



NetApp Solution Technical Report

Manually Designed 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 / 1,562.5 MB/s	61.44 TB	1.62 : 1
AVERAGE UTILIZATION	USABLE CAPACITY	EFFECTIVE CAPACITY***
42%	40.44 TiB	65.6578 TiB
MAXIMUM THROUGHPUT*	RAW CAPACITY HEADROOM**	USABLE VS EFFECTIVE
460,721 IOPS / 3,599.39 MB/s	122.88 TB	 40.44 TiB 65.6578 TiB
* 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.

Note: Usable and effective capacity is calculated and reported in base-2 format which aligns with values reported in ONTAP CLI, Storage Manager, and Unified Manager. It should be noted that ONTAP CLI displays base-2 capacity values, but labels these values using base-10 descriptors (e.g. GB/TB/PB).

CONFIGURATION			ENVIRONMENTAL	
Model:	ASA A800A	Onboard Ethernet Ports:	0	Rack Units: 4 U
Nodes:	2	Onboard UTA2 Ports:	0	System Weight: 114.86 lbs
Total Drives:	16	Onboard SAS Ports:	0	AC Power: 1667.00 W
Drive Type:	3.84TB NVMe SSD	Expansion Slots:	10	Current Draw: 8.33 A
Cluster Switches:	N/A	Stge Switches:	N/A	BTU/hr: 5688.00

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				
	ASA A800A w/ 16x3.84TB NVMe SSD	9.15.1 ONTAP	X4016A	1
			Grand Total	1
Storage				
			Grand Total	0
Adapter Cards/ Flash Cache				
			Grand Total	0

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
ASA A800A w/ 16x3.84TB NVMe SSDX4016A (2xControllers, 1xChassis)	1	4	8.33	10.96	1,667	2,191	1,754.74	2,306.32	5,688	7,480	14,612.92	19,206.31
Total	1	4	8.33	10.96	1,667	2,191	1,754.74	2,306.32	5,688	7,480	14,612.92	19,206.31

Median Power Usage

System Components	Qty	Median Current (Amps)	Median AC Power (Watts)	Median AC Power (VA)	Median Thermal Rating (BTU/hr)	Median Power (kWh/year)
ASA A800A w/ 16x3.84TB NVMe SSDX4016A (2xControllers, 1xChassis)	1	8.33	1,667	1,754.74	5,688	14,612.92
Total	1	8.33	1,667	1,754.74	5,688	14,612.92

Note: Median power is based on actual power numbers reported by install base systems of similar configuration and represent the midpoint where half of the similar configurations consume less power and the other half consume more power. Typical and Worst-case power numbers are calculated based on product specifications and spot checked for accuracy. Typical power values are used when median power values are not available.

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				Root-Data (RD) Partition Format		HDD or SSD Drives				Storage Pool Partition Format		SSD Drives			
		1	2	3	4			1	2	3	4			1	2	3	4
P1 Data Partition		P1	P1	P1	P1	P1 Data Partition		P1	P1	P1	P1	P1 Cache Partition		P1	P1	P1	P1
P2 Data Partition		P2	P2	P2	P2	P2 Root Partition		P2	P2	P2	P2	P2 Cache Partition		P2	P2	P2	P2
P3 Root Partition		P3	P3	P3	P3							P3 Cache Partition		P3	P3	P3	P3
												P4 Cache Partition		P4	P4	P4	P4

Root Aggrs	Node	Devices	Total	Data	Parity	RAID/Size	Reserve (TiB)	WAFL (TiB)	Parity (TiB)	Root (TiB)
netapp1_root	netapp1	37.42GiB P3 Partition	7	5	2	RAID_DP/7	0.0000	0.0183	0.0730	0.1644
netapp2_root	netapp2	37.42GiB P3 Partition	7	5	2	RAID_DP/7	0.0000	0.0183	0.0730	0.1644
			14	10	4	Totals	0.0000	0.0366	0.1460	0.3288

Data Aggrs	Node	Devices	Total	Data	Parity	RAID/Size	Reserve (TiB)	WAFL (TiB)	Parity (TiB)	Usable (TiB)
netapp1_aggr1	netapp1	1.73TiB P1 Partition	15	13	2	RAID_DP/15	0.0000	2.2466	3.4563	20.2193
netapp2_aggr1	netapp2	1.73TiB P2 Partition	15	13	2	RAID_DP/15	0.0000	2.2466	3.4563	20.2193
			30	26	4	Totals	0.0000	4.4932	6.9126	40.4386

Spares	Devices	Total	Capacity (TiB)
Root	37.42GiB P3 Partition	2	0.0731
Data	1769.64GiB P1 Partition	1	1.7282
Data	1769.64GiB P2 Partition	1	1.7282
		Total	3.5295

	Capacity (TiB)	Allocation
Drive Formatting	0.0051	0.02%
Root	0.3288	0.59%
Parity	7.0586	12.63%
WAFL	4.5298	8.11%
Reserve	0.0000	0%
Spare	3.5295	6.32%
Usable	40.4386	72.36%
Total	55.8904	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	(22, 0)	(0, 0)	2	24.53%
netapp2	(22, 0)	(0, 0)	2	24.53%

3.5 Workload Descriptions

Workload Name	Type	TPut IOPS	Effective Capacity (TiB)	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	10.00	N/A	FCP	1	50	50	0	0	8	8	64	64	5
workload 1 - clone	Custom	100,000.00 IOPS	10.00	N/A	FCP	1	50	50	0	0	8	8	64	64	5

3.6 Workload Aggregate Assignments

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

4 Environmental Certifications

4.1 Product Carbon Footprint

- [ASA A800A Report](#)

4.2 Statements & Certifications

- [Environmental Policy and Certifications](#)
- [ISO 14001:2015 Certificate](#)
- [PSU 80+ Titanium Certificate TDPS-1600GB A](#)
- [US TSCA PBT Substances Declaration](#)
- [E-waste Program](#)
- [European Union WEEE and Battery Statement](#)
- [European Union RoHS Compliance Statement](#)
- [China RoHS Compliance Statement](#)
- [China and Taiwan Toxic and Hazardous Substances or Elements Table](#)
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