CHRIS BEARD
MAC SYSADMIN FOR EDMS

TEST BOX SPECIAL: MACOS TESTING IN A VM AND OTHER OPTIONS

WHAT I'M GOING TO COVER

- Options for getting yourself a macOS test computer
- Advantages of using a Virtual Machine (VM)
- Options for building a VM
- Building a VM using VMware Fusion
- Building a VM using VMware Fusion plus AutoDMG and vfuse tools

All methods have pitfalls and limitations

WHAT CAN I TEST THIS ON? (1/3)

- What do I test new software/scripts/commands on?
  - **Main computer**
    - + Quick and easy
    - - Unforeseen consequences
    - - Not realistic test of end user's computer
    - - Limited scenarios: fixed OS, can't do new build
    - + Personal testing sometimes picks up issues

Not realistic - you may have customised your main computer with admin rights

WHAT CAN I TEST THIS ON? (2/3)

- What do I test new software/scripts/commands on?
  - **Second computer**
    - + Test different scenarios without risk
    - - Can be lengthy to switch scenarios, eg. macOS version
    - - Cost of having second Mac

Cost - Could save by running Mojave on a Hackintosh, but again potentially not realistic. (see links)

WHAT CAN I TEST THIS ON? (3/3)

- What do I test new software/scripts/commands on?
  - **Virtual Machine (VM)**
    - + Quickly create/destroy/rollback machines
    - + Test multiple scenarios
    - - Buy and learn hypervisor software
    - - Storage
    - - Not as realistic as hardware; can get complicated

Explain what VM is - entire macOS installation (apps, devices) instead of running on real hardware, it’s running on simulated hardware.

Snapshot - eg testing enrolling into management system, fix issue, roll back, go again

MacOS licence allows two VMs on same box. Can’t run on non-Apple hardware.

Not realistic enough for testing FileVault, DEP etc without additional tweaking

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SOFTWARE OPTIONS FOR RUNNING A MACOS VM

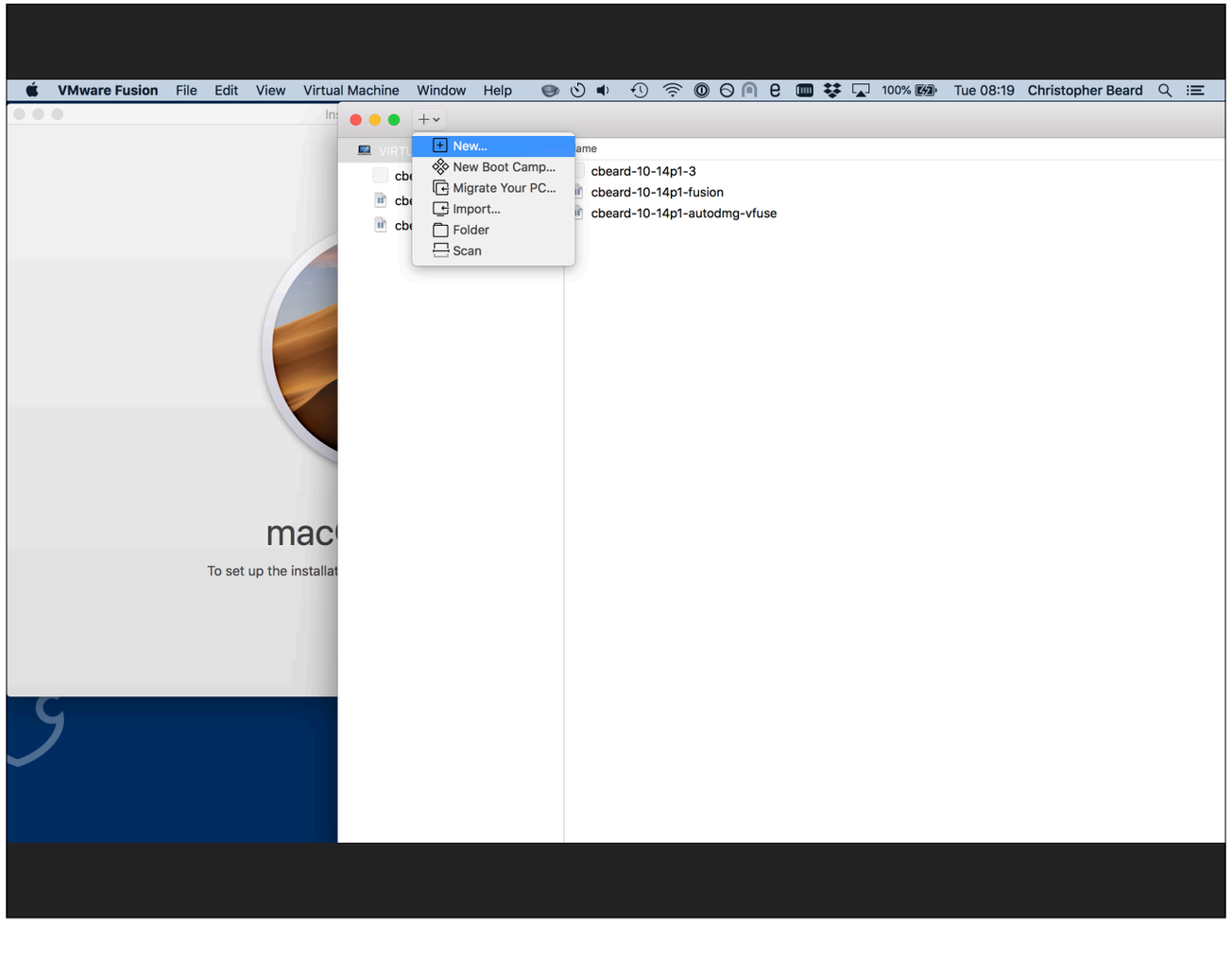
- Proprietary hypervisors
  - VMware Fusion. Version 11 supports Mojave.
  - Parallels
- Open source hypervisors
  - Oracle Virtual Box
  - QEMU

QEMU is more technical and mainly for kernel developers but can be useful for providing alternative virtualisation components.

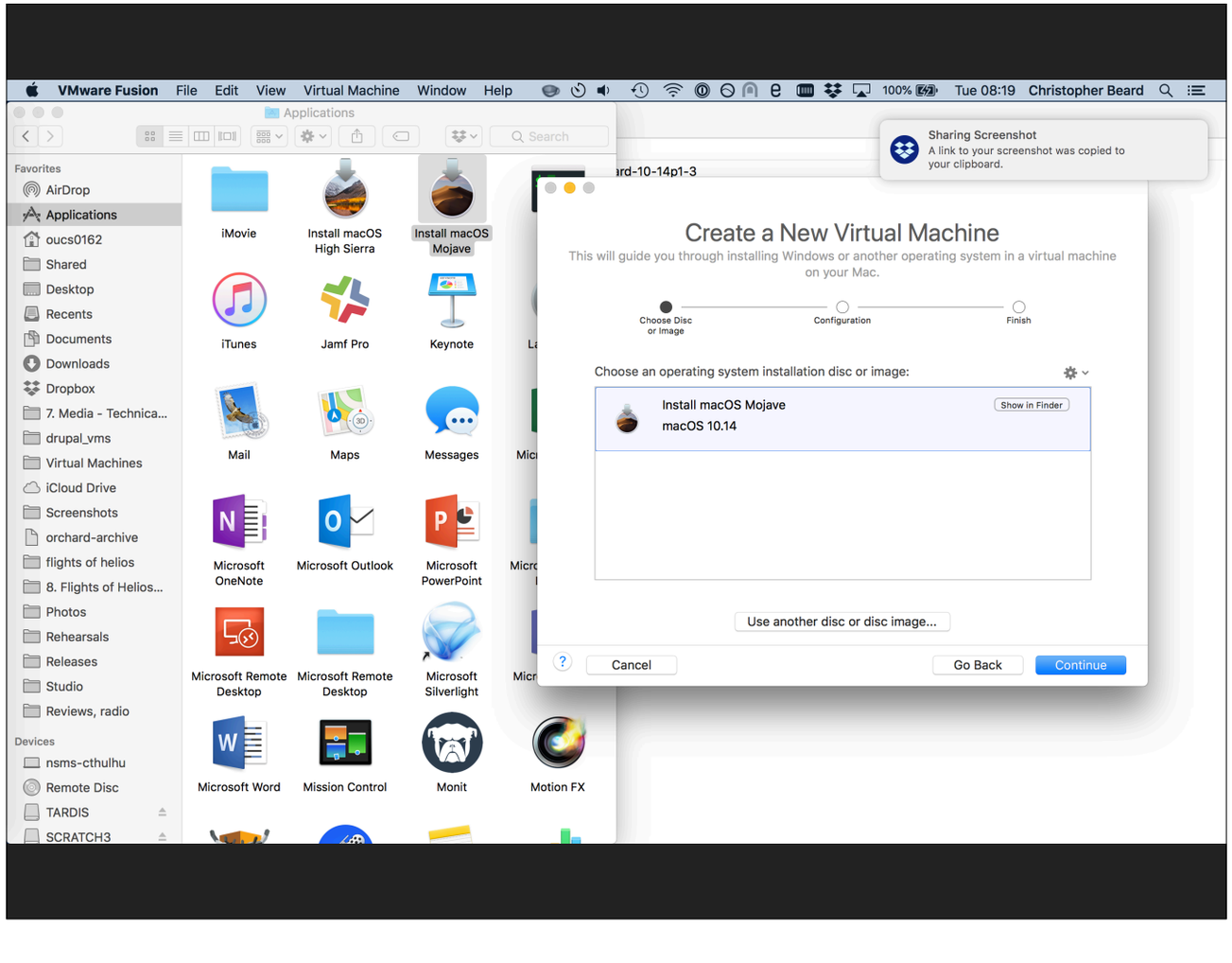
BUILDING A VM USING VMWARE FUSION

- Requirements for making a macOS 10.14 Mojave VM:
  - VMware Fusion 11 (Standard or Pro)
  - Install macOS Mojave.app (App Store)
  - 50GB storage
- No Fusion? See ‘Building a macOS VM using Virtual Box’ (in links)

Fusion 11 Pro has additional automation features not required by most users.



Creating a new VM in Fusion the normal way…


VMware Fusion File Edit View Virtual Machine Window Help
100% Tue 08:19 Christopher Beard
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SCRATCH3
iMovie
Install macOS High Sierra
Install macOS Mojave
iTunes
Jamf Pro
Keynote
Mail
Maps
Messages
Microsoft OneNote
Microsoft Outlook
Microsoft PowerPoint
Microsoft Remote Desktop
Microsoft Remote Desktop
Microsoft Silverlight
Microsoft Word
Mission Control
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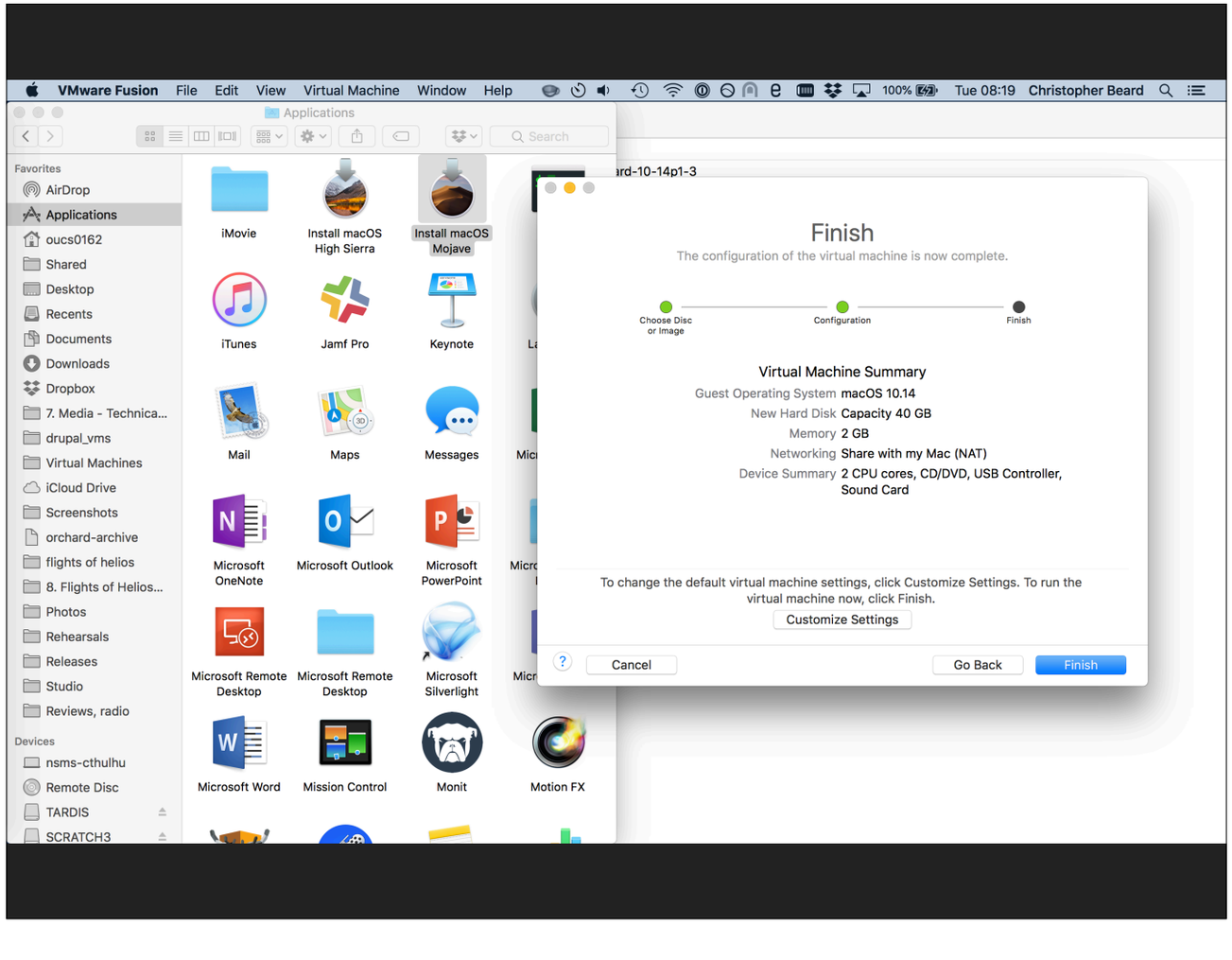
Sharing Screenshot
A link to your screenshot was copied to your clipboard.
Create a New Virtual Machine
This will guide you through installing Windows or another operating system in a virtual machine on your Mac.
Choose Disc or Image
Configuration
Finish
Choose an operating system installation disc or image:
Install macOS Mojave
macOS 10.14
Show in Finder
Use another disc or disc image...
Cancel
Go Back
Continue


VMware Fusion File Edit View Virtual Machine Window Help
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iCloud Drive
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Rehearsals
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Reviews, radio
Devices
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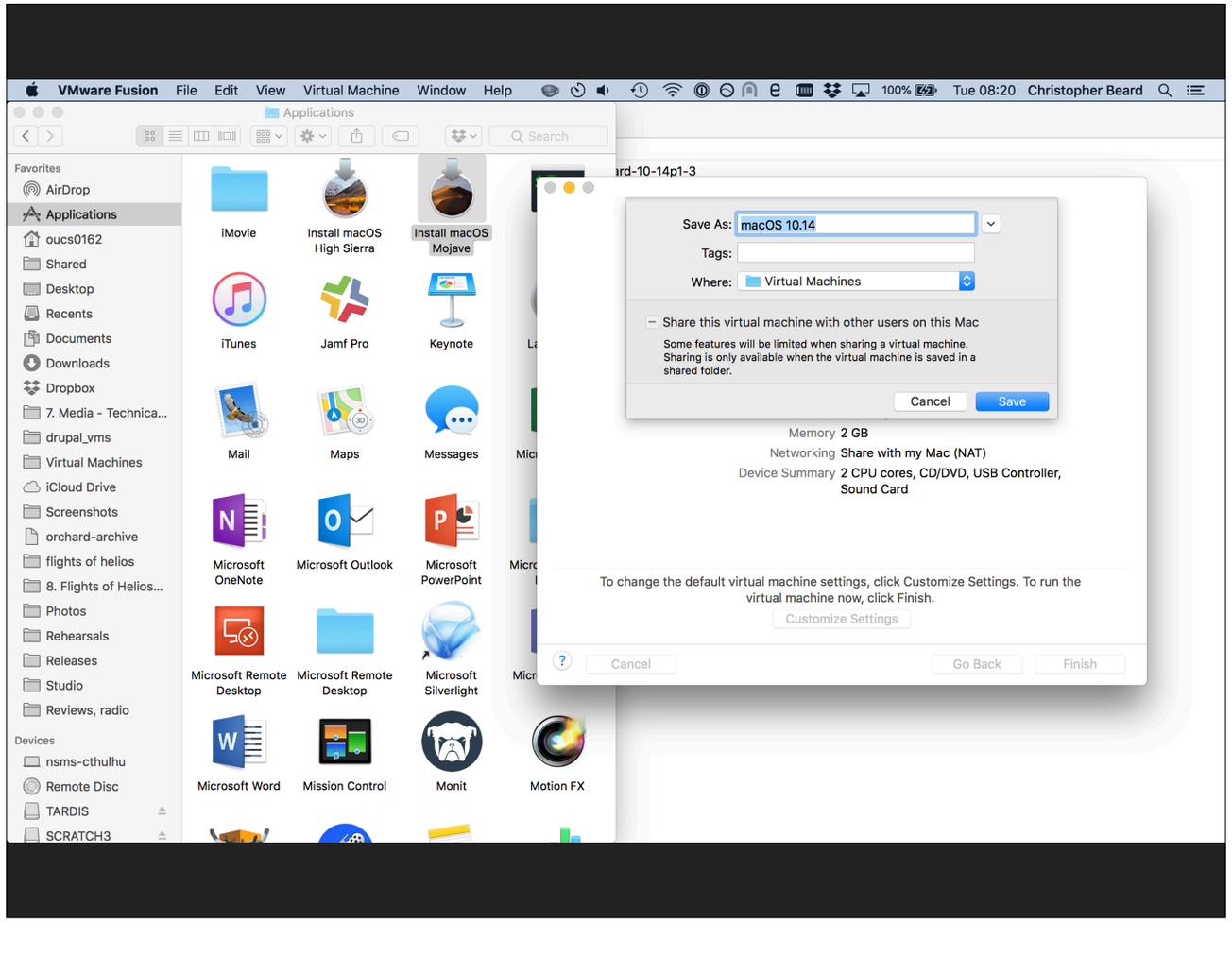
Remote Disc
TARDIS
SCRATCH3
iMovie
Install macOS High Sierra
Install macOS Mojave
iTunes
Jamf Pro
Keynote
Mail
Maps
Messages
Microsoft OneNote
Microsoft Outlook
Microsoft PowerPoint
Microsoft Remote Desktop
Microsoft Remote Desktop
Microsoft Silverlight
Microsoft Word
Mission Control
Monit
Motion FX
Finish
The configuration of the virtual machine is now complete.
Choose Disc or Image
Configuration
Finish
Virtual Machine Summary
Guest Operating System macOS 10.14
New Hard Disk Capacity 40 GB
Memory 2 GB
Networking Share with my Mac (NAT)
Device Summary 2 CPU cores, CD/DVD, USB Controller, Sound Card
To change the default virtual machine settings, click Customize Settings. To run the virtual machine now, click Finish.
Customize Settings
Cancel
Go Back
Finish


VMware Fusion File Edit View Virtual Machine Window Help
100% Tue 08:20 Christopher Beard
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Virtual Machines
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8. Flights of Helios...
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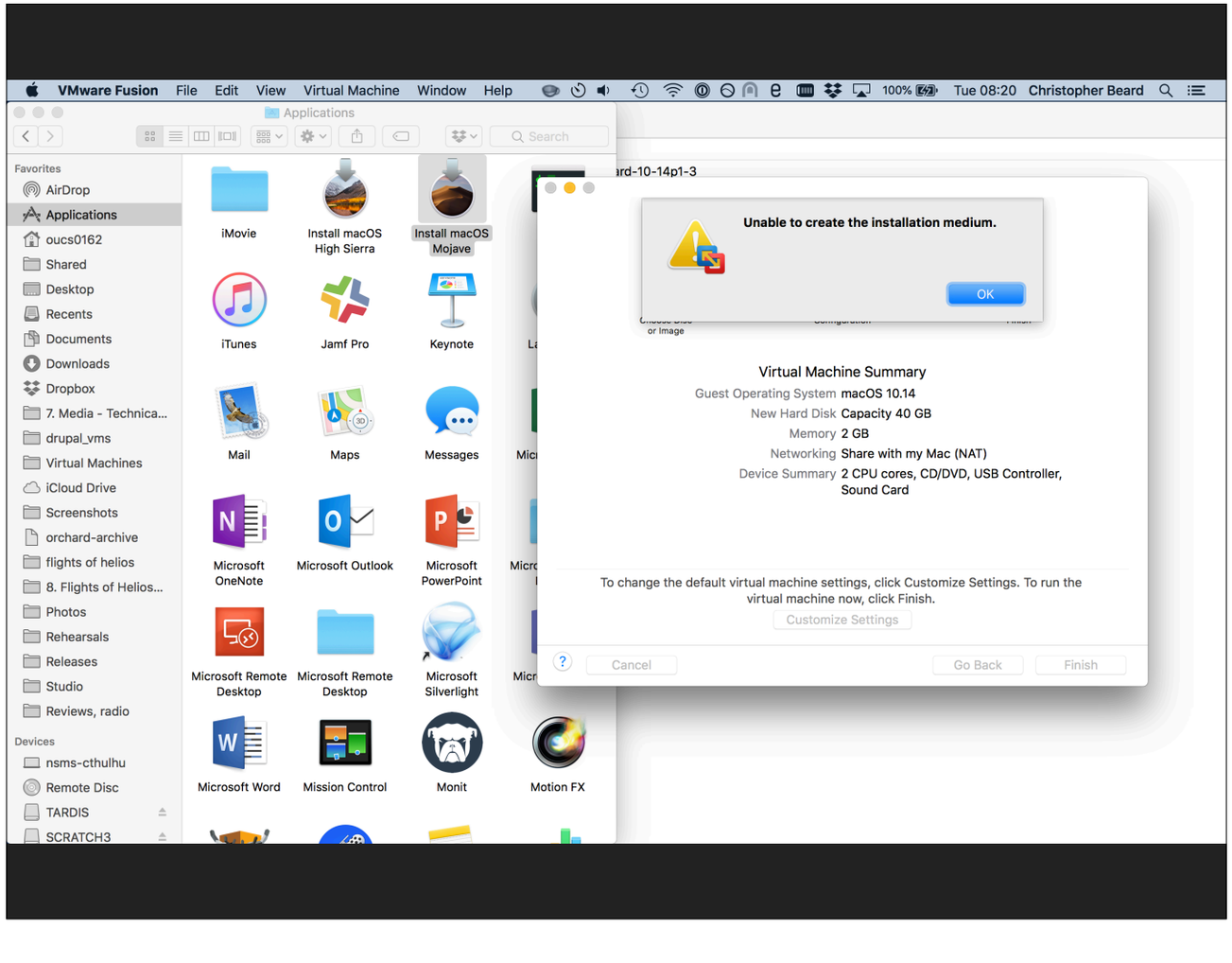
Reviews, radio
Devices
nsms-cthulhu
Remote Disc
TARDIS
SCRATCH3
iMovie
Install macOS High Sierra
Install macOS Mojave
iTunes
Jamf Pro
Keynote
Mail
Maps
Messages
Microsoft OneNote
Microsoft Outlook
Microsoft PowerPoint
Microsoft Remote Desktop
Microsoft Remote Desktop
Microsoft Silverlight
Microsoft Word
Mission Control
Monit
Motion FX
Save As: macOS 10.14
Tags:
Where: Virtual Machines
Share this virtual machine with other users on this Mac
Some features will be limited when sharing a virtual machine. Sharing is only available when the virtual machine is saved in a shared folder.
Cancel
Save
Memory 2 GB
Networking Share with my Mac (NAT)
Device Summary 2 CPU cores, CD/DVD, USB Controller, Sound Card
To change the default virtual machine settings, click Customize Settings. To run the virtual machine now, click Finish.
Customize Settings
Cancel
Go Back
Finish


