White Paper

SnapMirror Business Continuity: Ensuring Business Continuity for Critical Applications

Protecting Critical Systems and Enabling Seamless Disaster Recovery

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Abstract

This document provides an overview of NetApp's SnapMirror Business Continuity (SMBC) and its strategic value for organizations. SMBC ensures continuous availability and mitigates risks through synchronous replication of data between multiple storage arrays. It offers features such as zero recovery point objective (RPO), high performance, simplified management, non-disruptive upgrades, and cost-effective disaster recovery. Supported platforms include NetApp AFF A-Series, AFF C-Series, ASA A-Series, and ASA C-Series. The document also covers specific application deployments with SMBC, including VMware vMSC and Oracle RAC. Overall, SMBC offers a comprehensive business continuity solution for organizations seeking uninterrupted operations and data protection.

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Executive Summary

Avoiding business disruption from IT service outages is a top priority for operators of mission-critical systems. Despite advancements in technology, outages continue to be a major concern for industries, customers, and regulators. The Uptime Institute Global Data Center Survey 2022 revealed downtime remains a significant concern with natural disasters and power outages as primary risks. Resiliency remains a key focus for delivering services.

NetApp's SnapMirror Business Continuity (SMBC) provides strategic business value by ensuring continuous availability and mitigating risks. SMBC enables synchronous replication of data between multiple ONTAP clusters located in different failure domains, offering benefits such as continuous availability, zero recovery point objective (RPO), zero recovery time objective (RTO), high performance, simplified management, non-disruptive upgrades, cost-effective disaster recovery, and application mobility.

Introduction

Achieving business continuity for enterprise applications poses significant challenges. Outages can have severe consequences, and the most common business continuity architectures involve identical compute and data storage processing in separate locations. SMBC, available starting from ONTAP 9.9.1, is supported on both AFF and All SAN Array (ASA) clusters. SMBC provides protection for applications utilizing iSCSI or Fibre Channel (FCP) LUNs.

This white paper focuses on SMBC and its strategic value for organizations. SMBC, when combined with mission-critical deployments like VMware vSphere Metro Storage Cluster (vMSC) and Oracle Real Application Clusters (RAC), offers transparent application failover (TAF) and business continuity during outages and disasters. It highlights the benefits of SMBC, including continuous availability, data protection, high performance, simplified management, non-disruptive upgrades, and cost-effective disaster recovery, making it an excellent choice for comprehensive business continuity solutions across various application deployments.

SnapMirror Business Continuity

SnapMirror Business Continuity offers a compelling strategic business value proposition for organizations seeking continuous availability and risk mitigation. SMBC ensures uninterrupted operations and data protection, enabling businesses to maintain their critical applications and services even in the face of failure domain outages or planned maintenance activities. By providing synchronous replication of data between multiple ONTAP clusters across different failure domains, SMBC eliminates the risk of data loss and minimizes recovery point objectives (RPO) to zero. This level of data resiliency and high availability translates into enhanced customer satisfaction, increased productivity, and reduced financial impact due to downtime. Additionally, SMBC's high performance, simplified management, non-disruptive upgrades, and cost-effective disaster recovery capabilities contribute to the overall strategic value it brings to organizations, empowering them to deliver reliable and resilient services to their customers while minimizing operational complexity and cost.

Key features and benefits of SMBC for enterprise applications

- **Continuous Availability:** SMBC enables synchronous replication of data between multiple ONTAP clusters located in different failure domains. This ensures that data is always available, even in the event of a site failure or planned maintenance. Applications can seamlessly failover to the secondary sites without any disruption to operations.

- **Zero RPO:** SMBC maintains a synchronous copy of data across sites, ensuring that there is no data loss in case of a failure. This is particularly important for applications that cannot tolerate any data loss, such as financial systems or healthcare applications.
- **High Performance:** SMBC leverages NetApp's all-flash architecture platforms, providing high-performance storage for applications. The individual ONTAP clusters in SMBC allow for independent workloads, enabling workload distribution across clusters for improved performance and reduced latency.
- **Simplified Management:** SMBC is integrated into ONTAP System Manager interface, making it easy to configure and manage. Administrators can monitor and manage both sites from a single pane of glass, simplifying operations and reducing complexity.
- **Flexible Integration:** SMBC supports CLI and REST API access. This flexibility allows customers to seamlessly integrate SMBC into their existing management infrastructure, leveraging their preferred tools and workflows for enhanced customization and automation capabilities.
- **Non-Disruptive:** SMBC supports non-disruptive upgrades, allowing you to perform software and hardware upgrades without impacting application availability. This ensures that your systems remain online and accessible to users during maintenance activities.
- **Cost-Effective:** SMBC eliminates the need for separate disaster recovery infrastructure, reducing costs associated with maintaining duplicate systems. By leveraging synchronous replication and existing storage infrastructure, it provides a cost-effective solution for achieving high availability and disaster recovery.
- **Application Mobility:** SMBC allows for seamless workload mobility between sites. Applications can be easily moved between sites for load balancing, maintenance, or other operational requirements without impacting availability or performance.
- **Robust Data Protection:** SMBC supports fan-out architectures using SnapMirror asynchronous protection, enabling the creation of a third off-site data copy for enhanced data protection and resilience.

Supported Platforms

NetApp offers a range of storage solutions, including AFF A-Series, AFF C-Series, ASA A-Series, and ASA C-Series, all of which are supported for use with SMBC. SMBC provides protection for applications utilizing iSCSI or Fibre Channel LUNs. These platforms, powered by NetApp ONTAP data management software, deliver industry-leading performance, flexibility, data services, and cloud integration. They offer robust data services, integrated data protection, scalability, and security features. By leveraging NetApp technology, organizations can future-proof their infrastructure and achieve storage savings while ensuring availability, protection, and security for their important data.

