Module 6
SnapMirror Business Continuity

Business continuity solution

About this module

This module focuses on enabling you to do the following:

- Describe the architecture, features, and operation of SnapMirror Business Continuity
- Explain the steps to deploy SnapMirror Business Continuity
- Describe failover operations in SnapMirror Business Continuity

Lesson 1
SnapMirror Business Continuity overview

SnapMirror Business Continuity

Granular business continuity solution for SAN applications

Continuous availability
Active workloads on both clusters

Platform flexibility
Any 2-node NetApp AFF
or All SAN Array (ASA) clusters

Easy administration
NetApp SnapMirror simplicity

Setup simplicity

NetApp ONTAP System Manager simplicity

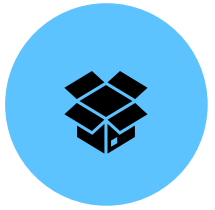
SAN protocols

Support for FC and iSCSI protocols

Highly resilient

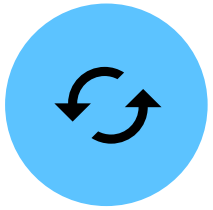
External ONTAP Mediator service for transparent failover

No new license



Part of the Data Protection bundle

Application support



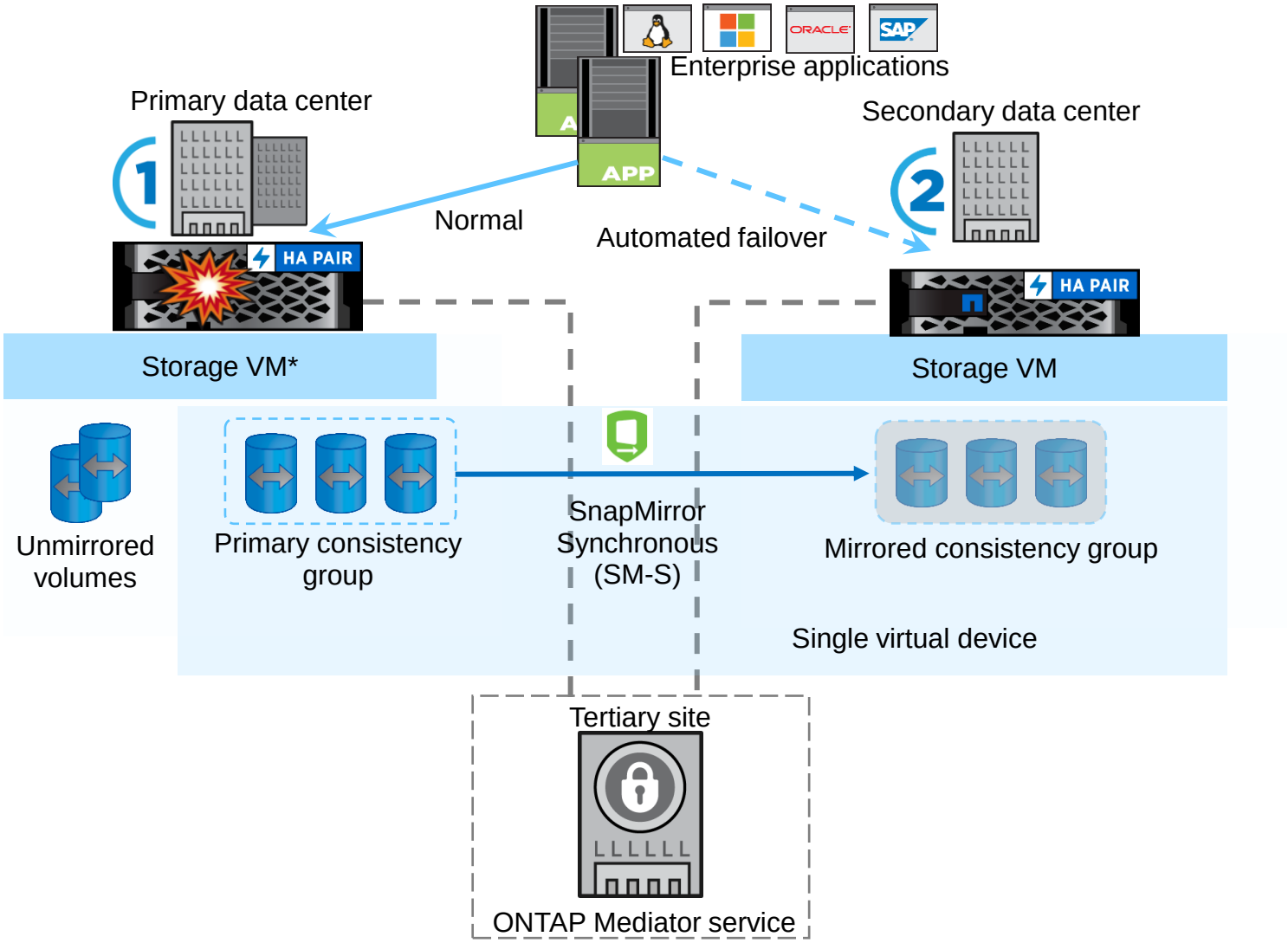
Consistency group

Monolithic and distributed applications

Key terminology and concepts

Consistency group	A collection of FlexVol volumes that provides a strong consistency guarantee for the protected application
Constituent	A FlexVol volume that belongs to a consistency group
Transparent Application Failover	A feature that enables the mirror consistency group to take over serving data from the primary consistency group during a disaster at the primary site
Out of sync	A condition in which the application I/O does not replicate to the secondary storage system
ONTAP Mediator service	A service that passively monitors the two ONTAP clusters and orchestrates automated failover during a disaster at the primary site