VMware Fusion File Edit View Virtual Machine Window Help
100% Tue 08:20 Christopher Beard
Applications
Search
Favorites
AirDrop
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oucs0162
Shared
Desktop
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Documents
Downloads
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7. Media - Technica...
drupal_vms
Virtual Machines
iCloud Drive
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orchard-archive
flights of helios
8. Flights of Helios...
Photos
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nsms-cthulhu
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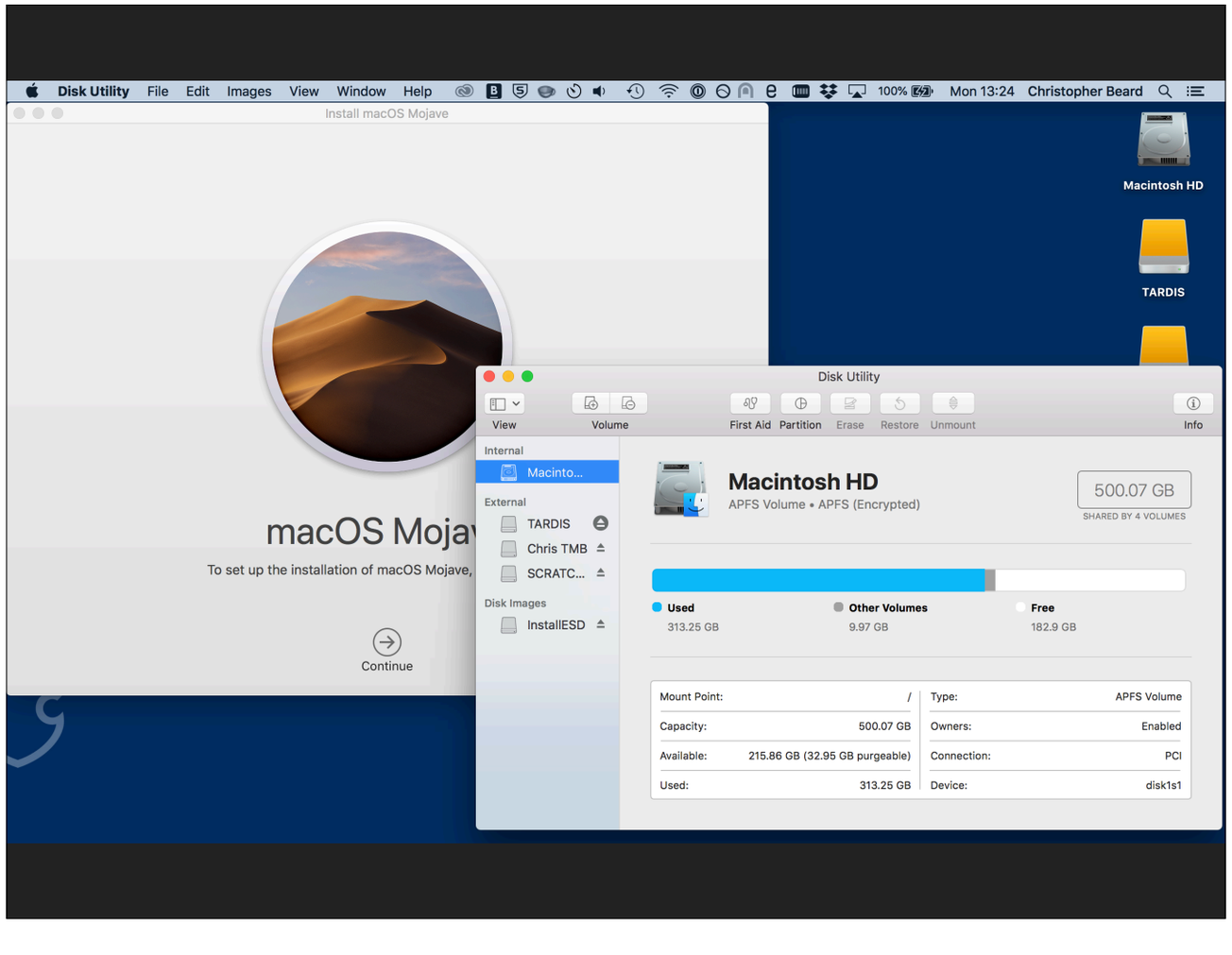
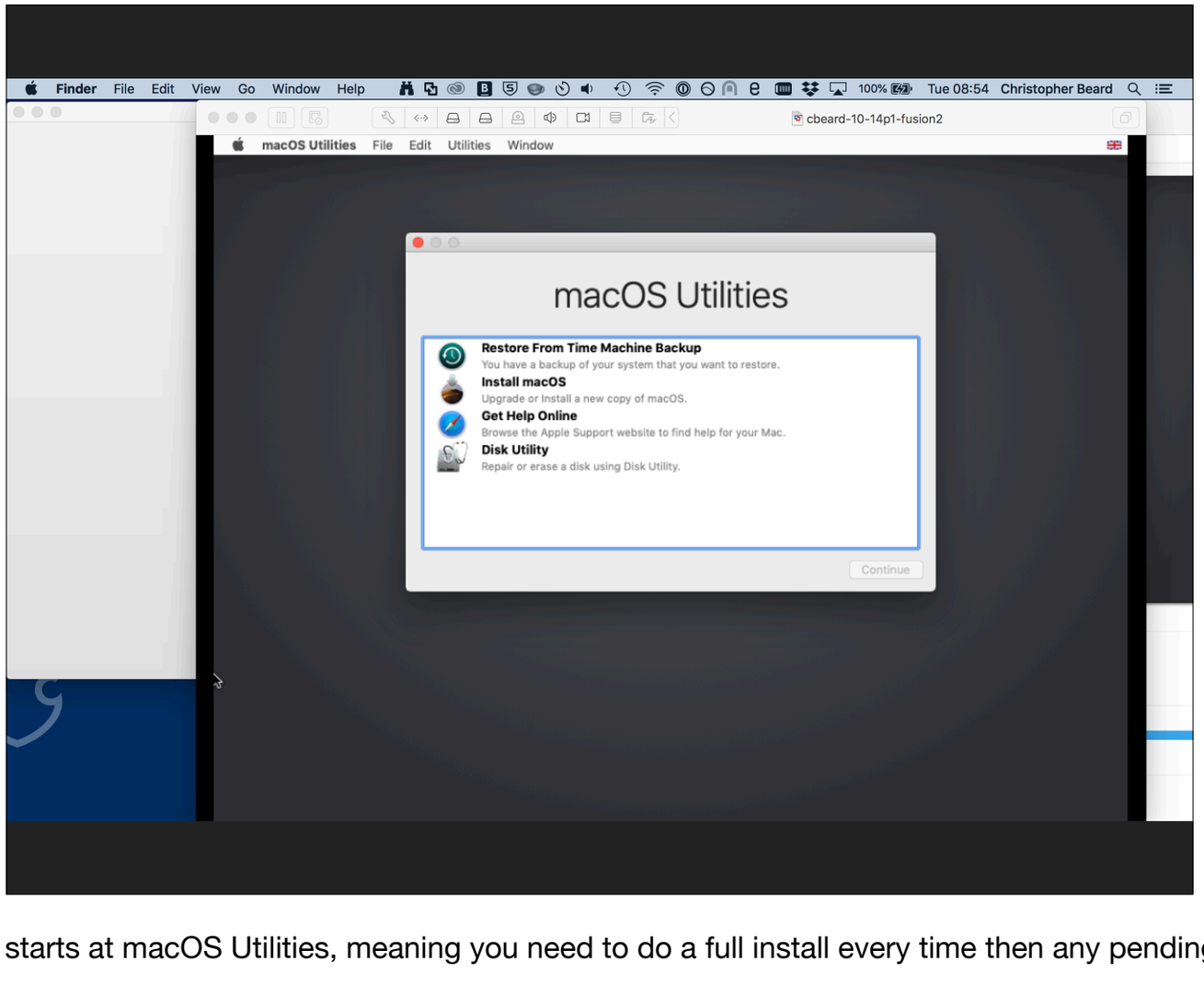
TARDIS
SCRATCH3
iMovie
Install macOS High Sierra
Install macOS Mojave
iTunes
Jamf Pro
Keynote
Mail
Maps
Messages
Microsoft OneNote
Microsoft Outlook
Microsoft PowerPoint
Microsoft Remote Desktop
Microsoft Remote Desktop
Microsoft Silverlight
Microsoft Word
Mission Control
Monit
Motion FX
Unable to create the installation medium.
OK
Virtual Machine Summary
Guest Operating System macOS 10.14
New Hard Disk Capacity 40 GB
Memory 2 GB
Networking Share with my Mac (NAT)
Device Summary 2 CPU cores, CD/DVD, USB Controller, Sound Card
To change the default virtual machine settings, click Customize Settings. To run the virtual machine now, click Finish.
Customize Settings
Cancel
Go Back
Finish

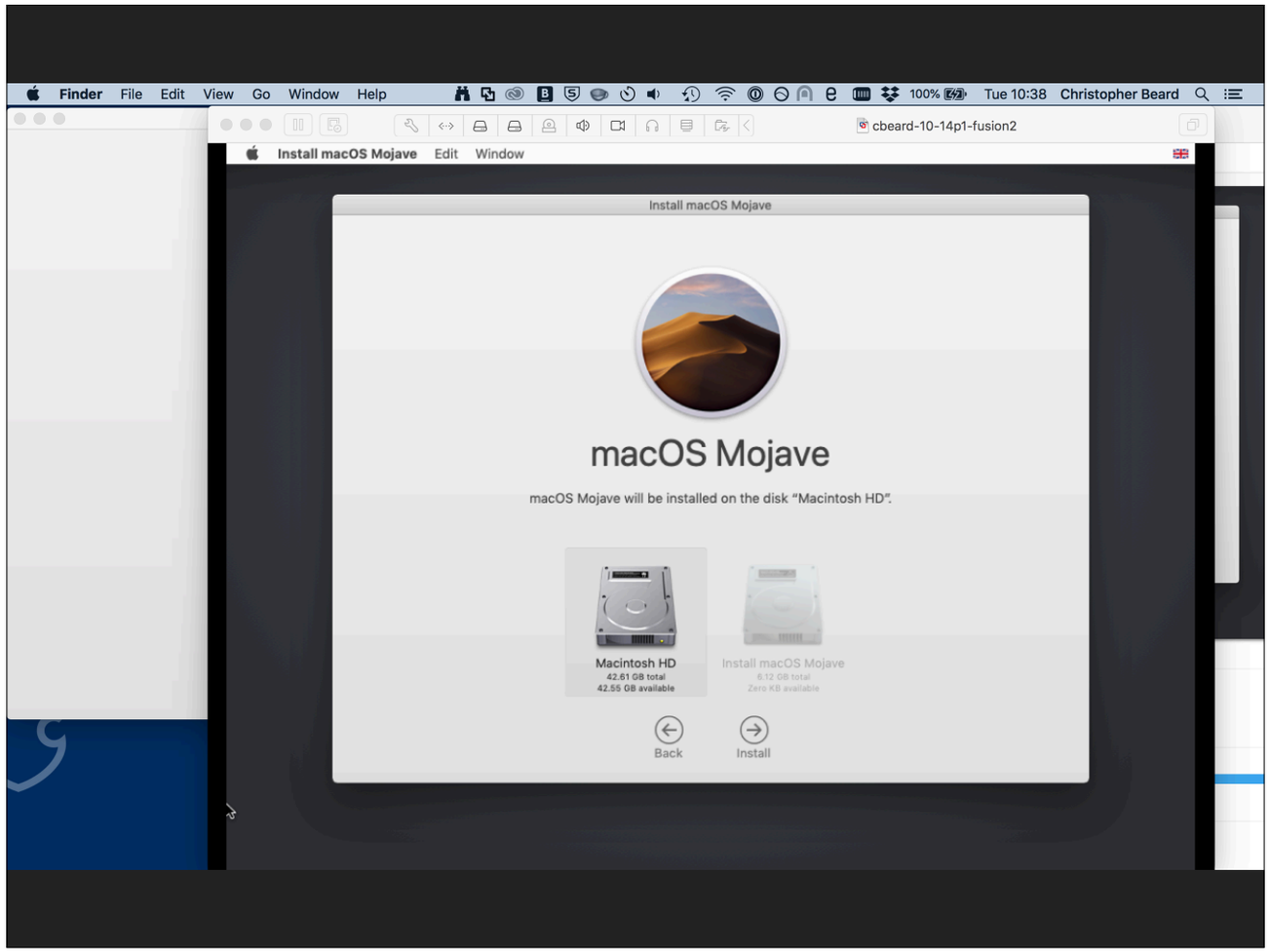
Gotcha 1!

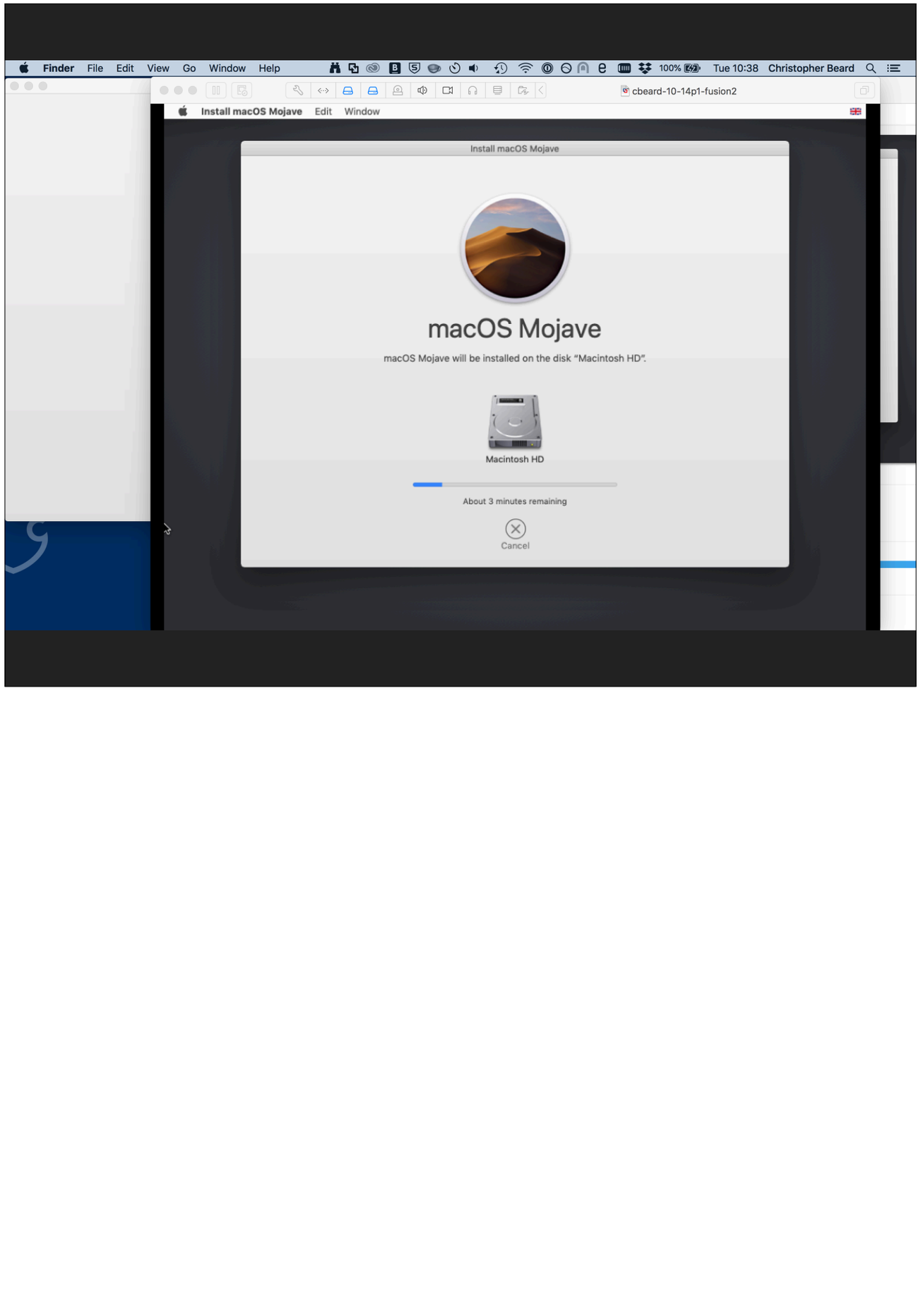


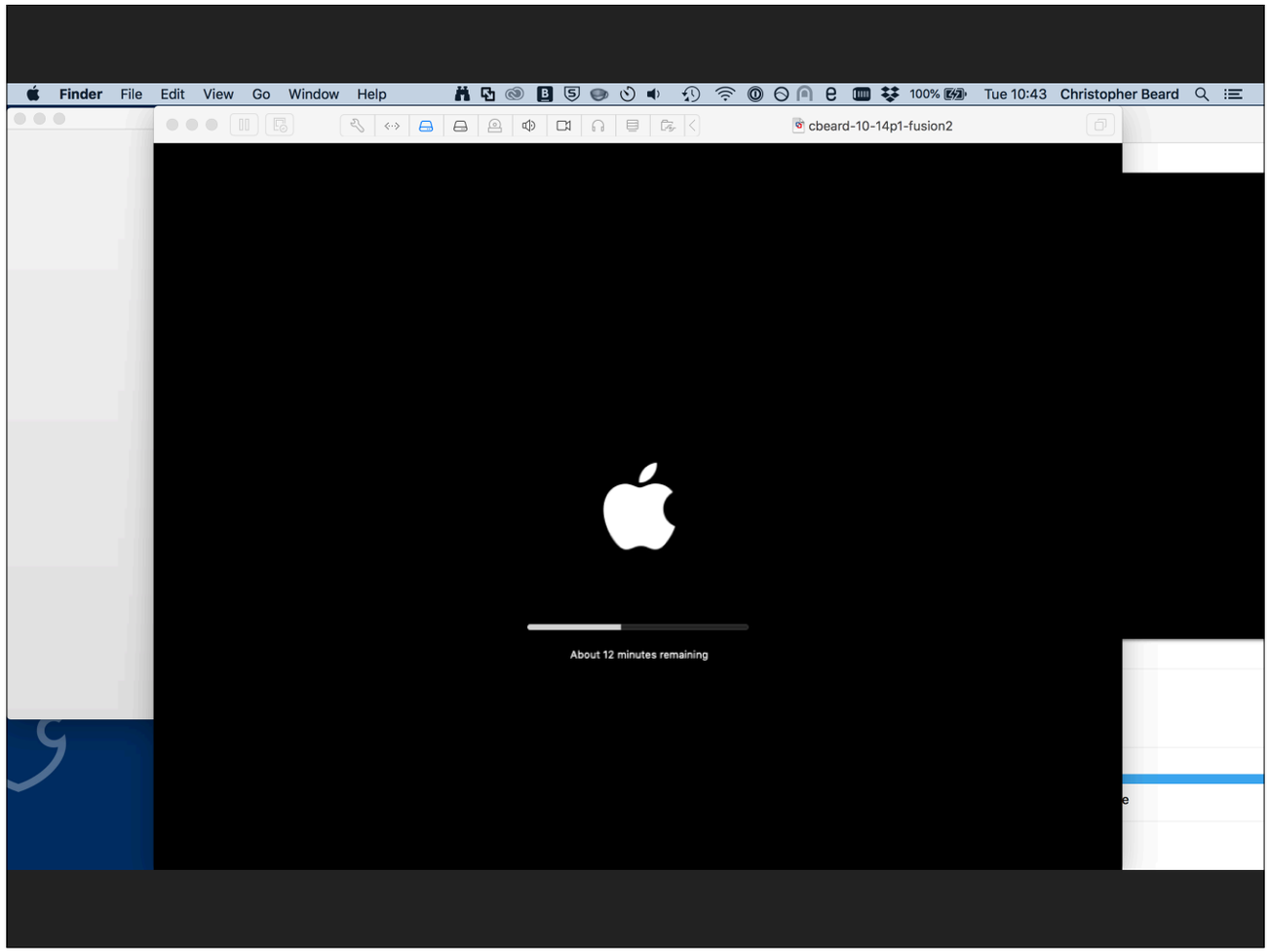
Solution to Gotcha 1: eject InstallESD.dmg



Standard method of building Fusion VM starts at macOS Utilities, meaning you need to do a full install every time then any pending updates. Can be an hour plus.


Finder File Edit View Go Window Help
100% Tue 10:38 Christopher Beard
cbeard-10-14p1-fusion2
Install macOS Mojave Edit Window
Install macOS Mojave
macOS Mojave
macOS Mojave will be installed on the disk "Macintosh HD".
Macintosh HD
42.61 GB total
42.55 GB available
Install macOS Mojave
6.12 GB total
Zero KB available
Back
Install


Finder File Edit View Go Window Help
100% Tue 10:38 Christopher Beard
cbeard-10-14p1-fusion2
Install macOS Mojave Edit Window
Install macOS Mojave
macOS Mojave
macOS Mojave will be installed on the disk "Macintosh HD".
Macintosh HD
About 3 minutes remaining
Cancel


