AMD Server Strategy

Highest performance
data center CPU*

Optimized silicon
for diverse workloads

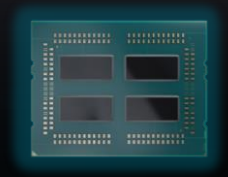
Complete solutions, to
accelerate time-to-value

*EPYC 9754; SEE ENDNOTE: SP5-143A

AMD EPYC™ CPU Journey

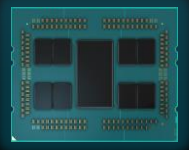
Four Generations of On-Time Execution…Continues!

1st Gen
AMD EPYC™



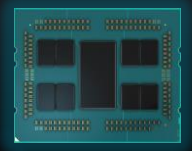
General Purpose
"Naples"

2nd Gen
AMD EPYC™

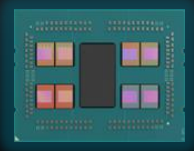


General Purpose
"Rome"

3rd Gen
AMD EPYC™

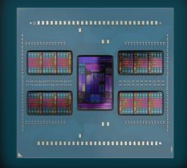


General Purpose
"Milan"

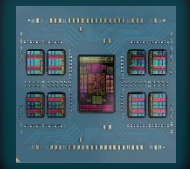


Technical
"Milan-X"

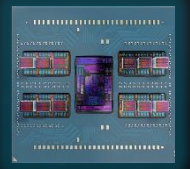
4th Gen
AMD EPYC™



General Purpose
"Genoa"



Cloud Native
"Bergamo"



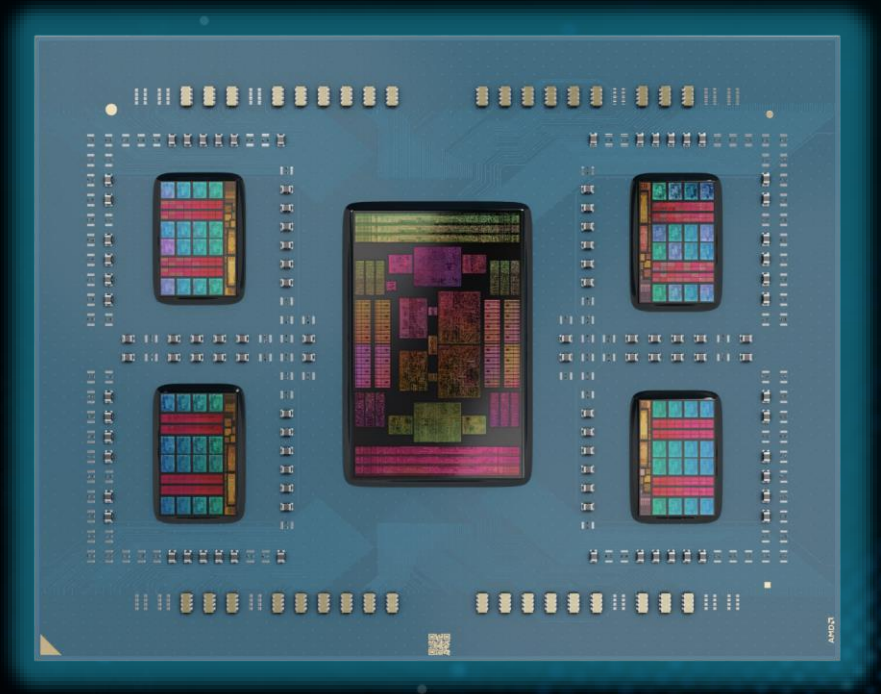
Technical
"Genoa-X"

Intelligent Edge
"Siena"

2017 → **2023**

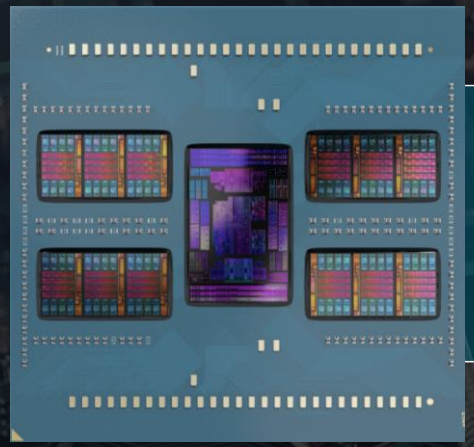
AMD EPYC™ 8004 Series CPUs

Purpose-built, energy-efficient CPUs for Cloud Service, Intelligent Edge and Telco deployments

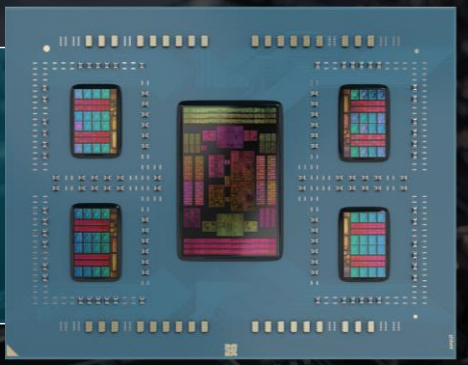


- Excellent Energy Efficiency
- Balanced Performance
- Leadership Performance per Watt/$
- Thermally Optimized Processors
- System Design Flexibility

SEE ENDNOTE: SP6-007



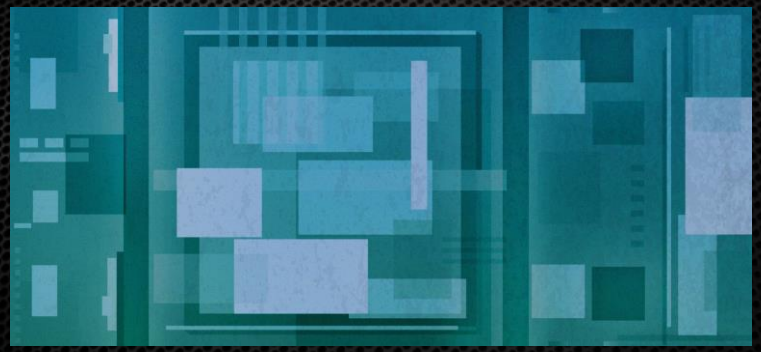
9004 SERIES		8004 SERIES
SP5 – 16 to 128 cores	Socket – Core Count Range	SP6 – 8 to 64 cores
‘Zen 4’ & ‘Zen4c’	Core Architecture	‘Zen 4c’
200w to 400w	TDP	70w to 225w
12 ch DDR5 up to 4800	Memory	6 ch DDR5 up to 4800
PCIe® Gen 5, 128 Ln/Socket, 128-160Ln/ 2P node	PCIe®	PCIe® Gen 5, 96 Ln
64 Ln on P links configured for CXL™1.1+	CXL®	48 Ln on P links configured for CXL™1.1+
1P and 2P	Socket Support	1P Only
RDIMM, 3DS RDIMM	DIMM Support	RDIMM

