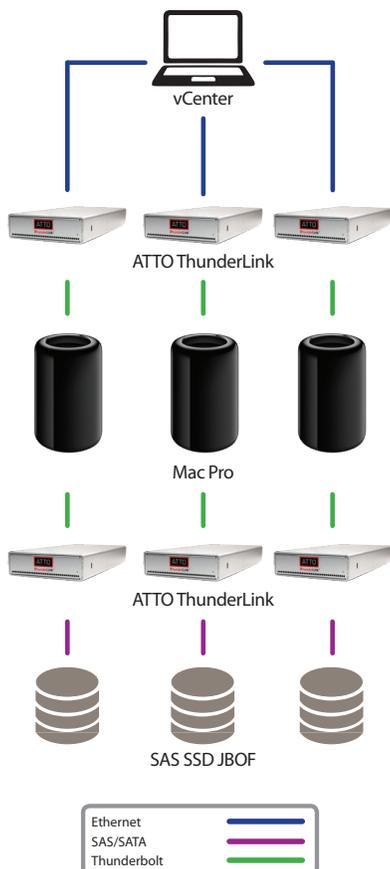


Maximize Your Mac

Virtualize Mac Pro® hosts and Microservers with ESXi™ and ATTO ThunderLink® Thunderbolt™ adapters

- ThunderLink adapters offer a purpose-built option to provide Thunderbolt connectivity to external block storage.
- ATTO provides VMware®-certified ESXi drivers. For a list of currently available certified drivers please consult the VMware Compatibility Guide.
- Software or web development, testing and validation environments using Mac® platforms.
- Deployment and roll outs for OS updates and applications.
- Test bed for VMware updates, changes and additions.
- Suitable for commercial, education, and government ecologies.



How to Virtualize a Mac®

Micro servers such as the Apple Mac Pro® 6,1 or the Intel NUC can be virtualized in vSphere environments with VMware ESXi™. They have sacrificed PCIe slots, storage connectivity and expansion potential for their smaller footprint. Thunderbolt™ connectivity with ATTO ThunderLink® adapters is the answer for a VMware Ready™ approved storage connectivity solution.

The following is a step-by-step guide to virtualize Apple Mac® hardware. ATTO offers this guide with no guarantees and with the understanding that the user is responsible for knowledge of and adherence to any licensing parameters, terms and conditions.

STEP 1: CONSIDERATIONS BEFORE YOU BEGIN

- Planning ahead is critical to successfully virtualizing Mac hardware. With careful and thoughtful preparation, installation of VMware ESXi can be a straight forward process.
- Make note of what you will need from the host before taking any steps and collect the resources needed. Back up macOS® on your Mac Pro before installing ESXi. Verify the backup.
- Make note of what additional drivers you may need to embed into the ESXi installation ISO and acquire them.
- You will need to create a macOS bootable installer to use for your VMs (if this is the macOS version you will install prior to installing ESXi). This will be created on a flash drive in the next step. If you are unfamiliar with this process, please review the instructions from Apple support before proceeding.

