



Red Hat Enterprise Linux 8

Converting from an RPM-based Linux distribution to RHEL

Instructions for a conversion from CentOS Linux or Oracle Linux to Red Hat Enterprise Linux 7 and Red Hat Enterprise Linux 8

Red Hat Enterprise Linux 8 Converting from an RPM-based Linux distribution to RHEL

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Abstract

This document provides instructions on how to convert your operating system from CentOS Linux or Oracle Linux to RHEL 7 and RHEL 8.

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PREFACE

This document provides instructions on how to convert your operating system from a different Linux distribution, namely CentOS Linux or Oracle Linux, to Red Hat Enterprise Linux (RHEL) 7 or RHEL 8. The conversion is performed by the **Convert2RHEL** utility.



NOTE

The conversion from CentOS Linux 6 or Oracle Linux 6 to RHEL 6 is not currently supported by Red Hat. For information on an unsupported conversion, see [How to perform an unsupported conversion from a RHEL-derived Linux distribution to RHEL](#).

MAKING OPEN SOURCE MORE INCLUSIVE

Red Hat is committed to replacing problematic language in our code, documentation, and web properties. We are beginning with these four terms: master, slave, blacklist, and whitelist. Because of the enormity of this endeavor, these changes will be implemented gradually over several upcoming releases. For more details, see [our CTO Chris Wright's message](#).

PROVIDING FEEDBACK ON RED HAT DOCUMENTATION

We appreciate your feedback on our documentation. Let us know how we can improve it.

Submitting comments on specific passages

1. View the documentation in the **Multi-page HTML** format and ensure that you see the **Feedback** button in the upper right corner after the page fully loads.
2. Use your cursor to highlight the part of the text that you want to comment on.
3. Click the **Add Feedback** button that appears near the highlighted text.
4. Add your feedback and click **Submit**.

Submitting feedback through Bugzilla (account required)

1. Log in to the [Bugzilla](#) website.
2. Select the correct version from the **Version** menu.
3. Enter a descriptive title in the **Summary** field.
4. Enter your suggestion for improvement in the **Description** field. Include links to the relevant parts of the documentation.
5. Click **Submit Bug**.

KEY MIGRATION TERMINOLOGY

While the following migration terms are commonly used in the software industry, these definitions are specific to Red Hat Enterprise Linux (RHEL).

Update

Sometimes called a software patch, an update is an addition to the current version of the application, operating system, or software that you are running. A software update addresses any issues or bugs to provide a better experience of working with the technology. In RHEL, an update relates to a minor release, for example, updating from RHEL 8.1 to 8.2.

Upgrade

An upgrade is when you replace the application, operating system, or software that you are currently running with a newer version. Typically, you first back up your data according to instructions from Red Hat. When you upgrade RHEL, you have two options:

- **In-place upgrade:** During an in-place upgrade, you replace the earlier version with the new version without removing the earlier version first. The installed applications and utilities, along with the configurations and preferences, are incorporated into the new version.
- **Clean install:** A clean install removes all traces of the previously installed operating system, system data, configurations, and applications and installs the latest version of the operating system. A clean install is ideal if you do not need any of the previous data or applications on your systems or if you are developing a new project that does not rely on prior builds.

Operating system conversion

A conversion is when you convert your operating system from a different Linux distribution to Red Hat Enterprise Linux. Typically, you first back up your data according to instructions from Red Hat.

Migration

Typically, a migration indicates a change of platform: software or hardware. Moving from Windows to Linux is a migration. Moving a user from one laptop to another or a company from one server to another is a migration. However, most migrations also involve upgrades, and sometimes the terms are used interchangeably.

- **Migration to RHEL:** Conversion of an existing operating system to RHEL
- **Migration across RHEL:** Upgrade from one version of RHEL to another

CHAPTER 1. SUPPORTED CONVERSION PATHS



IMPORTANT

Red Hat recommends that you seek the support of [Red Hat Consulting services](#) to ensure that the conversion process is smooth.

The automated conversion process is performed on a running system. The **Convert2RHEL** utility replaces all RPM packages from the original Linux distribution by their RHEL version. At the end of the process, it is necessary to restart the system to boot the RHEL kernel.

