

# From Manul to Kitten:

4 years of **AlmaLinux** development evolution

Andrew Lukoshko  
AlmaLinux OS Lead Architect  
FOSDEM 2025



## Andrew Lukoshko

- 23 years of Linux experience
- 13 years of building RHEL based products
- 5 years in HPC
- 5 years in Enterprise
- 5 years in Cloud Provider

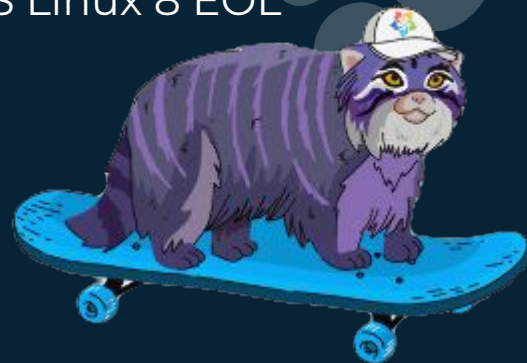
AlmaLinux OS Lead Architect from Day 1

🎉 On Feb 01, 2025, we celebrated 4 years since the release of the very first public release of AlmaLinux, **8.3 beta**, codenamed

# Purple Manul

## So this is how we started:

- Release took 55 days since Red Hat announced CentOS Linux 8 EOL
- Only 1 architecture was available - x86\_64 (Intel/AMD)
- Exact RHEL clone
- No Secure Boot support
- No mirrors
- No Errata or OpenSCAP support (CentOS Linux never had them either)



# Agenda

1. AlmaLinux Build System - our way to build RPM packages for 7 architectures
2. How we maintain dozens of images in easy and transparent way
3. How we unlocked major version upgrades in EL ecosystem
4. Why we decided to stop being RHEL clone
5. How we bring back support for 140+ devices disabled upstream
6. How we decided to support older CPUs than upstream does
7. Future of AlmaLinux

# AlmaLinux Build System

The screenshot displays the AlmaLinux Build System web interface. The browser address bar shows `build.almalinux.org`. On the left is a sidebar with navigation links: Administration, Feed, New build, Errata, Releases, Products, Teams, Test repositories, and Logout. The main content area shows details for **Build 25916**, created by [soksanichenko](#) at 1/29/2025, 3:23:58 PM. Below this is a table with tabs for different build components. The 'Summary' tab is active, showing the package `libsoup` with a link to `# imports/c9/libsou...`. A 'Released' status is indicated with a green cloud icon. A 'Sign' button with a lock icon is also present. At the bottom right is a blue button labeled 'OTHER ACTIONS' with a triangle icon.

	AlmaLinux-9.src	AlmaLinux-9.aarch64	AlmaLinux-9.i686	AlmaLinux-9.ppc64le	AlmaLinux-9.s390x	AlmaLinux-9.x86_64
libsoup <a href="#">key</a> <a href="#"># imports/c9/libsou...</a>	●	●	●	●	●	●

# Build system components

## AlmaLinux Build System core components:

1. Web-Server - <https://github.com/AlmaLinux/albs-web-server>
2. Frontend - <https://github.com/AlmaLinux/albs-frontend>
3. Build Node - <https://github.com/AlmaLinux/albs-node>
4. Sign Node - <https://github.com/AlmaLinux/albs-sign-node>
5. Sign File - <https://github.com/AlmaLinux/albs-sign-file>



FastAPI



# What is Pulp?

Pulp is an open-source platform designed to manage repositories of software packages and to distribute content across large numbers of systems. It allows users to fetch software from various sources, organize it into repositories, and then make it available to a wide range of consumers. Pulp supports a variety of content types, including RPMs, Python packages, and more, through its plugin architecture.

Used by Red Hat Satellite/Katello and Fedora COPR.

And by AlmaLinux Build System.



# Why own build system?

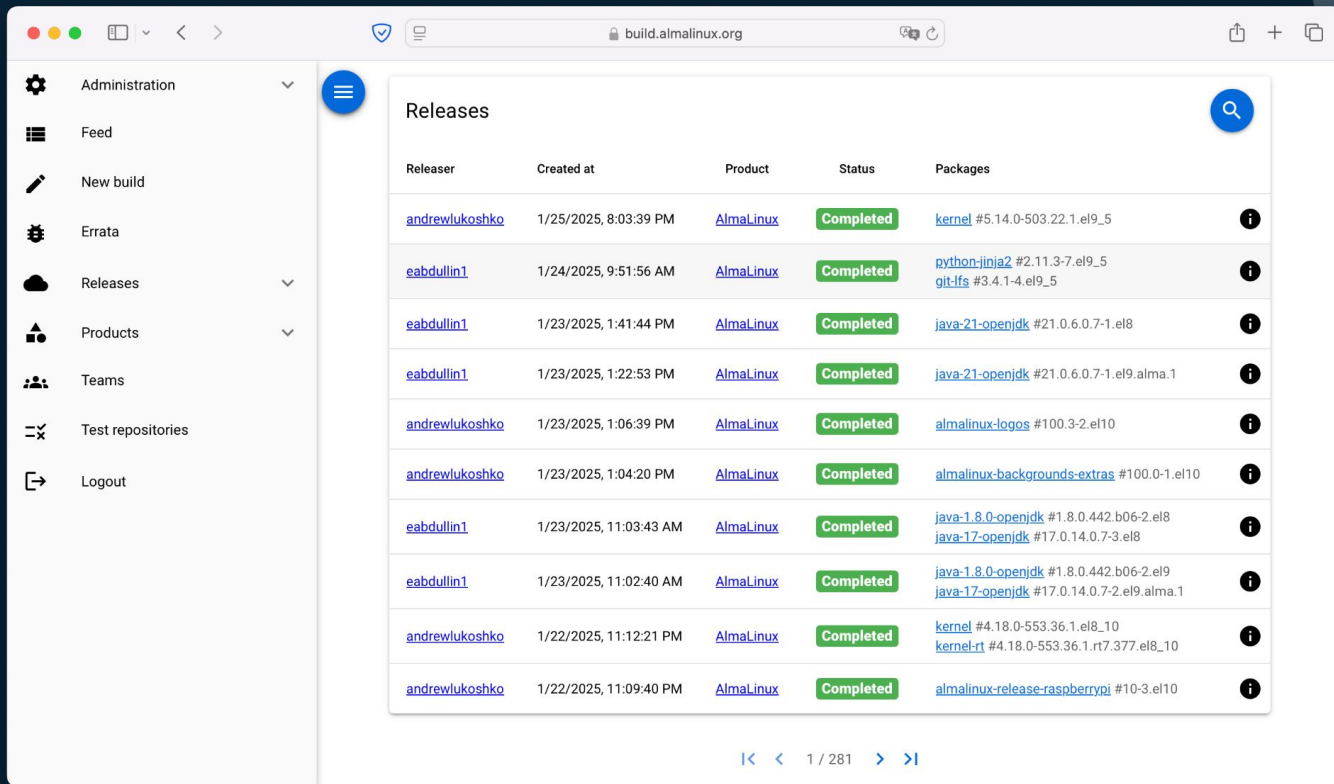
Build System SIG members have 10+ years of experience in developing build system, so we just have own vision how we should do that.

