

11. Windows 11 on ARM

11.1. General comments

Windows 11 on ARM will install and run on Fusion 13. With Fusion 13, VMware is providing virtual hardware features required by Windows 11 (both UEFI Secure Boot and Trusted Platform Module) as well as virtual device drivers for 2D graphics and networking.

Don't waste time on Windows 10 for ARM.

- Microsoft is encouraging upgrades to Windows 11 on all architectures.
- Microsoft no longer offers Windows 10 for ARM as an Insider Preview.
- Windows 11 on ARM is more feature complete to its Intel counterpart than Windows 10 was.
- Windows 11 on ARM includes Microsoft's x86_64 translator capabilities (useful for running Windows applications compiled on Intel versions of Windows). This functionality is not available on Windows 10.

The writing is on the wall. Use Windows 11.

Recommendation (for what it's worth...):

Try to use a Retail (a.k.a. "officially released") ISO build of Windows 11 22H2 obtained from uupdump.net to install Windows 11. The Insider Preview VHDX builds may seem easier to obtain and install but they are pre-release builds designed for IT professionals or experienced users. It is easier for less technical users to keep Retail builds of Windows 11 up to date through Windows Update than to deal with updating the Insider Preview VHDX builds.

11.2. “Start pxe over ipv4” message displayed during VM power up

If this message appears, check to see if one of the following has occurred:

- You did not respond to the “Press any key to start from CD or DVD” prompt before it timed out. You must click in the VM window before you press any key. If you fail to do this, the prompt will time out and the boot process will attempt a PXE boot over the network.
- You have a corrupt or invalid ISO file. Verify that you have valid installation media as a bootable operating system was not found. Please see the topic [Obtaining Windows 11 ARM ISO installation media](#).
- You are trying to use a Windows 11 on ARM Insider Preview VHDX file as a virtual CD-ROM drive. Please see the topic [Installing Windows 11 from Windows 11 on ARM](#)

[Insider Preview VHDX file](#)

- You have x86_64/x64 Windows 11 installation media. Only Windows 11 on ARM (arm64) media will boot on Apple Silicon processors. Please see the topic [Obtaining Windows 11 ARM ISO installation media](#).

11.3. Obtaining Windows 11 ARM ISO installation media

Windows 11 on ARM can be installed from ISO media in a similar manner to installing Windows 11 from ISO media on a PC.

Microsoft does not make it easy to find ISO installation media for Windows 11 ARM (or if they do, they have done a very good job hiding it from us mere mortals). Any ISOs built or downloaded via <https://www.microsoft.com/software-download/windows11> are for Intel (x86_64) architectures only.

Some Enterprise Partner programs or MSDN subscriptions may provide the required ISOs. For example, @shildebrandt (VMware employee) has reported success with the Windows 11 IoT Enterprise ISO included with an MSDN subscription. It is a full version of Windows 11 on ARM.

If do not have access to these Microsoft Partner or MSDN sources, use the UUP dump web site (<https://uupdump.net>) to build Windows 11 on ARM ISO installation media from Microsoft's repositories.

A sample procedure for the installation of Windows 11 for ARM in a Fusion 13 virtual machine can be found in the topic [Alternative method of installing tools when using ISO installation media](#).

11.3.1. Building Windows 11 for ARM 22H2 ISOs on Windows

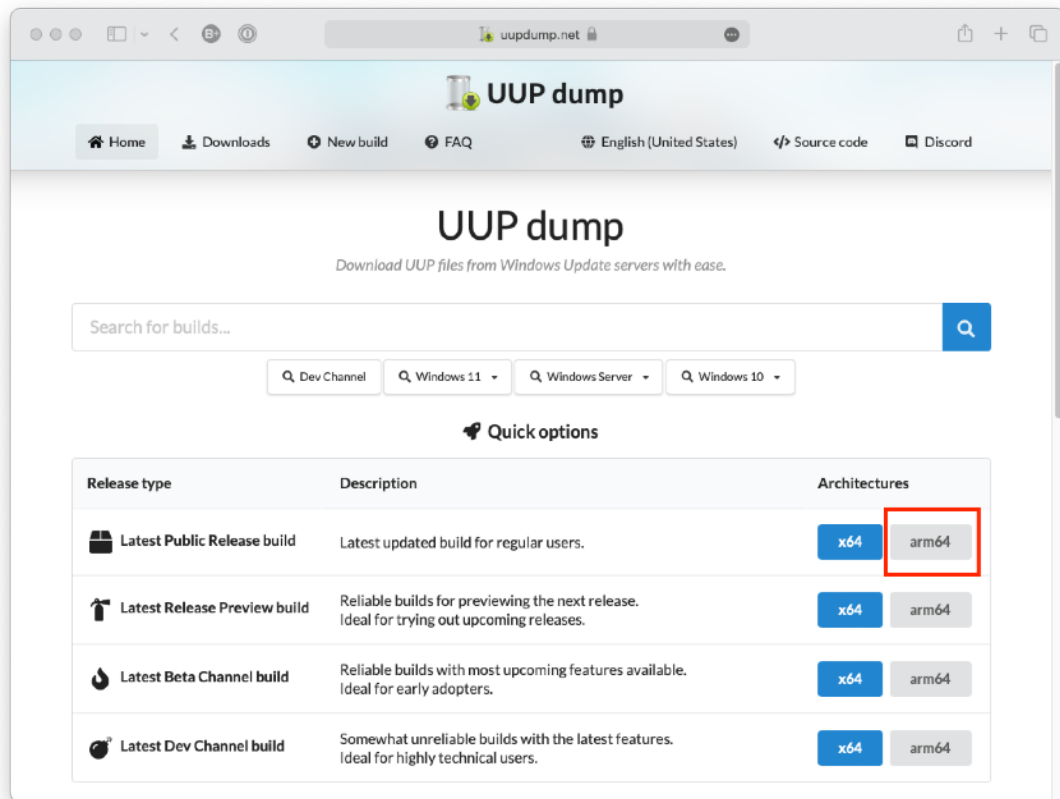
Note:

Use this procedure only if you have access to a Windows 10, version 2004 system or later.

