ADMIN

Network & Security

Focus Guide

INSIDE ROCKY LINUX

- **The New Kid**
  Find out why Rocky is emerging as a leading enterprise Linux
- **Rocky in HPC**
  Explore the tools for high-performance environments
- **Migration Stories**
  Moving from CentOS with migrate2rocky

We interview Rocky founder Greg Kurtzer

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INSIDE ROCKY LINUX

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Dear Readers:

Rocky Linux is catching on with users because it fills a niche. Rocky arrived on the scene just as Red Hat was relegating CentOS to an upstream spot, where it would no longer receive the testing and verification needed for an enterprise-grade product. Users looked for a free Linux that was "100% bug-for-bug compatible with Red Hat Enterprise Linux," and their eyes landed on Rocky. In this special focus guide, we'll take you inside Rocky Linux, and you'll learn why this Linux distro that is still less than two years old has already gained a wide audience with users around the world.

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Explore this all-free Linux distro with enterprise ambitions

Introducing Rocky

Rocky Linux is a new Linux distribution that is easy to use and ready for heavy lifting.

Linux distributions come and go, but once in a while, a promising new distro arrives on the scene and becomes a permanent part of the conversation. One new arrival that is destined to play a big role in the future is Rocky Linux. Veteran users are turning to Rocky because it offers the best of all worlds: an enterprise distro that is all free, is backed by a number of leading vendors and providers, and is maintained by experienced developers with a long-term vision.

Although Rocky is new, its roots run deep. Rocky is "100% bug-for-bug compatible with Red Hat Enterprise Linux," a distribution with its own heritage dating back to the early days of Linux. But there is much more to Rocky than RHEL. The Rocky team also inherits the legacy of CentOS, a quintessential community enterprise alternative that captured a huge share of the Linux server market before Red Hat repurposed it in 2020 (see the box entitled "Rocky's Mission.") Rocky founder Greg Kurtzer was a cofounder of the CentOS project in 2004, and his extensive experience with CentOS is one reason that Rocky came together so seamlessly, with a first release only four months after the initial announcement.

In this special focus guide, you'll learn all about Rocky, its origins, and the promise it holds for enterprise environments. We'll introduce you to Rocky and you'll learn why it has already become a favorite for many enterprise users. We'll also discuss some of the initiatives designed to enhance the power of Rocky in the HPC space. We'll show you how to transition your legacy CentOS systems to Rocky using the handy migrate2rocky script, and we'll even talk with Rocky founder Greg Kurtzer about his vision for the Rocky project.

Rocky's Mission

According to the Rocky community charter, the following objectives describe the project's mission:

- Build a community of individuals and organizations to develop and foster enterprise-grade, open source solutions.
- Work together to provide for the needs of the enterprise community.
- The security, stability, and integrity of our projects are paramount.
- Enable knowledge sharing, inclusiveness, collaboration, and open communication.
- Coordinate with the commercial, research, academic, and public sectors to help bring their products, technologies, and support into enterprise environments.
- Always make decisions in the best interest of the enterprise community while being beholden to no specific organization(s).

Photo by Vladislav Klapin on Unsplash

Rocky Values

The Rocky developers are as interested in culture as they are in code. The community charter lists the following values:

- Be practical. As open source advocates, our inclination toward solving problems is to use tools that are themselves permissible open source, but the best practical solution to a problem may preclude that. We use the right tool for the right job.
- Be reasonable. Respect is given and trust is earned. Input from all contributors is valued, and all perspectives are sought after and considered. Knowledge and righteousness does not follow seniority.
- Team ahead of self. Sycophants are not valuable to an organization, but neither are contrarians. We respectfully vocalize our concerns but pull together to drive forward once a decision has been reached.
- Enable the enterprise community. While we are starting with creating a stable downstream enterprise distribution of Linux, our goals are much broader, including attention to the needs of special interests, project hosting, education, collaboration, workshops, meetups, and individuals.
- Consider the human. Rocky Linux is developed and supported by a wide group of diverse individuals from all walks of life. We are strictly apolitical and will always assume the best intentions of others.

Who's Using Rocky?

Rocky Linux is a full-service enterprise Linux distribution that is equipped to serve on a laptop or professional workstation. The Rocky developers take a practical approach with the emphasis on diversity and respect (see the box entitled "Rocky Values"). Rocky supports all the leading graphic user environments and comes with a best-of-class collection of open source desktop applications. But Rocky is also gaining popularity as a server alternative. You'll find Rocky running on web servers, file servers, and other critical systems across the Internet, fitting into the niche left by CentOS as a free, industrial-strength Linux for common server scenarios. The HPC audience is also turning to Rocky, for its affinity with high-performance tools and it zero-cost-per-instance price point.

How Do I Get Started?

Rocky Linux is available for free download at the Rocky Linux website [https://rockylinux.org/]. The current version is Rocky 9.0, but the Rocky project also maintains a version of Rocky 8.0 for compatibility with RHEL 8 and its derivatives. Rocky flavors are available for the x86, ARM64, PowerPC, and s390 architectures, and you can choose any of the following ISO options:

- Minimal – a self-contained but minimal install set.
- DVD – a full version of Rocky at 7.9GB. (Note that this is too big to fit on a standard DVD.)
- Boot – a version designed for installation over the Internet. You boot a minimal image, and then the installer downloads the rest of the contents.

The Rocky project also maintains a collection of cloud images, as well as a number of special versions they call *alternative images*. Alternative image options include preconfigured images for the KDE, Gnome, and Xfce desktops, as well as a version for the OpenStack cloud.

Finding Rocky Help

The Rocky project maintains several help sources for beginners as well as advanced users. Click *Documentation* on the Rocky homepage, and then choose *Guides and Manuals* to access the Rocky documentation. The documentation comes in several forms. Choose *Guides* in the menu to access the Rocky guides – short how-to entries on specific topics (Figure 1). Categories include networking, security, package management, containers, automation, and more.

You can also choose *Books* to access Rocky's instructional books section. Rocky's books offer extended coverage on specific topics, including how-to steps as well background information and troubleshooting tips. Despite the name, Rocky books are not in ebook form but are, instead, multi-page HTML documents that you can read directly from the website. A handy summary at

the beginning of each entry lists the objectives, estimates the reading time, and gives an assessment of the complexity and the knowledge level of the discussion (Figure 2).
Rocky also has a collection of forums on various topics, where you can pose questions to the community and get real-world responses from Rocky users. Another way to interact directly with the Rocky community is through their Mattermost chat and messaging site at [https://chat.rockylinux.org/].

Read On!

If you're looking for a Linux distribution that combines enterprise stability with a free and open community spirit, turn the page and discover the world of Rocky Linux. ■

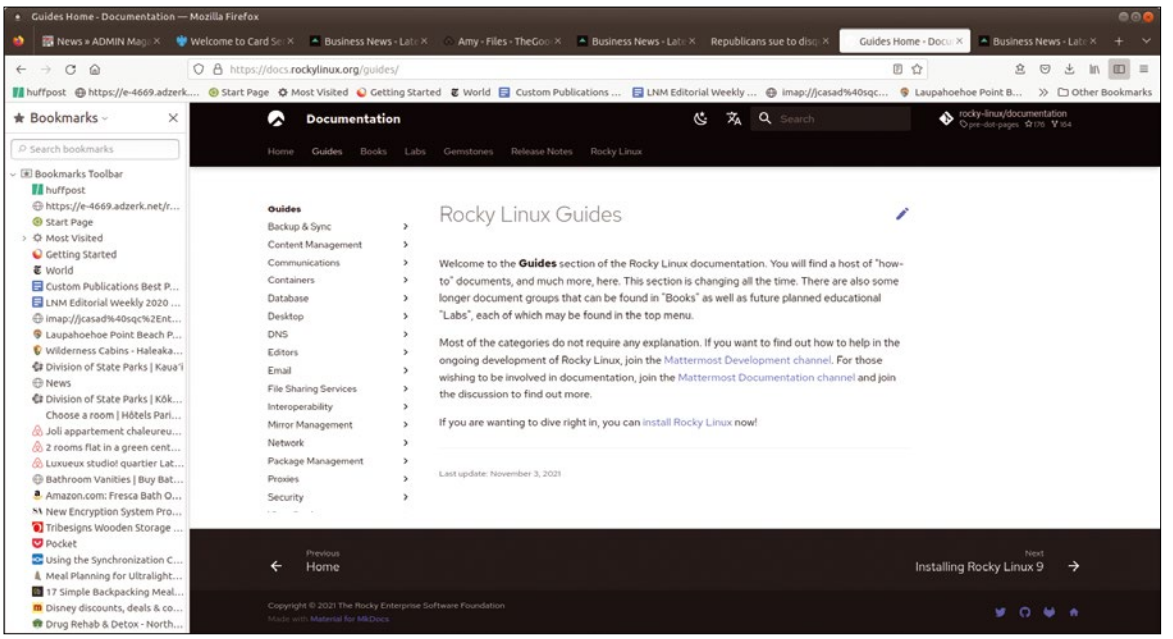

Figure 1: See the Guides section of the Rocky website for help with configuration and other startup tasks.

