

# Building the Community Enterprise Operating System through CentOS Stream

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# Who we are?

## Davide Cavalca

- Contributor and package maintainer in Fedora and CentOS
- Member of Fedora Asahi SIG
- Member of Fedora Cloud and Fedora Server WGs
- Co-chair of CentOS Hyperscale SIG
- Member of CentOS Alternative Images SIG
- CentOS Board Director
- Production Engineer, Linux Userspace at Meta Platforms, Inc.

## Neal Gompa

- Open Source Advocate
- Contributor and package maintainer in Fedora and CentOS
- Member of Fedora Engineering Steering Committee (FESCO)
- Chair of Fedora Asahi and KDE SIGs
- Member of Fedora Workstation, Fedora Cloud, and Fedora Server WGs
- Co-chair of CentOS Hyperscale SIG
- Member of CentOS Alternative Images SIG
- Member of KDE, e.V.
- Co-host of the Sudo Show podcast
- Principal Consultant at Velocity Limitless

# Agenda

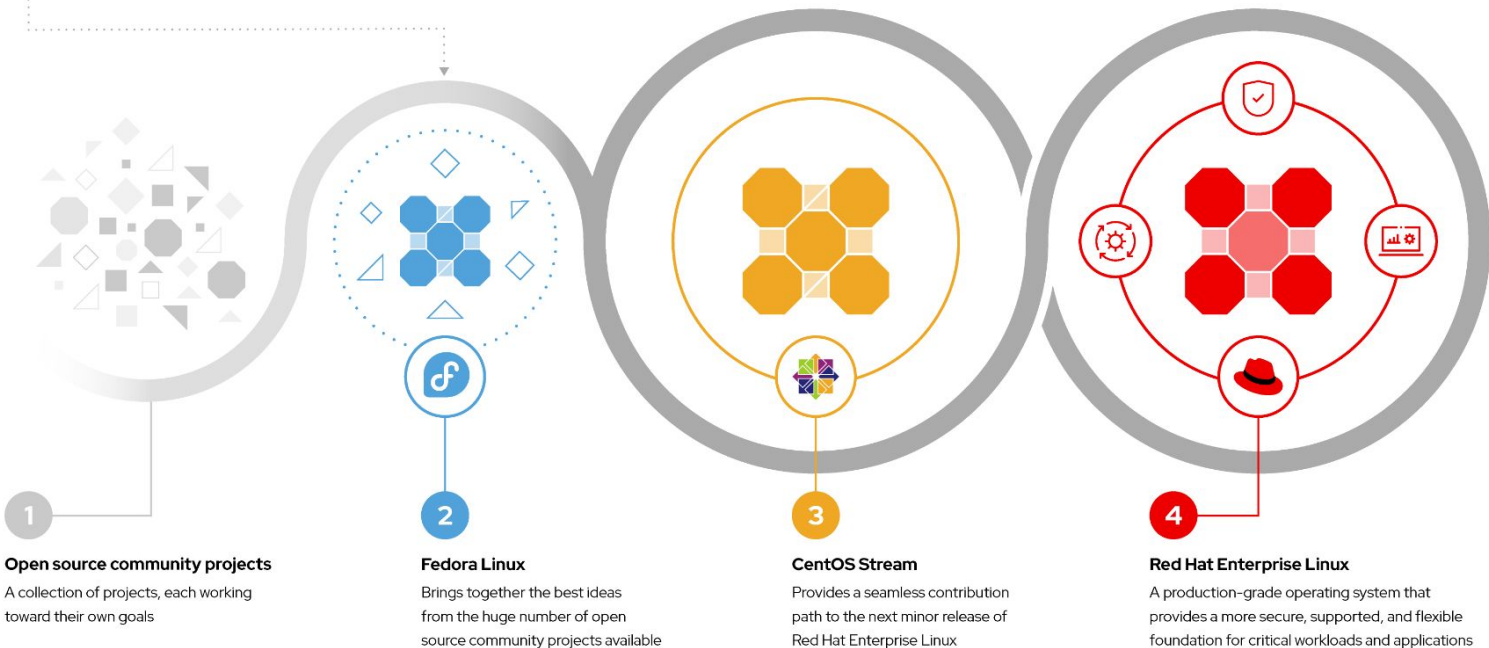
- CentOS Stream
- Hyperscale SIG
- Get involved



