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HPE CloudPhysics

Shared Storage Assessment Report
56 Datastores Analyzed
Evaluations and Opportunities for your Data Center

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Scope of Assessment

HPE CloudPhysics extracts configuration and resource utilization information from virtual environments—at the market's most granular collection interval—for a wide array of data points, including Virtual Machines, Physical Servers, Storage Arrays, and Network Infrastructure to help you identify existing or potential problems that may affect your environment's productivity, and also highlight optimization opportunities.

This report analyzed all **56 Datastores** discovered in your environment by HPE CloudPhysics with the following set of filters:

Infrastructure Scope	
vCenters:	All
Datacenter:	All
Compute Cluster:	All
Storage Cluster:	Not in Any Cluster
Keyword:	None
Any of Tags:	None

Non-defaults are marked in blue

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Assessment Report for 56 Datastores in your environment Storage Cluster: Not in Any Cluster

Executive Summary

This assessment was created by **HPE: UKIMESA Region** exclusively for **CUSTOMER** on **February 25, 2022**. It analyzed **56** Datastores.

High-Level Results:

- The discovered shared storage inventory consists of **50 datastores** with **173.62 TB** total capacity, including **173.62 TB VMFS** and **no NFS** storage.
- **1 vendor** and **1 model** are identified.
- There are **50 datastores** spanning multiple hosts.
- **IBM** is responsible for the most capacity (**173.62 TB**) in your environment.
- **IBM** represents the largest number of datastores (**50**) in your environment.
- **IBM** hosts the most VMs (**419**) in your environment.
- Over the period of time ranging from 18 Feb 2022, 12:00 AM UTC+00:00 to 25 Feb 2022, 12:00 AM UTC+00:00 the following performance characteristics were observed
 - Your environment's Average Growth Rate was **3.02 GB/day**.
 - **2 contentions**.
 - **IBM** has had the most contentions (**2**) in your environment.
 - Your environment had an aggregate peak throughput of **1.17 GB/s** and mean throughput of **346.28 MB/s**.
 - Your environment had an aggregate peak IOPS of **32,719** and mean IOPS of **13,789**.
 - Your environment had a read/write request ratio of **71%/29%**.
- **12** hosts will need to be replaced prior to a vSphere 7.0 upgrade; these hosts are fine now, but they are incompatible with ESXi 7.0.
- You have VMs with Operating System risk in your environment. **84** VMs are running Operating Systems that are no longer supported by platform vendors.

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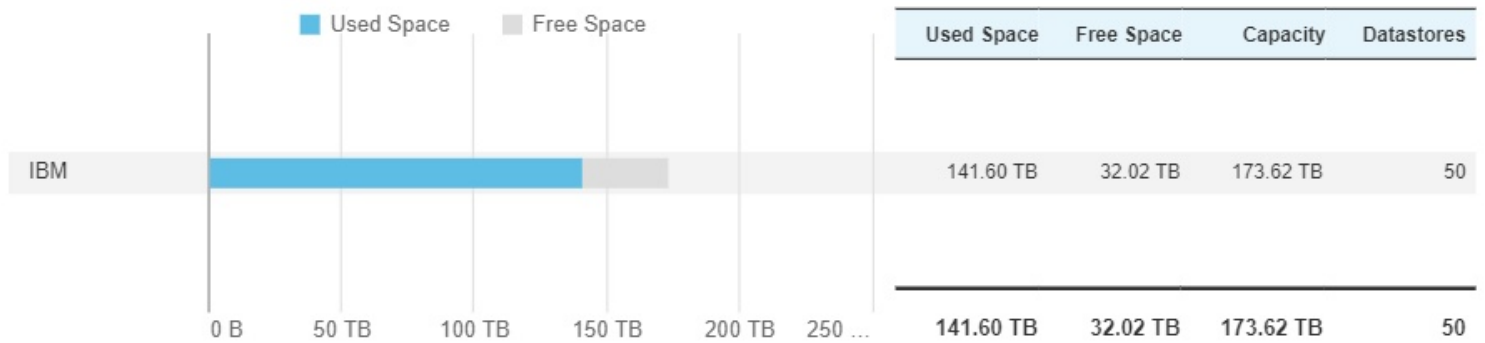
Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Shared Storage Analysis

We have profiled the capacity and performance characteristics of the selected datastores. The discovered vendor landscape and aggregate performance breakdown for the period of time ranging from 18 Feb 2022, 12:00 AM UTC+00:00 to 25 Feb 2022, 12:00 AM UTC+00:00 is detailed below.