Packages that are available only in the original distribution and do not have corresponding counterparts in RHEL repositories, and third-party packages, which originate neither from the original Linux distribution nor from RHEL, are not affected by the conversion. Red Hat does not provide support for third-party packages that are left unchanged during the conversion process. See the [Red Hat policy on supporting third-party software](#).



NOTE

The **Convert2RHEL** utility does not directly affect local users and their data in the `/home` and `/srv` directories. However, Convert2RHEL cannot control actions that RPM package scriptlets perform during the conversion process.

Currently, it is possible to convert your systems from the following Linux distributions, architectures, and versions to the corresponding minor version of RHEL listed in Table 1.1.

Table 1.1. Supported conversion paths

Source OS	Target OS	Architecture	Product Variant
CentOS Linux 8.5	RHEL 8.5	64-bit Intel	N/A
CentOS Linux 8.4	RHEL 8.4	64-bit Intel	N/A
CentOS Linux 7.9	RHEL 7.9	64-bit Intel	Server
Oracle Linux 8.7	RHEL 8.7	64-bit Intel	N/A
Oracle Linux 7.9	RHEL 7.9	64-bit Intel	Server

Because the last available minor version of CentOS Linux is CentOS Linux 8.5, it is not possible to convert from CentOS Linux 8 to the latest available minor version of RHEL 8, which is currently RHEL 8.7.

In addition to the above supported conversion paths, it is also possible to perform an unsupported conversion from CentOS Linux 6 and Oracle Linux 6 to RHEL 6 and from Rocky Linux, Alma Linux, and Scientific Linux to RHEL. For information on unsupported conversions, see [How to perform an unsupported conversion from a RHEL-derived Linux distribution to RHEL](#).



IMPORTANT

Conversions from CentOS Stream to RHEL are not currently possible.

For information on Red Hat's support policy for Linux distribution conversions, see [Convert2RHEL Support Policy](#).



NOTE

If you are converting to RHEL 8.4 or RHEL 8.5, it is recommended to update your system to RHEL 8.7 after the conversion.

CHAPTER 2. PLANNING A RHEL CONVERSION

You should consider the following before converting your system to RHEL:

- **Architecture** - The source OS must be installed on a system with 64-bit Intel architecture. It is not possible to convert with other system architectures.
- **Security** - Systems in FIPS mode are not supported for conversion.
- **Kernel** - Systems using kernel modules that do not exist in RHEL kernel modules are not currently supported for conversion. Red Hat recommends disabling or uninstalling foreign kernel modules before the conversion and then enabling or reinstalling those kernel modules afterwards. Unsupported kernel modules include:
 - Kernel modules for specialized applications, GPUs, network drivers, or storage drivers
 - Custom compiled kernel modules built by DKMS
- **Public clouds** - Conversions on public clouds are supported in the following situations:
 - CentOS Linux - Using RHSM for the following:
 - Bring Your Own Subscription instances on Amazon Web Services (AWS), Microsoft Azure, and Google Cloud
 - User-provided custom images on all public clouds
 - Oracle Linux - Using RHSM for user-provided custom images on all public clouds. RHEL packages cannot be accessed for on-demand Pay-As-You-Go (PAYG) instances using Red Hat Update Infrastructure (RHUI) on public cloud instances for both CentOS Linux and Oracle Linux.
- **High Availability** - Systems using high availability cluster software by Red Hat or third parties are not currently tested or supported for conversion to RHEL. Red Hat recommends migrating to newly installed RHEL systems to ensure the integrity of these environments.

CHAPTER 3. PREPARING FOR A RHEL CONVERSION

This procedure describes the steps that are necessary before performing the conversion from CentOS Linux or Oracle Linux to Red Hat Enterprise Linux (RHEL).

Prerequisites

- You have verified that your system is supported for conversion to RHEL. See [Supported conversion paths](#) for more information.
- You have stopped important applications, database services, and any other services that store data to reduce the risk of data integrity issues.
- You have temporarily disabled antivirus software to prevent the conversion from failing.
- You have disabled or adequately reconfigured any configuration management system (such as Salt, Chef, Puppet, Ansible) to not attempt to restore the original system.
- The **sos** package is installed. You must use this package to generate an **sosreport** that is required when opening a support case for the Red Hat Support team.

