



Red Hat Virtualization 4.3

Disaster Recovery Guide

Configure Red Hat Virtualization 4.3 for Disaster Recovery

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Abstract

Red Hat Virtualization can be configured to ensure that the environment remains operational even in the event of a catastrophe. This document provides information and instructions to configure Red Hat Virtualization environments for Disaster Recovery.

Table of Contents

CHAPTER 1. DISASTER RECOVERY SOLUTIONS	3
CHAPTER 2. ACTIVE-ACTIVE DISASTER RECOVERY	4
2.1. ACTIVE-ACTIVE OVERVIEW	4
2.1.1. Network Considerations	5
2.1.2. Storage Considerations	5
2.2. CONFIGURE A SELF-HOSTED ENGINE STRETCH CLUSTER ENVIRONMENT	6
2.3. CONFIGURE A STANDALONE MANAGER STRETCH CLUSTER ENVIRONMENT	7
CHAPTER 3. ACTIVE-PASSIVE DISASTER RECOVERY	9
3.1. ACTIVE-PASSIVE OVERVIEW	9
3.1.1. Network Considerations	11
3.1.2. Storage Considerations	11
3.2. CREATE THE REQUIRED ANSIBLE PLAYBOOKS	11
3.2.1. Using the ovirt-dr Script for Ansible Tasks	12
3.2.2. Create the Playbook to Generate the Mapping File	13
3.2.3. Create the Failover and Failback Playbooks	14
3.2.4. Create the Playbook to Clean the Primary Site	15
3.3. EXECUTE A FAILOVER	15
3.4. CLEAN THE PRIMARY SITE	16
3.5. EXECUTE A FAILBACK	16
APPENDIX A. MAPPING FILE ATTRIBUTES	18
APPENDIX B. TESTING THE ACTIVE-PASSIVE CONFIGURATION	22
B.1. DISCREET FAILOVER TEST	22
B.2. DISCREET FAILOVER AND FAILBACK TEST	23
B.3. FULL FAILOVER AND FAILBACK TEST	24

CHAPTER 1. DISASTER RECOVERY SOLUTIONS

Red Hat Virtualization (RHV) supports two types of disaster recovery solutions to ensure that environments can recover when a site outage occurs. Both solutions support two sites, and both require replicated storage.

Active-Active Disaster Recovery:

This solution is implemented using a stretch cluster configuration. This means that there is a single RHV environment with a cluster that contains hosts capable of running the required virtual machines in the primary and secondary site. Virtual machines automatically migrate to hosts in the secondary site if an outage occurs. However, the environment must meet latency and networking requirements. See [Section 2.1, "Active-Active Overview"](#) for more information.

Active-Passive Disaster Recovery:

Also referred to as site-to-site failover, this disaster recovery solution is implemented by configuring two separate RHV environments: the active primary environment, and the passive secondary (backup) environment. Failover and failback between sites must be manually executed, and is managed by Ansible. See [Section 3.1, "Active-Passive Overview"](#) for more information.

CHAPTER 2. ACTIVE-ACTIVE DISASTER RECOVERY

This chapter provides instructions to configure Red Hat Virtualization for disaster recovery using the active-active disaster recovery solution.