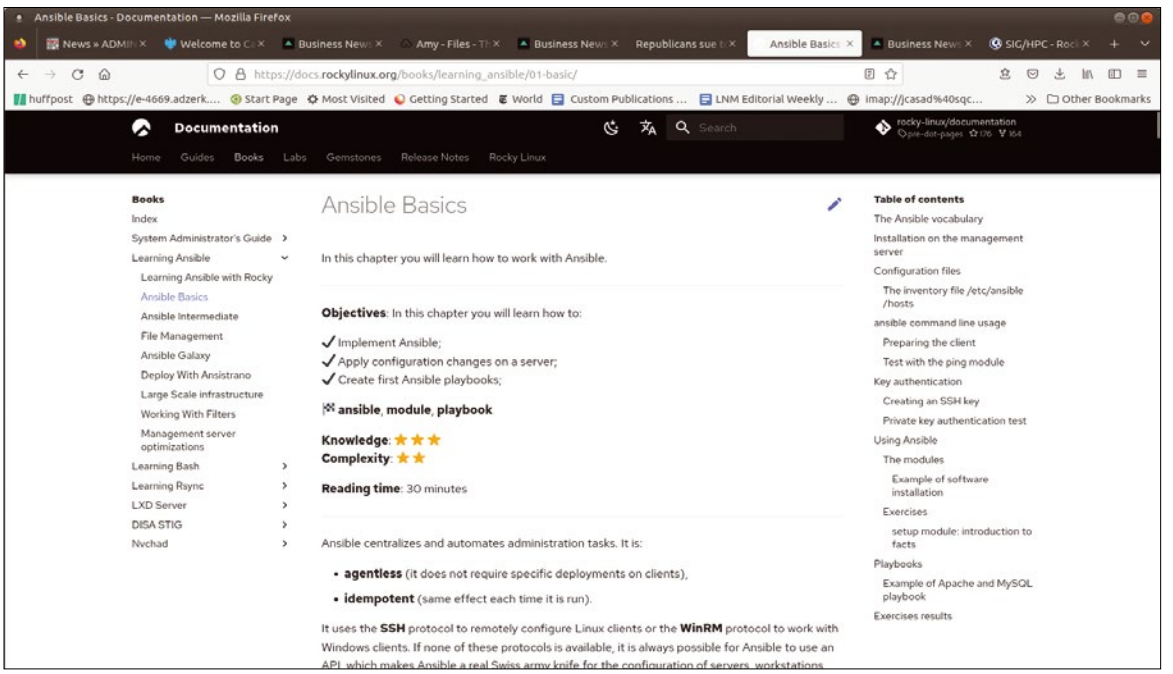

Figure 2: Each Rocky book chapter provides a handy summary describing the objectives and the knowledge level.

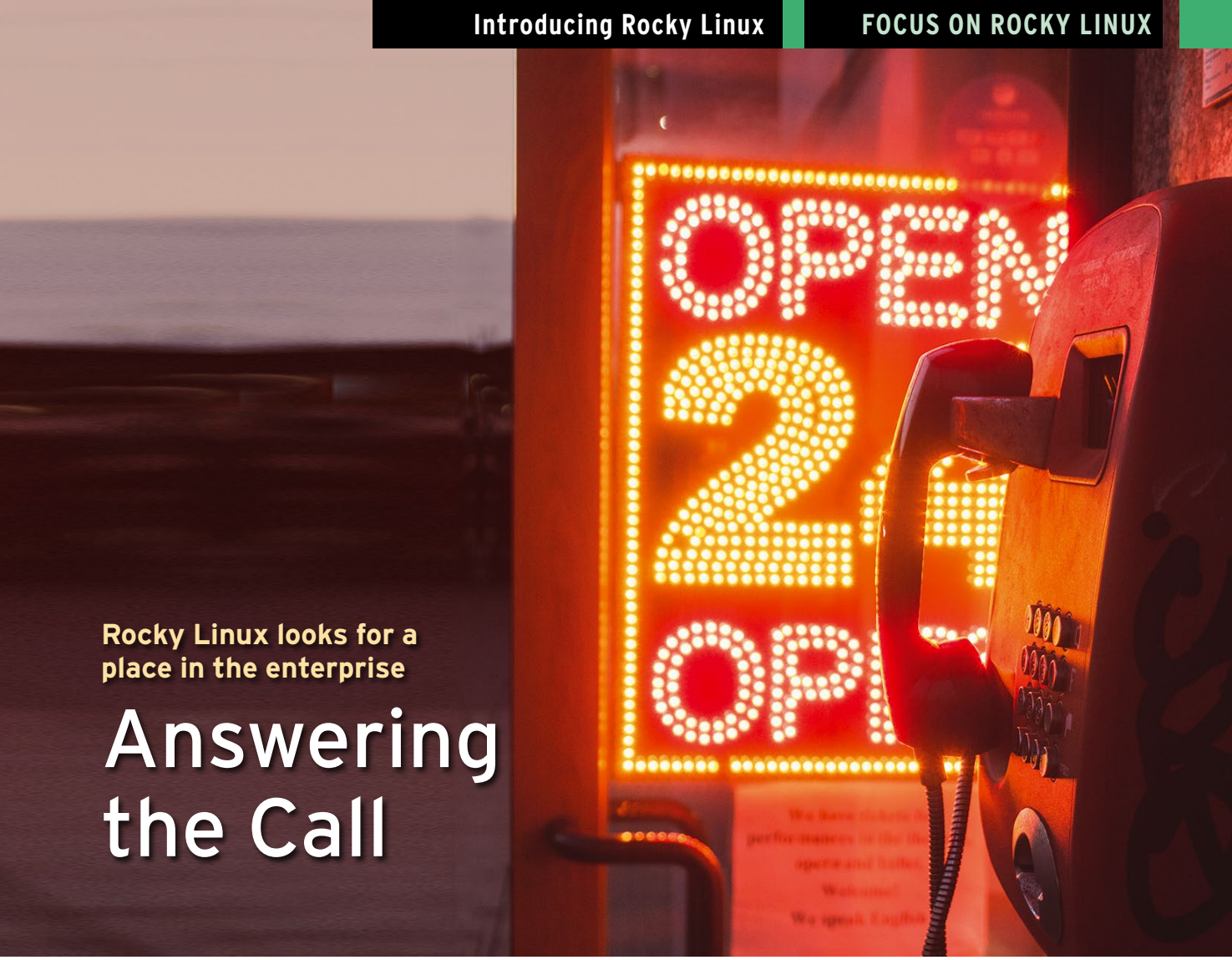

Photo by Mark Pan4ratte on Unsplash

Rocky Linux looks for a place in the enterprise

Answering the Call

Rocky Linux emerges as a free alternative to Red Hat Enterprise Linux. By Joe Casad

The open source world is constantly evolving, and new Linux distributions tend to appear whenever there is a need for them. Rocky Linux **[1]** just appeared last year, partly in response to a shake-up in the enterprise Linux space, but, as is often the case in the open source world, change can lead to opportunity. Rocky is already finding its way into professional server rooms, workstations, and cloud instances.

