PURE VALIDATED DESIGN

Pure FlashBlade with Commvault for Data Protection

Pure Validated Design

Contents

Executive Summary

Growing volumes of information and business demands for 24x7 access to applications make it harder for companies to develop adequate data protection and disaster recovery strategies. Traditional backup and recovery processes and infrastructure are pressed to keep pace as threats to high-value data become more common. Commvault and Pure Storage® have partnered to design, validate and deliver a high-performance, simple, and scalable enterprise-level data protection solution.

A Pure Validated Design (PVD) means that Pure has integrated and validated its leading-edge storage technology with an industry-leading application solution platform to simplify deployment, reduce risk, and free up IT resources for business-critical tasks. The PVD process validates a solution and provides design consideration and deployment best practices to accelerate deployment. The PVD process assures the chosen technologies form an integrated solution to address critical business objectives. This document provides design consideration and deployment best practices for the PVD using Pure FlashBlade® with Commvault Remote Office Appliance RO1105 for data protection.

The Commvault Remote Office Appliance RO1105 (RO1105) with Pure FlashBlade is especially well-suited to address the stringent data protection requirements of enterprise data centers. This solution allows Commvault backup clients to write directly to object storage on FlashBlade, which lets a small, remote-office server manage data at enterprise scale. This solution brings together a leading data protection appliance with an all-flash storage platform to offer high throughput, low latency, and built-in, always-on deduplication and compression to deliver high performance and simplicity for enterprise backup and restore operations.

Introduction

This document describes the benefits of implementing the RO1105 with Pure FlashBlade in addition to design considerations and deployment best practices. It also includes sizing guidelines, installation steps, and configuration best practices to leverage the simplicity, scalability, and agility of a Commvault with FlashBlade to provide high-performance, enterprise-class data protection.

Companies are experiencing exponential growth in the volume of data they need to manage, while rapid changes in data types and sources complicate data management. At the same time, growing levels of ransomware attacks threaten to bring down not just a single application but an entire operation and cause significant financial and business losses and legal issues, in addition to serious damage to the organization’s reputation. Traditional data protection methods are unable to meet these evolving requirements and new ransomware threats. Current solutions are often:

- **Slow:** Spinning disks make shrinking backup windows, aggressive recovery time objectives (RTOs), and stringent service level agreements (SLAs) virtually impossible to meet.
- **Complicated:** Multiple hardware vendors and backup products in the environment increase storage and data management complexity.

- **Costly:** Unpredictable costs for hardware refreshes and software upgrades put a strain on budgets, making it difficult to scale as the business grows.

Commvault and Pure have partnered to deliver a Pure Validated Design, which combines the simplicity of the Commvault Remote Office Appliance with the high performance and scalability of Pure FlashBlade storage to deliver a superior data protection solution for enterprise-wide mission critical data.

Solution Overview

This PVD leverages Commvault Backup & Recovery enterprise software to provide a fast, simple, and scalable data protection and infrastructure management solution designed for the modern data center. Included as part of the solution is the Commvault Storage Accelerator feature. Storage Accelerator allows backup clients to write directly to object storage on FlashBlade, removing the MediaAgents from the data stream. In this solution, the MediaAgents therefore only manage metadata. The reduced workload on the MediaAgents lets a small, remote-office server manage data at enterprise scale. MediaAgents also perform deduplication to efficiently use storage targets, increasing the benefits of using cloud storage for backup and archival.

Pure Storage FlashBlade is a high-performing, scale-out, unified fast file and object storage system optimized for storing and processing unstructured data. FlashBlade provides high throughput and fast time to first byte and it can host multiple file systems and multi-tenant object stores for thousands of clients. FlashBlade provides a highly scalable solution to meet growing storage demands and enables IT administrators to improve productivity and consolidate silos by supporting multiple data sources on one storage platform. Commvault's Deduplication Accelerated Streaming Hash (DASH) Copy process can be used for data with a retention period longer than data backed up for operational recovery, to archive on public cloud storage. The Commvault with FlashBlade architecture is shown in Figure 1.

Commvault Backup & Recovery's advanced data compression and deduplication capabilities combined with Pure FlashBlade's intelligent replication provide the data-protection foundation needed to ensure true business continuity today and the ability to meet growth demands of tomorrow.

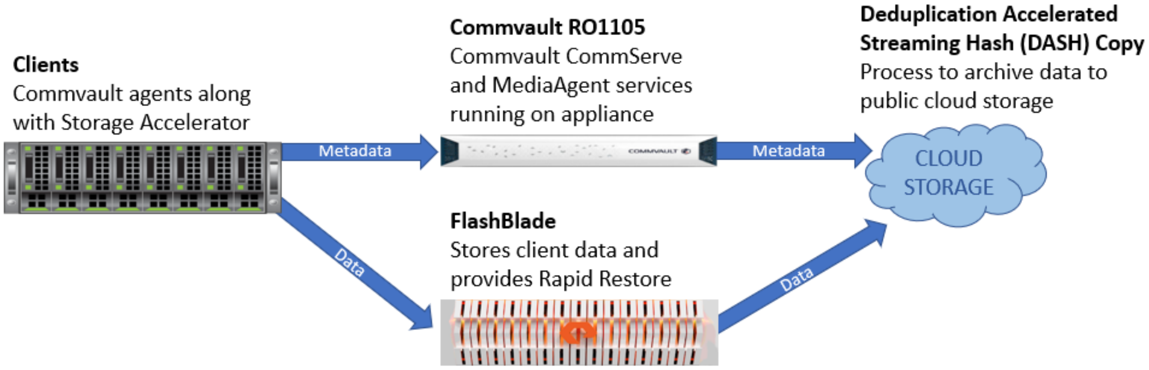

Clients
Commvault agents along with Storage Accelerator
Commvault RO1105
Commvault CommServe and MediaAgent services running on appliance
Deduplication Accelerated Streaming Hash (DASH) Copy
Process to archive data to public cloud storage
Metadata
Metadata
CLOUD STORAGE
Data
Data
FlashBlade
Stores client data and provides Rapid Restore

Figure 1. Pure FlashBlade storage with Commvault architecture.

Solution Benefits

Rapid growth in data creation, increased data retention requirements, and the always-on nature of business combine to place increased pressure on both Recovery Point Objectives (RPOs) and Recovery Time Objectives (RTOs). Traditional backup solutions are not able to meet these increasingly demanding requirements. The Commvault with FlashBlade solution includes advanced features to simplify management, improve performance, and attain the highest levels of data protection.

Performance

The FlashBlade all-flash backup target achieves data ingestion rates of up to 90TB/hour. Combining the high-performance, high-capacity blade technology with all-flash storage and 320 Gbs bandwidth of external fabric modules, provides a storage subsystem capable of meeting the performance demands of an enterprise-wide backup solution.

Performance throughout the backup process is important as it allows more data to be protected in a reduced timeframe. But, restore time is what is most important. A typical data restore consists of copying backup data from secondary storage to its original or possibly a new location. The restore is performed to return the data to its original state. But, finding and recovering the data takes time. FlashBlade Rapid Restore allows simultaneous restore operations to different clients which dramatically reduces restore time and delivers data-recovery speeds of up to 270TB/hour for Commvault protected data.

Load Distribution

The integration of FlashBlade object storage differentiates the Commvault with FlashBlade solution from traditional backup solutions that rely on block and file storage. To read and write data to file storage, Commvault breaks each backup or restore stream into chunks, which are written sequentially into large data files. In an object storage environment, the system creates a thread pool that is shared across all streams and breaks data chunks into smaller binary large objects (BLOBs) before they are written. As each thread is activated, it opens a TCP connection to storage and the threads write BLOBs in a highly parallel manner. Commvault automatically expands the thread pool, up to a customizable maximum, as needed to improve throughput. Because the threads each have their own TCP connections, Commvault's architecture results in excellent load distribution across FlashBlade blades and improved distribution to and across more clients.

Simplified Management

The Commvault Remote Office Appliance RO1105 protects and recovers data to and from the FlashBlade. It manages compression and deduplication before the data is sent to the FlashBlade, thereby reducing data being backed up, storage capacities, operating costs, and the network bandwidth required for backups and restores. The solution can also manage local backups and restores and replicate snapshots via Commvault IntelliSnap copies for greater data protection.

Commvault IntelliSnap streamlines and simplifies snapshot management by centralizing it across one or many storage arrays, automating object, application, and database recovery, and linking snapshots to backup processes. IntelliSnap quiesces applications or systems, triggers the storage array-based snapshot, and returns the system to a fully operational state within minutes. It minimizes administrative configuration and eliminates scripting requirements across arrays. In addition, IntelliSnap offers a simple data management, indexing and reporting framework, so data can be used for more than just backup and recovery.

Scale

FlashBlade's scale-out metadata architecture can handle tens of billions of files and objects with maximum performance and rich data services. A single FlashBlade can scale out instantly, simply by adding blades, up to 150 blades across 10 chassis, providing over 7.5PB of raw storage. Each added blade increases the system throughput, which results in faster backup and recovery as the FlashBlade grows. Adding Commvault 1U Data Servers increases the amount of data Commvault software can manage.

Ransomware Protection with SafeMode Snapshots

Backups protect critical data against common problems such as disasters, data corruption, and accidental deletions. But the latest threat facing corporate data is the threat of ransomware. Ransomware is a type of malware that encrypts files and requires payment of a ransom in return for restoring access to the data. As there's no guarantee a perpetrator will honor the terms of the ransom, the best protection is to prevent ransomware through cybersecurity best practices and routine snapshots.

The solution has advanced ransomware detection and mitigation capabilities to help ensure data can be recovered quickly in the case of an attack and to identify and react early to attacks and, thus, minimize potential damage. FlashBlade features SafeMode™ snapshots, which are uniquely designed to protect backup metadata. SafeMode snapshots allow administrators to periodically create read-only snapshots of backup data as immutable secure copies that cannot be deleted by an attacker or administrator. The backup data can be instantly rolled back to any snapshot, preventing malicious or accidental deletion of backup data to enable fast recovery from ransomware attacks and similar events.

Technology Overview

Commvault® Backup & Recovery

Commvault Backup & Recovery software provides enterprise-grade protection and recovery of virtual machines, containers, databases, applications (including cloud), endpoints and files. It provides increased visibility and role-based access control that enables self-service, restricting unauthorized access while helping to eliminate data sprawl. Source-side deduplication improves data transmission efficiency, with encryption available both at-rest and in-transit. Commvault supports flexible recovery of an entire system, instance, and application; or recovery as granular as a single file or database table. Commvault allows admins to manage backed-up data and workloads efficiently and securely, both on-premises and in any public cloud.

Commvault Remote Office Appliance RO1105

The Commvault Remote Office Appliance, also called the Data Control plane, runs the CommServe and MediaAgent Services:

- CommServe services are the single point of management, configuration, and reporting for the data protection solution.
- MediaAgent Services manage the meta data, including deduplication and job indexing, for the entire solution.

The RO1105 appliance is shown in Figure 2.

Figure 2. Commvault Remote Office Appliance

CommCell® Environment

A CommCell environment is the logical grouping of all Commvault components that protect, move, store, and manage data and information. The CommServe Services and CommCell Console have primary roles in managing data protection operations within the solution.

CommServe Services

The CommServe Services comprise the central management components of the CommCell environment, coordinating and executing all CommCell operations across the clients, source and destination sites (Figure 3). They also maintain the configuration, security, and operational history for the CommCell environment. The CommServe Services are responsible for:

- Managing administrative functions
- Communicating with MediaAgents when the media subsystem requires management
- Communicating with agents to initiate data protection, management, and recovery operations
- Providing tools to administer and manage the CommCell environment

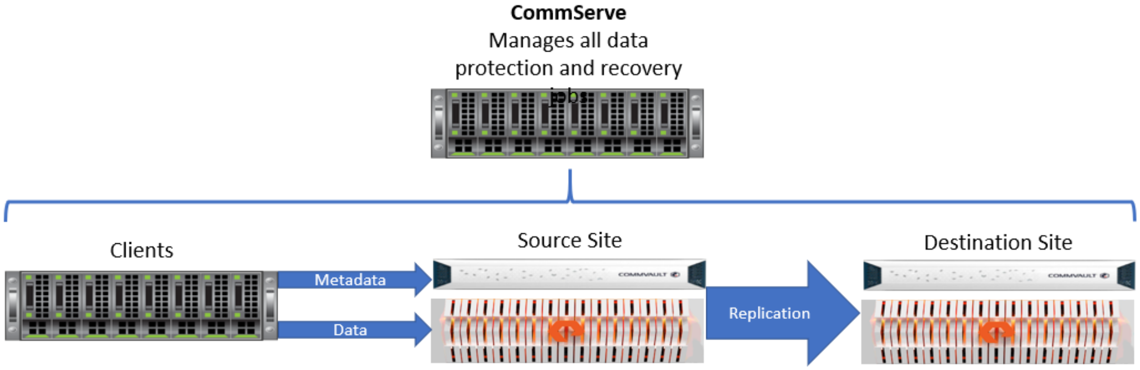


Figure 3. Commvault CommServe Services

MediaAgent Services

The MediaAgent Services process deduplication and maintain a distributed database of unique data patterns. They manage metadata indexing that enables browse-and-search-based recovery. They perform efficient replication of deduplicated data between sites and to public cloud storage. Finally, they prune data from storage after its retention period expires.

Storage Accelerator

In a typical backup architecture, protected client systems transfer data through MediaAgents, then on to data storage. These client systems are typically large servers attached to massive amounts of disk storage. The Commvault Storage Accelerator feature allows clients to bypass the MediaAgent (which shifts from a data mover to a data server role) and write deduplicated backup data directly to a FlashBlade object bucket. The data server, or MediaAgent, only processes job index and deduplication hash metadata, minimizing overhead. Backup and restore traffic are no longer bound by the MediaAgent network speed, and the data server can manage more backups and recoveries on less infrastructure. This is especially powerful when performing many simultaneous restore operations to different clients.

With Storage Accelerator, backup clients send metadata only to the Data Control plane while communicating directly with the FlashBlade to read and write data as shown in Figure 4. Commvault Storage Accelerator extension provides the ability to use cloud storage as a backup target. In this solution, FlashBlade is configured as an Amazon S3-compatible cloud storage library.

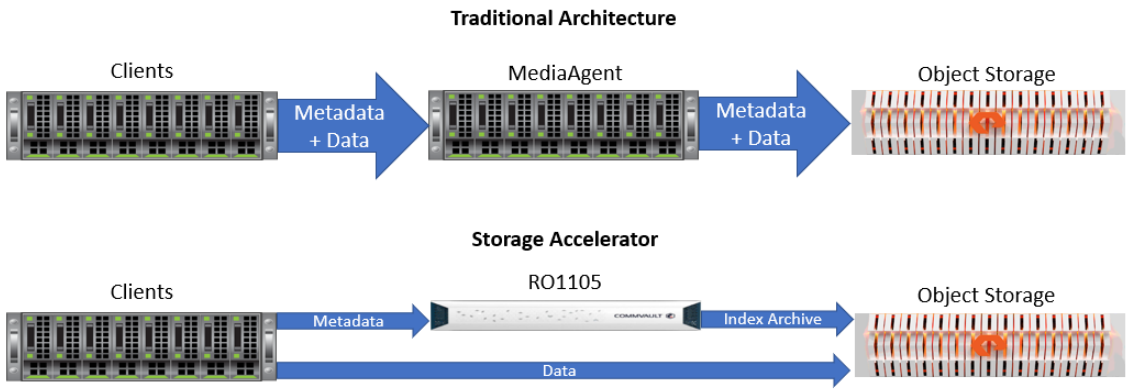
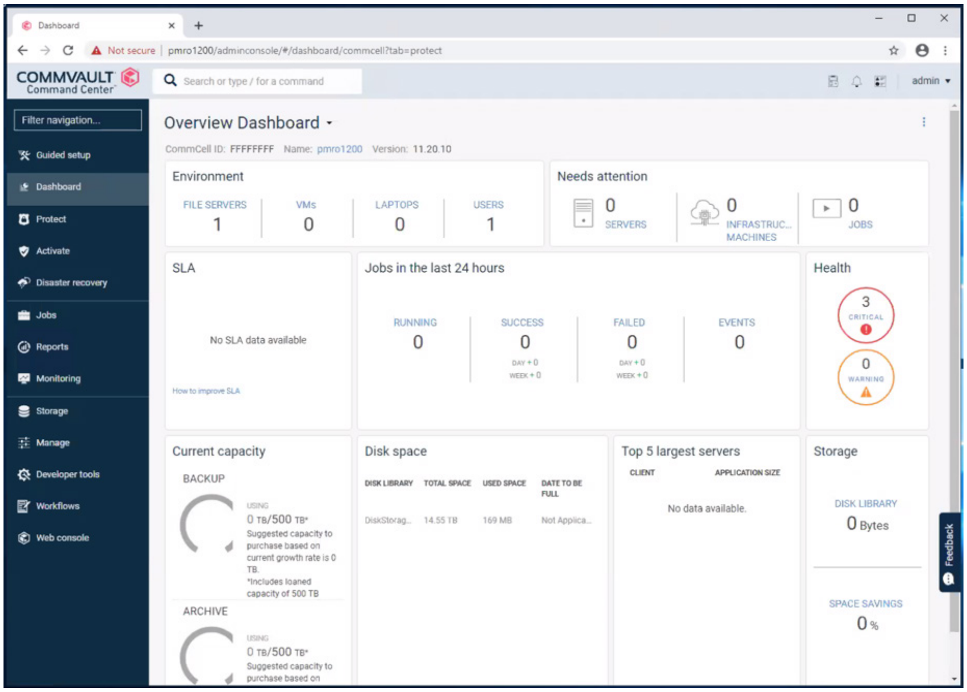


Figure 4. Commvault Storage Accelerator

Command Center

Commvault Command Center is a web-based user interface for managing data protection and disaster recovery solutions. It provides default configuration values and streamlined procedures for routine data protection and recovery tasks. Command Center is used to set up data protection environments, to identify content to protect and to initiate and monitor backup and restore operations.

