

AlmaLinux:

How to make a RHEL compatible distribution

Andrew Lukoshko

AlmaLinux OS Architect and Release Engineering Lead

FOSDEM 2024



Andrew Lukoshko

- 20+ years of Linux experience
- 10+ years of building RHEL based products
- 5 years in HPC
- 5 years in Enterprise
- 5 years in Cloud Provider



AlmaLinux Architect and
Release Engineering Lead
from Day 1



alukoshko@almalinux.org

What is AlmaLinux

An Open Source, community owned and governed, forever-free enterprise Linux distribution, focused on long-term stability, providing a robust production-grade platform.

- ✓ AlmaLinux OS is binary compatible with RHEL.
- ✗ AlmaLinux OS is not exact RHEL clone!



Today you will know

How we:

1. get sources (the tough one!)
2. build packages
3. check binary compatibility
4. maintain security advisories
5. build images

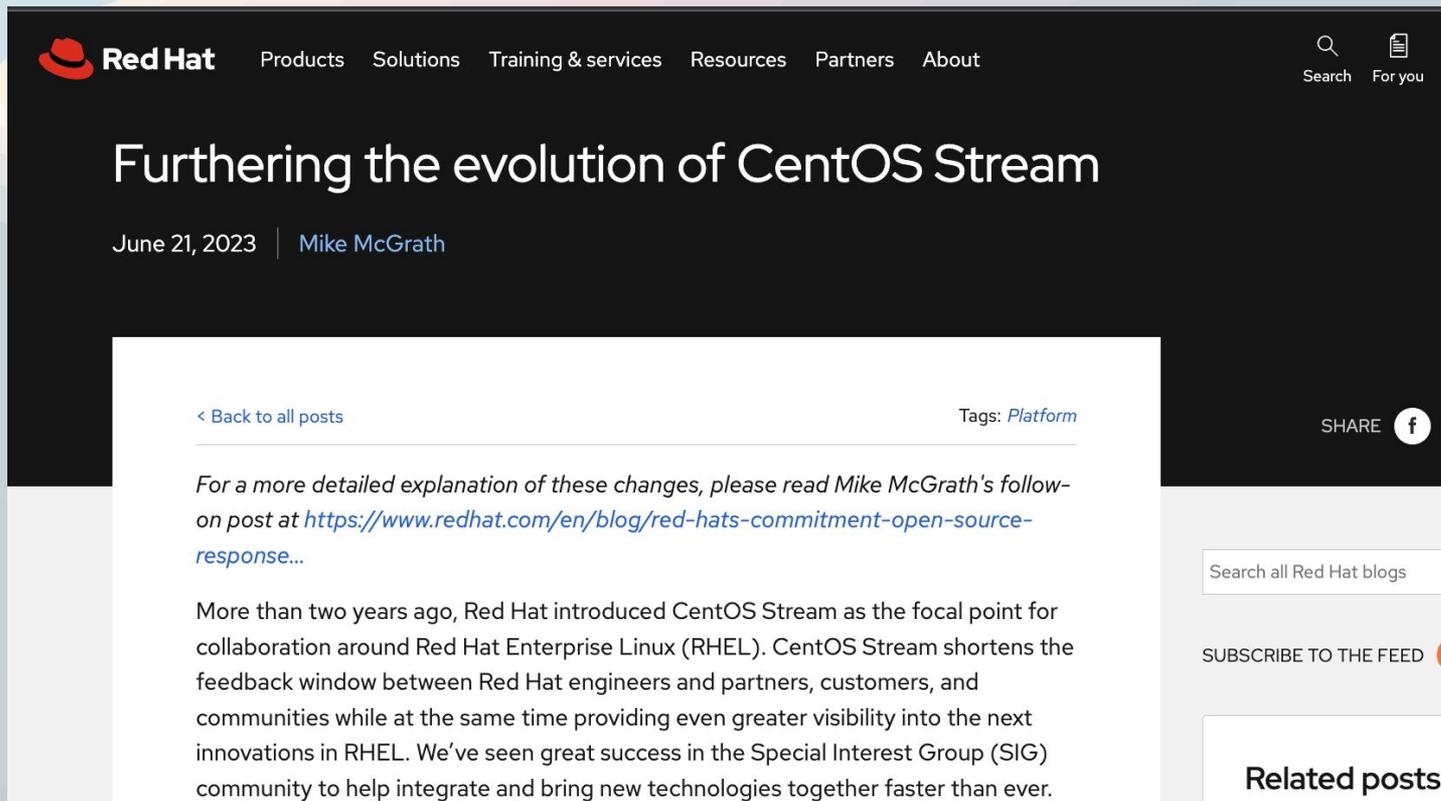
How you:

1. can download AlmaLinux in many ways
2. can upgrade your CentOS 7 system



Getting sources

After this:



The screenshot shows a Red Hat blog post. The header includes the Red Hat logo and navigation links: Products, Solutions, Training & services, Resources, Partners, and About. On the right, there are search and 'For you' icons. The main title is 'Furthering the evolution of CentOS Stream', dated June 21, 2023, by Mike McGrath. The post content includes a link back to all posts, a tag for 'Platform', and a paragraph explaining the changes to CentOS Stream. On the right sidebar, there is a 'SHARE' button with a Facebook icon, a search bar for all Red Hat blogs, a 'SUBSCRIBE TO THE FEED' button, and a 'Related posts' section.

 [Products](#) [Solutions](#) [Training & services](#) [Resources](#) [Partners](#) [About](#)  
Search For you

Furthering the evolution of CentOS Stream

June 21, 2023 | [Mike McGrath](#)

[< Back to all posts](#) Tags: [Platform](#)

For a more detailed explanation of these changes, please read Mike McGrath's follow-on post at <https://www.redhat.com/en/blog/red-hats-commitment-open-source-response...>

More than two years ago, Red Hat introduced CentOS Stream as the focal point for collaboration around Red Hat Enterprise Linux (RHEL). CentOS Stream shortens the feedback window between Red Hat engineers and partners, customers, and communities while at the same time providing even greater visibility into the next innovations in RHEL. We've seen great success in the Special Interest Group (SIG) community to help integrate and bring new technologies together faster than ever.

