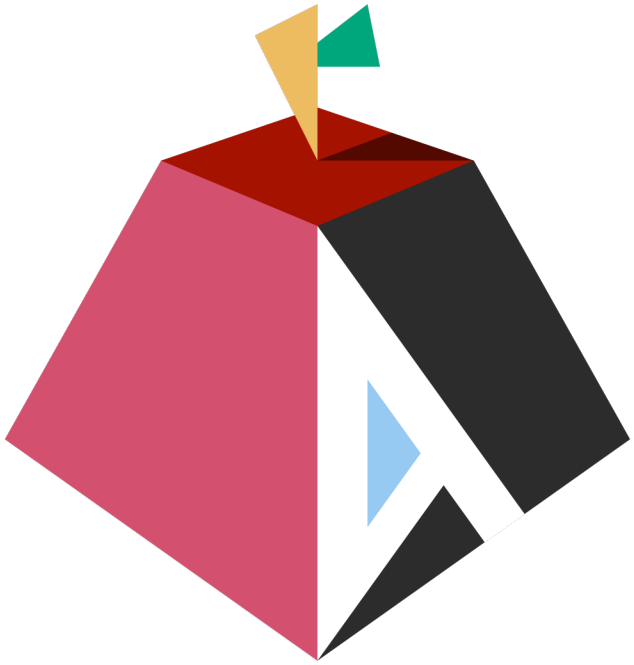


Introduction to Asahi Linux

Asahi Linux Overview

- Native Linux for Apple Silicon (M1)
  - m1n1/U-Boot + drivers + Arch Linux ARM
  - Booting other OSes on M1 is supported by Apple
  - They even added a raw image mode in macOS 12.1+ to prevent updates from breaking 3rd party booting
  - Must still have macOS installed (dual-boot)

- It's been my dev workstation for over 3 months
  - Mac Mini M1 (16GB RAM, 500GB SSD)
  - HDMI output to 34" monitor

Asahi Linux Overview

- Safe, stable and easy to remove
  - Only disables Apple's SIP (System Integrity Protection) for Linux (macOS still has it enabled)

- Developed full-time by Hector Marcan (marcan42)
  - 100% funded by Patreon with many other contributors
  - Interview with Hector on Twit.tv: https://twit.tv/shows/floss-weekly/episodes/680
  - How it's reverse engineered: https://www.youtube.com/watch?v=igYgGH6PnOw

My experience:

- 🤔 I have to try it out of curiosity (remove later?)
- 😮 Holy s*it this is fast
  - Chromium (102) compile took 12 minutes
  - Hugo composites my site 2x faster than on macOS
  - LibreOffice just appears magically
- 🤩 I want to use this
- 🤩 It runs all the stuff I need
  - i3-gaps, vim/Kate, Docker + K3S (Java/Postgres/Python)
- 😊 Arch is actually pretty good!

My experience:

- What doesn't work:
  - GPU (graphics are CPU-generated with LLVMpipe)
    - Limited to preferred monitor resolution
  - Bluetooth, Thunderbolt, HDMI on Macbooks
  - Sound/mic
    - Sound driver works, but are waiting for a PipeWire framework & kernel level volume caps (to prevent speakers from blowing!)
    - I don't use sound anyways (headphones + phone)
  - Apps that don't support the M1's 16K page size

