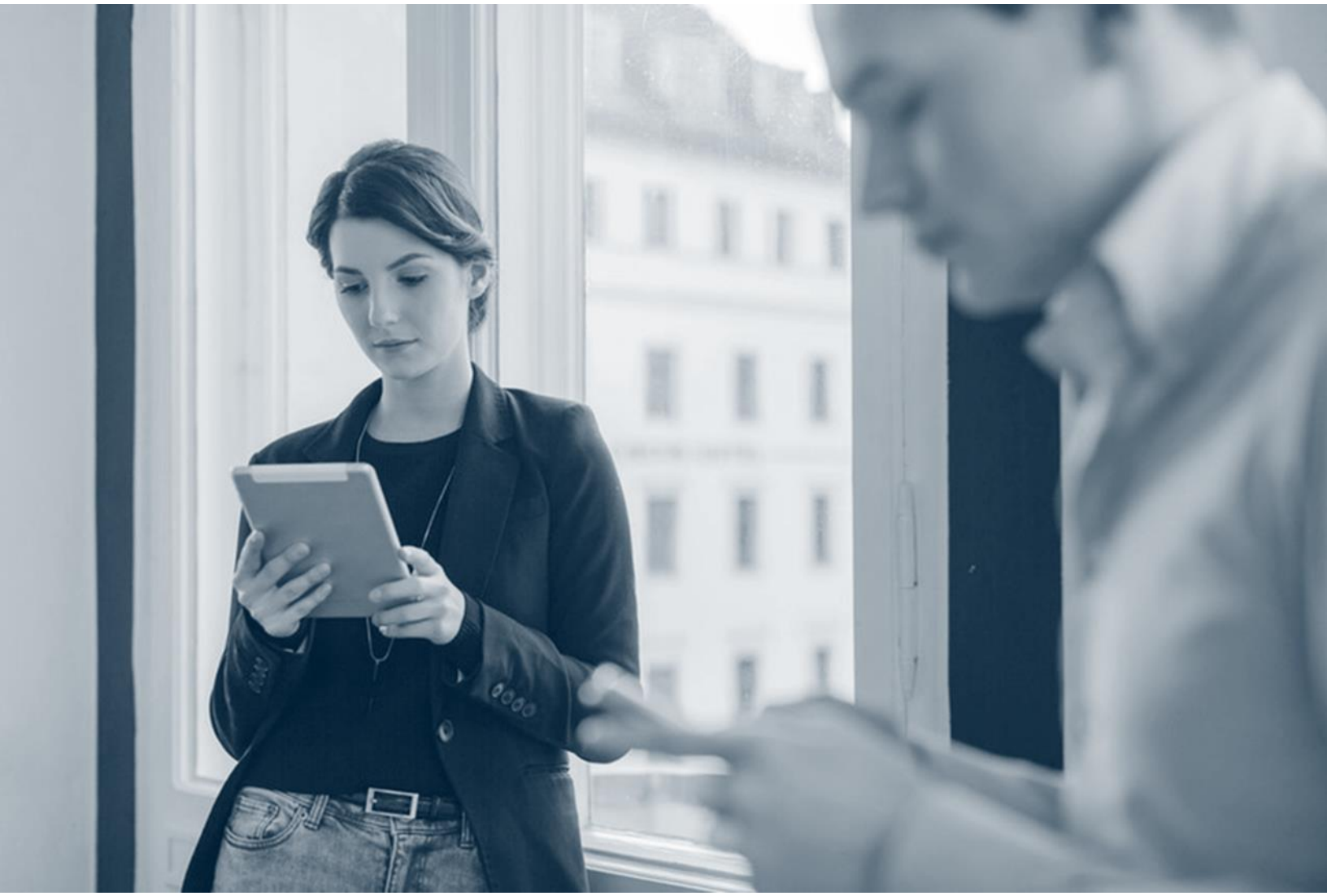




Commvault Solutions for Disaster Recovery

Version 11 Service Pack 17

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Commvault Solutions for Disaster Recovery

Use Commvault to deploy powerful, flexible, and cost-effective disaster recovery (DR) solutions that maximize the value of the Commvault data protection framework.