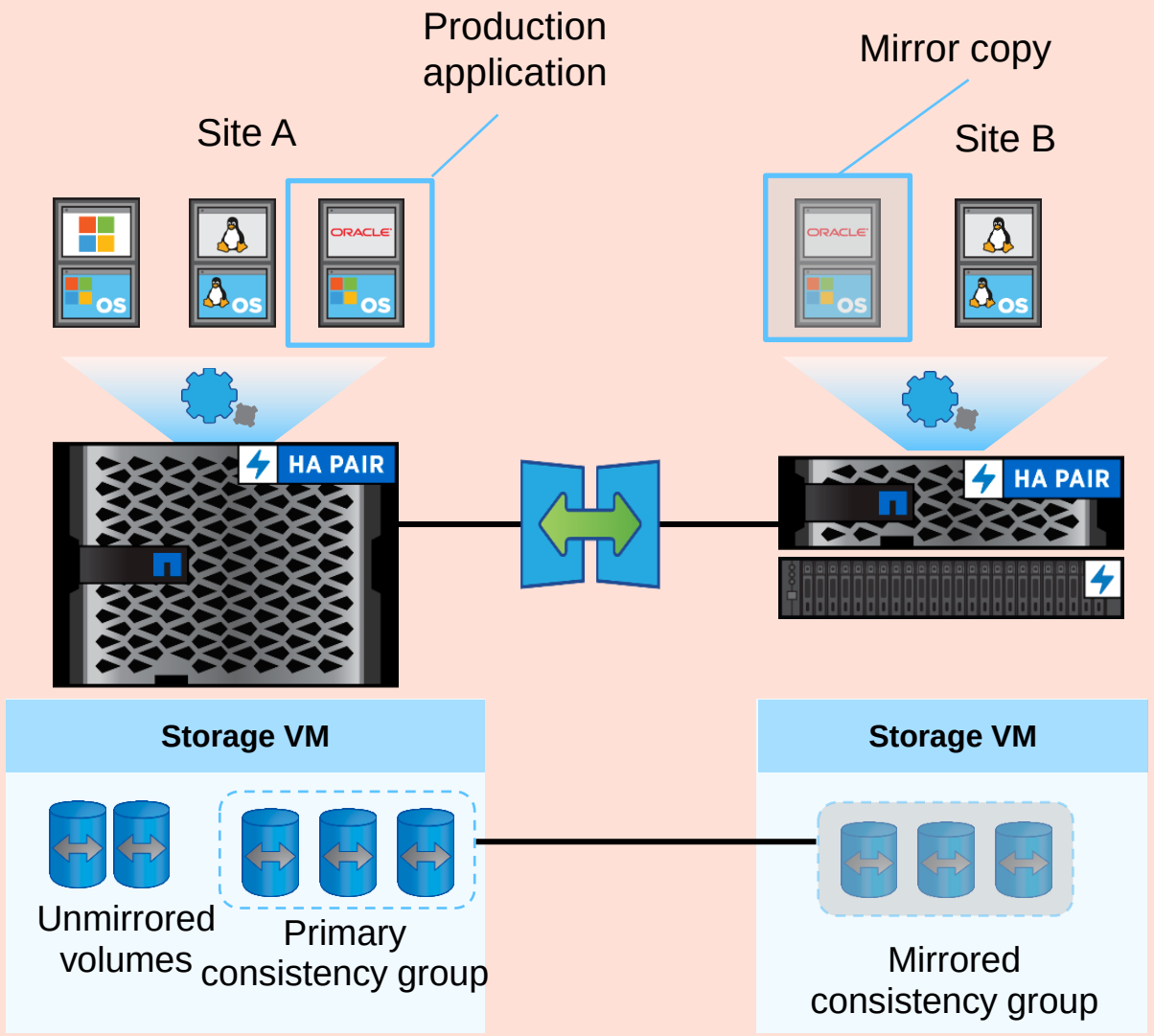
SnapMirror Business Continuity architecture



*Storage virtual machine, also known as SVM

SnapMirror Business Continuity operations

- Serves primary workloads from both clusters
- Adds application-specific LUNs from different volumes within a storage VM to a consistency group
- Enables seamless application failover to the mirror consistency group
- Other points to consider:
  - Unmirrored volumes that exist outside of protection for business continuity are supported.
  - Only one other SnapMirror asynchronous relationship is supported for volumes being protected for business continuity.
  - Cascade topologies are not supported with protection for business continuity.



SM-S, SnapMirror Business Continuity, and MetroCluster feature

Comparison

SM-S

- Manual or scripted application failover
- Zero data loss (RPO=0) for selectable volumes
- Controller, storage, and network agnostic
- Granular application protection
- Support for IP-only transport
- Support for application DevTest on the secondary site

MetroCluster feature

- Automated and transparent failover, no manual intervention
- Zero data loss (RPO=0) for the whole cluster
- Continuous availability
- Validated reference configurations
- Complete cluster protection
- High performance and scale
- Appliance approach with symmetric deployment
- Support for FC or IP transport

SnapMirror Business Continuity

- Automatic application failover at consistency groups
- Zero data loss (RTO/RPO=0) for selectable applications
- Controller, storage, and network agnostic
- Granular application protection
- Support for iSCSI and FC protocols

RPO = recovery point objective
RTO = recovery time objective

Lesson 2
SnapMirror Business Continuity configuration

Prerequisites

Hardware

- Only 2-node clusters are supported
- Both clusters must be either AFF or ASA (no mixing)

Licensing

- SnapMirror Synchronous license must be applied on both clusters
- SnapMirror license must be applied on both clusters

Software

- ONTAP 9.8 or later software
- ONTAP Mediator service 1.2 or later running on a Linux server or virtual machine (VM)