What is Rocky Linux and where did it come from? The best way to tell the story is to start from the beginning.

A Bit of History

Once upon a time, a free and open source OS called Red Hat Linux served as a cornerstone for the Linux community. Although Red Hat the company was a for-profit business, Red Hat Linux was very much a community effort. Anyone could use it, and many volunteers around the world gave their time for testing, development, and help forums.

Then one day Red Hat (the company) announced that it would no longer provide a binary version of their flagship OS for free download. The binary version would instead require a subscription, which came at a cost and included some support services. If you're wondering whether charging for Linux is consistent with Linux's GNU General Public License (GPL), rest assured that it is. The GPL requires that the *source code* be made available if the program is modified – it doesn't require the distributor to circulate the compiled, binary version for free. As long as Red Hat posted the source code somewhere for download, they were free to charge whatever they wanted for the binary version – and they charged every bit as much as Microsoft was charging for

Windows at the time. (Why not, since Linux was better than Windows?)

In an effort to maintain their ties with the Linux community, Red Hat announced that they would indeed still provide a free version of Linux, which they dubbed Fedora. Many users made the switch from Red Hat to Fedora, and Fedora continues to have fans to this day, but everyone knew that Fedora wasn't exactly the same. First of all, it was upstream from Red Hat Enterprise Linux (RHEL) and therefore did not face the same level of testing. Secondly, it was missing many of the tools and features included with RHEL. Red Hat Linux had morphed into the familiar duality of a "community" and an "enterprise" edition, like so many other open source products in the corporate space.

But the GPL meant they couldn't exactly put their enterprise code away forever. The source code was still out there, as was required by the terms of the GPL, and anyone who wanted to go to the trouble could take the source, remove the trademarks and other proprietary components, and then compile it and give it a different name. At the heyday, several projects offered free, recompiled versions of RHEL. Over time, a leader emerged among the RHEL clones, and it was CentOS. The CentOS community had a loyal community of users and volunteers, and it ran on file servers, web servers, and corporate workstations around the world. Whenever Red Hat put out a new version of RHEL, the CentOS team would perform the necessary adaptations and put out a new version of CentOS. CentOS became one of the most popular Linux variants – and why wouldn't it be: It was absolutely free, and it came with all the testing and refinements of an enterprise-grade Linux.

In 2014, Red Hat announced that it would sponsor the CentOS project and hired several of its developers. Their game plan had changed by that point, and they didn't see it as a problem to maintain free and subscription versions of the same code. It seemed they had come to the view that it could actually *help* them sell RHEL if users would get started on CentOS and then make the change to RHEL when they were ready to sign on for technical support.

IBM's acquisition of Red Hat caused a reordering of priorities, and the company changed course again in 2020, announcing that CentOS would no longer be a clone of the enterprise edition. It would still exist, but it was relegated to an upstream status, much like Fedora.

Once again the community scrambled, searching for a new distro that would play the role that CentOS had played for so long. One of the leading contenders to emerge as a free Linux based on RHEL source is Rocky Linux.

Introducing Rocky

On the same day that IBM and Red Hat announced they were moving CentOS upstream, CentOS co-creator Greg Kurtzer floated the idea of starting a new project that would continue to work with the latest Red Hat Enterprise source. As a CentOS veteran, Kurtzer was interested in more than an enterprise code base – he was also tuned in to the community and focused on the process.

The founding sponsor for the Rocky project is CIQ **[2]**, a company with around 50 employees that provides Rocky support and offers add-on components and services. Unlike RHEL, however, Rocky is an independent project that has several other sponsors, including AWS, Google Cloud, and Microsoft Azure. The storage company 45Drives, another sponsor, uses Rocky as a base for their storage platform. The Sponsors page at the website **[3]** lists 12 sponsors so far, and Rocky is looking for more.

Rocky bills itself as a system that is "…designed to be 100% bug-for-bug compatible with Red Hat Enterprise Linux," which means the latest version of Rocky comes with all the new stuff in the latest version of RHEL. Rocky 9 has all the features and updates you'll find in RHEL 9. Like other enterprise distros, Rocky doesn't purport to offer the most cutting-edge, experimental components. The enterprise audience is more interested in stability, thorough testing, and hardware compatibility. Like RHEL, Rocky offers regular updates and 10 years of support for each release.

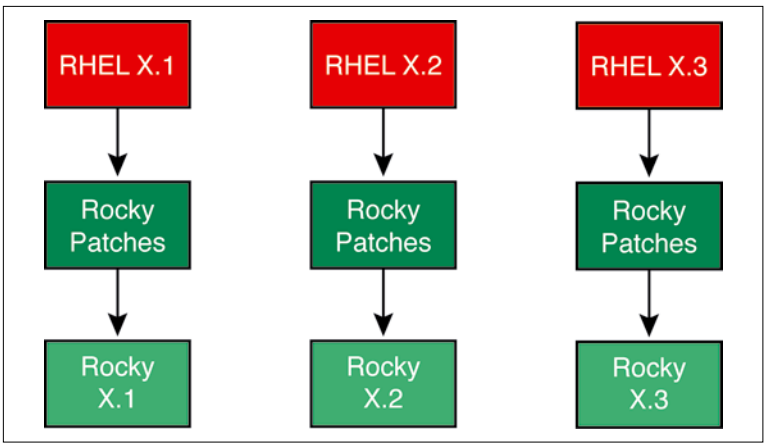

Figure 1: The old method: Rocky patches are applied separately to each release, even if the contents of the patch is the same or nearly the same with each new version.

Peridot

The Rocky developers strive for seamlessness as they keep pace with new releases and updates to the source code repository. In that context, they have contributed one new tool to the community that is attracting lots of positive attention.

Peridot (and yes, you do pronounce the "t") is a cloud-native build system created by the Rocky developers to help them turn out updates. The Rocky team has released Peridot as open source software and makes it available through GitHub. To understand what Peridot does, it is best to start with a look at what the Rocky project does. When Red Hat updates the source code for RHEL, they upload the new code to the CentOS website. (It is confusing, but yes, RHEL code source code is stored on the CentOS site even though the CentOS distro is no longer based on RHEL.) Rocky then downloads that source code and applies patches to it, such as removing trademarks and proprietary art, as well as customizing any settings and components as needed for the Rocky environment (Figure 1). The code is then built and packaged in RPM form and made available to Rocky users. Rocky, and CentOS before it, have been employing some version of this process for years.

In the past, this meant that they had to repeat the same steps for every new release. However, although the source files are unique with each new update, the patches applied to the code often don't change. The Rocky developers therefore built Peridot to automate the patching process. When an update to the RHEL source code appears, you just click one button and Peridot grabs the code, applies the predefined patches automatically, and builds the package (Figure 2).

The Rocky team uses Peridot to build *all* of Rocky Linux, and you can use it to build your own customized distribution, or to build a single package. If you have source code that you maintain locally, Peridot will perform the same service for your local files.

Rocky is betting that Peridot will help them keep up with Red Hat's schedule of new releases and security updates. Peridot could also be just the thing to help support the community of special interest users working on modified versions of Rocky.

