The Next Tentacle

Ceph on ARM

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me! me! me!

Things I worked on

Ceph Storage
Ubuntu Server
Landscape
SUSE Studio
SLES
SMT
Ximian Red Carpet
Man (I)

Peter Pouliot

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- I live in Stoneham, MA and am a lifelong New Englander originally from Rhode Island.

- I studied Philosophy for my undergraduate degree (RIC), and Telecommunications Security/Digital Forensics graduate degrees (BU)

- At Ampere Computing, I enable Open Source Software ecosystems with Aarch64 servers in the datacenter, and enabling Aarch64 native OSS server-based cloud computing.

- Previously at Microsoft, I helped to maintain OpenStack integration with Microsoft's virtualization platform Hyper-V and was Microsoft's OpenStack subject matter expert, running the largest CI/CD infrastructure within the OpenStack community for 5+ years.

one more thing

Supported CPU Architectures

RHCS is supported on Intel and AMD x86-64 microprocessors. IBM POWER and S390x CPUs are supported only as clients, but not as clusters.

Supported Host Operating Systems

Supported CPU Architectures

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Supported Host Operating Systems

outlook

2025 Q2
- 6/ IBM Ceph 8.1
- 6/ Red Hat Ceph 8.1

2025 Q3
- 7/ ODF 4.19

2025 Q4
- 11/ RHEL 9.7
- 11/ IBM Ceph 9.0
- 11/ Red Hat Ceph 9.0
- 11/ ODF 4.20

2025 Q3
- 9/ Community Lab reopens

2025 Q4
- ARM Cluster GA

2025 Q2
- ARM Client GA

PLAN

– SUBJECT TO CHANGE –

Community

punch list

- Community Lab reopening

- More test automation

- Tuning for ARM

- Optimization for ARM extensions

- ARM Reference architecture

2019...

SBC distributions

- Armbian

- Ubuntu

- Debian
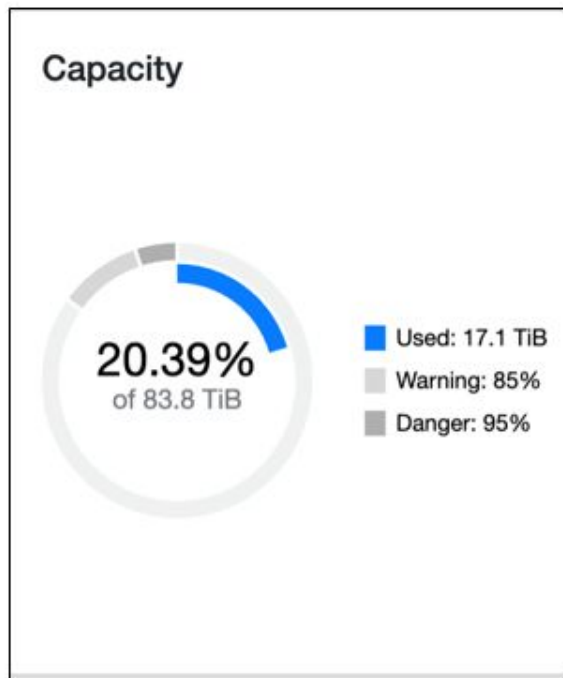
- Fedora

- RHEL

performance

Ceph Cluster Overview

Ceph Cluster Inventory

Ampere	
CPU	Ampereone
Memory	8 x 64GB DDR5 512 GB per node
Disks	8x 3.5 TB Micron 7450 NVME's per Node
NIC's	1 x 100Gb Private and 1 x 10Gb Public per Node
OS	Ubuntu 24.04
Ceph Version	Squid 19.2.0 with OSD's on Docker Containers
Client Nodes	3 Mt Kims

