

NetBackup Flex Scale

Mass recovery and backup performance.

Executive Summary

After an incident, like a ransomware attack, where multiple systems may be affected in parallel, it is essential to not only protect all your organization's data, but also recover quickly.

NetBackup™ Flex Scale is a purpose-built, scale-out data protection solution with multiple layers of security to protect your organization's most critical data. The scale-out design allows you to not only increase your capacity but also the number of systems you can simultaneously protect with the ability to take more frequent backups and reduce your recovery protection objective (RPO) and recovery time objective (RTO). It's designed from the ground up to provide the highest level of performance, delivering:

- Cloud Scale technology
 - Automated scaling
 - Intelligent load balancer
 - Eliminates client management overhead
- Highly optimized distributed file system

Cloud Scale Technology

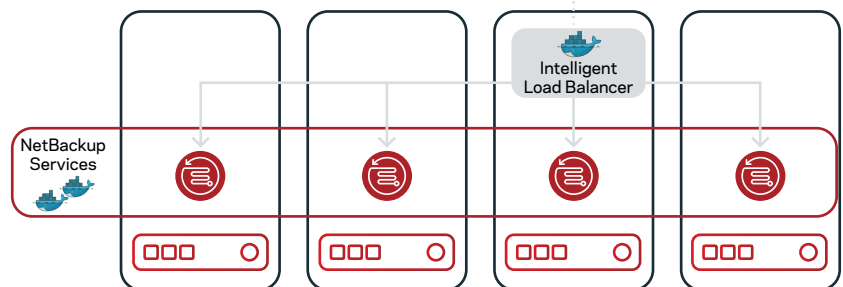
The Cloud Scale technology built into NetBackup Flex Scale includes cloud-like management, scaling, and intelligent load balancing. NetBackup Flex Scale abstracts the hardware layer from the NetBackup design to provide a cloud-like management experience. You don't need to determine how many media servers you need to run or try to figure out how best to balance which client connects to which server. This is because NetBackup Flex Scale automatically starts containerized NetBackup services, as needed, within the cluster, and allows clients to connect using a cluster-wide alias.

The actual job distribution is controlled by a built-in intelligent load balancer, which is aware of:

- Backup history
- All active NetBackup service containers
- Each node's
 - System load
 - Concurrent jobs

Unlike other load balancers that simply use a round-robin approach, NetBackup Flex Scale uses intelligence to determine the best distribution of jobs within the cluster to achieve optimal performance across all jobs.

Node	Containers	System Load	Concurrent Jobs	Last Backup
Node1	Running	40%	3	X
Node2	Running	65%	4	
Node3	Running	55%	5	
Node4	Running	50%	4	



NetBackup Flex Scale easily increases capacity by adding node(s) to the cluster. This automated process:

- Scales the capacity available to store backup images.
- Scales the catalog size to make room for more metadata.
- Increases the number of NetBackup service containers to allow for increased job concurrency.
- Optimizes and rebalances data across the nodes in the cluster.

The data rebalancing is optimized to ensure the minimum amount of data is moved and ensure data is equally distributed across all the nodes in the cluster. Depending upon how quickly you need the extra capacity and performance, NetBackup Flex Scale gives you the option to select the cluster resource priority for either minimal impact on backup and recovery jobs or faster rebalancing.

Priority	Impact to Job Performance	Time to Cluster Resize Complete
Backup / Recovery Jobs	Minimal	Slower
Rebalancing	Some	Fastest

*Actual time to complete rebalancing depends on the amount of data in the storage pool, the rebuild priority setting, and the activity level of the nodes during the rebalance operation.

Once the node addition process is complete, the new node will automatically be included in job distribution – there is no need to make any client-side or policy changes. This is because clients are configured to connect with an alias on the cluster, and job distribution is controlled by the built-in intelligent load balancer.

Highly Optimized Distributed File System

Arguably the most important aspect to get right when creating a data protection environment is the storage layer. It is important to get the best balance between performance, usable capacity, and data durability. This is very challenging, especially with a scale-out deployment.

Countless research and testing went into finding this perfect balance for NetBackup Flex Scale to ensure it was optimized specifically for scale-out data protection. This resulted in NetBackup Flex Scale's optimized hardware and networking configuration, as well as its block-based erasure coding.

