



Red Hat Enterprise Linux for SAP Solutions 9

Red Hat Enterprise Linux System Roles for SAP

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Abstract

This guide contains an overview and additional information about Red Hat Enterprise Linux system roles for SAP.

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MAKING OPEN SOURCE MORE INCLUSIVE

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

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CHAPTER 1. OVERVIEW

Red Hat Enterprise Linux (RHEL) 7 [RHEA-2019:3190](#) introduced RHEL System Roles for SAP to assist with remotely or locally configuring a RHEL system for the installation of SAP HANA or SAP NetWeaver software. RHEL System Roles for SAP development is based on the [SAP LinuxLab](#) upstream project.

RHEL System Roles is a collection of roles executed by Ansible to assist administrators with RHEL system configuration. These roles are provided in the RHEL AppStream repository. In contrast, **RHEL System Roles for SAP** is provided in the RHEL for SAP Solutions subscription.

The Red Hat Enterprise Linux for SAP Solution subscription provides support for RHEL System Roles for SAP with Ansible Core. However, if you require full support for Ansible Core, a separate subscription is necessary. Additional information is available at [Red Hat Enterprise Linux \(RHEL\) System Roles](#).

The following RHEL System Roles for SAP are fully supported on control nodes running RHEL 8.4 and later:

- *sap_general_preconfigure*
- *sap_netweaver_preconfigure*
- *sap_hana_preconfigure*
- *sap_hana_install*

The following RHEL System Roles for SAP are supported as Technology Preview on control nodes running RHEL 8.4 and later:

- *sap_ha_install_hana_hsr*
- *sap_ha_pacemaker_cluster*
- *sap_swpm (*)*

The RHEL System Roles for SAP, just like the [RHEL System Roles](#), are installed and run from a central node referred to as the *control node* (which can be [Ansible Automation controller](#), [Red Hat Satellite](#), or a RHEL 9 or RHEL 8 host). The control node connects to the local host and/or to one or more remote hosts (called *managed nodes* in the context of Ansible), and performs installation and configuration steps on them. It is recommended that you use the latest major release of RHEL on the control node (RHEL 9) and use the latest version of the roles either from the **rhel-system-roles-sap** RPM or from [Red Hat Automation Hub](#). The RHEL System Roles for SAP and Ansible packages do not need to be installed on the systems that are being managed/configured.

This document describes how to install and use RHEL package **rhel-system-roles-sap** version 3.3.0 (*) or Automation Hub collection **redhat.sap_install** version 1.2.1, which consists of the following roles.



NOTE

Package **rhel-system-roles-sap** version 3.3.0 does not contain the role **sap_swpm**. This role is planned to be released in the next version of package **rhel-system-roles-sap**.

Purpose

Role Name	Description
sap_general_preconfigure	Perform installation and configuration steps common to SAP NetWeaver and SAP HANA
sap_netweaver_preconfigure	Perform additional installation and configuration steps for SAP NetWeaver
sap_hana_preconfigure	Perform additional installation and configuration for SAP HANA
sap_hana_install	Perform a SAP HANA scale-up or scale-out installation
sap_ha_install_hana_hsr	Set up SAP HANA System Replication on two nodes
sap_ha_pacemaker_cluster	Install Pacemaker and configure the cluster and SAP cluster resources
sap_swpm	Install SAP Software via SWPM

Support Status

Role Name	Support Status	Remote Host Management	Control Node
sap_general_preconfigure	Fully supported	RHEL 7.6 and later, RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_netweaver_preconfigure	Fully supported	RHEL 7.6 and later, RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_hana_preconfigure	Fully supported	RHEL 7.6 and later, RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_hana_install	Fully supported	RHEL 7.6 and later, RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_ha_install_hana_hsr	Technology Preview	RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_ha_pacemaker_cluster	Technology Preview	RHEL 8, RHEL 9	RHEL 8, RHEL 9
sap_swpm (*)	Technology Preview for certain functionality, unsupported for all other functionality	RHEL 8, RHEL 9	RHEL 8, RHEL 9



NOTE

- * This version of the RHEL System Roles for SAP contains the role **sap_swpm** with a support scope of Technology Preview for the role's default mode only and only for the following deployment scenarios: **S/4HANA 2021** and **S/4HANA 2022** single-host installation on x86_64: RHEL 8.4, 8.6, 9.0 and ppc64le: RHEL 8.4 and 8.6.
All other functionality of the role **sap_swpm** is not supported.