3 Node Cluster with Ampereone setup for Performance benchmarking

Ampere 3 Node Cluster – Ceph details

Capacity

20.39%
of 83.8 TiB

Used: 17.1 TiB
Warning: 85%
Danger: 95%

Inventory

3 Hosts	3 ✅
3 Monitors	3 ✅
2 Managers	1 ✅ 1 ℹ️
24 OSDs	24 ✅
4 Pools	4 ✅
6145 PGs	6145 ✅

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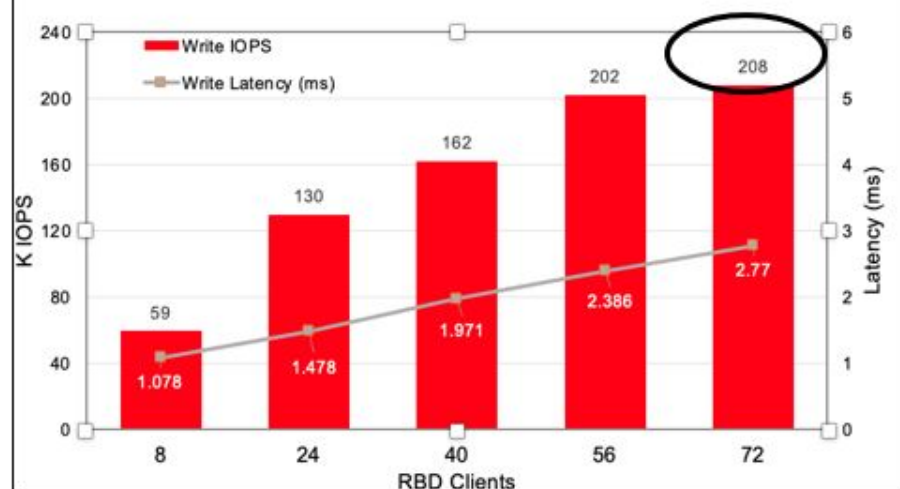|	
3 Hosts	3 ✓
3 Monitors	3 ✓
2 Managers	1 ✓ 1 ⓘ
24 OSDs	24 ✓
4 Pools	4 ✓
6145 PGs	6145 ✓

Ceph Cluster Block Storage Performance
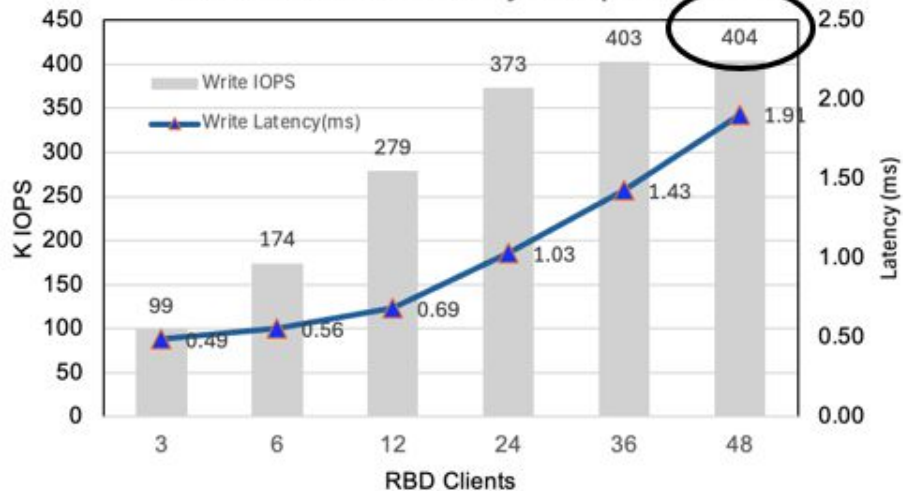
Block Storage Write Performance Comparison

