



Flash Memory Summit

Part 2: NVDIMMs with a Twist

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Santa Clara, CA
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But First, The Basics...

NVDIMM



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But First, The Basics...

NVDIMM

Non-Volatile Dual Inline Memory Module

[Hardware] A dual inline memory module that operates as standard RAM while also having persistence across power cycles.

- *SNIA Dictionary*



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There Are Different Types of NVDIMMs

NVDIMM-N

NVDIMM-F

NVDIMM-P



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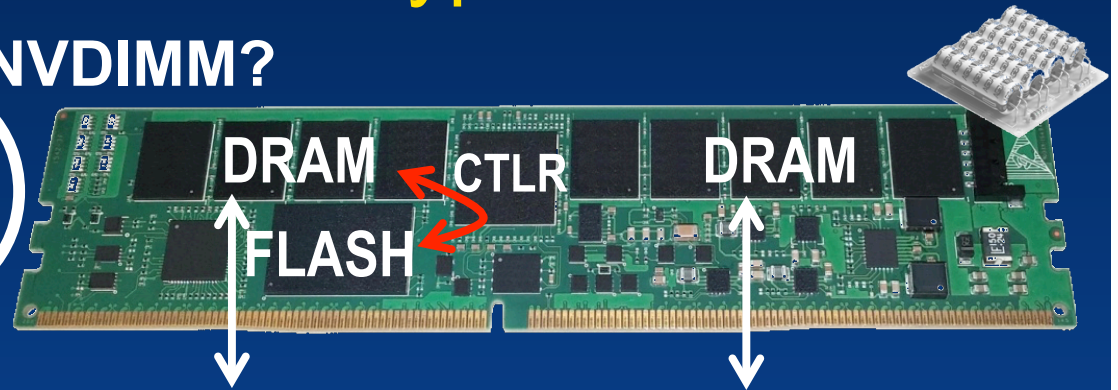
There Are Different Types of NVDIMMs

NVDIMM?

NVDIMM-N

NVDIMM-F

NVDIMM-P



- “Flash-Backed DRAM”
- Memory mapped DRAM. Flash is not system mapped.
- Access Methods: byte- or block-oriented access to DRAM
- Capacity = DRAM DIMM (1’s -10’s GB)
- Latency = DRAM (10’s of nanoseconds)
- Energy source for backup
- HW & SW interface standards defined by JEDEC



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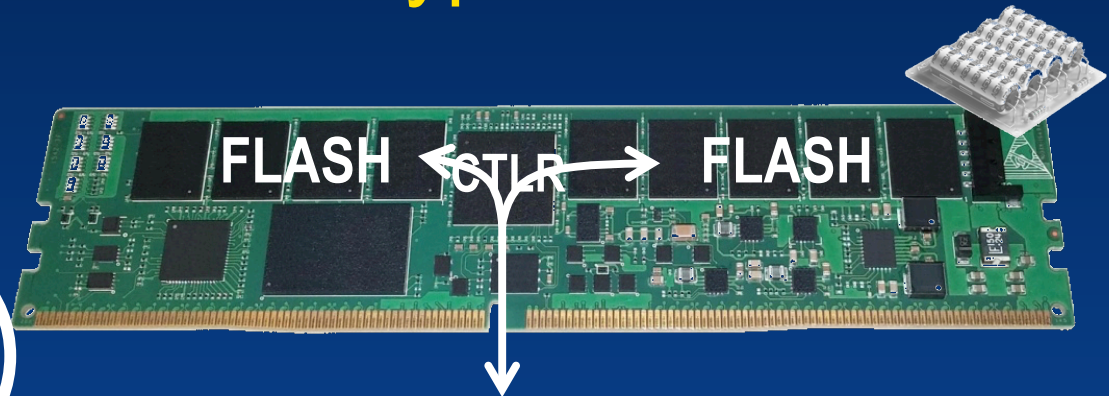
There Are Different Types of NVDIMMs

NVDIMM-N

FLASH

NVDIMM-F

NVDIMM-P



- “SSD in the Memory Channel”
- Memory mapped Flash. DRAM is not system mapped.
- Access Method: block-oriented access to NAND
- Capacity = NAND (100’s GB-1’s TB)
- Latency = NAND (10’s of microseconds)
- JEDEC SPD defined for this type, but no protocol std (yet?)



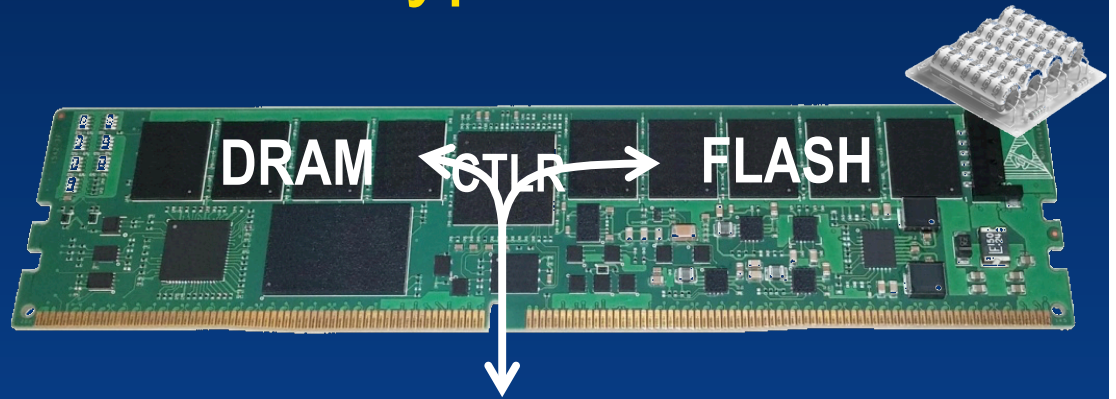
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There Are Different Types of NVDIMMs