Platforms

See the table below for the supported hardware/virtualization/cloud platforms of the managed node:

Hardware platform	Bare Metal/Virtualization/ Cloud platform	Support Status
x86_64	bare metal, Red Hat Virtualization/libvirt, VMware ESX, Red Hat Certified Cloud and Service Providers	supported as per Support Status in the previous table
ppc64le	PowerVM LPARs	supported as per Support Status in the previous table
s390x	zVM guest	fully supported: <i>sap_general_preconfigure</i> , <i>sap_netweaver_preconfigure</i>

Directories

Installation Method	Roles; Documentation
RHEL package <code>rhel-system-roles-sap</code>	<code>/usr/share/ansible/roles/<role>;</code> <code>/usr/share/doc/rhel-system-roles-sap/<role></code>
Automation Hub collection <code>redhat.sap_install</code>	<code>~/.ansible/collections/ansible_collection/redhat/sap_install/<role>;</code> <code>~/.ansible/collections/ansible_collection/redhat/sap_install/<role>/README.md</code>



NOTE

- The roles are designed to be used right after the initial installation of a managed node. If you want to run these roles against an SAP or other production system, run them in assertion mode first so you can detect which settings deviate from SAP's recommendations as per applicable SAP notes. When run in normal mode, the roles will enforce the SAP recommended configuration on the managed node(s). Unusual system configuration settings might in rare cases still lead to unintended changes by the role. Before using the roles in normal mode on production systems, it is strongly recommended to backup the system and test the roles on a test and QA system first.
- Before applying the roles on a managed node, verify that the RHEL release on the managed node is supported by the SAP software version that you are planning to install. The role **sap_hana_preconfigure** will fail if a RHEL minor version is used for which no SAP HANA validation exists (can be overridden).

CHAPTER 2. INSTALLING THE ANSIBLE ENGINE AND RHEL SYSTEM ROLES FOR SAP

Use the following procedure for installing Ansible Core and the RHEL System Roles for SAP package or collection.



NOTE

For installing packages on a **Red Hat Satellite** system, do not use the plain **dnf** command but follow the instructions in [How to install or update packages in Red Hat Satellite 6?](#) .

Procedure

1. Install Ansible Core:

```
# dnf install ansible-core
```

Continue with step 2 for installing the RHEL package **rhel-system-roles-sap** or with step 3 for installing the Automation Hub collection **redhat.sap_install**.

2. For installing the RHEL package **rhel-system-roles-sap**:
 - a. Enable the RHEL for SAP Solutions repository using Red Hat Subscription Manager:

```
# subscription-manager repos
--enable=rhel-$(rpm -E %rhel)-for-$(uname -m)-sap-solutions-rpms
```

- b. Install the RHEL System Roles for SAP:

```
# dnf install rhel-system-roles-sap
```

The **rhel-system-roles-sap** package is installed to `/usr/share/ansible/roles/<role>`, where **<role>** is the name of the individual role, for example, **sap_hana_preconfigure**. Each role includes a **README.md** file which explains all variables and how to use the role.