Storage by Vendor (50 Datastores)



Storage Metrics (50 Datastores)

Throughput

1.17GB/s
Peak
346.28MB/s
Mean

IOPS

32,719
Peak
13,789
Mean

Read/Write Request Ratio

71% / 29%

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

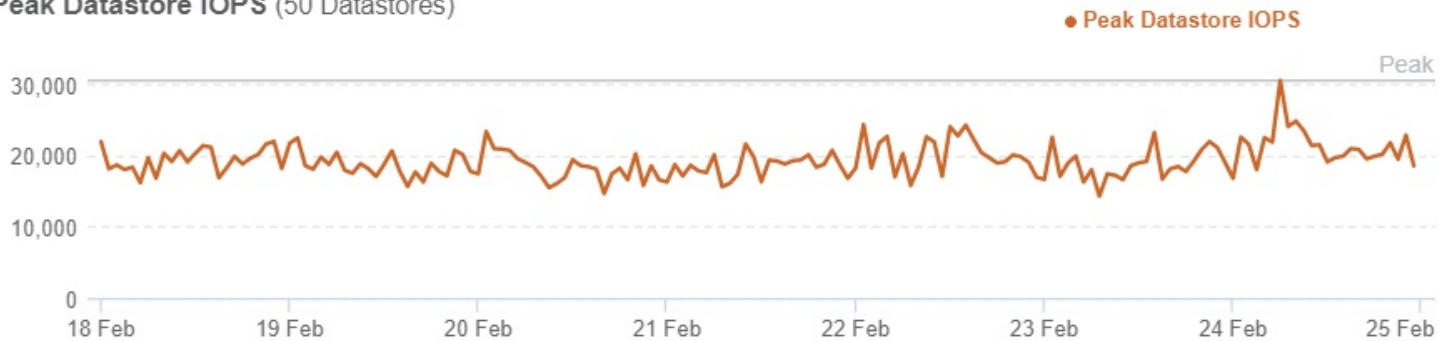
Shared Storage Analysis (cont'd)

The charts below depict the aggregate performance characteristics in detail from the period of time ranging from 18 Feb 2022, 12:00 AM UTC+00:00 through 25 Feb 2022, 12:00 AM UTC+00:00.

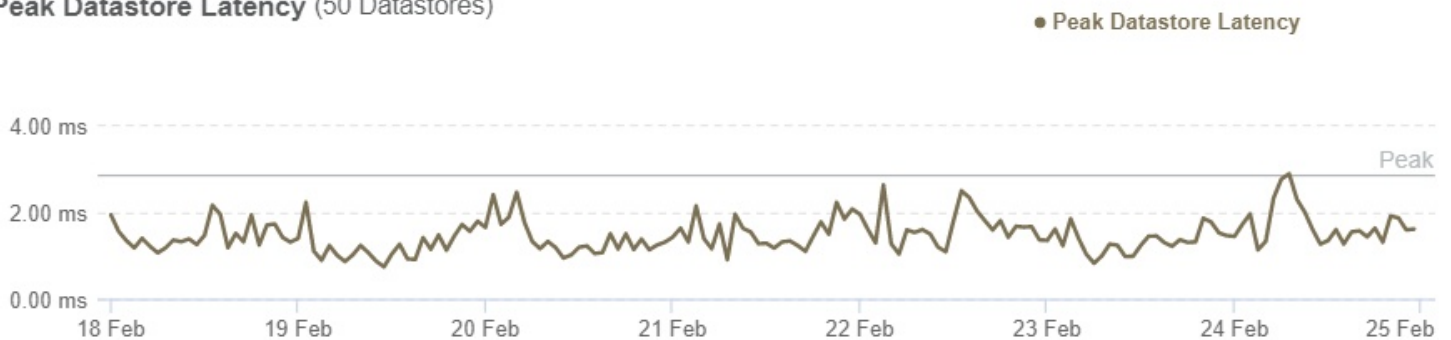
Peak Datastore Throughput (50 Datastores)



Peak Datastore IOPS (50 Datastores)



Peak Datastore Latency (50 Datastores)



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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Shared Storage Analysis (cont'd)

Most organizations depend on shared storage to support and drive operational efficiencies of their current data center; different vendors, models, and configurations can make a significant difference in the performance of your applications.

