



New CXL Product Line to Scale Memory Bandwidth and Capacity in Cloud

July 30, 2024

Forward-looking statements

Except for statements of historical fact, this presentation contains forward-looking statements (within the meaning of the federal securities laws) including statements related to future revenue, future earnings, and the success of our product releases that involve risks and uncertainties. Words such as “anticipates,” “expects,” “intends,” “plans,” “projects,” “believes,” “seeks,” “estimates,” “can,” “may,” “will,” “would” and similar expressions identify such forward-looking statements. These statements are not guarantees of results and should not be considered as an indication of future activity or future performance. Actual events or results may differ materially from those described in this presentation due to a number of risks and uncertainties.

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Overview

Company founded

1995

FY24 revenue

\$5.5B

Employees

6,800+

Patents worldwide

10,000+

Global fabless semiconductor supplier



 Nasdaq-100

Data center server market trends



CPU core growth outpacing **memory bandwidth** growth

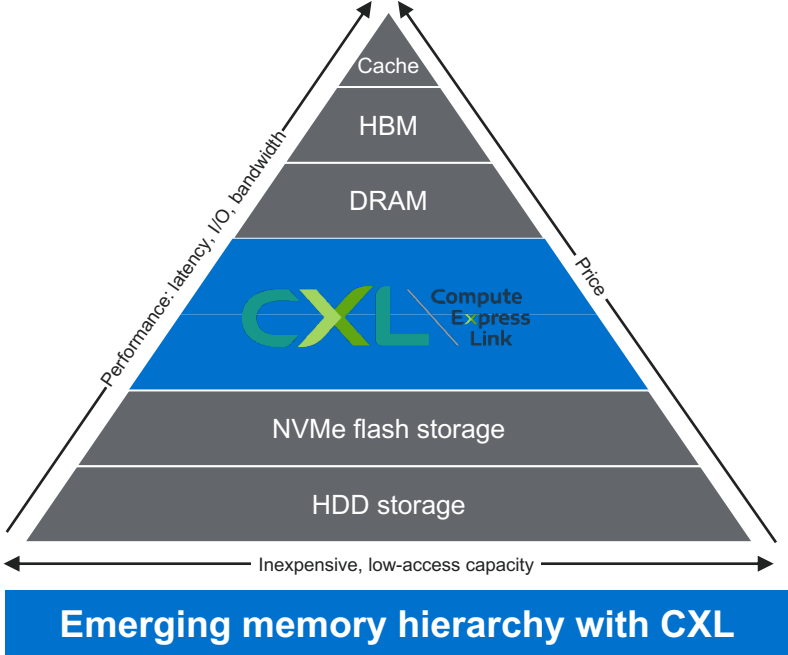
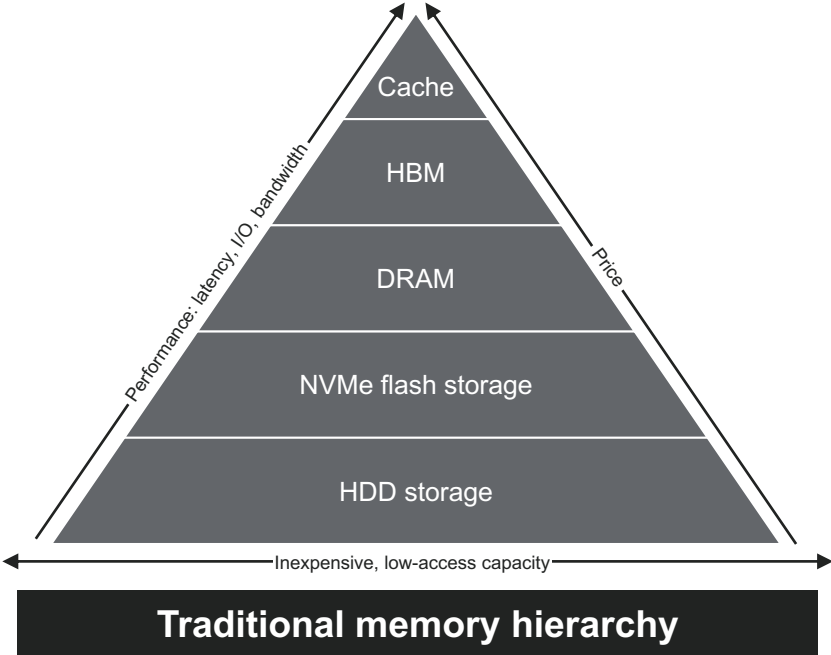