Networking environment

Intercluster latency round trip time (RTT) must be less than 10 ms

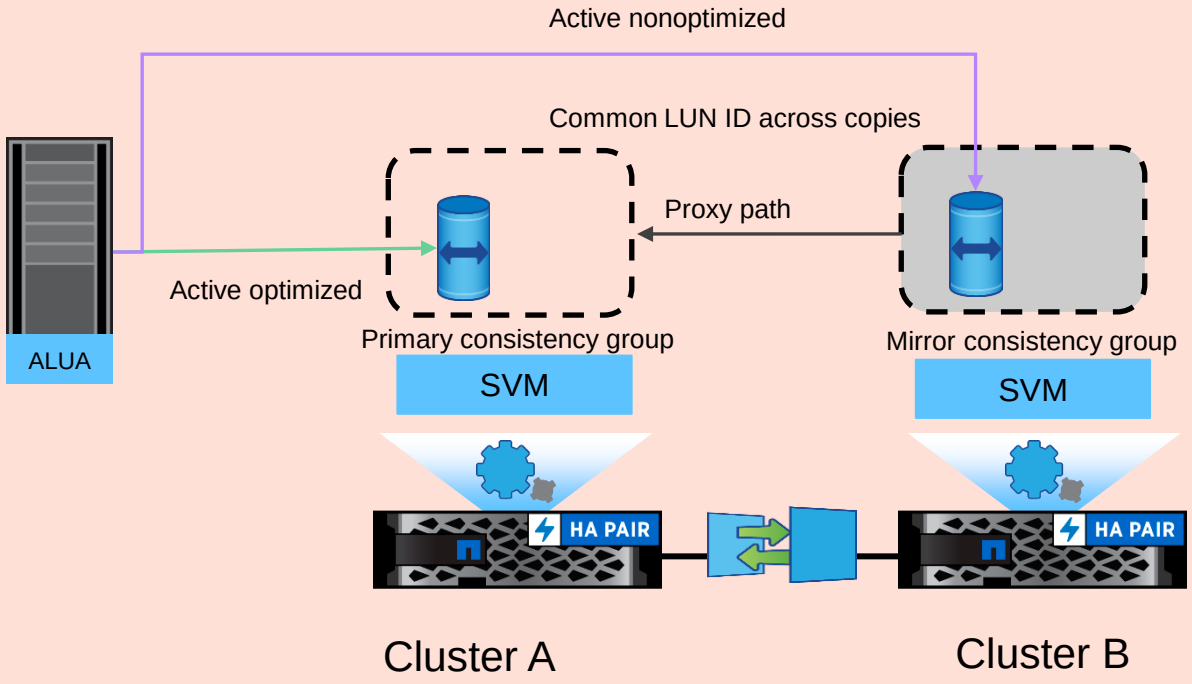
Configuring applications

Supported software
Microsoft Windows Server, stand-alone Red Hat Enterprise Linux, and VMware vSphere Metro Storage Cluster

Supported protocols
Only SAN protocols (FC and iSCSI)

Host access type
Uniform or nonuniform SAN connectivity

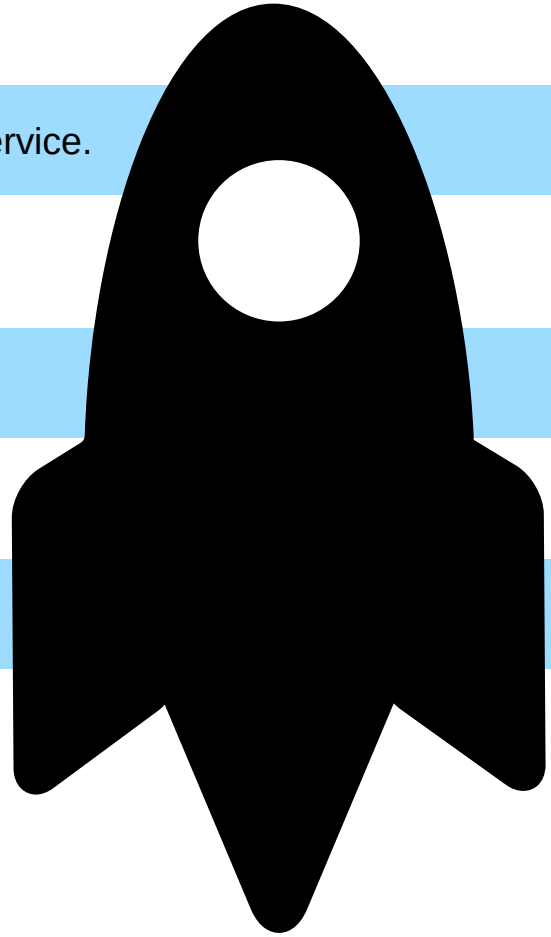
Multipathing
SnapMirror Business Continuity uses asymmetric logical unit access (ALUA) for multipathing



SnapMirror Business Continuity using ALUA

Deployment workflow

1. Install the ONTAP Mediator service.
2. Confirm cluster configuration.
3. Initialize the ONTAP Mediator service.
4. Create a consistency group relationship.
5. Initialize the consistency group.
6. Map LUNs to the application host.