SHARE 

SUBSCRIBE TO THE FEED 

Related posts

Getting sources: The problem



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



CentOS Linux git repo (<https://git.centos.org/>) was a 100% legal source for all RHEL clones for years. But after June 21, 2023 **only RHEL7 sources are updated.**

Getting sources: Looking for legal options



Red Hat Universal Base Image (UBI)

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



- Exact RHEL sources and binaries
- 100% legal, no Red Hat Subscription required
- EOL after 10 years
- Updates every day
- Includes base system, Python, Perl, PHP, NodeJS, Java, Dotnet, ...

Getting sources: Looking for legal options



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- Limited set of sources available:
 - 1511 packages for RHEL8 (~41%)
 - 951 packages for RHEL9 (~39%)

Getting sources: Looking for legal options



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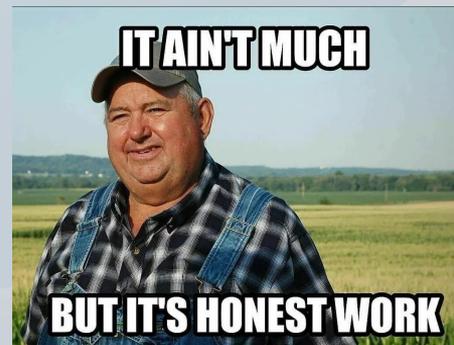


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Our decision: use every package available



Getting sources: Looking for legal options



CentOS Stream



- Upstream for RHEL and allows to get new package versions earlier
- 100% legal
- Available as src.rpm
<https://kojihub.stream.centos.org/>
- Available as git repo
<https://gitlab.com/redhat/centos-stream>

Getting sources: Looking for legal options



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- CVE updates usually delayed
- Not all packages available (example: Java 21)
- EOL after 5 years versus 10 years for RHEL, so no updates after 8.10 release

Getting sources: Looking for legal options



CentOS Stream



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- CVE updates usually delayed
- Not all packages available (example: Java 21)
- EOL after 5 years versus 10 years for RHEL, so no updates after 8.10 release

Our decision: use where applicable



Getting sources: Looking for legal options



RHEL clones



- No Red Hat Subscription required
- May contain exact RHEL sources

Getting sources: Looking for legal options



RHEL clones



- No Red Hat Subscription required
- May contain exact RHEL sources



- Exact RHEL sources are not guaranteed
- Not clear where they get sources
- Delayed updates

Getting sources: Looking for legal options



RHEL clones



- No Red Hat Subscription required
- May contain exact RHEL sources



- Exact RHEL sources are not guaranteed
- Not clear where they get sources
- Delayed updates

Our decision: use carefully 

(example: **squid** CVE-2023-46846 and CVE-2023-46847 patches from Oracle Linux)

Getting sources: pkgdiff tool

Package Changes Analyzer (pkgdiff) is a tool for visualizing changes in Linux software packages (RPM, DEB, TAR.GZ, etc)

<https://lvc.github.io/pkgdiff/>

```
% pkgdiff -list-added-removed -hide-unchanged dnf-4.7.0-19.el8.src.rpm \  
dnf-4.7.0-19.el8.alma.src.rpm  
  
reading packages ...  
comparing packages ...  
creating report ...  
result: CHANGED (0.02%)  
report: pkgdiff_reports/dnf/4.7.0-19.el8_to_4.7.0-19.el8.alma/changes_report.html
```

Getting sources: pkgdiff tool

Changes In Files

File Type	Total	Added	Removed	Changed
Spec file	<u>1</u>	0	0	<u>1</u>
Patch	<u>1</u>	<u>1</u>	0	0

Spec Files (1)

Name	Status	Delta	Visual Diff
dnf.spec	changed	0.1%	<u>diff</u>

Patches (1)

