



Symantec NetBackup on HP server platforms using Scality RING Scale-Out File System as a target

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Executive summary

This paper outlines the benefits of using HP ProLiant servers and the Scality RING to jointly optimize data backup and recommends configurations and best practices for a backup solution.

Explosive data growth continues to put pressure on IT administrators to optimize data storage practices and control storage IT spend. As organizations continue to realize value in their data, this task becomes increasingly challenging. Traditional scale-up systems are accompanied with substantial costs and cheaper alternatives, such as tape, are typically not deemed reliable enough in event of data loss. Businesses are exploring emerging storage architectures like object storage to help reduce costs and maintenance efforts while retaining or increasing enterprise-class reliability and safety of valuable data.

The Scality RING running on HP ProLiant servers can natively interface with industry-standard backup software. Leveraging a core object-based technology, this solution provides a lower infrastructure cost and a significantly higher level of scalability than traditional storage systems.

Many solutions will combine an object storage solution with a standard tape library for additional storage and for offsite copies of critical data. This combines the low cost of standard tape storage solutions with the benefits of added bandwidth, scale-out flexibility, and cost reduction that object storage solutions offer compared to traditional scale-up storage arrays.

HP Infrastructure, combined with Scality storage software and industry-standard backup software delivers a solution that:

- Supports petabytes of data and billions of objects.
- Lowers upfront solution investment and total cost of ownership (TCO) per gigabyte compared to a solution of purely traditional scale-up storage arrays.
- Provides enterprise-class infrastructure monitoring and management.
- Provides simplified business continuity by enabling native multi-site redundancy.
- Does not require management of large tape libraries for primary storage. Tape libraries can be used for additional and/or offsite copies of critical data.

Target audience: CTOs and solution architects looking for a storage solution that handles the rapid growth of backup/archival storage while controlling infrastructure costs. This paper assumes knowledge of enterprise data center administration challenges and familiarity with data center configuration and deployment best practices, primarily with regard to storage systems. This paper focuses on the configuration required to attach backup software to an object storage cluster and therefore assumes the object storage cluster is already installed and configured.

This white paper describes configuration testing performed by HP in January 2015.

Overview

Business problem

Businesses are looking for more cost-effective ways to manage exploding data storage requirements in backup applications.

In recent years, the amount of storage required for businesses has increased dramatically. Businesses are dealing with a shift from tape-based to disk-based backup, or a complementary mix of both for solution optimization. Cost-per-gigabyte and ease of retrieval are important factors for choosing a solution that can scale quickly and economically over many years of continual increase of backup data capacities and data retention requirements.

Many organizations still need to manage much—or all—of that data in-house. Regulations and privacy considerations can make offsite storage impractical or impossible. Hosting on a public cloud may not meet cost or data control requirements in the long-term; the performance and control of on-premise equipment still offers real business advantages. There is also risk with public clouds that the provider may cease operations with little notice, creating risky situations for important data.

Organizations that have been trying to keep up with data growth using traditional file and block storage solutions are finding that the complexity of managing and operating them has grown significantly—as have the costs of storage infrastructure.

Why HP ProLiant with Scality RING

Scality RING is petabyte-scale, software-defined storage leveraging a high-performance, object storage architecture. The RING runs on HP ProLiant servers, providing deployment flexibility, simple support, many hardware options, rapid adoption of HP hardware innovation, and multi-generation ProLiant support. The RING has native interfaces for file, object, and VM applications, and the performance to serve 80 percent of storage workloads, eliminating silos and overhead, and enabling new applications. The RING can consolidate and protect data in a single, petabyte-scale, 100 percent uptime environment without adding administrators.¹ The combination of software flexibility, multi-workload and application consolidation, and high scale and availability reduces total costs.

Disk-based backups to Scality are part of the “Enterprise Cloud” use case, enabling a multi-application environment to consolidate silos inside a traditional IT infrastructure. The following are key values specific to using Scality on ProLiant in a backup environment:

- **Lowest TCO:** Leverage HP ProLiant industry-standard servers and Scality software-based erasure coding to provide the maximum capacity at the lowest cost per gigabyte.
- **Seamless integration:** Combined with the Scality Scale-Out File System (SOFS) Connector, the Scality RING nodes appear to the backup software just like a local file system target.
- **Data readiness:** The backup data stored in a Scality RING is always readily available. This means that restorations can be performed almost instantaneously without additional overhead, even during planned and unplanned system maintenance, software updates, and hardware refreshes.
- **Predictable performance:** Parallel scalability will support read and write throughput streams specific to a given SLA.
- **Built-in disaster recovery:** With native geographically dispersed clustering, flexible “failure domains” can be configured to tolerate the loss of physical or logical boundaries.
- **Auxiliary usage:** In typical object storage deployments, a single cluster can be used, not just for backups, but also for other storage use cases where objects make sense and capacity and bandwidth considerations fit.

