



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.

```
> 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


```
> 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:		<u>Apple APFS Container disk4</u>	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

```
> 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:	<u>Apple APFS Container disk3</u>	400.0 GB	disk0s2
3:	<u>Apple APFS Container disk4</u>	2.5 GB	disk0s5
4:	<u>EFI EFI - ASahi</u>	500.2 MB	disk0s4
5:	<u>Linux Filesystem</u>	91.4 GB	disk0s7
6:	Apple_APFS_Recovery	5.4 GB	disk0s3

```
/dev/disk3 (synthesized):
```

#:	TYPE NAME	SIZE	IDENTIFIER
0:	APFS Container Scheme - Physical Store disk0s2	+400.0 GB	disk3
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 - Physical Store disk0s5	+2.5 GB	disk4

0:	GUID_partition_scheme	500.3 GB	disk0
1:	Apple_APFS_ISC	524.3 MB	disk0s1
2:	<u>Apple APFS Container disk3</u>	400.0 GB	disk0s2
3:	<u>Apple APFS Container disk4</u>	2.5 GB	disk0s5
4:	<u>EFI EFI - ASAHI</u>	500.2 MB	disk0s4
5:	<u>Linux Filesystem</u>	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



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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!

1: > 2: 4: 5:

Sunny 0(-4) °C 192.168.1.102/24 Mar29 21:20:07

```
[jasonkert@asahi-m1 ~]$ sudo k3s kubectl get nodes
NAME          STATUS    ROLES    AGE   VERSION
asahi-m1      Ready    control-plane,master 10d   v1.22.7+k3s1

[jasonkert@asahi-m1 ~]$ sudo k3s kubectl get pods -n kube-system
NAME                                READY   STATUS    RESTARTS   AGE
helm-install-traefik-crd--1-vjj2j  0/1     Completed 0           10d
helm-install-traefik--1-h5gqd       0/1     Completed 1           10d
traefik-56c4b88c4b-5nj4l            1/1     Running   18 (56m ago) 10d
svclb-traefik-fg7rc                 2/2     Running   36 (56m ago) 10d
coredns-96cc4f57d-shfk             1/1     Running   18 (56m ago) 10d
metrics-server-ff9dbcb6c-4hj7v      1/1     Running   32 (56m ago) 10d
local-path-provisioner-84bb864455-bm6nf 1/1     Running   27 (56m ago) 10d

[jasonkert@asahi-m1 ~]$ ll classfiles
total 100K
-rw-r----- 2 jasonkert jasonkert 14K May 26 1998 bigfile
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 bin
-rw-r--r-- 1 jasonkert jasonkert 2.7K Mar 27 15:03 binclock.sh
-rw-r----- 1 jasonkert jasonkert 0 May 26 1998 empty
-rw-r----- 1 jasonkert jasonkert 111 May 26 1998 greeting
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 Hidden
drwxr-xr-x 3 jasonkert jasonkert 4.0K Jun 15 2000 INTRO
-rw-r--r-- 1 jasonkert jasonkert 121 May 26 1998 issue
drwxr-xr-x 3 jasonkert jasonkert 4.0K Jun 15 2000 Lab3.1.1
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 Lab3.1.2
-rw-r----- 2 jasonkert jasonkert 1.1K May 26 1998 letter
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 Miscellaneous
drwxr-xr-x 5 jasonkert jasonkert 4.0K Jun 15 2000 Poems
-rw-r----- 1 jasonkert jasonkert 134 May 26 1998 proposal1
-rw-r----- 1 jasonkert jasonkert 2.2K May 26 1998 proposal2
-rw-r--r-- 4 jasonkert jasonkert 250 Jun 21 1995 README.GENERAL
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 SAI
drwxr-xr-x 2 jasonkert jasonkert 4.0K Jun 15 2000 SAI1
-rw-r----- 1 jasonkert jasonkert 1.6K May 26 1998 small_town
-rw-r----- 1 jasonkert jasonkert 250 May 26 1998 text.err
-rw-r----- 1 jasonkert jasonkert 231 May 26 1998 text.fxd
-r-x----- 1 jasonkert jasonkert 270 May 26 1998 tmeecal
-rw-r----- 1 jasonkert jasonkert 352 May 26 1998 what_am_i