Commvault solutions for disaster recovery provide the following benefits:

- Replication of data and applications across physical and virtual platforms, including on-premises deployments and public, private, or hybrid clouds.
- Flexible and cost-effective options to support a range of business requirements for the modern IT environment, with different recovery point objectives (RPOs) and recovery time objectives (RTOs) depending on the criticality of different workloads.
- Multiple recovery points based on backup operations, to ensure that systems are protected against loss of access, data corruption, and external threats.
- Orchestration to ensure critical systems can be redeployed quickly in the event of a disaster.
- Advanced data transport features for efficient data movement across networks, with data compression, deduplication, and ongoing incremental updates.
- Validation and testing to ensure replicated resources are ready to use in the event of disruption.
- Centralized management, monitoring, reporting, and visualization, with streamlined dashboard operations, multi-tenant support, and self-service interfaces.

This document is primarily concerned with disaster recovery for virtual machines.

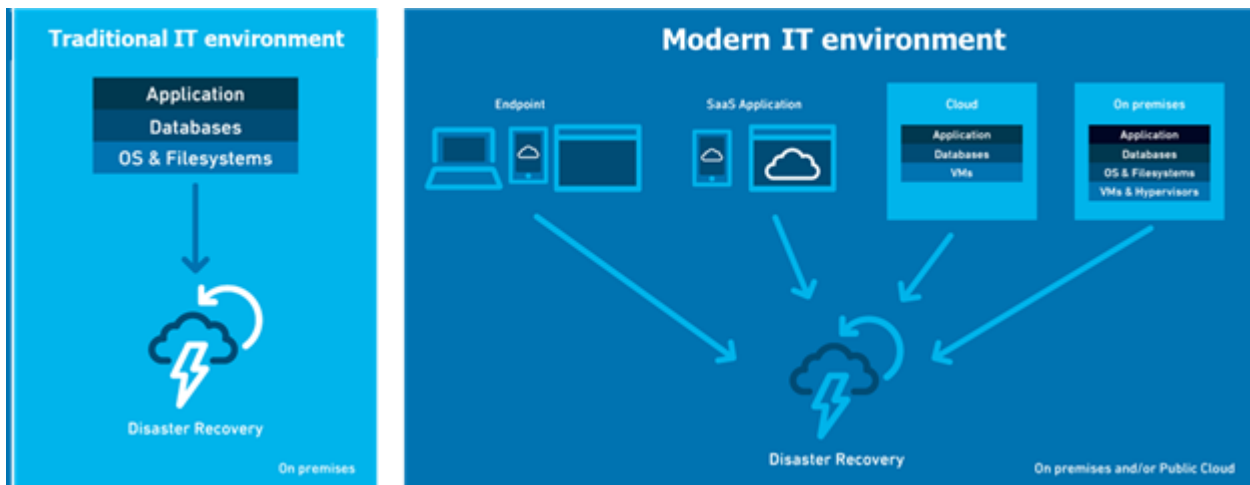
It also describes the Commvault framework for disaster recovery, provides context about the business requirements that drive DR strategies, and identifies related features that might be useful in the DR planning process.

Multi-Tiered DR Support for Modern IT Environments

Disaster recovery planning and testing are essential parts of the business environment. Over a third of companies surveyed by Commvault have initiated their disaster recovery plans at least once, and every company is likely to need to ensure continuity in the face of disruption, in the form of natural events, technological failures, or human actions.