SIGs

Rocky encourages users with similar interests to gather

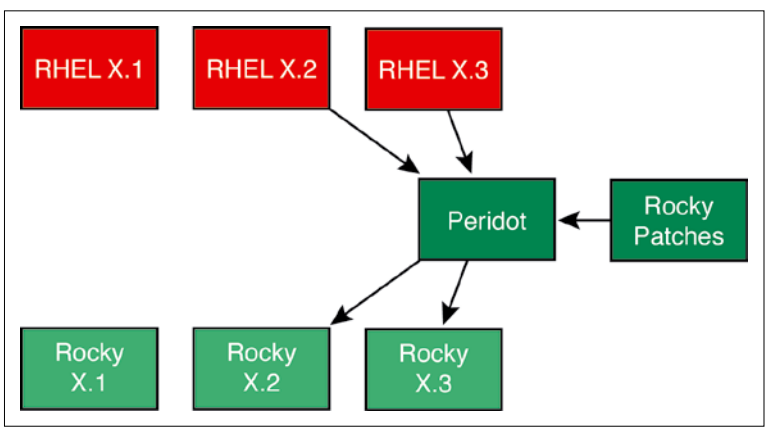

Figure 2: The new method: Peridot is preconfigured with the location of the source code and the location of the patches. When a new version of the source code arrives, the user can click one button to trigger an update.

together online to share solutions and ideas. These Special Interest Groups (SIGs) bring diverse viewpoints and energy to the Rocky project. Rocky has SIGs for Linux kernel, storage, virtualization, desktops, alternative architectures, high-performance computing, and legacy systems. The desktop SIG works on alternative versions for Gnome, KDE, and Xfce. The alternative architectures SIG is hard at work with a version of Rocky for the Raspberry Pi. Other SIGs specialize in containers, hyperscale, and embedded systems.

The Rocky team hopes the SIGs will be more than just chat groups, with several working on alternative spins of the Rocky distribution to support their special interests. High-performance computing (HPC) is a particular area of interest for the Rocky team. HPC systems require extensive testing and tuned-up performance, but at the same time, a massively parallel HPC system can include hundreds (or even thousands) of OS instances, which gives a competitive advantage to systems that are available at a lower cost. CentOS was once a favorite for many HPC users, and Rocky is trying to capture that niche. Rocky creator Greg Kurtzer has a long history with HPC – he also created the Singularity/Apptainer container system for HPC – and CIQ is heavily invested in supporting the HPC space. CIQ's HPC offering includes the Fuzzball (coming Fall 2022) federated computing platform, which is designed to "orchestrate workflows, services, and data globally across data centers while maintaining supply chain integrity from on premise, to cloud, and to the edge."

Community Matters

The Rocky project is officially owned by Rocky Enterprise Software Foundation (RESF). RESF is a public benefit corporation owned by Rocky creator Greg Kurtzer designed with a system of checks and balances to prevent co-option. The community hangs out on a Mattermost chat platform **[4]** (Figure 3). Currently over 7,700 members are registered on Rocky's chat site, not including users who connect through

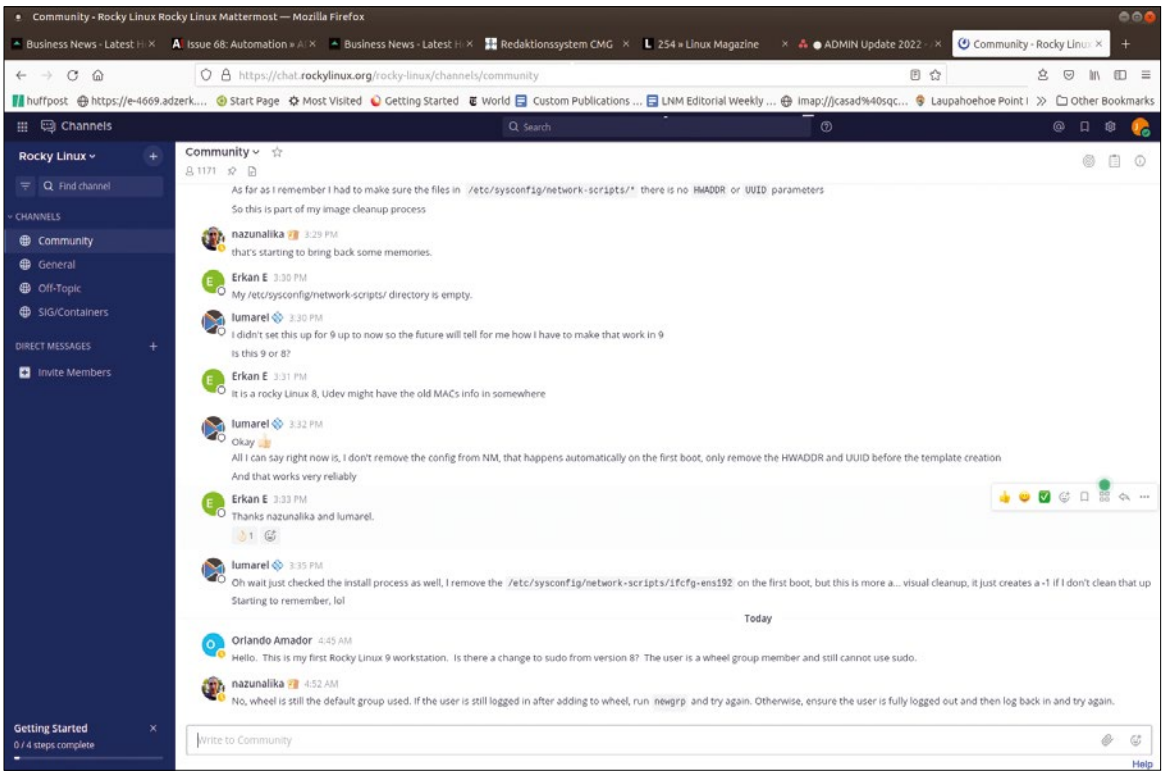

Figure 3: If you have a question about Rocky – or if you just want to get the pulse of the Rocky community – pay a visit to [https://chat.rockylinux.org].

IRC. Rocky also supports a collection of public forums **[5]** for users with more general information on Rocky and related topics.

To underscore its support for community, the Rocky team has adopted a charter, which is posted online at the Rocky forum. The Rocky Linux charter comes with a statement of values, which includes the following:

- Be practical. As open source advocates, our inclination toward solving problems is to use tools that are themselves permissible open source, but the best practical solution to a problem may preclude that. We use the right tool for the right job.
- Be reasonable. Respect is given and trust is earned. Input from all contributors are valued, and all perspectives are sought after and considered. Knowledge and righteousness does not follow seniority.
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- Consider the human. Rocky Linux is developed and supported by a wide group of diverse individuals from all walks of life. We are strictly apolitical and will always assume the best intentions of others.

These values will take the Rocky project a long way as they seek to build a community around their free enterprise Linux.

Conclusion

Rocky does everything RHEL can do, and you don't have to pay for it unless you want support. The Rocky team knows that their mission depends on efficient processes and a strong community, and they are investing heavily in building a process that runs well. The Peridot build system is a big part of that investment. Peridot makes it easy to put out a custom Rocky spin if you have a special need, but before you reinvent the wheel, check out the SIGs at the Rocky chat site – you might find a SIG with a similar vision that would be happy to help with your efforts.

Info

[1] Rocky Linux: [https://rockylinux.org/]
[2] CIQ: [https://ciq.co/]
[3] Rocky Sponsors: [https://rockylinux.org/sponsors/]
[4] Rocky chat platform: [https://chat.rockylinux.org]
[5] Rocky forum: [https://forums.rockylinux.org/]

Scaling up for high performance

Rocky Reaches for a Role in HPC

Can this enterprise Linux fill the void left by CentOS? By Joe Casad

When Red Hat announced that it would stop supporting CentOS as a free Linux distro based on Red Hat Enterprise Linux (RHEL), the whole Linux IT world had to scramble, but nowhere was that crisis more acute than within the HPC community. CentOS, which offered RHEL-level stability, testing, and performance without the expensive licensing fees, was a cornerstone of the world's HPC infrastructure.

One reason for the importance of CentOS to the HPC market was cost. The largest HPC systems on the TOP500 list are created with huge budgets where the operating system is less of a factor in the overall cost, but on all the other HPC systems, running in universities, research institutions, and corporate server rooms around the world, economy really does matter. Although Red Hat would love to sell you a paid license for every system in your HPC cluster, the cost is often prohibitive, and, in many cases, unnecessary. CentOS, which was 100 percent compatible with RHEL, could run on the same systems without the licensing cost. Some HPC systems ran all CentOS; others put RHEL on the head nodes and CentOS on the compute nodes. Either way, the sudden loss of CentOS was a big deal for the HPC community. CentOS gave institutions the flexibility to balance software licensing cost versus hardware cost, and it was clear that something new would have to emerge to fill the niche. According to many HPC users and developers, that something is Rocky Linux **[1]**. Although other RHEL clones have appeared since Red Hat retired CentOS, Rocky appears to be the one that is most invested in filling the vacancy in the HPC space.

