NetApp

Technical Report

Migrating an SVM into a MetroCluster solution
using SnapMirror asynchronous replication

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Abstract

This technical report provides a step-by-step methodology for migrating a storage virtual machine (SVM) from a standalone ONTAP® storage cluster into a MetroCluster solution using SnapMirror®.

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Introduction

NetApp® MetroCluster is a free feature of ONTAP software that provides real-time protection of your storage infrastructure. When deployed, MetroCluster automatically protects existing and new data and SVMs by synchronously replicating data volumes and SVMs between two physically disparate sites.

This implementation guide is useful if you are already using an existing NetApp storage cluster for your data solution, but your data protection requirements have expanded to providing site-level, real-time data protection for all your workloads – new and existing. This document explains how you can get your existing data and SVMs into this new MetroCluster infrastructure.

This implementation guide provides step-by-step instructions to use SnapMirror SVM disaster recovery (SVM DR) technology to migrate individual SVMs currently running on a standalone ONTAP cluster into a new production cluster within your MetroCluster deployment.

Note: Beginning with ONTAP 9.10.1, SVM DR has extended its support to include replication of MetroCluster SVMs to independent, external ONTAP clusters for disaster recovery scenarios. Although this use case is fully supported, it falls outside the scope of this document.

Note: This procedure is restricted by the supported scalability currently provided by SnapMirror for SVM-DR implementation. To understand the current SVM-DR scalability limitations, refer to TR-4015: SnapMirror configuration and best practices guide for ONTAP 9.

Configuration overview

This migration process uses SnapMirror asynchronous to migrate one or more SVMs – including configuration and FlexVol volumes – from a standalone ONTAP storage cluster to a cluster participating in a MetroCluster infrastructure, with the goal of having the migrated SVMs act as a source SVM for MetroCluster replication to a remote MetroCluster DR site (Figure 1).

Note: This process can be used to migrate an SVM into a MetroCluster IP or MetroCluster FC solution.

Figure 1) SVM migration between a stand-alone cluster and a MetroCluster solution.
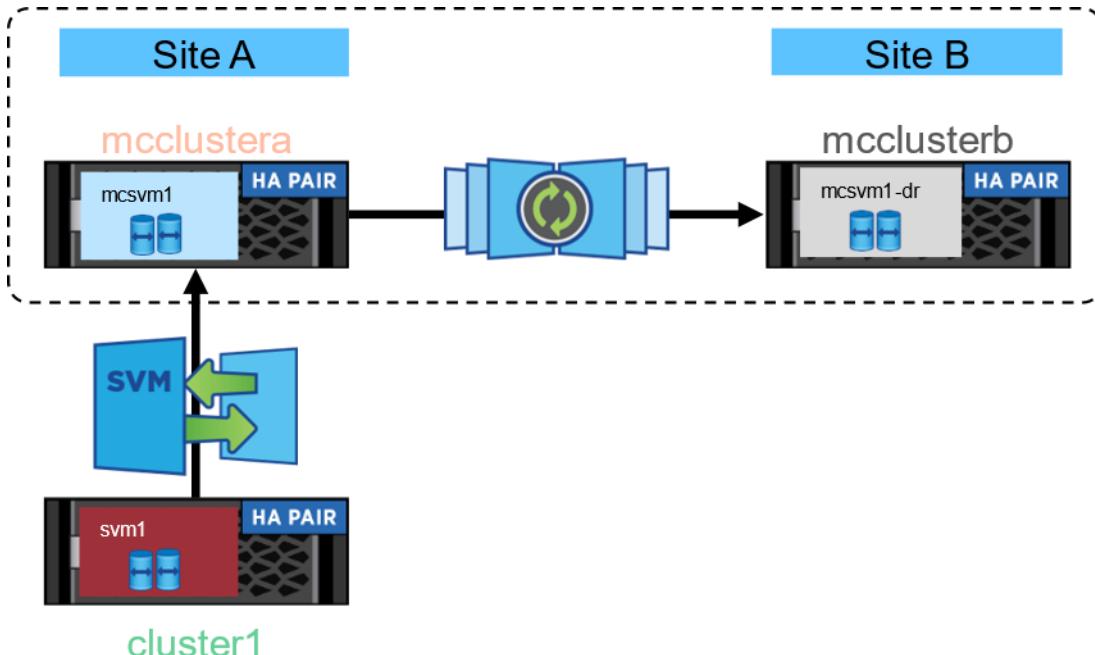
Prerequisites

