VMware Fusion 22H2 Tech Preview

Pre-Release software for Intel and Apple Silicon Macs

Updated Sept 23, 2022

vmware®

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- Support for newer Linux kernels, 3D graphics drivers.
- Share your experience in our community forum, in a blog, in a video, or any other public format.
- Private Feedback can be directed to fusion-beta@vmware.com

About This Guide

Thanks for your interest and help to improve VMware Fusion!

We're tremendously excited about the possibilities on a new, non-x86 platform, and we're looking for your participation as we refine our beloved desktop hypervisor for macOS.

In this guide we'll describe the state of the project, what works, what doesn't, and how to get productive with Fusion on M1 Macs.

So, let's get to it!

How to Download

The Fusion 22H2 Tech Preview can be downloaded from the following link:

https://www.vmware.com/go/fusion-pub-tp

Installation

With a new Universal DMG, Fusion can be installed on Intel and Apple Silicon Macs using the same DMG.

Once downloaded from the link above, mount and install the .dmg as you normally would. Note that you may be prompted for permission to allow Fusion to run.

- Download the .dmg
- Double-click the .dmg to mount it
- Double-click "Install VMware Fusion Tech Preview"
- Agree to the EULA to continue installation

What's New?

Windows

VMware Fusion 22H2 Tech Preview supports Windows 10 and 11 on Intel and Windows 11 for Arm on Apple Silicon Macs. This includes a new Virtual Trusted Platform Module device and a 'fast encryption' mode to satisfy Windows 11 requirements while remaining performant.

> ***Note: When Fusion is installed on Apple Silicon it will run arm64/aarch64 operating systems, and when Fusion is installed on an Intel Mac it will run x86/x86_64 based operating systems.***

Installing Windows 11 on an Intel Mac is the same installing Windows before (i.e. via a .iso file), with a new option in the installation wizard to specify the encryption type ('full' or 'fast'), and to set the password. The installation should recognize the virtual hardware as compatible without warnings or errors and allow the installation to proceed successfully. Full VMware Tools is provided and should be installed automatically, but if it does not for whatever reason it can be installed manually from the Virtual Machine > Install VMware Tools menu option.

While installing Windows on an Apple Silicon Macs is essentially the same, there are some notable differences:

- Windows on ARM does not ship with a supported driver for the vmxnet3 virtual network adapter like it does on Intel. There is a workaround described in the 'Installing Windows on Apple Silicon' section.
- VMware Tools is not complete. There are 2 main drivers present in the VM Tools ISO package: vmxnet3 and WDDM (Display). The drivers are installed via a PowerShell script.
    - They can be installed *during* (to support signing in with a Microsoft account) or *after* the installation (which creates an 'offline' account).
- Host-Guest integration features (i.e. Drag-drop, HGFS/Shared Folders, copy-paste between Host and Guest, VM window autofit resolution, Unity) are not present in Windows on Arm VMs at this time.

Linux

VMware Fusion on Intel and Apple Silicon both support a wide variety of Linux-based operating systems. On Intel there is added support for newer versions of Ubuntu, Debian and Fedora and others.
On Apple Silicon there are a number of arm64 OS's which have been tested and are known to work such as:

- **Fedora** - v37 has the latest drivers, including full 3D hardware accelerated graphics support.
- **Ubuntu 22.04.1 and 22.10** The ISOs and Fusion have all been fixed to support Ubuntu VMs OOTB, and include our graphics drivers. 3D is not yet enabled, pending resolution of *this bug*.
- **Debian** - Bookworm/Testing is ideal presently. Graphics drivers are included in 5.18 and newer kernels. Does not yet support 3D pending resolution of the similar bug as Ubuntu listed above.
- **VMware Photon OS**. v3 and v4 are both tested.
- Other OSs do function (such as **NixOS** and **Kali Linux**) but they remain untested at this time.

When installing a custom Linux distribution, we recommend a kernel of 5.18 or higher for best performance and stability. For testing 3D Accelerated OpenGL 4.3, a 5.19 or newer kernel is required, along with 22.1.1 or newer Mesa libraries. We appreciate the community's input identifying boot and other issues with the distribution of your choice.

Where to get ARM64/AARCH64 ISO Images?

In order to install a Windows, Linux or BSD guest, an ISO file is required and must be built for the appropriate architecture. Importing other image types are not supported. Windows may also be installed using a 'custom VM' option and converting an existing .VHDX file to .vmdk, which is explained later in this document.

Windows

There are several ways to obtain an ISO for Windows, including from private partner programs that Microsoft offers. Users who have valid licenses should have been provided a method to acquire a Windows 10 or 11 ISO file from Microsoft.

An alternate path, which we have tested, is using a utility service '*uupdump.net*' to download and build a compatible .iso file for Windows on ARM. UUPDump will allow users to create a .iso file which contains specific build, version and components of Windows. For example, you can specify a 'Dev branch' or a 'release branch' with different editions (Home, Pro, Enterprise) and Languages for each. Instructions for this are provided later in this document.

Linux – Ubuntu

Ubuntu versions 22.04 and the pending 22.10 have been updated to resolve issues preventing successful boot. Both versions include our graphics drivers and can support resolutions above 4K. Once the following bug is resolved, we expect that Ubuntu will have full 3D support Out Of The Box.

- 22.04.1:
  - ***Desktop**:* https://cdimage.ubuntu.com/jammy/daily-live/current/
    - *ISO: https://cdimage.ubuntu.com/jammy/daily-live/current/jammy-desktop-arm64.iso*
  - **Server**: https://cdimage.ubuntu.com/ubuntu-server/jammy/daily-live/current/
    - ISO: *https://cdimage.ubuntu.com/ubuntu-server/jammy/daily-live/current/jammy-live-server-arm64.iso*
- 22.10:
  - ***Desktop**:* https://cdimage.ubuntu.com/daily-live/current/
    - *ISO: https://cdimage.ubuntu.com/daily-live/current/kinetic-desktop-arm64.iso*
  - **Server**: https://cdimage.ubuntu.com/ubuntu-server/daily-live/current/
    - ISO: *https://cdimage.ubuntu.com/ubuntu-server/daily-live/current/kinetic-live-server-arm64.iso*

Linux – Debian

Debian 'testing/bookworm', and 'unstable/sid' branches contain the latest bits which are destined for the next major version of Debian (v12), codenamed 'Bookworm'. Debain 'Stable', version 11.4, is currently named 'Bullseye', boots "out of the box" but does not include graphics drivers or open-vm-tools. The drivers can be installed manually by upgrading the linux-image-arm64 to 5.18+, but Open VM Tools requires 'bookworm' pinned libraries.

- Testing / Sid / Bookworm: *https://cdimage.debian.org/cdimage/weekly-builds/arm64/iso-cd/*
  - *https://cdimage.debian.org/cdimage/weekly-builds/arm64/iso-cd/debian-testing-arm64-netinst.iso*
- Stable / Bullseye: *https://cdimage.debian.org/debian-cd/11.4.0/arm64/iso-cd/*
  - *https://cdimage.debian.org/debian-cd/11.4.0/arm64/iso-cd/debian-11.4.0-arm64-netinst.iso*

Linux – Fedora Workstation

Fedora 'Rawhide' is a bleeding-edge distribution that, once stable, will make its way downstream into Red Hat Enterprise Linux. It currently uses a 5.19 kernel which includes our 3D vmwgfx svga display drivers. Current ISOs of Fedora 36 do not presently boot, but we hope that backporting newer kernel patches will address that in the near future.

"Fedora 'Workstation' Rawhide"

- *https://dl.fedoraproject.org/pub/fedora/linux/development/rawhide/Workstation/aarch64/iso/*

"Fedora 'Everything' rawhide"

- *https://dl.fedoraproject.org/pub/fedora/linux/development/rawhide/Everything/aarch64/iso/*

Linux – Photon OS:

Photon continues to work out of the box, including open-vm-tools.

