



# **Install or upgrade**

## **ONTAP 9**

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# Table of Contents

- Install or upgrade ..... 1
  - Prepare to install or upgrade the ONTAP Mediator service ..... 1
  - Upgrade the host operating system and then the ONTAP Mediator ..... 2
  - Enable access to the repositories ..... 9
  - Download the Mediator installation package ..... 14
  - Verify the ONTAP Mediator code signature ..... 15
  - Install the ONTAP Mediator installation package ..... 20
  - Verify the installation ..... 37
  - Post-installation configuration ..... 38

# Install or upgrade

## Prepare to install or upgrade the ONTAP Mediator service

To install the ONTAP Mediator service, you must ensure all prerequisites are met, get the installation package and run the installer on the host. This procedure is used for an installation or an upgrade of an existing installation.

- Beginning with ONTAP 9.7, you can use any version of ONTAP Mediator to monitor a MetroCluster IP configuration.
- Beginning with ONTAP 9.8, you can use any version of ONTAP Mediator to monitor an SM-BC relationship.

### Before you begin

You must meet the following prerequisites.

ONTAP Mediator version	Supported Linux versions
1.6	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux: 8.4, 8.5, 8.6, 8.7, 9.0, 9.1</li><li>• Rocky Linux 8 and 9</li></ul>
1.5	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux: 7.6, 7.7, 7.8, 7.9, 8.1, 8.2, 8.3, 8.4, 8.5</li><li>• CentOS: 7.6, 7.7, 7.8, 7.9</li></ul>
1.4	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux: 7.6, 7.7, 7.8, 7.9, 8.1, 8.2, 8.3, 8.4, 8.5</li><li>• CentOS: 7.6, 7.7, 7.8, 7.9</li></ul>
1.3	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux: 7.6, 7.7, 7.8, 7.9, 8.1, 8.2, 8.3</li><li>• CentOS: 7.6, 7.7, 7.8, 7.9</li></ul>
1.2	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux: 7.6, 7.7, 7.8, 8.1</li><li>• CentOS: 7.6, 7.7, 7.8</li></ul>



The kernel version must match the operating system version.

- 64-bit physical installation or virtual machine
- 8 GB RAM
- User: Root access

Any library packages except the kernel can safely be updated but might require a reboot to take effect within the ONTAP Mediator application. A service window is recommended when a reboot is required.

If you install the `yum-utils` package, you can use the `needs-restarting` command.

The kernel core can be updated if it is being updated to a version that is still supported by the ONTAP Mediator version matrix. A reboot will be mandatory, so a service window is required.

The SCST kernel module must be uninstalled prior to the reboot, then re-installed after the reboot.



Upgrading to a kernel beyond the supported OS release for the specific ONTAP Mediator release is not support. (This likely indicates that the tested SCST module won't compile).

# Upgrade the host operating system and then the ONTAP Mediator

To upgrade the host OS for ONTAP Mediator to a later version, you must first uninstall ONTAP Mediator.

## Before you begin

The best practices for installing Red Hat Enterprise Linux or CentOS and the associated repositories on your system are listed below. Systems installed or configured differently might require additional steps.

- You must install Red Hat Enterprise Linux or CentOS according to Red Hat best practices. Due to end-of-life support for CentOS 8.x versions, compatible versions of CentOS 8.x are not recommended.
- While installing the ONTAP Mediator service on Red Hat Enterprise Linux or CentOS, the system must have access to the appropriate repository so that the installation program can access and install all the required software dependencies.
- For the yum installer to find dependent software in the Red Hat Enterprise Linux repositories, you must have registered the system during the Red Hat Enterprise Linux installation or afterwards by using a valid Red Hat subscription.

See the Red Hat documentation for information about the Red Hat Subscription Manager.

- The following ports must be unused and available for the Mediator:
  - 31784
  - 3260
- If using a third-party firewall: refer to [Firewall requirements for ONTAP Mediator](#)
- If the Linux host is in a location without access to the internet, you must ensure that the required packages are available in a local repository.

If you are using Link Aggregation Control Protocol (LACP) in a Linux environment, you must correctly configure the kernel and make sure the `sysctl net.ipv4.conf.all.arp_ignore` is set to "2".

## What you'll need

The following packages are required by the ONTAP Mediator service:

All RHEL/CentOS versions	Additional packages for RHEL 8.x / Rocky Linux 8	Additional packages for RHEL 9.x / Rocky Linux 9
--------------------------	--	--

<ul style="list-style-type: none"> <li>• openssl</li> <li>• openssl-devel</li> <li>• kernel-devel-\$(uname -r)</li> <li>• gcc</li> <li>• make</li> <li>• libselinux-utils</li> <li>• patch</li> <li>• bzip2</li> <li>• perl-Data-Dumper</li> <li>• perl-ExtUtils-MakeMaker</li> <li>• efibootmgr</li> <li>• mokutil</li> </ul>	<ul style="list-style-type: none"> <li>• python3-pip</li> <li>• elfutils-libelf-devel</li> <li>• policycoreutils-python-utils</li> <li>• redhat-lsb-core</li> <li>• python39</li> <li>• python39-devel</li> </ul>	<ul style="list-style-type: none"> <li>• python3-pip</li> <li>• elfutils-libelf-devel</li> <li>• policycoreutils-python-utils</li> <li>• python3</li> <li>• python3-devel</li> </ul>
--	---	--

The Mediator installation package is a self-extracting compressed tar file that includes:

- An RPM file containing all dependencies that cannot be obtained from the supported release's repository.
- An install script.

A valid SSL certification is recommended.

### About this task

When you upgrade the host OS for ONTAP Mediator to a later major version (for example, from 7.x to 8.x) using the leapp-upgrade tool, you must uninstall ONTAP Mediator because the tool tries to detect new versions of any RPMs that are installed in the repositories that are registered with the system.

Because an .rpm file was installed as part of the ONTAP Mediator installer, it is included in that search. However, because that .rpm file was unpacked as part of the installer and not downloaded from a registered repository, an upgrade cannot be found. In this case, the leapp-upgrade tool uninstalls the package.

In order to preserve the log files, which will be used to triage support cases, you should back up the files prior to doing an OS upgrade and restore them after a reinstall of the ONTAP Mediator package. Because the ONTAP Mediator is being reinstalled, any ONTAP Clusters that are connected to it will need to be reconnected after the new installation.



The following steps should be performed in order. Immediately after you reinstall ONTAP Mediator, you should stop the `ontap_mediator` service, replace the log files, and restart the service. This will ensure logs will not be lost.

### Steps

1. Back up the log files.

```
[rootmediator-host ~]# tar -czf ontap_mediator_file_backup.tgz -C
/opt/netapp/lib/ontap_mediator ./log
./ontap_mediator/server_config/ontap_mediator.user_config.yaml
[rootmediator-host ~]# tar -tf ontap_mediator_file_backup.tgz
./log/
./log/ontap_mediator.log
./log/scstadmin.log
./log/ontap_mediator_stdout.log
./log/ontap_mediator_requests.log
./log/install_20230419134611.log
./log/scst.log
./log/ontap_mediator_syslog.log
./ontap_mediator/server_config/ontap_mediator.user_config.yaml
[rootmediator-host ~]#
```

## 2. Perform upgrade with leapp-upgrade tool.

```
[rootmediator-host ~]# leapp preupgrade --target 8.4
..<snip upgrade checks>..
..<fix issues found>..
[rootmediator-host ~]# leapp upgrade --target 8.4
..<snip upgrade>..
[rootmediator-host ~]# cat /etc/os-release | head -2
NAME="Red Hat Enterprise Linux"
VERSION="8.4 (Ootpa)"
[rootmediator-host ~]#
```

## 3. Reinstall ONTAP Mediator.



Perform the rest of the steps immediately after reinstalling ONTAP Mediator to prevent a loss of log files.

```
[rootmediator-host ~]# ontap-mediator-1.6.0/ontap-mediator-1.6.0

ONTAP Mediator: Self Extracting Installer

..<snip installation>..
[rootmediator-host ~]#
```

## 4. Stop the ontap\_mediator service.

```
[rootmediator-host ~]# systemctl stop ontap_mediator  
[rootmediator-host ~]#
```

5. Replace the log files.

```
[rootmediator-host ~]# tar -xf ontap_mediator_log_backup.tgz -C  
/opt/netapp/lib/ontap_mediator  
[rootmediator-host ~]#
```

6. Start the ontap\_mediator service.

```
[rootmediator-host ~]# systemctl start ontap_mediator  
[rootmediator-host ~]#
```