Installing Asahi

- No ISO (run script from macOS)
  - M1 must use macOS firmware to boot (security)
  - So, Asahi pretends to be a particular version of macOS with that macOS's firmware at boot time
  - This firmware can't be redistributed, but can be downloaded during install from Apple's CDN
- After install, system boots to Asahi by default
  - Hold Power button at boot to select Asahi or macOS
  - Press Alt during selection to make it the default

```
❯ curl https://alx.sh | sh
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  1440  100  1440    0     0   1368      0  0:00:01  0:00:01 --:--:--  1376

Bootstrapping installer:
  Checking version...
  Version: v0.3.28
  Downloading...
  Extracting...
  Initializing...

The installer needs to run as root.
Please enter your sudo password if prompted.
Password:

Welcome to the Asahi Linux installer!

This installer is in an alpha state, and may not work for everyone.
It is intended for developers and early adopters who are comfortable
debugging issues or providing detailed bug reports.

Please make sure you are familiar with our documentation at:
  https://alx.sh/w

Press enter to continue.
```

```
Collecting partition information...
  System disk: disk0

Collecting OS information...

Partitions in system disk (disk0):
  1: APFS [Macintosh HD] (494.38 GB, 6 volumes)
    OS: [B*] [Macintosh HD] macOS v12.4 [disk3s1, D8B1487B-DF12-4D40-A0A3-A4BC2A
A5679]
  2: APFS (System Recovery) (5.37 GB, 2 volumes)
    OS: [  ] recoveryOS v12.4 [Primary recoveryOS]

  [B ] = Booted OS, [R ] = Booted recovery, [? ] = Unknown
  [ *] = Default boot volume

Using OS 'Macintosh HD' (disk3s1) for machine authentication.

Choose what to do:
  r: Resize an existing partition to make space for a new OS
  q: Quit without doing anything
» Action (r):
```

```
We're going to resize this partition:
  APFS [Macintosh HD] (494.38 GB, 6 volumes)
  Total size: 494.38 GB
  Free space: 259.15 GB
  Minimum free space: 38.00 GB
  Minimum total size: 273.24 GB (55.27%)

Enter the new size for your existing partition:
  You can enter a size such as '1GB', a fraction such as '50%',
  or the word 'min' for the smallest allowable size.

  Examples:
  30%  - 30% to macOS, 70% to the new OS
  80GB - 80GB to macOS, the rest to your new OS
  min  - Shrink macOS as much as (safely) possible

» New size (min): 400GB

Resizing will free up 94.39 GB of space.

Note: your system may appear to freeze during the resize.
This is normal, just wait until the process completes.
» Continue? (y/N): Y
```

```
Partitions in system disk (disk0):
  1: APFS [Macintosh HD] (400.00 GB, 6 volumes)
    OS: [B*] [Macintosh HD] macOS v12.4 [disk3s1, D8B1487B-DF12-4D40-A0A3-A4BC2A
A5679]
  2: (free space: 94.39 GB)
  3: APFS (System Recovery) (5.37 GB, 2 volumes)
    OS: [  ] recoveryOS v12.4 [Primary recoveryOS]

  [B ] = Booted OS, [R ] = Booted recovery, [? ] = Unknown
  [ *] = Default boot volume

Using OS 'Macintosh HD' (disk3s1) for machine authentication.

Choose what to do:
  f: Install an OS into free space
  r: Resize an existing partition to make space for a new OS
  q: Quit without doing anything
» Action (f):

Choose an OS to install:
  1: Asahi Linux Desktop
  2: Asahi Linux Minimal (Arch Linux ARM)
  3: UEFI environment only (m1n1 + U-Boot + ESP)
» OS:
```

```
Choose an OS to install:
  1: Asahi Linux Desktop
  2: Asahi Linux Minimal (Arch Linux ARM)
  3: UEFI environment only (m1n1 + U-Boot + ESP)
» OS: 1

Downloading OS package info...
-

Minimum required space for this OS: 15.00 GB

Available free space: 94.39 GB

How much space should be allocated to the new OS?
  You can enter a size such as '1GB', a fraction such as '50%',
  the word 'min' for the smallest allowable size, or
  the word 'max' to use all available space.
» New OS size (max):

The new OS will be allocated 94.39 GB of space,
leaving 86.02 KB of free space.

Enter a name for your OS
» OS name (Asahi Linux): Asahi

Using macOS 12.3 for OS firmware
```

```
Setting up System volume...

Setting up Data volume...
Setting up Preboot volume...
/ 100.00%
Setting up Recovery volume...
\ 100.00% A
Wrapping up...

Stub OS installation complete.

Adding partition EFI (500.17 MB)...
  Formatting as FAT...
Adding partition Root (91.39 GB)...
Collecting firmware...
Installing OS...
  Copying from esp into disk0s4 partition...
\ 100.00%
  Copying firmware into disk0s4 partition...
  Extracting root.img into disk0s7 partition...
    0.00%
```

