Red Hat Enterprise Linux 8

Converting from a Linux distribution to RHEL using the Convert2RHEL utility

Instructions for a conversion from Alma Linux, CentOS Linux, Oracle Linux, or Rocky Linux to Red Hat Enterprise Linux 7, 8, and 9 using the Convert2RHEL utility

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Legal Notice

Abstract

This document provides instructions on how to convert your operating system from Alma Linux, CentOS Linux, Oracle Linux, or Rocky Linux to RHEL 7, RHEL 8, or RHEL 9 using the Convert2RHEL utility.

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PREFACE

This document provides instructions on how to convert your operating system from the following Linux distributions to Red Hat Enterprise Linux (RHEL) 7, RHEL 8, and RHEL 9:

- Alma Linux

- CentOS Linux

- Oracle Linux

- Rocky Linux

The conversion is performed by the **Convert2RHEL** utility.

> **NOTE**
>
> The conversion from Scientific Linux to RHEL is not currently supported by Red Hat. For information about an unsupported conversion, see How to perform an unsupported conversion from a RHEL-derived Linux distribution to RHEL.

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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.

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

Table 1.1. Supported conversion paths

Source OS	Source version	Target OS and version	Product Variant	Available Conversion Methods
Alma Linux	9.5	RHEL 9.5	N/A	Command line, Satellite
	8.10	RHEL 8.10	N/A	Command line, Satellite
	8.8	RHEL 8.8 EUS	N/A	Command line, Satellite
CentOS Linux	8.5	RHEL 8.5	N/A	Command line, Satellite
	7.9	RHEL 7.9	Server	Command line, Satellite, Red Hat Insights
Oracle Linux	9.5	RHEL 9.5	N/A	Command line, Satellite
	8.10	RHEL 8.10	N/A	Command line, Satellite
	7.9	RHEL 7.9	Server	Command line, Satellite
Rocky Linux	9.5	RHEL 9.5	N/A	Command line, Satellite
	8.10	RHEL 8.10	N/A	Command line, Satellite
	8.8	RHEL 8.8 EUS	N/A	Command line, Satellite

Because the last available minor version of CentOS Linux is CentOS Linux 8.5, it is not possible to convert from CentOS Linux 8 directly to the latest available minor version of RHEL 8. It is recommended to update your system to the latest version of RHEL after the conversion.

RHEL 7 reaches the end of the Maintenance Support Phase on June 30, 2024. If you are converting to RHEL 7 and plan to stay on RHEL 7, it is strongly recommended to purchase the Extended Life Cycle Support (ELS) add-on subscription. If you plan to convert to RHEL 7 and then immediately upgrade to RHEL 8 or later, an ELS subscription is not needed. Note that without ELS, you have limited support for RHEL 7, including for the upgrade from RHEL 7 to RHEL 8. For more information, see the Red Hat Enterprise Linux Life Cycle and the Convert2RHEL Support Policy.

In addition to the above supported conversion paths, it is also possible to perform an unsupported conversion from Scientific Linux 7, CentOS Stream 8, and CentOS Stream 9 to RHEL. For information about unsupported conversions, see How to perform an unsupported conversion from a RHEL-derived Linux distribution to RHEL.

For information about Red Hat's support policy for Linux distribution conversions, see Convert2RHEL Support Policy.

CHAPTER 2. CONVERSION METHODS

Depending on your requirements, you can convert to RHEL by using one of the following methods:

- **Converting by using the command line** – Use this method to convert a small number of servers, or to convert a large number of servers at scale by using custom automation.

  > **NOTE**
  >
  > If you have a Satellite subscription but plan to convert by using the command line, you can access the required RHEL packages through Satellite instead of using the Red Hat Content Delivery Network (CDN).

  For more information about how to convert by using the command line, see Planning a RHEL conversion and Converting using the command-line.

- **Converting by using Red Hat Satellite** – Use this method to convert a large number of servers at scale. To convert by using Satellite, you must have a Satellite subscription. For more information about how to convert by using Satellite, see Converting a Host to Red Hat Enterprise Linux.

- **Converting by using Red Hat Insights** – Use this method to convert multiple systems in a user-friendly GUI interface without needing a Satellite subscription. Systems must be connected to the internet. Systems are fully onboarded with Red Hat Insights after the conversion.

