安裝及設定MetroCluster 資訊斷路器

ONTAP MetroCluster

NetApp
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目錄

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新功能

每個版本均隨附 MetroCluster Tiebreaker 軟體的增強功能。以下是 MetroCluster tiebreaker 最新版本的新功能。

增強功能

ONTAP tiebreaker 版本	增強功能
1.6.	• 更容易安裝 • 支援程式庫更新 • 安全性增強功能
1.5	• 支援程式庫更新 • 安全性增強功能
1.4.	• 支援程式庫更新

作業系統支援對照表

Tiebreaker 版本	**CentOS 7-7.9**	**Red Hat 7-7.9**	**Red Hat 8.1 - 8.7**	**Red Hat 8.8 - 9.2**	洛基**Linux 9.0**
1.6.	否	否	是的	是的	是的
1.5	否	否	是的	否	否
1.4.	是的	是的	是的	否	否

Tiebreaker軟體總覽

瞭解NetApp MetroCluster ESIT斷路 器軟體是什麼、以及它如何區分故障類型、MetroCluster 以便您有效監控您的故障組態、是很有幫助的。您可以使用tiebreaker CLI來管理設定、並監控MetroCluster 各種ESITE組態的狀態和運作。

使用**NetApp MetroCluster** 斷點器軟體偵測故障

只有當您想要監控兩個叢集、以及它們之間從第三個站台的連線狀態時、才需要Tiebreaker軟體。斷路器軟體位於第三個站台的 Linux 主機上、可讓叢集中的每個合作夥伴在站台間連結中斷時、區別 ISL 故障與站台故障。

在Linux主機上安裝tiebreaker軟體之後、您可以將叢集設定為MetroCluster 使用支援物件組態來監控災難情況。

tiebreaker 軟體最多可同時監控 15 個 MetroCluster 組態。它支援 MetroCluster IP 、 MetroCluster FC 和 Stretch MetroCluster 組態的組合。

Tiebreaker軟體如何偵測站台故障

NetApp MetroCluster 斷續器軟體可檢查MetroCluster ESIE組態中節點的可到達性和叢集、以判斷是否發生站台故障。在某些情況下、斷路器軟體也會觸發警示。

由Tiebreaker軟體監控的元件

Tiebreaker軟體可透過MetroCluster 多個路徑、建立冗餘連線至節點管理LIF和叢集管理LIF（兩者均裝載於IP網路上）、以監控整個ESIE組態中的每個控制器。

Tiebreaker軟體監控MetroCluster 下列元件的ESITESE組態：

- 透過本機節點介面建立節點
- 透過叢集指定的介面進行叢集
- 正常運作的叢集、評估它是否能連線至災難站台（非易失性互連、儲存設備和叢集間對等）

當斷路器軟體與叢集內的所有節點和叢集本身之間的連線中斷時、叢集會被斷路器軟體宣告為「無法連線」。偵測連線失敗約需三到五秒。如果叢集無法從Tiebreaker軟體連線到、則仍在運作的叢集（仍可連線的叢集）必須指出、在Tiebreaker軟體觸發警示之前、所有與合作夥伴叢集的連結都會中斷。

> 如果存續的叢集無法再透過FC（內華達互連和儲存設備）和叢集間對等、與災難站台上的叢集進行通訊、則所有連結都會中斷。

故障情況下、斷路器軟體會觸發警示

當災難站台上的叢集（所有節點）關閉或無法連線、而存續站台上的叢集指出「AllLinksSevered」狀態時、Tiebreaker軟體會觸發警示。

在下列情況下、Tiebreaker軟體不會觸發警示（或警示遭否決）：

- 在八節點MetroCluster 的不全功能組態中、如果災難站台的一個HA配對中斷
- 在災難站台上所有節點都關閉的叢集中、在正常運作的站台上有一個HA配對、而在正常運作站台上的叢集則會指出「AllLinksSevered'」狀態

  斷路器軟體會觸發警示、但ONTAP 不知該警示。在這種情況下、手動切換也會遭到否決

- 在任何情況下、斷路器軟體可以到達至少一個節點或災難站台的叢集介面、或是在正常運作的站台仍可透過FC（內華達互連與儲存設備）或叢集間對等來到達災難站台的任一節點

相關資訊

"在MetroCluster 作用中模式中使用ESITirepreaker的風險和限制"

Tiebreaker軟體如何偵測站台間連線故障

當站台之間的所有連線中斷時、系統會發出關於這個問題的警示。MetroCluster

網路路徑類型

視組態而定、MetroCluster 在兩個叢集之間有三種類型的網路路徑、採用一套樣的組態：

- * FC網路（以架構附加MetroCluster 的功能性支援組態提供）*

  此類網路由兩個備援FC交換器架構組成。每個交換器架構都有兩個FC交換器、每個交換器架構的一個交換器與一個叢集共用。每個叢集都有兩個FC交換器、每個交換器架構各一個。所有節點都能與位於同一位置的FC交換器建立FC（NV-互連和FCP啟動器）連線。資料會透過ISL從叢集複寫至叢集。

- 叢集間對等網路

  此類網路由兩個叢集之間的備援IP網路路徑所組成。叢集對等網路提供鏡射儲存虛擬機器（SVM）組態所需的連線能力。一個叢集上所有的SVM組態都會由合作夥伴叢集鏡射。

- * IP網路（MetroCluster 以不完整IP組態顯示）*

  此類網路由兩個備援IP交換器網路組成。每個網路都有兩個IP交換器、每個交換器的一個交換器與一個叢集共用。每個叢集都有兩個IP交換器、每個交換器架構各一個。所有節點均可連線至每個共置FC交換器。資料會透過ISL從叢集複寫至叢集。

監控站台間連線

Tiebreaker軟體會定期從節點擷取站台間連線的狀態。如果內華達互連連連中斷、而且叢集間對等連線無法回應ping、則叢集會假設站台已隔離、而且斷路器軟體會觸發「'AllLinksSevered'」警示。如果叢集識別「AllLinksSevered」狀態、而其他叢集無法透過網路連線、則Tiebreaker軟體會觸發警示「disaster」。

不同的災難類型如何影響**Tiebreaker**軟體偵測時間

為了改善災難恢復規劃、MetroCluster Eetire斷路 器軟體需要一些時間來偵測災難。這段時間是「災難偵測時間」。本產品可在災難發生後30秒內偵測站台災難、並觸發災難恢復作業、通知您災難發生的相關資訊。MetroCluster

偵測時間也取決於災難類型、在某些情況下可能超過30秒、大部分稱為「循環災難」。循環災難的主要類型如下：

- 電力中斷
- 恐慌
- 停止或重新開機
- 災難站台FC交換器遺失

電力中斷

當節點停止運作時、Tiebreaker軟體會立即觸發警示。停電時、所有連線和更新（例如叢集間對等、非易失互連和信箱磁碟）都會停止。叢集無法連線、偵測災難與觸發（包括預設的5秒無聲時間）之間所需的時間不應超過30秒。

恐慌

在SFC組態中、當站台之間的NV-互連連連連線中斷、而存續站台顯示「AllLinksSevered」狀態時、斷路器軟體

會觸發警示MetroCluster 。只有在完成coredump程序之後、才會發生這種情況。在此案例中、從叢集無法到達到偵測災難所需的時間可能較長、或大約等於核心傾印程序所需的時間。在許多情況下、偵測時間超過30秒。

如果節點停止運作、但未產生用於coredump程序的檔案、則偵測時間不應超過30秒。在靜態IP組態中、內華達州停止通訊、而存續的站台也不知道開機傾印程序MetroCluster 。

停止或重新開機

僅當節點當機、且存續站台指出「AllLinksSevered」狀態時、Tiebreaker軟體才會觸發警示。叢集無法連線至偵測災難之間所需的時間可能超過30秒。在此案例中、偵測災難所需的時間取決於災難站台節點關閉所需的時間。

在災難現場遺失**FC**交換器（網路附加**MetroCluster** 的功能不全組態）

當節點停止運作時、Tiebreaker軟體會觸發警示。如果FC交換器遺失、節點會嘗試將磁碟路徑恢復約30秒。在此期間、節點會在對等網路上啟動並回應。當兩個FC交換器都當機且無法恢復磁碟路徑時、節點會產生MultiDisk故障錯誤並停止。FC交換器故障與節點產生MultiDisk故障 錯誤的次數之間所需的時間約為30秒。這額外30秒必須新增至災難偵測時間。

關於**tiebreaker CLI**和手冊頁

Tiebreaker CLI提供的命令可讓您遠端設定Tiebreaker軟體、並監控MetroCluster 整個系統的支援。

CLI命令提示字元表示為NetApp MetroCluster ESITirepreaker：>。

在命令提示字元中輸入適用的命令名稱、即可在CLI中使用手冊頁。

安裝Tiebreaker軟體

tiebreaker 安裝工作流程

Tiebreaker軟體提供叢集式儲存環境的監控功能。當節點連線問題和站台災難發生時、也會傳送SNMP通知。

關於此工作流程

您可以使用此工作流程來安裝或升級 tiebreaker 軟體。

1. **"準備安裝 tiebreaker 軟體"**

安裝及設定斷路器軟體之前、請先確認您的系統符合特定需求。

2. **"確保安裝安全"**

對於執行MetroCluster 還原器1.5及更新版本的組態、您可以保護並強化主機作業系統和資料庫。

3. **"安裝 tiebreaker 軟體套件"**

執行新安裝或升級的 tiebreaker 軟體。您遵循的安裝程序取決於您要安裝的 tiebreaker 版本。

準備安裝 **tiebreaker** 軟體

在安裝和設定斷路器軟體之前、您應該先確認系統符合特定需求。

軟體需求

您必須符合下列軟體需求、視所安裝的斷路器版本而定。

ONTAP tiebreaker 版本	支援 ONTAP 的支援版本	支援的Linux版本	Java/MariaDB 需求
1.6.	更新版本ONTAP	請參閱 "作業系統支援對照表" 以取得詳細資料。	無。相依性與安裝相關。
1.5	ONTAP 9.8 至 ONTAP 9.14.1	• Red Hat Enterprise Linux 8.1至8.7	搭配 Red Hat Enterprise Linux 8.1 至 8.7 ： • MariaDB 10.x（使用使用「yum install MariaDB-server.x86_64」安裝的預設版本） • OpenJDK 17 、 18 或 19
1.4.	ONTAP 9.1 至 ONTAP 9.9.1	• Red Hat Enterprise Linux 8.1至8.7 • Red Hat Enterprise Linux 7 至 7.9 • CentOS 7 至 7.9 64 位元	使用 CentOS ： • MariaDB 5.5.52 x / MySQL Server 5.6x • 4 GB RAM • 開啟JRE 8 搭配 Red Hat Enterprise Linux 8.1 至 8.7 ： • MariaDB 10.x（使用使用「yum install MariaDB-server.x86_64」安裝的預設版本） • JRE 8.

其他需求

您必須瞭解下列額外需求：

- Tiebreaker軟體安裝在第三個站台、可讓軟體區分交換器間連結（ISL）故障（站台間連結中斷時）與站台故障。您的主機系統必須符合特定需求、才能安裝或升級 tiebreaker 軟體以監控 MetroCluster 組態。
- 您必須擁有「root」權限、才能安裝MetroCluster ESITiebreaker軟體和相依套件。
- 每個版本僅能使用一個MetroCluster ESIT斷路 器監控器來避免MetroCluster 與多個斷路器監控器發生衝突。

- 為 tiebreaker 軟體選取網路時間傳輸協定（ NTP ）來源時、您必須使用本機 NTP 來源。tiebreaker 軟體不應使用與 tiebreaker 軟體所監控的 MetroCluster 站台相同的來源。
- 磁碟容量：8 GB
- 防火牆：
  - 直接存取以設定AutoSupport 資訊訊息
  - SSH（連接埠22/TCP）、HTTPS（連接埠443/TCP）及ping（ICMP）

保護 tiebreaker 主機和資料庫的安裝安全

對於執行MetroCluster 還原器1.5及更新版本的組態、您可以保護並強化主機作業系統和資料庫。

保護主機安全

下列準則說明如何保護安裝了Tiebreaker軟體的主機。

使用者管理建議

- 限制「root」使用者的存取權。
  - 您可以使用能夠提升為root存取權限的使用者來安裝及管理tiebreaker軟體。
  - 您可以使用無法提升為root存取權限的使用者來管理tiebreaker軟體。
  - 安裝期間、您必須建立名為「 mcctbgrp 」的群組。安裝期間建立的主機根使用者和使用者都必須是成員。只有此群組的成員才能完整管理Tiebreaker軟體。

    > 非此群組成員的使用者無法存取Tiebreaker軟體或CLI。您可以在主機上建立其他使用者、並讓他們成為群組的成員。這些額外成員無法完全管理 tiebreaker 軟體。他們擁有 ReadOnly 存取權、無法新增、變更或刪除監視器。

  - 請勿以root使用者身分執行tiebreaker。使用專屬的無權限服務帳戶來執行Tiebreaker。
- 變更「/etc/SNMP /snmpd.conf」檔案中的預設社群字串。
- 允許最低寫入權限。無權限的tiebreaker服務帳戶不應擁有覆寫其執行檔二進位檔或任何組態檔的存取權。只有本地斷路器儲存設備（例如、用於整合式後端儲存設備）或稽核記錄的目錄和檔案、才應由斷路器使用者寫入。
- 不允許匿名使用者。
  - 將「允許TcpForwarding」設為「否」、或使用MATCH指令來限制匿名使用者。

相關資訊

- "Red Hat Enterprise Linux 8 產品文件"
- "Red Hat Enterprise Linux 9 產品文件"

基礎主機安全建議

- 使用磁碟加密
  - 您可以啟用磁碟加密。這可以是FullDiskEncryption（硬體）、或由主機（軟體）或SVM主機提供的加

密。

- 停用允許傳入連線的未使用服務。您可以停用任何未使用的服務。Tiebreaker軟體不需要傳入連線的服務、因為來自Tiebreaker安裝的所有連線都是傳出的。預設啟用且可停用的服務包括：
  - HTTP / HTTPS伺服器
  - FTP伺服器
  - Telnet、RSH, rlogin
  - NFS、CIFS及其他傳輸協定存取
  - RDP（RemoteDesktopProtocol）、X11伺服器、vnc或其他遠端「桌面」服務供應商。

> 您必須保留序列主控台存取權（若有支援）或至少啟用一個傳輸協定、才能遠端管理主機。如果停用所有傳輸協定、則需要實體存取主機以進行管理。

- 使用FIPS保護主機安全
  - 您可以在FIPS相容模式下安裝主機作業系統、然後安裝斷路器。

> OpenJDK 19會在開機時檢查主機是否以FIPS模式安裝。不需要手動變更。

  - 如果您保護主機安全、則必須確保主機能夠在不需要使用者介入的情況下開機。如果需要使用者介入、如果主機意外重新開機、則斷路器功能可能無法使用。如果發生這種情況、只有在手動介入和主機完全開機之後、才能使用斷路器功能。
- 停用Shell命令歷程記錄。
- 經常升級。Tiebreaker是積極開發的產品、更新頻繁對於將安全性修正程式與任何變更納入預設設定（例如金鑰長度或密碼套件）而言、非常重要。
- 訂閱HashiCorp公告郵寄清單、即可接收新版本的公告、並造訪Tiebreaker Changelog、以瞭解最新版本的最新更新詳細資料。
- 使用正確的檔案權限。在啟動Tiebreaker軟體之前、請務必確保適當的權限已套用至檔案、尤其是含有敏感資訊的檔案。
- 多因素驗證（MFA）可要求系統管理員使用多個使用者名稱和密碼來識別自己、藉此強化組織的安全性。雖然使用者名稱和密碼很重要、但容易遭受暴力攻擊、而且可能遭第三方竊取。
  - Red Hat Enterprise Linux 8 提供 MFA 、要求使用者提供多項資訊、以便成功驗證帳戶或 Linux 主機。其他資訊可能是一次性密碼、透過SMS傳送到您的手機、或是從Google驗證程式、TWilio驗證或FreefP等應用程式傳送認證。

相關資訊

- "Red Hat Enterprise Linux 8 產品文件"
- "Red Hat Enterprise Linux 9 產品文件"

