Transforming Cloud Data Centers with CXL

EMPOWERING OPEN.

OCP GLOBAL SUMMIT

OCTOBER 18-20, 2022
SAN JOSE, CA

Transforming Cloud Data Centers with CXL

Howard Borchew, Distinguished Engineer
Marvell Technology, Inc.

MARVELL™

Essential technology, done right™

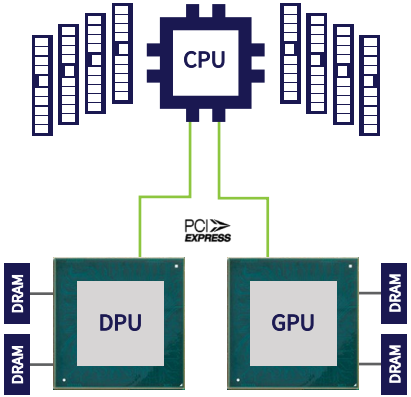
Forward-looking statements

Except for statements of historical fact, this presentation contains forward-looking statements (within the meaning of the federal securities laws) including, but not limited to, statements related to market trends and to the company's business and operations, business opportunities, growth strategy and expectations, and financial targets and plans, 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.

For factors that could cause Marvell's results to vary from expectations, please see the risk factors identified in Marvell's Quarterly Report on Form 10-Q for the fiscal quarter ended July 30, 2022, as filed with the SEC on August 26, 2022, and Marvell's Annual Report on Form 10-K for the fiscal year ended January 29, 2022, as filed with the SEC on March 10, 2022, and other factors detailed from time to time in Marvell's filings with the SEC. The forward-looking statements in this presentation speak only as of the date of this presentation and Marvell undertakes no obligation to revise or update publicly any forward-looking statements.