NetApp AFF A-Series

NetApp AFF A-Series systems are designed to meet the needs of data-driven organizations seeking an agile and efficient IT infrastructure. By modernizing your infrastructure with all-flash storage, you can improve speed and responsiveness for critical business applications. These systems deliver industry-leading performance, superior flexibility, and best-in-class data services and cloud integration, powered by NetApp ONTAP data management software. With end-to-end NVMe technologies and deep application and cloud integration, AFF A-Series systems accelerate applications, reduce data center costs, and simplify IT operations. They provide robust data services, integrated data protection, and seamless scalability, making them an ideal choice for demanding workloads and AI/DL applications. With NetApp's advanced NVMe technology, you can future-proof your infrastructure and achieve industry-leading storage savings. Additionally, AFF systems offer security, business continuity, and data protection features to keep your important data available, protected, and secure. NetApp's expertise and services further enhance the value of AFF systems, enabling you to optimize your data center and leverage the power of your data.

Note: For more information, please review the Datasheet for the NetApp AFF A-Series.

NetApp AFF C-Series

The NetApp AFF C-Series is a cloud-connected, all-flash storage system that enables organizations to modernize their data centers and seamlessly connect to the cloud. With the maturity of quad-level cell (QLC) flash technology, the AFF C-Series provides good performance for tier 1 and tier 2 workloads at a more affordable price compared to triple-level cell (TLC) media. It offers key benefits such as reducing total cost of ownership (TCO) and energy costs, scaling capacity and performance without disruption, and ensuring data security and availability. The AFF C-Series is built on NetApp ONTAP data management software, delivering industry-leading efficiency, flexibility, and cloud integration to simplify data management and reduce storage costs. It enables organizations to save on storage footprint and energy costs, achieve industry-leading storage savings, tier cold data to the cloud for greater storage and energy savings, and scale capacity and performance painlessly as data grows. With advanced technologies like NVMe/FC and NVMe/TCP connectivity, the AFF C-Series allows for scalable performance. By investing in NetApp AFF storage systems, organizations can future-proof their investment and stay current with technology innovations while protecting their data. NetApp Professional Services and certified partners are available to provide additional support and expertise.

Note: For more information, please review the Datasheet for the NetApp AFF C-Series.

NetApp ASA A-Series

NetApp ASA is a dedicated SAN storage solution designed to address the challenges faced by enterprise customers with mission-critical applications. It provides high performance, continuous availability, and operational efficiency for SAN workloads such as ERP, databases, and VDI. Built on an end-to-end NVMe architecture, NetApp ASA delivers industry-leading availability, superior performance, and simplified data management across hybrid cloud environments. With features like symmetric active-active controller architecture, NetApp MetroCluster software for synchronous replication, and integrated data protection capabilities, ASA ensures constant data availability with zero data loss and zero downtime. It also offers robust security features, including encryption, key management, and anti-ransomware protection. NetApp ASA simplifies operations with an intuitive user interface and SAN-specific data management capabilities, allowing IT staff to quickly provision storage, automate data tiering, and streamline data protection. Additionally, NetApp's Advance program helps future-proof the infrastructure by providing storage ownership benefits, including tech refreshes, performance guarantees, and high data availability guarantees.

Note: For more information, please review the Datasheet for the NetApp ASA.

NetApp ASA C-Series

NetApp ASA C-Series is a cost-effective, high-capacity storage system tailored for organizations with SAN workloads, delivering exceptional performance, continuous availability, and operational efficiency. Built on an end-to-end NVMe architecture, it ensures industry-leading availability and simplified data management across hybrid cloud environments. With multitasking capabilities and low-latency access to data, it enhances customer experience. The ASA C-Series guarantees data availability and protection through features like symmetric active-active controller architecture, integrated data protection software, and robust security measures. It simplifies operations, reduces TCO, and future-proofs infrastructure with the NetApp Advance program, providing controller upgrades, performance guarantees, and ransomware recovery assurance. NetApp ASA C-Series empowers organizations to optimize their infrastructure and leverage the full potential of their data.

Note: For more information, please review the Datasheet for the NetApp ASA.

Applications

Architectures

Application architectures play a crucial role in determining the performance, availability, and resilience of storage systems. Understanding the key concepts and differences between single-host and multi-host architectures, uniform access and non-uniform access architectures, asymmetric and symmetric architectures, active/standby, active/passive, and active/active configurations, disaggregated and stretched (shared) datastore architectures, and the benefits of Asymmetric Logical Unit Access (ALUA) allows us to offer targeted and effective solutions to our customers. By selecting the right architecture that aligns with their specific requirements, organizations can achieve optimal performance, data management, and availability.

Concepts

Single-Host vs Multi-Host

Single-Host Architecture employs a single host to manage I/O operations across storage networks. It emphasizes seamless operations and offers flexibility in primary data paths. This architecture utilizes secondary pathways to enhance performance and ensure robust failover processes. It is well-suited for simpler deployments and scenarios that prioritize consistent data availability.

In contrast, Multi-Host Architecture incorporates multiple hosts distributed across different failure domains. This architecture enhances resiliency and performance by providing cross-site connectivity and a more balanced distribution of workloads. Like Single-Host Architecture, it utilizes secondary pathways to boost performance and fortify failover processes. Multi-Host Architecture is particularly ideal for complex and high-demand environments that require enhanced performance and robust failover processes. Stretched Multi-Host architecture adds an extra layer of resilience by mitigating the risk of single-site failures through distributed data access.