Constrained CPU pin-count limiting **memory capacity**



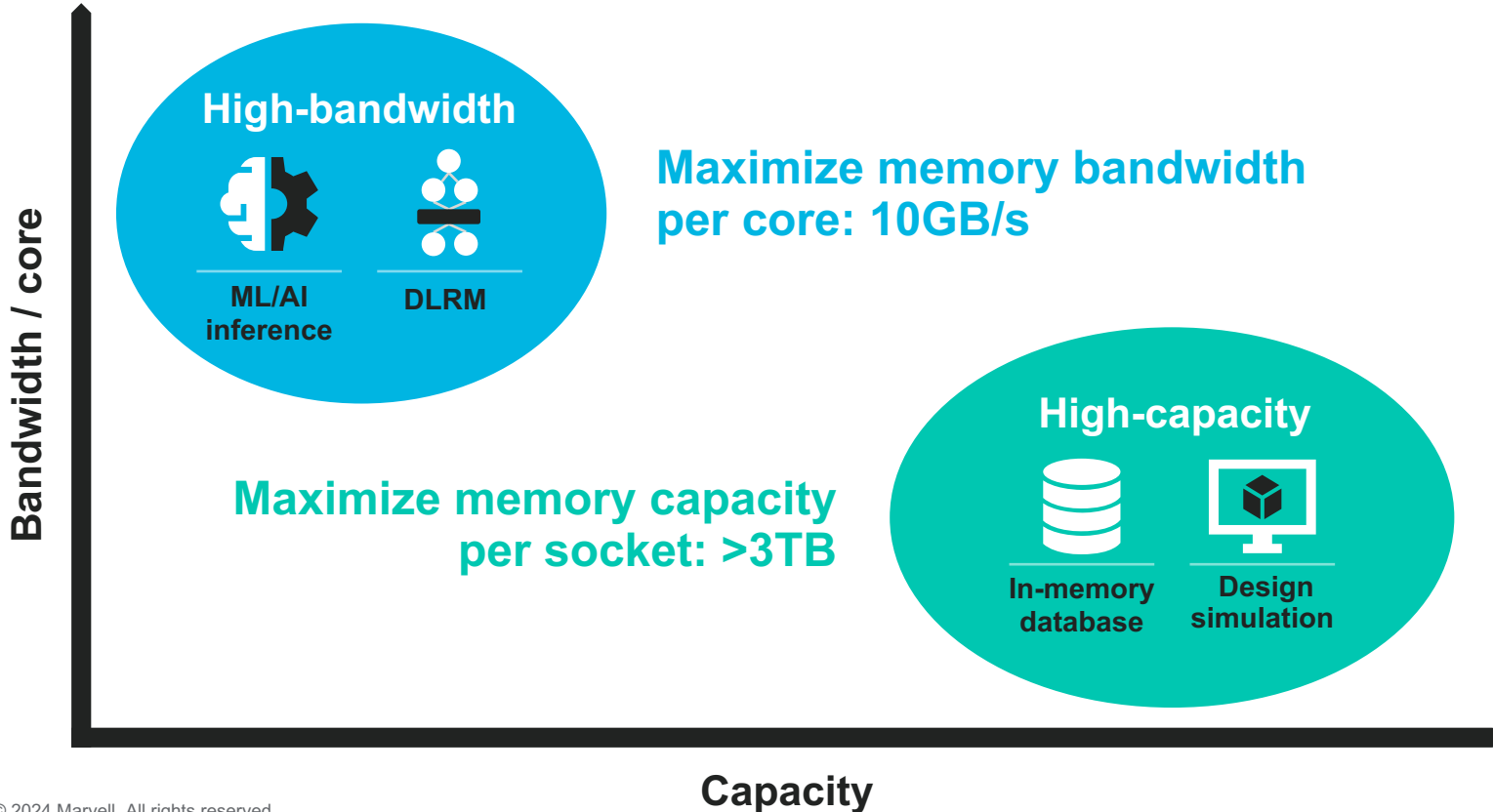
Sustainability and CAPEX driving **memory recycling** initiatives