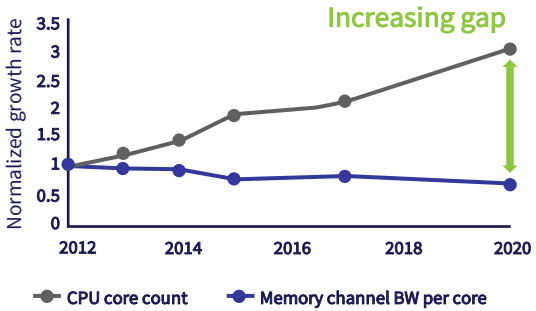
Cloud data center memory challenges

Memory tied-down to xPUs



Cannot share

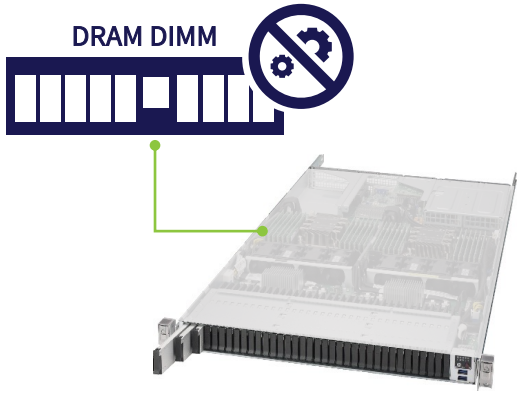
Bandwidth per core declining



Source: Meta, OCP Summit Presentation Nov 2021

Degrades efficiency

No near-memory compute



Limits performance

CXL is poised to address these issues

Cloud data center memory challenges

Memory tied-down to xPUs

CXL Expander

CXL Pooling

CXL Switch

Bandwidth per core declining

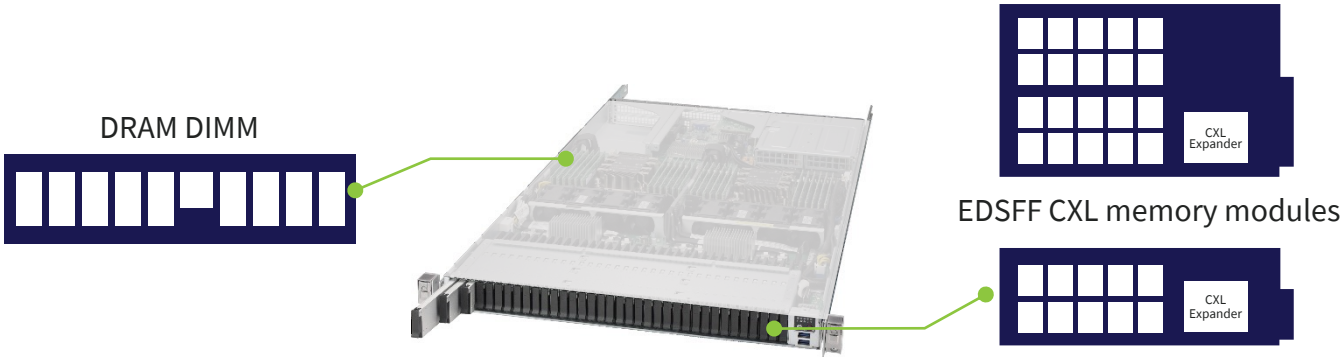
CXL Expander

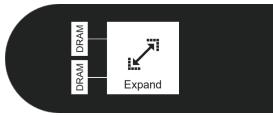
No near-memory compute

CXL Accelerator

CXL is poised to address these issues

CXL memory expansion





DIMM challenges

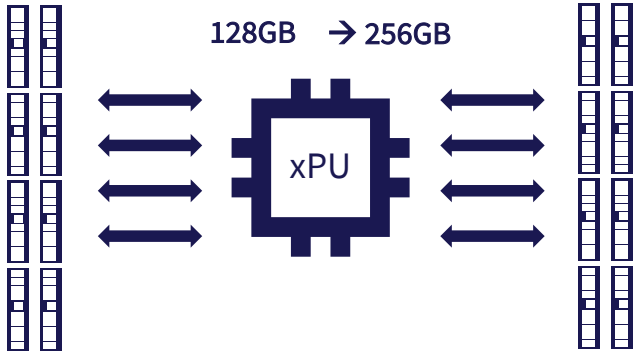
- Limited performance, capacity scaling
- Not serviceable / no telemetry
- No acceleration

CXL solution

- Scale performance and capacity
- Thermally optimized; pluggable
- Telemetry and acceleration
- Mix-and-match DRAM
- Share and pool
- SKU flexibility

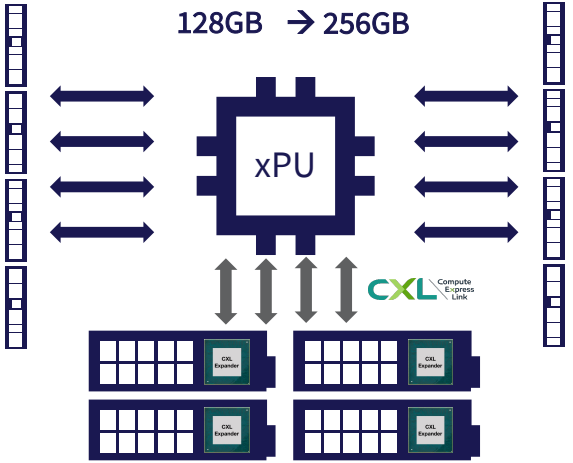
CXL memory expanders improve performance

Today: 2 DIMMs per channel (2DPC)