Altra

Write IOPS and Latency - Altra

Ampereone

Write IOPS and Latency - Ampereone

Ampereone Stats from Ceph Dashboard

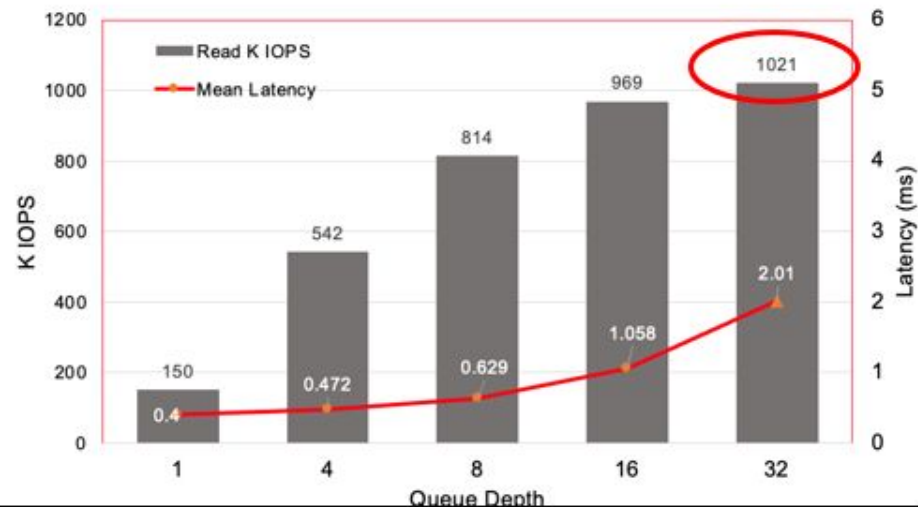| OSD Hosts	AVG CPU Busy	AVG RAM Utilizati	Physical IOPS	AVG Disk Utilizati	Network Load
3	**56.2%**	**17.6%**	**2430869**	**89.9%**	**5.82 GiB**

4 KB Random Writes reached a maximum of 400 K IOPS in Ampereone compared to 200 K IOPS achieved with Altra (Repl = 2)

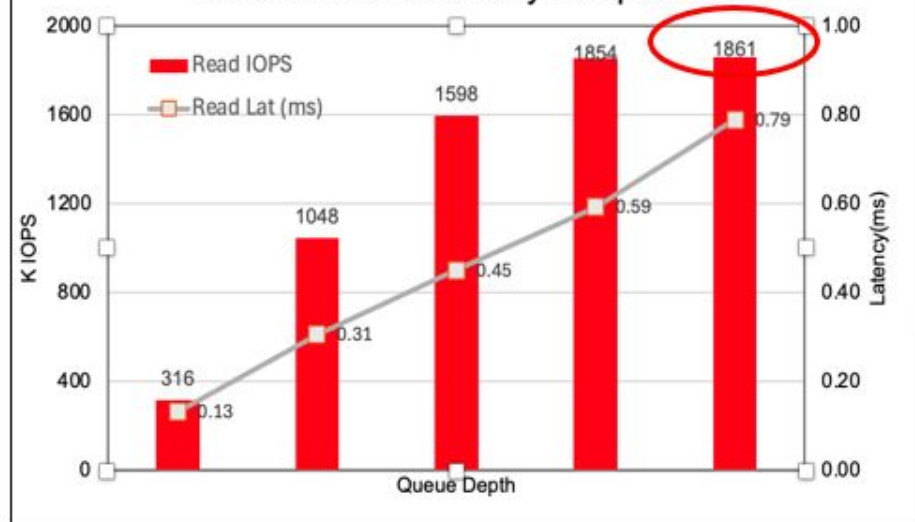AMPERE.

Block Storage Read Performance Comparison

Altra

Read IOPS and Latency - Altra

Legend: Read K IOPS, Mean Latency

Queue Depth values: 1, 4, 8, 16, 32
Read K IOPS: 150, 542, 814, 969, 1021
Mean Latency: 0.4, 0.472, 0.629, 1.058, 2.01

Ampereone

Read IOPS and Latency - Ampereone

Legend: Read IOPS, Read Lat (ms)

Read IOPS: 316, 1048, 1598, 1854, 1861
Read Lat (ms): 0.13, 0.31, 0.45, 0.59, 0.79

Ampereone Stats from Ceph Dashboard

OSD Hosts	AVG CPU Busy	AVG RAM Utilizati	Physical IOPS	AVG Disk Utilizati	Network Load
3	38.0%	12.8%	2113591	97.5%	4.09 GiB