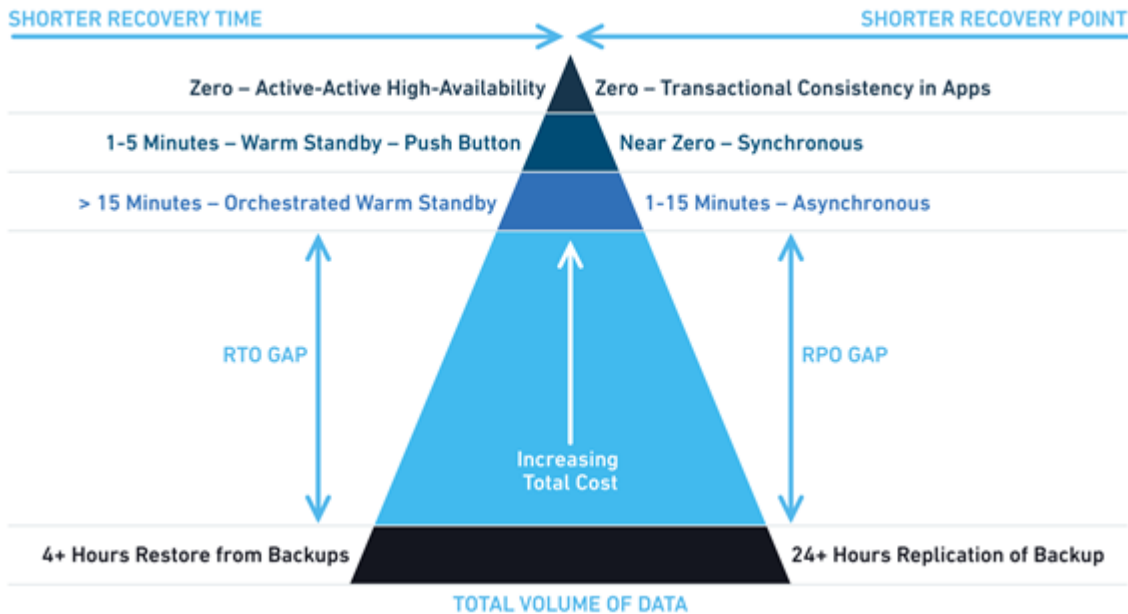
Changes in IT Environments

In the past, critical data for most businesses existed in a single location or in a small number of offices, and in a homogeneous environment that included a small number of servers, operating systems, and applications. By contrast, modern IT environments span multiple data types, multiple locations, and multiple platforms, from on-premises equipment to cloud environments, and reside in servers around the globe.



Costs of Rapid Recovery

In addition, the amount of data that businesses create, collect, and maintain has grown exponentially. Likewise, the cost of disaster recovery has grown, especially when businesses require frequent recovery points and rapid recovery times.

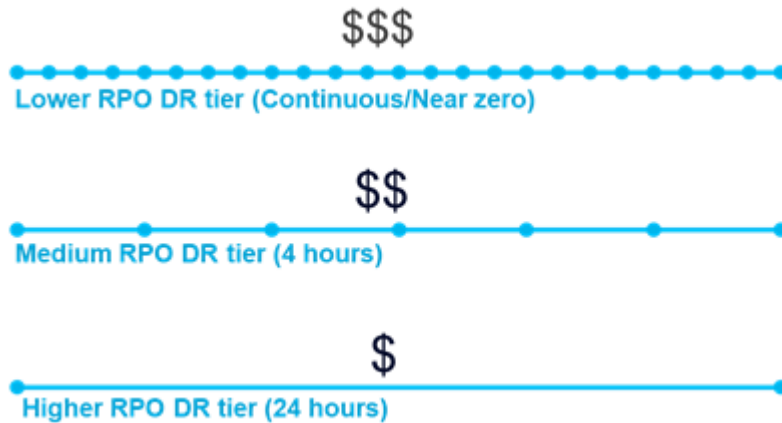


A one-size-fits-all approach to disaster recovery planning is not practical for modern IT environments. Instead, organizations must define DR plans that prioritize mission-critical data and applications:

1. Mission-critical data and applications need to be recovered as quickly as possible, with the latest updates from production systems.
2. Less critical assets can be brought back online more gradually. If updates to the original data are less frequent, frequent recovery points might not be as important.
3. Legacy data that is maintained for reference purposes can be recovered on an as-needed basis.

Aligning Budgets with Business Requirements

By using a multi-tiered approach, organizations can deploy IT budgets to align with business requirements.



Backup, Replication, and Orchestration

Commvault disaster recovery solutions begin with backup operations. This approach offers significant advantages over other types of solutions:

- The frequency of backup operations determines the recovery point objective (RPO).

Frequent recovery points also enable recovery from an earlier point in time, in the event that the latest data on production systems is corrupted or compromised. By contrast, solutions that rely entirely on replication might simply reproduce the original environment with the same issues.

- Backup operations can create application-consistent recovery points.

Solutions that rely on snapshots might require significant work, such as replaying transaction logs, to reproduce the state of application data.

- Using backup data as a source for DR sites makes it possible to use backup infrastructure for recovery, reducing the impact on production systems.
- By capturing data in a platform-independent form, you can avoid the need to recreate the original environment in a DR site.

For example, you can recover from a physical source to a virtual destination, or from on-premises equipment to a public cloud.

- You can validate backups as they are created, without the need to maintain destination infrastructure indefinitely.

This approach can be especially useful for non-critical data that might need to be accessed on an as-needed basis.

Unparalleled Protection

Because Commvault uses a common data protection framework across different systems and applications, and leverages native capabilities on different data sources, the coverage and efficiency of Commvault backup operations is unparalleled. For example:

- Perform streaming backups directly, or use native hardware snapshots to capture data quickly, and then use the snapshot to create a streaming backup copy.
- Begin with a full backup, and then use a "forever incremental" approach to capture ongoing updates.
- When necessary, use application agents or application-aware plugins to protect critical data.
- Protect different file systems, storage arrays, datastores, physical and virtual machines, databases, cloud sites, and applications.
- Validate backups as they are created.

