



NetApp Solution Technical Report

Storage Solution

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1 Business Requirements

[Use this section to document the customer's high-level business requirements]

2 Solution Summary

2.1 Proposed Solution Summary

This is a summary of what the proposed solution will deliver.

THROUGHPUT	RAW CAPACITY	STORAGE EFFICIENCY***
200,000 IOPS / 3,515.63 MB/s	92.16 TB	1 : 1
AVERAGE UTILIZATION	USABLE CAPACITY	EFFECTIVE CAPACITY***
81%	72.11 TB	72.1089 TB
MAXIMUM THROUGHPUT*	RAW CAPACITY HEADROOM**	USABLE VS EFFECTIVE
247,632 IOPS / 4,352.91 MB/s	1,751.04 TB	 72.11 TB 72.1089 TB
* assumes best practice configuration of aggregates and workload to aggregate mapping	** assumes future expansion using drives of same capacity	*** assumes use of storage efficiency technologies like compression and deduplication *** Lowest efficiencies have been applied to unused capacity within the cluster.

Warning: There is system with system utilization above 70%. Such system should be recognized as a risk in the event of a failover and approaching 100% is critical.

CONFIGURATION				ENVIRONMENTAL	
Model:	FAS8300A FC Bundle	Onboard Ethernet Ports:	40GbE (4)	Rack Units:	6 U
Nodes:	2	Onboard UTA2 Ports:	0	System Weight:	162.26 lbs
Total Drives:	24	Onboard SAS Ports:	8	AC Power:	1303.00 W
Drive Type:	3.84TB SSD	Expansion Slots:	10	Current Draw:	6.66 A
				BTU/hr:	4448.00

3 Solution Details

3.1 System Details

For rack elevation, please refer to the Storage Solution Visio Diagram

cluster1: netapp1/netapp2

Bill Of Materials				Total
	Description		Part Number	Qty
Systems				
	FAS8300A FC Bundle	9.8 ONTAP		1
	Grand Total			1
Storage				
	DS224C w/ 24x3.84TB SSD		X357A	1
	Grand Total			1
Adapter Cards/ Flash Cache				
	Grand Total			0

Quote Part Number	Description	Qty
FAS8300A-004	FAS8300 HA System,FC Bundle	1
DS224C-SL-3.8-24S-QS	SSD Shelf,12G,24x3.8TB,-C	1

3.2 Environmental Details

Line Voltage: 220

System Components	Qty	Rack Units	Current (Amps)		AC Power (Watts)		AC Power (VA)		Thermal Rating (BTU/hr)		Power (kWh/year)	
			Typical	Worst	Typical	Worst	Typical	Worst	Typical	Worst	Typical	Worst
FAS8300A FC Bundle (2xControllers , 1xChassis)	1	4	6.02	7.5	1,179	1,470	1,241.05	1,547.37	4,024	5,017	10,335.11	12,886.02
DS224C w/ 24x3.84TB SSDX357A	1	2	0.64	1.42	124	278	130.53	292.63	424	949	1,086.98	2,436.95
Total	2	6	6.66	8.92	1,303	1,748	1,371.58	1,840	4,448	5,966	11,422.09	15,322.97

3.3 Aggregate Details: netapp1/netapp2

This configuration leverages the Root-Data-Data partitioning which creates one small root partition (P3) for the root aggregates and two larger equally sized partitions (P1 and P2) for data aggregates. Up to 48 drives are partitioned in this format when ONTAP first initializes. The partition sizes and number of partitions are dependent on the number of drives installed when ONTAP first initializes.

Root-Data-Data (RD2) Partition Format	SSD Drives			
	1	2	3	4
P1 Data Partition	P1	P1	P1	P1
P2 Data Partition	P2	P2	P2	P2
P3 Root Partition	P3	P3	P3	P3

Root-Data (RD) Partition Format	HDD or SSD Drives			
	1	2	3	4
P1 Data Partition	P1	P1	P1	P1
P2 Root Partition	P2	P2	P2	P2

Storage Pool Partition Format	SSD Drives			
	1	2	3	4
P1 Cache Partition	P1	P1	P1	P1
P2 Cache Partition	P2	P2	P2	P2
P3 Cache Partition	P3	P3	P3	P3
P4 Cache Partition	P4	P4	P4	P4

Root Aggrs	Node	Devices	Total	Data	Parity	RAID/Size	Reserve (TB)	WAFL (TB)	Parity (TB)	Root (TB)
netapp1_root	netapp1	23.4GiB P3 Partition	10	8	2	RAID_DP/10	0.0000	0.0201	0.0502	0.1807
netapp2_root	netapp2	23.4GiB P3 Partition	10	8	2	RAID_DP/10	0.0000	0.0201	0.0502	0.1807
			20	16	4	Totals	0.0000	0.0402	0.1004	0.3614

Data Aggrs	Node	Devices	Total	Data	Parity	RAID/Size	Reserve (TB)	WAFL (TB)	Parity (TB)	Usable (TB)
netapp1_aggr1	netapp1	1.74TiB P1 Partition	23	21	2	RAID_DP/23	0.0000	4.0060	3.8153	36.0544
netapp2_aggr1	netapp2	1.74TiB P2 Partition	23	21	2	RAID_DP/23	0.0000	4.0060	3.8153	36.0544
			46	42	4	Totals	0.0000	8.0120	7.6306	72.1088

Spares	Devices	Total	Capacity (TB)
Root	23.4GiB P3 Partition	4	0.1005
Data	1776.65GiB P1 Partition	1	1.9077
Data	1776.65GiB P2 Partition	1	1.9077
Total			3.9159

	Capacity (TB)	Allocation
Drive Formatting	0.0088	0.01%
Root	0.3614	0.39%
Parity	7.7310	8.39%
WAFL	8.0522	8.73%
Reserve	0.0000	0%
Spare	3.9159	4.25%
Usable	72.1088	78.23%
Total	92.1781	100.0%

3.4 Drive Calculation Summary

Node	Drives (Qty) (#Partitions, #Non-Partitioned)	Flash Pool Drives (Qty) (#Partitions, #Non- Partitioned)	Aggregates (Qty)	Space Utilization
netapp1	(33, 0)	(0, 0)	2	45.52%
netapp2	(33, 0)	(0, 0)	2	45.52%

3.5 Workload Descriptions

Workload Name	Type	TPut IOPS	Effective Capacity (TB)	Cold Data %	Protocol	Read Latency (MS)	IO Percentages				IO Block Sizes (KB)				Working Set %
							Rand Read	Rand Write	Seq Read	Seq Write	Rand Read	Rand Write	Seq Read	Seq Write	
workload 1	Custom	100,000.00 IOPS	16.49	N/A	NFS	20	35	15	35	15	4	4	32	32	5
workload 1 - clone	Custom	100,000.00 IOPS	16.49	N/A	NFS	20	35	15	35	15	4	4	32	32	5

3.6 Workload Aggregate Assignments

Node	Aggregate	Workload	Workload Type
netapp1	netapp1_aggr1	workload 1	custom
netapp2	netapp2_aggr1	workload 1 - clone	custom

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