

# Virtualizing Macs<sup>®</sup> and Microservers with vSphere

The Power Behind the Storage



# Agenda

- About ATTO
- What are microservers?
- Solutions for connectivity expansion
- Why a Mac Pro®?
- VMware vSphere
- Virtualization Use Cases

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# Corporate Overview

- Established in 1988 – Buffalo/Niagara region
- Products – host bus adapters (HBAs), network interface cards (NICs), storage controllers, Thunderbolt™ devices and software
- Interconnect expertise – Fibre Channel, SAS, Ethernet, SATA, iSCSI, Thunderbolt, NVME
- Deep history with workstations, server, network and storage connectivity
- Worldwide distribution



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# Product Line Overview

- **Storage Controllers**
  - Fibre Channel-to-SAS/SATA
  - Ethernet-to-SAS/SATA
- **Thunderbolt™ Adapters**
  - Ethernet
  - Fibre Channel
  - SAS/SATA
- **Host Bus Adapters**
  - Fibre Channel
  - SAS/SATA
- **Network Interface Cards**
  - 10/40Gb Ethernet
  - 25/50/100Gb Ethernet
- **Software**
  - ATTO ConfigTool™
  - ATTO Disk Benchmark Tool



*Products designed to work seamlessly with all platforms*



# What are microservers?

Small, low power, inexpensive, readily available devices with compute and ram plus boot capability.

## Examples:

- Apple Mac Pro®
- Apple Mac mini®
- Intel® NUC



# Apple Mac Pro<sup>®</sup> 6,1

## Advantages:

- Small
- Robust I/O busses
- Strong CPU
- Low power
- RAM
- Runs any guest OS

## Specifications:

- Single SATA SSD
- 4 USB Ports
- 6 Thunderbolt™ Ports total across 3 Thunderbolt 2 busses (one shared with graphics)
- HDMI or Thunderbolt graphics
- 2x 1GbE ports



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# Apple Mac mini<sup>®</sup>

## Advantages:

- Small
- Low power
- Can run any guest OS
- Cost

## Specifications:

- 2 USB Ports
- 4 Thunderbolt™ 3 ports
- HDMI or Thunderbolt Graphics
- 10 GbE port (Optional)



# Intel® NUC

## Advantages:

- Small
- Low cost
- Good CPU

## Specifications:

- 1 2.5" drive 1 M.2 drive
- USB 3 or 3.1 capacity
- Thunderbolt™ 3 port
- Onboard 1GbE port
- HDMI port

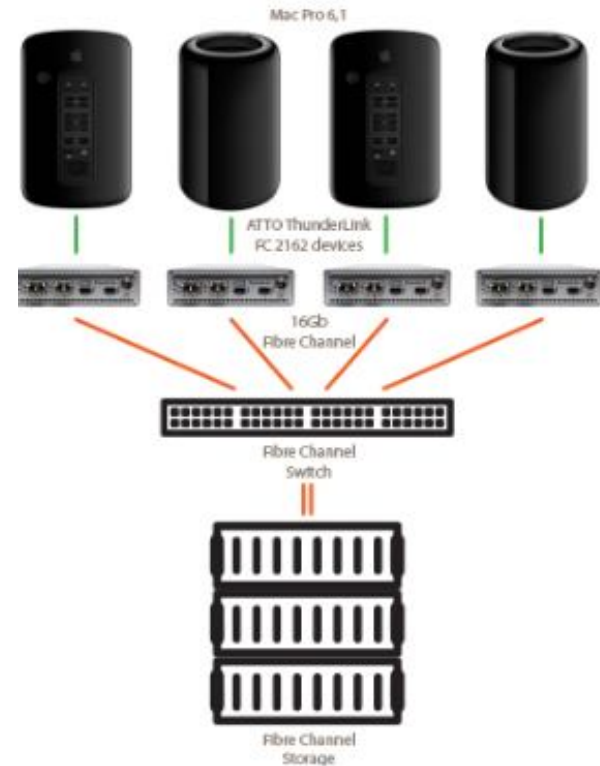




# Why Virtualize a Mac or microservers?

- Corporate Mandate
  - All devices must be virtualized
  - Company hardware does not leave the premise
- Solves unique problems
  - Only Apple hardware can run macOS®
- Fits the definition for small, portable, flexible

Most admins don't know it's possible!