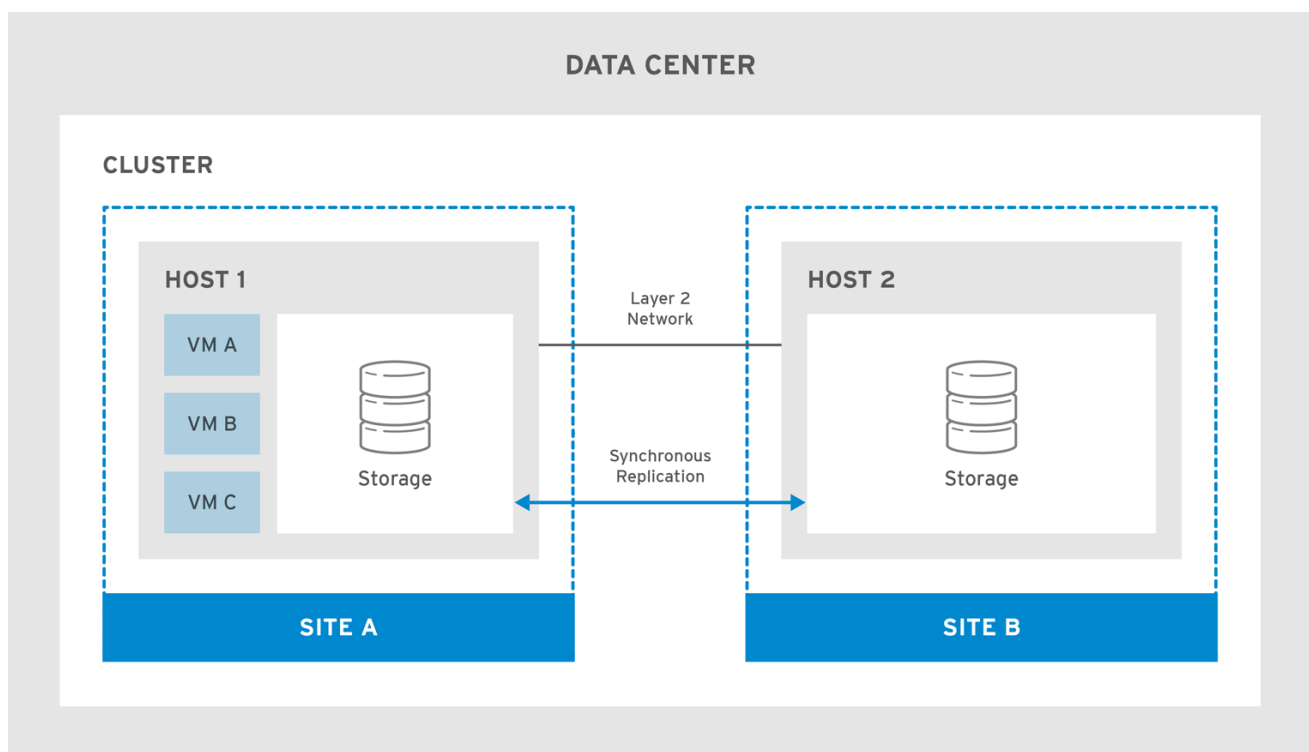
2.1. ACTIVE-ACTIVE OVERVIEW

Red Hat Virtualization supports an active-active disaster recovery failover configuration that can span two sites. Both sites are active, and if the primary site becomes unavailable, the Red Hat Virtualization environment will continue to operate in the secondary site to ensure business continuity.

The active-active failover is achieved by configuring a stretch cluster where hosts capable of running the virtual machines are located in the primary and secondary site. All the hosts belong to the same Red Hat Virtualization cluster.

You require replicated storage that is writeable on both sites to allow virtual machines to migrate between sites and continue running on the site's storage.

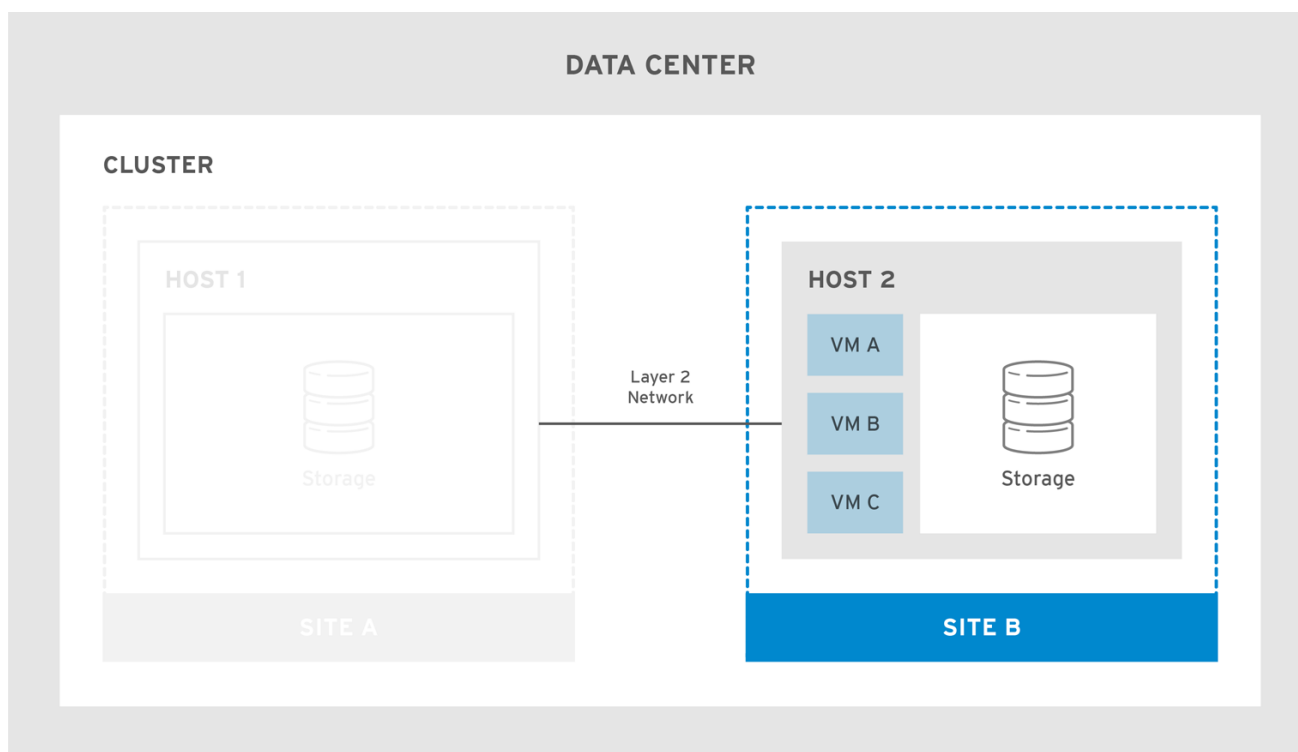
Figure 2.1. Stretch Cluster Configuration



RHV_460251_1017

Virtual machines will migrate to the secondary site if the primary site becomes unavailable. The virtual machines will automatically failback to the primary site when the site becomes available and the storage is replicated in both sites.

Figure 2.2. Failed Over Stretch Cluster



RHV_460251_1017

IMPORTANT

To ensure virtual machine failover and failback works:

- Virtual machines must be configured to be highly available, and each virtual machine must have a lease on a target storage domain to ensure the virtual machine can start even without power management.
- Soft enforced virtual machine to host affinity must be configured to ensure the virtual machines only start on the selected hosts.

For more information see [Improving Uptime with Virtual Machine High Availability](#) and [Affinity Groups](#) in the *Virtual Machine Management Guide*.

The stretched cluster configuration can be implemented using a self-hosted engine environment, or a standalone Manager environment. For more information about the different types of deployments see [Architecture](#) in the *Product Guide*.

2.1.1. Network Considerations

All hosts in the cluster must be on the same broadcast domain over an L2 network. This means that connectivity between the two sites needs to be L2.