Building Windows for ARM 22H2 ISOs on Windows

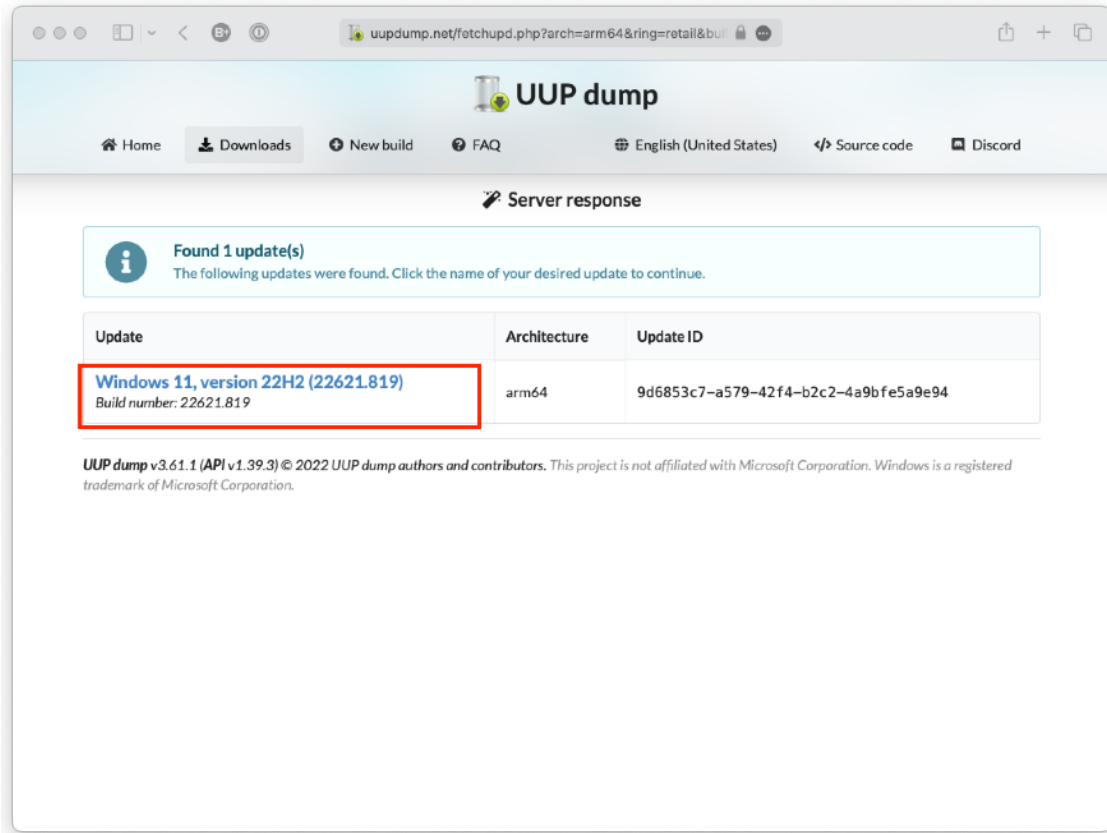
1. Navigate to <https://uupdump.net> using any web browser. Note that this can be done on any platform.

2. On the uupdump.net home page, click on the arm64 architecture for the Latest Public Release build:



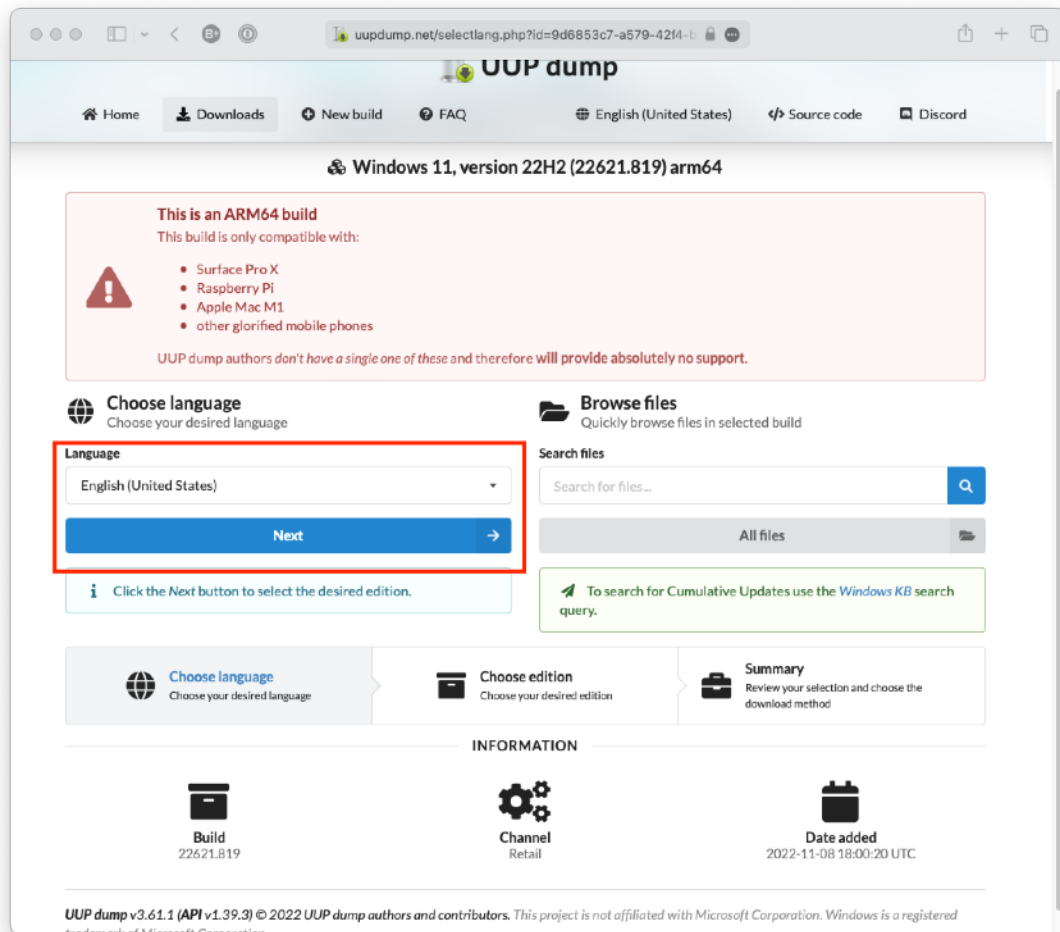
2

The latest Windows 11 public build will be displayed.



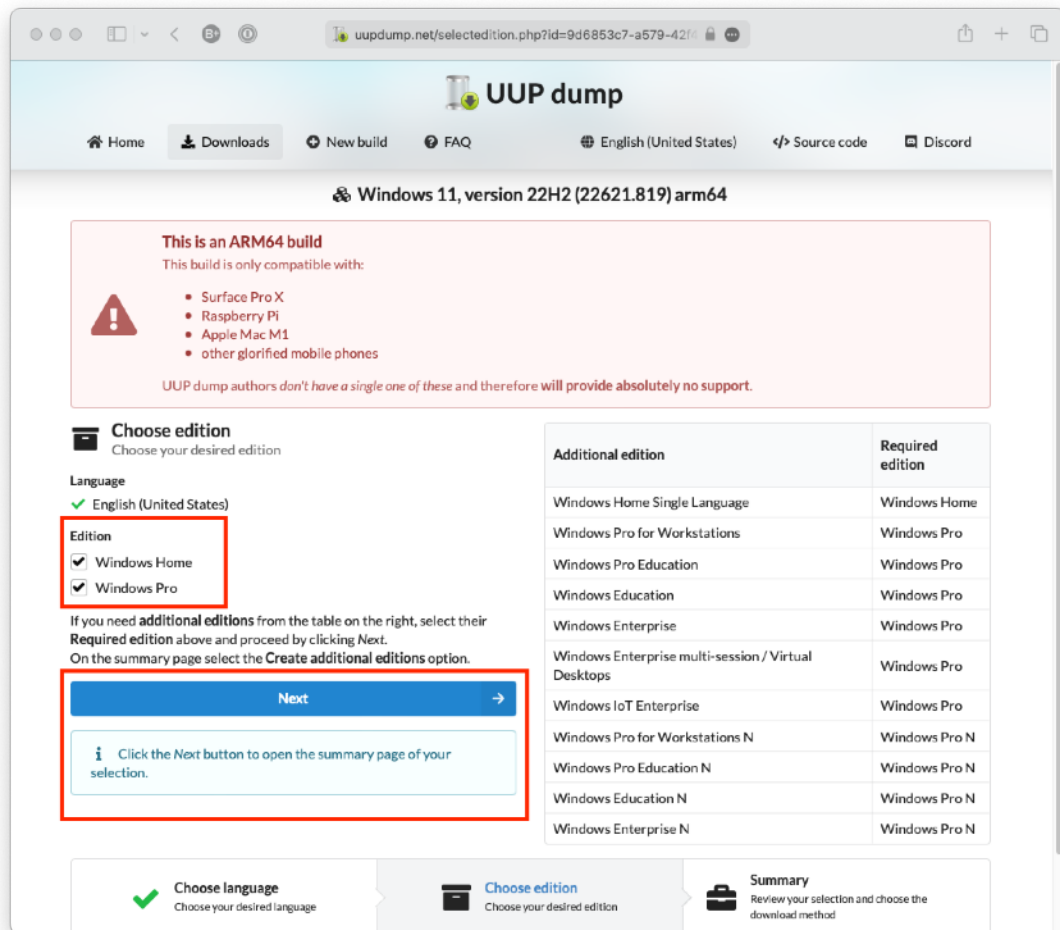
Click on the build.