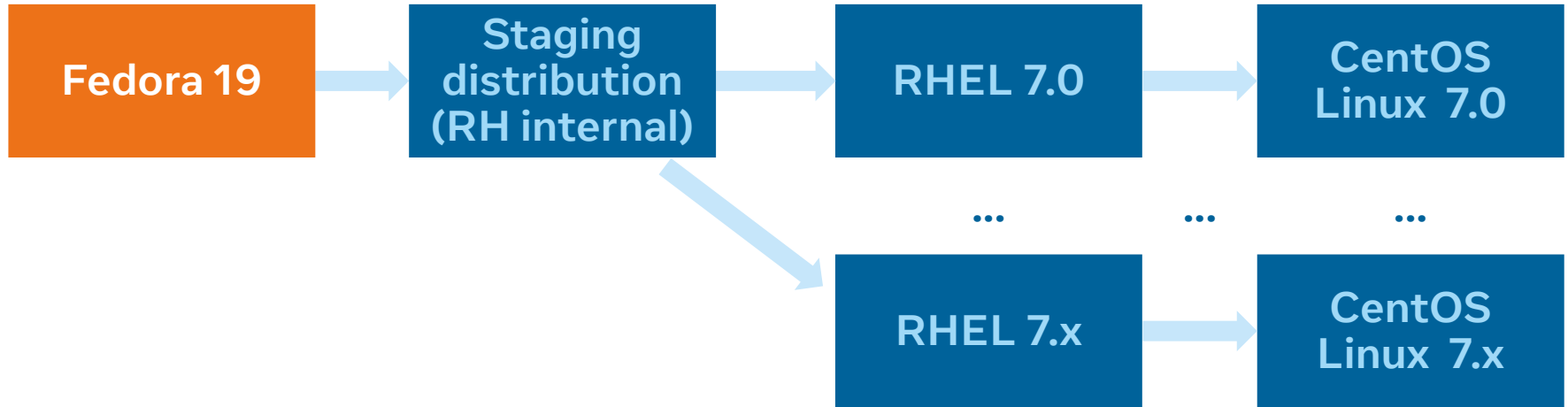
# CentOS Stream



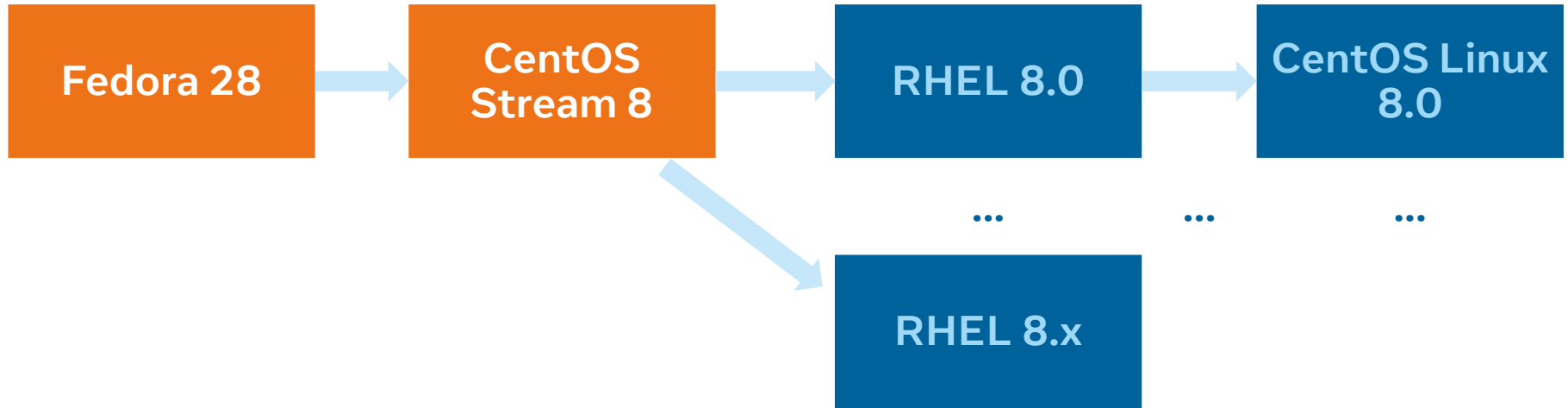
**Contributions** flow among all elements of the ecosystem; however, there is a stronger connection between CentOS Stream and Red Hat® Enterprise Linux®. They each contribute to the other while also ensuring that new code is submitted as far upstream as possible; and, ideally, directly into the relevant open source community projects.