The Command Center has several Dashboard views which present key CommCell environment health and status details via interactive widgets. The Overview Dashboard, as shown in Figure 5, presents the number, size, and status of all entities, job performance, and storage space in your CommCell environment. You can use the Overview Dashboard to monitor your CommCell environment health and performance from a high level. Many tiles on the dashboard open more detailed reports that you can use to analyze the displayed statistics.



Overview Dashboard

CommCell ID: FFFFFFFF Name: pmro1200 Version: 11.20.10

Environment

FILE SERVERS 1 | VMs 0 | LAPTOPS 0 | USERS 1

Needs attention

0 SERVERS | 0 INFRASTRUC... MACHINES | 0 JOBS

SLA

No SLA data available

How to improve SLA

Jobs in the last 24 hours

RUNNING 0 | SUCCESS 0 DAY + 0 WEEK + 0 | FAILED 0 DAY + 0 WEEK + 0 | EVENTS 0

Health

3 CRITICAL

0 WARNING

Current capacity

BACKUP

USING 0 TB/500 TB*
Suggested capacity to purchase based on current growth rate is 0 TB.
*Includes loaned capacity of 500 TB

ARCHIVE

USING 0 TB/500 TB*
Suggested capacity to purchase based on

Disk space

DISK LIBRARY	TOTAL SPACE	USED SPACE	DATE TO BE FULL
DiskStorag...	14.55 TB	169 MB	Not Applica...

Top 5 largest servers

CLIENT	APPLICATION SIZE

No data available.

Storage

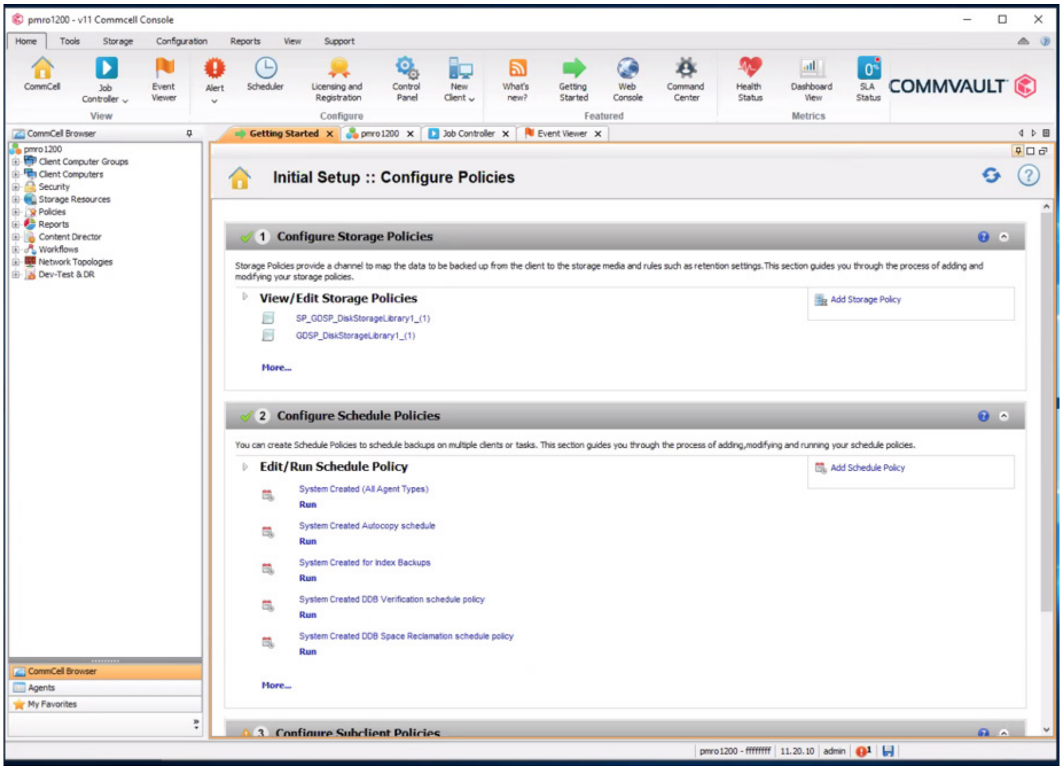
DISK LIBRARY 0 Bytes

SPACE SAVINGS 0 %

Figure 5. Command Center Overview Dashboard

CommCell Console

While the Command Center is the primary point of configuration and management, the CommCell Console (Figure 6) is an alternative interface specifically used for more advanced, granular configuration requirements and administration tasks.



Initial Setup :: Configure Policies

1 Configure Storage Policies

Storage Policies provide a channel to map the data to be backed up from the client to the storage media and rules such as retention settings. This section guides you through the process of adding and modifying your storage policies.

View/Edit Storage Policies

SP_GDSP_DiskStorageLibrary1_(1)

GDSP_DiskStorageLibrary1_(1)

More...

Add Storage Policy

2 Configure Schedule Policies

You can create Schedule Policies to schedule backups on multiple clients or tasks. This section guides you through the process of adding,modifying and running your schedule policies.

Edit/Run Schedule Policy

System Created (All Agent Types)
Run

System Created Autocopy schedule
Run

System Created for Index Backups
Run

System Created DDB Verification schedule policy
Run

System Created DDB Space Reclamation schedule policy
Run

More...

Add Schedule Policy

3 Configure Subclient Policies

Figure 6. CommCell Console

Pure FlashBlade Storage

FlashBlade is a unified fast file and object (UFFO) all-flash storage system optimized for storing, processing, and protecting unstructured data which addresses the data requirements of modern applications. The FlashBlade storage layer in the Commvault PVD solution brings superior performance to the functionality of the Commvault data protection. FlashBlade is used as an object store and also simplifies storage expansion, with seamless growth up to multiple petabytes.

Chassis

Figure 7 shows the front of each FlashBlade chassis which can be configured with up to 15 blades for processing data operations and storage. A full FlashBlade system configuration consists of up to 10 self-contained rack-mounted chassis. For reliability, each chassis is equipped with redundant power supplies and cooling fans. At the rear of each chassis are two on-board fabric modules (as seen in Figure 8 below) for interconnecting the blades, other chassis, and clients using TCP/IP over high-speed Ethernet. Both fabric modules are interconnected, and each contains a control processor and Ethernet switch ASIC.

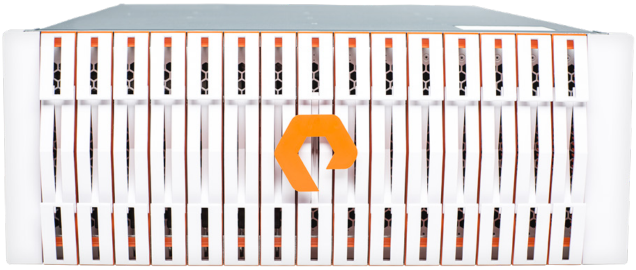


Figure 7. Pure FlashBlade Chassis Front View

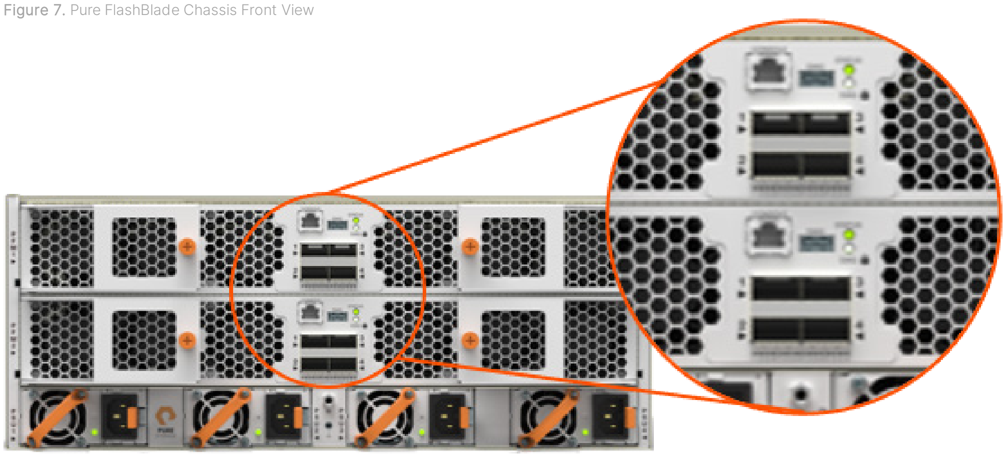


Figure 8. Pure FlashBlade Chassis Rear View - On-Board Fabric Modules

External Fabric Modules

For FlashBlade configurations with more than 15 blades, the rack-mounted chassis are interconnected by high-speed links to two external fabric modules (XFM) as seen in Figure 9.

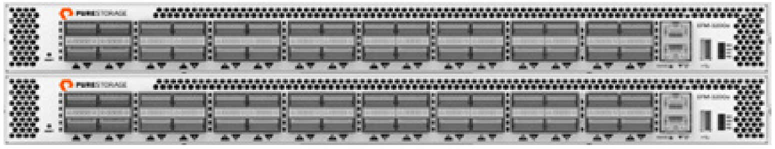


Figure 9. FlashBlade External Fabric Modules (XFM)

Blade

Each blade is a self-contained compute module equipped with processors, communication interfaces, and either 17TB or 52TB of flash memory for persistent data storage. Each blade can be hot-plugged into the system to add capacity and performance. Figure 10 shows the blade assembly.

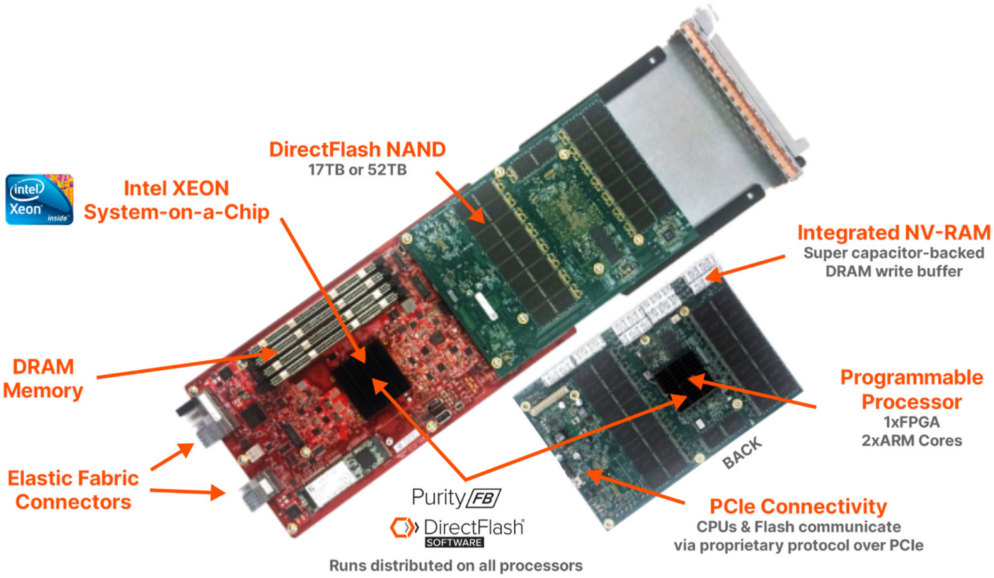
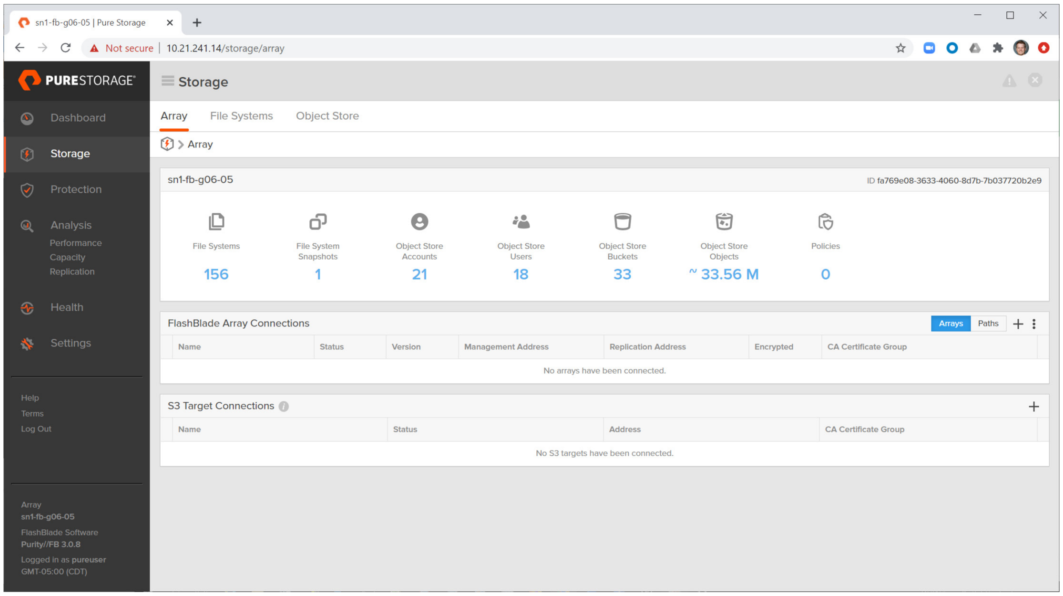


Figure 10. Pure FlashBlade Assembly

Purity//FB

Purity//FB is the operating system that runs on fabric modules. It minimizes workload-balancing problems by distributing client operation requests among the blades on FlashBlade storage. It is the heart of FlashBlade and is architected on a massively distributed key-value database for limitless scale and performance, delivering enterprise-class data services and management with simplicity. NFS file and S3 object protocols are native to the Purity//FB software stack. The Purity//FB Dashboard is shown in Figure 11.



sn1-fb-g06-05 ID fa769e08-3633-4060-8d7b-7b037720b2e9

File Systems	File System Snapshots	Object Store Accounts	Object Store Users	Object Store Buckets	Object Store Objects	Policies
156	1	21	18	33	~ 33.56 M	0

FlashBlade Array Connections

Name	Status	Version	Management Address	Replication Address	Encrypted	CA Certificate Group

No arrays have been connected.

S3 Target Connections

Name	Status	Address	CA Certificate Group

No S3 targets have been connected.

Array
sn1-fb-g06-05
FlashBlade Software
Purity//FB 3.0.8
Logged in as pureuser
GMT-05:00 (CDT)

Figure 11. Purity//FB Dashboard

Network Resources

Since backup traffic traversing a production network may adversely impact network performance, the backup LAN should be separate from production and management networks. If the backup environment is large, consider creating VLANs on the backup network and distribute backup load over these VLANs.