Compute Express Link (CXL) addressing trends



Memory-optimized, industry-standard protocol over PCI Express

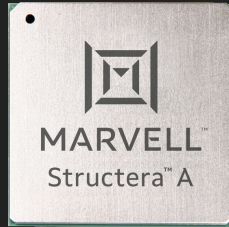
CXL addresses memory-intensive applications



Introducing the Marvell® Structera™ CXL product line

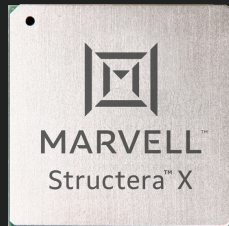
Structera™ A

Near-memory
compute accelerators



Structera™ X

Memory-expansion
controllers



Applications

High memory bandwidth

High memory capacity

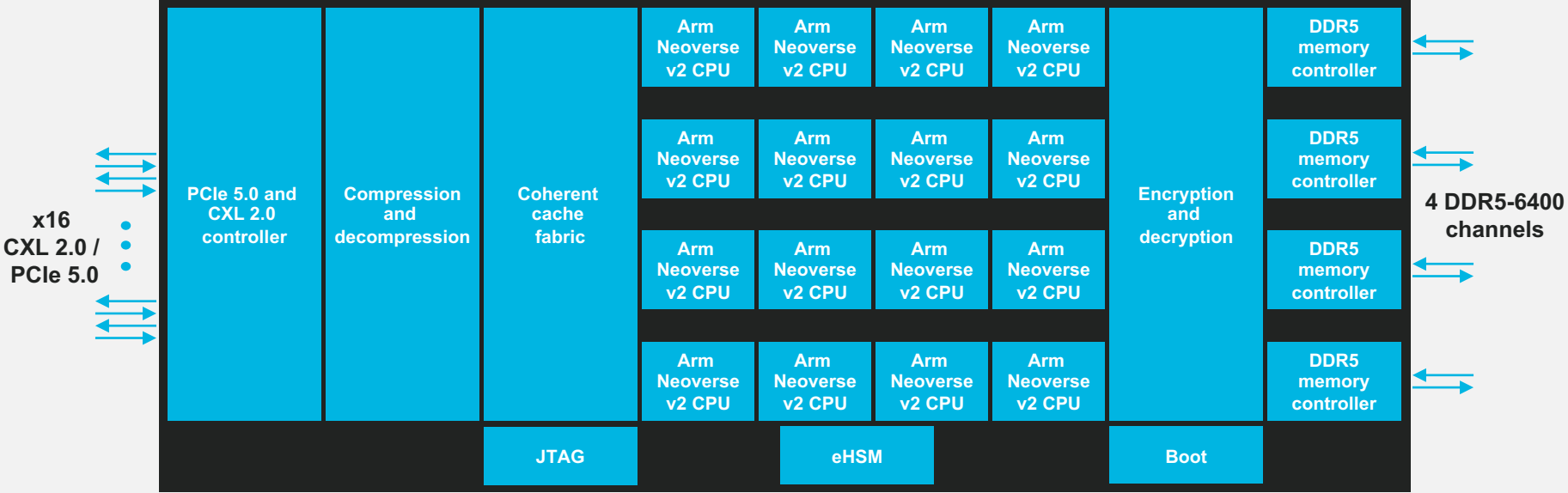
Structera A 2504: CXL 2.0 DDR5 4-channel accelerator



- CXL 2.0 / PCIe 5.0 x16 port controller
- 200 GB/s memory bandwidth
 - **4 x DDR5-6400 memory channels**
 - Support for up to two DIMMs per channel
- **16 Arm® Neoverse® V2 (Demeter) cores at 3.2 GHz**
- **Inline LZ4 compression / decompression**
- Inline AES-XTS 256-bit encryption and decryption
- Embedded hardware security module and secure boot
- **Built on industry-leading Marvell 5nm IP**
- Typical power consumption of <100W

Enables optimal compute and memory scaling

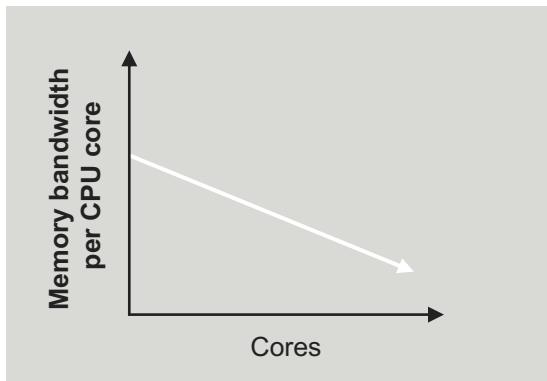
Structera A 2504 high-level block diagram