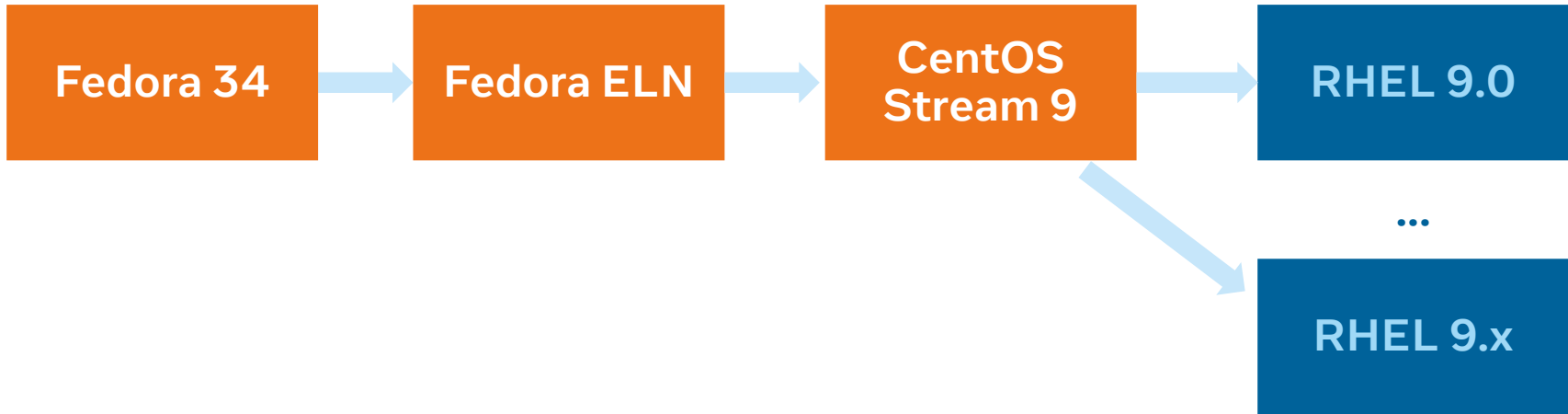
# CentOS Linux 7



# CentOS Linux 8 and CentOS Stream 8



# CentOS Stream 9



# Fedora

- Influences the next CentOS Stream major release
- File and fix bugs, maintain packages, drive Changes, etc.
  - <https://src.fedoraproject.org>
  - <https://fedoraproject.org/wiki/Changes>
- Drive and submit change proposals

# Fedora change proposals

## Completed:

- F33: btrfs by default
- F34: btrfs with zstd compression by default
- F34: systemd-oomd by default
- F35: btrfs by default in Fedora Cloud
- F36: relocate rpmdb to /usr
- F37: GPT for BIOS installs by default
- F37: Fallback hostname
- F38: -fno-omit-frame-pointer by default

## In progress:

- Linux Firmware minimization
- DNF Copy on Write

# Fedora EPEL

- Additional packages for RHEL and CentOS based on Fedora
- <https://fedoraproject.org/wiki/EPEL>
- EPEL Packagers SIG
  - Streamline the process to add packages to EPEL
  - Tooling improvements
  - Collective maintenance
  - <https://fedoraproject.org/wiki/EPEL/Packagers>
- ebranch: <https://pagure.io/epel/ebranch>

# Fedora ELN

- Continuous rebuild of Rawhide with the CentOS macros and toolchain
- Assists in the bringup of the next CentOS Stream major release
- ELN SIG
  - Enablement work to make ELN easier to consume
  - Extending to cover more packages via ELN Extras
  - <https://github.com/fedora-eln>
- Continuous testing and integration pipeline
  - Find and fix bugs long before they even make it into CentOS Stream
  - Identify policy and package changes early on