  > **NOTE**
  >
  > Insights supports conversions with Red Hat Enterprise Linux for Third Party Migration with the pay-as-you-go pricing model on Amazon Web Services (AWS). For more information, see Red Hat Enterprise Linux for Third Party Linux Migration.

  For more information about how to convert by using Red Hat Insights, see Planning a RHEL conversion and Converting using Insights.

CHAPTER 3. PLANNING A RHEL CONVERSION

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.

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:

  - Alma Linux, CentOS Linux, and Rocky Linux - Using Red Hat Subscription Manager (RHSM) for the following:

    - Images on Amazon Web Services (AWS), Microsoft Azure, and Google Cloud with no associated software cost.

    - User-provided custom images on all public clouds

  - Oracle Linux - Using RHSM for user-provided custom images on all public clouds. **Convert2RHEL** is unable to access RHEL packages through Red Hat Update Infrastructure (RHUI) during the conversion.

- **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.

- **Identity Management** - Performing an in-place conversion of a FreeIPA server is not supported. For more information about how to migrate a FreeIPA deployment to IdM, see Migrating to IdM on RHEL 7 from FreeIPA on non-RHEL Linux distributions , Migrating to IdM on

RHEL 8 from FreeIPA on non-RHEL Linux distributions, and Migrating to IdM on RHEL 9 from FreeIPA on non-RHEL Linux distributions.

- **Foreman** – Conversions of systems that use Foreman with the Katello plugin are not supported. To perform a supported conversion, migrate to Red Hat Satellite first and then proceed with the conversion.

- **RAID** – It is not possible to convert UEFI-based systems with **mdadm**-managed RAID devices.

CHAPTER 4. CONVERTING USING THE COMMAND-LINE

You can perform the conversion from Alma Linux, CentOS Linux, Oracle Linux, or Rocky Linux to RHEL by using the command line.

4.1. PREPARING FOR A RHEL CONVERSION

This procedure describes the steps that are necessary before performing the conversion from Alma Linux, CentOS Linux, Oracle Linux, or Rocky 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.

- You have created an activation key in Satellite or RHSM. For more information, see Managing activation keys in Satellite documentation and Getting started with activation keys on the Hybrid Cloud Console in RHSM documentation.

- You have enabled Simple Content Access (SCA). Red Hat accounts created after July 15, 2022 have SCA enabled by default.

Procedure

1. Back up your system and verify that it can be restored if needed.

2. Check Known issues and limitations and verify that your system is supported for conversion. Apply workarounds where applicable.

3. 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.

4. If you are converting with a firewall, using Red Hat Satellite, or through a proxy server, ensure that you have access to the following connections:

   - https://cdn.redhat.com

   - https://cdn-public.redhat.com

   - https://subscription.rhsm.redhat.com - required only for systems with firewalls