The following list of prerequisites must be met before starting the migration process. Any aspect of the standalone source ONTAP cluster and the source and destination MetroCluster infrastructure that does not fit these prerequisites invalidates the supportability of this migration process:

- All nodes in the external cluster (migration source) and MetroCluster clusters (migration destination) are running ONTAP 9.5 or later.
- The migrating SVM is hosting NAS services only.
- The MetroCluster infrastructure is already properly configured for operation as described in ONTAP 9 MetroCluster IP Installation and Configuration .
- MetroCluster utilizing either IP or FC site-to-site infrastructure.
- The source and destination cluster ONTAP versions is supported for SnapMirror interoperability as defined in Compatible ONTAP versions for SnapMirror relationships (netapp.com).
- All required intercluster LIF IP addresses and administrator passwords for each cluster are available.
- The MetroCluster inter-switch links are sized to support the data I/O volume of the migrated SVMs.
- The MetroCluster replication switch infrastructure is dedicated to the MetroCluster configuration.

Limitations

The following limitations restrict the supportability of this implementation guide for moving an SVM from a standalone cluster to a MetroCluster cluster.

- This process only supports SVMs hosting NFS, SMB, or both.

  Although it might be possible to migrate SAN LUNs and namespaces, SVM DR does not currently support migration of SAN configuration information. Any LUNs or namespaces hosted by the migrating SVM must be reconfigured when migrated to the MetroCluster infrastructure.

- This process assumes that only a single SVM is migrated at any time.

  Although it might be possible to migrate multiple SVMs simultaneously, this restriction makes sure that each SVM migrates as fast as possible, and without any possibility of outside influences – such as other migrating SVMs – that might impact the SVM migration.

- This process is not supported for migrating SVMs between two MetroCluster infrastructures.

  ONTAP currently restricts migration between two clusters that are part of a MetroCluster infrastructure.

- The MetroCluster ecosystem (NetApp OnCommand®, Active IQ® Unified Manager, Health Monitor, ConfigAdvisor, OnCommand Performance Monitor, and so on) are not supported.

- There is limited support for AutoSupport.

Terminology

The migration process uses the following naming and color conventions to reference various source and destination clusters, SVMs, and volumes. This aids in properly identifying each cluster in the various CLI commands. Actual names of clusters, SVMs, volumes, and aggregates can be of any value appropriate for the customer's production storage environment (use the provided worksheets to document cluster, volume, and SVM information before executing migrations).

Table 1) Naming conventions for migration process.

Names	Description
cluster1	The cluster that hosts the SVM at the beginning of the migration process. This cluster is a standalone cluster outside of the MetroCluster solution that the SVM is being migrated to.
mcclustera	A cluster that is located at one of the two sites that make up the MetroCluster infrastructure. This cluster will be the post-migration primary host of the migrating SVM.
mcclusterb	A cluster that is located at one of the two sites that make up the MetroCluster infrastructure. This cluster will be the MetroCluster DR destination of the SVM once the migration is complete.
svm1	The source SVM that is being migrated from cluster1 to mcclustera.
mcsvm1	The destination SVM that svm1 is being migrated to. This SVM is hosted by mcclustera
mcsvm1-mc	The destination SVM that MetroCluster is replicating from source mcsvm1is being migrated to. This SVM is hosted by mcclusterb
mcsvm1_root	The root volume of mcsvm1 on mcclustera