7. Reconnect all ONTAP clusters to the upgraded ONTAP Mediator

## Procedure for MetroCluster over IP

```
siteA::> metrocluster configuration-settings mediator show
```

Mediator IP	Port	Node	Configuration	Status	Status
172.31.40.122	31784	siteA-node2	true	false	false
		siteA-nodel	true	false	false
		siteB-node2	true	false	false
		siteB-node2	true	false	false

```
siteA::> metrocluster configuration-settings mediator remove
Removing the mediator and disabling Automatic Unplanned Switchover.
It may take a few minutes to complete.
Please enter the username for the mediator: mediatoradmin
Please enter the password for the mediator:
Confirm the mediator password:
Automatic Unplanned Switchover is disabled for all nodes...
Removing mediator mailboxes...
Successfully removed the mediator.

siteA::> metrocluster configuration-settings mediator add -mediator
-address 172.31.40.122
Adding the mediator and enabling Automatic Unplanned Switchover. It
may take a few minutes to complete.
Please enter the username for the mediator: mediatoradmin
Please enter the password for the mediator:
Confirm the mediator password:
Successfully added the mediator.

siteA::> metrocluster configuration-settings mediator show
```

Mediator IP	Port	Node	Configuration	Status	Status
172.31.40.122	31784	siteA-node2	true	true	true
		siteA-nodel	true	true	true
		siteB-node2	true	true	true
		siteB-node2	true	true	true

```
siteA::>
```



## Procedure for SnapMirror Business Continuity

For SnapMirror Business Continuity, if you installed your TLS certificate outside of the /opt/netapp directory, then you will not need to reinstall it. If you were using the default generated self-signed certificate or put your custom certificate in the /opt/netapp directory, then you should back it up and restore it.

```
peer1::> snapmirror mediator show
Mediator Address Peer Cluster      Connection Status Quorum Status
-----
172.31.49.237    peer2                unreachable      true

peer1::> snapmirror mediator remove -mediator-address 172.31.49.237
-peer-cluster peer2

Info: [Job 39] 'mediator remove' job queued

peer1::> job show -id 39
Job ID Name                      Owing
Vserver      Node                      State
-----
39    mediator remove    peer1    peer1-node1    Success
Description: Removing entry in mediator

peer1::> security certificate show -common-name ONTAPMediatorCA
Vserver      Serial Number  Certificate Name
Type
-----
peer1
4A790360081F41145E14C5D7CE721DC6C210007F
ONTAPMediatorCA
server-ca
Certificate Authority: ONTAP Mediator CA
Expiration Date: Mon Apr 17 10:27:54 2023

peer1::> security certificate delete -common-name ONTAPMediatorCA *
1 entry was deleted.

peer1::> security certificate install -type server-ca -vserver
peer1

Please enter Certificate: Press <Enter> when done
..<snip ONTAP Mediator CA public key>..

You should keep a copy of the CA-signed digital certificate for
future reference.
```

The installed certificate's CA and serial number for reference:

CA: ONTAP Mediator CA

serial: 44786524464C5113D5EC966779D3002135EA4254

The certificate's generated name for reference: ONTAPMediatorCA

```
peer2::> security certificate delete -common-name ONTAPMediatorCA *  
1 entry was deleted.
```

```
peer2::> security certificate install -type server-ca -vserver peer2
```

```
Please enter Certificate: Press <Enter> when done  
..  
..<snip ONTAP Mediator CA public key>..
```

You should keep a copy of the CA-signed digital certificate for future reference.

The installed certificate's CA and serial number for reference:

CA: ONTAP Mediator CA

serial: 44786524464C5113D5EC966779D3002135EA4254

The certificate's generated name for reference: ONTAPMediatorCA

```
peer1::> snapmirror mediator add -mediator-address 172.31.49.237  
-peer-cluster peer2 -username mediatoradmin
```

Notice: Enter the mediator password.

Enter the password:

Enter the password again:

Info: [Job: 43] 'mediator add' job queued

```
peer1::> job show -id 43
```

Job	ID	Name	Owning Vserver	Node	State
43		mediator add	peer1	peer1-node2	Success
Description: Creating a mediator entry					

```
peer1::> snapmirror mediator show
```

Mediator Address	Peer	Cluster	Connection	Status	Quorum	Status
172.31.49.237	peer2		connected		true	

```
peer1::>
```

## Enable access to the repositories

You should enable access to repositories so ONTAP Mediator can access the required packages during the installation process

### Steps

1. Determine which repositories must be accessed, as shown in the following table:

If your operating system is...	You must provide access to these repositories...
RHEL 7.x	<ul style="list-style-type: none"><li>• rhel-7-server-optional-rpms</li></ul>
RHEL 8.x	<ul style="list-style-type: none"><li>• rhel-8-for-x86_64-baseos-rpms</li><li>• rhel-8-for-x86_64-appstream-rpms</li></ul>
RHEL 9.x	<ul style="list-style-type: none"><li>• rhel-9-for-x86_64-baseos-rpms</li><li>• rhel-9-for-x86_64-appstream-rpms</li></ul>
CentOS 7.x	<ul style="list-style-type: none"><li>• C7.6.1810 - Base repository</li></ul>
Rocky Linux 8	<ul style="list-style-type: none"><li>• appstream</li><li>• baseos</li></ul>
Rocky Linux 9	<ul style="list-style-type: none"><li>• appstream</li><li>• baseos</li></ul>

2. Use one of the following procedures to enable access to the repositories listed above so ONTAP Mediator can access the required packages during the installation process.

## Procedure for RHEL 7.x operating system

Use this procedure if your operating system is **RHEL 7.x** to enable access to repositories:

### Steps

1. Subscribe to the required repository:

```
subscription-manager repos --enable rhel-7-server-optional-rpms
```

The following example shows the execution of this command:

```
[root@localhost ~]# subscription-manager repos --enable rhel-7-  
server-optional-rpms  
Repository 'rhel-7-server-optional-rpms' is enabled for this system.
```

2. Run the `yum repolist` command.

The following example shows the execution of this command. The "rhel-7-server-optional-rpms" repository should appear in the list.

```
[root@localhost ~]# yum repolist  
Loaded plugins: product-id, search-disabled-repos, subscription-  
manager  
rhel-7-server-optional-rpms | 3.2 kB  00:00:00  
rhel-7-server-rpms | 3.5 kB  00:00:00  
(1/3): rhel-7-server-optional-rpms/7Server/x86_64/group  
| 26 kB  00:00:00  
(2/3): rhel-7-server-optional-rpms/7Server/x86_64/updateinfo  
| 2.5 MB  00:00:00  
(3/3): rhel-7-server-optional-rpms/7Server/x86_64/primary_db  
| 8.3 MB  00:00:01  
repo id                                repo name  
status  
rhel-7-server-optional-rpms/7Server/x86_64  Red Hat Enterprise  
Linux 7 Server - Optional (RPMs)  19,447  
rhel-7-server-rpms/7Server/x86_64          Red Hat Enterprise  
Linux 7 Server (RPMs)                26,758  
repolist: 46,205  
[root@localhost ~]#
```

## Procedure for RHEL 8.x operating system

Use this procedure if your operating system is **RHEL 8.x** to enable access to repositories:

### Steps

1. Subscribe to the required repository:

```
subscription-manager repos --enable rhel-8-for-x86_64-baseos-rpms
```

```
subscription-manager repos --enable rhel-8-for-x86_64-appstream-rpms
```

The following example shows the execution of this command:

```
[root@localhost ~]# subscription-manager repos --enable rhel-8-for-
x86_64-baseos-rpms
Repository 'rhel-8-for-x86_64-baseos-rpms' is enabled for this
system.
[root@localhost ~]# subscription-manager repos --enable rhel-8-for-
x86_64-appstream-rpms
Repository 'rhel-8-for-x86_64-appstream-rpms' is enabled for this
system.
```

2. Run the `yum repolist` command.

The newly subscribed repositories should appear in the list.

## Procedure for RHEL 9.x operating system

Use this procedure if your operating system is **RHEL 9.x** to enable access to repositories:

### Steps

1. Subscribe to the required repository:

```
subscription-manager repos --enable rhel-9-for-x86_64-baseos-rpms
```

```
subscription-manager repos --enable rhel-9-for-x86_64-appstream-rpms
```

The following example shows the execution of this command:

```
[root@localhost ~]# subscription-manager repos --enable rhel-9-for-
x86_64-baseos-rpms
Repository 'rhel-9-for-x86_64-baseos-rpms' is enabled for this
system.
[root@localhost ~]# subscription-manager repos --enable rhel-9-for-
x86_64-appstream-rpms
Repository 'rhel-9-for-x86_64-appstream-rpms' is enabled for this
system.
```

2. Run the `yum repolist` command.

The newly subscribed repositories should appear in the list.

## Procedure for CentOS 7.x operating system

Use this procedure if your operating system is **CentOS 7.x** to enable access to repositories:



The following examples are showing a repository for CentOS 7.6 and might not work for other CentOS versions. Use the base repository for your version of CentOS.