保護資料庫安裝

下列準則說明如何保護及強化MariaDB 10.x資料庫安裝。

- 限制「root」使用者的存取權。
  - Tiebreaker使用專屬帳戶。用於儲存（組態）資料的帳戶和表格是在安裝tiebreaker期間建立的。唯一需

要提高資料庫存取權限的時間、是在安裝期間。

- 安裝期間需要下列存取權限：
  - 建立資料庫和資料表的能力
  - 能夠建立全域選項
  - 能夠建立資料庫使用者並設定密碼
  - 可將資料庫使用者與資料庫和資料表建立關聯、並指派存取權限

> 您在Tiebreaker安裝期間指定的使用者帳戶必須擁有所有這些權限。不支援將多個使用者帳戶用於不同的工作。

- 使用資料庫加密
  - 支援靜態資料加密。 "深入瞭解閒置資料加密"
  - 傳輸中的資料未加密。飛行中的資料使用本機的「SOCKS」檔案連線。
  - FIPS符合MariaDB規範：您不需要在資料庫上啟用FIPS相容性。以FIPS相容模式安裝主機已足夠。

    "瞭解 MySQL Enterprise Transparent Data Encryption （TDE）"

> 在安裝斷路器軟體之前、必須先啟用加密設定。

相關資訊

- 資料庫使用者管理

  "存取控制與帳戶管理"

- 保護資料庫安全

  "保護MySQL免受攻擊者攻擊"

  "保護MariaDB安全"

- 確保Vault安裝安全

  "正式作業強化"

安裝 tiebreaker 軟體套件

選擇您的安裝程序

您遵循的 tiebreaker 安裝程序取決於您要安裝的 tiebreaker 版本。

Tiebreaker 版本	前往…
斷路器 1.6.	"安裝斷路器 1.6"

斷路器 1.5	"安裝斷路器 1.5"
斷路器 1.4	"安裝斷路器 1.4"

安裝斷路器 **1.6**

在主機 Linux 作業系統上執行新的安裝或升級至 tiebreaker 1.6 、以監控 MetroCluster 組態。

關於這項工作

- 您的儲存系統必須執行 ONTAP 9.12.1 或更新版本。
- 您可以將 MetroCluster tiebreaker 安裝為非 root 使用者、並擁有足夠的管理權限來執行 tiebreaker 安裝、建立表格和使用者、以及設定使用者密碼。

步驟

1. 下載 MetroCluster Tiebreaker 1.6 軟體。

   "MetroCluster Tiebreaker （下載） - NetApp 支援網站"

2. 以root使用者身分登入主機。
3. 如果您正在執行升級、請確認您正在執行的 tiebreaker 版本：

   以下範例顯示 tiebreaker 1.5 。

   ```
   [root@mcctb ~] # netapp-metrocluster-tiebreaker-software-cli
   NetApp MetroCluster Tiebreaker :> version show
   NetApp MetroCluster Tiebreaker 1.5: Sun Mar 13 09:59:02 IST 2022
   NetApp MetroCluster Tiebreaker :> exit
   ```

4. 安裝或升級 tiebreaker 軟體。

安裝斷路器 **1.6**

請依照下列步驟安裝斷路器 1.6 。

步驟

a. 在執行下列命令 `[root@mcctb ~] #` 開始安裝的提示：

```
sh MetroClusterTiebreakerInstall-1.6
```

系統會顯示下列輸出、以利成功安裝：

```
Extracting the MetroCluster Tiebreaker installation/upgrade
archive
Install digest hash is Ok
Performing the MetroCluster Tiebreaker code signature check
Install code signature is Ok
Enter unix user account to use for the installation:
mcctbadminuser
Unix user account "mcctbadminuser" doesn't exist. Do you wish to
create "mcctbadminuser" user account? [Y/N]: y
useradd: warning: the home directory already exists.
Not copying any file from skel directory into it.
Creating mailbox file: File exists
Unix account "mcctbadminuser" created.
Changing password for user mcctbadminuser.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.
MetroCluster Tiebreaker requires unix user account
"mcctbadminuser" to be added to the group "mcctbgrp" for admin
access.
Do you wish to add ? [Y/N]: y
Unix user account "mcctbadminuser" added to "mcctbgrp".
Do you wish to generate your own public-private key pair for
encrypting audit log? [Y/N]: y
Generating public-private key pair...
Configuring Vault...
Starting vault server...
==> Vault server configuration:

             Api Address: <api_address>
                     Cgo: disabled
         Cluster Address: <cluster_address>
   Environment Variables: BASH_FUNC_which%%,
DBUS_SESSION_BUS_ADDRESS, GODEBUG, HISTCONTROL, HISTSIZE, HOME,
```

```
HOSTNAME, HOST_ACCOUNT, LANG, LESSOPEN, LOGNAME, LS_COLORS, MAIL,
PATH, PWD, SHELL, SHLVL, SSH_CLIENT, SSH_CONNECTION, SSH_TTY,
STAF_TEMP_DIR, TERM, USER, VAULT_ADDR, VAULT_TOKEN,
XDG_RUNTIME_DIR, XDG_SESSION_ID, _, vault_Addr, which_declare
              Go Version: go1.20.5
              Listener 1: tcp (addr: "0.0.0.0:8200", cluster
address: "0.0.0.0:8201", max_request_duration: "1m30s",
max_request_size: "33554432", tls: "enabled")
               Log Level:
                   Mlock: supported: true, enabled: true
           Recovery Mode: false
                 Storage: file
                 Version: Vault v1.14.0, built 2023-06-
19T11:40:23Z
             Version Sha:
13a649f860186dffe3f3a4459814d87191efc321

==> Vault server started! Log data will stream in below:

2023-11-23T15:14:28.532+0530 [INFO]  proxy environment:
http_proxy="" https_proxy="" no_proxy=""
2023-11-23T15:14:28.577+0530 [INFO]  core: Initializing version
history cache for core
2023-11-23T15:14:38.552+0530 [INFO]  core: security barrier not
initialized
2023-11-23T15:14:38.552+0530 [INFO]  core: seal configuration
missing, not initialized
2023-11-23T15:14:38.554+0530 [INFO]  core: security barrier not
initialized
2023-11-23T15:14:38.555+0530 [INFO]  core: security barrier
initialized: stored=1 shares=5 threshold=3
2023-11-23T15:14:38.556+0530 [INFO]  core: post-unseal setup
starting
2023-11-23T15:14:38.577+0530 [INFO]  core: loaded wrapping token
key
2023-11-23T15:14:38.577+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-11-23T15:14:38.577+0530 [INFO]  core: no mounts; adding
default mount table
2023-11-23T15:14:38.578+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-11-23T15:14:38.578+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-11-23T15:14:38.578+0530 [INFO]  core: successfully mounted:
```

```
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-11-23T15:14:38.581+0530 [INFO]  core: successfully mounted:
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-11-23T15:14:38.581+0530 [INFO]  rollback: starting rollback
manager
2023-11-23T15:14:38.581+0530 [INFO]  core: restoring leases
2023-11-23T15:14:38.582+0530 [INFO]  expiration: lease restore
complete
2023-11-23T15:14:38.582+0530 [INFO]  identity: entities restored
2023-11-23T15:14:38.582+0530 [INFO]  identity: groups restored
2023-11-23T15:14:38.583+0530 [INFO]  core: Recorded vault
version: vault version=1.14.0 upgrade time="2023-11-23
09:44:38.582881162 +0000 UTC" build date=2023-06-19T11:40:23Z
2023-11-23T15:14:38.583+0530 [INFO]  core: usage gauge collection
is disabled
2023-11-23T15:14:38.998+0530 [INFO]  core: post-unseal setup
complete
2023-11-23T15:14:38.999+0530 [INFO]  core: root token generated
2023-11-23T15:14:38.999+0530 [INFO]  core: pre-seal teardown
starting
2023-11-23T15:14:38.999+0530 [INFO]  rollback: stopping rollback
manager
2023-11-23T15:14:38.999+0530 [INFO]  core: pre-seal teardown
complete
2023-11-23T15:14:39.311+0530 [INFO]  core.cluster-listener.tcp:
starting listener: listener_address=0.0.0.0:8201
2023-11-23T15:14:39.311+0530 [INFO]  core.cluster-listener:
serving cluster requests: cluster_listen_address=[::]:8201
2023-11-23T15:14:39.312+0530 [INFO]  core: post-unseal setup
starting
2023-11-23T15:14:39.312+0530 [INFO]  core: loaded wrapping token
key
2023-11-23T15:14:39.312+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-11-23T15:14:39.313+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-11-23T15:14:39.313+0530 [INFO]  core: successfully mounted:
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-11-23T15:14:39.313+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-11-23T15:14:39.314+0530 [INFO]  core: successfully mounted:
```

```
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-11-23T15:14:39.314+0530 [INFO]  rollback: starting rollback
manager
2023-11-23T15:14:39.314+0530 [INFO]  core: restoring leases
2023-11-23T15:14:39.314+0530 [INFO]  identity: entities restored
2023-11-23T15:14:39.314+0530 [INFO]  expiration: lease restore
complete
2023-11-23T15:14:39.314+0530 [INFO]  identity: groups restored
2023-11-23T15:14:39.315+0530 [INFO]  core: usage gauge collection
is disabled
2023-11-23T15:14:39.316+0530 [INFO]  core: post-unseal setup
complete
2023-11-23T15:14:39.316+0530 [INFO]  core: vault is unsealed
Success! Uploaded policy: mcctb-policy
2023-11-23T15:14:39.795+0530 [INFO]  core: enabled credential
backend: path=approle/ type=approle version=""
Success! Enabled approle auth method at: approle/
2023-11-23T15:14:39.885+0530 [INFO]  core: successful mount:
namespace="" path=mcctb/ type=kv version=""
Success! Enabled the kv secrets engine at: mcctb/
Success! Data written to: auth/approle/role/mcctb-app
Installing the NetApp-MetroCluster-Tiebreaker-Software-1.6-
1.x86_64.rpm
Preparing...                          #
################################# # [100%]

Updating / installing...

1:NetApp-MetroCluster-Tiebreaker-So#
################################# # [100%]
Performing file integrity check
etc/cron.weekly/metrocluster-tiebreaker-support is Ok
etc/cron.weekly/metrocluster-tiebreaker-support-cov is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software-cov is Ok
etc/logrotate.d/mcctb is Ok
opt/netapp/mcctb/lib/common/activation-1.1.1.jar is Ok
opt/netapp/mcctb/lib/common/aopalliance.jar is Ok
opt/netapp/mcctb/lib/common/args4j.jar is Ok
opt/netapp/mcctb/lib/common/aspectjrt.jar is Ok
opt/netapp/mcctb/lib/common/aspectjweaver.jar is Ok
opt/netapp/mcctb/lib/common/asup.jar is Ok
opt/netapp/mcctb/lib/common/bcpkix-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk18on.jar is Ok
```

```
opt/netapp/mcctb/lib/common/bctls-fips-1.0.13.jar is Ok
opt/netapp/mcctb/lib/common/bctls-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/bcutil-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/cglib.jar is Ok
opt/netapp/mcctb/lib/common/commons-codec.jar is Ok
opt/netapp/mcctb/lib/common/commons-collections4.jar is Ok
opt/netapp/mcctb/lib/common/commons-compress.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.src.jar is Ok
opt/netapp/mcctb/lib/common/commons-dbcp2.jar is Ok
opt/netapp/mcctb/lib/common/commons-io.jar is Ok
opt/netapp/mcctb/lib/common/commons-lang3.jar is Ok
opt/netapp/mcctb/lib/common/commons-logging.jar is Ok
opt/netapp/mcctb/lib/common/commons-pool2.jar is Ok
opt/netapp/mcctb/lib/common/guava.jar is Ok
opt/netapp/mcctb/lib/common/httpclient.jar is Ok
opt/netapp/mcctb/lib/common/httpcore.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.activation.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.xml.bind-api.jar is Ok
opt/netapp/mcctb/lib/common/java-xmlbuilder.jar is Ok
opt/netapp/mcctb/lib/common/javax.inject.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-api-2.3.1.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-core.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-impl.jar is Ok
opt/netapp/mcctb/lib/common/jline.jar is Ok
opt/netapp/mcctb/lib/common/jna.jar is Ok
opt/netapp/mcctb/lib/common/joda-time.jar is Ok
opt/netapp/mcctb/lib/common/jsch.jar is Ok
opt/netapp/mcctb/lib/common/json.jar is Ok
opt/netapp/mcctb/lib/common/jsvc.zip is Ok
opt/netapp/mcctb/lib/common/junixsocket-common.jar is Ok
opt/netapp/mcctb/lib/common/junixsocket-native-common.jar is Ok
opt/netapp/mcctb/lib/common/logback-classic.jar is Ok
opt/netapp/mcctb/lib/common/logback-core.jar is Ok
opt/netapp/mcctb/lib/common/mail-1.6.2.jar is Ok
opt/netapp/mcctb/lib/common/mariadb-java-client.jar is Ok
opt/netapp/mcctb/lib/common/mcctb-mib.jar is Ok
opt/netapp/mcctb/lib/common/mcctb.jar is Ok
opt/netapp/mcctb/lib/common/mockito-core.jar is Ok
opt/netapp/mcctb/lib/common/slf4j-api.jar is Ok
opt/netapp/mcctb/lib/common/snmp4j.jar is Ok
opt/netapp/mcctb/lib/common/spring-aop.jar is Ok
opt/netapp/mcctb/lib/common/spring-beans.jar is Ok
opt/netapp/mcctb/lib/common/spring-context-support.jar is Ok
opt/netapp/mcctb/lib/common/spring-context.jar is Ok
opt/netapp/mcctb/lib/common/spring-core.jar is Ok
```

```
opt/netapp/mcctb/lib/common/spring-expression.jar is Ok
opt/netapp/mcctb/lib/common/spring-web.jar is Ok
opt/netapp/mcctb/lib/common/vault-java-driver.jar is Ok
opt/netapp/mcctb/lib/common/xz.jar is Ok
opt/netapp/mcctb/lib/org.jacoco.agent-0.8.8-runtime.jar is Ok
opt/netapp/mcctb/bin/mcctb-asup-invoke is Ok
opt/netapp/mcctb/bin/mcctb_postrotate is Ok
opt/netapp/mcctb/bin/netapp-metrocluster-tiebreaker-software-cli
is Ok
/

Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software
Created symlink /etc/systemd/system/multi-
user.target.wants/netapp-metrocluster-tiebreaker-software.service
→ /etc/systemd/system/netapp-metrocluster-tiebreaker-
software.service.

Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Successfully installed NetApp MetroCluster Tiebreaker software
version 1.6.
```

從 **tiebreaker 1.5** 升級至 **1.6**

請依照下列步驟、將 tiebreaker 1.5 軟體版本升級至 tiebreaker 1.6 。

步驟

a. 在執行下列命令 `[root@mcctb ~] #` 提示升級軟體：

```
sh MetroClusterTiebreakerInstall-1.6
```