**AlmaLinux Build System** can:

- Build RPM packages from any git repository or direct src.rpm URL for 7 architectures: x86\_64, x86\_64\_v2, i686, aarch64, ppc64le, s390x, riscv64.
- Build DNF modules (necessary for AlmaLinux 8 and 9)
- Sign bootloader and kernel packages for Secure Boot (Intel and ARM)
- Release RPMs to internal Pulp repos and export them to filesystem
- Collect security advisories from Red Hat's public sources
- Create our own advisories (sometimes we fix CVEs too fast 😊)



# How we release updates



The screenshot shows the 'Releases' page on the build.almalinux.org website. The left sidebar contains navigation links: Administration, Feed, New build, Errata, Releases, Products, Teams, Test repositories, and Logout. The main content area displays a table of releases with columns for Releaser, Created at, Product, Status, and Packages. The table lists 12 releases, all with a 'Completed' status. The packages listed include kernel, python-jinja2, git-lfs, java-21-openjdk, almalinux-logos, almalinux-backgrounds-extras, java-1.8.0-openjdk, java-17-openjdk, and almalinux-release-raspberrypi. A search icon is visible in the top right corner of the table area.

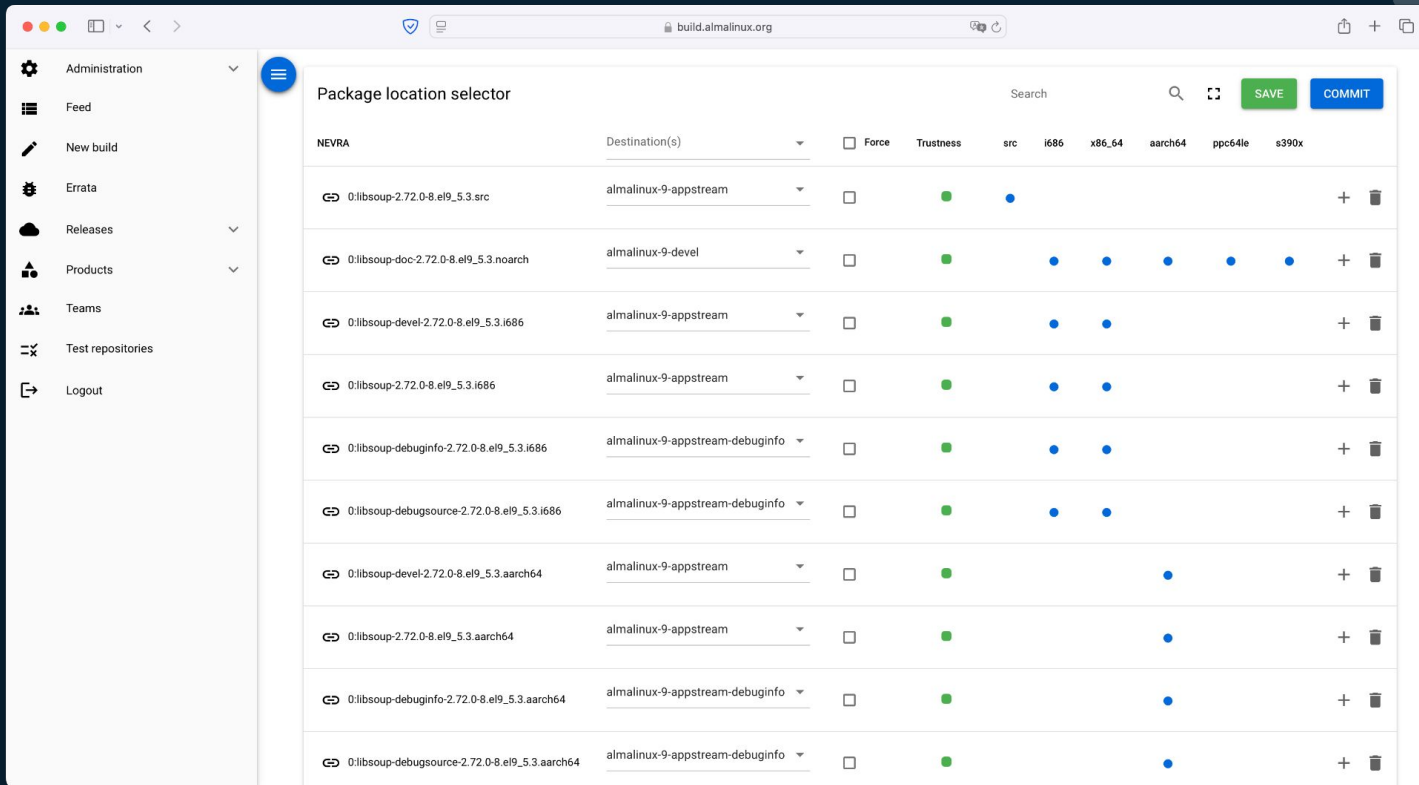
Releaser	Created at	Product	Status	Packages
<a href="#">andrewlukoshko</a>	1/25/2025, 8:03:39 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">kernel</a> #5.14.0-503.22.1.el9_5
<a href="#">eabdullin1</a>	1/24/2025, 9:51:56 AM	<a href="#">AlmaLinux</a>	Completed	<a href="#">python-jinja2</a> #2.11.3-7.el9_5 <a href="#">git-lfs</a> #3.4.1-4.el9_5
<a href="#">eabdullin1</a>	1/23/2025, 1:41:44 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">java-21-openjdk</a> #21.0.6.0.7-1.el8
<a href="#">eabdullin1</a>	1/23/2025, 1:22:53 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">java-21-openjdk</a> #21.0.6.0.7-1.el9.alma.1
<a href="#">andrewlukoshko</a>	1/23/2025, 1:06:39 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">almalinux-logos</a> #100.3-2.el10
<a href="#">andrewlukoshko</a>	1/23/2025, 1:04:20 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">almalinux-backgrounds-extras</a> #100.0-1.el10
<a href="#">eabdullin1</a>	1/23/2025, 11:03:43 AM	<a href="#">AlmaLinux</a>	Completed	<a href="#">java-1.8.0-openjdk</a> #1.8.0.442.b06-2.el8 <a href="#">java-17-openjdk</a> #17.0.14.0.7-3.el8
<a href="#">eabdullin1</a>	1/23/2025, 11:02:40 AM	<a href="#">AlmaLinux</a>	Completed	<a href="#">java-1.8.0-openjdk</a> #1.8.0.442.b06-2.el9 <a href="#">java-17-openjdk</a> #17.0.14.0.7-2.el9.alma.1
<a href="#">andrewlukoshko</a>	1/22/2025, 11:12:21 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">kernel</a> #4.18.0-553.36.1.el8_10 <a href="#">kernel-rt</a> #4.18.0-553.36.1.rt.377.el8_10
<a href="#">andrewlukoshko</a>	1/22/2025, 11:09:40 PM	<a href="#">AlmaLinux</a>	Completed	<a href="#">almalinux-release-raspberrypi</a> #10-3.el10