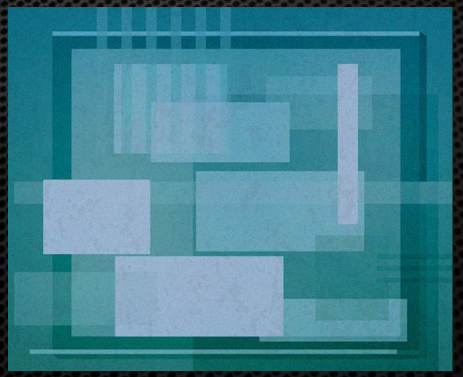


‘Zen 4c’ Core Architecture

Designed for **density** and **power efficiency**

‘Zen 4’core		‘Zen 4c’core
TSMC 5nm	← Node →	TSMC 5nm
3.84 mm^2	← Core + L2 Area →	2.48 mm^2





Same ISA, Same IPC

Logically Similar (same ISA, L1 & L2 cache)

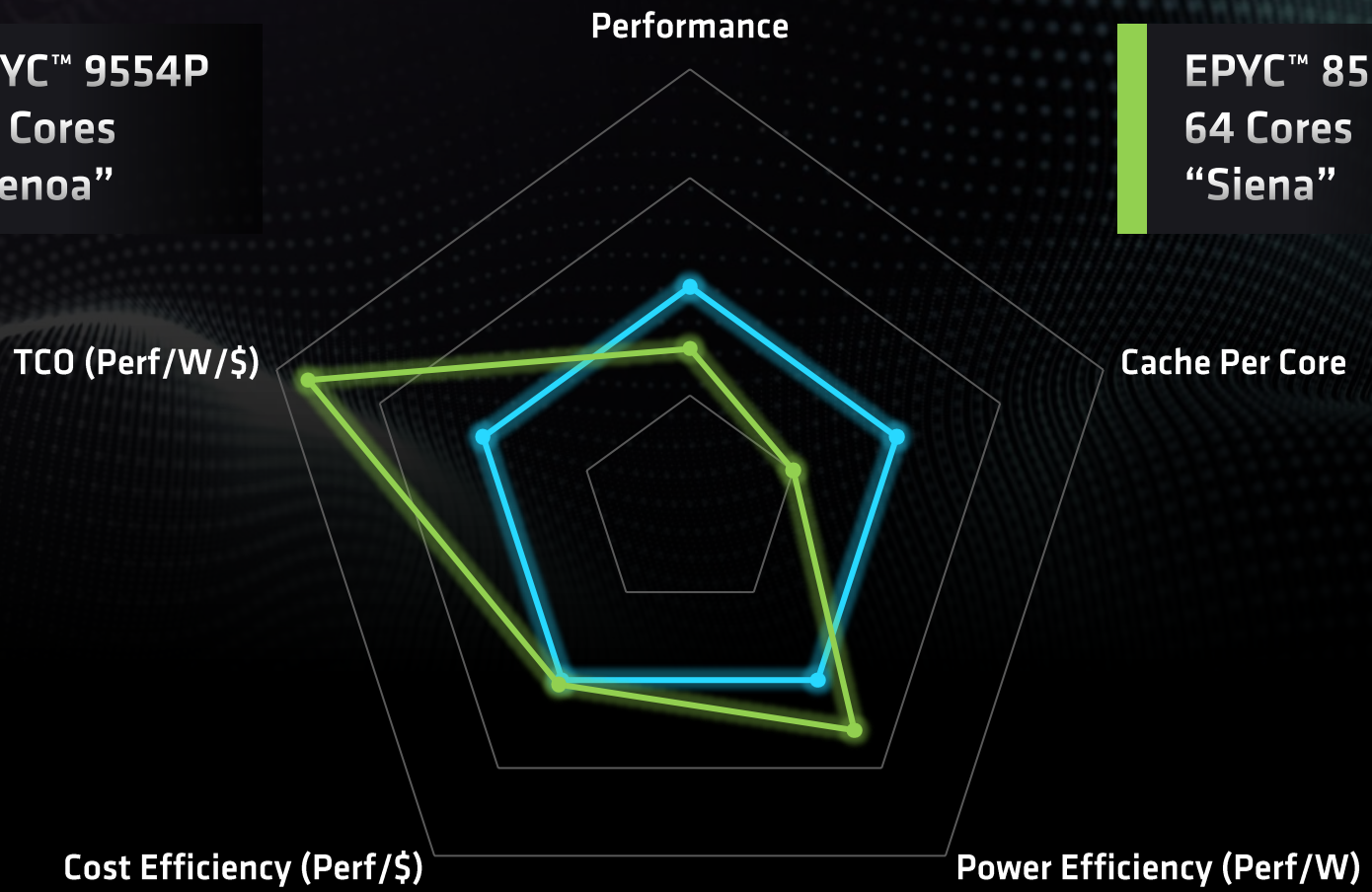
Implementation changes in 'Zen4c' are transparent from SW perspective

4th Gen AMD EPYC™ CPU

Optimized For Workloads From A Common Architecture

EPYC™ 9554P
64 Cores
“Genoa”

EPYC™ 8534P
64 Cores
“Siena”



For illustration purposes only

AMD EPYC™ 9004 / 8004 Series

Processor Naming Convention

EPYC™ 8534PN CPU

Product Family

★ **Product Series** 9004 / 8004

Generation

Compute

- "F" = High Frequency
- "N" = NEBS friendly
- "P" = 1P Capable Only
- "S" = Single Threaded
- "X" = 3D V-Cache™

Heart of Market core numbering

100s Digit	0	1	2	3	4	5	6	7
Cores	8	16	24	32	48	64	84-96	112-128

Core Count

- Indicates Core Count within the Series

Performance

10s digit – Perf w/in Core Count

- 9 = reserved
- 8, 7, 6, 5, 4, 3, 2, 1
  - Relative Performance w/in core count
  - Higher number = higher perf

AMD EPYC™ 8004 Series Processors

All-in Feature Set Support

- 'Zen4c' Cores
- 6 Channels of DDR5-4800
- Up to 1.152TB DDR5 memory capacity
- 96 lanes PCIe® 5
- 48 lanes CXL 1.1+
- AVX-512 ISA, SMT & core frequency boost
- AMD Infinity Fabric™
- AMD Infinity Guard

Cores	AMD EPYC	Base/Boost* (up to GHz)	Default TDP (w)	cTDP (w)	Operating Range (°C)
64 cores	**8534P**	2.3/3.1	200w	155-225w	0 – 75
	8534PN	2.0/3.1	175w	NA	-5 – 85
48 cores	**8434P**	2.5/3.1	200w	155-225w	0 – 75
	8434PN	2.0/3.0	155w	NA	-5 – 85
32 cores	**8324P**	2.65/3.0	180w	155-225w	0 – 75
	8324PN	2.05/3.0	130w	NA	-5 – 85
24 cores	**8224P**	2.55/3.0	160w	155-225w	0 – 75
	8224PN	2.0/3.0	120w	NA	-5 – 85
16 cores	**8124P**	2.45/3.0	125w	120-150w	0 – 75
	8124PN	2.0/3.0	100w	NA	-5 – 85
8 cores	**8024P**	2.4/3.0	90w	70-100w	0 – 75
	8024PN	2.05/3.0	80w	NA	-5 – 85