Figure 1) Single-Host Architecture

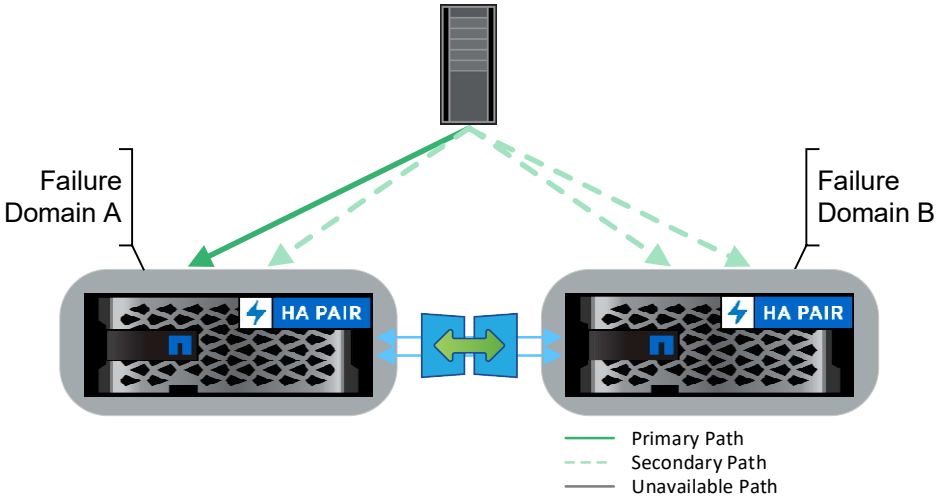
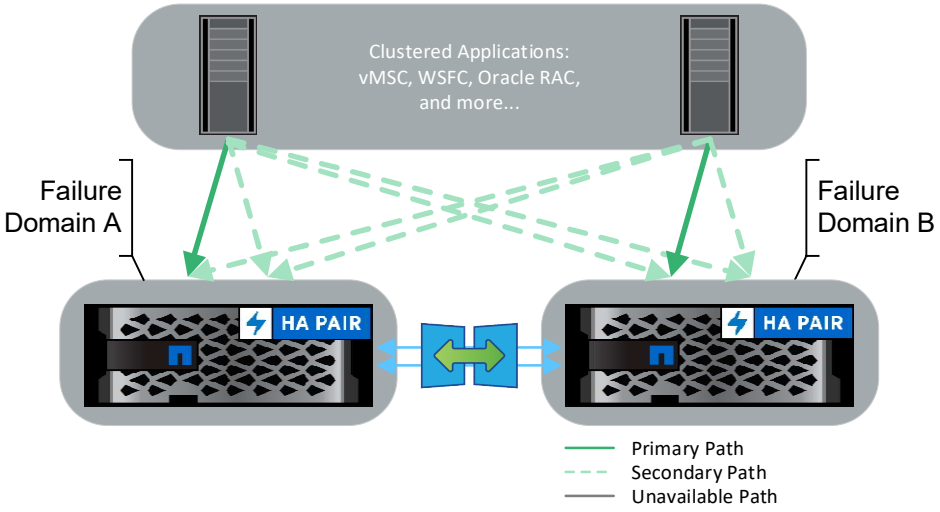


Figure 2) Multi-Host Architecture



Uniform Access vs Non-Uniform Access

Uniform Access architecture implements a storage network that spans across all sites, connecting all hosts to a shared storage node. This architecture ensures consistent and seamless data access, fostering operational continuity across multiple sites. It is particularly well-suited for environments that prioritize high connectivity and require ubiquitous data availability.

Non-Uniform Access architecture restricts host connections to storage nodes located within the same site. This design promotes local data access, optimizing performance within individual sites. It is suitable for environments that require localized data management and the need to boost site-specific performance.

The choice between Uniform and Non-Uniform Access architectures depends on specific needs, considering factors such as connectivity, data availability, localized performance, and data integrity. By carefully considering these factors, organizations can select the architecture that best aligns with their requirements, ensuring optimal performance and data management.

Figure 3) Uniform Access Architecture

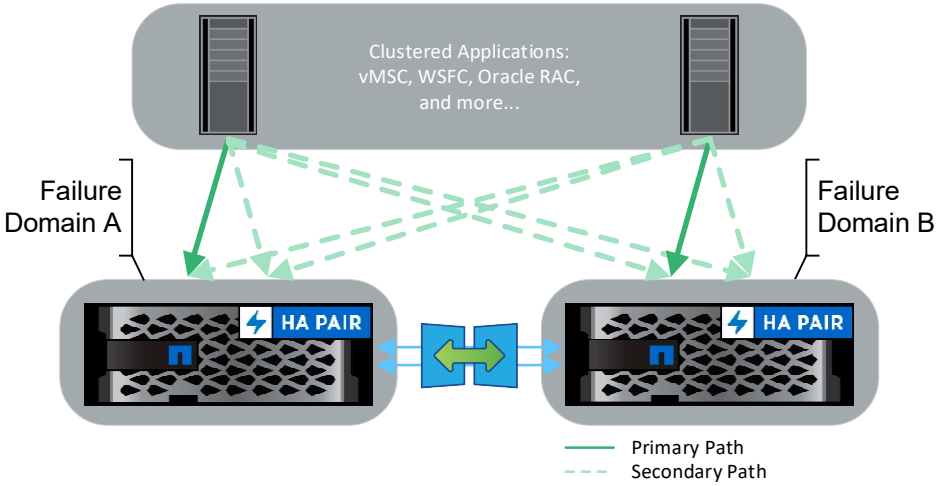
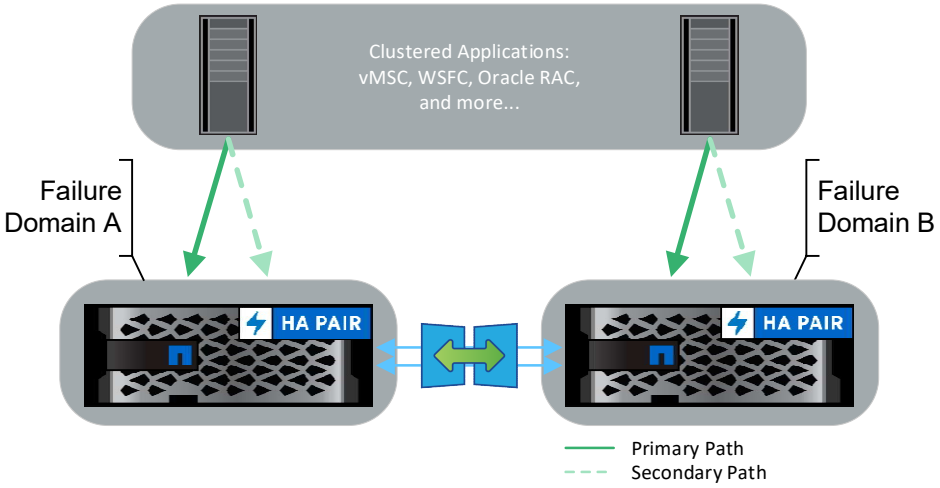


Figure 4) Non-Uniform Access Architecture



Asymmetric vs Symmetric

Asymmetric Architecture involves primary controllers that handle most operations, while secondary controllers remain on standby. This architecture is designed to optimize system performance under specific workloads. It is particularly suited for scenarios where certain applications require prioritized access to storage resources, ensuring that key applications have the necessary resources when they need them.