Procedure

1. Back up your system and verify that you can restore your system.
2. Check [Known issues and limitations](#) and verify that your system is supported for conversion. Apply workarounds where applicable.
3. Ensure that the standard kernel is the booted kernel:
 - CentOS Linux: the standard CentOS Linux kernel
 - Oracle Linux: the Red Hat Compatible Kernel (RHCK)
If the kernel your system is booted into is not the standard kernel, for example CentOS realtime kernel or Oracle Linux Unbreakable Enterprise Kernel (UEK), change the default kernel to the standard kernel and reboot your system.
4. If converting from CentOS Linux 8, remove any CentOS Stream packages from your system. CentOS Stream is not currently supported for conversion, and the conversion might fail if any packages are present on the system.
5. If converting from CentOS Linux 8, update the CentOS repository URLs:

```
# sed -i 's/^mirrorlist/#mirrorlist/g' /etc/yum.repos.d/CentOS-*
# sed -i 's|#baseurl=http://mirror.centos.org|baseurl=https://vault.centos.org|g'
/etc/yum.repos.d/CentOS-*
```



IMPORTANT

CentOS Linux 8 has reached end of life. For more information, see [CentOS Linux EOL](#).

6. Install **Convert2RHEL**:
 - a. Download the Red Hat GPG key:

```
# curl -o /etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release
https://www.redhat.com/security/data/fd431d51.txt
```

- b. Download the SSL certificate of the <https://cdn.redhat.com> server, which contains the **Convert2RHEL** repositories:

```
# curl --create-dirs -o /etc/rhsm/ca/redhat-uep.pem
https://ftp.redhat.com/redhat/convert2rhel/redhat-uep.pem
```

- c. Install the **Convert2RHEL** repository file:

```
# curl -o /etc/yum.repos.d/convert2rhel.repo
https://ftp.redhat.com/redhat/convert2rhel/<version_number>/convert2rhel.repo
```

Replace *version_number* with the appropriate major version of the OS, for example **7** or **8**.



NOTE

You must perform the conversion with the latest version of the **Convert2RHEL** repository file. If you had previously installed an earlier version of the repository file, remove the earlier version and install the current version.

- d. Install the **Convert2RHEL** utility:

```
# yum -y install convert2rhel
```

7. Ensure you have access to RHEL packages through one of the following methods:
- Red Hat Content Delivery Network (CDN) through Red Hat Subscription Manager (RHSM). You must have a Red Hat account and an appropriate RHEL subscription to access RHSM. Note that the OS will be converted to the corresponding minor version of RHEL per Table 1.1.
 - Red Hat Satellite in a version that has Full or Maintenance support. For more information, see [Red Hat Satellite Product Life Cycle](#).

**NOTE**

Ensure that the Satellite server meets the following conditions:

- Satellite has a subscription manifest with RHEL repositories imported. For more information, see the Managing Subscriptions chapter in the Content Management Guide for the particular version of [Red Hat Satellite](#), for example, for [version 6.10](#).
- All required repositories are enabled and synchronized with the latest target OS updates and published on Satellite. Enable at minimum the following repositories for the appropriate major version of the OS:
 - Red Hat Enterprise Linux 7 Server RPMs x86_64 7Server
 - Red Hat Enterprise Linux 8 for x86_64 - AppStream RPMs `<target_os>`
 - Red Hat Enterprise Linux 8 for x86_64 - BaseOS RPMs `<target_os>`

Replace `target_os` with **8.4** or **8.5** for CentOS Linux conversions and **8.7** for Oracle Linux conversions.

- c. Custom repositories configured in the `/etc/yum.repos.d/` directory and pointing to a mirror of the target OS repositories. Use custom repositories for systems that have access to only local networks or portable media and therefore cannot access Red Hat CDN through RHSM. Make sure that the repositories contain the latest content available for that RHEL minor version to prevent downgrading and potential conversion failures. For more information, see [Creating a Local Repository and Sharing With Disconnected/Offline/Air-gapped Systems](#).

**NOTE**

RHEL 8 content is distributed through two default repositories, BaseOS and AppStream. If you are accessing RHEL packages through custom repositories, you must configure both default repositories for a successful conversion. When running the **Convert2RHEL** utility, make sure to enable both repositories using the `--enablerepo` option. For more information about RHEL 8 repositories, see [Considerations in adopting RHEL 8](#).