*SEE ENDNOTES: EPYC-018, GD-183

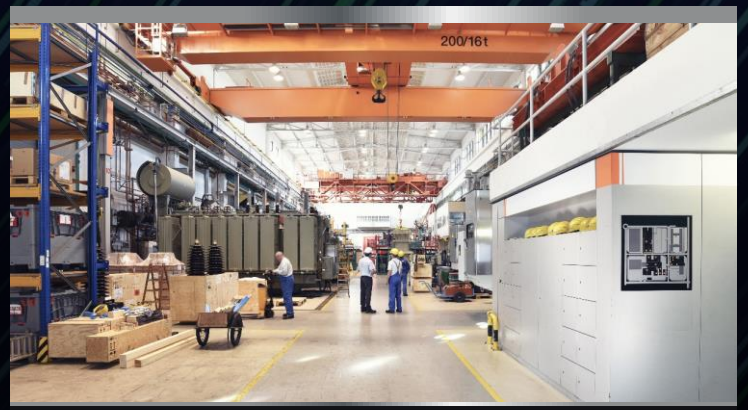
Pervasive Intelligence Brings New IT Deployment Requirements

Place and secure data, compute and storage closer to points of creation and consumption to unlock new experiences and services

Optimizations for Intelligent Edge

Challenging power and space availability

- Voice and video packet processing deployed in city telco buildings.
- Backbone network cloud in 8K-12Kwatt rack infrastructure.
- 3rd party mini data centers/ regional cloud



Extreme physical deployment environments

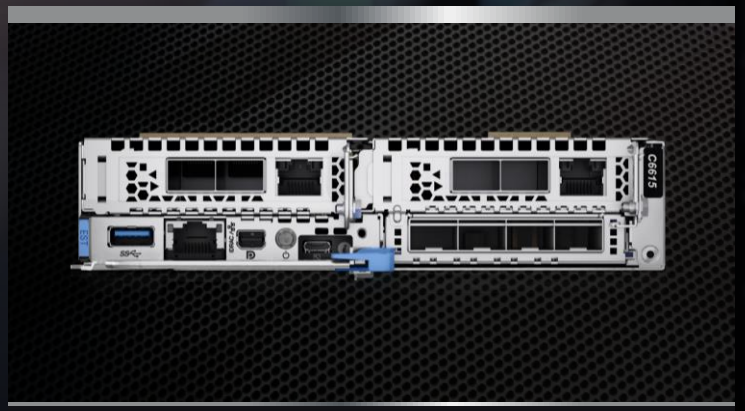
- Factory floor control systems
- Metro or regional operations for businesses, utilities and government.
- Base station, telecommunications metro sites and campus/private 5G network

People-friendly shared tech and work spaces

- Retail branch locations.
- Medical or office equipment.
- Departmental/site server

AMD EPYC™ 8004 Series

OEM Platform Examples



Dell PowerEdge C6615

- Designed for data center workloads from SaaS to databases and e-commerce
- Maximize performance with enhanced airflow to accommodate scalable computing power
- Perfect for customers needing easy resource scaling

Lenovo ThinkEdge SE455

- Flagship edge-optimized server for Edge Analytics and AI workloads
- Ideal for environments that demand quiet operations, such as healthcare and retail installations.
- Achieves a blend of performance and energy efficiency within a compact design

Supermicro WIO System

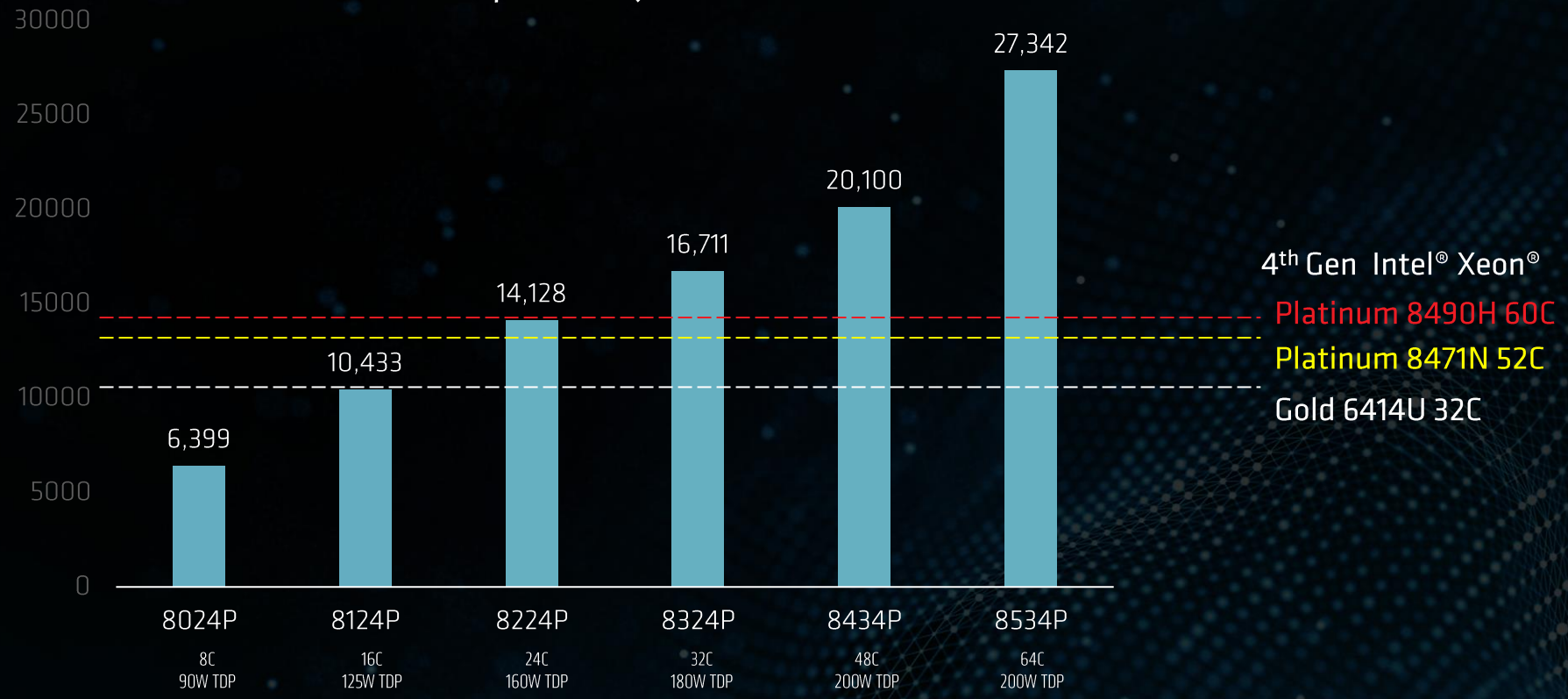
- Designed for diverse data center needs and edge deployments
- Made for database transaction processing, firewalls and edge applications; they also provide uniform performance for telco and are designed for NEBS™ compliance
- Short-Depth version maintains peak performance in confined spaces.