The maximum latency requirements between the sites across the L2 network differs for the two setups. The standalone Manager environment requires a maximum latency of 100ms, while the self-hosted engine environment requires a maximum latency of 7ms.

2.1.2. Storage Considerations

The storage domain for Red Hat Virtualization can be made of either block devices (SAN - iSCSI or FCP) or a file system (NAS - NFS, GlusterFS, or other POSIX compliant file systems). For more information about Red Hat Virtualization storage see [Storage](#) in the *Administration Guide*.

The sites require synchronously replicated storage that is writeable on both sites with shared layer 2 (L2) network connectivity. The replicated storage is required to allow virtual machines to migrate between sites and continue running on the site's storage. All storage replication options supported by Red Hat Enterprise Linux 7 and later can be used in the stretch cluster.



IMPORTANT

If you have a custom multipath configuration that is recommended by the storage vendor, copy the .conf file to the `/etc/multipath/conf.d/` directory. The custom settings will override settings in the VDSMs `multipath.conf` file. Do not modify the VDSM file directly.

2.2. CONFIGURE A SELF-HOSTED ENGINE STRETCH CLUSTER ENVIRONMENT

This procedure provides instructions to configure a stretch cluster using a self-hosted engine deployment.

Prerequisites:

- A writable storage server in both sites with L2 network connectivity.
- Real-time storage replication service to duplicate the storage.

Limitations:

- Maximum 7ms latency between sites.

Configuring the Self-hosted Engine Stretch Cluster

1. Deploy the self-hosted engine. See [Installing Red Hat Virtualization as a self-hosted engine using the Cockpit web interface](#).
2. Install additional self-hosted engine nodes in each site and add them to your cluster. See [Adding Self-hosted Engine Nodes to the Red Hat Virtualization Manager](#) in *Installing Red Hat Virtualization as a self-hosted engine using the Cockpit web interface*.
3. Optionally, install additional standard hosts. See [Adding Standard Hosts to the Red Hat Virtualization Manager](#) in *Installing Red Hat Virtualization as a self-hosted engine using the Cockpit web interface*.
4. Configure the SPM priority to be higher on all hosts in the primary site to ensure SPM failover to the secondary site occurs only when all hosts in the primary site are unavailable. See [SPM Priority](#) in the *Administration Guide*.
5. Configure all virtual machines that need to failover as highly available, and ensure that the virtual machine has a lease on the target storage domain. See [Configuring a Highly Available Virtual Machine](#) in the *Virtual Machine Management Guide*.
6. Configure virtual machine to host soft affinity and define the behavior you expect from the affinity group. See [Affinity Groups](#) in the *Virtual Machine Management Guide* and [Scheduling Policies](#) in the *Administration Guide*.

The active-active failover can be manually performed by placing the main site's hosts into maintenance mode.

2.3. CONFIGURE A STANDALONE MANAGER STRETCH CLUSTER ENVIRONMENT

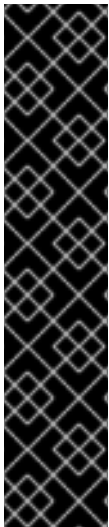
This procedure provides instructions to configure a stretch cluster using a standalone Manager deployment.

Prerequisites:

- A writable storage server in both sites with L2 network connectivity.
- Real-time storage replication service to duplicate the storage.

Limitations:

- Maximum 100ms latency between sites.



IMPORTANT

The Manager must be highly available for virtual machines to failover and failback between sites. If the Manager goes down with the site, the virtual machines will not failover.

The standalone Manager is only highly available when managed externally. For example:

- Using Red Hat's High Availability Add-On.
- As a highly available virtual machine in a separate virtualization environment.
- Using Red Hat Enterprise Linux Cluster Suite.
- In a public cloud.

Configuring the Standalone Manager Stretch Cluster

1. Install and configure the Red Hat Virtualization Manager. See [Installing Red Hat Virtualization as a standalone Manager with local databases](#).
2. Install the hosts in each site and add them to the cluster. See [Installing Hosts for Red Hat Virtualization](#) in *Installing Red Hat Virtualization as a standalone Manager with local databases*.
3. Configure the SPM priority to be higher on all hosts in the primary site to ensure SPM failover to the secondary site occurs only when all hosts in the primary site are unavailable. See [SPM Priority](#) in the *Administration Guide*.
4. Configure all virtual machines that need to failover as highly available, and ensure that the virtual machine has a lease on the target storage domain. See [Configuring a Highly Available Virtual Machine](#) in the *Virtual Machine Management Guide*.
5. Configure virtual machine to host soft affinity and define the behavior you expect from the affinity group. See [Affinity Groups](#) in the *Virtual Machine Management Guide* and [Scheduling Policies](#) in the *Administration Guide*.

The active-active failover can be manually performed by placing the main site's hosts into maintenance mode.

CHAPTER 3. ACTIVE-PASSIVE DISASTER RECOVERY

This chapter provides instructions to configure Red Hat Virtualization for disaster recovery using the active-passive disaster recovery solution.

3.1. ACTIVE-PASSIVE OVERVIEW

Red Hat Virtualization supports an active-passive disaster recovery solution that can span two sites. If the primary site becomes unavailable, the Red Hat Virtualization environment can be forced to fail over to the secondary (backup) site.

The failover is achieved by configuring a Red Hat Virtualization environment in the secondary site, which requires:

- An active Red Hat Virtualization Manager.
- A data center and clusters.
- Networks with the same general connectivity as the primary site.
- Active hosts capable of running critical virtual machines after failover.