Name	Status	Delta	Visual Diff
<u>almalinux_bugtracker.patch</u>	added		

dnf.spec	dnf.spec
<pre> skipping to change at line 67 # Use the same directory of the main package for subpackage licence and doc s %global _docdir_fmt %{name} %global pkg_summary Package manager %global pkg_description Utility that allows users to manage packages on the ir systems. It supports RPMs, modules and comps groups & environments. Name: dnf Version: 4.7.0 Release: 19%{?dist} Summary: %{pkg_summary} # For a breakdown of the licensing, see PACKAGE-LICENSING License: GPLv2+ URL: https://github.com/rpm-software-management/dnf Source0: %{url}/archive/%{version}/%{name}-%{version}.tar.gz # Patches are stored in the upstream repository in this branch: # https://github.com/rpm-software-management/dnf/tree/rhel-8.7 # Use "git format-patch -N" to regenerate the patch files. Patch0001: 0001-Set-top-level-directory-for-unittest.patch </pre>	<pre> skipping to change at line 67 # Use the same directory of the main package for subpackage licence and doc s %global _docdir_fmt %{name} %global pkg_summary Package manager %global pkg_description Utility that allows users to manage packages on the ir systems. It supports RPMs, modules and comps groups & environments. Name: dnf Version: 4.7.0 Release: 19%{?dist}.alma Summary: %{pkg_summary} # For a breakdown of the licensing, see PACKAGE-LICENSING License: GPLv2+ URL: https://github.com/rpm-software-management/dnf Source0: %{url}/archive/%{version}/%{name}-%{version}.tar.gz # Patches are stored in the upstream repository in this branch: # https://github.com/rpm-software-management/dnf/tree/rhel-8.7 # Use "git format-patch -N" to regenerate the patch files. Patch0001: 0001-Set-top-level-directory-for-unittest.patch </pre>
<pre> skipping to change at line 121 Patch0035: 0035-Move-system-upgrade-plugin-to-core-RhBug-2054235.patch Patch0036: 0036-Add-support-for-rollback-of-group-upgrade-rollback-R.p atch Patch0037: 0037-Document-changes-to-offline-upgrade-command.patch Patch0038: 0038-Better-explain-traceback-of-rpm.error-with-dnf.patch Patch0039: 0039-Ignore-processing-variable-files-with-unsupported-en.p atch Patch0040: 0040-Update-translations.patch Patch0041: 0041-Omit-src-RPMs-from-check-update-RhBug-2151910.patch Patch0042: 0042-Backport-automatic-Fix-onl-detect-proxy-RhBz2022440.pa tch Patch0043: 0043-automatic-Return-an-error-when-transaction-fails-RhB.p atch Patch0044: 0044-Document-symbols-in-dnf-history-list-output.patch </pre>	<pre> skipping to change at line 121 Patch0035: 0035-Move-system-upgrade-plugin-to-core-RhBug-2054235.patch Patch0036: 0036-Add-support-for-rollback-of-group-upgrade-rollback-R.p atch Patch0037: 0037-Document-changes-to-offline-upgrade-command.patch Patch0038: 0038-Better-explain-traceback-of-rpm.error-with-dnf.patch Patch0039: 0039-Ignore-processing-variable-files-with-unsupported-en.p atch Patch0040: 0040-Update-translations.patch Patch0041: 0041-Omit-src-RPMs-from-check-update-RhBug-2151910.patch Patch0042: 0042-Backport-automatic-Fix-onl-detect-proxy-RhBz2022440.pa tch Patch0043: 0043-automatic-Return-an-error-when-transaction-fails-RhB.p atch Patch0044: 0044-Document-symbols-in-dnf-history-list-output.patch </pre>
<pre> BuildArch: noarch BuildRequires: cmake BuildRequires: gettext # Documentation </pre>	<pre> BuildArch: noarch BuildRequires: cmake BuildRequires: gettext # Documentation </pre>

Getting sources: pkgdiff tool

Changes In Files

File Type	Total	Added	Removed	Changed
Spec file	<u>1</u>	0	0	<u>1</u>
Patch	<u>1</u>	<u>1</u>	0	0

Spec Files (1)

Name	Status	Delta	Visual Diff
dnf.spec	changed	0.1%	<u>diff</u>

Patches (1)

Name	Status	Delta	Visual Diff
<u>almalinux_bugtracker.patch</u>	added		

```
almalinux_bugtracker.patch plain
diff -aruN dnf-4.7.0/dnf/const.py.in dnf-4.7.0_almalinux/dnf/const.py.in
--- dnf-4.7.0/dnf/const.py.in 2021-04-12 18:26:33.000000000 +0300
+++ dnf-4.7.0_almalinux/dnf/const.py.in 2021-12-30 10:30:33.806575400
+0300
@@ -55,4 +55,4 @@
USER_AGENT = "dnf/%s" % VERSION

BUGTRACKER_COMPONENT=NAME.lower()
BUGTRACKER='https://bugzilla.redhat.com/enter_bug.cgi?
product=Fedora&component=%s' % BUGTRACKER_COMPONENT
+BUGTRACKER='https://bugs.almalinux.org/'
diff -aruN dnf-4.7.0/doc/conf.py.in dnf-4.7.0_almalinux/doc/conf.py.in
--- dnf-4.7.0/doc/conf.py.in 2021-04-12 18:26:33.000000000 +0300
+++ dnf-4.7.0_almalinux/doc/conf.py.in 2021-12-30 10:34:07.810855800
+0300
@@ -267,5 +267,5 @@
.. _DNF: https://github.com/rpm-software-management/dnf/
.. _hawkey: http://rpm-software-management.github.io/hawkey/
.. _YUM: http://yum.baseurl.org/
-.. _bugzilla: https://bugzilla.redhat.com/enter_bug.cgi?
product=Fedora&component=dnf
+.. _bugzilla: https://bugs.almalinux.org/
"""

diff -aruN dnf-4.7.0/tests/test_config.py dnf-
4.7.0_almalinux/tests/test_config.py
--- dnf-4.7.0/tests/test_config.py 2021-04-12 18:26:33.000000000
+0300
+++ dnf-4.7.0_almalinux/tests/test_config.py 2021-12-30 10:33:24.147815500
+0300
@@ -55,8 +55,7 @@
def test_bugtracker(self):
    conf = Conf()
    self.assertEqual(conf.bugtracker_url,
- "https://bugzilla.redhat.com/enter_bug.cgi"
+
- "?product=Fedora&component=dnf")
+ "https://bugs.almalinux.org/")

def test_conf_from_file(self):
    conf = Conf()
```

Building packages

Sources:

- All sources are at <https://git.almalinux.org/rpms>
- All tarballs are stored in S3 storage at <https://sources.almalinux.org> and downloaded during build

Builds:

We use AlmaLinux Build System to build and release packages and corresponding security bulletins (errata).

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

Building packages

- Administration
- Feed
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Build 8022 created by [soksanichenko](#) at 22.11.2023, 22:07:43

Summary	AlmaLinux-9.aarch64	AlmaLinux-9.i686	AlmaLinux-9.ppc64le	AlmaLinux-9.s390x	AlmaLinux-9.x86_64
<code>squid</code>  # imports/c9/squid-...					