Symmetric Architecture ensures that each controller shares equal roles, providing uniform access to storage. This architecture promotes a balanced distribution of workloads and seamless failover capabilities. It is ideal for environments where balanced resource utilization and high availability are of utmost importance.

Figure 5) Asymmetric Architecture

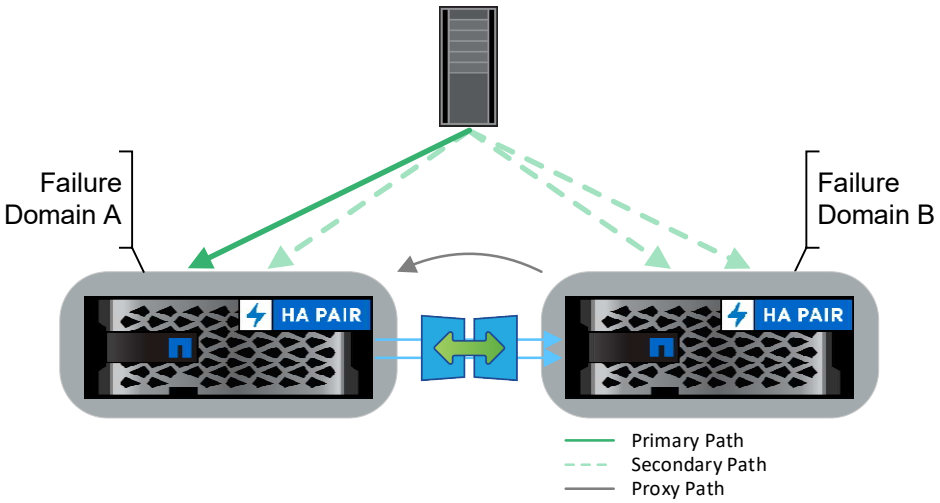
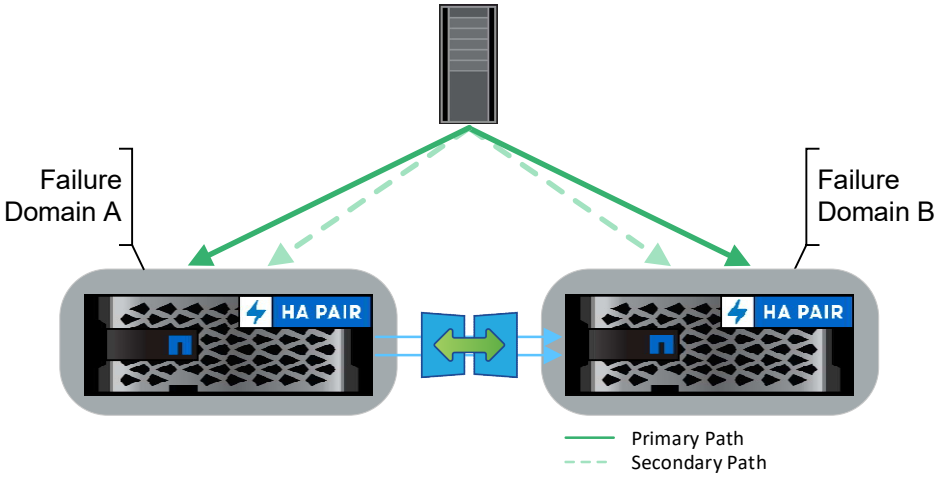


Figure 6) Symmetric Architecture



Active/Standby, Active/Passive, and Active/Active

An Active/Standby (Active/Passive) architecture involves one site actively handling I/O operations while the other site remains on standby. This architecture ensures data availability during failover events, making it suitable for scenarios that prioritize consistent data availability over simultaneous resource usage. In the Active/Standby model, the second data copy remains dormant until a disaster event occurs, at which point it is activated. Alternatively, in the Active/Passive variation, the second data copy remains in a read-only state and becomes writable only during disaster scenarios.

An Active/Active architecture has both sites actively handling I/O operations, maximizing resource utilization. This architecture promotes superior system performance and seamless failover. It is optimized for environments that require high performance and maximized system utilization. In an Active/Active setup, individual workloads can access both data copies simultaneously in real-time, optimizing system utilization and ensuring efficient data access.

Figure 7) Active/Standby (Active/Passive) Architecture

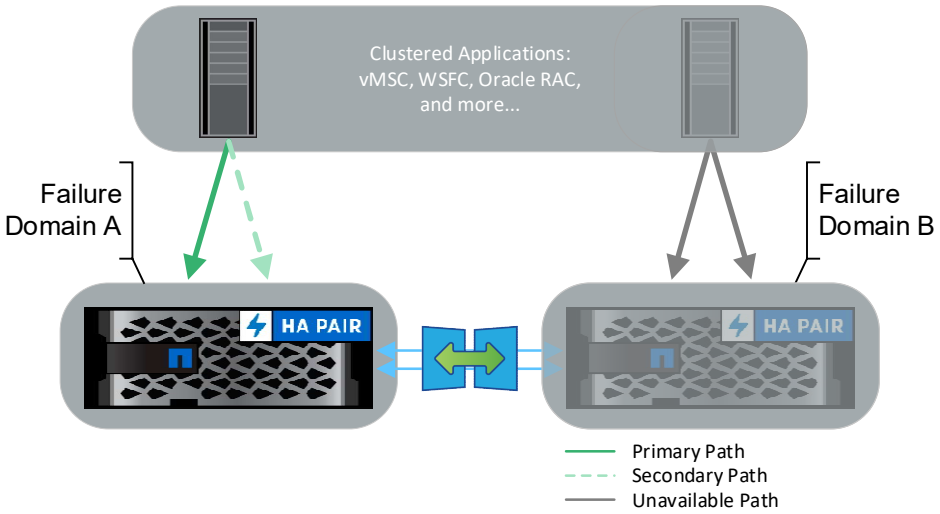
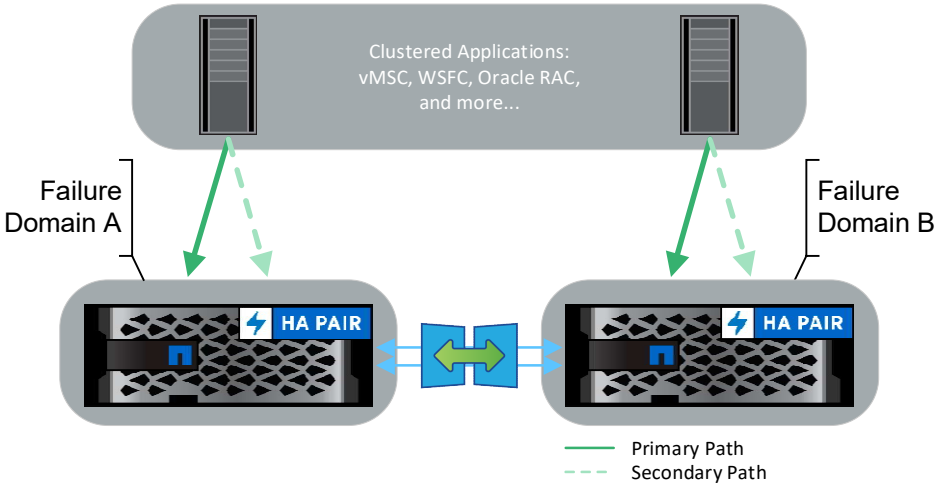


