Deploying Containers without Kubernetes

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Sometimes k8s is not the solution

- Reduce sysadmin cost, infrastructure cost, time of people
- Reduce the time needed to make projects available (MVP)
- Version control (GitOps)

- **Scalability**
- Clever updates
- On-prem or cloud
From the 2020 CNCF Survey about 20% of respondent have a fleet of 20 or less.

Containers in small infrastructures
Services available to run containers

- Azure Container Instance
- AWS Fargate
- Google Cloud - Cloud Run

+ No need to care about the Infrastructure and Operating systems

- Delivery pipeline strongly coupled to service provider
Clouds and IaaS - Workflow

- Code + Test
- Build
- Container
- Deploy
- Monitor

Can be done by Platform

Platform dependent
Alternatives? What about Linux?

Dedicated Linux solution focused on running containerized applications

SERVER

Container Manager (podman, docker, ...)

Security (updates, SELinux)  Provisioning

Linux
Tiny Linux Ecosystem

- Flat Car
- openSUSE MicroOS
- CoreOS
- RancherOS
- Photon OS
- Talos Systems
Fedora CoreOS

- **Reduce sysadmin cost, infrastructure cost, time of people**
  - Automatic Updates (deploy it and forget about it)
- **Reduce the time needed to make projects available (MVP)**
  - Easy to deploy and provision (ready in less than a minute)
- **Version control (GitOps)**
  - Configuration as YAML/JSON
- **Clever updates**
  - 3 versions streams (next, testing and stable), update don’t break
- **On-prem or cloud**
  - Currently available on 12 platforms (AWS, GCP, Azure, Digital Ocean, OpenStack, libvirt, VMware ..)
Fedora CoreOS

- Fedora CoreOS features Automatic Updates by default
  - Automatic updates → Reliable updates
    - Extensive tests in automated CI pipelines
    - Several update streams to preview what’s coming
      - Users run various streams to help find issues
    - Managed upgrade rollouts over several days
      - Halt the rollout if issues are found
  - For when things go wrong
    - rpm-ostree rollback can be used to go back
    - future: automated rollback
      - based on user specified health checks
Fedora CoreOS

• Offered update streams with automatic updates
  ○ next - experimental features, Fedora major rebases
  ○ testing - preview of what’s coming to stable
    ▪ point in time snapshot of Fedora stable rpm content
  ○ stable - most reliable stream offered
    ▪ promotion of testing stream after some bake time
• Goals
  ○ Publish new releases into update streams every two weeks
  ○ Find issues in next/testing streams before they hit stable
Fedora CoreOS

Automated Provisioning

- Fedora CoreOS uses Ignition to automate provisioning
  - Any logic for machine lifetime is encoded in the config
    - Very easy to automatically re-provision nodes
  - Same starting point whether on bare metal or cloud
    - Use Ignition everywhere as opposed to kickstart for bare metal and cloud-init for cloud
OS Versioning & Security

- Fedora CoreOS uses rpm-ostree technology
  - “Like git for your Operating System”
    - 32.20200615.2.0 - 86c0246
    - A single identifier tells you all software in that release
  - Uses read-only filesystem mounts
    - Prevents accidental OS corruption (rm -rf)
    - Prevents novice attacks from modifying system
- SELinux enforcing by default
  - Prevents compromised apps from gaining further access
Container OS - Workflow

- Code + Test
- Build
- Container + Provisioning config
- Deploy
- Monitor

OS dependent

Platform independent
Example - Matrix Server

SERVER

Container Manager (podman)

Volumes

podman pod (shared network)

Fedora CoreOS (kernel, SELinux, networking, ..)

postgres
synapse
element-web
nginx
nginx-http

data
well-known

443 8448 80

chat.mydomain.com & matrix.mydomain.com

https://github.com/travier/fedora-coreos-matrix
Fedora CoreOS

- Community
Fedora CoreOS

- Getting started
- How to get in touch
  - Discourse: https://discussion.fedoraproject.org/c/server/coreos/5
  - IRC: #fedora-coreos on freenode
  - GitHub: https://github.com/coreos
- Getting Started with Fedora CoreOS - A Hands-on lab
  (Tomorrow)