Before you begin

Overview of steps involved in migrating SVM to MetroCluster

1. Verify that all prerequisites are met.
2. Understand and accept the current limitations of this process.
3. Create the migration target SVM and volumes on the MetroCluster cluster that will be the post-migration production cluster.
4. Create the peering relationship between the external cluster (SVM migration source) and the MetroCluster cluster (SVM migration target destination)
5. Create the SVM peering relationship between the source SVM (external cluster) and the destination SVM (MetroCluster cluster)
6. Create and initialize the SnapMirror relationship between the source SVM and the destination SVM
7. Failover the SVM from the source cluster to the MetroCluster SVM
8. Post-migration cleanup

Migration planning worksheet
Appendix A: SVM volume worksheets provides worksheets that can be used to document each SVM that will be migrated.

Migration process

The following steps are provided to migrate an SVM from a standalone ONTAP cluster source to a destination cluster that is a member of a MetroCluster infrastructure.

Before you begin

It is recommended that you test the process using a non-production SVM hosting at least one volume storing some miscellaneous random data to make sure that the process is understood and successfully migrates an SVM within your specific deployment environment.

Note: All command input parameters and resulting outputs are for reference only. Substitute actual names and IP addresses as appropriate for the specific solution deployment requirements.

Create peer relationship

1. Create cluster peer relationship between cluster1 and mcclustera.

```
mcclustera::> cluster peer create -peer-addrs cluster1 -username admin
Remote Password:
mcclustera::> cluster peer show -instance
Peer Cluster Name: cluster1
              Remote Intercluster Addresses: mcclustera
         Availability of the Remote Cluster: Available
                        Remote Cluster Name: cluster1
                         Active IP Addresses: 10.1.1.246, 10.1.1.243
                       Cluster Serial Number: 1-80-123456
              Address Family of Relationship: ipv4
         Authentication Status Administrative: no-authentication
           Authentication Status Operational: absent
                            Last Update Time: 02/05 21:05:41
                 IPspace for the Relationship: Default
 Encryption for Inter-Cluster Communication: none
```

2. Create mcsvm1 on mcclustera. This is the new production SVM post-migration.

```
mcclustera::> vserver create -vserver mcsvm1
[Job 96] Job succeeded: Vserver creation completed.
```

3. Take the root volume of mcsvm1 offline.

```
mcclustera::>volume offline -vserver mcsvm1 -volume mcsvm1_root
mcclustera::> vserver show -vserver mcsvm1 -fields rootvolume, rootvolume-security-style,
aggregate
  vserver rootvolume aggregate rootvolume-security-style
  ------- ---------- --------- -------------------------
  mcsvm1  mcsvm1_root
                    aggr1     unix
```

4. Delete the root volume of mcsvm1.

    Note: This required advanced level privileges.

```
mcclustera::> set advanced
Warning: These advanced commands are potentially dangerous; use them only when directed to do so
by NetApp personnel.
Do you want to continue? {y|n}: y
mcclustera::*> volume delete -vserver mcsvm1 -volume mcsvm1_root -force true
[Job 98] Job succeeded: Successful
```

5. Stop mcsvm1. This prevents any access to mcsvm1 while performing the next steps.

```
mcclustera::*> vserver stop -vserver mcsvm1
[Job 99] Job succeeded: DONE
mcclustera::*> vserver show -vserver mcsvm1
                                Admin       Operational Root
Vserver        Type    Subtype        state       state       Volume      Aggregate
-----------    ------- -------------- ----------- ----------- ----------- ---------
mcsvm1.        data    default        stopped     stopped     root_vs1    aggr0
mcclustera::> set admin
```

6. Create the SVM peer relationship process between svm1 and mcsvm1.

```
cluster1::> vserver peer create -vserver svm1 -peer-vserver mcsvm1 -applications snapmirror -
peer-cluster mcclustera
```

```
Info: [Job 505] 'vserver peer create' job queued. Vserver creation completed.
cluster1::> vserver peer show -vserver svm1
            Peer        Peer                               Peering        Remote
Vserver     Vserver     State        Peer Cluster          Applications   Vserver
----------- ----------- ------------ ----------------- -------------- ---------
svm1        mcsvm1      peered       mcclustera            snapmirror     mcsvm1
```