系統會顯示下列輸出以成功升級：

```
Extracting the MetroCluster Tiebreaker installation/upgrade
archive
Install digest hash is Ok
Performing the MetroCluster Tiebreaker code signature check
Install code signature is Ok

Enter database user name : root
```

```
Please enter database password for root
Enter password:

Password updated successfully in the database.

Do you wish to generate your own public-private key pair for
encrypting audit log? [Y/N]: y
Generating public-private key pair...
Configuring Vault...
==> Vault shutdown triggered
2023-07-21T00:30:22.335+0530 [INFO]  core: marked as sealed
2023-07-21T00:30:22.335+0530 [INFO]  core: pre-seal teardown
starting
2023-07-21T00:30:22.335+0530 [INFO]  rollback: stopping rollback
manager
2023-07-21T00:30:22.335+0530 [INFO]  core: pre-seal teardown
complete
2023-07-21T00:30:22.335+0530 [INFO]  core: stopping cluster
listeners
2023-07-21T00:30:22.335+0530 [INFO]  core.cluster-listener:
forwarding rpc listeners stopped
2023-07-21T00:30:22.375+0530 [INFO]  core.cluster-listener: rpc
listeners successfully shut down
2023-07-21T00:30:22.375+0530 [INFO]  core: cluster listeners
successfully shut down
2023-07-21T00:30:22.376+0530 [INFO]  core: vault is sealed
Starting vault server...
==> Vault server configuration:

             Api Address: <api_address>
                     Cgo: disabled
         Cluster Address: <cluster_address>
   Environment Variables: BASH_FUNC_which%%,
DBUS_SESSION_BUS_ADDRESS, GODEBUG, HISTCONTROL, HISTSIZE, HOME,
HOSTNAME, HOST_ACCOUNT, LANG, LESSOPEN, LOGNAME, LS_COLORS, MAIL,
PATH, PWD, SHELL, SHLVL, SSH_CLIENT, SSH_CONNECTION, SSH_TTY,
STAF_TEMP_DIR, TERM, USER, VAULT_ADDR, VAULT_TOKEN,
XDG_RUNTIME_DIR, XDG_SESSION_ID, _, vault_Addr, which_declare
              Go Version: go1.20.5
              Listener 1: tcp (addr: "0.0.0.0:8200", cluster
address: "0.0.0.0:8201", max_request_duration: "1m30s",
max_request_size: "33554432", tls: "enabled")
               Log Level:
                   Mlock: supported: true, enabled: true
           Recovery Mode: false
```

```
                  Storage: file
                  Version: Vault v1.14.0, built 2023-06-
19T11:40:23Z
             Version Sha:
13a649f860186dffe3f3a4459814d87191efc321

==> Vault server started! Log data will stream in below:

2023-07-21T00:30:33.065+0530 [INFO]  proxy environment:
http_proxy="" https_proxy="" no_proxy=""
2023-07-21T00:30:33.098+0530 [INFO]  core: Initializing version
history cache for core
2023-07-21T00:30:43.092+0530 [INFO]  core: security barrier not
initialized
2023-07-21T00:30:43.092+0530 [INFO]  core: seal configuration
missing, not initialized
2023-07-21T00:30:43.094+0530 [INFO]  core: security barrier not
initialized
2023-07-21T00:30:43.096+0530 [INFO]  core: security barrier
initialized: stored=1 shares=5 threshold=3
2023-07-21T00:30:43.098+0530 [INFO]  core: post-unseal setup
starting
2023-07-21T00:30:43.124+0530 [INFO]  core: loaded wrapping token
key
2023-07-21T00:30:43.124+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-07-21T00:30:43.124+0530 [INFO]  core: no mounts; adding
default mount table
2023-07-21T00:30:43.125+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-07-21T00:30:43.126+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-07-21T00:30:43.126+0530 [INFO]  core: successfully mounted:
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-07-21T00:30:43.129+0530 [INFO]  core: successfully mounted:
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-07-21T00:30:43.130+0530 [INFO]  rollback: starting rollback
manager
2023-07-21T00:30:43.130+0530 [INFO]  core: restoring leases
2023-07-21T00:30:43.130+0530 [INFO]  identity: entities restored
2023-07-21T00:30:43.130+0530 [INFO]  identity: groups restored
2023-07-21T00:30:43.131+0530 [INFO]  core: usage gauge collection
```

```
is disabled
2023-07-21T00:30:43.131+0530 [INFO]  expiration: lease restore
complete
2023-07-21T00:30:43.131+0530 [INFO]  core: Recorded vault
version: vault version=1.14.0 upgrade time="2023-07-20
19:00:43.131158543 +0000 UTC" build date=2023-06-19T11:40:23Z
2023-07-21T00:30:43.371+0530 [INFO]  core: post-unseal setup
complete
2023-07-21T00:30:43.371+0530 [INFO]  core: root token generated
2023-07-21T00:30:43.371+0530 [INFO]  core: pre-seal teardown
starting
2023-07-21T00:30:43.371+0530 [INFO]  rollback: stopping rollback
manager
2023-07-21T00:30:43.372+0530 [INFO]  core: pre-seal teardown
complete
2023-07-21T00:30:43.694+0530 [INFO]  core.cluster-listener.tcp:
starting listener: listener_address=0.0.0.0:8201
2023-07-21T00:30:43.695+0530 [INFO]  core.cluster-listener:
serving cluster requests: cluster_listen_address=[::]:8201
2023-07-21T00:30:43.695+0530 [INFO]  core: post-unseal setup
starting
2023-07-21T00:30:43.696+0530 [INFO]  core: loaded wrapping token
key
2023-07-21T00:30:43.696+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-07-21T00:30:43.697+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-07-21T00:30:43.698+0530 [INFO]  core: successfully mounted:
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-07-21T00:30:43.698+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-07-21T00:30:43.701+0530 [INFO]  core: successfully mounted:
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-07-21T00:30:43.701+0530 [INFO]  rollback: starting rollback
manager
2023-07-21T00:30:43.702+0530 [INFO]  core: restoring leases
2023-07-21T00:30:43.702+0530 [INFO]  identity: entities restored
2023-07-21T00:30:43.702+0530 [INFO]  expiration: lease restore
complete
2023-07-21T00:30:43.702+0530 [INFO]  identity: groups restored
2023-07-21T00:30:43.702+0530 [INFO]  core: usage gauge collection
is disabled
```

```
2023-07-21T00:30:43.703+0530 [INFO]  core: post-unseal setup
complete
2023-07-21T00:30:43.703+0530 [INFO]  core: vault is unsealed
Success! Uploaded policy: mcctb-policy
2023-07-21T00:30:44.226+0530 [INFO]  core: enabled credential
backend: path=approle/ type=approle version=""
Success! Enabled approle auth method at: approle/
2023-07-21T00:30:44.315+0530 [INFO]  core: successful mount:
namespace="" path=mcctb/ type=kv version=""
Success! Enabled the kv secrets engine at: mcctb/
Success! Data written to: auth/approle/role/mcctb-app
Upgrading to NetApp-MetroCluster-Tiebreaker-Software-1.6-
1.x86_64.rpm
Preparing...
################################# [100%]
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################# [ 50%]
Performing file integrity check
etc/cron.weekly/metrocluster-tiebreaker-support is Ok
etc/cron.weekly/metrocluster-tiebreaker-support-cov is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software-cov is Ok
etc/logrotate.d/mcctb is Ok
opt/netapp/mcctb/lib/common/activation-1.1.1.jar is Ok
opt/netapp/mcctb/lib/common/aopalliance.jar is Ok
opt/netapp/mcctb/lib/common/args4j.jar is Ok
opt/netapp/mcctb/lib/common/aspectjrt.jar is Ok
opt/netapp/mcctb/lib/common/aspectjweaver.jar is Ok
opt/netapp/mcctb/lib/common/asup.jar is Ok
opt/netapp/mcctb/lib/common/bcpkix-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/bctls-fips-1.0.13.jar is Ok
opt/netapp/mcctb/lib/common/bctls-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/bcutil-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/cglib.jar is Ok
opt/netapp/mcctb/lib/common/commons-codec.jar is Ok
opt/netapp/mcctb/lib/common/commons-collections4.jar is Ok
opt/netapp/mcctb/lib/common/commons-compress.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.src.jar is Ok
opt/netapp/mcctb/lib/common/commons-dbcp2.jar is Ok
opt/netapp/mcctb/lib/common/commons-io.jar is Ok
opt/netapp/mcctb/lib/common/commons-lang3.jar is Ok
opt/netapp/mcctb/lib/common/commons-logging.jar is Ok
```

```
opt/netapp/mcctb/lib/common/commons-pool2.jar is Ok
opt/netapp/mcctb/lib/common/guava.jar is Ok
opt/netapp/mcctb/lib/common/httpclient.jar is Ok
opt/netapp/mcctb/lib/common/httpcore.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.activation.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.xml.bind-api.jar is Ok
opt/netapp/mcctb/lib/common/java-xmlbuilder.jar is Ok
opt/netapp/mcctb/lib/common/javax.inject.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-api-2.3.1.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-core.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-impl.jar is Ok
opt/netapp/mcctb/lib/common/jline.jar is Ok
opt/netapp/mcctb/lib/common/jna.jar is Ok
opt/netapp/mcctb/lib/common/joda-time.jar is Ok
opt/netapp/mcctb/lib/common/jsch.jar is Ok
opt/netapp/mcctb/lib/common/json.jar is Ok
opt/netapp/mcctb/lib/common/jsvc.zip is Ok
opt/netapp/mcctb/lib/common/junixsocket-common.jar is Ok
opt/netapp/mcctb/lib/common/junixsocket-native-common.jar is Ok
opt/netapp/mcctb/lib/common/logback-classic.jar is Ok
opt/netapp/mcctb/lib/common/logback-core.jar is Ok
opt/netapp/mcctb/lib/common/mail-1.6.2.jar is Ok
opt/netapp/mcctb/lib/common/mariadb-java-client.jar is Ok
opt/netapp/mcctb/lib/common/mcctb-mib.jar is Ok
opt/netapp/mcctb/lib/common/mcctb.jar is Ok
opt/netapp/mcctb/lib/common/mockito-core.jar is Ok
opt/netapp/mcctb/lib/common/slf4j-api.jar is Ok
opt/netapp/mcctb/lib/common/snmp4j.jar is Ok
opt/netapp/mcctb/lib/common/spring-aop.jar is Ok
opt/netapp/mcctb/lib/common/spring-beans.jar is Ok
opt/netapp/mcctb/lib/common/spring-context-support.jar is Ok
opt/netapp/mcctb/lib/common/spring-context.jar is Ok
opt/netapp/mcctb/lib/common/spring-core.jar is Ok
opt/netapp/mcctb/lib/common/spring-expression.jar is Ok
opt/netapp/mcctb/lib/common/spring-web.jar is Ok
opt/netapp/mcctb/lib/common/vault-java-driver.jar is Ok
opt/netapp/mcctb/lib/common/xz.jar is Ok
opt/netapp/mcctb/bin/mcctb_postrotate is Ok
opt/netapp/mcctb/bin/netapp-metrocluster-tiebreaker-software-cli
is Ok
/

Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
```

```
metrocluster-tiebreaker-software

Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Successfully upgraded NetApp MetroCluster Tiebreaker software to
version 1.6.
Cleaning up / removing...
   2:NetApp-MetroCluster-Tiebreaker-
So################################# [100%]
```

從 Tiebreaker 1.4 升級至 1.6

請依照下列步驟、將 Tiebreaker 1.4 軟體版本升級至 Tiebreaker 1.6 。

步驟

a. 在執行下列命令 `[root@mcctb ~] #` 提示升級軟體：

```
sh MetroClusterTiebreakerInstall-1.6
```

系統會顯示下列輸出以成功升級：

```
Extracting the MetroCluster Tiebreaker installation/upgrade
archive
Install digest hash is Ok
Performing the MetroCluster Tiebreaker code signature check
Install code signature is Ok
Enter unix user account to use for the installation:
mcctbuseradmin1
Unix user account "mcctbuseradmin1" doesn't exist. Do you wish to
create "mcctbuseradmin1" user account? [Y/N]: y
Unix account "mcctbuseradmin1" created.
Changing password for user mcctbuseradmin1.
New password:
Retype new password:
passwd: all authentication tokens updated successfully.

Enter database user name : root

Please enter database password for root
Enter password:

Password updated successfully in the database.

MetroCluster Tiebreaker requires unix user account
```

```
"mcctbuseradmin1" to be added to the group "mcctbgrp" for admin
access.
Do you wish to add ? [Y/N]: y
Unix user account "mcctbuseradmin1" added to "mcctbgrp".
Do you wish to generate your own public-private key pair for
encrypting audit log? [Y/N]: y
Generating public-private key pair...
Configuring Vault...
Starting vault server...
==> Vault server configuration:

             Api Address: <api_addess>
                     Cgo: disabled
         Cluster Address: <cluster_address>
   Environment Variables: BASH_FUNC_which%%,
DBUS_SESSION_BUS_ADDRESS, GODEBUG, HISTCONTROL, HISTSIZE, HOME,
HOSTNAME, HOST_ACCOUNT, LANG, LESSOPEN, LOGNAME, LS_COLORS, MAIL,
PATH, PWD, SHELL, SHLVL, SSH_CLIENT, SSH_CONNECTION, SSH_TTY,
STAF_TEMP_DIR, TERM, USER, VAULT_ADDR, VAULT_TOKEN,
XDG_RUNTIME_DIR, XDG_SESSION_ID, _, vault_Addr, which_declare
              Go Version: go1.20.5
              Listener 1: tcp (addr: "0.0.0.0:8200", cluster
address: "0.0.0.0:8201", max_request_duration: "1m30s",
max_request_size: "33554432", tls: "enabled")
               Log Level:
                   Mlock: supported: true, enabled: true
           Recovery Mode: false
                 Storage: file
                 Version: Vault v1.14.0, built 2023-06-
19T11:40:23Z
             Version Sha:
13a649f860186dffe3f3a4459814d87191efc321

==> Vault server started! Log data will stream in below:

2023-11-23T15:58:10.400+0530 [INFO]  proxy environment:
http_proxy="" https_proxy="" no_proxy=""
2023-11-23T15:58:10.432+0530 [INFO]  core: Initializing version
history cache for core
2023-11-23T15:58:20.422+0530 [INFO]  core: security barrier not
initialized
2023-11-23T15:58:20.422+0530 [INFO]  core: seal configuration
missing, not initialized
2023-11-23T15:58:20.424+0530 [INFO]  core: security barrier not
initialized
2023-11-23T15:58:20.425+0530 [INFO]  core: security barrier
```

```
initialized: stored=1 shares=5 threshold=3
2023-11-23T15:58:20.427+0530 [INFO]  core: post-unseal setup
starting
2023-11-23T15:58:20.448+0530 [INFO]  core: loaded wrapping token
key
2023-11-23T15:58:20.448+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-11-23T15:58:20.448+0530 [INFO]  core: no mounts; adding
default mount table
2023-11-23T15:58:20.449+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-11-23T15:58:20.449+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-11-23T15:58:20.449+0530 [INFO]  core: successfully mounted:
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-11-23T15:58:20.451+0530 [INFO]  core: successfully mounted:
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-11-23T15:58:20.452+0530 [INFO]  rollback: starting rollback
manager
2023-11-23T15:58:20.452+0530 [INFO]  core: restoring leases
2023-11-23T15:58:20.453+0530 [INFO]  identity: entities restored
2023-11-23T15:58:20.453+0530 [INFO]  identity: groups restored
2023-11-23T15:58:20.453+0530 [INFO]  expiration: lease restore
complete
2023-11-23T15:58:20.453+0530 [INFO]  core: usage gauge collection
is disabled
2023-11-23T15:58:20.453+0530 [INFO]  core: Recorded vault
version: vault version=1.14.0 upgrade time="2023-11-23
10:28:20.453481904 +0000 UTC" build date=2023-06-19T11:40:23Z
2023-11-23T15:58:20.818+0530 [INFO]  core: post-unseal setup
complete
2023-11-23T15:58:20.819+0530 [INFO]  core: root token generated
2023-11-23T15:58:20.819+0530 [INFO]  core: pre-seal teardown
starting
2023-11-23T15:58:20.819+0530 [INFO]  rollback: stopping rollback
manager
2023-11-23T15:58:20.819+0530 [INFO]  core: pre-seal teardown
complete
2023-11-23T15:58:21.116+0530 [INFO]  core.cluster-listener.tcp:
starting listener: listener_address=0.0.0.0:8201
2023-11-23T15:58:21.116+0530 [INFO]  core.cluster-listener:
serving cluster requests: cluster_listen_address=[::]:8201
```

```
2023-11-23T15:58:21.117+0530 [INFO]  core: post-unseal setup
starting
2023-11-23T15:58:21.117+0530 [INFO]  core: loaded wrapping token
key
2023-11-23T15:58:21.117+0530 [INFO]  core: successfully setup
plugin catalog: plugin-directory=""
2023-11-23T15:58:21.119+0530 [INFO]  core: successfully mounted:
type=system version="v1.14.0+builtin.vault" path=sys/
namespace="ID: root. Path: "
2023-11-23T15:58:21.120+0530 [INFO]  core: successfully mounted:
type=identity version="v1.14.0+builtin.vault" path=identity/
namespace="ID: root. Path: "
2023-11-23T15:58:21.120+0530 [INFO]  core: successfully mounted:
type=cubbyhole version="v1.14.0+builtin.vault" path=cubbyhole/
namespace="ID: root. Path: "
2023-11-23T15:58:21.123+0530 [INFO]  core: successfully mounted:
type=token version="v1.14.0+builtin.vault" path=token/
namespace="ID: root. Path: "
2023-11-23T15:58:21.123+0530 [INFO]  rollback: starting rollback
manager
2023-11-23T15:58:21.124+0530 [INFO]  core: restoring leases
2023-11-23T15:58:21.124+0530 [INFO]  identity: entities restored
2023-11-23T15:58:21.124+0530 [INFO]  identity: groups restored
2023-11-23T15:58:21.124+0530 [INFO]  expiration: lease restore
complete
2023-11-23T15:58:21.125+0530 [INFO]  core: usage gauge collection
is disabled
2023-11-23T15:58:21.125+0530 [INFO]  core: post-unseal setup
complete
2023-11-23T15:58:21.125+0530 [INFO]  core: vault is unsealed
Success! Uploaded policy: mcctb-policy
2023-11-23T15:58:21.600+0530 [INFO]  core: enabled credential
backend: path=approle/ type=approle version=""
Success! Enabled approle auth method at: approle/
2023-11-23T15:58:21.690+0530 [INFO]  core: successful mount:
namespace="" path=mcctb/ type=kv version=""
Success! Enabled the kv secrets engine at: mcctb/
Success! Data written to: auth/approle/role/mcctb-app
Upgrading to NetApp-MetroCluster-Tiebreaker-Software-1.6-
1.x86_64.rpm
Preparing...
################################# [100%]
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################# [ 50%]
Performing file integrity check
```

```
etc/cron.weekly/metrocluster-tiebreaker-support is Ok
etc/cron.weekly/metrocluster-tiebreaker-support-cov is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software is Ok
etc/init.d/netapp-metrocluster-tiebreaker-software-cov is Ok
etc/logrotate.d/mcctb is Ok
opt/netapp/mcctb/lib/common/activation-1.1.1.jar is Ok
opt/netapp/mcctb/lib/common/aopalliance.jar is Ok
opt/netapp/mcctb/lib/common/args4j.jar is Ok
opt/netapp/mcctb/lib/common/aspectjrt.jar is Ok
opt/netapp/mcctb/lib/common/aspectjweaver.jar is Ok
opt/netapp/mcctb/lib/common/asup.jar is Ok
opt/netapp/mcctb/lib/common/bcpkix-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk15on.jar is Ok
opt/netapp/mcctb/lib/common/bcprov-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/bctls-fips-1.0.13.jar is Ok
opt/netapp/mcctb/lib/common/bctls-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/bcutil-jdk18on.jar is Ok
opt/netapp/mcctb/lib/common/cglib.jar is Ok
opt/netapp/mcctb/lib/common/commons-codec.jar is Ok
opt/netapp/mcctb/lib/common/commons-collections4.jar is Ok
opt/netapp/mcctb/lib/common/commons-compress.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.jar is Ok
opt/netapp/mcctb/lib/common/commons-daemon.src.jar is Ok
opt/netapp/mcctb/lib/common/commons-dbcp2.jar is Ok
opt/netapp/mcctb/lib/common/commons-io.jar is Ok
opt/netapp/mcctb/lib/common/commons-lang3.jar is Ok
opt/netapp/mcctb/lib/common/commons-logging.jar is Ok
opt/netapp/mcctb/lib/common/commons-pool2.jar is Ok
opt/netapp/mcctb/lib/common/guava.jar is Ok
opt/netapp/mcctb/lib/common/httpclient.jar is Ok
opt/netapp/mcctb/lib/common/httpcore.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.activation.jar is Ok
opt/netapp/mcctb/lib/common/jakarta.xml.bind-api.jar is Ok
opt/netapp/mcctb/lib/common/java-xmlbuilder.jar is Ok
opt/netapp/mcctb/lib/common/javax.inject.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-api-2.3.1.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-core.jar is Ok
opt/netapp/mcctb/lib/common/jaxb-impl.jar is Ok
opt/netapp/mcctb/lib/common/jline.jar is Ok
opt/netapp/mcctb/lib/common/jna.jar is Ok
opt/netapp/mcctb/lib/common/joda-time.jar is Ok
opt/netapp/mcctb/lib/common/jsch.jar is Ok
opt/netapp/mcctb/lib/common/json.jar is Ok
opt/netapp/mcctb/lib/common/jsvc.zip is Ok
opt/netapp/mcctb/lib/common/junixsocket-common.jar is Ok
opt/netapp/mcctb/lib/common/junixsocket-native-common.jar is Ok
```

```
opt/netapp/mcctb/lib/common/logback-classic.jar is Ok
opt/netapp/mcctb/lib/common/logback-core.jar is Ok
opt/netapp/mcctb/lib/common/mail-1.6.2.jar is Ok
opt/netapp/mcctb/lib/common/mariadb-java-client.jar is Ok
opt/netapp/mcctb/lib/common/mcctb-mib.jar is Ok
opt/netapp/mcctb/lib/common/mcctb.jar is Ok
opt/netapp/mcctb/lib/common/mockito-core.jar is Ok
opt/netapp/mcctb/lib/common/slf4j-api.jar is Ok
opt/netapp/mcctb/lib/common/snmp4j.jar is Ok
opt/netapp/mcctb/lib/common/spring-aop.jar is Ok
opt/netapp/mcctb/lib/common/spring-beans.jar is Ok
opt/netapp/mcctb/lib/common/spring-context-support.jar is Ok
opt/netapp/mcctb/lib/common/spring-context.jar is Ok
opt/netapp/mcctb/lib/common/spring-core.jar is Ok
opt/netapp/mcctb/lib/common/spring-expression.jar is Ok
opt/netapp/mcctb/lib/common/spring-web.jar is Ok
opt/netapp/mcctb/lib/common/vault-java-driver.jar is Ok
opt/netapp/mcctb/lib/common/xz.jar is Ok
opt/netapp/mcctb/lib/org.jacoco.agent-0.8.8-runtime.jar is Ok
opt/netapp/mcctb/bin/mcctb-asup-invoke is Ok
opt/netapp/mcctb/bin/mcctb_postrotate is Ok
opt/netapp/mcctb/bin/netapp-metrocluster-tiebreaker-software-cli
is Ok
/

Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software

Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Successfully upgraded NetApp MetroCluster Tiebreaker software to
version 1.6.
Cleaning up / removing...
   2:NetApp-MetroCluster-Tiebreaker-
So################################# [100%]
```