 Released

 Sign ^

The build is signed with D36CB86CB86B3716 PGP key (AlmaLinux-9)

[OTHER ACTIONS](#) 

Building packages

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squid x86_64

[BUILD LOGS](#) [TEST LOGS](#)

```
build system logs:
albs.145153.1700691679.log
mock RPM logs:
mock.145153.1700692299.cfg
mock_build.145153.1700692299.log
mock_hw_info.145153.1700692299.log
mock_installed_pkgs.145153.1700692299.log
mock_root.145153.1700692299.log
mock_state.145153.1700692299.log
mock_stderr.145153.1700692299.log
mock src-RPM logs:
mock.srpm.145153.1700691719.cfg
mock_build.srpm.145153.1700691719.log
mock_hw_info.srpm.145153.1700691719.log
mock_root.srpm.145153.1700691719.log
mock_state.srpm.145153.1700691719.log
mock_stderr.srpm.145153.1700691719.log
```

```
Executing(%build): /bin/sh -e /var/tmp/rpm-tmp.RrZnZE
+ umask 022
+ cd /builddir/build/BUILD
+ cd squid-5.5
+ CFLAGS='-O2 -flto=auto -ffat-lto-objects -fexceptions -g -grecord-gcc-switches -pipe -Wall -Werror=format-security -Wp,-D_FORTIFY_SOURCE=2 -Wp,-D_GLIBCXX_ASSERTIONS -specs=/usr/lib/rpm/redhat/redhat-hardened-cc1 -fstack-protector-strong -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -m64 -march=x86-64-v2 -mtune=generic -fasynchronous-unwind-tables -fstack-clash-protection -fcf-protection'
+ export CFLAGS
+ CXXFLAGS='-O2 -flto=auto -ffat-lto-objects -fexceptions -g -grecord-gcc-switches -pipe -Wall -Werror=format-security -Wp,-D_FORTIFY_SOURCE=2 -Wp,-D_GLIBCXX_ASSERTIONS -specs=/usr/lib/rpm/redhat/redhat-hardened-cc1 -fstack-protector-strong -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -m64 -march=x86-64-v2 -mtune=generic -fasynchronous-unwind-tables -fstack-clash-protection -fcf-protection'
+ export CXXFLAGS
+ FFLAGS='-O2 -flto=auto -ffat-lto-objects -fexceptions -g -grecord-gcc-switches -pipe -Wall -Werror=format-security -Wp,-D_FORTIFY_SOURCE=2 -Wp,-D_GLIBCXX_ASSERTIONS -specs=/usr/lib/rpm/redhat/redhat-hardened-cc1 -fstack-protector-strong -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -m64 -march=x86-64-v2 -mtune=generic -fasynchronous-unwind-tables -fstack-clash-protection -fcf-protection'
+ export FFLAGS
+ FCFLAGS='-O2 -flto=auto -ffat-lto-objects -fexceptions -g -grecord-gcc-switches -pipe -Wall -Werror=format-security -Wp,-D_FORTIFY_SOURCE=2 -Wp,-D_GLIBCXX_ASSERTIONS -specs=/usr/lib/rpm/redhat/redhat-hardened-cc1 -fstack-protector-strong -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 -m64 -march=x86-64-v2 -mtune=generic -fasynchronous-unwind-tables -fstack-clash-protection -fcf-protection'
+ export FCFLAGS
+ LDFLAGS='-Wl,-z,relro -Wl,--as-needed -Wl,-z,now -specs=/usr/lib/rpm/redhat/redhat-hardened-ld -specs=/usr/lib/rpm/redhat/redhat-annobin-cc1 '
+ export LDFLAGS
+ LT_SYS_LIBRARY_PATH=/usr/lib64:
+ export LT_SYS_LIBRARY_PATH
+ CC=gcc
+ export CC
+ CXX=g++
+ export CXX
+ '[' -flto=auto -ffat-lto-objectsx' != ' x ']'
++ find . -type f -name configure -print
+ for file in $(find . -type f -name configure -print)
+ /usr/bin/sed -r --in-place=backup 's/^\char \\(\*\f) \\(\) = /__attribute__ ((used)) char (*f) () = /g' ./libltdl/configure
```

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squid x86_64

[BUILD LOGS](#) [TEST LOGS](#)

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- albs.145153.1700691679.log

mock RPM logs:

- mock.145153.1700692299.cfg**
- mock_build.145153.1700692299.log
- mock_hw_info.145153.1700692299.log
- mock_installed_pkgs.145153.1700692299.log
- mock_root.145153.1700692299.log
- mock_state.145153.1700692299.log
- mock_stderr.145153.1700692299.log

mock src-RPM logs:

- mock.srpm.145153.1700691719.cfg
- mock_build.srpm.145153.1700691719.log
- mock_hw_info.srpm.145153.1700691719.log
- mock_root.srpm.145153.1700691719.log
- mock_state.srpm.145153.1700691719.log
- mock_stderr.srpm.145153.1700691719.log

```
config_opts["root"] = "17b010ca5acc2b83c4f6e5832de3e54c1782e6606cea2667b02f6768e9ed0880.0"
config_opts["chroot_setup_cmd"] = "install tar gcc-c++ redhat-rpm-config almalinux-release
which xz sed make bzip2 gzip coreutils unzip shadow-utils diffutils cpio bash gawk rpm
-build info patch util-linux findutils grep zlib scl-utils scl-utils-build git-core"
config_opts["dist"] = "el9"
config_opts["dnf_common_opts"] = ["--setopt=deltarpm=False", "--allowerasing", "--setopt=install_weak_deps=False"]
config_opts["dnf_install_command"] = "install dnf dnf-plugins-core shadow-utils"
config_opts["legal_host_arches"] = ["x86_64"]
config_opts["nspawn_args"] = ["--rlimit=RLIMIT_NOFILE=20480", "--capability=cap_ipc_lock"]
config_opts["package_manager"] = "dnf"
config_opts["releasever"] = "9"
config_opts["rpmbuild_networking"] = True
config_opts["target_arch"] = "x86_64"
config_opts["use_bootstrap_container"] = False
config_opts["use_host_resolv"] = True
config_opts["yum.conf"] = ""
[main]
assumeyes = 1
best = 1
cachedir = /var/cache/yum
debuglevel = 1
gpgcheck = 0
logfile = /var/log/yum.log
module_platform_id = platform:el9
```