1DPC same bandwidth as 2DPC

1DPC + CXL expanders

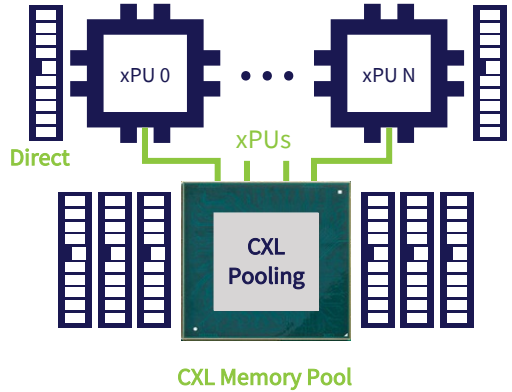


Use PCI Express to open bandwidth

Same capacity with greater bandwidth and utilization

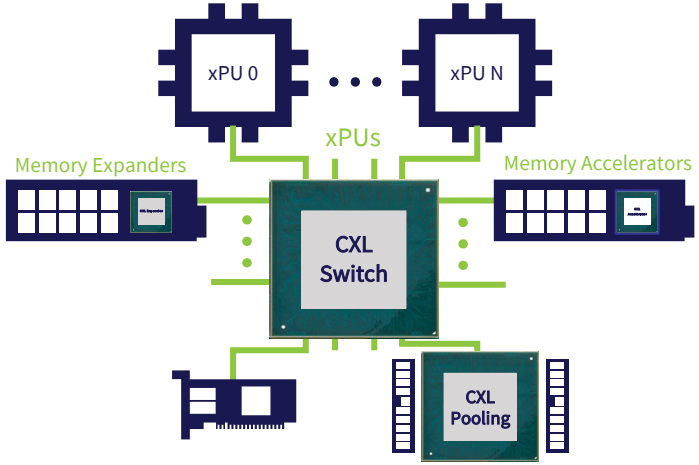
Sharing memory with CXL

CXL pooling



- Pool memory across multiple xPUs
- Rescue under-utilized DRAM
- Scale memory independent of xPUs

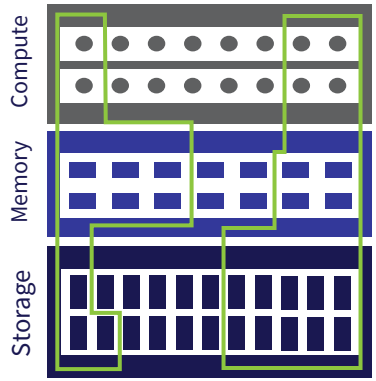
CXL switch



- Flexible to connect resources into fabric
- Scalable, serviceable
- Enables fully composable infrastructure

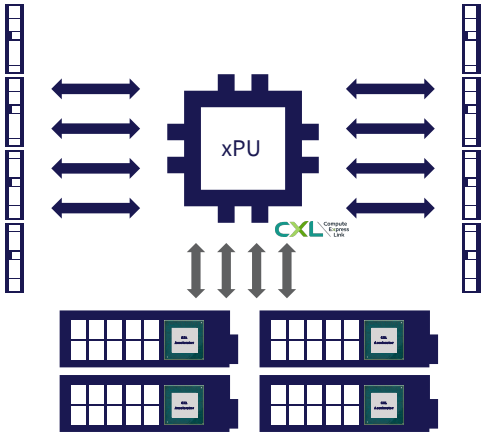
CXL solves data center memory challenges