STEP 2: CREATE BOOTABLE macOS MEDIA

- You will need to log into a macOS system which still has the install dmg available. Note that where you see a reference to a macOS version in the script below, such as Sierra.app, it can be changed to the version you are using (for example, replace Sierra.app with ElCapitan.app).
- Connect the flash drive. At least 12GB of available storage space is recommended.
- Run all of the commands below in Terminal. The system may report the ISO is too large for the flash drive upon completion. To resolve this issue, format the USB stick as exFAT with RUFUS. This should allow you to move the ISO from the Mac to the machine you are using as a host for macOS on the VM install.

```
hdiutil attach /Applications/Install\ macOS\ Sierra.app/Contents/SharedSupport/InstallESD.dmg -noverify -nobrowse -mountpoint /Volumes/install_app
hdiutil create -o /tmp/Sierra.cdr -size 7316m -layout SPUD -fs HFS+J
hdiutil attach /tmp/Sierra.cdr.dmg -noverify -nobrowse -mountpoint /Volumes/install_build
asr restore -source /Volumes/install_app/BaseSystem.dmg -target /Volumes/install_build -noprompt -noverify -erase
rm /Volumes/OS\ X\ Base\System/System/Installation/Packages
cp -rp /Volumes/install_app/Packages /Volumes/OS\ X\ Base\System/System/Installation/
cp -rp /Volumes/install_app/BaseSystem.chunklist /Volumes/OS\ X\ Base\System/BaseSystem.chunklist
cp -rp /Volumes/install_app/BaseSystem.dmg /Volumes/OS\ X\ Base\System/BaseSystem.dmg
hdiutil detach /Volumes/install_app
hdiutil detach /Volumes/OS\ X\ Base\System/
hdiutil convert /tmp/Sierra.cdr.dmg -format UDTO -o /tmp/Sierra.iso
mv /tmp/Sierra.iso.cdr ~/Desktop/Sierra.iso
```

HELPFUL RESOURCES

NOTE: The following third-party tools may not be fully supported but could be helpful for non-powerCLI users.

ESXi-Customizer

www.v-front.de/p/esxi-customizer.html#download

RUFUS

Recommend the portable version

RUFUS.akeo.ie

Eric Garrison - "They Made Me Blog"

theymademeblog.com

William Lam - "VirtuallyGhetto"

www.virtuallyghetto.com

ATTO RESOURCES

VMware Solutions

www.atto.com/solutions/vmware

Apple Solutions

www.atto.com/solutions/apple

ATTO CONTACTS

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Channel Sales

716.691.1999 Ext. 240

OEM Sales

716.691.1999 Ext. 241

Direct Sales

www.atto.com

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STEP 3: VMWARE MEDIA PREPARATION

- Download the VMware ESXi installation ISO you wish to use. You can use ESXi-Customizer or ESXi-Customizer-PS to embed the drivers you want or need into it. Please read the online documentation for ESXi-Customizer and/or ESXi-Customizer-PS before proceeding.
- Depending on the version of ESXi you want to use and the Mac Pro you may need to embed a SATA driver or possibly an Ethernet driver. Please be certain you are embedding the drivers you need before proceeding.
- If you are going to create ESXi media with drivers for ATTO ThunderLink Fibre Channel or SAS adapters (so that you can install to a remote LUN), you will want to do that in this step. The ATTO ThunderLink Ethernet devices will appear as Intel or Mellanox adapters with embedded drivers.
- Once you have the ISO completed, you can use RUFUS to create a bootable flash drive to boot the host. NOTE: If you are installing ESXi 6.5 or a version that DOES NOT prefer the vmklinux drivers, there may be extra steps involved. See the section "Caveats" below.

STEP 4: ESXI INSTALLATION

- Hold the ALT key if you are using a non-Mac keyboard as you power on a Mac Pro with a flash drive inserted into a USB slot. This lets you choose which drive to use as a boot device.
- Follow the prompts and install as you would any other host.
- NOTE: The host NIC 0 is the NIC on the right and NIC 1 is the NIC on the left of a Mac Pro 6,1. It is recommended that you use vCenter and add the host to your datacenter.

STEP 5: CREATING THE VMs

- The process of VM creation follows the normal procedure.
- Select "Other" as the OS when creating a VM and select the exact version of macOS you will be creating, or the latest version of macOS listed if you are installing a later version.

STEP 6: INSTALLING macOS

- OPTION 1: upload the macOS ISO to a datastore and mount it to the VM.
- OPTION 2: Use a local mounted CD-ROM and assign the ISO to the VM to install the macOS instance.
- NOTE: Assigning the virtual CD can be accomplished from the vCenter VM console viewer for that VM.

ABOUT ATTO TECHNOLOGY, INC.