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# Why go small?

## Why is it necessary to consider virtualizing smaller non-traditional hardware?

- Corporate mandates
- Budget constraints
- Apple hardware and macOS® virtualization
- Space constraints

## We can categorize these reasons into 2 categories

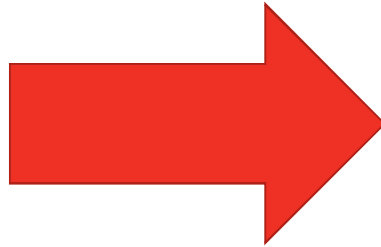
- I have to virtualize on Apple Hardware for macOS/iOS/watchOS®/tvOS™/VDI
- I need R&D/Test/Pre-deployment/VDI or to virtualize everything

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# What are the limitations of going small?

## Specifications:

- Limited PCIe slots
- CPU/RAM limitations
- Storage limitations
- Limited network connections



## Questions of viability:

- How do I connect to my corporate vSphere storage?
- Can I make a vSAN test cluster?
- Do I have to run everything off of a USB stick?
- How can I expand beyond the box?

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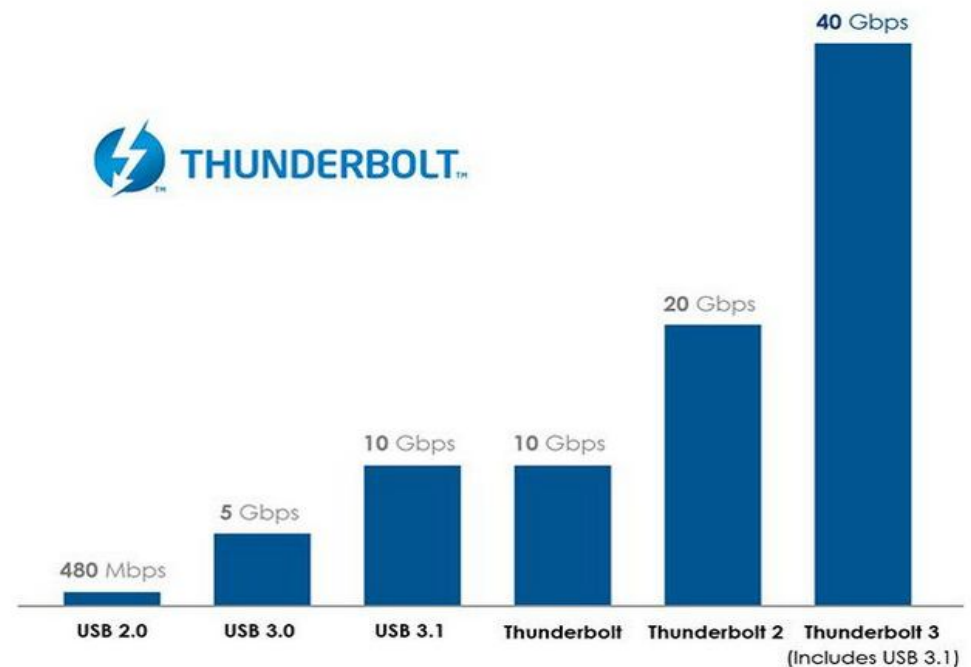
# Thunderbolt™

**Problem:** Powerful new generation of portable and all in one computer platforms lack expansion for high speed storage and network interfaces.

**Solution:** Intel and Apple introduced a high speed interface called Thunderbolt. Thunderbolt is an extension of the PCIe bus.