Each backup component (server, client, storage nodes) needs to open a network port in the host where the component is installed. If firewalls or other network protection methods are used in the environment, the security administrator needs to provide the appropriate permissions and ensure network ports are open for backup and recovery.

Technical Solution Design

The solution is broken up into three functional layers as shown in Figure 12:

- The Data Control plane, provided by the RO1105, is responsible for the cataloging, reporting, and management framework. The Data Control plane provides a single management, indexing, and reporting framework that enables direct access to FlashBlade storage which reduces infrastructure and management costs.
- The Data plane is provided by Pure FlashBlade UFFO storage, configured as a high-performance S3 compatible cloud storage library that is fast and simple to administer.
- The Workloads layer is the production data that needs to be protected and recovered and the client systems that house the data. The clients work with the Data Control plane to process deduplication and metadata and send deduplicated data to FlashBlade for retention and operational recovery. The Workloads layer is provided by Pure Storage FlashArray™ or other storage device.

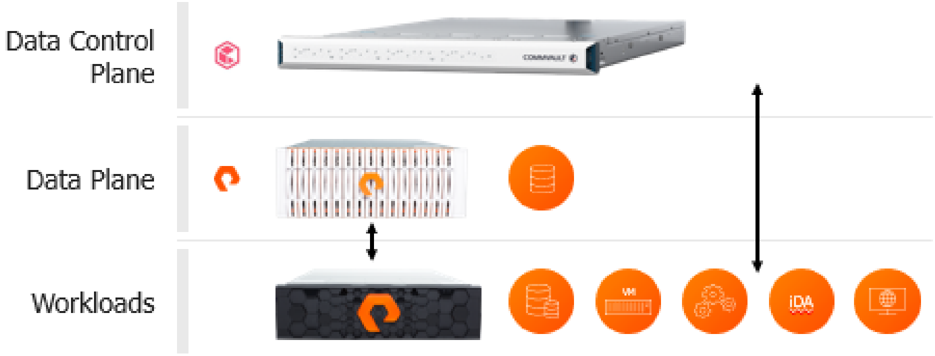


Figure 12. Commvault with FlashBlade functional layers

The RO1105 appliance and Pure FlashBlade sit in both the primary and disaster recovery (DR) sites. The operating system, deduplication database, and additional Commvault features for the Data Server and CommServe Services reside on local flash storage. Replication between the primary and DR sites are shown in Figure 13.

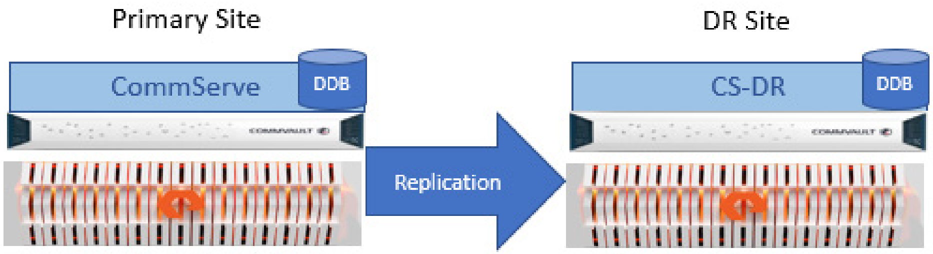


Figure 13. Commvault with FlashBlade replication

RO1105 Appliance

The RO1105 appliance is the command and control center, or the Data Control plane, for all data management functionality. The appliance is a fully integrated appliance that includes:

- Pre-installed Windows Server 2019 operating system
- Pre-installed Commvault software
- 4 x 10GbE ports plus 2 x 1GbE ports
- 960GB of metadata storage capacity

Once the appliance is deployed and configured, all data protection, data life cycle management, cataloging, and reporting operations can be managed from the Commvault Command Center.

Sizing

There are many considerations that need to be made to properly size Commvault with FlashBlade. To understand how to size an effective high-performance backup architecture, first understand the total amount of capacity that must be backed up, then consider the types of applications involved. Determining the actual size required is a function of determining the actual workload and calculating it with data compression and deduplication reductions.

Other considerations include how often data should be backed up and how fast recovery needs to be. Finally, the connectivity needs to be determined,to support high-speed recovery. A very important piece of information needed to size the solution is the annual data storage growth rate. This may come directly from the business or be extrapolated from historical information.

A single RO1105 appliance is ideally sized to protect up to 50TB of source data, and up to 500 virtual machines (VMs), and to manage 100TB of FlashBlade storage. FlashBlade starts with 7x52TB blades and can be scaled in place with up to eight additional 52TB blades, for up to 400TB of usable storage in a single chassis. Additional chassis can be added for even greater capacities. Commvault 1U Data Servers expand the Commvault Data Control plane to manage the additional storage.

Sizing Backup Targets

When sizing backup targets, consider how much data needs to be backed up, how many copies must be kept, and how long each copy should be kept. This information helps to calculate the total storage capacity required. If sizing is being performed for new backup deployment, use this information to determine the required capacity and number of media. If the sizing is for an existing backup environment, this information can help determine if the environment has enough backup capacity.

Data for backup = (Total data to be backed up × Frequency of backup × Retention period) / Data Reduction Ratio

The effectiveness of deduplication and compression is expressed as a data reduction ratio (DRR), denoting the ratio of the amount of data before reduction to the amount of data after reduction.

DRR = Total data before reduction / Total data after reduction

The ratio incorporates both deduplication and compression. This ratio is typically depicted as “ratio:1” or “ratio X”, (10:1 or 10X). For example, if 200GB of data consumes 20GB of storage capacity after reduction, the DRR is 10:1. The actual DRR varies, based on the following factors:

- **Retention period:** This is the period of time that defines how long the backup copies are retained. The longer the retention, the greater the chance of identical data existence in the backup set which would increase the deduplication ratio and storage space savings.
- **Frequency of full backup:** As more full backups are performed; the amount of same data being repeatedly backed up increases resulting in a higher deduplication ratio.
- **Change rate:** This is the rate at which the client data changes between backups. Data with many changes between backups does not reduce as well as static data.
- **Data type:** Backups of user data such as text documents, PowerPoint presentations, spreadsheets, and e-mails are known to contain redundant data and are good deduplication candidates. Database transaction logs and virtual machine disk files compress very well. Other data such as audio, video, and scanned images are highly unique and typically do not yield much data reduction.

Sample Storage Capacity Sizing

- 1TB of data to be backed up
- Assume 5x deduplication rate for first full backup
- 10% daily change rate
- Daily incremental backup: total six incremental backup per week @ 10x deduplication rate
- One synthetic full backup per week @ 25x deduplication rate
- Eight weeks of retention
- No data growth

Would result in:

- First full backup of 1TB at 5x deduplication rate requires 200GB storage space
- One incremental backup (100GB due to 10% change rate) at 10x deduplication rate requires 10GB storage space
  - Therefore, for eight weeks, backup requires 480GB (10 * 6 * 8)
- One full backup per week at 25x deduplication requires 40GB storage space
  - Therefore, for eight weeks, backup requires 320GB (40 * 8)
- Total space required for eight weeks retention with deduplication is 1TB (200GB + 480GB + 320GB)

Settings and Tuning

Commvault uses a pool of threads to write to object storage. By default, a process on the Storage Accelerator client can create up to 50 concurrent connections to the FlashBlade. All concurrent jobs on that MediaAgent or client will share the connections, and the number of active streams or jobs does not directly affect the number of threads in use. If connection counts from a client to the FlashBlade regularly exceed 40 and the client network interface is not saturated, increase the pool size to 100 and continue to monitor connections. The maximum pool size is 500.

Maximum read/write throughputs to FlashBlade storage can be throttled during certain periods, like the peak business hours. To set the thread pool for a client or MediaAgent, you need to apply the `nCloudGlobalUploadThreadPoolMaxCount` additional setting. This does not force the system to use a certain number of threads. Instead, it simply allows it to go beyond the default 50. This can be change using the CommCell Console or Command Line Interface. Increasing the threads will speed up the backups but will also result in more memory and CPU consumption.

Additional settings are configured using the CommCell Console. The best way to apply the setting is through a client computer group, a logical grouping of Commvault systems. To create a group to control the thread count: In the CommCell Console, right-click Client Computer Groups and select New Group from the context menu (Figure 14).

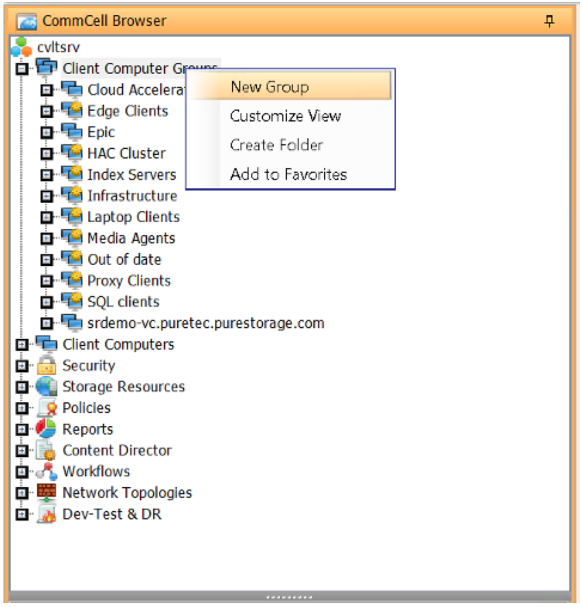
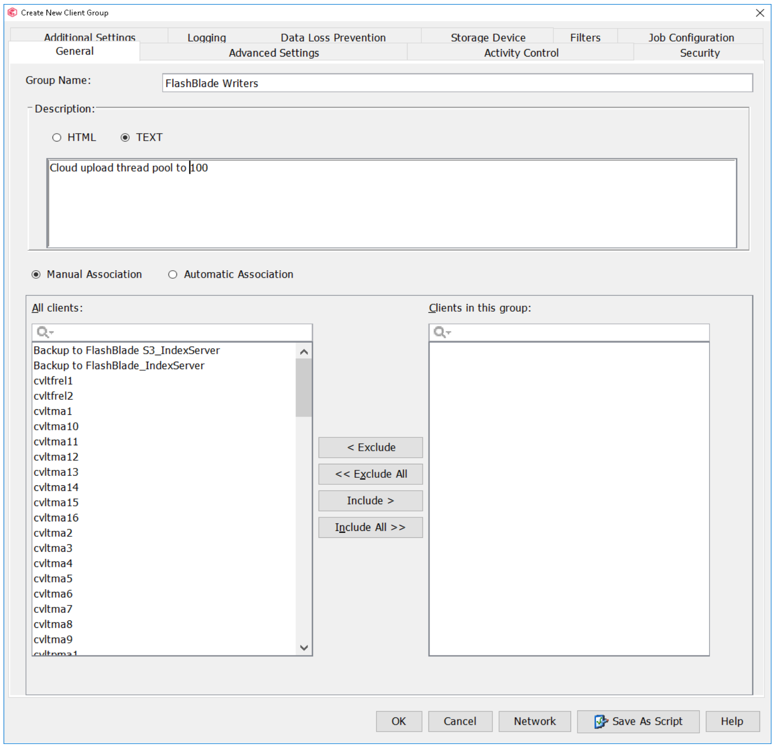


Figure 14. Creating a client computer group

As shown in Figure 15, give the group a descriptive name. Select the Manual Association option. Select the clients and MediaAgents that will send data to FlashBlade in the left pane, then click the Include button.



Group Name: FlashBlade Writers

Description:

○ HTML ● TEXT

Cloud upload thread pool to 100

● Manual Association ○ Automatic Association

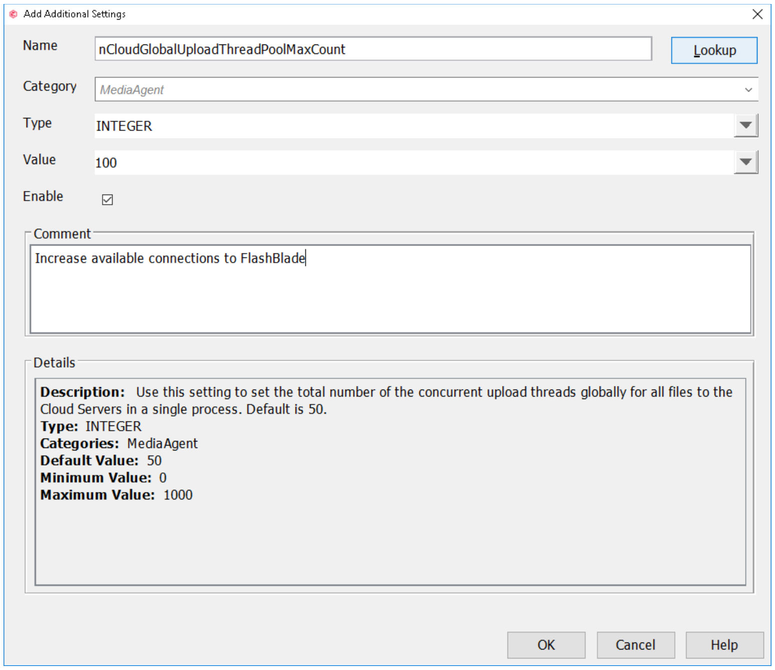
All clients:

Backup to FlashBlade S3_IndexServer
Backup to FlashBlade_IndexServer
cvltfrel1
cvltfrel2
cvltma1
cvltma10
cvltma11
cvltma12
cvltma13
cvltma14
cvltma15
cvltma16
cvltma2
cvltma3
cvltma4
cvltma5
cvltma6
cvltma7
cvltma8
cvltma9

Clients in this group:

Figure 15. Client computer group general options

Select the Additional Settings tab. Click on Add, then enter `nCloudGlobalUploadThreadPoolMaxCount` (Figure 16). When the setting appears in the search list, click it to automatically prepopulate all the fields. Enter the desired maximum number of threads per system, as calculated earlier, in the Value field. Enter a text value in the Description field. Click OK to create the group. The setting will automatically apply to the group members and be honored in the next job writing to FlashBlade. Make sure that the network between the clients and FlashBlade storage system can support multiple simultaneous backups.



Name: nCloudGlobalUploadThreadPoolMaxCount

Category: MediaAgent

Type: INTEGER

Value: 100

Enable ☑

Comment

Increase available connections to FlashBlade

Details

Description: Use this setting to set the total number of the concurrent upload threads globally for all files to the Cloud Servers in a single process. Default is 50.
Type: INTEGER
Categories: MediaAgent
Default Value: 50
Minimum Value: 0
Maximum Value: 1000

Figure 16. Additional Settings configuration

Scaling

Both the data control plane and data storage plane can be easily scaled. Adding data storage by adding individual blades to the FlashBlade, up to the limits of a single chassis, does not require any configuration changes or downtime. Scaling to multiple chassis requires additional hardware configuration, but the object storage components on the FlashBlade and in Commvault do not need any changes. As data storage grows, the data control plane needs to expand. Simply add Commvault 1U Data Servers, with minimal configuration, to expand the Commvault data control plane to manage the additional storage.

Deployment

This section describes best practices for deployment of this PVD. It provides guidelines for installing and configuring the hardware and software and describes the configuration options for implementing an enterprise class data protection solution.

Deployment Considerations

Prior to deploying the solution, make decisions regarding:

- Fully Qualified Domain Name or Host name
  - The hostname of the RO1105 must be fully resolvable and addressable by the CommServe Services and client computers in the CommCell environment.
- IP address, Subnet mask, and Default gateway
  - By default, this information is provided by the Dynamic Host Configuration Protocol (DHCP). If the option is disabled to automatically obtain the IPv4 address, provide the static IP address, subnet mask, and default gateway.
- DNS Server
  - By default, this information is provided by the DHCP. If this information is not provided by the DHCP, type this information. If the option is disabled to automatically obtain the DNS Server address, provide the preferred DNS server and the alternate DNS server.
- *Optional:* Domain Name
  - To add the RO1105 appliance to an existing Active Directory domain, specify the domain name: Existing Domain Name
- *Optional:* Domain Username and password
  - User credentials required to add the RO1105 appliance to an existing Active Directory domain: Domain User Name and Domain Password
- *Optional:* Mail server
  - If the CommServe Services is installed in the RO1105 appliance, alerts can be sent for events in the CommCell.