Photon 4.0 Rev 2: *https://github.com/vmware/photon/wiki/Downloading-Photon-OS - downloading-photon-os-40-rev2*

- **Full ISO:** *https://packages.vmware.com/photon/4.0/Rev2/iso/photon-4.0-c001795b8-aarch64.iso*
- **Minimal ISO:** *https://packages.vmware.com/photon/4.0/Rev2/iso/photon-minimal-4.0-c001795b8-aarch64.iso*

Notes

Disabling Wayland

Wayland no longer needs to be disabled and is now expected to work.

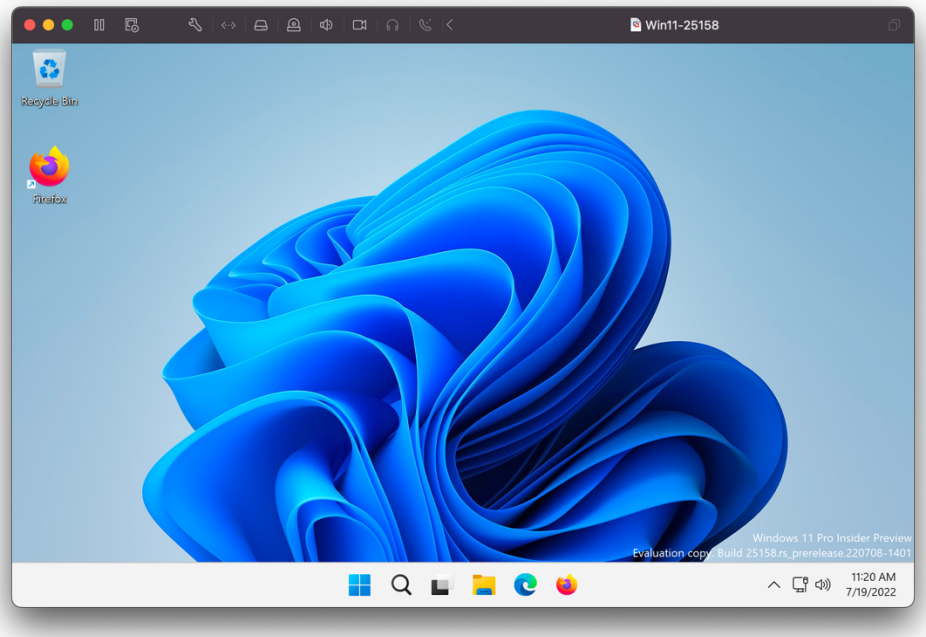
Installing open-vm-tools

Open VM Tools can be installed from a distributions' package manager (i.e. apt), or compiled from source. Instructions for this are outside the scope of this document, but the same process applies for both x86_64 and arm64 versions. Examples (minus the quotes):

- For Ubuntu and Debian: `sudo apt install open-vm-tools open-vm-tools-desktop`
- For Fedora: `sudo yum install open-vm-tools open-vm-tools-desktop`

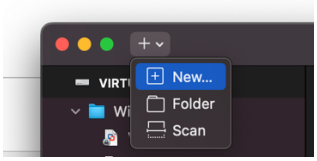
Installing Windows on Apple Silicon from .iso file

A major new feature for Fusion on Apple Silicon is improved support for Windows on ARM virtual machines. Installing Windows requires either an .iso file or a preexisting .vmdk virtual disk.

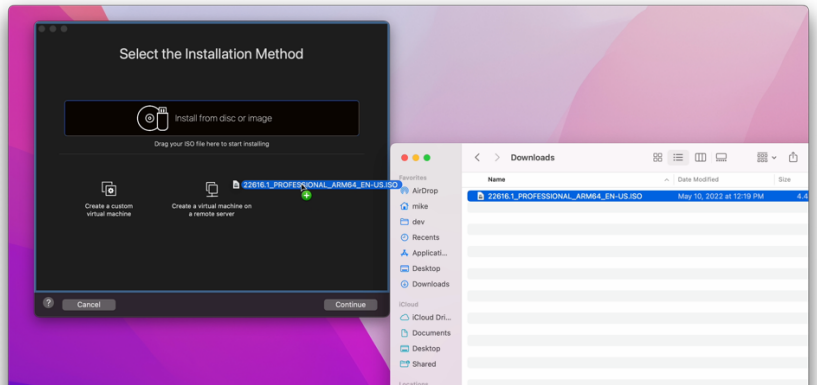


To install Windows on Apple Silicon from ISO:

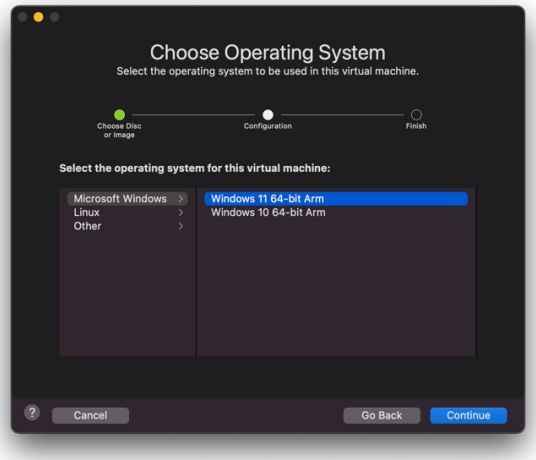
1) Select File > New, or click the '+' button in the Virtual Machine Library Window



2) Drag-drop the Windows ISO file onto the New VM dialogue



3) Click Continue and select the appropriate version of Windows in the Guest OS selection