3. The Choose Language page for the selected build will be displayed.



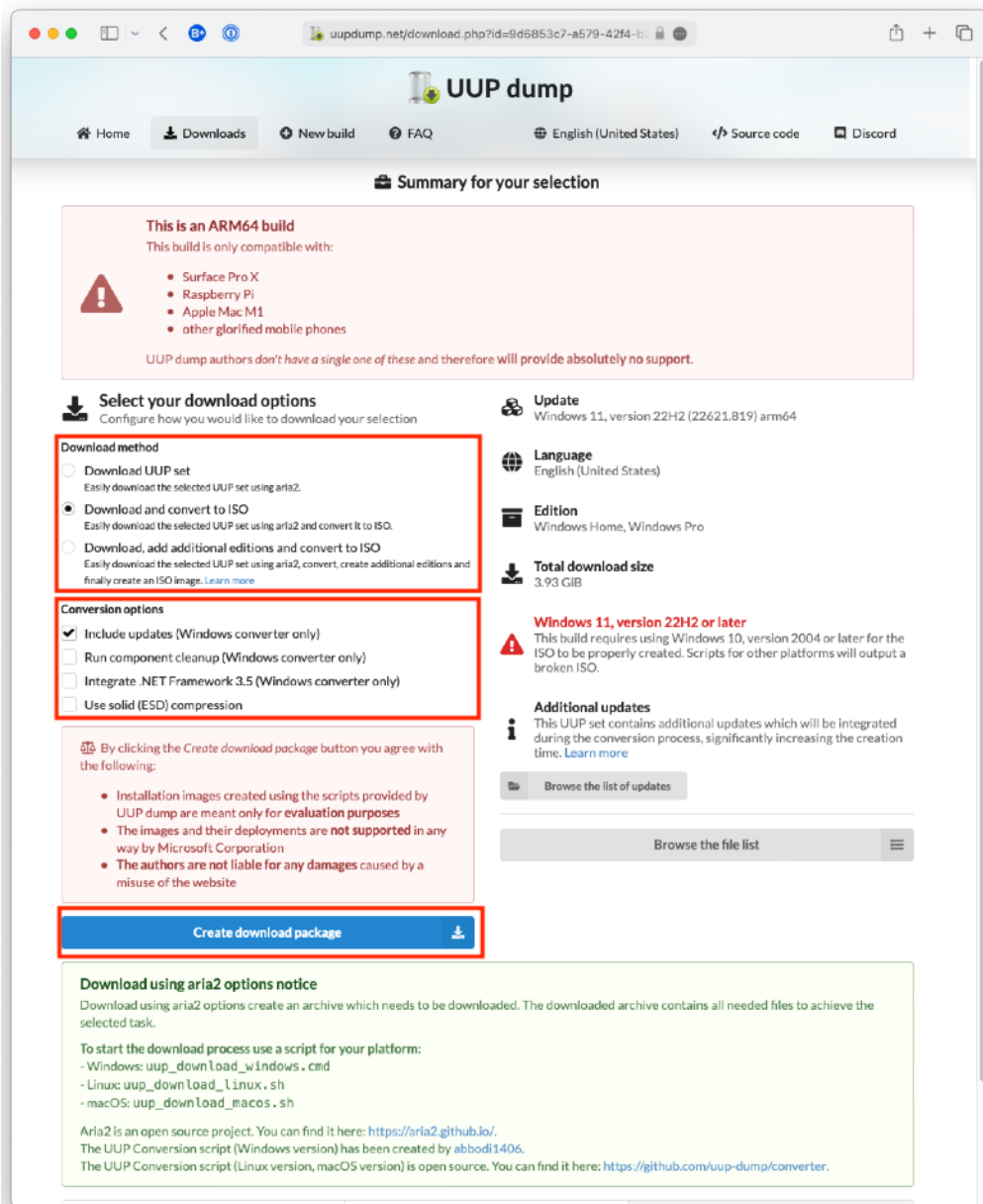
Select the desired language, then click the Next button to proceed

4. The 'Choose Edition' page will be displayed:



Select both Windows Home and Windows Pro Editions, then click Next.

5. The 'Summary' page will be displayed:



Under Download Method, select Download and convert to ISO.

Under Conversion options, only select Include Updates. Uncheck the other options.

Click 'Create download package' to continue.

6. A .zip file will be created and will download to your Downloads folder. This .zip file that contains information and shell scripts which will download and create the ISO installation media.

7.	Transfer this .zip file to a system running Windows 10, version 2004 or later (or Windows 11). The system can be physical or virtual, and either Intel or ARM. Have about 20 GB of free storage available to download and build the ISO.
8.	Extract the zip file, and a folder will be created containing the ISO creation scripts and necessary support files. The folder where the scripts reside will be used as a working folder for download and creation of the ISO media.
9.	Open a Windows command prompt, and 'cd' to the folder where the extracted files reside.
10.	Run the script to start the ISO creation process. <pre>.\uup_download_windows.cmd</pre>

Take a break and get a cup/glass of your favorite beverage while the file download and ISO creation process is in progress. The ISO will be found in the working folder at the end of the process. Transfer the file back to the Mac to use it for Windows 11 installation.

The zip file and working folder can be deleted once the ISO is confirmed to install.

11.3.2. Building Windows 11 for ARM 22H2 ISOs on macOS

Important:

This procedure assumes you have installed Homebrew on your macOS system.

Instructions for installing Homebrew are outside the scope of this document. Please reference the Homebrew web page at <https://brew.sh> and other web resources for instructions on how to install Homebrew.