Key solution technologies

HP ProLiant servers

Using HP ProLiant servers as cluster components gives enormous flexibility for customizing, configuring, and balancing cost per customer use case. (CPU per disk, storage density, network infrastructure, etc.). With massive scale, costs of the cluster building blocks add up, so choosing the right components makes a difference.

HP hardware is the right platform for a large-scale storage cluster because it provides better TCO for operating and maintaining the hardware than “white box” servers. HP provides:

- Platform management tools that scale across data centers
- Server components and form factors that are optimized for enterprise use cases
- Hardware platforms where component parts have been qualified
- A proven support infrastructure

Solutions built with “white box” servers work for business at small scales, but as those solutions grow, the complexity and cost make them less compelling than enterprise-focused hardware. With “white box” solutions, IT has to standardize and integrate their platforms and supported components themselves. Support escalation becomes more complicated. Without standardized toolsets to manage the hardware at scale, IT must chart their own way with platform management and automation. Power consumption and space inefficiencies of generic platform design also limit scale and increase cost over time.

The result is IT staff working harder and the business spending more to support the quantity and complexity of a “white box” hardware infrastructure. The lowest upfront cost does not deliver the lowest total cost or easiest solution to maintain.

Sample configuration

The sample reference configuration uses Symantec NetBackup as the backup/archive software with a Scality RING file SOFS Connector on HP ProLiant platforms as a target. Symantec NetBackup natively supports storage targets with a file system or NFS connector as well as providers that utilize a Symantec OST plug-in.

The NetBackup Manager Server and Media Server configurations are based on the HP ProLiant DL360p Gen8 Server. The single rack contains:

- Two HP ProLiant DL360p Server
- Red Hat® Enterprise Linux® Server release 7.0

¹ scality.app.box.com/s/m2g9hjk5vytdukhvnb3m

- NetBackup Enterprise software with applicable licenses for Manager Server and Media Server installations
- 10GbE Networking running on HP 5900AF switches
- 1GbE Networking running on an HP 2920 Switch
- Rack and power components

The sample cluster is based on storage on the HP ProLiant SL4540 Server:

- Three 2-node HP ProLiant SL4540 Gen8 Server, with 3 TB drives
- Two HP ProLiant DL360p Server chassis for Supervisor and Connector installations
- CentOS release 6.5
- 10GbE Networking running on HP 5900AF switches, carrying object data traffic
- 1GbE Networking running on an HP 2920 Switch, carrying HP Integrated Lights-Out (iLO) and corporate management traffic
- Rack and power components

In this configuration the HP ProLiant SL4540 Servers are storage servers. The HP ProLiant DL360p Gen8 Server is used to run Supervisor and Connectors. The Supervisor provides management access to the RING via a Web user interface (UI) or the command-line interface (CLI).

Scality RING architecture

This document describes backup/archival solution based on the Scalality RING software and HP ProLiant server hardware. Multiple HP servers are combined into a single, near-limitless pool of storage, which is presented to applications in a file system using the Scalality SOFS interface. The solution consists of the Scalality RING software running on HP ProLiant servers along with networking, rack, and power components.

Because of the software-defined nature of the solution, a customized real-world deployment might mix and match many different configurations for many different use cases. These options include HP ProLiant storage server platform, Linux® OS vendor, solid-state media, and different spinning disk capabilities from high-performance to cloud drives. A typical deployment can scale to a multi-petabyte storage infrastructure.

A complete solution includes the following three components:

- **Storage servers**—Dedicated to write, read, store, and data preservation operations. These servers interface with and manage the system's interaction with physical storage devices.
- **Connectors**—Individually installable processes serving as translators that receive data requests from application servers and coordinate access to the RING storage nodes. This solution paper focuses on file-based Connectors, but native connectivity for object (HTTP/REST), SMB/NFS, and virtual machine storage is also available.
- **Supervisor**—Runs on a separate server that provides central administration and statistics gathering for the storage platform. Failure of the Supervisor does not impact the cluster's ability to service requests.

A storage node is a logical entity distinct from a physical server; a storage node runs on the HP ProLiant storage server as a Linux process. Nodes are independent of one another, even when they operate on the same server. These storage node instances control their portion of the global key space of the distributed hash table; their primary role is to locate data and honor object requests.

Each storage server will host 12 storage node processes—six dedicated to metadata operations and six dedicated to core data operations. In the event of a server failure, the corresponding data responsibilities for the nodes will be distributed evenly across the RING.

Connectors are Linux packages that can be installed anywhere in the data environment, including directly onto the storage servers. They are stateless, so they are easy to scale and are fault tolerant. Connectors provide fine-grained caching of RING topology and metadata, resulting in very fast response times.