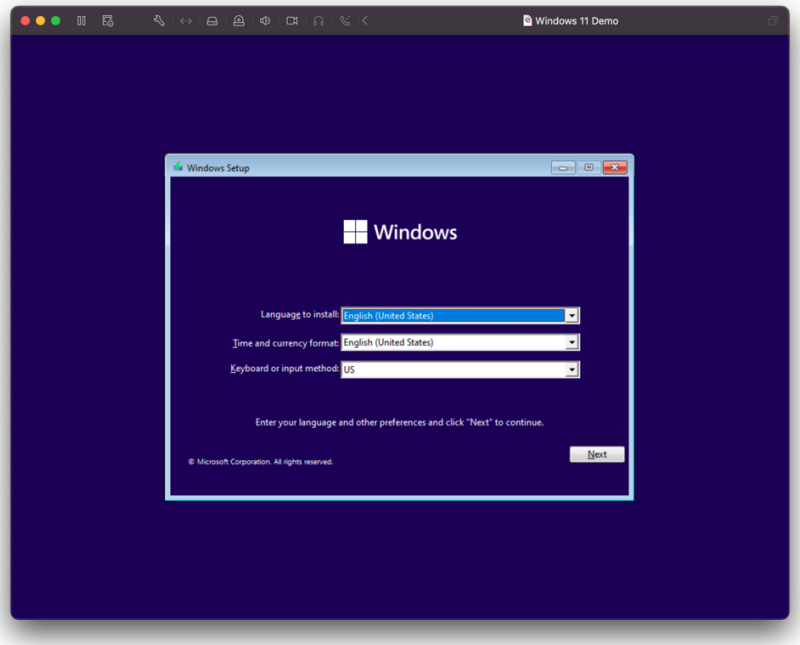


4) Choose to use UEFI Secure Boot or not

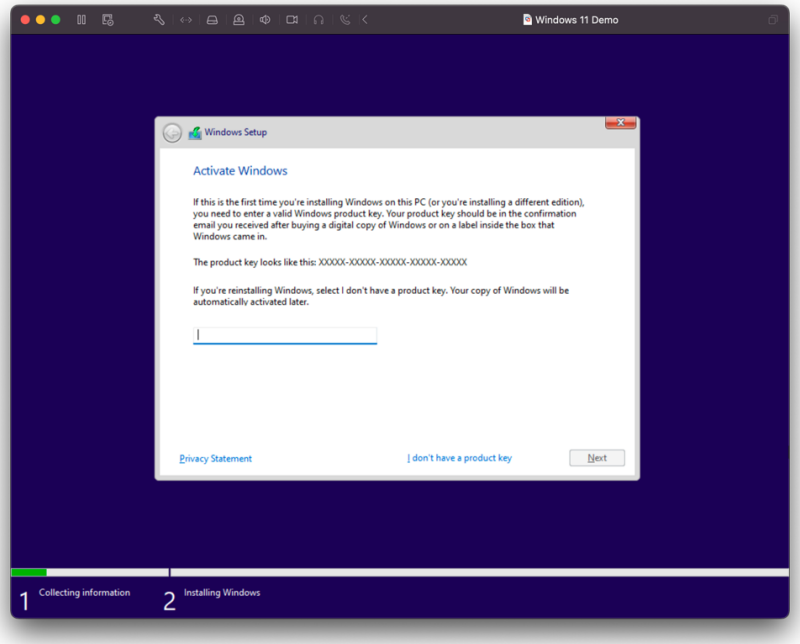
5) For Windows 11 guest types, encryption is needed to support a virtual TPM device which is a requirement of Windows 11. The new 'Fast' encryption can be used to ensure maximum performance while meeting Windows 11 requirement. In this step, choose the desired encryption type and either enter a passkey or have Fusion auto-generate one. It will be stored in the system Keychain by default. If it is not stored, the user will be prompted to enter the passkey each time the VM boots.

6) Select 'Finish' or 'Customize' to increase the default RAM, CPU count or Disk Size, and save the VM to your Mac.

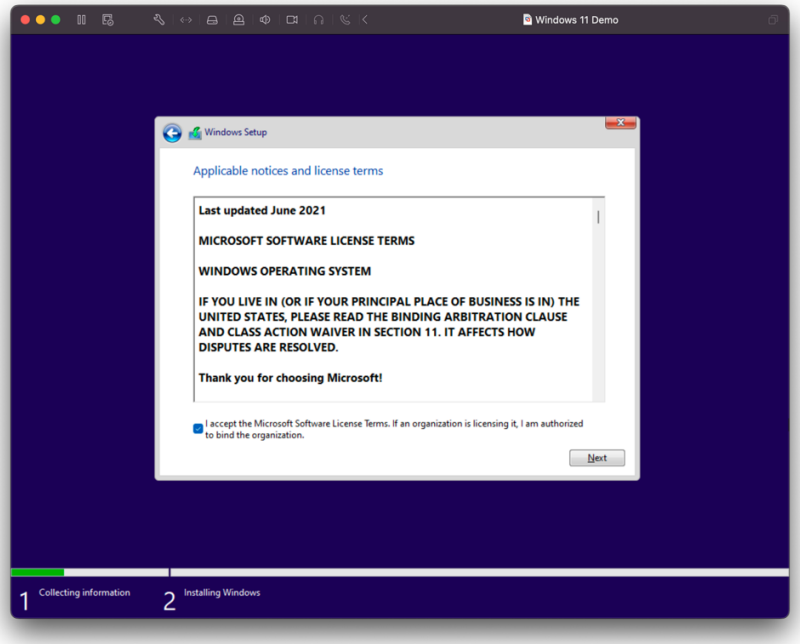
7) When the VM boots, you will be presented with the standard Windows Installation Setup. Click 'Next' followed by 'Install Now'



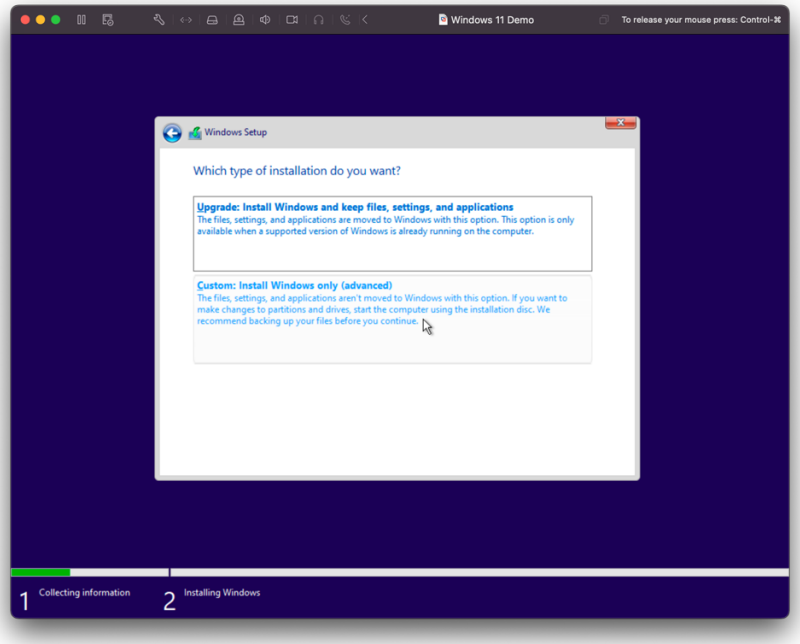
8) Activate Windows by entering your license key or by selecting 'I don't have a product key' to continue



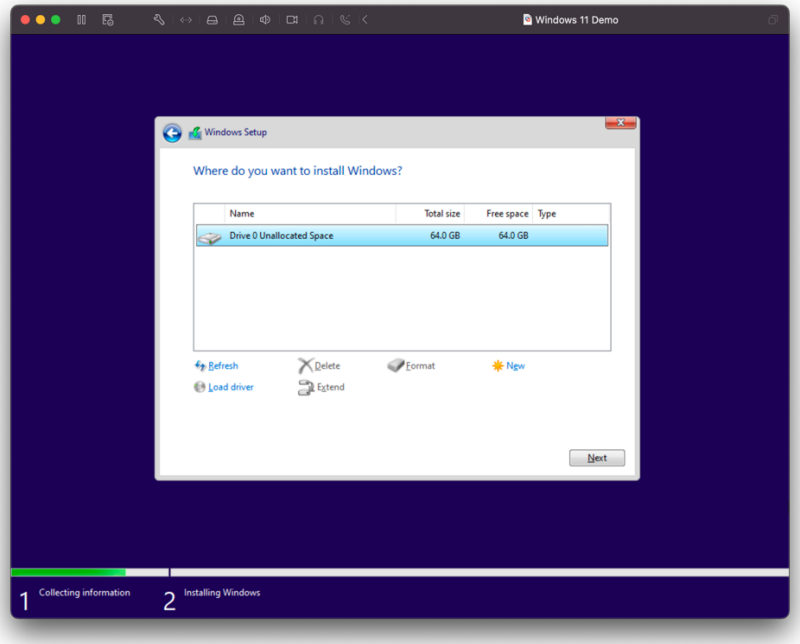
9) Accept the terms of the License if you are authorized to do so.



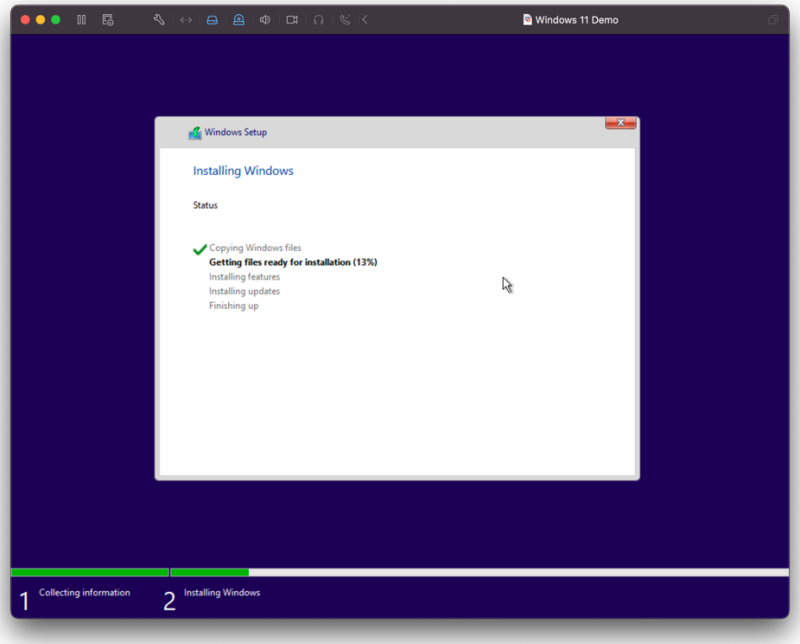
10) Choose ‘Custom: Install Windows only (advanced)’