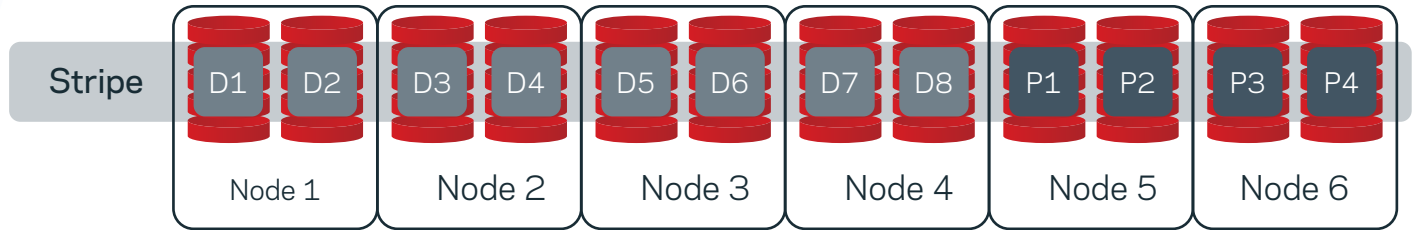


Hardware Configuration:

The design starts with a high-speed distributed file system that stores the backup images. To optimize performance, it is made up of the drives from all of the cluster nodes. File system traffic is on an isolated low latency private network that gives you the option to use either two 10 GbE or two 25 GbE ports per node. Communication is optimized using the User Datagram Protocol (UDP), which provides 60% greater bandwidth than the Transmission Control Protocol (TCP) (patent pending).

Erasure Coding:

As soon as the system receives 2 MB from a backup image, a slice is created that is divided into 12 equally sized fragments (8 data and 4 parity) using the Reed-Solomon erasure coding scheme of 8,4. These 12 erasure coded fragments make up a stripe that is equally distributed across the nodes in the cluster. If more than one fragment of a stripe is sent to a node, the system ensures they are written to different disks.



The optimal block size and erasure coding scheme for NetBackup Flex Scale ensure it provides:

- Optimal performance:
 - Backup throughput is equal for large and small jobs, since there is no need to wait for a full backup image before writing to disk.
 - Checks ensure a single job doesn't overwhelm any resources
 - The block size is optimized for throughput
 - Each job is able to utilize all the nodes and disks in the cluster
- Optimal Usable Capacity: 66% raw to usable capacity
- Optimal Data Durability:
 - NetBackup Flex Scale can lose one node, plus one disk with the minimal four node configuration
 - Data Durability increases as the cluster size increases, up to two full nodes with six or more nodes

Together, the parallelism of jobs, the low latency private UDP network, and block-based erasure coding in NetBackup Flex Scale provides:

- Optimal performance for both backup and recovery operations, since each job will use system resources across the entire cluster.
- Performance that scales - adding more servers automatically increases the appliance throughput and input/output operations per second (IOPS), ensuring you can increase the number of systems you protect and provide multiple recovery points for a very low RPO
- Block-based erasure coding that avoids the overhead of garbage collection while maintaining a high level of resiliency
- Faster rebuilds - internal testing shows 3.5X faster rebuilds than redundant array of independent disks (RAID)

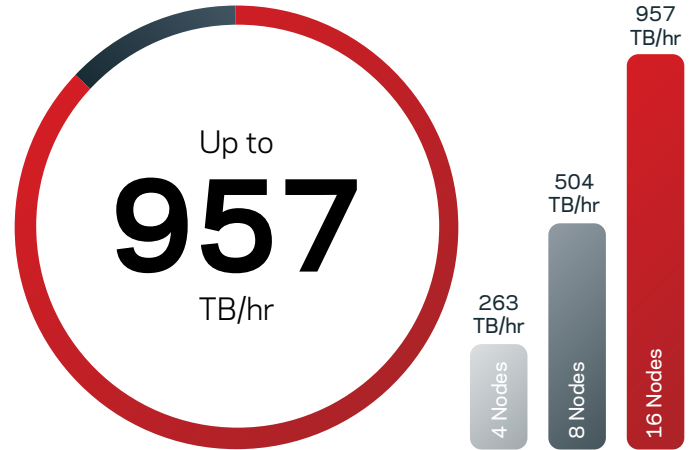
Also, to ensure the fastest and highest availability access to the NetBackup catalog, data is stored on the NVMe SSDs in the servers and protected with triple mirroring, snapshots, and backups.

