HybriDIMM™ Media Controller

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Netlist
Memory Solution Space

- Cost effective 256GB-1TB+ capacities on the DRAM bus
  - Cost effective, High Bandwidth, Low latency
  - Use of Software drivers (no special HW protocol required)

- Architectural context that encompasses
  - Take advantage of large DRAM:NAND price ratio of ~50:1 per GB
  - Supports emerging memory technologies - RRAM, PCM, MRAM, NRAM, etc

- Significant progress in standardization
  - Competitive solutions continue to be single sourced
SCM - What is the ideal solution?

NAND
Economics

DRAM
Performance

ARCHITECTURES
Architecture agnostic → using software drivers & accommodating emerging memories

BW & LATENCY
Cost effective performance improvements and latency reduction
HybriDIMMTM solution

- Memory and Storage on one physical DIMM
  - Three HW elements: (a) DRAM, (b) NVM, and (c) HybriDIMMTM Media Controller (HMC)

Significant progress on HybriDIMMTM ASIC
SCM: HybriDIMM™ Architectural Advantages

Raw Technologies

- Ideal Case
- DRAM
- MRAM
- NRAM
- ReRAM
- 3D-NAND
- PCM

Capacity/$

Bandwidth

Response Time

Endurance

Density

bits/pJ

HybriDIMM

- Ideal Case
- HD w/DRAM+NAND
- HD w/DRAM+PCM
- HD w/MRAM+NAND
- HD w/MRAM+PCM
- HD w/NRAM+NAND
- HD w/NRAM+PCM
- HD w/ReRAM+NAND
- HD w/ReRAM+PCM

Capacity/$

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Response Time

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bits/pJ

With their own idiosyncrasies & vol. ramps

HybriDIMM™ provides the architectural context to use multiple memory technologies as they mature
Summary

1. Cost effective → takes advantage of growing DRAM:NAND price ratio
2. Standardization → not a single sourced solution
3. Software drivers → does not require special HW protocol
Thank You!

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