Building Windows for ARM 22H2 ISOs on macOS	
1.	Follow steps 1 through 6 of the procedure Building Windows 11 on ARM 22H2 ISOs on Windows.
2..	Copy the downloaded .zip file from the Downloads folder into into an empty folder.
3.	Execute a Terminal session and install the required utilities from Homebrew. <pre>brew tap sidneys/homebrew brew install aria2 cabextract wimlib imagex brew install cdrtools sidneys/homebrew/chntpw</pre>

4.	Extract the .zip file obtained from step 7 and change the working directory to the folder that was created during the unzip process.
5.	Modify the permissions of the macOS shell script to allow execution. <pre>chmod +x uup_download_macos.sh</pre>
6.	Run the script to start the download process. <pre>./uup_download_macos.sh</pre>

Go have a cup of your favorite beverage while the Windows components are being downloaded and the ISO is being built. At the end of the process, a copy of the ISO file will be found in the directory where the script was run.

11.4. Installing Windows 11 on ARM from Insider Preview VHDX file

Note:

The procedure in the Tech Preview Testing Guide for downloading and converting the Windows 11 on ARM Insider Preview VHDX (Hyper-V virtual disk) to a VMware-compatible vm disk file assumes Homebrew is already installed on the Mac before starting the procedure.

Instructions for installing Homebrew are outside the scope of this document. Please reference the Homebrew web page at <https://brew.sh> and other web resources for instructions on how to install Homebrew.

In order to install a Windows 11 on ARM virtual machine from the Windows 11 on ARM Insider Preview VHDX file, you must visit <https://insider.windows.com> and sign up for the Windows Insider Program. Once enrolled, you are able to download the Insider Preview VHDX virtual hard disk file can be downloaded from Microsoft here: <https://www.microsoft.com/en-us/software-download/windowsinsiderpreviewARM64>.

When selecting the edition to download, select the Beta channel edition, not the Dev channel edition.

Once the file is downloaded, it must be converted from .VHDX (Hyper-V) virtual disk format to VMDK (VMware) virtual disk format. Warning: Both of these editions are pre-release software and may not be easily upgradeable.

After downloading and converting the VHDX file, use the following procedure to complete the creation of the VM:

Installing Windows 11 from Windows Insider Preview VHDX file

1. Download the virtual machine from the Microsoft Windows Insider site using the following link: <https://www.microsoft.com/en-us/software-download/windowsinsiderpreviewARM64> .
When prompted, select the Beta Channel edition, not the Dev Channel edition.
2. Open the Terminal application, and install QEMU from Homebrew with the following command:

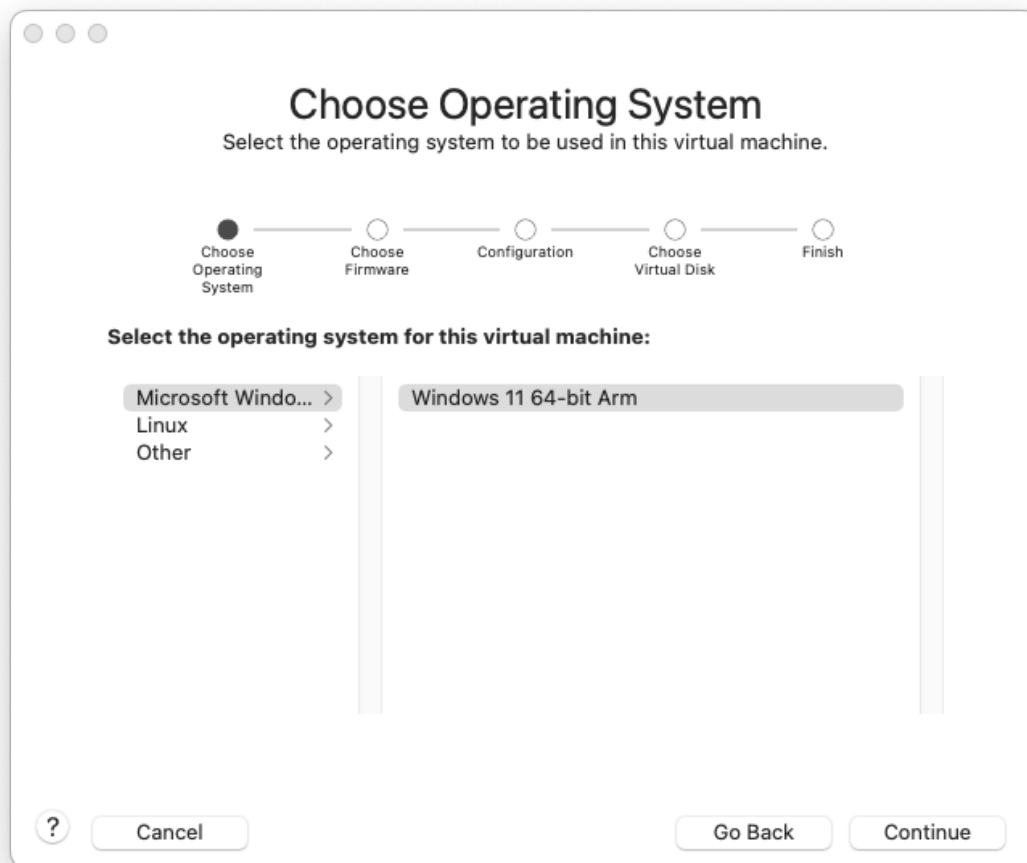
```
brew install qemu
```
3. In the Terminal application, change the working directory to the location where you downloaded the VHDX file.
Convert the VHDX file using the following command:

```
qemu-img convert -p -O vmdk vhdx-file-name.VHDX Windows11.vmdk
```


Where *vhdx-file-name.VHDX* is the name of the download file.
Note that the name of the converted file (in this case windows11.vmdk) must be different than the file being converted, and must contain the .vmdk extension. Failure to do this will result in a corrupted conversion.
4. Create a new virtual machine in Fusion using File -> New... in the Fusion menu bar.
5. In the “Select the Installation Method” dialog, click “Create a custom virtual machine”, then click Continue.

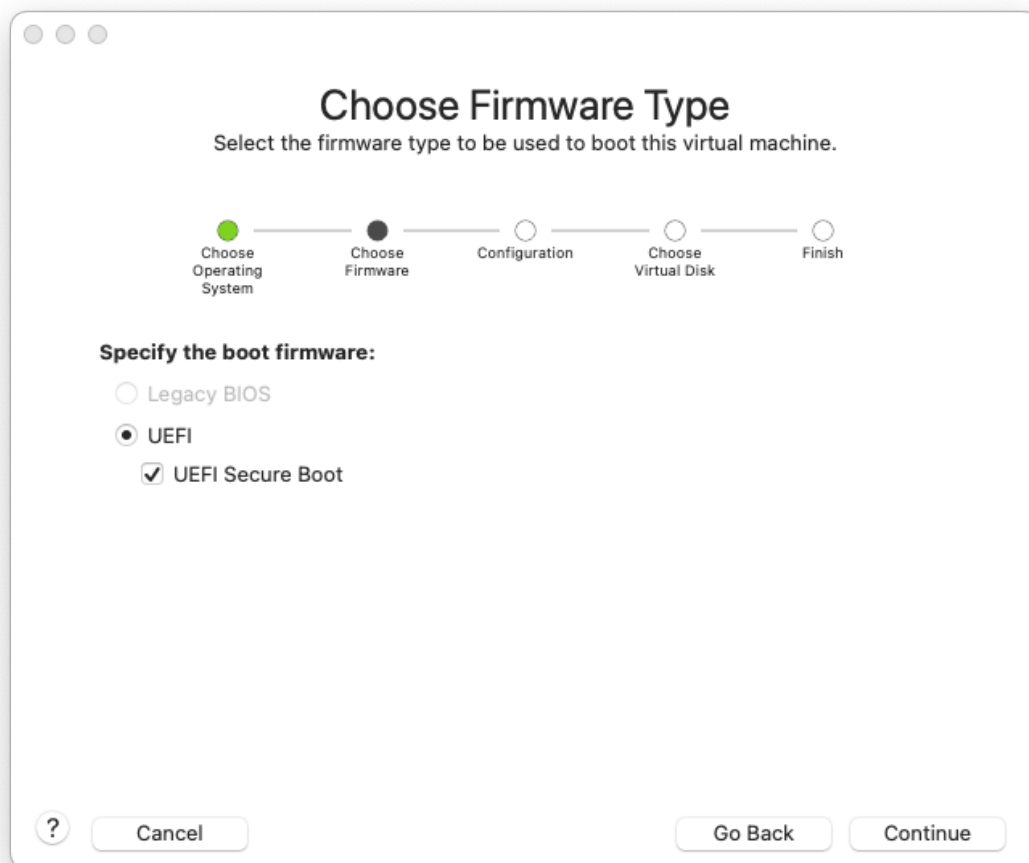
Installing Windows 11 from Windows Insider Preview VHDX file