EPYC™ 8004 Processors

Leadership Energy Efficiency For The Intelligent Edge

Up to 2x PERFORMANCE PER 1P SYSTEM WATT

SPECpower_ssj® 2008 results

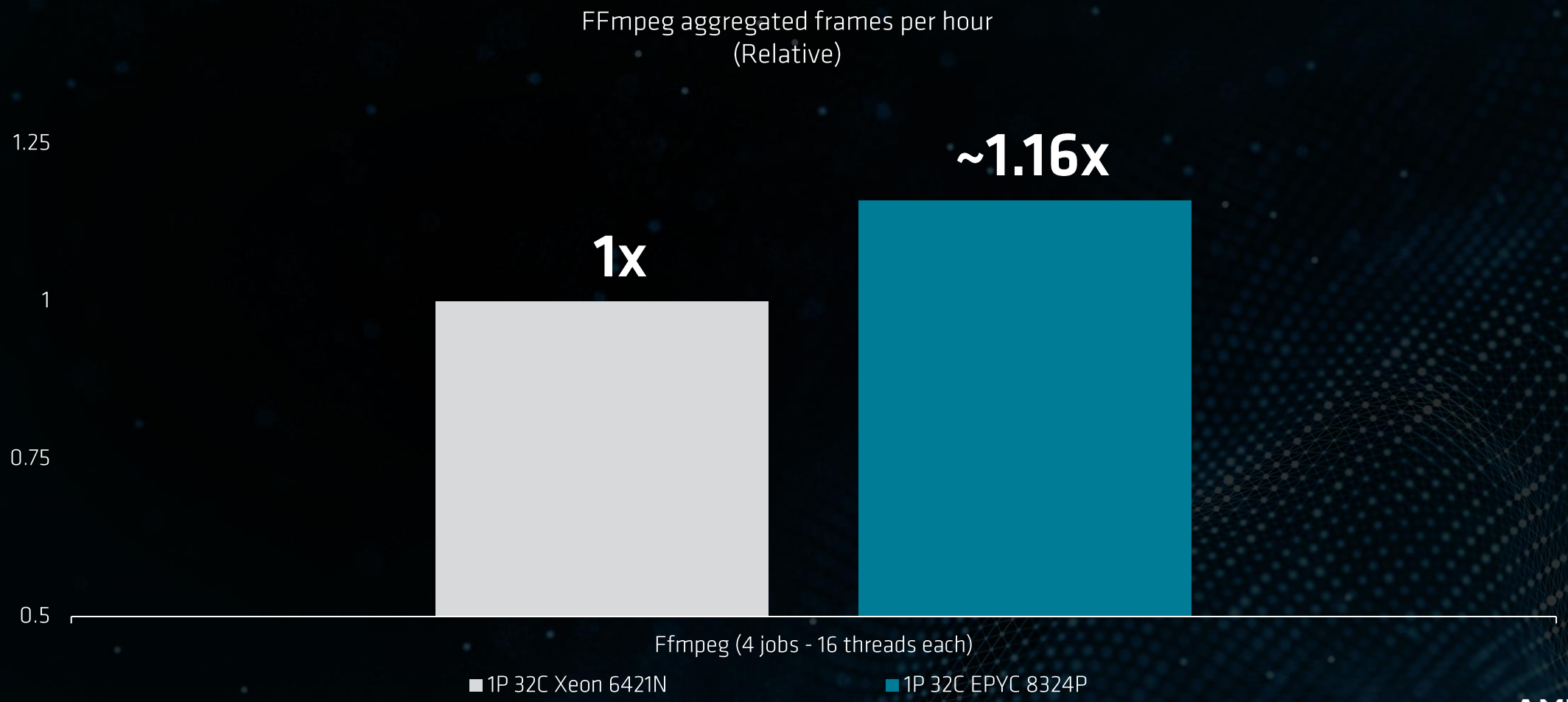


AS OF 9/18/2023, SEE ENDNOTE SP6-008.

AMD
together we advance_

Balanced Edge Performance

~1.16x THE TRANSCODING PERFORMANCE-PER-CORE



AS OF 9/18/2023, SEE ENDNOTE SP6-009.
FFMPEG (4 JOBS - 16 THREADS EACH)

Excellent Energy Efficiency

1P server node

1.4x

the perf per system power

32%

lower avg. est system power

8Kw rack capacity of 1P server nodes

1.8x

the core density per rack

1.4x

the performance throughput per rack

64C EPYC™ 8534PN vs. 52C Xeon® Platinum 8471N Systems

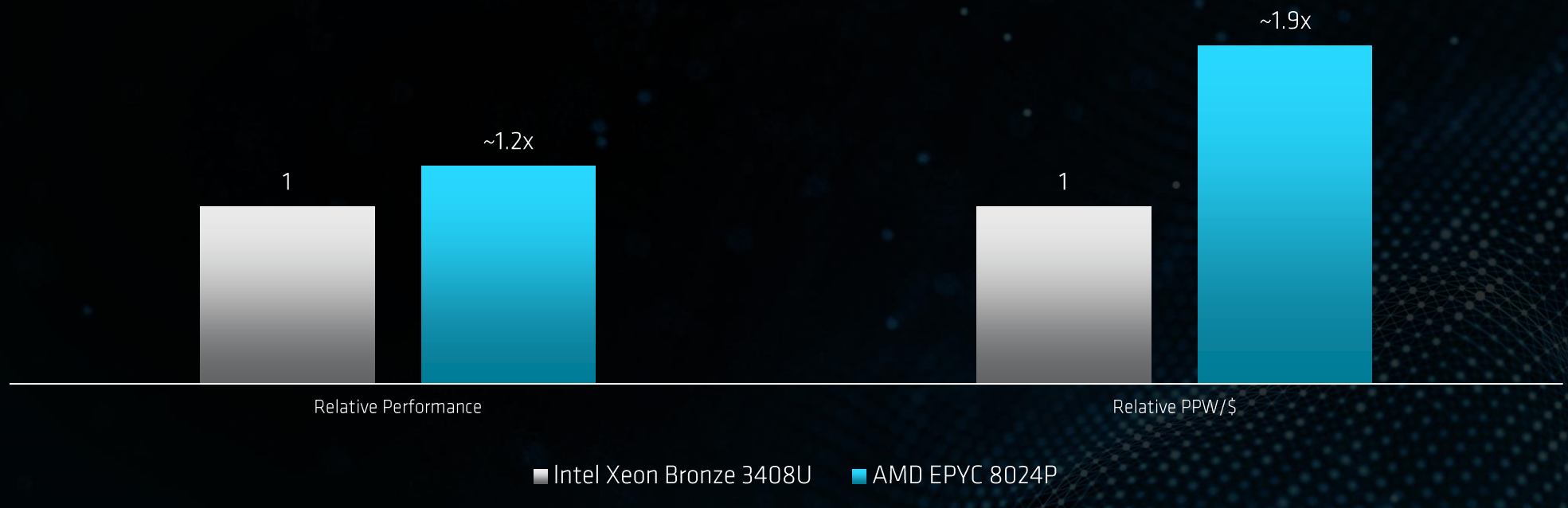
SPECrate®2017_int_base

Power = Power Determinism mode in BIOS. As of 9/18/2023, see endnote SP6-003.
SPECrate®2017_int_base metric is the geomean of 10 server applications running n number of concurrent copies/users