[jasonkert@asahi-m1 ~]$
```

```
%          P9          n          {          *
/          9Q          S          y          G          ]
3          H3          I          y          A          [
}          x          A          *          F          +
F          j          -          W          t          h          n
m          =          ^?          >          v          %          D          k
6          d          V          0          h          q          s          |
Z          T          {          +          w          :          Y          3          Jq          x
~          -          #          q          0          &          e          K          o          v          ~          (          7          Jq          x
1          u          k          g          {          1          u          ~          =          \          p          ;          U          #
f          ~          B          "          &          }          >          x          }          \          v          ~          (          7          Jq          x
Y          J          e          n          9          d          >          j          "w          f          P          L          Q          R          ge          I          8          V          #
2          (          n          \          Q          n          L          =          v          x          I          8          V          #
|          S          m          \          ^?          Q          n          L          =          v          x          I          8          V          #
\          {          3          ^?          Q          n          L          =          v          x          I          8          V          #
y          g          |          h          n          z          >          l          Gv          q          G          ge          I          8          V          #
b          J          h          n          z          >          l          Gv          q          G          ge          I          8          V          #
u          w          ^?          H          z          >          l          Gv          q          G          ge          I          8          V          #
G          A          o          i          n          K          K          .          \          2          Z          a          4          #
m          n          =          O          cx          h          8          Z          a          4          #
9          m          -          $          G          FH          J          %          K          j          m          i
C          K          2          H          xp$          -          7          K          j          m          i
          m          ^          j          &R          1          u          2          8          i
```



Let's explore Asahi!

1: > 2: 3: 4: 5:

Sunny 0(-4) °C 192.168.1.102/24 Mar29 20:52:26

```
# Screenshots
bindsym Print exec --no-startup-id maim "/home/$USER/Pictures/${date}"
#bindsym $mod+Print exec --no-startup-id maim --window $(xdotool getactivewindow) "/home/$USER/Pictures/${date}"
#bindsym Shift+Print exec --no-startup-id maim --select "/home/$USER/Pictures/${date}"

## Clipboard Screenshots
#bindsym Ctrl+Print exec --no-startup-id maim | xclip -selection clipboard -t image/png
#bindsym Ctrl+$mod+Print exec --no-startup-id maim --window $(xdotool getactivewindow) | xclip -selection clipboard -t image/png
#bindsym Ctrl+Shift+Print exec --no-startup-id maim --select | xclip -selection clipboard -t image/png

#Color variables
set $bg-color #2f343f
set $inactive-bg-color #2f343f
set $text-color #f3f4f5
set $text-color-red #ff0000
set $inactive-text-color #676E7D
set $urgent-bg-color #E53935

#Window colors
#Fields: identifier border background text indicator
client.focused $bg-color $bg-color $text-color #ff0000
client.unfocused $inactive-bg-color $inactive-bg-color $inactive-text-color #ff0000
client.focused_inactive $inactive-bg-color $inactive-bg-color $inactive-text-color #ff0000
client.urgent $urgent-bg-color $urgent-bg-color $text-color #ff0000

# Start i3bar to display a workspace bar (plus the system information i3status)
# finds out, if available)
bar {
    status_command i3blocks
    position top
    colors {
        background $bg-color
        separator #757575
        #Fields: identifier border background text indicator
        focused_workspace $bg-color $bg-color $text-color
        inactive_workspace $inactive-bg-color $inactive-bg-color $inactive-text-color
        urgent_workspace $urgent-bg-color $urgent-bg-color $text-color
    }
}

exec_always feh --bg-scale /usr/share/wallpapers/DarkestHour/contents/images/2560x1600.jpg
#exec_always feh --bg-scale /usr/share/wallpapers/vjpetlpji4631.jpg
#exec_always feh --bg-scale /usr/share/wallpapers/sacredmachine_4k.jpg
exec --no-startup-id i3-msg 'workspace $ws1; exec kitty'
exec --no-startup-id i3-msg 'workspace $ws2; exec firefox'
exec --no-startup-id i3-msg 'workspace $ws3; exec gnome-system-monitor'
NORMAL .config/i3/config i3config utf-8[unix] 97% 227/234 ln : 86 [15]tra...
```

```
0[||||| 3.9%] 4[|] 2.6%]
1[||||| 9.0%] 5[|] 2.0%]
2[| 1.3%] 6[|] 5.2%]
3[| 4.5%] 7[|] 3.2%]
Mem[||||| 1.97G/15.4G] Tasks: 103, 649 thr, 122 kthr; 1 running
Swp[ 0K/0K] Load average: 1.08 0.97 0.73
Uptime: 00:31:09