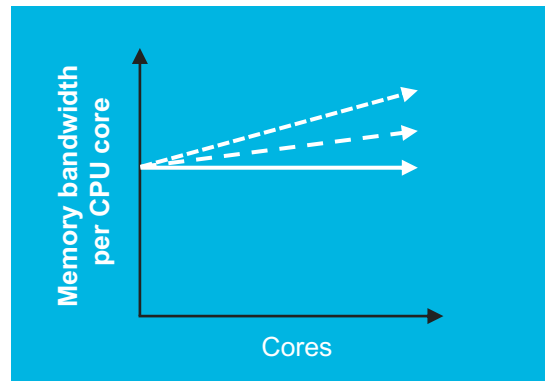
Industry's 1st CXL accelerator with server-class processor cores

Structera A scales compute and memory BW

Before

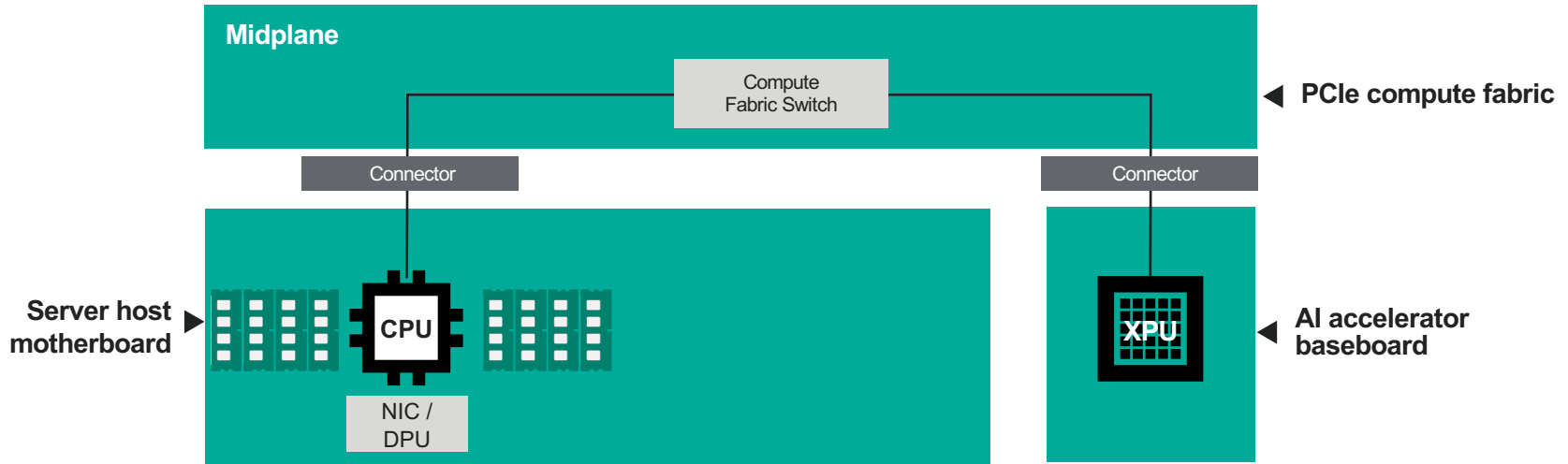


After



Enables new high-performance compute architectures

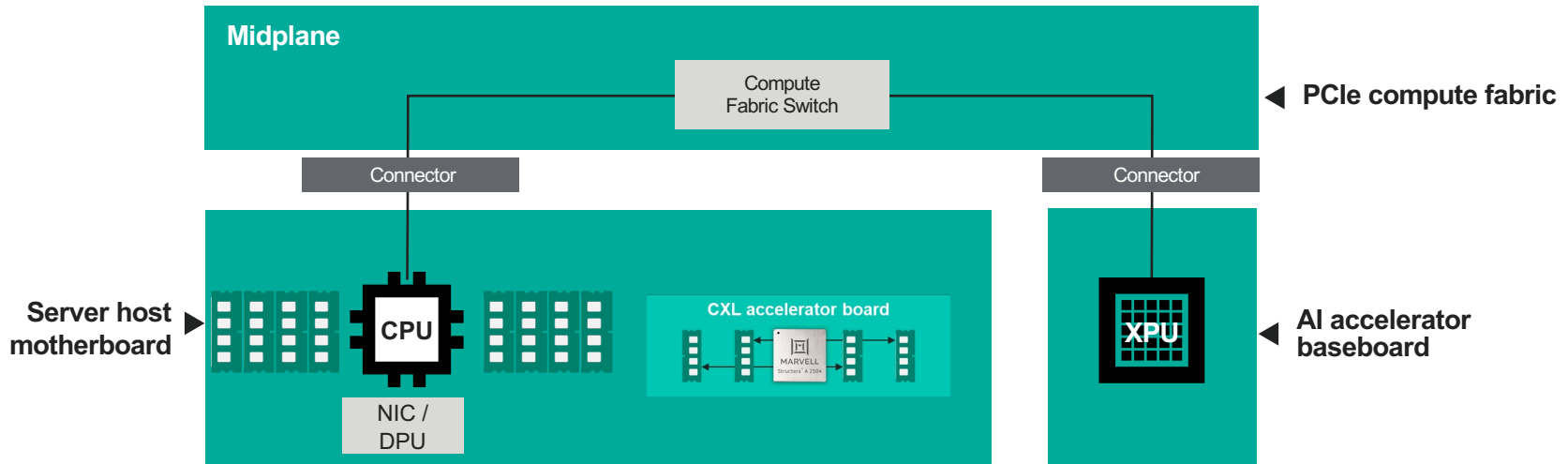
Deep learning recommendation model (DLRM) server