3. For installing the Automation Hub collection **redhat.sap_install**, you can either directly install the collection from **Automation Hub** or first download it and then install it from the downloaded file.
 - a. To install the collection directly from Automation Hub, follow the instructions on [this page](#). The essential steps are:
 - i. Make a copy of your Offline token, the Server URL, and the SSO URL from [this page](#) and note the Server URL and SSO URL on the same page. If needed (e.g. because it expired), recreate the token.
 - ii. Use these values to configure file `/etc/ansible/ansible.cfg` according to the instructions in [this chapter](#). Use the Server URL for variable **url**, the SSO URL for variable **auth_url**, and the Offline token for variable **token**, as in the following example (replace the dummy token by the actual token):

```
[galaxy]
server_list = automation_hub_install
```

```
[galaxy_server.automation_hub_install]
url = https://console.redhat.com/api/automation-
hub/[https://console.redhat.com/api/automation-hub/]
auth_url = https://sso.redhat.com/auth/realms/redhat-external/protocol/openid-
connect/token[https://sso.redhat.com/auth/realms/redhat-external/protocol/openid-
connect/token]
token = 123567890abcdef...abcdef1234
```

- iii. Install the collection by running the following command as the user which will use the collection (the user which will run the playbooks to install software or configure settings on managed nodes):

```
# ansible-galaxy collection install redhat.sap_install
```

This will install the collection into the default location for the user (necessary directories will be created recursively), which is:

```
~/.ansible/collections/ansible_collections/redhat/sap_install.
```

- b. To download the collection from Automation Hub and then install it, perform the following step:
 - i. Download the collection tar file from [this page](#) (use the **Download tarball** link) and then run the following command as the user which will use the collection:

```
# ansible-galaxy collection install
./redhat-sap_install-1.2.1.tar.gz
```

This will also install the collection into the default location for the user, as described before.

The file **README.md** in each role's subdirectory below **sap_install**, e.g. **roles/sap_general_preconfigure**, contains the documentation for each of the roles.

CHAPTER 3. NEW FEATURES

Automation Hub collection **redhat.sap_install** version 1.2.1 has the following new features:

- New **sap_ha_pacemaker_cluster** role for performing all HA related configuration changes in one role, using the **ha_cluster** Linux System Role and its enhanced features
- Improve SID and instance checking in role **sap_hana_install**, so the role will return successfully if a HANA system with the desired SID and instance number is detected (idempotency)
- Enable modifying SELinux file labels for SAP directories during preconfiguration and HANA installation, using the **selinux** Linux System Role
- New **sap_swpm** role for performing certain SWPM based installations

CHAPTER 4. KNOWN ISSUES

4.1. REBOOT REQUIREMENT DETECTION

The reboot requirement detection is not reliable on RHEL 8.5 and later on platform ppc64le.

A failed reboot requirement detection can lead to unnecessary reboots at the end of a playbook which calls the preconfiguration roles. Role parameters are available for avoiding reboots, and playbooks can be extended to unconditionally reboot a system. See bug [2166444](#) for more information.

4.2. RHEL 9 PACKAGES FOR SAP HANA

On RHEL 9, some packages are not getting installed and some are installed which are not required for SAP HANA.

SAP note [3108316](#) has been published with some updates which were not known at the time this version of the RHEL System Roles for SAP had been finalized. The additional package that has to be installed for SAP HANA is **compat-openssl11**.

See [this comment](#) for instructions on how to quickly define a list of packages to be installed.

4.3. EXTENDED CHECK (ASSERT) FUNCTION

Be careful when using the extended check (=assert) function of the preconfigure roles.

The preconfigure roles can run in an assert mode, in which case they do not modify managed nodes but report the compliance of a node with the applicable SAP notes. When using the same control node also for modifying the system configuration, by running the preconfigure roles in normal mode, extra caution needs to be applied to ensure that a "normal" playbook is not accidentally used for checking the system configuration. It is strongly recommended to only run the roles on production systems after testing them on test and QA systems first.

4.4. DNS NAME RESOLUTION

Role **sap_general_preconfigure** fails if the DNS domain is not set on the managed node.