Figure 8) Active/Active Architecture



Disaggregated Datastore vs Stretched (shared) Datastore

A Disaggregated Datastore architecture enables independent scaling of storage resources based on workload needs. It is ideal for dynamic environments and workloads that require optimal resource utilization. This architecture allows for clear partitioning of storage, ensuring a defined boundary between Site A and Site B. By offering the flexibility to scale processing capacity without expanding the storage footprint, or vice versa, the Disaggregated Datastore model can adapt to fluctuating workload demands.

Stretched (Shared) Datastore architecture provides a unified storage resource for applications across different physical locations. This architecture ensures high availability and resilience through bi-directional sync replication, which synchronizes LUN changes in both directions. By offering synchronized data across failure domains, it provides protection against site-level failures. The shared storage approach enables seamless failover and continuous operations, making it an excellent choice for environments that require uninterrupted access and high availability across multiple sites. In contrast to local high availability (HA) pairs that offer shared storage within a single site, multi-site Business Continuity (BC) solutions extend shared storage across multiple sites, thereby increasing redundancy and resilience.

Figure 9) Disaggregated Datastore

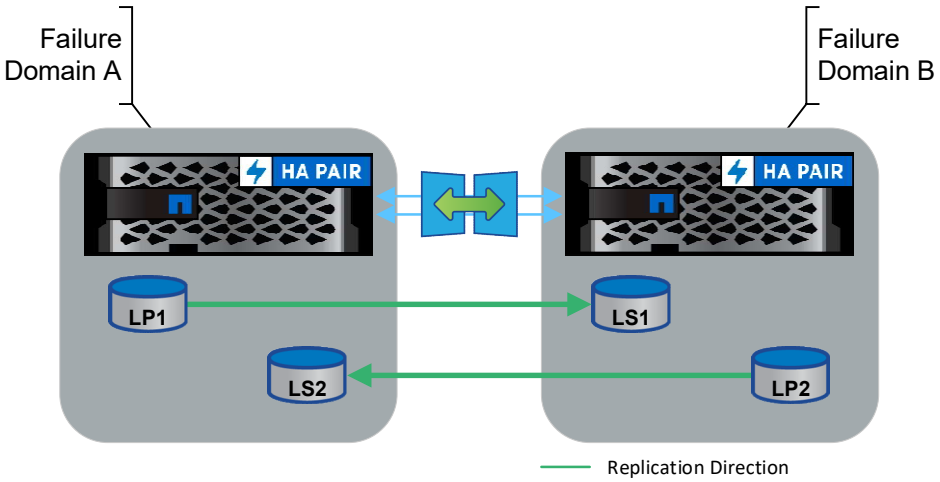
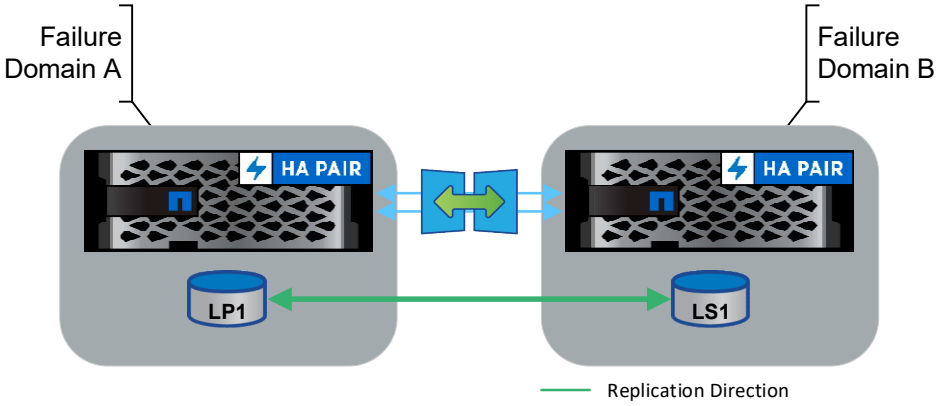


Figure 10) Stretched (shared) Datastore



Asymmetric Logical Unit Access

Asymmetric Logical Unit Access (ALUA) is a crucial feature commonly found in ONTAP clusters, including NetApp systems. It plays a significant role in optimizing storage access in environments where there are multiple paths between a host server and a storage array. By intelligently directing I/O traffic through the most optimal paths, ALUA improves overall performance and availability, ensuring a seamless storage experience.

In a typical storage array, there exist two types of paths: active/optimized paths and passive/non-optimized paths. Active paths, which are usually connected to the primary storage controller, provide the best performance and availability. On the other hand, passive paths serve as secondary paths with potentially higher latency or lower performance. To leverage the benefits of ALUA, the host server is configured with multipathing software or drivers that make it aware of the active and passive paths.

When a host initiates I/O operations, ALUA ensures that the traffic is directed through the active paths, maximizing performance, and minimizing latency. This intelligent path selection is a key factor in achieving optimal storage performance. However, ALUA does not stop there. It also offers failover capabilities, automatically redirecting I/O traffic to passive paths if an active path fails or becomes congested. This ensures continued access to the storage array and minimizes disruptions in critical workflows.