8. If you are accessing RHEL packages through a Red Hat Satellite server, download the consumer RPM to the `/usr/share/convert2rhel/subscription-manager/` directory:

```
# curl --insecure --output /usr/share/convert2rhel/subscription-manager/katello-ca-consumer-latest.noarch.rpm https://<satellite.example.com>/pub/katello-ca-consumer-latest.noarch.rpm
```

Replace `satellite.example.com` with the hostname of your Satellite server.

9. Temporarily disable antivirus software to prevent the conversion from failing.
10. Update the original OS to the minor version supported for conversion as specified in Table 1.1 and then reboot the system.
You must perform the conversion with the latest packages from the minor version of the OS that is supported for conversion to use the rollback feature in case the conversion fails. For more information, see [Conversion rollback](#).

CHAPTER 4. CONVERTING TO A RHEL SYSTEM

This procedure describes the steps necessary to convert your system from CentOS Linux or Oracle Linux to Red Hat Enterprise Linux (RHEL).



NOTE

You can upgrade your RHEL system to the next major version of RHEL using the Leapp utility after converting your system from CentOS Linux to RHEL.

For more information on an in-place upgrade using the Leapp utility, see [Upgrading from RHEL 7 to RHEL 8](#) or [Upgrading from RHEL 8 to RHEL 9](#).

If you are accessing RHEL packages using Red Hat CDN or Satellite through RHSM, there are two methods of registering and subscribing your system during the conversion:

- Provide the organization ID and activation key. This method is preferred when converting many systems or when automating the conversion process using scripts. You must be the organization administrator to create an activation key. You must use this method if you are accessing RHEL packages using Satellite through RHSM.
- Provide the username, password, and pool ID. Any user who is accessing RHEL packages using Red Hat CDN through RHSM can use this method.

Prerequisites

- You have completed the steps listed in [Preparing for a RHEL conversion](#).
- If you are providing the organization ID and activation key to register and subscribe your system, you have created an activation key in Satellite or RHSM. For more information, see [Managing activation keys](#) in Satellite documentation and [Understanding activation keys](#) in RHSM documentation.

Procedure

1. Start the **Convert2RHEL** utility.

You can use **Convert2RHEL** with either RHSM or custom repositories. To display all available options, use the **-h, --help** option:

```
# convert2rhel -h
```

- To convert using RHSM with the organization ID and activation key, complete the following steps. You must use this method if you are accessing RHEL packages using Satellite:
 - Create a configuration file containing the activation key and save the file in the **.ini** file format:

```
[subscription_manager]
activation_key = <activation_key>
```

Replace *activation_key* with the activation key from the Red Hat Customer Portal if you are using Red Hat CDN or the Satellite web UI if you are using Red Hat Satellite.

- Start the **Convert2RHEL** utility:

—

```
# convert2rhel --org <organization_ID> --config-file <config_file_name>
```

Replace *organization_ID* with the organization ID from the [Red Hat Customer Portal](#) if you are using Red Hat CDN or the Satellite web UI if you are using Red Hat Satellite. Replace *config_file_name* with the name of the configuration file you created, for example **convert2rhel.ini**.



NOTE

If you are accessing RHEL packages using Satellite and your system does not have internet access, add the **--keep-rhsm** option. Note that you must have the **subscription-manager** and **katello-ca-consumer** packages already installed and must provide both your organization ID and the configuration file containing the activation key when running the **convert2rhel** command.

- To convert using RHSM with the username, password, and pool ID, complete the following steps:
 - Create a configuration file containing the password and save the file in the **.ini** file format:

```
[subscription_manager]
password = <password>
```

Replace *password* with your Red Hat Account password credentials.

- Start the **Convert2RHEL** utility:

```
# convert2rhel --username <username> --config-file <config_file_name> --pool
<pool_ID>
```

Replace *username* with your Red Hat Account username credentials. Replace *config_file_name* with the name of the configuration file you created, for example **convert2rhel.ini**. Replace *pool_ID* with the pool ID of the subscription that you want to attach to the system. If you do not know the pool ID, omit the **--pool** option to generate a list of all subscriptions available for the account.