安裝斷路器 **1.5**

設定管理員對**ONTAP SURE API**和**SSH**的存取權限

您可以設定管理員存取ONTAP 功能以存取SURE API和SSH。

步驟

1. 建立可ONTAP 存取API的管理員使用者： `security login create -user-or-group-name` *`mcctb`* `-application ontapi -authentication-method` *`password`*
2. 建立具有SSH存取權限的管理使用者： `security login create -user-or-group-name` *`mcctb`* `-application` *`ssh`* `-authentication-method` *`password`*
3. 確認已建立新的管理使用者： `security login show`
4. 在合作夥伴叢集上重複這些步驟。

> "系統管理員驗證與RBAC" 已實作。

安裝 **MetroCluster tiebreaker 1.5** 相依性

視主機 Linux 作業系統而定、您必須先安裝 MySQL 或 MariaDB 伺服器、才能安裝或升級 tiebreaker 軟體。

步驟

1. 安裝 JDK
2. 安裝及設定Vault
3. 安裝MySQL或MariaDB伺服器：

如果Linux主機是	然後…
Red Hat Enterprise Linux 7/CentOS 7.	在 Red Hat Enterprise Linux 7 或 CentOS 7 上安裝 MySQL Server 5.5.30 或更新版本和 5.6.x 版本
Red Hat Enterprise Linux 8	在 Red Hat Enterprise Linux 8 上安裝 MariaDB 伺服器

安裝 **JDK**

在安裝或升級 tiebreaker 軟體之前、您必須在主機系統上安裝 JDK 。Tiebreaker 1.5 及更新版本支援 OpenJDK 17 、 18 或 19 。

步驟

1. 以「root」使用者或可變更為進階權限模式的Sudo使用者身分登入。

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2017 from host.domain.com
```

2. 檢查可用的 JDK 版本：

   ```
   yum search openjdk
   ```

3. 安裝 JDK 17 、 18 或 19 。

   下列命令會安裝 JDK 17 ：

   ```
   yum install java-17-openjdk
   ```

4. 驗證安裝：

   ```
   java -version
   ```

   成功安裝時會顯示下列輸出：

   ```
   openjdk version "17.0.2" 2022-01-18 LTS
   OpenJDK Runtime Environment 21.9 (build 17.0.2+8-LTS)
   OpenJDK 64-Bit Server VM 21.9 (build 17.0.2+8-LTS, mixed mode, sharing)
   ```

安裝及設定**Vault**

如果您沒有或想要使用本機Vault伺服器、則必須安裝Vault。您可以參閱本標準程序來安裝Vault、或參閱《橋式安裝說明》以取得替代準則。

> ⓘ 如果您的網路中有Vault伺服器、您可以設定MetroCluster 使用該Vault安裝的還原斷路器主機。如果您這麼做、就不需要在主機上安裝 Vault 。

步驟

1. 瀏覽至 `/bin` 目錄：

   ```
   [root@mcctb] cd /bin
   ```

2. 下載Vault壓縮檔。

   ```
   [root@mcctb /bin]#  curl -sO
   https://releases.hashicorp.com/vault/1.12.2/vault_1.12.2_linux_amd64.zip
   ```

3. 解壓縮Vault檔案。

   ```
   [root@mcctb /bin]# unzip vault_1.12.2_linux_amd64.zip
   Archive:  vault_1.12.2_linux_amd64.zip
     inflating: vault
   ```

4. 驗證安裝。

```
[root@mcctb /bin]# vault -version
Vault v1.12.2 (415e1fe3118eebd5df6cb60d13defdc01aa17b03), built 2022-11-
23T12:53:46Z
```

5. 瀏覽至 `/root` 目錄：

```
[root@mcctb /bin] cd /root
```

6. 在下建立 Vault 組態檔案 `/root` 目錄。

   的 `[root@mcctb ~]` 提示、複製並執行下列命令以建立 `config.hcl` 檔案：

```
# cat > config.hcl << EOF
 storage "file" {
  address = "127.0.0.1:8500"
  path    = "/mcctb_vdata/data"
 }
 listener "tcp" {
   address     = "127.0.0.1:8200"
   tls_disable = 1
 }
EOF
```

7. 啟動Vault伺服器：

```
[root@mcctb ~] vault server -config config.hcl &
```

8. 匯出Vault位址。

```
[root@mcctb ~]# export VAULT_ADDR="http://127.0.0.1:8200"
```

9. 初始化Vault。

```
[root@mcctb ~]# vault operator init
2022-12-15T14:57:22.113+0530 [INFO]  core: security barrier not
initialized
2022-12-15T14:57:22.113+0530 [INFO]  core: seal configuration missing,
not initialized
2022-12-15T14:57:22.114+0530 [INFO]  core: security barrier not
```

```
initialized
2022-12-15T14:57:22.116+0530 [INFO]  core: security barrier initialized:
stored=1 shares=5 threshold=3
2022-12-15T14:57:22.118+0530 [INFO]  core: post-unseal setup starting
2022-12-15T14:57:22.137+0530 [INFO]  core: loaded wrapping token key
2022-12-15T14:57:22.137+0530 [INFO]  core: Recorded vault version: vault
version=1.12.2 upgrade time="2022-12-15 09:27:22.137200412 +0000 UTC"
build date=2022-11-23T12:53:46Z
2022-12-15T14:57:22.137+0530 [INFO]  core: successfully setup plugin
catalog: plugin-directory=""
2022-12-15T14:57:22.137+0530 [INFO]  core: no mounts; adding default
mount table
2022-12-15T14:57:22.143+0530 [INFO]  core: successfully mounted backend:
type=cubbyhole version="" path=cubbyhole/
2022-12-15T14:57:22.144+0530 [INFO]  core: successfully mounted backend:
type=system version="" path=sys/
2022-12-15T14:57:22.144+0530 [INFO]  core: successfully mounted backend:
type=identity version="" path=identity/
2022-12-15T14:57:22.148+0530 [INFO]  core: successfully enabled
credential backend: type=token version="" path=token/ namespace="ID:
root. Path: "
2022-12-15T14:57:22.149+0530 [INFO]  rollback: starting rollback manager
2022-12-15T14:57:22.149+0530 [INFO]  core: restoring leases
2022-12-15T14:57:22.150+0530 [INFO]  expiration: lease restore complete
2022-12-15T14:57:22.150+0530 [INFO]  identity: entities restored
2022-12-15T14:57:22.150+0530 [INFO]  identity: groups restored
2022-12-15T14:57:22.151+0530 [INFO]  core: usage gauge collection is
disabled
2022-12-15T14:57:23.385+0530 [INFO]  core: post-unseal setup complete
2022-12-15T14:57:23.387+0530 [INFO]  core: root token generated
2022-12-15T14:57:23.387+0530 [INFO]  core: pre-seal teardown starting
2022-12-15T14:57:23.387+0530 [INFO]  rollback: stopping rollback manager
2022-12-15T14:57:23.387+0530 [INFO]  core: pre-seal teardown complete
Unseal Key 1: <unseal_key_1_id>
Unseal Key 2: <unseal_key_2_id>
Unseal Key 3: <unseal_key_3_id>
Unseal Key 4: <unseal_key_4_id>
Unseal Key 5: <unseal_key_5_id>

Initial Root Token: <initial_root_token_id>


Vault initialized with 5 key shares and a key threshold of 3. Please
securely
distribute the key shares printed above. When the Vault is re-sealed,
restarted, or stopped, you must supply at least 3 of these keys to
```

```
unseal it
before it can start servicing requests.

Vault does not store the generated root key. Without at least 3 keys to
reconstruct the root key, Vault will remain permanently sealed!

It is possible to generate new unseal keys, provided you have a quorum
of
existing unseal keys shares. See "vault operator rekey" for more
information.
```

您必須將金鑰 ID 和初始根權杖記錄並儲存在安全位置、以便稍後在程序中使用。

10. 匯出Vault根憑證。

```
[root@mcctb ~]#  export VAULT_TOKEN="<initial_root_token_id>"
```

11. 使用建立的五個金鑰中的任何三個來解除保存 Vault 的密封。

    您必須執行 `vault operator unseal` 三個按鍵的命令：

    a. 使用第一個金鑰來解除保存資料保險箱的密封：

    ```
    [root@mcctb ~]# vault operator unseal
    Unseal Key (will be hidden):
    Key                Value
    ---                -----
    Seal Type          shamir
    Initialized        true
    Sealed             true
    Total Shares       5
    Threshold          3
    Unseal Progress    1/3
    Unseal Nonce       <unseal_key_1_id>
    Version            1.12.2
    Build Date         2022-11-23T12:53:46Z
    Storage Type       file
    HA Enabled         false
    ```

    b. 使用第二個金鑰來解除保存資料保險箱的密封：

```
[root@mcctb ~]# vault operator unseal
Unseal Key (will be hidden):
Key                Value
---                -----
Seal Type          shamir
Initialized        true
Sealed             true
Total Shares       5
Threshold          3
Unseal Progress    2/3
Unseal Nonce       <unseal_key_2_id>
Version            1.12.2
Build Date         2022-11-23T12:53:46Z
Storage Type       file
HA Enabled         false
```

c. 使用第三個金鑰來解除保存資料保險箱的密封：

```
[root@mcctb ~]# vault operator unseal
Unseal Key (will be hidden):
2022-12-15T15:15:00.980+0530 [INFO]  core.cluster-listener.tcp:
starting listener: listener_address=127.0.0.1:8201
2022-12-15T15:15:00.980+0530 [INFO]  core.cluster-listener: serving
cluster requests: cluster_listen_address=127.0.0.1:8201
2022-12-15T15:15:00.981+0530 [INFO]  core: post-unseal setup starting
2022-12-15T15:15:00.981+0530 [INFO]  core: loaded wrapping token key
2022-12-15T15:15:00.982+0530 [INFO]  core: successfully setup plugin
catalog: plugin-directory=""
2022-12-15T15:15:00.983+0530 [INFO]  core: successfully mounted
backend: type=system version="" path=sys/
2022-12-15T15:15:00.984+0530 [INFO]  core: successfully mounted
backend: type=identity version="" path=identity/
2022-12-15T15:15:00.984+0530 [INFO]  core: successfully mounted
backend: type=cubbyhole version="" path=cubbyhole/
2022-12-15T15:15:00.986+0530 [INFO]  core: successfully enabled
credential backend: type=token version="" path=token/ namespace="ID:
root. Path: "
2022-12-15T15:15:00.986+0530 [INFO]  rollback: starting rollback
manager
2022-12-15T15:15:00.987+0530 [INFO]  core: restoring leases
2022-12-15T15:15:00.987+0530 [INFO]  expiration: lease restore
complete
2022-12-15T15:15:00.987+0530 [INFO]  identity: entities restored
2022-12-15T15:15:00.987+0530 [INFO]  identity: groups restored
2022-12-15T15:15:00.988+0530 [INFO]  core: usage gauge collection is
disabled
2022-12-15T15:15:00.989+0530 [INFO]  core: post-unseal setup complete
2022-12-15T15:15:00.989+0530 [INFO]  core: vault is unsealed
Key             Value
---             -----
Seal Type       shamir
Initialized     true
Sealed          false
Total Shares    5
Threshold       3
Version         1.12.2
Build Date      2022-11-23T12:53:46Z
Storage Type    file
Cluster Name    vault-cluster
Cluster ID      <cluster_id>
HA Enabled      false
```

12. 確認Vault密封狀態為假。