Gregory Kurtzer, who founded Rocky Linux, was one of the founders of CentOS and has long-standing ties with the CentOS community. Kurtzer also has close ties with HPC and is credited with founding several high-profile HPC initiatives, such as Warewulf and Apptainer (formally Singularity). In parallel with launching Rocky Linux, Kurtzer started a company called CIQ **[2]** to support Rocky development, consolidate ongoing work for the various HPC projects he is

Photo by Christina-wocintechchat on unsplash

associated with, and drive development of a new generation of tools for compute-intensive workloads. The Rocky Linux project was announced within hours after Red Hat announced it was moving CentOS upstream (see the box entitled "Where Did CentOS Go?").

What Is Rocky

Rocky Linux bills itself as "bug-for-bug compatible with Red Hat Enterprise Linux" (Figure 1). The Rocky system is compiled from the same sources as RHEL. If you're an HPC developer or user, and you're wondering what makes Rocky Linux different from RHEL, the answer is in the energy, the approach, and the connections with the HPC community, in addition to a governance structure that eliminates the possibility of a sudden end like the fate that befell CentOS. According to Kurtzer, Rocky had more than 10,000 members in its Slack space within six weeks after the launch, and they eventually got too big to use Slack effectively. The Rocky Linux community now includes many thousands of users through its online forum **[3]** and Mattermost site **[4]**.

Rocky's ties with the HPC community begin with Kurtzer and lead to other Rocky developers working to integrate Rocky Linux with the HPC environment. The Rocky team is currently working closely with the OpenHPC project **[5]**. (OpenHPC is an effort to consolidate the most important open source HPC components into a single working environment.) And the OpenHPC project is equally interested in building roads back to Rocky. OpenHPC has announced that the testing and installation recipes for CentOS will transition to Rocky Linux instead. According to the OpenHPC project **[6]**, "With the announcement that CentOS 8 is being discontinued at the end of 2021, the OpenHPC project is migrating example installation recipes and associated testing to use Rocky 8." OpenHPC is not directly affiliated with any Linux brands, but they do base their development and testing on a few reference distros. The RHEL clones are all compatible, so theoretically, any one of them

Where Did CentOS Go?

Did Red Hat make CentOS disappear? It depends on how you look at it. The important thing is that CentOS Linux will no longer be based on the final RHEL source code. Red Hat launched a new project called CentOS Stream that is located upstream from RHEL in the development process and thus will not have the tuning, testing, and validation that comes with RHEL.

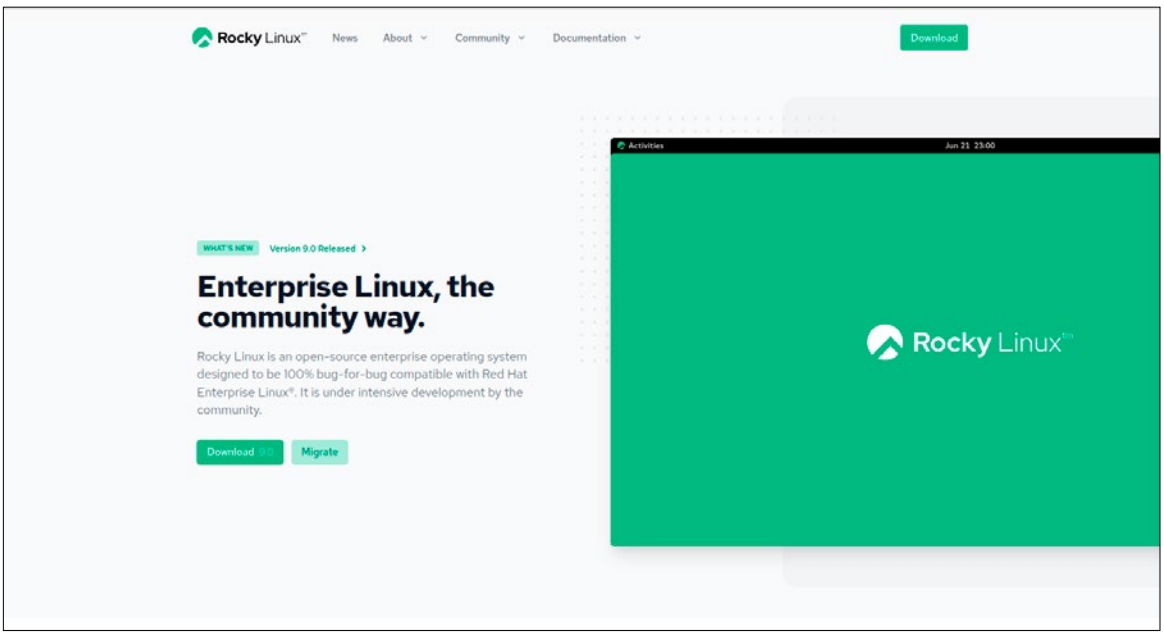

Figure 1: Unlike some RHEL derivatives, Rocky is not shy about celebrating its Red Hat lineage.

could run OpenHPC, but the use of Rocky Linux for testing and installation recipes underscores its emergence as the RHEL clone of choice for HPC settings.

The Big Picture

CIQ is currently developing and promoting some tools to expand and extend Rocky within the HPC space. Much of this work centers around open source utilities that Kurtzer developed independently and has now brought into focus through CIQ. These tools are available to everyone, not just CIQ, but they are at the center of CIQ's support offering, and Kurtzer's presence as a guiding force for Rocky Linux brings additional synergies.

Warewulf **[7]** and Apptainer/Singularity **[8]** have both been around for many years. Warewulf is a cluster-management and provisioning tool that has been used in HPC clusters for more than 20 years for large-scale stateless operating system management. The goal of Apptainer is to bring the benefits of container technology to the HPC space. One of those benefits is portability. By encapsulating the software stack with the application, Apptainer offers a chance for flexibility across a complex hardware environment without compromising performance. Another benefit of a container architecture is a security model that is more appropriately optimized for clustering and supply chain security. CIQ envisions combining Rocky Linux, Warewulf, and Apptainer with OpenHPC to form an integrated HPC stack.

CIQ's ambitious Fuzzball **[9]** project, on the other hand, charts a whole new parallel direction for HPC and could one day serve as a building block for the next-generation HPC platform, HPC 2.0. The Fuzzball developers refer to their project as a "cloud-native, cloud-hybrid, neutral, meta-orchestration platform for all performance-intensive workloads and data." Fuzzball, which will debut later this year, is intended as a complete rethink of the traditional concept of an HPC cluster as a flat, monolithic collection of parallel nodes with shared storage and management through SSH. The Fuzzball environment is API-driven and provides for a configurable HPC infrastructure that is well suited for cloud and cloud hybrid settings.

Rocky Linux is still new, but it has already built a large community of users and developers. Through its commitment to core HPC projects like OpenHPC, and its close affinity with open source tools that extend and expand the HPC space, Rocky Linux appears positioned to fill the space left by CentOS as a core operating system for HPC. ■

Info

[1] Rocky Linux: [https://rockylinux.org/]
[2] CIQ: [https://ciq.co/]
[3] Rocky Linux Forum: [https://forums.rockylinux.org/]
[4] Rocky Linux Mattermost: [https://chat.rockylinux.org/]
[5] OpenHPC: [https://openhpc.community/]
[6] GitHub OpenHPC: [https://github.com/openhpc/ohpc/releases/tag/v2.4.GA]
[7] Warewulf: [https://warewulf.org/]
[8] Apptainer: [https://apptainer.org/]
[9] Fuzzball: [https://ciq.co/fuzzball/]

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Photo by Ray Hennessy on Unsplash

Migrating CentOS to Rocky Linux with migrate2rocky

Safer Ground

CentOS users need to find a replacement soon. If you use CentOS 8 and you're looking for safer ground, the migrate2rocky script will automatically migrate your system to Rocky Linux – an enterprise RHEL derivative created by CentOS co-founder Greg Kurtzer. By Artur Skura

Red Hat's announced re-envisioning of the popular CentOS Linux distribution **[1]** caused a major disruption in the Linux space. According to some surveys **[2]**, CentOS was actually the third most popular Linux distribution in the world (after Ubuntu and Debian), and all those CentOS instances weren't just running on desktops. CentOS has carved out a role as a distro of choice for web servers, file servers, and even high-performance computing systems.

