Flash Memory Summit

Solving Memory Bottlenecks in Compute Systems with CXL™-Based Memory Controllers

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35 YEARS OF NAND FLASH MEMORY INNOVATION

Agenda

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- What problem is being solved by CXL™ and how
- Resource management
- Sharing and efficient data exchange
- First instantiations of CXL™
- Resilience, security and performance

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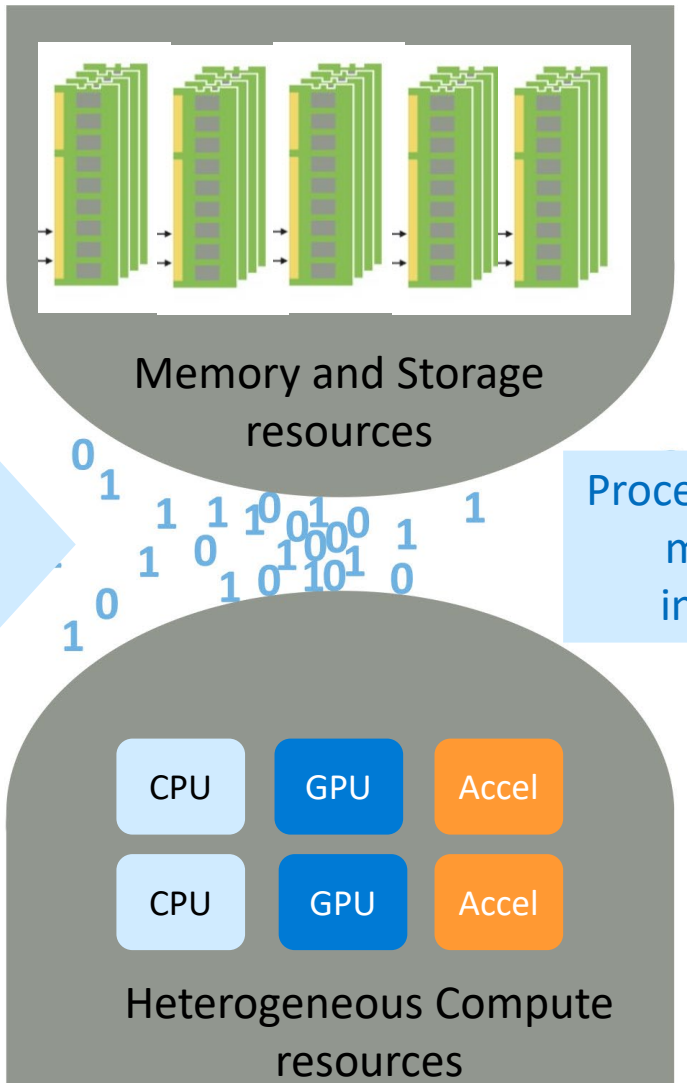
What Problem is Being Solved by CXL™

Global data generation



Process and extract meaningful information

Time critical data
- Stock market decisions

Analysis extraction
- Medical modelling
- Self driving machines

Filtered and sorting
- Data analytics
- Cat photos

Task Prioritization
Augmented reality
Advertising
Catastrophe avoidance
Tomorrows weather forecast