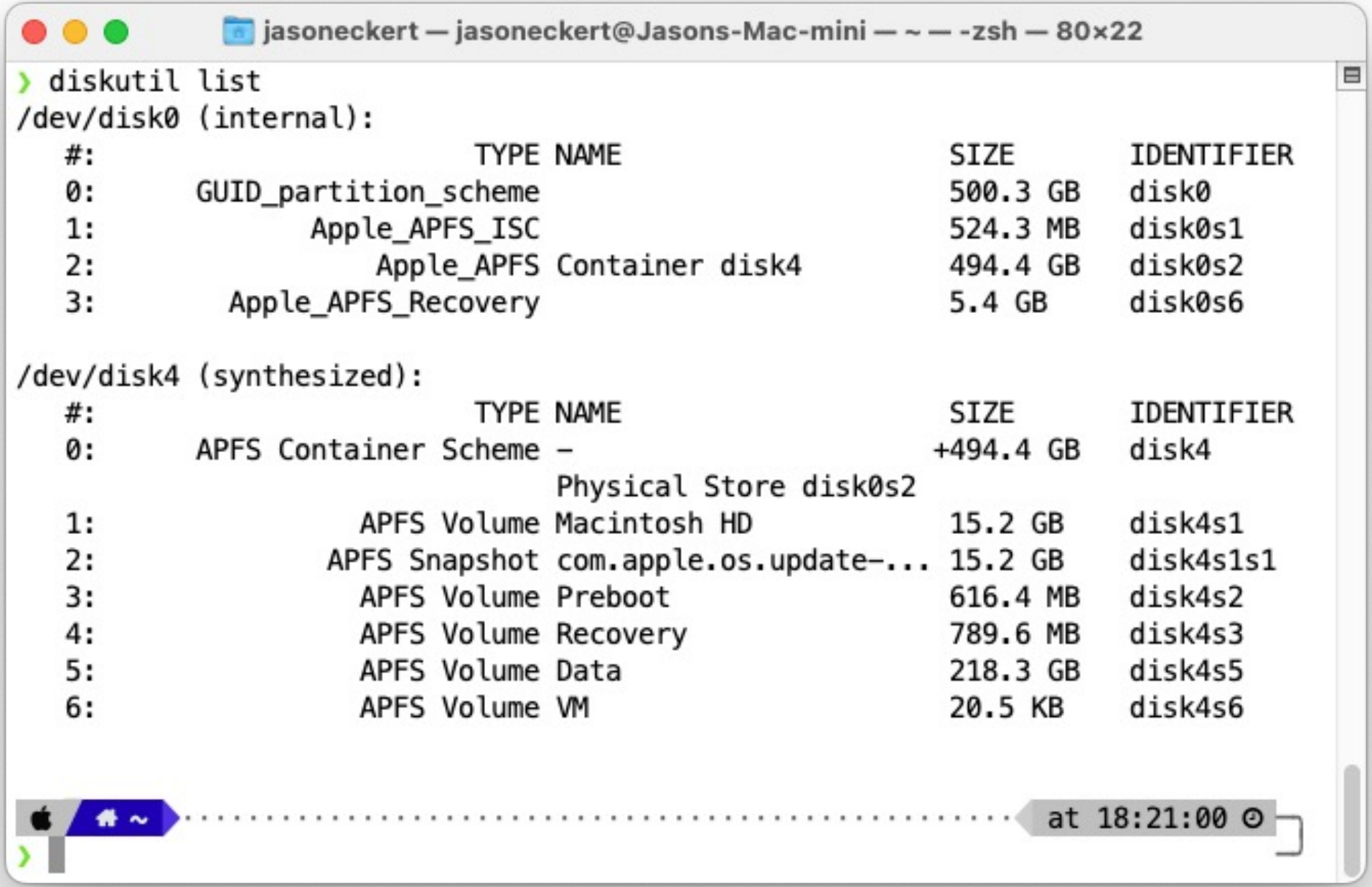
To be able to boot your new OS, you will need to complete one more step.
Please read the following instructions carefully. Failure to do so
will leave your new installation in an unbootable state.