```
[root@mcctb ~]# vault status
Key             Value
---             -----
Seal Type       shamir
Initialized     true
Sealed          false
Total Shares    5
Threshold       3
Version         1.12.2
Build Date      2022-11-23T12:53:46Z
Storage Type    file
Cluster Name    vault-cluster
Cluster ID      <cluster_id>
HA Enabled      false
```

13. 將 Vault 服務設定為開機時啟動。
    a. 執行下列命令： `cd /etc/systemd/system`

    ```
    [root@mcctb ~]#  cd /etc/systemd/system
    ```

    b. 的 `[root@mcctb system]` 提示、複製並執行下列命令以建立 Vault 服務檔案。

    ```
    # cat > vault.service << EOF
    [Unit]
    Description=Vault Service
    After=mariadb.service

    [Service]
    Type=forking
    ExecStart=/usr/bin/vault server -config /root/config.hcl &
    Restart=on-failure

    [Install]
    WantedBy=multi-user.target
    EOF
    ```

    c. 執行下列命令： `systemctl daemon-reload`

    ```
    [root@mcctb system]#  systemctl daemon-reload
    ```

    d. 執行下列命令： `systemctl enable vault.service`

```
[root@mcctb system]#  systemctl enable vault.service
Created symlink /etc/systemd/system/multi-
user.target.wants/vault.service → /etc/systemd/system/vault.service.
```

安裝MetroCluster 完ESITiebreaker時、系統會提示您使用此功能。如果您想要變更解封Vault的方法、則需要解除安裝並重新安裝MetroCluster 還原器軟體。

在 **Red Hat Enterprise Linux 7** 或 **CentOS 7** 上安裝 **MySQL Server 5.5.30** 或更新版本和 **5.6.x** 版本

安裝或升級Tiebreaker軟體之前、您必須先在主機系統上安裝MySQL Server 5.5.30或更新版本及5.6.x版本。對於 Red Hat Enterprise Linux 8 、 安裝 MariaDB 伺服器。

步驟

1. 以root使用者或可變更為進階權限模式的Sudo使用者身分登入。

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2016 from host.domain.com
```

2. 將MySQL儲存庫新增至主機系統：

   [root@mcctb ~]# yum localinstall https://dev.mysql.com/get/mysql57-community-release-el6-11.noarch.rpm`

```
Loaded plugins: product-id, refresh-packagekit, security, subscription-
manager
Setting up Local Package Process
Examining /var/tmp/yum-root-LLUw0r/mysql-community-release-el6-
5.noarch.rpm: mysql-community-release-el6-5.noarch
Marking /var/tmp/yum-root-LLUw0r/mysql-community-release-el6-
5.noarch.rpm to be installed
Resolving Dependencies
--> Running transaction check
---> Package mysql-community-release.noarch 0:el6-5 will be installed
--> Finished Dependency Resolution
Dependencies Resolved
=============================================================================
========
Package               Arch   Version
                                     Repository
Size
=============================================================================
========
Installing:
mysql-community-release
                       noarch el6-5 /mysql-community-release-el6-
5.noarch 4.3 k
Transaction Summary
=============================================================================
========
Install       1 Package(s)
Total size: 4.3 k
Installed size: 4.3 k
Is this ok [y/N]: y
Downloading Packages:
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing : mysql-community-release-el6-5.noarch
1/1
  Verifying  : mysql-community-release-el6-5.noarch
1/1
Installed:
  mysql-community-release.noarch 0:el6-5
Complete!
```

3. 停用MySQL 57儲存庫：

[root@mcctb ~]# yum-config-manager -disablemysql57-community

4. 啟用MySQL 56儲存庫：

   [root@mcctb ~]# yum-config-manager --enable mysql56-community

5. 啟用儲存庫：

   [root@mcctb ~]# yum repolist enabled| grep "mysql.**-community.**

```
mysql-connectors-community           MySQL Connectors Community
21
mysql-tools-community                MySQL Tools Community
35
mysql56-community                    MySQL 5.6 Community Server
231
```

6. 安裝MySQL社群伺服器：

   [root@mcctb ~]# yum install mysql-community-server'

```
Loaded plugins: product-id, refresh-packagekit, security, subscription-
manager
This system is not registered to Red Hat Subscription Management. You
can use subscription-manager
to register.
Setting up Install Process
Resolving Dependencies
--> Running transaction check
 .....Output truncated.....
---> Package mysql-community-libs-compat.x86_64 0:5.6.29-2.el6 will be
obsoleting
--> Finished Dependency Resolution
Dependencies Resolved
================================================================================
======
Package                          Arch   Version       Repository
Size
================================================================================
======
Installing:
 mysql-community-client         x86_64  5.6.29-2.el6  mysql56-community
18  M
     replacing  mysql.x86_64 5.1.71-1.el6
 mysql-community-libs           x86_64  5.6.29-2.el6  mysql56-community
1.9 M
     replacing  mysql-libs.x86_64 5.1.71-1.el6
```

```
 mysql-community-libs-compat    x86_64  5.6.29-2.el6  mysql56-community
1.6 M
     replacing  mysql-libs.x86_64 5.1.71-1.el6
 mysql-community-server         x86_64  5.6.29-2.el6  mysql56-community
53  M
     replacing  mysql-server.x86_64 5.1.71-1.el6
Installing for dependencies:
mysql-community-common          x86_64  5.6.29-2.el6  mysql56-community
308 k

Transaction Summary
=================================================================================
=======
Install       5 Package(s)
Total download size: 74 M
Is this ok [y/N]: y
Downloading Packages:
(1/5): mysql-community-client-5.6.29-2.el6.x86_64.rpm       |  18 MB
00:28
(2/5): mysql-community-common-5.6.29-2.el6.x86_64.rpm       | 308 kB
00:01
(3/5): mysql-community-libs-5.6.29-2.el6.x86_64.rpm         | 1.9 MB
00:05
(4/5): mysql-community-libs-compat-5.6.29-2.el6.x86_64.rpm  | 1.6 MB
00:05
(5/5): mysql-community-server-5.6.29-2.el6.x86_64.rpm       |  53 MB
03:42
 ---------------------------------------------------------------------------
--------
Total                                                 289 kB/s |  74 MB
04:24
warning: rpmts_HdrFromFdno: Header V3 DSA/SHA1 Signature, key ID
<key_id> NOKEY
Retrieving key from file:/etc/pki/rpm-gpg/RPM-GPG-KEY-mysql
Importing GPG key 0x5072E1F5:
 Userid : MySQL Release Engineering <mysql-build@oss.oracle.com>
Package: mysql-community-release-el6-5.noarch
         (@/mysql-community-release-el6-5.noarch)
 From   : file:/etc/pki/rpm-gpg/RPM-GPG-KEY-mysql
Is this ok [y/N]: y
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing : mysql-community-common-5.6.29-2.el6.x86_64
....Output truncated....
```

```
1.el6.x86_64
7/8
  Verifying  : mysql-5.1.71-1.el6.x86_64
8/8
Installed:
  mysql-community-client.x86_64 0:5.6.29-2.el6
  mysql-community-libs.x86_64 0:5.6.29-2.el6
  mysql-community-libs-compat.x86_64 0:5.6.29-2.el6
  mysql-community-server.x86_64 0:5.6.29-2.el6

Dependency Installed:
  mysql-community-common.x86_64 0:5.6.29-2.el6

Replaced:
  mysql.x86_64 0:5.1.71-1.el6 mysql-libs.x86_64 0:5.1.71-1.el6
  mysql-server.x86_64 0:5.1.71-1.el6
Complete!
```

7. 啟動MySQL伺服器：

```
Initializing MySQL database:  2016-04-05 19:44:38 0 [Warning] TIMESTAMP
with implicit DEFAULT value is deprecated. Please use
--explicit_defaults_for_timestamp server option (see documentation
for more details).
2016-04-05 19:44:38 0 [Note] /usr/sbin/mysqld (mysqld 5.6.29)
        starting as process 2487 ...
2016-04-05 19:44:38 2487 [Note] InnoDB: Using atomics to ref count
        buffer pool pages
2016-04-05 19:44:38 2487 [Note] InnoDB: The InnoDB memory heap is
disabled
....Output truncated....
2016-04-05 19:44:42 2509 [Note] InnoDB: Shutdown completed; log sequence
       number 1625987

PLEASE REMEMBER TO SET A PASSWORD FOR THE MySQL root USER!
To do so, start the server, then issue the following commands:

  /usr/bin/mysqladmin -u root password 'new-password'
  /usr/bin/mysqladmin -u root -h mcctb password 'new-password'

Alternatively, you can run:
  /usr/bin/mysql_secure_installation

which will also give you the option of removing the test
databases and anonymous user created by default.  This is
strongly recommended for production servers.
.....Output truncated.....
WARNING: Default config file /etc/my.cnf exists on the system
This file will be read by default by the MySQL server
If you do not want to use this, either remove it, or use the
--defaults-file argument to mysqld_safe when starting the server

                                                           [  OK  ]
Starting mysqld:                                           [  OK  ]
```

8. 確認MySQL伺服器正在執行：

   [root@mcctb ~]#服務mysqLD狀態

```
mysqld (pid  2739) is running...
```

9. 設定安全性和密碼設定：

```
NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MySQL
```

```
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

 In order to log into MySQL to secure it, we'll need the current
 password for the root user.  If you've just installed MySQL, and
 you haven't set the root password yet, the password will be blank,
 so you should just press enter here.

 Enter current password for root (enter for none):   <== on default
install
                                                         hit enter here
 OK, successfully used password, moving on...

 Setting the root password ensures that nobody can log into the MySQL
 root user without the proper authorization.

 Set root password? [Y/n] y
 New password:
 Re-enter new password:
 Password updated successfully!
 Reloading privilege tables..
  ... Success!

 By default, a MySQL installation has an anonymous user, allowing anyone
 to log into MySQL without having to have a user account created for
 them.  This is intended only for testing, and to make the installation
 go a bit smoother.  You should remove them before moving into a
 production environment.

 Remove anonymous users? [Y/n] y
  ... Success!

 Normally, root should only be allowed to connect from 'localhost'.
This
 ensures that someone cannot guess at the root password from the
network.

 Disallow root login remotely? [Y/n] y
  ... Success!

 By default, MySQL comes with a database named 'test' that anyone can
 access.  This is also intended only for testing, and should be removed
 before moving into a production environment.

 Remove test database and access to it? [Y/n] y
  - Dropping test database...
 ERROR 1008 (HY000) at line 1: Can't drop database 'test';
 database doesn't exist
```

```
 ... Failed!  Not critical, keep moving...
 - Removing privileges on test database...
 ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
 ... Success!

All done!  If you've completed all of the above steps, your MySQL
installation should now be secure.

Thanks for using MySQL!

Cleaning up...
```

10. 驗證MySQL登入是否正常運作：

```
Enter password: <configured_password>
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 17
Server version: 5.6.29 MySQL Community Server (GPL)

Copyright (c) 2000, 2016, Oracle and/or its affiliates. All rights
reserved.

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
statement.
mysql>
```

如果MySQL登入正常運作、輸出將在「mysql>」提示字元結束。

啟用 **MySQL** 自動啟動設定

您應該確認MySQL精靈的自動啟動功能已開啟。開啟MySQL精靈會在MetroCluster 系統重新開機時、自動重新啟動MySQL。如果MySQL精靈未執行、則tiebreaker軟體會繼續執行、但無法重新啟動、也無法進行組態變更。

步驟

1. 驗證MySQL在開機時是否已啟用自動啟動：

[root@mcctb ~]# systemctl list-unit-filesmysqld.service`

```
UNIT FILE           State
------------------- ----------
mysqld.service      enabled
```

如果MySQL在開機時未啟用自動啟動、請參閱MySQL文件、以啟用安裝的自動啟動功能。

在 **Red Hat Enterprise Linux 8** 上安裝 **MariaDB** 伺服器

您必須先在主機系統上安裝MariaDB伺服器、才能安裝或升級tiebreaker軟體。對於 Red Hat Enterprise Linux 7 或 CentOS 7 、 安裝 MySQL Server。

開始之前

您的主機系統必須在Red Hat Enterprise Linux（RHEL）8上執行。

步驟

1. 以登入 `root` 使用者或可Sudo進階權限模式的使用者。

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2017 from host.domain.com
```

2. 安裝 MariaDB 伺服器：

[root@mcctb ~]# yum install MariaDB-server.x86_64

```
[root@mcctb ~]# yum install mariadb-server.x86_64
Loaded plugins: fastestmirror, langpacks
 ...
 ...

=================================================================================
 Package                      Arch   Version         Repository
Size
=================================================================================
Installing:
mariadb-server               x86_64   1:5.5.56-2.el7   base
11 M
Installing for dependencies:

Transaction Summary
=================================================================================
```

```
===
Install  1 Package  (+8 Dependent packages)
Upgrade             ( 1 Dependent package)

Total download size: 22 M
Is this ok [y/d/N]: y

Downloading packages:
No Presto metadata available for base warning:
/var/cache/yum/x86_64/7/base/packages/mariadb-libs-5.5.56-
2.el7.x86_64.rpm:
Header V3 RSA/SHA256 Signature,
key ID f4a80eb5: NOKEY] 1.4 MB/s | 3.3 MB  00:00:13 ETA
Public key for mariadb-libs-5.5.56-2.el7.x86_64.rpm is not installed
(1/10): mariadb-libs-5.5.56-2.el7.x86_64.rpm  | 757 kB  00:00:01
..
..
(10/10): perl-Net-Daemon-0.48-5.el7.noarch.rpm|  51 kB  00:00:01
--------------------------------------------------------------------------
-----------------
Installed:
  mariadb-server.x86_64 1:5.5.56-2.el7

Dependency Installed:
mariadb.x86_64 1:5.5.56-2.el7
perl-Compress-Raw-Bzip2.x86_64 0:2.061-3.el7
perl-Compress-Raw-Zlib.x86_64 1:2.061-4.el7
perl-DBD-MySQL.x86_64 0:4.023-5.el7
perl-DBI.x86_64 0:1.627-4.el7
perl-IO-Compress.noarch 0:2.061-2.el7
perl-Net-Daemon.noarch 0:0.48-5.el7
perl-PlRPC.noarch 0:0.2020-14.el7

Dependency Updated:
  mariadb-libs.x86_64 1:5.5.56-2.el7
Complete!
```

3. 啟動MariaDB伺服器：

   [root@mcctb ~]# systemcl start MariaDB

4. 確認MariaDB伺服器已啟動：

   [root@mcctb ~]# systemctl狀態MariaDB

```
[root@mcctb ~]# systemctl status mariadb
mariadb.service - MariaDB database server
...
Nov 08 21:28:59 mcctb systemd[1]: Starting MariaDB database server...
...
Nov 08 21:29:01 mcctb systemd[1]: Started MariaDB database server.
```

5. 設定安全性和密碼設定：

> 當系統提示您輸入 root 密碼時、請將其保留空白、然後按 Enter 鍵繼續設定安全性和密碼設定。

```
root@localhost systemd]# mysql_secure_installation

 NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user.  If you've just installed MariaDB, and
you haven't set the root password yet, the password will be blank,
so you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

Set root password? [Y/n] y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
 ... Success!


By default, a MariaDB installation has an anonymous user, allowing
anyone
to log into MariaDB without having to have a user account created for
them.  This is intended only for testing, and to make the installation
go a bit smoother.  You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] y
 ... Success!
```

```
Normally, root should only be allowed to connect from 'localhost'.  This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
 ... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access.  This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
 - Dropping test database...
  ... Success!
 - Removing privileges on test database...
   ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n]

 ... Success!