The following sections provide breakdowns and insights of your shared storage inventory using the following parameters:

- Storage capacity and usage
- Storage touchpoints (a measure of your relative reliance on specific storage attributes)
- Storage performance (represented by I/O contention* events over the last 7 days)

Shared Storage by Vendor

Vendor	Capacity	Used Space	Free Space	Overcommitted Space	Datastores	Hosts	VMs	Contentions over 7 days
IBM	173.62 TB	141.60 TB	32.02 TB	7.22 TB	50	536	419	2

Notable Insights:

- **IBM** is responsible for the most capacity (**173.62 TB**) in your environment.
- **IBM** represents the largest number of datastores (**50**) in your environment.
- **IBM** hosts the most VMs (**419**) in your environment.
- **IBM** has had the most contentions (**2**) in your environment.

**A contention is a storage performance issue that negatively impacts the availability and performance of the associated VM. This can be due to the frequency of reads and writes to a datastore, too many VMs on a single datastore, or insufficient I/O available to a storage vendor. Further analysis by datastore will be required to identify the potential source of a contention.*

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Shared Storage Analysis (cont'd)

Shared Storage by Volume Type

Storage volume types offer differing functionalities to the hypervisor. Natively, VMware provides VMFS volume type to offer shared storage for most storage vendors. Network based storage solutions like NFS, Virtual Volumes, and VMware vSAN may offer additional features. VMware VMFS is a block level file system while NFS is a file level file system. VMFS allows for single files to be locked at a block level and reduces contentions while NFS can only lock at a file level there by potentially increasing the risk of storage contention. VMFS typically is a direct attached storage solution while NFS offers network based connectivity to the storage. NFS may be able to automatically extend storage as well as provide deduplication, offering greater flexibility and efficiency in using the storage system.

Volume Type	Capacity	Used Space	Free Space	Overcommitted Space	Datastores	Hosts	VMs	Contentions over 7 days
VMFS	173.62 TB	141.60 TB	32.02 TB	7.22 TB	50	536	419	2

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Shared Storage Analysis (cont'd)

Shared Storage by Vendor and Model

Vendor	Model	Capacity	Used Space	Free Space	Overcommitted Space	Datastores	Hosts	VMs	Contentions over 7 days
IBM	2145	173.62 TB	141.60 TB	32.02 TB	7.22 TB	50	536	419	2

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

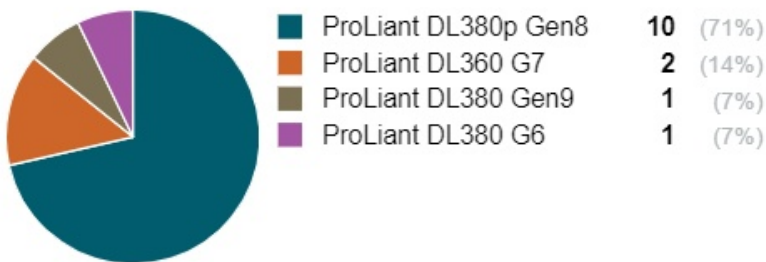
Host Inventory Summary and vSphere 7.0 Upgrade Considerations

As part of the public cloud migration analysis, HPE CloudPhysics also looked for other issues in the data center that might indicate that the time is right to consider public cloud migration. For instance, CUSTOMER may need, or may soon need, to upgrade some of its hardware infrastructure.

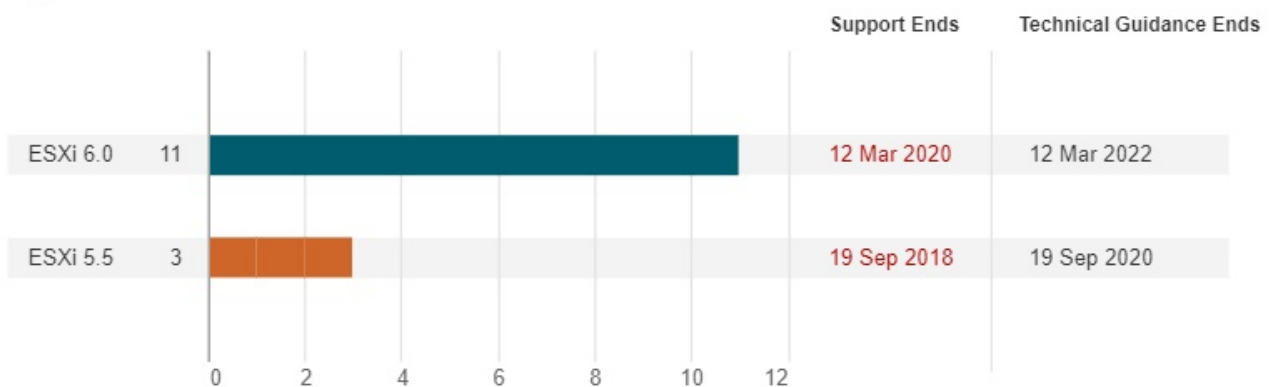
In total, across the entire vSphere environment, CUSTOMER currently has:

- 1 hosts that are not in VMware's hardware compatibility list (HCL) at all; non-HCL hosts should be replaced/retired immediately, or their workloads should be ported to another environment.
- 2 hosts that are in the current HCL, but are running versions of ESXi that they do not support; hosts running ESXi versions that they do not support should be replaced/retired immediately, or their workloads should be ported to another environment.
- 12 hosts that will need to be replaced prior to a vSphere 7.0 upgrade; these hosts are fine now, but they are incompatible with ESXi 7.0.

Server Models (14 Hosts)



Hypervisor Releases (14 Hosts)

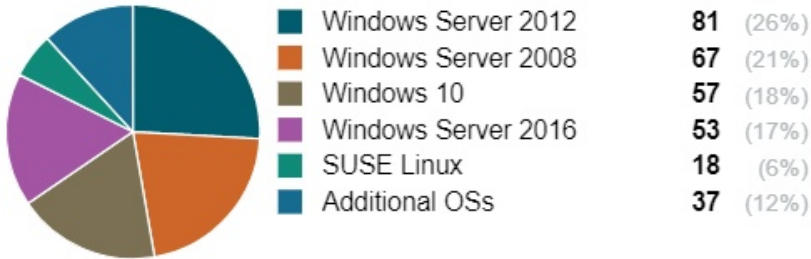


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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

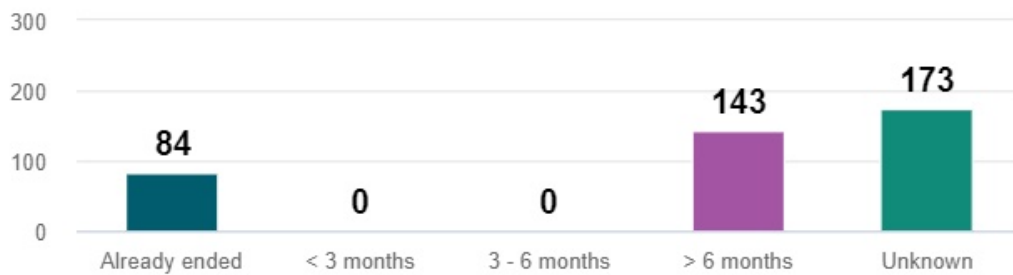
Operating System Summary

Guest OS Breakdown (400* VMs)



**87 VMs excluded due to incomplete data.*

End of Support (400 VMs)



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Appendix A: vCenter Summary for entire environment

<div>vCenters 2*</div> <div>Datacenters 2</div>	<div>Clusters 4</div> <div>Storage Clusters 0</div> <div>Networks 31</div>	<div>Datastores 0 Clustered 56 Standalone</div> <div>VMFS 56 NFS 0</div> <div>Total Storage 179.09 TB Free Storage 35.76 TB</div>
<div>Hosts 14 0 Clustered Standalone</div> <div>On 13 Off 0 Maintenance 1</div> <div>Avg. Consolidation Ratio 22.6:1 VMs (on) : Hosts (on)</div>	<div>Memory Virtual 2.73 TB Physical 2.96 TB</div> <div>CPUs Virtual 1,144 Physical Cores 168</div>	<div>Virtual Machines 400</div> <div>On 294 Off 98 Suspended 0 Templates 8</div>

**One or more VMware vCenters are not running the most recent version and may require to be upgraded. Upgrading to the most recent VMware vCenter version will be required to support the most recent VMware ESXi release and supporting services.*

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis

Datastores by Contentions

The datastores with the top contentions over the past 7 days is an indicator of datastores with too many high I/O workloads. Consider distributing the high I/O VMs to dedicated datastores to increase performance of your negatively impacted workloads.

Datastore	Vendor	Model	Volume Type	Contentions over 7 days	VMs
CL01-V3700-2_DFS06	IBM	2145	VMFS	1	11
CL01-V3700-3_DEV04	IBM	2145	VMFS	1	19

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by VM Count

Datastores with significant numbers of VMs may experience significant contention if several VMs attempt to read or write at the same time. This is common in Virtual Desktop (VDI) environments where several virtual machines may boot or be refreshed at the same time. Backups and snapshots may also contribute to performance bottlenecks on the shared storage if frequent communications occur simultaneously.