Backup

Ensuring you are protecting your data frequently is essential to any business. Given the data sprawl in typical organizations and the amount of data that requires protection, it is essential to be able to protect multiple systems in parallel.

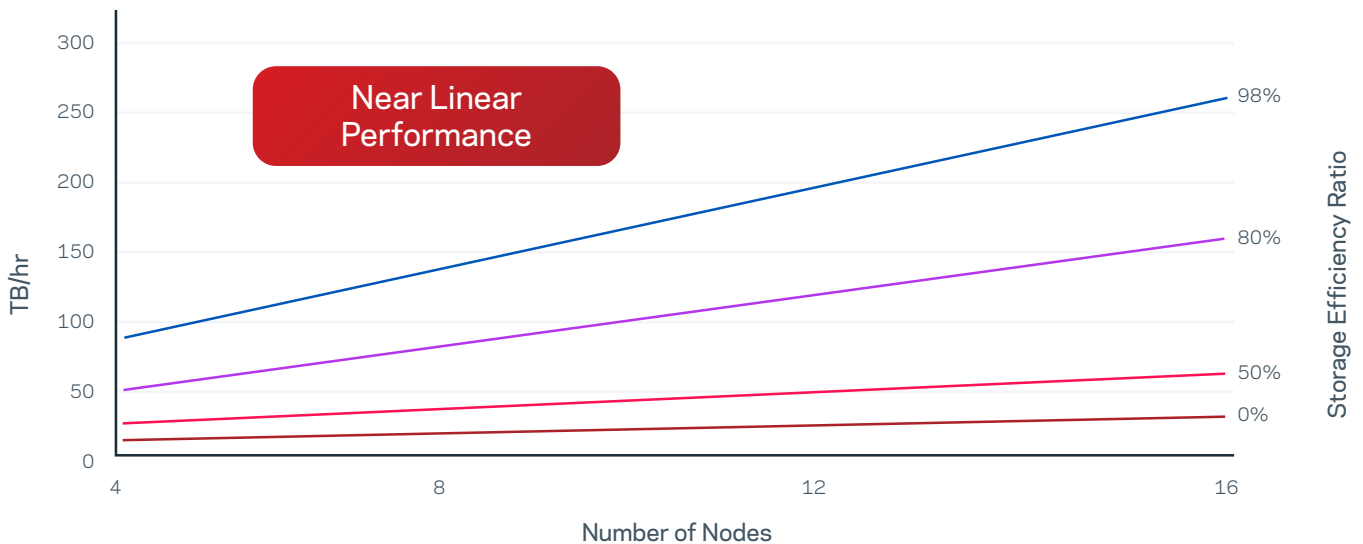
The fastest way to protect your data is with NetBackup Client Direct. This allows client software to create the backup image and perform the storage efficiency operations, so that only the unique segments are sent to NetBackup Flex Scale. While this does take some extra processing on the client, it offers the highest levels of performance.

The speed of backup and recovery is dependent upon the storage efficiency ratio and network performance. In our testing, when NetBackup Client Direct with 98% storage efficiency sent segments to a NetBackup Flex Scale cluster, we saw backup times of up to 957 TB/hr.



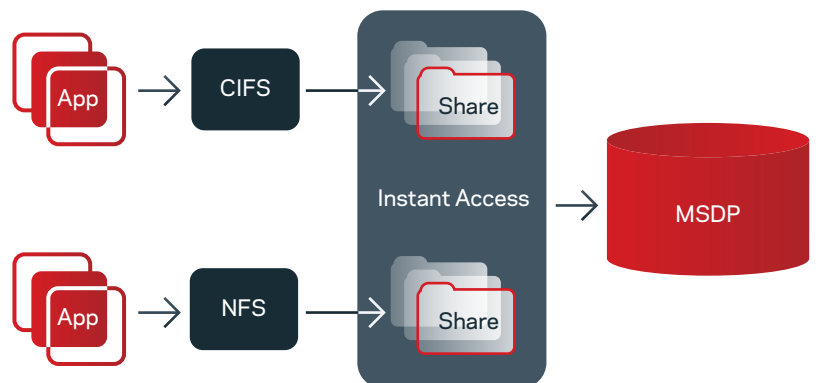
This shows that backup performance scales near linearly (at an average of 90%) as you add nodes to the cluster.