### Steps

1. Add the C7.6.1810 - Base repository. The C7.6.1810 - Base vault repository contains the "kernel-devel" package needed for ONTAP Mediator.
2. Add the following lines to /etc/yum.repos.d/CentOS-Vault.repo.

```
[C7.6.1810-base]
name=CentOS-7.6.1810 - Base
baseurl=http://vault.centos.org/7.6.1810/os/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-7
enabled=1
```

3. Run the `yum repolist` command.

The following example shows the execution of this command. The CentOS-7.6.1810 - Base repository should appear in the list.

```
Loaded plugins: fastestmirror
Loading mirror speeds from cached hostfile
* base: distro.ibiblio.org
* extras: distro.ibiblio.org
* updates: ewr.edge.kernel.org
C7.6.1810-base | 3.6 kB 00:00:00
(1/2): C7.6.1810-base/x86_64/group_gz | 166 kB 00:00:00
(2/2): C7.6.1810-base/x86_64/primary_db | 6.0 MB 00:00:04
repo id repo name status
C7.6.1810-base/x86_64 CentOS-7.6.1810 - Base 10,019
base/7/x86_64 CentOS-7 - Base 10,097
extras/7/x86_64 CentOS-7 - Extras 307
updates/7/x86_64 CentOS-7 - Updates 1,010
repolist: 21,433
[root@localhost ~]#
```

## Procedure for Rocky Linux 8 or 9 operating systems

Use this procedure if your operating system is **Rocky Linux 8** or **Rocky Linux 9** to enable access to repositories:

### Steps

1. Subscribe to the required repositories:

```
dnf config-manager --set-enabled baseos  
  
dnf config-manager --set-enabled appstream
```

2. Perform a clean operation:

```
dnf clean all
```

3. Verify the list of repositories:

```
dnf repolist
```

### Example for Rocky Linux 8

```
[root@localhost ~]# dnf config-manager --set-enabled baseos  
[root@localhost ~]# dnf config-manager --set-enabled appstream  
[root@localhost ~]# dnf clean all  
[root@localhost ~]# dnf repolist  
repo id                                repo name  
appstream                              Rocky Linux 8 - AppStream  
baseos                                 Rocky Linux 8 - BaseOS  
[root@localhost ~]#
```

### Example for Rocky Linux 9

```
[root@localhost ~]# dnf config-manager --set-enabled baseos  
[root@localhost ~]# dnf config-manager --set-enabled appstream  
[root@localhost ~]# dnf clean all  
[root@localhost ~]# dnf repolist  
repo id                                repo name  
appstream                              Rocky Linux 9 - AppStream  
baseos                                 Rocky Linux 9 - BaseOS  
[root@localhost ~]#
```

## Download the Mediator installation package

Download the Mediator installation package as part of the installation process.

### Steps



1. Download the Mediator installation package from the ONTAP Mediator page.

[ONTAP Mediator download page](#)

2. Confirm that the Mediator installation package is in the current working directory:

```
ls
```

```
[root@mediator-host ~]#ls
ontap-mediator-1.5.0.tgz
```



For ONTAP Mediator versions 1.4 and earlier, the installer is named `ontap-mediator`.

If you are at a location without access to the internet, you must ensure that the installer has access to the required packages.

3. If necessary, move the Mediator installation package from the download directory to the installation directory on the Linux Mediator host.
4. Unzip the installer package:

```
tar xvfz ontap-mediator-1.6.0.tgz
```

```
[root@scs000099753 ~]# tar xvfz ontap-mediator-1.6.0.tgz
ontap-mediator-1.6.0/
ontap-mediator-1.6.0/ONTAP-Mediator-production.pub
ontap-mediator-1.6.0/tsa-prod-chain-ONTAP-Mediator.pem
ontap-mediator-1.6.0/tsa-prod-ONTAP-Mediator.pem
ontap-mediator-1.6.0/csc-prod-ONTAP-Mediator.pem
ontap-mediator-1.6.0/csc-prod-chain-ONTAP-Mediator.pem
ontap-mediator-1.6.0/ontap-mediator-1.6.0
ontap-mediator-1.6.0/ontap-mediator-1.6.0.sig.tsr
ontap-mediator-1.6.0/ontap-mediator-1.6.0.tsr
ontap-mediator-1.6.0/ontap-mediator-1.6.0.sig
```

## Verify the ONTAP Mediator code signature

You should verify the ONTAP Mediator code signature before installing the Mediator installation package.

### Before you begin

Before verifying the Mediator code signature, your system must meet the following requirements.

- openssl versions 1.0.2 to 3.0 for basic verification
- openssl version 1.1.0 or later for Time Stamping Authority (TSA) operations
- Public internet access for OCSP verification



The following files are included in the download package:

File	Description
ONTAP-Mediator-development.pub	The public key used to verify the signature
csc-prod-chain-ONTAP-Mediator.pem	The public certification CA chain of trust
csc-prod-ONTAP-Mediator.pem	The certificate used to generate the key
ontap-mediator-1.6.0	The product installation executable for version 1.6.0
ontap-mediator-1.6.0.sig	The SHA-256 hashed, then RSA-signed using the csc-prod key, signature for the installer
ontap-mediator-1.6.0.sig.tsr	The revocation request for use by OCSCP for the installer's signature
tsc-prod-ONTAP-Mediator.pem	The public certificate for the TSR
tsc-prod-chain-ONTAP-Mediator.pem	The public certificate CA Chain for the TSR

## Steps

1. Perform the revocation check on `csc-prod-ONTAP-Mediator.pem` by using Online Certificate Status Protocol (OCSP).
  - a. Find the OCSP URL used to register the certificate because developer certificates might not provide a uri.

```
openssl x509 -noout -ocsp_uri -in csc-prod-chain-ONTAP-Mediator.pem
```

- b. Generate an OCSP request for the certificate.

```
openssl ocsp -issuer csc-prod-chain-ONTAP-Mediator.pem -CAfile csc-prod-chain-ONTAP-Mediator.pem -cert csc-prod-ONTAP-Mediator.pem -reqout req.der
```

- c. Connect to the OCSP Manager to send the OCSP request:

```
openssl ocsp -issuer csc-prod-chain-ONTAP-Mediator.pem -CAfile csc-prod-chain-ONTAP-Mediator.pem -cert csc-prod-ONTAP-Mediator.pem -url ${ocsp_uri} -resp_text -respout resp.der
```

2. Verify the trust chain of the CSC and expiration dates against the local host:

```
openssl verify
```



The openssl version from the PATH must have a valid cert.pem (not self-signed).

```
openssl verify -untrusted csc-prod-chain-ONTAP-Mediator.pem -CApath  
${OPENSSLDIR} csc-prod-ONTAP-Mediator.pem # Failure action: The Code-  
Signature-Check certificate has expired or is invalid. Download a newer  
version of the ONTAP Mediator.  
openssl verify -untrusted tsa-prod-chain-ONTAP-Mediator.pem -CApath  
${OPENSSLDIR} tsa-prod-ONTAP-Mediator.pem # Failure action: The Time-  
Stamp certificate has expired or is invalid. Download a newer version of  
the ONTAP Mediator.
```

3. Verify the ontap-mediator-1.5.0.sig.tsr and ontap-mediator-1.6.0.tsr files using the associated certificates:

```
openssl ts -verify
```



.tsr files contain the time stamp response associated with the installer and the code signature. Processing confirms that the time stamp has a valid signature from TSA and that your input file has not changed. The verification is performed locally on your machine. Independently, there is no need to access TSA servers.

```
openssl ts -verify -data ontap-mediator-1.6.0.sig -in ontap-mediator-  
1.6.0.sig.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-  
prod-ONTAP-Mediator.pem  
openssl ts -verify -data ontap-mediator-1.6.0 -in ontap-mediator-  
1.6.0.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-prod-  
ONTAP-Mediator.pem
```

4. Verify signatures against the key:

```
openssl dgst -verify
```

```
openssl dgst -sha256 -verify ONTAP-Mediator-production.pub -signature  
ontap-mediator-1.6.0.sig ontap-mediator-1.6.0
```

