



安装或升级 ONTAP 9

NetApp
April 24, 2024

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安装或升级

准备安装或升级ONTAP 调解器服务

要安装ONTAP调解器服务、必须确保满足所有前提条件、提取安装包并在主机上运行安装程序。此操作步骤用于安装或升级现有安装。

关于此任务

- 从ONTAP 9.7开始、您可以使用任何版本的ONTAP 调解器来监控MetroCluster IP配置。
- 从ONTAP 9.8开始、您可以使用任何版本的ONTAP 调解器来监控SM-BC关系。

开始之前

您必须满足以下前提条件。

ONTAP 调解器版本	支持的 Linux 版本
1.7.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 8.5、 8.6、 8.7、 8.8、 8.9、 9.0、 9.1、 9.2 和9.3• 落基Linux 8和9
1.6.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 8.4、 8.5、 8.6、 8.7、 8.8、 9.0、 9.1、 9.2• 落基Linux 8和9
1.5.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 7.6、 7.7、 7.8、 7.9、 8.1、 8.2、 8.3、 8.4 、 8.5• CentOS ： 7.6 ， 7.7 ， 7.8 ， 7.9
1.4.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 7.6、 7.7、 7.8、 7.9、 8.1、 8.2、 8.3、 8.4 、 8.5• CentOS ： 7.6 ， 7.7 ， 7.8 ， 7.9
1.3.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 7.6、 7.7、 7.8、 7.9、 8.1、 8.2、 8.3• CentOS ： 7.6 ， 7.7 ， 7.8 ， 7.9
1.2.	<ul style="list-style-type: none">• Red Hat Enterprise Linux： 7.6、 7.7、 7.8、 8.1• CentOS ： 7.6 ， 7.7 ， 7.8



内核版本必须与操作系统版本匹配。

- 64 位物理安装或虚拟机
- 8 GB RAM

- 1 GB磁盘空间(用于应用程序安装、服务器日志和数据库)
- 用户: root 访问权限

可以安全地更新除内核之外的任何库软件包、但可能需要重新启动才能在ONTAP 调解器应用程序中生效。需要重新启动时、建议使用服务窗口。

如果安装 yum-utils 软件包中、您可以使用 needs-restarting 命令:

如果要将内核更新到ONTAP 调解器版本表仍支持的版本、则可以更新此内核。必须重新启动、因此需要一个服务窗口。

必须在重新启动之前卸载SCST内核模块、然后在重新启动之后重新安装。



不支持升级到特定ONTAP 调解器版本支持的操作系统版本以外的内核。(这可能表示测试的SCST模块不会编译)。

启用UEFI安全启动后注册安全密钥

如果启用了UEFI安全启动、则要安装ONTAP调解器、您必须先注册安全密钥、然后才能启动ONTAP调解器服务。要确定系统是否已启用UEFI且安全启动已打开、请执行以下步骤:

步骤

1. 如果未安装mokutil、请运行以下命令:

```
yum install mokutil
```

2. 要确定系统上是否启用了UEFI安全启动、请运行以下命令:

```
mokutil --sb-state
```

结果显示此系统上是否启用了UEFI安全启动。



ONTAP调解器1.2.0及先前版本不支持此模式。

禁用UEFI安全启动

在安装ONTAP调解器之前、您还可以选择禁用UEFI安全启动。

步骤

1. 在物理机BIOS设置中、禁用"UEFI安全启动"选项。
2. 在VM的VMware设置中、禁用vSphere 6.x的"Safe Start"(安全启动)选项或vSphere 7.x的"Secure Boot"(安全启动)选项

升级主机操作系统、然后升级ONTAP 调解器

要将适用于ONTAP 调解器的主机操作系统升级到更高版本、必须先卸载ONTAP 调解器。

开始之前

下面列出了在系统上安装Red Hat Enterprise Linux或Rocky's Linux以及关联存储库的最佳实践。以不同方式安装或配置的系统可能需要执行其他步骤。

- 您必须根据Red Hat最佳实践安装Red Hat Enterprise Linux或Rocky's Linux。由于CentOS 8.x版本支持生命周期终结、因此不建议使用兼容版本的CentOS 8.x。
- 在Red Hat Enterprise Linux或洛基Linux上安装ONTAP调解器服务时、系统必须能够访问相应的存储库、以便安装程序可以访问和安装所有必需的软件依赖项。
- 要使 yum 安装程序在 Red Hat Enterprise Linux 存储库中查找相关软件，您必须在 Red Hat Enterprise Linux 安装期间或之后使用有效的 Red Hat 订阅注册系统。