   - https://*.akamaiedge.net - required only for systems with firewalls

   - https://cert.console.redhat.com

5. If converting from CentOS Linux, 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-*
```
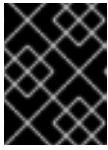
> **IMPORTANT**
>
> CentOS Linux 7 and CentOS Linux 8 have reached end of life. For more information, see CentOS Linux EOL.

6. Install **Convert2RHEL**:

   a. Download the Red Hat GPG key:

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

   b. Install the **Convert2RHEL** repository file.

      i. For conversions to RHEL 7, enter the following command:

      ```
      # curl -o /etc/yum.repos.d/convert2rhel.repo https://cdn-
      public.redhat.com/content/public/repofiles/convert2rhel-for-rhel-7-x86_64.repo
      ```

      ii. For conversions to RHEL 8, enter the following command:

      ```
      # curl -o /etc/yum.repos.d/convert2rhel.repo https://cdn-
      public.redhat.com/content/public/repofiles/convert2rhel-for-rhel-8-x86_64.repo
      ```

      iii. For conversions to RHEL 9, enter the following command:

      ```
      # curl -o /etc/yum.repos.d/convert2rhel.repo https://cdn-
      public.redhat.com/content/public/repofiles/convert2rhel-for-rhel-9-x86_64.repo
      ```

      > **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.

   c. Install the **Convert2RHEL** utility:

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

7. Ensure you have access to RHEL packages through one of the following methods:

   a. 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.

b. 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 Red Hat Subscriptions chapter in the Managing Content guide for the particular version of Red Hat Satellite, for example, for version 6.14.
>
> - 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 **8.5** for CentOS Linux conversions and **8.9**, **8.8**, or **8.6** for Alma Linux, Oracle Linux, or Rocky Linux conversions.
>
>   - Red Hat Enterprise Linux 9 for x86_64 – BaseOS (RPMs)
>
>   - Red Hat Enterprise Linux 9 for x86_64 – AppStream (RPMs)

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 the Red Hat Knowledgebase solution Creating a Local Repository and Sharing With Disconnected/Offline/Air-gapped Systems.

> **NOTE**
>
> RHEL 8 and RHEL 9 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 these repositories, see Considerations in adopting RHEL 8 and Considerations in adopting RHEL 9 .

8. If you are accessing RHEL packages through a Red Hat Satellite server, register your system with Red Hat Satellite. For more information, see Registering Hosts and Setting Up Host Integration.

9. If you are converting by using RHSM and have not yet registered the system, update the **/etc/convert2rhel.ini** file to include the following data:

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

Replace *organization_id* and *activation_key* with the organization ID and activation key from the Red Hat Customer Portal if you are using Red Hat CDN.

10. Temporarily disable antivirus software to prevent the conversion from failing.

11. If you are accessing RHEL packages by using custom repositories, disable these repositories. The **Convert2RHEL** utility enables the custom repositories during the conversion process.

12. 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.

4.2. REVIEWING THE PRE-CONVERSION ANALYSIS REPORT

To assess whether your systems can be converted to RHEL, run the RHEL pre-conversion analysis. The pre-conversion analysis generates a report that summarizes potential problems and suggests recommended solutions. The report also helps you decide whether it is possible or advisable to proceed with the conversion to RHEL.

Always review the entire pre-conversion analysis report, even when the report finds no inhibitors to the conversion. The pre-conversion analysis report contains recommended actions to complete before the conversion to ensure that the converted RHEL system functions correctly.
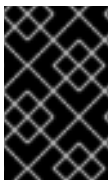
IMPORTANT

The pre-conversion analysis report cannot identify all inhibiting problems with your system. As a result, issues might still occur during the conversion even after you have reviewed and remediated all problems in the report.

Prerequisites

- You have completed the steps listed in Preparing for a RHEL conversion .

Procedure

1. On your Alma Linux, CentOS Linux, Oracle Linux, or Rocky Linux system, run the pre-conversion analysis:

   ```
   #  convert2rhel analyze
   ```

   - If you are converting to RHEL 8.8 and have an Extended Upgrade Support (EUS), add the **--eus** option. This option ensures that your system receives important security updates delivered to EUS repositories only.

   - If you are converting to RHEL 7 and have an Extended Life Cycle Support (ELS) add-on, add the **--els** option. It is recommended to purchase an ELS add-on if you plan to stay on RHEL 7 to continue receiving support.

2. The pre-conversion analysis runs a series of tests to determine whether your system can be converted to RHEL. After the analysis is complete, review the status and details of each completed test in the pre-conversion report in the terminal. Non-successful tests contain a description of the issue, a diagnosis of the possible cause of the issue, and, if applicable, a recommended remediation.
   Each test results in one of the following statuses:

   - **Success** - The test was successful and there are no issues for this component.

   - **Error** - The test encountered an issue that would cause the conversion to fail because it is very likely to result in a deteriorated system state. This issue must be resolved before converting.

   - **Overridable** - The test encountered an issue that would cause the conversion to fail because it is very likely to result in a deteriorated system state. This issue must be either resolved or manually overridden before converting.

   - **Warning** - The test encountered an issue that might cause system and application issues after the conversion. However, this issue would not cause the conversion to fail.

   - **Skip** - Could not run this test because of a prerequisite test failing. Could cause the conversion to fail.

   - **Info** - Informational with no expected impact to the system or applications.
     For example:

     ```
     ========== Warning (Review and fix if needed) ==========

     (WARNING) PACKAGE_UPDATES::PACKAGE_NOT_UP_TO_DATE_MESSAGE -
     Outdated packages detected
         Description: Please refer to the diagnosis for further information
         Diagnosis: The system has 4 package(s) not updated based on the enabled system
     repositories.
        List of packages to update: openssh-server openssh openssh-clients.

        Not updating the packages may cause the conversion to fail.
        Consider updating the packages before proceeding with the conversion.
         Remediation: [No further information given]
     ```