Disks reaching saturation point in Ampereone

Ceph Incremental Performance with OSDs

Write IOPS and Latency vs OSDs - Ampereone
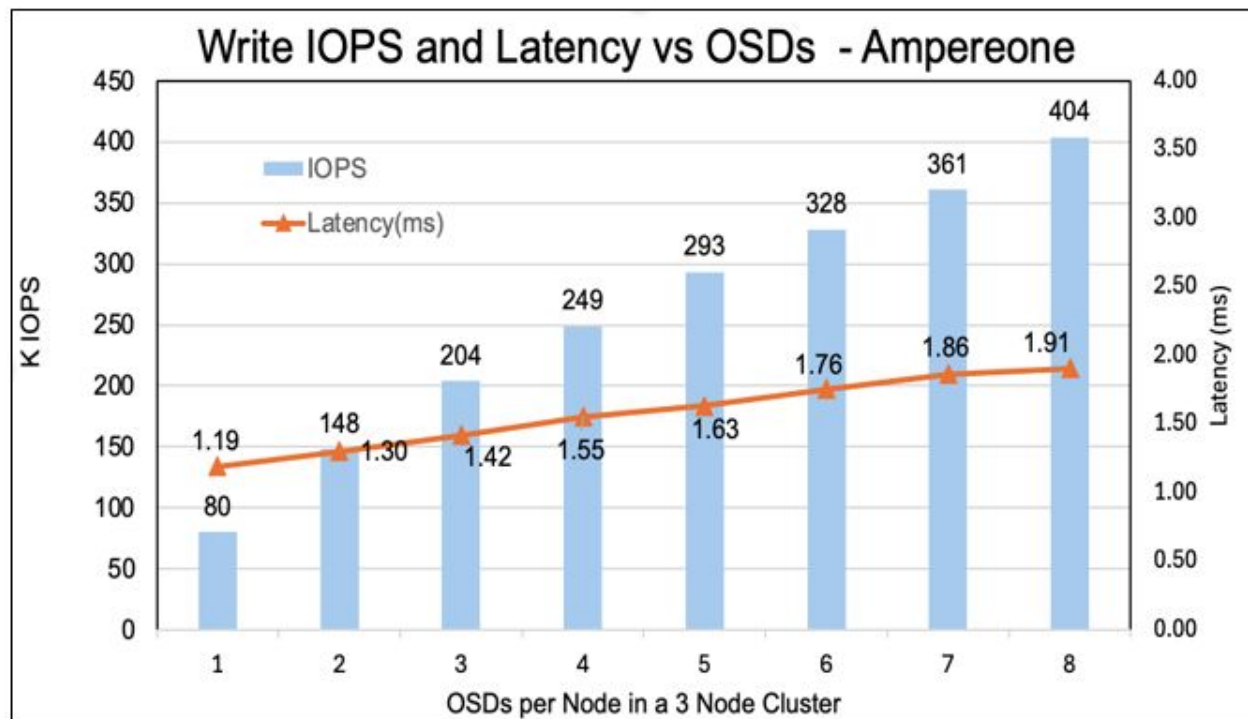
Compare and Contrast our results

(Jan 2024)

|		
Number of Nodes	3	3
CPU	3 x AMD 9454	3 x Ampereone
Cores/Threads	48 Core/96 Threads	192 Cores
Memory	3 x 192GiB DDR5	3 x 512GiB DDR5
Disks	3 x 10 15TB NVME Drives	3 x 8 3.5TB NVME Drives
Write IOPS	248 K IOPS (Repl 3)	404 K IOPS (Repl 2) 277 K IOPS (Repl 3)
Read IOPS	1.9 M IOPS	1.86 M IOPS

Ceph Cluster Power Consumption

Ceph Cluster Power Consumption (4k Writes)