有关 Red Hat 订阅管理器的信息，请参见 Red Hat 文档。

- 必须未使用以下端口，这些端口可用于调解器：
 - 31784.
 - 3260
- 如果使用第三方防火墙：请参见 ["ONTAP 调解器的防火墙要求"](#)
- 如果Linux主机所在位置无法访问Internet、则必须确保所需的软件包在本地存储库中可用。

如果您在Linux环境中使用链路聚合控制协议(Link Aggregation)](LACP)、则必须正确配置内核并确保 `sysctl net.ipv4.conf.all.arp_ignore` 设置为"2"。

您需要的内容

ONTAP 调解器服务需要以下软件包：

所有 RHEL/CentOS 版本	适用于RHEL 8.x / Rocky Linux 8的其他软件包	适用于RHEL 9.x / Rocky Linux 9的其他软件包
<ul style="list-style-type: none">• OpenSSL• OpenSSL 开发• kernel-devel-\$(uname -r)• GCC• 创建• libselinux-utils• patch• bzip 2• Perl 数据 - Dumper• Perl 扩展程序 -MakeMaker• efibootmgr• mukutil	<ul style="list-style-type: none">• python3-pip• elfutils-libelf-devel• policycoreutils-python 实用程序• RedHat-lsb-core• python39• python39-devel	<ul style="list-style-type: none">• python3-pip• elfutils-libelf-devel• policycoreutils-python 实用程序• python3.• python3-devel

调解器安装包是一个自解压压缩 tar 文件，其中包括：

- 一个 RPM 文件，其中包含无法从受支持版本的存储库获取的所有依赖项。

- 安装脚本。

建议提供有效的SSL认证。

关于此任务

使用leapp-upgrade工具将适用于ONTAP 的主机操作系统调解器升级到更高的主要版本(例如、从7.x升级到8.x)时、您必须卸载ONTAP 调解器、因为该工具会尝试检测已向系统注册的存储库中安装的任何RPM的新版本。

由于.rpm文件是作为ONTAP 调解器安装程序的一部分安装的、因此会包含在该搜索中。但是、由于.rpm文件是作为安装程序的一部分解压缩的、并且未从注册的存储库下载、因此无法找到升级。在这种情况下、leapp-upgrade工具将卸载该软件包。

为了保留用于鉴别支持案例的日志文件、您应在操作系统升级之前备份这些文件、并在重新安装ONTAP 调解器软件包之后还原这些文件。由于正在重新安装ONTAP 调解器、因此、在新安装后、需要重新连接与其连接的所有ONTAP 集群。



应按顺序执行以下步骤。重新安装ONTAP 调解器后、您应立即停止ONTAP调解器服务、替换日志文件并重新启动该服务。这将确保日志不会丢失。

步骤

1. 备份日志文件。

```
[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. 使用leapp-upgrade工具执行升级。

```
[rootmediator-host ~]# leapp preupgrade --target 8.4
..
```

3. 重新安装ONTAP 调解器。



重新安装ONTAP 调解器后立即执行其余步骤、以防止日志文件丢失。

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

ONTAP Mediator: Self Extracting Installer

..
```

4. 停止ONTAP调解器服务。

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

5. 替换日志文件。

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

6. 启动ONTAP调解器服务。

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

7. 将所有ONTAP 集群重新连接到升级后的ONTAP 调解器

```

siteA::> metrocluster configuration-settings mediator show
Mediator IP      Port      Node      Configuration
Connection
Status      Status
-----
-----
172.31.40.122
31784      siteA-node2      true      false
           siteA-node1      true      false
           siteB-node2      true      false
           siteB-node2      true      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
Connection
Status      Status
-----
-----
172.31.40.122
31784      siteA-node2      true      true
           siteA-node1      true      true
           siteB-node2      true      true
           siteB-node2      true      true

siteA::>

```


对于SnapMirror业务连续性、如果您在/opt/NetApp目录之外安装了TLS证书、则无需重新安装它。如果您使用的是默认生成的自签名证书、或者将自定义证书放在/opt/NetApp目录中、则应将其备份并还原。

```
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
```