Flexible and Efficient Recovery or Replication

Commvault supports recovery on the broadest possible range of systems, platforms, and locations, and optimizes data transfers to remote sites.

- Recover or replicate from on-premises equipment to a public, private, or hybrid cloud environment.
- Recover data from a physical machine to a virtual machine, or convert a VM from one hypervisor to a different hypervisor.
- Create copies of data at remote sites, replicate to a warm recovery site, or configure real-time transactional updates to support immediate recovery.
- Replicate groups of virtual machines to support operations or to create a test environment quickly.

- Replicate to multiple DR sites to decrease risk.
- Live mount virtual machines from backups to validate backups, recover virtual machines quickly, or access data directly from a VM.
- Use incremental updates, data compression, and deduplication to reduce network transport times.

Rich Orchestration Features

Orchestration features make it possible to validate backups, coordinate failovers, and automate common operations:

- Perform test boot operations to verify that virtual machines are ready to use.
- Monitor or report on recovery readiness and replication activity.
- Schedule planned failovers to a destination site, test failovers, perform point-in-time failovers, initiate unplanned failovers after disruptions, enable automatic failovers, fail back to the production site, and undo or reverse failovers.
- Replicate a development and test environment or create a virtual lab.

Disaster Recovery Features for Data, Applications, and Systems

Commvault provides disaster recovery features for a broad range of business requirement and platforms.

This list will never be up to date, because we are constantly working to provide more and better solutions!

For a summary of the features that are available for each platform, see [Cross-Platform Feature Support for Live Sync Replication](#) (on page 17)

Backup and Recovery

Perform backups, and then create copies of backup data at remote sites where they can be used for recovery as needed.

Live Sync Replication for Virtualization

Live sync for virtualization uses backup data from source VMs to create VMs at one or more destination sites. Destination sites can use the same hypervisor as the source, or can convert VMs to run on a different hypervisor. You can create VMs from a full backup, then apply updates from incremental backups to keep destination VMs in sync with source VMs. Live sync includes orchestration features that enable rapid recovery at a destination site. You can use live sync to replicate single VMs or large groups of VMs.

Commvault provides the following live sync features for virtualization:

- **Live Sync:** From streaming backups or backup copies, identify VMs to replicate, configure settings for destination VMs (such as destination network settings), create VMs from backups, apply ongoing updates from incremental backups, monitor replication activity, and orchestrate testing and recovery operations.
- **Live Sync Direct:** From IntelliSnap backups, replicate VMs directly from a hardware or software snapshot, apply ongoing updates from incremental backups, and use other features from basic live sync.
- **Live Sync I/O:** For transaction-based replication, capture VM writes in real time and replicate them to the destination site. Continuously update destination VMs or maintain granular recovery points.

Other Virtualization Features

- **Dev-Test Groups:** Create a virtual lab from a backup or replication job and then use it to validate job content.
- **Failover groups:** Identify groups of VMs to recover to a destination site.
- **Live mount:** Live mount virtual machines from backups to validate backups, recover virtual machines quickly, or access data directly from a VM.

Live Sync for Databases

- Live Sync Replication of DB2 Databases
- Live Sync Replication of SQL Server Databases
- Live Sync Replication of Oracle Databases
- Live Sync Replication of Oracle RAC Databases
- Live Sync Replication of PostgreSQL Databases

Live Sync for the CommServe System

- **High Availability CommServe Host (also called CommServe LiveSync):** Keep the CommServe server ready for disaster recovery and provides the ability to quickly failover to a designated standby host in the event of a disaster.

Replication for File Systems

- **Block-Level Replication (also called Live Sync for File Systems):** Back up file system data, replicate block-level extents to one or more destination computers, and apply ongoing updates from incremental backups.
- **ContinuousDataReplicator (CDR):** Replicates data from a source computer to a destination computer. This is done in near real-time by logging all file write activity to a replication log in the source computer, including new files and changes to existing files. These replication logs are transferred to the destination computer and replayed, ensuring that the destination remains a nearly real-time replica of the source.

Features for Cloud Applications

- Oracle Database Application Migration to Oracle Cloud Classic, Oracle Cloud Infrastructure, or Amazon EC2
- Backup and Recovery for:
 - Alibaba RDS
 - Amazon RDS
 - Amazon S3
 - Amazon Web Services
 - Azure Blob Storage

- Google Cloud Database
- Google Cloud Storage
- Google Mail and Google Drive
- Microsoft OneDrive for Business
- Microsoft SQL Server (on Azure or Amazon RDS)
- OpenStack Swift
- Oracle Cloud Classic
- Oracle Cloud Infrastructure
- Oracle PaaS
- Oracle Storage
- Salesforce

Use Cases

Live Sync replication provides a warm disaster recovery solution that can be used for individual VMs or for large numbers of VMs. You can provide a DR site using on-premises equipment or using a public cloud site. Live Sync Direct uses hardware or software snapshots for replication.