Finder File Edit View Go Window Help
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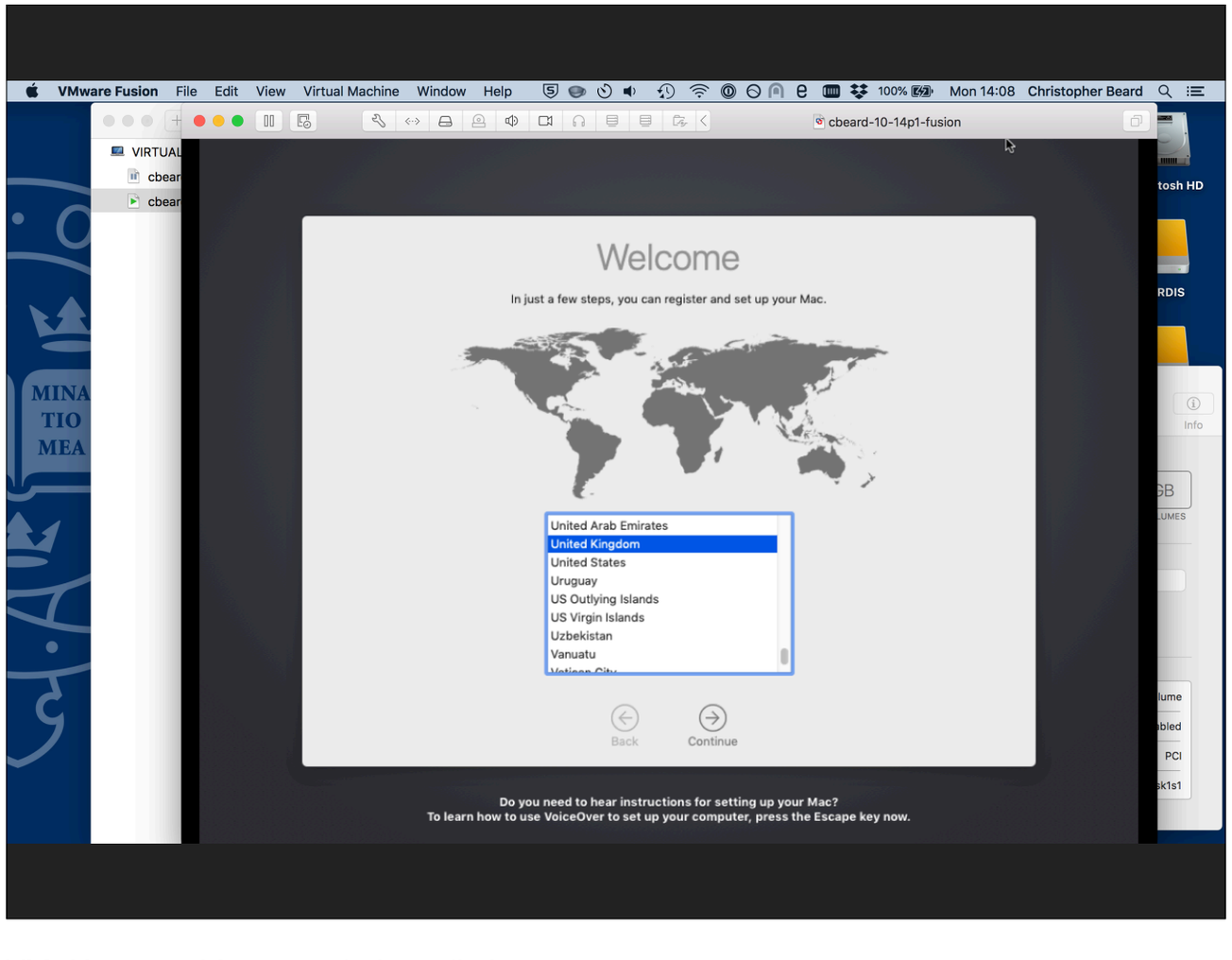
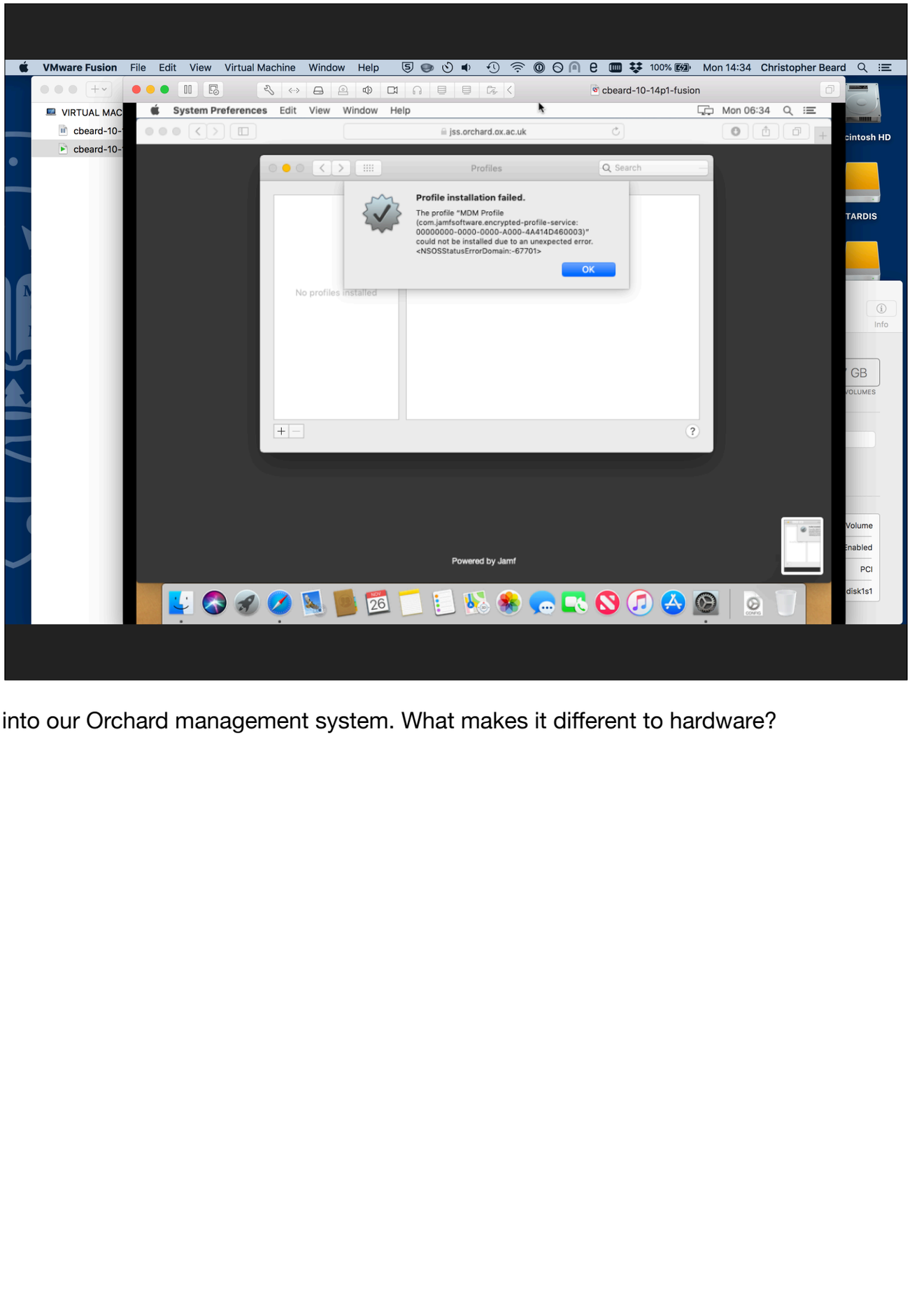
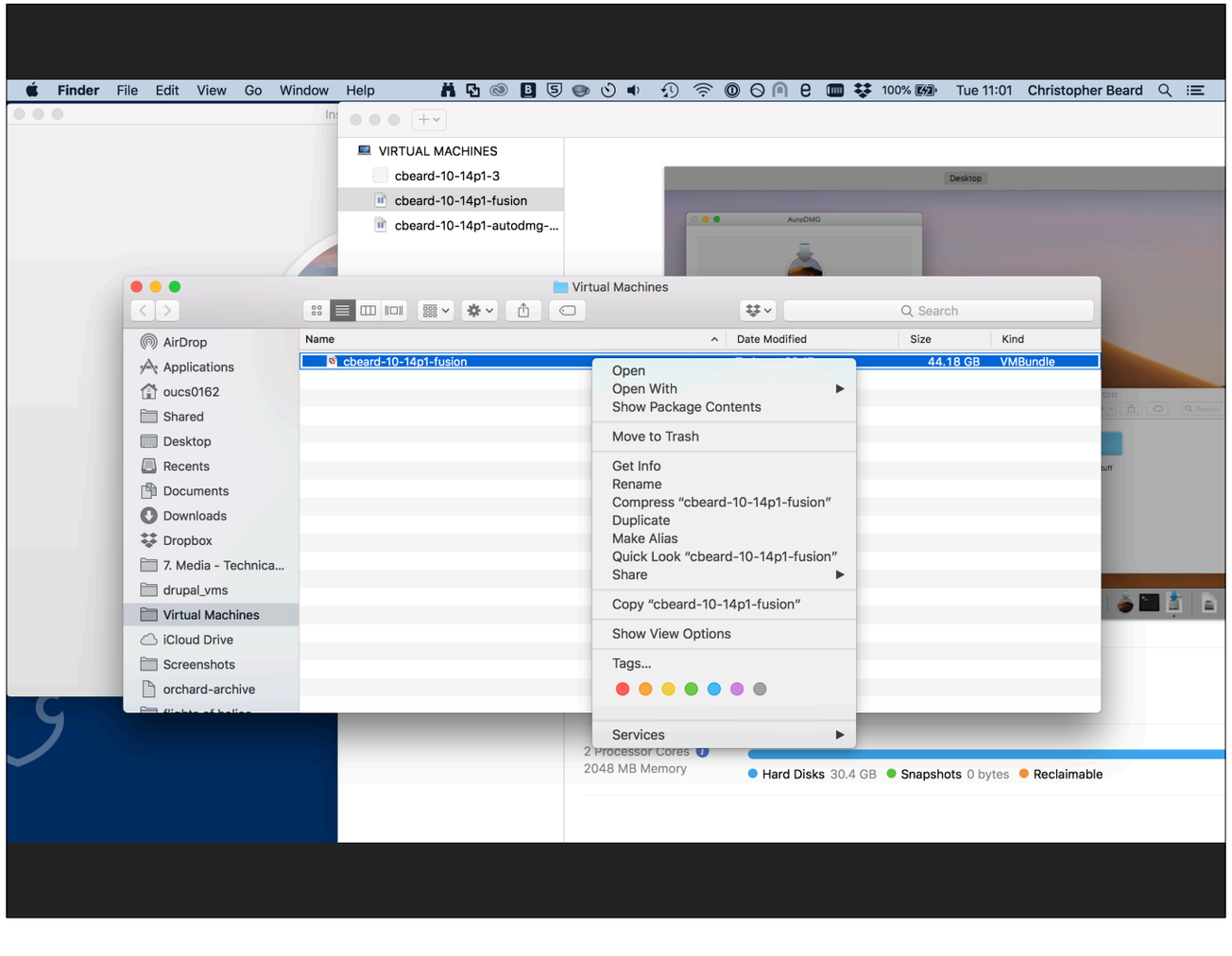
cbeard-10-14p1-fusion2
About 12 minutes remaining



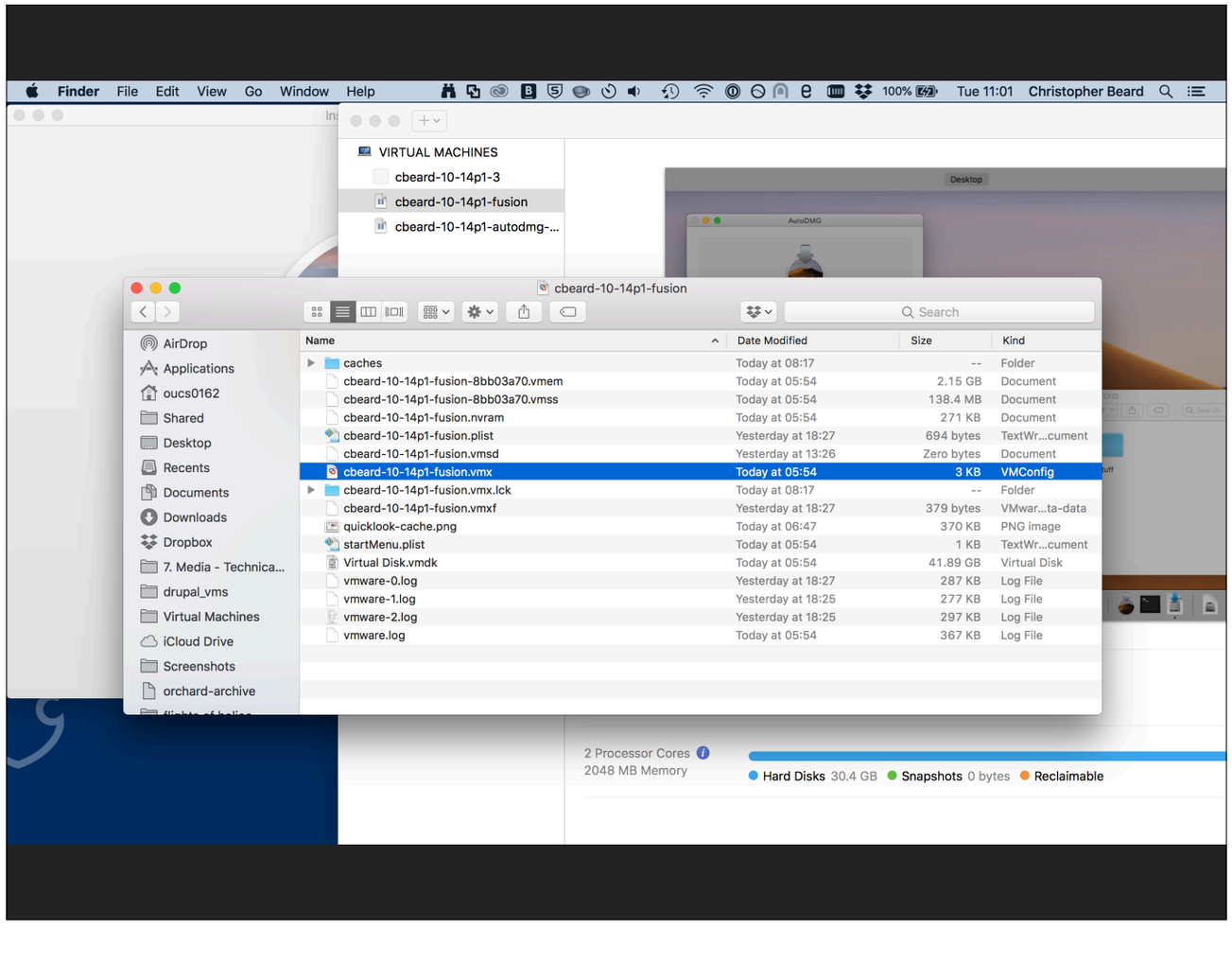
Will result in a generally working Mojave VM. However it’s not entirely realistic…



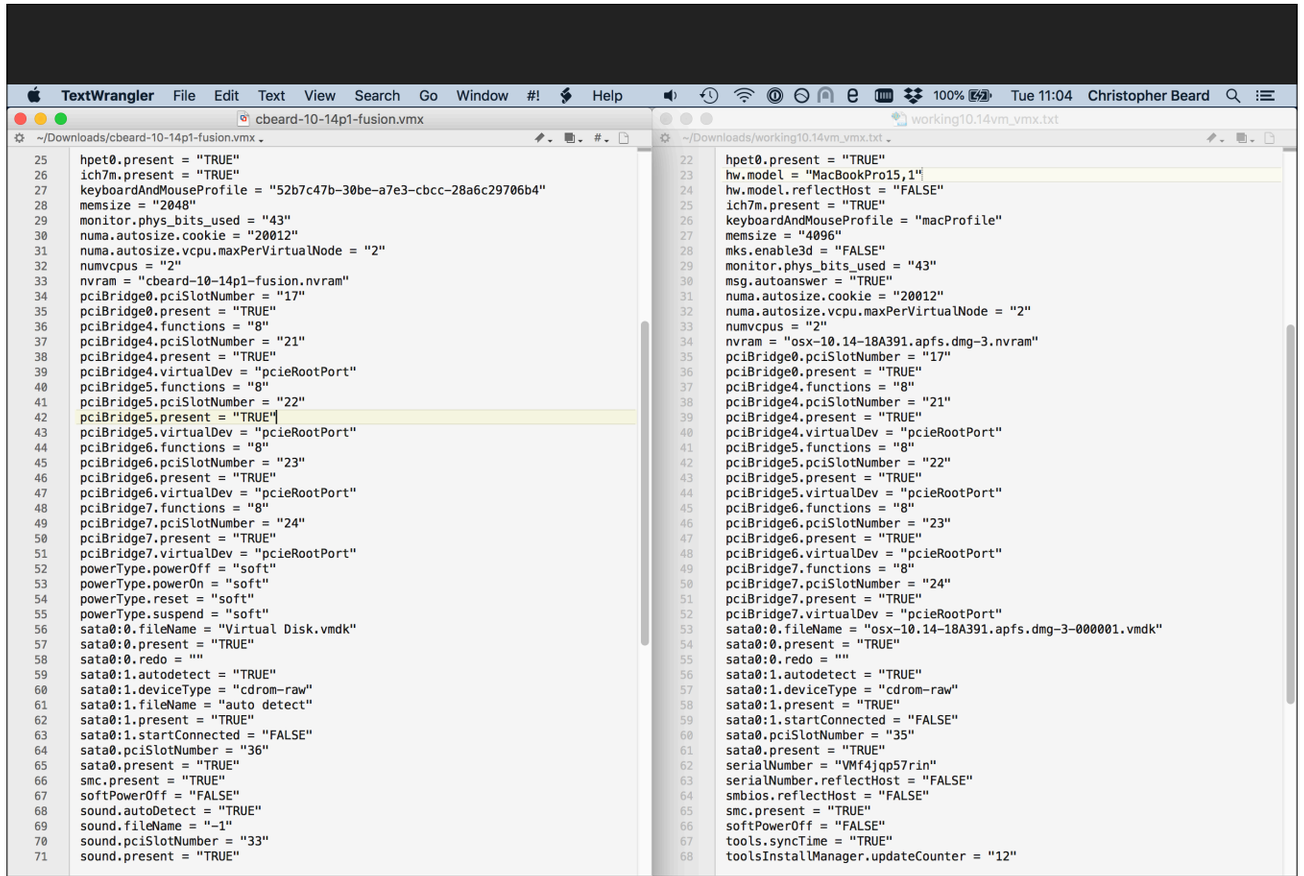
Standard Fusion VM cannot be enrolled into our Orchard management system. What makes it different to hardware?



Looking at the VM files…



<vm-name>.vmx is the main configuration file for the VM.



Comparing with a VM built from other means, the standard Fusion built VM (left) is lacking a serial number and model among other keys. Probably why can’t enrol into our management system as serial is used to identify devices.

A BETTER WAY: VMWARE FUSION + AUTODMG + VFUSE

- AutoDMG by Per Olofsson
  - Uses macOS installer to create never-booted Macintosh HD inside a disk image (dmg)
- vfuse by Joseph Chilcote
  - Takes a never-booted disk image and converts it to a VMware Fusion VM
- Download the latest release.

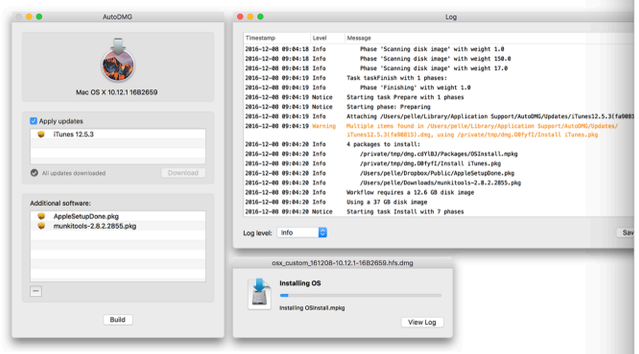
Safari File Edit View History Bookmarks Develop Window Help 100% Tue 11:15 Christopher Beard

github.com/MagerValp/AutoDM

ADAM talk FrontPage/EndUser ITSS/Support...cumentation Mojave TO Prep

AutoDMG

The award winning AutoDMG takes a macOS installer (10.10 or newer) and builds a system image suitable for deployment with Imagr, DeployStudio, LANrev, Jamf Pro, and other asr-based imaging tools.



Documentation

Documentation and help is in the AutoDMG wiki.

Presentation

For a great overview of modular imaging and a demonstration of some of AutoDMG's features, watch Anthony F
presentation from Penn State MacAdmins 2014:

github.com/chilcote/vfuse

ADAM talk FrontPage/EndUser ITSS/Support...cumentation Mojave TO Prep

vfuse

This script takes a never-booted DMG and converts it to a VMware Fusion VM.

The germ of this idea came about, as all good ideas, and germs, do: while drinking beer. Specifically, I was t
back drinks and tossing around ideas with Gilbert Wilson, and he mentioned that he uses the VMware CLI to
convert DMGs to VMDKs based on a blog post he'd read. Intrigued, I asked Gil to email me the specifics. Afte
how potentially cool this was, I wrapped it up in this here terribly illegible, queasingly unpythonic script.

> Note: VMware Fusion 11 was released in September, and there is currently a bug in the binaries that `vfuse`
> to create the VM. Please see this wiki note for more details.

Requirements

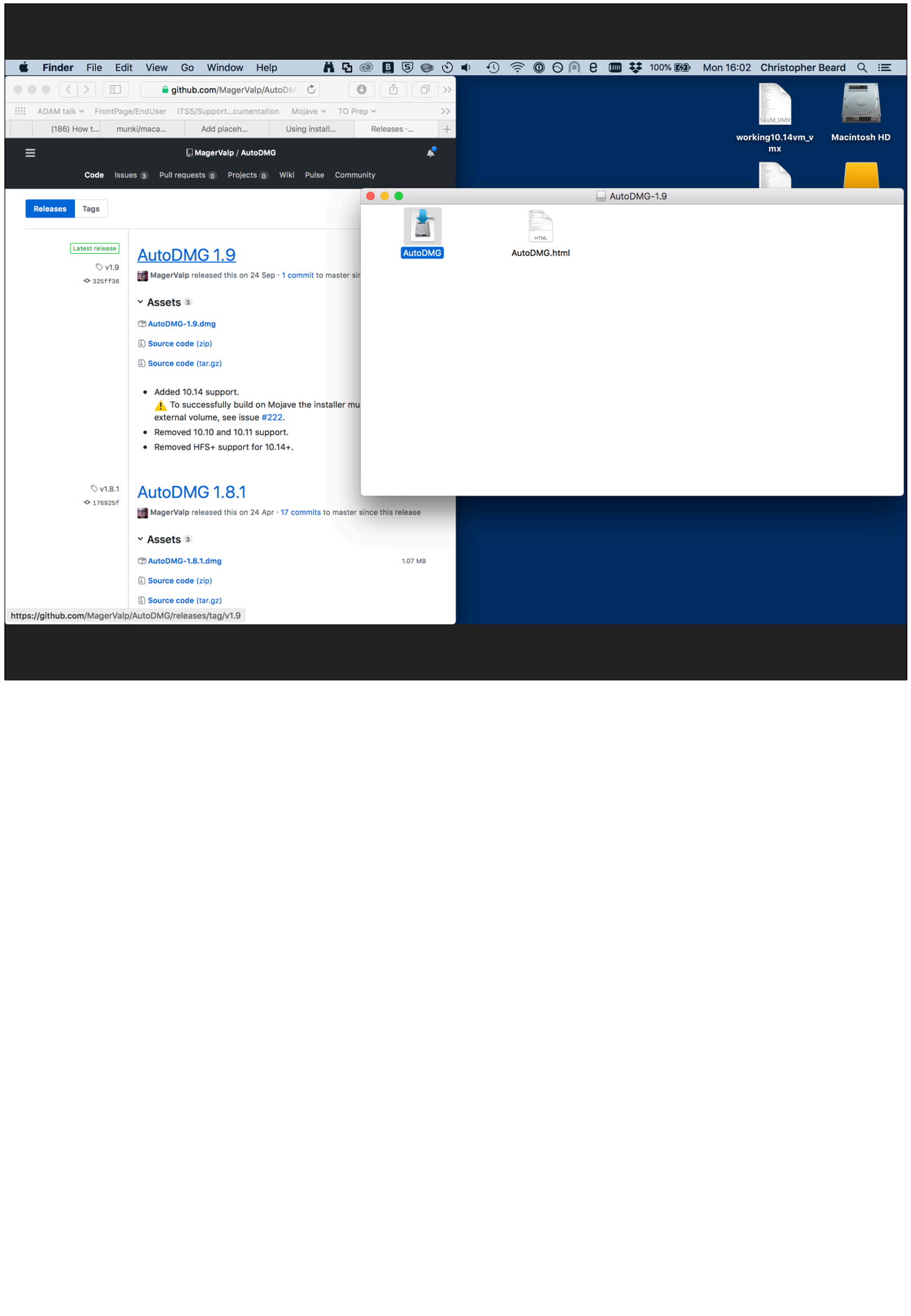
- VMware Fusion 10.x Professional or above
- OS X 10.13.6+
- A never-booted image created with AutoDMG.
- (optional) Packer 1.1.1 (or above) for building a vagrant box.
- (optional) qemu-img

Usage

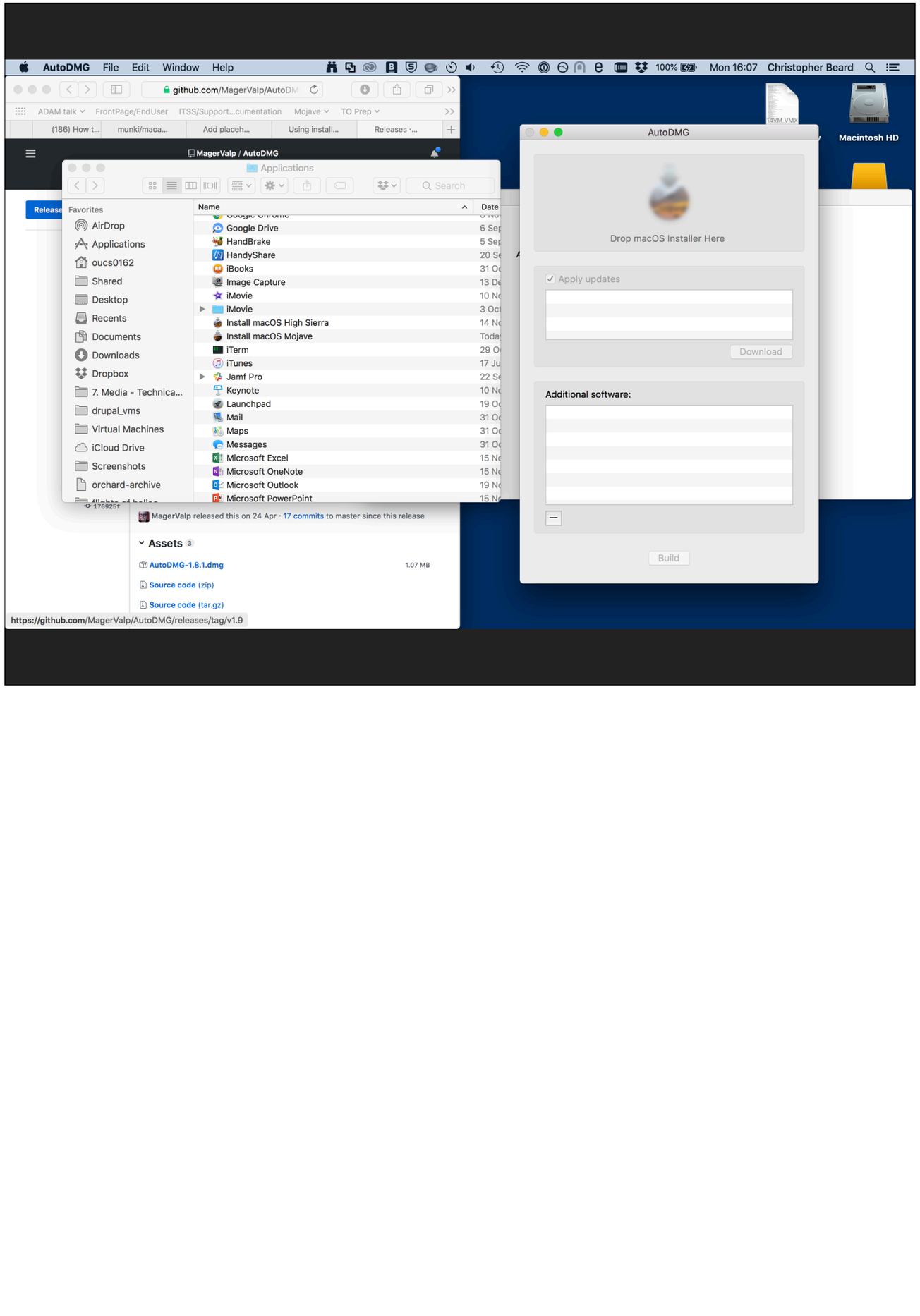
```
usage: vfuse [-h] [--version] [-i INPUT] [-o OUTPUT] [-n NAME] [-w HW_VERSION]
             [-m MEM_SIZE] [-s [SERIAL]] [-t TEMPLATE] [-e] [-p PACKER] [-d D]
             [--hw-model HW_MODEL] [--start [START]] [--stop STOP]
             [--reset RESET] [--use-qemu] [--recovery] [--snapshot]
             [--snapshot-name SNAPSHOT_NAME] [-c CHECKSUM] [--list-templates]
             [--list-cache] [--clear-cache]

Create and monitor VM from source DMG.

optional arguments:
  -h, --help            show this help message and exit
  --version             show the version number
  -i INPUT, --input INPUT
                        /path/to/dmg
  -o OUTPUT, --output OUTPUT
                        /path/to/output/dir
  -n NAME, --name NAME  Use a custom name
  -w HW_VERSION, --hw-version HW_VERSION
                        VMware hardware version
```



Can run AutoDMG from its Disk Image.


