Building community with CentOS Stream

LISA21

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FACEBOOK Infrastructure
Agenda

CentOS at Facebook

Contributing upstream

Hyperscale SIG

Get involved
CentOS at Facebook
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Why CentOS?

• Stable releases
• Binary compatibility
• Security updates
• Mature and well understood tooling
• EPEL
• Close relationship with Fedora
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FTL - Fast Thin Layer

• Backports from Fedora Rawhide for stuff we care about
• Mostly plumbing and low-level packages
• GitHub: facebookincubator/rpm-backports
• %facebook macro to gate internal stuff
• CentOS + FTL = stable distro, moving fast
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Policy deviations

- Upstream kernel
  - cgroup2 by default
  - btrfs on / by default
- iptables: legacy backend instead of nftables
- networking: network-scripts instead of NetworkManager
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Major OS upgrades

- CentOS Linux 5 -> 6 (~2013-2016)
- CentOS Linux 6 -> 7 (2016-2018)
- CentOS Linux 7 -> CentOS Stream 8 (2018-2021)
- Reprovisioning for OS upgrades
  - Clean slate
  - Deprecated unwanted features
  - Policy changes coupling
- Leverage the general host maintenance window
- Tooling and automation for rollouts
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Minor OS upgrades

• Incremental Rolling OS upgrades
• Every two weeks we sync down the latest updates...
• ...and roll them out over two weeks
• ‘dnf upgrade’ kicked off via Chef
• High level monitoring of rollout health
• Easy stop button and opt out for individual packages
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Can we do better?

• FTL
  - Internal backports are forks
  - No clear path to upstreaming
  - Bug fixes get lost
  - Distro updates have to be manually integrated

• Policy deviations
  - Have to be maintained long-term
  - Can impact bug reports and repros
  - No real feedback loop
Contributing upstream
Contributing upstream

Upstream first

• Community sets the direction
• We move fast; Open Source often moves faster
• We don’t need to write everything ourselves
• Sharing our code means sharing the maintenance and having others extend it
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How

• Show up
• Engage with the community as a peer
• Solve real problems
• Build trust
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CentOS Linux 7

Fedora 19 → Staging distribution (RH internal) → RHEL 7.0 → CentOS Linux 7.0

... → ... → ...

... → RHEL 7.x → CentOS Linux 7.x
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CentOS Linux 8 and CentOS Stream 8

Fedora 28 → CentOS Stream 8 → RHEL 8.0 → CentOS Linux 8.0

... → RHEL 8.x → ...
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CentOS Stream 9

Fedora 34 → Fedora ELN → CentOS Stream 9 → RHEL 9.0

CentOS Stream blog post: https://tinyurl.com/ycn29k2c
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Fedora

- Influences the next CentOS Stream major release
- File and fix bugs, maintain packages, drive Changes, etc.
  - [https://src.fedoraproject.org](https://src.fedoraproject.org)
  - [https://fedoraproject.org/wiki/Changes](https://fedoraproject.org/wiki/Changes)
- Change proposals
  - F33: Btrfs by default
  - F34: Btrfs with zstd compression by default
  - F34: systemd-oomd by default
  - F34 F35: DNF RPM Copy-on-Write
  - F35: Btrfs by default for Fedora Cloud
  - F35: fsverity RPM support
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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
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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-extra
    - https://github.com/fedora-eln
- Continuous testing and integration pipeline
  - Within Facebook: provisioning, Chef, containers
  - Find and fix bugs long before they even make it into CentOS Stream
  - Identify policy and package changes early on
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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
Hyperscale SIG
Hyperscale SIG
What we do

• CentOS Stream focus
• Large scale infrastructure
• 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
• [https://wiki.centos.org/SpecialInterestGroup/Hyperscale](https://wiki.centos.org/SpecialInterestGroup/Hyperscale)
• #centos-hyperscale on Libera.Chat
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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, ...
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systemd

- Actively maintained systemd backport
- Running in production at FB
- 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/c8s-sig-hyperscale
- CI/CD pipeline to build and test daily snapshots
  - Keeps the staging repo in sync
  - Builds and tests dailies for the latest git master
  - https://pagure.io/centos-sig-hyperscale/systemd-releng
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LLVM 12

- Non-modular LLVM 12 build
- llvm, clang, lld, lldb (+ mesa)
- Modular LLVM 12 is slated for CentOS Steam proper
- https://bugzilla.redhat.com/show_bug.cgi?id=1952248
- https://reviews.llvm.org/D101972
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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
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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](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
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Work in progress

- Kernel
  - LTS-tracking upstream kernel
  - Feature enablement: btrfs, cgroup2, BPF
- Btrfs
  - Installer support
  - Userspace enablement
  - Transactional updates
- Container images: https://quay.io/centoshyperscale/centos
- Cloud images
  - https://pagure.io/centos-sig-hyperscale/sig/issues
Get involved
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Participate in the CentOS community

• Read and contribute to the blog: https://blog.centos.org
• Join the mailing list: centos-devel@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
Get involved

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 pull requests:
  - https://gitlab.com/redhat/centos-stream
  - https://kojihub.stream.centos.org
- Download and test daily composes:
  - https://composes.stream.centos.org/test
Thank you!
Resources

Related talks

• Hyperscale SIG update (CentOS Dojo May 2021): https://tinyurl.com/47av47ye
• CentOS Stream on the desktop (CentOS Dojo May 2021): https://tinyurl.com/36h3zf73
• Hyperscale SIG introduction (CentOS Dojo FOSDEM 2021): https://tinyurl.com/2ez2m6hp
• Speeding up DNF and RPM using Copy on Write (CentOS Dojo FOSDEM 2021): https://tinyurl.com/6ub6ct49
• CentOS Stream at Facebook (DevConf.cz 2021): https://tinyurl.com/jbtw6ska
• Upgrading CentOS on the Facebook fleet (DevConf.cz 2020): https://tinyurl.com/3chkmfz5
• systemd @ Facebook in 2019 (All Systems Go 2019): https://tinyurl.com/vm2fxyfv
• Building better FLOSS community relations (DevConf.cz 2017): https://tinyurl.com/y7gx6nro
• Really large scale system configuration (Atmosphere 2014): https://tinyurl.com/bk4pj3u
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