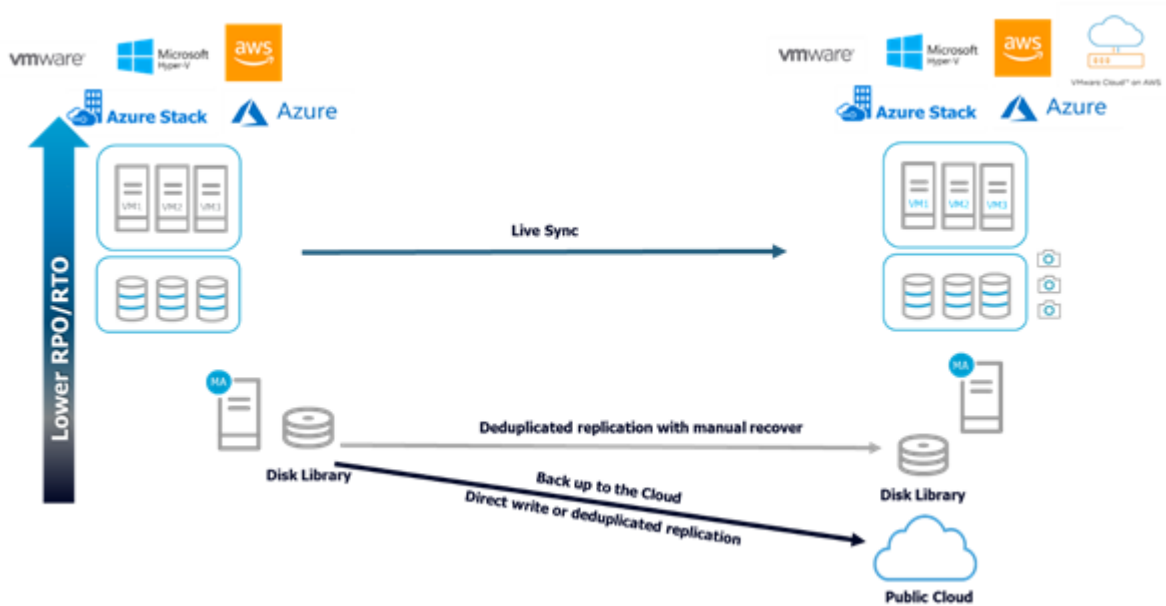
For workloads that require very low RPOs and RTOs, you can use Live Sync I/O to capture VM writes and replicate them to a DR site for near real-time replication.

For less critical workloads, you can copy backup data and stage it at a DR site for recovery on an as-needed basis.

Live Sync to a Warm Disaster Recovery Site

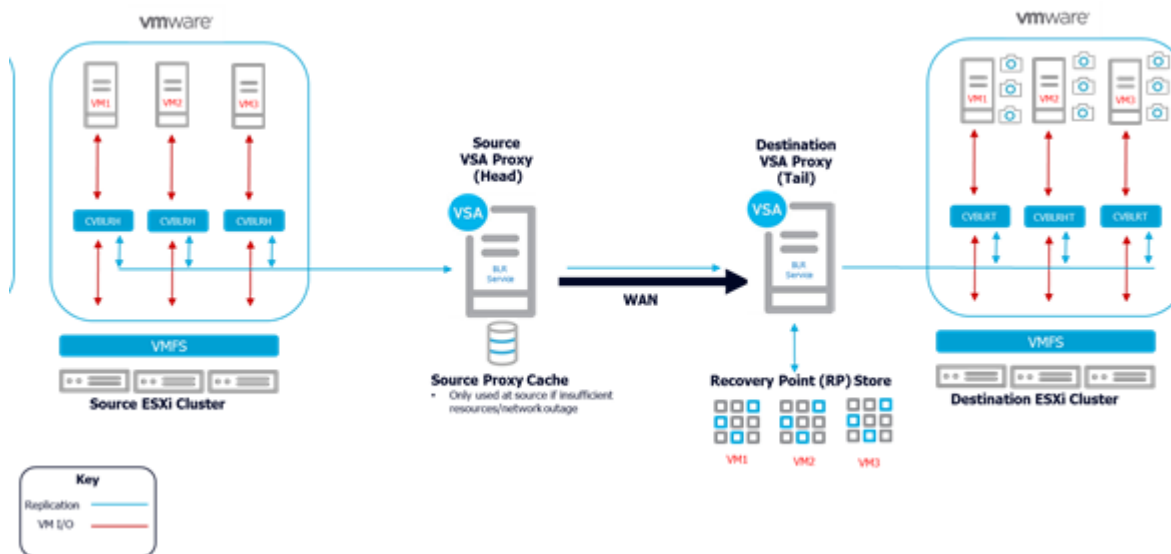
Live Sync replication uses full backups to create virtual machines at one or more DR sites, and then uses incremental backups to update destination VMs on an ongoing basis. You can configure schedules to update destination VMs immediately after each backup, or on a regular schedule. You can also spread the workload to use multiple streams when updating multiple VMs simultaneously.