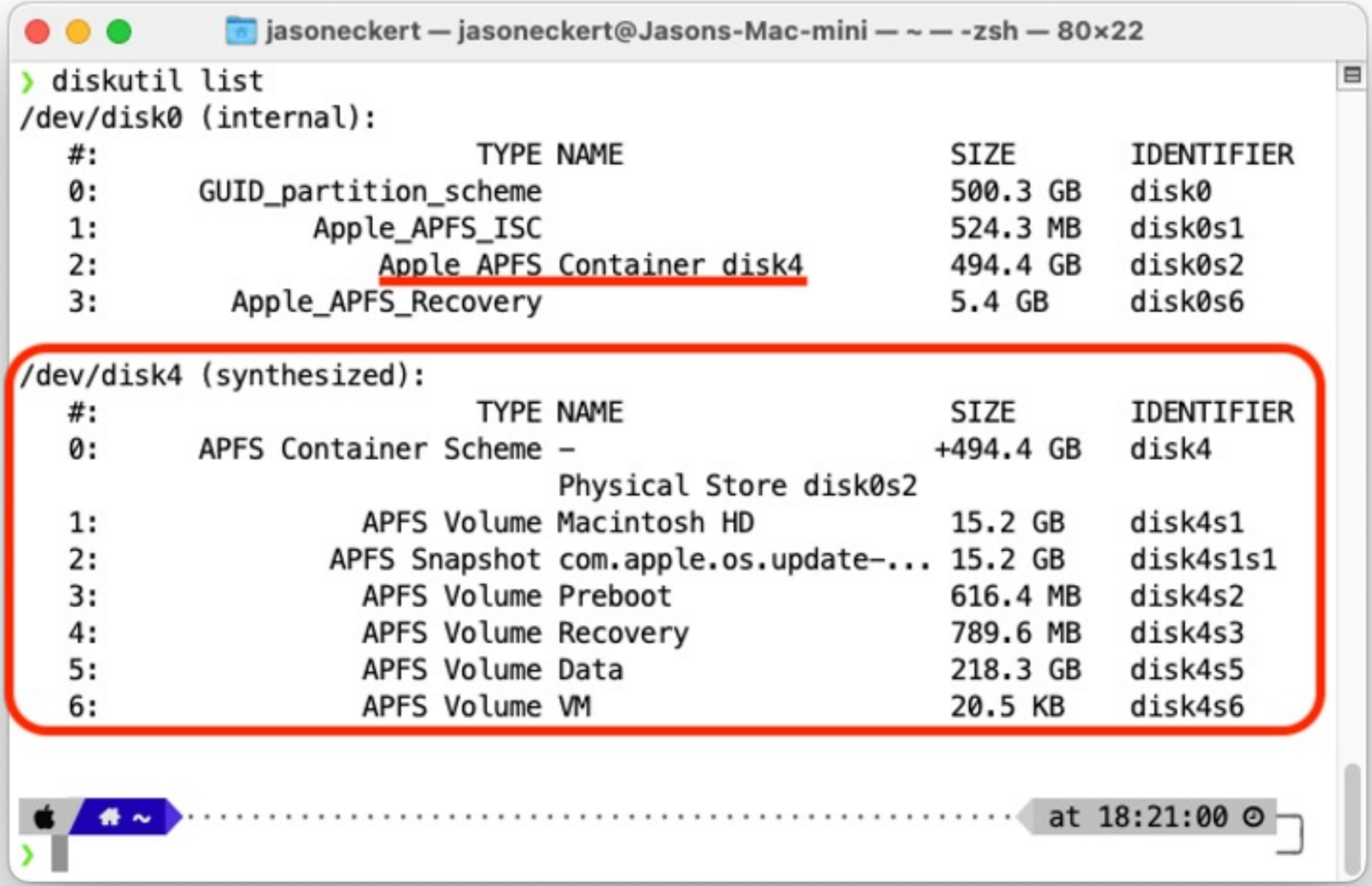
Press enter to continue.

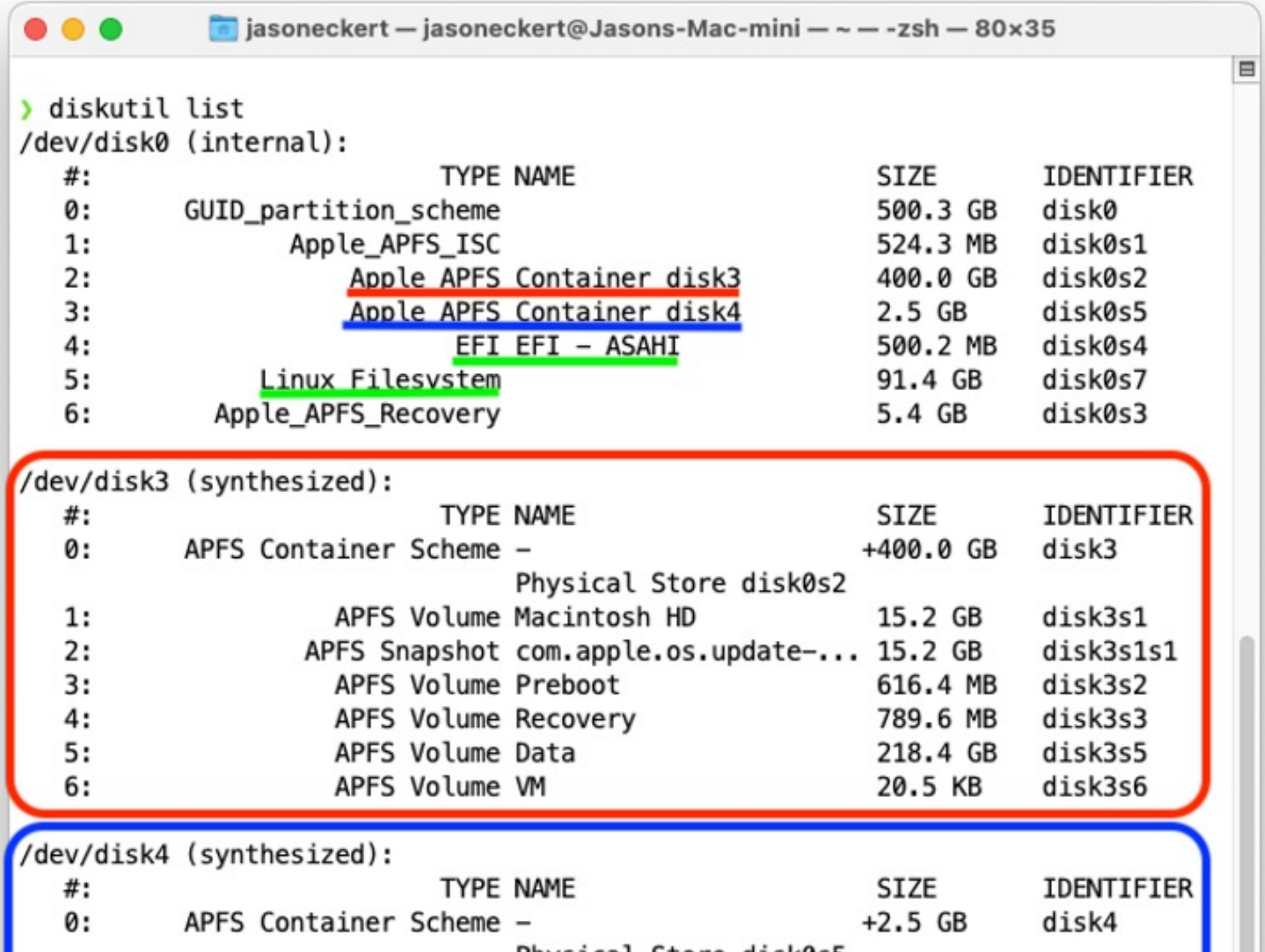
When the system shuts down, follow these steps:

1. Wait 15 seconds for the system to fully shut down.
2. Press and hold down the power button to power on the system.
   * It is important that the system be fully powered off before this step,
     and that you press and hold down the button once, not multiple times.
     This is required to put the machine into the right mode.
3. Release it once 'Entering startup options' is displayed,
   or you see a spinner.
4. Wait for the volume list to appear.
5. Choose 'Asahi'.
6. You will briefly see a 'macOS Recovery' dialog.
   * If you are asked to 'Select a volume to recover',
     then choose your normal macOS volume and click Next.
     You may need to authenticate yourself with your macOS credentials.
7. Once the 'Asahi Linux installer' screen appears, follow the prompts.

Press enter to shut down the system.


jasoneckert — jasoneckert@Jasons-Mac-mini — ~ — -zsh — 80×22
❯ diskutil list
/dev/disk0 (internal):
#: TYPE NAME SIZE IDENTIFIER
0: GUID_partition_scheme 500.3 GB disk0
1: Apple_APFS_ISC 524.3 MB disk0s1
2: Apple_APFS Container disk4 494.4 GB disk0s2
3: Apple_APFS_Recovery 5.4 GB disk0s6
/dev/disk4 (synthesized):
#: TYPE NAME SIZE IDENTIFIER
0: APFS Container Scheme - +494.4 GB disk4
Physical Store disk0s2
1: APFS Volume Macintosh HD 15.2 GB disk4s1
2: APFS Snapshot com.apple.os.update-... 15.2 GB disk4s1s1
3: APFS Volume Preboot 616.4 MB disk4s2
4: APFS Volume Recovery 789.6 MB disk4s3
5: APFS Volume Data 218.3 GB disk4s5
6: APFS Volume VM 20.5 KB disk4s6
~
at 18:21:00
❯


jasoneckert — jasoneckert@Jasons-Mac-mini — ~ — -zsh — 80×22
❯ diskutil list
/dev/disk0 (internal):
#: TYPE NAME SIZE IDENTIFIER
0: GUID_partition_scheme 500.3 GB disk0
1: Apple_APFS_ISC 524.3 MB disk0s1
2: Apple_APFS Container disk4 494.4 GB disk0s2
3: Apple_APFS_Recovery 5.4 GB disk0s6
/dev/disk4 (synthesized):
#: TYPE NAME SIZE IDENTIFIER
0: APFS Container Scheme - +494.4 GB disk4
Physical Store disk0s2
1: APFS Volume Macintosh HD 15.2 GB disk4s1
2: APFS Snapshot com.apple.os.update-... 15.2 GB disk4s1s1
3: APFS Volume Preboot 616.4 MB disk4s2
4: APFS Volume Recovery 789.6 MB disk4s3
5: APFS Volume Data 218.3 GB disk4s5
6: APFS Volume VM 20.5 KB disk4s6
~
at 18:21:00
❯