- To convert using custom repositories, start the **Convert2RHEL** utility:

```
# convert2rhel --no-rhsm --enablerepo <RHEL_RepoID1> --enablerepo
<RHEL_RepoID2>
```

Replace *RHEL_RepoID* with your custom repository configured in the **/etc/yum.repos.d/** directory, for example, **rhel-7-server-rpms** or **rhel-8-baseos** and **rhel-8-appstream**.



NOTE

When converting using RHSM or custom repositories, you can enable the RHEL 7 Extras or Optional repositories manually by using the **--enablerepo** option to replace additional packages with their RHEL counterparts. Note that packages in the Optional repository are unsupported. For more information, see [Support policy of the optional and supplementary channels in Red Hat Enterprise Linux](#).

2. Before **Convert2RHEL** starts replacing packages from the original distribution with RHEL packages, the following warning message is displayed:

```
The tool allows rollback of any action until this point.  
By continuing, all further changes on the system will need to be reverted manually by the  
user, if necessary.
```

Changes made by **Convert2RHEL** up to this point can be automatically reverted. Confirm that you wish to proceed with the conversion process.

3. Wait until **Convert2RHEL** installs the RHEL packages and finishes successfully.
4. *Recommended:* If you used custom repositories for the conversion, register and subscribe your RHEL system. For more information, see [How to register and subscribe a system offline to the Red Hat Customer Portal?](#).
5. At this point, the system still runs with the original distribution kernel loaded in RAM. Reboot the system to boot the newly installed RHEL kernel.

```
# reboot
```

6. Remove third-party packages from the original OS that remained unchanged (typically packages that do not have a RHEL counterpart). To get a list of these packages, use:

```
# yum list extras --disablerepo="" --enablerepo=<RHEL_RepoID>
```

Replace *RHEL_RepoID* with your repository.

7. Optional: If you converted to RHEL 8.4 or RHEL 8.5, update your system to the latest minor version:

```
# yum update -y
```

Verification

- Verify that your system operates as expected. If necessary, reconfigure system services after the conversion and fix dependency errors. For more information, see [Fixing dependency errors](#).

CHAPTER 5. CONVERSION ROLLBACK

The **Convert2RHEL** utility provides a limited rollback functionality. If the conversion is canceled by the user or if it fails, the utility performs a rollback of changes made during the conversion process under the following conditions:

- Only changes performed until **Convert2RHEL** starts replacing packages from the original distribution with RHEL packages can be reverted. This moment is indicated by the warning message:

The tool allows rollback of any action until this point.
By continuing all further changes on the system will need to be reverted manually by the user, if necessary.

followed by a question whether you wish to continue with the process.



NOTE

If the **-y** option is used with the **convert2RHEL** command, the question indicating the moment after which the automated rollback is no longer possible is skipped.

- Access to repositories providing packages from the original distribution is required, especially to the base repository, to perform a rollback. Without access to these repositories, **Convert2RHEL** is unable to restore the system to the original state even if the tool execution is stopped in the early stages of the conversion because **Convert2RHEL** removes certain packages during the conversion process and needs to preemptively download them from the original repository for rollback.
- A rollback is feasible only on a system where all packages from the original OS are updated to the latest version that is available in the repositories accessible from the system. Therefore use the **yum** update command before starting the conversion process.



WARNING

If the conversion process is canceled or fails after **Convert2RHEL** has started the package replacement phase, the system can become dysfunctional. In such a case, manual fixes will be needed. Please contact [Red Hat Consulting services](#) for assistance.

CHAPTER 6. TROUBLESHOOTING CONVERSIONS

This chapter lists troubleshooting resources and tips.

6.1. TROUBLESHOOTING RESOURCES

To help you troubleshoot issues that can occur during the conversion process, review the log messages that are printed to the console and log files.

Console Output

By default, only info, warning, error, and critical log level messages are printed to the console output by the **Convert2RHEL** utility. To also print debug messages, use the **--debug** option with the **convert2rhel** command.

Logs

- The **/var/log/convert2rhel/convert2rhel.log** file lists debug, info, warning, error, and critical messages.
- The **/var/log/convert2rhel/rpm_va.log** file lists all package files on the unconverted system that a user has modified. This output is generated by the **rpm -Va** command, which is run automatically unless the **--no-rpm-va** option is used with the **convert2rhel** command.

6.2. FIXING DEPENDENCY ERRORS

During a conversion from a different Linux distribution to RHEL, certain packages might be installed without some of their dependencies.