One of the primary benefits of ALUA is its ability to improve performance by routing I/O traffic through the most optimal paths, reducing latency, and maximizing throughput. Additionally, ALUA significantly increases availability by automatically redirecting traffic to alternative paths in the event of path failure or congestion. This ensures uninterrupted access to the storage array, even in challenging situations.

ALUA also simplifies the configuration and management of multipathing, reducing complexity for administrators. Traditionally, administrators had to manually identify and select the optimal paths for I/O operations. However, with ALUA, this manual intervention is no longer necessary as the system automatically handles path management. This streamlined approach saves time, reduces the risk of human error, and simplifies storage management in multi-pathing environments.

It is important to note that proper configuration and support from both the storage array and the host server are necessary for ALUA to function optimally. Compatibility between the host's multipathing software and the storage array's ALUA implementation is crucial to ensure seamless operation.

ALUA is a powerful feature that brings strategic business value to organizations utilizing ONTAP clusters, such as NetApp systems. It improves performance, increases availability, and simplifies storage management in multi-pathing environments. By leveraging ALUA, organizations can optimize their

storage infrastructure, enhance productivity, and ensure a seamless storage experience for their critical workloads.

For more information about ALUA on NetApp storage please read the following documentation.

- Asymmetric Logical Unit Access (ALUA) support on NetApp Storage - Frequently Asked Questions https://kb.netapp.com/onprem/ontap/da/SAN/Asymmetric_Logical_Unit_Access_(ALUA)_support_on_NetApp_Storage_-_Frequently_Asked_Questions

Deploying VMware vMSC with SMBC

A VMware vSphere Metro Storage Cluster (vMSC) configuration is a certified solution that combines synchronous replication with array-based clustering. It allows organizations to extend high availability and disaster recovery capabilities across two geographically dispersed locations. vMSC provides seamless failover and workload mobility, ensuring continuous availability for critical applications.

By integrating SMBC into vMSC deployments, organizations can further enhance the strategic business value and resilience of their virtualized environments. SMBC brings several key benefits to vMSC-enabled deployments:

- **Continuous Availability:** SMBC enables synchronous replication of data between multiple ONTAP clusters located in different sites. This ensures that data is always available, even in the event of a site failure or planned maintenance. Applications can seamlessly failover to the secondary site without any disruption to operations.
- **Zero RPO (Recovery Point Objective):** SMBC maintains a synchronous copy of data across sites, ensuring that there is no data loss in case of a failure. This is particularly important for applications that cannot tolerate any data loss, such as financial systems or healthcare applications.
- **High Performance:** SMBC leverages NetApp's all-flash architecture platforms, providing high-performance storage for vMSC-enabled applications. The active-active configuration allows for workload distribution across the ONTAP clusters, maximizing performance and reducing latency.
- **Simplified Management:** SMBC is integrated into the ONTAP System Manager interface, making it easy to configure and manage. Administrators can monitor and manage both sites from a single pane of glass, simplifying operations and reducing complexity.
- **Non-Disruptive Upgrades:** SMBC supports non-disruptive upgrades, allowing organizations to perform software and hardware upgrades without impacting application availability. This ensures that systems remain online and accessible to users during maintenance activities.

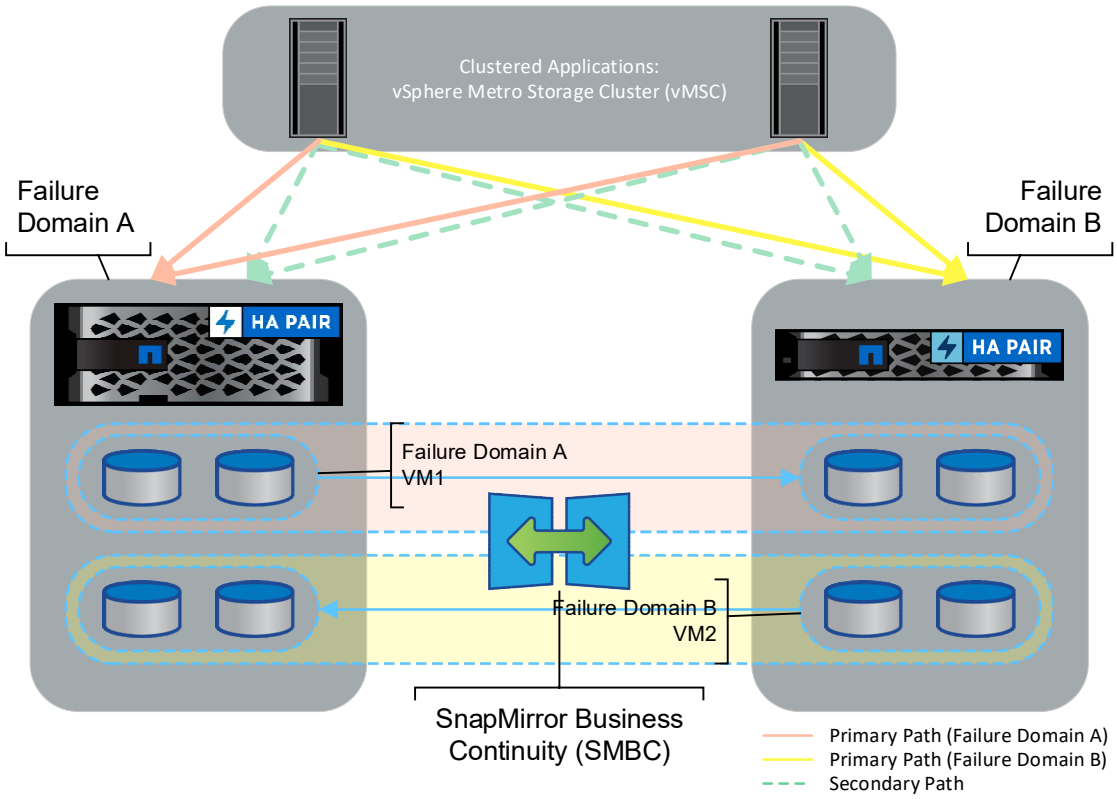
VMware vSphere Metro Storage Cluster (vMSC) combines synchronous replication and array-based clustering to ensure high availability and disaster recovery in virtualized environments. When integrated with NetApp SnapMirror Business Continuity (SMBC), vMSC gains additional capabilities and strategic business value. The vMSC with SMBC architecture features multi-host support for clustered applications, uniform access to storage systems across sites, an asymmetric active-active storage design, active workload distribution, and a disaggregated datastore model. These attributes enable seamless failover, workload mobility, optimized data flow, and flexibility for operational requirements without compromising availability or performance.