Being fully native to Scalality—rather than provided by a third party—Connectors are built to support the parallelism, performance, and scalability ethics of the rest of the environment. At the same time, Connectors allow you to size data access resources based on your data profiles and performance requirements. The Scalality SOFS Connector is used in this solution to connect the Symantec NetBackup software to the Scalality RING as a local mount point.

Scality’s Advanced Resiliency Configuration (ARC) erasure coding

Software erasure coding provides redundancy at the file level as opposed to using hardware RAID. Files are broken up into smaller fragments and stored in different locations. In the event of a failure, the file can be recovered from any combination of a smaller number of these fragments.

Scality’s patented erasure coding methodology stores data in the clear providing read performance operations at an average of five times faster than traditional object storage. Individual fragments of objects, files, and VMs can be read and written independently, without any complex reconstruction of data.

ARC provides very flexible methods for meeting specific durability and availability levels. This schema is referred to as ARC(n,k)–n being the amount of data fragments each object is broken into and k being the amount of parity objects created. This is configurable, and this paper uses ARC(4,2).

Note that the schema above creates a total of six chunks of data. This solution uses more than six physical storage servers. This combination ensures that no two data chunks from a single object will exist on the same physical server. The total capacity overhead for this configuration is 50 percent. The two parity chunks will thus guarantee that any and all objects on the RING can be accessed during the complete loss of two physical servers.²

Symantec NetBackup architecture

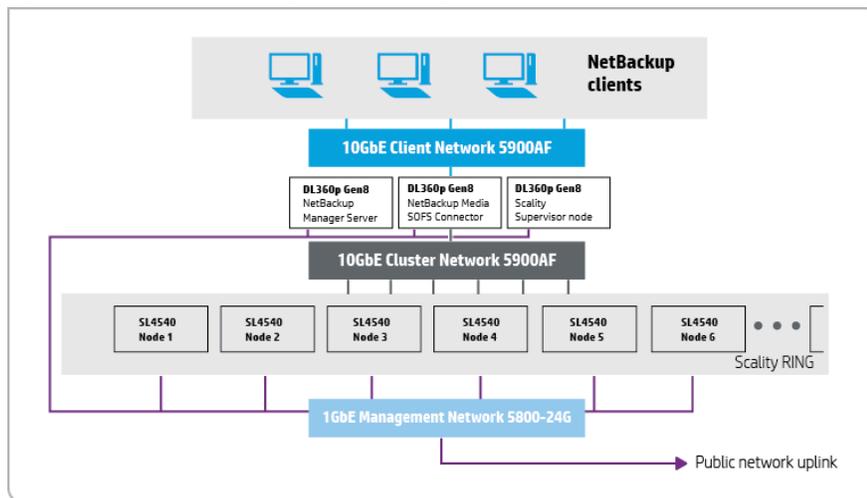
Symantec NetBackup is a leading enterprise software suite for backup/archival solutions that is built to protect large and demanding enterprise environments. It provides a holistic backup and recovery solution optimized for data protection that can scale nicely with object storage solutions. Symantec NetBackup has a three-tier architecture that consists of the following three components:

- **Master Server**—Maintains a database with information about backup images, system configurations, and available backup resources. The Master Server is also responsible for initiating backups as scheduled by any configured backup policies and also for scheduling and allocating the required resources to complete each job.
- **Media Server**—Dedicated to reads and writes of backup and restore data between clients and designated backup media. The Media Server owns one or more backup devices. In the case of this solution, the “backup device” is the Scality RING object store accessed by the Media Server. Backup resources can be partitioned and shared between multiple Media Servers.
- **Clients**—Systems where the data to be protected resides.

Solution diagram

This block diagram shows how the object storage roles are connected together. There are three networks represented in this architecture. The 1GbE Management Network, shown in light blue, has an uplink to the larger management network, and the management network has a route to the Internet. Internet access allows rack management network infrastructure to reach package update repositories, while the uplink connects the cluster with other management servers and consoles. Not shown (to keep the diagram simpler), each HP ProLiant SL4540 Gen8 and HP ProLiant DL360p Gen8 Server also has an HP iLO connection to this management network. There is a 10GbE Cluster Network, shown in gray, which is used for traffic between the Supervisors and storage nodes. The third 10GbE Client Network connects the clients with the Symantec NetBackup software.

Figure 1. Sample reference configuration block diagram



² scality.app.box.com/s/m2q9hik5vytdukhvn3m

Solution components

Component choices

Operating systems

Standard updated and final versions of Red Hat Enterprise Linux and CentOS Linux were used for both Symantec NetBackup software and Scalality software respectively. These operating systems are interchangeable as they are both supported by both software packages.

