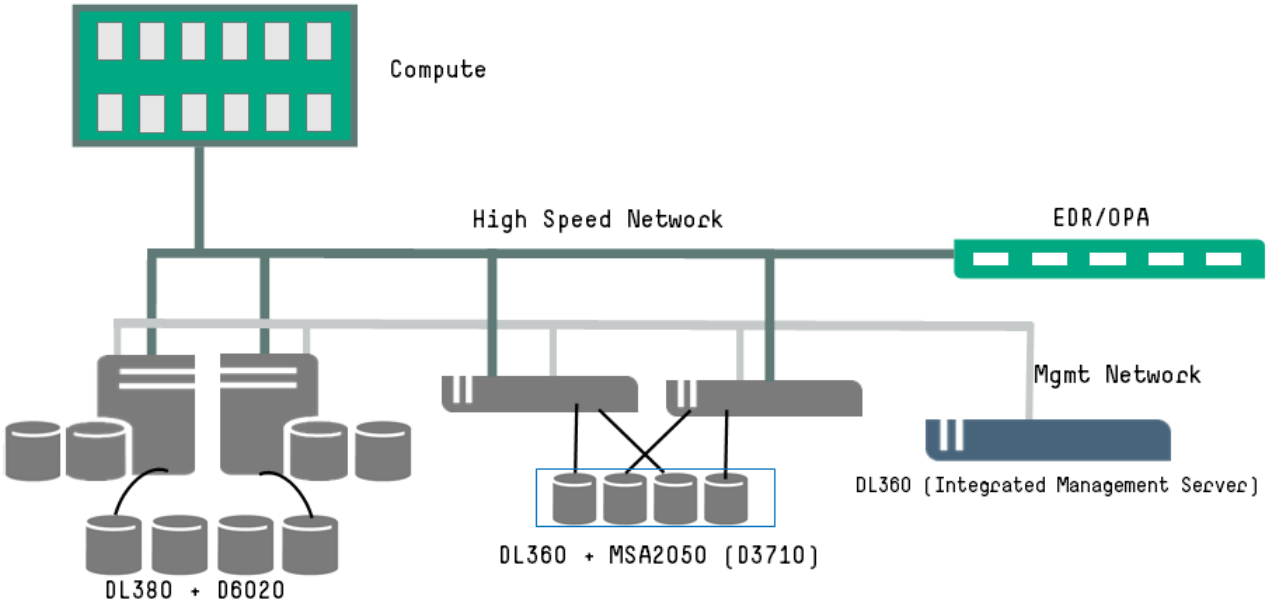
Overview

Scalable Storage for Lustre

Based on ProLiant Gen10 Servers



Scalable Storage for Lustre Diagram

Supported Server Operating Systems are RHEL/CentOS 7.X

Scalable Storage for Lustre is a software-defined storage platform that runs on the HPE ProLiant Gen10 servers. Lustre is an object based, open source, distributed, parallel, clustered file system. It is designed for maximum performance at massive scale that is resource efficient and cost effective, especially with large block sequential IO. Available in various configurations and delivered like an “appliance.”

Community Lustre paired with HPE ProLiant Gen10 servers delivers a high availability solution that has built in failover capabilities. The Reference Architecture that has been created, recommends a fully configured cluster that will deliver optimized performance. The configuration includes a pair of DL380 servers as the Object Storage Targets (OST) and D6020 storage JBODs with 70 SAS hard drives. The two DL380 nodes require a Lustre subscription support license each. In addition, the solution contains two HPE ProLiant DL360’s that server with an MSA 2050 (or a D3710) that serves as the management (MGS) and metadata servers (MDS). The active MDS DL360 requires a Lustre subscription support license. An additional HPE ProLiant DL360 acts to support the HPE developed IML (integrated manager for Lustre) plug-in software.

Overview

Models

HPE Lustre* SKU's

HPE Lustre Software 1yr Support Subscription E-LTU	P9L65AAE

Notes: Worldwide except China and India

Standard Features

Software Overview

What is Lustre?

Lustre is an object based file system that splits metadata from the data and stores the metadata on the Metadata Servers (MDS) and the actual data in multiple objects on the Object Storage Servers (OSS). When a client opens a file, Lustre gets the access permissions & other pertinent metadata from the MDS, and after that all the I/O happens between the client and the OSTs. This is unlike other file systems which require going thru a single head node. Lustre allows multiple clients to access multiple OSS nodes at the same time independent of one another, thereby allowing the aggregate system to scale throughput by adding additional nodes in parallel.