3. After reviewing the report and resolving all reported issues, repeat steps 1-2 to rerun the analysis and confirm that there are no issues outstanding.

4.3. CONVERTING TO A RHEL SYSTEM

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

Procedure

1. Start the **Convert2RHEL** utility:

   ```
   # convert2rhel
   ```

   - To display all available options, use the **--help** (**-h**) option.

- If you are converting by using custom repositories instead of RHSM, add the --no-rhsm and the **--enablerepo** *<RHEL_RepoID1>* **--enablerepo** *<RHEL_RepoID2>* options. 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**.

- If you are converting to RHEL 7, you can manually enable RHEL 7 Extras or Optional repositories 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 the Red Hat Knowledgebase solution Support policy of the optional and supplementary channels in Red Hat Enterprise Linux.

- If you are converting to RHEL 8.8 and have an Extended Upgrade Support (EUS), add the **--eus** option. This option ensures that your system receives important security updates delivered to EUS repositories only.

- If you are converting to RHEL 7 and have an Extended Life Cycle Support (ELS) add-on, add the **--els** option. It is recommended to purchase an ELS add-on if you plan to stay on RHEL 7 to continue receiving support.

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 the Red Hat Knowledgebase solution 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. Optional: Remove any remaining Convert2RHEL packages, files, and repositories:

   a. Remove the Convert2RHEL package:

   ```
   # yum remove -y convert2rhel
   ```

   b. Remove Convert2RHEL files and repositories:

   ```
   # rm -f /etc/convert2rhel.ini.rpmsave
   # rm -f /etc/yum.repos.d/convert2rhel.repo
   ```

7. Review the list of the third-party packages and remove unnecessary packages from the original OS that remained unchanged. These are 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.

8. If you have converted a system in Amazon Web Services (AWS) or Microsoft Azure with the Red Hat Enterprise Linux for Third Party Linux Migration with ELS offering, enable host metering on the system. For more information, see Enabling metering for Red Hat Enterprise Linux with Extended Lifecycle Support in your cloud environment.

9. Optional: If you converted to RHEL 7 or RHEL 8, perform an in-place upgrade to RHEL 9 to ensure your system is updated with the latest enhancements, security features, and bug fixes. For more information, see the Upgrading from RHEL 7 to RHEL 8 and Upgrading from RHEL 8 to RHEL 9 guides. Note that if you have converted to RHEL 7, you must first perform the in-place upgrade from RHEL 7 to RHEL 8, and then from RHEL 8 to RHEL 9.

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. CONVERTING USING INSIGHTS

You can perform the conversion from CentOS Linux 7 to RHEL 7 by using Red Hat Insights.

5.1. PREPARING FOR A RHEL CONVERSION USING INSIGHTS

Prepare your system for the pre-conversion analysis by using Red Hat Insights and then performing the conversion to RHEL with the steps below.

Prerequisites

- You are planning to convert CentOS Linux 7 systems to Red Hat Enterprise Linux (RHEL) 7. Conversions from CentOS Linux 8 and other Linux distributions must be performed in the command-line or Satellite.

- You have an account and activation key at Red Hat Customer Portal . For more information, see Getting started with activation keys on the Hybrid Cloud Console .

- 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.

- You have enabled Simple Content Access (SCA). Red Hat accounts created after July 15, 2022 have SCA enabled by default.

Procedure

1. Back up your systems and verify that they can be restored if needed.

2. Check Known issues and limitations and verify that your system is supported for conversion. Apply workarounds where applicable.

3. Ensure that the standard CentOS Linux kernel is the booted kernel. If the kernel your system is booted into is not the standard kernel, change the default kernel to the standard kernel and reboot your system to apply the changes. For more information, see Making Persistent Changes to a GRUB Menu Using the grubby Tool.

4. If you are converting with a firewall or through a proxy server, ensure that you have access to the following connections:

   - https://cdn.redhat.com

   - https://cdn-public.redhat.com

   - https://subscription.rhsm.redhat.com - required only for systems with firewalls

   - https://*.akamaiedge.net - required only for systems with firewalls

   - https://cert.console.redhat.com

5. Install the Red Hat client tools:

   a. Download the Red Hat GPG key:

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

   b. Install the **client-tools** repository file:

      ```
      # curl -o /etc/yum.repos.d/client-tools.repo https://cdn-
      public.redhat.com/content/public/repofiles/client-tools-for-rhel-7-server.repo
      ```

   c. Install the **client tools** packages:

      ```
      # yum -y install subscription-manager subscription-manager-rhsm-certificates rhc rhc-
      worker-script insights-client
      ```

6. Enable Remote Host Configuration, register your systems with Red Hat Subscription Manager
   (RHSM), and connect your systems with Red Hat Insights:

   ```
   # rhc connect --activation-key <activation_key> --organization <organization_ID>
   ```

   Replace *organization_id* and *activation_key* with the organization ID and activation key from the
   Red Hat Customer Portal . For more information on Remote Host Configuration, see the
   Remote Host Configuration (rhc) Knowledgebase article.

Verification

1. Log in to the Red Hat Hybrid Cloud Console and go to **Red Hat Insights** > **RHEL** > **Inventory** >
   Systems.

2. Verify that your CentOS Linux systems appear as expected.

> **NOTE**
>
> The only Red Hat Insights service you can use with registered CentOS Linux systems is
> the RHEL conversion. All other Insights services are available only after the conversion to
> RHEL.

5.2. REVIEWING THE PRE-CONVERSION ANALYSIS REPORT USING INSIGHTS

To assess whether your CentOS Linux systems can be converted to RHEL, run the **Pre-conversion
analysis for converting to RHEL** task. The pre-conversion analysis generates a report that summarizes
potential problems and suggests recommended solutions. The report also helps you decide whether it is
possible or advisable to proceed with the conversion to RHEL.

Prerequisites

- You have completed the steps listed in Preparing for a RHEL conversion using Insights .

Procedure

1. Log in to the Red Hat Hybrid Cloud Console and go to **Red Hat Enterprise Linux** > **Insights for RHEL** > **Automation toolkit** > **Tasks**.

2. Locate the **Pre-conversion analysis for converting to RHEL** task and click **Select systems**.

3. Alternatively, log in to the Red Hat Hybrid Cloud Console , go to **Red Hat Enterprise Linux** > **Insights for RHEL** > **Inventory** > **Systems**, choose a system you want to convert and click **Convert system to RHEL** label.

