Creating Content Collections for CentOS SIGs

When you need more than just a pile of packages…

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Who am I?

- Open Source Advocate
- Principal Consultant at Velocity Limitless
- Contributor to Fedora, CentOS, openSUSE, and Mageia
  - Member of Fedora Engineering Steering Committee (FESCo)
  - Member of Fedora Workstation, Fedora Cloud, and Fedora Server WGs
  - Chair of Fedora KDE SIG
  - Co-chair of CentOS Hyperscale SIG
  - Member of CentOS Alternative Images SIG
  - Member of the openSUSE Board
  - Member of the openSUSE Heroes (Infrastructure)
  - Member of the Mageia Council and Mageia.org Board
- Contributor to RPM, DNF, KIWI, Koji, Open Build Service, and various other similar projects
- KDE contributor
  - Member of KDE, e.V. and X.Org Foundation
- Co-host of the Sudo Show podcast

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CentOS Special Interest Groups (CentOS SIGs)

CentOS Special Interest Groups

The CentOS Project is organized into two major subdivisions: the Red Hat Enterprise Linux engineering team producing CentOS Stream, and the Special Interest Groups producing content that layers on top of that.

CentOS SIGs operate on the premise that they provide additive value to CentOS Stream.

CentOS
Community Enterprise
Operating System

The layers of a SIG...

CentOS SIGs have their content build in the CentOS Community Build Service (CBS), which is a Koji deployment.

In order for the premise of SIGs providing additive value to CentOS Stream to work, this is implemented by having their build spaces structured such that they are layered on top of the base operating system as "immutable" external repositories.

This does not mean that packages cannot be overridden, but such replacement packages are scoped local to their build spaces.

Information for tag **hyperscale10s-images-experimental-el10s-build**

Name	hyperscale10s-images-experimental-el10s-build
ID	3076
Arches	x86_64 aarch64
Locked	no
Permission	none
Inheritance	hyperscale10s-images-experimental-el10s-build

- buildsys10s-release
- hyperscale10s-images-experimental-candidate
- hyperscale10s-packages-experimental-release
- hyperscale10s-packages-main-release
- hyperscale10s-packages-spin-release
- hyperscale10s-packages-kernel-release
- hyperscale10s-packages-gnome-release
- extras10s-extras-common-release

External repos
- centos10s-baseos [bare]
- centos10s-appstream [bare]
- centos10s-crb [bare]
- epel10 [bare]

Two big problems for SIGs

Content integration is constantly shifting:

- SIG content in CBS Koji can change and publish at any moment based on activity by SIG members.
- Base content pulled in by CBS Koji changes on their own schedule and any two points in time may result in breakage in SIG content without any real method to identify where the drift occurred.

Lack of testable units of content:

- SIG content is not strongly linked to base content it is stacked on, making it difficult to reproduce conditions of failure or success.
- A complete content collection is not available for evaluating reproducibly.

Quick jump to Fedora...

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Fedora and how it differs from CentOS

The Fedora Project has two major deliverables: the Fedora Linux distribution and the Extra Packages for Enterprise Linux (EPEL) repository that layers on various Enterprise Linux distributions (CentOS Stream, AlmaLinux, etc.).

While EPEL more or less behaves like CentOS SIG content and have many of the same issues, the production of the Fedora Linux distribution is different as it's an entirely self-contained content collection.

Fedora content collections ("composes")

Index of /compose/rawhide

Name	Last modified	Size	Description
Parent Directory		-	
Fedora-Rawhide-20250116.n.0/	2025-01-16 05:15	-	
Fedora-Rawhide-20250117.n.0/	2025-01-17 05:15	-	
Fedora-Rawhide-20250118.n.0/	2025-01-18 05:15	-	
Fedora-Rawhide-20250119.n.0/	2025-01-19 05:15	-	
Fedora-Rawhide-20250120.n.0/	2025-01-20 05:15	-	
Fedora-Rawhide-20250121.n.0/	2025-01-21 05:15	-	
Fedora-Rawhide-20250122.n.0/	2025-01-22 05:15	-	
Fedora-Rawhide-20250122.n.1/	2025-01-22 17:31	-	
Fedora-Rawhide-20250122.n.2/	2025-01-22 20:07	-	
Fedora-Rawhide-20250123.n.0/	2025-01-23 05:15	-	
Fedora-Rawhide-20250124.n.0/	2025-01-24 05:15	-	
Fedora-Rawhide-20250125.n.0/	2025-01-25 05:15	-	
Fedora-Rawhide-20250126.n.0/	2025-01-26 05:15	-	
Fedora-Rawhide-20250127.n.0/	2025-01-27 05:15	-	
Fedora-Rawhide-20250128.n.0/	2025-01-28 05:15	-	
Fedora-Rawhide-20250129.n.0/	2025-01-29 05:15	-	
Fedora-Rawhide-20250130.n.0/	2025-01-30 05:15	-	
latest-Fedora-Rawhide/	2025-01-30 05:15	-	

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Fedora OpenQA testing a "compose"

Back to CentOS...