Meaningful data, Time critical results

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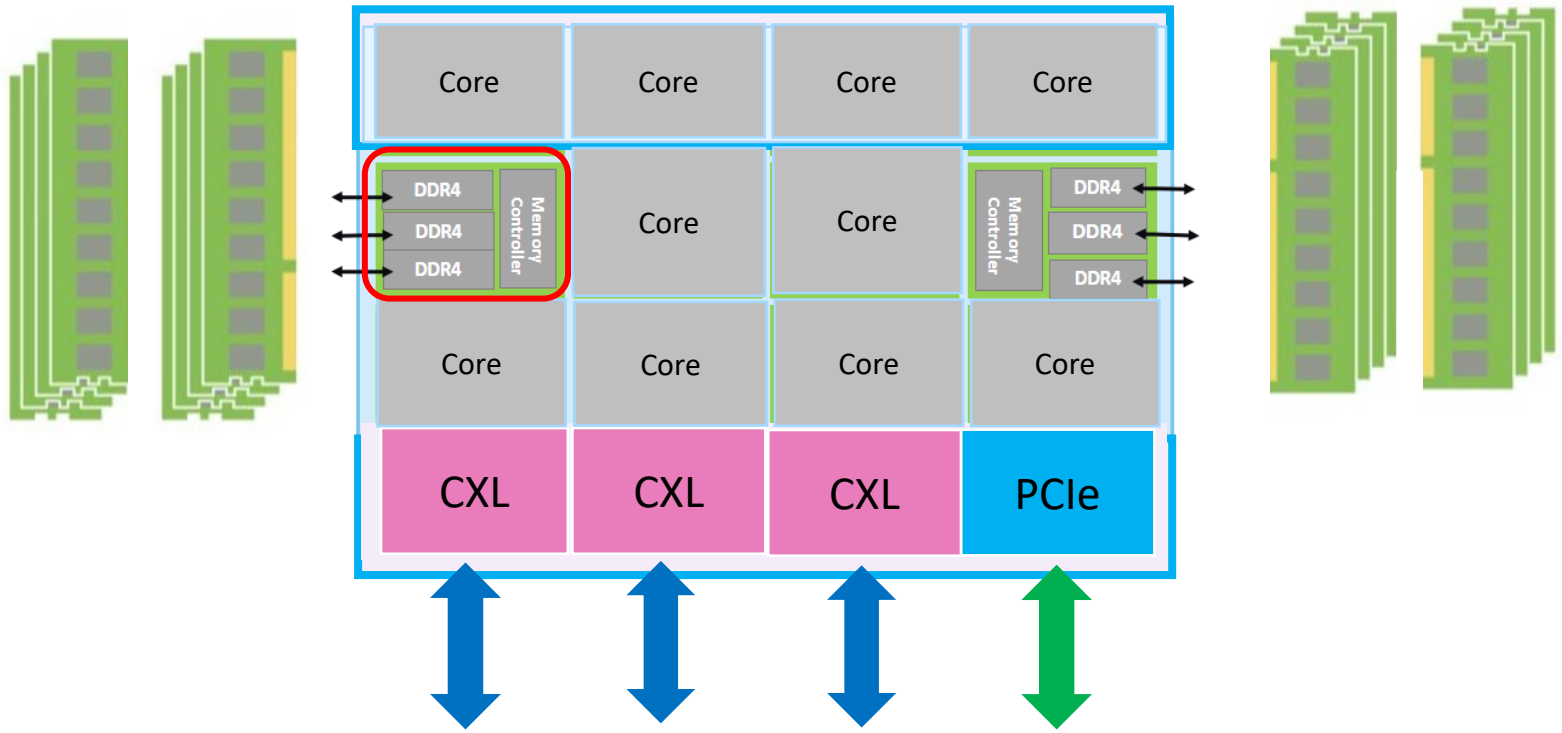
Resource Management



- CXL ports enables expansion of memory access by the processor cores
- CXL support 3 protocols:
  - CXL.mem
  - CXL.cache and
  - CXL.io

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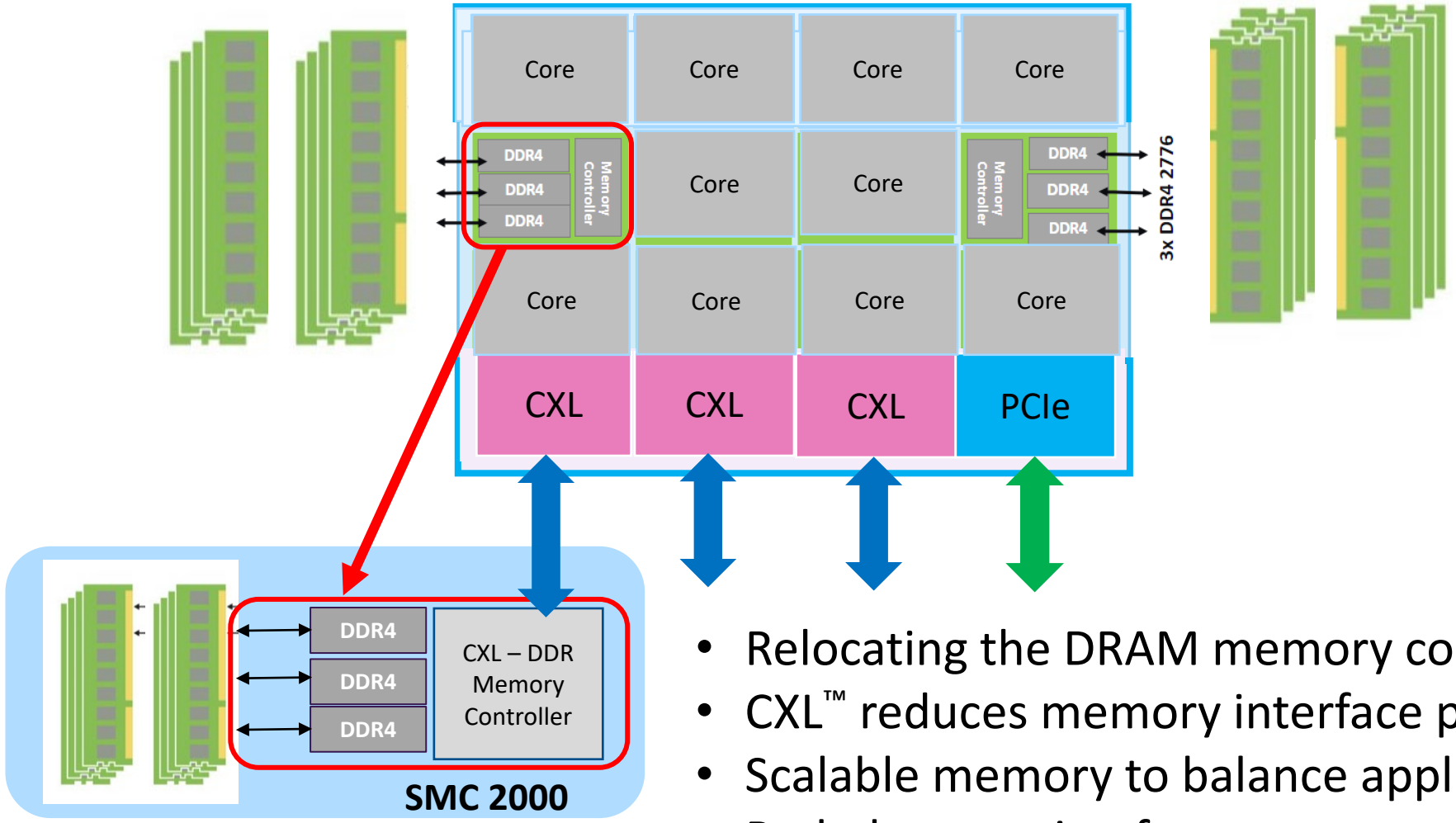
Resource Management