7. Complete the SVM peer relationship process between svm1 and mcsvm1 by accepting the peer relationship.

```
mcclustera::> vserver peer accept -vserver mcsvm1 -peer-vserver svm1 -application snapmirror
Info: [Job 505] 'vserver peer create' job queued. Vserver creation completed.
mcclustera::> vserver peer show -vserver mcsvm1
            Peer        Peer                               Peering        Remote
Vserver     Vserver     State        Peer Cluster          Applications   Vserver
----------- ----------- ------------ ----------------- -------------- ---------
mcsvm1
            svm1        peered       cluster1              snapmirror     svm1
```

Create a replication schedule

The following step can be used to create a schedule for the replication process that will migrate the SVM and data to the destination MetroCluster cluster. This might not be necessary if you have an appropriate SnapMirror schedule configured that meets your migration timeline.

1. Create a schedule on mcclustera to control the migration process. It is recommended to use a minimum schedule of no less than 15 minutes for the migration process.

```
mcclustera::> job schedule cron create -name 15min_schedule -minute "00,15,30,45"
  (job schedule cron create)

mcclustera::> job schedule cron show -name 15min_schedule
Cluster Vserver  Name        Description
------- -------- ----------- --------------------------------------------------
mcclustera
        mcsvm1
                 15min_schedule
                          @:10,:25,:40,:55
```

Note: The schedule might need to be longer depending on the amount of data that might change on svm1 before the final cutover.

Create the SnapMirror relationship

The following steps create the SnapMirror relationship that migrates the SVM configuration and data to the new MetroCluster cluster.

1. Create an asynchronous SnapMirror relationship between svm1 and mcsvm1 using the schedule defined in Create a replication schedule.

```
mcclustera::> snapmirror create -source-path svm1: -destination-path mcsvm1: -identity-preserve
true -schedule 15min_schedule
```

Note: This relationship must use the `-identity-preserve true` parameter to migrate all NAS settings to the destination mcsvm1 SVM.

Migrate the data using SnapMirror

1. Verify that the SnapMirror relationship shows the Mirror State as `Broken-off`.

```
mcclustera::> snapmirror show
Source             Destination Mirror  Relationship  Total              Last
Path        Type   Path        State   Status        Progress  Healthy  Updated
----------- ----   ----------- ------- -------------- --------- ------- --------
svm1:       XDP    mcsvm1:     Broken-off
                                       Idle          -          true    -
```

2. Perform a SnapMirror resync operation to start the data migration.

```
mcclustera::> snapmirror resync mcsvm1:
```

Note: The resync operation changes the SVM type for mcsvm1 from `default` to `dp-destination` and the state from `running` to `stopped`.

3. Verify and monitor the progress of the SnapMirror data migration. During the transfer, the Mirror State continues to show `Broken-off`, the Relationship Status is `Transferring`, and the Total Progress field displays the amount of data replicated.

   When the baseline data migration is complete, the Total Progress field shows `Idle` and the Relationship Status field shows `Snapmirrored`.

```
mcclustera::> snapmirror show
Source             Destination Mirror  Relationship  Total               Last
Path         Type  Path        State   Status        Progress  Healthy Updated
----------- ----  ------------ ------- -------------- --------- ------- --------
svm1:        XDP   mcsvm1:      Broken-off
                                        Transferring  -          true    -


mcclustera::> snapmirror show
Source             Destination Mirror  Relationship  Total               Last
Path         Type  Path        State   Status        Progress  Healthy Updated
----------- ----  ------------ ------- -------------- --------- ------- --------
svm1:        XDP   mcsvm1:      Snapmirrored
                                        Idle          -          true    -
```