In case there is no DNS domain set on the managed node, which is typically the case on cloud systems, the role **sap_general_preconfigure** will fail in task *Verify that the DNS domain is set*. To avoid this, set the role variable **sap_domain** in the vars section of your playbook, in an inventory file for the managed node or run the **ansible-playbook** command with parameter **-e "sap_domain=example.com"** (replace **example.com** by your own DNS domain name).

CHAPTER 5. QUICK START GUIDE TO RHEL SYSTEM ROLES FOR SAP

Use the following procedures for configuring or verifying one or more systems for the installation of SAP NetWeaver or SAP HANA

5.1. PREPARING THE CONTROL NODE

Use the following steps to display the system messages in English. RHEL System Roles for SAP requires that the Ansible control node uses locale **C** or **en_US.UTF-8**.

Procedure

1. Run the command on the local host to check the current setting.

```
# locale
```

2. The output should display either **C** or **en_US.UTF-8** in the line starting with **LC_MESSAGES=**.
 - a. If the command does not produce the expected output, run the following command on the local host before executing the **ansible-playbook** command:

```
# export LC_ALL=C
```

Or

```
# export LC_ALL=en_US.UTF-8
```



NOTE

These steps are necessary because by default, the **LC_*** variables are forwarded to a remote system (see **man ssh_config** and **man sshd_config**), and the roles are evaluating certain command outputs from remote systems.

5.2. CONFIGURING THE LOCAL SYSTEM

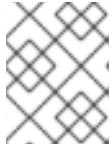
Use the following steps for preparing the local system for the installation of SAP NetWeaver

Prerequisites

- No production software running on the system
- A minimum of 20480 MB of swap space is configured on the local system

Procedure

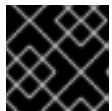
1. Make a backup, if you would like to preserve the original configuration of the server.

**NOTE**

These roles are run after the installation of RHEL, therefore a backup should not be required.

2. Create a YAML file named **sap-netweaver.yml** with the following content:

```
- hosts: localhost
  connection: local
  roles:
    - sap_general_preconfigure
    - sap_netweaver_preconfigure
```

**IMPORTANT**

The correct indentation of 2 spaces in front of **roles:** is essential.

3. Run the RHEL System Roles **sap_general_preconfigure** and **sap_netweaver_preconfigure** to prepare the managed nodes for the installation of SAP NetWeaver.

```
# ansible-playbook sap-netweaver.yml
```

4. At the end of the playbook run, the role will likely report that a reboot is required, for example because certain packages had been installed. In this case, reboot the system at this time.

5.3. VERIFYING THE LOCAL SYSTEM

RHEL System roles for SAP can also be used to verify that RHEL systems are configured correctly. Use the following steps to verify if the local system is configured correctly for installation of SAP NetWeaver.

Prerequisites

- RHEL System Roles for SAP version 3

Procedure

1. Create a YAML file named **sap-netweaver.yml** with the following content:

```
- hosts: localhost
  connection: local
  vars:
    sap_general_preconfigure_assert: yes
    sap_general_preconfigure_assert_ignore_errors: yes
    sap_netweaver_preconfigure_assert: yes
    sap_netweaver_preconfigure_assert_ignore_errors: yes
  roles:
    - sap_general_preconfigure
    - sap_netweaver_preconfigure
```

2. Run the following command:

```
# ansible-playbook sap-netweaver.yml
```

In case you would like to get a more compact output, you can pipe the output to the shell script **beautify-assert-output.sh**, located in the tools directory of each of the preconfigure roles, to just display the essential FAIL or PASS information for each assertion. Assuming you have copied the script to directory `~/bin`, the command would be:

```
# ansible-playbook sap-netweaver-assert.yml |
./bin/beautify-assert-output.sh
```

If you are using a terminal with dark background, replace all occurrences of color code `[30m` in the following command sequence by `[37m`. Otherwise, the output of some lines will be unreadable due to a dark font on a dark background. In case you accidentally ran the above command in a terminal with a dark background, you can re-enable the default white font again with the following command:

```
# echo -e "\033[37mResetting font color\n"
```

5.4. CONFIGURING REMOTE SYSTEMS

Use the following steps for preparing one or more remote systems (managed nodes) for the installation of SAP HANA.