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squid x86_64

[BUILD LOGS](#) [TEST LOGS](#)

build system logs:

albs.145153.1700691679.log	↓
----------------------------	---

mock RPM logs:

mock.145153.1700692299.cfg	↓
mock_build.145153.1700692299.log	↓
mock_hw_info.145153.1700692299.log	↓
mock_installed_pkgs.145153.1700692299.log	↓
mock_root.145153.1700692299.log	↓
mock_state.145153.1700692299.log	↓
mock_stderr.145153.1700692299.log	↓

mock src-RPM logs:

mock.srpm.145153.1700691719.cfg	↓
mock_build.srpm.145153.1700691719.log	↓
mock_hw_info.srpm.145153.1700691719.log	↓
mock_root.srpm.145153.1700691719.log	↓
mock_state.srpm.145153.1700691719.log	↓
mock_stderr.srpm.145153.1700691719.log	↓

```
p11-kit-trust-0.24.1-2.e19.x86_64 1648214264 450927 e178e31419a9be5894da8d429f4d512e0 installed
cpio-2.13-16.e19.x86_64 1643489457 1088179 20d7eb1219e79364f2b8f81bc0fe0a0c installed
pcrc-8.44-3.e19.3.x86_64 1649948713 539328 a0782c0f28325f4d48ebe112615ee57f installed
openssl-libs-1.3.0.7-24.e19.x86_64 1695762934 6771372 8edb63917d19ee7daf2651cd975e9e8c installed
ca-certificates-2023.2.60_v7.0.306-90.1.e19_2.noarch 1694517635 2354652 1b5d5183fa21dc6e25530d0977cb4e8a installed
gzip-1.12-1.e19.x86_64 1665854720 377005 b5c23607ca0175f8586bb9f04bc0c894 installed
libmount-2.37.4-15.e19.x86_64 1695783012 310093 f8aba16ab39007de75759ae8cce2bd02 installed
cracklib-dicts-2.9.6-27.e19.x86_64 1643491090 9815154 70cb82f78826244294e7adc4592f8d6a installed
openssl-1.3.0.7-24.e19.x86_64 1695762934 1894987 ab2e57aa29c55c1367a2a3d8699a345d installed
libarchive-3.5.3-4.e19.x86_64 1680733912 906142 6c8d4dc8132dcfa7b24219ac3a301ce installed
pkgconf-1.7.3-10.e19.x86_64 1680812823 77890 ab427b19d35afc539d12a6b9ad6f9d99 installed
libpipeline-1.5.3-4.e19.x86_64 1644459380 115269 a0f97370caaacc44d0e94a80688f2017 installed
make-1:4.3-7.e19.x86_64 1644478878 1720878 d25aa1d6dd6b3d474467d49c03b312c4 installed
perl-Digest-1.19-4.e19.noarch 1644595375 36844 7698964c801c15b9e09af239d06d325a installed
perl-Digest-MD5-2.58-4.e19.x86_64 1644596344 61538 3d1d54ac6c6d2e660c60e1febe6ba812 installed
perl-Data-Dumper-2.174-462.e19.x86_64 1645021433 111885 af724cea7fa63c7ca7f3f01ec012a55e installed
perl-base-0:2.27-480.e19.noarch 1680800859 13819 9f5f96c2af5c48a48490e638013111fd installed
perl-URI-5.09-3.e19.noarch 1648214228 216915 7d631b61f4e7d1a59b7702853d439458 installed
perl-Text-Tabs+Wrap-2013.0523-460.e19.noarch 1645014862 24828 a93eda6aa00df774344de75de3e7d620 installed
perl-Time-Local-2:1.300-7.e19.noarch 1650006587 67344 1a5c30f3e59f6d6dab723640d41ceab7 installed
perl-IO-Socket-IP-0.41-5.e19.noarch 1645012339 100240 bc34f266c7ab758d6f9f7051375473af installed
perl-File-Path-2.18-4.e19.noarch 1645015494 65333 5f5233277e7d003386aabf73ba2e3b00 installed
perl-subs-0:1.03-480.e19.noarch 1680800859 3061 66f1bc989ca527166335d22516da0227 installed
perl-Class-Struct-0:0.66-480.e19.noarch 1680800859 26953 f8131387a72faa1789b5e484a1630a2f installed
perl-POSIX-0:1.94-480.e19.x86_64 1680800771 240003 a6ac7ddeb51772ef681c25278eef0b9 installed
perl-File-Temp-1:0.231.100-4.e19.noarch 1645005893 166550 231231e9fdda4215e8fc63879bc29373 installed
perl-Pod-Simple-1:3.42-4.e19.noarch 1644595067 577293 59a0c9c7881c8c759d59513738cf3a6 installed
perl-SelectSaver-0:1.02-480.e19.noarch 1680800859 3171 374c6c7d46d86503df40430b0e99da41 installed
perl-File-stat-0:1.09-480.e19.noarch 1680800859 13949 4d6209fde1050d69938e0ddc490d806b installed
perl-Pod-Perldoc-3.28.01-461.e19.noarch 1644882690 179060 3592c6f8ec5d262935747c142a20f4e installed
perl-Fcntl-0:1.13-480.e19.x86_64 1680800771 30124 d8de6b188928428f07e703657c8a5513 installed
perl-Text-ParseWords-3.30-460.e19.noarch 1645008582 13101 95074ebfc08d2e7945b6a351107c6de installed
perl-Pod-Usage-4:2.01-4.e19.noarch 1644595290 87186 1c81d46cf49953bf17671509bb9f143b installed
perl-constant-1.33-461.e19.noarch 1645017554 27104 77ae4fa31b0e05c47722d3f42c3031f4 installed
perl-MIME-Base64-3.16-4.e19.x86_64 1645024373 48161 74c7445541edb6812cb547cb1ed7001 installed
perl-Scalar-List-Utils-4:1.56-461.e19.x86_64 1644595538 143668 9925440a3d2d49e5555174654a22662 installed
perl-Storable-1:3.21-460.e19.x86_64 1644882355 228564 f1fe7637efd26378c700703de66084a9 installed
perl-Getopt-Long-1:2.52-4.e19.noarch 1645006486 139937 91b70507061382352f5f8cea185952c4 installed
```

Checking binary compatibility

Package ABI Diff (Pkg-ABIdiff) — a tool to verify API/ABI compatibility of Linux packages (RPM or DEB).