Datastore	Vendor	Model	Volume Type	VMs
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	24
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	22
CL01-V3700-2_DEV01	IBM	2145	VMFS	21
CL01-V3700-3_DEV04	IBM	2145	VMFS	19
CL01-V3700-2_01	IBM	2145	VMFS	19
CL01-V3700-2_06	IBM	2145	VMFS	18
CL01-V3700-5_DEV01	IBM	2145	VMFS	18
CL01-V3700-4_DEV01	IBM	2145	VMFS	18
CL01-V3700-3_03	IBM	2145	VMFS	15
CL01-V3700-2_08	IBM	2145	VMFS	14

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Capacity

This is where the largest portion of defined disk is being consumed by VMware vSphere.

Datastore	Vendor	Model	Volume Type	Capacity	Free Space	Used Space %	VMs
FS_CL01-V3700-2_DFS01	IBM	2145	VMFS	20.00 TB	509.95 GB	98%	1
NEX_PRK-V5010-STORE02-01	IBM	2145	VMFS	10.00 TB	1.00 TB	90%	1
NEX_PRK-V5010-STORE03-01	IBM	2145	VMFS	10.00 TB	1.00 TB	90%	1
FS_CL01-V3700-3_05	IBM	2145	VMFS	10.00 TB	548.71 GB	95%	1
FS_CL01-V3700-4_DFS02	IBM	2145	VMFS	8.00 TB	884.73 GB	89%	2
FS_CL01-V3700-3_DFS02	IBM	2145	VMFS	8.00 TB	958.57 GB	88%	1
FS_CL01-V3700-2_DFS02	IBM	2145	VMFS	8.00 TB	1.70 TB	79%	1
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	6.95 TB	2.77 TB	60%	24
FS_CL01-V3700-5_04	IBM	2145	VMFS	5.00 TB	992.32 GB	81%	3
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	VMFS	4.00 TB	1.31 TB	67%	4

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores with Most Free Space

Datastores with significant free space often fall into two categories: new datastores or underutilized datastores. The following table details the top datastores that currently have the most space available and are potential space saving opportunities in the data center.

Datastore	Vendor	Model	Volume Type	Capacity	Free Space	VMs
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	6.95 TB	2.77 TB	24
FS_CL01-V3700-2_DFS02	IBM	2145	VMFS	8.00 TB	1.70 TB	1
EPOS_CL01-V3700-3_DFS03	IBM	2145	VMFS	2.00 TB	1.50 TB	1
SQL_CL01-V3700-5_DFS05	IBM	2145	VMFS	2.00 TB	1.41 TB	2
FS_CL01-V3700-5_DFS04	IBM	2145	VMFS	2.00 TB	1.32 TB	1
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	VMFS	4.00 TB	1.31 TB	4
NEX_PRK-V5010-STORE02-01	IBM	2145	VMFS	10.00 TB	1.00 TB	1
NEX_PRK-V5010-STORE03-01	IBM	2145	VMFS	10.00 TB	1.00 TB	1
CL01-V3700-3_DEV04	IBM	2145	VMFS	2.43 TB	0.99 TB	19
FS_CL01-V3700-5_04	IBM	2145	VMFS	5.00 TB	992.32 GB	3

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores with Least Free Space

Datastores with insufficient free space as a percentage of disk are at risk of running out of capacity in the near future and causing VM failures and data corruption. The following table details the top datastores that currently have the least space available and should be reviewed frequently based on storage growth.

Datastore	Vendor	Model	Volume Type	Capacity	Free Space	Used Space %	Average Growth Rate	VMs
CL01-V3700-2_01	IBM	2145	VMFS	2.00 TB	105.10 GB	95%	11.55 GB/day	19
CL01-V3700-3_DFS05	IBM	2145	VMFS	2.00 TB	312.35 GB	85%	6.70 GB/day	8
CL01-V3700-5_02	IBM	2145	VMFS	2.00 TB	328.77 GB	84%	299 KB/day	5
CL01-V3700-4_03	IBM	2145	VMFS	2.00 TB	329.25 GB	84%	-1.98 MB/day	6
CL01-V3700-2_06	IBM	2145	VMFS	2.00 TB	331.29 GB	84%	425.73 MB/day	18
CL01-V3700-5_01	IBM	2145	VMFS	2.00 TB	338.78 GB	83%	-1.07 MB/day	12
FS_CL01-V3700-2_DF S04	IBM	2145	VMFS	2.00 TB	346.73 GB	83%	No growth	1
CL01-V3700-4_07	IBM	2145	VMFS	2.00 TB	346.92 GB	83%	2.27 MB/day	5
CL01-V3700-5_03	IBM	2145	VMFS	2.00 TB	356.03 GB	83%	233 KB/day	6
CL01-V3700-5_05	IBM	2145	VMFS	2.00 TB	357.07 GB	83%	3.57 GB/day	12