## Example of Verifying the ONTAP Mediator code signature (console output)

```
[root@scspa2695423001 ontap-mediator-1.6.0]# pwd
/root/ontap-mediator-1.6.0
[root@scspa2695423001 ontap-mediator-1.6.0]# ls -l
total 63660
-r--r--r-- 1 root root      8582 Feb 19 15:02 csc-prod-chain-ONTAP-
Mediator.pem
-r--r--r-- 1 root root      2373 Feb 19 15:02 csc-prod-ONTAP-
Mediator.pem
-r-xr-xr-- 1 root root 65132818 Feb 20 15:17 ontap-mediator-1.6.0
-rw-r--r-- 1 root root      384 Feb 20 15:17 ontap-mediator-1.6.0.sig
-rw-r--r-- 1 root root      5437 Feb 20 15:17 ontap-mediator-
1.6.0.sig.tsr
-rw-r--r-- 1 root root      5436 Feb 20 15:17 ontap-mediator-1.6.0.tsr
-r--r--r-- 1 root root      625 Feb 19 15:02 ONTAP-Mediator-
production.pub
-r--r--r-- 1 root root      3323 Feb 19 15:02 tsa-prod-chain-ONTAP-
Mediator.pem
-r--r--r-- 1 root root      1740 Feb 19 15:02 tsa-prod-ONTAP-
Mediator.pem
[root@scspa2695423001 ontap-mediator-1.6.0]#
[root@scspa2695423001 ontap-mediator-1.6.0]#
/root/verify_ontap_mediator_signatures.sh
++ openssl version -d
++ cut -d '"' -f2
+ OPENSSLDIR=/etc/pki/tls
+ openssl version
OpenSSL 1.1.1k  FIPS 25 Mar 2021
++ openssl x509 -noout -ocsp_uri -in csc-prod-chain-ONTAP-Mediator.pem
+ ocsp_uri=http://ocsp.entrust.net
+ echo http://ocsp.entrust.net
http://ocsp.entrust.net
+ openssl ocsp -issuer csc-prod-chain-ONTAP-Mediator.pem -CAfile csc-
prod-chain-ONTAP-Mediator.pem -cert csc-prod-ONTAP-Mediator.pem -reqout
req.der
+ openssl ocsp -issuer csc-prod-chain-ONTAP-Mediator.pem -CAfile csc-
prod-chain-ONTAP-Mediator.pem -cert csc-prod-ONTAP-Mediator.pem -url
http://ocsp.entrust.net -resp_text -respout resp.der
OCSP Response Data:
  OCSF Response Status: successful (0x0)
  Response Type: Basic OCSP Response
  Version: 1 (0x0)
  Responder Id: C = US, O = "Entrust, Inc.", CN = Entrust Extended
Validation Code Signing CA - EVCS2
  Produced At: Feb 28 05:01:00 2023 GMT
```

Responses:

Certificate ID:

Hash Algorithm: sha1

Issuer Name Hash: 69FA640329AB84E27220FE0927647B8194B91F2A

Issuer Key Hash: CE894F8251AA15A28462CA312361D261F8FE78

Serial Number: 511A542B57522AEB7295A640DC6200E5

Cert Status: good

This Update: Feb 28 05:00:00 2023 GMT

Next Update: Mar 4 04:59:59 2023 GMT

Signature Algorithm: sha512WithRSAEncryption

3c:1d:49:b0:93:62:37:3e:c7:38:e3:9f:9f:62:82:73:ed:f4:  
ea:00:6b:f1:01:cd:79:57:92:f1:9d:5d:85:9b:60:59:f8:6c:  
e6:f4:50:51:f3:4c:8a:51:dd:50:68:16:8f:20:24:7e:39:b0:  
44:94:8d:b0:61:da:b9:08:36:74:2d:44:55:62:fb:92:be:4a:  
e7:6c:8c:49:dd:0c:fd:d8:ce:20:08:0d:0f:5a:29:a3:19:03:  
9f:d3:df:41:f4:89:0f:73:18:3f:ac:bb:a7:a3:96:7d:c5:70:  
4c:57:cd:17:17:c6:8a:60:d1:37:c9:2d:81:07:2a:d7:a6:02:  
ee:ce:88:16:22:db:e3:43:64:1e:9b:0d:4d:31:66:fa:ab:a5:  
52:99:94:4a:4a:d0:52:c5:34:f5:18:c7:15:5b:ce:74:c2:fc:  
61:ea:55:aa:f1:2f:82:a3:6a:95:8d:7e:2b:38:49:4f:bf:b1:  
68:7b:1b:24:8b:1f:4d:c5:77:f0:71:af:9c:34:c8:7a:82:50:  
09:a2:19:6e:c6:30:4f:da:a2:79:08:f9:d0:ff:85:d9:2a:84:  
cf:0c:aa:75:8f:72:c9:a7:a2:83:e8:8b:cf:ed:0c:69:75:b6:  
2a:7b:6b:58:99:01:d8:34:ad:e1:89:25:27:1b:fa:d9:6d:32:  
97:3a:0b:0a:8e:a3:9e:e3:f4:e0:d6:1a:c9:b5:14:8c:3e:54:  
3b:37:17:1a:93:44:84:8b:4a:87:97:1e:76:43:3e:d3:ec:8b:  
7e:56:4a:3f:01:31:c0:e5:58:fb:50:ce:6f:b1:e7:35:f9:b7:  
a3:ef:6b:3b:21:95:37:a6:5b:8f:f0:15:18:36:65:89:a1:9c:  
9b:69:00:b4:b1:65:6a:bc:11:2d:d4:9b:b4:97:cc:cb:7a:0c:  
16:11:c1:75:58:7e:13:ab:56:3c:3f:93:5b:95:24:c6:54:52:  
1f:86:a9:16:ce:d9:ea:8b:3a:f3:4f:c4:8f:ad:de:e8:3e:3c:  
d2:51:51:ad:33:7f:d8:c5:33:24:26:f1:2d:9d:0e:9f:55:d0:  
68:bf:af:bd:68:4a:40:08:bc:92:a0:62:54:7d:16:7b:36:29:  
15:b1:cd:58:8e:fb:4a:f2:3e:94:8b:fe:56:95:cc:24:32:af:  
5f:71:99:18:ed:0c:64:94:f7:54:48:87:48:d0:6d:b3:42:04:  
96:03:73:a2:8e:8a:6a:b2:af:ee:56:19:a1:c6:35:12:59:ad:  
19:6a:fe:e0:f1:27:cc:96:4e:f0:4f:fb:6a:bd:ce:05:2c:aa:  
79:7c:df:02:5c:ca:53:7d:60:12:88:7c:ce:15:c7:d4:02:27:  
c1:ab:cf:71:30:1e:14:ba

WARNING: no nonce in response

Response verify OK

csc-prod-ONTAP-Mediator.pem: good

This Update: Feb 28 05:00:00 2023 GMT

Next Update: Mar 4 04:59:59 2023 GMT

+ openssl verify -untrusted csc-prod-chain-ONTAP-Mediator.pem -CApath

```

/etc/pki/tls csc-prod-ONTAP-Mediator.pem
csc-prod-ONTAP-Mediator.pem: OK
+ openssl verify -untrusted tsa-prod-chain-ONTAP-Mediator.pem -CApath
/etc/pki/tls tsa-prod-ONTAP-Mediator.pem
tsa-prod-ONTAP-Mediator.pem: OK
+ openssl ts -verify -data ontap-mediator-1.6.0.sig -in ontap-mediator-
1.6.0.sig.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-
prod-ONTAP-Mediator.pem
Using configuration from /etc/pki/tls/openssl.cnf
Verification: OK
+ openssl ts -verify -data ontap-mediator-1.6.0 -in ontap-mediator-
1.6.0.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-
prod-ONTAP-Mediator.pem
Using configuration from /etc/pki/tls/openssl.cnf
Verification: OK
+ openssl dgst -sha256 -verify ONTAP-Mediator-production.pub -signature
ontap-mediator-1.6.0.sig ontap-mediator-1.6.0
Verified OK
[root@scspa2695423001 ontap-mediator-1.6.0]#

```

## Install the ONTAP Mediator installation package

To install the ONTAP Mediator service, you must get the installation package and run the installer on the host.

### About this task

- Beginning with ONTAP Mediator 1.4, the Secure Boot mechanism is enabled on UEFI systems. When Secure Boot is enabled, you must take additional steps to register the security key after installation:
  - Follow instructions in the README file to sign the SCST kernel module.:

```
/opt/netapp/lib/ontap_mediator/ontap_mediator/SCST_mod_keys/README.module-
signing
```

- Locate the required keys:

```
/opt/netapp/lib/ontap_mediator/ontap_mediator/SCST_mod_keys
```



After installation, the README files and key location are also provided in the system output.

### Steps

- Run the installer and respond to the prompts as required:

```
./ontap-mediator-1.6.0/ontap-mediator-1.6.0 -y
```

```
[root@scs000099753 ~]# ./ontap-mediator-1.5.0/ontap-mediator-1.6.0 -y
```

The installation process proceeds to create the required accounts and install required packages. If you have a previous version of Mediator installed on the host, you will be prompted to confirm that you want to upgrade.

