



Red Hat OpenStack Platform 16.1

Undercloud and Control Plane Back Up and Restore

Procedures for backing up and restoring the undercloud and the overcloud control plane during updates and upgrades

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Abstract

This guide explains how to install and configure Relax-and-Recover (ReaR) on the undercloud and overcloud control plane nodes; how to back up the undercloud and Control Plane nodes before updates and upgrades; and, how to restore the undercloud and Control Plane nodes if an error occurs while performing updates or upgrades.

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CHAPTER 1. INTRODUCTION TO UNDERCLOUD AND CONTROL PLANE BACK UP AND RESTORE

Undercloud and Control Plane Back Up and Restore describes the tasks that are required to back up the state of the Red Hat OpenStack Platform 16.1 undercloud and overcloud controller nodes, also known as control plane nodes, before updates and upgrades. You can use the created backups to restore the undercloud and overcloud control plane nodes to their previous state if an error occurs during an update or upgrade.

1.1. ABOUT THE REAR DISASTER RECOVERY SOLUTION

The tasks described in the Undercloud and Control Plane Back Up and Restore guide use the open source Relax and Recover (ReaR) disaster recovery solution that is written in Bash. You can use ReaR to create bootable images of the latest state of the undercloud or control plane nodes, or to back up specific files.

ReaR supports the following boot media formats:

- ISO
- USB
- eSATA
- PXE

The examples in this document were tested using the **ISO** bootable files format.

ReaR can use the following protocols to transport files:

- HTTP/HTTPS
- SSH/SCP
- FTP/SFTP
- NFS
- CIFS (SMB)

For the purposes of backing up and restoring the Red Hat OpenStack Platform 16.1 undercloud and overcloud control plane nodes, the examples in this document were tested using NFS.

1.2. REAR BACKUP MANAGEMENT OPTIONS

You can use ReaR with internal and external backup management options.

Internal backup management

You can use ReaR with the following internal backup options:

- **tar**
- **rsync**

External backup management

External backup management options include open source and proprietary solutions. You can use ReaR with the following open source solutions:

- Bacula
- Bareos

You can use ReaR with the following proprietary solutions:

- EMC NetWorker (Legato)
- HP DataProtector
- IBM Tivoli Storage Manager (TSM)
- Symantec NetBackup

CHAPTER 2. CONFIGURING THE BACKUP NODE

Before you can create a backup of the undercloud or control plane nodes, you must configure the backup node. You can install and configure an NFS server on the backup node using the **backup-and-restore** Ansible role.

Procedure

1. On the undercloud node, source the undercloud credentials:

```
(stack@undercloud-0 ~)$ source stackrc
(undercloud) [stack@undercloud ~]$
```

2. On the undercloud node, create an inventory file for the backup node and replace the **<IP_ADDRESS>** and **<USER>** with the values that apply to your environment:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF'> ~/nfs-inventory.yaml
[BACKUP_NODE]
serverX ansible_host=<IP_ADDRESS> ansible_user=<USER>
EOF
```

3. On the undercloud node, create the following Ansible playbook and replace **<BACKUP_NODE>** with the host name of the backup node:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF'> ~/bar_nfs_setup.yaml
# Playbook
# Substitute <BACKUP_NODE> with the host name of your backup node.
- become: true
  hosts: <BACKUP_NODE>
  name: Setup NFS server for ReaR
  roles:
    - role: backup-and-restore
EOF
```

4. On the undercloud node, enter the following **ansible-playbook** command, to configure the backup node:

```
(undercloud) [stack@undercloud ~]$ ansible-playbook \
-v -i ~/nfs-inventory.yaml \
--extra="ansible_ssh_common_args='-o StrictHostKeyChecking=no'" \
--become \
--become-user root \
--tags bar_setup_nfs_server \
~/bar_nfs_setup.yaml
```

CHAPTER 3. INSTALLING REAR ON THE UNDERCLOUD AND CONTROL PLANE NODES

Before creating a backup of the undercloud and control plane nodes, you must install the Relax and Recover (ReaR) packages on the undercloud node and on each of the controller nodes.