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CentOS Hyperscale and content collections

The CentOS Hyperscale SIG is unusual among CentOS SIGs in that it produces a couple of artifacts:

- Packages in various segmented repositories to enable selective consumption
- Images that leverage SIG repositories and packages from CentOS Stream and EPEL to offer curated experiences to demonstrate what is developed in the SIG

In this respect, CentOS Hyperscale has some of the requirements that Fedora has to raise the quality bar.

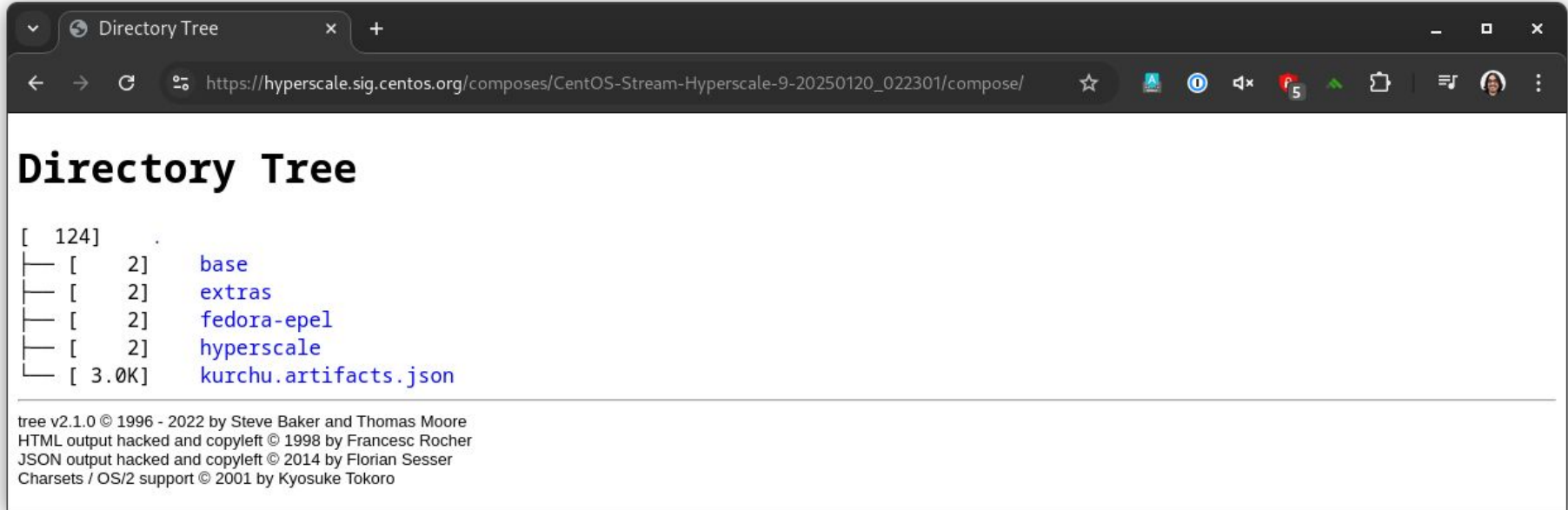Velocity Limitless

CentOS Hyperscale SIG

Introducing Kurchu

Kurchu (కూర్చు) is a tool to assemble Fedora/CentOS resources to create artifact collections.

The goal of Kurchu is to provide a straightforward and declarative way to create artifact collections (which are called "composes") to host and even redistribute. This is in contrast to Pungi, which uses a custom script configuration engine to programmatically define how to construct a compose.

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Hyperscale SIG

```
1   [compose]
2   # compose name defined
3   release_name = "centoshyperscale"
4   release_version = "9"
5   date_format = "%Y%m%d_%H%M%S"
6   compose_id = "CentOS-Stream-Hyperscale-{release_version}-{compose_date}"
7   # For local compose directory
8   destdir = "/mnt/kurchu/composes"
9
10  [compose.gather]
11  # package gather step
12
13  sources = [
14      { name = "hyperscale{release_version}s-packages-main-release", url = "https://cbs.centos.org/kojifiles/repos-dist/{name}/latest/", target = "hyperscale/{release_version}/packages-main", type = "kojidist", sync = true },
15      { name = "hyperscale{release_version}s-packages-experimental-release", url = "https://cbs.centos.org/kojifiles/repos-dist/{name}/latest/", target = "hyperscale/{release_version}/packages-experimental", type = "kojidist", sync = true },
16      { name = "hyperscale{release_version}s-packages-spin-release", url = "https://cbs.centos.org/kojifiles/repos-dist/{name}/latest/", target = "hyperscale/{release_version}/packages-spin", type = "kojidist", sync = true },
17      { name = "hyperscale{release_version}s-packages-facebook-release", url = "https://cbs.centos.org/kojifiles/repos-dist/{name}/latest/", target = "hyperscale/{release_version}/packages-facebook", type = "kojidist", sync = true },
18      { name = "extras{release_version}s-extras-common-release", url = "https://cbs.centos.org/kojifiles/repos-dist/{name}/latest/", target = "extras/{release_version}/common-release", type = "kojidist", sync = true },
19      { name = "CentOS-Stream-{release_version}", url = "https://composes.stream.centos.org/production/latest-CentOS-Stream/", target = "base/{release_version}/", type = "odcs", sync = true },
20      { name = "Fedora-Epel-{release_version}", url = "https://kojipkgs.fedoraproject.org/compose/updates/epel{release_version}/", target = "fedora-epel/{release_version}/base/", type = "bodhi", sync = true },
21      { name = "Fedora-Epel-Next-{release_version}", url = "https://kojipkgs.fedoraproject.org/compose/updates/epel{release_version}-next/", target = "fedora-epel/{release_version}/next/", type = "bodhi", sync = true },
22  ]
23
24  [compose.furnish]
25  # publish step
26  write_compose_info = true
27  upload_targets = [
28      { name = "invalid-centos-compse-bucket-name", target = "/composes", generate_indexhtml = true, public = false, type = "s3" },
29  ]
30
```