## Example of ONTAP Mediator 1.5 installation (console output)

```
[root@scs000099753 ~]# ./ontap-mediator-1.6.0/ontap-mediator-1.6.0 -y
ONTAP Mediator: Self Extracting Installer

+ Extracting the ONTAP Mediator installation/upgrade archive
+ Performing the ONTAP Mediator run-time code signature check
  Using openssl from the path: /usr/bin/openssl configured for
CApath:/etc/pki/tls

+ Unpacking the ONTAP Mediator installer
ONTAP Mediator requires two user accounts. One for the service
(netapp), and one for use by ONTAP to the mediator API (mediatoradmin).
Using default account names: netapp + mediatoradmin

Enter ONTAP Mediator user account (mediatoradmin) password:

Re-Enter ONTAP Mediator user account (mediatoradmin) password:

+ Checking if SELinux is in enforcing mode

+ Checking for default Linux firewall
success
success
success

#####
Preparing for installation of ONTAP Mediator packages.

+ Installing required packages.

Last metadata expiration check: 0:25:24 ago on Fri 21 Oct 2022 04:00:13
PM EDT.
Package openssl-1:1.1.1k-4.el8.x86_64 is already installed.
Package gcc-8.4.1-1.el8.x86_64 is already installed.
Package python36-3.6.8-2.module+el8.1.0+3334+5cb623d7.x86_64 is already
installed.
Package libselinux-utils-2.9-5.el8.x86_64 is already installed.
Package perl-Data-Dumper-2.167-399.el8.x86_64 is already installed.
Package efibootmgr-16-1.el8.x86_64 is already installed.
Package mokutil-1:0.3.0-11.el8.x86_64 is already installed.
```



Package python3-pip-9.0.3-19.el8.noarch is already installed.  
 Package polycoreutils-python-utils-2.9-14.el8.noarch is already installed.  
 Dependencies resolved.

```
=====
```

Package	Architecture	Repository
Version		
Size		
=====		
=====		
=====		
Installing:		
bzip2	x86_64	
1.0.6-26.el8		rhel-8-for-
x86_64-baseos-rpms	60 k	
elfutils-libelf-devel	x86_64	
0.186-1.el8		rhel-8-for-
x86_64-baseos-rpms	60 k	
kernel-devel	x86_64	
4.18.0-348.el8		rhel-8-for-
x86_64-baseos-rpms	20 M	
make	x86_64	
1:4.2.1-11.el8		rhel-8-for-
x86_64-baseos-rpms	498 k	
openssl-devel	x86_64	
1:1.1.1k-7.el8_6		rhel-8-for-
x86_64-baseos-rpms	2.3 M	
patch	x86_64	
2.7.6-11.el8		rhel-8-for-
x86_64-baseos-rpms	138 k	
perl-ExtUtils-MakeMaker	noarch	
1:7.34-1.el8		rhel-8-for-
x86_64-appstream-rpms	301 k	
python36-devel	x86_64	
3.6.8-38.module+el8.5.0+12207+5c5719bc		rhel-8-for-
x86_64-appstream-rpms	17 k	
redhat-lsb-core	x86_64	
4.1-47.el8		rhel-8-for-
x86_64-appstream-rpms	45 k	
Upgrading:		
cpp	x86_64	
8.5.0-10.1.el8_6		rhel-8-for-
x86_64-appstream-rpms	10 M	
elfutils-libelf	x86_64	

0.186-1.el8			rhel-8-for-
x86_64-baseos-rpms	229 k		
elfutils-libs		x86_64	
0.186-1.el8			rhel-8-for-
x86_64-baseos-rpms	295 k		
gcc		x86_64	
8.5.0-10.1.el8_6			rhel-8-for-
x86_64-appstream-rpms	23 M		
libgcc		x86_64	
8.5.0-10.1.el8_6			rhel-8-for-
x86_64-baseos-rpms	80 k		
libgomp		x86_64	
8.5.0-10.1.el8_6			rhel-8-for-
x86_64-baseos-rpms	207 k		
libsemanage		x86_64	
2.9-8.el8			rhel-8-for-
x86_64-baseos-rpms	168 k		
mokutil		x86_64	
1:0.3.0-11.el8_6.1			rhel-8-for-
x86_64-baseos-rpms	46 k		
openssl		x86_64	
1:1.1.1k-7.el8_6			rhel-8-for-
x86_64-baseos-rpms	709 k		
openssl-libs		x86_64	
1:1.1.1k-7.el8_6			rhel-8-for-
x86_64-baseos-rpms	1.5 M		
platform-python-pip		noarch	
9.0.3-22.el8			rhel-8-for-
x86_64-baseos-rpms	1.6 M		
policycoreutils		x86_64	
2.9-19.el8			rhel-8-for-
x86_64-baseos-rpms	374 k		
policycoreutils-python-utils		noarch	
2.9-19.el8			rhel-8-for-
x86_64-baseos-rpms	253 k		
python3-libsemanage		x86_64	
2.9-8.el8			rhel-8-for-
x86_64-baseos-rpms	128 k		
python3-pip		noarch	
9.0.3-22.el8			rhel-8-for-
x86_64-appstream-rpms	20 k		
python3-policycoreutils		noarch	
2.9-19.el8			rhel-8-for-
x86_64-baseos-rpms	2.2 M		
python36		x86_64	
3.6.8-38.module+el8.5.0+12207+5c5719bc			rhel-8-for-

```

x86_64-appstream-rpms                19 k
Installing dependencies:
  annobin                             x86_64
10.29-3.el8                           rhel-8-for-
x86_64-appstream-rpms                117 k
  at                                  x86_64
3.1.20-11.el8                         rhel-8-for-
x86_64-baseos-rpms                   81 k
  bc                                  x86_64
1.07.1-5.el8                         rhel-8-for-
x86_64-baseos-rpms                   129 k
  cups-client                        x86_64
1:2.2.6-38.el8                       rhel-8-for-
x86_64-appstream-rpms                169 k
  dwz                                x86_64
0.12-10.el8                          rhel-8-for-
x86_64-appstream-rpms                109 k
  ed                                  x86_64
1.14.2-4.el8                         rhel-8-for-
x86_64-baseos-rpms                   82 k
  efi-srpm-macros                    noarch
3-3.el8                              rhel-8-for-
x86_64-appstream-rpms                22 k
  esmtplib                           x86_64
1.2-15.el8                           EPEL-8
57 k
  glibc-srpm-macros                  noarch
1.4.2-7.el8                          rhel-8-for-
x86_64-appstream-rpms                9.4 k
  go-srpm-macros                      noarch
2-17.el8                             rhel-8-for-
x86_64-appstream-rpms                13 k
  keyutils-libs-devel                x86_64
1.5.10-6.el8                         rhel-8-for-
x86_64-baseos-rpms                   48 k
  krb5-devel                          x86_64
1.18.2-14.el8                       rhel-8-for-
x86_64-baseos-rpms                   560 k
  libcom_err-devel                   x86_64
1.45.6-2.el8                        rhel-8-for-
x86_64-baseos-rpms                   38 k
  libesmtplib                        x86_64
1.0.6-18.el8                        EPEL-8
70 k
  libkadm5                           x86_64
1.18.2-14.el8                       rhel-8-for-

```

x86_64-baseos-rpms	187 k		
libblockfile		x86_64	
1.14-1.el8			rhel-8-for-
x86_64-appstream-rpms	32 k		
libselinux-devel		x86_64	
2.9-5.el8			rhel-8-for-
x86_64-baseos-rpms	200 k		
libsepol-devel		x86_64	
2.9-3.el8			rhel-8-for-
x86_64-baseos-rpms	87 k		
libverto-devel		x86_64	
0.3.0-5.el8			rhel-8-for-
x86_64-baseos-rpms	18 k		
m4		x86_64	
1.4.18-7.el8			rhel-8-for-
x86_64-baseos-rpms	223 k		
mailx		x86_64	
12.5-29.el8			rhel-8-for-
x86_64-baseos-rpms	257 k		
ncurses-compat-libs		x86_64	
6.1-9.20180224.el8			rhel-8-for-
x86_64-baseos-rpms	328 k		
ocaml-srpm-macros		noarch	
5-4.el8			rhel-8-for-
x86_64-appstream-rpms	9.5 k		
openblas-srpm-macros		noarch	
2-2.el8			rhel-8-for-
x86_64-appstream-rpms	8.0 k		
pcre2-devel		x86_64	
10.32-2.el8			rhel-8-for-
x86_64-baseos-rpms	605 k		
pcre2-utf16		x86_64	
10.32-2.el8			rhel-8-for-
x86_64-baseos-rpms	229 k		
pcre2-utf32		x86_64	
10.32-2.el8			rhel-8-for-
x86_64-baseos-rpms	220 k		
perl-CPAN-Meta-YAML		noarch	
0.018-397.el8			rhel-8-for-
x86_64-appstream-rpms	34 k		
perl-ExtUtils-Command		noarch	
1:7.34-1.el8			rhel-8-for-
x86_64-appstream-rpms	19 k		
perl-ExtUtils-Install		noarch	
2.14-4.el8			rhel-8-for-
x86_64-appstream-rpms	46 k		