Server has **64 cores** with **400 GB/s** of **DRAM bandwidth** and consumes **400W** power
6.25 GB/s per **CPU core** and **1 W** per **GB/s**

Scaling compute and memory bandwidth per core critical

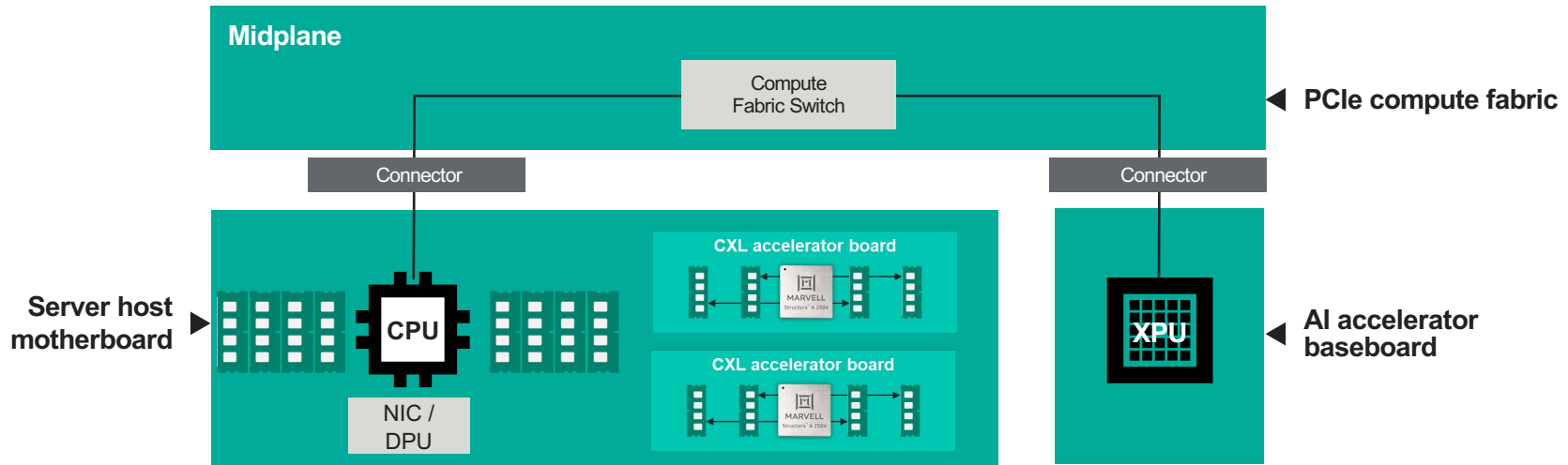
DLRM server example with Structera A CXL accelerator



Server has **80 cores** with **600 GB/s of DRAM bandwidth** and consumes **500W power**
7.5 GB/s per CPU core and **0.83W per GB/s**