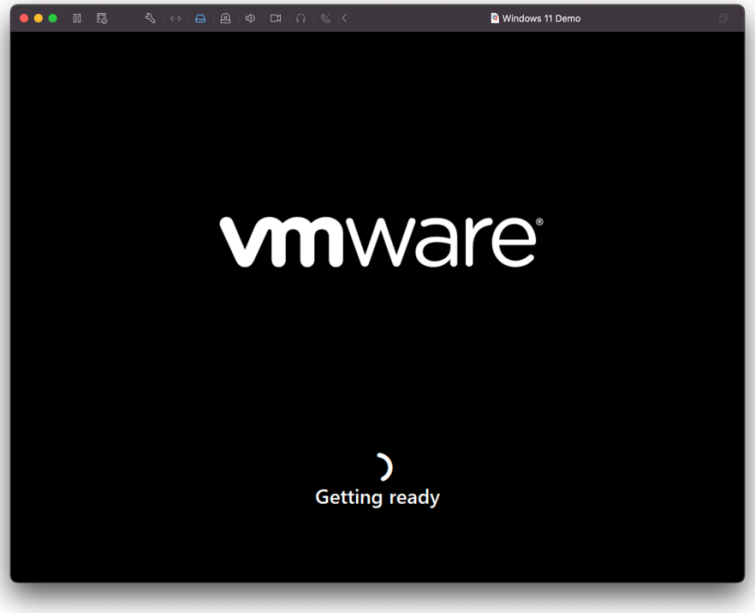
11) Click 'Next' to accept the default partition layout, or modify it, to continue.



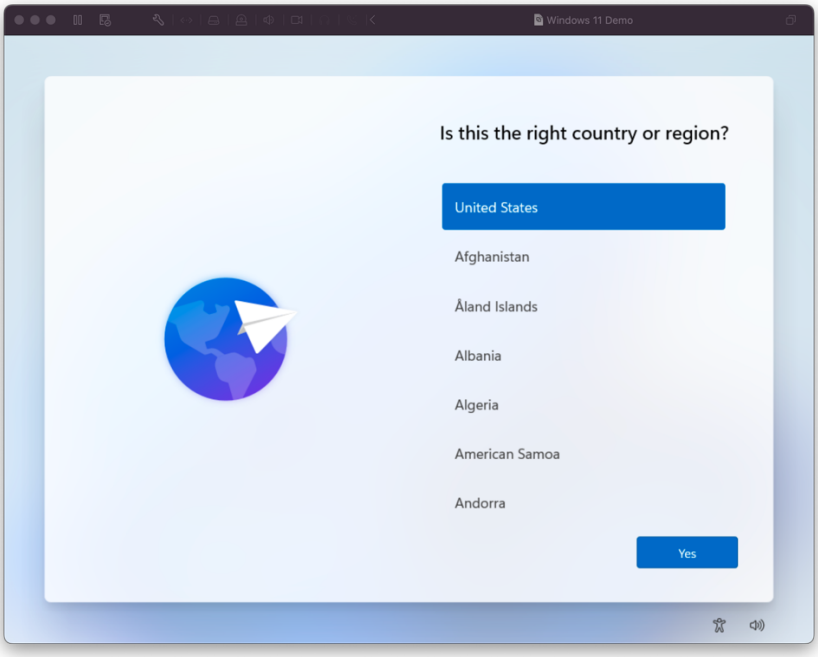
12) The installation should continue for a few moments



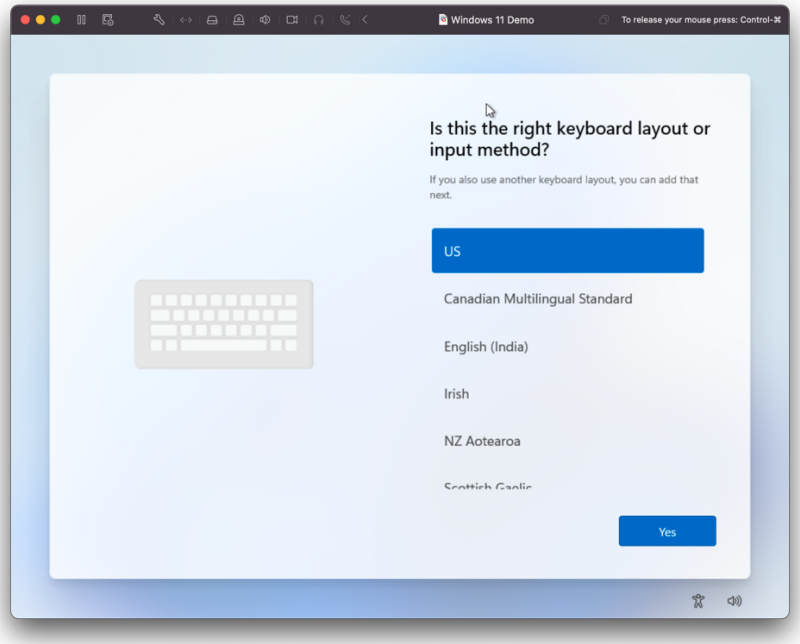
13) After the first part of the installation is complete, the OS will reboot and the installer will move into the next phase.



14) Select your country or region and click 'Yes'

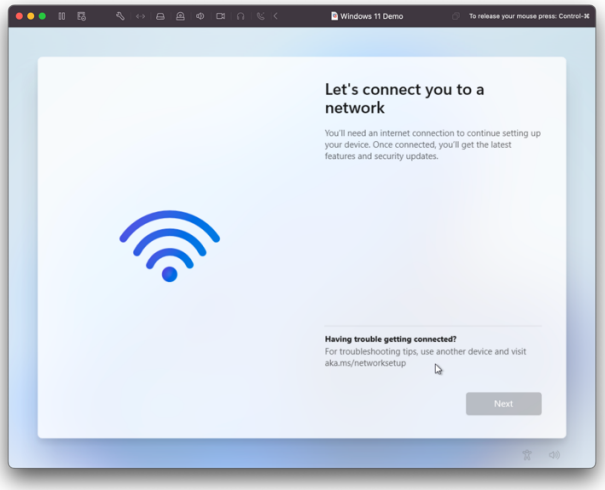


15) Select the appropriate Keyboard Layout



16) At this step, user interaction is required. By default, Windows Pro and Home Editions require a network connection to continue, however the required 'vmxnet3' virtual network driver does not ship with Windows on ARM like the default Intel Network Adapter driver does on Intel Macs. As such, this step must be bypassed. (this is not required on Windows 11 Enterprise editions)

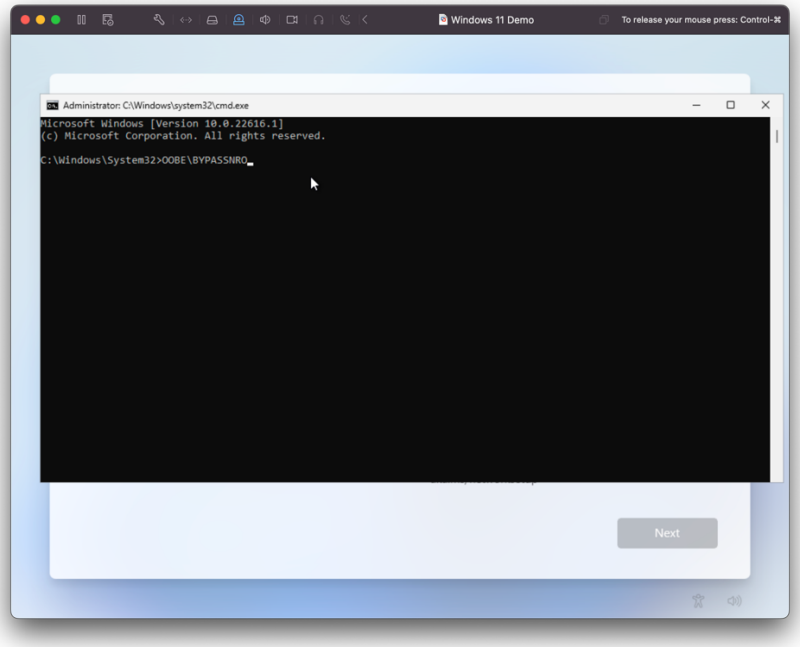
Alternatively, you can install the VMware Tools drivers during the installation from command line. See the section titled: "install drivers during OS Insatllation"