IMPORTANT

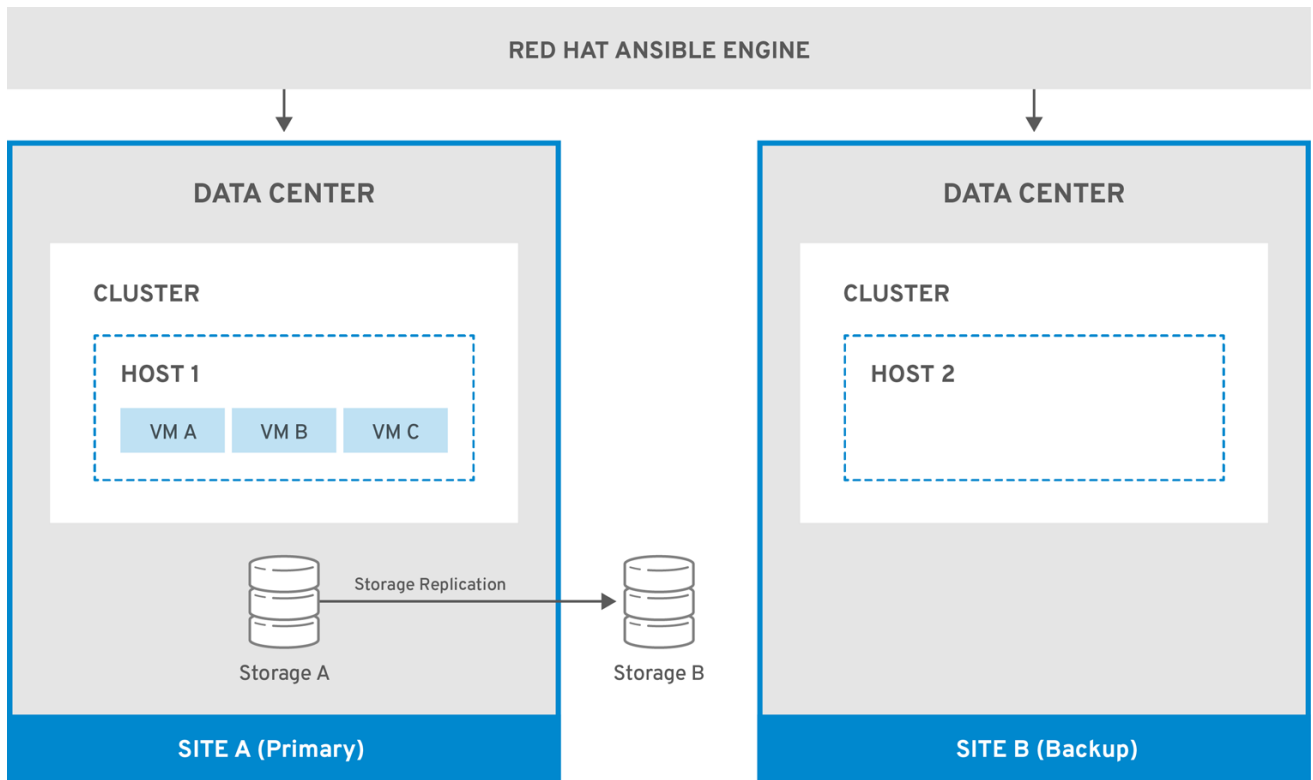
You must ensure that the secondary environment has enough resources to run the failed over virtual machines, and that both the primary and secondary environments have identical Manager versions, data center and cluster compatibility levels, and PostgreSQL versions. The minimum supported compatibility level is 4.2.

Storage domains that contain virtual machine disks and templates in the primary site must be replicated. These replicated storage domains must not be attached to the secondary site.

The failover and failback process must be executed manually. To do this you need to create Ansible playbooks to map entities between the sites, and to manage the failover and failback processes. The mapping file instructs the Red Hat Virtualization components where to fail over or fail back to on the target site.

The following diagram describes an active-passive setup where the machine running Red Hat Ansible Engine is highly available, and has access to the **oVirt.disaster-recovery** Ansible role, configured playbooks, and mapping file. The storage domains that store the virtual machine disks in Site A is replicated. Site B has no virtual machines or attached storage domains.