If you're wondering how the world will get along without CentOS, the first thing to know is that Red Hat didn't eliminate the CentOS *brand*, but they did move it upstream. CentOS used to be based on Red Hat Enterprise Linux source code, which meant that all the testing, troubleshooting, and verification that went into Red Hat's flagship distro also applied to CentOS. Now the CentOS developers will pull code from the RHEL development pipeline at an earlier point in the process, so it won't receive the value-added testing and verification that goes into RHEL. The newly named *CentOS Stream* distribution will fall somewhere between Fedora and RHEL in the development cycle, which significantly reduces its value to enterprise customers. Those thousands of CentOS users are now searching for a solution. Luckily, the Linux community specializes in in-flight adaptations to adjust to changing times. CentOS is not the only distribution based on RHEL source code. Some existed previously, and a few others launched after Red Hat's announcement. One of the newcomers is Rocky Linux **[3]**. The Rocky project, which launched one day after Red Hat announced that it was

CentOS Versions

The only CentOS version still receiving maintenance updates is CentOS 7, which is a relatively ancient system. CentOS 7 first appeared in 2014 and stopped receiving full updates in mid-2020. Still, you can find it on many servers, and several hosting providers offer images allowing you to start new projects on CentOS 7 servers. But because CentOS 7 is basically an old system, running the 3.x kernel, it is not supported by Rocky Linux – Rocky has no equivalent to CentOS 7.
CentOS 8 was the last version of the CentOS distribution, released in September 2019. This version corresponds to RHEL 8 (with 4.x kernels), of which multiple minor versions have been released since. Rocky Linux 8.4 appeared over a month after RHEL 8.4, whereas 8.5 and 8.6 were released less than a week after Red Hat's releases. RockyLinux 8 will be supported until June 2029.
In May 2021, Red Hat released RHEL 9 based on CentOS Stream and including Linux kernel 5.14. Two months later Rocky Linux 9 appeared. The distribution will be supported until the end of May 2032. If you are starting a new project and are considering using Rocky Linux, you should probably install the most recent version, Rocky 9. However, if you are migrating from CentOS 8, setting up Rocky 8 with the migrate2rocky script is a convenient option.

moving CentOS upstream, was started by one of the founders of CentOS, who envisions it as an enterprise-ready (and cluster-ready) alternative to RHEL. By now, most CentOS users know the clock is ticking, and they will need to find an alternative. (See the box entitled "CentOS Versions.")
The heat is on now for users who want to jump ship. Migrating a server is a delicate operation, and many things can go wrong. If you're thinking about making the jump to Rocky Linux, the good news is that the developers provide a script that will automatically transition your system from CentOS to Rocky. The migrate2rocky script described in this article **[4]** supports upgrades from CentOS 8, and another script called migrate2rocky9.sh supports RHEL 9-based distributions. If you are still using CentOS 7, the recommended solution is to set up a new server with either Rocky 8 or 9, and manually install all services that were running on your old CentOS 7 server. (The ELevate project **[5]**, which is sponsored by AlmaLinux, is working on an automated alternative for CentOS 7 migration that is still under development.) For CentOS 8 and 9 users, the migrate2rocky* scripts provide a fast and convenient way to escape the abandoned CentOS for higher ground.

Preparing for Migration

If you are running CentOS 8 or one of the other distributions based on RHEL 8, the migration process is fairly simple. The first step is to make sure you have enough space on your partitions: 250MB on */usr*, 1.5GB on */var*, and 50MB on */boot*. Failure to ensure you have enough disk space will break the migration process and might render your server unusable. Depending on the combination of packages, unexpected problems can arise, so it is important to make a full backup of the server before attempting the migration. All the following operations should run as root.
Connect to your server and fire up a session manager such as *tmux* or *screen*. You can install *screen* with:

```
dnf -y install screen
```

And then run it by typing:

```
screen -S migration
```

A tool like `tmux` and `screen` will allow the migration process to continue if anything happens to your connection (unlike plain SSH, which could terminate the migration process if your connection is cut short). To reconnect with a running session, enter:

```
screen -r migration
```

The next step is to make sure the system is up to date by running:

```
dnf update
```

```
migrate2rocky - Begin logging at Tue 23 Aug 2022 10:53:21 PM CEST.

Usage: migrate2rocky.sh [OPTIONS]

Options:
-h Display this help
-r Convert to rocky
-V Verify switch
   !! USE WITH CAUTION !!
[root@ws231 migrate2rocky]# ./migrate2rocky.sh -r
migrate2rocky - Begin logging at Tue 23 Aug 2022 10:53:31 PM CEST.

Modular dependency problems:

 Problem 1: conflicting requests
  - nothing provides module(perl:5.26) needed by module perl-IO-Socket-SSL:2.066:8030020201222215140:1e4bbb35.x86_64
 Problem 2: conflicting requests
  - nothing provides module(perl:5.26) needed by module perl-libwww-perl:6.34:8030020201223164340:b967a9a2.x86_64

Removing dnf cache
Preparing to migrate CentOS Linux 8 to Rocky Linux 8.
```

Figure 1: The migrate2rocky script finds only two issues in the existing CentOS 8 configuration and proceeds with the migration.

```
  python3-oauthlib-2.1.0-1.el8.noarch
  python3-ply-3.9-9.el8.noarch
  python3-prettytable-0.7.2-14.el8.noarch
  python3-pycparser-2.14-14.el8.noarch
  python3-pyserial-3.1.1-8.el8.noarch
  python3-pysocks-1.6.8-3.el8.noarch
  python3-pytz-2017.2-9.el8.noarch
  python3-pyudev-0.21.0-7.el8.noarch
  python3-pyyaml-3.12-12.el8.x86_64
  python3-requests-2.20.0-2.1.el8_1.noarch
  python3-setuptools-39.2.0-6.el8.noarch
  python3-setuptools-wheel-39.2.0-6.el8.noarch
  python3-six-1.11.0-8.el8.noarch
  python3-slip-0.6.4-11.el8.noarch
  python3-slip-dbus-0.6.4-11.el8.noarch
  python3-unbound-1.7.3-17.el8.x86_64
  python3-urllib3-1.24.2-5.el8.noarch
  qrencode-libs-3.4.4-5.el8.x86_64
  quota-1:4.04-14.el8.x86_64
  quota-nls-1:4.04-14.el8.noarch
  readline-7.0-10.el8.x86_64
  rootfiles-8.1-22.el8.noarch
  rpcbind-1.2.5-8.el8.x86_64
  setup-2.12.2-6.el8.noarch
  sg3_utils-1.44-5.el8.x86_64
  sg3_utils-libs-1.44-5.el8.x86_64
  shared-mime-info-1.9-3.el8.x86_64
  slang-2.3.2-3.el8.x86_64
  snappy-1.1.8-3.el8.x86_64
  sqlite-3.26.0-15.el8.x86_64
  sqlite-libs-3.26.0-15.el8.x86_64
  squashfs-tools-4.3-20.el8.x86_64
  tar-2:1.30-5.el8.x86_64
  teamd-1.31-2.el8.x86_64
  timedatex-0.5-3.el8.x86_64
  tpm2-tss-2.3.2-4.el8.x86_64
  trousers-0.3.15-1.el8.x86_64
  trousers-lib-0.3.15-1.el8.x86_64
  unbound-libs-1.7.3-17.el8.x86_64
  userspace-rcu-0.10.1-4.el8.x86_64
  ustr-1.0.4-26.el8.x86_64
  wget-1.19.5-10.el8.x86_64
  xkeyboard-config-2.28-1.el8.noarch

Complete!



Done, please reboot your system.
A log of this installation can be found at /var/log/migrate2rocky.log
[root@ws231 migrate2rocky]#
```

Figure 2: The migration has been completed and the system can now be restarted to automatically boot Rocky Linux 8.