Requires binary package and corresponding debuginfo package.

<https://github.com/lvc/pkg-abidiff>

```
% pkg-abidiff -r -old ubi/zlib-1.2.11-25.el8.x86_64.rpm
ubi/zlib-debuginfo-1.2.11-25.el8.x86_64.rpm -new almalinux/zlib-1.2.11-25.el8.x86_64.rpm
almalinux/zlib-debuginfo-1.2.11-25.el8.x86_64.rpm
...
Comparing ABIs ...
Comparing libz.so.1.2.11 (old) and libz.so.1.2.11 (new)
BC: 100%, SC: 100%
Counting symbols in the ABI dump for libz.so.1.2.11 (old)
The report has been generated to:
compat_report/x86_64/zlib/1.2.11-25.el8/1.2.11-25.el8/index.html
Avg. BC: 100%, Avg. SC: 100%
```

Checking binary compatibility

ABI report for zlib: 1.2.11-25.el8 vs 1.2.11-25.el8

Test Info

Package	zlib
Old Version	1.2.11-25.el8
New Version	1.2.11-25.el8
Arch	x86_64
Subject	Public ABI + Private ABI

Test Result

Binary compatibility: 100%

Source compatibility: 100%

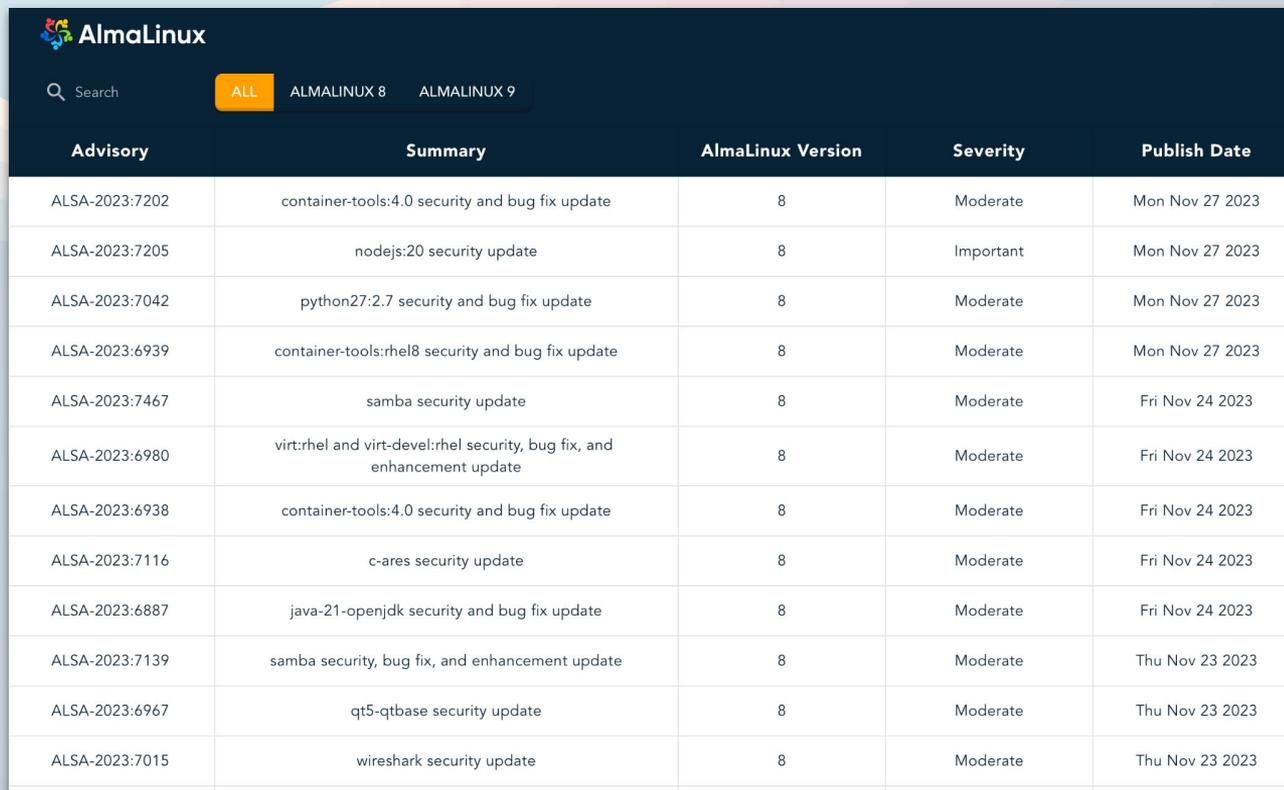
Packages

Old	New	Files
zlib-1.2.11-25.el8.x86_64.rpm	zlib-1.2.11-25.el8.x86_64.rpm	1
zlib-debuginfo-1.2.11-25.el8.x86_64.rpm	zlib-debuginfo-1.2.11-25.el8.x86_64.rpm	1

Shared Objects

Object	Compatibility		Added Symbols	Removed Symbols	Total Symbols
	BC	SC			
libz.so.1.2.11	100%	100%	0	0	11