perl-ExtUtils-Manifest		noarch	
1.70-395.el8			rhel-8-for-
x86_64-appstream-rpms	37 k		
perl-ExtUtils-ParseXS		noarch	
1:3.35-2.el8			rhel-8-for-
x86_64-appstream-rpms	83 k		
perl-JSON-PP		noarch	
1:2.97.001-3.el8			rhel-8-for-
x86_64-appstream-rpms	68 k		
perl-Math-BigInt		noarch	
1:1.9998.11-7.el8			rhel-8-for-
x86_64-baseos-rpms	196 k		
perl-Math-Complex		noarch	
1.59-421.el8			rhel-8-for-
x86_64-baseos-rpms	109 k		
perl-Test-Harness		noarch	
1:3.42-1.el8			rhel-8-for-
x86_64-appstream-rpms	279 k		
perl-devel		x86_64	
4:5.26.3-419.el8_4.1			rhel-8-for-
x86_64-appstream-rpms	599 k		
perl-srpm-macros		noarch	
1-25.el8			rhel-8-for-
x86_64-appstream-rpms	11 k		
perl-version		x86_64	
6:0.99.24-1.el8			rhel-8-for-
x86_64-appstream-rpms	67 k		
platform-python-devel		x86_64	
3.6.8-41.el8			rhel-8-for-
x86_64-appstream-rpms	249 k		
python-rpm-macros		noarch	
3-41.el8			rhel-8-for-
x86_64-appstream-rpms	15 k		
python-srpm-macros		noarch	
3-41.el8			rhel-8-for-
x86_64-appstream-rpms	15 k		
python3-pyparsing		noarch	
2.1.10-7.el8			rhel-8-for-
x86_64-baseos-rpms	142 k		
python3-rpm-generators		noarch	
5-7.el8			rhel-8-for-
x86_64-appstream-rpms	25 k		
python3-rpm-macros		noarch	
3-41.el8			rhel-8-for-
x86_64-appstream-rpms	14 k		
qt5-srpm-macros		noarch	

5.15.2-1.el8			rhel-8-for-
x86_64-appstream-rpms	11 k		
redhat-lsb-submod-security		x86_64	
4.1-47.el8			rhel-8-for-
x86_64-appstream-rpms	22 k		
redhat-rpm-config		noarch	
125-1.el8			rhel-8-for-
x86_64-appstream-rpms	87 k		
rust-srpm-macros		noarch	
5-2.el8			rhel-8-for-
x86_64-appstream-rpms	9.3 k		
spax		x86_64	
1.5.3-13.el8			rhel-8-for-
x86_64-baseos-rpms	217 k		
systemtap-sdt-devel		x86_64	
4.6-4.el8			rhel-8-for-
x86_64-appstream-rpms	86 k		
time		x86_64	
1.9-3.el8			rhel-8-for-
x86_64-baseos-rpms	54 k		
unzip		x86_64	
6.0-46.el8			rhel-8-for-
x86_64-baseos-rpms	196 k		
util-linux-user		x86_64	
2.32.1-28.el8			rhel-8-for-
x86_64-baseos-rpms	100 k		
zip		x86_64	
3.0-23.el8			rhel-8-for-
x86_64-baseos-rpms	270 k		
zlib-devel		x86_64	
1.2.11-17.el8			rhel-8-for-
x86_64-baseos-rpms	58 k		
Installing weak dependencies:			
perl-CPAN-Meta		noarch	
2.150010-396.el8			rhel-8-for-
x86_64-appstream-rpms	191 k		
perl-CPAN-Meta-Requirements		noarch	
2.140-396.el8			rhel-8-for-
x86_64-appstream-rpms	37 k		
perl-Encode-Locale		noarch	
1.05-10.module+el8.3.0+6498+9eecfe51			rhel-8-for-
x86_64-appstream-rpms	22 k		
perl-Time-HiRes		x86_64	
4:1.9758-2.el8			rhel-8-for-
x86_64-appstream-rpms	61 k		

## Transaction Summary

Install 69 Packages

Upgrade 17 Packages

Total download size: 72 M

Is this ok [y/N]: y

Downloading Packages:

(1/86): perl-ExtUtils-Install-2.14-4.el8.noarch.rpm

735 kB/s | 46 kB 00:00

(2/86): libesmtplib-1.0.6-18.el8.x86\_64.rpm

1.0 MB/s | 70 kB 00:00

(3/86): esmtplib-1.2-15.el8.x86\_64.rpm

747 kB/s | 57 kB 00:00

(4/86): rust-srpm-macros-5-2.el8.noarch.rpm

308 kB/s | 9.3 kB 00:00

(5/86): perl-ExtUtils-Manifest-1.70-395.el8.noarch.rpm

781 kB/s | 37 kB 00:00

(6/86): perl-CPAN-Meta-2.150010-396.el8.noarch.rpm

2.7 MB/s | 191 kB 00:00

(7/86): ocaml-srpm-macros-5-4.el8.noarch.rpm

214 kB/s | 9.5 kB 00:00

(8/86): perl-JSON-PP-2.97.001-3.el8.noarch.rpm

1.2 MB/s | 68 kB 00:00

(9/86): perl-ExtUtils-MakeMaker-7.34-1.el8.noarch.rpm

5.8 MB/s | 301 kB 00:00

(10/86): ghc-srpm-macros-1.4.2-7.el8.noarch.rpm

317 kB/s | 9.4 kB 00:00

(11/86): perl-Test-Harness-3.42-1.el8.noarch.rpm

4.5 MB/s | 279 kB 00:00

(12/86): perl-ExtUtils-Command-7.34-1.el8.noarch.rpm

520 kB/s | 19 kB 00:00

...

15 MB/s | 1.5 MB 00:00

Total

35 MB/s | 72 MB 00:02

Running transaction check

Transaction check succeeded.

Running transaction test

```

Transaction test succeeded.
Running transaction
  Preparing      :
1/1
  Running scriptlet: openssl-libs-1:1.1.1k-7.el8_6.x86_64
1/1
  Upgrading       : openssl-libs-1:1.1.1k-7.el8_6.x86_64
1/103
  Running scriptlet: openssl-libs-1:1.1.1k-7.el8_6.x86_64
1/103
  Upgrading       : libgcc-8.5.0-10.1.el8_6.x86_64
2/103
  Running scriptlet: libgcc-8.5.0-10.1.el8_6.x86_64
2/103
  Upgrading       : elfutils-libelf-0.186-1.el8.x86_64
3/103
  Installing      : perl-version-6:0.99.24-1.el8.x86_64
4/103
  Installing      : perl-CPAN-Meta-Requirements-2.140-396.el8.noarch
5/103
  Upgrading       : libsemanage-2.9-8.el8.x86_64
6/103
  Installing      : zlib-devel-1.2.11-17.el8.x86_64
7/103
  Installing      : python-srpm-macros-3-41.el8.noarch
8/103
  Installing      : python-rpm-macros-3-41.el8.noarch
9/103
  Installing      : python3-rpm-macros-3-41.el8.noarch
10/103
  Installing      : perl-Time-HiRes-4:1.9758-2.el8.x86_64
11/103
  Installing      : perl-ExtUtils-ParseXS-1:3.35-2.el8.noarch
12/103
  Installing      : perl-Test-Harness-1:3.42-1.el8.noarch
13/103
  Upgrading       : python3-libsemanage-2.9-8.el8.x86_64
14/103
  Upgrading       : polycoreutils-2.9-19.el8.x86_64
15/103
  Running scriptlet: polycoreutils-2.9-19.el8.x86_64
15/103
  Upgrading       : python3-polycoreutils-2.9-19.el8.noarch
16/103
  Installing      : dwz-0.12-10.el8.x86_64
17/103

```



```

Installing      : ncurses-compat-libs-6.1-9.20180224.el8.x86_64
18/103
Installing      : libesmtplib-1.0.6-18.el8.x86_64
19/103
Installing      : mailx-12.5-29.el8.x86_64
20/103
Installing      : libkadm5-1.18.2-14.el8.x86_64
21/103
Upgrading       : libgomp-8.5.0-10.1.el8_6.x86_64
22/103
Running scriptlet: libgomp-8.5.0-10.1.el8_6.x86_64
22/103
Upgrading       : platform-python-pip-9.0.3-22.el8.noarch
23/103
Upgrading       : python3-pip-9.0.3-22.el8.noarch
24/103
Upgrading       : python36-3.6.8-
38.module+el8.5.0+12207+5c5719bc.x86_64
25/103
Running scriptlet: python36-3.6.8-
38.module+el8.5.0+12207+5c5719bc.x86_64
25/103
Upgrading       : cpp-8.5.0-10.1.el8_6.x86_64
26/103
Running scriptlet: cpp-8.5.0-10.1.el8_6.x86_64
26/103
Upgrading       : gcc-8.5.0-10.1.el8_6.x86_64
27/103
Running scriptlet: gcc-8.5.0-10.1.el8_6.x86_64
27/103
Installing      : annobin-10.29-3.el8.x86_64
28/103
Installing      : unzip-6.0-46.el8.x86_64
29/103
Installing      : zip-3.0-23.el8.x86_64
30/103
Installing      : perl-Math-Complex-1.59-421.el8.noarch
31/103
Installing      : perl-Math-BigInt-1:1.9998.11-7.el8.noarch
32/103
Installing      : perl-JSON-PP-1:2.97.001-3.el8.noarch
33/103
Installing      : make-1:4.2.1-11.el8.x86_64
34/103
Running scriptlet: make-1:4.2.1-11.el8.x86_64
34/103