If you see a message saying there is nothing to update, you are good to go. Otherwise, wait for the process to finish, then reboot the machine. The reboot will ensure that all system files have actually been updated.

The migrate2rocky script relies on the original CentOS repositories being present. If you haven't modified the default repositories, you should be fine. Otherwise, you need to make sure at least `/etc/yum.repos.d/CentOS-Linux-BaseOS.repo` is present and enabled.

Installing migrate2rocky

The best way to obtain migrate2rocky is using Git. If Git is not installed, set it up with:

```
dnf -y install git
```

Next, clone the repository that includes the migration script:

```
git clone https://github.com/rocky-linux/rocky-tools.git
```

If you are not particularly concerned with security, you can download the script directly using a tool such as Curl or Wget:

```
wget
https://raw.githubusercontent.com/
  rocky-linux/rocky-tools/main/
  migrate2rocky/migrate2rocky.sh
```

If you used the Git method, you need to change the directory:

```
cd rocky-tools/migrate2rocky/
```

Finally, make it executable with:

```
chmod u+x migrate2rocky.sh
```

Running the Migration Script

The script has only three options: *-h* to display a short help message, *-r* to start the conversion, and *-V* to verify the system. If you completed all the previous steps, you are now ready to start the main migration process (Figure 1):

```
migrate2rocky.sh -r
```

If you migrate a freshly installed server, the script should run without any trouble. On the other hand, very few people need to migrate a freshly installed CentOS 8 server because, if you are setting up a server now, it would make more sense to install Rocky Linux directly instead of installing CentOS. It is safe to assume the typical user of the migration script is working with a CentOS system that has been in use for a while and has some services that were originally installed a few years ago. It is impossible to test every possible combination of packages and custom software, but in our tests, migrate2rocky performed

```
migrate2rocky - Begin logging at Tue 23 Aug 2022 10:53:31 PM CEST.

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 Problem 2: conflicting requests
  - nothing provides module(perl:5.26) needed by module perl-libwww-perl:6.34:8030020201223164340:b967a9a2.x86_64

Removing dnf cache
Preparing to migrate CentOS Linux 8 to Rocky Linux 8.

Determining repository names for CentOS Linux 8......

Found the following repositories which map from CentOS Linux 8 to Rocky Linux 8:
CentOS Linux 8  Rocky Linux 8
appstream       appstream
powertools      devel
ha              ha
baseos          baseos
extras          extras
powertools      powertools

Getting system package names for CentOS Linux 8.........

Found the following system packages which map from CentOS Linux 8 to Rocky Linux 8:
CentOS Linux 8        Rocky Linux 8
centos-logos-ipa      rocky-logos-ipa
centos-backgrounds    rocky-backgrounds
centos-gpg-keys       rocky-gpg-keys
centos-logos          rocky-logos
centos-indexhtml      rocky-indexhtml
centos-linux-release  rocky-release
centos-logos-httpd    rocky-logos-httpd
centos-linux-repos    rocky-repos

Getting list of installed system packages.

We will replace the following CentOS Linux 8 packages with their Rocky Linux 8 equivalents
Packages to be Removed  Packages to be Installed
centos-gpg-keys         rocky-gpg-keys
centos-linux-release    rocky-release
centos-logos-httpd      rocky-logos-httpd
centos-linux-repos      rocky-repos

In addition to the above the following system packages will be removed:
centos-linux-release
centos-linux-release

Getting a list of enabled modules for the system repositories.

/var/log/migrate2rocky.log
```

Figure 3: Reviewing the log file /var/log/migrate2rocky.log.

surprisingly well and managed to update a system with a number of customizations without any problems.
In our lab, we used a system with the Apache, PHP, MariaDB, and NGINX acting as a reverse proxy, as well as an ancient version of MongoDB from MongoDB repository left over from CentOS 7. The script replaced all relevant packages correctly (Figure 2) and everything worked fine after the reboot, including MongoDB.

Caveats

If you use OpenJDK, you might find that Java no longer works: This issue is caused by missing symlinks in */etc/alternatives*. The problem is caused by the OpenJDK package, and as a temporary workaround, you can use the following command:

```
rpm -qa --scripts java-{1.8.0,11}➥
  -openjdk-{headless,devel} | ➥
  sed -n ,/postinstall/, /exit/{ ➥
  /postinstall/! { /exit/ ! p} }' | sh
```

If your IPA server fails to run after the migration, use the following command (after fixing the Java issue mentioned above):

```
ipa-server-upgrade --skip-version-check
```

It is also worth checking the log file */var/log/migrate2rocky.log* (Figure 3), which might contain errors the script encountered during the migration. There should be very few errors, but it is worth looking into each error to understand if anything needs fixing.

Conclusion

If you proceed according to instructions and take the necessary precautions, the migration from CentOS 8 to Rocky Linux 8 is a simple process – definitely easier than a manual upgrade between major versions. Given the fact that Rocky 8 will be supported until the end of May 2029, your server should be safe until then. However, if you are just running a few services and your configuration is fairly simple, you might want to consider setting up a new server based on the more modern Rocky Linux 9 and manually migrating the services one by one. ■

Info

[1] CentOS Project Shifts Focus to CentOS Stream: [https://blog.centos.org/2020/12/future-is-centos-stream/]

[2] 40 Linux Statistics You Need to Know: [https://kommandotech.com/statistics/linux-statistics/]

[3] Rocky Linux: [https://rockylinux.org/]

[4] migrate2rocky: [https://github.com/rocky-linux/rocky-tools/tree/main/migrate2rocky]

[5] ELevate Project: [https://wiki.almalinux.org/elevate/]

Up close with Rocky founder Greg Kurtzer

Set It Free

Rocky Linux founder Greg Kurtzer shares his thoughts on Rocky and the road ahead. By Joe Casad

Rocky Linux is new, but it draws from a long history of community-minded volunteers focused on keeping a free Linux option in the enterprise space. Rocky founder Greg Kurtzer tells the story.

Tell us a little about yourself. How did you get started with computers – and with Linux? What was your motivation for launching CentOS 20 years ago?

I've always been interested in computers, even at a very young age. In elementary school, I spent lunch time using the Apple IIe that was in our classroom, learning to program. But for me, I always considered working on computers more play than work.
In school I studied biochemistry and started my career working in pharmaceutical research in the mid 90s. In doing genomic analysis, I began to use more computational resources to quantify and annotate genomic data as the bioinformatics field was just emerging. This was where I was first introduced to Linux and open source, which I became enamored with and thus ended up pivoting my career. From then on, everything was Linux and open source coupled with science, so HPC and research computing was my perfect niche.
I ended up at Lawrence Berkeley National Laboratory within the US Department of Energy with a joint appointment to UCOP/UC Berkeley. It was there that I started my first big open source project (Warewulf, a cluster operating system management) and, shortly thereafter, cAos Linux, the cAos Foundation, and then CentOS, which came out of my work with cAos.
The motivation to build CentOS occurred when Red Hat killed off their freely available Linux platform called Red Hat Linux (RHL) in favor of Red Hat Enterprise Linux (RHEL), which was only available commercially. At that point, we were still bootstrapping and basing cAos Linux Core off of RHL, so this affected us greatly, and we decided to rebuild the RHEL sources as cAos-EL, which then became CentOS Linux.

Where were you when you heard that Red Hat was repurposing CentOS? Was it a total surprise, or was it something that you could see brewing for a long time?