To install ReaR using the **backup-and-restore** Ansible role, complete the following procedures:

1. [Section 3.1, “Installing ReaR on the undercloud node”](#)
2. [Section 3.2, “Installing ReaR on the control plane nodes”](#)

3.1. INSTALLING REAR ON THE UNDERCLOUD NODE

To create a backup of the undercloud node, you must install and configure Relax and Recover (ReaR) on the undercloud.

Prerequisites

- You have configured the backup node. For more information, see [Configuring the backup node](#).

Procedure

1. On the undercloud node, source the undercloud credentials and use the **tripleo-ansible-inventory** command to generate a static inventory file that contains hosts and variables for all the overcloud nodes:

```
[stack@undercloud-0 ~]$ source stackrc
(undercloud) [stack@undercloud ~]$ tripleo-ansible-inventory \
--ansible_ssh_user heat-admin \
--static-yaml-inventory /home/stack/tripleo-inventory.yaml
```

2. On the undercloud node, create the following Ansible playbook:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF' > ~/bar_rear_setup-undercloud.yaml
# Playbook
# Installing and configuring ReaR on the undercloud node
- become: true
  hosts: undercloud
  name: Install ReaR
  roles:
    - role: backup-and-restore
EOF
```

3. On the undercloud node, enter the following **ansible-playbook** command to install ReaR:

```
(undercloud) [stack@undercloud ~]$ ansible-playbook \
-v -i ~/tripleo-inventory.yaml \
--extra="ansible_ssh_common_args='-o StrictHostKeyChecking=no'" \
--become \
--become-user root \
--tags bar_setup_rear \
~/bar_rear_setup-undercloud.yaml
```

3.2. INSTALLING REAR ON THE CONTROL PLANE NODES

To create a backup of the overcloud control plane, you must install and configure Relax and Recover (ReaR) on each of the control plane nodes.

Prerequisites

- You have configured the backup node. For more information, see [Configuring the backup node](#).

Procedure

1. On the undercloud node, create the following Ansible playbook:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF' > ~/bar_rear_setup-controller.yaml
# Playbook
# Install and configuring ReaR on the control plane nodes
- become: true
  hosts: Controller
  name: Install ReaR
  roles:
    - role: backup-and-restore
EOF
```

2. On the undercloud node, enter the following **ansible-playbook** command to install Rear on the control plane nodes:

```
(undercloud) [stack@undercloud ~]$ ansible-playbook \
-v -i ~/tripleo-inventory.yaml \
--extra="ansible_ssh_common_args='-o StrictHostKeyChecking=no'" \
--become \
--become-user root \
--tags bar_setup_rear \
~/bar_rear_setup-controller.yaml
```

CHAPTER 4. CREATING A BACKUP OF THE UNDERCLOUD AND CONTROL PLANE NODES

To create a backup of the undercloud and control plane nodes using the **backup-and-restore** Ansible role, complete the following procedures:

1. [Section 4.1, “Creating a backup of the undercloud node”](#)
2. [Section 4.2, “Creating a backup of the control plane nodes”](#)

4.1. CREATING A BACKUP OF THE UNDERCLOUD NODE

You can use the **backup-and-restore** Ansible role to create a backup of the undercloud node.

Prerequisites

- You have configured the backup node. For more information, see [Configuring the backup node](#).
- You have installed ReaR on the undercloud node. For more information, see [Installing ReaR on the undercloud node](#).