# CentOS Stream 8

- Continuously delivered distribution tracking the next minor release of RHEL
- File and fix bugs: <https://bugzilla.redhat.com>
  - Product: Red Hat Linux Enterprise 8
  - Version: CentOS Stream
- Follow development and send pull requests
  - <https://git.centos.org>
- Drive change via Special Interest Groups (SIGs)
  - Building blocks of the CentOS community
  - <https://wiki.centos.org/SpecialInterestGroup>

# CentOS Stream 9

- Being developed right now, in the open
- File and fix bugs: <https://bugzilla.redhat.com>
  - Product: Red Hat Linux Enterprise 9
  - Version: CentOS Stream
- Follow development and send merge requests:
  - <https://gitlab.com/redhat/centos-stream>
  - <https://kojihub.stream.centos.org>
- Download and test daily composes:
  - <https://composes.stream.centos.org/production>
- Available on the mirror network
  - <http://mirror.stream.centos.org/9-stream/>

# CentOS Stream 9 feature contributions

- systemd-oomd package and default configuration
- Packaging macros for third-party nginx modules
- PipeWire with WirePlumber and JACK compatibility
- Wayland support for the GNOME Classic session
- SDL2 support for GNOME Wayland
- libva and wayland updates
- ethtool 5.16 rebase

# CentOS Stream 10

- Branched off ELN around Fedora Linux 40
- In active development
  - c10s branches on <https://gitlab.com/redhat/centos-stream>
- Unsigned composes already available
  - <https://composes.stream.centos.org/stream-10/production/>
- Signed composes coming soon!

# Hyperscale SIG

# Hyperscale SIG

- CentOS Stream focus
- Large scale deployments (server, cloud, workstation)
- Foster cross-company collaboration on packaging and tooling
- Bring in-house development out in the open
- Open to anybody interested in working in this space
- SIG website: <https://sigs.centos.org/hyperscale/>
- Bi-weekly Matrix meetings:  
<https://sigs.centos.org/hyperscale/internal/meetings>
- Monthly hackathons / video hangouts
- Meetups!
- [#centos-hyperscale:fedoraproject.org](https://matrix.to/j/centos-hyperscale) on Matrix

# Faster-moving package backports

- Updated backports of distro packages
- Feature enablement, closely tracking upstream development
- Drop in replacements for distro packages
- Stable and targeting production use
- Delivered as a dedicated repository
  - `dnf install centos-release-hyperscale`
- Available packages
  - <https://cbs.centos.org/koji/packages?tagID=2249>
  - dracut, dwarves, grep, less, libvirt, meson, mtr, ninja-build, pykickstart, rasdaemon, systemd, tpm2-tss, tpm2-tools, util-linux, ...
- Work in progress: openssh

# systemd

- Actively maintained systemd backport
- Features: cgroup2, systemd-oomd, systemd-networkd, systemd-resolved, ...
- Tracking latest upstream stable release
  - Staging repo: <https://pagure.io/centos-sig-hyperscale/systemd>
- Based on the Fedora packaging
  - <https://git.centos.org/rpms/systemd/tree/c9s-sig-hyperscale>
- Contbuild on CentOS CI
  - Based on the current Hyperscale packaging
  - Daily rebuilds of the upstream git main for CentOS Stream 8 and CentOS Stream 9
  - <https://gitlab.com/CentOS/Hyperscale/releng/systemd-releng>
- Contribution guide: <https://sigs.centos.org/hyperscale/internal/systemd/>

# Virtualization stack

- Actively maintained backport: libvirt, qemu, libguestfs
- Tracking upstream stable releases
- Refreshed periodically
- Currently in testing

# Intel-optimized packages

- Intel-Zlib backport with SSE2 optimized slide hash function
  - <https://github.com/intel/zlib>
  - Major deflate performance improvement on x86\_64
- Experimental glibc backport with perf improvements and bugfixes
- ABI and API compatible drop-in replacement
- <https://blog.centos.org/2023/05/high-performance-zlib-compression/>
- <https://sigs.centos.org/hyperscale/content/repositories/intel/>

# LLVM 12

- Non-modular LLVM 12 build
- llvm, clang, lld, lldb (+ mesa)
- Modular LLVM 12 eventually landed in CentOS Stream proper...
- ...and later in RHEL 8.5
- [https://bugzilla.redhat.com/show\\_bug.cgi?id=1952248](https://bugzilla.redhat.com/show_bug.cgi?id=1952248)
- <https://reviews.llvm.org/D101972>