When deploying vMSC with SMBC, organizations should consider the following key factors:

- **Architectural Considerations:** Ensure the proper configuration of the vMSC architecture, including network connectivity, storage zoning, and redundancy. Plan for the placement of virtual machines and datastores across sites to optimize performance and availability.
- **Configuration Requirements:** Understand the configuration requirements for vMSC and SMBC, including storage array compatibility, network latency, and bandwidth considerations. Follow best practices and guidelines provided by NetApp to ensure a successful deployment.

- **Data Protection and Disaster Recovery:** Define the protection policies and recovery objectives for vMSC-enabled applications. Leverage the synchronous replication capabilities of SMBC to ensure continuous data protection and enable rapid failover in the event of a site failure.
- **Performance Optimization:** Optimize the performance of vMSC environments by leveraging NetApp's all-flash architecture platforms and load balancing capabilities. Distribute workloads across ONTAP clusters to maximize performance and minimize latency.
- **Simplified Management and Monitoring:** Take advantage of the integrated management capabilities of SMBC and the ONTAP System Manager interface. Monitor the health and performance of both sites from a centralized location, simplifying management tasks and reducing administrative overhead.

Figure 11) vMSC and SMBC architecture diagram



Deploying VMware vMSC with SnapMirror Business Continuity (SMBC) provides organizations with a powerful solution for achieving continuous availability and disaster recovery in their virtualized environments. By leveraging the strategic business value of SMBC, organizations can ensure uninterrupted operations, zero data loss, and simplified management of their critical applications. The combination of vMSC and SMBC delivers a robust and resilient infrastructure that enables organizations to meet their business objectives and maintain a competitive edge in today's dynamic IT landscape.

Note: For more information about vMSC with SMBC please read the following documentation.

- NetApp ONTAP with NetApp SnapMirror Business Continuity (SM-BC) with VMware vSphere Metro Storage Cluster (vMSC). (83370)
  https://kb.vmware.com/s/article/83370

Deploying Oracle with SMBC

Deploying Oracle RAC on SnapMirror Business Continuity (SM-BC) provides organizations with a robust solution for achieving high availability and disaster recovery in their mission-critical environments. By leveraging the combined capabilities of Oracle RAC and SM-BC, organizations can ensure continuous operations, zero data loss, and simplified management of their Oracle databases. The integration of Oracle RAC and SM-BC offers the following key benefits:

- **Zero Data Loss:** SM-BC enables synchronous replication of data between multiple NetApp ONTAP clusters, ensuring zero data loss in case of a failure. This is crucial for applications that require continuous availability and cannot tolerate any data loss.
- **High Availability:** Oracle RAC allows organizations to run a single Oracle Database across multiple servers, maximizing availability and enabling horizontal scalability. SM-BC complements this by providing synchronous replication and failover capabilities, ensuring uninterrupted access to the database even in the event of a site failure.
- **Disaster Recovery:** By stretching the RAC cluster across geographically disparate sites, organizations can achieve true disaster recovery capabilities. SM-BC ensures that the underlying data is synchronously replicated and available at the remote site, enabling rapid failover and minimizing downtime.
- **Transparent Application Failover (TAF):** SM-BC includes features such as transparent application failover, which allows Oracle RAC instances to safely replay changes during outages without impacting end-user applications. This ensures a seamless user experience and hides the impact of outages from end users.
- **Simplified Management:** SM-BC is integrated into the ONTAP System Manager interface, providing a unified management platform for configuring and monitoring the replication and failover processes. Administrators can easily manage both the primary and remote sites from a single interface, reducing complexity and administrative overhead.

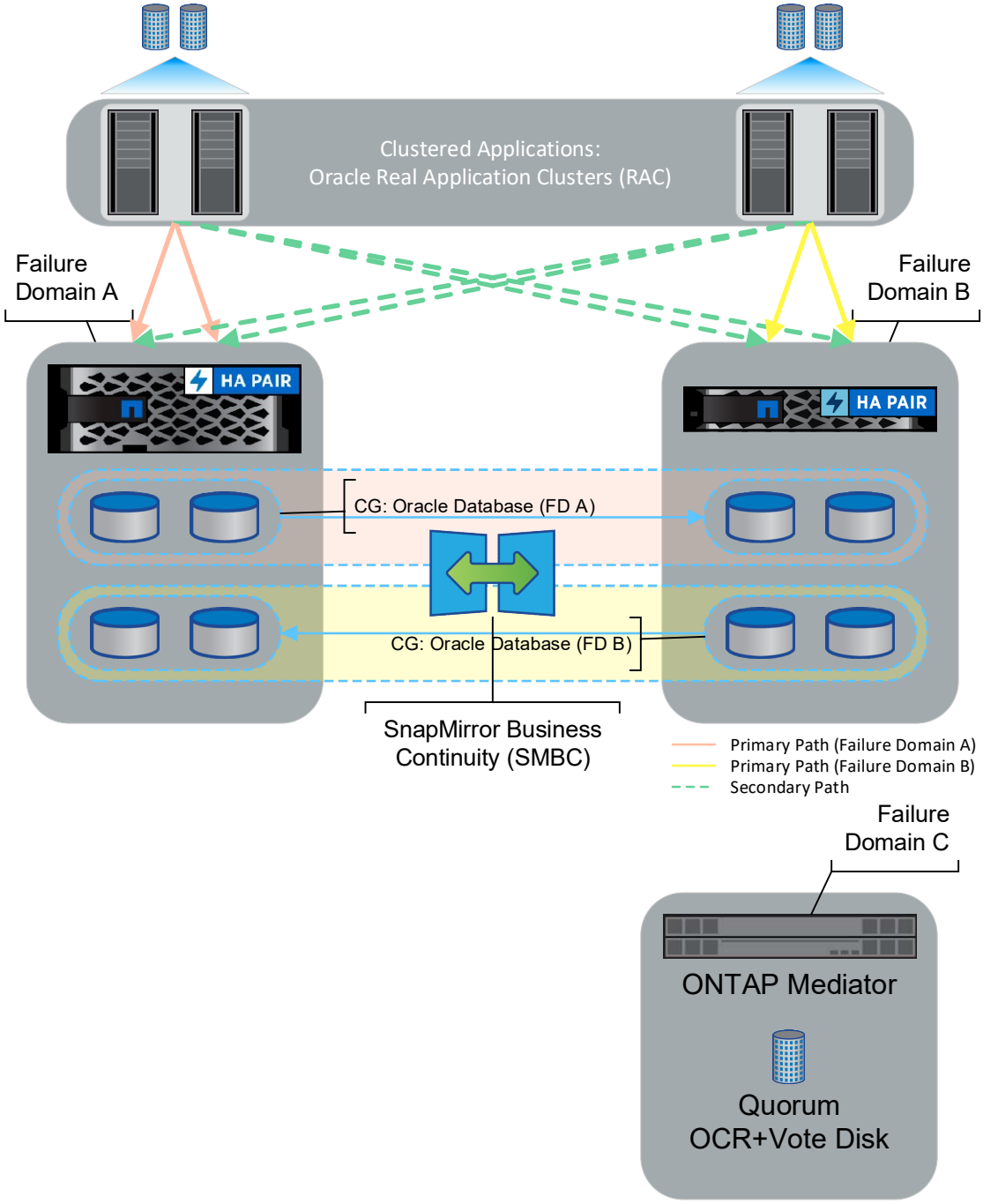
Oracle databases are critical components of many enterprise applications, and ensuring their high availability and disaster recovery is of utmost importance. By leveraging the capabilities of Oracle RAC in conjunction with NetApp SnapMirror Business Continuity (SMBC), organizations can achieve enhanced resiliency and strategic benefits for their Oracle deployments. The integration of Oracle with SMBC introduces a robust architecture that supports clustered databases across multiple hosts, provides uniform access to storage systems across sites, utilizes an asymmetric active-active storage design, enables active workload distribution, and adopts a disaggregated datastore model. These features collectively deliver seamless failover capabilities, enable efficient workload mobility, optimize data flow, and provide operational flexibility without compromising the availability or performance of Oracle databases.