    Additionally, the e-mail server can be configured after the RO1105 is configured: E-Mail Server
- *Optional:* E-mail address
  - E-mail address of the recipient of e-mail alerts: User E-mail Address
- License Requirements
  - All core licensing is included with the appliance. The only additional license required is for Commvault Backup & Recovery.

Deployment Guide

The basic configuration provides a quick and simple implementation of the data protection solution. Refer to the General Best Practices and Advanced Configuration sections for advanced solution optimization guidance.

Install Pure FlashBlade Storage

Pure offers three installation options for installing a FlashBlade array. They include DIY, Install-with-Pure, and White-glove.

- **Do-it-Yourself:** Customers can install FlashBlade systems using tools and documentation on GitHub. While there's a difference between doing it yourself and paying for a Pure installation service, this option provides choice and flexibility for those who want it.
- **Install-with-Pure:** Pure can help install new systems remotely, via video conference. This option is best for organizations with on-site personnel who can unbox and rack the equipment while relying on a certified Pure Storage engineer for end-to-end guidance.
- **White Glove Installation:** Pure or its authorized partners perform a complete white-glove installation where and when local regulations allow.

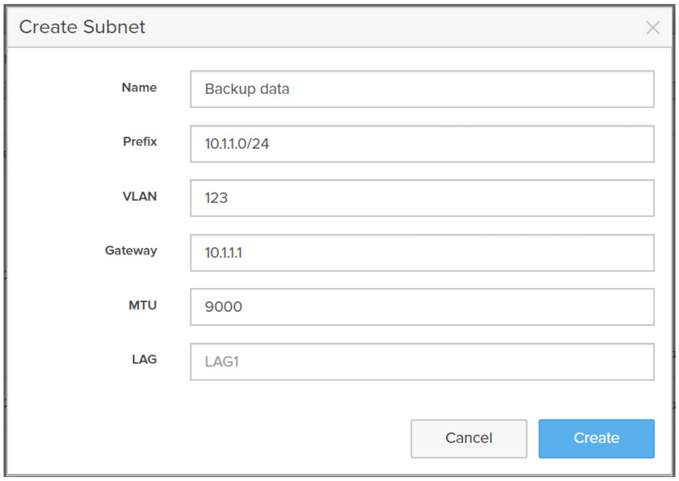
This guide assumes the successful installation of the Pure FlashBlade storage and the initial setup of the FlashBlade Purity//FB OS and appropriate networking.

Set-up Pure FlashBlade

Once FlashBlade is installed, set up data access, create replication links between FlashBlade arrays, and provision storage.

Configure Network for Data Access

1. Create a subnet for backup data traffic.
   a. In the Purity//FB GUI, select Settings > Network.
   b. In the Subnets list, click the Add (+) button in the Subnets title bar. The Create Subnet window appears as in Figure 17.
   c. In the Name field, type the name of the subnet.
   d. In the Prefix field, type the IP address of the network prefix and prefix length in the form ddd.ddd.ddd.ddd/dd for IPv4, or xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx/xxx for IPv6.
   e. In the VLAN field, specify the VLAN ID to which the subnet is configured. Valid VLAN ID numbers are between 1 and 4094.
   f. In the Gateway field, type the IP address of the gateway through which the data vip communicates with the network in the form ddd.ddd.ddd.ddd for IPv4, or xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx for IPv6
   g. In the MTU field, specify the maximum transmission unit (MTU) of the data vip. If the MTU is not specified during subnet creation, the value defaults to 1500.
   h. Click Create.

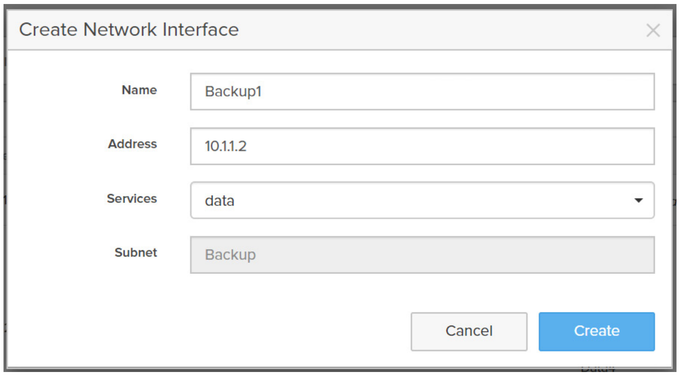


Create Subnet

Name	Backup data
Prefix	10.1.1.0/24
VLAN	123
Gateway	10.1.1.1
MTU	9000
LAG	LAG1

Figure 17. Create Subnet Window

2. Create a virtual interface on the backup subnet.
   a. Select Settings > Network.
   b. In the Subnets list, find the subnet with the correct network prefix, VLAN ID, and gateway. The data vip will be attached to this subnet for file export purposes. Create a subnet if none of the existing ones meet requirements.
   c. Click the Add interface button (+) belonging to the subnet to which the data vip will be attached. The Create Network Interface window appears as shown in Figure 18.
   d. In the Name field, type the name of the data vip.
   e. In the Address field, type the IP address to be associated with the data vip.
   f. In the Services field, leave the service type as data.
   g. In the Subnet field, leave the subnet name as the default.
   h. Click Create.

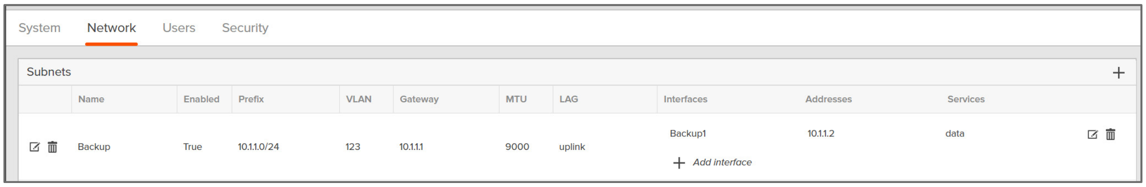


Create Network Interface

Name	Backup1
Address	10.1.1.2
Services	data
Subnet	Backup

Figure 18. Create Network Interface Window

3. The new subnet is displayed in the Subnets list as show in Figure 19.



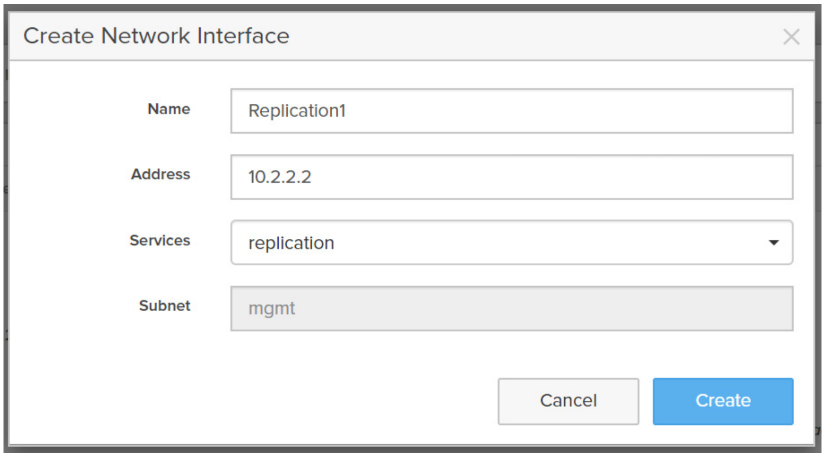
Subnets

	Name	Enabled	Prefix	VLAN	Gateway	MTU	LAG	Interfaces	Addresses	Services
	Backup	True	10.1.1.0/24	123	10.1.1.1	9000	uplink	Backup1 + Add interface	10.1.1.2	data

Figure 19. Subnets list

4. If using FlashBlade to replicate Commvault backups or data, configure a replication network interface. This can be on the subnet just created or a separate subnet. Follow steps 2 and/or 3 as appropriate to create the interface. In step 3, when setting the Services option, select `replication` instead of `data` as shown in Figure 20.

5. Create forward and reverse lookup records in DNS for the data IP address that was assigned.



Create Network Interface

Name: Replication1

Address: 10.2.2.2

Services: replication

Subnet: mgmt

Figure 20. Creating a Replication Network Interface

Add FlashBlade Replication Links

To allow the primary site FlashBlade to replicate to the DR site FlashBlade, connect the arrays. To connect two arrays, perform the following:

1. From the **Storage** > **Array** page, click the add (+) button in the **FlashBlade Array Connections** panel. The **Connect FlashBlade Array** pop-up window appears.
2. Enter the target array hostname or management address (unless using NAT) in the **Management Address** field. The address can be located from the **Subnets** table by navigating to the **Settings** > **Network** page.
3. On the target array, create a connection key. Connection keys are created from the FlashBlade Array Connections panel of the Array page. To create a connection key, perform the following:
   a. On the target array, navigate to the Storage > Array page.
   b. In the FlashBlade Array Connections pane, click More Options > Create Connection Key. The Connection Key pop-up window appears displaying the new connection key.
   c. Copy the new connection key.
   d. Once created, the key is active for two hours. If the source and target arrays have not been connected within that two-hour period, a new connection key must be created.
4. Enter the connection key for the target array in the **Connection Key** field.
5. The replication address is auto-discovered unless using NAT. The source and target arrays each need a replication network interface. If not already created, create the replication network interfaces on the source and target arrays. Enter the target array replication network address in the **Replication Address** field.
6. (Optional) Enable encryption by setting the **Encrypted** toggle to on. If set, the _default_replication_certs CA certificate group is applied. Note that encryption is set on the source array only. If enabled, the encryption setting displays as enabled on the target array.
7. Click **Connect**.

8. If using NAT, enter the source array replication address on the target array.
   a. On the target array, in the FlashBlade Array Connections panel on the Storage > Array page, click the edit button at the end of the row displaying the connected source array. The Edit Connected Array pop-up window appears.
   b. Enter the replication address for the source array in the Replication Address field and click Save.

Repeat this procedure, using the DR site FlashBlade as the source array and the primary site FlashBlade as the target. This enables replication capability in both directions.

Create Protection Policy for Replication

To use replication in both directions, create a protection policy on each FlashBlade. The policy manages scheduling and retention of snapshots for replication. To create a protection policy:

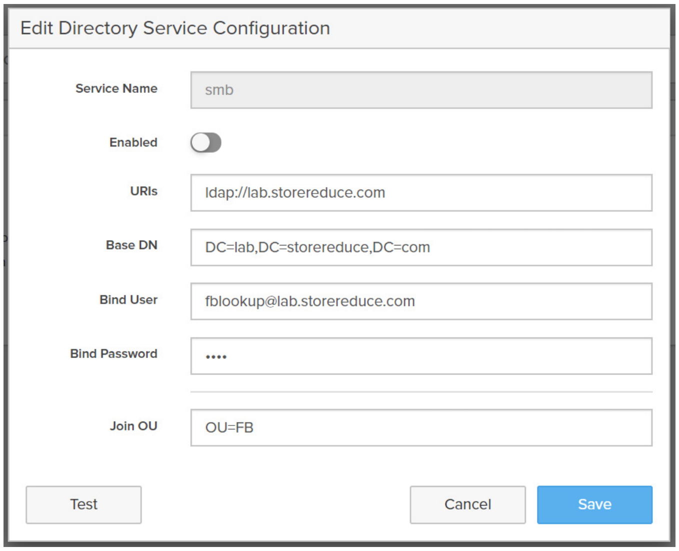
1. From the Protection > Policies page, click the Add (+) button in the heading of the Policies list. The Create Policy pop-up window appears.
2. In the Name field enter the name of the snapshot policy.
3. By default, the policy is set to enabled (blue). To disable the policy, set the Enabled button to disabled (gray).
4. Click the expand button next to Create rule for policy to add rules.
5. In the field labelled Create or replicate 1 snapshot every field, enter the frequency at which snapshots are created or replicated. The value must be entered in the format n{m|h|d|w}. For example, 15m, 3h, 2d, 1w, etc. For DR backup replication, the frequency should be 12h or less.
6. In the At field, enter the time of day the snapshot is created. The value must be entered in the format n[am|pm], where n is a value of 1-12. If entered without am or pm, n must be a value of 0-23. This field is only editable if the value specified in the Create or replicate 1 snapshot every field is in days. For example, 24h, 48h, 72h, 1d, 2d, 3d, 1w, etc.
7. In the And keep for field, enter the retention period for the snapshot. The value must be entered in the format n{m|h|d|w}. For example, 30m, 1h, 2d, 1w, etc. The retention period cannot be less than the snapshot interval. The retention for DR backups should be 5d or greater.
8. Click Create.

Provision File System for Commvault DR Backups

FlashBlade provides a simple way to ensure availability of the DR backups Commvault DR backups.

1. Create three accounts in Active Directory.
   a. User account for FlashBlade SMB to bind to Active Directory
   b. User account for writing Commvault DR backups
   c. Domain group to contain CommServe computer accounts
   d. Set a value in the uidNumber and gidNumber attributes on both users and groups

2. Configure directory services for SMB on the FlashBlade.
   a. Select Settings > Users.
   b. In the Directory Service panel, select SMB.
   c. Click the Edit icon to the right of Configuration. The Edit Directory Service Configuration pop-up window appears. (Figure 21)



Edit Directory Service Configuration

Service Name: smb

Enabled: ○

URIs: ldap://lab.storereduce.com

Base DN: DC=lab,DC=storereduce,DC=com

Bind User: fblookup@lab.storereduce.com

Bind Password: ••••

Join OU: OU=FB

Figure 21. Configure SMB directory service

d. In the URIs field, type the comma-separated list of up to 30 URIs of the directory servers.

e. For file sharing over SMB, the base DN of the directory service is used in place of the URI to represent the LDAP URL.

f. Each URI must include the scheme ldap:// or ldaps:// (for LDAP over SSL), a hostname, and a domain name or IP address. For example, ldap://ad.company.com configures the directory service with the hostname "ad" in the domain "company.com" while specifying the unencrypted LDAP protocol.

g. We highly recommend either configuring StartTLS by enabling a certificate or certificate group, or configuring URIs by using the ldaps:// scheme to use LDAP over SSL, unless there is no need for secure communication in your environment.

h. For SMB, only one domain controller (DC) is supported and its preferences cannot be set when configuring the URI.

i. If specifying a domain name, it should be resolvable by the configured DNS servers.

j. If specifying an IP address, for IPv4, specify the IP address in the form ddd.ddd.ddd.ddd, where ddd is a number ranging from 0 to 255 representing a group of 8 bits.

k. For IPv6, specify the IP address in the form [xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx], where xxxx is a hexadecimal number representing a group of 16 bits. Enclose the entire address in square brackets ([]). Consecutive fields of zeros can be shortened by replacing the zeros with a double colon (::).

l. If the base DN is not configured and a URI is provided, the base DN will automatically default to the domain components of the URIs.

m. Optionally, specify a port. Append the port number after the end of the entire address. Default ports are 389 for ldap, and 636 for ldaps. Non-standard ports can be specified in the URI if they are in use.

n. In the **Base DN** field, type the base distinguished name (DN) of the directory service. The Base DN is built from the domain and should consist of only domain components (DCs). For example, for ldap://ad.storage.company.com, the Base DN would be: DC=storage,DC=company,DC=com.

o. In the **Bind User** field, type the username used to bind to and query the directory.

p. For OpenLDAP and Active Directory servers, you can use the full DN of the user account that is used to perform lookups. For example, CN=John,OU=Users,DC=example,DC=com.

q. For Active Directory servers, you may instead choose to enter the username - often referred to as the sAMAccountName or user login name - of the account that is used to perform directory lookups. The username cannot contain the characters " [ ] : ; | = + * ? < > / \, and cannot exceed 104 characters in length.

r. In the **Bind Password** field, type the password for the bind user account.

s. In the **Join OU** field, enter the relative DN of the organizational unit (OU) within your domain where the system machine account should be created when joining the domain for SMB. For example, OU=Arrays,OU=Storage,OU=ServiceMachines.

t. Click **Save**.