jasoneckert — jasoneckert@Jasons-Mac-mini — ~ — -zsh — 80×35
❯ diskutil list
/dev/disk0 (internal):
#: TYPE NAME SIZE IDENTIFIER
0: GUID_partition_scheme 500.3 GB disk0
1: Apple_APFS_ISC 524.3 MB disk0s1
2: Apple APFS Container disk3 400.0 GB disk0s2
3: Apple APFS Container disk4 2.5 GB disk0s5
4: EFI EFI - ASAHI 500.2 MB disk0s4
5: Linux Filesystem 91.4 GB disk0s7
6: Apple_APFS_Recovery 5.4 GB disk0s3
/dev/disk3 (synthesized):
#: TYPE NAME SIZE IDENTIFIER
0: APFS Container Scheme - +400.0 GB disk3
Physical Store disk0s2
1: APFS Volume Macintosh HD 15.2 GB disk3s1
2: APFS Snapshot com.apple.os.update-... 15.2 GB disk3s1s1
3: APFS Volume Preboot 616.4 MB disk3s2
4: APFS Volume Recovery 789.6 MB disk3s3
5: APFS Volume Data 218.4 GB disk3s5
6: APFS Volume VM 20.5 KB disk3s6
/dev/disk4 (synthesized):
#: TYPE NAME SIZE IDENTIFIER
0: APFS Container Scheme - +2.5 GB disk4

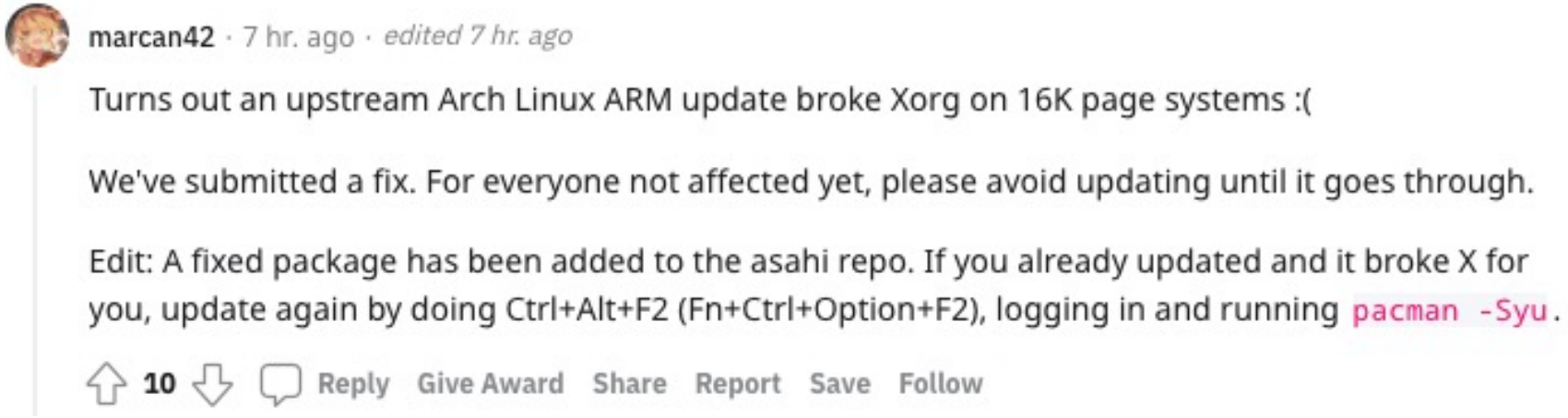
```
   0:      GUID_partition_scheme                        500.3 GB   disk0
   1:              Apple_APFS_ISC                       524.3 MB   disk0s1
   2:                 Apple_APFS Container disk3         400.0 GB   disk0s2
   3:                 Apple_APFS Container disk4         2.5 GB     disk0s5
   4:                         EFI EFI - ASAHI            500.2 MB   disk0s4
   5:           Linux Filesystem                         91.4 GB    disk0s7
   6:        Apple_APFS_Recovery                         5.4 GB     disk0s3

/dev/disk3 (synthesized):
   #:                       TYPE NAME                    SIZE       IDENTIFIER
   0:      APFS Container Scheme -                      +400.0 GB  disk3
                                Physical Store disk0s2
   1:                APFS Volume Macintosh HD            15.2 GB    disk3s1
   2:              APFS Snapshot com.apple.os.update-... 15.2 GB    disk3s1s1
   3:                APFS Volume Preboot                 616.4 MB   disk3s2
   4:                APFS Volume Recovery                789.6 MB   disk3s3
   5:                APFS Volume Data                    218.4 GB   disk3s5
   6:                APFS Volume VM                      20.5 KB    disk3s6

/dev/disk4 (synthesized):
   #:                       TYPE NAME                    SIZE       IDENTIFIER
   0:      APFS Container Scheme -                      +2.5 GB    disk4
                                Physical Store disk0s5
   1:                APFS Volume Asahi - Data            843.8 KB   disk4s1
   2:                APFS Volume Asahi                   196.6 KB   disk4s2
   3:                APFS Volume Preboot                 48.8 MB    disk4s3
   4:                APFS Volume Recovery                1.8 GB     disk4s4
```

Of course, it’s Linux ;-)

- Ran/updated perfectly for 2 months 🥰🥰🥰
- Then, one day after updating, X wouldn’t start
- Reddit to the rescue:



marcan42 · 7 hr. ago · *edited 7 hr. ago*

Turns out an upstream Arch Linux ARM update broke Xorg on 16K page systems :(

We've submitted a fix. For everyone not affected yet, please avoid updating until it goes through.