Install ONTAP Mediator service

1. Sign into the Linux system that will host the ONTAP Mediator service.
2. Download the mediator installation package from the ONTAP Mediator service page.
3. Install the ONTAP Mediator service and respond to all prompts, as required.
4. Optionally, replace the self-signed Secure Sockets Layer (SSL) and certificate authority (CA) with the third-party validated SSL Certificate and CA.
   - The certificate you install must not be expired.
   - Copy the contents of the ca.crt file from the ONTAP Mediator directory: /opt/netapp/lib/ontap_mediator/ontap_mediator/server_config
5. From the ONTAP CLI, install the certificate on both the local and peer cluster:

```
security certificate install -type server-ca -vserver cserverName
```


Confirm the ONTAP cluster configuration

1. Confirm that a cluster peering relationship exists between the clusters.
2. Confirm that the storage VMs are created on each cluster.
3. Confirm that a peer relationship exists between the storage VMs on each cluster.
4. Confirm that the volumes exist for your LUNs.
5. Confirm that at least one SAN LIF is created on each node in the cluster.
6. Confirm that the necessary LUNs are created and mapped to the initiator group (igroup), which is used to map LUNs to the initiator on the application host.
7. Rescan the application host to discover any new LUNs.

Initialize the ONTAP Mediator service

1. Initialize the ONTAP Mediator service on one of the clusters.

```
snapmirror mediator add -mediator-address IP_Address -peer-cluster cluster_name
-username user_name
```

2. Check the status of the ONTAP Mediator service configuration.

```
snapmirror mediator show
```


Create a consistency group relationship

Create a consistency group and constituent relationship.

This example creates two consistency groups: srccg with constituent volumes vol1 and vol2, and dstcg with constituent volumes vol1_dr and vol2_dr.

```
destination::> snapmirror create -source-path vs1_src:/cg/cg_src
-destination-path vs1_dst:/cg/cg_dst -cg-item-mappings
vol_src1:@vol_dst1,vol_src2:@vol_dst2 -policy AutomatedFailover
```



```
vs2.example.com::> snapmirror create -destination-path
       vs2.example.com:/cg/cg_dst -source-path
       vs1.example.com:/cg/cg_src -type XDP -policy SmgrSync
       -cg-item-mappings /vol/srcvol/lun1:@/vol/dstvol/lun1,
                         /vol/srcvol/lun2:@/vol/dstvol/lun2
```

Under PVR control to create a new item mapping between *lun3* on volume *srcvol* and *lun3* on volume *dstvol* in the existing SnapMirror synchronous Consistency Group relationship that was created above, type the following command:

```
vs2.example.com::> snapmirror create -destination-path
       vs2.example.com:/cg/cg_dst -source-path
       vs1.example.com:/cg/cg_src -type XDP -policy SmgrSync
       -cg-item-mappings /vol/srcvol/lun3:@/vol/detvol/lun3
```


Initialize a consistency group

Steps

1. Sign in to the ONTAP CLI at the destination cluster and initialize the consistency group.

```
destination::>snapmirror initialize -destination-path vs1_dst:/cg/cg_dst
```

2. Confirm that the initialization operation completed successfully. The status should be InSync.

```
snapmirror show
```


Map LUNs to the application hosts

Steps

1. Create an igroup on each cluster.

```
lun igroup create -igroup name -protocol fcp|iscsi -ostype os -initiator initiator_name
```