When deploying Oracle RAC on SM-BC, organizations should consider the following key factors:

- **Architectural Considerations:** Plan the layout of the Oracle RAC cluster, including the distribution of RAC nodes across sites and the placement of data storage. Ensure proper network connectivity, storage zoning, and redundancy to optimize performance and availability.
- **Configuration Requirements:** Understand the configuration requirements for Oracle RAC and SM-BC, including storage array compatibility, network latency, and bandwidth considerations. Follow best practices and guidelines provided by NetApp to ensure a successful deployment.
- **Data Protection and Disaster Recovery:** Define the protection policies and recovery objectives for the Oracle RAC databases. Leverage the synchronous replication capabilities of SM-BC to ensure continuous data protection and enable rapid failover in the event of a site failure.
- **Performance Optimization:** Optimize the performance of the Oracle RAC environment by leveraging NetApp's all-flash architecture platforms and load balancing capabilities. Distribute workloads across ONTAP clusters to maximize performance and minimize latency.

- **Simplified Management and Monitoring:** Take advantage of the integrated management capabilities of SM-BC and the ONTAP System Manager interface. Monitor the health and performance of both sites from a centralized location, simplifying management tasks and reducing administrative overhead.

Figure 12) Oracle and SMBC architecture diagram



By deploying Oracle RAC on SM-BC, organizations can achieve a highly available and resilient infrastructure for their Oracle databases. This combination of technologies ensures continuous availability, zero data loss, and simplified management, enabling organizations to meet their business objectives and minimize the impact of outages in their critical systems.

Note: For more information about Oracle RAC with SMBC please read the following documentation.

- TR-4899: Oracle Database Transparent Application Failover with NetApp SnapMirror Business Continuity https://www.netapp.com/pdf.html?item=/media/40384-tr-4899.pdf

Conclusion

SnapMirror Business Continuity (SMBC) offers a range of benefits that make it a compelling choice for organizations seeking continuous availability, data protection, and high-performance storage solutions. With SMBC, businesses can achieve uninterrupted operations and eliminate the risk of data loss, thanks to its synchronous replication and zero recovery point objective (RPO). The simplified management, non-disruptive upgrades, and cost-effective disaster recovery capabilities further enhance the value proposition of SMBC.

Key takeaways for deploying various applications with SMBC include:

- **VMware vMSC:** By integrating SMBC into vMSC deployments, organizations can extend high availability and disaster recovery capabilities across geographically dispersed locations, ensuring continuous availability and zero data loss.
- **Oracle:** Deploying Oracle RAC on SMBC ensures high availability, disaster recovery, and simplified management for mission-critical Oracle deployments, offering zero data loss and continuous operations.
- **Microsoft Hyper-V:** Deploying Hyper-V with SMBC provides organizations with a robust and resilient infrastructure, enabling high availability, disaster recovery, and simplified management of critical virtualized environments.
- **Microsoft SQL Server:** By leveraging SMBC, organizations can achieve continuous availability and data protection for their MS SQL databases, ensuring uninterrupted operations and minimizing recovery time objectives (RTO).
- **SAP HANA:** Integrating SMBC with SAP HANA deployments delivers high availability, disaster recovery, and data protection for organizations running critical SAP applications, enabling them to meet their business objectives and maintain operational resilience.

In a competitive landscape, SnapMirror Business Continuity stands out as a superior choice for organizations looking for comprehensive business continuity solutions. With its advanced features, including synchronous replication, zero RPO, high performance, simplified management, and cost-effective disaster recovery, SnapMirror Business Continuity offers a distinct advantage over competitors. By choosing SnapMirror Business Continuity, organizations can ensure uninterrupted operations, mitigate risks, and deliver reliable and resilient services to their customers. Take the next step towards achieving continuous availability and data protection by selecting SnapMirror as your preferred business continuity solution.

Where to find additional information

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

- SnapMirror Business Continuity overview
  https://docs.netapp.com/us-en/ontap/smbc/index.html
- NetApp Product Documentation
  https://www.netapp.com/support-and-training/documentation/

Version history

Version	Date	Document version history
Version 1.0	October 2023	ONTAP 9.14.1

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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