Edit: A fixed package has been added to the asahi repo. If you already updated and it broke X for you, update again by doing Ctrl+Alt+F2 (Fn+Ctrl+Option+F2), logging in and running `pacman -Syu`.

10 Reply Give Award Share Report Save Follow

What about M2?

Hector Martin
@marcan42

Since everyone is asking the question, I'm just going to call it.

M2 will boot to penguins in a day and to SoC feature parity to what we're shipping in Asahi Linux in a week, two tops.

The rest depends on whether the audio/WiFi chips are new or not. If not, not much left to do.

2:26 PM · Jun 8, 2022 · Twitter Web App

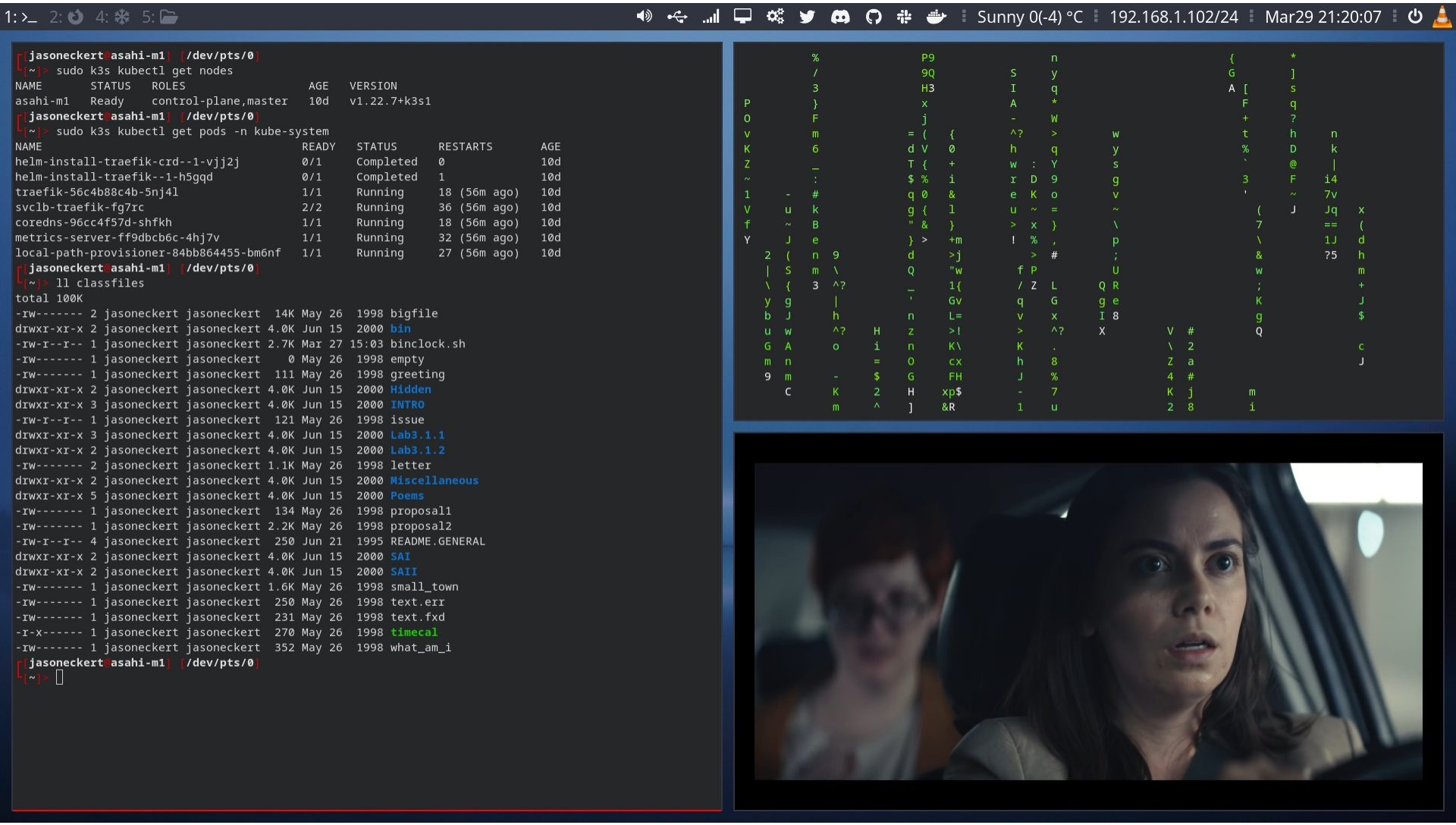
What about M2?