Switches

Top-of-rack (TOR) switches (HP 5900AF-48XG-4QSPF+) for data and replication traffic

The HP 5900AF-48XG-4QSPF+ 10GbE high-density, ultra-low latency, TOR switch provides IRF bonding and sFlow®, which simplifies the management, monitoring, and resiliency of the network. This model has 48X 10-Gigabit/Gigabit SFP+ ports with four QSFP+ 40-Gigabit ports for ultra-high capacity connections. The high performance 10GbE Networking provides cut-through and non-blocking architecture, delivering industry-leading low latency (~1 microsecond) for very demanding enterprise applications. The switch delivers a 1.28 Tbps switching capacity and 952.32 Mpps packet forwarding rate in addition to incorporating 9 MB of packet buffers.

Figure 2. HP 5900AF-48XG-4QSPF+ TOR Switch



TOR switches (HP 2920-48G) for HP iLO and management

The HP 2920-48G is an ideal TOR 1GbE switch for denser rack configurations with up to four 10GbE uplinks, and 48 1GbE ports. A management switch for HP iLO traffic is required for the HP ProLiant SL4540 Server, and this also may be used to segment other non-cluster traffic (SSH connectivity, package updates).

Figure 3. HP 2920-48G TOR Switch



Both of the switches referenced are rear facing, in that the cables for the switch are connected on the same side of the rack as the cables that are connected to the NICs at the back of the HP ProLiant SL4540 Servers.

Server selection

Within this architecture, the cluster can be scaled effectively while using the same server hardware. This section briefly talks about sample reference configuration server choices.

Scalality RING Supervisors/Connectors and NetBackup Manager/Media Servers

For both Scalality and NetBackup components, the 1U HP ProLiant DL360p Gen8 Server is a dual socket server, with a choice of Intel® Xeon® E5-2600 v2 and Intel Xeon E5-2600 processors, up to 768 GB of memory, and two expansion slots was chosen. Network connectivity can be provided through FlexibleLOM in a 4x1GbE NIC configuration or a 2x10GbE configuration. For storage, various configurations are available with LFF or SFF drives with an HP Smart Array P420i Controller.

The HP ProLiant DL360p Server was chosen to keep rack space requirements minimal for nodes where storage density was not the issue, but still provide good network bandwidth and compute power. An eight SFF drive configuration is used in the sample reference configuration, but the storage on the HP ProLiant DL360p Server is not particularly important to NetBackup functionality outside of providing a reliable mirrored OS boot drive.

Figure 4. HP ProLiant DL360p Gen8 Server



Scalify RING storage nodes

The HP ProLiant SL4540 Gen8 Server provides flexibility of compute and storage capacity to allow tailoring the server to fit any object storage use case. Maximizing storage density with the SL4540 and Scalify software is achieved using the SL4540 Gen8 model configured with a single compute node containing up to 60 drives.

With nine single node ProLiant SL4540 Gen8 Servers, the solution can be configured to ~3.2 PB of raw storage capacity using 6 TB drives. The solution can be extended afterward with additional ProLiant SL4540 Gen8 Servers to meet expanding storage requirements, or further geo-dispersed to meet even greater availability and durability needs.

Figure 5. HP ProLiant 2x25 SL4540 Gen8 Server



Sample reference configuration design

The sample reference configuration could have represented anything from a minimal test configuration to multiple PODs. A bill of materials (BOM) of three HP ProLiant SL4540 Gen8 2 Node Server and four HP ProLiant DL360p Gen8 Servers was chosen because it's a size representative of enterprise data needs without being too large to be a reasonable initial deployment use case for many readers.

The sample reference configuration fits in a single rack, but is scalable in some important ways. For one, there's space left to configure for further HP ProLiant SL4540 Gen8 Server scaling or other data center equipment. It's relatively simple to source this configuration to multiple racks by replicating elements of the BOM.

Licensing and support

These are important for a scale-out solution with industry-standard servers as they provide reliability and management required to operate petabyte plus scale clusters and beyond. HP iLO provides the foundation for linking the hardware platform to cluster performance, along with remote hardware management. HP service and support provide expertise through setup, operation, and escalation for issues with HP provided hardware.

Configuration guidance

Symantec NetBackup Installation

The Symantec NetBackup client, Manager Server, and Media Server should be installed on Red Hat Enterprise Linux 7. The client can also be installed on a Windows® machine, but this guide does not explore that option. Ideally, the NetBackup Manager and Media Server systems will have a fresh install that has been updated to the latest. Before starting the installation process, there are some requirements that need to be satisfied.