Leadership Edge IoT Gateway Performance

Up to 1.9x THE SYSTEM PERFORMANCE/W/$

Apache IoTDB points/second
(Higher is Better)



POWER = POWER DETERMINISM MODE IN BIOS. AS OF 9/18/2023, SEE ENDNOTE SP6-005.
APACHE IOTDB IS A TIME SERIES DATABASE AND THIS BENCHMARK IS FACILITATED USING THE IOT BENCHMARK

AMD EPYC™ Processors: Out-of-the-Box Optimization

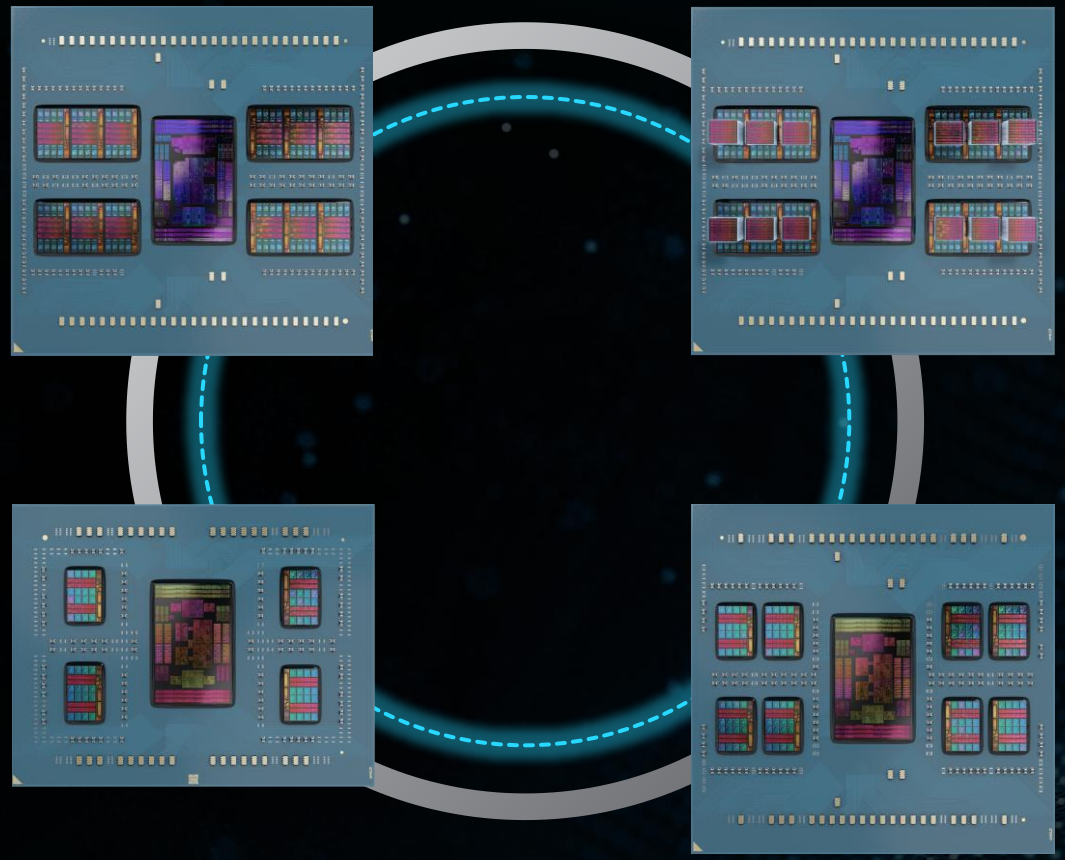
- Dedicate silicon area for cores benefitting the most workloads
- Minimize software impact
- Simplify customer choices
- Minimize acceleration taxes
- Implement broad workload optimizations
- Deploy high-performance accelerators where frequent operations and performance requirements are highest

AMD EPYC™ CPU Leadership

AMD EPYC™ 9004 SERIES PROCESSORS "GENOA"

1.7x Enterprise Server-Side Java® Performance

2P server : EPYC™ 9654 vs Intel™ Xeon® Platinum 8490H



AMD EPYC™ 9004 PROCESSORS WITH AMD 3D V-CACHE® "GENOA-X"

Up to **2.9x** Ansys® Fluent® CFD Jobs/Day

2P server : EPYC™ 9684X vs Intel™ Xeon® Platinum 8490H

AMD EPYC™ 8004 SERIES PROCESSORS "SIENA"

2.1x Server-side Java® Operations per Watt

2P server: AMD EPYC™ 8534P vs Intel™ Xeon® Platinum 8471N

AMD EPYC™ 97X4 PROCESSORS "BERGAMO"

~2.1x Cloud Container Density

2P server: AMD EPYC™ 9754 vs Intel™ Xeon® Platinum 8490H

SEE ENDNOTES SP5-011E, SP5-149, SP6-007

ANSYS® FLUENT BRIEF: HTTPS://WWW.AMD.COM/SYSTEM/FILES/DOCUMENTS/AMD-EPYC-9004X-PB-ANSYS-FLUENT.PDF

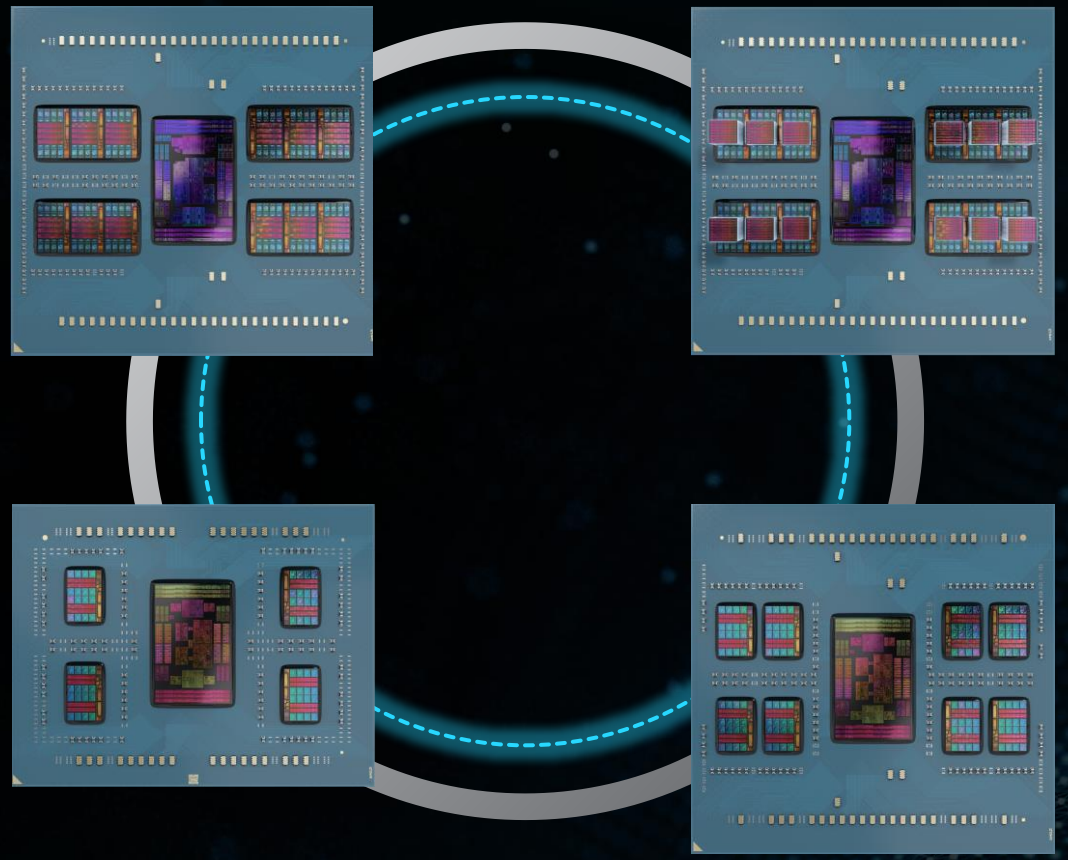
Completing The Optimized 4th Gen EPYC™ CPU Portfolio

