# Servin' your own software: Self-hostin' + Homelabbin'

Brandon Sprague, W1 '24

Recurse Center, 2024-11-13

Slides + source available at bsprague.com/rc-selfhost

Which is, of course, running out of my basement

# The Treadmill

# The Treadmill

- I’m on a treadmill

# The Treadmill

- I’m on a treadmill
- I bought it on Craigslist

# The Treadmill

- I’m on a treadmill
- I bought it on Craigslist
- 3-7 miles a day

# The Treadmill

- I’m on a treadmill
- I bought it on Craigslist
- 3-7 miles a day
- Lifespan TR 1200 DT

# What is self-hosting?

# What is self-hosting?

- Running software on computers you control

# What is self-hosting?

- Running software on computers you control
- Simple as that

# What is self-hosting?

- Running software on computers you control
- Simple as that
- Ignore gatekeepers of what “real” self-hosting is

# Why would anyone want to do that?

# Plenty of reasons!

# Plenty of reasons!

- Hone your technical skills

# Plenty of reasons!

- Hone your technical skills
- Ownership over your data

# Plenty of reasons!

- Hone your technical skills
- Ownership over your data
- Privacy/security*

* A well-structured homelab is less likely to get hacked than some random small company, but you're probably safer with Google overall.

# Plenty of reasons!

- Hone your technical skills
- Ownership over your data
- Privacy/security*
- ~~You'll break everything so badly you need to pay Ceph/Rook consultants to fix it and even they won't be able to~~

* A well-structured homelab is less likely to get hacked than some random small company, but you're probably safer with Google overall.

# Plenty of reasons!

- Hone your technical skills
- Ownership over your data
- Privacy/security*
- ~~You'll break everything so badly you need to pay Ceph/Rook consultants to fix it and even they won't be able to~~
- It's fun!

* A well-structured homelab is less likely to get hacked than some random small company, but you're probably safer with Google overall.

# Why *wouldn't* I want to self-host?

# Plenty of reasons!

# Plenty of reasons!

- It can be a **ton** of work
  - Plus ongoing maintenance

# Plenty of reasons!

- It can be a **ton** of work
  - Plus ongoing maintenance
- You might get hacked

# Plenty of reasons!

- It can be a **ton** of work
  - Plus ongoing maintenance
- You might get hacked
- You'll break everything so badly you need to pay Ceph/Rook consultants to fix it and even they won't be able to

# Plenty of reasons!

- It can be a **ton** of work
  - Plus ongoing maintenance
- You might get hacked
- You'll break everything so badly you need to pay Ceph/Rook consultants to fix it and even they won't be able to
- It might not spark joy for you

# Plenty of reasons!

- It can be a **ton** of work
  - Plus ongoing maintenance
- You might get hacked
- You'll break everything so badly you need to pay Ceph/Rook consultants to fix it and even they won't be able to
- It might not spark joy for you

— Marie Condo

# What kinda stuff can you self-host?

# Anything!

Check out awesome-selfhosted on GitHub

# Anything!

- Media streaming (Jellyfin, Plex)
- File storage (ownCloud, NextCloud)
- Game servers
- Password manager
- Email servers
- Git hosting (Gitea, Codeberg)
- Calendars / Scheduling tools (Cal.com)
- All your websites
- Pair programming tools (Upterm)
- Browser sync
- Reverse proxy tools (e.g. ngrok alternatives)
- Doesn't even need to be open-source!

Check out awesome-selfhosted on GitHub

# Anything!

- Media streaming (Jellyfin, Plex)
- File storage (ownCloud, NextCloud)
- Game servers
- Password manager
- Email servers
- Git hosting (Gitea, Codeberg)
- Calendars / Scheduling tools (Cal.com)
- All your websites
- Pair programming tools (Upterm)
- Browser sync
- Reverse proxy tools (e.g. ngrok alternatives)
- Doesn't even need to be open-source!