Symantec NetBackup has a strict set of requirements for Linux limits on system-wide resources that are controlled by the utility *ulimit*. When these requirements are not met, NetBackup may experience varying levels of performance reductions. These can be requirements that can be easily satisfied by running the following command as root:

```
$ echo "kernel.sem=300 307200 32 1024" >> /etc/sysctl.conf
```

The system firewall will also need to be configured to allow the proper traffic through. To accomplish this, the *iptables* service needs to be configured to allow destination port 13782 through on a proper interface. This involves adding a rule to the firewall INPUT chain. The command will be similar to the following:

```
$ iptables -A INPUT -p tcp -m tcp -s IP_OF_BACKUP_SERVER -dport 13782 -j ACCEPT
$ ip6tables -A INPUT -p tcp -m tcp -s IP_OF_BACKUP_SERVER -dport 13782 -j ACCEPT
```

It is also an option to eliminate firewall as a potential issue in the configuration by stopping the related services. If this configuration is chosen, take steps to ensure the systems are on an isolated and sanitary network.

```
$ systemctl stop iptables
$ systemctl stop ip6tables
$ systemctl stop firewalld
```

It may also be a good idea to add the IP address and fully resolved hostnames of the other machines in the solution to the `/etc/hosts` file of each machine in the case of DNS failures. The machine that this is being run on should be omitted from the following commands and the values of the IP addresses should be populated with their true IP addresses found via *ifconfig*.

```
$ echo "XXX.XXX.XXX.XXX FULLY_RESOLVED_MEDIA_HOSTNAME" >> /etc/hosts
$ echo "XXX.XXX.XXX.XXX FULLY_RESOLVED_MANAGER_HOSTNAME" >> /etc/hosts
$ echo "XXX.XXX.XXX.XXX FULLY_RESOLVED_CLIENT_HOSTNAME" >> /etc/hosts
```

Next, the Symantec NetBackup Manager software needs to be installed on each respective system: manager, Media Server, and client. The installation of the Symantec NetBackup Servers should follow the standard installation guide provided by Symantec. It should follow default answers to installation questions and the respective fully resolved hostnames should be provided for both Manager Server and Media Server when prompted. A valid license key will also be required to complete the installation.

Symantec NetBackup Manager Server configuration

The first configuration item for the NetBackup Manager Server is to register the Media Server and client. To register the Media Server, run the following command as root:

```
$ /usr/opensv/netbackup/bin/admincmd/nbemcmd -addhost -machinename \
FULLY_RESOLVED_MEDIA_HOSTNAME -machinetype media -masterserver \
FULLY_RESOLVED_MANAGER_SERVER_HOSTNAME -netbackupversion 7.6 -operatingsystem
linux
```

To register the client with the Master Server, run:

```
$ /usr/opensv/netbackup/bin/admincmd/bpclient -client
FULLY_RESOLVED_CLIENT_HOSTNAME -add
```

Once all machines have been registered with the Manager Server, the rest of the configuration can be done via the GUI. To launch the GUI, run:

```
$ /usr/opensv/java/jnbsA
```

The first step in the GUI is to create a backup policy. To start the Policy Wizard, choose "Create a Policy" from the top level menu as shown in figure 6.

Under the "Create a backup policy for" option, make sure the default option "File systems, databases, applications" is chosen, and click "Next."

In the next window, give the policy a name and leave the default option "Standard" selected under "Select Policy Type," and click "Next." In the client list window, click "Add..." and then enter the fully resolved client hostname, choose the client's operating system, and then click "Add" and then "Ok." Repeat for additional clients and then click "Next."

In the "Backup Selections" menu, choose particular files to back up or select the checkbox for "Back up all local drives" and then click "Next."

In the “Backup Type” menu, choose backup options for the clients in this policy and then click “Next.”

In the “Frequency and Retention” menu, select the appropriate scheduling options for this policy and then click “Next.”

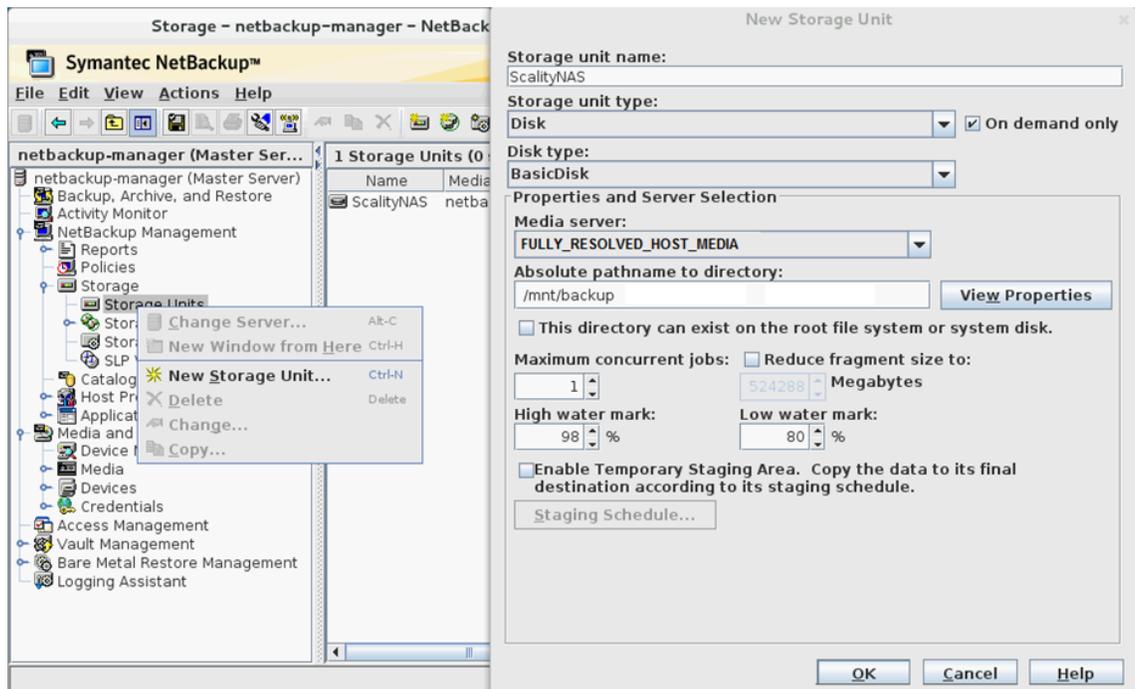
In the “Start Window” menu, select appropriate options for this policy, click “Next,” and then “Finish” on the following window.