A Kurchu TOML configuration file for creating a CentOS Stream Hyperscale 9 "compose"

A CentOS Stream Hyperscale 9 "compose" made by Kurchu (dated January 20, 2025 @ 2:23:01 UTC)

Kurchu output artifacts JSON

```
▼ compose:
    compose_date:          "20250120_022301"
    compose_id:            "CentOS-Stream-Hyperscale-9-20250120_022301"
  ▼ furnish:
      write_compose_info:  true
  ▼ gather:
    ▼ sources:
      ▼ 0:
          name:            "hyperscale9s-packages-main-release"
          sync:            true
          target:          "hyperscale/9/packages-main"
          type:            "kojidist"
        ▼ url:             "https://cbs.centos.org/kojifiles/repos-dist/hyperscale9s-packages-main-release/1307402/"
      ▼ 1:
          name:            "hyperscale9s-packages-experimental-release"
          sync:            true
          target:          "hyperscale/9/packages-experimental"
          type:            "kojidist"
        ▼ url:             "https://cbs.centos.org/kojifiles/repos-dist/hyperscale9s-packages-experimental-release/1306104/"
      ▼ 2:
          name:            "hyperscale9s-packages-spin-release"
          sync:            true
          target:          "hyperscale/9/packages-spin"
          type:            "kojidist"
        ▼ url:             "https://cbs.centos.org/kojifiles/repos-dist/hyperscale9s-packages-spin-release/1194085/"
      ▼ 3:
          name:            "hyperscale9s-packages-facebook-release"
          sync:            true
          target:          "hyperscale/9/packages-facebook"
          type:            "kojidist"
        ▼ url:             "https://cbs.centos.org/kojifiles/repos-dist/hyperscale9s-packages-facebook-release/1308880/"
      ▼ 4:
          name:            "extras9s-extras-common-release"
          sync:            true
          target:          "extras/9/common-release"
          type:            "kojidist"
        ▼ url:             "https://cbs.centos.org/kojifiles/repos-dist/extras9s-extras-common-release/1305991/"
      ▼ 5:
          name:            "CentOS-Stream-9"
          sync:            true
          target:          "base/9/"
          type:            "odcs"
        ▼ url:             "https://composes.stream.centos.org/production/CentOS-Stream-9-20250117.0/"
      ▼ 6:
          name:            "Fedora-Epel-9"
          sync:            true
          target:          "fedora-epel/9/base/"
          type:            "bodhi"
        ▼ url:             "https://kojipkgs.fedoraproject.org/compose/updates/Fedora-Epel-9-updates-20250120.0/"
      ▼ 7:
          name:            "Fedora-Epel-Next-9"
          sync:            true
          target:          "fedora-epel/9/next/"
          type:            "bodhi"
        ▼ url:             "https://kojipkgs.fedoraproject.org/compose/updates/Fedora-Epel-Next-9-updates-20241225.0/"
    release_name:          "centoshyperscale"
    release_version:       "9"
```

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CentOS Hyperscale SIG

Current state of Kurchu and release plans

Kurchu development is sponsored by Meta and aligned with the development of the initial release of CentOS Stream Hyperscale 10.

At this time, Kurchu can:

- Gather content collections with knowledge of Pungi, Bodhi, ODCS, and YUM repositories
- Furnish the gathered content into a single published compose unit
- Produce JSON metadata of the produced content for other tools to use to consume the compose.

The remaining step to implement for the initial release of Kurchu is the ability to direct the creation of images to include in the compose unit.

The hyperscale.sig.centos.org site where the composes live will launch alongside the release of the Kurchu software.

This will feed into efforts to set up OpenQA testing by using these compose units as the test input, similar to how Fedora does it.

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Questions?

www.velocitylimitless.com