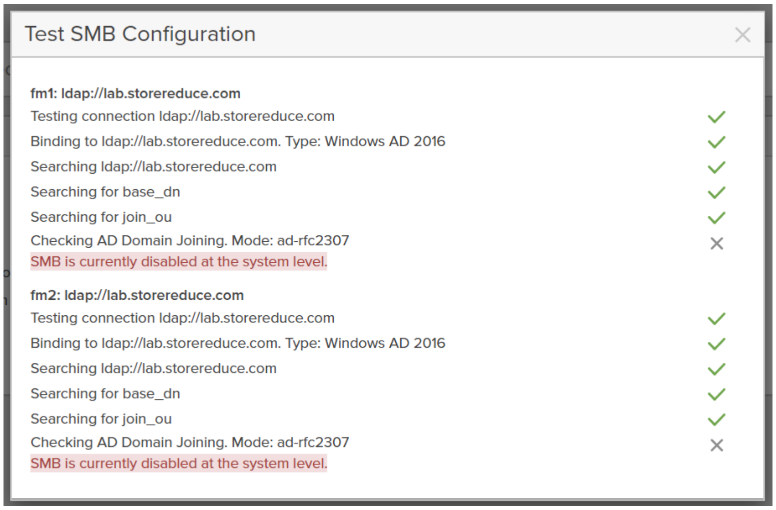
3. After you configure the directory service settings, test the directory service configuration to verify that the URI can be resolved and that the directory service can successfully bind and query the tree using the bind user credentials.

   To test the directory service configuration:

   a. Select Settings > Users.

   b. In the **Directory Service** panel, select the directory service you wish to test.

   c. Click **Test**. The **Test SMB Configuration** pop-up window appears, displaying the output of the test. During the directory service test, Purity//FB tests the directory service configuration to verify that the URI can be resolved and that the directory service can successfully bind and query the tree using the bind user credentials.



Test SMB Configuration

```
fm1: ldap://lab.storereduce.com
Testing connection ldap://lab.storereduce.com                              ✓
Binding to ldap://lab.storereduce.com. Type: Windows AD 2016               ✓
Searching ldap://lab.storereduce.com                                       ✓
Searching for base_dn                                                      ✓
Searching for join_ou                                                      ✓
Checking AD Domain Joining. Mode: ad-rfc2307                               ×
SMB is currently disabled at the system level.

fm2: ldap://lab.storereduce.com
Testing connection ldap://lab.storereduce.com                              ✓
Binding to ldap://lab.storereduce.com. Type: Windows AD 2016               ✓
Searching ldap://lab.storereduce.com                                       ✓
Searching for base_dn                                                      ✓
Searching for join_ou                                                      ✓
Checking AD Domain Joining. Mode: ad-rfc2307                               ×
SMB is currently disabled at the system level.
```

Figure 22. Test SMB Configuration

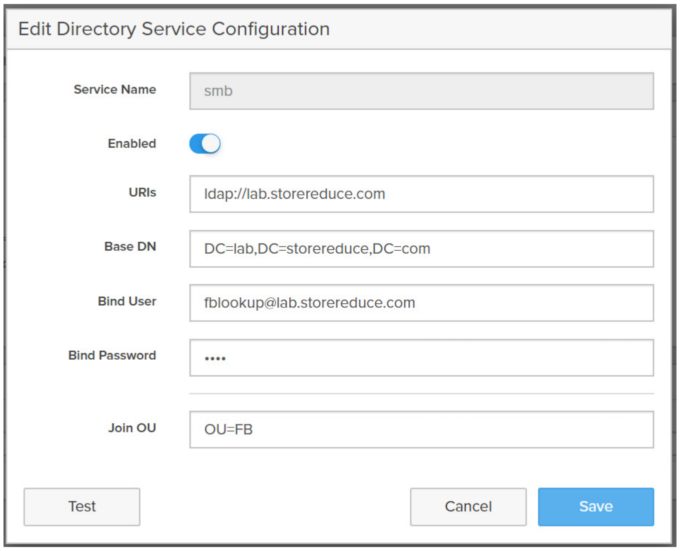
4. Once the test passes, enable the directory service (Figure 23).

   a. Select Settings > Users.

   b. In the **Directory Service** panel, select the directory service you wish to enable and click the **Edit** icon.

   c. Set the **Enabled** toggle button to enable (blue) the directory service.

   d. Click **Save**.



Edit Directory Service Configuration

Service Name: smb

Enabled: on

URIs: ldap://lab.storereduce.com

Base DN: DC=lab,DC=storereduce,DC=com

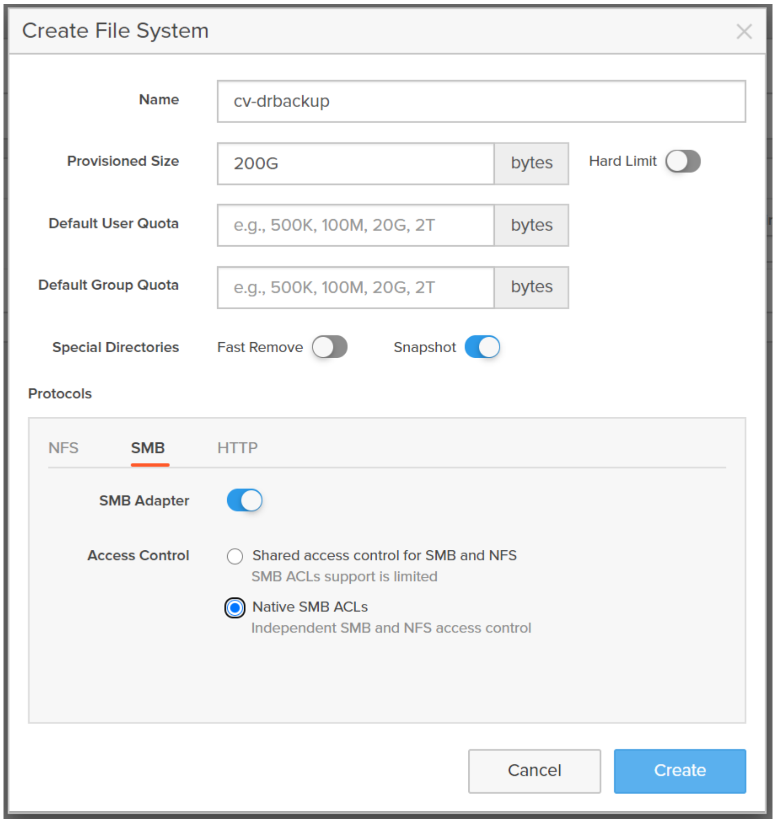
Bind User: fblookup@lab.storereduce.com

Bind Password: ••••

Join OU: OU=FB

Figure 23. Enable SMB directory service

5. Create a file system to store the Commvault DR backups (Figure 24).
   a. Create the file system.
      - From the **Storage** > **File Systems** page, click the add (+) button in the heading of the **File Systems** list. The **Create File System** pop-up window appears.
      - In the **Name** field, type the name of the directory to be exported.
      - In the **Provisioned Size** field, specify the provisioned size allocated to the file system. The size is a quota of space that helps gauge the fullness of the file system. If left blank, the provisioned size will default to an unlimited size. You should set the provisioned size to 100G or greater, although DR backups should consume significantly less.
      - Click **SMB** in the **Protocols** section.
        Click the **SMB Adapter** toggle button to enable (blue) the **SMB** protocol adapter.
        From the **Access Control** section, select **Native SMB ACLs**.
   b. Click **Create**.



Create File System

Name	cv-drbackup	
Provisioned Size	200G bytes	Hard Limit ○
Default User Quota	e.g., 500K, 100M, 20G, 2T bytes	
Default Group Quota	e.g., 500K, 100M, 20G, 2T bytes	
Special Directories	Fast Remove ○	Snapshot ●

Protocols

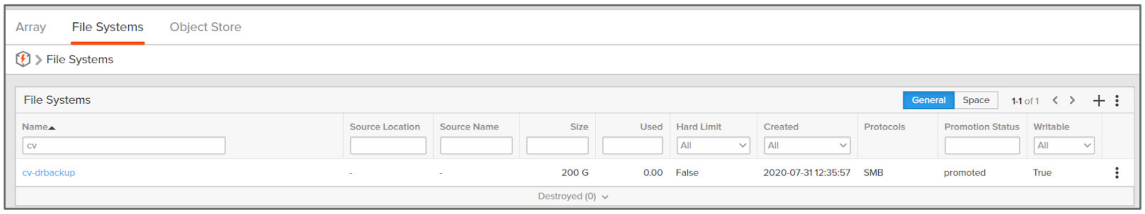
SMB Adapter ●

Access Control
○ Shared access control for SMB and NFS
SMB ACLs support is limited
● Native SMB ACLs
Independent SMB and NFS access control

Figure 24. Create File System form

Note: The SMB share will have the same name as the file system.

You will see the new file system in the File Systems pane (Figure 25).

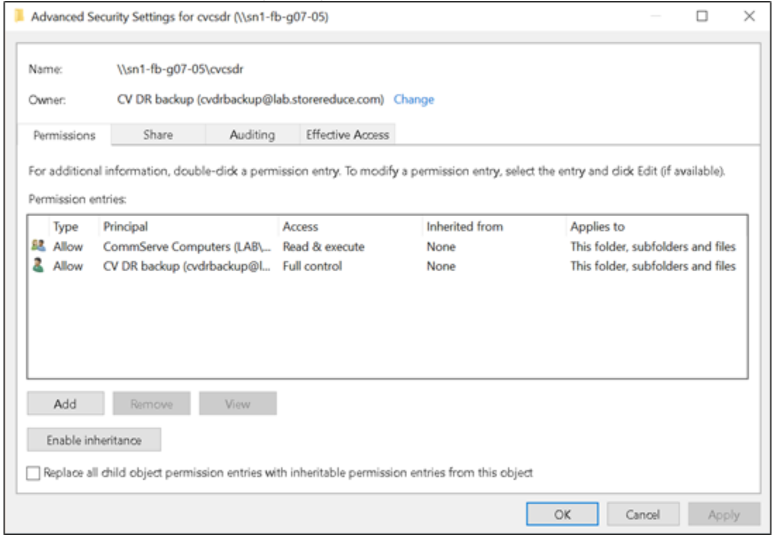


Name▲	Source Location	Source Name	Size	Used	Hard Limit	Created	Protocols	Promotion Status	Writable
cv					All	All			All
cv-drbackup	-	-	200 G	0.00	False	2020-07-31 12:35:57	SMB	promoted	True

Figure 25. File Systems pane

6. Create a file replication link for the file system from the primary site FlashBlade to the DR site FlashBlade.
   a. From the **Protection > File Replica Links** page, click the add (**+**) button in the heading of the **File Replica Links** list. The **Create File Replica Link** pop-up window appears.
   b. From the **Local File System** list, select the local (source) file system to be replicated.
   c. From the **Remote Connection** list, select the remote (target) array.
   d. Do not enter a name for the remote file system to which data from the local file system will be replicated in the **Remote File System** field. The target array will create a file system with the same name as the source.
   e. From the **Policy** list, select the replication policy you created.
   f. Click **Create**.

7. Prepare the file system using Windows File Explorer. You may use other tools if you prefer.
   a. Set permissions on the base of the SMB share (Figure 26).
      - Grant full control permissions to the DR backup user account.
      - Grant read and execute access to the CommServe computers group.
      - Remove all other principals from the ACL.



Advanced Security Settings for cvcsdr (\\sn1-fb-g07-05)

Name: \\sn1-fb-g07-05\cvcsdr

Owner: CV DR backup (cvdrbackup@lab.storereduce.com) Change

For additional information, double-click a permission entry. To modify a permission entry, select the entry and click Edit (if available).

Permission entries:

Type	Principal	Access	Inherited from	Applies to
Allow	CommServe Computers (LAB\...	Read & execute	None	This folder, subfolders and files
Allow	CV DR backup (cvdrbackup@l...	Full control	None	This folder, subfolders and files

☐ Replace all child object permission entries with inheritable permission entries from this object

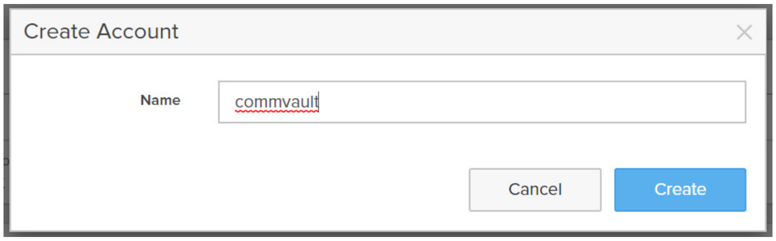
Figure 26. File system ACL for DR backup share

IMPORTANT: Once you commit the ACL, only the DR backup user account will be able to manage data in this file system.

Provision Object Bucket for Backup Data

Create a bucket for Commvault to write backup data. Buckets are organized into accounts. To create a new account:

1. In the Accounts section of the Storage > Object Store page, click the add (+) button. The Create Account window appears as shown in Figure 27.



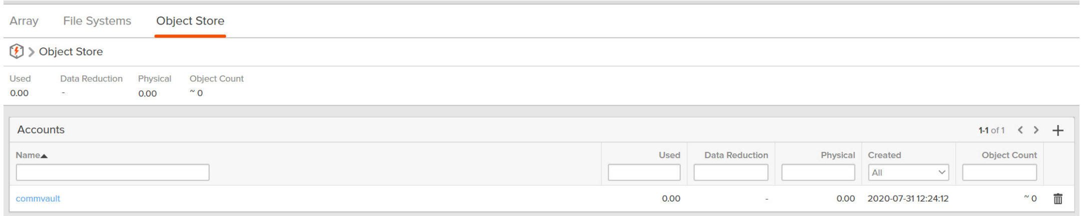
Create Account

Name: commvault

Figure 27. Create Account Window

2. Enter the new account's name in the Name field and click Create.

3. The account will be listed in the Accounts pane shown in Figure 28. Click the account name to open its details.



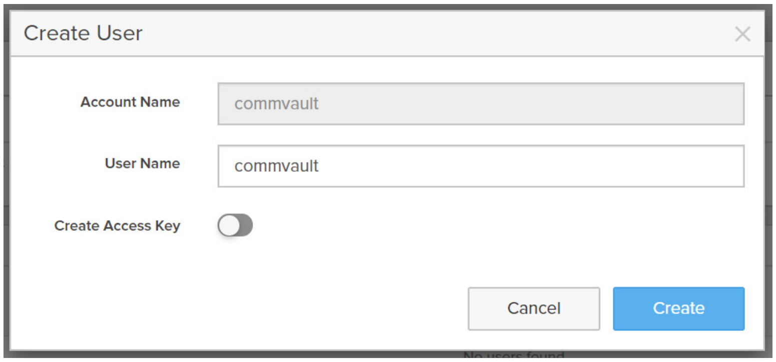
Used	Data Reduction	Physical	Object Count
0.00	-	0.00	~ 0

Accounts 1-1 of 1

Name▲	Used	Data Reduction	Physical	Created	Object Count
commvault	0.00	-	0.00	2020-07-31 12:24:12	~ 0

Figure 28. Accounts pane

4. Within the account, create a user, which will have an access key associated with it. To create a new user:
    a. From the Storage > Object Store page, click the account to add a new user.
    b. In the Users section, click the add (+) button. The Create User window appears as shown in Figure 29.
    c. Enter the new user's name in the User Name field.
    d. Do not enable the Create Access Key option now. Create a key in a later step.
    e. Click Create.



Create User

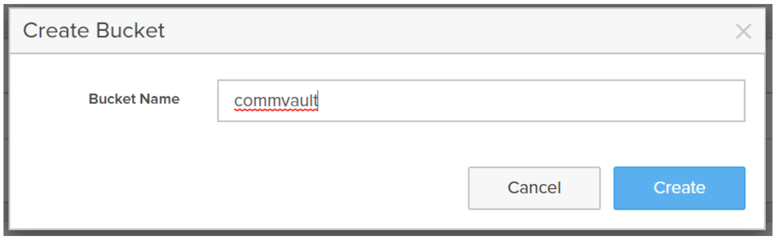
Account Name: commvault

User Name: commvault

Create Access Key: ○

Figure 29. Create User Window

5. Within the same account, create a bucket to store the objects Commvault writes. To create a bucket:
    a. From the Storage > Object Store page, click the account to add a bucket.
    b. From the Buckets pane, click the add (+) button. The Create Bucket window appears as shown in Figure 30.

