Fedora CoreOS

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🌐 https://getfedora.org/coreos

\# fedora-coreos on freenode.net

Today's agenda

- What is Fedora CoreOS?

- What are some of the features of Fedora CoreOS?

- How does it relate to RHEL CoreOS?

- How does it relate to OKD?

- Demo: Automatically deployed Matrix homeserver on Fedora CoreOS

- Questions!

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Fedora CoreOS - Emerging Fedora Edition

- Came from the merging of two communities:
  - CoreOS Inc's Container Linux
  - Project Atomic's Atomic Host
- Incorporates Container Linux
  - Philosophy
  - Provisioning Stack
  - Cloud Native Expertise
- Incorporates Atomic Host
  - Fedora Foundation
  - Update Stack
 - SELinux Enhanced Security
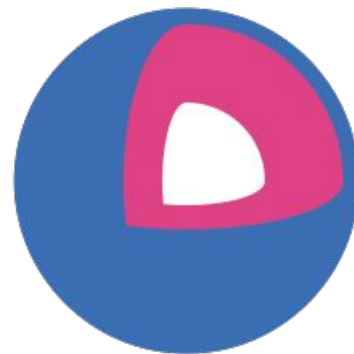
Philosophy behind Container Linux

- Automatic updates
  - no interaction for administrators
  - staying up to date -> security fixes applied
- All nodes start from ~same starting point
  - Use Ignition to provision a node wherever it's started
  - Bare metal and cloud based instances share provisioning
- Immutable infrastructure
  - Need a change? Update configs and re-provision.
- User software runs in containers
 - Host updates are more reliable

Fedora CoreOS Features
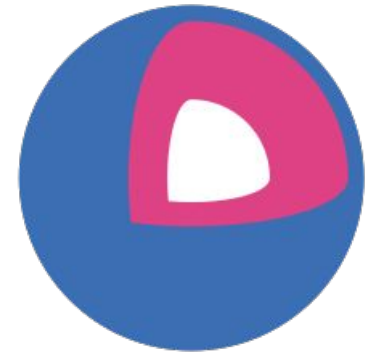
Features: Automatic Updates

- 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
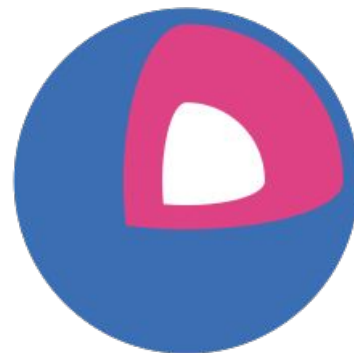
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Multiple Update Streams

- 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

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Fedora CoreOS Release Promotion

Release Nomenclature

31.20200323.3.0

Fedora Release   OS content date   Release Stream   Revision
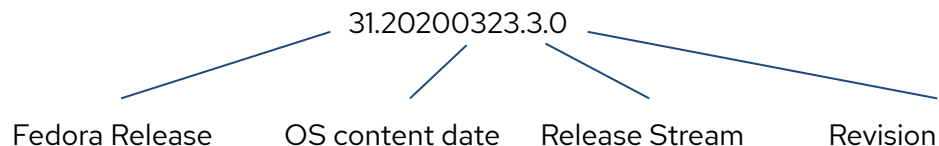
1) OS content is snapped by date
   e.g. 20200323

Fedora rpmdb

2) Releases are promoted to testing & reflect the rpmdb date
   e.g. 31.20200323.2.0
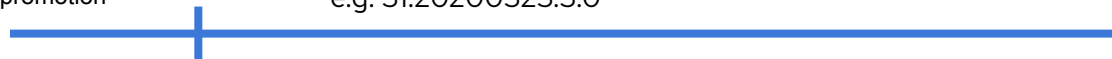
Testing Stream

~2 week promotion

3) Testing is then promoted to stable & shows the same rpmdb date
   e.g. 31.20200323.3.0