We don't have to regenerate repositories  
after every package update



# How we release updates



The screenshot shows the Pulp Package location selector interface. The left sidebar contains navigation links: Administration, Feed, New build, Errata, Releases, Products, Teams, Test repositories, and Logout. The main area is titled "Package location selector" and includes a search bar and "SAVE" and "COMMIT" buttons. Below the title is a table with columns: NEVRA, Destination(s), Force, Trustness, src, i686, x86\_64, aarch64, ppc64le, s390x. The table lists various packages and their destinations, with checkboxes for Force and Trustness, and buttons for adding and deleting entries.

NEVRA	Destination(s)	Force	Trustness	src	i686	x86_64	aarch64	ppc64le	s390x
0:libsoup-2.72.0-8.el9_5.3.src	almalinux-9-appstream	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					
0:libsoup-doc-2.72.0-8.el9_5.3.noarch	almalinux-9-devel	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
0:libsoup-devel-2.72.0-8.el9_5.3.i686	almalinux-9-appstream	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
0:libsoup-2.72.0-8.el9_5.3.i686	almalinux-9-appstream	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
0:libsoup-debuginfo-2.72.0-8.el9_5.3.i686	almalinux-9-appstream-debuginfo	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
0:libsoup-debugsource-2.72.0-8.el9_5.3.i686	almalinux-9-appstream-debuginfo	<input type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
0:libsoup-devel-2.72.0-8.el9_5.3.aarch64	almalinux-9-appstream	<input type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		
0:libsoup-2.72.0-8.el9_5.3.aarch64	almalinux-9-appstream	<input type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		
0:libsoup-debuginfo-2.72.0-8.el9_5.3.aarch64	almalinux-9-appstream-debuginfo	<input type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		
0:libsoup-debugsource-2.72.0-8.el9_5.3.aarch64	almalinux-9-appstream-debuginfo	<input type="checkbox"/>	<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>		



Packages are released to repos according to their current placement in AlmaLinux and CentOS Stream

# How we produce errata



Red Hat Security Data is publicly available under Creative Commons Attribution 4.0 International License

Data is available in several ways:

- Security Data API
- OVAL feed (deprecated)
- CSAF/VEX documents
- RSS feed

Data contains:

- Advisory id (RHSA-YYYY-NNNN)
- Description
- CVE and Red Hat bugzilla references
- Package names and versions

# How we produce errata

The screenshot displays the build.almalinux.org web interface. On the left is a sidebar with navigation links: Administration, Feed, New build, Errata, Releases, Products, Teams, Test repositories, and Logout. The main content area is divided into two panels. The left panel shows a search interface with filters for Platform and Status, and input fields for Advisory ID and CVE ID. Below this is a table of advisories. The right panel shows the details for a specific advisory, including the Bulletin title, Description, Security Fix(es), and a list of affected packages with their status.

**Administration**

- Administration
- Feed
- New build
- Errata
- Releases
- Products
- Teams
- Test repositories
- Logout

**Platform** **Status**

Advisory ID  CVE ID

Bulletin title

**Advisory**

<input type="checkbox"/> ID	Status	Updated date	Platform	Bulletin title
<input type="checkbox"/> ALSA-2025:07	<span style="color: green;">●</span>	January 29, 2025	AlmaLinux-9	Important: libsoup security update
<input type="checkbox"/> ALSA-2025:0746	<span style="color: green;">●</span>	January 28, 2025	AlmaLinux-8	Important: gimp:2.8 security update
<input type="checkbox"/> ALSA-2025:0743	<span style="color: green;">●</span>	January 28, 2025	AlmaLinux-8	Moderate: keepalived security update
<input type="checkbox"/> ALSA-2025:0739	<span style="color: green;">●</span>	January 28, 2025	AlmaLinux-8	Moderate: mariadb:10.5 security update
<input type="checkbox"/> ALSA-2025:0737	<span style="color: green;">●</span>	January 28, 2025	AlmaLinux-8	Moderate: mariadb:10.11 security update

**Bulletin title**  
Important: libsoup security update

**Description**  
The libsoup packages provide an HTTP client and server library for GNOME.

**Security Fix(es):**  
\* libsoup: buffer overflow via UTF-8 conversion in soup\_header\_parse\_param\_list\_strict (CVE-2024-52531)