Completing the migration

1. When the baseline data replication has been completed, quiesce the SnapMirror relationship.

```
mcclustera::> snapmirror quiesce mcsvm1:

mcclustera::> snapmirror show
                                                                    Progress
Source             Destination Mirror  Relationship  Total               Last
Path         Type  Path        State   Status        Progress  Healthy Updated
----------- ----  ------------ ------- -------------- --------- ------- --------
svm1:        XDP   mcsvm1:      Snapmirrored
                                        Quiesced      -          true    -
```

2. Stop the svm1 SVM. This prevents access to the SVM by application clients.

```
cluster1::*> vserver stop svm1
[Job 791] Job succeeded: DONE
```

3. Verify that svm1 has stopped

```
cluster1::*> vserver show
                                Admin       Operational Root
Vserver      Type    Subtype    State       State       Volume     Aggregate
----------- ------- ---------- ----------- ----------- ---------- ----------
svm1         data    default    stopped     stopped     root_svm1  aggr1
```

4. Restart the SnapMirror relationship from the quiesced state.

```
mcclustera::> snapmirror resume mcsvm1:
```

5. Verify that mcsvm1 has restarted SnapMirror replication. Status should show `Idle`.

```
mcclustera::> snapmirror show
                                                                    Progress
Source             Destination Mirror  Relationship  Total               Last
Path         Type  Path        State   Status        Progress  Healthy Updated
----------- ----  ------------ ------- -------------- --------- ------- --------
svm1:        XDP   mcsvm1:      Snapmirrored
                                        Idle          -          true    -
```

6. Execute a final update to the SnapMirror relationship.

```
mcclustera::> snapmirror update mcsvm1:
```

7. Monitor the SnapMirror progress. Once the update has completed, the Status will change from `Transferring` to `Idle`.

```
mcclustera::> snapmirror show
Source          Destination Mirror Relationship  Total           Last
Path       Type Path        State  Status        Progress Healthy Updated
---------- ---- ----------- ------ ------------- -------- ------- --------
svm1:      XDP  mcsvm1:     Snapmirrored
                                   Transferring  -        true    -


mcclustera::> snapmirror show
Source          Destination Mirror Relationship  Total           Last
Path       Type Path        State  Status        Progress Healthy Updated
---------- ---- ----------- ------ ------------- -------- ------- --------
svm1:      XDP  mcsvm1:     Snapmirrored
                                   Idle          -        true    -
```

8. Break the SnapMirror relationship between svm1 and mcsvm1. This results in mcsvm1 volumes switching from read-only to read-write.

```
mcclustera::> snapmirror break mcsvm1:


mcclustera::> snapmirror show
Source          Destination Mirror Relationship  Total           Last
Path       Type Path        State  Status        Progress Healthy Updated
---------- ---- ----------- ------ ------------- -------- ------- --------
svm1:      XDP  mcsvm1:     Broken-off
                                   Idle          -        true    -
```

Start mcsvm1

1. Start mcsvm1 on mcclustera. This restarts all NFS and SMB servers using the same configuration as the original svm1 SVM.

```
mcclustera::> vserver start -vserver mcsvm1
[Job 519] Job succeeded: DONE
```

2. Verify that the new mcsvm1 is running.

```
mcclustera::*> vserver show
                             Admin      Operational Root
Vserver     Type    Subtype  State      State       Volume     Aggregate
----------- ------- -------- ---------- ----------- ---------- ----------
mcsvm1      data    default  running    running     root_mcsvm1
                                                               aggr1
```

3. Verify that mcsvm1-mc is present on mcclusterb.

```
mcclusterb::*> vserver show
                             Admin      Operational Root
Vserver     Type    Subtype  State      State       Volume     Aggregate
----------- ------- -------- ---------- ----------- ---------- ----------
mcsvm1-mc   data    default  running    running     root_mcsvm1
                                                               aggr1
```

4. Verify that the volume is in the online state and is of type RW

```
mcclustera::*> volume show -vserver mcsvm1
Vserver   Volume      Aggregate    State     Type Size      Available Used%
--------- ----------- ------------ --------- ---- --------- --------- -----
mcclustera
          mcsvm1      aggr1        online    RW   2GB       1.9GB     5%
```