2. Map LUNs to the igroup.

```
lun map -path path_name -igroup igroup_name
```

3. Verify that the LUNs are mapped.

```
lun show
```

4. On the application host, discover the new LUNs.

Lesson 3
Failover operations and failure scenarios

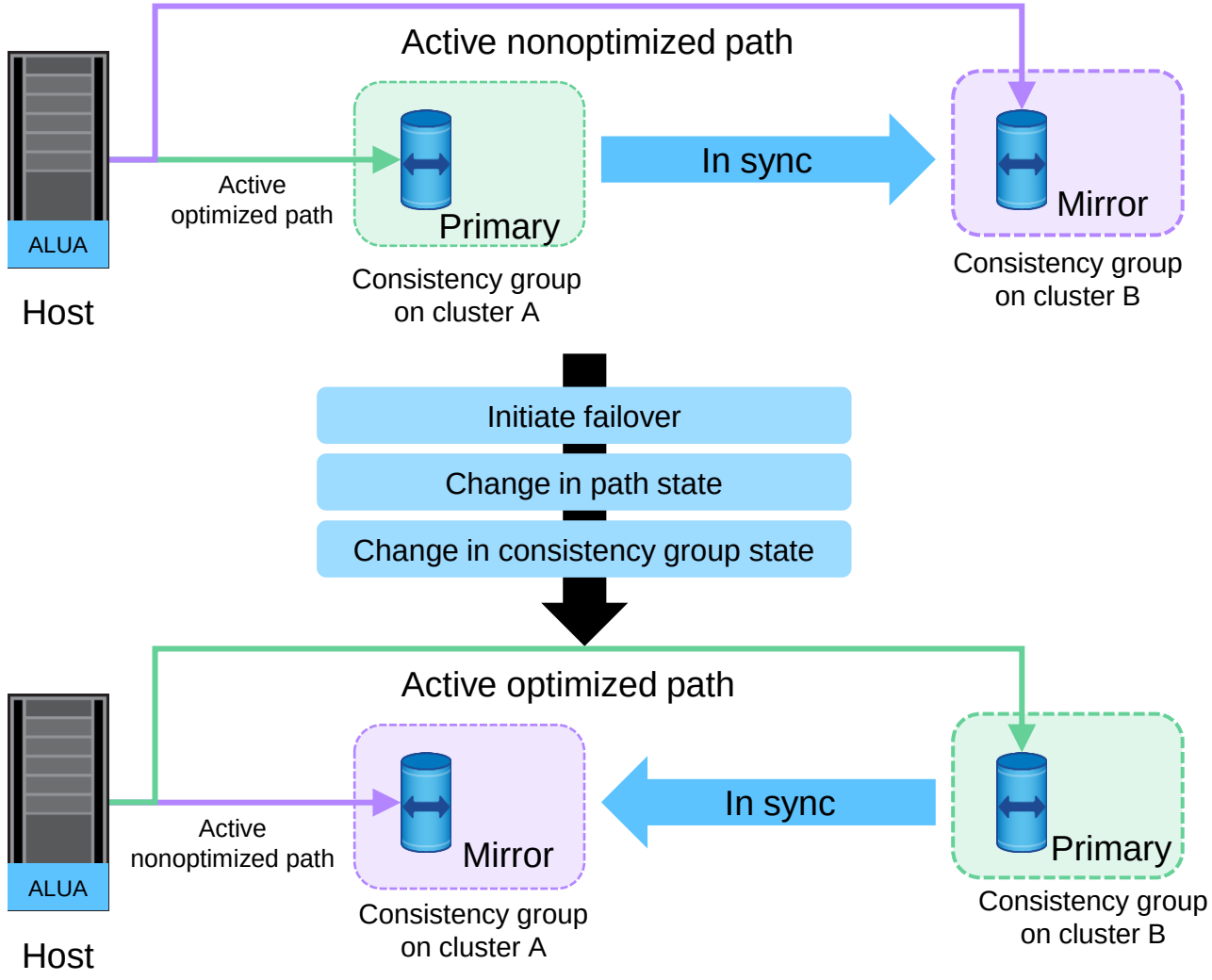
Failover operations

Planned and unplanned failover

Planned failover

Host accesses LUN by using newly designated optimized path during a planned failover

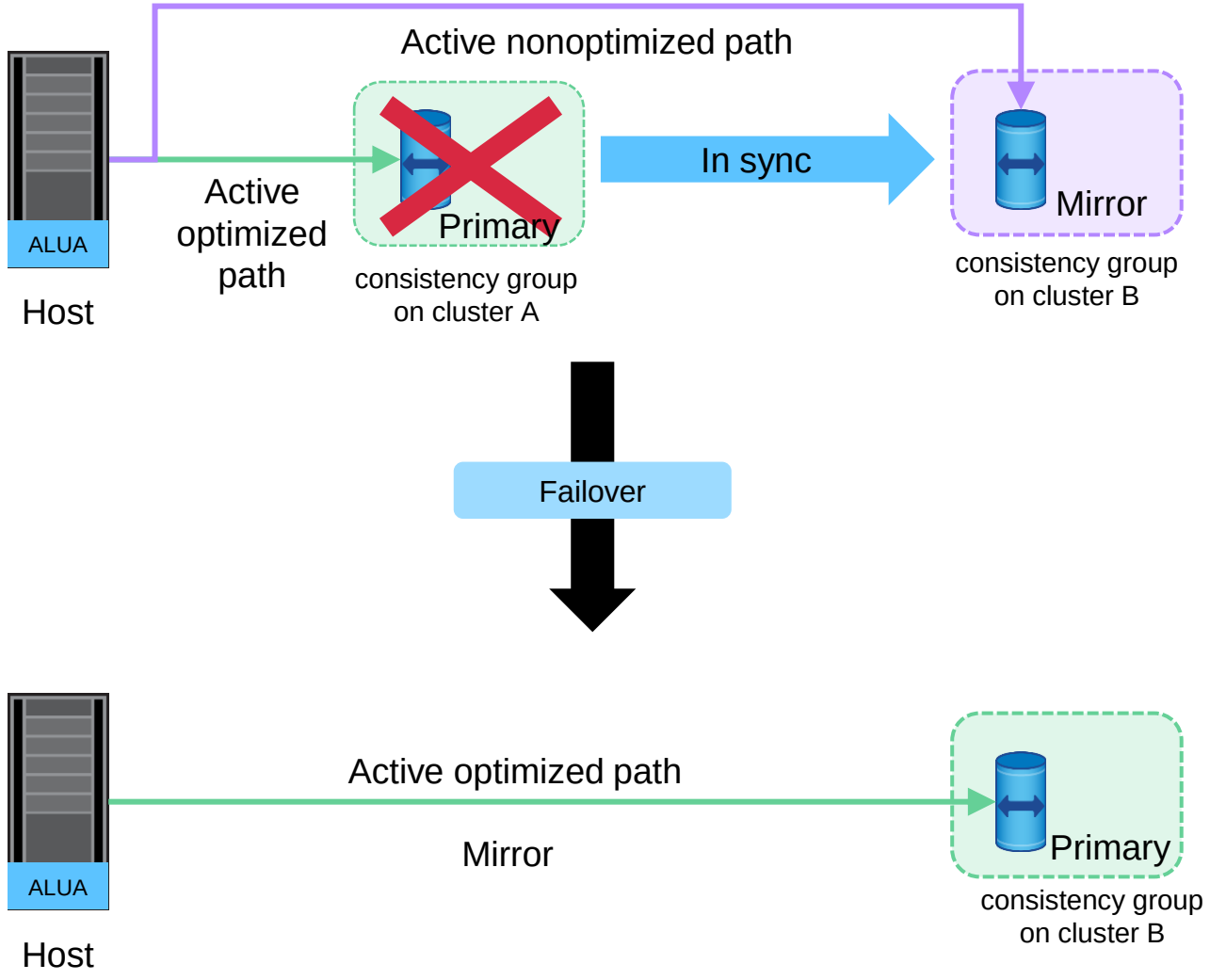
- For failover to be initiated, the consistency group relationship must be in sync and ONTAP Mediator service must be configured.
- A common Snapshot copy is created. The mirror consistency group changes to primary after an in-flight write operation is committed and the role changes in the ONTAP Mediator service, with consensus.
- The state of paths to the LUNs in the consistency group changes. Previously nonoptimized paths become optimized and vice versa.
- The direction of replication reverses, with host writes going to the new primary consistency group.