Procedure

1. On the undercloud node, create the following Ansible playbook:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF' > ~/bar_rear_create_restore_images-
undercloud.yaml
# Playbook
# Using ReaR on the undercloud node.
- become: true
  hosts: undercloud
  name: Create the recovery images for the undercloud
  roles:
    - role: backup-and-restore
EOF
```

2. To create a backup of the undercloud node, enter the following **ansible-playbook** command:

```
(undercloud) [stack@undercloud ~]$ ansible-playbook \
-v -i ~/tripleo-inventory.yaml \
--extra="ansible_ssh_common_args=-o StrictHostKeyChecking=no" \
--become \
--become-user root \
--tags bar_create_recover_image \
~/bar_rear_create_restore_images-undercloud.yaml
```

4.2. CREATING A BACKUP OF THE CONTROL PLANE NODES

You can use the **backup-and-restore** Ansible role to create a backup of the control plane nodes.

Prerequisites

- You have configured the backup node. For more information, see [Configuring the backup node](#).

- You have installed ReaR on the control plane nodes. For more information, see [Installing ReaR on the control plane nodes](#).

Procedure

1. On the undercloud node, create the following Ansible playbook:

```
(undercloud) [stack@undercloud ~]$ cat <<'EOF' > ~/bar_rear_create_restore_images-
controller.yaml
# Playbook
# Using ReaR on the control plane nodes.
- become: true
  hosts: ceph_mon
  name: Backup ceph authentication
  tasks:
    - name: Backup ceph authentication role
      include_role:
        name: backup_and_restore
        tasks_from: ceph_authentication
      tags:
        - bar_create_recover_image
- become: true
  hosts: Controller
  name: Create the recovery images for the control plane
  roles:
    - role: backup-and-restore
EOF
```

2. On the undercloud node, enter the following **ansible-playbook** command, to create a backup of the control plane nodes:

```
(undercloud) [stack@undercloud ~]$ ansible-playbook \
-v -i ~/tripleo-inventory.yaml \
--extra="ansible_ssh_common_args='-o StrictHostKeyChecking=no'" \
--become \
--become-user root \
--tags bar_create_recover_image \
~/bar_rear_create_restore_images-controller.yaml
```

CHAPTER 5. RESTORING THE UNDERCLOUD AND CONTROL PLANE NODES

If an error occurs during an update or upgrade, you can restore either the undercloud or overcloud control plane nodes, or both to their previous state using backups.

To restore the undercloud and control plane nodes using backups, complete the following procedures:

1. [Section 5.1, “Restoring the undercloud node”](#)
2. [Section 5.2, “Restoring the control plane nodes”](#)

5.1. RESTORING THE UNDERCLOUD NODE

If an error occurs during an update or upgrade, you can restore the undercloud node to its previous state using the backup ISO image that you created using ReaR. You can find the backup ISO images on the backup node. Burn the bootable ISO image to a DVD or download it to the undercloud node through Integrated Lights-Out (iLO) remote access.

Prerequisites

- You have created a backup of the undercloud node using ReaR. For more information, see [Creating a backup of the undercloud node](#).
- You have access to the backup node.

Procedure

1. Power off the undercloud node. Ensure that the undercloud node is powered off completely before you proceed.
2. Boot the undercloud node with the backup ISO image.
3. When the **Relax-and-Recover** boot menu displays, select **Recover <UNDERCLOUD_NODE>** where **<UNDERCLOUD_NODE>** is the name of your undercloud node.
4. Log in as the **root** user and restore the node:
The following message displays:

```
Welcome to Relax-and-Recover. Run "rear recover" to restore your system!
RESCUE <UNDERCLOUD_NODE>:~ # rear recover
```

When the undercloud node restoration process completes, the console displays the following message:

```
Finished recovering your system
Exiting rear recover
Running exit tasks
```

5. When the command line interface is available, power off the node:

```
RESCUE <UNDERCLOUD_NODE>:~ # poweroff
```

On boot up, the node resumes its previous state.

5.2. RESTORING THE CONTROL PLANE NODES

If an error occurs during an update or upgrade, you can restore the control plane nodes to their previous state using the backup ISO image that you have created using ReaR.

To restore the control plane, you must restore all control plane nodes to ensure state consistency.

You can find the backup ISO images on the backup node. Burn the bootable ISO image to a DVD or download it to the undercloud node through Integrated Lights-Out (iLO) remote access.



NOTE

Red Hat supports backups of Red Hat OpenStack Platform with native SDNs, such as Open vSwitch (OVS) and the default Open Virtual Network (OVN). For information about third-party SDNs, refer to the third-party SDN documentation.

Prerequisites

- You have created a backup of the control plane nodes using ReaR. For more information, see [Creating a backup of the control plane nodes](#).
- You have access to the backup node.

Procedure

1. Power off each control plane node. Ensure that the control plane nodes are powered off completely before you proceed.
2. Boot each control plane node with the corresponding backup ISO image.
3. When the **Relax-and-Recover** boot menu displays, on each control plane node, select **Recover <CONTROL PLANE NODE>**. Replace **<CONTROL PLANE NODE>** with the name of the corresponding control plane node.
4. On each control plane node, log in as the **root** user and restore the node:
The following message displays:

```
Welcome to Relax-and-Recover. Run "rear recover" to restore your system!
RESCUE <CONTROL PLANE NODE>:~ # rear recover
```

When the control plane node restoration process completes, the console displays the following message:

```
Finished recovering your system
Exiting rear recover
Running exit tasks
```

5. When the command line interface is available on each control plane node, power off the node:

```
RESCUE <CONTROL PLANE NODE>:~ # poweroff
```

6. Set the boot sequence to the normal boot device. On boot up, the node resumes its previous state.
7. To ensure that the services are running correctly, check the status of pacemaker. Log in to a Controller node as the **root** user and enter the following command:

```
# pcs status
```

8. To view the status of the overcloud, use Tempest. For more information about Tempest, see Chapter 4 of the [OpenStack Integration Test Suite Guide](#).

CHAPTER 6. BACKING UP AND RESTORING THE UNDERCLOUD AND CONTROL PLANE NODES WITH COLLOCATED CEPH MONITORS

If an error occurs during an update or upgrade, you can use ReaR backups to restore either the undercloud or overcloud control plane nodes, or both, to their previous state.

Prerequisites

- Install ReaR on the undercloud and control plane nodes. For more information, see [Installing ReaR on the undercloud and control plane nodes](#).
- Configure the backup node. For more information, see [Configuring the backup node](#).
- Create a backup of the undercloud and control plane nodes. For more information, see [Creating a backup of the undercloud and control plane nodes](#).

Procedure

1. On the backup node, export the NFS directory to host the Ceph backups. Replace **<IP_ADDRESS/24>** with the IP address and subnet mask of the network:

```
[root@backup ~]# cat >> /etc/exports << EOF
/ceph_backups <IP_ADDRESS/24>(rw,sync,no_root_squash,no_subtree_check)
EOF
```

2. On the undercloud node, source the undercloud credentials and run the following script:

```
# source stackrc
```

```
#!/bin/bash
for i in `openstack server list -c Name -c Networks -f value | grep controller | awk -F=' ' '{print $2}' | awk -F' ' '{print $1}'`; do ssh -q heat-admin@$i 'sudo systemctl stop ceph-mon@$(hostname -s) ceph-mgr@$(hostname -s)'; done
```

To verify that the **ceph-mgr@controller.service** container has stopped, enter the following command:

```
[heat-admin@overcloud-controller-x ~]# sudo podman ps | grep ceph
```

3. On the undercloud node, source the undercloud credentials and run the following script. Replace **<BACKUP_NODE_IP_ADDRESS>** with the IP address of the backup node:

```
# source stackrc
```

```
#!/bin/bash
for i in `openstack server list -c Name -c Networks -f value | grep controller | awk -F=' ' '{print $2}' | awk -F' ' '{print $1}'`; do ssh -q heat-admin@$i 'sudo mkdir /ceph_backups'; done
```

```
#!/bin/bash
for i in `openstack server list -c Name -c Networks -f value | grep controller | awk -F=' ' '{print $2}' | awk -F' ' '{print $1}'`; do ssh -q heat-admin@$i 'sudo mount -t nfs
```