AutoDMG File Edit Window Help
Mon 16:07 Christopher Beard
github.com/MagerValp/AutoDM
MagerValp / AutoDMG
Applications
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AirDrop
Applications
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Documents
Downloads
Dropbox
7. Media - Technica...
drupal_vms
Virtual Machines
iCloud Drive
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orchard-archive
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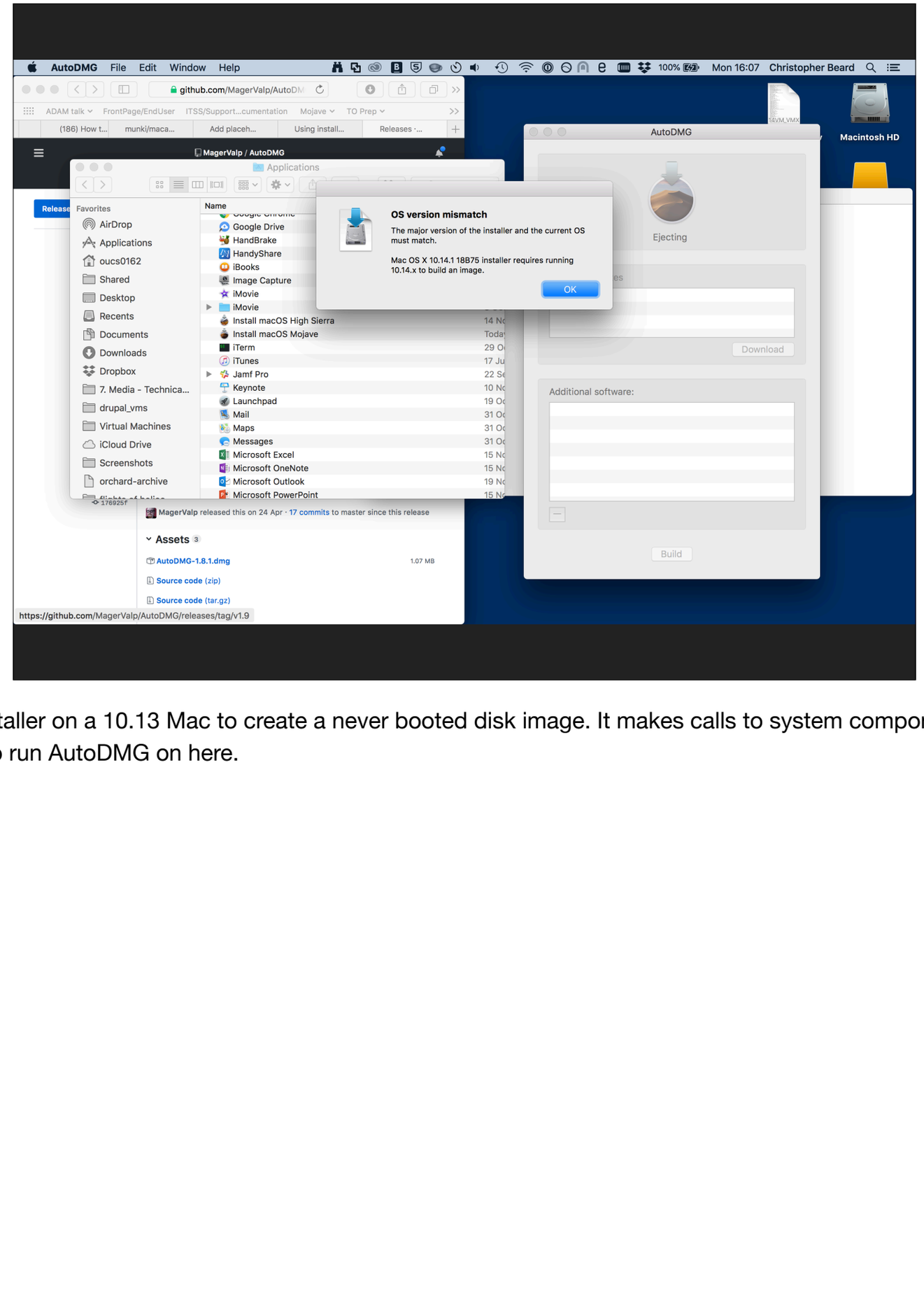
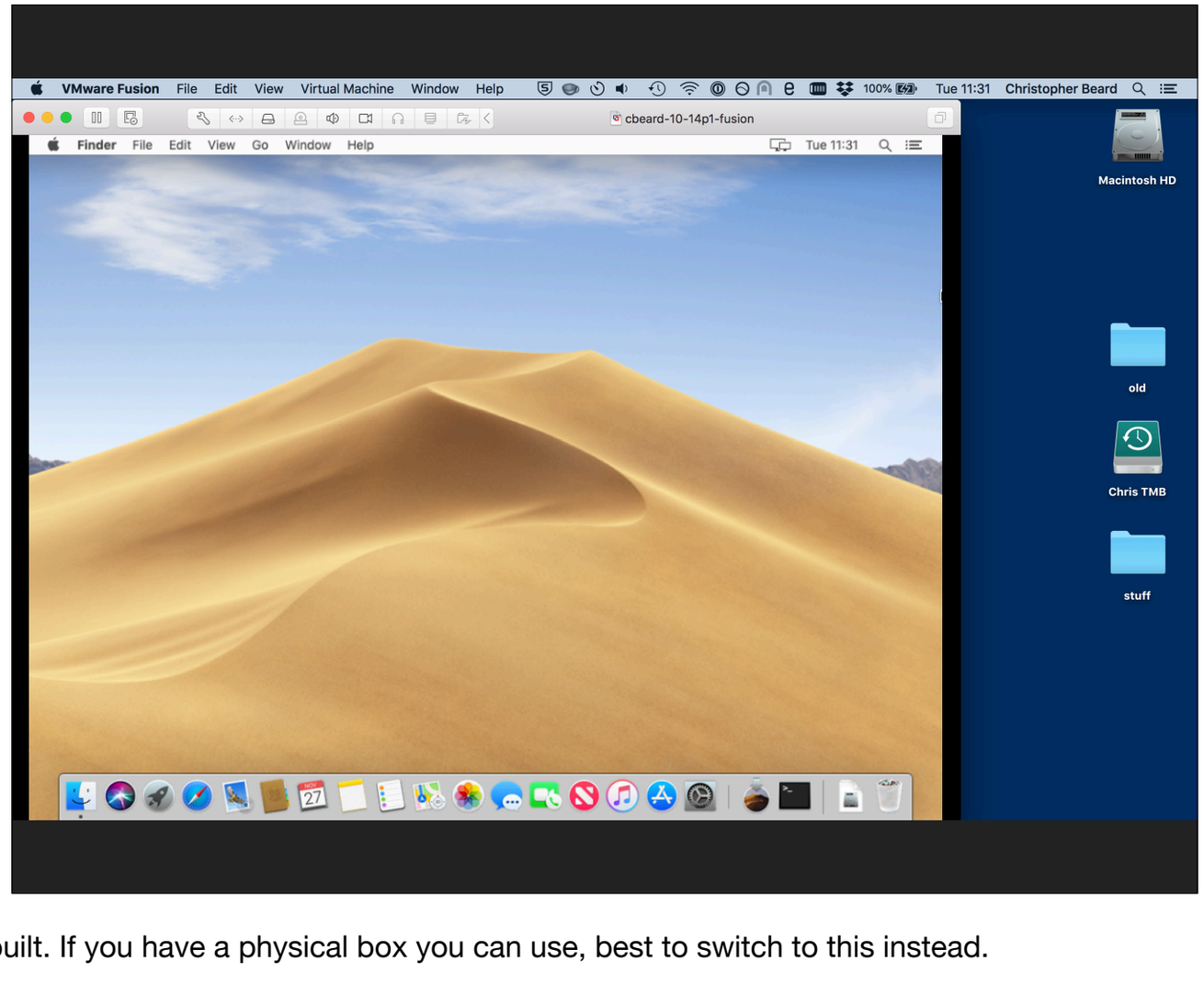
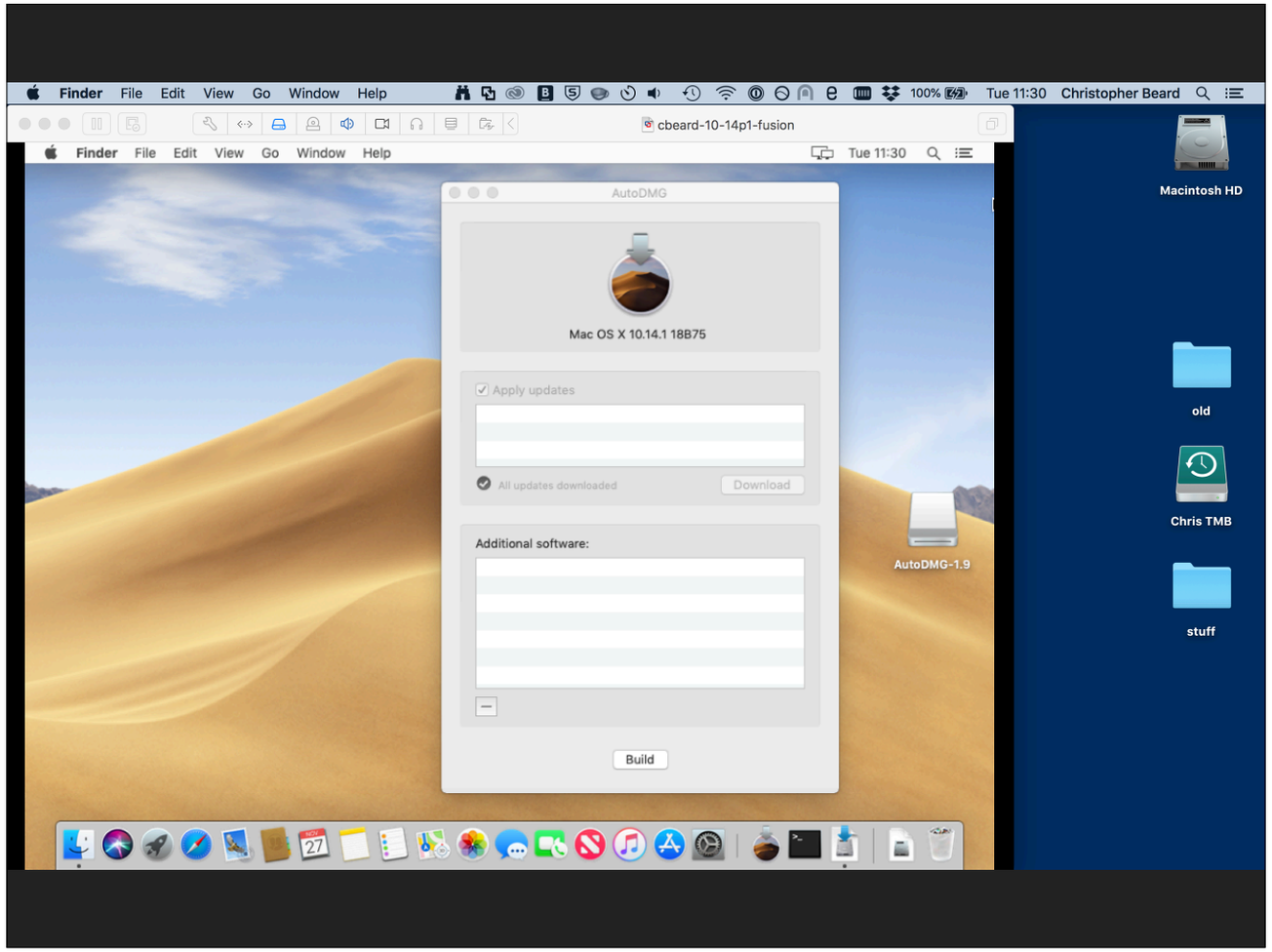
Google Drive
HandBrake
HandyShare
iBooks
Image Capture
iMovie
iMovie
Install macOS High Sierra
Install macOS Mojave
iTerm
iTunes
Jamf Pro
Keynote
Launchpad
Mail
Maps
Messages
Microsoft Excel
Microsoft OneNote
Microsoft Outlook
Microsoft PowerPoint
MagerValp released this on 24 Apr · 17 commits to master since this release
Assets 3
AutoDMG-1.8.1.dmg 1.07 MB
Source code (zip)
Source code (tar.gz)
https://github.com/MagerValp/AutoDMG/releases/tag/v1.9
AutoDMG
Drop macOS Installer Here
Apply updates
Download
Additional software:
Build
Macintosh HD

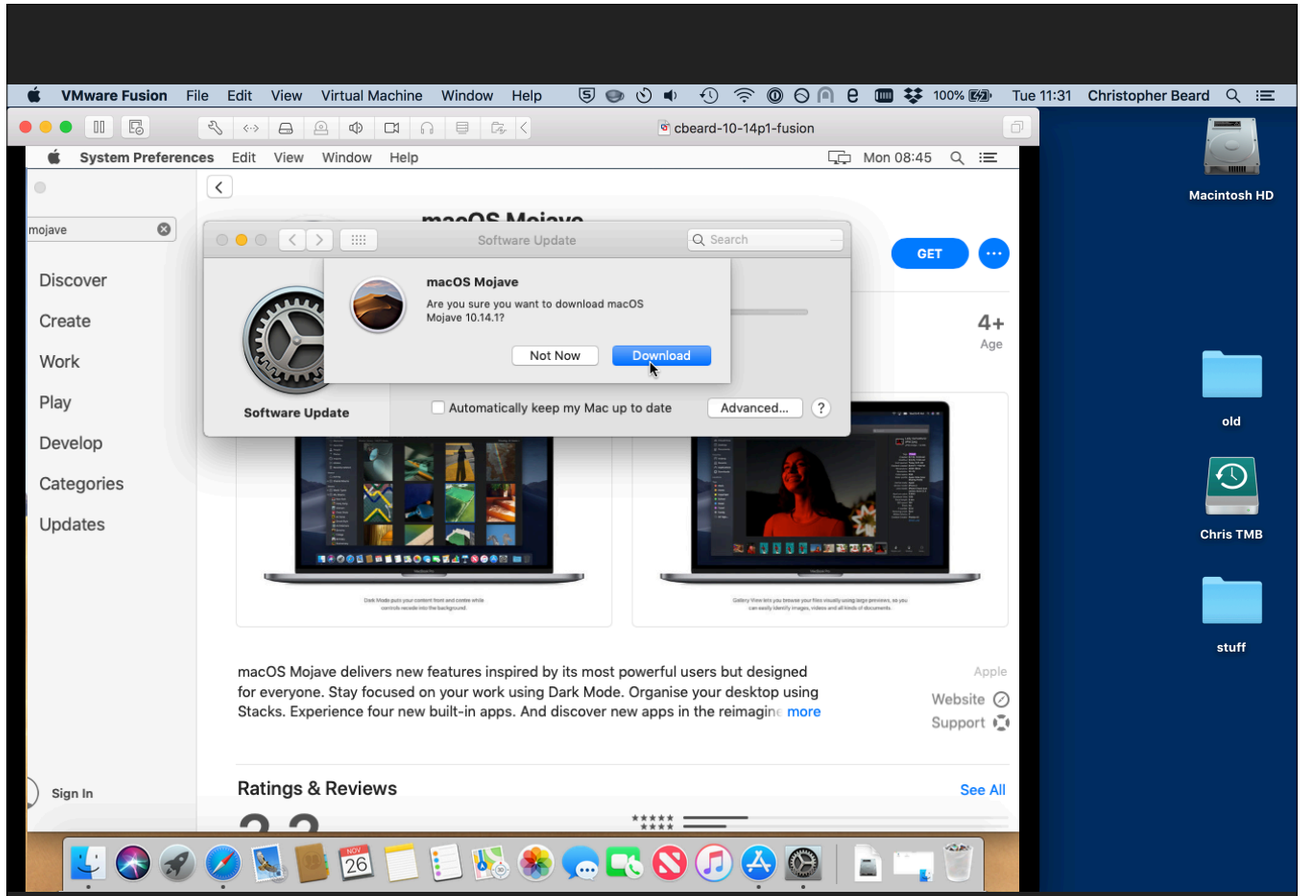


Gotcha 2: can’t run a 10.14 macOS installer on a 10.13 Mac to create a never booted disk image. It makes calls to system components (installer framework) only present in 10.14. So we need a 10.14 system to run AutoDMG on here.



Using the standard Fusion VM we just built. If you have a physical box you can use, best to switch to this instead.


Finder File Edit View Go Window Help
100% Tue 11:30 Christopher Beard
cbeard-10-14p1-fusion
Finder File Edit View Go Window Help
Tue 11:30
AutoDMG
Mac OS X 10.14.1 18B75
Apply updates
All updates downloaded
Download
Additional software:
Build
AutoDMG-1.9
Macintosh HD
old
Chris TMB
stuff