Check out awesome-selfhosted on GitHub

# What might you *not* want to self-host?

# Anything!

- Email can be kind of a struggle
  - Really just sending it, receiving it is straightforward
- Things that require exposing lots of ports to the internet
- Mission-critical stuff
- Security-sensitive things
  - Unless you're comfortable with what that entails

# Why should you listen to me?

**Why should you listen to me?**

(spoiler: you probably shouldn't)

**I’ve stepped on all the rakes**
**so you don’t have to**

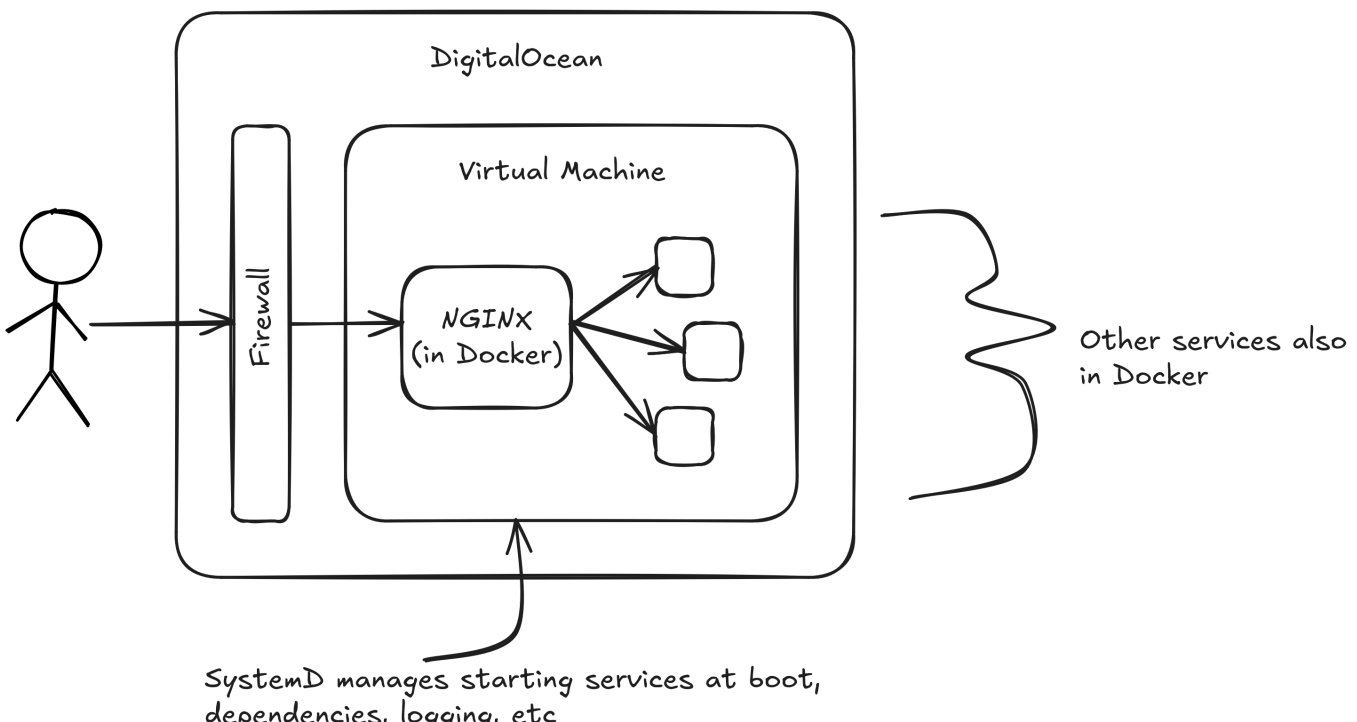
**I've stepped on all the rakes**
**so you don't have to**
(unless you want to)

# My Self-Hosting Story, in brief

# V0: A First Foray

- Ran a Flatcar Linux VM on Digital Ocean
- Used systemd to manage Docker images
- NGINX to route traffic
- Let's Encrypt/ certbot for TLS

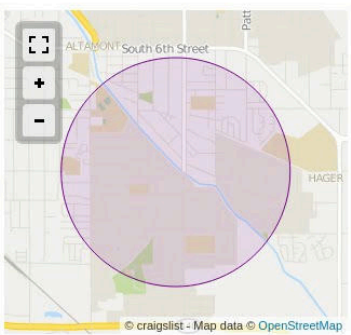
# V0: A First Foray



# V1: Killing the Planet for Fun and a Severe Lack of Profit

reply ☆ favorite hide flag share Posted 18 days ago print

**Server Farm m1000e m610 16 blades - $5,000 (Klamath Falls)**




condition: **good**

make / manufacturer: **dell**

model name / number: **m1000e m610**

size / dimensions: **10u**

M1000e with all 16 m610 blades. Each blade has 32g ram and dual processors (2x6core). All 6 power supplies and all fans. Basically if you are looking at this you likely know what it can do. Also has 32x300g drives (10k). Its fast and ran an entire 15x15 atlas server which was impressive. Let me know as we dont use it anymore. I can deliver but it would be best if you come take a look. I cant boot it up here as i dont have the 220v to run it at the house.