Asahi Linux @AsahiLinux · 18h

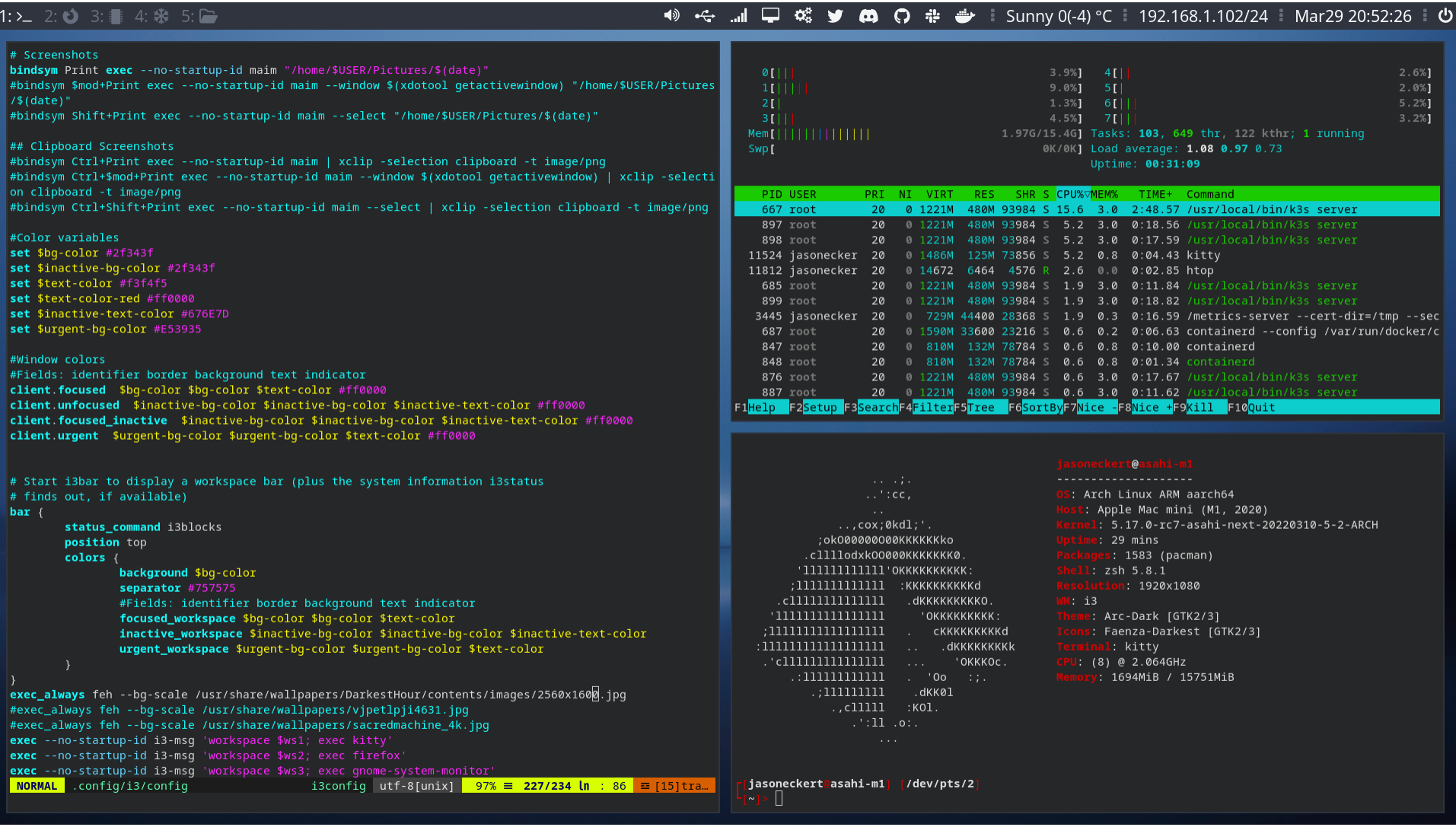
After one day of work, the M2 MacBook Pro is more than halfway to feature parity with the rest of the family 🎉

> **Hector Martin** @marcan42 · 19h
>
> USB works. That's it for today!
>
> Missing things:
> · Speakers untested
> · Keyboard/trackpad needs new driver
> · IPMI needs new driver
> · PCIe needs the fusemap in m1n1 to initialize
>
> Not bad for one day!

Let’s explore Asahi!



Let’s explore Asahi!



Let’s explore Asahi!