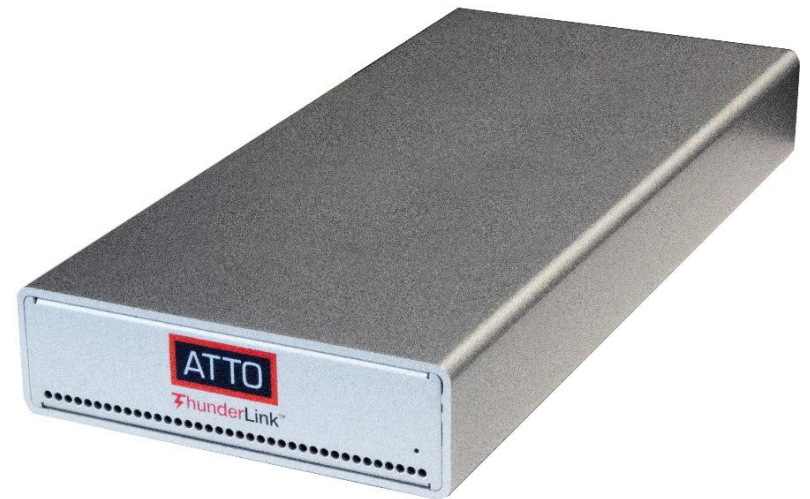
## Specifications:

- Thunderbolt 2 = 20Gb
- Thunderbolt 3 = 40Gb
- USB 3.1 = 10Gb



# ATTO ThunderLink<sup>®</sup> Thunderbolt<sup>™</sup> Adapters

- Purpose-made adapters for use with newest generation of mobile and desktop workstations with Thunderbolt ports
- Thunderbolt 3 and 2 connectivity options
- Low profile design
- Cooling efficient
- All-in-one solution



# What are the alternatives for expansion?

Expansion Chassis solutions:

- Higher time to deploy
- Greater power consumption
- Larger footprint

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# What are the ideal options for expansion?

## SAN

- Thunderbolt™ adapters for Fibre Channel and iSCSI
  - Purpose built adapters designed by ATTO Technology



## Ethernet

- Thunderbolt™ adapters for Ethernet
  - Purpose built adapters designed by ATTO Technology



## SAS

- Thunderbolt™ adapters for SAS/SATA
  - Purpose built adapters designed by ATTO Technology



# Maximize your Mac and Microservers!

**Background:** VMware ESXi™ is the world's leading hypervisor

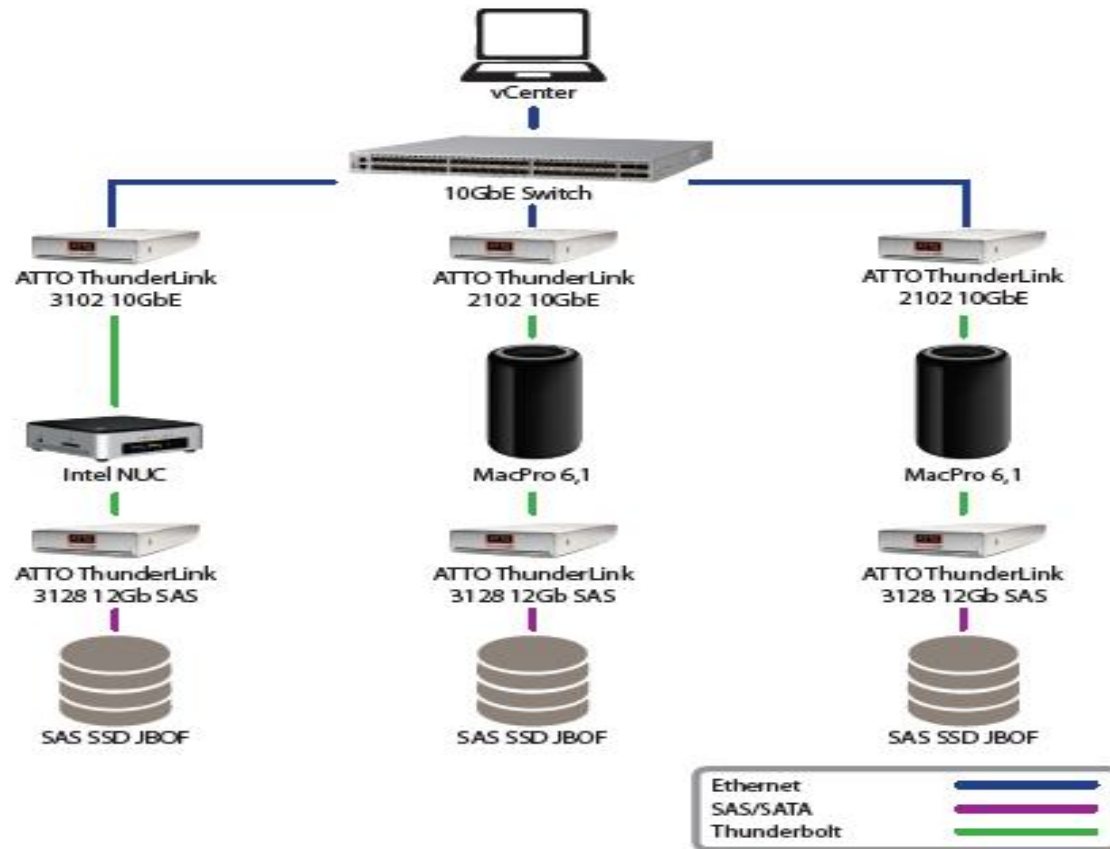
**Problem:** Some development and test platforms such as the Apple Mac Pro® and other microservers have ample performance but do not have the ability to connect to the block storage needed for expansion via internal PCIe slots. The only option for storage connectivity is to use the external Thunderbolt port as the I/O transport.