Please call. No texts/email.

- do NOT contact me with unsolicited services or offers

# V1: Killing the Planet for Fun and a Severe Lack of Profit

- A Dell M1000e Blade Server I found on Craigslist
- 16x M610 blades (computers), each with:
  - 2x 6-core Xeon 5600 series processors
  - 32GB DDR3 ECC RAM
  - 2x 300GB 10K HDD
- Released in like 2010
- I thought I was getting a good deal
  - I paid **way** too much for it
  - Such is the cost of ignorance

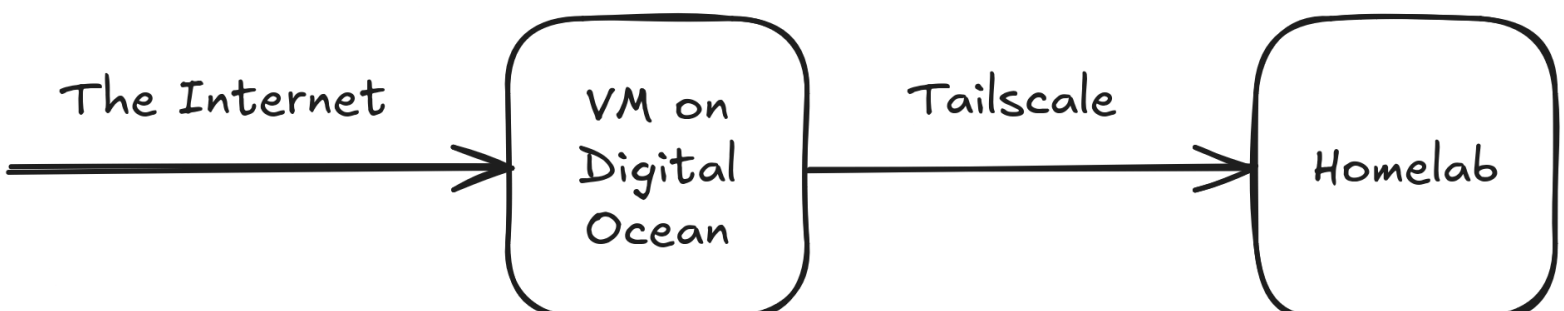
# V1: Killing the Planet for Fun and a Severe Lack of Profit

# V2: More Small Box

- Beelink GTR6
  - Modern mini PC
- Single-node Kubernetes Cluster using Talos
- Caddy for web server
- Traffic from the internet via Digital Ocean
- Secure services with Tailscale/Headscale