NVDIMM-N

NVDIMM-F

NVDIMM-P

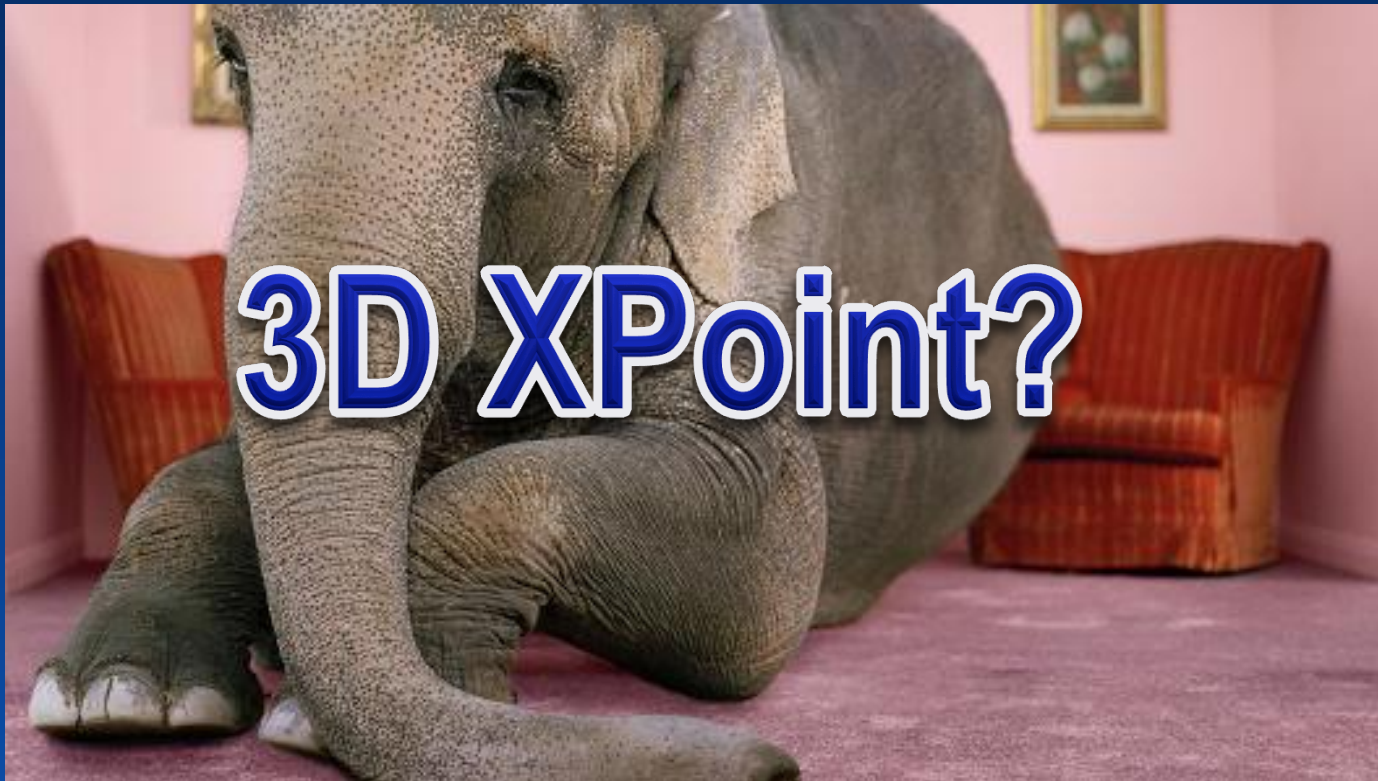


- “Combination of -N and -F”
- Memory mapped Flash AND memory mapped DRAM
- Access methods: byte- and/or block-oriented access
- Capacity = NVM (100’s GB-1’s TB)
- Latency = NVM (100’s of nanoseconds)
- Definition still under discussion within JEDEC



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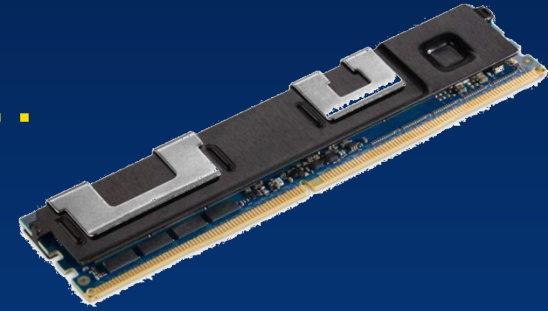
But What About...





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Here's What I Know...



- Not much

Micron
QUANTX

10X+
IOPS Over NAND @
Low Queue Depths

10X+
Faster Response Time
Than NAND

4X+
Memory Footprint
Per CPU Than DRAM

Turning Big Data into **Fast** Data

THE BREAKTHROUGH
A NEW CLASS OF NON-VOLATILE MEMORY

1000X
FASTER
THAN NAND

1000X
ENDURANCE
OF NAND

10X
DENSER
THAN CONVENTIONAL
MEMORY

3DX can be complementary to NVDIMMs (both -N and -P)



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And now
for something
completely different...



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