

SOLUTION BRIEF

SQL Server Backup to Object Store

Achieve rapid backup and recovery for SQL Server.

Data will grow at a rate of 33% in the next two years. With the current amount of data in the world clocking in at 120 zettabytes, this exponential data growth will accelerate the current data gravity issues most organizations are facing. Data is diverse, and regardless of its form or function, it needs to be backed up. Meeting backup and recovery service level agreements (SLAs) can be a challenge, but using Microsoft SQL Server 2022 and Pure Storage® FlashBlade® can help with both managing diverse data footprints in multiple silos and the rising issue of data gravity.

Fast and Simple Backup and Recovery Solutions

Traditional backup appliances are designed to store data, but that makes them slow at recovery. Fast backups enable database administrators (DBAs) to meet their SLAs, so rapid recovery performance is just as critical in emergencies as backup speed. FlashBlade//S™ has no moving parts and is not limited in backup or recovery speed, allowing it to achieve significantly quicker recovery times compared to traditional backup appliances.

SQL Server 2022 integrates with FlashBlade object storage, providing superior scalability for ever-growing data center footprints. With direct backups from FlashArray™ (block storage) to FlashBlade (object) storage, you can run analytics by day and backups by night with dual-use storage.

S3-compatible Object Storage for SQL Server 2022

SQL Server 2022 introduces object storage integration, enabling backup and recovery workflows between SQL Server and any provider of S3-compatible object storage through a URL syntax using the S3 REST API.

Traditionally, backups were sped up using CPU, faster disks, or adding more servers, but this tactic has its limits. The advantages of S3 API scale-out backups are that you can increase performance by adding additional compute nodes as you scale the system out.



Rapid Recovery

Recover multiple instances at speeds over 60TB/hr.



Off-site Resiliency

Copy the contents of object stores to other FlashBlade systems or S3-compatible object stores with object replication for greater resiliency.



Tamper-proofing

Protect objects and object versions from overwrites or deletes for a predefined length of time or permanently with Object lock.

Each of these nodes have their own CPU, disk, and networking. This is simpler for administration because you can use additional backup and data files to scale. This is all done in a single namespace on S3, making it easier to find all your backups.

High Performance Backup and Recovery

Combining SQL Server with FlashBlade//S object storage for backup and recovery allows you to protect database landscapes of varying sizes and complexity using a single management interface for storage.

The following factors will affect the performance and efficiency of SQL Server data protection workflows:

- **Multi-threaded reads increase throughput.** For each physical volume associated with a database, SQL server allocates a reader thread to the backup operation. Increasing the number of physical volumes across multiple database files will enhance read performance and place additional read load on the storage devices where the SQL Server is stored.
- **Multi-threaded writes speeds output.** SQL Server allocates a writer thread for each backup file stored on the target. Each file uses a dedicated URL to the FlashBlade object store. The increased the number of files and URLs will improve overall throughput by multi-threading the writes and increasing the throughput to files.
- **Tuning parameters for faster performance.** Increasing parameters such as MAXTRANSFERSIZE allows for larger databases to be backed up and increases overall throughput but can only be used with compression.
- **Compression for increased throughput.** Compression allows for backup files to be compacted, saving storage space, and reducing networking load at the cost of increased CPU usage on the database host. The use of compression can result in a significant improvement to both backup and restore times.

Proven Outcomes with FlashBlade//S500

FlashBlade//S is provided in one of two specifications, //S200 for ultimate efficiency or //S500 for extreme performance. It is a high-performance consolidated storage platform for both file and object workloads, delivering a simplified experience for infrastructure and data management. The following table lays out the different specifications:

Model	Workload Requirement	Compression Level	Networking	Capacity Details	Physical
//S200	Ultimate Efficiency	Very High	Up to 8 x 100GbE	<ul style="list-style-type: none"> • Number of DFM: 1 to 4 • DFM Media: QLC • Up to 1920TB raw capacity 	<ul style="list-style-type: none"> • Rack Units: 5U • Power: 2,400W* • Dimensions: 8.59" x 17.43" x 32.00" • Weight: 215 lbs**
//S500	Extreme Performance	High	Up to 8 x 100GbE	<ul style="list-style-type: none"> • Number of DFM: 1 to 4 • DFM Media: QLC • Up to 1920TB raw capacity 	<ul style="list-style-type: none"> • Rack Units: 5U • Power: 2,400W* • Dimensions: 8.59" x 17.43" x 32.00" • Weight: 215 lbs**

Table 1. FlashBlade//S specifications (per chassis)

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FlashBlade//S500 can be used to achieve the most demanding SQL Server disaster recovery SLA's for both backup and recovery. An internal evaluation that tested and assessed SQL Server backup and recovery with FlashBlade//S500 object storage performance based on the challenges we noted earlier was based on the following evaluation criteria:

- **Variations in the number of instances being backed up or restored in parallel.** Only a single database can be backed up or recovered for a single instance at a time. The performance benefits of FlashBlade//S are exponential when it is executing concurrent operations. However, FlashBlade//S provides incredible performance to meet demanding SLAs whether a single or multiple instances are performing backup and recovery.
- **Variations in the number of URLs and files.** Each file being targeted for backup or recovery expands the scalability of the operation and makes better use of the extreme performance provided by FlashBlade//S.
- **Variations in the MAXTRANSFERSIZE parameter.** A higher value of the MAXTRANSFERSIZE parameter increases backup and recovery performance. When restoring a database, the parameter is determined by the value used in the backup phase. This parameter can only be changed when using compression options.
- **Whether compression is enabled or disabled.** Compressed backups are smaller than uncompressed backups containing the same data, and compressing a backup typically requires less storage space and network bandwidth, while increasing backup and recovery speeds.