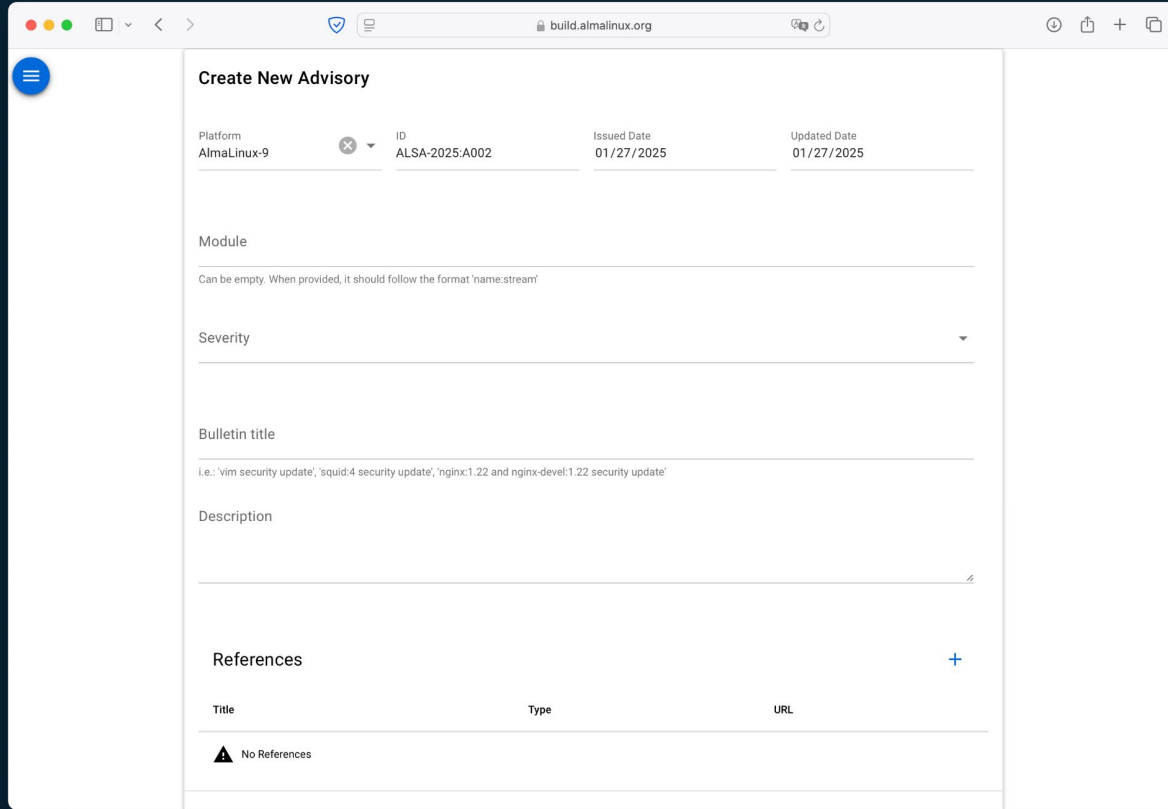
For more details about the security issue(s), including the impact, a CVSS score, acknowledgments, and other related information, refer to the CVE page(s) listed in the References section.

**Patch info** **Packages** **Latest release log**

<input type="checkbox"/> RHEL	Alma	Status
<input type="checkbox"/> 0:libsoup-2.72.0-8.el9_5.3	libsoup	<span style="color: green;">Released</span>

**libsoup**

# How we produce errata

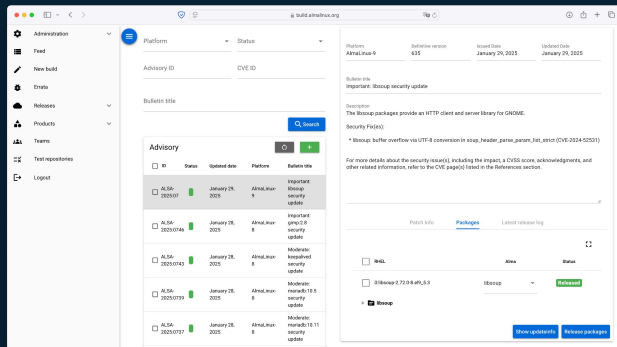


The screenshot shows a web browser window with the address bar displaying 'build.almalinux.org'. The page title is 'Create New Advisory'. The form contains several fields:

- Platform:** A dropdown menu with 'AlmaLinux-9' selected.
- ID:** A text field containing 'ALSA-2025:A002'.
- Issued Date:** A text field containing '01/27/2025'.
- Updated Date:** A text field containing '01/27/2025'.
- Module:** A text field with a placeholder text: 'Can be empty. When provided, it should follow the format 'name:stream''.
- Severity:** A dropdown menu.
- Bulletin title:** A text field with a placeholder text: 'i.e.: 'vim security update', 'squid:4 security update', 'nginx:1.22 and nginx-devel:1.22 security update''.
- Description:** A large text area.
- References:** A section with a table header and a message indicating no references are present.

Title	Type	URL
No References		

# How we produce errata



Errata website

Mailing list

RSS feed

JSON feed

OVAL feed

updateinfo.xml

OSV database

# How we build images



## ISO Images

AlmaLinux supports 4 architectures:

- x86\_64
- aarch64
- ppc64le
- s390x

[Download ISO from mirrors](#)



## Cloud Images

AlmaLinux provides official images for cloud providers:

[Amazon AWS](#)  
[Generic Cloud](#)  
[Google Cloud](#)  
[Microsoft Azure](#)  
[OpenNebula](#)  
[Oracle Cloud Infrastructure](#)



## Container Images

AlmaLinux provides official OCI, Docker and UBI compatible images.

[Get Docker Image](#)  
[Get OCI Image from Quay.io](#)  
[Get OCI Image from GitHub](#)



## Live Media

AlmaLinux builds Live Media images for GNOME, GNOME Mini, KDE, XFCE and MATE options.

[Get Live Media Image](#)



## Vagrant Boxes

AlmaLinux provides official images for Vagrant:

- Libvirt
- VirtualBox
- Hyper-V
- VMWare
- Parallels

[Get AlmaLinux on HCP Vagrant Registry](#)



## Incus and LXC

AlmaLinux images are available for Incus and LXC.

[Get Incus and LXC Images](#)



## Raspberry Pi

AlmaLinux builds Raspberry Pi images, and also with GNOME desktop environment.

[Get Raspberry Pi Image](#)



## WSL

Run the AlmaLinux terminal environment on Windows.

[Get AlmaLinux for WSL](#)

# How we build images

ISO images:

**Pungi** tool is patched to build ISO images and repos without koji:

<https://git.almalinux.org/almalinux/pungi>

(this requires to have a local mirror of AlmaLinux repos we're building from)

Configuration files:

<https://git.almalinux.org/almalinux/pungi-almalinux>

Guide:

<https://wiki.almalinux.org/development/building-almalinux-iso-locally>





# How we build images

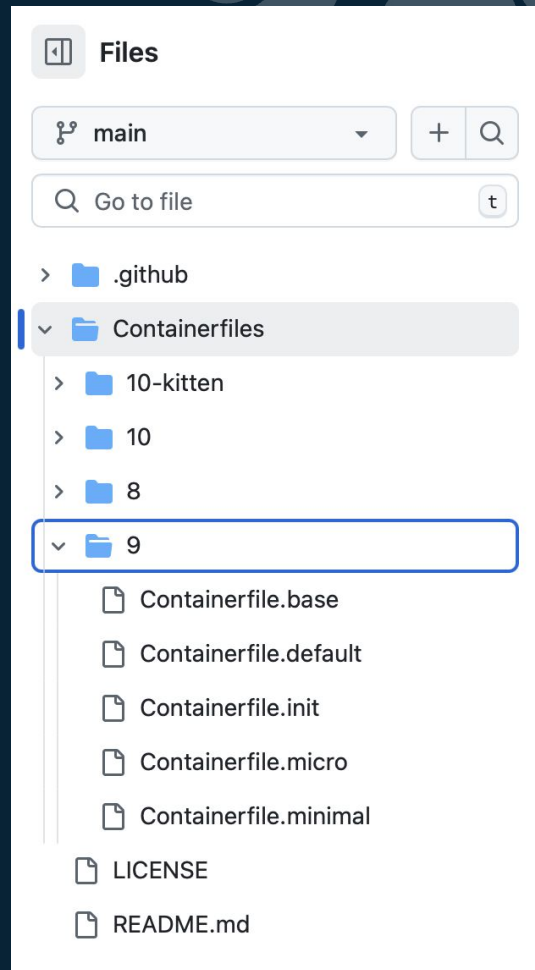
## Container images:

### GitHub repo:

<https://github.com/AlmaLinux/container-images>

### GitHub Actions pipeline is used to:

- Build containers for all supported architectures:
  - x86\_64
  - aarch64
  - ppc64le
  - s390x
- Push to Docker Hub, Quay.io, GitHub Packages
- Create PR to Docker Hub Official Library



# How we build images

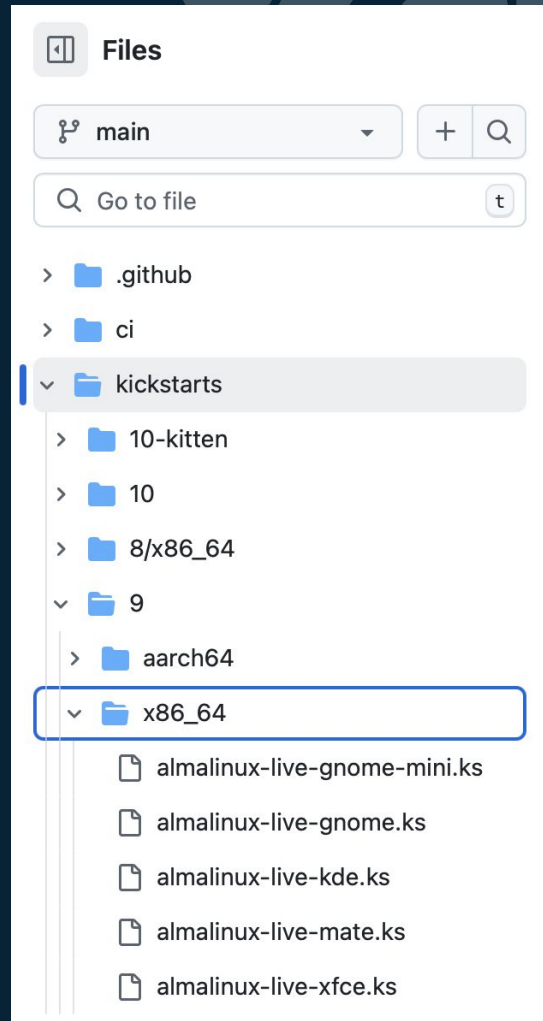
Live Media images:

**GitHub repo:**

<https://github.com/AlmaLinux/sig-livemedia>

**GitHub Actions pipeline is used to:**

- Run AlmaLinux vagrant box
- Build for x86\_64 and aarch64 with livemedia-creator
- Upload ISOs and logs to Amazon S3 bucket
- Notify in SIG/LiveMedia chat channel



# How we build images

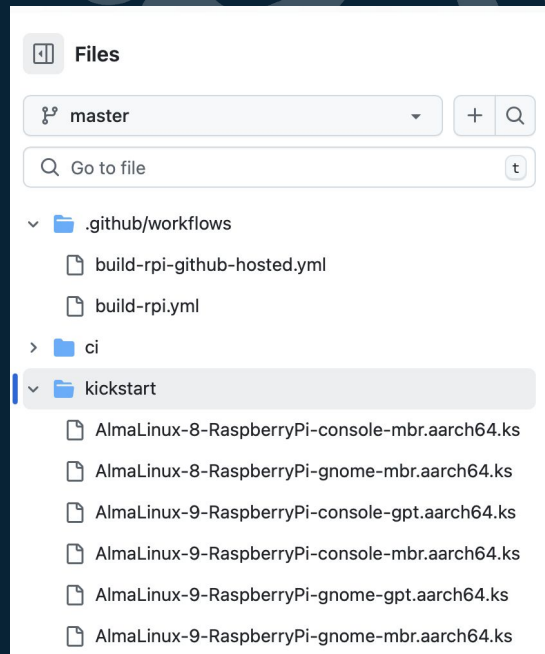
Raspberry Pi images:

**GitHub repo:**

<https://github.com/AlmaLinux/raspberry-pi>

**GitHub Actions pipeline is used to:**

- Run AlmaLinux aarch64 container
- Build images with appliance-creator
- Upload images and logs to Amazon S3 bucket
- Notify in SIG/AltArch chat channel



# How we build images

Cloud and Vagrant images:

**GitHub repo:**

















<https://github.com/AlmaLinux/cloud-images>

**We use Packer + Ansible to produce images for:**

- OpenStack
- OpenNebula
- Azure
- AWS
- Oracle OCI
- Vagrant



You can contribute in automation!

 almalinux-8-azure.pkr.hcl
 almalinux-8-digitalocean.pkr.hcl
 almalinux-8-gencloud.pkr.hcl
 almalinux-8-oci.pkr.hcl
 almalinux-8-opennebula.pkr.hcl
 almalinux-8-vagrant.pkr.hcl
 almalinux-9-azure.pkr.hcl
 almalinux-9-digitalocean.pkr.hcl
 almalinux-9-gencloud.pkr.hcl
 almalinux-9-oci.pkr.hcl
 almalinux-9-opennebula.pkr.hcl
 almalinux-9-vagrant.pkr.hcl
 almalinux_8_ami.pkr.hcl
 almalinux_8_gencloud_s390x.xml.tmpl
 almalinux_9_ami.pkr.hcl
 almalinux_9_gencloud_s390x.xml.tmpl

# How to switch to AlmaLinux

We started our project with CentOS Linux 8 EOL in mind, so one of the first tools we developed was **almalinux-deploy**, a tool for online migration of already existing systems to AlmaLinux.