AMD EPYC™
9004 SERIES PROCESSORS
"GENOA"

World's best data center CPU

AMD EPYC™
8004 SERIES PROCESSORS
"SIENA"

Purpose built for
Intelligent Edge



AMD EPYC™
9004 SERIES PROCESSORS
WITH AMD 3D V-CACHE®
"GENOA-X"

Best technical computing
optimized CPU

AMD EPYC™
97X4 PROCESSORS
"BERGAMO"

Best cloud native
optimized CPU

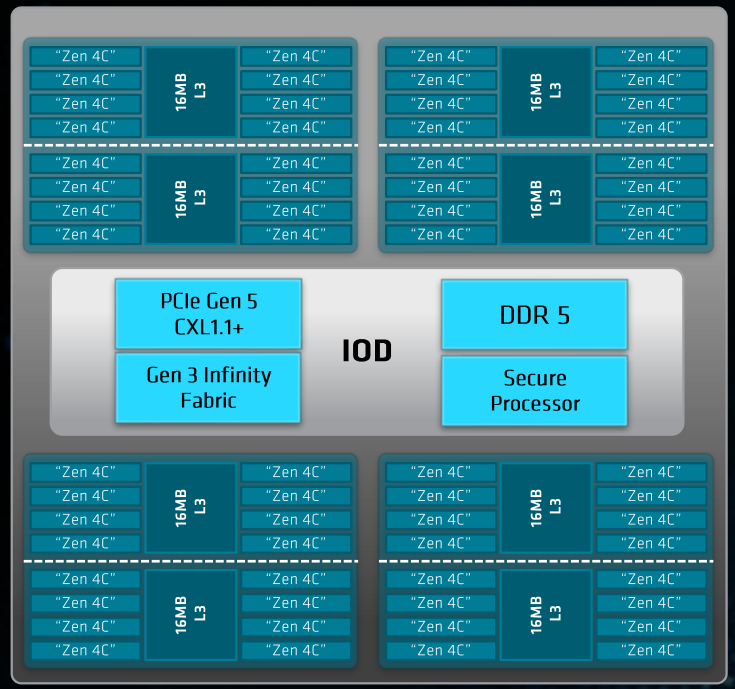
AMD EPYC™ 8004 Series CPUs At A Glance

COMPUTE

- AMD "Zen4c" x86 cores (Up to 4 CCDs / 64 cores / 128 threads); 1P only
- 1MB L2/Core, 16MB L3/CCX (32MB L3/CCD)
- ISA updates: BFLOAT16, VNNI, AVX-512 (256b data path)
- Memory addressability with 57b/52b Virtual/Physical Address
- Updated IOD and internal AMD Gen3 Infinity Fabric™ architecture with increased die-to-die bandwidth
- Target TDP range: 70W - 225W
- Updated RAS

MEMORY

- 6 channel DDR5 with ECC up to 4800 MHz
- Option for 2, 4, 6 channel memory interleaving
- RDIMM
- Up to 2 DIMMs/channel capacity of 1.152TB/socket (96GB DIMMs)



ORANGE indicates changes from SP5

Integrated I/O – No Chipset

- Up to 96 IO lanes of PCIe® Gen5, with speeds up to 32Gbps, bifurcations supported down to x1
- Up to 8 additional PCIe3 bonus lanes
- 32 IO lanes for SATA (shared with PCIe)
- 48 IO Lanes support CXL™1.1+ with bifurcations supported down to x4

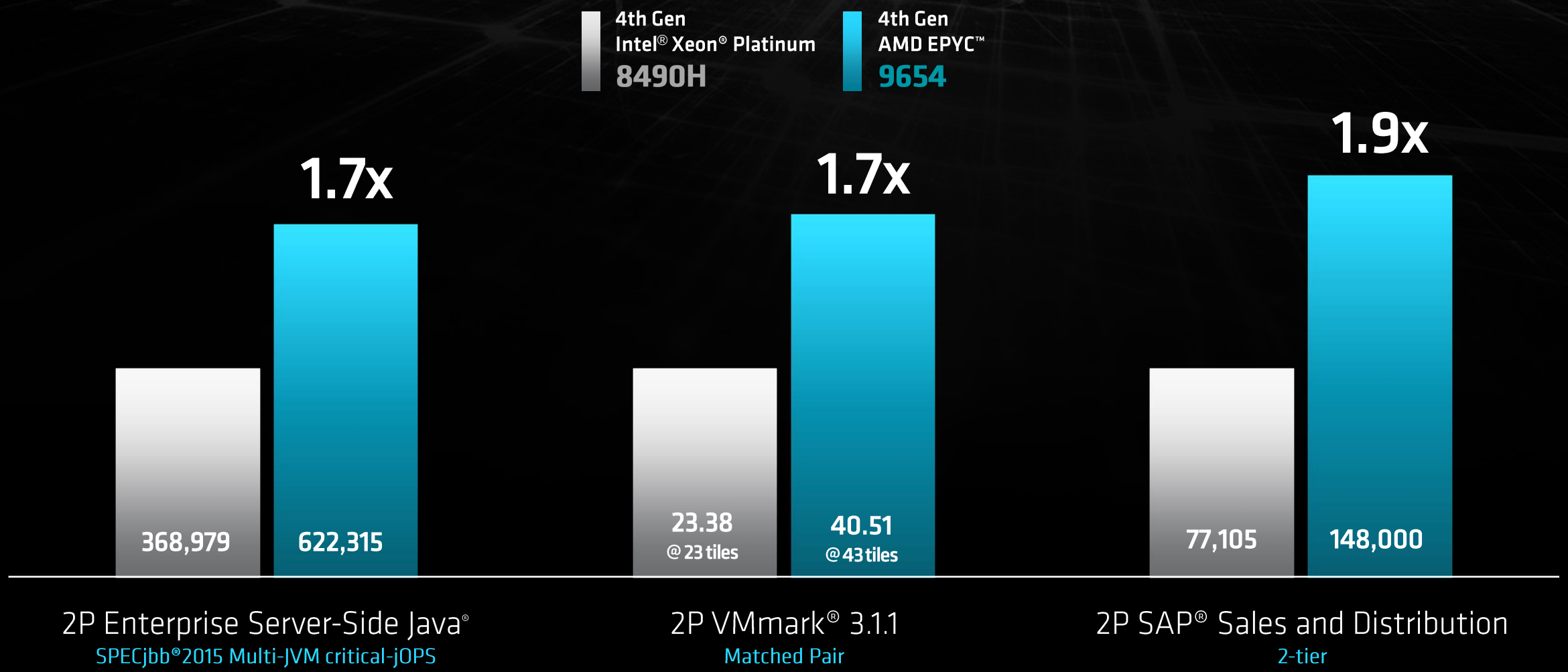
SP6 PLATFORM

- New socket, smaller form factor
- 58.5mm x 75.4mm, 4844 pins
- Optimized BOM Cost
- Server Controller Hub (USB, UART, SPI, I2C, etc.)