		Owning		
Job ID	Name	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::>
```

启用对存储库的访问

您应启用对存储库的访问、以便ONTAP 调解器可以在安装过程中访问所需的软件包

步骤

1. 确定必须访问哪些存储库、如下表所示：

操作系统	您必须提供对这些存储库的访问权限 ...
RHEL 7.x	<ul style="list-style-type: none">• rhel-7-server-optional -rpms
RHEL 8.x	<ul style="list-style-type: none">• rhel-8-for-x86_64 — basos-rpms• rhel-8-for-x86_64 — AppStream — rpms
RHEL 9.x	<ul style="list-style-type: none">• rhel-9-for x86、64-baseos-rpms• rhel-9-for x86、64-AppStream-rpms
CentOS 7.x	<ul style="list-style-type: none">• C7.6.1810 —基本存储库
落基Linux 8.	<ul style="list-style-type: none">• AppStream• baseos
落基Linux 9	<ul style="list-style-type: none">• AppStream• baseos

2. 使用以下过程之一启用对上面列出的存储库的访问、以便ONTAP 调解器可以在安装过程中访问所需的软件包。

如果您的操作系统为*RHEL 7.x*，请使用此操作步骤 来访问存储库：

步骤

1. 订阅所需的存储库：

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

以下示例显示了此命令的执行情况：

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

2. 运行 yum repolist 命令：

以下示例显示了此命令的执行情况。列表中应显示 rhel-7-server-optional -rpms 存储库。

```
[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 ~]#
```

如果您的操作系统为***RHEL 8.x***，请使用此操作步骤来访问存储库：

步骤

1. 订阅所需的存储库：

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

以下示例显示了此命令的执行情况：

```
[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. 运行 `yum repolist` 命令：

新订阅的存储库应显示在列表中。

如果您的操作系统为***RHEL 9.x***，请使用此操作步骤来访问存储库：

步骤

1. 订阅所需的存储库：

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

以下示例显示了此命令的执行情况：

```
[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. 运行 `yum repolist` 命令：

新订阅的存储库应显示在列表中。

如果您的操作系统为*CentOS 7.x*，请使用此操作步骤 来访问存储库：



以下示例显示的是CentOS 7.6的存储库、可能不适用于其他CentOS版本。使用适用于您的CentOS版本的基础存储库。

步骤

1. 添加 C7.6.1810 —基本存储库。C7.6.1810 -基本存储库包含ONTAP 调解器所需的"kernel-devel"软件包。
2. 将以下行添加到 /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. 运行 yum repolist 命令：

以下示例显示了此命令的执行情况。CentOS-7.6.1810 —基本存储库应显示在列表中。

```
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 ~]#
```

如果您的操作系统是*Rocky Linux 8*或*Rocky Linux 9*，请使用此操作步骤 来访问存储库：

步骤

1. 订阅所需的存储库：

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

2. 执行 clean 操作：

```
dnf clean all
```

3. 验证存储库列表：

```
dnf repolist
```

```
[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 ~]#
```

```
[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 ~]#
```

下载调试器安装包

在安装过程中下载调试器安装包。

步骤

1. 从 ONTAP 调试器页面下载调试器安装包。

2. 确认调解器安装包位于当前工作目录中：

ls

```
[root@mediator-host ~]#ls
ontap-mediator-1.7.0.tgz
```



对于ONTAP 调解器1.4及更早版本、安装程序名为 `ontap-mediator.o`。

如果您所在位置无法访问 Internet ，则必须确保安装程序能够访问所需的软件包。

3. 如有必要，请将调解器安装包从下载目录移至 Linux 调解器主机上的安装目录。
4. 解压缩安装程序包：

tar xvfz ontap-mediator-1.7.0.tgz