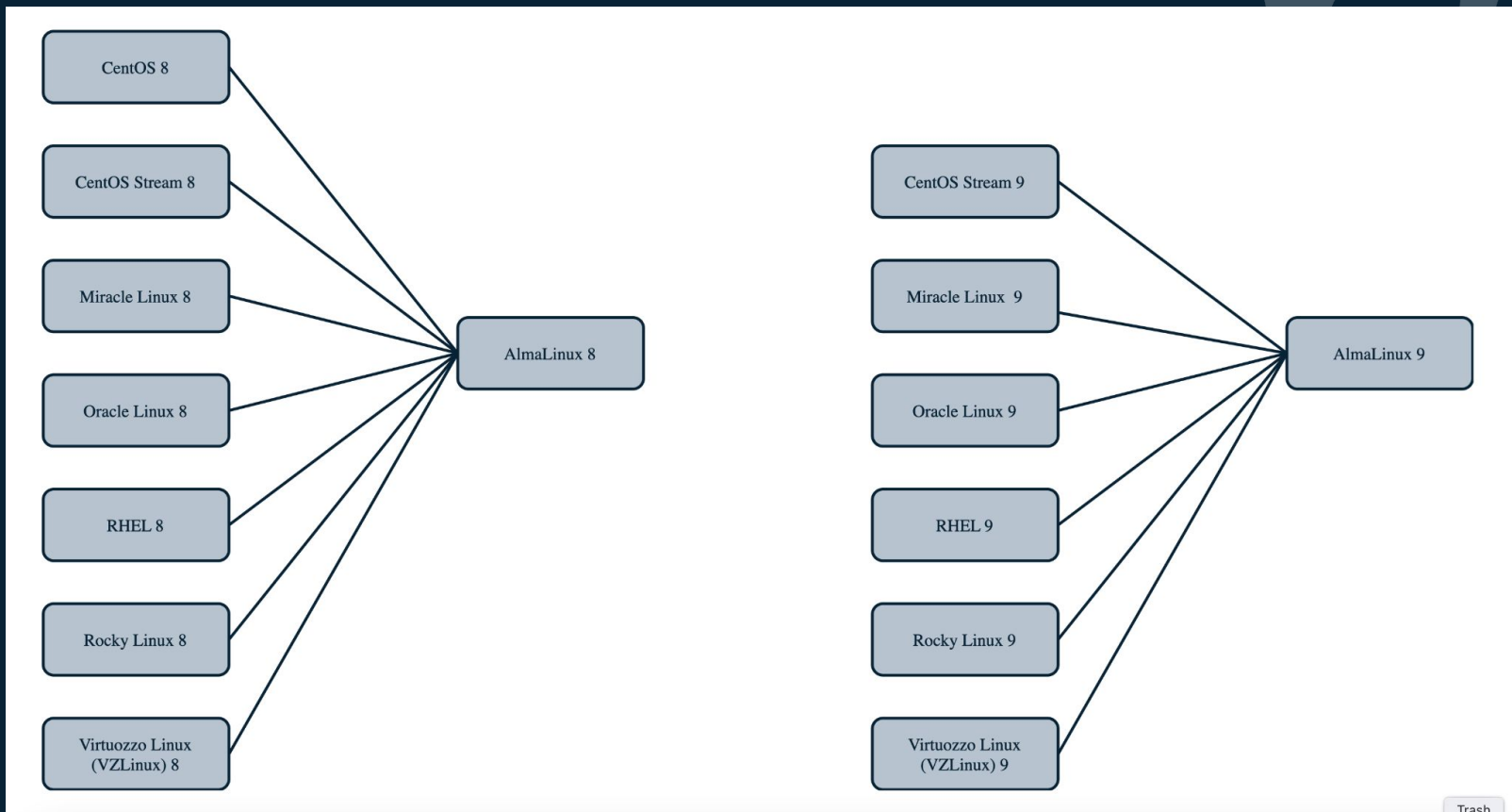
GitHub Repository:

<https://github.com/AlmaLinux/almalinux-deploy>

Migration guide:

<https://wiki.almalinux.org/documentation/migration-guide.html>

# How to switch to AlmaLinux



# How we unlocked major version upgrades in EL ecosystem

In 2021 we started the ELevate project:

<https://almalinux.org/elevate/>

It unlocks upgrades to next major versions which is unsupported in RHEL derivatives, and has become especially popular after CentOS Linux 7 EOL.

Based on Red Hat's Leapp framework:

<https://github.com/oamg/leapp>

<https://github.com/oamg/leapp-repository>

ELevate is developed in a distribution agnostic way and is built as a tool for the whole ecosystem, not just AlmaLinux!

# How we unlocked major version upgrades in EL ecosystem

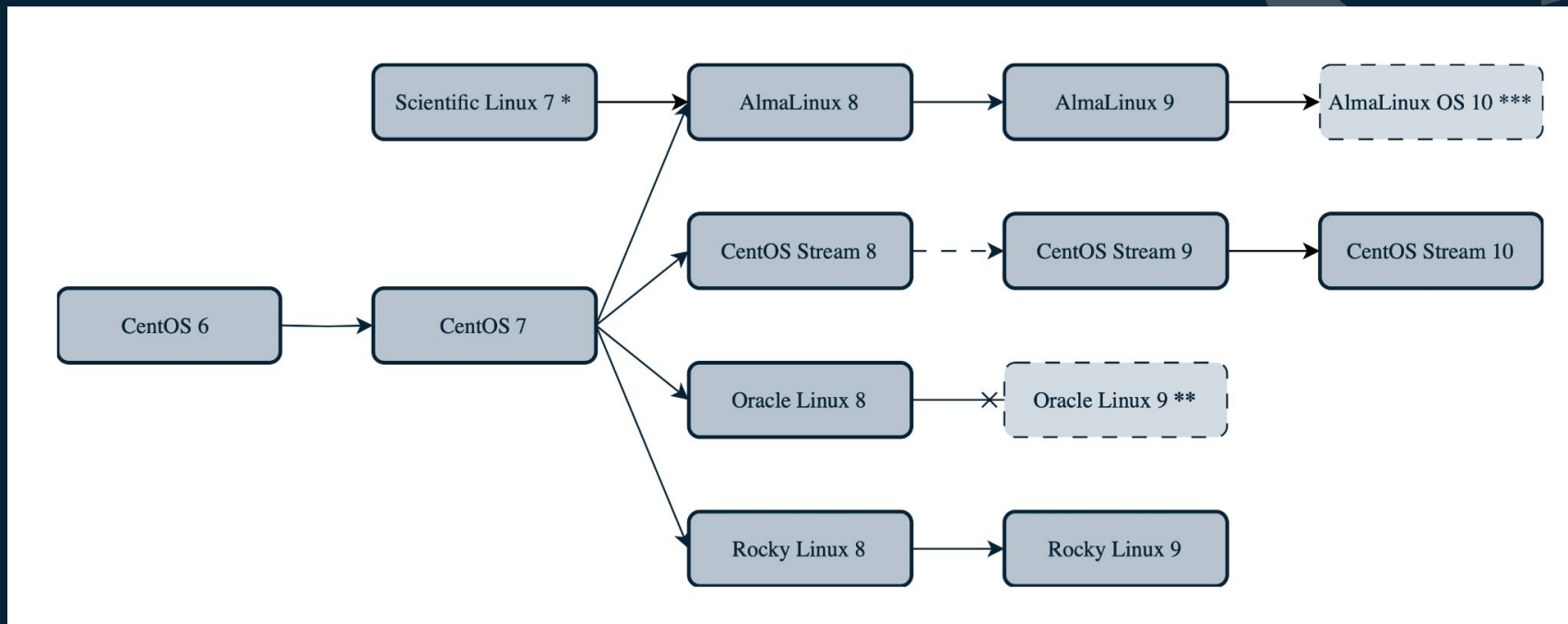
We maintain soft fork of <https://github.com/oamg/leapp-repository> repo to add the following features:

- Support for non-RHEL distributions
- Support for popular 3rd party repositories like:
  - EPEL (!)
  - Docker CE
  - MariaDB
  - Microsoft Linux Package Repositories
  - nginx
  - PostgreSQL
  - Imunify
  - KernelCare



# How we unlocked major version upgrades in EL ecosystem

Supported operating systems:



# How we unlocked major version upgrades in EL ecosystem

How to contribute to ELevate?