Unplanned failover during a disaster

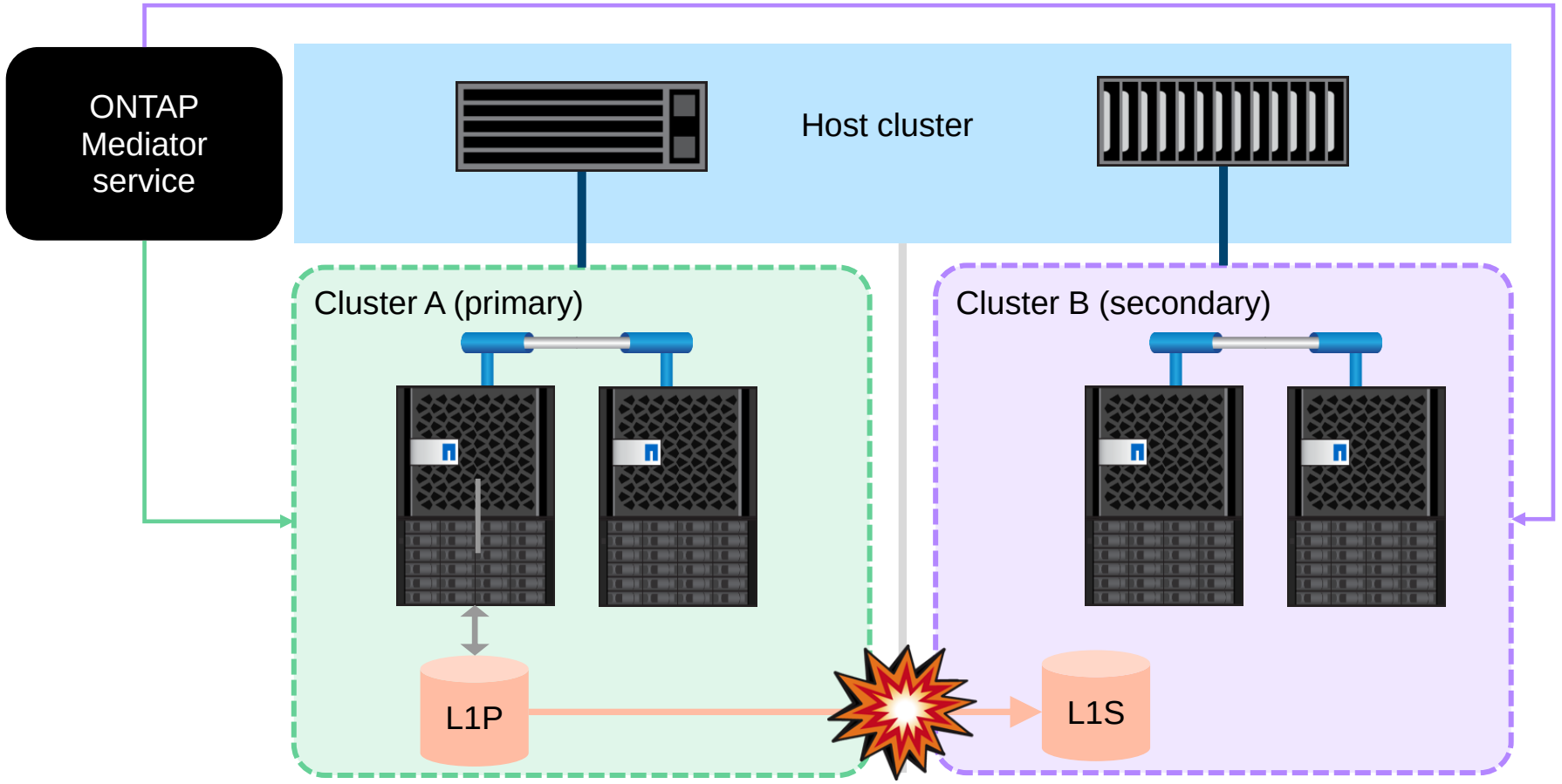
ONTAP Mediator service initiates automatic transparent failover

- Automated failover is initiated by the ONTAP Mediator service during a disaster.
- The mirror consistency group changes to primary after an in-flight write operation is committed.
- The sole path remains active optimized; erstwhile nonoptimized paths become optimized.
- Replication from the primary consistency group is suspended.