Disaggregated memory



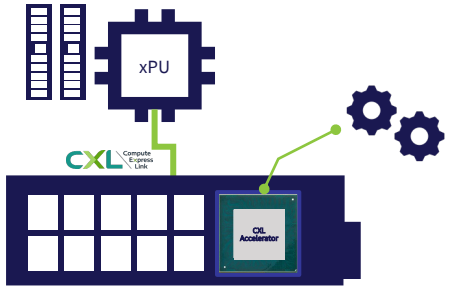
Fully composable

More bandwidth per core



Optimize efficiency

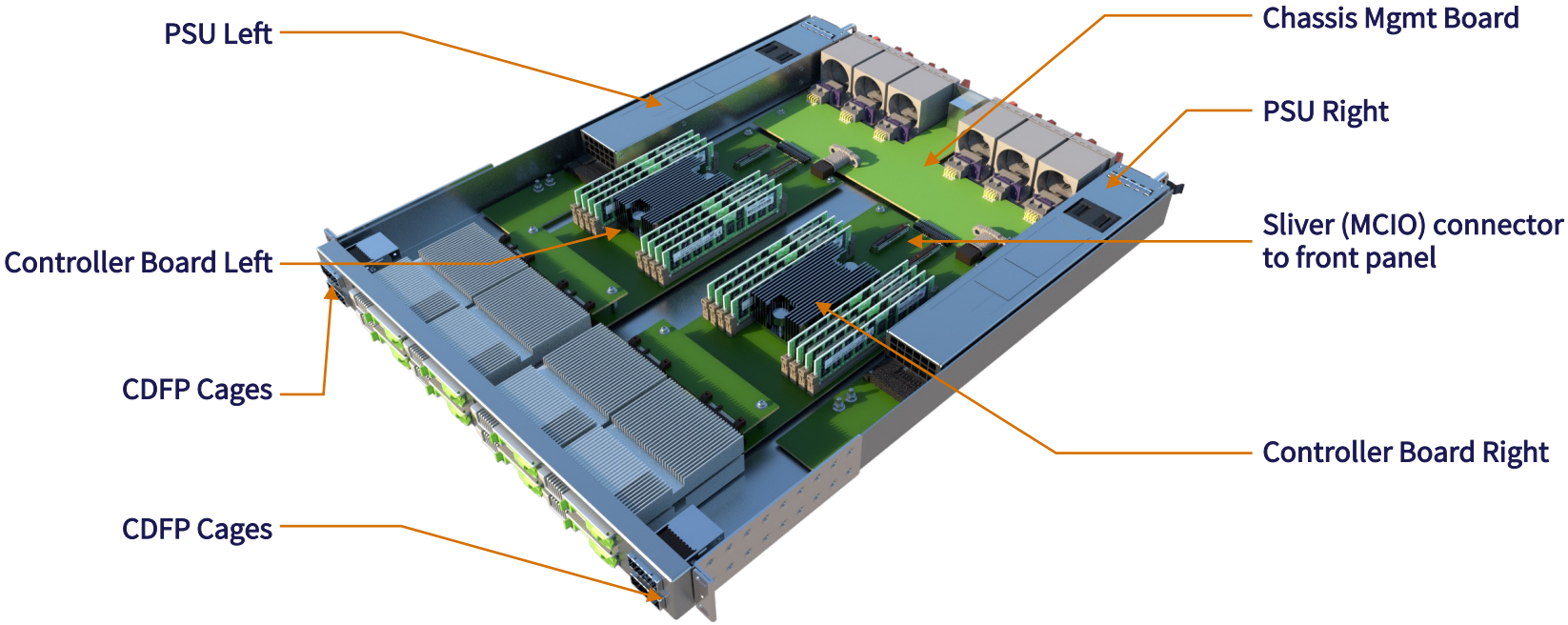
Near-memory computation



Ultimate performance

CXL is disrupting cloud data center architectures

CXL memory pooling appliance



CXL memory pooling appliance

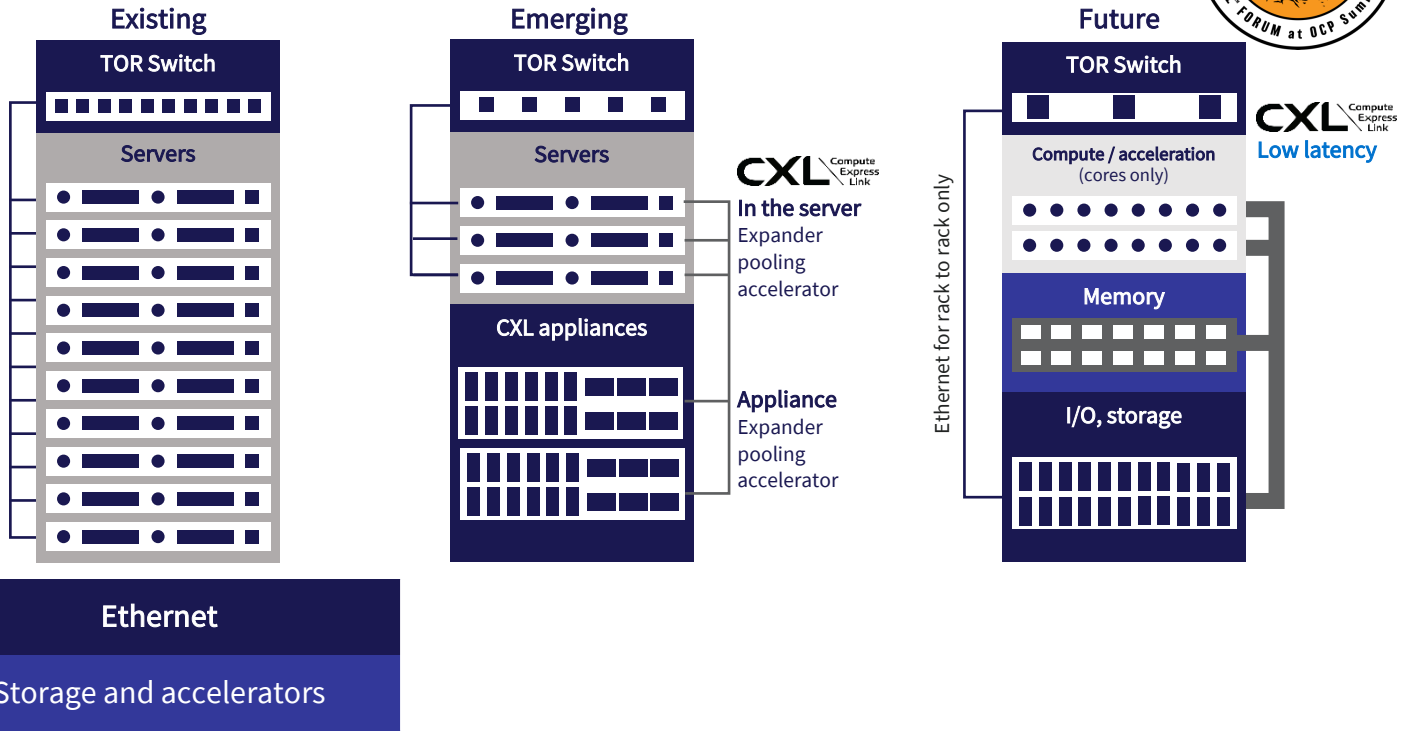
Phase 1

- Two FPGAs per appliance
- Four CXL 32GT x8 hosts per FPGA

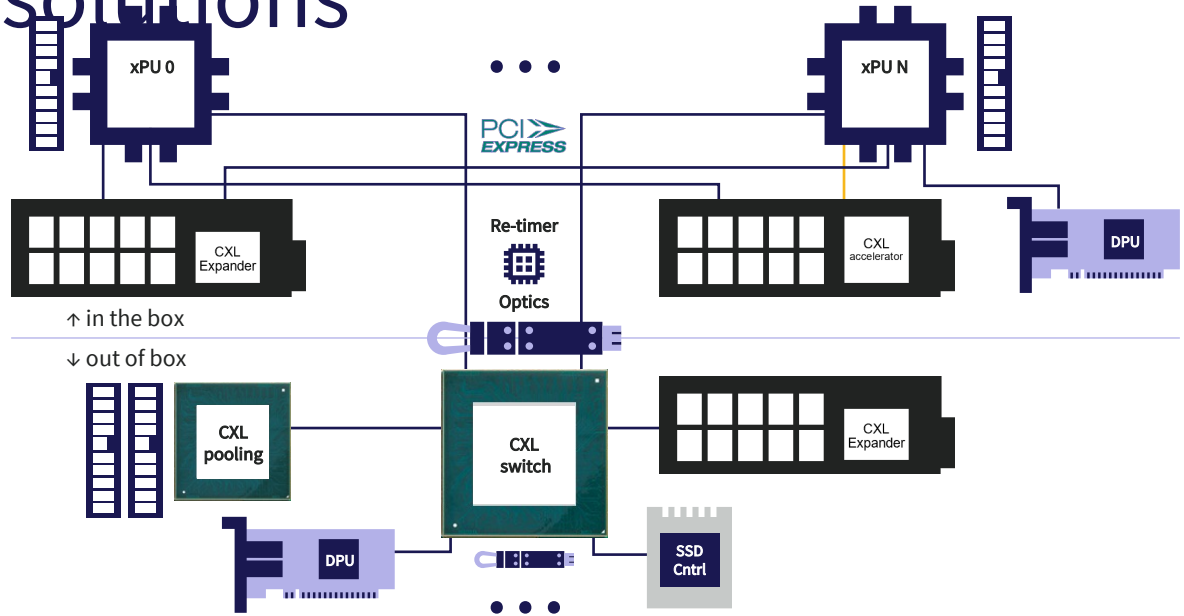
Phase 2

- Two 5nm SoCs per appliance
- Eight CXL 32GT x8 hosts per SoC

CXL vision: Optimal resource utilization



Comprehensive end-to-end CXL solutions



Marvell solution

- Expanders
- Pooling
- Switch
- Accelerators

- Custom Compute
- DPUs / SmartNICs
- Electro-optics
- Re-timers
- SSD Controllers

Built on industry's most comprehensive cloud portfolio

Summary

1. CXL is disrupting cloud data center architectures
2. Uniquely positioned to enable end-to-end CXL in data center
3. CXL is driving the next multi-billion-dollar opportunity
4. CXL live memory pooling demo at OCP 2022

Thank you.

EMPOWERING OPEN.

OCP GLOBAL SUMMIT

OCTOBER 18-20, 2022
SAN JOSE, CA