```

```

Installing      : libcom_err-devel-1.45.6-2.el8.x86_64
35/103
Installing      : util-linux-user-2.32.1-28.el8.x86_64
36/103
Installing      : libsepol-devel-2.9-3.el8.x86_64
37/103
Installing      : pcre2-utf32-10.32-2.el8.x86_64
38/103
Installing      : pcre2-utf16-10.32-2.el8.x86_64
39/103
Installing      : pcre2-devel-10.32-2.el8.x86_64
40/103
Installing      : libselinux-devel-2.9-5.el8.x86_64
41/103
Installing      : patch-2.7.6-11.el8.x86_64
42/103
Installing      : python3-pyparsing-2.1.10-7.el8.noarch
43/103
Installing      : systemtap-sdt-devel-4.6-4.el8.x86_64
44/103
Installing      : spax-1.5.3-13.el8.x86_64
45/103
Running scriptlet: spax-1.5.3-13.el8.x86_64
45/103
Installing      : m4-1.4.18-7.el8.x86_64
46/103
Running scriptlet: m4-1.4.18-7.el8.x86_64
46/103
Installing      : libverto-devel-0.3.0-5.el8.x86_64
47/103
Installing      : bc-1.07.1-5.el8.x86_64
48/103
Running scriptlet: bc-1.07.1-5.el8.x86_64
48/103
Installing      : at-3.1.20-11.el8.x86_64
49/103
Running scriptlet: at-3.1.20-11.el8.x86_64
49/103
Installing      : keyutils-libs-devel-1.5.10-6.el8.x86_64
50/103
Installing      : krb5-devel-1.18.2-14.el8.x86_64
51/103
Installing      : time-1.9-3.el8.x86_64
52/103
Running scriptlet: time-1.9-3.el8.x86_64
52/103

```

```

Upgrading      : polycoreutils-python-utils-2.9-19.el8.noarch
80/103
Installing     : elfutils-libelf-devel-0.186-1.el8.x86_64
81/103
Upgrading      : elfutils-libs-0.186-1.el8.x86_64
82/103
Upgrading      : mokutil-1:0.3.0-11.el8_6.1.x86_64
83/103
Upgrading      : openssl-1:1.1.1k-7.el8_6.x86_64
84/103
Installing     : kernel-devel-4.18.0-348.el8.x86_64
85/103
Running scriptlet: kernel-devel-4.18.0-348.el8.x86_64

...

85/103
Installing     : bzip2-1.0.6-26.el8.x86_64
86/103
Cleanup        : polycoreutils-python-utils-2.9-14.el8.noarch
87/103
Cleanup        : python3-polycoreutils-2.9-14.el8.noarch
88/103
Cleanup        : python36-3.6.8-
2.module+el8.1.0+3334+5cb623d7.x86_64
89/103
Running scriptlet: python36-3.6.8-
2.module+el8.1.0+3334+5cb623d7.x86_64
89/103
Cleanup        : elfutils-libs-0.185-1.el8.x86_64
90/103
Cleanup        : openssl-1:1.1.1k-4.el8.x86_64
91/103
Cleanup        : python3-libsemanage-2.9-6.el8.x86_64
92/103
Running scriptlet: gcc-8.4.1-1.el8.x86_64
93/103
Cleanup        : gcc-8.4.1-1.el8.x86_64
93/103
Running scriptlet: polycoreutils-2.9-14.el8.x86_64
94/103
Cleanup        : polycoreutils-2.9-14.el8.x86_64
94/103
Cleanup        : mokutil-1:0.3.0-11.el8.x86_64
95/103

```

```

Cleanup          : python3-pip-9.0.3-19.el8.noarch
96/103
Cleanup          : platform-python-pip-9.0.3-19.el8.noarch
97/103
Cleanup          : openssl-libs-1:1.1.1k-4.el8.x86_64
98/103
Running scriptlet: openssl-libs-1:1.1.1k-4.el8.x86_64
98/103
Cleanup          : libsemanage-2.9-6.el8.x86_64
99/103
Running scriptlet: cpp-8.4.1-1.el8.x86_64
100/103
Cleanup          : cpp-8.4.1-1.el8.x86_64
100/103
Cleanup          : libgcc-8.5.0-3.el8.x86_64
101/103
Running scriptlet: libgcc-8.5.0-3.el8.x86_64
101/103
Running scriptlet: libgomp-8.4.1-1.el8.x86_64
102/103
Cleanup          : libgomp-8.4.1-1.el8.x86_64
102/103
Running scriptlet: libgomp-8.4.1-1.el8.x86_64
102/103
Cleanup          : elfutils-libelf-0.185-1.el8.x86_64
103/103
Running scriptlet: elfutils-libelf-0.185-1.el8.x86_64
103/103
Verifying        : esmtp-1.2-15.el8.x86_64
1/103
Verifying        : libesmtp-1.0.6-18.el8.x86_64

...

Upgraded:
  cpp-8.5.0-10.1.el8_6.x86_64                                elfutils-
libelf-0.186-1.el8.x86_64      elfutils-libs-0.186-1.el8.x86_64
gcc-8.5.0-10.1.el8_6.x86_64
  libgcc-8.5.0-10.1.el8_6.x86_64                                libgomp-
8.5.0-10.1.el8_6.x86_64      libsemanage-2.9-8.el8.x86_64
mokutil-1:0.3.0-11.el8_6.1.x86_64
  openssl-1:1.1.1k-7.el8_6.x86_64                                openssl-
libs-1:1.1.1k-7.el8_6.x86_64  platform-python-pip-9.0.3-22.el8.noarch
policycoreutils-2.9-19.el8.x86_64
  policycoreutils-python-utils-2.9-19.el8.noarch                python3-
libsemanage-2.9-8.el8.x86_64  python3-pip-9.0.3-22.el8.noarch

```

```

python3-policycoreutils-2.9-19.el8.noarch
python36-3.6.8-38.module+el8.5.0+12207+5c5719bc.x86_64
Installed:
annobin-10.29-3.el8.x86_64 at-
3.1.20-11.el8.x86_64 bc-1.07.1-5.el8.x86_64
bzip2-1.0.6-26.el8.x86_64
cups-client-1:2.2.6-38.el8.x86_64 dwz-0.12-
10.el8.x86_64
ed-1.14.2-4.el8.x86_64
efi-srpm-macros-3-3.el8.noarch elfutils-libelf-
devel-0.186-1.el8.x86_64
esmtplib-1.2-15.el8.x86_64
ghc-srpm-macros-1.4.2-7.el8.noarch go-srpm-macros-2-
17.el8.noarch
kernel-devel-4.18.0-348.el8.x86_64
keyutils-libs-devel-1.5.10-6.el8.x86_64 krb5-devel-1.18.2-
14.el8.x86_64
libcom_err-devel-1.45.6-2.el8.x86_64
libesmtplib-1.0.6-18.el8.x86_64 libkadm5-1.18.2-
14.el8.x86_64
libblockfile-1.14-1.el8.x86_64
libselinux-devel-2.9-5.el8.x86_64 libsepol-devel-2.9-
3.el8.x86_64
libverto-devel-0.3.0-5.el8.x86_64 m4-
1.4.18-7.el8.x86_64 mailx-12.5-
29.el8.x86_64
make-1:4.2.1-11.el8.x86_64
ncurses-compat-libs-6.1-9.20180224.el8.x86_64 ocaml-srpm-macros-
5-4.el8.noarch
openblas-srpm-macros-2-2.el8.noarch
openssl-devel-1:1.1.1k-7.el8_6.x86_64 patch-2.7.6-
11.el8.x86_64
pcre2-devel-10.32-2.el8.x86_64
pcre2-utf16-10.32-2.el8.x86_64 pcre2-utf32-10.32-
2.el8.x86_64
perl-CPAN-Meta-2.150010-396.el8.noarch
perl-CPAN-Meta-Requirements-2.140-396.el8.noarch perl-CPAN-Meta-
YAML-0.018-397.el8.noarch
perl-Encode-Locale-1.05-10.module+el8.3.0+6498+9eecfe51.noarch
perl-ExtUtils-Command-1:7.34-1.el8.noarch perl-ExtUtils-
Install-2.14-4.el8.noarch
perl-ExtUtils-MakeMaker-1:7.34-1.el8.noarch
perl-ExtUtils-Manifest-1.70-395.el8.noarch perl-ExtUtils-
ParseXS-1:3.35-2.el8.noarch
perl-JSON-PP-1:2.97.001-3.el8.noarch
perl-Math-BigInt-1:1.9998.11-7.el8.noarch perl-Math-Complex-