# Policy and configuration alternatives

- Modifications of distro packages to enable alternative options
- Meant to be backward compatible and minimize changes
- Example: iptables
  - Only supports nftables in CentOS Linux 8
  - Rebuild to enable the legacy iptables backend as an alternative

# Large-scale testing

- Provide a way to test distro-wide changes in production settings
- Example: DNF/RPM Copy-on-Write
  - <https://fedoraproject.org/wiki/Changes/RPMCoW>
  - Requires patched packaging stack
- Currently deployed in production at FB
- Delivered as a dedicated repository
  - `dnf install centos-release-hyperscale-experimental`

# Kernel

- 6.8 kernel based on the Fedora kernel with a RHEL-ish config
  - Previously 5.14 based derived from the CentOS Stream 9 kernel
- Development tree: <https://gitlab.com/CentOS/Hyperscale/src/kernel-ark>
- Build for CentOS Stream 9
- Btrfs support
- Binderfs support (for Waydroid)
- Secure boot is still outstanding: <https://pagure.io/centos-infra/issue/307>
- Available in the experimental repo

# Kernel collaboration work

- CentOS Stream 9 kernel contributions
  - zstd sync with 5.16 and configuration enablement
  - CONFIG\_CRYPTOLIB\_BLAKE2B
  - Build fixes
- Contribution guide: <https://sigs.centos.org/hyperscale/internal/kernel/>
- kmod-btrfs for CentOS Stream 9
  - Targeting the stock CentOS Stream 9 / RHEL 9 kernel
  - Published by the CentOS Kmods SIG

# Kernel userspace

- Btrfs
  - btrfs-progs backported from Fedora, currently at 6.7
  - compsize 1.5
  - Restored btrfs support in the storage stack and installer
    - Anaconda installer development tree: <https://pagure.io/centos-sig-hyperscale/anaconda>
    - Released to dedicated “spin” repo for media
    - Used for Hyperscale spin media
- kpatch 0.9.8
  - Includes `kpatch-build`
  - Backported clang PGO support and other fixes

# Container image

- Minimal container image based on Hyperscale repos and packages
- <https://quay.io/centoshyperscale/centos>
- Build from scratch and automatically published from OpenShift CI
  - <https://pagure.io/centos-sig-hyperscale/containers-releng>
- CentOS Stream 8

```
podman run -a stdin,stdout,stderr -t quay.io/centoshyperscale/centos:stream8
```

- CentOS Stream 9

```
podman run -a stdin,stdout,stderr -t quay.io/centoshyperscale/centos:stream9
```

# Live media spin

- Two CentOS Stream 9 spins: GNOME and KDE Plasma
  - Building using [kiwi](https://pagure.io/centos-sig-hyperscale/kiwi-descriptions/tree/c9s) with descriptions in CBS:  
<https://pagure.io/centos-sig-hyperscale/kiwi-descriptions/tree/c9s>
  - A product of collaboration with the [Alternative Images SIG](#)
- Live DVD ISO images with Hyperscale repos and packages
- Leveraging our kernel with btrfs support out of the box
- Download: <https://sigs.centos.org/hyperscale/spins/workstation/>
- Report issues: <https://pagure.io/centos-sig-hyperscale/spin-bugs>
- CentOS Stream 8 spins phased out
  - Built using livecd-creator from [livecd-tools](https://pagure.io/centos-sig-hyperscale/spin-kickstarts/tree/c8s) with kickstarts:  
<https://pagure.io/centos-sig-hyperscale/spin-kickstarts/tree/c8s>



Get involved

# Get involved

- Read and contribute to the blog: <https://blog.centos.org>
- Join the mailing list: [devel@lists.centos.org](mailto:devel@lists.centos.org)
- Attend a meeting: <https://www.centos.org/community/calendar>
- Join a SIG: <https://wiki.centos.org/SpecialInterestGroup>
- Report or fix a bug: <https://bugzilla.redhat.com>
- Maintain a package in EPEL: <https://fedoraproject.org/wiki/EPEL/Packagers>
- Contribute to Fedora: <https://fedoramagazine.org/how-to-contribute-to-fedora>
- Related talks: <https://sigs.centos.org/hyperscale/communication/talks/>

Questions?



Thanks!