6. In the “Choose Operating System” dialog, select “Microsoft Windows” in the left hand pane, then “Windows 11 64-bit Arm” in the right hand pane.



Installing Windows 11 from Windows Insider Preview VHDX file

7. In the “Choose Firmware Type” dialog, ensure the UEFI Secure Boot box is checked.



Click Continue.

Installing Windows 11 from Windows Insider Preview VHDX file

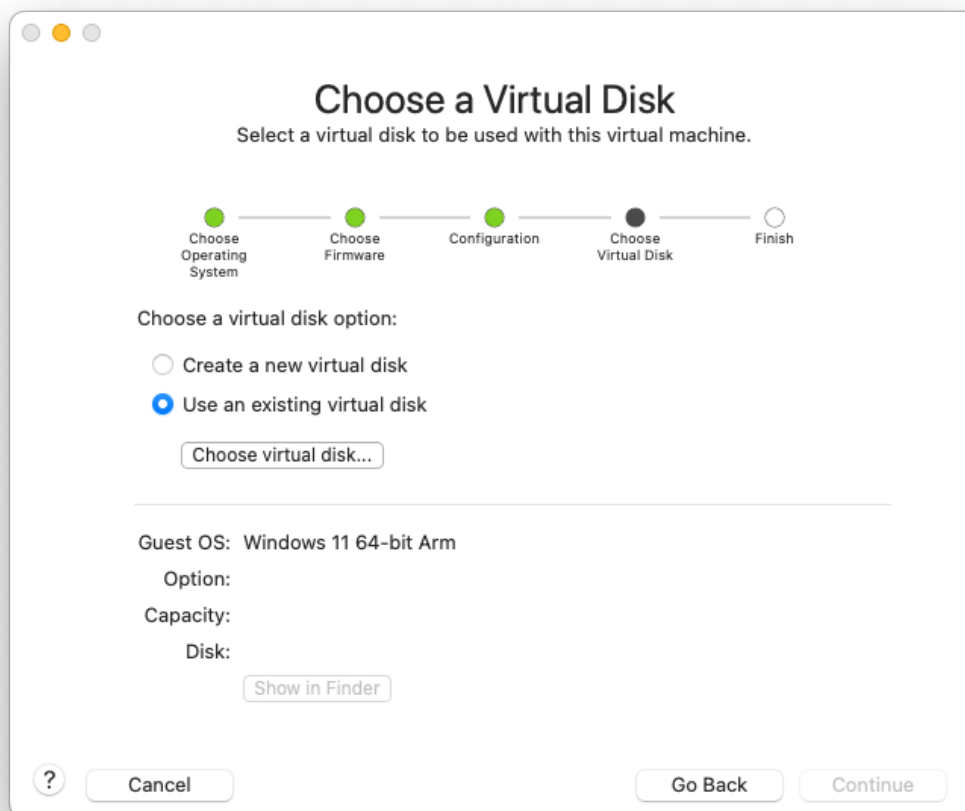
8. In the Choose Encryption dialog, select “Only the files needed...”, provide a password, and ensure the “Remember Password and store it in Mac’s Keychain”. If you forget what the password for the virtual machine is, it can be found in the user’s Keychain.



Click Continue.

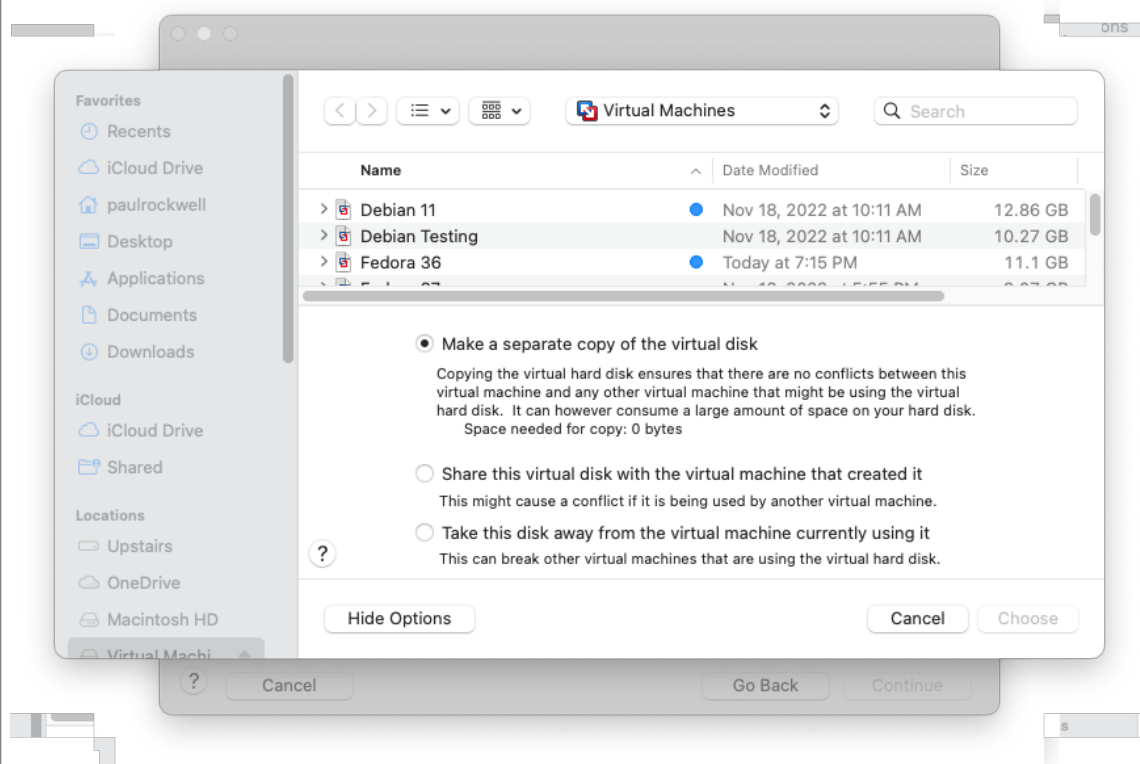
Installing Windows 11 from Windows Insider Preview VHDX file

9. In the Choose a Virtual Disk dialog, select “Use an existing Virtual Disk”, then click the “Choose virtual disk” button.