Increases number of cores by 25% and memory bandwidth by 50%

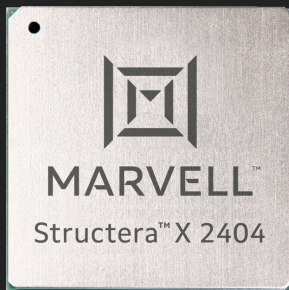
DLRM server example with 2 Structera A CXL accelerators



Server has **96 cores** with **800 GB/s of DRAM bandwidth** and consumes **600W power**
8.33 GB/s per CPU core and **0.75W per GB/s**

Increases number of cores by 50% and doubles memory bandwidth

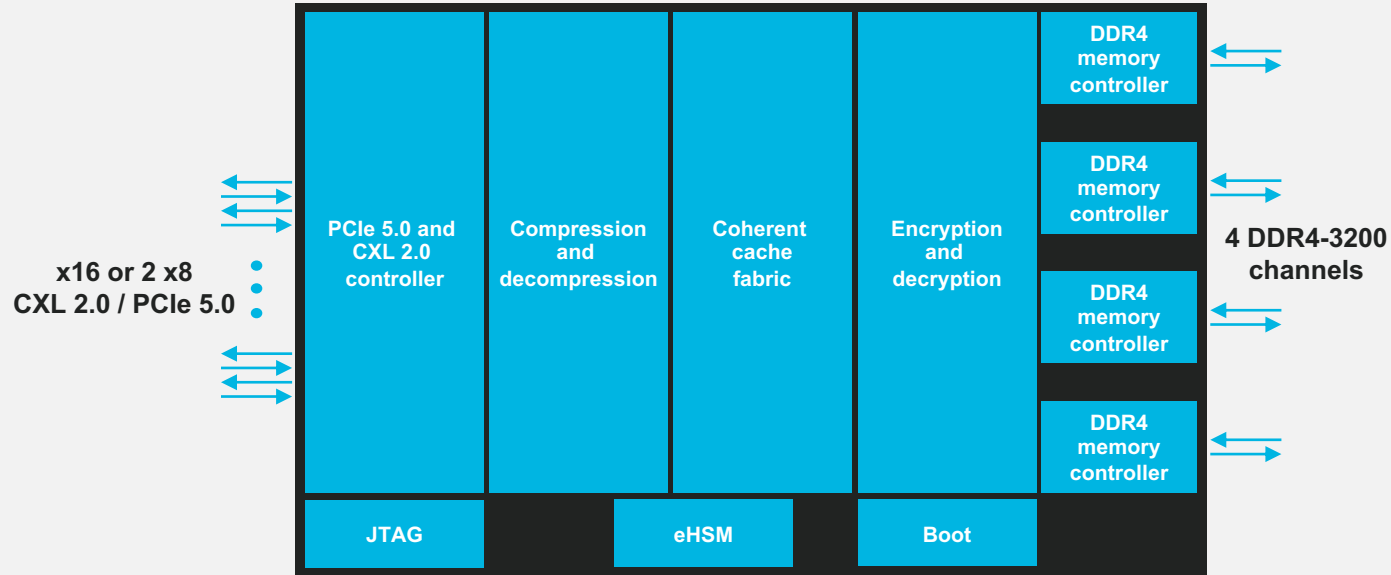
Structera X 2404: CXL 2.0 DDR4 4-channel expander



- CXL 2.0 / PCIe 5.0 1x16-port or 2x8-port controller
- 100 GB/s memory bandwidth
 - 4 x DDR4-3200 memory channels
- **Support for up to three DIMMs per channel**
- **Support for >6TB of DRAM memory capacity**
- **Inline LZ4 compression / decompression**
- Inline AES-XTS 256-bit encryption and decryption
- Embedded hardware security module and secure boot
- **Built on industry-leading Marvell 5nm IP**
- Typical power consumption of <30W