We saw the same scale on our tests where storage efficiency was done on NetBackup Flex Scale without NetBackup Client Direct.



Mass Recovery

NetBackup Flex Scale is optimized for the recovery speed and parallelism you need to get your business back up and running quickly in the event of an outage. It not only allows you to run multiple parallel recovery operations, but also gives you instant access to your most critical data stored in virtual machines (VMs) and applications, like Oracle and MSSQL. It works by presenting a read-only copy of the backup image that can be mounted for immediate access to the data, without affecting the backup image or the recoverability of the data.



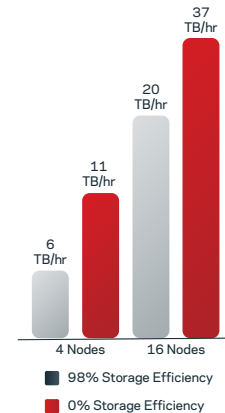
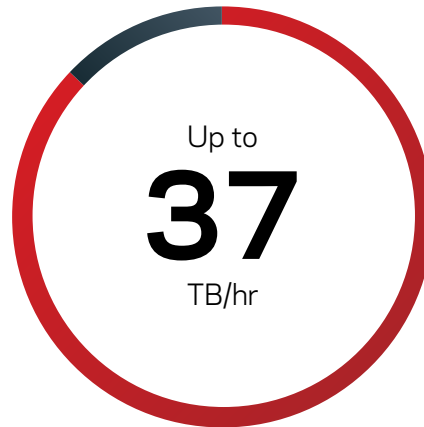
Instantly Access 1600 VMs

Integrating an intelligent load balancer that can optimally distribute jobs across multiple servers and container instances allows NetBackup Flex Scale to perform multiple parallel restores.

Depending on your storage efficiency ratio and the number of nodes in your cluster, testing has shown restore performance of up to 37 TB/hr.

With NetBackup Flex Scale, testing shows restore performance scales near linearly (average of 90%) as you add nodes into your cluster.

In our testing, we were able to mount 1600 VMs from backup images to instantly gain access to their data.



800 Parallel Streams

The recommended number of parallel streams per node for a NetBackup Flex Scale cluster is 50. For example, with a 16-node cluster, you could run any combination of instant access shares or recovery streams in parallel, up to a total of 800, to quickly get your business back up and running.

Summary

NetBackup Flex Scale's scale-out architecture significantly improves your data protection performance and resiliency with built-in optimization features, including intelligent load balancing, a high-speed cluster network, and a performance optimized distributed file system. NetBackup Flex Scale ensures that you are able to quickly protect IT services across your entire organization, while providing multiple recovery points for a very low RPO. With support for 800 parallel streams, including Instant Access and Universal Shares, you are able to recover at scale to give you near instant access to your most critical data.

For more information on the NetBackup Flex Scale architectural design and multiple layers of security check out these whitepapers:

[Technical Overview](#)

[Secure-by-Design](#)

About Veritas

Veritas Technologies is a global leader in data protection and availability. Over 80,000 customers—including 87 percent of the Fortune Global 500—rely on us to abstract IT complexity and simplify data management. The Veritas Enterprise Data Services Platform automates the protection and orchestrates the recovery of data everywhere it lives, ensures 24/7 availability of business-critical applications, and provides enterprises with the insights they need to comply with evolving data regulations. With a reputation for reliability at scale and a deployment model to fit any need, Veritas Enterprise Data Services Platform supports more than 800 different data sources, over 100 different operating systems, more than 1,400 storage targets, and more than 60 different cloud platforms. Learn more at www.veritas.com. Follow us on Twitter at [@veritastechllc](https://twitter.com/veritastechllc).

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