing macOS from macOS Recovery

You can use macOS Recovery to manually upgrade your computer to the latest compatible macOS version. This method requires an internet connection during the upgrade process and is only for major macOS releases.

To install the latest macOS version compatible with your computer, start up from macOS Recovery by turning on your computer and pressing **Option-Command-R**. If you want to erase the data on the computer before installing macOS, you can use the Disk Utility.

> **Note:** On FileVault encrypted computers with macOS 10.15 or later, you must enter the password or the recovery key of the FileVault enabled user to access the recovery partition.

For more information on how to install macOS from macOS Recovery, see How to reinstall macOS from macOS Recovery from Apple's support website.

Packaging and Deploying the macOS Installer

If you want to automate the upgrade process, you can package the macOS installer and install it automatically or allow users to install it via Self Service. This method is recommended for major macOS releases. You can erase the data on computers with macOS 10.13.4 or later by using the `--eraseinstall` flag. Additionally, you have the option of using a script to customize the end user experience.

Deploying a policy to upgrade computers to macOS 10.13 or later involves the following steps:

1. Add the .app file for macOS to Jamf Admin or Composer.
2. Create a smart computer group to identify eligible computers.
3. Cache the macOS installer package file using a policy.
4. Create a smart computer group with the cached macOS installer package.
5. Create a policy for upgrading macOS automatically or via Self Service.

> **Note:** The name of the macOS installer package file in Jamf Admin and Composer will vary depending on the version of macOS that you plan to deploy.

Requirements

- Jamf Pro 9.98 or later

> **Note:** If you are using Jamf Pro 8.3-9.1, see the [Deploying macOS 10.7 or Later with Jamf Pro](#) article for instructions on deploying a macOS upgrade.

- Jamf Admin or Composer
- The .app file for the version of macOS that you plan to deploy (For example, `Install macOS Mojave.app`.)
  You can obtain the latest .app file for macOS from the Mac App Store.
- Managed computers with:
  - (Optional) Self Service
  - The system requirements for the version of macOS that you plan to deploy

Step 1: Add the .app File for macOS to Jamf Admin or Composer

Adding the .app File for macOS to Jamf Admin

Jamf Admin zips the .app file so you can cache and install it using policies.

1. Open Jamf Admin and authenticate to the Jamf Pro server.
2. Drag the .app file to the main repository in Jamf Admin.
   The .app file is displayed in blue text in the Unknown category until you add it to a category.
3. Double-click the package in the main repository.
4. Click the **General** tab and choose a category for the package.
5. Click **OK.**

Adding the .app File for macOS to Composer

Composer packages the .app file so you can cache and install it using policies.

1. Open Composer and authenticate locally.
2. Drag the .app file into the sources section of the sidebar in Composer.

   > **Note:** The file path reflected in Composer is where the package will install on target computers.

3. Select the .app file from the Sources list in the sidebar.
4. In the toolbar, click **Build as PKG** 🛠️ .

   > **Note:** If the **Build flat PKGs** preference is enabled and the package source contains scripts that are not supported by flat PKGs, a dialog will appear. To disable this preference for this package only, click **Build as non-flat PKG**. To build a flat PKG that ignores unsupported scripts, click **Build as flat PKG**. For more information on which scripts are supported by flat PKGs, see Adding Scripts to Package Sources in the *Composer User Guide*.

5. Select the principal distribution point in Jamf Pro, and then click **Save.**

Step 2: Create a Smart Computer Group to Identify Eligible Computers.

Create a smart computer group to identify computers that can be upgraded.

1. Log in to Jamf Pro.

2. Click **Computers** at the top of the page.

3. Click **Smart Computer Groups**.

4. Click **New** (+ New) .

5. Use the Computer Group pane to configure basic settings for the group.
   To enable email notifications, select the **Send email notification on membership change** checkbox.

6. Click the **Criteria** tab and add criteria to the group:

   > **Note:** These are the minimum recommendations, consider adding other criteria to your smart computer group.

   a. Click **Add** (+ Add) .

   b. Click **Choose** for the "Operating System Version".

   > **Note:** Only your 30 most frequently used criteria are listed. To display additional criteria, click **Show Advanced Criteria**.

   c. Choose an operator from the **Operator** pop-up menu.

   d. Enter the macOS version you want to upgrade in the **Value** field, or browse for a macOS version by clicking **Browse** ⬚ .

   e. (Optional) Repeat steps a through d to create a range of macOS versions to upgrade.

7. Choose "and" from the **And/Or** pop-up menus to specify the relationships between criteria.

8. To group criteria and join multiple operations, choose parentheses from the pop-up menus around the criteria you want to group.

9. Click **Save**.
   Operations in the group take place in the order they are listed (top to bottom).
   Group memberships are updated each time computers check in with Jamf Pro and meet or fail to meet the specified criteria.

   To view the eligible computers, click **View**.

Step 3: Cache the macOS Installer Package Using a Policy

After adding the .app file to Jamf Admin or Composer, you can cache the file using a policy. Caching the file ahead of time speeds up the upgrade process.