Live Sync includes orchestration features to perform test boots, failovers, failbacks, and other operations that enable you to test the DR site or move operations between the primary site and a destination site.



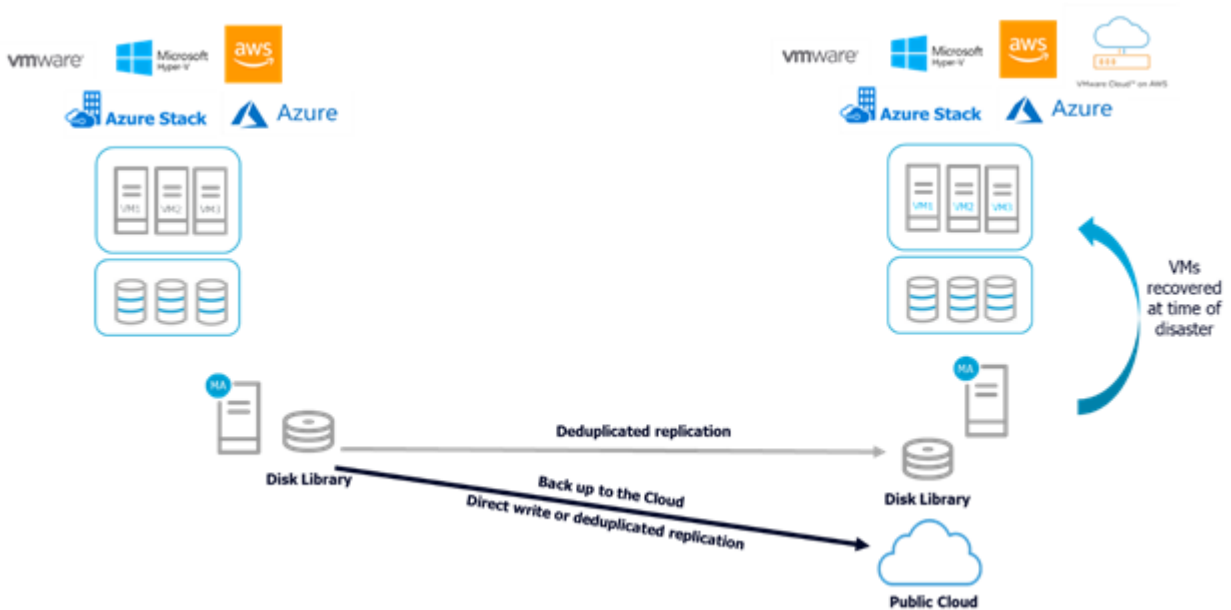
Live Sync I/O for Synchronous Replication

For VMware environments that require very fast recovery with the latest transaction data, you can configure Live Sync I/O. Live Sync I/O uses VMware vSphere APIs for I/O Filtering (VAIO) to capture block-level changes to source VMs and stream the changes to destination VMs continuously. You can configure Live Sync I/O to maintain the latest version of each VM at the destination site, or to maintain a series of application-consistent recovery points for each VM at the destination site.