Cleaning up...

All done!  If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
```

啟用 **MariaDB** 伺服器的自動啟動設定

您應該確認 MariaDB 伺服器的自動啟動功能已開啟。如果您未啟用自動啟動功能、MetroCluster 且駐留的系統必須重新開機、則tiebreaker軟體會繼續執行、但無法重新啟動MariaDB服務、也無法進行組態變更。

步驟

1. 啟用自動啟動服務：

   [root@mcctb ~]# systemctl enable mariadb.service`

2. 確認已啟用MariaDB、以便在開機時自動啟動：

   [root@mcctb ~]# systemctl list-unit-filesmariadb.service`

```
UNIT FILE           State
------------------ ----------
mariadb.service     enabled
```

安裝或升級至 **tiebreaker 1.5**

在主機 Linux 作業系統上執行新的安裝或升級至 tiebreaker 1.5 、以監控 MetroCluster 組態。

關於這項工作

- 您的儲存系統必須執行支援的 ONTAP 版本。請參閱 "軟體需求" 詳細資料請見下表。
- 您必須使用安裝OpenJDK `yum install java-x.x.x-openjdk` 命令。Tiebreaker 1.5 及更新版本支援 OpenJDK 17 、 18 或 19 。
- 您可以將 MetroCluster tiebreaker 安裝為非 root 使用者、並擁有足夠的管理權限來執行 tiebreaker 安裝、建立表格和使用者、以及設定使用者密碼。

步驟

1. 下載 MetroCluster tiebreaker 軟體和 MetroCluster 的 tiebreaker 、 RPM_GPG 金鑰。

   > MetroCluster_tiebreer_RPM_GPG 金鑰可從您在 NetApp 支援網站 下載 tiebreaker 1.5 軟體套件的同一頁下載。

   "MetroCluster Tiebreaker （下載） - NetApp 支援網站"

2. 以root使用者身分登入主機。
3. 建立非 root 使用者和 `mcctbgrp` 群組：

   a. 建立非 root 使用者並設定密碼。

      下列命令範例可建立名為的非 root 使用者 `mcctbuser1`：

      ```
      [root@mcctb ~]# useradd mcctbuser1
      [root@mcctb ~]# passwd mcctbuser1
      Changing password for user mcctbuser1.
      New password:
      Retype new password:
      passwd: all authentication tokens updated successfully.
      ```

   b. 建立名為的群組 `mcctbgrp`：

      ```
      [root@mcctb ~~]# groupadd mcctbgrp
      ```

   c. 將您建立的非 root 使用者新增至 `mcctbgrp` 群組：

下列命令會新增 `mcctbuser1` 至 `mcctbgrp` 群組：

```
[root@mcctb ~]# usermod -a -G mcctbgrp mcctbuser1
```

4. 驗證RPM檔案。

   從包含 RPM 金鑰的目錄執行下列子步驟。

   a. 下載並匯入RPM金鑰檔：

   ```
   [root@mcctb ~]# rpm --import MetroCluster_Tiebreaker_RPM_GPG.key
   ```

   b. 檢查指紋、確認已匯入正確的金鑰。

   下列範例顯示正確的金鑰指紋：

```
root@mcctb:~/signing/mcctb-rpms# gpg --show-keys --with-fingerprint
MetroCluster_Tiebreaker_RPM_GPG.key
pub   rsa3072 2022-11-17 [SCEA] [expires: 2025-11-16]
      65AC 1562 E28A 1497 7BBD  7251 2855 EB02 3E77 FAE5
uid                      MCCTB-RPM (mcctb RPM production signing)
<mcctb-rpm@netapp.com>
```

   a. 驗證簽名： `rpm --checksig NetApp-MetroCluster-Tiebreaker-Software-1.5-1.x86_64.rpm`

   ```
   NetApp-MetroCluster-Tiebreaker-Software-1.5-1.x86_64.rpm: digests OK
   ```

   > 您必須在成功驗證簽名之後、才能繼續安裝。

5. [[install-tiebreaker）]安裝或升級Tiebreaker軟體：

   > 從Tiebreaker 1.4版升級時、您只能升級至Tiebreaker 1.5版。不支援從舊版升級至Tiebreaker 1.5。

   根據您是執行新安裝還是升級現有安裝、選擇正確的程序。

執行新安裝

a. 擷取並記錄 Java 的絕對路徑：

```
[root@mcctb ~]# readlink -f /usr/bin/java
/usr/lib/jvm/java-19-openjdk-19.0.0.0.36-
2.rolling.el8.x86_64/bin/java
```

b. 執行下列命令： `rpm -ivh NetApp-MetroCluster-Tiebreaker-Software-1.5-1.x86_64.rpm`

系統會顯示下列輸出、以利成功安裝：

> 在安裝期間出現提示時、請提供您先前建立並指派給的非 root 使用者 `mcctbgrp` 群組：

```
Verifying...
################################# [100%]
Preparing...
################################# [100%]
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################# [100%]
Enter the absolute path for Java : /usr/lib/jvm/java-19-openjdk-
19.0.0.0.36-2.rolling.el8.x86_64/bin/java
Verifying if Java exists...
Found Java. Proceeding with the installation.
Enter host user account to use for the installation:
mcctbuser1
User account mcctbuser1 found. Proceeding with the installation
Enter database user name:
root
Please enter database password for root
Enter password:
Sealed          false
Do you wish to auto unseal vault(y/n)?y
Enter the key1:
Enter the key2:
Enter the key3:
Success! Uploaded policy: mcctb-policy
Error enabling approle auth: Error making API request.
URL: POST http://127.0.0.1:8200/v1/sys/auth/approle
Code: 400. Errors:
* path is already in use at approle/
Success! Enabled the kv secrets engine at: mcctb/
Success! Data written to: auth/approle/role/mcctb-app
Password updated successfully in the vault.
Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software
Created symlink /etc/systemd/system/multi-
user.target.wants/netapp-metrocluster-tiebreaker-software.service
→ /etc/systemd/system/netapp-metrocluster-tiebreaker-
software.service.
Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Successfully installed NetApp MetroCluster Tiebreaker software
version 1.5.
```

升級現有的安裝

a. 確認已安裝受支援版本的OpenJDK、而且是主機上目前的Java版本。

> 若要升級至Tiebreaker 1.5、您必須安裝OpenJDK 17、18或19版。

```
[root@mcctb ~]# readlink -f /usr/bin/java
/usr/lib/jvm/java-19-openjdk-19.0.0.0.36-
2.rolling.el8.x86_64/bin/java
```

b. 確認Vault服務未密封且正在執行： `vault status`

```
[root@mcctb ~]# vault status
Key             Value
---             -----
Seal Type       shamir
Initialized     true
Sealed          false
Total Shares    5
Threshold       3
Version         1.12.2
Build Date      2022-11-23T12:53:46Z
Storage Type    file
Cluster Name    vault
Cluster ID      <cluster_id>
HA Enabled      false
```

c. 升級Tiebreaker軟體。

```
[root@mcctb ~]# rpm -Uvh NetApp-MetroCluster-Tiebreaker-Software-
1.5-1.x86_64.rpm
```

系統會顯示下列輸出以成功升級：

```
Verifying...
################################# [100%]
Preparing...
################################# [100%]
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################# [ 50%]

Enter the absolute path for Java : /usr/lib/jvm/java-19-openjdk-
19.0.0.0.36-2.rolling.el8.x86_64/bin/java
Verifying if Java exists...
Found Java. Proceeding with the installation.
Enter host user account to use for the installation:
mcctbuser1
User account mcctbuser1 found. Proceeding with the installation
Sealed          false
Do you wish to auto unseal vault(y/n)?y
Enter the key1:
Enter the key2:
Enter the key3:
Success! Uploaded policy: mcctb-policy
Error enabling approle auth: Error making API request.
URL: POST http://127.0.0.1:8200/v1/sys/auth/approle
Code: 400. Errors:
* path is already in use at approle/
Success! Enabled the kv secrets engine at: mcctb/
Success! Data written to: auth/approle/role/mcctb-app
Enter database user name : root
Please enter database password for root
Enter password:
Password updated successfully in the database.
Password updated successfully in the vault.
Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software
Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Successfully upgraded NetApp MetroCluster Tiebreaker software to
version 1.5.
Cleaning up / removing...
   2:NetApp-MetroCluster-Tiebreaker-
So################################# [100%]
```

> 如果您輸入錯誤的MySQL根密碼、則Tiebreaker軟體會指出已成功安裝、但會顯示「拒絕存取」訊息。若要解決此問題、您必須使用「rpm -e」命令解除安裝Tiebreaker軟體、然後使用正確的MySQL root密碼重新安裝軟體。

6. 開啟從斷路器主機到每個節點管理生命期和叢集管理生命期的SSH連線、以檢查斷路器與MetroCluster 該軟件的連線。

相關資訊

"NetApp支援"

安裝斷路器 1.4

安裝 MetroCluster Tiebreaker 1.4 相依性

安裝或升級 tiebreaker 軟體之前、請先安裝 MySQL 或 MariaDB 伺服器、視您的主機 Linux 作業系統而定。

步驟

1. 安裝 JDK。
2. 安裝MySQL或MariaDB伺服器：

如果Linux主機是	然後…
Red Hat Enterprise Linux 7/CentOS 7.	在 Red Hat Enterprise Linux 7 或 CentOS 7 上安裝 MySQL Server 5.5.30 或更新版本和 5.6.x 版本
Red Hat Enterprise Linux 8	在 Red Hat Enterprise Linux 8 上安裝 MariaDB 伺服器

安裝 JDK

在安裝或升級 tiebreaker 軟體之前、您必須在主機系統上安裝 JDK 。Tiebreaker 1.4 及更早版本支援 JDK 1.8.0 。（JRE 8）。

步驟

1. 以「 root 」使用者身分登入。

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2017 from host.domain.com
```

2. 安裝 JDK 1.8.0 ：

```
yum install java-1.8.0-openjdk.x86_64
```

```
[root@mcctb ~]# yum install java-1.8.0-openjdk.x86_64
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
... shortened....
Dependencies Resolved

=================================================================================
Package                Arch   Version                  Repository    Size
=================================================================================
Installing:
 java-1.8.0-openjdk  x86_64  1:1.8.0.144-0.b01.el7_4 updates      238 k
 ..
 ..
Transaction Summary
=================================================================================
Install  1 Package  (+ 4 Dependent packages)

Total download size: 34 M
Is this ok [y/d/N]: y

Installed:
java-1.8.0-openjdk.x86_64 1:1.8.0.144-0.b01.el7_4
Complete!
```

在 **Red Hat Enterprise Linux 7** 或 **CentOS 7** 上安裝 **MySQL Server 5.5.30** 或更新版本和 **5.6.x** 版本

安裝或升級Tiebreaker軟體之前、您必須先在主機系統上安裝MySQL Server 5.5.30或更新版本及5.6.x版本。 對於 Red Hat Enterprise Linux 8 、 安裝 MariaDB 伺服器。

步驟

1. 以root使用者身分登入。

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2016 from host.domain.com
```

2. 將MySQL儲存庫新增至主機系統：

   [root@mcctb ~]# yum localinstall https://dev.mysql.com/get/mysql57-community-release-el6-11.noarch.rpm`

```
Loaded plugins: product-id, refresh-packagekit, security, subscription-
manager
Setting up Local Package Process
Examining /var/tmp/yum-root-LLUw0r/mysql-community-release-el6-
5.noarch.rpm: mysql-community-release-el6-5.noarch
Marking /var/tmp/yum-root-LLUw0r/mysql-community-release-el6-
5.noarch.rpm to be installed
Resolving Dependencies
--> Running transaction check
---> Package mysql-community-release.noarch 0:el6-5 will be installed
--> Finished Dependency Resolution
Dependencies Resolved
=============================================================================
========
Package               Arch   Version
                                     Repository
Size
=============================================================================
========
Installing:
mysql-community-release
                       noarch el6-5 /mysql-community-release-el6-
5.noarch 4.3 k
Transaction Summary
=============================================================================
========
Install       1 Package(s)
Total size: 4.3 k
Installed size: 4.3 k
Is this ok [y/N]: y
Downloading Packages:
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing : mysql-community-release-el6-5.noarch
1/1
  Verifying  : mysql-community-release-el6-5.noarch
1/1
Installed:
  mysql-community-release.noarch 0:el6-5
Complete!
```

3. 停用MySQL 57儲存庫：

[root@mcctb ~]# yum-config-manager -disablemysql57-community

4. 啟用MySQL 56儲存庫：

   [root@mcctb ~]# yum-config-manager --enable mysql56-community

5. 啟用儲存庫：

   [root@mcctb ~]# yum repolist enabled| grep "mysql.**-community.**

```
mysql-connectors-community           MySQL Connectors Community
21
mysql-tools-community                MySQL Tools Community
35
mysql56-community                    MySQL 5.6 Community Server
231
```

6. 安裝MySQL社群伺服器：

   [root@mcctb ~]# yum install mysql-community-server'

```
Loaded plugins: product-id, refresh-packagekit, security, subscription-
manager
This system is not registered to Red Hat Subscription Management. You
can use subscription-manager
to register.
Setting up Install Process
Resolving Dependencies
--> Running transaction check
 .....Output truncated.....
---> Package mysql-community-libs-compat.x86_64 0:5.6.29-2.el6 will be
obsoleting
--> Finished Dependency Resolution
Dependencies Resolved
================================================================================
======
Package                          Arch   Version       Repository
Size
================================================================================
======
Installing:
 mysql-community-client         x86_64  5.6.29-2.el6  mysql56-community
18  M
     replacing  mysql.x86_64 5.1.71-1.el6
 mysql-community-libs           x86_64  5.6.29-2.el6  mysql56-community
1.9 M
     replacing  mysql-libs.x86_64 5.1.71-1.el6
```

```
 mysql-community-libs-compat    x86_64  5.6.29-2.el6  mysql56-community
1.6 M
     replacing  mysql-libs.x86_64 5.1.71-1.el6
 mysql-community-server         x86_64  5.6.29-2.el6  mysql56-community
53  M
     replacing  mysql-server.x86_64 5.1.71-1.el6
Installing for dependencies:
mysql-community-common          x86_64  5.6.29-2.el6  mysql56-community
308 k

Transaction Summary
=================================================================================
=======
Install       5 Package(s)
Total download size: 74 M
Is this ok [y/N]: y
Downloading Packages:
(1/5): mysql-community-client-5.6.29-2.el6.x86_64.rpm       |  18 MB
00:28
(2/5): mysql-community-common-5.6.29-2.el6.x86_64.rpm       | 308 kB
00:01
(3/5): mysql-community-libs-5.6.29-2.el6.x86_64.rpm         | 1.9 MB
00:05
(4/5): mysql-community-libs-compat-5.6.29-2.el6.x86_64.rpm  | 1.6 MB
00:05
(5/5): mysql-community-server-5.6.29-2.el6.x86_64.rpm       |  53 MB
03:42
 ---------------------------------------------------------------------------
--------
Total                                                 289 kB/s |  74 MB
04:24
warning: rpmts_HdrFromFdno: Header V3 DSA/SHA1 Signature, key ID
<key_id> NOKEY
Retrieving key from file:/etc/pki/rpm-gpg/RPM-GPG-KEY-mysql
Importing GPG key 0x5072E1F5:
 Userid : MySQL Release Engineering <mysql-build@oss.oracle.com>
Package: mysql-community-release-el6-5.noarch
         (@/mysql-community-release-el6-5.noarch)
 From   : file:/etc/pki/rpm-gpg/RPM-GPG-KEY-mysql
Is this ok [y/N]: y
Running rpm_check_debug
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing : mysql-community-common-5.6.29-2.el6.x86_64
....Output truncated....
```

```
1.el6.x86_64
7/8
  Verifying  : mysql-5.1.71-1.el6.x86_64
8/8
Installed:
  mysql-community-client.x86_64 0:5.6.29-2.el6
  mysql-community-libs.x86_64 0:5.6.29-2.el6
  mysql-community-libs-compat.x86_64 0:5.6.29-2.el6
  mysql-community-server.x86_64 0:5.6.29-2.el6

Dependency Installed:
  mysql-community-common.x86_64 0:5.6.29-2.el6

Replaced:
  mysql.x86_64 0:5.1.71-1.el6 mysql-libs.x86_64 0:5.1.71-1.el6
  mysql-server.x86_64 0:5.1.71-1.el6
Complete!
```

7. 啟動MySQL伺服器：

```
Initializing MySQL database:  2016-04-05 19:44:38 0 [Warning] TIMESTAMP
with implicit DEFAULT value is deprecated. Please use
--explicit_defaults_for_timestamp server option (see documentation
for more details).
2016-04-05 19:44:38 0 [Note] /usr/sbin/mysqld (mysqld 5.6.29)
        starting as process 2487 ...
2016-04-05 19:44:38 2487 [Note] InnoDB: Using atomics to ref count
        buffer pool pages
2016-04-05 19:44:38 2487 [Note] InnoDB: The InnoDB memory heap is
disabled
....Output truncated....
2016-04-05 19:44:42 2509 [Note] InnoDB: Shutdown completed; log sequence
       number 1625987

PLEASE REMEMBER TO SET A PASSWORD FOR THE MySQL root USER!
To do so, start the server, then issue the following commands:

  /usr/bin/mysqladmin -u root password 'new-password'
  /usr/bin/mysqladmin -u root -h mcctb password 'new-password'

Alternatively, you can run:
  /usr/bin/mysql_secure_installation

which will also give you the option of removing the test
databases and anonymous user created by default.  This is
strongly recommended for production servers.
.....Output truncated.....
WARNING: Default config file /etc/my.cnf exists on the system
This file will be read by default by the MySQL server
If you do not want to use this, either remove it, or use the
--defaults-file argument to mysqld_safe when starting the server

                                                           [  OK  ]
Starting mysqld:                                           [  OK  ]
```

8. 確認MySQL伺服器正在執行：

   [root@mcctb ~]#服務mysqLD狀態

```
mysqld (pid  2739) is running...
```

9. 設定安全性和密碼設定：

```
NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MySQL
```

```
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

 In order to log into MySQL to secure it, we'll need the current
 password for the root user.  If you've just installed MySQL, and
 you haven't set the root password yet, the password will be blank,
 so you should just press enter here.