Benefits of the Solution

Fully Redundant Hardware

The hardware that comes with this solution is based on the Gen 10 evolution of the HPE DL360 and DL380 server platforms – which are the most broadly deployed server platforms in the world. The architecture does not have a single point of failure because it blends pairs of nodes – called Scalable Storage Units or SSUs - that share access to highly available JBOD drive enclosures based on a dual-controller architecture. During normal operations, each node has access to half of the drives connected to the pair of SSU servers, but in case one of the nodes fails, the remaining active node will instantly take over drives of the failed node. The architecture allows for an SSU architecture that can leverage multiple JBODs to meet scalability and performance objectives.

Flexibility & Customizability

This solution comes ready to be deployed and configured based on the exact needs of the workloads of customers. Systems can be pre-staged in the HPE factory to streamline on-site deployments, and customers purchase deployment services to enable the configuration of the validated solution on-site. During the deployment process, customers can work with HPE to tune the solution to precisely meet performance and use case requirements.

Scalability

The architecture supports the ability to start small and grow to larger solution as requirements evolve. Customers can scale the size and the throughput of this solution by adding more Scalable Storage Units (SSUs) that include pairs of servers combined with high-capacity JBOD storage enclosures. They can start off with a single DL380-based SSU - and then can add more of these basic building blocks - thereby increasing the available capacity as well as throughput. Lustre was developed to handle the demands of scientific data and has been tested and trusted at extreme levels of throughput and with many thousands of client connections.

Faster Rebuild Times

This solution provides multiple levels of data protection using ZFS-based software RAID. In addition to its many impressive data protection features, ZFS uses an advanced pool-based storage approach that enables much faster RAID rebuild times than traditional RAID in the event of a drive failure by spreading the rebuild process among many devices. Only the data is rebuilt not the entire hard drive which could be under-utilized.

Compression

The ZFS-based software RAID leveraged within the HPE solution allows for data compression that not only save storage space - but which can also improve the overall I/O of the solution by reducing the size of data moving between the SSU compute nodes and the drives on which the data is being stored.

Data Scrubbing While Online

The ZFS-based storage delivered with the HPE Lustre solution performs automated online data validation activities – checking on the health of all user data to verify its integrity, detect any silent media corruption and proactively correct any errors detected. All of this happens automatically - without any administrative intervention.

Standard Features

Performance

The HPE Lustre solution is designed to enable fully parallel I/O throughput across many clients, servers and storage devices. Many Lustre configurations are running in production with hundreds of GB/sec of throughput with advanced installations achieving throughput of over 1 terabytes per second. This means extremely high volumes of data can be delivered to critical high performance applications. HPE has fully benchmarked the HPE Lustre solution architecture and can quickly provide system configuration specifications to meet customer requirements for performance and capacity based on the latest processor, interconnect, storage device and Lustre software technology.

Affordability

The HPE Lustre solution is comprised of standard HPE x86 server architecture, high-performance storage enclosures and Community Lustre/ZFS software which includes the open source Lustre and ZFS distributions combined with full commercial support on the overall solution from HPE . The included Integrated Manager for Lustre (IML) software provides browser-based tools for fast efficient management – in addition to a powerful set of standard Lustre command line interfaces (CLI).

Integration with HPE Data Management Framework

The solution is fully validated and compatible with the HPE Data Management Framework (DMF) which provides advanced capabilities for data tiering, data protection, backup and disaster recovery. See separate product information on HPE DMF for details on the capabilities, architecture and value points that HPE DMF can deliver when deployed in conjunction with an HPE Lustre solution for high-performance data storage.

Features

- Fully scalable for both throughput and capacity
- Single point of HPE support for all hardware and software
- No single point of failure
- Factory installation to streamline on-site deployment
- Data Storage using ZFS software RAID
  - File system snapshotting
  - Data compression
  - Integrated file system health checks and repair
  - End-to-end data checksums for protection
  - Accelerated RAID rebuilds
- Data Management and Protection using HPE DMF
  - Data tiering to object storage, cloud, tape and HPE Zero Watt Storage
  - Data replication
  - Data backup
  - Disaster recovery
- GUI-based system management using Integrated Lustre Manager (IML)
- Sizing tool to assist with building configurations that meet customer capacity, performance and network interface

HPE Lustre Software Warranty

Worldwide, 24-hour support is available for the Lustre software solution thru HPE. Customers are provided with complete installation services and given access to advanced services such as proactive health checks and migration assistance.