```
[root@scs000099753 ~]# tar xvfz ontap-mediator-1.7.0.tgz
ontap-mediator-1.7.0/
ontap-mediator-1.7.0/ONTAP-Mediator-production.pub
ontap-mediator-1.7.0/tsa-prod-chain-ONTAP-Mediator.pem
ontap-mediator-1.7.0/tsa-prod-ONTAP-Mediator.pem
ontap-mediator-1.7.0/csc-prod-ONTAP-Mediator.pem
ontap-mediator-1.7.0/csc-prod-chain-ONTAP-Mediator.pem
ontap-mediator-1.7.0/ontap-mediator-1.7.0
ontap-mediator-1.7.0/ontap-mediator-1.7.0.sig.tsr
ontap-mediator-1.7.0/ontap-mediator-1.7.0.tsr
ontap-mediator-1.7.0/ontap-mediator-1.7.0.sig
```

验证ONTAP 调解器代码签名

在安装调解器安装包之前、您应验证ONTAP 调解器代码签名。

开始之前

在验证调解器代码签名之前、您的系统必须满足以下要求。

- OpenSSL 1.0.2到3.0版、用于基本验证
- 适用于时间戳颁发机构(TSA)操作的OpenSSL 1.1.0或更高版本
- 用于OCSP验证的公有 Internet访问

下载包中包含以下文件：

文件	Description
ONTAP-Mediator-development.pub	用于验证签名的公共密钥
csc-prod-chain-ONTAP-Mediator.pem	公共认证CA信任链
csc-prod-ONTAP-Mediator.pem	用于生成密钥的证书
ontap-mediator-1.7.0	1.7.0版的产品安装可执行文件
ontap-mediator-1.7.0.sig	SHA-256经过哈希处理、然后使用Ccs-prod密钥(安装程序签名)进行RSA签名
ontap-mediator-1.7.0.sig.tsr	OCSCP用于安装程序签名的撤消请求
tsc-prod-ONTAP-Mediator.pem	TSR的公共证书
tsc-prod-chain-ONTAP-Mediator.pem	TSR的公共证书CA链

步骤

1. 对执行撤消检查 csc-prod-ONTAP-Mediator.pem 使用联机证书状态协议(OCSP)。

- a. 查找用于注册证书的OCSP URL、因为开发人员证书可能不提供URL。

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

- b. 生成证书的OCSP请求。

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

- c. 连接到OCSP Manager以发送OCSP请求：

```
openssl ocsf -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 -verify_other csc-prod-chain-ONTAP-Mediator.pem
```

2. 验证CSC的信任链以及本地主机的到期日期：

```
openssl verify
```



- 。 openssl 路径中的版本必须有效 cert.pem (非自签名)。

```
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. 验证 ontap-mediator-1.6.0.sig.tsr 和 ontap-mediator-1.7.0.tsr 使用关联证书的文件:

```
openssl ts -verify
```



.tsr 文件包含与安装程序关联的时间戳响应以及代码签名。处理过程会确认时间戳具有来自TSA的有效签名、并且您的输入文件未更改。此验证将在您的计算机上本地执行。独立地、无需访问TSA服务器。

```
openssl ts -verify -data ontap-mediator-1.7.0.sig -in ontap-mediator-  
1.7.0.sig.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-  
prod-ONTAP-Mediator.pem  
openssl ts -verify -data ontap-mediator-1.7.0 -in ontap-mediator-  
1.7.0.tsr -CAfile tsa-prod-chain-ONTAP-Mediator.pem -untrusted tsa-prod-  
ONTAP-Mediator.pem
```

4. 根据密钥验证签名:

```
openssl dgst -verify
```

```
openssl dgst -sha256 -verify ONTAP-Mediator-production.pub -signature  
ontap-mediator-1.7.0.sig ontap-mediator-1.7.0
```

```

[root@scspa2695423001 ontap-mediator-1.7.0]# pwd
/root/ontap-mediator-1.7.0
[root@scspa2695423001 ontap-mediator-1.7.0]# 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-1.7.0
-rw-r--r-- 1 root root      384 Feb 20 15:17 ontap-mediator-1.7.0.sig
-rw-r--r-- 1 root root      5437 Feb 20 15:17 ontap-mediator-
1.7.0.sig.tsr
-rw-r--r-- 1 root root      5436 Feb 20 15:17 ontap-mediator-1.7.0.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-1.7.0]#
[root@scspa2695423001 ontap-mediator-1.7.0]#
/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 -verify_other csc-
prod-chain-ONTAP-Mediator.pem
OCSP Response Data:
    OCSP 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: CE894F8251AA15A28462CA312361D261FBBF8FE78

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-1.7.0.sig -in ontap-mediator-
1.7.0.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-1.7.0 -in ontap-mediator-
1.7.0.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-1.7.0.sig ontap-mediator-1.7.0
Verified OK
[root@scspa2695423001 ontap-mediator-1.7.0]#