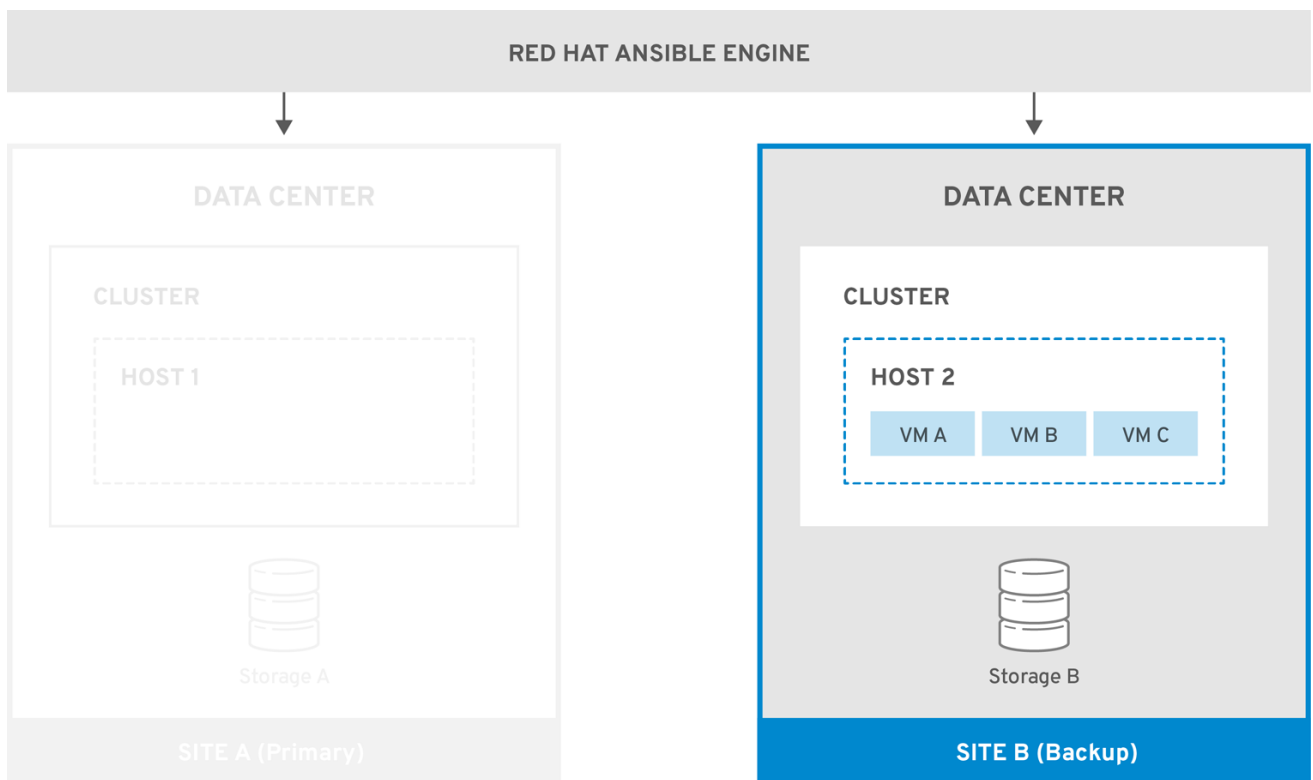
Figure 3.1. Active-Passive Configuration



RHV_466010_0218

When the environment fails over to Site B, the storage domains are first attached and activated in Site B's data center, and then the virtual machines are registered. Highly available virtual machines will fail over first.

Figure 3.2. Failover to Backup Site



RHV_466010_0218

You will need to manually fail back to the primary site (Site A) when it is running again.

3.1.1. Network Considerations

You must ensure that the same general connectivity exists in the primary and secondary sites.

If you have multiple networks or multiple data centers then you must use an empty network mapping in the mapping file to ensure that all entities register on the target during failover. See [Appendix A, Mapping File Attributes](#) for more information.

3.1.2. Storage Considerations

The storage domain for Red Hat Virtualization can be made of either block devices (SAN - iSCSI or FCP) or a file system (NAS - NFS, GlusterFS, or other POSIX compliant file systems). For more information about Red Hat Virtualization storage see [Storage](#) in the *Administration Guide*.



IMPORTANT

Local storage domains are unsupported for disaster recovery.

A primary and secondary storage replica is required. The primary storage domain's block devices or shares that contain virtual machine disks or templates must be replicated. The secondary storage must not be attached to any data center, and will be added to the backup site's data center during failover.

If you are implementing disaster recovery using self-hosted engine, ensure that the storage domain used by the self-hosted engine Manager virtual machine does not contain virtual machine disks because the storage domain will not be failed over.

All storage solutions that have replication options that are supported by Red Hat Enterprise Linux 7 and later can be used.

3.2. CREATE THE REQUIRED ANSIBLE PLAYBOOKS

Ansible is used to initiate and manage the disaster recovery failover and failback. You therefore need to create Ansible playbooks to facilitate this. For more information about creating Ansible playbooks, see the [Ansible documentation](#).

Prerequisites:

- Fully functioning Red Hat Virtualization environment in the primary site.
- A backup environment in the secondary site with the same data center and cluster compatibility level as the primary environment. The backup environment must have:
 - A Red Hat Virtualization Manager.
 - Active hosts capable of running the virtual machines and connecting to the replicated storage domains.
 - A data center with clusters.
 - Networks with the same general connectivity as the primary site.
- Replicated storage. See [Section 3.1.2, "Storage Considerations"](#) for more information.

**NOTE**

The replicated storage that contains virtual machines and templates must not be attached to the secondary site.

- The **oVirt.disaster-recovery** package must be installed on the highly available Red Hat Ansible Engine machine that will automate the failover and failback.
- The machine running Red Hat Ansible Engine must be able to use SSH to connect to the Manager in the primary and secondary site.

It is also recommended to create environment properties that exist in the primary site, such as affinity groups, affinity labels, users, on the secondary site.

**NOTE**

The default behaviour of the Ansible playbooks can be configured in the **/usr/share/ansible/roles/oVirt.disaster-recovery/defaults/main.yml** file.

The following playbooks must be created:

- The playbook that creates the file to map entities on the primary and secondary site.
- The failover playbook.
- The failback playbook.

You can also create an optional playbook to clean the primary site before failing back.

Create the playbooks and associated files in **/usr/share/ansible/roles/oVirt.disaster-recovery/** on the Ansible machine that is managing the failover and failback. If you have multiple Ansible machines that can manage it, ensure that you copy the files to all of them.

You can test the configuration using one or more of the testing procedures in [Appendix B, Testing the Active-Passive Configuration](#).

3.2.1. Using the **ovirt-dr** Script for Ansible Tasks

The **ovirt-dr** script is located in **/usr/share/ansible/roles/oVirt.disaster-recovery/files**. This script simplifies the following Ansible tasks:

- Generating a **var** mapping file of the primary and secondary sites for failover and fallback
- Validating the **var** mapping file
- Executing failover on a target site
- Executing failback from a target site to a source site

Usage

```
# ./ovirt-dr generate/validate/failover/failback
    [--conf-file=dr.conf]
    [--log-file=ovirt-dr-log_number.log]
    [--log-level=DEBUG/INFO/WARNING/ERROR]
```


You can set the parameters for the script's actions in the configuration file, `/usr/share/ansible/roles/oVirt.disaster-recovery/files/dr.conf`.