Maintain security advisories



Advisory	Summary	AlmaLinux Version	Severity	Publish Date
ALSA-2023:7202	container-tools:4.0 security and bug fix update	8	Moderate	Mon Nov 27 2023
ALSA-2023:7205	nodejs:20 security update	8	Important	Mon Nov 27 2023
ALSA-2023:7042	python27:2.7 security and bug fix update	8	Moderate	Mon Nov 27 2023
ALSA-2023:6939	container-tools:rhel8 security and bug fix update	8	Moderate	Mon Nov 27 2023
ALSA-2023:7467	samba security update	8	Moderate	Fri Nov 24 2023
ALSA-2023:6980	virt:rhel and virt-devel:rhel security, bug fix, and enhancement update	8	Moderate	Fri Nov 24 2023
ALSA-2023:6938	container-tools:4.0 security and bug fix update	8	Moderate	Fri Nov 24 2023
ALSA-2023:7116	c-ares security update	8	Moderate	Fri Nov 24 2023
ALSA-2023:6887	java-21-openjdk security and bug fix update	8	Moderate	Fri Nov 24 2023
ALSA-2023:7139	samba security, bug fix, and enhancement update	8	Moderate	Thu Nov 23 2023
ALSA-2023:6967	qt5-qtbase security update	8	Moderate	Thu Nov 23 2023
ALSA-2023:7015	wireshark security update	8	Moderate	Thu Nov 23 2023

<https://errata.almalinux.org>

Maintain security advisories

AlmaLinux provides many options to get security updates info:

- Errata website <https://errata.almaLinux.org>
- OVAL feed
- RSS feed
- JSON feed
- updateinfo.xml repodata (works with dnf updateinfo)
- OSV database (<https://osv.dev/list?ecosystem=AlmaLinux>)
- Mailing list

Check <https://almalinux.org/security/> for details.

How we made it using public only sources?

Maintain security advisories



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

Data is available in several ways:

- Security Data API <- *AlmaLinux uses*
- OVAL files
- RSS feed

Data contains:

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

<https://access.redhat.com/security/data>

Maintain security advisories

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

Platform: AlmaLinux-9

Status: ▼

Advisory ID:

CVE ID:

Bulletin title:

Advisory

Status	Update date	ID	Bulletin title
released	November 27, 2023	ALSA-2023:7507	Important: firefox security update
released	November 27, 2023	ALSA-2023:7501	Important: thunderbird security update
released	November 22, 2023	ALSA-2023:7465	Important: squid security update
released	November 15, 2023	ALSA-2023:7277	Important: open-vm-tools security update
released	November 15, 2023	ALSA-2023:7257	Moderate: dotnet6.0 security update
released	November 15, 2023	ALSA-2023:7255	Moderate: dotnet7.0 security update
released	November 15, 2023	ALSA-2023:7253	Moderate: dotnet8.0 security update
released	November 7, 2023	ALSA-2023:6748	Critical: squid security update
released	November 7, 2023	ALSA-2023:6746	Important: nghttp2 security update
released	November 7, 2023	ALSA-2023:6745	Important: curl security update

Platform	Definitive version	Issued Date	Updated Date
AlmaLinux-9	635	November 27, 2023	November 27, 2023

Bulletin title
Important: firefox security update

Description
Mozilla Firefox is an open-source web browser, designed for standards compliance, performance, and portability.

This update upgrades Firefox to version 115.5.0 ESR.

Security Fix(es):

- * Mozilla: Out-of-bound memory access in WebGL2 blitFramebuffer (CVE-2023-6204)
- * Mozilla: Use-after-free in MessagePort:Entangled (CVE-2023-6205)
- * Mozilla: Clickjacking permission prompts using the fullscreen transition (CVE-2023-6206)
- * Mozilla: Use-after-free in ReadableByteStreamQueueEntry::Buffer (CVE-2023-6207)
- * Mozilla: Memory safety bugs fixed in Firefox 120, Firefox ESR 115.5, and Thunderbird 115.5 (CVE-2023-6212)
- * Mozilla: Using Selection API would copy contents into X11 primary selection. (CVE-2023-6208)

Patch Info Packages Latest release log

<input type="checkbox"/> RHEL	Alma	Status
<input type="checkbox"/> 0:firefox-115.5.0-1.el9_3	firefox	Released
<input checked="" type="checkbox"/> firefox		

Maintain security advisories

The screenshot shows a web interface for managing security advisories. On the left is a navigation menu with options like Administration, Feed, New feed, Errata, Releases, Products, Teams, and Test repositories. The main content area is divided into two panels. The left panel displays a table of advisories with columns for Status, Update date, ID, and Subtitle. The right panel shows details for a specific advisory, including its ID, subtitle, description, and a list of affected packages with their versions and update dates.

Status	Update date	ID	Subtitle
Released	November 27, 2023	ALSA-2023-7628	Important: Firefox security update
Released	November 27, 2023	ALSA-2023-7624	Important: Thunderbird security update
Released	November 22, 2023	ALSA-2023-7463	Important: squid security update
Released	November 16, 2023	ALSA-2023-7277	Important: openvm-tools security update
Released	November 16, 2023	ALSA-2023-7257	Moderate: openssl security update
Released	November 16, 2023	ALSA-2023-7228	Moderate: distro-firmware security update
Released	November 16, 2023	ALSA-2023-7253	Moderate: openssl security update
Released	November 5, 2023	ALSA-2023-6748	Critical: rpm security update
Released	November 7, 2023	ALSA-2023-6746	Important: rpm2 security update
Released	November 7, 2023	ALSA-2023-6745	Important: curl security update

Platform: AlmaLinux 9 | Subtitle version: 635 | Issued Date: November 27, 2023 | Updated Date: November 27, 2023

Advisory ID: CVE ID

Bulletin title

Search

Advisory

This update upgrades Firefox to version 115.0.0 ESR.