 Enter current password for root (enter for none):   <== on default
install
                                                         hit enter here
 OK, successfully used password, moving on...

 Setting the root password ensures that nobody can log into the MySQL
 root user without the proper authorization.

 Set root password? [Y/n] y
 New password:
 Re-enter new password:
 Password updated successfully!
 Reloading privilege tables..
  ... Success!

 By default, a MySQL installation has an anonymous user, allowing anyone
 to log into MySQL without having to have a user account created for
 them.  This is intended only for testing, and to make the installation
 go a bit smoother.  You should remove them before moving into a
 production environment.

 Remove anonymous users? [Y/n] y
  ... Success!

 Normally, root should only be allowed to connect from 'localhost'.
This
 ensures that someone cannot guess at the root password from the
network.

 Disallow root login remotely? [Y/n] y
  ... Success!

 By default, MySQL comes with a database named 'test' that anyone can
 access.  This is also intended only for testing, and should be removed
 before moving into a production environment.

 Remove test database and access to it? [Y/n] y
  - Dropping test database...
 ERROR 1008 (HY000) at line 1: Can't drop database 'test';
 database doesn't exist
```

```
 ... Failed!  Not critical, keep moving...
 - Removing privileges on test database...
 ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] y
 ... Success!

All done!  If you've completed all of the above steps, your MySQL
installation should now be secure.

Thanks for using MySQL!

Cleaning up...
```

10. 驗證MySQL登入是否正常運作：

```
Enter password: <configured_password>
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 17
Server version: 5.6.29 MySQL Community Server (GPL)

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input
statement.
mysql>
```

當 MySQL 登入如預期般運作時、輸出會在結束 `mysql>` 提示。

啟用 **MySQL** 自動啟動設定

您應該確認MySQL精靈的自動啟動功能已開啟。開啟MySQL精靈會在MetroCluster 系統重新開機時、自動重新啟動MySQL。如果MySQL精靈未執行、則tiebreaker軟體會繼續執行、但無法重新啟動、也無法進行組態變更。

步驟

1. 驗證MySQL在開機時是否已啟用自動啟動：

[root@mcctb ~]# systemctl list-unit-filesmysqld.service`

```
UNIT FILE          State
------------------ ----------
mysqld.service     enabled
```

如果MySQL在開機時未啟用自動啟動、請參閱MySQL文件、以啟用安裝的自動啟動功能。

在 **Red Hat Enterprise Linux 8** 上安裝 **MariaDB** 伺服器

您必須先在主機系統上安裝MariaDB伺服器、才能安裝或升級tiebreaker軟體。 對於 Red Hat Enterprise Linux 7 或 CentOS 7 、 安裝 MySQL Server。

開始之前

您的主機系統必須在Red Hat Enterprise Linux（RHEL）8上執行。

步驟

1. 以登入 `root` 使用者：

```
login as: root
root@mcctb's password:
Last login: Fri Jan  8 21:33:00 2017 from host.domain.com
```

2. 安裝 MariaDB 伺服器：

[root@mcctb ~]# yum install MariaDB-server.x86_64

```
[root@mcctb ~]# yum install mariadb-server.x86_64
Loaded plugins: fastestmirror, langpacks
 ...
 ...

=================================================================================
 Package                      Arch   Version         Repository
Size
=================================================================================
Installing:
mariadb-server               x86_64   1:5.5.56-2.el7   base
11 M
Installing for dependencies:

Transaction Summary
=================================================================================
```

```
===
Install  1 Package  (+8 Dependent packages)
Upgrade             ( 1 Dependent package)

Total download size: 22 M
Is this ok [y/d/N]: y

Downloading packages:
No Presto metadata available for base warning:
/var/cache/yum/x86_64/7/base/packages/mariadb-libs-5.5.56-
2.el7.x86_64.rpm:
Header V3 RSA/SHA256 Signature,
key ID f4a80eb5: NOKEY] 1.4 MB/s | 3.3 MB  00:00:13 ETA
Public key for mariadb-libs-5.5.56-2.el7.x86_64.rpm is not installed
(1/10): mariadb-libs-5.5.56-2.el7.x86_64.rpm  | 757 kB  00:00:01
..
..
(10/10): perl-Net-Daemon-0.48-5.el7.noarch.rpm|  51 kB  00:00:01
--------------------------------------------------------------------------
-----------------
Installed:
  mariadb-server.x86_64 1:5.5.56-2.el7

Dependency Installed:
mariadb.x86_64 1:5.5.56-2.el7
perl-Compress-Raw-Bzip2.x86_64 0:2.061-3.el7
perl-Compress-Raw-Zlib.x86_64 1:2.061-4.el7
perl-DBD-MySQL.x86_64 0:4.023-5.el7
perl-DBI.x86_64 0:1.627-4.el7
perl-IO-Compress.noarch 0:2.061-2.el7
perl-Net-Daemon.noarch 0:0.48-5.el7
perl-PlRPC.noarch 0:0.2020-14.el7

Dependency Updated:
  mariadb-libs.x86_64 1:5.5.56-2.el7
Complete!
```

3. 啟動MariaDB伺服器：

   [root@mcctb ~]# systemcl start MariaDB

4. 確認MariaDB伺服器已啟動：

   [root@mcctb ~]# systemctl狀態MariaDB

```
[root@mcctb ~]# systemctl status mariadb
mariadb.service - MariaDB database server
...
Nov 08 21:28:59 mcctb systemd[1]: Starting MariaDB database server...
...
Nov 08 21:29:01 mcctb systemd[1]: Started MariaDB database server.
```

5. 設定安全性和密碼設定：

> 當系統提示您輸入 root 密碼時、請將其保留空白、然後按 Enter 鍵繼續設定安全性和密碼設定。

```
root@localhost systemd]# mysql_secure_installation

 NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user.  If you've just installed MariaDB, and
you haven't set the root password yet, the password will be blank,
so you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password ensures that nobody can log into the MariaDB
root user without the proper authorisation.

Set root password? [Y/n] y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
 ... Success!


By default, a MariaDB installation has an anonymous user, allowing
anyone
to log into MariaDB without having to have a user account created for
them.  This is intended only for testing, and to make the installation
go a bit smoother.  You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] y
 ... Success!
```

```
Normally, root should only be allowed to connect from 'localhost'.  This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] y
 ... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access.  This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] y
 - Dropping test database...
  ... Success!
 - Removing privileges on test database...
   ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n]

  ... Success!

Cleaning up...

All done!  If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
```

啟用 **MariaDB** 伺服器的自動啟動設定

您應該確認 MariaDB 伺服器的自動啟動功能已開啟。如果您未啟用自動啟動功能、MetroCluster 且駐留的系統必須重新開機、則tiebreaker軟體會繼續執行、但無法重新啟動MariaDB服務、也無法進行組態變更。

步驟

1. 啟用自動啟動服務：

   [root@mcctb ~]# systemctl enable mariadb.service`

2. 確認已啟用MariaDB、以便在開機時自動啟動：

   [root@mcctb ~]# systemctl list-unit-filesmariadb.service`

```
UNIT FILE           State
------------------ ----------
mariadb.service     enabled
```

安裝或升級至 **tiebreaker 1.4**

在主機 Linux 作業系統上執行新的安裝或升級至 tiebreaker 1.4 、以監控 MetroCluster 組態。

關於這項工作

- 您的儲存系統必須執行支援的 ONTAP 版本。請參閱 "軟體需求" 詳細資料請見下表。
- 您必須使用安裝OpenJDK `yum install java-x.x.x-openjdk` 命令。Tiebreaker 1.4 及更早版本支援 JDK 1.8.0 （ JRE 8 ）。

步驟

1. 下載 MetroCluster Tiebreaker 軟體。

   "MetroCluster Tiebreaker （下載） - NetApp 支援網站"

2. 以root使用者身分登入主機。
3. [[install-tiebreaker]]安裝或升級Tiebreaker軟體：

   根據您是執行新安裝還是升級現有安裝、選擇正確的程序。

執行新安裝

a. 執行以下項目來安裝 tiebreaker 軟體：

```
rpm -ivh NetApp-MetroCluster-Tiebreaker-Software-1.4-1.x86_64.rpm
```

系統會顯示下列輸出、以利成功安裝：

```
Verifying...
################################# [100%]
Preparing...
################################# [100%]
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################# [100%]
Post installation start Fri Apr  5 02:28:09 EDT 2024
Enter MetroCluster Tiebreaker user password:

Please enter mysql root password when prompted
Enter password:
Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software
Created symlink /etc/systemd/system/multi-
user.target.wants/netapp-metrocluster-tiebreaker-software.service
→ /etc/systemd/system/netapp-metrocluster-tiebreaker-
software.service.
Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Enabled autostart of NetApp MetroCluster Tiebreaker software
daemon during boot
Created symbolic link for NetApp MetroCluster Tiebreaker software
CLI
Post installation end Fri Apr  5 02:28:22 EDT 2024
Successfully installed NetApp MetroCluster Tiebreaker software
version 1.4.
```

升級現有安裝

a. 升級Tiebreaker軟體。

```
[root@mcctb ~]# rpm -Uvh NetApp-MetroCluster-Tiebreaker-Software-
1.4-1.x86_64.rpm
```

系統會顯示下列輸出以成功升級：

```
Verifying...
################################# [100%]
Preparing...
################################# [100%]
Upgrading NetApp MetroCluster Tiebreaker software....
Stopping NetApp MetroCluster Tiebreaker software services before
upgrade.
Updating / installing...
   1:NetApp-MetroCluster-Tiebreaker-
So################################## [ 50%]
Post installation start Mon Apr  8 06:29:51 EDT 2024
Synchronizing state of netapp-metrocluster-tiebreaker-
software.service with SysV service script with
/usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable netapp-
metrocluster-tiebreaker-software
Attempting to start NetApp MetroCluster Tiebreaker software
services
Started NetApp MetroCluster Tiebreaker software services
Enabled autostart of NetApp MetroCluster Tiebreaker software
daemon during boot
Created symbolic link for NetApp MetroCluster Tiebreaker software
CLI
Post upgrade end Mon Apr  8 06:29:51 EDT 2024
Successfully upgraded NetApp MetroCluster Tiebreaker software to
version 1.4.
Cleaning up / removing...
   2:NetApp-MetroCluster-Tiebreaker-
So################################## [100%]
```

> 如果您輸入錯誤的MySQL根密碼、則Tiebreaker軟體會指出已成功安裝、但會顯示「拒絕存取」訊息。若要解決此問題、您必須使用「rpm -e」命令解除安裝Tiebreaker軟體、然後使用正確的MySQL root密碼重新安裝軟體。

4. 開啟從斷路器主機到每個節點管理生命期和叢集管理生命期的SSH連線、以檢查斷路器與MetroCluster 該軟件的連線。

相關資訊

"NetApp支援"

升級正在執行 tiebreaker 監視器的主機

您可能需要升級正在執行 tiebreaker 監視器的主機。

步驟

1. 解除安裝 tiebreaker 軟體：

   ```
   rpm -e NetApp-MetroCluster-Tiebreaker-Software
   ```

2. 升級主機。如需詳細資訊、請參閱主機作業系統文件。
3. 重新安裝 tiebreaker 軟體。

   請依照中的步驟執行全新安裝的 tiebreaker "安裝Tiebreaker軟體"。

設定Tiebreaker軟體

安裝了Tiebreaker軟體之後、您可以新增或修改MetroCluster 任何版本的物件組態、或是從Tiebreaker軟體中移除這些組態。

啟動Tiebreaker軟體CLI

安裝Tiebreaker軟體之後、您必須啟動其CLI來設定軟體。

1. 從安裝軟體的主機提示字元啟動CLI：

   《NetApp-MetroCluster-tiebreer-software-cli》

2. 安裝完成後、第一次啟動時、請輸入密碼、讓Tiebreaker使用者存取資料庫。這是您在安裝期間為資料庫使用者指定的密碼。

新增MetroCluster 功能

安裝完NetApp MetroCluster 斷點器軟體之後、您可以一MetroCluster 次新增更多的一套功能。

您必須已在MetroCluster 一個不支援的環境中安裝了這個支援功能、ONTAP 並啟用軟體中的設定。

1. 使用tiebreaker命令列介面（CLI）監控器add命令來新增MetroCluster 物件組態。

   如果您使用的是主機名稱、則必須是完整網域名稱（FQDN）。

   下列範例顯示叢集A的組態：

```
NetApp MetroCluster Tiebreaker :> monitor add wizard
Enter monitor Name: cluster_A
Enter Cluster IP Address: 10.222.196.130
Enter Cluster Username: admin
Enter Cluster Password:
Enter Peer Cluster IP Address: 10.222.196.40
Enter Peer Cluster Username: admin
Enter Peer Cluster Password:
Successfully added monitor to NetApp MetroCluster Tiebreaker software.
```

2. 使用MetroCluster tiebreaker CLI "monitorer show -STATUS"命令、確認已正確新增此功能。

```
NetApp MetroCluster Tiebreaker :> monitor show -status
```

3. 停用斷路器軟體的觀察模式、以便在偵測到站台故障後自動啟動切換：

   「監控者修改-監 控名稱監控名稱-觀察者 模式錯」

```
NetApp MetroCluster Tiebreaker :> monitor modify -monitor-name 8pack
-observer-mode false
Warning: If you are turning observer-mode to false, make sure to review
the 'risks and limitations'
as described in the MetroCluster Tiebreaker installation and
configuration.
Are you sure you want to enable automatic switchover capability for
monitor "8pack"? [Y/N]: y
```

相關資訊

"在MetroCluster 作用中模式中使用ESITirepreaker的風險和限制"

修改MetroCluster 斷點器組態的命令

您可以在MetroCluster 需要變更設定時修改此功能的組態。

Tiebreaker CLI監控修改命令可搭配下列任一選項使用。您可以使用監控show -STATUS命令來確認變更。

選項	說明
-監 控名稱	系統名稱MetroCluster
-enable監控	啟用和停用MetroCluster 監控功能

無訊息期間	在偵測到站台故障後、由斷位器軟體等待確認的期間（以秒為單位）MetroCluster
觀察者模式	觀察者模式（true）僅提供監控功能、不會在站台發生災難時觸發切換。線上模式（假）會在站台發生災難時觸發切換。 • "Tiebreaker軟體如何偵測站台故障" • "在MetroCluster 作用中模式中使用ESITirepreaker的風險和限制"

下列範例會變更組態的無訊息期間。