SECURITY

- Dedicated Security Subsystem with Hardware Root-of-Trust enhancements

Enterprise leadership

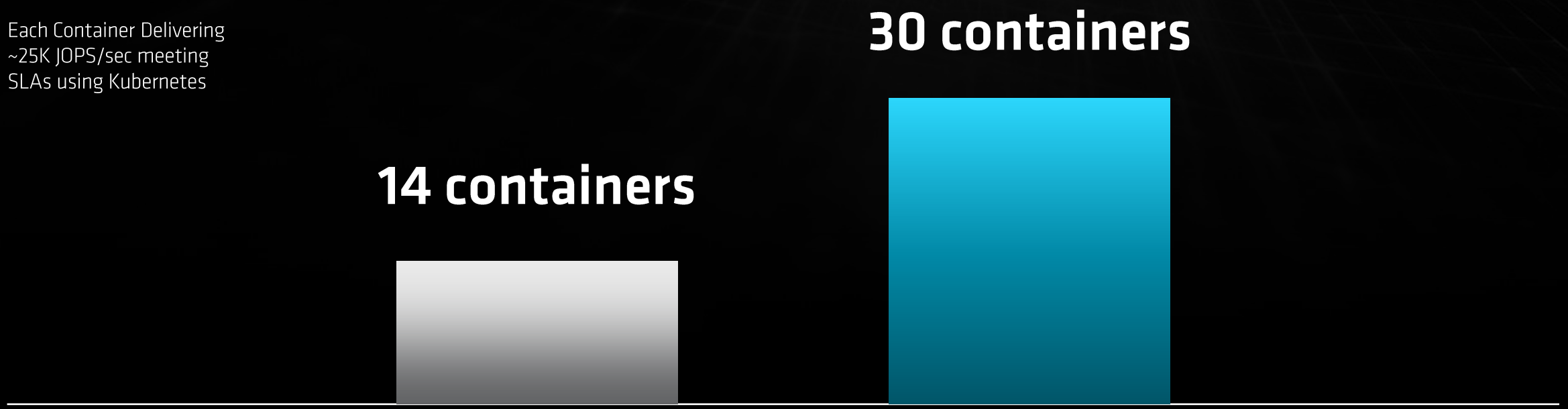


CLAIMS: SP5-104A, -049C, -056B

Density leadership

Up to
2.1x containers per server

Each Container Delivering
~25K JOPS/sec meeting
SLAs using Kubernetes

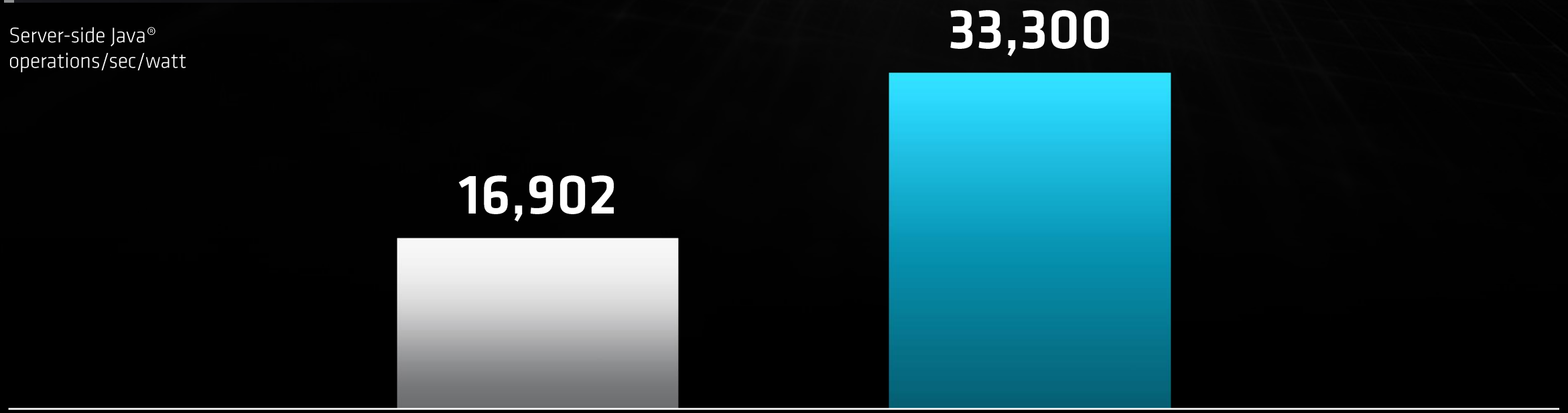


Equivalent Java® Ops Per Sec Per Container
SPECrate®2017_int_base
2P servers: 128C AMD EPYC 9754 vs 60C Intel Xeon Platinum 8490H