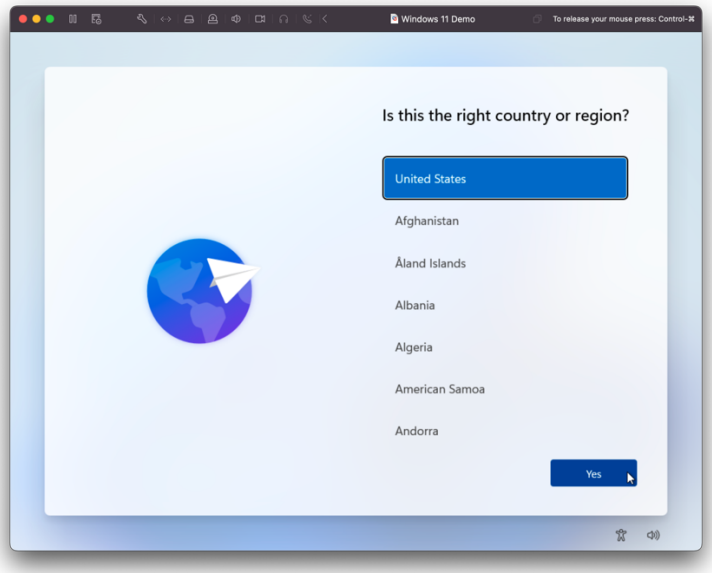
To bypass the Network Enrollment, on the Keyboard press "Shift+F10". On most Macs, accessing the Function keys requires use of the 'Fn' button, which would make the key combination "Shift+Fn+F10".

In the Command Prompt window that comes up, type the following:

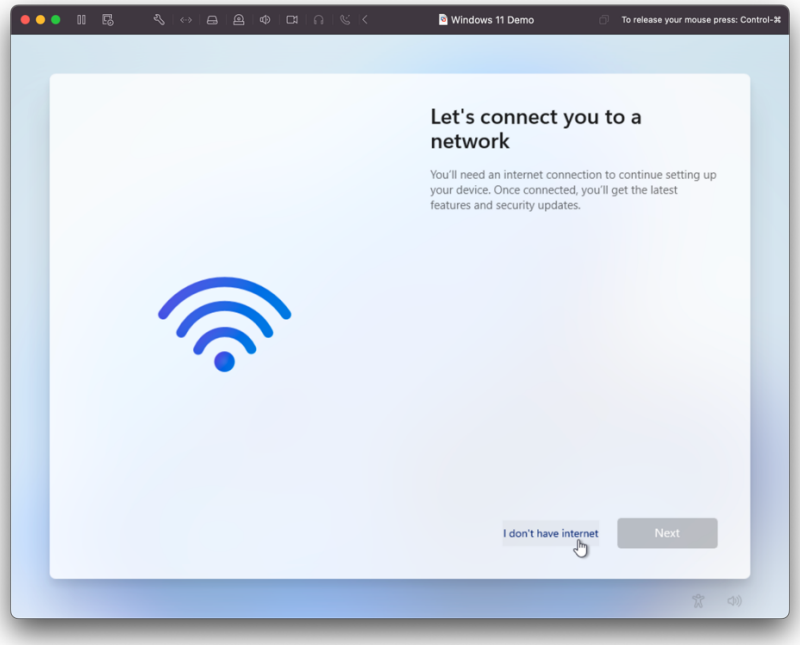
OOBE\BYPASSNRO

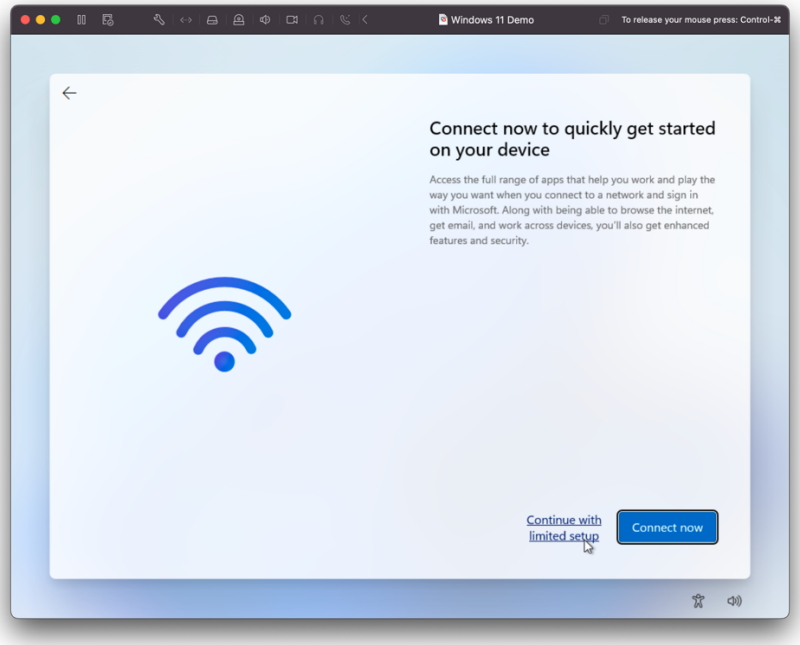


And hit the 'enter' key. This will restart the 2nd phase of the installation, but the "Out Of Box Experience" will now allow the user to "Bypass Network Enrollment".



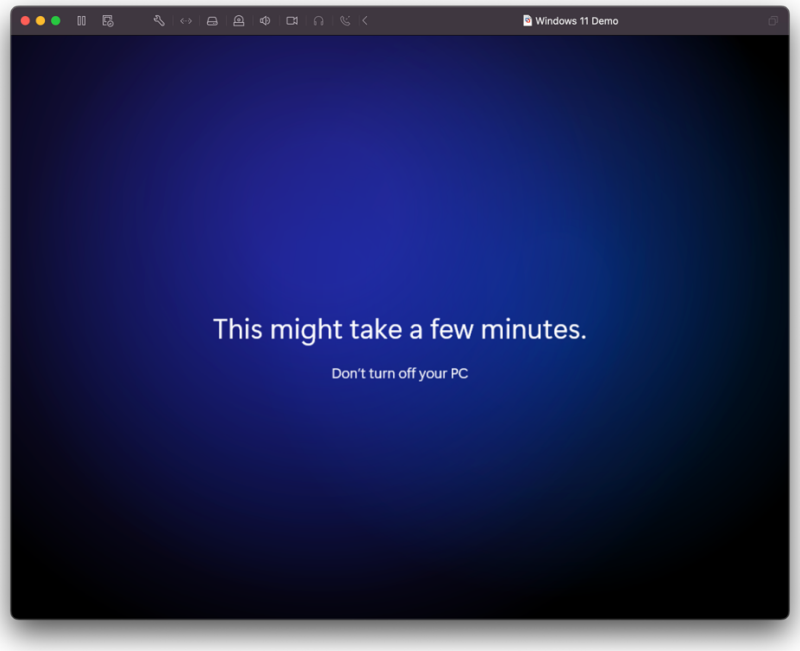
17) The user can now select "I don't have internet" to continue, followed by 'Continue with limited setup'