Altra

Ceph Cluster Power Consumption (Watts)
4 x Q64 Altra

Around 225W per Node

Ampereone
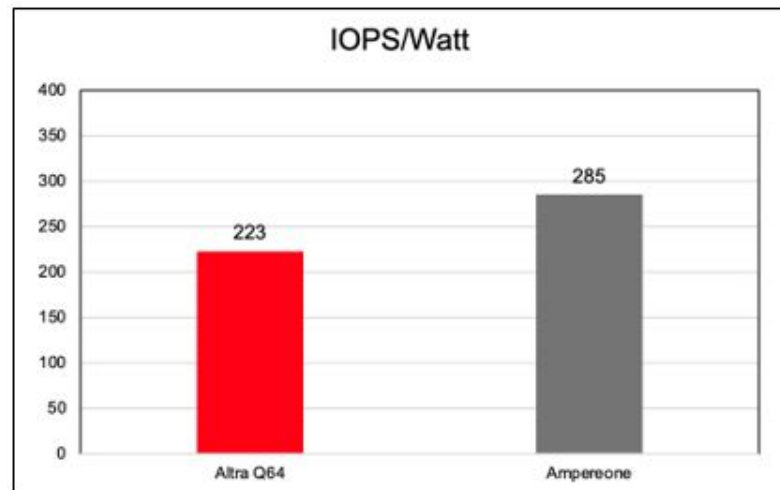

Ceph Cluster Power Consumption (Watts)
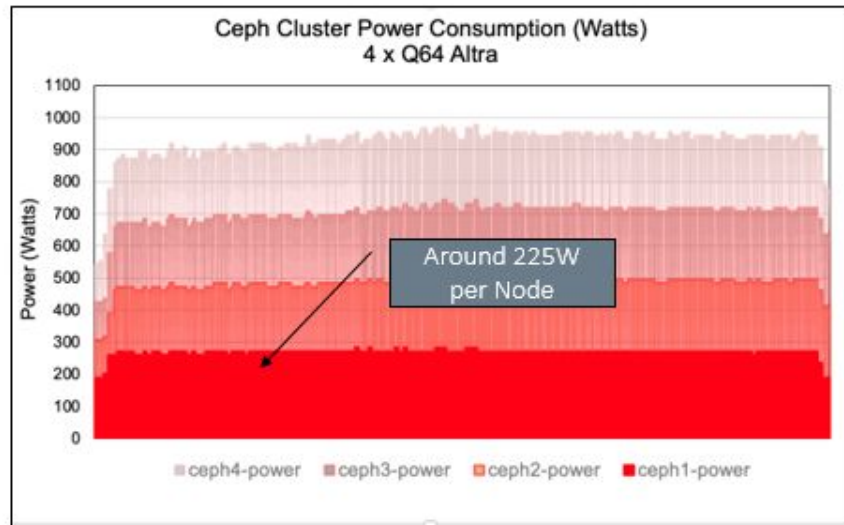
Around 477 W per Node
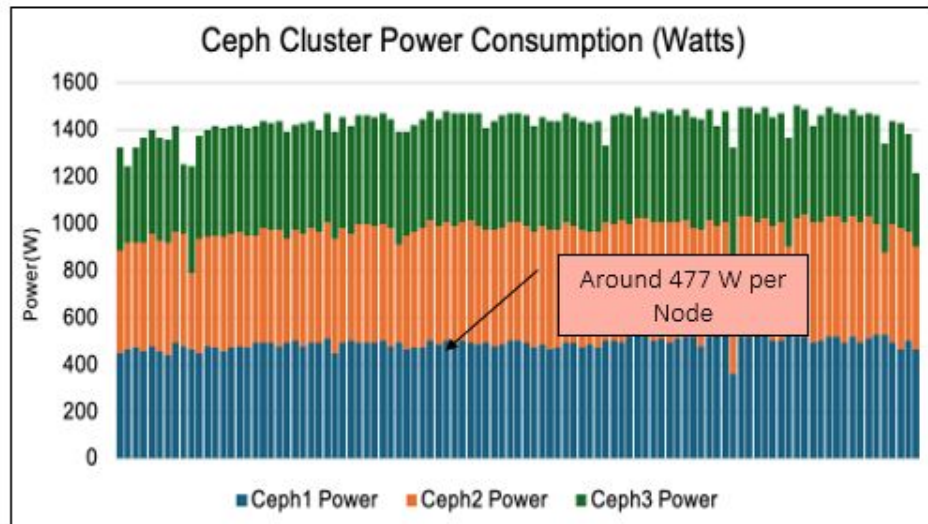
- 4 x Altra nodes delivered around 200 K IOPS while consuming around 900 Watts
- 3 x Ampereone Nodes delivered around 400 K IOPS while consuming around 1430 Watts

Ceph Back End Performance

	Altra (q64)	Ampereone (192)
CPU Cores/Threads	64 Cores	192 Cores
CPU	56%	55%
Mem	16%	18%
Physical Disk IOPS	40k-45 K	100 K
Total Power	224 W	477 W
CPU Power	84 W	228 W

IOPS/Watt

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THANK YOU.