PID USER PRI NI VIRT RES SHR S CPU%MEM% TIME+ Command
667 root 20 0 1221M 480M 93984 S 15.6 3.0 2:48.57 /usr/local/bin/k3s server
897 root 20 0 1221M 480M 93984 S 5.2 3.0 0:18.56 /usr/local/bin/k3s server
898 root 20 0 1221M 480M 93984 S 5.2 3.0 0:17.59 /usr/local/bin/k3s server
11524 jasonecker 20 0 1486M 125M 73856 S 5.2 0.8 0:04.43 kitty
11812 jasonecker 20 0 14672 6464 4576 R 2.6 0.0 0:02.85 http
685 root 20 0 1221M 480M 93984 S 1.9 3.0 0:11.84 /usr/local/bin/k3s server
899 root 20 0 1221M 480M 93984 S 1.9 3.0 0:18.82 /usr/local/bin/k3s server
3445 jasonecker 20 0 729M 44400 28368 S 1.9 0.3 0:16.59 /metrics-server --cert-dir=/tmp --sec
687 root 20 0 1590M 33600 23216 S 0.6 0.2 0:06.63 containerd --config /var/run/docker/c
847 root 20 0 810M 132M 78784 S 0.6 0.8 0:10.00 containerd
848 root 20 0 810M 132M 78784 S 0.6 0.8 0:01.34 containerd
876 root 20 0 1221M 480M 93984 S 0.6 3.0 0:17.67 /usr/local/bin/k3s server
887 root 20 0 1221M 480M 93984 S 0.6 3.0 0:11.62 /usr/local/bin/k3s server
F1Help F2Setup F3Search F4Filter F5Tree F6SortBy F7Nice F8Nice F9Kill F10Quit
```

```
jasonecker@asahi-m1
-----
OS: Arch Linux ARM aarch64
Host: Apple Mac mini (M1, 2020)
Kernel: 5.17.0-rc7-asahi-next-20220310-5-2-ARCH
Uptime: 29 mins
Packages: 1583 (pacman)
Shell: zsh 5.8.1
Resolution: 1920x1080
WM: i3
Theme: Arc-Dark [GTK2/3]
Icons: Faenza-Darkest [GTK2/3]
Terminal: kitty
CPU: (8) @ 2.064GHz
Memory: 1694MiB / 1751MiB

.. ;.
..':cc,
..
..,cox;0kdl';
;ok0000000000KKKKKKko
.cllllodxxk00000KKKKKKK0.
'lllllllllllll'OKKKKKKKKKK:
;lllllllllllllll :KKKKKKKKKKd
.clllllllllllllllll .dKKKKKKKKKK0.
'lllllllllllllllll 'OKKKKKKKKKK:
;lllllllllllllllll . cKKKKKKKKKKd
;llllllllllllllllllll .. .dKKKKKKKKKKk
.'clllllllllllllllll ... 'OKKKKoc.
..lllllllllllllll 'Oo ;.
..lllllllllll .dKK01
..,cllllll :K01.
.:lll .o:.
...

jasonecker@asahi-m1 [/dev/pts/2]
[~]>
```

Let's explore Asahi!

The screenshot shows a QEMU virtual machine window titled "QEMU" with a toolbar and a status bar indicating "Jun 5 07:21". Inside the VM, the desktop environment is Ubuntu 20.04.4 LTS with a red background. A terminal window titled "woot@UbuntuVM: ~" is open, displaying the output of the `neofetch` command. The output shows system information for the VM, including OS, Host, Kernel, Uptime, Packages, Shell, Resolution, DE, WM, WM Theme, Theme, Icons, Terminal, CPU, GPU, and Memory. A color calibration bar is visible at the bottom of the terminal output.