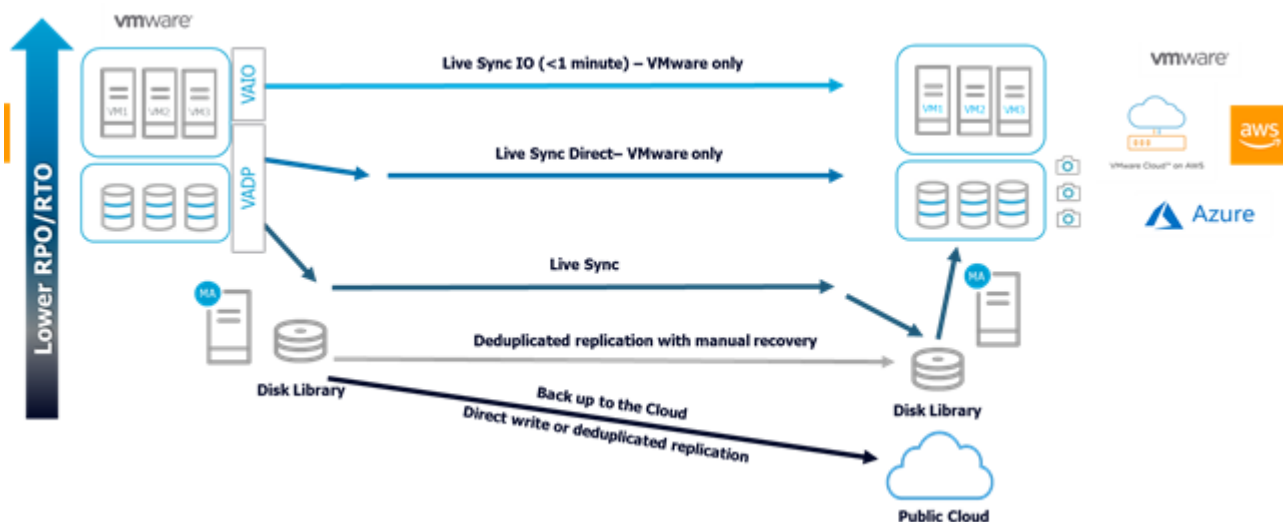
Remote Staging for On-Demand Recovery

For less critical VMs, you can create auxiliary copies and send them to remote sites, using data compression and deduplication to maximize transfer speeds. As needed, you can recover VMs at the destination sites automatically or manually.



Recovery Options to Match Business Requirements

For different classes of virtual machines, you can choose the solution that matches your requirements.



Role-Based Management Interfaces

You can access Commvault software in different ways, depending on the operations you need to perform and the degree to which you need to customize your configuration.

- Command Center is a web-based interface for quick deployment and daily operations. It uses smart defaults to simplify configuration, provides dashboards for operational control, and can be customized to support specific user roles.
- CommCell Console provides advanced features for configuration and operations. It supports managed service providers (MSPs) and organizations that need fine-grained control for data protection operations.
- Web Console is a web-based interface for end users. It provides self-service access to backup and recovery data for physical and virtual machines.
- Programmatic access to Commvault software is available through command-line operations, REST APIs, and other developer tools.
- Third-party plugins enable users to access Commvault from within other applications, such as ServiceNow, vRealize or the vSphere Web Client.

Architecture for Data Portability

Commvault is designed to protect data using a common framework across different platforms and applications. This architecture provides a foundation that supports the evolving needs of organizations moving into the future.

The Commvault architecture provides comprehensive coverage and supports emerging technologies.

- **Platform independence:** Protect and recover data across physical and virtual platforms. Move data and applications from on-premises equipment to the cloud, and back again.
- **Enterprise coverage:** Include different operating systems, applications, devices, storage arrays, and cloud platforms in an integrated management and operational framework.
- **Policy-driven automation:** Define policies to support operational objectives and enable streamlined operations with automation.
- **Scalability:** Flexible infrastructure for efficient management of massive collections of data.
- **Built for recovery:** Enable rapid recovery from outages, natural disasters, and ransomware attacks.
- **Compliance and risk management:** Manage compliance with information governance policies. Monitor and report on operations and data storage.
- **Analytics:** Find data and extract insights for better data governance and business outcomes.

Cross-Platform Feature Support for Live Sync Replication

The following table shows supported source and destination sites and supported features for Command Center and CommCell Console.

Source	Destination	Command Center supported features	CommCell Console supported features
Azure streaming backups	Azure	<ul style="list-style-type: none"> • Failover groups • Planned or unplanned failover • Failback 	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback
Azure Stack streaming backups	Azure Stack	Not supported	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback
Hyper-V streaming backups	Azure	<ul style="list-style-type: none"> • Failover groups • Planned or unplanned failover • Failback 	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback
Hyper-V streaming backups or backup copies	Hyper-V	<ul style="list-style-type: none"> • Failover groups • Test boot • Planned or unplanned failover • Failback 	<ul style="list-style-type: none"> • Test boot • Planned or unplanned failover
OpenStack	OpenStack	<ul style="list-style-type: none"> • Planned or unplanned failover 	Not supported