**User benefits** include **flexibility**, **scalability** and **agility**. The speed to provision and ease of management make for a compelling use case when it comes to hybrid cloud, remote workgroups and disaster recovery.

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# Maximize your Mac and Microservers!



# What can you do with virtualized Macs?

- VDI
- Application development
- Upgrade testing and roll out
- vSAN Cluster



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# Use Case 1: Application Development

- New instances can be created from templates quickly and easily
- A single template can create dozens of new virtual machines running different macOS® versions within minutes
- This would compare to spending hours loading each new macOS version onto physical devices by hand



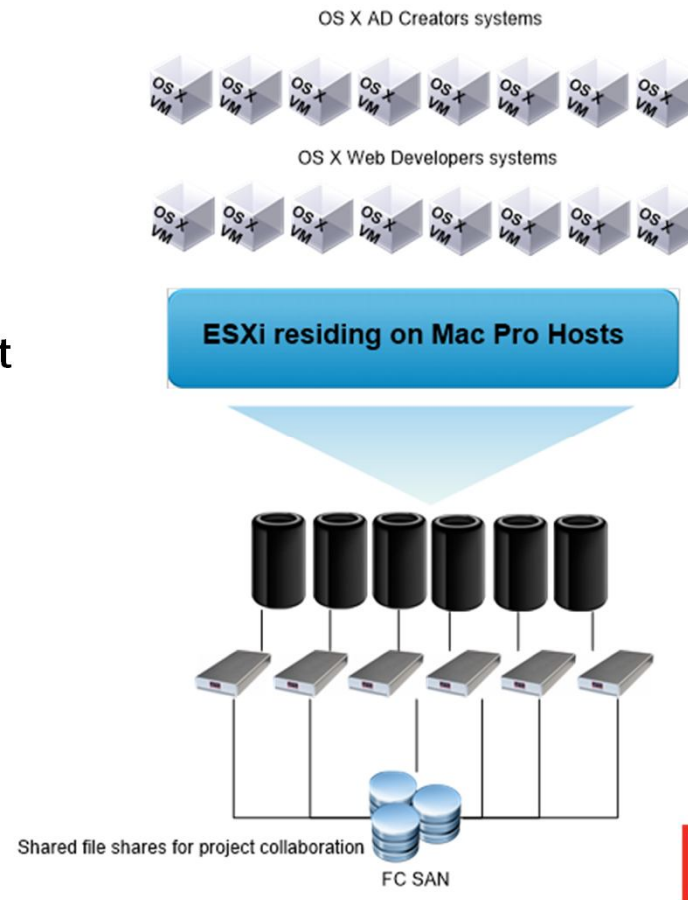
# Use Case 2: Mac Virtual Desktop Infrastructure (VDI)

- Many supported devices run an app that allows remote virtual desktop session running the operating system designated for the user.
- Users can have a persistent desktop environment, saving files and maintaining a unique instance, or users can see a new OS instance when needed.
- In environments where the ability to change all virtual desktops or environments quickly and easily is desired, virtualization becomes a necessity.