When I first heard that Red Hat was acquiring CentOS Linux, it

was because I had a number of contacts from software vendors who were concerned that one of the biggest operating systems used by their customers would be under the control of the same company that pretty much sold the same bits. It seemed like a conflict of interest, but my response was to see how it played out.

Later, when I heard that Red Hat was being acquired by IBM, it was because I had a number of contacts from hardware vendors who were concerned that their competition now owned the two biggest Enterprise Linux options for their customers (RHEL and CentOS). Again, I didn't want to have a knee-jerk reaction, and instead I gave them the benefit of the doubt, because Red Hat had been doing well balancing the conflict of interest so far.

I created CIQ based on a vision for the next generation of computing software infrastructure, and we were planning on building out and supporting a full software stack. Our stack was to be built on top of CentOS, so we did some diligence and saw the writing on the wall that something was going to change. We created some contingency plans, "just in case," and even though we were somewhat prepared that something was going to happen, it was still surprising. Because the changes to CentOS affected us, it affected our customers and the community at large, so I quickly responded, and within hours, Rocky Linux was born via my comment on the CentOS Blog post.

CentOS was supposed to be an open source project, with its own governing board. How did it end up disappearing upstream?

My role in CentOS was limited to only the first one to two years of the project's foundation. CentOS came out of another Linux distribution project called cAos Linux, for which I created the cAos Foundation, a nonprofit organization that was the legal entity and decision-making authority behind cAos Linux. Rocky McGaugh, who was an early community member and developer, announced the name change and that he was 99 percent complete with the first version of CentOS. CentOS was under the cAos Foundation for only the beginning of the project's life, as Lance Davis was allowed to control some of the assets personally and thus take over the project. Lance continued to hold the CentOS assets for many years until this "Open Letter to Lance Davis." The project only survived due to the dedication and integrity of the developers and contributors, to whom the CentOS community owes a debt of gratitude.

Over time Red Hat was able to acquire the project by hiring the remaining CentOS team and gaining control with a new board structure that they defined, led, and controlled. We put in a number of protections to protect the projects under the Rocky Enterprise Software Foundation (RESF) from this sort of thing.

How do we know the same thing won't happen with Rocky? I understand that CIQ is not Red Hat, but how did you approach it differently this time? What steps did you take to ensure Rocky's permanence and independence?

The longevity and stability of Rocky Linux has been our goal since day one. I used to believe that the best path for an open source project was to roll the project into a well-funded host company that can contribute ongoing resources (like CentOS, Fedora, Ubuntu, Elasticsearch, etc.), but I was wrong.

When an open source project is under a profit-motivated corporation (especially when the company is productizing the project), it runs the risk of alienating outside contributors, and company-sponsored development fills in the gaps. More strategic engineering conversations start happening solely within the company, not in the community, thus the community suffers. I believe this problem is unmanageable unless the control structure for the open source project exists outside of a corporate entity.

"If you love something, set it free." That is how I feel about open source projects, and this applies to my own company as well. That is why CIQ does not own or control any of the open source projects we've created or contributed to. We "set them free" to the community.

This also forces us to build an ethical business model by adding value, not controlling or holding the project hostage.

Companies, vendors, and people come to us when they need help beyond what the community provides or if they need a product that delivers more value to customers.
In short, we set up the RESF so that no company, not even CIQ, can do the same thing to Rocky that Red Hat did to CentOS. The RESF is also available to host other open source projects that are looking for neutral ground and collaboration across company barriers.

The Rocky Enterprise Software Foundation is actually a public benefit corporation (PBC), with you as the owner. Why did you choose a PBC instead of a conventional nonprofit corporation?

About 10 years ago, it started becoming difficult for open source projects to gain charitable organization status from the IRS through a conventional 501(c)3 nonprofit structure. 501(c)6 is what some open source projects are heading for, but specifically that type of a nonprofit focuses on supporting commercial activities rather than the general public benefit. Either way, tax-exempt status is no panacea guaranteeing that the organization will protect assets properly or even avoid succumbing to corruption. Being a nonprofit is not a recipe for integrity.
So what is the recipe for integrity? We think that the answer is accountability. At the RESF, this accountability starts with making promises, sharing visions, doing the right thing, and defining a structure of checks and balances. All this gets codified with bylaws, a charter, publicly defined principles, and transparency, all providing absolute accountability for our actions. We are a self-imposed not-for-profit organization specifically for the benefit of the general public, and we ask for the community to hold us accountable.
The RESF bylaws and charter will be ratified in the next few weeks, and we are very excited to share with the world how this vision for accountability is unfolding.

Describe the Rocky development process. How many developers work for Rocky? What percentage of them work for CIQ (versus volunteers)? Rocky has several other sponsors in addition to CIQ. Do other companies commit full-time coders to the Rocky project? Did a lot of former CentOS volunteers follow you over to Rocky?

Great questions…. First point, no developers work for Rocky or the RESF proper. From that first blog post, every single person, and every contribution came from a volunteer. In less than two months, we had over ten thousand volunteers join to help, coming from all corners, including CentOS and Fedora. And to date, CIQ has hired fewer than 10 people from the Rocky Linux community. That means Rocky development, engineering, and infrastructure is controlled directly by the community, which manages all resources. This means all companies are welcome!
Rocky and the RESF have many sponsors, partners, and contributors who provide resources to the project (CIQ is one of them). Having many organizations associated with the project is critically important for longevity. A great example is Google, which not only joined and sponsors Rocky Linux, but also supports Rocky Linux directly to all Google customers and offers a version of Rocky Linux that is optimized for Google Cloud.

The Peridot build tool received some attention in the press as an innovative open source tool from the Rocky project. What is Peridot and how is it important for Rocky's evolution?

Peridot is an absolute game changer for all Linux build systems, not just Rocky! To date, build systems have been purpose built to run on dedicated servers, most of them project or company specific, not well documented, not easy to replicate, and very difficult to fix or customize.
One of the first things we realized was that creating the infrastructure necessary to build the operating system was actually *more* complicated and more important than building the operating system itself. It is critical for the build system to take advantage of modern capabilities around cloud native orchestration. That is what Peridot is, a completely cloud-native, stateless, build system that can easily ride on top of Kubernetes.

But wait, there's more! Peridot is designed to help with the important goal of allowing the community at large to take part in the core development, as well as enhancements of Rocky Linux via Special Interest Groups (SIGs). Peridot also allows someone to "fork" the operating system to make specific versions or builds of Rocky Linux for custom sites, appliances, or other value-add builds.
I'm so excited about the innovation that Peridot brings to the table for Linux distributions, optimization, extensibility, and flexibility. Peridot helps make Rocky Linux the Enterprise Linux for all use cases.

HPC is clearly an area of emphasis for the Rocky community. Are there other sectors Rocky is targeting? CentOS used to run on a lot of ordinary web servers and file servers. Do you see Rocky fitting into that space, or are you aiming more at the enterprise, cloud-native market? OK, I get that Rocky Linux can do everything RHEL can do, but I guess the question is more about where Rocky is putting its energy.

HPC is an emphasis for Rocky Linux, just as HPC was an emphasis for CentOS. Members of the early CentOS team (including Rocky McGaugh and myself) were coming from an HPC background and motivation. Aside from that, there are many areas of emphasis for the Rocky community.
The project is focused on several areas: 1) The base Rocky Linux as a bug-for-bug compatible and completely stable Enterprise Linux variant; 2) the infrastructure necessary to build, maintain, and enhance Rocky Linux; and 3) development of special interest groups, such that all areas of the ecosystem can enhance and build targeted versions of Rocky Linux (e.g., cloud, HPC, hyperscale, etc.). This makes Rocky Linux a perfect general purpose operating system for all use cases and stable environments.

Lots of Linux distros are out there. What makes Rocky different?

Rocky is filling the immediate pain point that CentOS left behind, so it is less of "What makes Rocky different" as opposed to what makes Rocky Linux the best replacement for CentOS. Rocky is specifically focused on the enterprise community of professional organizations and individuals. This niche includes engineers who are ultimately responsible for the servers and infrastructure that power their organizations. ■

■