CLOUD NATIVE LEADERSHIP ENERGY EFFICIENCY

Up to
2x the system energy efficiency

Server-side Java®
operations/sec/watt



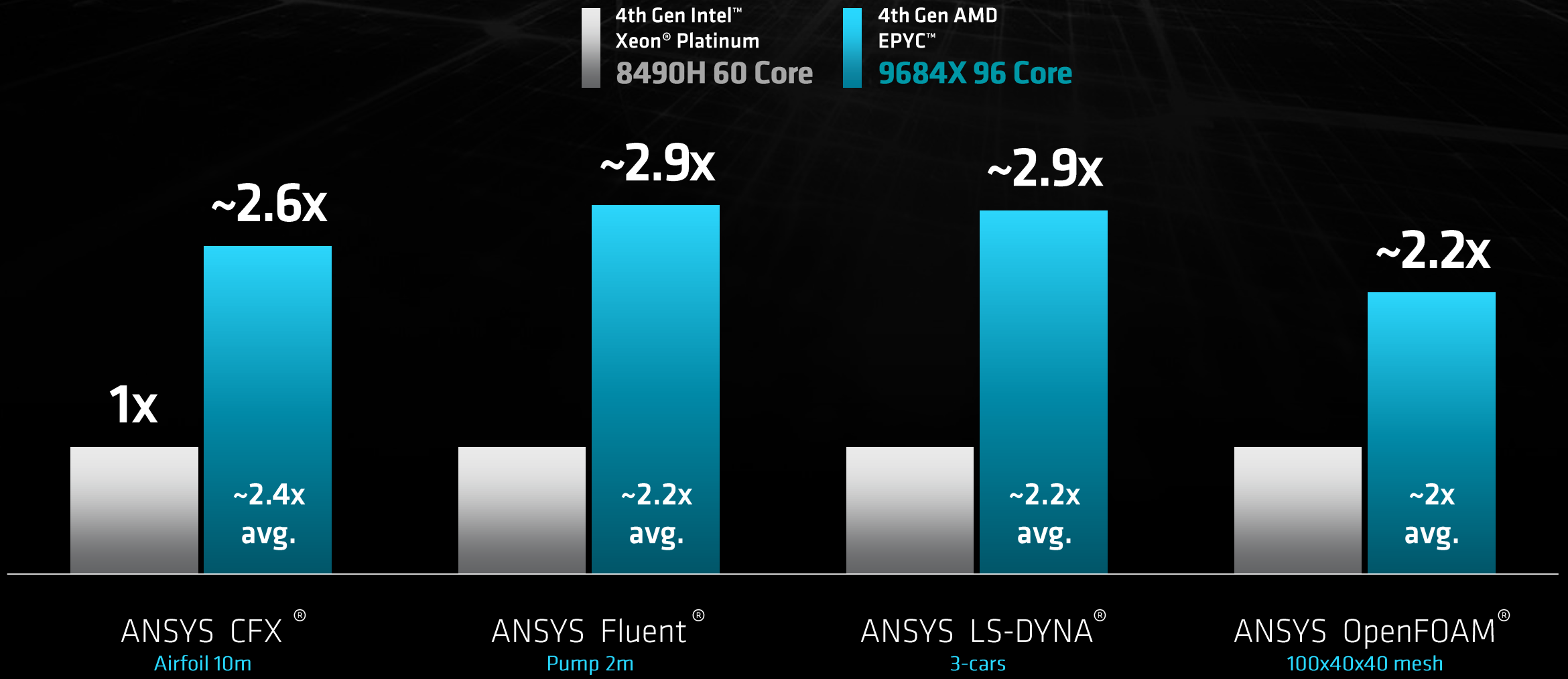
SPECpower_ssj®2008

2P Servers: 128C AMD EPYC 9754 vs 60C Intel Xeon Platinum 8490H

RESULTS MAY VARY DUE TO FACTORS INCLUDING SYSTEM CONFIGURATIONS, SOFTWARE VERSIONS AND BIOS SETTINGS. AS OF 6/13/2023, SEE HTTPS://WWW.AMD.COM/CONTENT/DAM/AMD/EN/DOCUMENTS/EPYC-BUSINESS-DOCS/PERFORMANCE-BRIEFS/AMD-EPYC-9754-PB-SPEC-POWER.PDF .

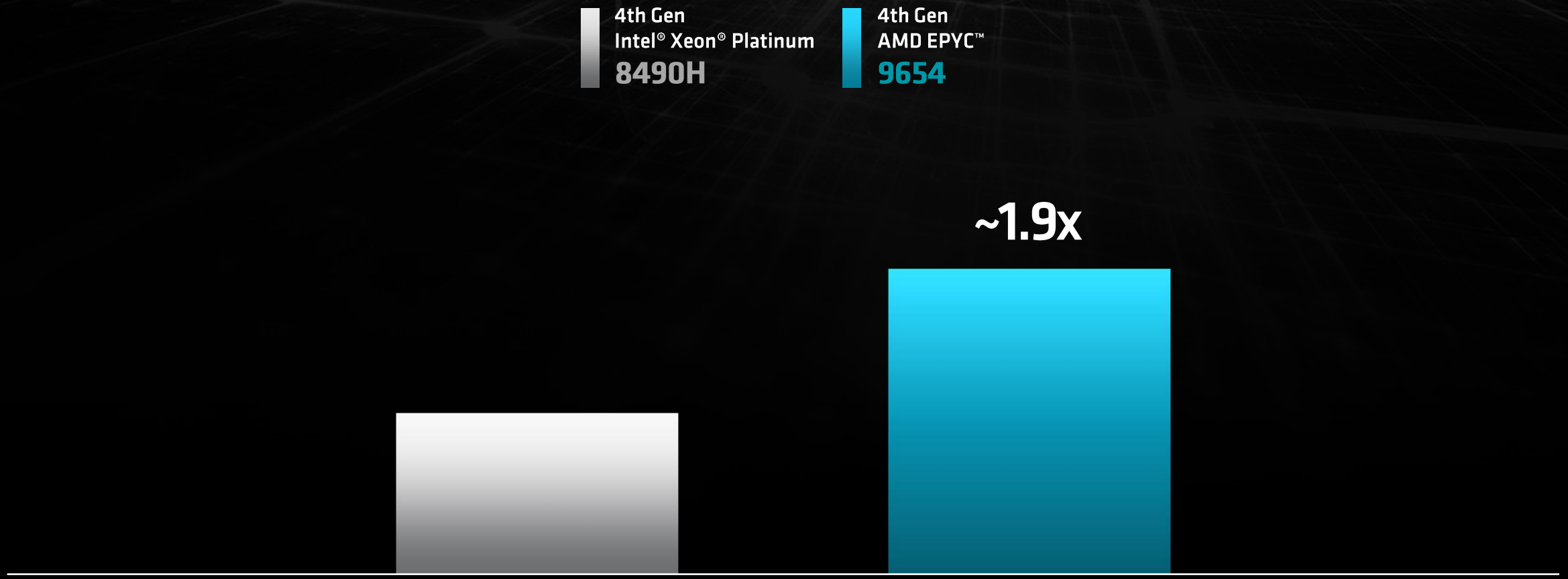
High Performance Computing Leadership

CFD and FEA | Top-of-Stack Max/Avg. Comparison



RESULTS MAY VARY DUE TO FACTORS INCLUDING SYSTEM CONFIGURATIONS, SOFTWARE VERSIONS AND BIOS SETTINGS.
AS OF 6/13/2023, SEE ANSYS CFX HTTPS://WWW.AMD.COM/CONTENT/DAM/AMD/EN/DOCUMENTS/EPYC-BUSINESS-DOCS/PERFORMANCE-BRIEFS/AMD-EPYC-9004X-PB-ANSYS-CFX.PDF, ANSYS LS-DYNA HTTPS://WWW.AMD.COM/CONTENT/DAM/AMD/EN/DOCUMENTS/EPYC-BUSINESS-DOCS/PERFORMANCE-BRIEFS/AMD-EPYC-9004X-PB-ANSYS-LS-DYNA.PDF, ANSYS FLUENT HTTPS://WWW.AMD.COM/CONTENT/DAM/AMD/EN/DOCUMENTS/EPYC-BUSINESS-DOCS/PERFORMANCE-BRIEFS/AMD-EPYC-9004X-PB-ANSYS-FLUENT.PDF AND OPENFOAM HTTPS://WWW.AMD.COM/CONTENT/DAM/AMD/EN/DOCUMENTS/EPYC-BUSINESS-DOCS/PERFORMANCE-BRIEFS/AMD-EPYC-9004X-PB-OPENFOAM.PDF

CPU AI Leadership



TPCx-AI

End-to-end workload derived from TPC® Express AI
Comparison run at SF3

CLAIM: SP5-051