Case Study

Intel® Xeon® Processors

Open Compute Project Collaboration Opens Doors to New Data Center Modular Hardware Systems

Modular server systems, supported by Intel® technologies, help customers reduce cost, speed innovation, and make data centers more environmentally friendly.

Solution Summary

- Data Center Modular Hardware System (DC-MHS)
- Intel® Xeon® processors

Executive Summary

The Open Compute Project (OCP) centers on a cross-industry initiative to help standardize the server hardware "blocks" used for workloads like artificial intelligence and edge deployments. Toward that goal, Intel and other major technology companies, including OEMs, cloud vendors, and hardware manufacturers, created new specifications and standards for the Data Center Modular Hardware System (DC-MHS) and the Data Center Secure Control Module (DC-SCM). DC-SCM is part of of the DC-MHS modularity family, but operates out of the Open Compute Hardware Management Project. The modular computing approach can simplify systems management, improve data center energy efficiency, reduce hardware costs, and minimize waste.

Challenge

Demands on the data center have never been greater. Enterprises adopting more complex and resource-intensive workloads, like machine learning (ML) and edge computing, must maximize their system hardware and software for hyperscale efficiency. However, a one-size-fits-all server solution cannot address every customer's requirements. Modern businesses need better consistency across disparate components, including unified management. Therefore, it's vital that technology vendors align to standardize their products, simplify customer technology solutions, and get those systems to market as quickly as possible. To save costs, enterprises also need ways to increase the lifespan of their technology investments. The ability to upgrade components within existing

The Open Compute Project fosters an ecosystem where industry players collaborate in a safe framework, shaping a versatile and diverse supply chain.

server infrastructure can provide customers with improved compute density, while embracing environmentally friendly business practices.

Solution

Modular computing systems, including servers featuring Intel® Xeon® processors, offer the potential to address all these issues simultaneously. With support from several technology companies including AMD, Dell, Google, HPE, Jabil, Meta, Microsoft, Nvidia, and Ampere Technology, among others, Intel was the driving force for the OCP DC-MHS initiative to help drive scalability, sustainability, and security across the data center. These technology vendors can help customers future-proof their platform investments by committing to a joint specification that embraces a modular design philosophy. The approach also reduces development, integration, and validation costs by sharing that investment among multiple technology suppliers. DC-MHS efforts will enable greater interoperability among data center and edge-based deployments by providing a more consistent management interface and form factors among building blocks. Plus, standards-based solutions coming to market can help customers deploy greener and more energy-efficient infrastructure faster. Since server elements can be reused or recycled, the DC-MHS specification can help reduce waste and offer enterprises a path to increase their data centers' scale and speed while reducing electricity consumption.

> "By working together with major technology vendors through the Open Compute Project DC-MHS initiative, we have an incredible opportunity to help enterprises embrace AI's transformative impact, improve data center efficiency, and enhance their sustainability efforts."
>
> *— Zane Ball, Corporate VP & GM Datacenter Engineering & Architecture at Intel*

Results

From 2010 to 2018, Intel helped reduce the amount of energy required for data centers worldwide by 20 percent yearly while increasing compute instances by 550 percent and growing electricity consumption by only six percent.[1] The cross-industry DC-MHS standard will extend that trend into the future through solutions that deliver greater compute density in an environmentally responsible way. By right-sizing each component and connecting them modularly, Intel reduced a reference system's carbon footprint by 27% compared to a non-modular approach.[2]

Key Takeaways

- The joint DC-MHS initiative paves the way for new, more turnkey data center solutions with unified systems management.
- Validated, modular data center solutions can help enterprises enhance compute power and scale while lowering their infrastructure spend.
- Because modular components can be reused or recycled, enterprises can lower their carbon footprint and reduce waste.

For More Information

Explore Intel Xeon Processors

Find out more about the Open Compute Project DC-MHS

[1] "Recalibrating global data center energy-use estimates," *Science Magazine*, February 28, 2020, Volume 367, Issue 6481

[2] Embodied carbon, scope 3 specific calculation as of July 2023 using an Internal Intel optimization of PAIA model used to calculate embodied carbon. (See details in configuration chart below). For general information on how Intel calculates embodied carbon, visit https://edc.intel.com/content/www/us/en/products/performance/benchmarks/sustainability/

PLATFORM / PROCESSOR	EAGLE STREAM				BIRCH STREAM	
Specification	**4th Gen Intel® Xeon® Scalable Processors**		**5th Gen Intel® Xeon® Scalable Processors**		**Granite Rapids SP**	
PC	**Fox Creek Pass**		**Fox Creek Pass Refresh**		**Deer Creek City (Pass)**	
System	2U 1N Spread core general purpose server (incl. fan, sb, BB etc.)	300	2U 1N Spread core general purpose server (incl. fan, sb, BB etc.)	300	M-FLW, 2U 1N Spread core general purpose server	360
Processor	32C/2.1G/270W (6430)	540	32C/2.1G/270W (6530)	540	300W	600
Memory	64GB DDR5-4800 RDIMM (16Gb, DRx4,14.4W) x16	230	64GB DDR5-5600 RDIMM (16Gb, DRx4,16W)x16	256	64GB DDR5-6400 RDIMM (19W)x16	304
Storage boot (M.2)	PCIe Gen 4 x4, M.2 2280 480GB (Micron 7400 PRO, 7.25W)x2	15	PCIe Gen 4 x4, M.2 2280 480GB (Micron 7400 PRO, 7.25W)x2	15	PCIe Gen 4 x4, M.2 2280 480GB (Micron 7400 PRO, 7.25W)x2	15
Storage data (U.2/E3)	PCIe Gen 4, 2.5" U.2, 15mm (15W)x8	120	PCIe Gen 4, 2.5" U.2, 15mm (15W)x8	120	PCIe Gen 5, E3.S (20W)x8	160
PCIe AIC	PCIe gen5x16 AIC 25W +75W	100	PCIe gen5 x16 AIC 25W +75W	100	PCIe gen5x16 AIC 75Wx2	150
OCP	OCP NIC 3.0 (25W)x1 PCIE gen5x16, 200G/400G	25	OCP NIC 3.0 (25W)x1 PCIE gen5x16, 200G/400G	25	OCP NIC 3.0 (35W)x1 PCIE gen5x16, 400G/800G	70
Baseboard overall	count in System	0	count in System	0	count in System	0
Total system power cal DC		1330		1356		1659
PSU efficiency	80 Plus Titanium	0.91	80 Plus Titanium	0.91	80 Plus Titanium	1410
AC inlet power (W)		1461		1490		0.90
Tool input (W)		**1400**		**1450**		**1566**

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary. Intel technologies may require enabled hardware, software or service activation.

RJMJ/SB/012024/PDF ♻ Please Recycle 358772-001US