You can change the location of the configuration file with the `--conf-file` option.

You can set the location and level of logging detail with the `--log-file` and `--log-level` options.

3.2.2. Create the Playbook to Generate the Mapping File

The Ansible playbook used to generate the mapping file will prepopulate the file with the target (primary) site's entities. You then need to manually add the backup site's entities, such as IP addresses, cluster, affinity groups, affinity label, external LUN disks, authorization domains, roles, and vNIC profiles, to the file.



IMPORTANT

The mapping file generation will fail if you have any virtual machine disks on the self-hosted engine's storage domain. Also, the mapping file will not contain an attribute for this storage domain because it must not be failed over.

In this example the Ansible playbook is named `dr-rhv-setup.yml`, and is executed on the Manager machine in the primary site.

Creating the mapping file

1. Create an Ansible playbook to generate the mapping file. For example:

```
---
- name: Generate mapping
  hosts: localhost
  connection: local

  vars:
    site: https://example.engine.redhat.com/ovirt-engine/api
    username: admin@internal
    password: my_password
    ca: /etc/pki/ovirt-engine/ca.pem
    var_file: disaster_recovery_vars.yml

  roles:
    - oVirt.disaster-recovery
```



NOTE

For extra security you can encrypt your Manager password in a `.yml` file. See [Using Ansible Roles to Configure Red Hat Virtualization](#) in the *Administration Guide* for more information.

2. Run the Ansible command to generate the mapping file. The primary site's configuration will be prepopulated.

```
# ansible-playbook dr-rhv-setup.yml --tags "generate_mapping"
```

3. Configure the mapping file (**disaster_recovery_vars.yml** in this case) with the backup site's configuration. See [Appendix A, Mapping File Attributes](#) for more information about the mapping file's attributes.

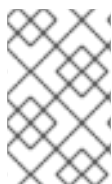
If you have multiple Ansible machines that can perform the failover and failback, then copy the mapping file to all relevant machines.

3.2.3. Create the Failover and Failback Playbooks

Ensure that you have the mapping file that you created and configured, in this case **disaster_recovery_vars.yml**, because this must be added to the playbooks.

You can define a password file (for example **passwords.yml**) to store the Manager passwords of the primary and secondary site. For example:

```
---
# This file is in plain text, if you want to
# encrypt this file, please execute following command:
#
# $ ansible-vault encrypt passwords.yml
#
# It will ask you for a password, which you must then pass to
# ansible interactively when executing the playbook.
#
# $ ansible-playbook myplaybook.yml --ask-vault-pass
#
dr_sites_primary_password: primary_password
dr_sites_secondary_password: secondary_password
```



NOTE

For extra security you can encrypt the password file. However, you will need to use the **--ask-vault-pass** parameter when running the playbook. See *Using Ansible Roles to Configure Red Hat Virtualization* in the [Administration Guide](#) for more information.

In these examples the Ansible playbooks to fail over and fail back are named **dr-rhv-failover.yml** and **dr-rhv-failback.yml**.

Create the following Ansible playbook to failover the environment:

```
---
- name: Failover RHV
  hosts: localhost
  connection: local
  vars:
    dr_target_host: secondary
    dr_source_map: primary
  vars_files:
    - disaster_recovery_vars.yml
    - passwords.yml
  roles:
    - oVirt.disaster-recovery
```

Create the following Ansible playbook to failback the environment:

```

---
- name: Failback RHV
  hosts: localhost
  connection: local
  vars:
    dr_target_host: primary
    dr_source_map: secondary
  vars_files:
    - disaster_recovery_vars.yml
    - passwords.yml
  roles:
    - oVirt.disaster-recovery

```

3.2.4. Create the Playbook to Clean the Primary Site

Before you failback to the primary site, you need to ensure that the primary site is cleaned of all storage domains to be imported. This can be performed manually on the Manager, or optionally you can create an Ansible playbook to perform it for you.

The Ansible playbook to clean the primary site is named **dr-cleanup.yml** in this example, and it uses the mapping file created in [Section 3.2.2, "Create the Playbook to Generate the Mapping File"](#) :

```

---
- name: clean RHV
  hosts: localhost
  connection: local
  vars:
    dr_source_map: primary
  vars_files:
    - disaster_recovery_vars.yml
  roles:
    - oVirt.disaster-recovery

```

3.3. EXECUTE A FAILOVER

Prerequisites:

- The Manager and hosts in the secondary site are running.
- Replicated storage domains are in read/write mode.
- No replicated storage domains are attached to the secondary site.
- A machine running Red Hat Ansible Engine that can connect via SSH to the Manager in the primary and secondary site, with the required packages and files:
 - The **oVirt.disaster-recovery** package.
 - The mapping file and required failover playbook.



IMPORTANT

Sanlock must release all storage locks from the replicated storage domains before the failover process starts. These locks should be released automatically approximately 80 seconds after the disaster occurs.

This example uses the **dr-rhv-failover.yml** playbook created earlier.

Executing a failover:

Run the failover playbook with the following command:

```
# ansible-playbook dr-rhv-failover.yml --tags "fail_over"
```

When the primary site becomes active, ensure that you clean the environment before failing back. See [Section 3.4, "Clean the Primary Site"](#) for more information.

