What is NVDIMM?
A Non-Volatile Dual In-line Memory Module (NVDIMM) is a “persistent memory technology” that retains data in the event of a power loss or a system shut down.

So it’s a storage device? or DRAM?
Both! NVDIMM(s) come in various volatile and non-volatile media combinations that can be block and/or byte addressable. You can use it as memory that is persistent or the fastest storage device in your application.

A NEW STORAGE PYRAMID

CPU
DRAM
NVDIMM
SSD (high-performance)
SSD (mainstream)
HDD
CLOUD
TAPE

LATENCY
nanoseconds
milliseconds

“moving storage closer to the CPU”

NVDIMM - N
Memory mapped DRAM with no system access to flash.
Attributes:
Low-Capacity (2GB - 32GB)
Very-low Latency (10s of nanoseconds)

NVDIMM - F
Memory mapped Flash where DRAM is not system mapped.
Attributes:
High-Capacity (100GB - 1TB)
Low Latency (10s of microseconds)

NVDIMM - P
Memory mapped Flash and memory mapped DRAM with two access mechanisms: persistent DRAM (–N) and block-oriented drive access (–F)
Attributes:
High-Capacity (100GB - 1TB)
Low Latency (100s of nanoseconds)

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The What(s) & Why(s) of NVDIMM Technology

NVDIMM-N
- A growing number of applications:
  - Require frequent access to large data sets
  - Are sensitive to down time
  - Have performance limitations due to I/O bottlenecks
- NVDIMM-N provides:
  - Low latency, high performance and near infinite endurance of DRAM
  - The persistence of NVM
- No impact to memory bus performance
- Fast recovery from system power loss
- Software overhead can be eliminated

NVDIMM-F
- Provides direct access to NVM on the low-latency, high bandwidth memory interface
  - High-capacity, high-performance block storage
  - High-capacity, economical, byte-addressable system memory
- Data remains within memory subsystem (shortest path to CPU)
- NVDIMM-F as Storage:
  - Bypasses I/O subsystem for fastest data access
  - Eliminates contention with I/O Devices
  - Memory bus provides massive parallelism and access consistency
- NVDIMM-F as Memory:
  - NVM density enables more block memory per socket and per server
  - Processes larger data sets in-memory

NVDIMM-P
- Combination of -N and -P attributes and feature sets
  - High-capacity, high-performance block storage
  - Low latency, high performance and near infinite endurance of DRAM
- Memory mapped Flash AND memory mapped DRAM with two access mechanisms: persistent DRAM (–N) and block-oriented drive access (–F)

Use Cases for each type
It’s not a one size fit all.

In Memory Database
- Traditional Database
- Enterprise Storage
- Virtualization
- High-Performance Computing
- NVRAM Replacement
- Financial & Real-time Transaction
- Object Store
- Unstructured Data

Database & Big Data Analytics
- Virtualization
- Financial & Real-time Transaction
- Image-editing Systems
- Movie Rendering
- CAD Systems
- SAN appliances and Arrays
- Distributed Storage Systems
- Distributed Cache

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