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Datastores by Overcommitted Space

This occurs when thin provisioned VMs are defined but are not fully consuming their defined resources. This poses a risk for substantially overcommitted volumes with large storage growth rates. Overcommitting a volume can save considerable space for slow growing datastores or workloads but at the risk of running out of resources over time.

Datastore	Vendor	Model	Volume Type	Capacity	Overcommitted Space	Free Space	Average Growth Rate
EPOS_CL01-V3700-5_07	IBM	2145	VMFS	2.00 TB	5.07 TB (254%)	368.72 GB	-704.71 MB/day
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	2.00 TB	718.61 GB (35%)	774.92 GB	33.85 GB/day
CL01-V3700-5_DFS03	IBM	2145	VMFS	2.00 TB	396.64 GB (19%)	422.18 GB	203.27 MB/day
CL01-V3700-3_01	IBM	2145	VMFS	2.00 TB	299.45 GB (15%)	452.75 GB	292.91 MB/day
CL01-V3700-2_05	IBM	2145	VMFS	2.00 TB	290.65 GB (14%)	399.80 GB	-263.87 MB/day
CL01-V3700-2_01	IBM	2145	VMFS	2.00 TB	219.67 GB (11%)	105.10 GB	11.55 GB/day
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	6.95 TB	204.06 GB (3%)	2.77 TB	105.86 GB/day
CL01-V3700-5_05	IBM	2145	VMFS	2.00 TB	73.48 GB (4%)	357.07 GB	3.57 GB/day

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Growth Rate

Datastores can fill up quickly if not monitored. Datastores that have frequent writes and changes are most likely to fill up quickly. When a datastore runs out of capacity, virtual machines will start to fail when they are unable to write data to their virtual disks. The following are the fastest growing datastores.

Datastore	Vendor	Model	Volume Type	Free Space	Average Growth Rate	VMs
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	2.77 TB	105.86 GB/day	24
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	774.92 GB	33.85 GB/day	22
CL01-V3700-2_01	IBM	2145	VMFS	105.10 GB	11.55 GB/day	19
CL01-V3700-3_03	IBM	2145	VMFS	373.43 GB	7.26 GB/day	15
CL01-V3700-3_DFS05	IBM	2145	VMFS	312.35 GB	6.70 GB/day	8
CL01-V3700-3_DFS04	IBM	2145	VMFS	401.99 GB	5.36 GB/day	12
CL01-V3700-5_05	IBM	2145	VMFS	357.07 GB	3.57 GB/day	12
CL01-V3700-5_DEV01	IBM	2145	VMFS	480.04 GB	3.37 GB/day	18
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	VMFS	1.31 TB	2.92 GB/day	4
CL01-V3700-4_DEV01	IBM	2145	VMFS	444.86 GB	2.45 GB/day	18

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Shrink Rate

When VMs are deleted or dead space from thin provisioned disks is reclaimed, a datastore can gain capacity. The following are datastores that are freeing up space the fastest.

Datastore	Vendor	Model	Volume Type	Free Space	Average Growth Rate	VMs
EPOS_CL01-V3700-3_DFS03	IBM	2145	VMFS	1.50 TB	-29.84 GB/day	1
CL01-V3700-2_DEV01	IBM	2145	VMFS	935.20 GB	-4.38 GB/day	21
EPOS_CL01-V3700-5_07	IBM	2145	VMFS	368.72 GB	-704.71 MB/day	1
SQL_CL01-V3700-3_07	IBM	2145	VMFS	513.62 GB	-585.32 MB/day	1
CL01-V3700-2_03	IBM	2145	VMFS	436.02 GB	-393.94 MB/day	13
CL01-V3700-2_05	IBM	2145	VMFS	399.80 GB	-263.87 MB/day	11
CL01-V3700-2_07	IBM	2145	VMFS	409.64 GB	-204.67 MB/day	12
CL01-V3700-5_06	IBM	2145	VMFS	437.43 GB	-79.41 MB/day	14
CL01-V3700-4_03	IBM	2145	VMFS	329.25 GB	-1.98 MB/day	6
CL01-V3700-5_01	IBM	2145	VMFS	338.78 GB	-1.07 MB/day	12

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Peak Throughput

Datastores with significant number of VMs or with high performance VMs will generate significant throughput. Large throughput datastores can often benefit from migration from lower speed storage to new high speed and cache enabled storage systems.