Stable Stream

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Features: 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
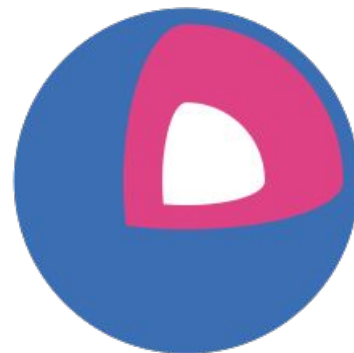
Ignition: Details

Ignition configs
- Declarative JSON documents provided via user data
- Runs exactly once, during the initramfs stage on first boot
- Can write files and systemd units, create users and groups, partition disks, create RAID arrays, format filesystems
- If provisioning fails, the boot fails (no half provisioned systems)
- Ignition configs are machine-friendly (JSON), currently spec v3

Writing Configs
- Fedora CoreOS Config Transpiler to translate to Ignition spec
  - Configs are Human friendly (YAML)
  - Ignition semantics, plus sugar for common operations
  - Transpiler catches common errors at build time

```
{
 "ignition": {
  "config": {},
  "timeouts": {},
  "version": "3.0.0"
 },
 "passwd": {
  "users": [
   {
    "name": "core",
    "passwordHash":
"$6$43y3tkl...",
    "sshAuthorizedKeys": [
     "key1"
    ]
   }
  ]
 },
 "storage": {},
 "systemd": {}
}
```

Features: Cloud Native & Container Focused

- Software runs in containers
    - podman or moby engine container runtimes
- Ready for clustered deployments
    - Spin up 100 nodes and have them join a cluster
        - Ignition configs used to automate cluster join
    - Spin down nodes when no longer needed
    - Spin up nodes again when load increases
- Offered on (or for) a plethora of cloud/virt platforms
    - Alibaba, AWS, Azure, DigitalOcean, Exoscale, GCP, Openstack, Vultr, VMWare, QEMU/KVM

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Features: 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

What's in the OS?

- Latest Fedora base components (built from RPMs)

- Hardware support

- Basic administration tools

- Container engines: podman, moby

- No python

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Coming soon

- More Cloud Platforms

- Multi-arch support (aarch64, ppc64le, s390x)

- More FCCT human friendly helper functions

- Host extensions (more reliable package layering)

- More/improved documentation

- Tighter integrations with OKD

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Fedora CoreOS and RHEL CoreOS