Configuration Information

Notes: Sizing for storage servers should be tailored to the specific workload requirement. Data protection strategy and average file size should be taken into account for optimal configuration. As such it is recommended that you engage with your Hewlett Packard Enterprise representative to document your individual solution needs and design an environment with required services to deploy.

Warranty of DL360 and DL380

This product is covered by a global limited warranty and supported by HPE Services and a worldwide network of Hewlett Packard Enterprise Authorized Channel Partners resellers. Hardware diagnostic support and repair is available for three years from date of purchase. Support for software and initial setup is available for 90 days from date of purchase. Enhancements to warranty services are available through HPE Services operational services or customized service agreements. Hard drives have either a one year or three year warranty; refer to the specific hard drive QuickSpecs for details.

Notes: Server Warranty includes 3-Year Parts, 3-Year Labor, 3-Year Onsite support with next business day response. Warranty repairs may be accomplished through the use of Customer Self Repair (CSR) parts. These parts fall into two categories: 1) Mandatory CSR parts are designed for easy replacement. A travel and labor charge will result when customers decline to replace a Mandatory CSR part; 2) Optional CSR parts are also designed for easy replacement but may involve added complexity. Customers may choose to have Hewlett Packard Enterprise replace Optional CSR parts at no charge.

Additional information regarding worldwide limited warranty and technical support is available at
http://h17007.www1.hpe.com/us/en/enterprise/servers/warranty/index.aspx

Service and Support

HPE Services

No matter where you are in your digital transformation journey, you can count on HPE Services to deliver the expertise you need when, where and how you need it. From planning to deployment, ongoing operations and beyond, our experts can help you realize your digital ambitions.

https://www.hpe.com/services

Consulting Services

No matter where you are in your journey to hybrid cloud, experts can help you map out your next steps. From determining what workloads should live where, to handling governance and compliance, to managing costs, our experts can help you optimize your operations.

https://www.hpe.com/services/consulting

HPE Managed Services

HPE runs your IT operations, providing services that monitor, operate, and optimize your infrastructure and applications, delivered consistently and globally to give you unified control and let you focus on innovation.

HPE Managed Services | HPE

Operational services

Optimize your entire IT environment and drive innovation. Manage day-to-day IT operational tasks while freeing up valuable time and resources. Meet service-level targets and business objectives with features designed to drive better business outcomes.

https://www.hpe.com/services/operational

HPE Complete Care Service

HPE Complete Care Service is a modular, edge-to-cloud IT environment service designed to help optimize your entire IT environment and achieve agreed upon IT outcomes and business goals through a personalized experience. All delivered by an assigned team of HPE Services experts. HPE Complete Care Service provides:

- A complete coverage approach -- edge to cloud
- An assigned HPE team
- Modular and fully personalized engagement
- Enhanced Incident Management experience with priority access
- Digitally enabled and AI driven customer experience

https://www.hpe.com/services/completecare

HPE Tech Care Service

HPE Tech Care Service is the operational support service experience for HPE products. The service goes beyond traditional support by providing access to product specific experts, an AI driven digital experience, and general technical guidance to not only reduce risk but constantly search for ways to do things better. HPE Tech Care Service delivers a customer-centric, AI driven, and digitally enabled customer experience to move your business forward. HPE Tech Care Service is available in three response levels. Basic, which provides 9x5 business hour availability and a 2-hour response time. Essential which provides a 15-minute response time 24x7 for most enterprise level customers, and Critical which includes a 6-hour repair commitment where available and outage management response for severity 1 incidents.

https://www.hpe.com/services/techcare

Service and Support

HPE Lifecycle Services

HPE Lifecycle Services provide a variety of options to help maintain your HPE systems and solutions at all stages of the product lifecycle. A few popular examples include:

- Lifecycle Install and Startup Services: Various levels for physical installation and power on, remote access setup, installation and startup, and enhanced installation services with the operating system.
- HPE Firmware Update Analysis Service: Recommendations for firmware revision levels for selected HPE products, taking into account the relevant revision dependencies within your IT environment.
- HPE Firmware Update Implementation Service: Implementation of firmware updates for selected HPE server, storage, and solution products, taking into account the relevant revision dependencies within your IT environment.
- Implementation assistance services: Highly trained technical service specialists to assist you with a variety of activities, ranging from design, implementation, and platform deployment to consolidation, migration, project management, and onsite technical forums.
- HPE Service Credits: Access to prepaid services for flexibility to choose from a variety of specialized service activities, including assessments, performance maintenance reviews, firmware management, professional services, and operational best practices.