```
<BACKUP_NODE_IP_ADDRESS>:/ceph_backups /ceph_backups'; done

#!/bin/bash
for i in `openstack server list -c Name -c Networks -f value | grep controller | awk -F=' '{print $2}' | awk -F' ' '{print $1}'`; do ssh -q heat-admin@$i 'sudo mkdir /ceph_backups/${hostname -s}'; done

#!/bin/bash
for i in `openstack server list -c Name -c Networks -f value | grep controller | awk -F=' '{print $2}' | awk -F' ' '{print $1}'`; do ssh -q heat-admin@$i 'sudo tar -zcv --xattrs-include=*. * --xattrs --xattrs-include=security.capability --xattrs-include=security.selinux --acls -f /ceph_backups/${hostname -s}/${hostname -s}.tar.gz /var/lib/ceph'; done
```

4. On the node that you want to restore, complete the following tasks:

- a. Power off the node before you proceed.
- b. Restore the node with the ReaR backup file that you have created during the backup process. The file is located in the **/ceph_backups** directory of the backup node.
- c. From the **Relax-and-Recover** boot menu, select **Recover <CONTROL_PLANE_NODE>**, where **<CONTROL_PLANE_NODE>** is the name of the control plane node.
- d. At the prompt, enter the following command:

```
RESCUE <CONTROL_PLANE_NODE> :~ # rear recover
```

When the image restoration process completes, the console displays the following message:

```
Finished recovering your system
Exiting rear recover
Running exit tasks
```

5. For the node that you want to restore, copy the Ceph backup from the **/ceph_backups** directory into the **/var/lib/ceph** directory:

- a. Identify the system mount points:

```
RESCUE <CONTROL_PLANE_NODE>:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs         16G   0  16G   0% /dev
tmpfs            16G   0  16G   0% /dev/shm
tmpfs            16G  8.4M  16G   1% /run
tmpfs            16G   0  16G   0% /sys/fs/cgroup
/dev/vda2        30G  13G  18G  41% /mnt/local
```

The **/dev/vda2** file system is mounted on **/mnt/local**.

- b. Create a temporary directory:

```
RESCUE <CONTROL_PLANE_NODE>:~ # mkdir /tmp/restore
RESCUE <CONTROL_PLANE_NODE>:~ # mount -v -t nfs -o rw,noatime
<BACKUP_NODE_IP_ADDRESS>:/ceph_backups /tmp/restore/
```

- c. On the control plane node, remove the existing **/var/lib/ceph** directory:

```
RESCUE <CONTROL_PLANE_NODE>:~ # rm -rf /mnt/local/var/lib/ceph/*
```

- d. Restore the previous Ceph maps. Replace **<CONTROL_PLANE_NODE>** with the name of your control plane node:

```
RESCUE <CONTROL_PLANE_NODE>:~ # tar -xvC /mnt/local/ -f
/tmp/restore/<CONTROL_PLANE_NODE>/<CONTROL_PLANE_NODE>.tar.gz --xattrs -
-xattrs-include='*.*' var/lib/ceph
```

- e. Verify that the files are restored:

```
RESCUE <CONTROL_PLANE_NODE>:~ # ls -l
total 0
drwxr-xr-x 2 root 107 26 Jun 18 18:52 bootstrap-mds
drwxr-xr-x 2 root 107 26 Jun 18 18:52 bootstrap-osd
drwxr-xr-x 2 root 107 26 Jun 18 18:52 bootstrap-rbd
drwxr-xr-x 2 root 107 26 Jun 18 18:52 bootstrap-rgw
drwxr-xr-x 3 root 107 31 Jun 18 18:52 mds
drwxr-xr-x 3 root 107 31 Jun 18 18:52 mgr
drwxr-xr-x 3 root 107 31 Jun 18 18:52 mon
drwxr-xr-x 2 root 107  6 Jun 18 18:52 osd
drwxr-xr-x 3 root 107 35 Jun 18 18:52 radosgw
drwxr-xr-x 2 root 107  6 Jun 18 18:52 tmp
```

6. Power off the node:

```
RESCUE <CONTROL_PLANE_NODE> :~ # poweroff
```

7. Power on the node. The node resumes its previous state.