Source	Destination	Command Center supported features	CommCell Console supported features
Oracle Cloud Infrastructure streaming backups	Oracle Cloud Infrastructure	<ul style="list-style-type: none"> • Failover groups • Planned or unplanned failover • Undo failover 	Not supported
VMware streaming backups	Amazon	<ul style="list-style-type: none"> • Failover groups • Planned or unplanned failover • Failback • Validation 	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback • Validation
VMware streaming backups	Azure	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback 	<ul style="list-style-type: none"> • Planned or unplanned failover • Failback

Source	Destination	Command Center supported features	CommCell Console supported features
VMware streaming backups	VMware (vCenter or vCloud)	<ul style="list-style-type: none"> • Live Sync I/O • Failover groups • Test boot • Test failover • Planned or unplanned failover • Point-in-time failover • Undo failover • Reverse replication • Failback • Live mount • Validation 	<ul style="list-style-type: none"> • Live Sync I/O • Test boot • Planned or unplanned failover • Automatic failover • Failback • Live mount • Validation
VMware IntelliSnap backups	Amazon	Not supported	<ul style="list-style-type: none"> • Planned or unplanned failover • Validation

Source	Destination	Command Center supported features	CommCell Console supported features
VMware IntelliSnap backups	VMware	<ul style="list-style-type: none"> • Live Sync Direct • Failover groups • Test boot • Test failover • Planned or unplanned failover • Point-in-time failover • Undo failover • Reverse replication • Failback • Live mount • Validation 	<ul style="list-style-type: none"> • Live Sync Direct • Test boot • Planned or unplanned failover • Live mount • Validation

Where to Find More Information

For detailed information about Commvault disaster recovery solutions, see the following links.

Command Center

- Replication for Virtual Machines
(http://documentation.commvault.com/commvault/v11_sp14/adminconsole/article?p=87228.htm)
- DR Orchestration and Failover Groups
(http://documentation.commvault.com/commvault/v11_sp14/adminconsole/article?p=87178.htm)
- VMware Replication Using VAIO (Live Sync I/O)
(http://documentation.commvault.com/commvault/v11_sp14/adminconsole/article?p=106449.htm)
- Live Mounts
(<http://documentation.commvault.com/commvault/v11/article?p=93254.htm>)
- CommServe Recovery
(http://documentation.commvault.com/commvault/v11_sp14/adminconsole/article?p=107578.htm)
- Oracle E-Business Suite Migration
(http://documentation.commvault.com/commvault/v11_sp14/adminconsole/article?p=86682.htm)
- Live Sync Replication of Oracle Databases
http://documentation.commvault.com/commvault/v11_sp17/article?p=111211_1.htm
- Live Sync Replication of SQL Databases
http://documentation.commvault.com/commvault/v11_sp17/article?p=109430.htm

CommCell Console

- Live Sync Virtual Machine Replication
(<http://documentation.commvault.com/commvault/v11/article?p=92453.htm>)
- Configuring Live Sync Direct
(<http://documentation.commvault.com/commvault/v11/article?p=36559.htm>)

- VMware Replication Using VAIO (Live Sync I/O)
(http://documentation.commvault.com/commvault/v11_sp14/article?p=88419.htm)
- Dev-Test Groups and Virtual Labs
(<http://documentation.commvault.com/commvault/v11/article?p=33034.htm>)
- Live Mount for VMware
(<http://documentation.commvault.com/commvault/v11/article?p=32114.htm>)
- CommCell Disaster Recovery
(<http://documentation.commvault.com/commvault/v11/article?p=43507.htm>)
- Live Sync Replication of DB2 Databases
(<http://documentation.commvault.com/commvault/v11/article?p=108667.htm>)
- Live Sync Replication of Oracle Databases
(<http://documentation.commvault.com/commvault/v11/article?p=20653.htm>)
- Live Sync Replication of Oracle RAC Databases
(<http://documentation.commvault.com/commvault/v11/article?p=21138.htm>)
- Live Sync Replication of PostgreSQL Databases
(<http://documentation.commvault.com/commvault/v11/article?p=21615.htm>)
- Live Sync Replication of SQL Databases
(<http://documentation.commvault.com/commvault/v11/article?p=92005.htm>)
- Oracle Database Application Migration to the Cloud
(<http://documentation.commvault.com/commvault/v11/article?p=20622.htm>)
- Cloud Apps
(<http://documentation.commvault.com/commvault/v11/article?p=30007.htm>)
- ContinuousDataReplicator
(<http://documentation.commvault.com/commvault/v11/article?p=37192.htm>)

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