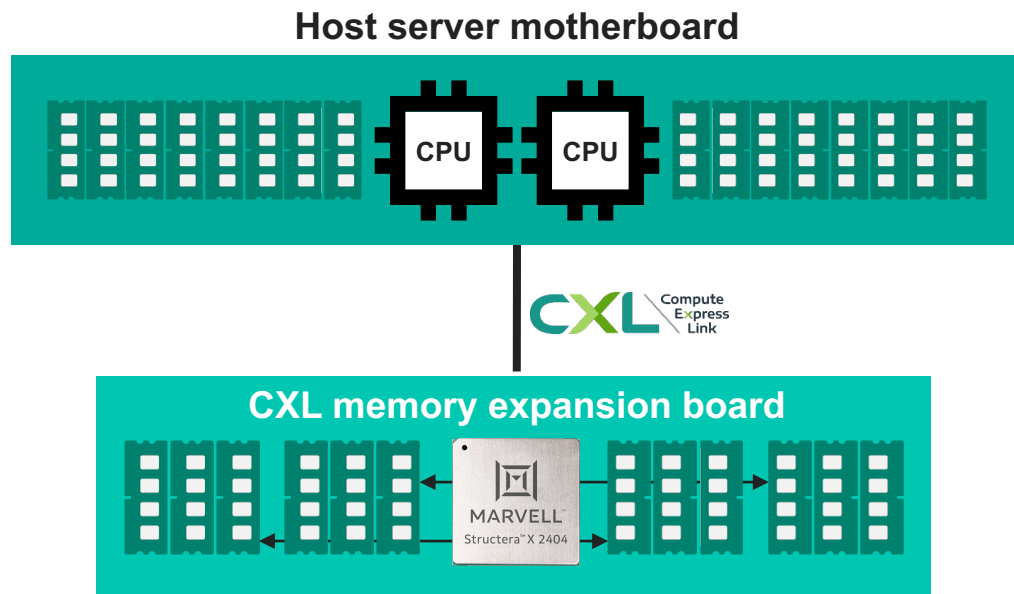
Enables recycling of DDR4 DIMMs to increase server memory capacity

Structera X 2404 high-level block diagram



Industry's 1st 4 memory channel DDR4 expander with compression

Structera X 2404 enables **DDR4** memory recycling



Recycle up to **12 DDR4 DIMMs** per expander (up to 6TB)

Increases server memory capacity with lower CAPEX and reduces e-waste

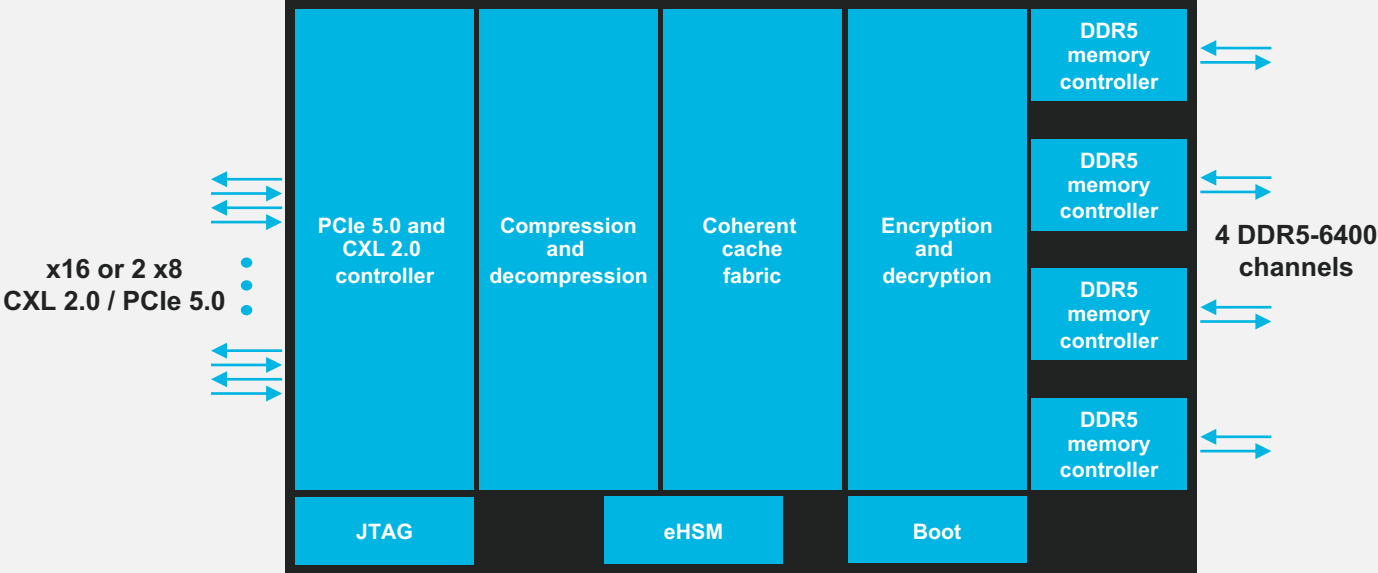
Structera X 2504: CXL 2.0 DDR5 4-channel expander