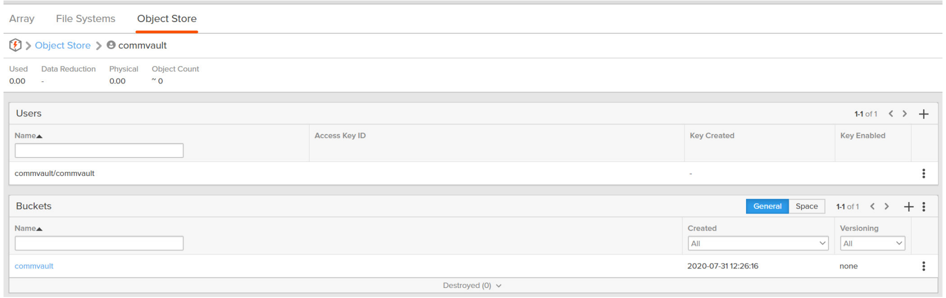


Create Bucket

Bucket Name: commvault

Figure 30. Create Bucket Window

    c. Enter a name for the bucket and click Create.
    d. The screen will display a user and an empty bucket within the object store account that was created (Figure 31).



Used	Data Reduction	Physical	Object Count
0.00	-	0.00	~ 0

Users 1-1 of 1

Name▲	Access Key ID	Key Created	Key Enabled
commvault/commvault		-	

Buckets General Space 1-1 of 1

Name▲	Created	Versioning
	All	All
commvault	2020-07-31 12:26:16	none

Figure 31. New user and bucket

Optional: Add CA Certificate

To use TLS to secure the connection between Commvault clients and the FlashBlade object store, update the FlashBlade with a certificate generated by a trusted certification authority (CA). To import a CA certificate:

1. Select Settings > System.
2. Click the More Options button from the SSL Certificate panel.
3. Click Import Certificate.
4. Complete or modify the following fields:
   a. Certificate - Click Choose File and select the signed certificate. Verify that the certificate is PEM formatted (Base64 encoded), and that it includes the " -----BEGIN CERTIFICATE----- " and " -----END CERTIFICATE----- " lines.
   b. Private Key - Click Choose File and select the private key.
   c. Intermediate Certificate - (Optional) Click Choose File and select the intermediate certificate.
   d. Key Passphrase - (Optional) If the private key is encrypted with a passphrase, enter the passphrase.
5. Click Import. The page will refresh in several seconds.

Set up the RO1105

Commvault documentation describes in detail the process to set up the appliance and then install the CommServe and MediaAgent Software on the RO1105. The steps are also described below:

Complete Initial Appliance Setup

1. Turn on the appliance and press Ctrl+Alt+Del to log on to Windows.
2. In the Administrator box, type `appliance@cv1` and press Enter. The Commvault Configuration Wizard will start automatically after a successful login.
3. In the Commvault Installation page, click the License Agreement and review the Commvault End User License Agreement. Click I Agree to continue.
4. The Select Network Interfaces page is displayed. Select one or more ports to configure the network settings for data and click Next.
5. The Configure Network Interface page is displayed. Choose one of the following options:
   - If you have a DHCP server to automatically assign IP addresses and detect the DNS server, select the `Obtain IPV4 address automatically` and the `Obtain DNS server address automatically` options and then click Next.
   - In the absence of a DHCP server, clear the `Obtain IPV4 address automatically` and the `Obtain DNS server address automatically` options, type the appropriate details, and then click Next.
6. The Configure Host Name and Domain Settings page is displayed. Add the following details:
   - To assign a new host name, in the New Host Name box, enter a unique name to identify the computer in the network.
   - To configure the appliance in an existing domain, select the `Add this appliance to a domain` check box. Type the appropriate domain credentials in the Domain name, Domain user name and Domain user password boxes.
7. A message prompts you to restart your computer. Click Yes to continue. (Clicking No will proceed with the installation without changing the host name and/or the domain.)
8. A confirmation prompt will be displayed. Click OK to restart the computer.

9. After the reboot log on to the system using the administrator credentials `appliance@cv1`. (Same as step 2.) The Commvault Configuration Wizard will resume automatically.
10. The Setup Commvault Software page is displayed. Perform the following:
    a. Select `CommServe` and `MediaAgent`.
    b. If you want to configure email alerts, in the Email server and the Email address for the Commvault administrator boxes, type the server name and the administrator details.
    c. Click Next.
11. Click Configure to complete the installation and configuration process.
12. The Automatic Disk Group Configuration page is displayed. Click Yes to confirm the library configuration. (You must click Yes when you setup the appliance for the first time.) The library is configured, and the result is displayed.
13. Click OK to continue. The configuration result is displayed.
14. Click Finish.

Change the Default Administrator Password

After installing and configuring the Commvault Remote Office Appliance RO1100, you must change the default Windows administrator password for the appliance.

1. Turn on the appliance. The screen prompts you to press Ctrl+Alt+Del keys to activate the Windows screen.
2. Click Change Password.
3. In the Old Password box, type `appliance@cv1`.
4. Type the New Password and confirm by retyping the new password.

Complete Core Setup

1. Go to the Command Center URL: `http://webhost/adminconsole`. Note: webhost is the host name assigned to the RO1105 during CommServe and MediaAgent installation.
2. Enter Commvault administrator username and password.
3. Click Login.
4. From the navigation pane, go to Guided setup. The initial application setup page appears.
5. Click Let's get started. The Core Setup wizard appears.
   - On the Add storage pool tab of the wizard, add the disk library created during configuration to storage pool settings. Select the 960GB SSD volume for DDB, and then click Save.

Create an access key for the object user that was created on FlashBlade:

1. Switch to the Purity//FB GUI.
2. From the Storage > Object Store page, click the account to which a new user was recently added.
3. From the Users section, click the More Options > Create access key button on the same row as the user for whom an access key must be created (Figure 32).

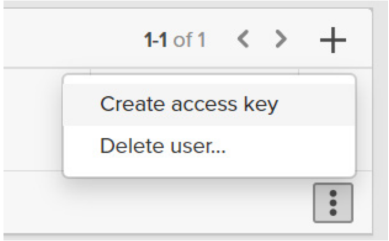
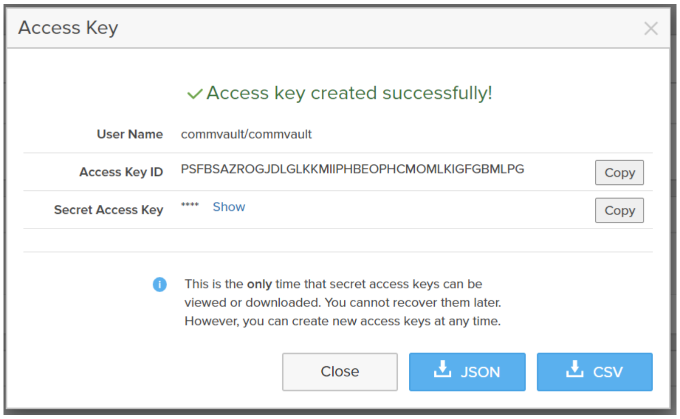


Figure 32. More Options Menu

4. A confirmation window will display (Figure 33).


Access Key

✓ Access key created successfully!

User Name commvault/commvault

Access Key ID PSFBSAZROGJDLGLKKMIIPHBEOPHCMOMLKIGFGBMLPG

Secret Access Key **** Show

This is the **only** time that secret access keys can be viewed or downloaded. You cannot recover them later. However, you can create new access keys at any time.

Figure 33. Access Key Confirmation Window

5. Leave the Access Key confirmation window open while adding storage in Commvault Command Center.

Create the cloud library in Command Center:

1. From the Command Center navigation pane, click Storage > Cloud. The Cloud page appears.

2. In the upper right of the page, click Add to add a cloud storage. The Add cloud window appears as shown in Figure 34.

3. In the Name field, enter a display name for the cloud storage target. Click Add to create a new cloud storage.

4. In the Type field, select "S3 Compatible Storage."

5. In the MediaAgent field, select the RO1105 client name.

6. In the Server host field, enter the DNS name or vip for Commvault to use to access FlashBlade.

Note: By default, Commvault will use TLS to secure the connection. If the FlashBlade does not have a trusted certificate applied that matches the provided name, TLS will fail. To work around this, include "http://" in the Server host field. This will prevent Commvault from attempting TLS.

7. In the Bucket field, enter the name of the target bucket under the configured user account.

8. In the **Credentials** field, click the **Create new** (+) button.

   a. In the **Credential name** field, enter a descriptive display name for the new stored credential.

   b. Copy the access key ID from the Purity//FB GUI, using the Copy button, and paste it into the **Access key ID** field.

   c. Copy the secret access key from the Purity//FB GUI, using the **Copy** button, and paste it into the **Secret access key** field.

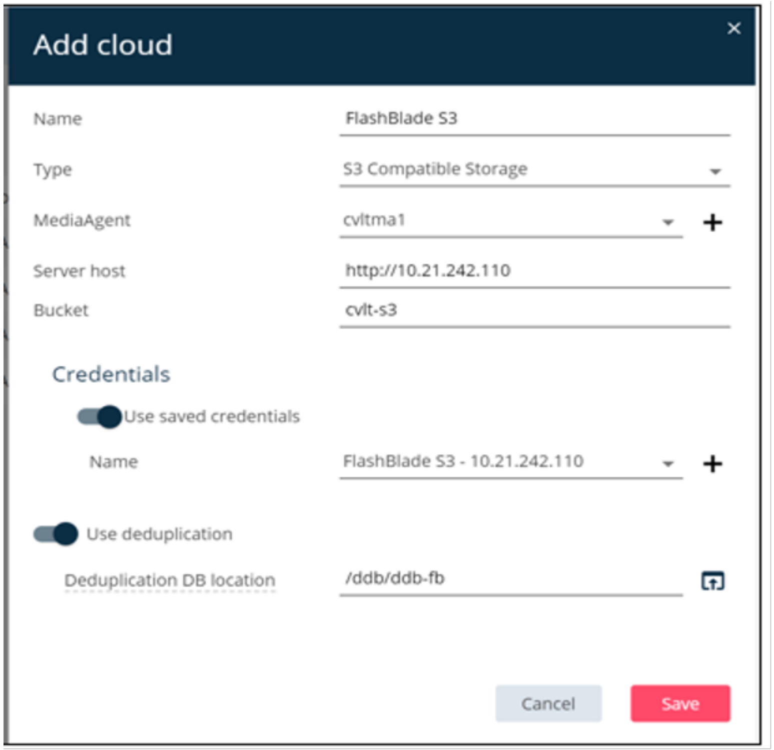
   d. Click the Save button when all fields are configured.

Note: To reduce the risk of key compromise, **copy** the key values directly from the Purity//FB GUI and avoid saving them in a file. Close the **Access Key** popup in the Purity//FB GUI once the cloud library has been created.

9. In the **Deduplication DB location** field, select the 960GB SSD volume for DDB.

10. Click the **Save** button when all fields are configured. Commvault will connect to FlashBlade and validate the keys and bucket name. Once validated it will create the cloud storage.

11. On the Create server backup plan tab, modify the plan according to requirements, and then click Save.



Name: FlashBlade S3

Type: S3 Compatible Storage

MediaAgent: cvltma1

Server host: http://10.21.242.110

Bucket: cvlt-s3

Credentials

Use saved credentials: ●

Name: FlashBlade S3 - 10.21.242.110

Use deduplication: ●

Deduplication DB location: /ddb/ddb-fb

Figure 34. Add Cloud Window

Download latest Feature Release and hotfixes:

1. From Guided setup select Download/copy software

2. Ensure select Upgrade to Latest Release

3. If additional operating systems are required, select those from Operating system options

4. Click Download

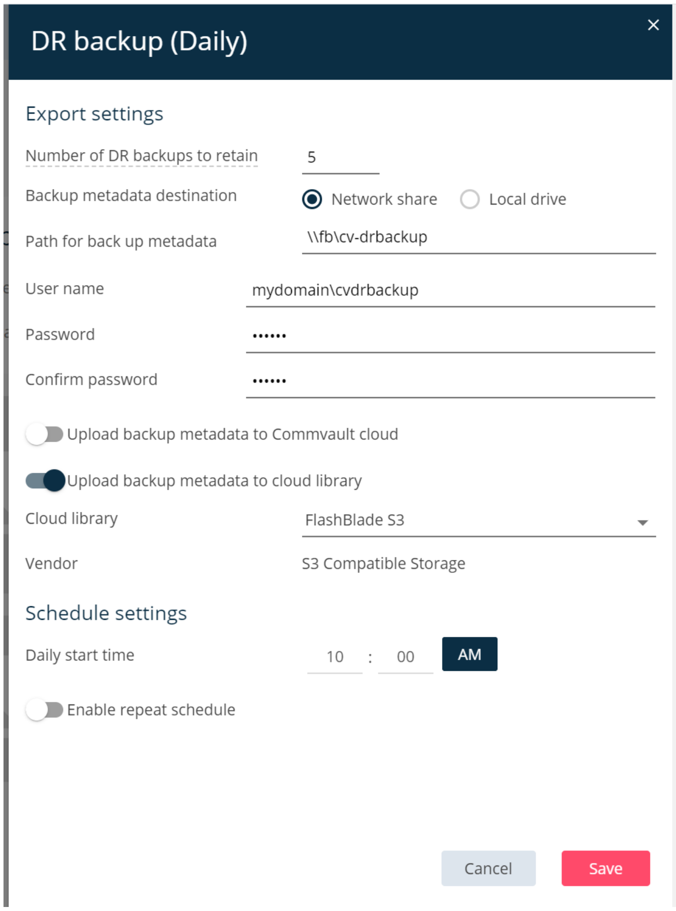
   - As part of the **Command Center** configuration, a basic **Server Plan** will be created using the local RO1105 disk library. Subsequent plans should all use the cloud library created above as the **Backup Destination**. Refer to Commvault documentation for plan options:

     - File Servers
     - Configure Hypervisor
     - Databases
     - Applications

Once setup is complete, CommServe Services DR backups will be stored on local storage on the RO1105.

Configure Commvault to leverage the replicated file system which was set up earlier on the FlashBlade:

1. Add the Active Directory computer account for the RO1105 into the CommServe Services group which was created earlier. Reboot the appliance after changing the group membership.
2. From the Command Center navigation pane, click **Manage** > **System**. The **System** page will appear.
3. Click the **Maintenance** tile to open the **Maintenance** page.
4. Click the **DR backup (Daily)** tile to load the configuration details. Click the **Edit** button (gear icon) to access the **DR backup (Daily)** form as shown in Figure 35.
5. Edit the settings as follows:
   - For the **Backup metadata destination** option, select **Network share.**
   - In the **Path for back up metadata field**, enter the UNC path to the file system which was created.
   - Enter the credentials for the DR backup account which was created in Active Directory in the **Username, Password**, and **Confirm password** fields.
   - If desired, enable the **Upload backup metadata to Commvault cloud** option.
   - Enable the **Upload backup metadata to cloud** library option.
   - In the **cloud library** dropdown, select the cloud storage target which was created on FlashBlade.
   - Click the **Save** button to commit the changes.



DR backup (Daily)

Export settings

Number of DR backups to retain: 5

Backup metadata destination: ● Network share ○ Local drive

Path for back up metadata: \\fb\cv-drbackup

User name: mydomain\cvdrbackup

Password: ••••••

Confirm password: ••••••

○ Upload backup metadata to Commvault cloud

● Upload backup metadata to cloud library

Cloud library: FlashBlade S3

Vendor: S3 Compatible Storage

Schedule settings

Daily start time: 10 : 00 AM

○ Enable repeat schedule

Figure 35. DR backup (Daily) form

Enable Virtualization Solution

The guided setup for virtualization creates a hypervisor configuration and enables the virtualization solution to protect VMware VMs. A VMware hypervisor can be a vCenter server or a standalone ESXi host. The required virtual server agent (VSA) is installed by default on the RO1105 appliance as well as the Data Servers.