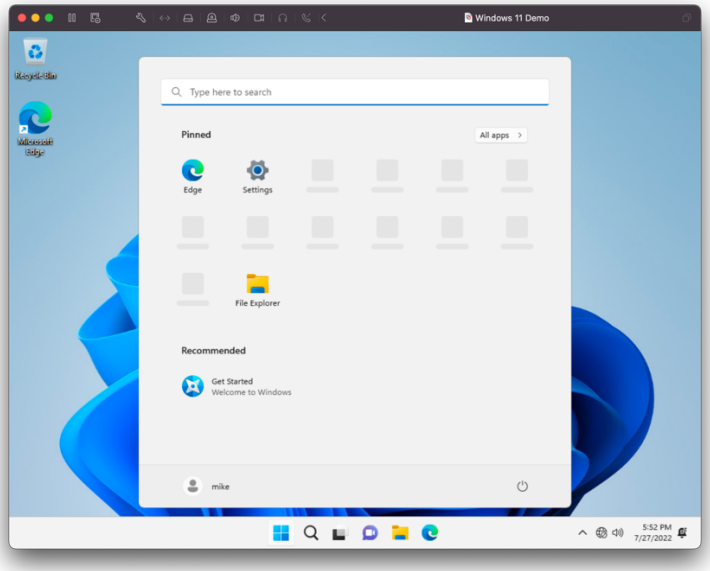


18) Continue through the installation to create a user account, add security questionsm, opt into additional telemetry and services, until you reaching the desktop.

19) Windows will continue the installation unattended.

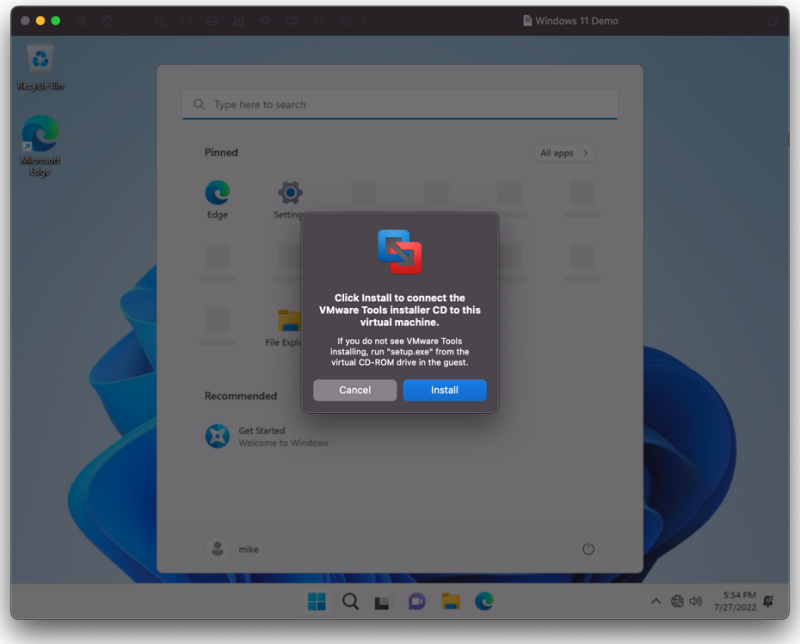


After Windows finishes installing and reaches the Desktop, the necessary VMware Tools drivers can now be installed.

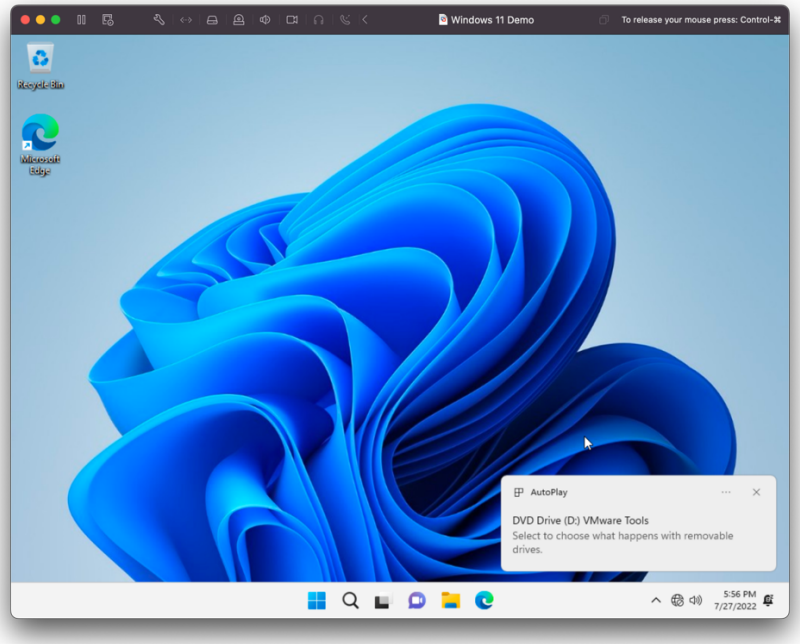


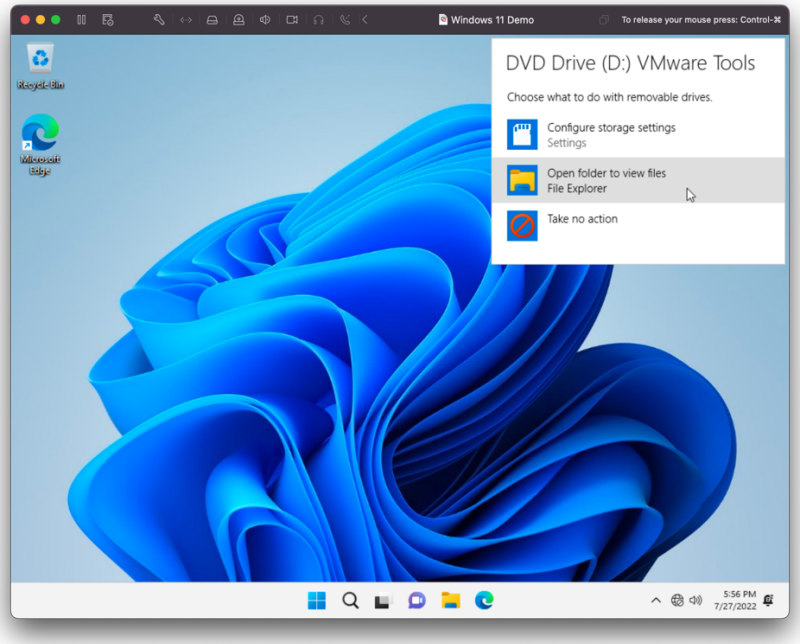
Installing VMware Tools Drivers

1) Navigate to the Menu Bar and select Virtual Machine > Install VMware Tools and click 'Install' at the prompt. (note at this time there is no 'setup.exe' to click on. This will be present in a future update.

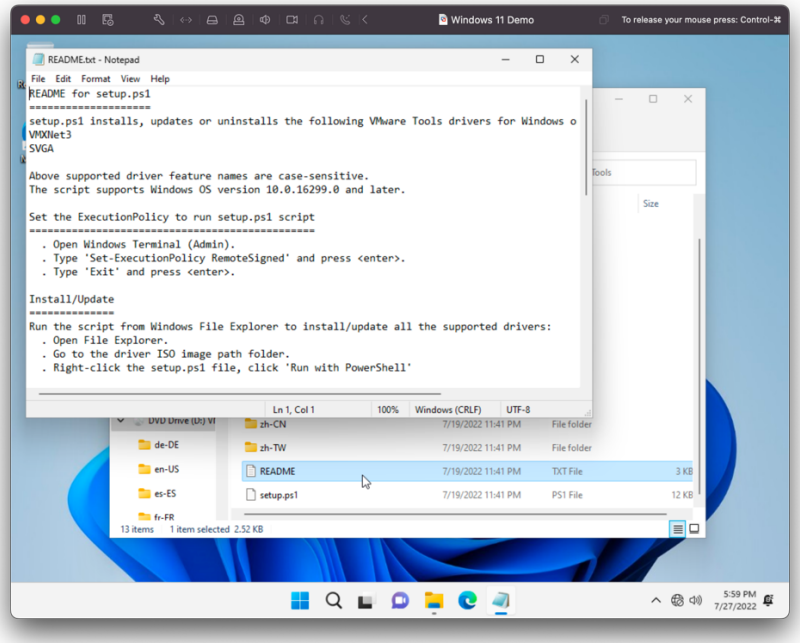


2) Windows will ask what to do. Click 'Open folder to view files'