```
woot@UbuntuVM:~$ neofetch

      .-/+000000+/-.-
      '+$$$$$$$$$$$$$$$$+'
      -+$$$$$$$$$$$$$$$-
      .0$$$$$$$$$$$$$$$0.
      /$$$$$$$$$hdmmNNmyNNMMmh$$$$$$$/
      +$$$$$$$hmyNNMMNNddddd$$$$$$+
      /$$$$$$$hNNMMmyhyyyhNNMMNh$$$$$$/
      .$$$$$$$dMMNNh$$$$$$$hNNMMd$$$$$$$.
      +$$$hhhyNNMMny$$$$$$$$$yNNMMmy$$$$$$$+
      o$$$yNNMMNyMMh$$$$$$$$$hmmh$$$$$$$o
      o$$$yNNMMNyMMh$$$$$$$$$hmmh$$$$$$$o
      +$$$hhhyNNMMny$$$$$$$$$yNNMMmy$$$$$$$+
      .$$$$$$$dMMNNh$$$$$$$hNNMMd$$$$$$$.
      /$$$$$$$hNNMMmyhyyyhNNMMNh$$$$$$$/
      +$$$$$$$dmyNNMMNNddddd$$$$$$+
      /$$$$$$$$$hdmmNNNNmyNNMMmh$$$$$$/
      .0$$$$$$$$$$$$$$$$$dMMNNy$$$$$.
      -+$$$$$$$$$$$$$$$$$yyy$$$$-
      '+$$$$$$$$$$$$$$$$+'
      .-/+000000+/-.-

woot@UbuntuVM:~$
```

System Information (from terminal output):

- OS: Ubuntu 20.04.4 LTS aarch64
- Host: QEMU Virtual Machine virt-7.0
- Kernel: 5.13.0-46-generic
- Uptime: 13 mins
- Packages: 1419 (dpkg), 7 (snap)
- Shell: bash 5.0.17
- Resolution: 1179x866
- DE: GNOME
- WM: Mutter
- WM Theme: Adwaita
- Theme: Yaru [GTK2/3]
- Icons: Yaru [GTK2/3]
- Terminal: gnome-terminal
- CPU: (4)
- GPU: 00:02.0 Red Hat, Inc. Virtio GP
- Memory: 692MiB / 2972MiB

On the right, a terminal window titled "jasoneckert@asahi: ~" shows the output of a script named `./script.sh` which runs `bin/neofetch.sh`. The output displays system information for the Asahi Mac mini, including OS, Host, Kernel, Uptime, Packages, Shell, Resolution, DE, WM, WM Theme, Theme, Icons, Terminal, CPU, and Memory.

```
jasoneckert@asahi:~$ ./script.sh
bin/neofetch.sh

      .-/+000000+/-.-
      '+$$$$$$$$$$$$$$$$+'
      -+$$$$$$$$$$$$$$$-
      .0$$$$$$$$$$$$$$$0.
      /$$$$$$$$$hdmmNNmyNNMMmh$$$$$$$/
      +$$$$$$$hmyNNMMNNddddd$$$$$$+
      /$$$$$$$hNNMMmyhyyyhNNMMNh$$$$$$/
      .$$$$$$$dMMNNh$$$$$$$hNNMMd$$$$$$$.
      +$$$hhhyNNMMny$$$$$$$$$yNNMMmy$$$$$$$+
      o$$$yNNMMNyMMh$$$$$$$$$hmmh$$$$$$$o
      o$$$yNNMMNyMMh$$$$$$$$$hmmh$$$$$$$o
      +$$$hhhyNNMMny$$$$$$$$$yNNMMmy$$$$$$$+
      .$$$$$$$dMMNNh$$$$$$$hNNMMd$$$$$$$.
      /$$$$$$$hNNMMmyhyyyhNNMMNh$$$$$$$/
      +$$$$$$$dmyNNMMNNddddd$$$$$$+
      /$$$$$$$$$hdmmNNNNmyNNMMmh$$$$$$/
      .0$$$$$$$$$$$$$$$$$dMMNNy$$$$$.
      -+$$$$$$$$$$$$$$$$$yyy$$$$-
      '+$$$$$$$$$$$$$$$$+'
      .-/+000000+/-.-

jasoneckert@asahi:~$
```

System Information (from right terminal output):

- OS: Arch Linux ARM aarch64
- Host: Apple Mac mini (M1, 2020)
- Kernel: 5.17.0-rc7-asahi-next-20
- Uptime: 6 mins
- Packages: 1490 (pacman)
- Shell: zsh 5.9
- Resolution: 1920x1080
- DE: GNOME 42.2
- WM: Mutter
- WM Theme: Adwaita
- Theme: Breeze [GTK2/3]
- Icons: breeze [GTK2/3]
- Terminal: gnome-terminal
- CPU: (8) @ 2.064GHz
- Memory: 4680MiB / 15751MiB