Prerequisites

- You have successfully completed the conversion to RHEL. See [Converting to a RHEL system](#) for more information.

Procedure

1. Identify dependencies errors:

```
# yum check dependencies
```

If the command displays no output, no further actions are required.

2. To fix dependency errors, reinstall the affected packages. During this operation, the **yum** utility automatically installs missing dependencies. If the required dependencies are not provided by repositories available on the system, install those packages manually.

6.3. KNOWN ISSUES AND LIMITATIONS

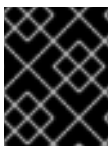
The following issues and limitations are known to occur during the conversion:

- The conversion stops if any files are mounted directly to the **/mnt/** directory or if the **/sys/** directory is mounted as read-only.

- Systems that connect to the Internet using an HTTP proxy server cannot convert using Red Hat CDN or Satellite through RHSM. To work around this problem, enable HTTP proxy for yum and then configure the HTTP proxy for RHSM:
 1. Configure yum to use an HTTP proxy as described in [How to enable proxy settings for yum command on RHEL?](#)
 2. Configure a repository as described in [Configuring Yum and Yum Repositories](#) pointing to one of the following URLs:
 - For CentOS Linux and Oracle Linux 7: https://cdn-ubi.redhat.com/content/public/ubi/dist/ubi/server/7/7Server/x86_64/os/
 - For CentOS Linux and Oracle Linux 8: https://cdn-ubi.redhat.com/content/public/ubi/dist/ubi8/8/x86_64/baseos/os/
 3. Install the **subscription-manager** package from the repository you configured..
 4. Configure HTTP proxy for RHSM as described in [How to configure HTTP Proxy for Red Hat Subscription Management](#).
 5. Perform the conversion to RHEL with the **--keep-rhsm** option. ([BZ#1965487](#))
- UEFI systems with Secure Boot enabled are not supported for conversion. To work around this issue, disable Secure Boot before the conversion and then re-enable after the conversion is complete. ([BZ#2057229](#))
- The conversion fails while checking the latest kernel version if any of the repositories enabled on the system is not accessible. ([JIRA:RHELC-689](#))
- The conversion fails when the **subscription-manager-rhsm-certificates** package is installed. To work around this problem, after installing the **convert2rhel** package, disable the **convert2rhel** repository by setting **enabled=0** in the **/etc/yum.repos.d/convert2rhel.repo** file. For more details, see the Knowledgebase solution [Convert2RHEL fails when "subscription-manager-rhsm-certificates" package is installed](#). ([BZ#2127448](#))

6.4. OBTAINING SUPPORT

If you experience problems during the conversion, notify Red Hat so that these problems can be addressed.



IMPORTANT

If you are experiencing problems during the conversion, raise a Support case of Severity 3 or Severity 4 level only. For more details, see [Production Support Terms of Service](#).

Prerequisites

- The **sos** package is installed. You must use this package to generate an **sosreport** that is required when opening a support case for the Red Hat Support team.

Procedure

- To obtain support, perform either of the following steps:

- Open a support case:
 - Select RHEL 7 or RHEL 8 as the product, and provide an **sosreport** from your system.
 - Generate an **sosreport** on your system:

```
# sosreport
```

Note that you can leave the case ID empty.

- Submit a [bug report](#):
 - Open a bug, select RHEL 7 or RHEL 8 as the product, and select **convert2rhel** as the component.

For details on generating an **sosreport**, see the solution [What is an sosreport and how to create one in Red Hat Enterprise Linux?](#).

For more information on opening and managing a support case on the Customer Portal, see the article [How do I open and manage a support case on the Customer Portal?](#) .

For information on Red Hat’s support policy for Linux distribution conversions, see [Convert2RHEL Support Policy](#).

CHAPTER 7. ADDITIONAL RESOURCES

- [How to convert from CentOS Linux 6 or Oracle Linux 6 to RHEL 6](#)
- [Red Hat Enterprise Linux technology capabilities and limits](#)
- [Migration planning guide - migration to RHEL 7](#)
- [Upgrading from RHEL 6 to RHEL 7](#)
- [Considerations in adopting RHEL 8](#)
- [Upgrading from RHEL 7 to RHEL 8](#)
- [Convert2RHEL FAQ \(Frequently Asked Questions\)](#)