Security Fix(es):

- * Mozilla: Out-of-bound memory access in WebGL2 MFFractalShader (CVE-2023-4206)
- * Mozilla: Use-after-free in MessagePort::EraseAnd (CVE-2023-4203)
- * Mozilla: Click-jacking prevention bypass using the AllowNetAccess (CVE-2023-4206)
- * Mozilla: Use-after-free in ReadStateByIndexOverwriteEntry Buffer (CVE-2023-4207)
- * Mozilla: Memory safety logic flaw in Firefox OS, Firefox ESR 115.0, and Thunderbird 115.5 (CVE-2023-4212)
- * Mozilla: Using Selection API would cause contents into X11 primary selection. (CVE-2023-4208)

Package info | Packages | Latest release log

Package	Version	Update
<input type="checkbox"/> @SELinux	Alma	Date
<input type="checkbox"/> @firefox-115.0.0-1.el9_2	firefox	Released
<input checked="" type="checkbox"/> Firefox		

View Show updates Release package Release updates

Errata website

Mailing list

RSS feed

JSON feed

OVAL feed

updateinfo.xml

OSV database

Building ISO images and repos

To build AlmaLinux ISO images and repos:

1. Use AlmaLinux-patched **Pungi** tool from <https://git.almalinux.org/almalinux/pungi>
2. Use configuration from <https://git.almalinux.org/almalinux/pungi-almalinux>

Configuration git repo provides the following files for all architectures:

- **comps.xml** - dnf groups definition (@core, @base, ...)
- **include_exclude.conf** - customization and filters config
- **multilib.conf** - multilib (i686 libraries in x86_64 repos) config
- **packages.json** - packages placement to repos (BaseOS, AppStream, ...)
- **variants.xml** - repos, modules, groups definition
- **variants_options.json** - repos and ISO images build options



Guide:

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

Building live, cloud, rpi, container, wsl images

All scripts and tools that we use are available for everyone:

- Live Media: <https://github.com/AlmaLinux/sig-livemedia>
- Cloud Images: <https://github.com/AlmaLinux/cloud-images>
- Raspberry Pi images: <https://github.com/AlmaLinux/raspberry-pi>
- Containers: <https://github.com/AlmaLinux/docker-images>
- WSL: <https://github.com/AlmaLinux/wsl-images>

Get AlmaLinux OS



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](#)



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 Vagrant Cloud](#)



LXC/LXD

AlmaLinux images are available for LXC/LXD.

[Get LXC/LXD Images](#)



Raspberry Pi

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

[Get Raspberry Pi Image](#)

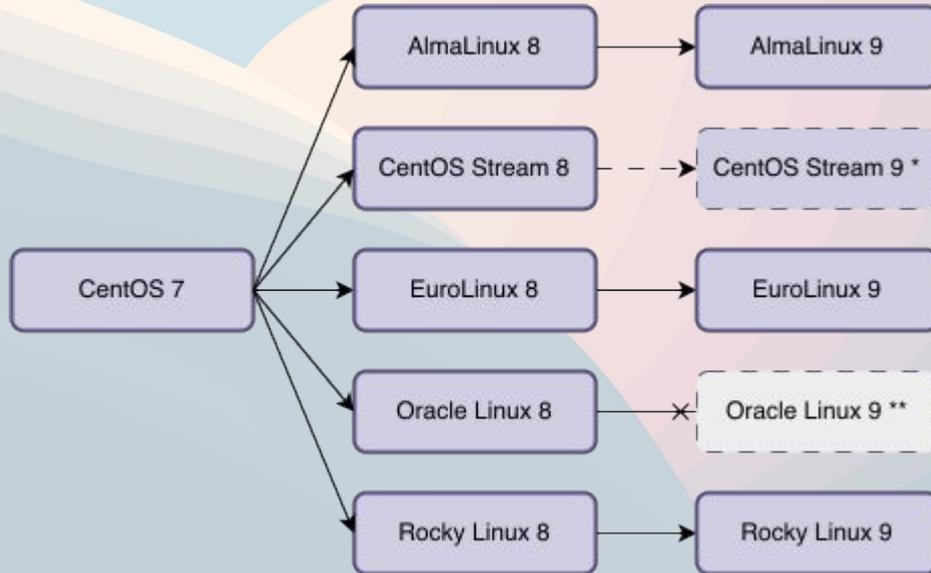


WSL

Run the AlmaLinux terminal environment on Windows.

[Get AlmaLinux for WSL](#)

ELevate: unlock upgrades to next major version



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

ELevate enables migration between major versions of RHEL® derivatives. Move from CentOS 7.x to 8.x version of the RHEL derivative of your choice, or upgrade from 8.x to 9.x within the same derivative.

ELevate: unlock upgrades to next major version

ELevate stable:

- Based on **leapp** 0.14.0 and **leapp-repository** 0.16.0.
- Includes support for 3rd party repos.

Repos list:

- EPEL (!)
- Imunify
- KernelCare
- MariaDB
- nginx
- PostgreSQL

Elevate NG (in development):

- Based on **leapp** 0.16.0 and **leapp-repository** 0.19.0.
- Uses high quality migration data from upstream **leapp-repository** repo shared by Red Hat (thanks!).
- 3rd party repos support is on the way.

How to get involved

Join a SIG <https://wiki.almalinux.org/sigs/>

- Help us staff events
- Share your passion in a blog post
- Help with cloud image automation
- Provide website translations
- Follow us on social platforms
- Answer questions on the forums
- Engage however you'd like

Join the Foundation:

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

Come hang out with us!

-  chat.almalinux.org
-  fosstodon.org/@almalinux
-  reddit.com/r/almalinux
-  lists.almalinux.org
-  almalinux.discourse.group
-  github.com/almalinux
-  wiki.almalinux.org

March 18th, 2024

Europa Park
Rust, Germany



AlmaLinux Day: Germany

Learn, build, engage, and connect

On stage: AlmaLinux experts from all over the world



Kenneth Tan
Executive Director
Sardina Systems



benny Vasquez
Chair, BoD
AlmaLinux



Simon Phipps
Founder
Meshed Insights



Andrew Lukushko
AlmaLinux Architect
CloudLinux



Hidenori Ishikawa
Manager
Prime Strategy



Alex Iribarren
Cloud IAAS and
Linux Leader
CERN



Jesse Asklund
Chief Experience
Officer
WebPros



Igor Seletskiy
CEO
TuxCare &
CloudLinux

Register - free!!



Thank you for your time,
and for your love of
open source.

Andrew Lukoshko

AlmaLinux OS Architect and Release Engineering Lead

FOSDEM 2024