



Flatcar Linux: Provisioned, Not Installed

**A declarative and Immutable Operating
Systems for Containers and Kubernetes**

Jan Bronicki

whoami



Jan Bronicki

Flatcar Maintainer

Software Engineer @ Microsoft



@John15321

Agenda

- The community behind Flatcar
- What Flatcar Container Linux actually is
- Provisioned, not installed
- Immutable by design & A/B updates
- Live demo

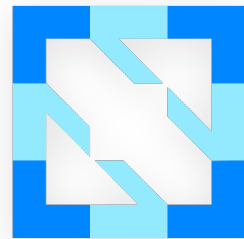
Community Stewarded

What that means, and who we are

Community stewarded

- **Fully open, fully free:** Apache 2.0, public roadmap, public issue tracker
- **No single owner:** the project and trademark belong to the CNCF and the Linux Foundation
- **CNCF project:** neutral governance under the Cloud Native Computing Foundation
- **You can join:** SIG meetings are public; anyone can propose changes or maintain

Flatcar is a **CNCF** project



**CLOUD NATIVE
COMPUTING FOUNDATION**

The community

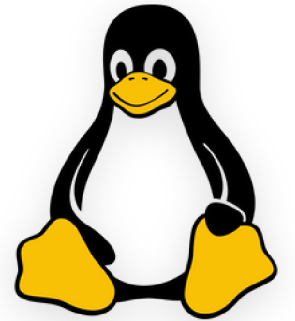


We work with

- Gentoo and Fedora CoreOS
- systemd, Dracut, Grub, Afterburn
- Openwall **oss-security** non-disclosure list
- Co-founders of the **UAPI Group**, cross-distro SIG for image-based Linux



gentoo linux™



[● ◀] systemd

Runs everywhere



In production at



How Flatcar Works

What is it, and how do you use it?

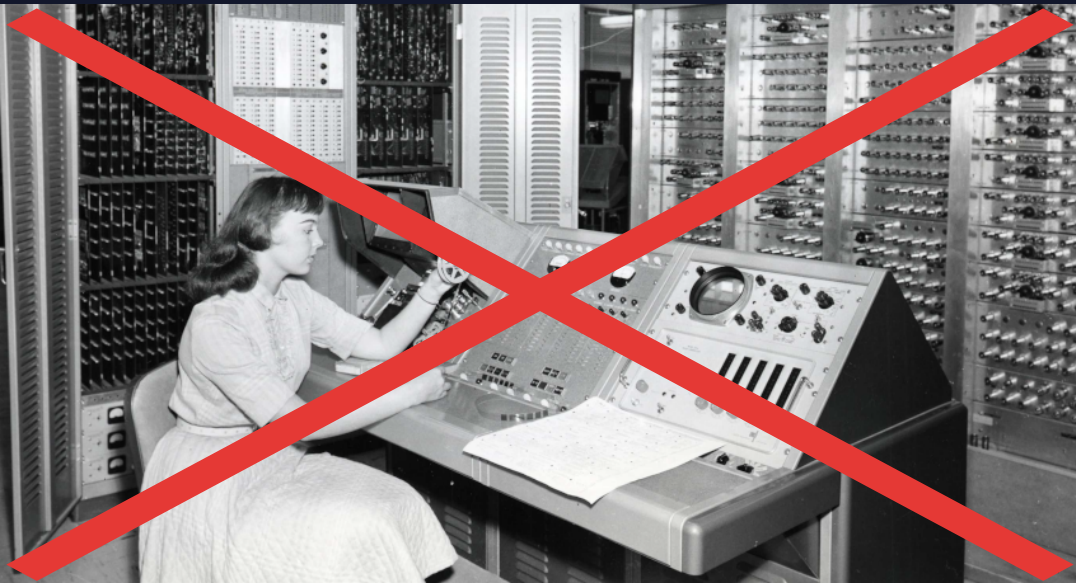
Flatcar?



Flatcar!



The UX we chose



General-purpose Linux



Flatcar

You don't install Flatcar.

You provision it.