VMware Fusion File Edit View Virtual Machine Window Help
100% Tue 11:31 Christopher Beard
cbeard-10-14p1-fusion
System Preferences Edit View Window Help
Mon 08:45
mojave
Discover
Create
Work
Play
Develop
Categories
Updates
Sign In
Software Update
Search
macOS Mojave
Are you sure you want to download macOS Mojave 10.14.1?
Not Now
Download
Software Update
Automatically keep my Mac up to date
Advanced...
GET
4+
Age
macOS Mojave delivers new features inspired by its most powerful users but designed for everyone. Stay focused on your work using Dark Mode. Organise your desktop using Stacks. Experience four new built-in apps. And discover new apps in the reimagin more
Apple
Website
Support
Ratings & Reviews
See All
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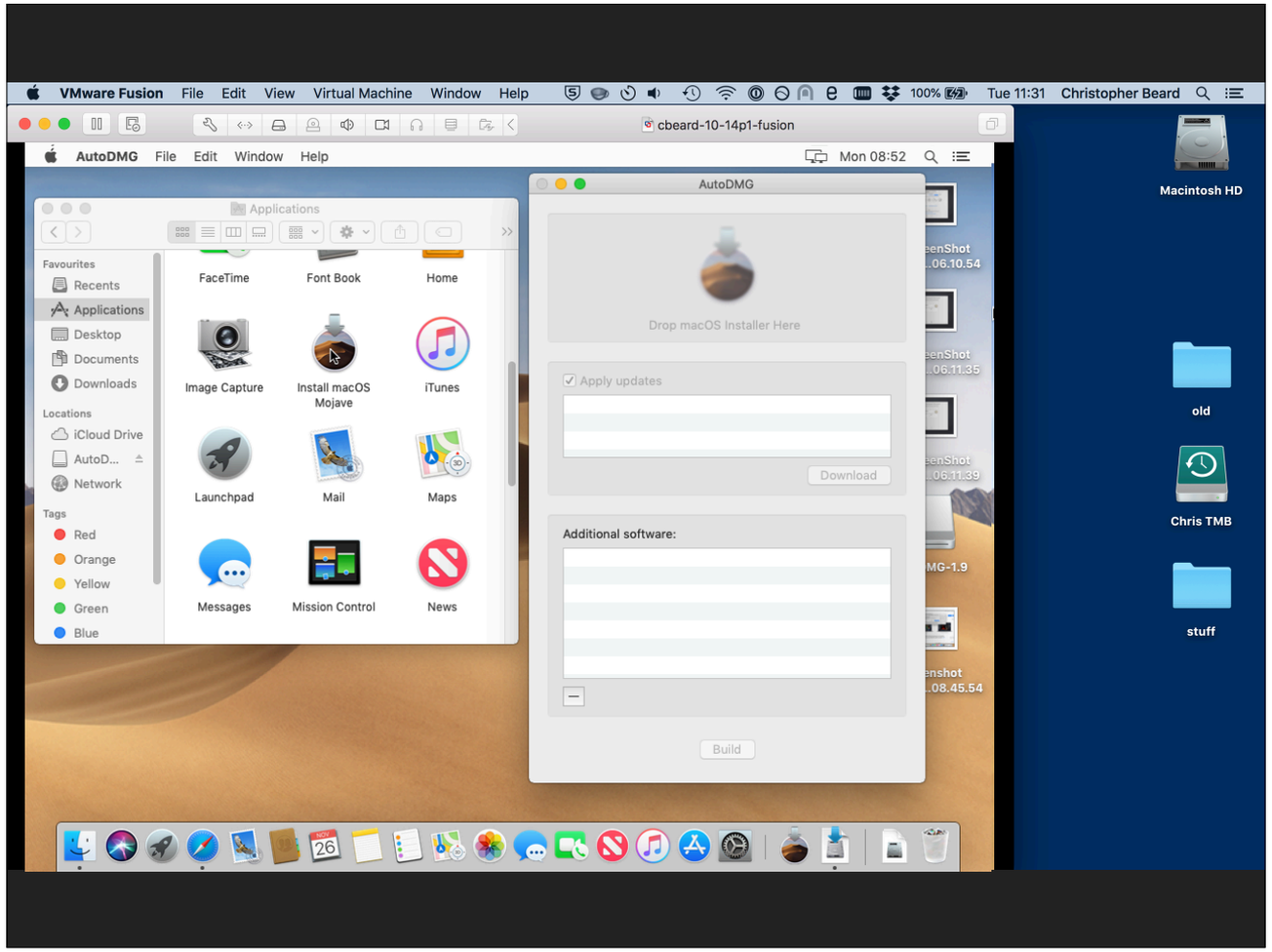
VMware Fusion File Edit View Virtual Machine Window Help
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cbeard-10-14p1-fusion
AutoDMG File Edit Window Help
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Applications
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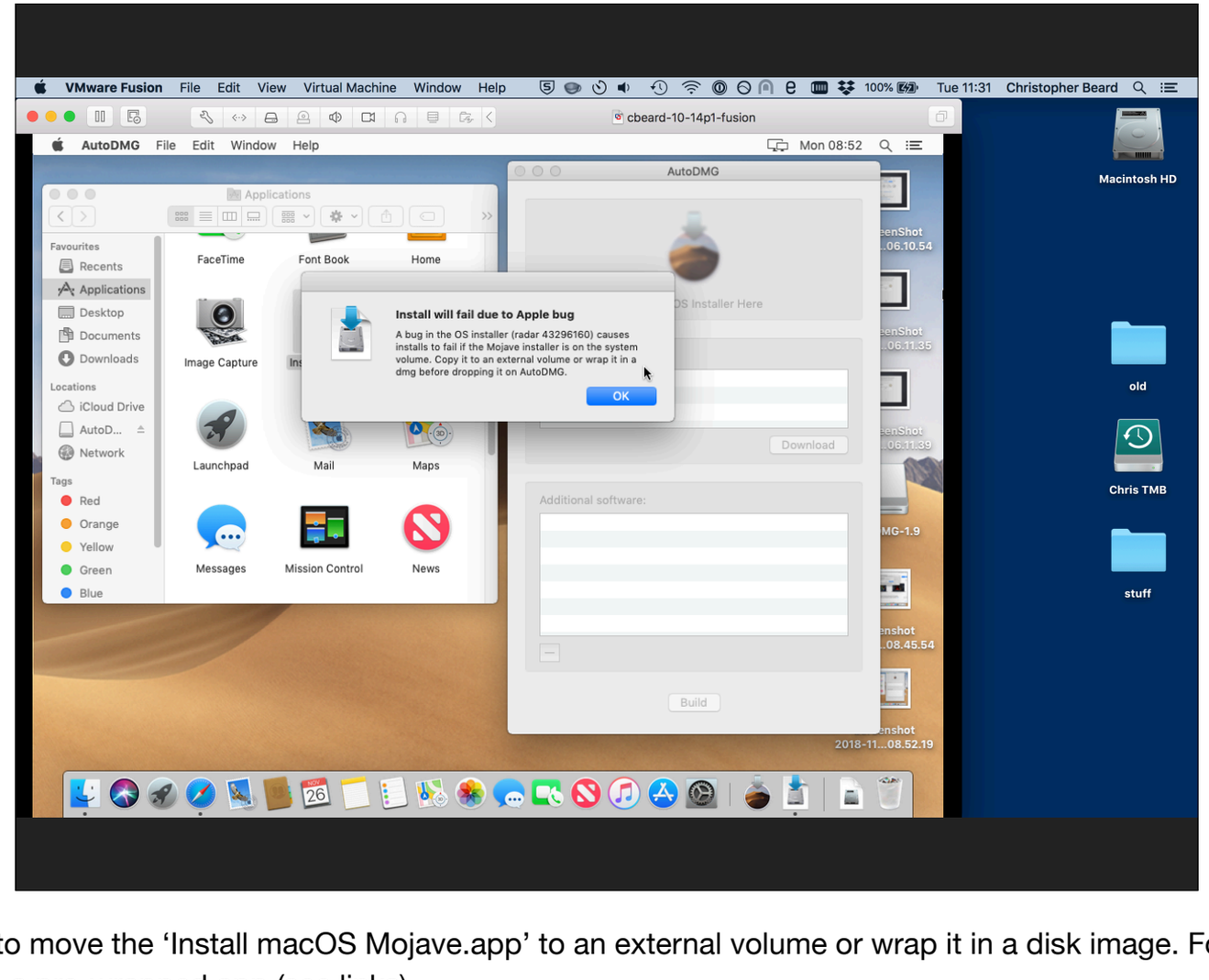
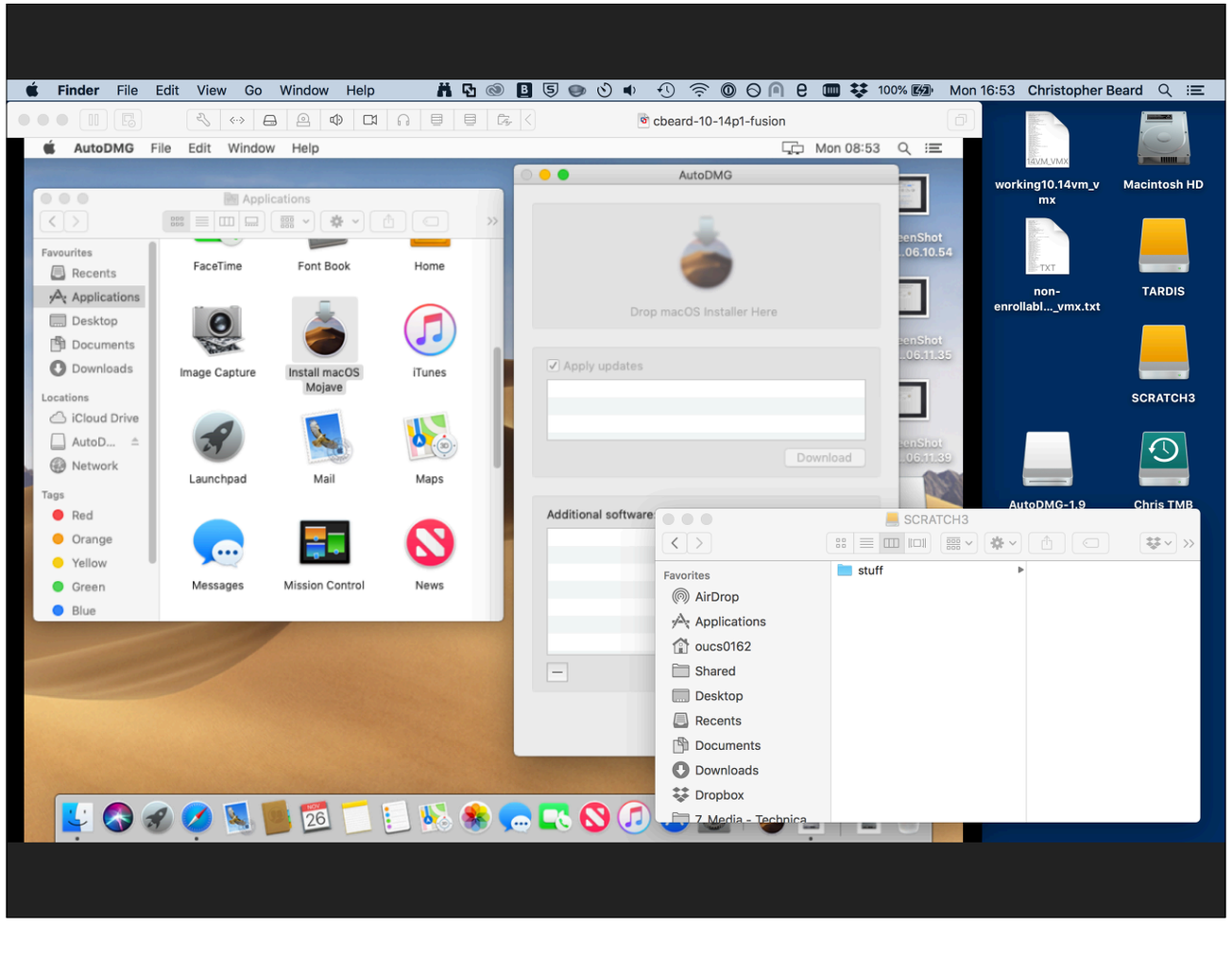
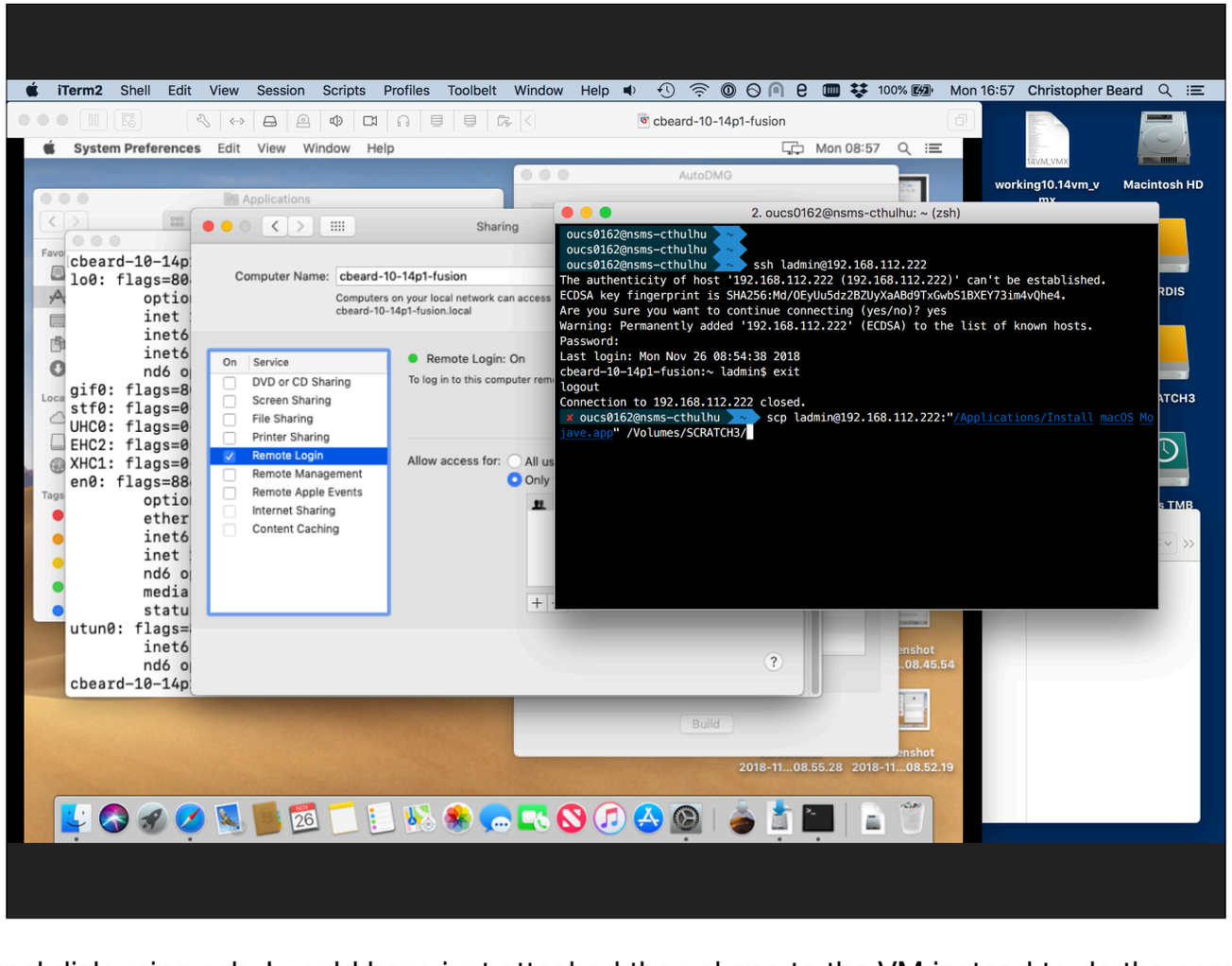
Recents
Applications
Desktop
Documents
Downloads
Locations
iCloud Drive
Network
Tags
Red
Orange
Yellow
Green
Blue
FaceTime
Font Book
Home
Image Capture
Install macOS Mojave
iTunes
Launchpad
Mail
Maps
Messages
Mission Control
News
AutoDMG
Drop macOS Installer Here
Apply updates
Download
Additional software:
Build
Macintosh HD
old
Chris TMB
stuff



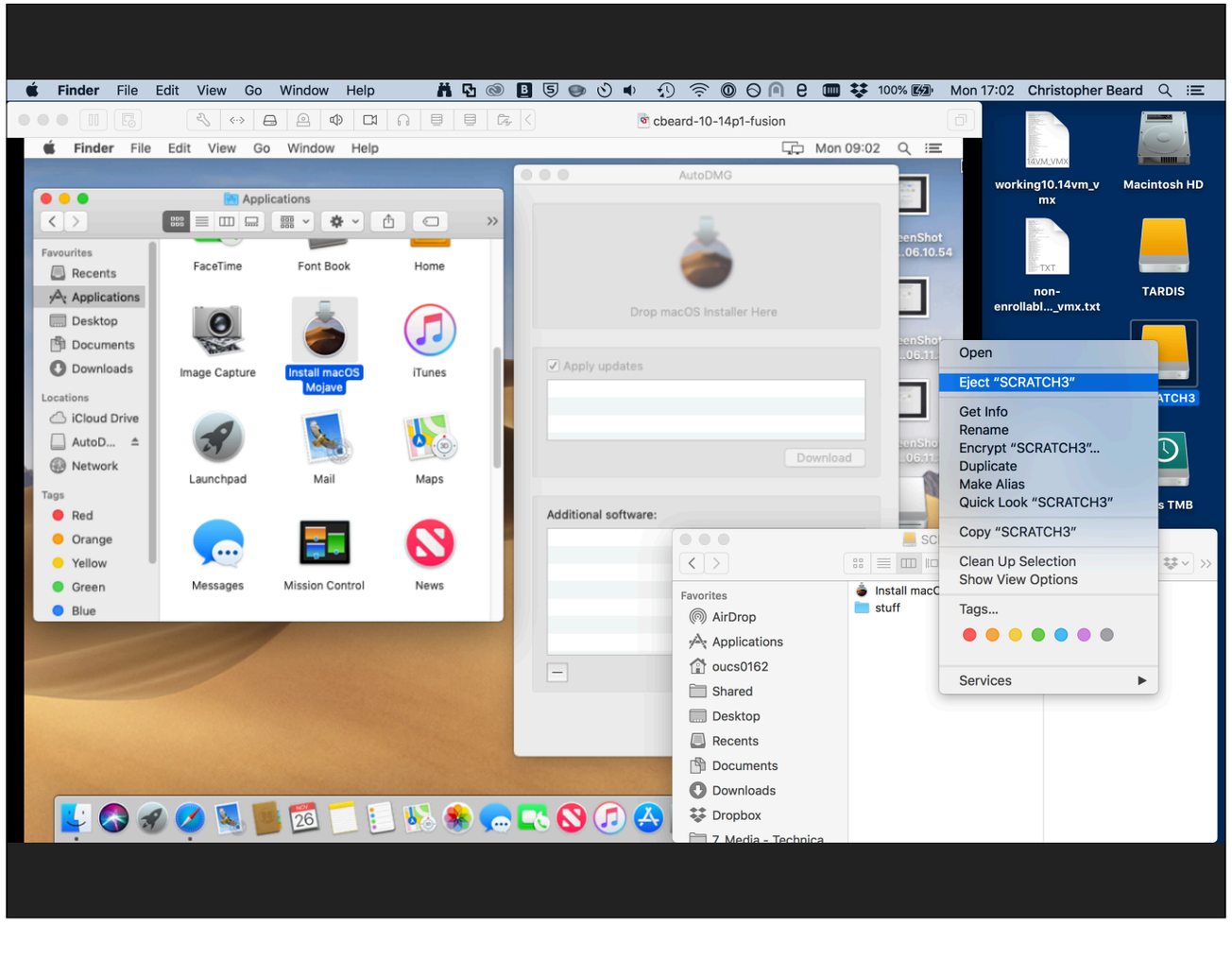
Gotcha 3: For 10.14 installers we have to move the ‘Install macOS Mojave.app’ to an external volume or wrap it in a disk image. For the latter could use installinstallmacos.py script to generate a pre-wrapped app (see links).

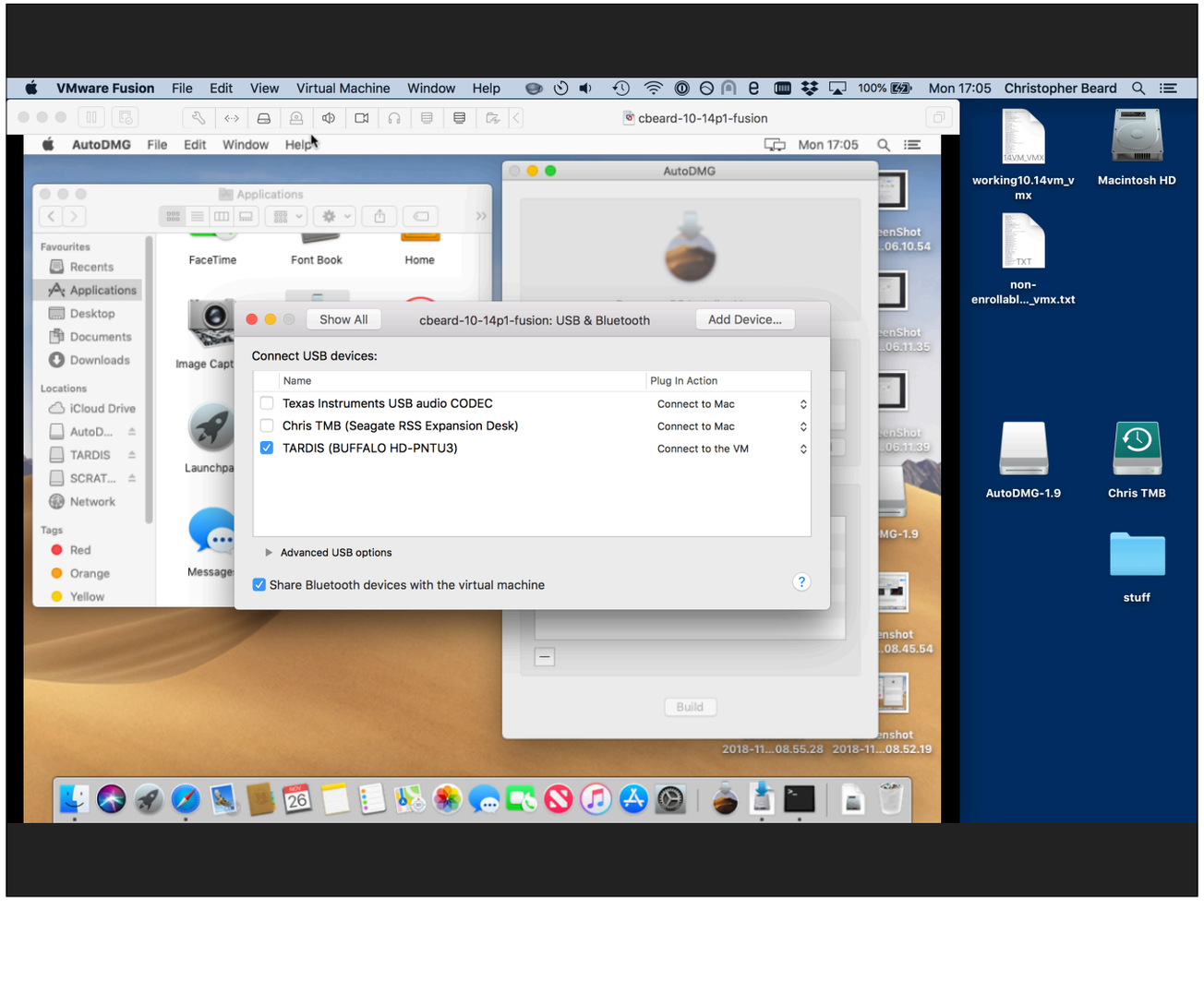


Scratch3 is my external volume

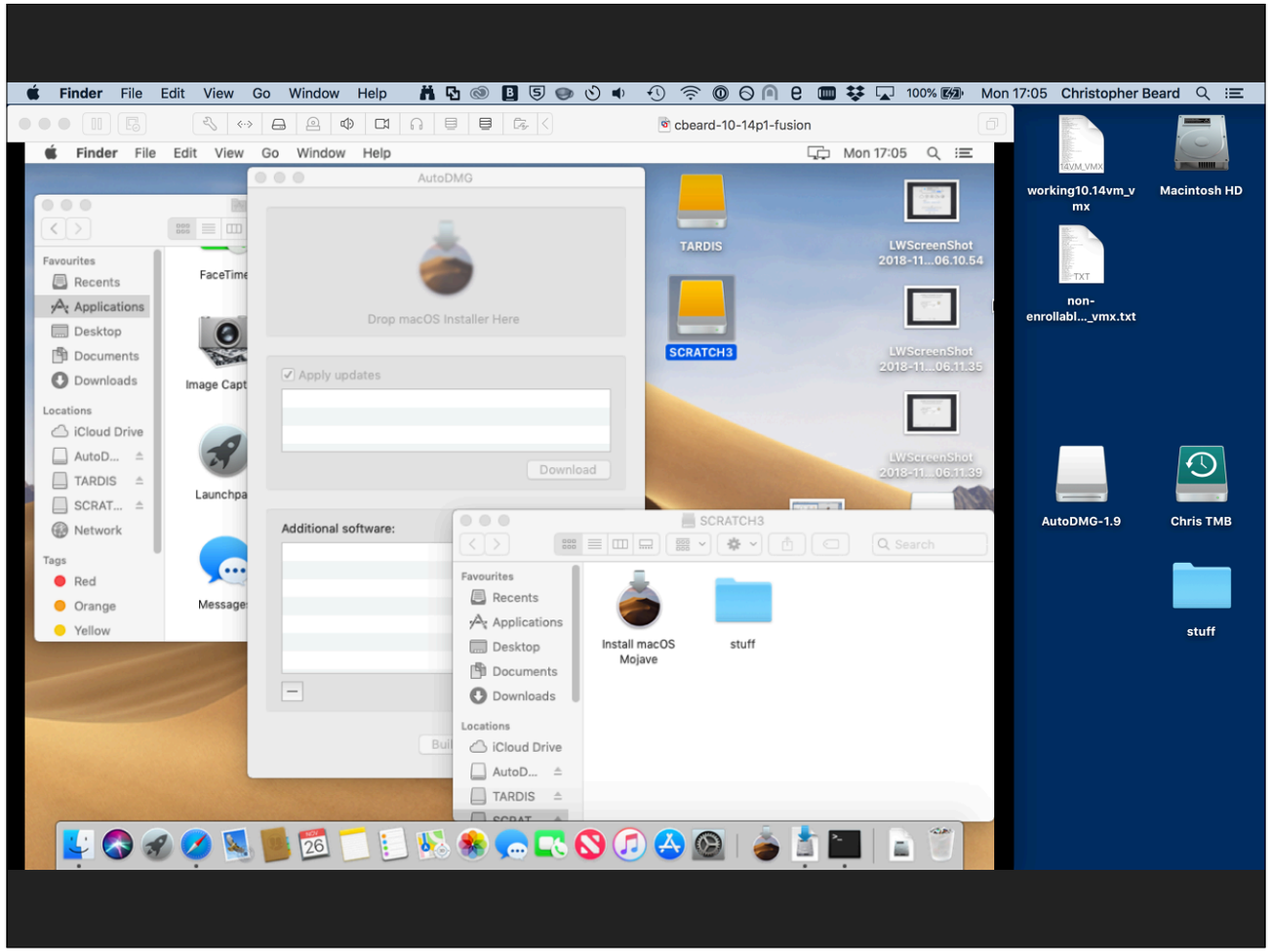


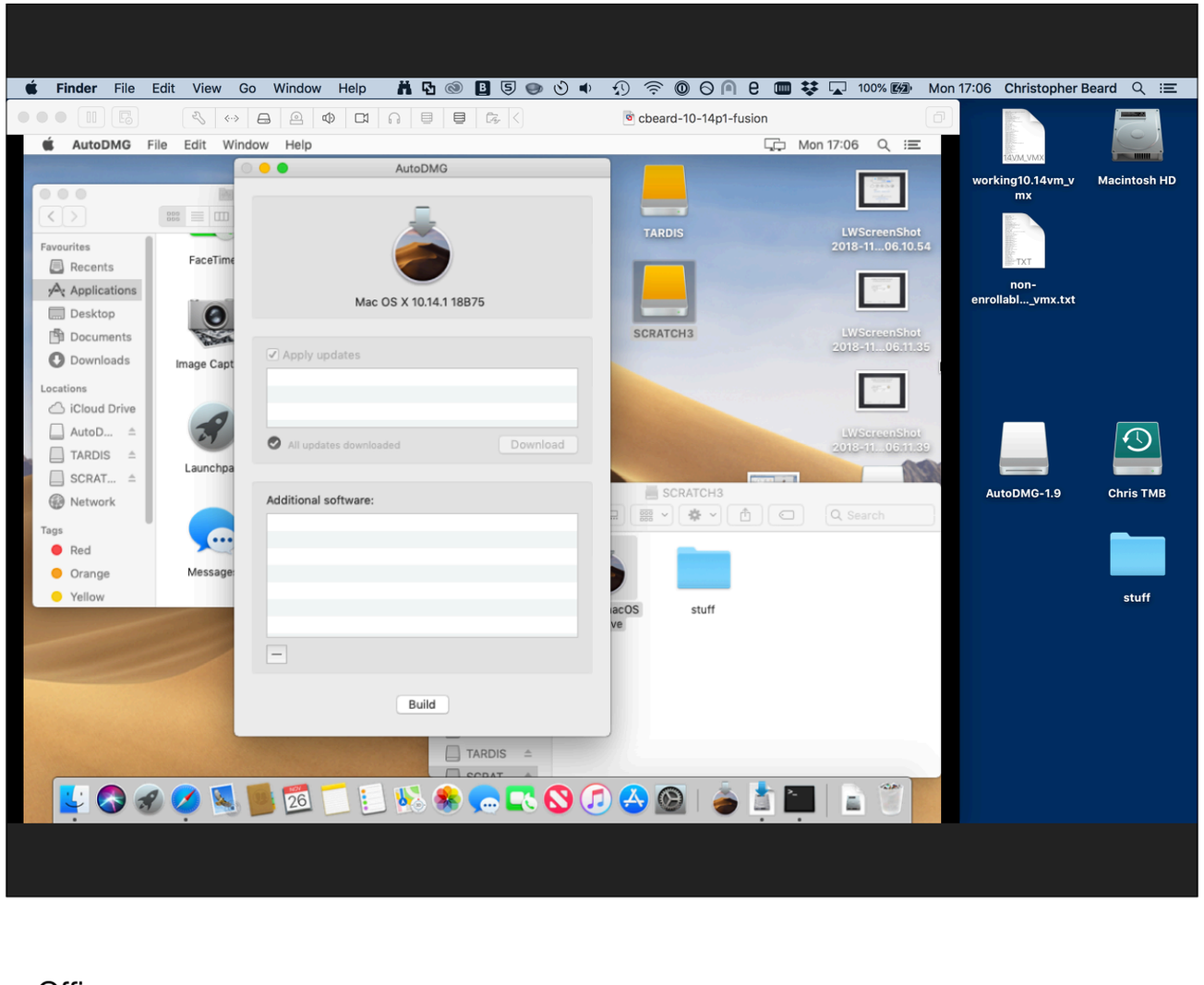
Copying the Mojave installer to my external disk using ssh. I could have just attached the volume to the VM instead to do the copy.