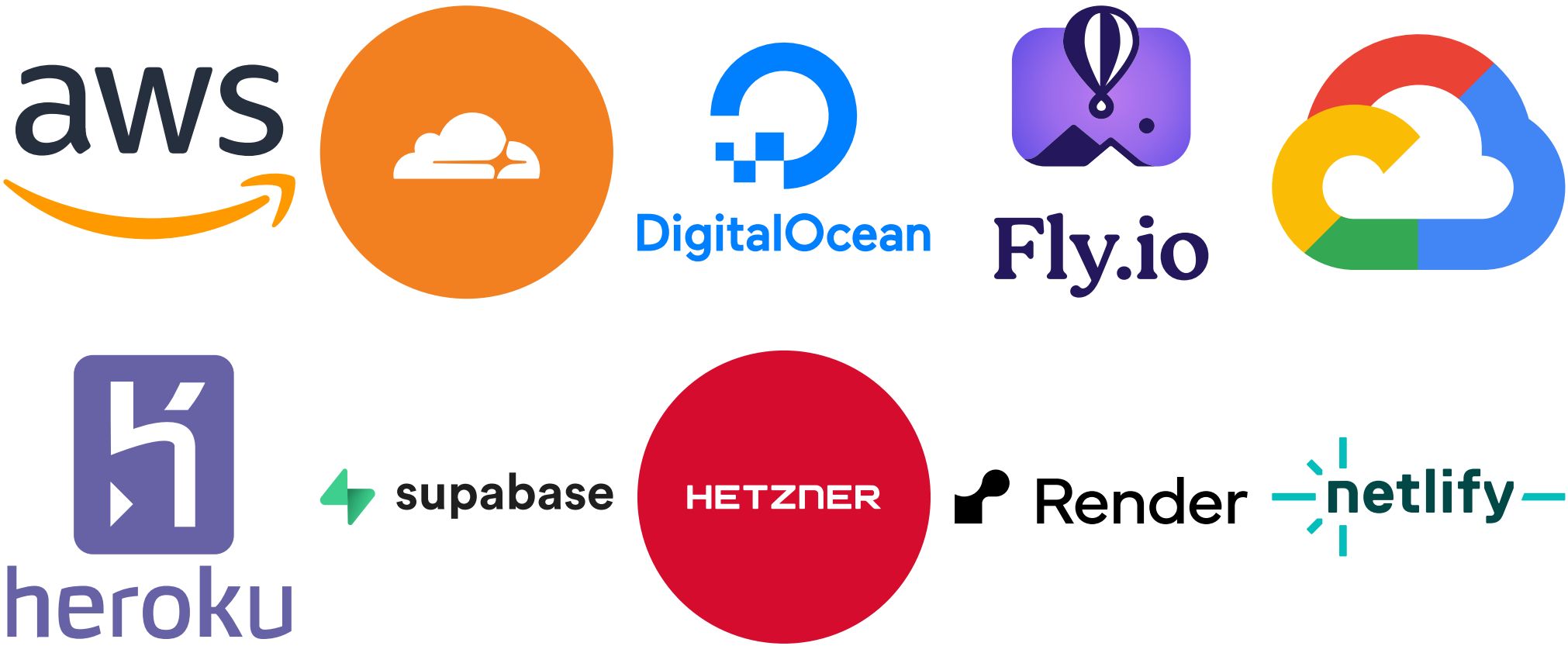
# V2: More Small Box

# V2: More Small Box



# Where can you self-host things?

# Anywhere!


aws
DigitalOcean
Fly.io
heroku
supabase
HETZNER
Render
netlify

# Questions to ask yourself

- What am I hoping to get out of the experience?
- How hands-on do I want to be?
- What's my appetite for risk?
- What kinds of workloads do I want to run?

# How can one manage their software?

- Can use containers
  - Either alone or via K8s/Nomad/Dokku/Kamal/Knative/etc
- Can run on “bare metal”
  - Manage services with systemd or another init system
    - Also things like cloud-init (Container-Optimized OS on GCP) or Butane (Fedora CoreOS)
    - And Disco !
  - Or just some bash scripts
- Also platforms like Sandstorm

# How do I manage my software?

- I run K8s on Talos
  - Very minimal OS, no SSH, just K8s for the most part
- Manage software as configs written in CUE
- Caddy on Digital Ocean VM to gate traffic
  - And manage TLS
- Caddy on homelab to route it
- Alerting from GCP probes

# How do I manage my software?

```
// mozsync.cue
package kube

deployment: mozsync: spec: template: spec: {
  containers: [{
    envFrom: [{
      secretRef: name: "mozsync-secrets"
    }]
    volumeMounts: [{
      name:      "data"
      mountPath: "/data"
      subPath:   "mozsync"
    }]
    ports: [{
      containerPort: 8080
      name:          "web"
    }]
  }]
  volumes: [{
    name: "data"
    persistentVolumeClaim: claimName: "local-pvc"
  }]
}
```

# How do I manage my software?

```
// Caddyfile
http://mozsync.bsprague.com {
  reverse_proxy mozsync.default.svc.cluster.local:8080
}
```

# Operational considerations (especially for homelabs)

- Backups (Restic, Borg, Kopia)
- Privacy and Security
- Random bots hitting your home network
- Auditing the software you're running
- Networking + Access control
  - Tailscale, Nebula, ZeroTier, NetBird

# Deciding on hardware for homelabbing

- Whatever you've got laying around
  - Raspberry Pi, old desktop/laptop, hacked together franken-machines
- Can buy legitimate server hardware from Dell, Supermicro, HP, etc
- Can build your own server
  - Can buy chassis from Supermicro or Silverstone
  - Can buy motherboard from Supermicro or ASRack
    - Gives you "enterprise" server/BMC features like booting machine remotely, and seeing screen remotely
  - Companies like Falcon Northwest will build you custom servers

# How to get homelab on the internet

- Hosted services like ngrok or Cloudflare Tunnel
- Self-hosted tunneling tools like frp , rathole , etc
  - Requires a VM somewhere on the public internet
- Dynamic DNS or Static IP
  - Not necessarily recommended

# Quick demo!

# Questions?