Installing Windows 11 from Windows Insider Preview VHDX file

10. In the next dialog box, locate the converted VMDK file, and choose the “Make a separate copy of the virtual disk”. This makes a copy of the converted virtual disk for use by the new Windows 11 virtual machine, and leaves the original copy of the virtual disk intact for later use.

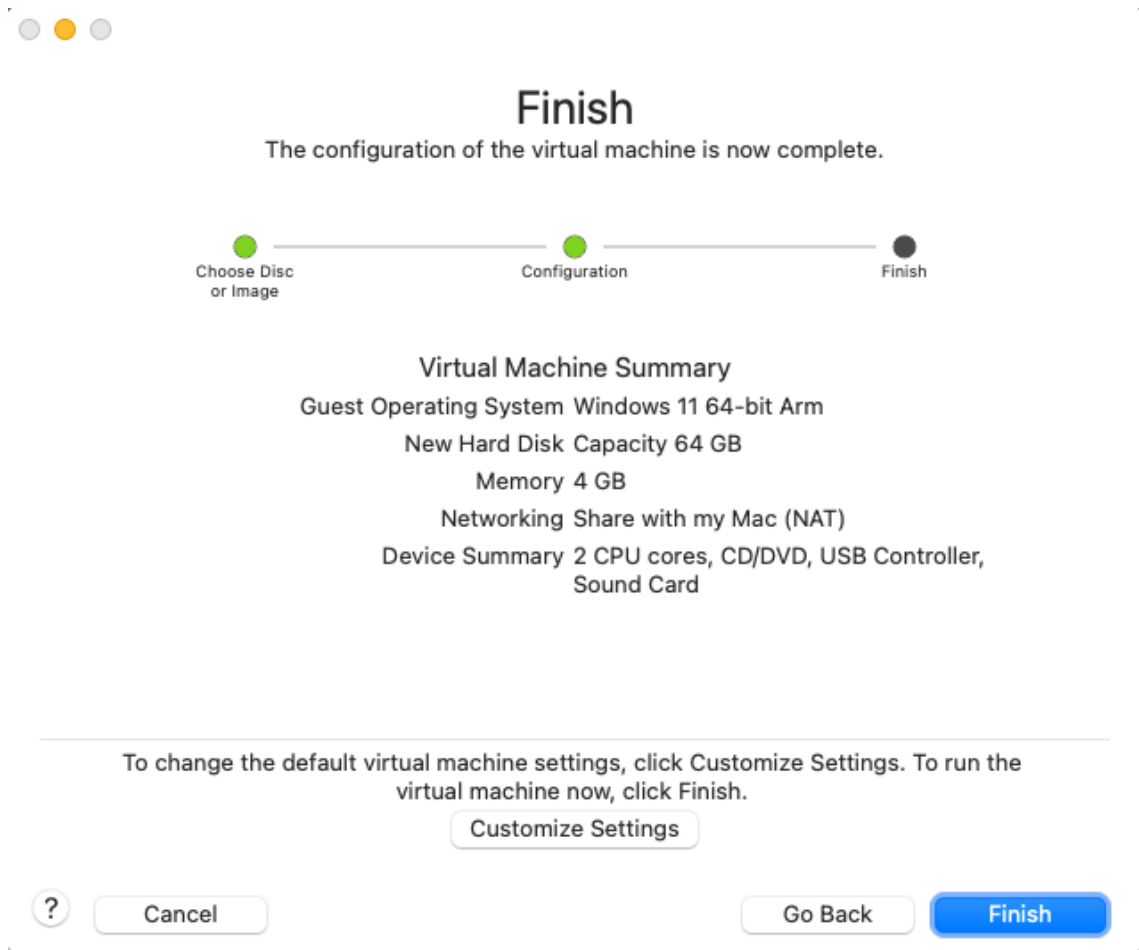


Click Choose when finished, This dialog will close.

Click Continue on the Choose a Virtual Disk dialog.

Installing Windows 11 from Windows Insider Preview VHDX file

11. At the Finish screen, press Customize Settings rather than Finish. This will allow you to alter settings of your virtual machine before starting the installation.

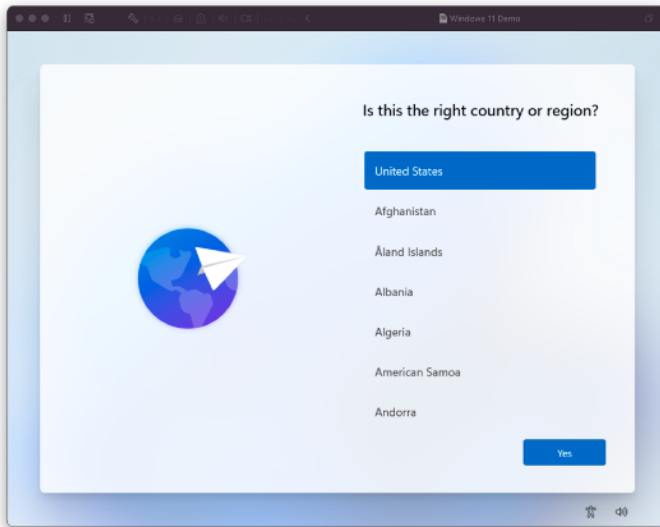


After pressing Customize Settings, name your VM and select the folder where the VM is to be stored.

12. The virtual machine's Settings panel will appear. Make any changes to the number of processors, memory, and virtual hard disk size that are desired.
When finished, power on the virtual machine.

Installing Windows 11 from Windows Insider Preview VHDX file

13. You will see the this first screen of the Windows 11 setup process:



Do not answer any of the questions. Instead, press Shift-fn-F10 to open a command line prompt.

14. In the command line prompt, execute PowerShell

```
powershell
```

The Windows command line prompt will be replaced by a PowerShell prompt.

15. From the Fusion menu bar, select Virtual Machine > Install VMware Tools.
Click “Install” on the dialog when prompted. The VMware Tools ISO will be mounted to your VM as the D: drive.
Wait a few moments while the VMware Tools ISO is being mounted to the VM.

16. In the PowerShell window, install the VMware Tools by executing the following commands:

```
D:  
Set-ExecutionPolicy RemoteSigned  
.\setup.ps1
```

The script will install both the VMware graphics driver and the VMware network driver for Windows 11. The screen may blank briefly while this happens.