Common tooling & components - different scope and purpose
- RHEL CoreOS is not intended as a standalone OS
  - Based on RHEL package set
  - Component of OpenShift
  - Updates and configuration controlled by cluster operators
- Fedora CoreOS
  - Based on Fedora package set
  - Shares components and tooling with RHEL CoreOS
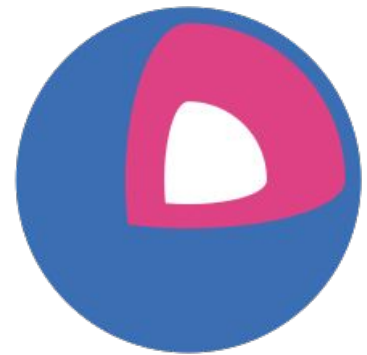 - Standalone OS with auto-updates
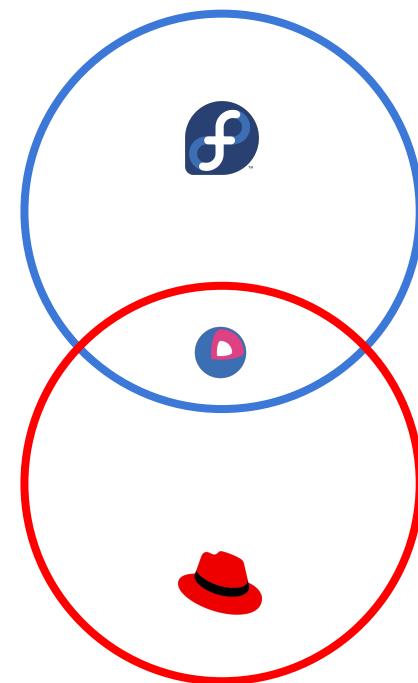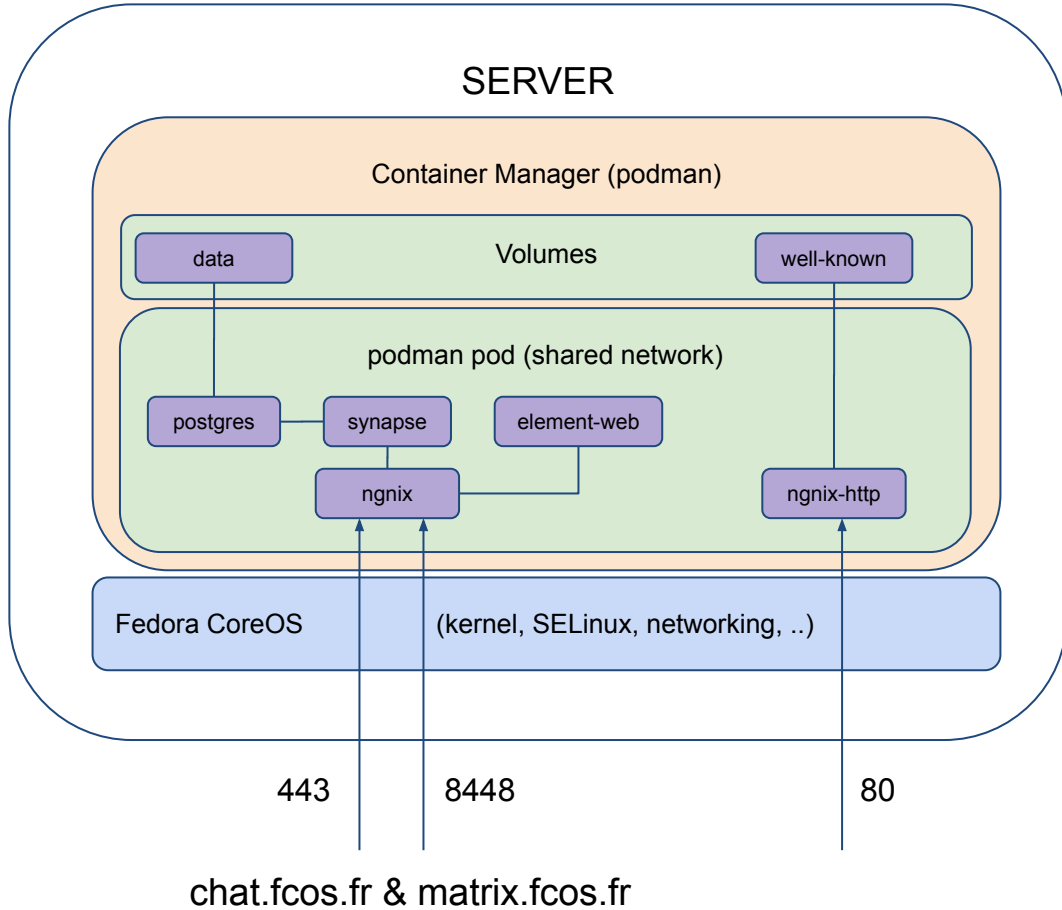
OKD on Fedora CoreOS

- Installable with OKD's installer (openshift-install)

- Cluster controls OS upgrades with machine-config-operator

- Upgrades are provided as machine-os-content containers

  - includes Fedora CoreOS + cluster dependencies

- Cluster can manage and bring up new machines automatically

Get involved!

- Web: https://getfedora.org/coreos

- Issues: https://github.com/coreos/fedora-coreos-tracker/issues

- Forum: https://discussion.fedoraproject.org/c/server/coreos

- Mailing list: coreos@lists.fedoraproject.org

- IRC: freenode #fedora-coreos

- Devconf.cz

  - Up and running with Fedora CoreOS (Friday Feb 19)

  - Getting Started with Fedora CoreOS - A Hands-on lab (Saturday Feb 20)

Demo!

Thank you!