Notes: To review the list of Lifecycle Services available for your product go to:
https://www.hpe.com/services/lifecycle

For a list of the most frequently purchased services using service credits, see the **HPE Service Credits Menu**

Other Related Services from HPE Services:

HPE Education Services

Training and certification designed for IT and business professionals across all industries. Broad catalogue of course offerings to expand skills and proficiencies in topics ranging from cloud and cybersecurity to AI and DevOps. Create learning paths to expand proficiency in a specific subject. Schedule training in a way that works best for your business with flexible continuous learning options.
https://www.hpe.com/services/training

Defective Media Retention

An option available with HPE Complete Care Service and HPE Tech Care Service and applies only to Disk or eligible SSD/Flash Drives replaced by HPE due to malfunction.

Consult your HPE Sales Representative or Authorized Channel Partner of choice for any additional questions and services options.

Parts and Materials

HPE will provide HPE-supported replacement parts and materials necessary to maintain the covered hardware product in operating condition, including parts and materials for available and recommended engineering improvements.

Parts and components that have reached their maximum supported lifetime and/or the maximum usage limitations as set forth in the manufacturer's operating manual, product quick-specs, or the technical product data sheet will not be provided, repaired, or replaced as part of these services.

How to Purchase Services

Services are sold by Hewlett Packard Enterprise and Hewlett Packard Enterprise Authorized Service Partners:

- Services for customers purchasing from HPE or an enterprise reseller are quoted using HPE order configuration tools.
- Customers purchasing from a commercial reseller can find services at **https://ssc.hpe.com/portal/site/ssc/**

Service and Support

AI Powered and Digitally Enabled Support Experience
Achieve faster time to resolution with access to product-specific resources and expertise through a digital and data driven customer experience

Sign into the HPE Support Center experience, featuring streamlined self-serve case creation and management capabilities with inline knowledge recommendations. You will also find personalized task alerts and powerful troubleshooting support through an intelligent virtual agent with seamless transition when needed to a live support agent.
https://support.hpe.com/hpesc/public/home/signin

Consume IT On Your Terms

HPE GreenLake edge-to-cloud platform brings the cloud experience directly to your apps and data wherever they are—the edge, colocations, or your data center. It delivers cloud services for on-premises IT infrastructure specifically tailored to your most demanding workloads. With a pay-per-use, scalable, point-and-click self-service experience that is managed for you, HPE GreenLake edge-to-cloud platform accelerates digital transformation in a distributed, edge-to-cloud world.

- Get faster time to market
- Save on TCO, align costs to business
- Scale quickly, meet unpredictable demand
- Simplify IT operations across your data centers and clouds

To learn more about HPE Services, please contact your Hewlett Packard Enterprise sales representative or Hewlett Packard Enterprise Authorized Channel Partner. Contact information for a representative in your area can be found at "Contact HPE"
https://www.hpe.com/us/en/contact-hpe.html

For more information
http://www.hpe.com/services

Technical Specifications

Additional Information

Licensing Requirements

Licensing for support for the HPE Scalable Storage for Lustre is required

Operating System Support

RHEL and CentOS 7.x

Environment-friendly Products and Approach- End-of-life Management and Recycling

Hewlett Packard Enterprise offers end-of-life **product return, trade-in, and recycling programs**, in many geographic areas, for our products. Products returned to Hewlett Packard Enterprise will be recycled, recovered or disposed of in a responsible manner.

The EU WEEE directive (2002/95/EC) requires manufacturers to provide treatment information for each product type for use by treatment facilities.
This information (product disassembly instructions) is posted on the **Hewlett Packard Enterprise web** site. These instructions may be used by recyclers and other WEEE treatment facilities as well as Hewlett Packard Enterprise OEM customers who integrate and re-sell Hewlett Packard Enterprise equipment.

Summary of changes

Date	Version History	Action	Description of Change
08-Jan-2024	Version 5	Changed	HPE Services Rebranding
15-Nov-2021	Version 4	Changed	Service and Support section was updated
04-Sep-2018	Version 3	Changed	Overview, Standard Features, Configuration Information and Technical Specification sections were updated. QuickSpecs name was changed
23-Oct-2017	Version 2	Changed	Care Pack naming and Service and Support- Parts and Materials updated.
31-Mar-2016	Version 1	Created	Create the QuickSpecs for the HPE Scalable Storage with Intel Enterprise Edition for Lustre*

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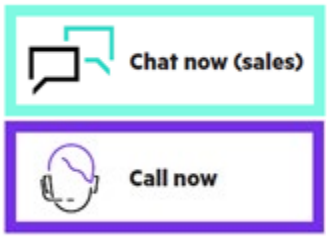

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