```

```

1.59-421.el8.noarch
perl-Test-Harness-1:3.42-1.el8.noarch
perl-Time-HiRes-4:1.9758-2.el8.x86_64 perl-devel-
4:5.26.3-419.el8_4.1.x86_64
perl-srpm-macros-1-25.el8.noarch
perl-version-6:0.99.24-1.el8.x86_64 platform-python-
devel-3.6.8-41.el8.x86_64
python-rpm-macros-3-41.el8.noarch
python-srpm-macros-3-41.el8.noarch python3-pyparsing-
2.1.10-7.el8.noarch
python3-rpm-generators-5-7.el8.noarch
python3-rpm-macros-3-41.el8.noarch python36-devel-
3.6.8-38.module+el8.5.0+12207+5c5719bc.x86_64
qt5-srpm-macros-5.15.2-1.el8.noarch
redhat-lsb-core-4.1-47.el8.x86_64 redhat-lsb-submod-
security-4.1-47.el8.x86_64
redhat-rpm-config-125-1.el8.noarch
rust-srpm-macros-5-2.el8.noarch spax-1.5.3-
13.el8.x86_64
systemtap-sdt-devel-4.6-4.el8.x86_64
time-1.9-3.el8.x86_64 unzip-6.0-
46.el8.x86_64
util-linux-user-2.32.1-28.el8.x86_64
zip-3.0-23.el8.x86_64 zlib-devel-1.2.11-
17.el8.x86_64

```

Complete!

OS package installations finished

+ Installing ONTAP Mediator. (Log: /tmp/ontap\_mediator.JixKGP/ontap-mediator-1.6.0/ontap-mediator-1.6.0/install\_20221021155929.log)

This step will take several minutes. Use the log file to view progress.

Sudoer config verified

ONTAP Mediator rsyslog and logging rotation enabled

+ Install successful. (Moving log to /opt/netapp/lib/ontap\_mediator/log/install\_20221021155929.log)

+ WARNING: This system supports UEFI

Secure Boot (SB) is currently disabled on this system.

If SB is enabled in the future, SCST will not work unless the following action is taken:

Using the keys in

/opt/netapp/lib/ontap\_mediator/ontap\_mediator/SCST\_mod\_keys follow instructions in

/opt/netapp/lib/ontap\_mediator/ontap\_mediator/SCST\_mod\_keys/README.module-signing

to sign the SCST kernel module. Note that reboot will be

needed.

SCST will not start automatically when Secure Boot is enabled and not configured properly.

+ Note: ONTAP Mediator uses a kernel module compiled specifically for the current

OS. Using 'yum update' to upgrade the kernel might cause service interruption.

```
For more information, see /opt/netapp/lib/ontap_mediator/README
[root@scs000099753 ~]# cat /etc/redhat-release
Red Hat Enterprise Linux release 8.5 (Ootpa)
[root@scs000099753 ~]#
```

## Verify the installation

After the ONTAP Mediator has been installed, you should verify that the ONTAP Mediator services are running.

### Steps

1. View the status of the ONTAP Mediator services:

a. `systemctl status ontap_mediator`

```
[root@scspr1915530002 ~]# systemctl status ontap_mediator

ontap_mediator.service - ONTAP Mediator
Loaded: loaded (/etc/systemd/system/ontap_mediator.service; enabled;
vendor preset: disabled)
Active: active (running) since Mon 2022-04-18 10:41:49 EDT; 1 weeks 0
days ago
Process: 286710 ExecStop=/bin/kill -s INT $MAINPID (code=exited,
status=0/SUCCESS)
Main PID: 286712 (uwsgi)
Status: "uWSGI is ready"
Tasks: 3 (limit: 49473)
Memory: 139.2M
CGroup: /system.slice/ontap_mediator.service
├─286712 /opt/netapp/lib/ontap_mediator/pyenv/bin/uwsgi --ini
/opt/netapp/lib/ontap_mediator/uwsgi/ontap_mediator.ini
├─286716 /opt/netapp/lib/ontap_mediator/pyenv/bin/uwsgi --ini
/opt/netapp/lib/ontap_mediator/uwsgi/ontap_mediator.ini
└─286717 /opt/netapp/lib/ontap_mediator/pyenv/bin/uwsgi --ini
/opt/netapp/lib/ontap_mediator/uwsgi/ontap_mediator.ini

[root@scspr1915530002 ~]#
```

b. `systemctl status mediator-scst`

```
[root@scspr1915530002 ~]# systemctl status mediator-scst
Loaded: loaded (/etc/systemd/system/mediator-scst.service;
enabled; vendor preset: disabled)
Active: active (running) since Mon 2022-04-18 10:41:47 EDT; 1
weeks 0 days ago
Process: 286595 ExecStart=/etc/init.d/scst start (code=exited,
status=0/SUCCESS)
Main PID: 286662 (iscsi-scstd)
Tasks: 1 (limit: 49473)
Memory: 1.2M
CGroup: /system.slice/mediator-scst.service
└─286662 /usr/local/sbin/iscsi-scstd

[root@scspr1915530002 ~]#
```

2. Confirm the ports that are used by the ONTAP Mediator service:

`netstat`

```
[root@scspr1905507001 ~]# netstat -anlt | grep -E '3260|31784'

tcp        0      0 0.0.0.0:31784        0.0.0.0:*           LISTEN
tcp        0      0 0.0.0.0:3260        0.0.0.0:*           LISTEN
tcp6       0      0 :::3260             :::*                 LISTEN
```

## Post-installation configuration

After the ONTAP Mediator service is installed and running, additional configuration tasks must be performed in the ONTAP storage system to use the Mediator features:

- To use the ONTAP Mediator service in a MetroCluster IP configuration, see [Configuring the ONTAP Mediator service from a MetroCluster IP configuration](#).
- To use SnapMirror Business Continuity, see [Install ONTAP Mediator Service and confirm the ONTAP cluster configuration](#).

### Configure ONTAP Mediator security policies

The ONTAP Mediator server supports several configurable security settings. The default values for all settings are provide in a `low_space_threshold_mib: 10` read-only file:

```
/opt/netapp/lib/ontap_mediator/server_config/ontap_mediator.user_config.yaml
```



All values that are placed in the `ontap_mediator.user_config.yaml` will override the default values and be maintained across all ONTAP Mediator upgrades.

After you modify `ontap_mediator.user_config.yaml`, restart the ONTAP Mediator service:

```
systemctl restart ontap_mediator
```

The following attributes can be configured: NOTE: Other default values in the `ontap_mediator.config.yaml` should not be modified.

- **Settings used to install third-party SSL certificates as replacements for the default self-signed certificates**

```
cert_path:
'/opt/netapp/lib/ontap_mediator/ontap_mediator/server_config/ontap_mediator_server.crt'
key_path:
'/opt/netapp/lib/ontap_mediator/ontap_mediator/server_config/ontap_mediator_server.key'
ca_cert_path:
'/opt/netapp/lib/ontap_mediator/ontap_mediator/server_config/ca.crt'
ca_key_path:
'/opt/netapp/lib/ontap_mediator/ontap_mediator/server_config/ca.key'
ca_serial_path:
'/opt/netapp/lib/ontap_mediator/ontap_mediator/server_config/ca.srl'
cert_valid_days: '1095' # Used to set the expiration
on client certs to 3 years
x509_passin_pwd: 'pass:ontap' # passphrase for the signed
client cert
```

- **Settings that provide protections against brute-force password guessing attacks**

To enable the feature, set a value for the `window_seconds` and the `retry_limit`

Examples:

- Provide a 5-minute window for guesses, and then reset the count to zero failures:

```
authentication_lock_window_seconds: 300
```

- Lock the account if five failures occur within the window timeframe:

```
authentication_retry_limit: 5
```

- Reduce the impact of brute-force password guessing attacks by setting a delay that occurs prior to rejecting each attempt, which slows the attacks.

```
authentication_failure_delay_seconds: 5
```

```
authentication_failure_delay_seconds: 0    # seconds (float) to delay
failed auth attempts prior to response, 0 = no delay
authentication_lock_window_seconds: null   # seconds (int) since the
oldest failure before resetting the retry counter, null = no window
authentication_retry_limit: null           # number of retries to
allow before locking API access, null = unlimited
```

- **Fields that control the password complexity rules of the ONTAP Mediator API user account**

```
password_min_length: 8

password_max_length: 64

password_uppercase_chars: 0    # min. uppercase characters

password_lowercase_chars: 1    # min. lowercase character

password_special_chars: 1      # min. non-letter, non-digit

password_nonletter_chars: 2    # min. non-letter characters (digits,
specials, anything)
```

- **Setting that controls the required free space on the `/opt/netapp/lib/ontap_mediator` disk.**

If the space is lower than the set threshold, the service will issue a warning event.

```
low_space_threshold_mib: 10
```

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