17. When the tools installation finishes, reboot your VM via command line.:

```
shutdown /r /t 0
```

Installing Windows 11 from Windows Insider Preview VHDX file

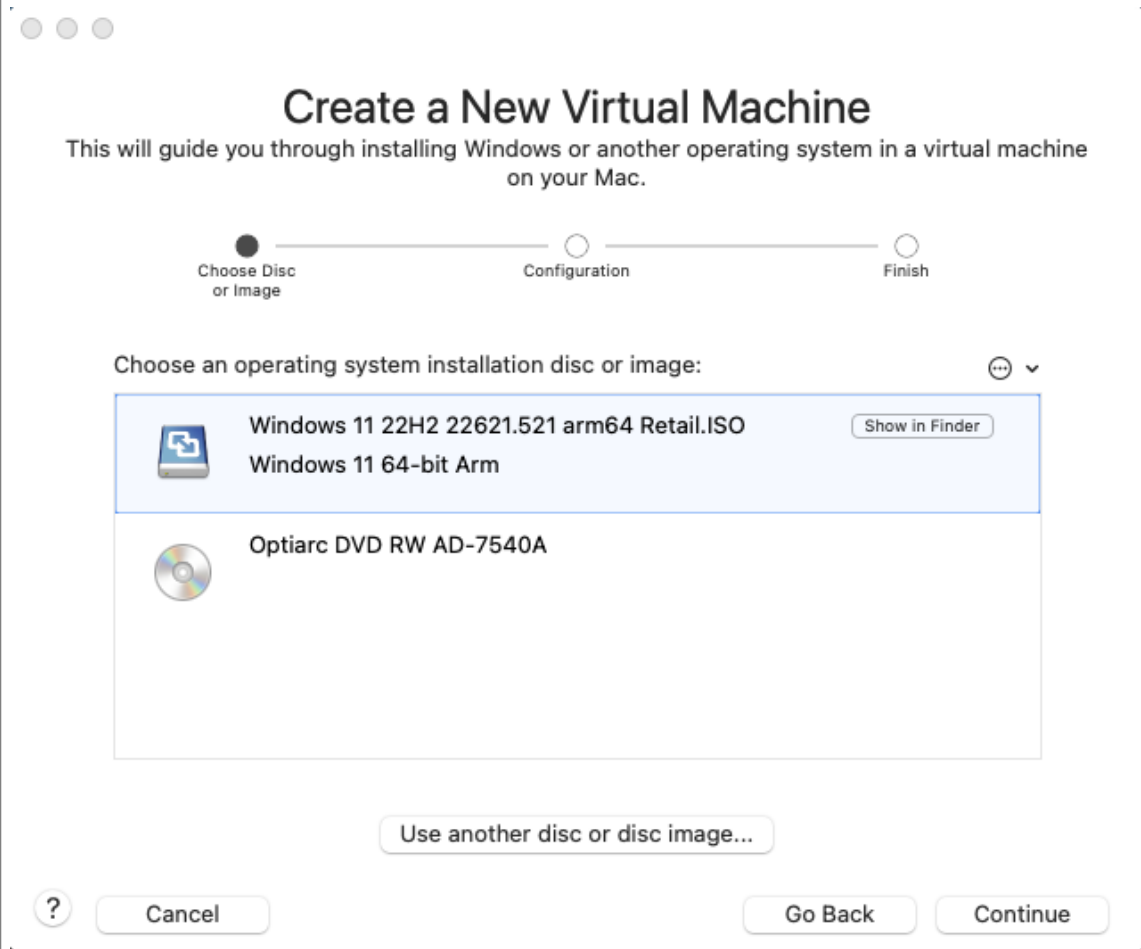
7. The VM will reboot, and the Windows setup will restart. Continue with the setup.
You will not be prompted for a network connection because the network should now be discovered and operational with the new VMware driver.
Answer additional Windows Setup prompts as directed.
Note that since the VM now has a network connection Windows may update itself “to the latest version” during initial setup.

11.5. Installing Windows 11 on ARM from ISO

Use the following procedure to install the Windows 11 on ARM from downloaded ISO media.

Installing Windows 11 on ARM from ISO

1. Create a new virtual machine by clicking File -> New... in the Fusion menu bar.
2. In the Select the Installation Method dialog, drag and drop the Windows 11 ISO to the area marked "Install from disc or image". You will see the ISO detected as a Windows 11 ISO.



Press "Continue"

Installing Windows 11 on ARM from ISO

3. On the Choose Firmware Type screen, select UEFI Secure Boot. Windows 11 has Secure Boot as a requirement for installation, and it will detect if it is not there.

The screenshot shows the 'Choose Firmware Type' window. At the top, there are three progress indicators: a grey circle, a yellow circle, and a grey circle. Below them, the title 'Choose Firmware Type' is centered, followed by the instruction 'Select the firmware type to be used to boot this virtual machine.' A progress bar with three dots is shown: the first dot is green and labeled 'Choose Disc or Image', the second is black and labeled 'Configuration', and the third is grey and labeled 'Finish'. Under the heading 'Specify the boot firmware:', there are three options: 'Legacy BIOS' with an unselected radio button, 'UEFI' with a selected radio button, and 'UEFI Secure Boot' with a checked checkbox. At the bottom, there is a help icon (question mark in a circle), a 'Cancel' button, a 'Go Back' button, and a blue 'Continue' button.

Press Continue

Installing Windows 11 on ARM from ISO

4. On the Choose Encryption page, Select “Only the files needed...”. This only encrypts the portions of the VM needed to support the TPM and secure enclave.

Do not choose All the files, because that will incur encryption/decryption penalties for the entire virtual disk.

The screenshot shows the 'Choose Encryption' window. At the top, there are three progress indicators: 'Choose Disc or Image' (green dot), 'Configuration' (black dot), and 'Finish' (grey dot). The title is 'Choose Encryption' with the subtitle 'Key in the Password for Encrypting this virtual machine.' Below this is a progress bar with three stages: 'Choose Disc or Image' (green dot), 'Configuration' (black dot), and 'Finish' (grey dot). The main section is titled 'Key in the Password for Encryption' and contains the text: 'This Guest OS requires a virtualized TPM to function securely. The VM must be encrypted with either Full or Fast encryption to add a TPM device. The password must have atleast 8 characters.' There are two radio button options: 'All the files (.vmdk, .vmx, etc) for this virtual machine are encrypted.' (unselected) and 'Only the files needed to support a TPM are encrypted. (.nvram, .vmss, .vmem, .vmx, .vmxn)' (selected). Below these are two password input fields: 'Password' and 'Verify', both containing eight dots. To the right of the 'Password' field is a button labeled 'Auto Generate Password'. Below the password fields is a checkbox labeled 'Remember Password and store it in Mac's Keychain' which is checked. At the bottom are three buttons: a help button with a question mark, a 'Cancel' button, and a 'Continue' button.