```
NetApp MetroCluster Tiebreaker :> monitor modify -monitor-name cluster_A
-silent-period 15
Successfully modified monitor in NetApp MetroCluster Tiebreaker
software.
```

tiebreaker CLI的「debug」命令可用來變更記錄模式。

命令	說明
偵錯狀態	顯示偵錯模式的狀態
啟用偵錯	啟用記錄的偵錯模式
停用偵錯	停用記錄的偵錯模式

在執行tiebreaker 1.4及更早版本的系統中、tiebreaker CLI `update-mcctb-password` 命令可用於更新使用者密碼。此命令已在tiebreaker 1.5及更新版本中過時。

命令	說明
update-mcctb-password	使用者密碼已成功更新

移除MetroCluster 部分組態

當MetroCluster 您不想再監控MetroCluster 某個非重複組態時、可以移除正在由斷路器軟體監控的非重複組態。

1. 使用tiebreaker CLI "monitor" remove"命令來移除MetroCluster 該組態。

   在下列範例中、「叢集_a'」會從軟體中移除：

```
NetApp MetroCluster Tiebreaker :> monitor remove -monitor-name cluster_A
Successfully removed monitor from NetApp MetroCluster Tiebreaker
software.
```

2. 使用tiebreaker CLI "monitorer show -STATUS"命令、確認MetroCluster 已正確移除該組態。

```
NetApp MetroCluster Tiebreaker :> monitor show -status
```

設定斷路器軟體的SNMP設定

若要將SNMP搭配Tiebreaker軟體使用、您必須設定SNMP設定。

1. 使用tiebreaker CLI `snmp config wizard` 命令以新增MetroCluster 功能。

   目前僅支援一個SNMP設陷主機。

   以下範例顯示支援SNMP V3的SNMP接收器組態、IP位址為10.240.45.66、而設陷訊息則為連接埠號碼162。Tiebreaker軟體已準備好傳送設陷到您指定的SNMP接收器。

```
NetApp MetroCluster Tiebreaker :> snmp config wizard
Enter SNMP Version[V1/V3]: v3
Enter SNMP Host: 10.240.45.66
Enter SNMP Port: 162
Enter SNMP V3 Security Name: v3sec
Enter SNMP V3 Authentication password:
Enter SNMP V3 Privacy password:
Engine ID : 8000031504932eff571825192a6f1193b265e24593
Successfully added SNMP properties to NetApp MetroCluster Tiebreaker
software.
```

   您應該設定v3、因為SNMPv1不安全。請確定預設的社群字串*不是*設為公用。

2. 確認已設定SNMP設定：

   "NMP組態測試"

   下列範例顯示、Tiebreaker軟體可傳送事件test_SNMP設陷的SNMP：

```
NetApp MetroCluster Tiebreaker :> snmp config test
Sending SNMP trap to localhost. Version : V1.
Successfully sent SNMP trap for event TEST_SNMP_CONFIG
NetApp MetroCluster Tiebreaker :>
```

監控MetroCluster 功能組態

藉由讓您監控功能、評估傳送給NetApp客戶支援的SNMP事件和陷阱、以及檢視監控作業的狀態、還原軟體可將恢復程序自動化。MetroCluster MetroCluster

設定AutoSupport 功能

根據預設、AutoSupport 在安裝Tiebreaker軟體一週後、會將這些資訊傳送給NetApp。觸發AutoSupport 故障通知的事件包括斷路器軟體故障、MetroCluster 偵測到有關故障狀況的資訊、或是未知MetroCluster 的故障設定狀態。

開始之前

您必須能夠直接存取才能設定AutoSupport 不必要訊息。

步驟

1. 使用tiebreaker CLI AutoSupport isfuse命令搭配下列任一選項：

選項	說明
叫用	傳送AutoSupport 一個消息給客戶支援部門
設定精靈	設定Proxy伺服器認證的精靈
刪除組態	刪除Proxy伺服器認證
啟用	啟用AutoSupport 功能不通知（這是預設值）。
停用	停用AutoSupport 資訊通知
-show	顯示AutoSupport 畫面的不均狀態

下列範例顯示AutoSupport 啟用或停用了功能、AutoSupport 以及發佈了該功能的目的地：

```
NetApp MetroCluster Tiebreaker :> autosupport enable
AutoSupport already enabled.

NetApp MetroCluster Tiebreaker :> autosupport disable
AutoSupport status            : disabled
Proxy Server IP Address       : 10.234.168.79
Proxy Server Port Number      : 8090
Proxy Server Username         : admin
AutoSupport destination       :
https://support.netapp.com/asupprod/post/1.0/postAsup

NetApp MetroCluster Tiebreaker :> autosupport enable
AutoSupport status            : enabled
Proxy Server IP Address       : 10.234.168.79
Proxy Server Port Number      : 8090
Proxy Server Username         : admin
AutoSupport destination       :
https://support.netapp.com/asupprod/post/1.0/postAsup

NetApp MetroCluster Tiebreaker :> autosupport invoke
AutoSupport transmission      : success
Proxy Server IP Address       : 10.234.168.79
Proxy Server Port Number      : 8090
Proxy Server Username         : admin
AutoSupport destination       :
https://support.netapp.com/asupprod/post/1.0/postAsup
```

以下範例顯示AutoSupport 使用IP位址和連接埠號碼、透過驗證的Proxy伺服器進行的靜態設定：

```
NetApp MetroCluster Tiebreaker :> autosupport configure wizard
Enter Proxy Server IP address :  10.234.168.79
Enter Proxy Server port number :  8090
Enter Proxy Server Username :  admin
Enter Proxy Server Password : 123abc
Autosupport configuration updated successfully.
```

以下範例顯示AutoSupport 刪除一個示例：

```
NetApp MetroCluster Tiebreaker :> autosupport delete configuration
Autosupport configuration deleted successfully.
```

SNMP事件與設陷

NetApp MetroCluster 的NetApp產品區斷路器軟體使用SNMP設陷來通知您重大事件。這些陷阱是NetApp mib檔案的一部分。每個陷阱都包含下列資訊：陷阱名稱、嚴重性、影響層級、時間戳記和訊息。

事件名稱	活動詳細資料	陷阱號碼
無法連線到BIOS組態MetroCluster MetroCluster	警告系統管理員軟體無法偵測到災難。當兩個叢集都無法連線時、就會發生此事件。	25000
無法連線至叢集的資訊MetroCluster	警告系統管理員、軟體無法連絡到其中一個叢集。	25001
支援叢集時偵測到災難MetroCluster	通知管理員軟體偵測到站台故障。系統將會傳送通知。	25002
合作夥伴叢集之間的所有連結都會中斷。	軟體偵測到兩個叢集都可連線、但兩個叢集之間的所有網路路徑都已關閉、而且叢集無法彼此通訊。	25005.
SNMP測試設陷	現在可以執行SNMP組態測試命令來測試SNMP組態。	25006

顯示監控作業的狀態

您可以顯示監控作業MetroCluster 的整體狀態、以利執行一套功能。

步驟

1. 使用tiebreaker CLI監控器show命令、以MetroCluster 下列任一選項顯示執行動作的狀態：

選項	說明
-監 控名稱	顯示指定監視器名稱的狀態
營運記錄	顯示最多10個上次在叢集上執行的監控作業
統計資料	顯示與指定叢集相關的統計資料
狀態	顯示指定叢集的狀態*注意：* MetroCluster 此功能可能需要10分鐘的時間來反映諸如修復集合體、修復根或切換等作業的完成狀態。

以下範例顯示叢集叢集叢集（cluster）和叢集（cluster）B的連線狀況良好：

```
NetApp MetroCluster Tiebreaker:> monitor show -status
MetroCluster: cluster_A
    Disaster: false
    Monitor State: Normal
    Observer Mode: true
    Silent Period: 15
    Override Vetoes: false
    Cluster: cluster_Ba(UUID:4d9ccf24-080f-11e4-9df2-00a098168e7c)
        Reachable: true
        All-Links-Severed: FALSE
            Node: mcc5-a1(UUID:78b44707-0809-11e4-9be1-e50dab9e83e1)
                Reachable: true
                All-Links-Severed: FALSE
                State: normal
            Node: mcc5-a2(UUID:9a8b1059-0809-11e4-9f5e-8d97cdec7102)
                Reachable: true
                All-Links-Severed: FALSE
                State: normal
    Cluster: cluster_B(UUID:70dacd3b-0823-11e4-a7b9-00a0981693c4)
        Reachable: true
        All-Links-Severed: FALSE
            Node: mcc5-b1(UUID:961fce7d-081d-11e4-9ebf-2f295df8fcb3)
                Reachable: true
                All-Links-Severed: FALSE
                State: normal
            Node: mcc5-b2(UUID:9393262d-081d-11e4-80d5-6b30884058dc)
                Reachable: true
                All-Links-Severed: FALSE
                State: normal
```

在下列範例中、會顯示最近在叢集B上執行的七項作業：

```
NetApp MetroCluster Tiebreaker:> monitor show -operation-history
MetroCluster: cluster_B
 [ 2014-09-15 04:48:32.274 ] MetroCluster Monitor is initialized
 [ 2014-09-15 04:48:32.278 ] Started Discovery and validation of
MetroCluster Setup
 [ 2014-09-15 04:48:35.078 ] Discovery and validation of MetroCluster
Setup succeeded. Started monitoring.
 [ 2014-09-15 04:48:35.246 ] NetApp MetroCluster Tiebreaker software is
able to reach cluster "mcc5a"
 [ 2014-09-15 04:48:35.256 ] NetApp MetroCluster Tiebreaker software is
able to reach cluster "mcc5b"
 [ 2014-09-15 04:48:35.298 ] Link to remote DR cluster is up for cluster
"mcc5a"
 [ 2014-09-15 04:48:35.308 ] Link to remote DR cluster is up for cluster
"mcc5b"
```

顯示**MetroCluster** 部分組態資訊

您可以在MetroCluster Tiebreaker軟體中顯示所有執行個體的顯示器名稱和IP位址。

步驟

1. 使用tiebreaker CLI組態show命令來顯示MetroCluster 有關物件組態的資訊。

   以下範例顯示叢集叢集叢集（cluster）和叢集（cluster）的資訊：

```
MetroCluster: North America
    Monitor Enabled: true
    ClusterA name: cluster_A
    ClusterA IpAddress: 10.222.196.130
    ClusterB name: cluster_B
    ClusterB IpAddress: 10.222.196.140
```

正在建立傾印檔案

您可以將tiebreaker軟體的整體狀態儲存至傾印檔案、以供偵錯之用。

步驟

1. 使用tiebreaker CLI監控dump -STATUS命令、建立一個傾印檔案、說明所有MetroCluster 的整套功能。

   下列範例顯示成功建立/var/log/NetApp/mcctb/metrocluster-tiebreaker-status.xml傾印檔案：

```
NetApp MetroCluster Tiebreaker :> monitor dump -status
MetroCluster Tiebreaker status successfully dumped in file
/var/log/netapp/mcctb/metrocluster-tiebreaker-status.xml
```

在MetroCluster 作用中模式中使用ESITirepreaker的風險和限制

偵測到站台故障時會自動切換、MetroCluster 而使用作用中模式的還原器。此模式可用來輔助ONTAP/FAS自動切換功能。

當您在MetroCluster 作用中模式中實作資料保護斷路器時、下列已知問題可能會導致資料遺失：

- 當站台間連結失敗時、每個站台上的控制器都會繼續為用戶端提供服務。但是控制器不會鏡射。一個站台的控制器故障被識別為站台故障、MetroCluster 而Eeti斷路 器則啟動切換。在站台間連結失敗之後、未鏡射到遠端站台的資料將會遺失。
- 當遠端站台的集合體處於降級狀態時、就會發生切換。如果在Aggregate重新同步之前發生切換、則不會複寫資料。
- 進行切換時、會發生遠端儲存設備故障。
- 儲存控制器中的非揮發性記憶體（NVRAM或NVMEM、視平台機型而定）不會鏡射至合作夥伴站台上的遠端災難恢復（DR）合作夥伴。
- 如果叢集對等網路長時間關機、且中繼資料磁碟區在切換後未上線、中繼資料就會遺失。

> 您可能會遇到未提及的案例。對於MetroCluster 在作用中模式下使用本產品所造成的任何損害、NetApp概不負責。如果您無法接受風險和限制、請勿在MetroCluster 作用中模式中使用斷續器。

防火牆要求MetroCluster

利用多個連接埠與特定服務進行通訊。MetroCluster

下表列出防火牆中必須允許的連接埠：

連接埠/服務	來源	目的地	目的
443 / TCP	Tiebreaker	網際網路	正在傳送AutoSupport 一些資訊給NetApp
22 / TCP	管理主機	Tiebreaker	Tiebreaker管理
443 / TCP	Tiebreaker	叢集管理生命	透過HTTP（SSL）保護與叢集的通訊安全
22 / TCP	Tiebreaker	叢集管理生命	透過SSH保護與叢集的通訊安全

443 / TCP	Tiebreaker	節點管理生命里	透過HTTP（SSL）保護與節點的通訊安全
22 / TCP	Tiebreaker	節點管理生命里	透過SSH保護與節點的通訊安全
162/udp	Tiebreaker	SNMP設陷主機	用於傳送警示通知SNMP設陷
ICMP（ping）	Tiebreaker	叢集管理生命	檢查叢集IP是否可連線
ICMP（ping）	Tiebreaker	節點管理生命里	檢查節點IP是否可連線

事件記錄檔MetroCluster 、適用於還原者

事件記錄檔包含MetroCluster 由資訊斷路器軟體執行的所有動作記錄。

Tiebreaker軟體執行下列動作：

- 偵測站台災難
- 偵測與資料庫、其他斷路器監控器或MetroCluster 還原斷路器軟體相關的組態變更
- 偵測SSH連線和中斷連線
- 探索MetroCluster 各種需求的組態

這些動作會以下列格式記錄在事件記錄檔中：

時間戳記嚴重性/記錄層級執行緒ID模組

```
2022-09-07 06:14:30,797 INFO  [MCCTBCommandServer-16] [SslSupport]
Successfully initiated SSL context. Protocol used is TLSv1.3.
2022-09-07 06:14:34,137 INFO  [MCCTBCommandServer-16] [DataBase]
Successfully read MCCTB database.
2022-09-07 06:14:34,137 INFO  [MCCTBCommandServer-16]
[ConfigurationMonitor] Debug mode disabled.
```

何處可找到其他資訊

您可以深入瞭MetroCluster 解有關功能的組態設定與操作。

包含各種資訊MetroCluster

資訊	主旨

"資訊文件MetroCluster"	• 所有MetroCluster 資訊
"NetApp技術報告4375：NetApp MetroCluster 的《ONTAP 關於NetApp的資訊》9.3"	• 關於整套組態和操作的技術總覽MetroCluster 。 • 最佳實務做法MetroCluster ：
"Fabric附加MetroCluster 的安裝與組態"	• 架構附加MetroCluster 的架構 • 組態佈線 • 設定FC對SAS橋接器 • 設定FC交換器 • 設定MetroCluster 功能不ONTAP 只是功能不一
"延伸MetroCluster 安裝與組態"	• 延伸MetroCluster 架構 • 組態佈線 • 設定FC對SAS橋接器 • 設定MetroCluster 功能不ONTAP 只是功能不一
"安裝與組態MetroCluster"	• 知識產權架構MetroCluster • 連接MetroCluster 纜線連接整個過程 • 設定MetroCluster 功能不ONTAP 只是功能不一
"維護MetroCluster 這些元件"	• 關於進行支援的準則MetroCluster • FC至SAS橋接器和FC交換器的硬體更換或升級與韌體升級程序 • 在光纖附加或延伸MetroCluster 的支援架構組態中熱新增磁碟櫃 • 以光纖連接或延伸MetroCluster 的支援架構組態熱移除磁碟櫃 • 在裝有網路或延伸MetroCluster 的支援架構配置中、更換災難現場的硬體 • 將雙節點架構連接或延伸MetroCluster 的支援架構組態擴充至四節點MetroCluster 的支援架構組態。 • 將四節點的Fabric附加或延伸MetroCluster 功能的支援功能組態擴充至八節點MetroCluster 的支援功能組態。
本文檔Active IQ Unified Manager "NetApp文件：產品指南與資源"	• 監控MetroCluster 不一致的組態和效能
"複本型轉換"	• 將資料從7-Mode儲存系統移轉至叢集式儲存系統