GitHub repository with Leapp soft fork:

<https://github.com/AlmaLinux/leapp-repository>

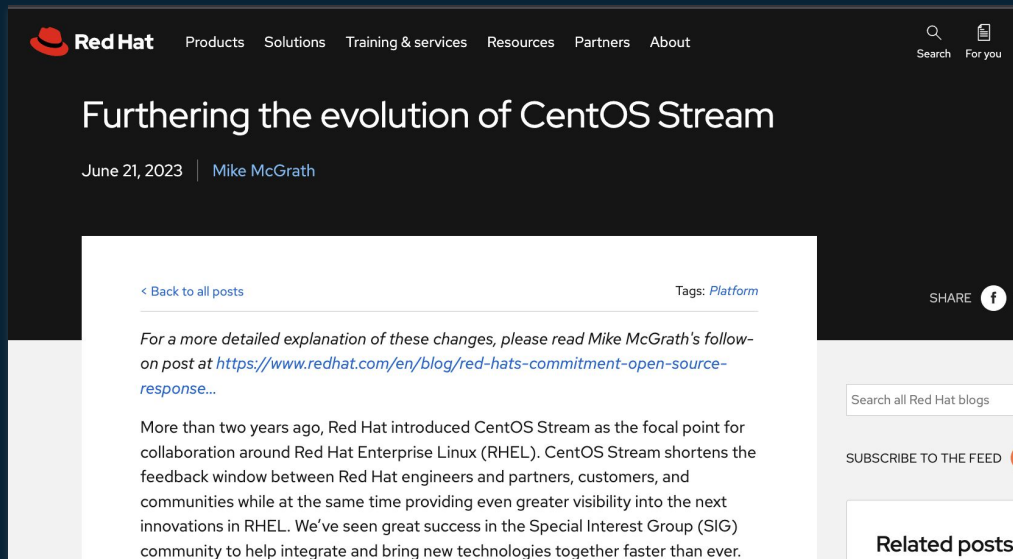
GitHub repository with OS and 3rd party repos configuration:

<https://github.com/AlmaLinux/leapp-data>

Contribution guide:

<https://wiki.almalinux.org/elevate/Contribution-guide.html>

# How we now build AlmaLinux from various sources



Red Hat stopped uploading sources to CentOS git since June 21, 2023

Downloading Red Hat sources to use them for your product is  
**Red Hat Subscription Agreement violation!**

# How we now build AlmaLinux from various sources

[Blog](#)[Wiki](#)[Resources ▾](#)[Shop](#)[Get Support](#)[Download](#)

## The Future of AlmaLinux is Bright



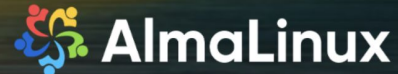
*benny Vasquez*

*Chair of the Board, AlmaLinux OS Foundation*

☐ Thu Jul 13, 2023

A large rectangular image showing a sunset or sunrise over a body of water. The sky is dark with some clouds, and the water reflects the light. The text "The Future of AlmaLinux is Bright" is overlaid in white. The AlmaLinux logo is in the bottom right corner.

The Future of AlmaLinux  
is Bright



# Getting sources legally



## Red Hat Universal Base Image (UBI)

<https://cdn-ubi.redhat.com/content/public/ubi/dist/>

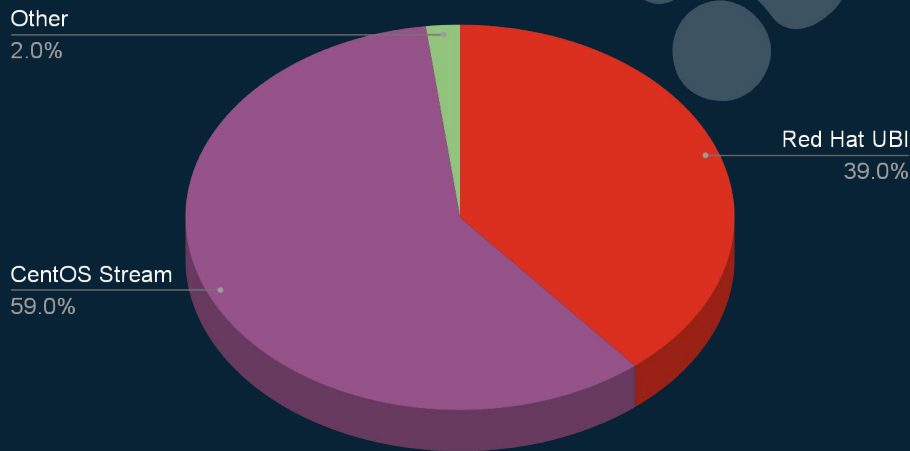
- RHEL sources in public, updated daily
- Limited set of packages



## CentOS Stream

<https://gitlab.com/redhat/centos-stream/rpms/>

- Future RHEL packages
- We pick only specific package versions
- Not all packages are the same as RHEL



# Why is it great not to be a RHEL clone?

- AlmaLinux team can release bugfixes requested by our community without waiting for RHEL updates. Moreover, we send fixes to CentOS Stream ourselves!
- AlmaLinux team can fix vulnerabilities earlier than Red Hat. As a distribution vendor we're subscribed to [distros@vs.openwall.org](mailto:distros@vs.openwall.org) mailing list and can obtain info about vulnerabilities and fixes much earlier they become available for public, so we can independently prepare and release updates same day.
- AlmaLinux derivatives can request to include some changes specific to them to avoid maintaining the package fork, but only if such changes don't affect AlmaLinux users.
- AlmaLinux can include device drivers that were removed from RHEL for non-technical reasons.