Datastore	Vendor	Model	Volume Type	Peak Throughput	Mean Throughput	VMs
EPOS_CL01-V3700-5_07	IBM	2145	VMFS	594.13 MB/s	9.53 MB/s	1
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	547.00 MB/s	13.04 MB/s	22
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	534.97 MB/s	25.47 MB/s	24
CL01-V3700-3_DFS05	IBM	2145	VMFS	529.25 MB/s	4.70 MB/s	8
EPOS_CL01-V3700-4_10	IBM	2145	VMFS	511.28 MB/s	24.04 MB/s	1
CL01-V3700-5_DEV01	IBM	2145	VMFS	494.26 MB/s	8.71 MB/s	18
FS_CL01-V3700-5_DFS02	IBM	2145	VMFS	439.60 MB/s	2.91 MB/s	1
CL01-V3700-5_02	IBM	2145	VMFS	436.04 MB/s	10.03 MB/s	5
CL01-V3700-4_DEV01	IBM	2145	VMFS	413.17 MB/s	12.59 MB/s	18
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	VMFS	407.84 MB/s	7.83 MB/s	4

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Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Peak Read Throughput

The following datastores have the greatest Peak Read Throughput and may benefit most from larger cache or SSD, NVMe, and high speed storage arrays.

Datastore	Vendor	Model	Volume Type	Peak Read Throughput	Mean Read Throughput	VMs
EPOS_CL01-V3700-5_07	IBM	2145	VMFS	594.13 MB/s	8.27 MB/s	1
CL01-V3700-3_DFS05	IBM	2145	VMFS	526.72 MB/s	3.23 MB/s	8
EPOS_CL01-V3700-4_10	IBM	2145	VMFS	506.19 MB/s	21.35 MB/s	1
CL01-V3700-5_DEV01	IBM	2145	VMFS	493.43 MB/s	5.53 MB/s	18
CL01-V3700-4_DEV01	IBM	2145	VMFS	412.01 MB/s	7.80 MB/s	18
CL01-V3700-4_07	IBM	2145	VMFS	378.56 MB/s	2.28 MB/s	5
FS_CL01-V3700-4_09	IBM	2145	VMFS	376.16 MB/s	1.45 MB/s	1
FS_CL01-V3700-2_DFS01	IBM	2145	VMFS	329.73 MB/s	10.74 MB/s	1
CL01-V3700-5_02	IBM	2145	VMFS	279.51 MB/s	6.17 MB/s	5
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	276.00 MB/s	11.39 MB/s	22

HPE CloudPhysics

Assessment Report for 56 Datastores in your environment

Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Peak Write Throughput

The following datastores have the greatest Peak Write Throughput and will benefit most from pre-allocated blocks and thick provisioned volumes and disks.

Datastore	Vendor	Model	Volume Type	Peak Write Throughput	Mean Write Throughput	VMs
CL01-V3700-4_02	IBM	2145	VMFS	398.06 MB/s	4.16 MB/s	12
CL01-V3700-2_01	IBM	2145	VMFS	272.53 MB/s	4.89 MB/s	19
RESERVED_CL01-V3700-3_06	IBM	2145	VMFS	271.00 MB/s	1.65 MB/s	22
FS_CL01-V3700-4_DFS03	IBM	2145	VMFS	266.03 MB/s	3.43 MB/s	24
CL01-V3700-3_DFS05	IBM	2145	VMFS	237.65 MB/s	1.48 MB/s	8
CL01-V3700-5_02	IBM	2145	VMFS	232.48 MB/s	3.86 MB/s	5
FS_CL01-V3700-5_DFS02	IBM	2145	VMFS	221.74 MB/s	802 KB/s	1
FS_CL01-V3700-2_DFS01	IBM	2145	VMFS	218.75 MB/s	9.22 MB/s	1
EPOS_CL01-V3700-4_10	IBM	2145	VMFS	218.34 MB/s	2.70 MB/s	1
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	VMFS	181.27 MB/s	2.86 MB/s	4

HPE CloudPhysics

Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Peak IOPS

While throughput is an indicator of volume, IOPS is an indicator of frequency of communication. High IOPS to a datastore increases the potential for storage contention.