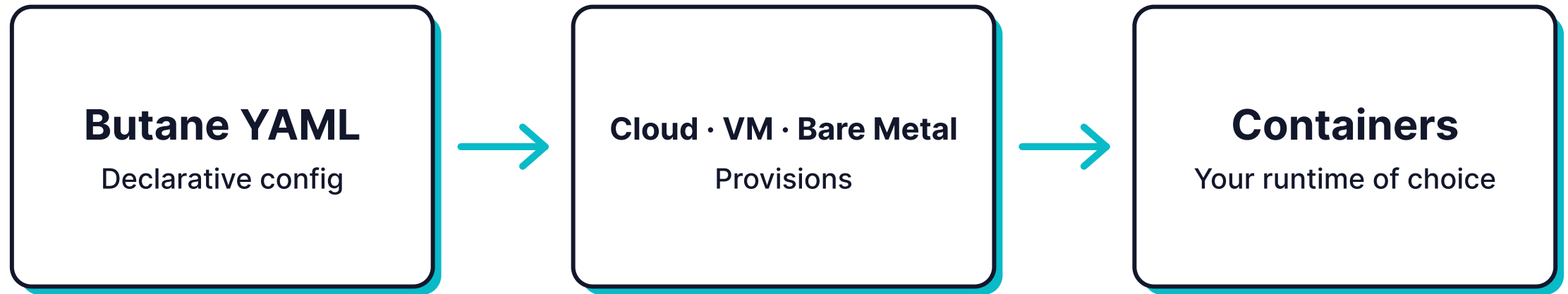
Provisioned, not Installed

Traditional install

- Interactive choices during setup
- Every machine ends up a little different
- Manual updates, package churn, drift
- No separation between OS and config

Flatcar: provisioned

- One declarative config, applied at boot
- Every machine identical, reproducible
- Whole-OS atomic updates, no drift
- Same idea as containers



What Butane looks like



```
# Butane config header: declares this is a Flatcar config
variant: flatcar
version: 1.0.0

# Drop in a systemd unit. Flatcar installs and starts it at first boot
systemd:
  units:
    - name: nginx.service
      enabled: true
      contents: |
        [Service]
        ExecStart=/usr/bin/docker run --rm -p 80:80 nginx
        [Install]
        WantedBy=multi-user.target
```

```
# Transpile Butane to an ignition config (JSON)  
$ butane -o config.ign config.bu  
  
# Boot Flatcar in QEMU with the config applied  
$ ./flatcar_production_qemu.sh -i config.ign
```

The config gets handed to Flatcar as **user-data**. Same channel every major cloud, hypervisor, and bare-metal provisioner uses to seed an instance.

It came up serving



```
$ systemctl is-active nginx.service  
active
```

```
$ curl -sI http://localhost  
HTTP/1.1 200 OK  
Server: nginx/1.27.3  
Content-Type: text/html
```

No login. No post-boot setup. The machine came up already doing its job.

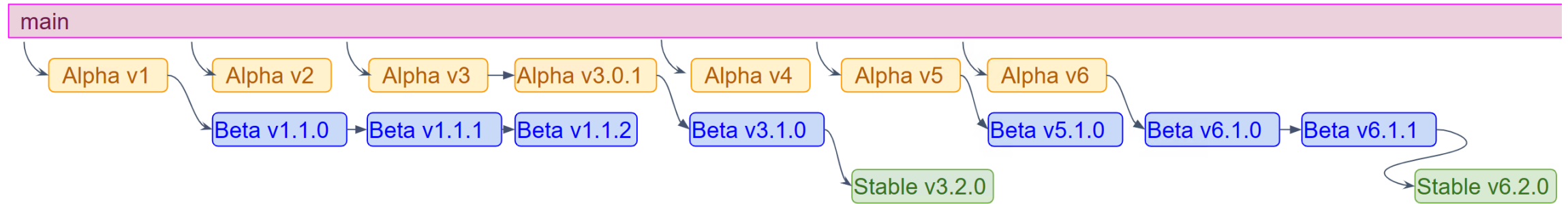
Immutable by Design

- **First boot** provisions from config. After that: the base OS doesn't change.
- The OS is **read-only** and **dm-verity** protected.
- **No package updates**: the entire OS updates as one unit.
- Same config + same base image = **identical machine every time**.
- **sysexts** for optional add-ons.

A/B Updates



↻ The passive slot is **never auto-synced**. It's your rollback until the next update lands.



- **Alpha:** fully tested, may have incomplete features. Developers.
- **Beta:** production-ready. Canary alongside stable.
- **Stable:** widespread production. Promoted from beta.
- **LTS:** slower-moving track for environments that need it.

Every commit runs the full test suite: unit, integration, and product tests across every supported cloud. By the time a version ships, even **Alpha**, it's been through hundreds of runs.

Demos!

github.com/John15321/demos



Thank you!

 flatcar.org

 github.com/flatcar

 discord.gg/PMYjFUsJyq



 [Join our Discord!](https://discord.gg/PMYjFUsJyq)

Office hours · every 2nd Tue, 16:30 CEST **Dev sync** · every 4th Tue, 16:30 CEST

Everyone welcome. Users, contributors, or just curious. Ask questions, get help, share what you're building!