3.4. CLEAN THE PRIMARY SITE

After you fail over, you must clean the environment in the primary site before failing back to it:

- Reboot all hosts in the primary site.
- Ensure the secondary site's storage domains are in read/write mode and the primary site's storage domains are in read only mode.
- Synchronize the replication from the secondary site's storage domains to the primary site's storage domains.
- Clean the primary site of all storage domains to be imported. This can be done manually in the Manager, or by creating and running an Ansible playbook. See [Detaching a Storage Domain](#) in the *Administration Guide* for manual instructions, or [Section 3.2.4, "Create the Playbook to Clean the Primary Site"](#) for information to create the Ansible playbook.

This example uses the **dr-cleanup.yml** playbook created earlier to clean the environment.

Cleaning the primary site:

Clean up the primary site with the following command:

```
# ansible-playbook dr-cleanup.yml --tags "clean_engine"
```

You can now failback the environment to the primary site. See [Section 3.5, "Execute a Failback"](#) for more information.

3.5. EXECUTE A FAILBACK

Once you fail over, you can fail back to the primary site when it is active and you have performed the necessary steps to clean the environment.

Prerequisites:

- The environment in the primary site is running and has been cleaned, see [Section 3.4, "Clean the Primary Site"](#) for more information.

- The environment in the secondary site is running, and has active storage domains.
- A machine running Red Hat Ansible Engine that can connect via SSH to the Manager in the primary and secondary site, with the required packages and files:
 - The **oVirt.disaster-recovery** package.
 - The mapping file and required failback playbook.

This example uses the **dr-rhv-failback.yml** playbook created earlier.

Executing a failback:

1. Run the failback playbook with the following command:

```
# ansible-playbook dr-rhv-failback.yml --tags "fail_back"
```

2. Enable replication from the primary storage domains to the secondary storage domains.

APPENDIX A. MAPPING FILE ATTRIBUTES

The following table describes the attributes in the mapping file that is used to fail over and fail back between the two sites in an active-passive disaster recovery solution.

Table A.1. Mapping File Attributes

Mapping File Section	Description
Site details	<p>These attributes map the Manager details in the primary and secondary site. For example:</p> <pre> dr_sites_primary_url: https://manager1.example.redhat.com/ovirt- engine/api dr_sites_primary_username: admin@internal dr_sites_primary_ca_file: /etc/pki/ovirt- engine/ca.pem # Please fill in the following properties for the secondary site: dr_sites_secondary_url: https://manager2.example.redhat.com/ovirt- engine/api dr_sites_secondary_username: admin@internal dr_sites_secondary_ca_file: /etc/pki/ovirt- engine/ca.pem </pre>
Storage domain details	<p>These attributes map the storage domain details between the primary and secondary site. For example:</p> <pre> dr_import_storages: - dr_domain_type: nfs dr_primary_name: DATA dr_master_domain: True dr_wipe_after_delete: False dr_backup: False dr_critical_space_action_blocker: 5 dr_warning_low_space: 10 dr_primary_dc_name: Default dr_discard_after_delete: False dr_primary_path: /storage/data dr_primary_address: 10.64.100.xxx # Fill in the empty properties related to the secondary site dr_secondary_dc_name: Default dr_secondary_path: /storage/data2 dr_secondary_address:10.64.90.xxx dr_secondary_name: DATA </pre>

Mapping File Section	Description
Cluster details	<p>These attributes map the cluster names between the primary and secondary site. For example:</p> <pre>dr_cluster_mappings: - primary_name: cluster_prod secondary_name: cluster_recovery - primary_name: fc_cluster secondary_name: recovery_fc_cluster</pre>
Affinity group details	<p>These attributes map the affinity groups that virtual machines belong to. For example:</p> <pre>dr_affinity_group_mappings: - primary_name: affinity_prod secondary_name: affinity_recovery</pre>
Affinity label details	<p>These attributes map the affinity labels that virtual machines belong to. For example:</p> <pre>dr_affinity_label_mappings: - primary_name: affinity_label_prod secondary_name: affinity_label_recovery</pre>
Domain AAA details	<p>The domain Authentication, Authorization and Accounting (AAA) attributes map authorization details between the primary and secondary site. For example:</p> <pre>dr_domain_mappings: - primary_name: internal-authz secondary_name: recovery-authz - primary_name: external-authz secondary_name: recovery2-authz</pre>
Role details	<p>The Role attributes provide mapping for specific roles. For example, if a virtual machine is registered with a user with a VmCreator role, it is possible on failover for the Manager to register a permission for that virtual machine with the same user but with a different role. For example:</p> <pre>dr_role_mappings: - primary_name: VmCreator Secondary_name: NewVmCreator</pre>

Mapping File Section	Description
Network details	<p>The network attributes map the vNIC details between the primary and secondary site. For example:</p> <pre>dr_network_mappings: - primary_network_name: ovirtmgmt primary_profile_name: ovirtmgmt primary_profile_id: 0000000a-000a-000a- 000a-0000000000398 # Fill in the correlated vnic profile properties in the secondary site for profile 'ovirtmgmt' secondary_network_name: ovirtmgmt secondary_profile_name: ovirtmgmt secondary_profile_id: 0000000a-000a- 000a-000a-0000000000410</pre> <p>If you have multiple networks or multiple data centers then you must use an empty network mapping in the mapping file to ensure that all entities register on the target during failover. For example:</p> <pre>dr_network_mappings: # No mapping should be here</pre>