Figure 6. NetBackup Manager Server GUI



Once the policy is complete a Storage Unit needs to be added. Right click “Storage Units” under NetBackup Management > Storage and choose “New Storage Unit...”. This menu will require the name, type, disk type, Media Server, and absolute pathname of the SOFS mount on the Media Server. An example can be referenced in figure 7.

Figure 7. NetBackup Storage Unit configuration



Symantec NetBackup Media Server configuration

As long as the Scalality SOFS directory has been mounted correctly on the Symantec NetBackup Media Server and correctly pointed to by the Storage Unit that was created, no further configuration needs to be done on the Media Server.

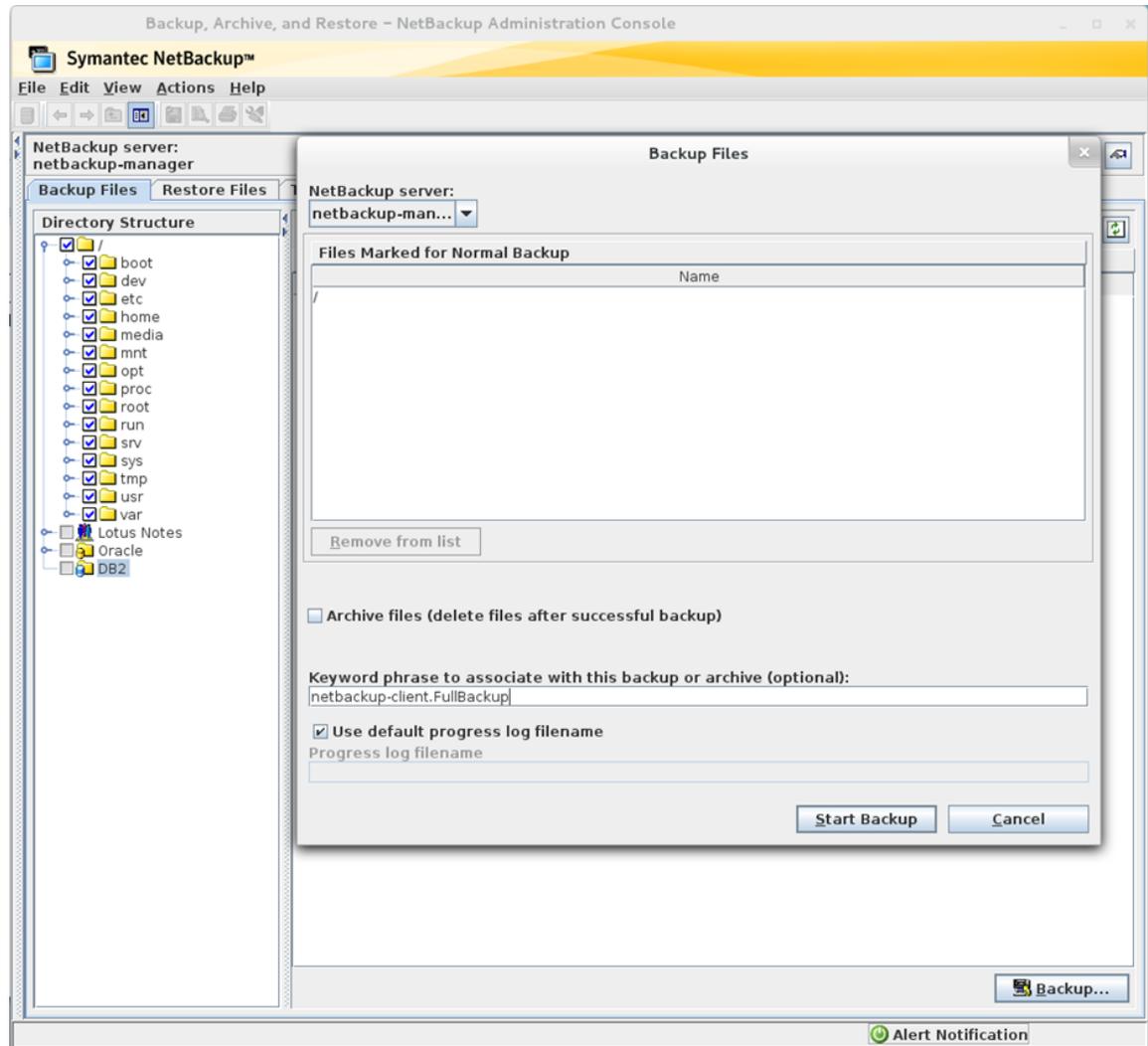
Symantec NetBackup Client configuration

Once the NetBackup client is successfully installed, the GUI can be launched with the same command as before:

```
$ /usr/openssl/java/jnbSA
```

In the GUI, make sure that the NetBackup Manager Server is correctly listed and choose what files should be backed up. In this example, the entire root directory of the machine was chosen. A keyword phrase can be given to the backup to help identify it later. Once this is done, click “Start Backup” and verify that it is successful. This step can be seen in figure 8.

Figure 8. NetBackup Client configuration



Bill of materials

This BOM reproduces the sample reference configuration. Note: HP ProLiant servers ship with an IEC-IEC power cord for rack mounting.

HP ProLiant DL360p Gen8 Server

Qty	Part number	Description
4	654081-B21	HP ProLiant DL360p Gen8 8 SFF Server
4	654772-L21	HP ProLiant DL360p Gen8 E5-2650 (2.0GHz/8-core/20MB/95W) FIO Kit