Finder File Edit View Go Window Help
100% Mon 17:02 Christopher Beard
cbeard-10-14p1-fusion
Finder File Edit View Go Window Help
Mon 09:02
Applications
Favourites
Recents
Applications
Desktop
Documents
Downloads
Locations
iCloud Drive
AutoD...
Network
Tags
Red
Orange
Yellow
Green
Blue
FaceTime
Font Book
Home
Image Capture
Install macOS Mojave
iTunes
Launchpad
Mail
Maps
Messages
Mission Control
News
AutoDMG
Drop macOS Installer Here
Apply updates
Download
Additional software:
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
TARDIS
Open
Eject “SCRATCH3”
Get Info
Rename
Encrypt “SCRATCH3”...
Duplicate
Make Alias
Quick Look “SCRATCH3”
Copy “SCRATCH3”
Clean Up Selection
Show View Options
Tags...
Services
Favorites
AirDrop
Applications
oucs0162
Shared
Desktop
Recents
Documents
Downloads
Dropbox
stuff

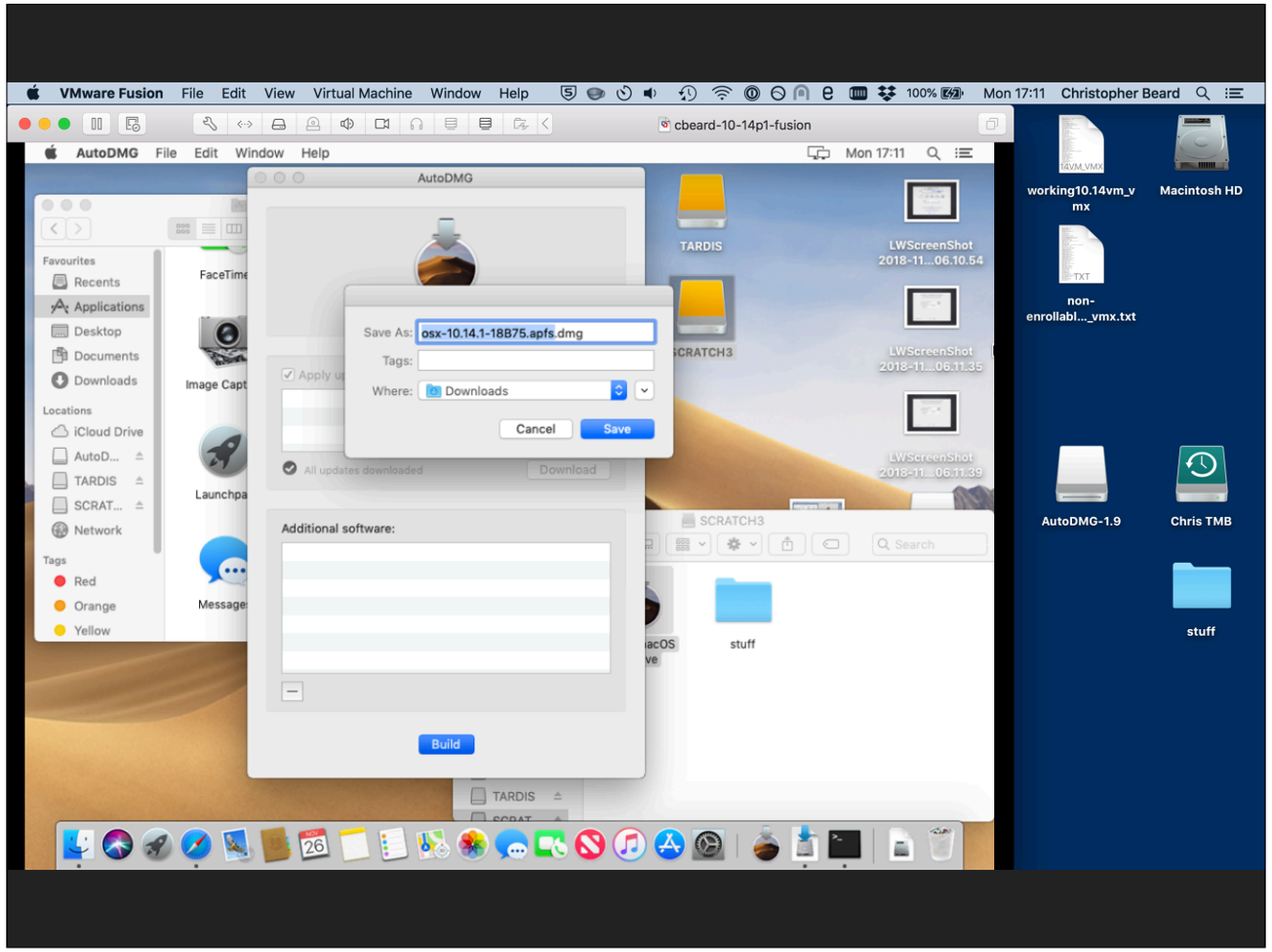


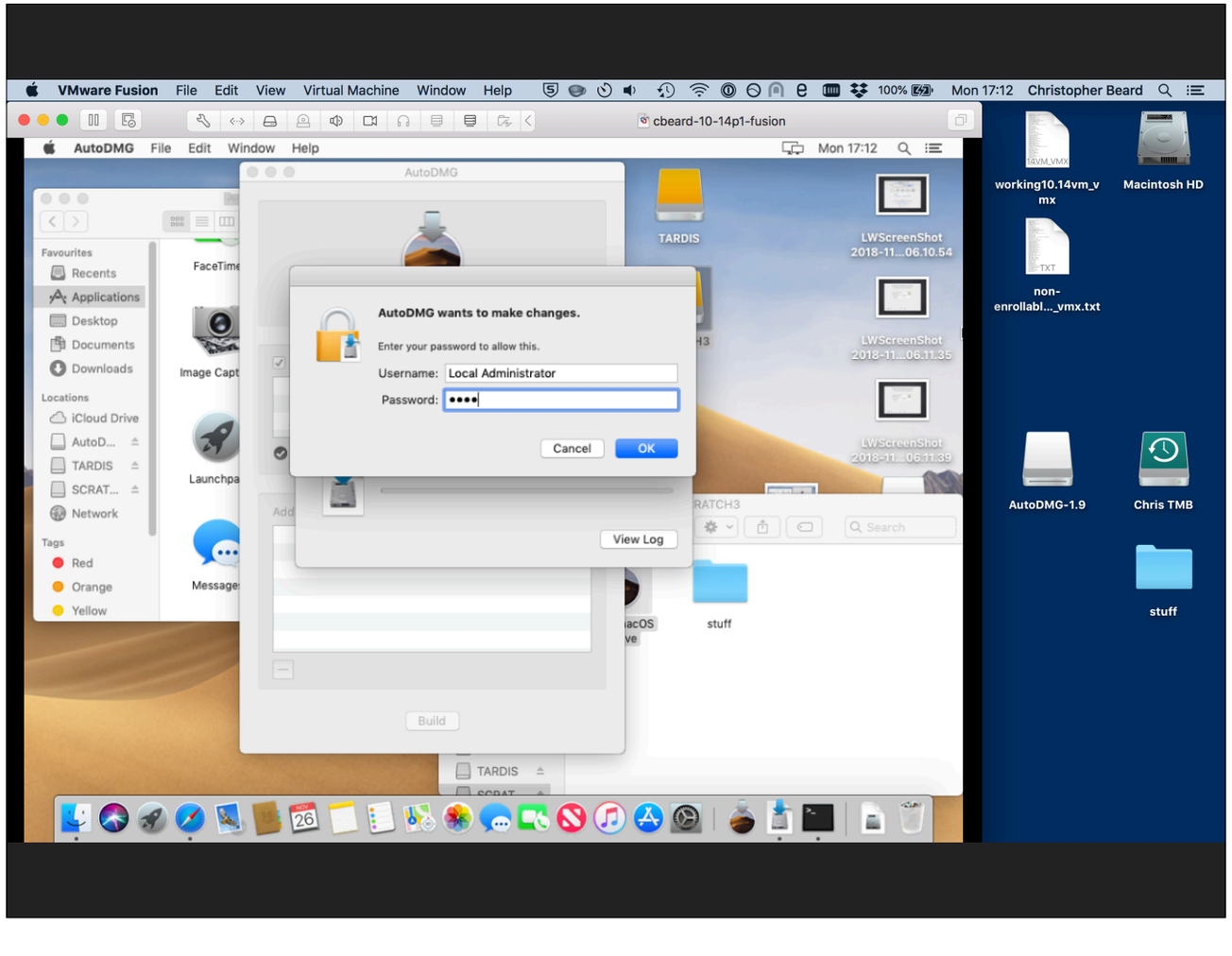
Attaching my external drive to the VM.

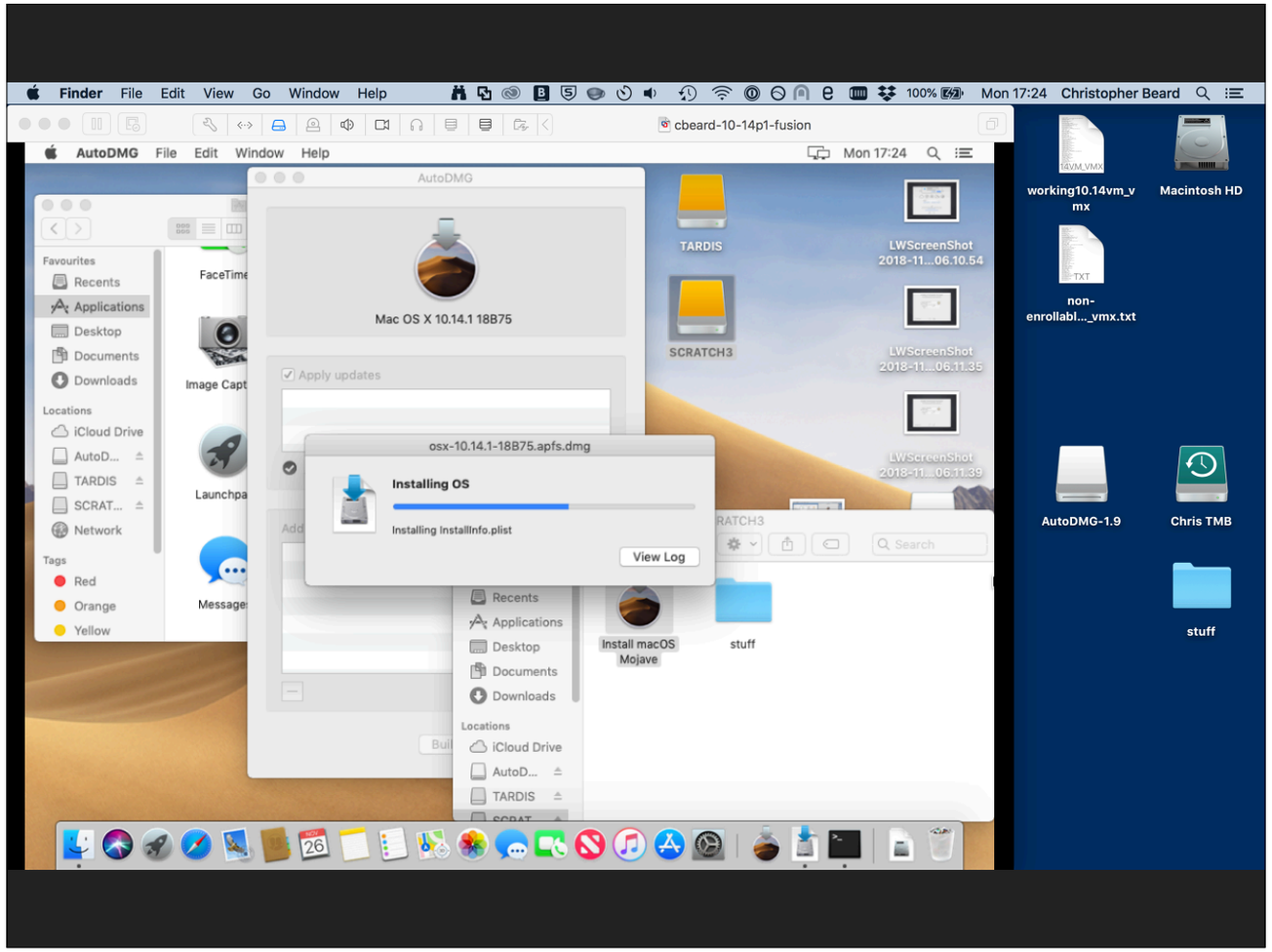

Finder File Edit View Go Window Help
100% Mon 17:05 Christopher Beard
cbeard-10-14p1-fusion
Finder File Edit View Go Window Help
Mon 17:05
AutoDMG
Drop macOS Installer Here
Apply updates
Download
Additional software:
Favourites
Recents
Applications
Desktop
Documents
Downloads
Locations
iCloud Drive
AutoD...
TARDIS
SCRAT...
Network
Tags
Red
Orange
Yellow
FaceTime
Image Capt
Launchpa
Messages
TARDIS
SCRATCH3
LWScreenShot 2018-11...06.10.54
LWScreenShot 2018-11...06.11.35
LWScreenShot 2018-11...06.11.39
SCRATCH3
Search
Install macOS Mojave
stuff
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
AutoDMG-1.9
Chris TMB
stuff



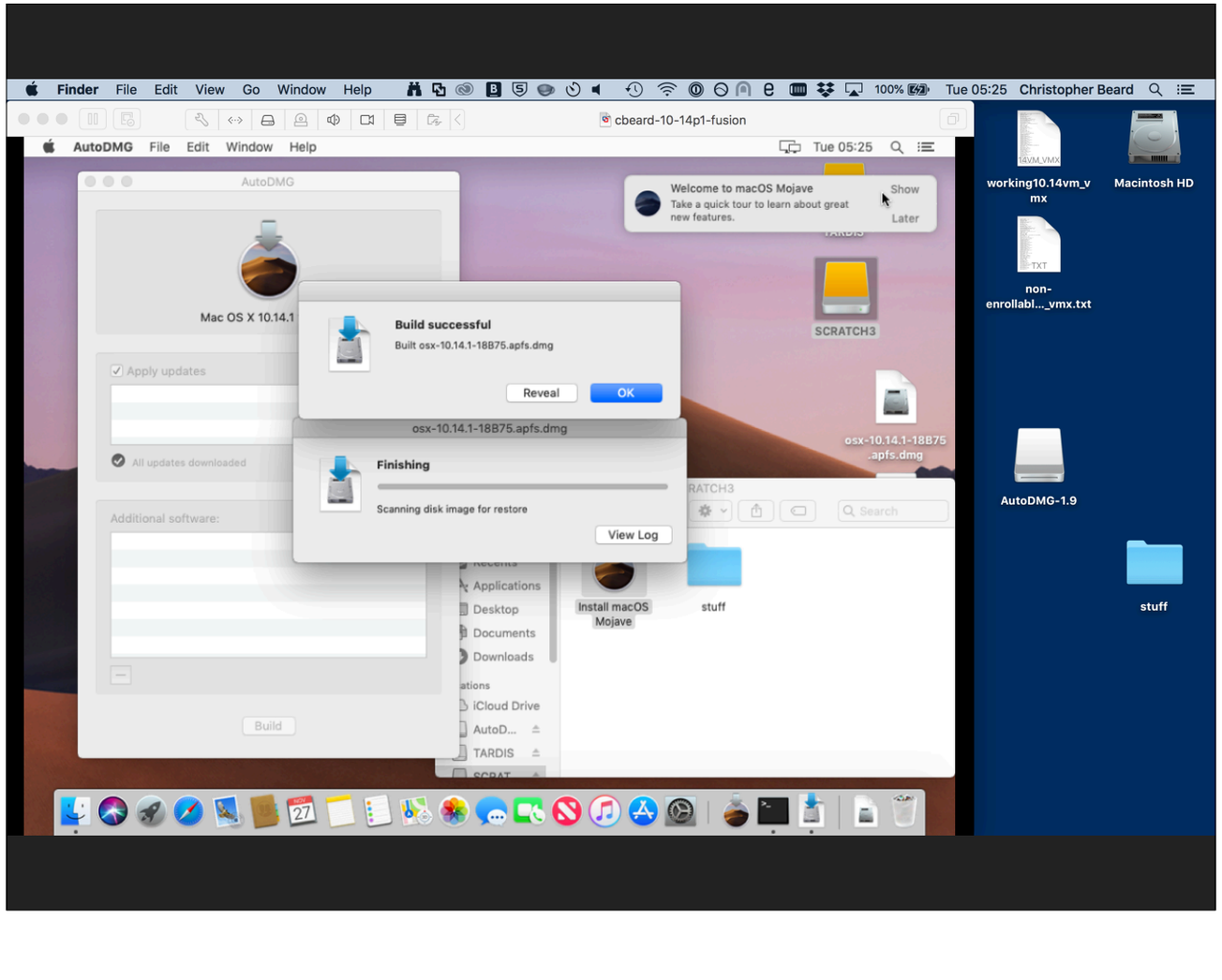
Available updates automatically found
Can add additional software packages eg. Office


VMware Fusion File Edit View Virtual Machine Window Help
Mon 17:11 Christopher Beard
cbeard-10-14p1-fusion
AutoDMG File Edit Window Help
AutoDMG
Save As: osx-10.14.1-18B75.apfs.dmg
Tags:
Where: Downloads
Cancel Save
Additional software:
Build
Download
All updates downloaded
Favourites
Recents
Applications
Desktop
Documents
Downloads
Locations
iCloud Drive
Network
Tags
Red
Orange
Yellow
TARDIS
SCRATCH3
LWScreenShot 2018-11...06.10.54
LWScreenShot 2018-11...06.11.35
LWScreenShot 2018-11...06.11.39
stuff
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
AutoDMG-1.9
Chris TMB
stuff

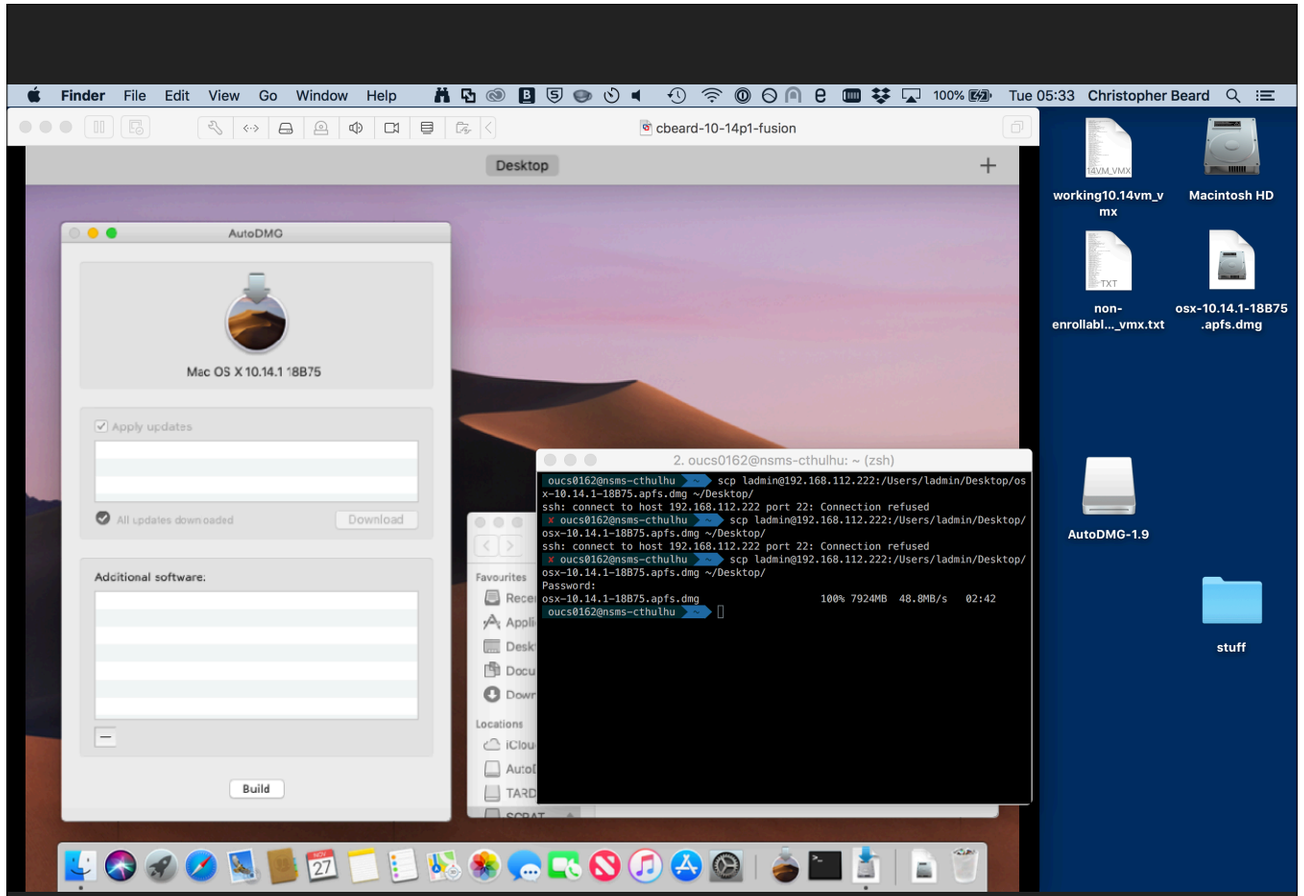

VMware Fusion File Edit View Virtual Machine Window Help
100% Mon 17:12 Christopher Beard
cbeard-10-14p1-fusion
AutoDMG File Edit Window Help
Mon 17:12
AutoDMG
AutoDMG wants to make changes.
Enter your password to allow this.
Username: Local Administrator
Password:
Cancel
OK
View Log
Build
Favourites
Recents
Applications
Desktop
Documents
Downloads
Locations
iCloud Drive
Network
Tags
Red
Orange
Yellow
TARDIS
LWScreenShot 2018-11...06.10.54
LWScreenShot 2018-11...06.11.35
LWScreenShot 2018-11...06.11.39
stuff
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
AutoDMG-1.9
Chris TMB
stuff

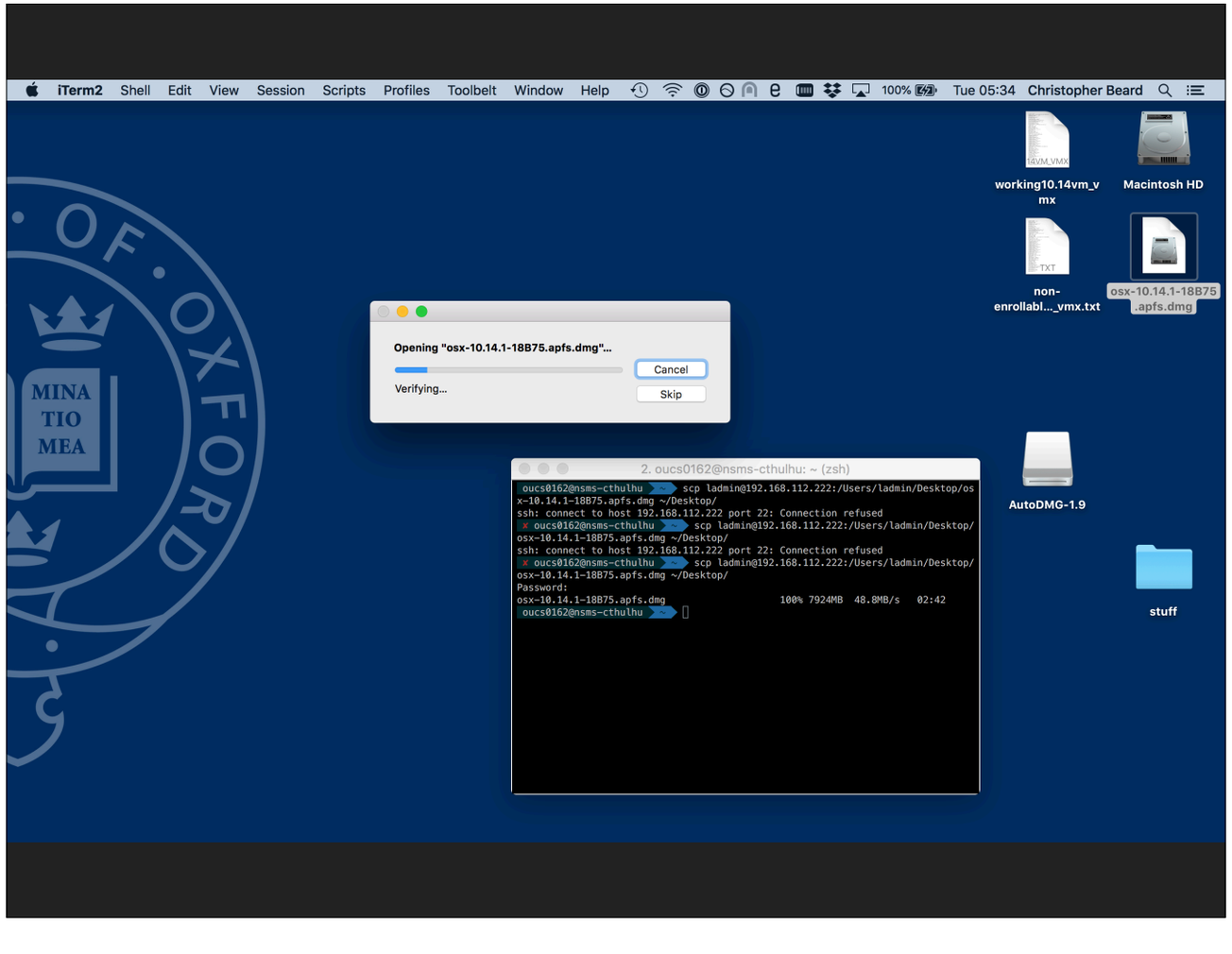


<1 hour on a physical machine (spec dependent)
Circa 2 hours on a VM
Obviously more risk running in a VM eg. may need to restart the host box. Physical machine more reliable.