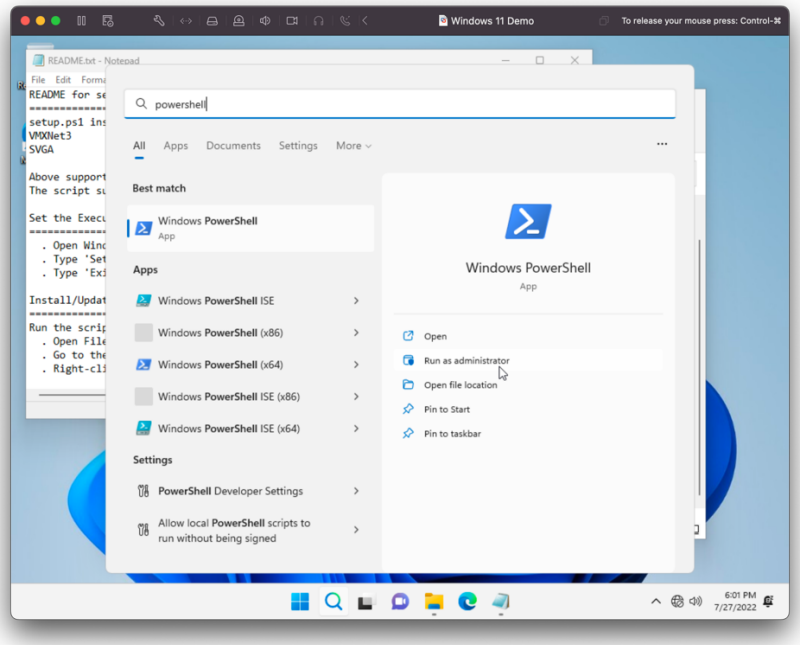


3) The 'README.txt' contains full instructions for how to install and update the drivers, but a summary will be provided here.



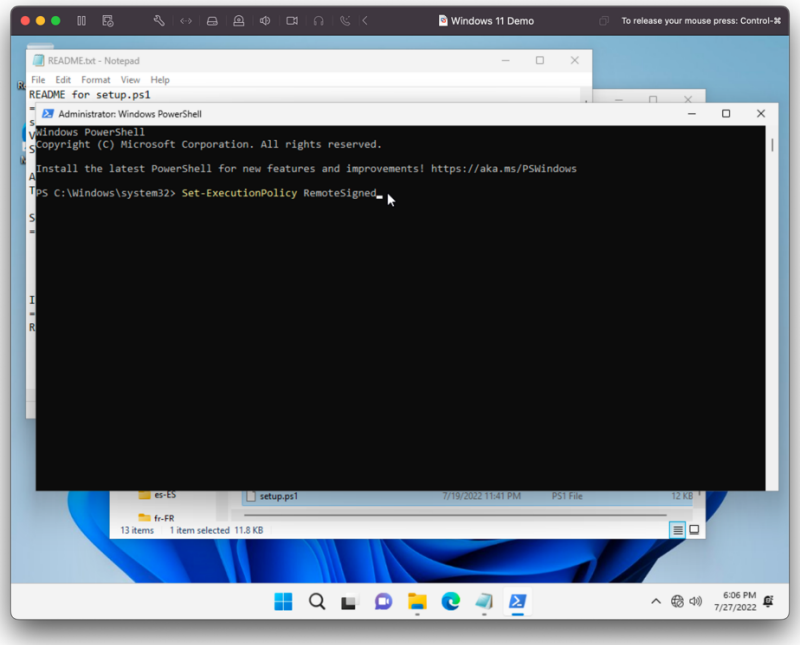
3.1) Set the 'ExecutionPolicy' to run the setup.ps1 script

- Open PowerShell As Administrator



- type/paste the following from the README:

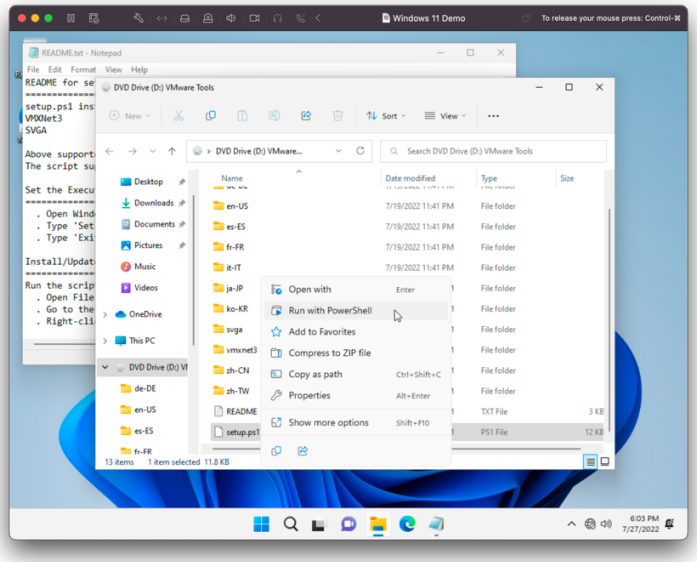
Set-ExecutionPolicy RemoteSigned



- Press Enter, type ‘Y’ or ‘A’ to accept the policy change
- Type ‘exit’ and press Enter to close the window. The policy is now changed, no reboot is required.

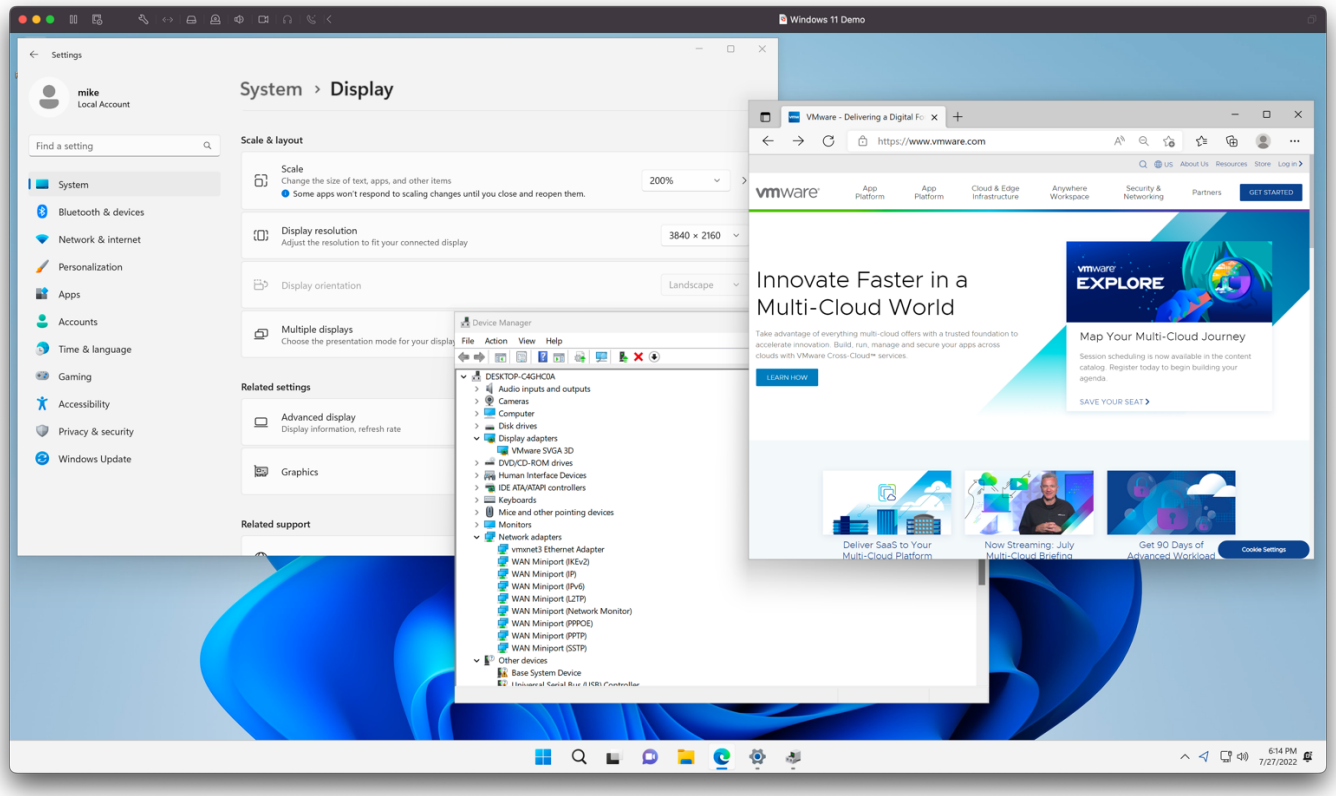
3.2) Run the .ps1 script.