4	654772-B21	HP ProLiant DL360p Gen8 E5-2650 (2.0GHz/8-core/20MB/95W) Kit
32	647899-B21	HP 8GB (1x8GB) SR x4 PC3-12800R (DDR3-1600) Reg. CAS-11 Memory Kit
4	684208-B21	HP Ethernet 1GbE 4P 331FLR FIO Adptr
4	665249-B21	HP Ethernet 10GbE 2P 560SFP+ Adptr
8	652572-B21	HP 450GB 6G SAS 10K rpm SFF (2.5-inch) SC Enterprise 3yr Warranty Hard Drive
4	631681-B21	HP 2GB P-series Smart Array FBWC
8	656362-B21	HP 460W CS Platinum Ht Plg Pwr Supply Kit
4	663200-B21	HP 1U FIO Friction Rail Kit
4	512485-B21	HP iLO Adv 1-Svr incl. 1yr TS&U SW

HP ProLiant SL4540 Gen8 2 Node Server

Qty	Part number	Description
3	663600-B22	HP ProLiant SL454x 2x Node Chassis
12	656363-B21	HP 750W CS Plat PL Ht Plg Pwr Supply Kit
3	681254-B21	HP 4.3U Rail Kit
6	664644-B22	HP ProLiant SL4540 Gen8 2 Node Server
6	684373-L21	HP SL4540 Gen8 E5-2470 (2.3GHz/8-core/20MB/95W) FIO Kit
6	684373-B21	HP SL4540 Gen8 E5-2470 (2.3GHz/8-core/20MB/95W) Kit
72	647897-B21	HP 8GB (1x8GB) DR x4 PC3L-10600R (DDR3-1333) Reg. CAS-9 Memory Kit
6	692276-B21	HP Smart Array P420i Mezz Ctrlr FIO Kit
6	631681-B21	HP 2GB P-series Smart Array FBWC
6	682632-B21	HP SL4500 Storage Mezz to PCIe Opt Kit
6	668943-B21	HP 12in Super Capacity Option for Smart Array
6	664648-B21	HP SL4500 10G IO Module Kit
6	655874-B21	HP QSFP/SFP+ Adptr Kit
12	655708-B21	HP 500GB 6G SATA 7.2k 2.5 in SC MDL HDD
18	691854-B21	HP 200GB 6G SATA ME LFF 3.5 in SC EM SSD
132	652766-B21	HP 3TB 6G SAS 7.2K rpm LFF 3.5 in SC MDL HDD

HP Networking Cables

Qty	Part number	Description
6	263474-B23	HP IP CAT5 Qty-8 12ft/3.7m Cable
8	263474-B22	HP IP CAT5 Qty-8 6ft/2m Cable
4	JD096C	HP X240 10G SFP+ to SFP+ 1.2m DAC Cable
6	JD097C	HP X240 10G SFP+ to SFP+ 3m DAC Cable
2	JG328A	HP X240 40G QSFP+ QSFP+ 5m DAC Cable