5. Verify that MetroCluster is healthy and replicating to mcclusterb.

```
mcclustera::> metrocluster vserver show
Cluster: mcclustera
                                    Partner                 Configuration
          Vserver                   Vserver                 State
          ------------------        ----------------------  ----------------
          mcsvm1                    mcsvm1-mc               healthy
          vs1                       vs1-mc                  healthy
Cluster: mcclusterb
                                    Partner                 Configuration
          Vserver                   Vserver                 State
          ------------------        ----------------------  ----------------
          vs2                       vs2-mc                  healthy
          3 entries were displayed.
```

Repeat the entire Migration process for any additional SVMs that need to be migrated from cluster1 to mcclustera.

Post migration verification

Perform the following steps to delete the SVM from cluster1 for each SVM that has been migrated to the MetroCluster solution:

1. Verify that the data hosted by mcsvm1 matches the data on original source cluster svm1.

2. Perform any steps on the client systems to redirect access from volumes on svm1 and redirect access to SMB shares or NFS exports on mcsvm1.

3. Delete the SnapMirror relationship between svm1 and mcsvm1.

```
mcclustera::> snapmirror delete -source-path svm1: -destination-path mcsvm1:
```

4. Delete the SVM peer relationship between svm1 and mcsvm1.

```
cluster1::> vserver peer delete -vserver svm1 -peer-vserver mcsvm1
```

5. Delete the volumes hosted on cluster1://svm1 when no longer needed.

```
cluster1::> volume delete -vserver svm1 -volume vol1_old
```

   Note: Repeat step 6 for each volume hosted by svm1, including the svm1_root volume.

6. Delete the original, external source SVM svm1.

```
cluster1::> vserver delete -vserver svm1
```

7. Delete the cluster peer relationship between cluster1 and mcclustera.

```
mcclustera::> cluster peer delete -cluster cluster1
```

Support

Hardware or software support for host or storage systems during this migration process should use the standard interfaces as they are defined in your support contract with NetApp.

NetApp CSS handles host environment hardware and software issues. Escalations should be directed to the appropriate CSS specialist or NetApp support communities on communities.netapp.com or the NetApp Discord community

Appendix A: SVM volume worksheets

Migration target MetroCluster information

Cluster name	
Cluster intercluster LIF IP address	
Cluster management LIF IP address	
Administrator account (keep passwords hidden)	

Migration source information (non-MetroCluster cluster)

Cluster name	
Cluster intercluster LIF IP address	
Cluster management LIF IP address	
Administrator account (keep passwords hidden)	

SVM

SVM name	
Cluster intercluster LIF IP address	
Cluster management LIF IP address	
Administrator account (keep passwords hidden)	

Volume list

Source	Destination	Notes

SVM migration information

	Source	Destination
SVM name		
Cluster intercluster LIF IP address(es)		
Cluster management LIF IP address		

	Source	Destination
Administrator account (keep passwords hidden)		

Volume list

Source	Destination	Notes

Where to find additional information

To learn more about the information that is described in this document, review the following documents and/or websites:

- MetroCluster Documentation (netapp.com)
  https://docs.netapp.com/us-en/ontap-metrocluster/
- Cluster and SVM peering overview with the CLI (netapp.com)
  https://docs.netapp.com/us-en/ontap/peering/index.html
- About SnapMirror SVM replication (netapp.com)
  https://docs.netapp.com/us-en/ontap/data-protection/snapmirror-svm-replication-concept.html
- Compatible ONTAP versions for SnapMirror relationships (netapp.com)
  https://docs.netapp.com/us-en/ontap/data-protection/compatible-ontap-versions-snapmirror-concept.html

Version history

Version	Date	Document version history
Version 1.0	April 2023	Initial release of document

Refer to the [Interoperability Matrix Tool (IMT)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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