4. In the **Task name** field type the name of the task and select the CentOS Linux 7 systems that you want to analyze for conversion. Click **Next**.

5. Configure the pre-conversion analysis task with the following settings:

   Do not use the ELS subscription

   Choose this option if you plan to upgrade your RHEL system to version 8 or higher.

   Allow kernel modules outside of RHEL repositories on the system

   Choose this option to allow the pre-conversion analysis to ignore kernel modules that are not part of RHEL repositories.

   Allow outdated kernel on the system

   Choose this option to allow the pre-conversion analysis to ignore when your system is booted from an outdated kernel.

   Allow outdated packages on the system

   Choose this option to allow the pre-conversion analysis to ignore all outdated packages on the system.

6. Click **Run task**. The pre-conversion analysis can take up to an hour to complete.
   The pre-conversion analysis utility generates a new report in the **Activity** tab. Select the report to view a summary of issues found in each system. You can also review further by selecting a system to view each issue and, when applicable, a potential remediation in detail.

   Each issue is assigned a severity level:

   Inhibitor

   Would cause the conversion to fail because it is very likely to result in a deteriorated system state. You must resolve this issue before converting.

   Overridable inhibitor

   Would cause the conversion to fail because it is very likely to result in a deteriorated system state. You must resolve or manually override this issue before converting. For more details about which inhibitors you can override, see the step about configuring the settings of the pre-conversion analysis in this procedure.

   Skipped

   Could not run this test because of a prerequisite test failing. Could cause the conversion to fail.

   Warning

   Would not cause the conversion to fail. System and application issues might occur after the conversion.

   Info

   Informational with no expected impact to the system or applications.

7. After reviewing the report and resolving all reported issues, click **Run task again** to rerun the analysis and confirm that there are no issues outstanding.

5.3. CONVERTING TO A RHEL SYSTEM USING INSIGHTS

After running the **Pre-conversion analysis for converting to RHEL**task and resolving all reported issues, you can convert your CentOS Linux 7 systems to RHEL 7.

Prerequisites

- You have completed the steps listed in Preparing for a RHEL conversion using Insights and Reviewing the pre-conversion analysis report using Insights .

  > **NOTE**
  >
  > To avoid serious problems after the conversion, do not convert any systems that have unresolved inhibitors and warnings in the pre-conversion analysis.

Procedure

1. Log in to the Red Hat Hybrid Cloud Console and go to **Red Hat Insights** > **RHEL** > **Automation toolkit** > **Tasks**.

2. Locate the **Convert to RHEL from CentOS 7 Linux**task and click **Run task**.

3. Select the CentOS Linux 7 systems that you want to convert to RHEL and click **Execute task**.

   > **NOTE**
   >
   > The conversion process can take up to an hour to complete.

4. Go to the **Activity** tab and select the newly generated conversion report.

5. Review each system and message:

   - If a system has been successfully converted with no issues, reboot the system and proceed to the next step.

   - If the system was not converted, review the message for more information on the found problems and how to resolve them. Additionally, verify the following:

     - You have completed all steps in Preparing for a RHEL conversion using Insights .

     - The system contains all packages required for the conversion.

     - The system is running.

     - You have resolved all issues found in the Reviewing the pre-conversion analysis report using Insights.

   - If the conversion timed out without completing, verify that the system is running and retry at another time. If issues persist, contact Support.

6. After rebooting the system that has been successfully converted, remove third-party packages from the original OS that remained unchanged. These are 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: Perform an in-place upgrade to RHEL 9 to ensure your system is updated with the latest enhancements, security features, and bug fixes. For more information, see the Upgrading from RHEL 7 to RHEL 8 and Upgrading from RHEL 8 to RHEL 9 guides.

CHAPTER 6. CONVERSION ROLLBACK

The **Convert2RHEL** utility provides a limited rollback functionality under the following conditions:

- If **Convert2RHEL** has been run in the analyze mode, the utility performs a rollback of all changes it made.

- If the utility fails or is stopped by the user, 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.

> **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 7. TROUBLESHOOTING CONVERSIONS

This chapter lists troubleshooting resources and tips.

7.1. 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.

7.2. 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.

7.3. TROUBLESHOOTING ISSUES WITH RED HAT INSIGHTS CONVERSIONS

The following issues might occur when using Red Hat Insights to convert to RHEL.

7.3.1. Missing systems in pre-conversion analysis task

When running the **Pre-conversion analysis for converting to RHEL** task in Red Hat Insights, CentOS Linux 7 systems that appeared correctly in **RHEL Inventory** might not appear in the list of available systems to run the pre-conversion analysis on. This issue occurs when the Remote Host Configuration (RHC) is disconnected.

Procedure

1. Log in to the [Red Hat Hybrid Cloud Console](#) and go to **Red Hat Insights** > **RHEL** > **Inventory** > **Systems**.

2. Select the affected system from the table.

3. In the **General Information** tab, go to the **System Status** card and verify the RHC status:

   a. If the RHC status is **Connected**, RHC is connected correctly.

   b. If the RHC status is **Not available**, RHC is disconnected. Proceed to the next step to reconnect RHC.

4. Unregister the system in your terminal:

   ```
   # rhc disconnect
   ```

5. To help with troubleshooting, set the **RHC systemd** service (**rhcd**) logging to the highest level:

   ```
   # sed -ie 's%error%trace%' /etc/rhc/config.toml
   ```

6. Register your system with Red Hat Insights and re-enable RHC in your terminal:

   ```
   # insights-client --register
   # rhc connect -a <activation_key> -o <organization_ID>
   ```

   Replace *activation_key* and *organization_ID* with the activation key and organization ID from the Red Hat Customer Portal.

Verification

- Verify that you can select the system in the Pre-conversion analysis for converting to RHEL task.
  If the system still does not appear correctly, review error messages from **rhcd** and the **insights-client** tool:

  ```
  # journalctl -u rhcd
  # less /var/log/insights-client/insights-client.log
  ```

7.3.2. Pre-conversion analysis task fails to complete

After running the **Pre-conversion analysis for converting to RHEL** task, one or more of the systems can fail to generate a report with the error message **Task failed to complete for an unknown reason. Retry this task at a later time.** If this issue occurs, complete the steps below to troubleshoot.

Procedure

1. Verify if the affected system is unavailable, for example because of a network accessibility issue or because the system is shut off.

2. Review the **RHC systemd** service (**rhcd**) for errors:

   a. Stop rhcd in your terminal:

      ```
      # systemctl stop rhcd
      ```

   b. Set **rhcd** logging to the highest level:

      ```
      # sed -ie 's%error%trace%' /etc/rhc/config.toml
      ```

   c. Restart **rhcd**:

      ```
      # systemctl start rhcd
      ```

   d. Review error messages posted by **rhcd**:

      ```
      # journalctl -u rhcd
      ```

3. Review the **rhc-worker-script** log file for errors:

   ```
   # less /var/log/rhc-worker-script/rhc-worker-script.log
   ```

7.4. KNOWN ISSUES AND LIMITATIONS

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

- Systems that connect to the Internet using an HTTP proxy server cannot convert using Red Hat CDN or Satellite through RHSM by using the command line. 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. For more information, see the Red Hat Knowledgebase solution How to enable proxy settings for yum command on RHEL?

  2. Install the **subscription-manager** package:

     a. Download the Red Hat GPG key:

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

     b. Install a repository file for the **client-tools** repository that contains the **subscription-manager** package:

        - conversions to RHEL 7:

          ```
          # curl -o /etc/yum.repos.d/client-tools.repo https://cdn-
          public.redhat.com/content/public/repofiles/client-tools-for-rhel-7-server.repo
          ```

        - For conversions to RHEL 8:

```
# curl -o /etc/yum.repos.d/client-tools.repo https://cdn-
public.redhat.com/content/public/repofiles/client-tools-for-rhel-8.repo
```

- For conversions to RHEL 9:

```
# curl -o /etc/yum.repos.d/client-tools.repo https://ftp.redhat.com/redhat/client-
tools/client-tools-for-rhel-9.repo
```

c. If you are converting to an earlier version of RHEL 8, for example, RHEL 8.5, update the **$releasever** value in the client-tools repository:

```
# sed -i 's%\$releasever%<release_version>%' /etc/yum.repos.d/client-tools.repo
```

Replace *release_version* with the correct release version, for example **8.5** or **8.8**.

d. Install the following subscription-manager packages:

```
# yum -y install subscription-manager subscription-manager-rhsm-certificates
```

3. Configure HTTP proxy for RHSM. For more information, see the Red Hat Knowledgebase solution How to configure HTTP Proxy for Red Hat Subscription Management .

4. Register the system with RHSM:

```
# subscription-manager register --org <organization_id> --activationkey <activation_key>
```

Replace *organization_id* and *activation_key* with the organization ID and activation key from the Red Hat Customer Portal.

5. Remove the organization ID and activation key from the **/etc/convert2rhel.ini** file.

6. Perform the conversion to RHEL:

```
# convert2rhel
```

(RHELC-559)

- UEFI systems with Secure Boot enabled are not supported for conversion. To work around this issue, complete the following steps:

1. Disable Secure Boot before the conversion. For more information, see the Red Hat Knowledgebase solution convert2rhel fails on UEFI systems with Secure Boot enabled .

2. Perform the conversion to RHEL.

3. If converting from Oracle Linux 7 or Alma Linux 8, install the **shim-x64** package:

```
# yum install -y shim-x64
```

4. Re-enable Secure Boot.
   (RHELC-138)

- If you are converting by using Red Hat Insights, running two RHC daemon (rhcd) processes simultaneously prevents the pre-conversion analysis from running as expected. To prevent this issue, run only one rhcd process at a time. (HMS-2629)

7.5. OBTAINING SUPPORT

If you experience problems during the conversion, notify Red Hat so that these problems can be addressed.
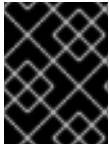
> **IMPORTANT**
>
> If you are experiencing problems during the conversion, raise a Support case of Severity 3 or Severity 4 level only. For more details, see Production Support Terms of Service.

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 the appropriate version of RHEL 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 the appropriate version of RHEL as the product, and select **convert2rhel** as the component.

For details on generating an **sosreport**, For more information, see the Red Hat Knowledgebase solution What is an sosreport and how to create one in Red Hat Enterprise Linux? .

For more information about 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 about Red Hat's support policy for Linux distribution conversions, see Convert2RHEL Support Policy.

CHAPTER 8. ADDITIONAL RESOURCES

- How to perform an unsupported conversion from a RHEL-derived Linux distribution to RHEL

- Red Hat Enterprise Linux technology capabilities and limits

- Red Hat Enterprise Linux documentation

- Migration planning guide - migration to RHEL 7

- Considerations in adopting RHEL 8

- Upgrading from RHEL 7 to RHEL 8

- Upgrading from RHEL 8 to RHEL 9

- Convert2RHEL FAQ (Frequently Asked Questions)