HP 1GbE Switch

Qty	Part number	Description
1	J9728A	HP 2920-48G Switch, 1 J9739A Power Supply Included
1	U6319E	3-year Support Plus, 4-hour onsite, 24x7 coverage
1	U4830E	HP Networks Stackable Legacy Switch Startup Service
1	U4826E	HP Networks Stackable Legacy Switch Installation Service

HP 10GbE Switches

Qty	Part number	Description
2	JC772A	HP 5900AF-48XG-4QSFP+ Switch
4	JC680A	HP 58x0AF 650W AC Power Supply
4	JC682A	HP 58x0AF Bck(pwr)-Frt(ports) Fan Tray
2	U5Y06E	HP 3y SupportPlus24 5900-48 swt Svc (for JC772A)

HP Rack and Power

Qty	Part number	Description
1	BW908A	HP 642 1200mm Shock Intelligent Rack
1	BW932A	HP 600mm Rack Stabilizer Kit
1	BW930A	HP Air Flow Optimization Kit
1	BW909A	HP 42U 1200mm Side Panel Kit
2	AF916A	HP 3PH 48A NA/JP Pwr Monitoring PDU
2	AF500A	HP 2, 7X C-13 Stk Intl Modular PDU
1	120672-B21	HP 9000 Series Ballast Option Kit

Summary

To solve the problem of rapid growth of backup and archival data, HP and Scalify provide a solution that maximizes storage density and optimizes your cost of ownership. The HP and Scalify solution is easy to deploy, simple to grow, and is built to create the right balance of protection and performance for your petabyte-scale storage needs. The sample bill of materials provides a small configuration with a single storage node; however, this architecture can be scaled to meet a wide range of capacity and site redundancy requirements. HP and Scalify help you manage your data growth and control your costs.

The Scalify RING is a simple-to-configure-and-manage-software-based storage architecture. Scalify software reduces your overall storage footprint as compared to traditional object storage solutions that use data replication, while still maintaining the durability and availability your enterprise data assets require.

The ProLiant SL4540 Gen8 Server has all the right characteristics for a Scalify RING. Choices of compute and storage capacity let you choose one of the three possible configurations to match the compute to storage ratio that best satisfies your data access needs. Flexible deployment and HP software management suite make it easy to roll out in your data center.

Symantec NetBackup is integrated into the solution seamlessly with the Scalality SOFS Connector. This allows the client to perform backups and restorations with the Scalality RING in a way that is transparent to the user. This provides a robust backup and archival solution that is easy to scale, use, and maintain.

Software, storage, and networking have been integrated to provide a standards-based converged infrastructure solution that can solve your exploding data problems today. Scalality software and HP hardware are the ideal solution for your object storage needs.

Implementing a proof-of-concept

As a matter of best practice for all deployments, HP recommends implementing a proof-of-concept using a test environment that matches as closely as possible the planned production environment. In this way, appropriate performance and scalability characterizations can be obtained. For help with a proof-of-concept, contact an [HP Technology Consulting Services](#) or your HP partner.

Glossary

- **Cold, warm, and hot storage**—Temperature in data management refers to frequency and performance of data access in storage. Cold storage is rarely accessed and can be stored on the slowest tier of storage. As the storage “heat” increases, the bandwidth over time as well as instantaneous (latency, IOPS) performance requirements increase.
- **Failure domain**—An area of the solution impacted when a key device or service experiences failure.
- **Federated storage**—A collection of autonomous storage resources with centralized management that provides rules about how data is stored, managed, and moved through the cluster. Multiple storage systems are combined and managed as a single storage pool.
- **Object storage**—A storage model focusing on data objects instead of file systems or disk blocks; objects have key/value pairs of metadata associated with them to give the data context. Typically accessed by a REST API, designed for massive scale, and using a wide, flat namespace.

Resources

With increased density, efficiency, serviceability, and flexibility, the HP ProLiant SL4540 Gen8 Server is the perfect solution for scale-out storage needs. To learn more, visit hp.com/servers/sl4540.

To support the management and access features of object storage, and seamlessly operate as part of HP Converged Infrastructure, the HP ProLiant DL360p Gen8 Server brings the power, density, and performance required. Visit [HP ProLiant DL360 Gen9 Server](#).

HP OneView helps companies of all sizes unlock the value of a converged infrastructure by bringing the best of consumer IT to the data center and allowing teams to work in a more natural and collaborative way. Visit hp.com/go/oneview.

HP Integrated Lights-Out simplifies server setup, promotes remote administration, engages health monitoring, and maintains power and thermal control. For more information, see hp.com/go/ilo.

HP simplifies, integrates, and automates networking so organizations can focus on what they do best. Visit hp.com/go/networking for more information.

Documents for HP scale-out object storage solutions on industry-standard servers are at hp.com/go/objectstorage.

The HP switches used in this document are [HP 2920 Switch Series](#).

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