```

安装 ONTAP 调解器安装包

要安装ONTAP调解器服务、您必须获取安装包并在主机上运行安装程序。

步骤

1. 运行安装程序并根据需要响应提示：

```
./ontap-mediator-1.7.0/ontap-mediator-1.7.0 -y
```

```
[root@scs000099753 ~]# ./ontap-mediator-1.5.0/ontap-mediator-1.7.0 -y
```

安装过程将继续创建所需的帐户并安装所需的软件包。如果主机上安装了先前版本的调解器，系统将提示您确认是否要升级。

2. 从ONTAP 调解器1.4开始、安全启动机制在UEFI系统上启用。启用安全启动后、您必须执行其他步骤、以便在安装后注册安全密钥：

- 按照README文件中的说明对SCST内核模块进行签名：

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

- 找到所需的密钥：

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



安装后、系统输出中还会提供README文件和密钥位置。

ONTAP调解器1.6安装示例(控制台输出)

```
[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
Version                                Repository
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		
libselenium-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 ~]#

验证安装。

安装ONTAP 调解器后、您应验证ONTAP 调解器服务是否正在运行。

步骤

1. 查看ONTAP 调解器服务的状态：

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. 确认ONTAP 调解器服务使用的端口：

`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
```

安装后配置

安装并运行ONTAP 调解器服务后、必须在ONTAP 存储系统中执行其他配置任务才能使用调解器功能：

- 要在 MetroCluster IP 配置中使用 ONTAP 调解器服务，请参见 ["从 MetroCluster IP 配置配置 ONTAP 调解器服务"](#)。
- 要使用 SnapMirror 业务连续性，请参见 ["安装 ONTAP 调解器服务并确认 ONTAP 集群配置"](#)。

配置ONTAP 调解器安全策略

ONTAP 调解器服务器支持多种可配置的安全设置。所有设置的默认值均在`low_space_threshold` MIB：10只读文件中提供：

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

放置在中的所有值 `ontap_mediator.user_config.yaml` 将覆盖默认值、并在所有ONTAP 调解器升级中保持不变。

修改后 `ontap_mediator.user_config.yaml`，重新启动ONTAP 调解器服务：

```
systemctl restart ontap_mediator
```

修改ONTAP调解器属性

可以配置以下属性：



中的其他默认值 `ontap_mediator.config.yaml` 不应修改。

- 用于安装第三方**SSL**证书以替代默认自签名证书的设置

```
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
```

- 提供保护以防止暴力破解密码攻击的设置

要启用此功能、请为设置一个值 `window_seconds` 和 `retry_limit`

示例

- 提供一个5分钟的窗口供您进行猜测、然后将计数重置为零故障：

```
authentication_lock_window_seconds: 300
```

- 如果在窗口时间范围内发生五次故障、请锁定帐户：

```
authentication_retry_limit: 5
```

- 通过设置在拒绝每次尝试之前发生的延迟来减少暴力密码猜测攻击的影响、从而减缓攻击的速度。

```
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
```

- 用于控制**ONTAP** 调解器**API**用户帐户的密码复杂度规则的字段

```
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)
```

- 用于控制上所需可用空间的设置 **/opt/netapp/lib/ontap_mediator** 磁盘。

如果此空间低于设置的阈值、则此服务将对警告事件执行问题描述 操作。

```
low_space_threshold_mib: 10
```

- 用于控制**RESERT_LOG_SPACE**的设置。

默认情况下、ONTAP调解器服务器会为日志创建单独的磁盘空间。 安装程序会创建一个新的固定大小文件、其中总磁盘空间为700 MB、将明确用于调解器日志记录。

要禁用此功能并使用默认磁盘空间、请执行以下步骤：

- a. 将以下文件中的**RESERT_LOG_SPACE**值从"1"更改为"0"：

```
/opt/netapp/lib/ontap_mediator/tools/mediator_env
```

- b. 重新启动调解器：

- i.

```
cat /opt/netapp/lib/ontap_mediator/tools/mediator_env | grep
"RESERVE_LOG_SPACE"
```

```
RESERVE_LOG_SPACE=0
```

ii. `systemctl restart ontap_mediator`

要重新启用此功能、请将值从"0"更改为"1"、然后重新启动调解器。



在磁盘空间之间切换不会清除现有日志。之前的所有日志都会进行备份、然后在切换并重新启动调解器后移至当前磁盘空间。

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