Failure scenarios

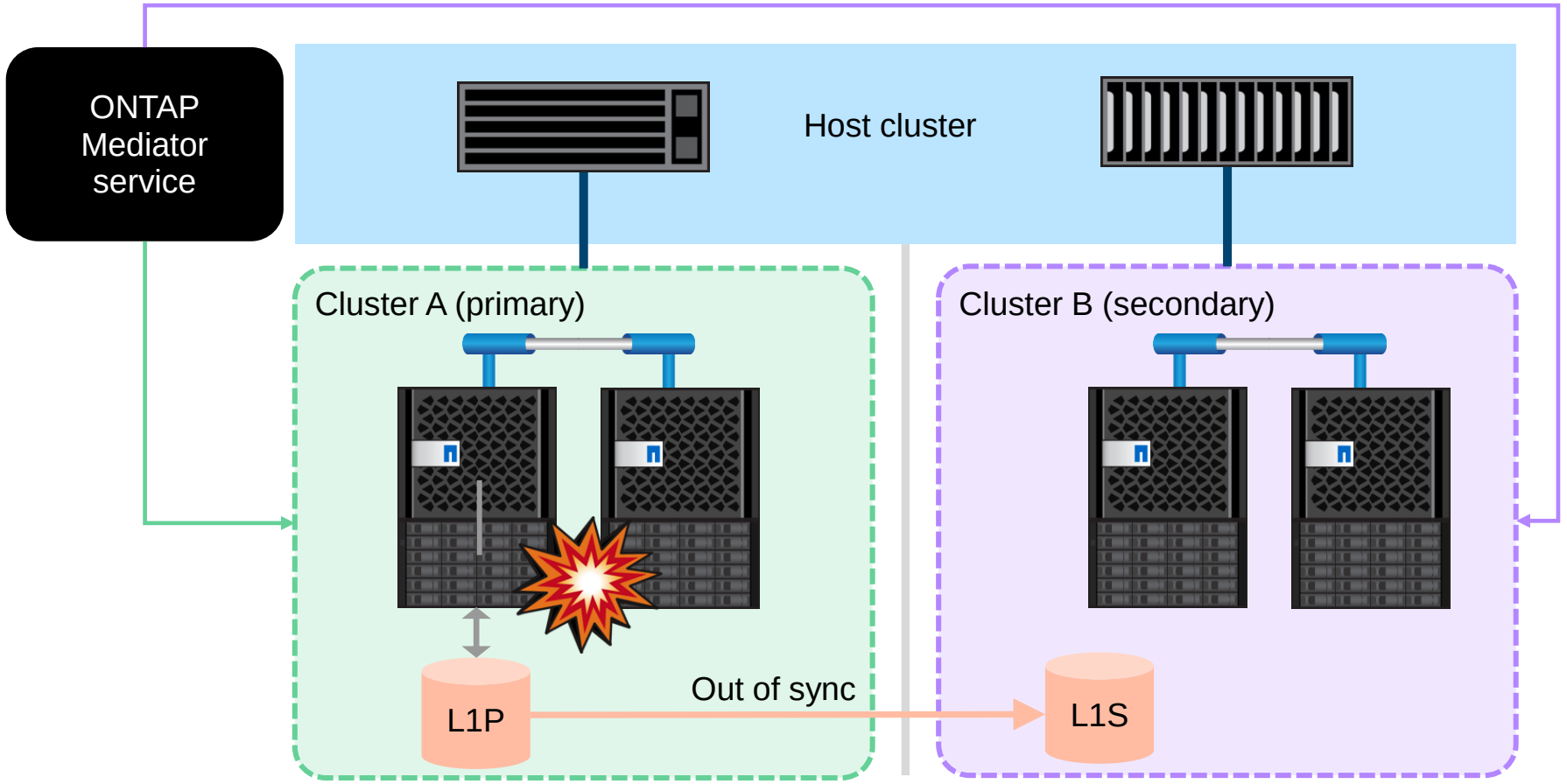
Replication link failure



L1P = Primary LUN

L1S = Secondary LUN

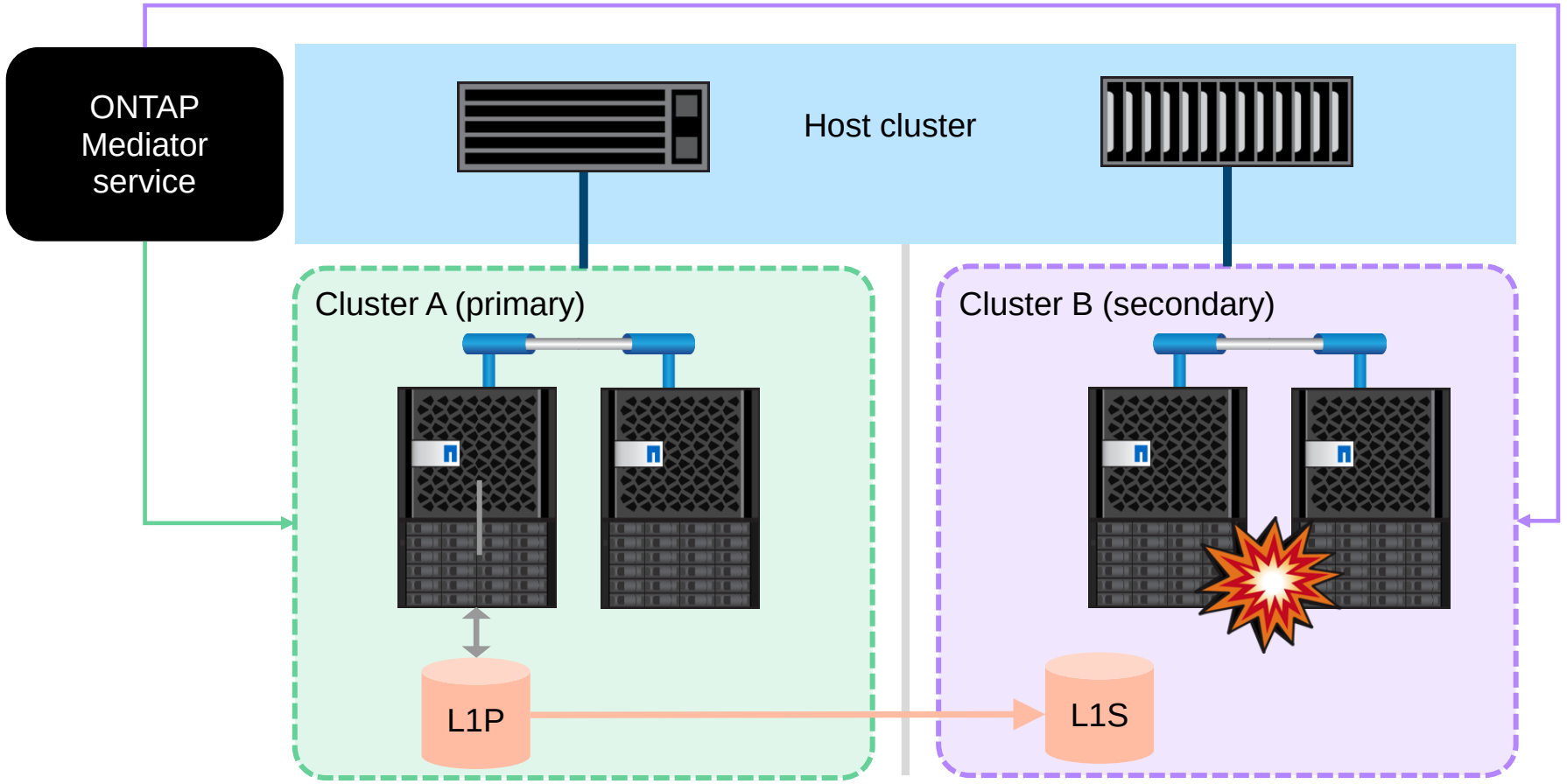
Disaster at Site A



L1P = Primary LUN

L1S = Secondary LUN

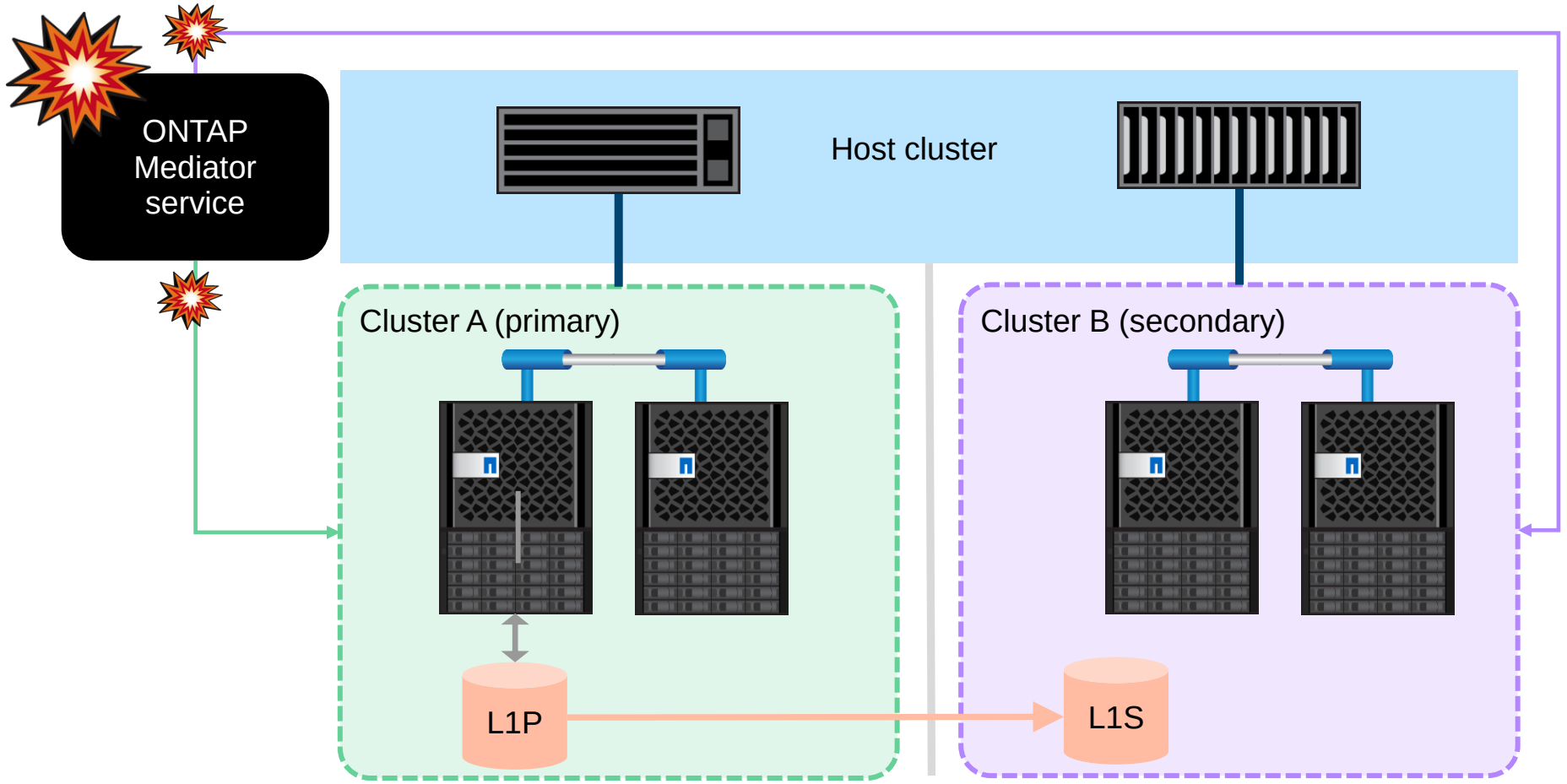
Disaster at Site B



L1P = Primary LUN

L1S = Secondary LUN

ONTAP Mediator service failure



L1P = Primary LUN

L1S = Secondary LUN

Resources

- ONTAP 9 release notes

  https://library.netapp.com/ecm/ecm_download_file/ECMLP2492508

- *ONTAP Data Protection Power Guide*

  https://docs.netapp.com/ontap-9/topic/com.netapp.doc.pow-dap/Data%20protection.pdf

- SnapMirror Business Continuity documentation

  https://docs.netapp.com/us-en/ontap/smbc/index.html

- Installing the ONTAP Mediator

  https://docs.netapp.com/us-en/ontap/smbc/smbc_install_installing_the_ontap_mediator.html

Module summary

This module focused on enabling you to do the following:

- Describe the architecture, features, and operation of SnapMirror Business Continuity
- Deploy SnapMirror Business Continuity
- Describe failover operations in SnapMirror Business Continuity