Scaling Backup Performance

The objective of the backup evaluation was to highlight which configuration options need to be used to achieve the shortest backup time. To establish expected outcomes for backup performance when integrating FlashBlade//S500 object with Microsoft SQL Server, several configurations were assessed. Multiple configurations were assessed using both single and multiple instances recovering databases concurrently.

The best configuration to establish the shortest backup time was when using compression, a MAXTRANSFERSIZE of 20, and a total of 11 striped backup files (URLs). This produces a backup speed of 54.74TB/hr.

Backup Performance - With and Without Compression

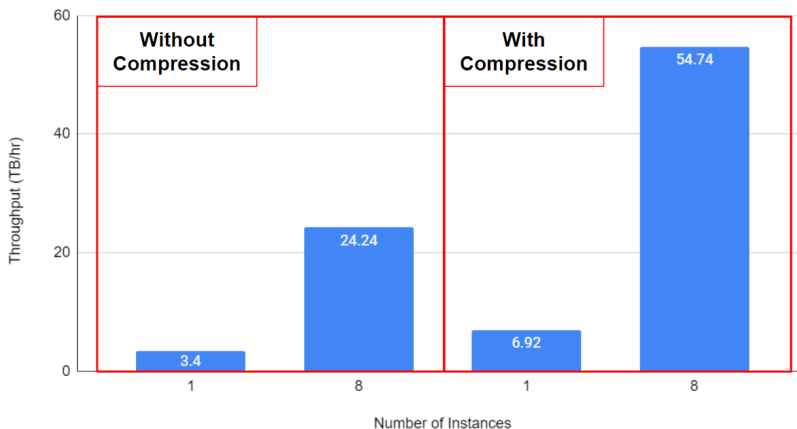


Figure 1. Backup performance and scaling capabilities of FlashBlade//S500 with SQL Server object storage.

Scaling Recovery Performance

Recovery performance is the key to meeting SLAs and ensuring recovery objectives can be met is a top priority. To establish expected outcomes for recovery performance when integrating FlashBlade//S500 object with Microsoft SQL Server, several configurations were assessed. It is important to note that the configuration of recovery is dependent on the original configuration when the backup was performed.

Like the results highlighted in the previous section, the most optimal configuration for the shortest recovery time was found to be the use of compression with a MAXTRANSFERSIZE of 20 and multiple striped backup files (URL's). Producing a recovery throughput of 61.93TB/hr, or over a TB a minute.

What this internal evaluation highlighted was that when using FlashBlade//S500 as a data protection and disaster recovery repository, the highest throughput rates were achieved when multiple instances were performing backup or restore operations concurrently. This demonstrates the value FlashBlade//S500 can provide for environments with many instances that require short recovery times.

Restore Performance - With and Without Compression

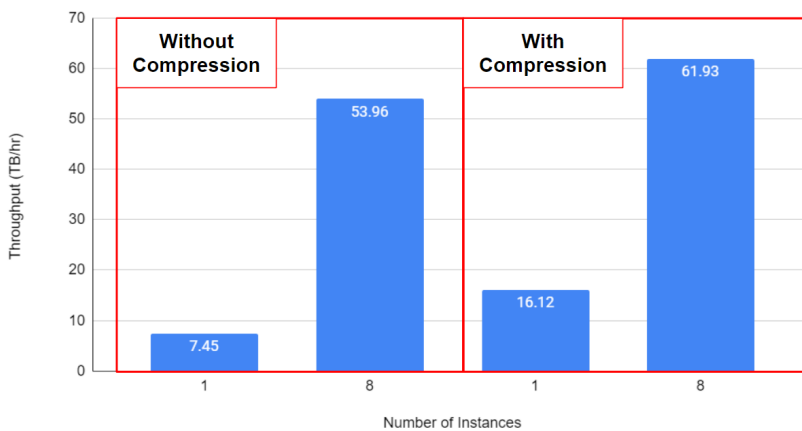


Figure 2. Recovery performance and scaling capabilities of FlashBlade//S500 with SQL Server object storage

Additional Resources

- Read more about SQL Server backup to URL for S3-compatible object storage in the SQL Server 2022 [documentation](#).
- Learn more about [FlashBlade//S](#).
- Find out more about [SQL Server Solutions](#) on Pure Storage.

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