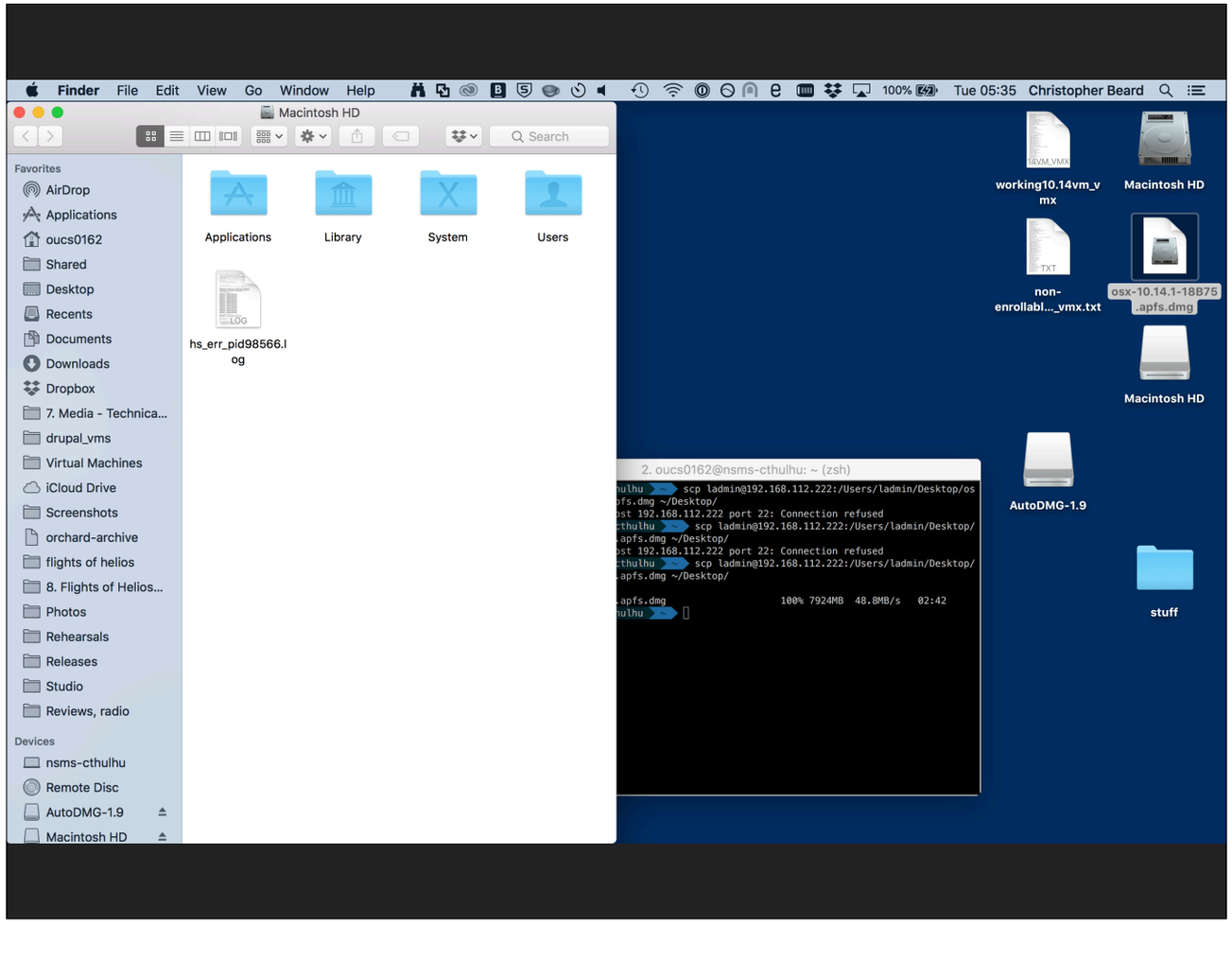

Finder File Edit View Go Window Help
100% Tue 05:25 Christopher Beard
cbeard-10-14p1-fusion
AutoDMG File Edit Window Help
Tue 05:25
AutoDMG
Mac OS X 10.14.1
Apply updates
All updates downloaded
Additional software:
Build
Welcome to macOS Mojave
Take a quick tour to learn about great new features.
Show
Later
Build successful
Built osx-10.14.1-18B75.apfs.dmg
Reveal
OK
osx-10.14.1-18B75.apfs.dmg
Finishing
Scanning disk image for restore
View Log
SCRATCH3
osx-10.14.1-18B75.apfs.dmg
Search
Applications
Desktop
Documents
Downloads
iCloud Drive
AutoD...
TARDIS
Install macOS Mojave
stuff
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
AutoDMG-1.9
stuff

Success!

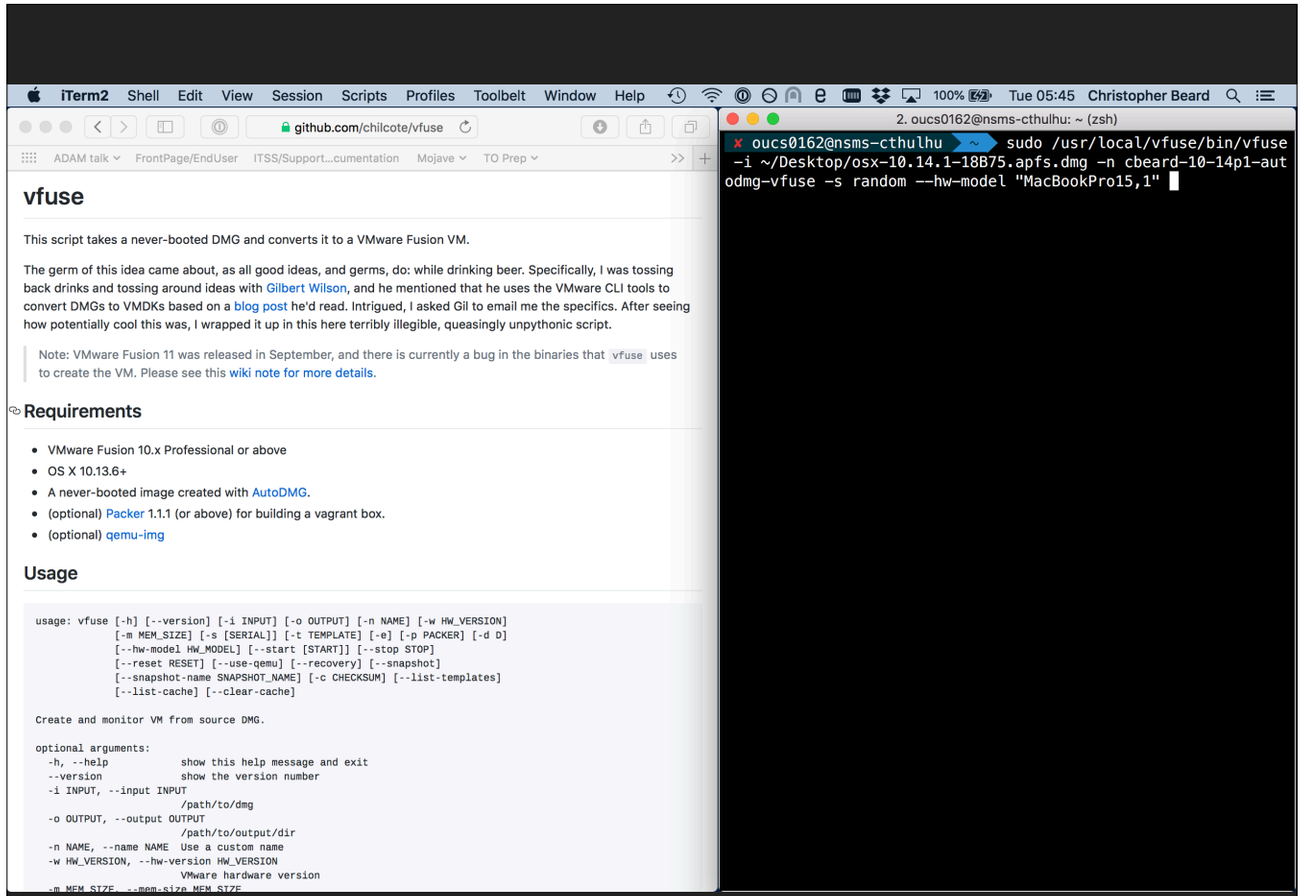

Finder File Edit View Go Window Help
100% Tue 05:33 Christopher Beard
cbeard-10-14p1-fusion
Desktop
AutoDMG
Mac OS X 10.14.1 18B75
Apply updates
All updates downloaded
Download
Additional software:
Build
2. oucs0162@nsms-cthulhu: ~ (zsh)
oucs0162@nsms-cthulhu ~ scp ladmin@192.168.112.222:/Users/ladmin/Desktop/osx-10.14.1-18B75.apfs.dmg ~/Desktop/
ssh: connect to host 192.168.112.222 port 22: Connection refused
oucs0162@nsms-cthulhu ~ scp ladmin@192.168.112.222:/Users/ladmin/Desktop/osx-10.14.1-18B75.apfs.dmg ~/Desktop/
ssh: connect to host 192.168.112.222 port 22: Connection refused
oucs0162@nsms-cthulhu ~ scp ladmin@192.168.112.222:/Users/ladmin/Desktop/osx-10.14.1-18B75.apfs.dmg ~/Desktop/
Password:
osx-10.14.1-18B75.apfs.dmg 100% 7924MB 48.8MB/s 02:42
oucs0162@nsms-cthulhu ~
Favourites
Locations
working10.14vm_vmx
Macintosh HD
non-enrollabl..._vmx.txt
osx-10.14.1-18B75.apfs.dmg
AutoDMG-1.9
stuff



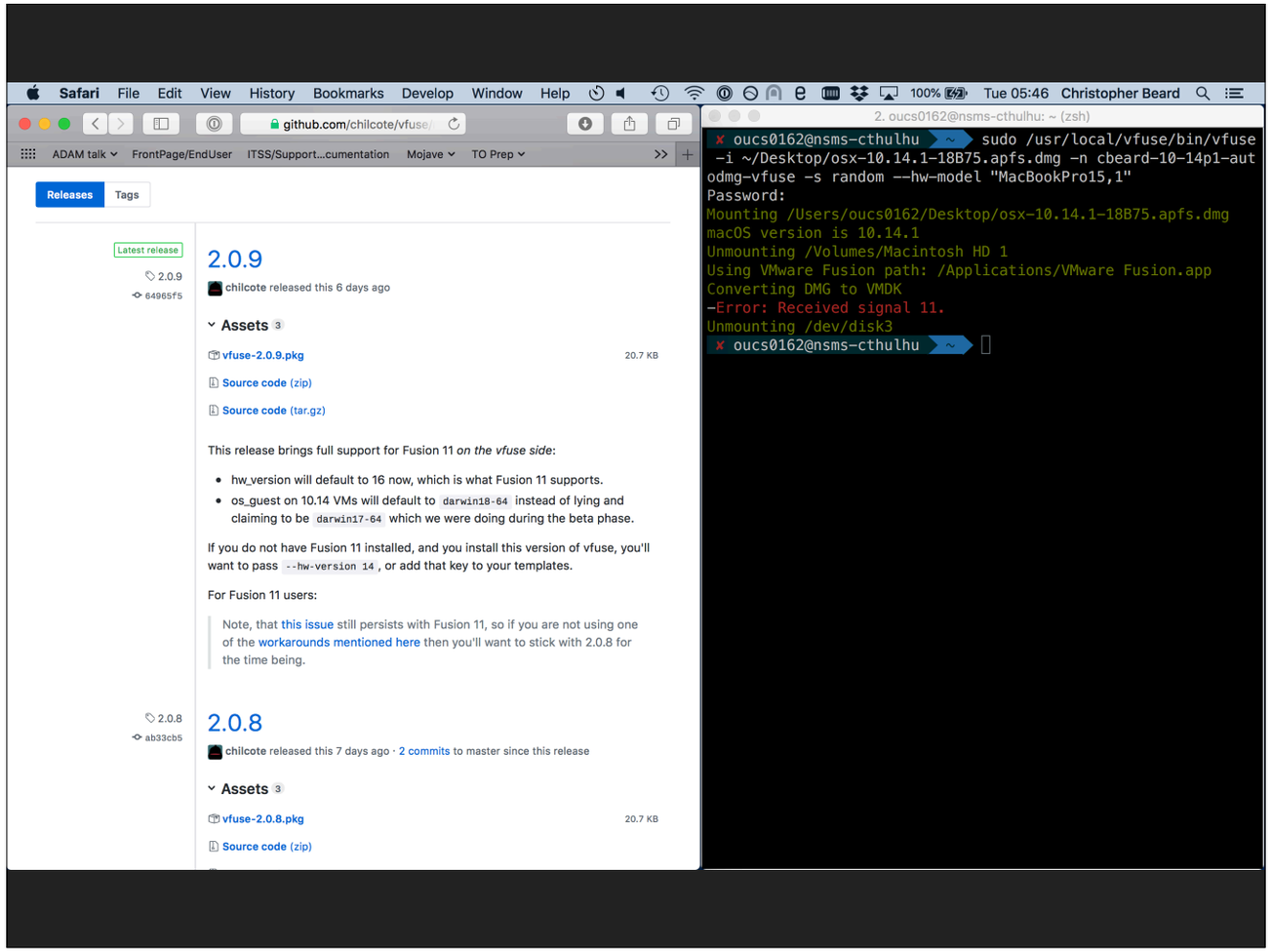
Checking the contents of our never-booted file system.



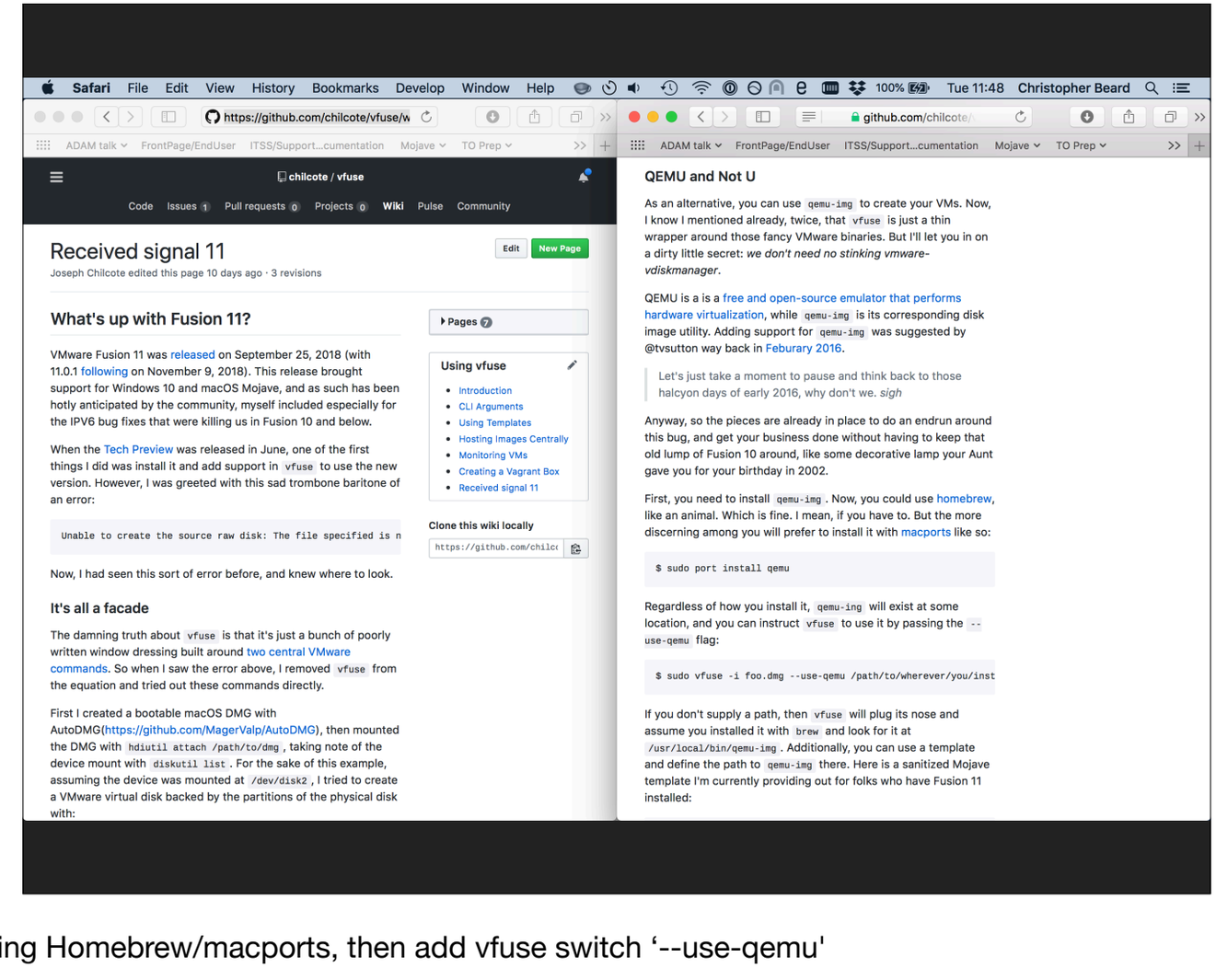
Odd error log mentioning JAVA failed. Another reason to use physical hardware for running AutoDMG. The error had no obvious subsequent effects.



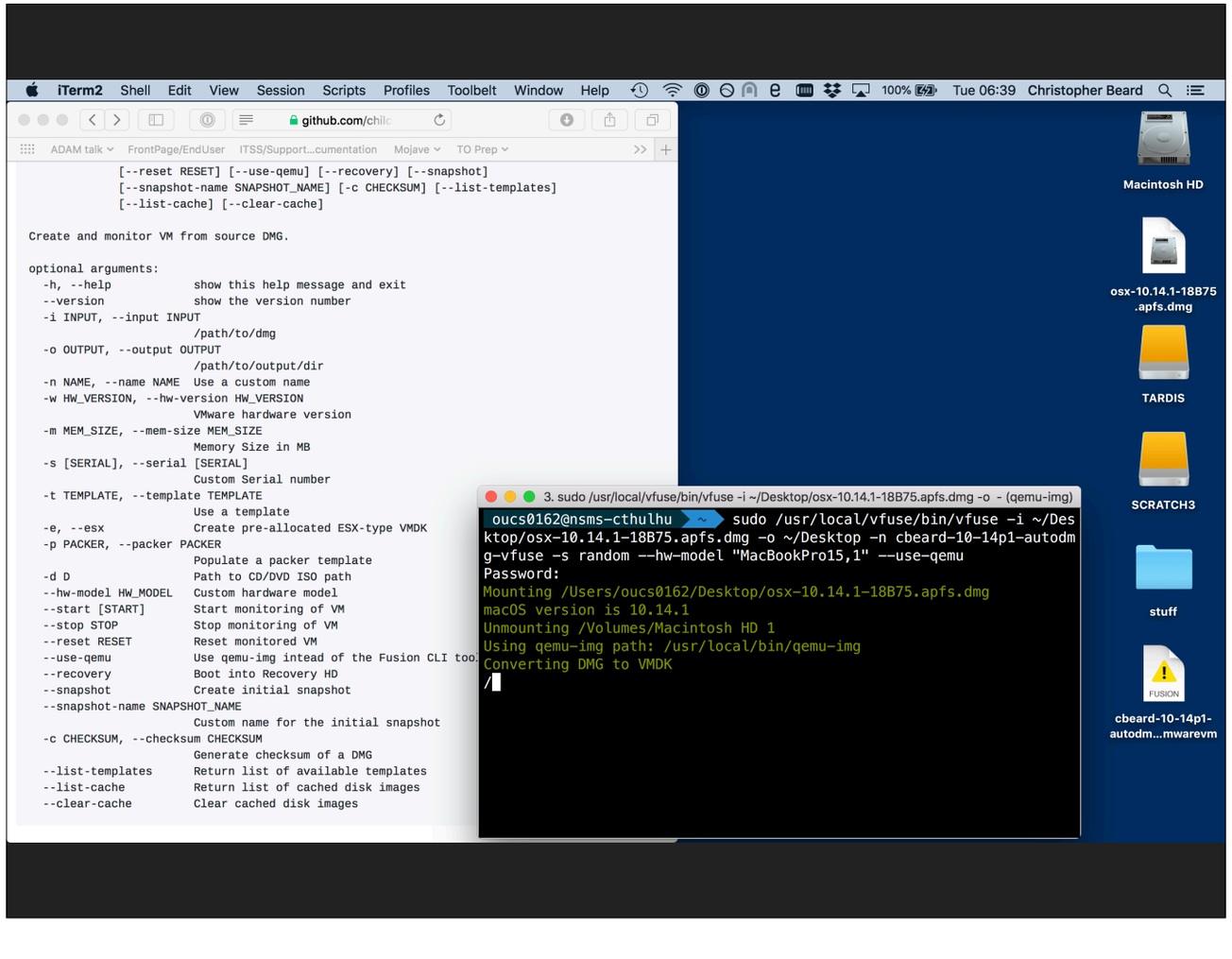
Using vfuse to build a VM with a name, serial number and hardware model



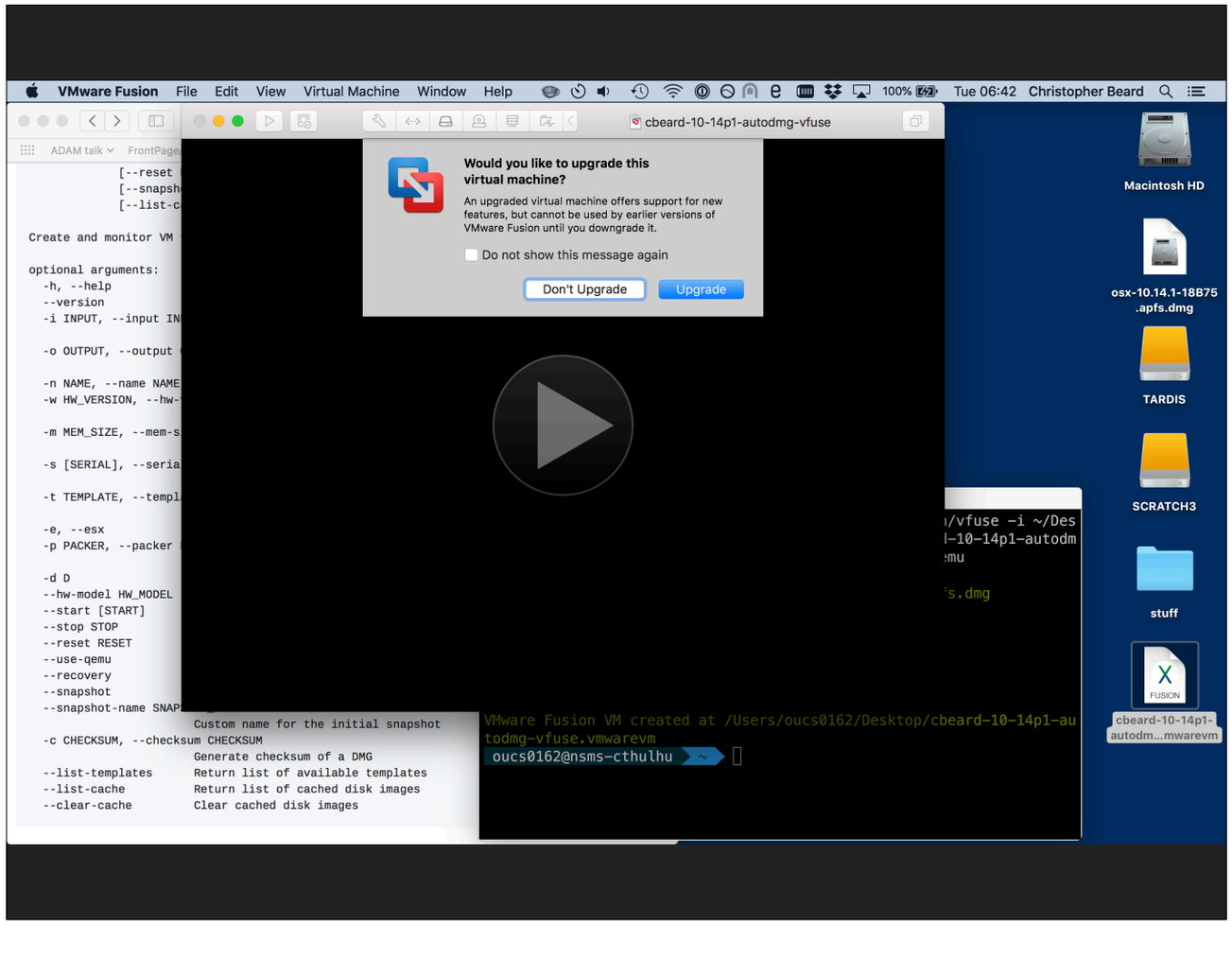
Gotcha 4: vfuse does not work with Fusion 11!