- CXL 2.0 / PCIe 5.0 1x16-port
- 200 GB/s memory bandwidth
 - 4 x DDR5-6400 memory channels
 - Support for up to two DIMMs per channel
- **Support for >4TB of DRAM memory capacity**
- **Inline LZ4 compression / decompression**
- Inline AES-XTS 256-bit encryption and decryption
- Embedded hardware security module and secure boot
- **Built on industry-leading Marvell 5nm IP**
- Typical power consumption of <30W

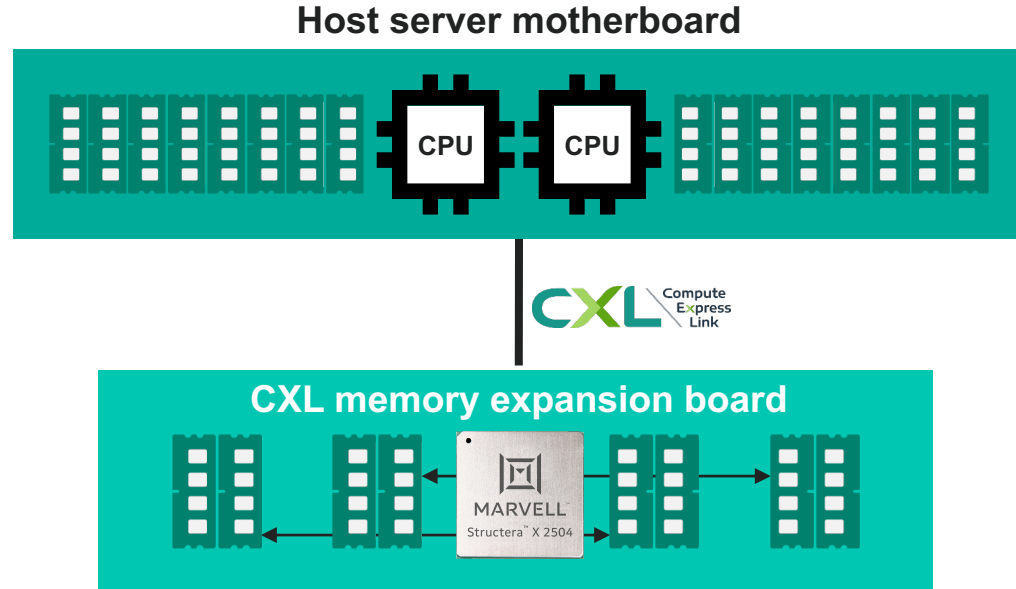
Enables high-capacity DDR5 memory servers

Structera X 2504 high-level block diagram



Industry's 1st 4 memory channel DDR5 expander with compression

Structera X 2504 enables **DDR5** memory expansion



Up to 8 DDR5 DIMMs per expander (up to 4TB)

Increases server memory capacity with high-capacity DDR5 DIMMs

Structera product family overview summary

Structera A

Near-memory accelerators



Structera X

Memory-expansion controllers



**CXL 2.0 /
PCIe 5.0**

4 x DDRx
memory channels

Industry-first features
to enable CXL adoption

Structera

Industry firsts

4 memory channel support	←→	Higher memory bandwidth and capacity
Inline compression	←→	Optimizes DRAM capacity
3 DIMMs per channel (3DPC)	←→	Maximizes DRAM capacity
5nm process	←→	Lower power consumption
Multi-host support	←→	Improves memory utilization
Arm® Neoverse® V2 cores	←→	Optimizes server efficiencies

Key features and capabilities to enable CXL adoption in cloud

Key takeaways

1

CXL to address data center server memory bandwidth, capacity and recycling trends

2

New Marvell Structera CXL product line optimized for memory-intensive cloud applications

3

Structera devices are 1st to support 4 memory channels, integrate compression and use 5nm

4

Structera A 2504 is industry's 1st CXL accelerator with Arm Neoverse v2 cores

5

Structera X 2404 is industry's 1st CXL expander to support recycling of up to 12 DDR4 DIMMs



Thank You



Essential technology, done right™