Mapping File Section	Description
External LUN disk details	<p>The external LUN attributes allow virtual machines to be registered with the appropriate external LUN disk after failover and failback. For example:</p> <pre> dr_lun_mappings: - primary_logical_unit_id: 460014069b2be431c0fd46c4bdce29b66 primary_logical_unit_alias: Fedora_Disk primary_wipe_after_delete: False primary_shareable: False primary_logical_unit_description: 2b66 primary_storage_type: iscsi primary_logical_unit_address: 10.35.xx.xxx primary_logical_unit_port: 3260 primary_logical_unit_portal: 1 primary_logical_unit_target: iqn.2017- 12.com.prod.example:444 secondary_storage_type: iscsi secondary_wipe_after_delete: False secondary_shareable: False secondary_logical_unit_id: 460014069b2be431c0fd46c4bdce29b66 secondary_logical_unit_address: 10.35.x.xxx secondary_logical_unit_port: 3260 secondary_logical_unit_portal: 1 secondary_logical_unit_target: iqn.2017- 12.com.recovery.example:444 </pre>

APPENDIX B. TESTING THE ACTIVE-PASSIVE CONFIGURATION

You must test your disaster recovery solution after configuring it. This section provides multiple options to test the active-passive disaster recovery configuration.

1. Test failover while the primary site remains active and without interfering with virtual machines on the primary site's storage domains. See [Section B.1, "Discreet Failover Test"](#).
2. Test failover and failback using specific storage domains attached to the the primary site, therefore allowing the primary site to remain active. See [Section B.2, "Discreet Failover and Failback Test"](#).
3. Test failover and failback for an impending disaster where you have a grace period to failover to the secondary site, or an unplanned shutdown of the primary site. See [Section B.3, "Full Failover and Failback test"](#).



IMPORTANT

Ensure that you completed all the steps to configure your active-passive configuration before running any of these tests.

B.1. DISCREET FAILOVER TEST

This test simulates a failover while the primary site and all its storage domains remain active, allowing users to continue working in the primary site. For this to happen you will need to disable replication between the primary storage domains and the replicated (secondary) storage domains. During this test the primary site will be unaware of the failover activities on the secondary site.

This test will not allow you to test the failback functionality.



IMPORTANT

Ensure that no production tasks are performed after the failover. For example, ensure that email systems are blocked from sending emails to real users, or redirect emails elsewhere. If systems are used to directly manage other systems, prohibit access to the systems or ensure that they access parallel systems in the secondary site.

Performing the discreet failover test:

1. Disable storage replication between the primary and replicated storage domains, and ensure that all replicated storage domains are in read/write mode.
2. Run the command to fail over to the secondary site:

```
# ansible-playbook playbook --tags "fail_over"
```

For more information, see [Section 3.5, "Execute a Failback"](#).

3. Verify that all relevant storage domains, virtual machines, and templates are registered and running successfully.

Restoring the environment to its active-passive state:

1. Detach the storage domains from the secondary site.
2. Enable storage replication between the primary and secondary storage domains.

B.2. DISCREET FAILOVER AND FAILBACK TEST

For this test you must define testable storage domains that will be used specifically for testing the failover and failback. These storage domains must be replicated so that the replicated storage can be attached to the secondary site. This allows you to test the failover while users continue to work in the primary site.



NOTE

Red Hat recommends defining the testable storage domains on a separate storage server that can be offline without affecting the primary storage domains used for production in the primary site.

For more information about failing over the environment, cleaning the environment, and performing the failback, see [Section 3.3, “Execute a Failover”](#), [Section 3.4, “Clean the Primary Site”](#), and [Section 3.5, “Execute a Failback”](#).

Performing the discreet failover test:

1. Stop the test storage domains in the primary site. You can do this by, for example, shutting down the server host or blocking it with an **iptables** rule.
2. Disable the storage replication between the testable storage domains and ensure that all replicated storage domains used for the test are in read/write mode.
3. Place the test primary storage domains into read-only mode.
4. Run the command to fail over to the secondary site:

```
# ansible-playbook playbook --tags "fail_over"
```

5. Verify that all relevant storage domains, virtual machines, and templates are registered and running successfully.

Performing the discreet failback test

1. Run the command to clean the primary site and remove all inactive storage domains and related virtual machines and templates:

```
# ansible-playbook playbook --tags "clean_engine"
```

2. Run the failback command:

```
# ansible-playbook playbook --tags "fail_back"
```

3. Enable replication from the primary storage domains to the secondary storage domains.
4. Verify that all relevant storage domains, virtual machines, and templates are registered and running successfully.

B.3. FULL FAILOVER AND FAILBACK TEST

This test performs a full failover and failback between the primary and secondary site. You can simulate the disaster by shutting down the primary site's hosts or by adding **iptables** rules to block writing to the storage domains.

For more information about failing over the environment, cleaning the environment, and performing the failback, see [Section 3.3, "Execute a Failover"](#), [Section 3.4, "Clean the Primary Site"](#), and [Section 3.5, "Execute a Failback"](#).

Performing the failover test:

1. Disable storage replication between the primary and replicated storage domains and ensure that all replicated storage domains are in read/write mode.
2. Run the command to fail over to the secondary site:

```
# ansible-playbook playbook --tags "fail_over"
```

3. Verify that all relevant storage domains, virtual machines, and templates are registered and running successfully.

Performing the failback test

1. Synchronize replication between the secondary site's storage domains and the primary site's storage domains. The secondary site's storage domains must be in read/write mode and the primary site's storage domains must be in read-only mode.
2. Run the command to clean the primary site and remove all inactive storage domains and related virtual machines and templates:

```
# ansible-playbook playbook --tags "clean_engine"
```

3. Run the failback command:

```
# ansible-playbook playbook --tags "fail_back"
```

4. Enable replication from the primary storage domains to the secondary storage domains.
5. Verify that all relevant storage domains, virtual machines, and templates are registered and running successfully.