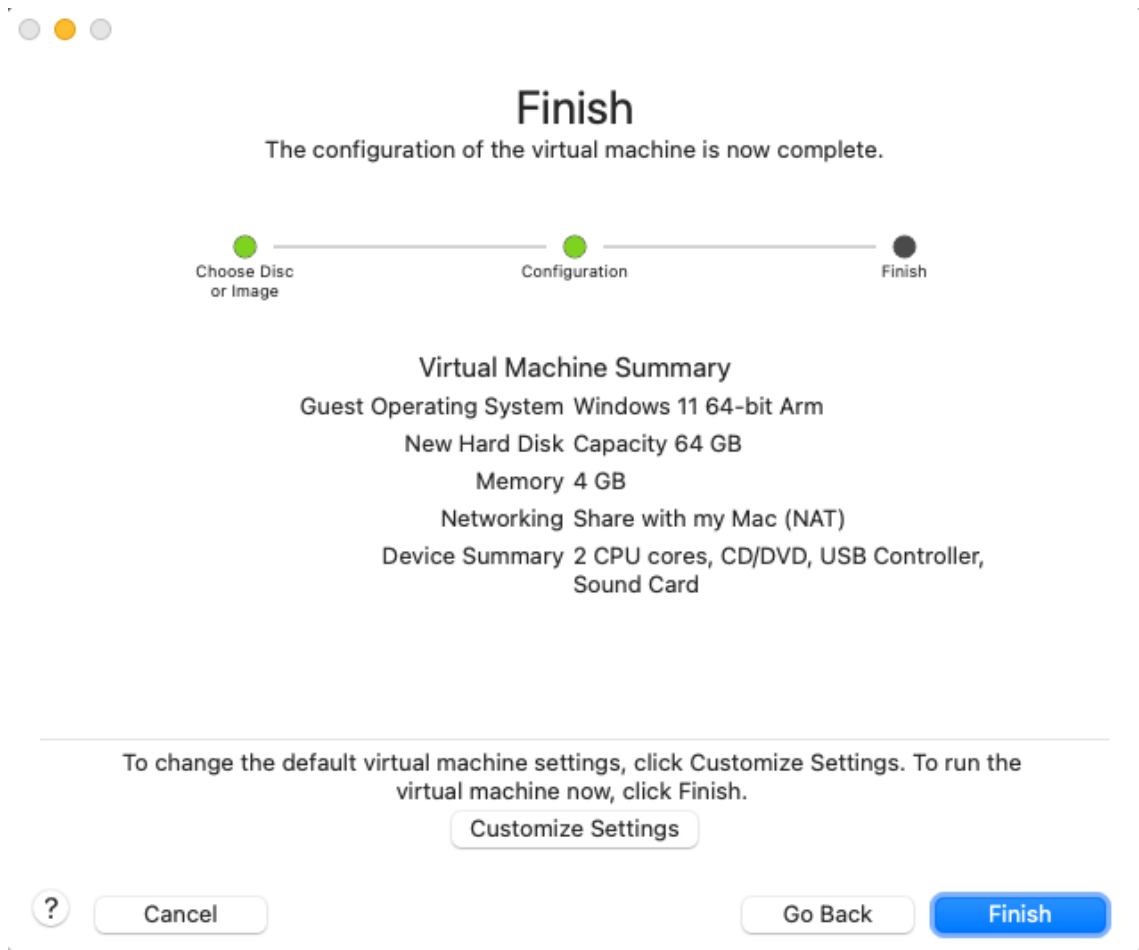
Create a password, and remember it. It is highly recommended to allow the password to be stored in the Mac's keychain - in case you forget it.

This process will automatically add the required Trusted Platform Module (TPM) device to the virtual machine configuration.

Press Continue.

Installing Windows 11 on ARM from ISO

5. At the Finish screen, press Customize Settings rather than Finish. This will allow you to alter settings of your virtual machine before starting the installation.



After pressing Customize Settings, name your VM and select the folder where the VM is to be stored.

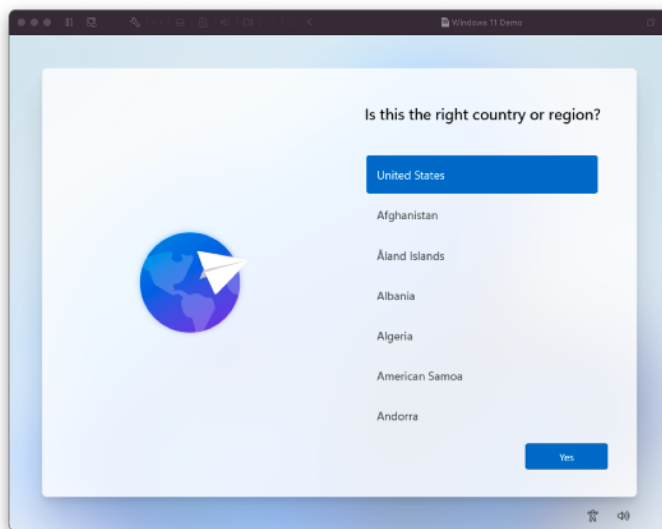
6. The virtual machine's Settings panel will appear. Make any changes to the number of processors, memory, and virtual hard disk size that are desired.
When finished, power on the virtual machine.

Installing Windows 11 on ARM from ISO

7. The virtual machine will boot and the console window will display the message
- Press any key to boot from CD or DVD**
- Quickly click in the virtual machine's window and press any key to continue the boot process from the ISO.
- This prompt will time out. If it does, the boot from ISO will time out and the VM will attempt to boot from the network. If messages about PXE booting are displayed, power off the virtual machine and power it on again.

8. The Windows installer should boot. Answer all questions for the initial installation. This process is identical to any Windows installation from ISO media.
- The virtual machine will reboot after Windows is installed to the virtual hard disk.

9. After reboot, you will see the this first screen of the Windows 11 setup process:



Do not answer any of the questions. Instead, press Shift-fn-F10 to open a command line prompt.

10. In the command line prompt, execute PowerShell

powershell

The Windows command line prompt will be replaced by a PowerShell prompt.

11. From the Fusion menu bar, select Virtual Machine > Install VMware Tools. Click "Install" on the dialog when prompted. The VMware Tools ISO will be mounted to your VM as the D: drive.

Wait a few moments while the VMware Tools ISO is being mounted to the VM.

Installing Windows 11 on ARM from ISO	
12.	<p>In the PowerShell window, install VMware Tools by executing the following commands:</p> <pre>D: Set-ExecutionPolicy RemoteSigned .\setup.ps1</pre> <p>The setup.ps1 script will install both the VMware graphics driver and the VMware network driver for Windows 11. The screen may blank out briefly while this happens.</p>
13.	<p>When the tools installation finishes, reboot your virtual machine via command line.:</p> <pre>shutdown /r /t 0</pre>
14.	<p>After reboot, the Windows setup will restart. Continue with the setup.</p> <p>You will not be prompted for a network connection because the network should now be discovered and operational with the new VMware driver.</p> <p>Answer additional Windows Setup prompts as directed.</p> <p>Note that since the VM now has a network connection Windows may update itself “to the latest version” during initial setup.</p>

11.6. Sharing folders with the Mac host in Fusion 13

The VMware Tools included with Fusion 13 do not support Fusion's Shared Folders functionality. Use one of the following workarounds to share folders between the Mac host and a Windows VM:

- **Configure macOS Windows file sharing**
Consult macOS Help (found in the Finder's Help menu bar) or Internet resources for instructions on how to configure macOS Windows file sharing, and then add the folders you wish to share with your VM to the configuration. This will allow the Windows VM to access the file system via standard Windows file sharing.
- **Use a Remote Desktop client**
Access the VM that is running Windows 11 Pro or Enterprise via a Remote Desktop client (such as Microsoft Remote Desktop on the Mac) and utilize its folder redirection capabilities. Consult documentation on how to enable RDP in Windows VM, and your RDP client on how to enable folder redirection.

Alternatively, a network file transfer utility such as WinSCP can be used to transfer files between the Windows VM and the Mac host.