1. If the setup page is not displayed, from the navigation pane, click Guided setup.
2. After completing the core setup, on the Protect tab, click the Virtualization tile.
3. On the Create server backup plan page, type a name for the plan, then provide information about storage, retention, and backup schedules. If a server backup plan was configured as part of the Core Setup, the wizard will skip this page.
4. Click Save. The Add hypervisor page appears.
5. Provide the required information for the VMware hypervisor:
   - **Select vendor:** Select VMware vCenter.
   - **vCenter server name:** Enter a fully qualified hostname or IP address for the hypervisor.
   - **Hypervisor display name:** Type a descriptive name for the hypervisor.
     To provide access to the hypervisor, enter credentials that provide administrative access to the hypervisor:
     - **Username:** Enter the user name for the vCenter user.
     - **Password:** Enter the password for the vCenter user.
   - **Access nodes:** To identify access nodes (VSA proxies) that can manage backups and restores for the VMware hypervisor, select one or more previously deployed access nodes, and then click OK.
6. Click Save.
7. On the Add VM group page, type a descriptive name to identify the VM group, and then select the VMs to be protected.
8. Click Save.
9. To finish, choose one of the following options:
   - Click Back up Now to perform an immediate backup of the VMs in the VM group (without requiring confirmation).
   - The Job details page appears and displays job status information.
   - Click Do it later to go to the hypervisor page without performing a backup.

Deploy Commvault Storage Accelerator on All Clients:

The Commvault Storage Accelerator software package provides the ability for clients to write directly to object storage without having the MediaAgent package installed, and without having to share mount paths to them in the storage target configuration. The MediaAgent controlling jobs can manage more streams with fewer resources. Because clients are accessing the FlashBlade without a MediaAgent, network restrictions are critically important. Be sure your network security policy does not allow endpoints to directly access backup storage, or choose an alternative solution using a traditional consolidated MediaAgent architecture.

To enable Commvault Storage Accelerator, install the Storage Accelerator package. In the CommCell Console, navigate to Client Computers. As shown in Figure 36, right-click the client, then select All Tasks > Add/Remove Software > Install Software. Follow the wizard, accepting default options.

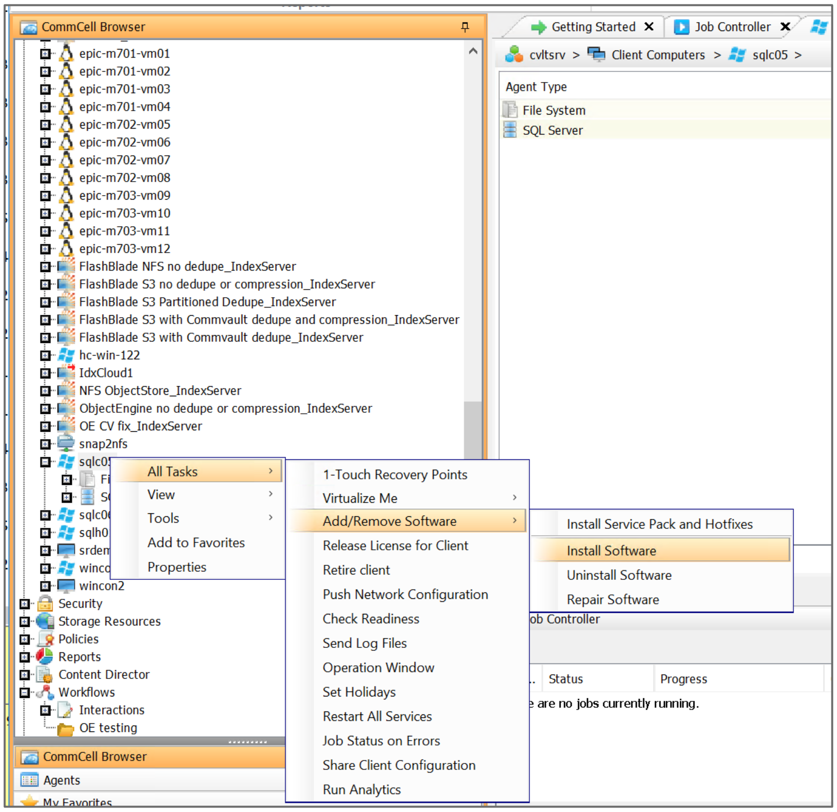


Figure 36. Install Storage Accelerator package

On the Select Packages to Install screen, select the Storage Accelerator option under the Tools section as shown in Figure 37. Click Finish at the end of the wizard to begin the installation. Once the installation completes, Commvault Storage Accelerator will be enabled automatically.

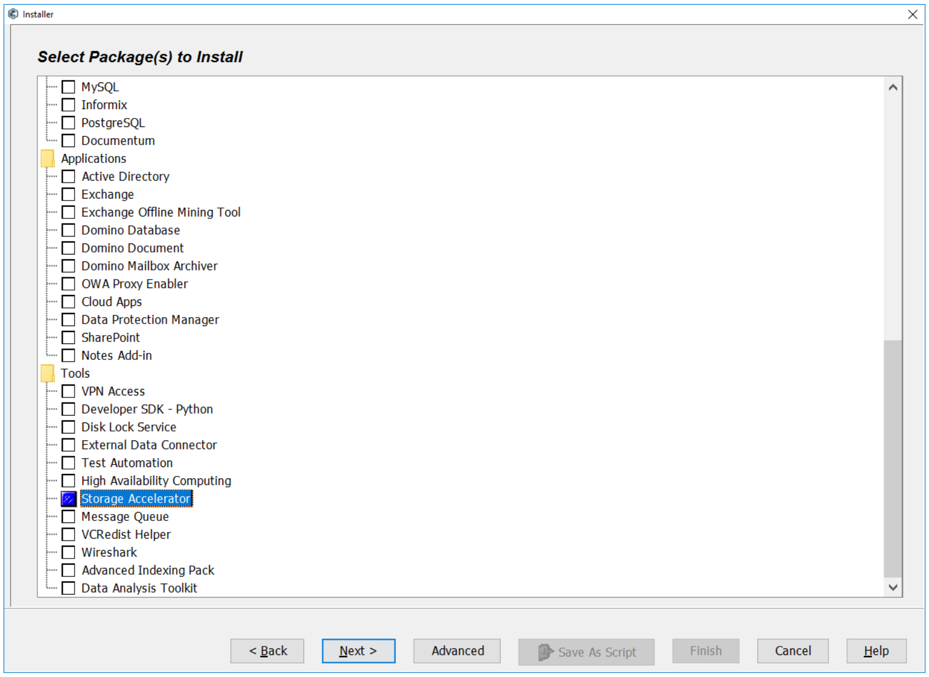


Figure 37. Software package selection

Validate the Commvault RO1105 Configuration

Launch the Commvault Command Center and verify the components that are installed and configured.

From the Windows Start menu, expand Commvault, then select Commvault Command Center. Or, open a web browser and navigate to https://webhost/adminconsole, replacing webhost with the DNS name or IP address of the RO1105 appliance. Log in using the account created during the initial setup.

From the Command Center console, verify the following components:

- **Virtual Server Agent:** From the navigation pane, expand Manage, then select Servers. Locate the RO1105 appliance in the list and click its name to open the server's properties page. Confirm that the Agents list includes Virtual Server.
- **Cloud Storage:** From the navigation pane, expand Storage, then select Cloud. Click the name of the FlashBlade cloud storage to open its properties. In the Bucket section, confirm that the bucket displays the RO1105 name, the bucket name is correct, and its status is "Ready."
- **Server Plan:** From the cloud storage, click the Associated plans tab. Confirm that the server plan is associated.
- **Index Cache:** From the navigation pane, expand Manage, then select Infrastructure. From the Infrastructure page, click the MediaAgents tile. Click the RO1105 name to open its properties. The Index Cache tile displays the path to the index cache. Confirm that Index Directory is configured as E:\index cache.

Commvault Software Upgrade

Use the Command Center to perform upgrade tasks. Download Commvault feature release and maintenance release installation files to the CommServe Services cache and remote caches on demand.

1. From the navigation pane, go to Manage > System > Maintenance.
   - The Maintenance page appears.
2. Click Download/copy software.
   - The Download/copy software section appears, showing the current feature release, the latest available feature release, and the last job that was run.
3. Click Run job.
   - The Download/copy software dialog box appears.
4. Select Download software using Internet.
5. In Download installation media, select the available feature release or maintenance release installation files to be downloaded.
6. In Operating system options, select the platform and operating system for the software to be downloaded.
7. In Remote caches to sync, select the remote caches where the downloaded packages (in addition to downloading to the CommServe Services) will be copied.
8. Click Download.

Use the Command Center to install the Commvault service pack and hotfix installation files on the CommServe Services on demand.

1. From the navigation pane, go to Manage > System > Maintenance.
2. The Maintenance page appears.
   - Click Install update schedules.
3. The Install update schedules section appears, showing the current installation schedules.
4. To install software for a specific schedule, click Run job for the desired schedule.
5. To install software for a new set of servers or server groups, click Run job at the top of the Install update schedules section.
   - The Install updates dialog box appears.
6. Select the servers on which the software will be installed, and then click Run.

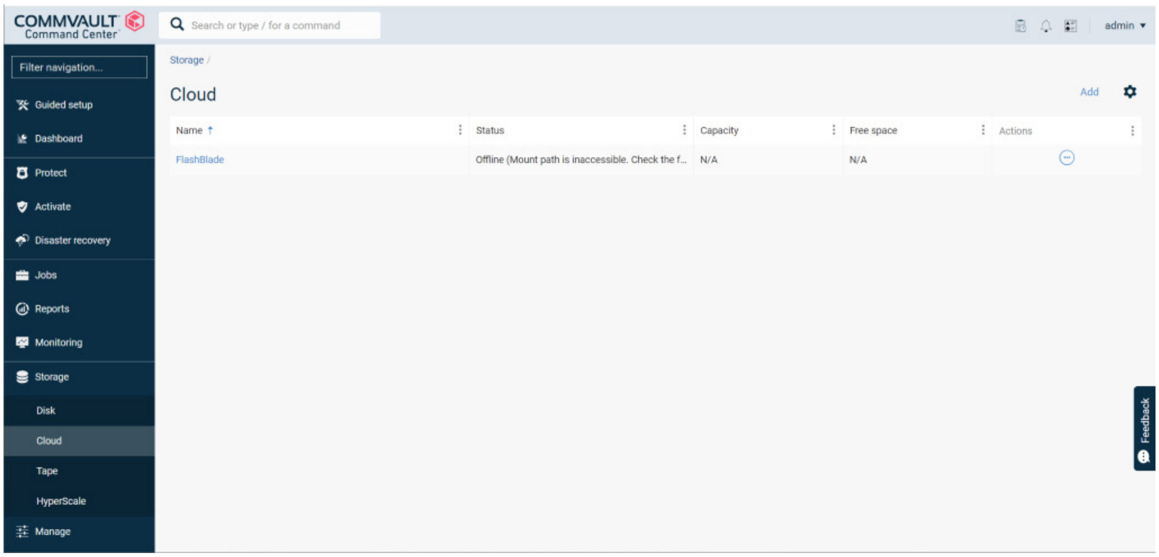
Monitoring

Monitoring Pure FlashBlade Storage Using the Commvault Command Center

The Commvault Command Center provides an overview of the status and configuration of the Pure FlashBlade cloud library. To view the status of the library:

From the left pane expand 'Storage' and Select 'Cloud'

- The main window will display all configured cloud libraries and their statuses as shown below in Figure 38.

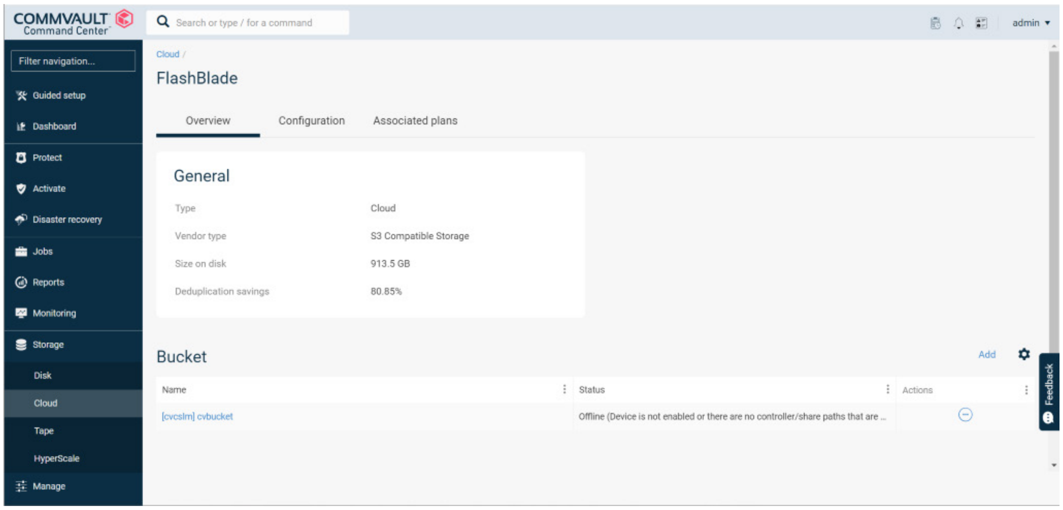


Cloud

Name	Status	Capacity	Free space	Actions
FlashBlade	Offline (Mount path is inaccessible. Check the f...	N/A	N/A	⊖

Figure 38. Software package selection

Select a cloud library to display an overview of the library, including the status for each bucket (Figure 39).



FlashBlade

General

Type	Cloud
Vendor type	S3 Compatible Storage
Size on disk	913.5 GB
Deduplication savings	80.85%

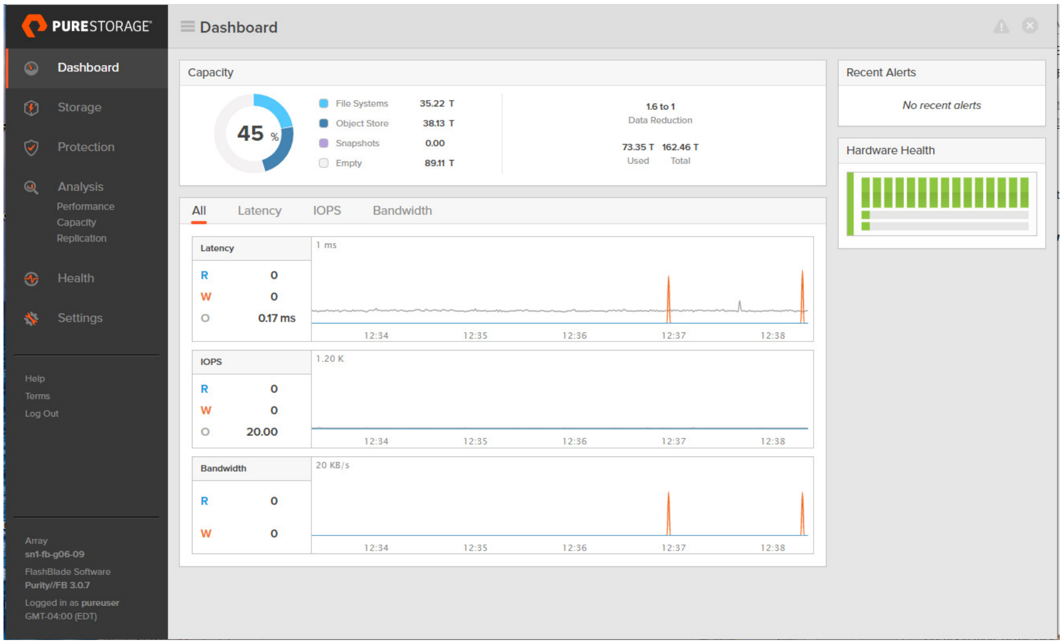
Bucket

Name	Status	Actions
[cvcslm] cvbucket	Offline (Device is not enabled or there are no controller/share paths that are ...	

Figure 39. Software package selection

Monitoring Pure FlashBlade Storage Using the Purity//FB GUI Dashboard

Use Purity//FB GUI to monitor the health of the Pure FlashBlade storage system. The Dashboard page displays a running graphical overview of the array 's storage capacity, performance, and hardware status as shown in Figure 40.