# Use Case 3: Shared private cloud for Ad and Web development

- In agencies that collaborate on ad or website development, the ability to collaborate and access a remote macOS® environment can transform their workflow.
- Centralized SAN file storage and backup allows for project security and access from nearly anywhere, similar to VDI concepts.
- In case of a crash, restoration from a template is quick and easy. Management can be offloaded to the IT staff.



# How to virtualize a Mac

## Step 1: Considerations before you start:

- Back up the macOS® on your Mac Pro before installing ESX onto the SSD
- Prior to installing ESXi, create the macOS Boot media ISO that you will use for your VMs (setting that as next step) if this is the macOS version you will install

## Step 2: Media prep for bootable macOS media

- See Appendix

## Step 3: Media Preparation

- USB Stick boot prep
- Custom adding drivers to iso

## Step 4: ESXi Installation

- Almost nothing out of the ordinary

## Step 5: Creating the VMs

- This part is easy!

## Step 6: Installing MacOS

- The fun part

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# Key Takeaways

- Virtualize your Mac Pro hosts and microservers with ESXi and ATTO Thunderbolt™ adapters
- ATTO has VMware Ready™ VCG approved products
- Application Development, VDI, Cloud hosting or Shared private clouds are just a handful of use cases
- ThunderLink devices can easily fit in to new or existing vSphere environments

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# Resources

<https://www.atto.com/>

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- vmLIVE presentation and resources <https://www.atto.com/vmlivethunderbolt>
- ATTO solutions for VMware <https://www.atto.com/solutions/vmware/>
- ATTO Mac Pro Virtualization <https://www.atto.com/solutions/vmware/apple-enterprise/>
- VMware Solution Exchange- Thunderbolt enabled VMware ESXi  
<https://marketplace.vmware.com/vsx/solutions/thunderbolt-enabled-vmware-esxi-1?ref=search>

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# Appendix

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# SAN, Ethernet and SAS Virtualization

Brand Name	Model	Device Type	Supported Releases
ATTO Technology, Inc	ATTO ThunderLink TLFC-2XX2	FC	ESXi  6.7 U1 6.7 6.5 U2 6.5 U1 6.5
ATTO Technology, Inc	Thunderlink TLSH3128	SAS	ESXi 6.7 U1 6.7 6.5 U2 6.5 U1 6.5

## Certified Models:

Thunderbolt 2 to 8Gb and 16Gb Fibre Channel

Thunderbolt 3 to 12Gb SAS

## Available solutions:

Thunderbolt 2 to 10GbE

Thunderbolt 3 to 10GbE and 40GbE

## Planned solutions:

Thunderbolt 3 to 16Gb and 32Gb Fibre Channel



# Virtualization notes

- Mac mini® and Mac Pro® sometimes need SATA drivers added to an ISO
- You may need to add specific drivers as well for a NUC install
- 6.5 and 6.7 to boot using the vmkLinux kernel is a very easy tweak
- Please note this compilation is intended for legal use of hardware and software and should be used within the Apple EULA
- Credit goes to William Lam [@lamw](#) and the resources he created and linked on [Virtually Ghetto](#)

*You can effectively run an R&D test lab from USB sticks*

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# Mac Media Prep

You will need to log into an MacOS system which still has its install dmg on the system. Where you see a name such as Sierra.app in the script below, you can change it if you are using a different version of MacOS (ElCapitan.app as an example). Run all of these commands in a terminal window. Once complete, you MAY have some issues with the ISO not moving cleanly to a USB stick due to size and formatting issues of the USB (It will falsely report the iso being too large for the USB stick). To resolve, format the USB stick as exFat with Rufus and this should allow you to move the ISO from the Mac to the machine you are using as a host iso file for the MacOS on a 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`

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