For over 30 years ATTO Technology, Inc. has been a global leader across the IT and media & entertainment markets, specializing in storage and network connectivity and infrastructure solutions for the most data-intensive computing environments. ATTO works with partners to deliver end-to-end solutions to better store, manage and deliver data. Working as an extension of customer's design teams, ATTO manufactures host and RAID adapters, network adapters, storage controllers, Thunderbolt™ adapters, and software. ATTO solutions provide a high level of connectivity to all storage interfaces, including Fibre Channel, SAS/SATA, iSCSI, Ethernet, NVMe, NVMe over Fabrics and Thunderbolt. ATTO is the Power Behind the Storage.

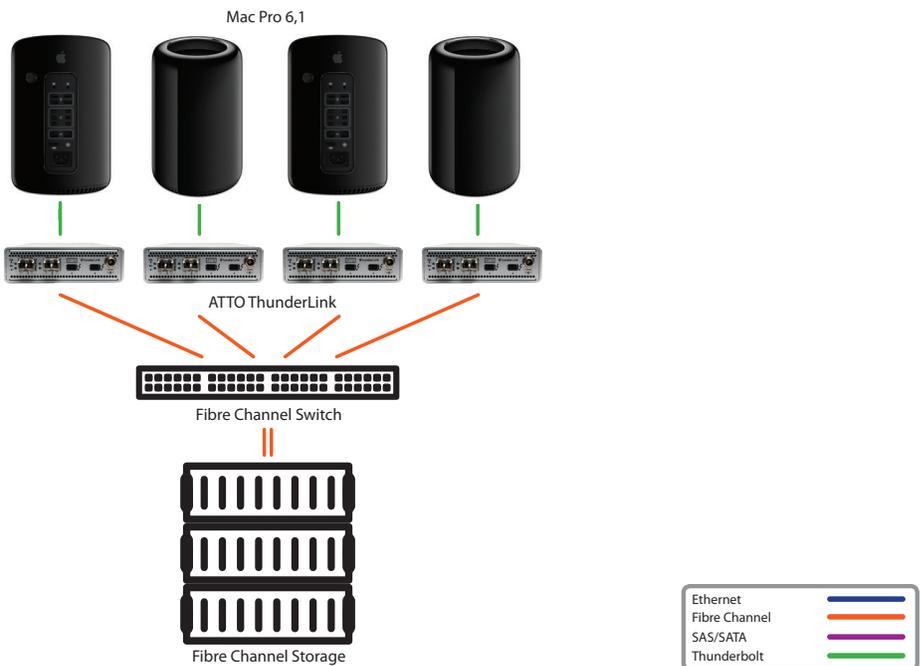
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How to Virtualize a Mac®

CAVEATS

1. No Directpath IO. ESXi can not push hardware directly to macOS.
2. Sometimes Apple changes drivers. If the ESXi installer cannot see the SATA drive or the NIC on your initial install, it's likely that the base drivers with ESXi cannot see the hardware. To troubleshoot this try a different (newer or older) version of ESXi. When the hardware appears and the problem is resolved, simply upgrade to the newer ESXi version.
3. 6.5 and the vmklinux issue. If you try to install on ESXi 6.5 where the vmklinux is not enabled by default (meaning the installer wants to use all native drivers) you will need to modify the install media. This could be the issue if the install fails at different points (usually between the initial load and the actual install).
To counteract and resolve* try the following procedure from William Lam at Virtually Ghetto:
 - a. Use an unzip (you can use 7Zip) program to open the ISO installer.
 - b. There will be 2 files to edit. They are in the root of the ISO boot.cfg and /efi/boot/boot.cfg
 - c. In these files will be a line (close to the top) that says "kernelopt=runweasel". You will need to append this line so that it says "kernelopt=runweasel preferVmklinux=True".
 - d. Once you have saved the changes, re-make the ISO with an ISO creator and you should be able to boot using this ISO file and the previously mentioned steps.

*NOTE: With 6.5U1 release, these issues appeared to be alleviated.



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