- Right-click the ‘setup.ps1’ file and select ‘Run with PowerShell’



The script will run and close after it completes.

Once the script is finished, Networking will function, and the display resolution can be changed within Windows.



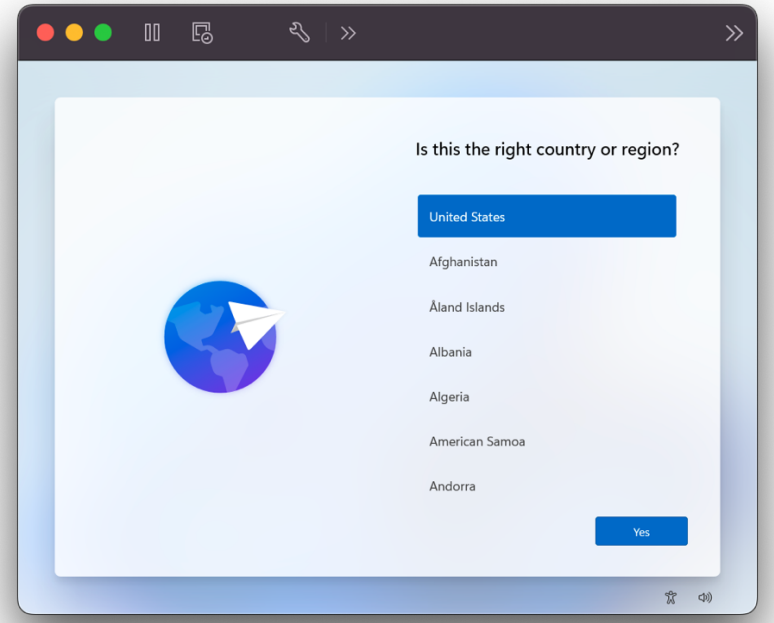
From here you can continue to use Windows as normal, with the following caveats:

- Drag and Drop and other Host-Guest interactions such as Shared Folders do not work at this time
- Unity mode is not supported
- Only 2D acceleration is supported at this time.
- Auto-Fit Guest Resolution and Auto-Scaling is not supported at this time

Installing VMware Tools drivers during Windows 11 Installation

During the Windows 11 installation, before it connects to the Internet, you can install the WDDM and Network Adapter drivers and complete the installation. This allows the Network Enrollment to succeed without requiring a bypass. This will require the user to log in using their Microsoft account, as opposed to an 'offline' account which is created when 'Network Enrollment' is bypassed as described above.

To do this, once the installation gets to the new UI after it reboots:



- On the Mac / Fusion Menu Bar click Virtual Machine > **Install VMware Tools**
  - The CD will mount to the VM behind the scenes
- Press 'SHIFT-Fn-F10' to bring up the command prompt
- type "powershell", hit return
- Run the script from the Tools install disk:
  - cd D:\
  - Type: Set-ExecutionPolicy RemoteSigned
  - Type .\setup.ps1 (type 's' hit 'tab' to autocomplete)
  - When it finishes, you can exit this window and the installation will continue

To Install Windows using a Microsoft-provided .VHDX file:

1) Download the .vhdx file of your choice from here:
   https://www.microsoft.com/en-us/software-download/windowsinsiderpreviewARM64
2) Install `qemu` via Homebrew:
   brew install qemu
3) Convert the .vhdx to .vmdk: using `qemu-img convert -O <Type> <path to source> <output path>

   qemu-img convert -p -O vmdk /path/to/.VHDX /destination/path/to.vmdk

This .vmdk can now be used to create a Custom VM.

In Fusion:

1) File > New > Create a Custom Virtual Machine > Continue
2) Choose Microsoft Windows > Windows 1164-bit Arm
3) Choose to enable Secure Boot or not
4) Because the OS is Windows 11, a TPM is required.
   Choose the Encryption type (‘Fast’ [only the files needed], or ‘Full’ [all the files])
   Create or Auto-Generate a password, and choose whether to store it in the Mac’s Keychain
   Click Continue
5) Choose the Virtual Disk
   Select ‘Use an existing virtual disk’
   Click ‘Choose virtual disk…’ and select the newly created .vmdk from earlier.
   Choose whether to make a copy of the disk, share, or take the disk away. (Copy is the safest value but requires adequate space)
6) Click Continue
7) Customize the Settings
   Save the VM
   Increase settings for CPU and RAM if required
   Verify the Trusted Platform Module is present
   Verify Encryption is enabled as was selected
8) Power On the VM

Tech Preview Update 2 – Sept 22, 2022

The Tech Preview for Fusion has been updated with performance improvements and bugfixes.

The most notable change is that Rosetta is no longer needed for the vTPM, it now runs using 100% native code on Apple Silicon.

Reporting Bugs

Of course, using it is only half the fun! We encourage users to share their experiences on our Community Forum, but you are not restricted from also sharing on personal blogs, videos, media, etc. We also have surveys for folks who wish to provide more detailed feedback which is also not visible by other tech preview program participants.

https://communities.vmware.com/t5/Private-Fusion-for-Apple-Silicon/ct-p/3010

If you prefer to not share such information in our public forum, you are welcome to reach out to the beta team directly by emailing: *fusion-beta@vmware.com*
We do read but we may not respond to all emails

Known Issues – Apple Silicon

There are a number of general issues and limitations that we've encountered as our development has progressed.
Below is a summary of what is currently expected.

KNOWN ISSUES	
ISSUE	**DETAIL OR WORK AROUND**
x86 operating systems won't boot on M1 or M2 Macs	• Fusion for Apple silicon will only boot arm64/aarch64 operating systems
Linux VM hangs at boot	• These issues should have been resolved. If you experience such an issue, please report it in the Community Forums.
OVF Export/Import	• OVFTool has been and should function using Rosetta on Apple Silicon Macs
Host-Guest interop features are slow	• The High-Bandwidth communication channel has not yet been optimized for aarch64. • Copy/Paste, Drag-and-drop, Shared Folders should function but are limited to roughly 4MBps transfer speed. • This will be addressed in a future update
P2V Conversion	• Not going to be supported
macOS Guest VM	• Not currently supported
Vctl / kind	• Not currently supported
3D Graphics	• Requires 5.19 Kernel and Mesa 22.1.3 or greater, Linux only at this time.
MTU size	• Modifying the MTU variable size may not function properly
"Auto-Fit"	• AutoFit is only supported on Linux VMs at this time, and requires Open VM Tools.
USB Devices	• Not every USB device that has been tested on x86 has been tested on Apple silicon devices, as such devices may have unexpected results. • If you encounter issues with your important USB devices, we would love to hear about it!
Sound Device	• At times, when the Guest OS plays audio (eg: when a system 'beep' happens), Fusion may pop up a dialogue which reads: Error in creating sound stream. Playback may not work.

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