Datastore	Vendor	Model	Volume Type	Peak IOPS	Mean IOPS	VMs
CL01-V3700-4_02	IBM	2145	VMFS	10,637	211.13	12
CL01-V3700-3_DFS05	IBM	2145	VMFS	9,474	179.73	8
SQL_CL01-V3700-3_07	IBM	2145	VMFS	9,298	95.35	1
CL01-V3700-5_02	IBM	2145	VMFS	7,692	2,740.71	5
CL01-V3700-4_DEV01	IBM	2145	VMFS	7,027	314.40	18
CL01-V3700-4_01	IBM	2145	VMFS	6,062	2,351.71	12
CL01-V3700-5_05	IBM	2145	VMFS	5,745	281.68	12
EPOS_CL01-V3700-4_10	IBM	2145	VMFS	5,461	389.38	1
CL01-V3700-2_01	IBM	2145	VMFS	5,454	416.48	19
FS_CL01-V3700-3_05	IBM	2145	VMFS	5,201	448.06	1

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Top Ten Datastores by Peak Latency

Datastore latency increases as throughput and IOPS increase. If significant number of VMs attempt to read and write at the same time, latency will increase. In addition, if a storage subsystem has too few spinning disks or undersized interfaces, latency will also increase. Datastores with significant latency should be reviewed for optimization and distribution of VMs. If the VM count is low and IOPS is low, the storage array and interface may be undersized for the frequency of reads and writes generated by the virtual environment.

Datastore	Vendor	Model	Volume Type	Peak Latency	Mean Latency	VMs
CL01-V3700-2_DEV01	IBM	2145	VMFS	841 ms	4.22 ms	21
CL01-V3700-2_03	IBM	2145	VMFS	719 ms	1.91 ms	13
CL01-V3700-2_DFS06	IBM	2145	VMFS	685 ms	1.32 ms	11
CL01-V3700-3_DEV04	IBM	2145	VMFS	547 ms	3.08 ms	19
CL01-V3700-5_06	IBM	2145	VMFS	540 ms	0.86 ms	14
CL01-V3700-2_02	IBM	2145	VMFS	537 ms	1.75 ms	9
CL01-V3700-3_01	IBM	2145	VMFS	505 ms	1.83 ms	7
CL01-V3700-2_06	IBM	2145	VMFS	440 ms	1.37 ms	18
CL01-V3700-5_DEV01	IBM	2145	VMFS	402 ms	1.72 ms	18
CL01-V3700-4_DEV01	IBM	2145	VMFS	296 ms	1.32 ms	18

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Assessment Report for 56 Datastores in your environment
Storage Cluster: Not in Any Cluster

Appendix B: Detailed Shared Storage Analysis (cont'd)

Datastores by Peak Outstanding I/O Requests

As a host becomes busy or a storage array becomes saturated with I/O requests, the VMware hypervisor will queue up storage requests. High outstanding storage request numbers are an indicator that the datastore or the array interface may be undersized for the type of reads and writes performed. It may also be an indicator that too many VMs are trying to read or write at the same time. Distributing VMs and storage can reduce this outstanding request count. A high peak I/O requests with a high mean may indicate a system problem while a high peak I/O requests with a very low mean may indicate a one time storage events.

Top Ten VMFS Datastores

Datastore	Vendor	Model	Peak Outstanding Requests	Mean Outstanding Requests	VMs
CL01-V3700-4_02	IBM	2145	1,155.53	0.60	12
EPOS_CL01-V3700-4_10	IBM	2145	120.48	3.82	1
CL01-V3700-2_DEV01	IBM	2145	81.66	1.79	21
CL01-V3700-3_DEV04	IBM	2145	63.12	1.28	19
SQL_CL01-V3700-3_07	IBM	2145	57.78	0.26	1
CL01-V3700-5_DEV01	IBM	2145	54.07	0.48	18
EPOS_CL01-V3700-5_07	IBM	2145	48.20	0.43	1
CL01-V3700-3_DFS04	IBM	2145	46.75	0.65	12
EPOS_SCCM_CL01-V3700-2_DFS05	IBM	2145	45.93	0.29	4
CL01-V3700-5_05	IBM	2145	37.32	0.54	12