Disaggregated CXL – DDR memory controller

- Relocating the DRAM memory controller outside the core
- CXL™ reduces memory interface pin-count
- Scalable memory to balance application needs
- Re-balance ratio of processor cores to memory

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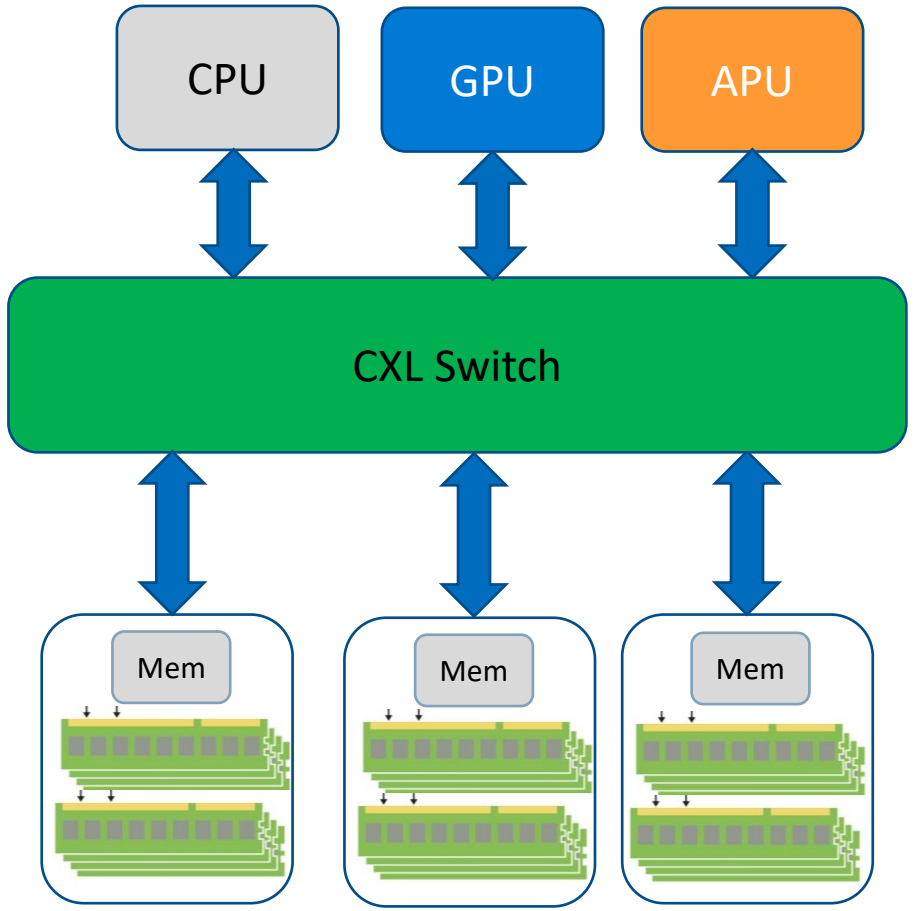
Sharing and Efficient Data Exchange

- CXL™ 2.0 adds support for switching topologies
- Switching enables resources to be allocated, managed and reconfigured in response to application needs
- Provisioning is much more flexible to avoid underutilized or stranded resources



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First Instantiations of CXL™ – Memory Controllers

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EDSFF formats

Add-in card formats

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Resilience, Security and Performance

Lowest Latency Memory Controllers
Enable CXL-attached memory to be used as hot memory tier

Enterprise Class RAS (Reliability Availability Serviceability)
Advanced ECC, Data Integrity, Diagnostics, Scrub, BIST

Industry Leading Security
Secure boot with hardware root of trust
Firmware attestation
Link encryption

Ecosystem Interoperability
All CPUs, all DRAM vendors

Media Independence
Supports both DDR4 and DDR5

Lowers Total Cost of Ownership
Decreased spend per unit bandwidth
Futureproofs investment

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