Capacity

45 %

File Systems	35.22 T
Object Store	38.13 T
Snapshots	0.00
Empty	89.11 T

1.6 to 1 Data Reduction

73.35 T Used 162.46 T Total

Recent Alerts

No recent alerts

Latency	
R	0
W	0
O	0.17 ms

IOPS	
R	0
W	0
O	20.00

Bandwidth	
R	0
W	0

Array sn1-fb-g06-09
FlashBlade Software Purity//FB 3.0.7
Logged in as pureuser
GMT-04:00 (EDT)

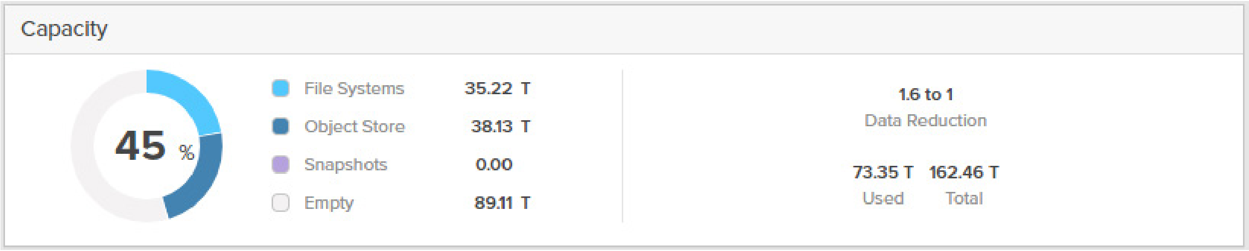
Figure 40. Purity//FB GUI Dashboard

The **Dashboard** page contains the following panels and charts:

- Capacity
- Performance Charts
- Recent Alerts
- Replication Bandwidth (only for replication setups)
- Hardware Health

Monitoring Capacity

The **Capacity** panel displays array size and storage consumption details as shown in Figure 41.



Capacity

45 %

🟦 File Systems	35.22 T
🟦 Object Store	38.13 T
🟪 Snapshots	0.00
□ Empty	89.11 T

1.6 to 1
Data Reduction

73.35 T	162.46 T
Used	Total

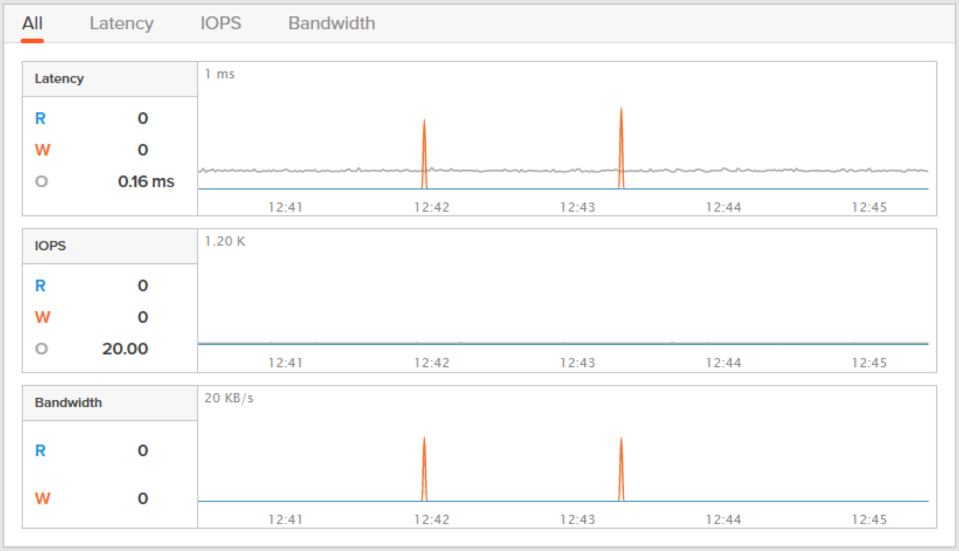
Figure 41. Dashboard - Capacity Panel

The capacity wheel displays the percentage of array space occupied by file system data. The percentage value in the center of the wheel is calculated as **Used** capacity/ **Total** capacity. All capacity values are rounded to two decimal places. The capacity data is broken down into the following components:

- **File Systems:** Amount of space that the written data occupies on the array 's file systems after reduction via data compression
- **Object Store:** Amount of space that the written data occupies on the array 's buckets after reduction via data compression
- **Snapshots:** Amount of space that the array 's snapshots occupy after data compression
- **Empty:** Unused space
- **Used:** Amount of space that the written data occupies on the array after reduction via data compression
- **Total:** Total usable capacity of the array
- **Data Reduction:** Ratio of the size of the written data (i.e. Used) versus the amount of space the data occupies after data compression (i.e. Physical)

Monitoring Performance

The performance panel displays latency, IOPS, and bandwidth values in real time.



Latency

R	0
W	0
○	0.16 ms

IOPS

R	0
W	0
○	20.00

Bandwidth

R	0
W	0

Figure 42. Purity//FB GUI Dashboard - Performance Charts

The performance metrics are displayed along a scrolling graph; incoming data appears along the right side of each graph every second as older data drops off the left side after 5 minutes. Each performance chart includes R, W, and O (if applicable) values, representing the most recent data samples. Hover over any of the charts to display metrics for a specific point in time. The values that appear in the point-in-time tooltips are rounded to two decimal places. The performance panel includes Latency, IOPS, and Bandwidth charts. The All chart displays all three performance charts in one view as shown in Figure 42.

Monitoring Latency

The Latency chart displays the average latency times for various operations.

- **Read Latency (R)** Average arrival-to-completion time, measured in milliseconds, for a read operation
- **Write Latency (W)** Average arrival-to-completion time, measured in milliseconds, for a write operation
- **Other Latency (O)** Average arrival-to-completion time, measured in milliseconds, for all other metadata operations.

IOPS

The IOPS (Input/output Operations Per Second) chart displays I/O requests processed per second by the array. This metric counts requests per second, regardless of how much or how little data is transferred in each.

- **Read IOPS (R)** Number of read requests processed per second.
- **Write IOPS (W)** Number of write requests processed per second.
- **Other IOPS (O)** Number of metadata operations processed per second.
- **Average IO Size** Average I/O size per request processed. Requests include reads and writes.

Bandwidth

The Bandwidth chart displays the number of bytes transferred per second to and from the array (both file systems and buckets). The data is counted in its expanded form rather than the reduced form stored in the array to truly reflect what is transferred over the storage network. Metadata bandwidth is not included in these numbers.

- **Read Bandwidth (R)** Number of bytes read per second.
- **Write Bandwidth (W)** Number of bytes written per second.

By default, the performance charts display performance metrics for the past 5 minutes. To display more than 5 minutes of historical data, select Analysis > Performance.

Note about the Performance Charts

The Dashboard and Analysis pages display the same latency, IOPS, and bandwidth performance charts, but the information is presented differently between the two pages.

In the Dashboard page:

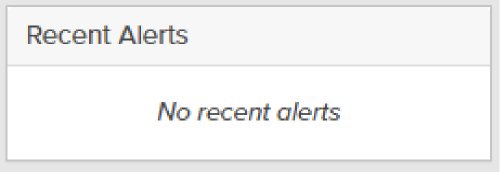
- The performance charts are updated once every second.
- The performance charts display up to 5 minutes of historical data.

In the **Analysis** page:

- At its shortest range (5m), the performance charts are updated once every second. As the range increases, the update frequency (and resolution) decreases.
- The performance charts display up to 1 year of historical data.
- The performance charts can be filtered to display metrics by protocol.

Monitoring Alerts

The **Recent Alerts** panel displays a list of alerts that Purity//FB saw that is both flagged and not in the closed state. The list contains recent alerts of all severity levels. If no alerts are logged, the panel displays **No recent alerts** as shown in Figure 43.



Recent Alerts

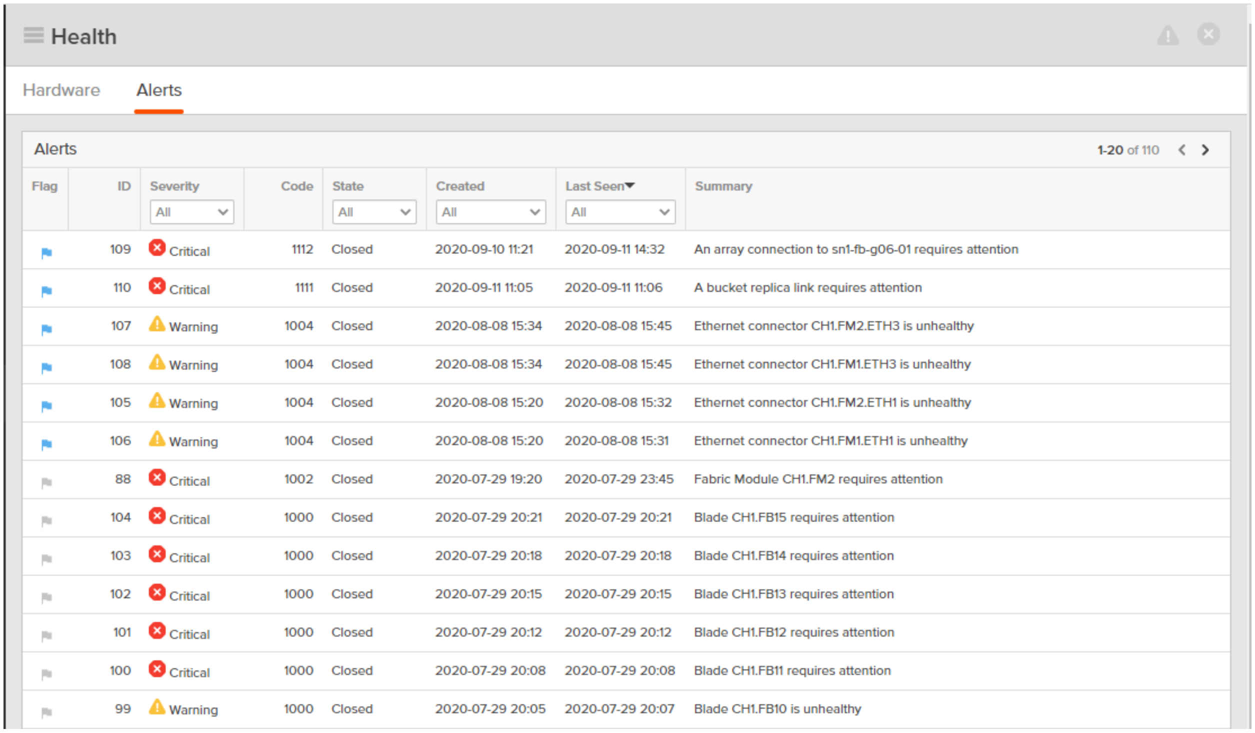
No recent alerts

Figure 43. Purity//FB GUI Dashboard - Recent Alerts Panel

To view the details of an alert, click the alert message.

To remove an alert from the **Recent Alerts** panel, click the clear flag (**X**) button. The alert will no longer be displayed in the **Recent Alerts** panel but will still appear on the **Health** page.

To view a list of all alerts, including ones that are in no longer open, go to the **Health** page as shown in Figure 44.



Alerts — 1-20 of 110

Flag	ID	Severity	Code	State	Created	Last Seen▾	Summary
		All		All	All	All	
⚑	109	✖ Critical	1112	Closed	2020-09-10 11:21	2020-09-11 14:32	An array connection to sn1-fb-g06-01 requires attention
⚑	110	✖ Critical	1111	Closed	2020-09-11 11:05	2020-09-11 11:06	A bucket replica link requires attention
⚑	107	⚠ Warning	1004	Closed	2020-08-08 15:34	2020-08-08 15:45	Ethernet connector CH1.FM2.ETH3 is unhealthy
⚑	108	⚠ Warning	1004	Closed	2020-08-08 15:34	2020-08-08 15:45	Ethernet connector CH1.FM1.ETH3 is unhealthy
⚑	105	⚠ Warning	1004	Closed	2020-08-08 15:20	2020-08-08 15:32	Ethernet connector CH1.FM2.ETH1 is unhealthy
⚑	106	⚠ Warning	1004	Closed	2020-08-08 15:20	2020-08-08 15:31	Ethernet connector CH1.FM1.ETH1 is unhealthy
⚐	88	✖ Critical	1002	Closed	2020-07-29 19:20	2020-07-29 23:45	Fabric Module CH1.FM2 requires attention
⚐	104	✖ Critical	1000	Closed	2020-07-29 20:21	2020-07-29 20:21	Blade CH1.FB15 requires attention
⚐	103	✖ Critical	1000	Closed	2020-07-29 20:18	2020-07-29 20:18	Blade CH1.FB14 requires attention
⚐	102	✖ Critical	1000	Closed	2020-07-29 20:15	2020-07-29 20:15	Blade CH1.FB13 requires attention
⚐	101	✖ Critical	1000	Closed	2020-07-29 20:12	2020-07-29 20:12	Blade CH1.FB12 requires attention
⚐	100	✖ Critical	1000	Closed	2020-07-29 20:08	2020-07-29 20:08	Blade CH1.FB11 requires attention
⚐	99	⚠ Warning	1000	Closed	2020-07-29 20:05	2020-07-29 20:07	Blade CH1.FB10 is unhealthy

Figure 44. Purity//FB GUI Health page - Alerts

Monitoring Hardware Health

The **Hardware Health** panel displays the operational state of the FlashBlade array chassis, blades, and fabric modules. Hover over the image to view the component details.

Depending on the configuration of your array, the **Hardware Health** panel displays either a single or multi-chassis FlashBlade graphic. The single chassis Hardware Health panel is shown in Figure 45.

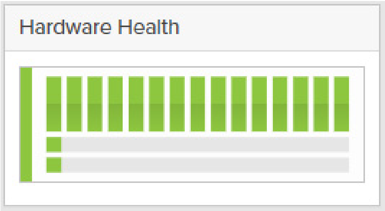


Figure 45. Purity//FB GUI Dashboard - Hardware Health Panel - Single chassis

To analyze the hardware components in more detail, click the **Health** link, the display is shown below in Figure 46.

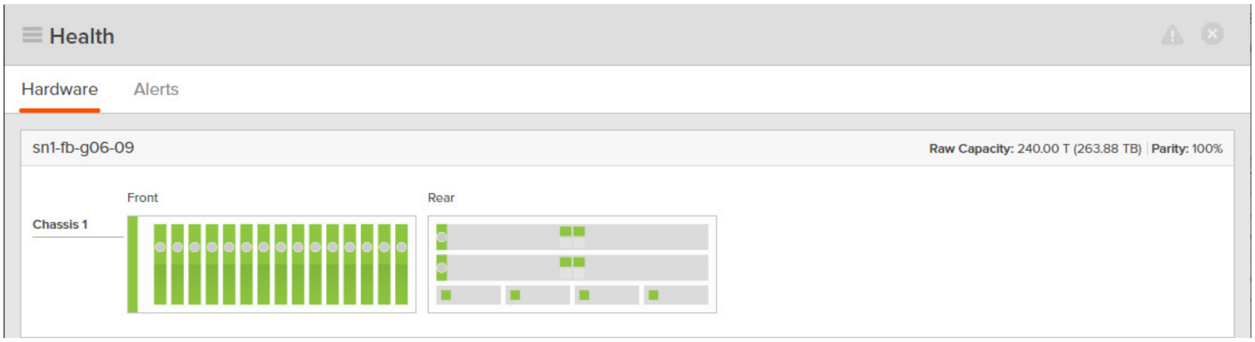


Figure 46. Purity//FB GUI Dashboard Health - Hardware

Conclusion

The Pure Validated Design using FlashBlade with Commvault Remote Office Appliance RO1105 is especially well-suited to address the stringent data protection requirements of modern data centers. This solution brings together a leading data protection appliance with an all-flash storage platform to offer high throughput, low latency, and built-in, always-on deduplication and compression to deliver high performance and simplicity for backup and restore operations.

Product Support

Pure and Commvault will support their customers following each respective company's normal support process. When the need arises, the Pure and Commvault support teams will engage each other through TSANet to collaborate. Pure offers support services over the phone, by email, and through our web portal.

• WEB	pure1.purestorage.com/support
• EMAIL	support@purestorage.com
• PHONE (US)	+1 (866) 244-7121 or +1 (650) 729-4088
• PHONE (INTERNATIONAL)	support.purestorage.com/pure1/support

Additional Documentation

- Ransomware Protection with Pure Storage and Commvault
- Best Practices for Configuring Commvault with FlashBlade
- Commvault Documentation
- Installing the CommServe and MediaAgent Software on Commvault Remote Office Appliance RO1100

Document Updates

We are always looking to improve the quality of our content and documentation and welcome your feedback. Please send us your comments at pvd-documents@purestorage.com.

Document Revisions

Rev #	Description	Date
1.1	Updated deployment information related to provisioning file system for Commvault DR backup	February 2021
1.0	Initial Publication	November 2020

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