1. Log in to Jamf Pro.
2. Click **Computers** at the top of the page.
3. Click **Policies**.
4. Click **New** (+ New) .
5. In the General payload, enter a display name for the policy.
6. Select **Recurring Check-in** as the trigger.
7. Choose "Once per Computer" from the **Execution Frequency** pop-up menu.
8. Select the Packages payload and click **Configure**.
9. Click **Add** for the macOS installer package file.
10. Choose "Cache" from the **Action** pop-up menu.
11. Specify a distribution point for computers to download the package from.
12. Select the Maintenance payload and click **Configure**.
13. Ensure that the **Update Inventory** checkbox is selected.
14. Click the **Scope** tab and configure the scope of the policy. You can add the previously created smart group of eligible computers as the scope.
    For more information, see Scope in the *Jamf Pro Administrator's Guide*.
15. Click **Save**.

The macOS installer package file is cached on computers in the scope the next time they check in with Jamf Pro and meet the criteria in the General payload.

Step 4: Create a Smart Computer Group with the Cached macOS Installer Package

Create a smart group of computers with the macOS installer package file cached. The smart group will be used as the scope of the policy for installing the macOS upgrade automatically or for allowing users to download the upgrade via Self Service.

1. Log in to Jamf Pro.
2. Click **Computers** at the top of the page.

3. Click **Smart Computer Groups**.

4. Click **New** ⊕ New .

5. On the Computer Group pane, enter a display name for the smart computer group.

6. Click the **Criteria** tab.

7. Click **Add** ⊕ Add .

8. Click **Choose** for "Cached Packages".

> **Note:** Only your 30 most frequently used criteria are listed. To display additional criteria, click **Show Advanced Criteria**.

9. Choose "has" from the **Operator** pop-up menu.

10. Click **Browse** ⋯ .

11. Click **Choose** for the macOS installer package file.

> **Note:** The macOS installer package file is not available as a value until it has been cached on at least one computer.

12. Click **Save**.

Step 5: Create a Policy for Upgrading macOS

After caching the macOS installer package file, you can create a policy that allows users to upgrade macOS through Self Service, or that upgrades macOS on computers in the scope automatically.

Creating a Self Service Policy for Upgrading macOS

1. Log in to Jamf Pro.

2. Click **Computers** at the top of the page.

3. Click **Policies**.

4. Click **New** ⊕ New .

5. In the General payload, enter a display name for the policy. For example, "Upgrade macOS".

6. Choose "Once per Computer" from the **Execution Frequency** pop-up menu.

7. Select the Packages payload and click **Configure**.

8. Click **Add** for the macOS installer package file.

9. Choose "Install Cached" from the **Action** pop-up menu.

10. (Optional) To use a script to install macOS, use the Scripts payload to add the script and configure the settings.
    For information, see Managing Scripts and Running Scripts in the *Jamf Pro Administrator's Guide*.

> **Note:** You can also use Jamf Helper to add additional end-user messaging.

11. Select the Files and Processes payload and click **Configure**.

12. In the **Execute Command** field, enter the file path to the installer with the `--startosinstall` command. For example, `"/file/path/Install macOS High Sierra.app/Contents /Resources/startosinstall"`.

    a. (Optional) To erase data while installing macOS, add the `--eraseinstall` flag to the command.

    b. (Optional) To suppress end-user messages during installation, add the `--agreetolicense` flag to the command.

13. Click the **Scope** tab.

14. Click **Add** ⌜ + Add ⌝ .

15. Click the **Computer Groups** tab.

16. Click **Add** for the smart computer group with the cached macOS installer package file you just created.

17. Click the **Self Service** tab.

18. Select **Make the policy available in Self Service**.

19. Configure how the policy is displayed in Self Service using the settings on the pane.

20. Click **Save**.

    The policy is made available in Self Service on computers in the scope the next time they check in with Jamf Pro and meet the criteria in the General payload. macOS is upgraded when users run the policy from Self Service.

    Upgrading FileVault 2-enabled drives from macOS 10.7 or 10.8 prompts users to enter their password after reboot. Upgrading FileVault 2-enabled drives from macOS 10.9 or later automatically bypasses authentication after reboot.

Creating a Policy for Upgrading macOS Automatically

1. Log in to Jamf Pro.

2. Click **Computers** at the top of the page.

3. Click **Policies**.

4. Click **New** ⌜ + New ⌝ .

5. In the General payload, enter a display name for the policy. For example, "Upgrade macOS".

6. Choose "Once per Computer" from the **Execution Frequency** pop-up menu.

7. Select the Packages payload and click **Configure**.

8. Click **Add** for the macOS installer package file.

9. Choose "Install Cached" from the **Action** pop-up menu.

10. (Optional) To use a script to install macOS, use the Scripts payload to add the script and configure the settings.
    For information, see Managing Scripts and Running Scripts in the *Jamf Pro Administrator's Guide*.

11. Select the Files and Processes payload and click **Configure**.

12. In the **Execute Command** field, enter the file path to the installer with the `--startosinstall` command. For example, `"/file/path/Install macOS High Sierra.app/Contents/Resources/startosinstall"`

    - (Optional) To erase data while installing macOS, add the `--eraseinstall` flag to the command.

    - (Optional) To suppress user messages while installing macOS, add the `--agreetolicense` flag to the command.

13. Click the **Scope** tab.

14. Click **Add** ⊕ Add .

15. Click the **Computer Groups** tab.

16. Click **Add** for the smart computer group with the cached macOS installer package file you just created.

17. (Optional) Click the **User Interaction** tab and enter messages to display to users or allow users to defer the policy.
    For more information, see User Interaction with Policies in the *Jamf Pro Administrator's Guide* .

18. Click **Save**.
    The upgrade installs on computers in the smart group depending on the trigger configured in the policy.