# Why is it great not to be a RHEL clone? Bugfixes

Mark Wielaard, **bzip2** developer, contacted us on Nov 12 and informed us that recent AlmaLinux 8 security update for CVE-2019-12900 breaks upstream **bzip2** data integrity tests so basically updated **bzip2** may fail on some archives. He recommended us to apply additional upstream patch to fix this behaviour.

AlmaLinux update for **bzip2** was released Nov 15. Also we informed Red Hat about this issue and sent pull requests to CentOS Stream 8 and 9:

<https://issues.redhat.com/browse/RHEL-67824>

[https://gitlab.com/redhat/centos-stream/rpms/bzip2/-/merge\\_requests/7](https://gitlab.com/redhat/centos-stream/rpms/bzip2/-/merge_requests/7)

[https://gitlab.com/redhat/centos-stream/rpms/bzip2/-/merge\\_requests/8](https://gitlab.com/redhat/centos-stream/rpms/bzip2/-/merge_requests/8)

RHEL8 got this fix January 28, 2025

# Why is it great not to be a RHEL clone? Security

On July 24, 2023 AMD published CVE-2023-20593 “**Zenbleed**” vulnerability. We immediately started intensive public testing for **linux-firmware** package update and published it to AlmaLinux 8 and 9 repos on July 27. Same security update for RHEL 8 and 9 was released September 12 and 19 respectively.

On July 01, 2024 high severity **openssh** vulnerability CVE-2024-6387 “**regreSSHion**” was published. Thanks to [distros@vs.openwall.org](mailto:distros@vs.openwall.org) mailing list we knew about this vulnerability several days earlier than it became public. So we was able to build and test the fix internally in advance and just release it to AlmaLinux repos same day the vulnerability was published. Red Hat released this fix 2 days later.



# Why is it great not to be a RHEL clone? Derivatives

We're very satisfied when other organizations decide to use AlmaLinux as foundation for their software or even hardware projects. And we're here to help them with that.

The most popular AlmaLinux derivative is CloudLinux, operating system for hosting industry, which is based on AlmaLinux since version 8.5 and uses AlmaLinux public mirrors infrastructure.

They decided to rebase on AlmaLinux to not duplicate efforts in rebuilding upstream packages but better focus on their own packages set that makes CloudLinux unique.

For example, to reduce this packages set they contributed CloudLinux support to AlmaLinux's **cloud-init** package. So AlmaLinux team applies patch for both AlmaLinux and CloudLinux support to reduce amount of packages for derivative to maintain.

# How we support additional hardware

CentOS 7 EOL happened June 30, 2024 and since 2023 many users started upgrading to AlmaLinux 8 and have found that many of their storage and network devices are not supported anymore and basically don't work because upstream decided to drop support to hardware they considering outdated.

We decided to bring this removed devices support back to kernel, it's **more than 140 devices** covered by the following drivers:

- **aacraid** - Dell PERC2, 2/Si, 3/Si, 3/Di, Adaptec Advanced Raid Products, HP NetRAID-4M, IBM ServeRAID & ICP SCSI
- **be2iscsi** - Emulex OneConnectOpen-iSCSI for BladeEngine 2 and 3 adapters
- **be2net** - Emulex BladeEngine 2 and 3 adapters
- **hpsa** - HP Smart Array Controller
- **lpfc** - Emulex LightPulse Fibre Channel SCSI
- **megaraid\_sas** - Broadcom MegaRAID SAS
- **mlx4\_core** - Mellanox Gen2 and ConnectX-2 adapters
- **mpt3sas** - LSI MPT Fusion SAS 3.0
- **mptsas** - Fusion MPT SAS Host
- **qla2xxx** - QLogic Fibre Channel HBA
- **qla4xxx** - QLogic iSCSI HBA



# How we support additional hardware

Global patch to move all “disabled” pci ids to “unmaintained” list:  
0001-Enable-all-disabled-pci-devices-by-moving-to-unmaint.patch

Per-driver patches:

0002-Bring-back-deprecated-pci-ids-to-mptsas-mptspi-driver.patch

0003-Bring-back-deprecated-pci-ids-to-hpsa-driver.patch

0004-Bring-back-deprecated-pci-ids-to-qla2xxx-driver.patch

0005-Bring-back-deprecated-pci-ids-to-lpfc-driver.patch

0006-Bring-back-deprecated-pci-ids-to-qla4xxx-driver.patch

0007-Bring-back-deprecated-pci-ids-to-be2iscsi-driver.patch

<https://git.almalinux.org/rpms/kernel>



# How to become even more special?

Our experience of the last 1.5 years shows that the new path we've chosen is successful. We're able to reliably maintain 100% ABI compatibility with RHEL using legal only sources and even can bring minor improvements to our users.

But what about major changes? How to bring them? How to make community test them? How to prepare our infrastructure for next major AlmaLinux version?

The answer is...

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# AlmaLinux Kitten

# How to become even more special?



- No minor versions
- Based on CentOS Stream 10 sources
- Supported for at least 5 years
- Foundation for AlmaLinux 10 Beta
- Will allow to get AlmaLinux 10 updates earlier

Since Day 1 has the following changes compared CentOS Stream:

- Compiled with **Frame Pointers enabled** to improve profiling and debugging
- **Secure Boot** is supported for both Intel and ARM
- **SPICE** protocol support for virtualization environments (dropped since RHEL9)
- **KVM** virtualization support on **IBM Power** platform (dropped since RHEL9)
- Even more devices supported that were dropped from RHEL
- Has additional **x86\_64\_v2** architecture option to support older Intel/AMD CPUs (since 2008)
- ~~Firefox and Thunderbird are included~~

# How to add x86\_64\_v2 (\_v3,\_v4) architecture to EL?

RPM supports x86\_64 levels as architectures since 4.19.0

But it's still necessary to patch:

- dnf
- libdnf
- efi-rpm-macros
- libsolv
- lorax
- pesign
- python-productmd
- ...

For full packages list with v2 patches applied go to:

<https://wiki.almalinux.org/development/Modified-packages.html>

# How to add x86\_64\_v2 (\_v3,\_v4) architecture to EL?

RPM supports x86\_64 levels as architectures since 4.19.0

Surprisingly, we still need to patch RPM as well because of this:

```
%ifarch x86_64  
# some genius code  
%endif
```



```
%ifarch %{x86_64}  
# some genius code  
%endif
```





# What's next?

## Plans for 2025:

- AlmaLinux 10 stable release in May
- AlmaLinux 10 for RISC-V
- EPEL 10 for x86\_64\_v2 (<https://github.com/AlmaLinux/ALESCo/pull/2>)
- Automation, automation, automation
- Improve contributor experience

No drama,  
just Linux.

# AlmaLinux Special Interest Groups (SIGs)



Thank you!  
Q&A time!