Prerequisites

- Verify that the managed nodes are correctly set up for installing Red Hat software packages from a Red Hat Satellite server or the Red Hat Customer Portal.
- Passwordless ssh access to each managed node from the Ansible control node.
- Supported RHEL release for SAP HANA.
 - For information on supported RHEL releases for SAP HANA, see [SAP Note 2235581](#).

Procedure

1. Make a backup if you would like to preserve the original configuration of the server.
2. Create an inventory file or modify file `/etc/ansible/hosts` that contains the name of a group of hosts and each system which you intend to configure (=managed node) in a separate line (example for three hosts in a host group named **sap_hana**):

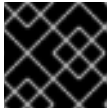
```
[sap_hana]
host01
host02
host03
```

3. Verify that you can log in to all three hosts using ssh without password. Example:

```
# ssh host01 uname -a
# ssh host02 hostname
# ssh host03 echo test
```

4. Create a YAML file named **sap-hana.yml** with the following content:

```
- hosts: sap_hana
  roles:
    - sap_general_preconfigure
    - sap_hana_preconfigure
```



IMPORTANT

The correct indentation (e.g. 2 spaces in front of **roles:**) is essential.

- Run the RHEL System Roles **sap_general_preconfigure** and **sap_hana_preconfigure** to prepare the managed nodes for the installation of SAP HANA.

```
# ansible-playbook sap-hana.yml
```



NOTE

- The roles are designed to be used right after the initial installation of a managed node. If you want to run these roles against an SAP or other production system, run them in assertion mode first so you can detect which settings deviate from SAP's recommendations as per applicable SAP notes. When run in normal mode, the roles will enforce the SAP recommended configuration on the managed node(s). Unusual system configuration settings might in rare cases still lead to unintended changes by the role. Before using the roles in normal mode on production systems, it is strongly recommended to backup the system and test the roles on a test and QA system first.
- At the end of the playbook run, the command will report for each managed node that a reboot is required. Reboot the managed nodes at this time.

5.5. INSTALLING SAP SOFTWARE

For instructions on installing the SAP HANA database or SAP S/4HANA on RHEL 8 or RHEL 9, refer to [Installing SAP HANA or SAP S/4HANA with the RHEL System Roles for SAP](#) .

CHAPTER 6. ADDITIONAL INFORMATION

6.1. IMPLEMENTED SAP NOTES IN SAP*PRECONFIGURE

The implemented SAP notes in the three preconfigure roles, along with the SAP note versions, are contained in each preconfigure role's vars files, in a variable named

_`<role_name>`_sapnotes_versions. Sample file name:

`/usr/share/ansible/roles/sap_general_preconfigure/vars/RedHat_8.yml`. In these files the variable **`_sap_general_preconfigure_sapnotes_versions`** contains the implemented SAP notes along with their version numbers.

6.2. ROLE VARIABLES

The file **README.md** of each role, located in directory **`/usr/share/ansible/roles/<role>`**, describes the purpose of all user configurable variables as well as their default settings. The variables are defined and can be changed in several places, e.g. in an inventory file, in your playbooks, or by using the **ansible-playbook** command line parameter **`--extra-vars`** or **`-e`**.

CHAPTER 7. RELATED INFORMATION

- [Linux System Roles upstream project](#)
- [Red Hat Enterprise Linux \(RHEL\) System Roles](#) (Red Hat Knowledge Base Article)
- [Installing SAP HANA or SAP S/4HANA with the RHEL System Roles for SAP](#) (Red Hat Knowledge Base Article)
- [RHEL System Roles for SAP v.1](#)
- [RHEL System Roles for SAP v.2](#)