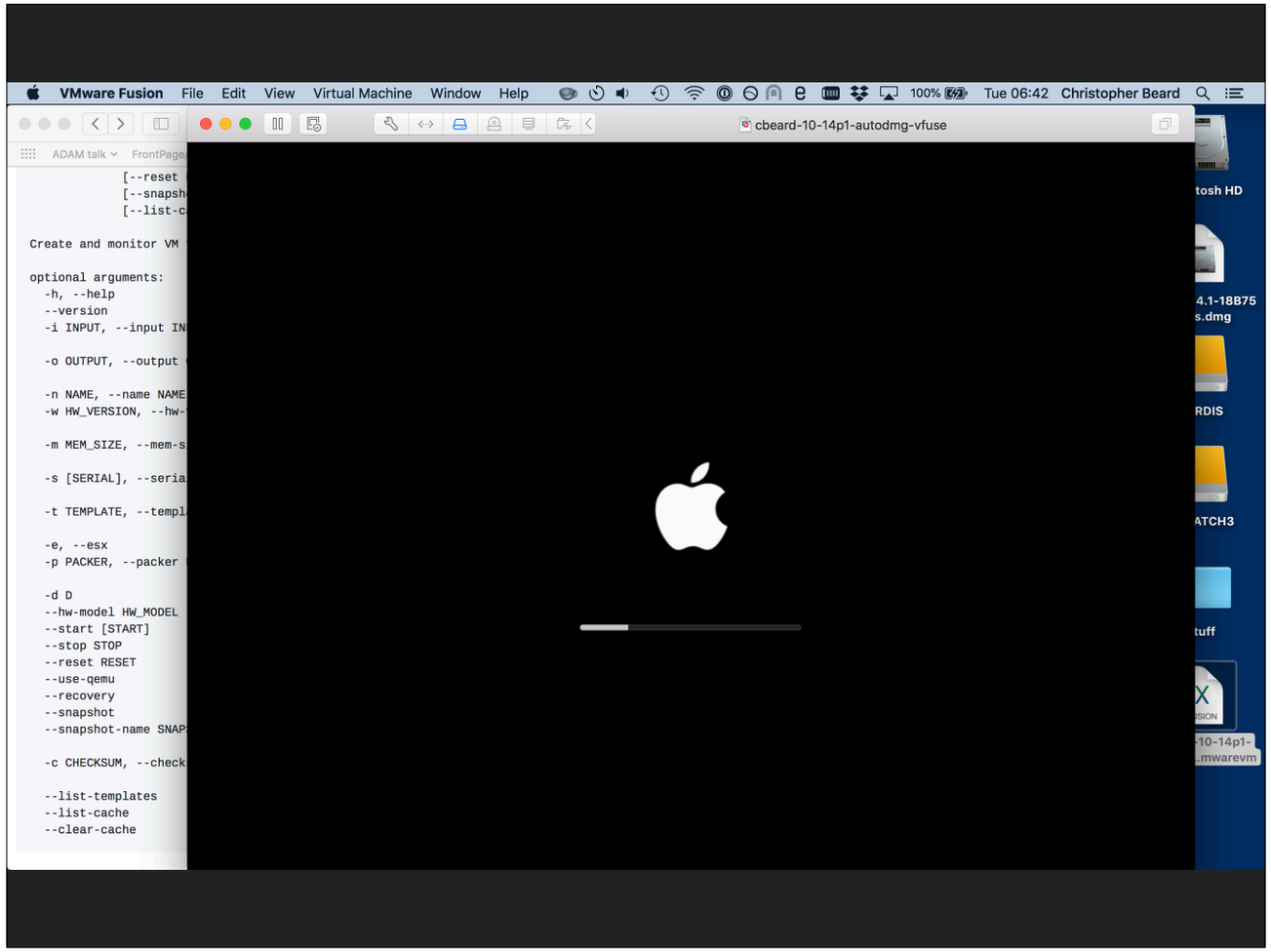
Solution for Gotcha 4: install QEMU using Homebrew/macports, then add vfuse switch ‘--use-qemu'

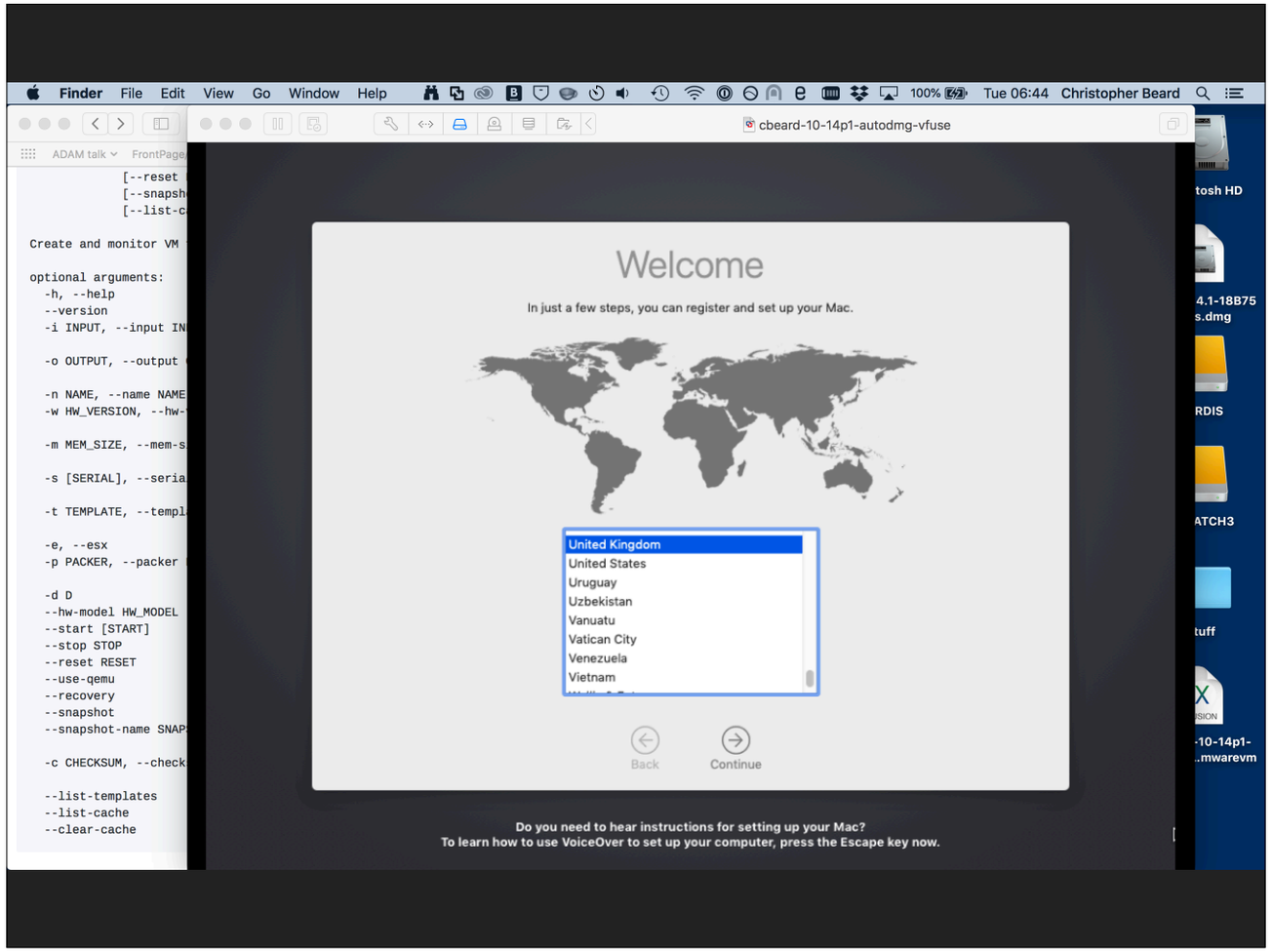


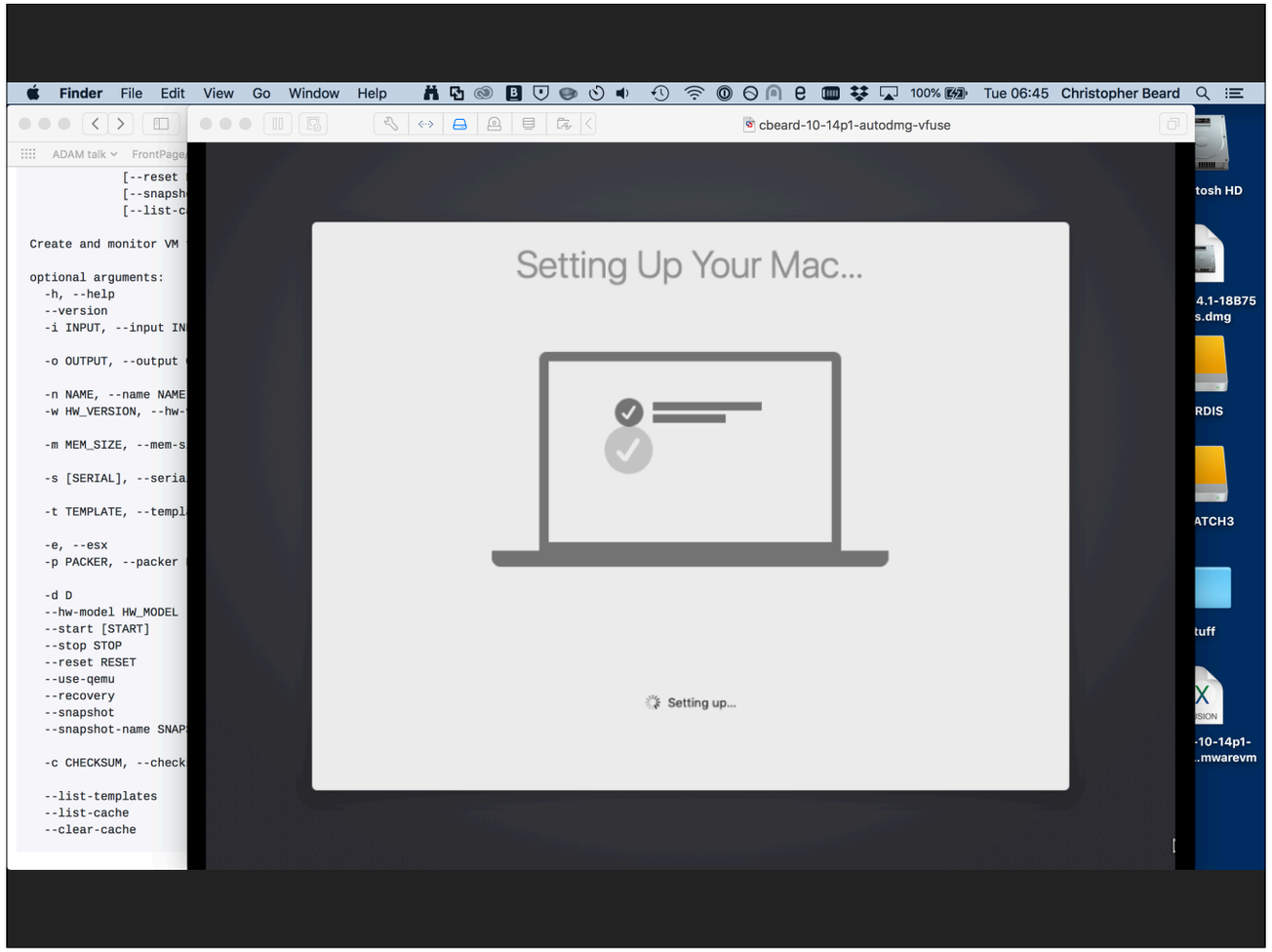
Vfuse now running fine. Takes 10-15 minutes to provision a working Mojave VM.



Opening our new VM in Fusion works ok.


VMware Fusion File Edit View Virtual Machine Window Help
100% Tue 06:42 Christopher Beard
cbeard-10-14p1-autodmg-vfuse
ADAM talk
FrontPage
[--reset
[--snapsh
[--list-c
Create and monitor VM
optional arguments:
-h, --help
--version
-i INPUT, --input IN
-o OUTPUT, --output
-n NAME, --name NAME
-w HW_VERSION, --hw-
-m MEM_SIZE, --mem-s
-s [SERIAL], --seria
-t TEMPLATE, --templ
-e, --esx
-p PACKER, --packer
-d D
--hw-model HW_MODEL
--start [START]
--stop STOP
--reset RESET
--use-qemu
--recovery
--snapshot
--snapshot-name SNAP
-c CHECKSUM, --check
--list-templates
--list-cache
--clear-cache
tosh HD
4.1-18B75
s.dmg
RDIS
ATCH3
tuff
-10-14p1-
.mwarevm

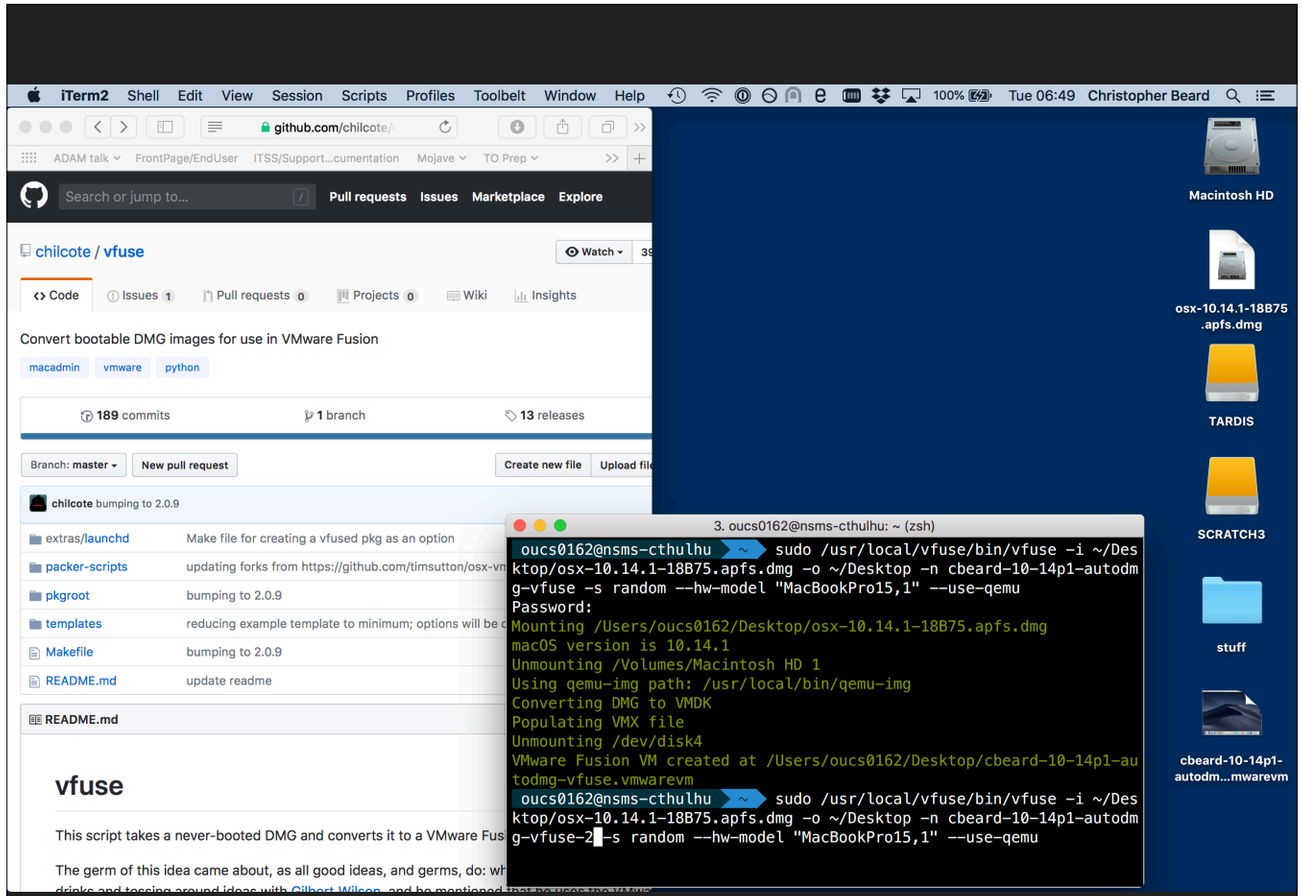

Finder File Edit View Go Window Help
100% Tue 06:44 Christopher Beard
cbeard-10-14p1-autodmg-vfuse
Welcome
In just a few steps, you can register and set up your Mac.
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Vatican City
Venezuela
Vietnam
Back
Continue
Do you need to hear instructions for setting up your Mac?
To learn how to use VoiceOver to set up your computer, press the Escape key now.


Finder File Edit View Go Window Help
100% Tue 06:45 Christopher Beard
cbeard-10-14p1-autodmg-vfuse
Setting Up Your Mac...
Setting up...
Create and monitor VM
optional arguments:
-h, --help
--version
-o OUTPUT, --output
-n NAME, --name NAME
-m MEM_SIZE, --mem-s
-s [SERIAL], --seria
-t TEMPLATE, --templ
-e, --esx
-p PACKER, --packer
-d D
--hw-model HW_MODEL
--start [START]
--stop STOP
--reset RESET
--use-qemu
--recovery
--snapshot
-c CHECKSUM, --check
--list-templates
--list-cache
--clear-cache

New VM looks good!

What is the point of this rigmarole? (1/2)

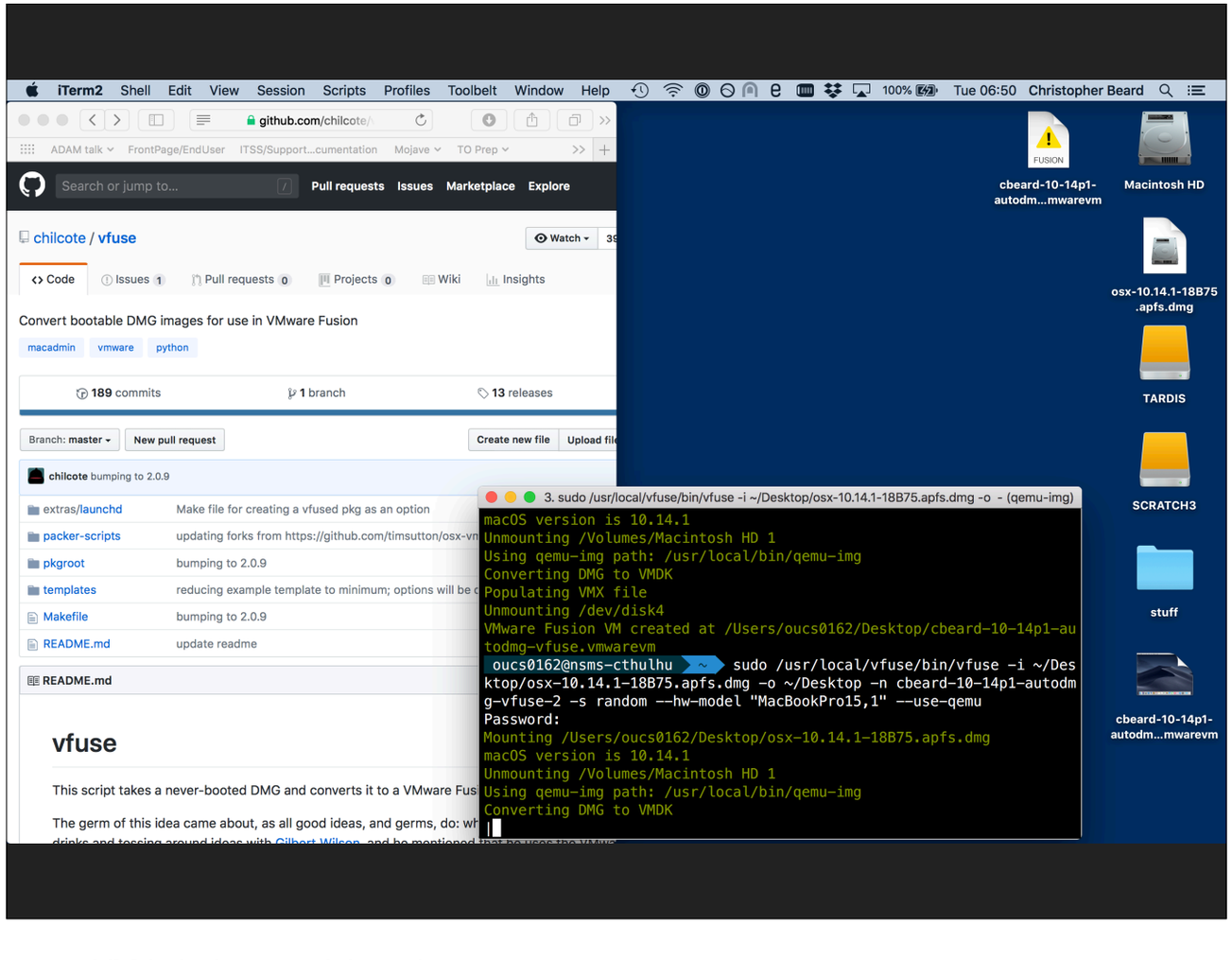
1. This new VM is more realistic than a standard Fusion VM, eg. meaning it will enroll into our management system.



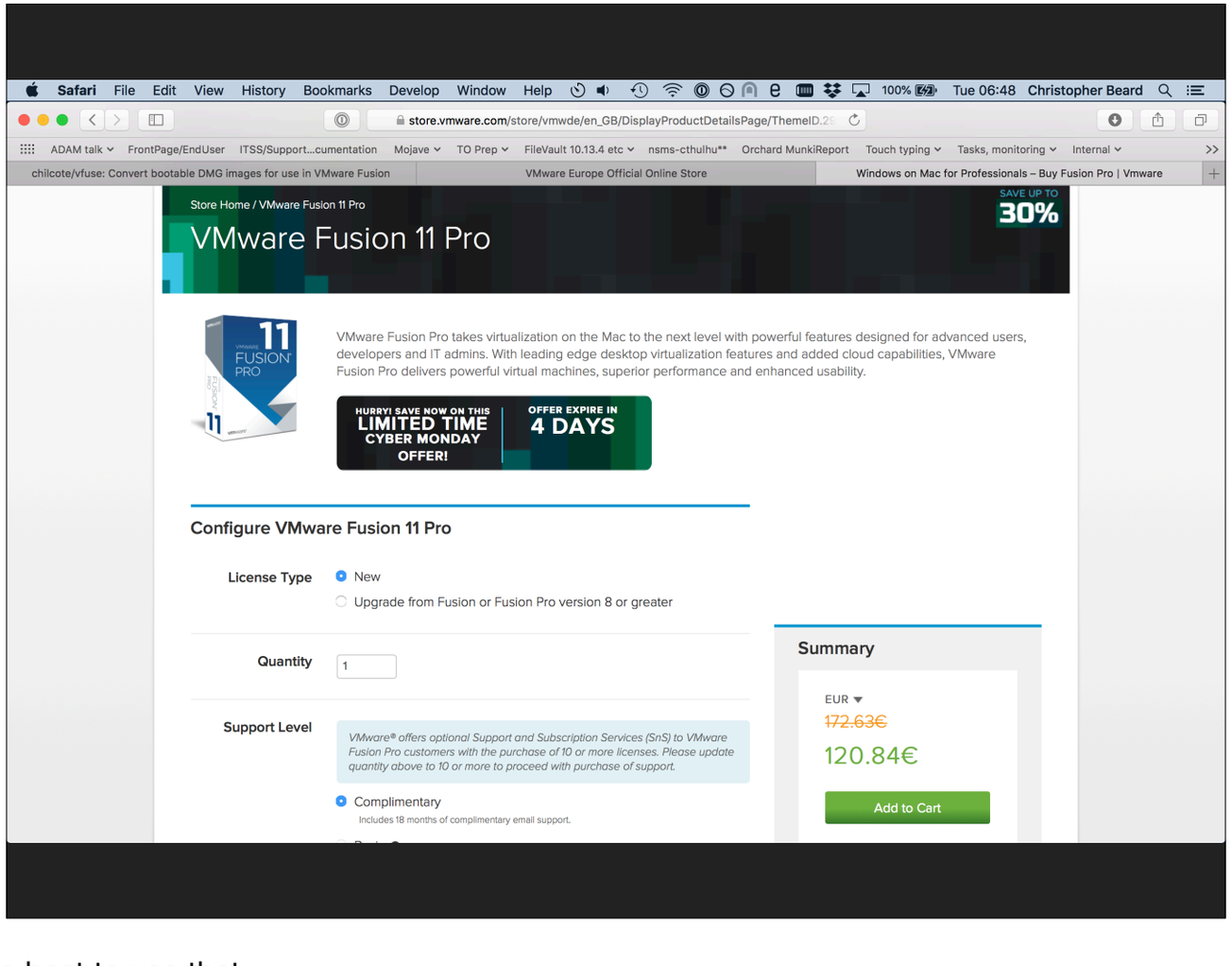
What is the point of this rigmarole? (2/2)

2. Using vfuse I can quickly spin up macOS VMs eg. with different models for testing, with a specific serial number for DEP. May still need to hack at .vmx file but saves a lot of initial setup work.

Easy to use autoDMG to create a never-booted DMG for each OS you support and then you can quickly spin up VMs for testing.



One change to the vfuse command and a new VM is being provisioned.



Standard education deal is year-round so best to use that.

LINKS

- Build a Mojave Hackintosh with UniBeast: https://www.tonymacx86.com/threads/unibeast-install-macos-mojave-on-any-supported-intel-based-pc.259381/
- DEP-enabled Fusion VM: https://www.rderewianko.com/how-to-create-a-vm-thatll-work-with-dep-on-vmware-fusion/
- VMware Fusion: https://www.vmware.com/uk/products/fusion.html
- Build a macOS VM using Virtual Box: https://github.com/geerlingguy/macos-virtualbox-vm
- AutoDMG: https://github.com/MagerValp/AutoDMG
- vfuse: https://github.com/chilcote/vfuse
- Installinstallmacos - can be useful for obtaining macOS installer apps: https://github.com/munki/macadmin-scripts/blob/master/installinstallmacos.py