Persistent Memory Productization driven by AI & ML

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Persistent Memory Usage from Cloud to Node

CLOUD

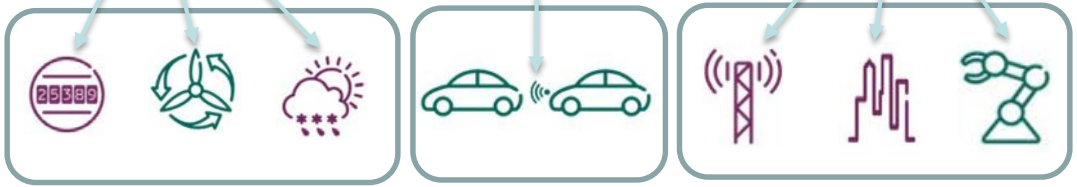
Big *data* processing
Data Warehousing

EDGE

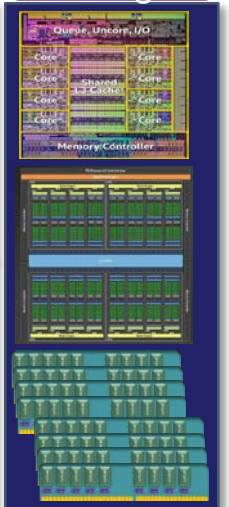
Data Visualization
Data caching
Data filtering

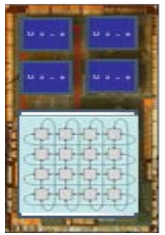
IoT NODE

Realtime
Data processing



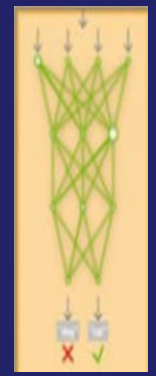
Compute Storage



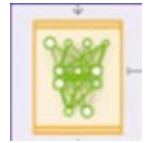


Deep Learning

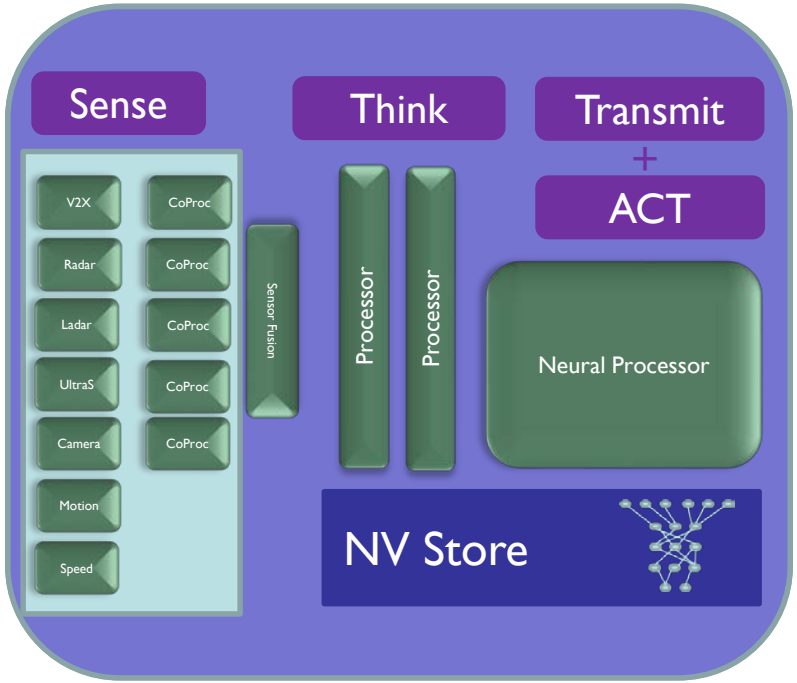
Training



Inference



Node Architecture : From Data Fusion to AI

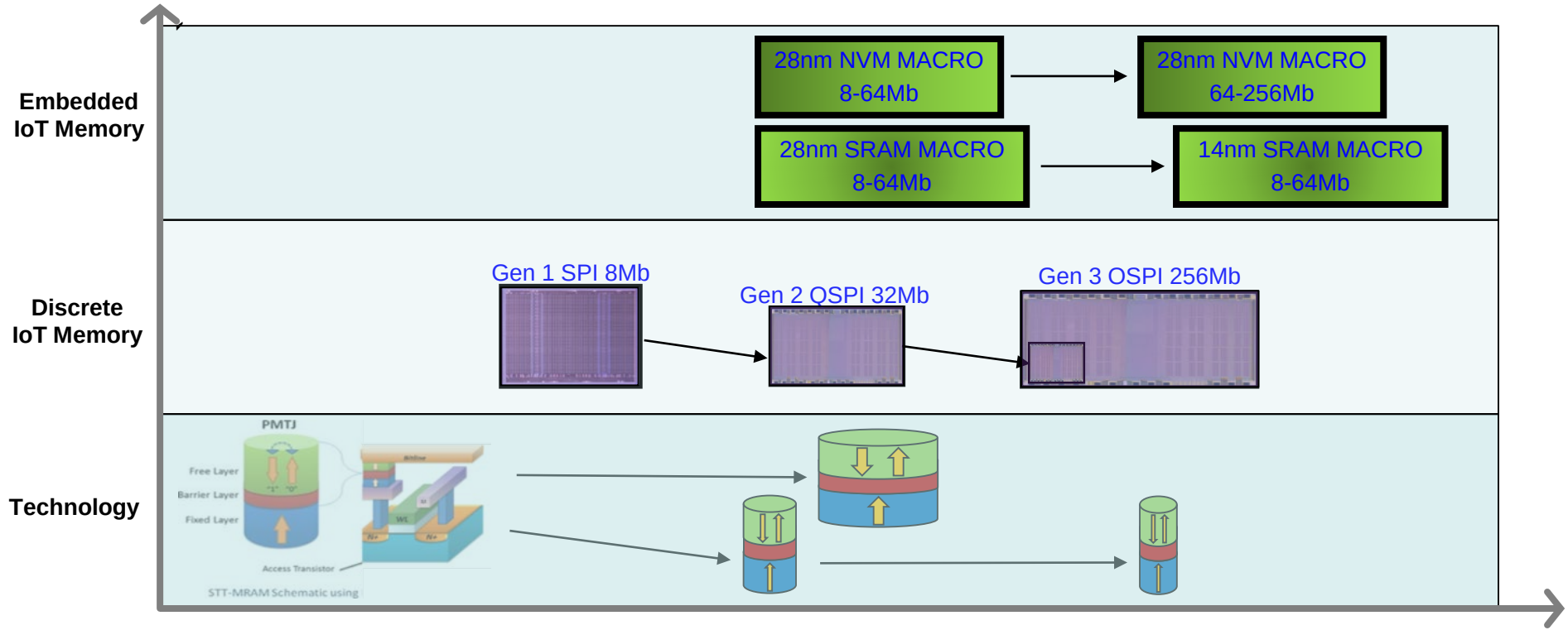


- **The Node:**
  - Collects Data
  - Aggregates data
  - Sends data back to Edge
  - Make decisions per input
  - Learn based on local stimuli

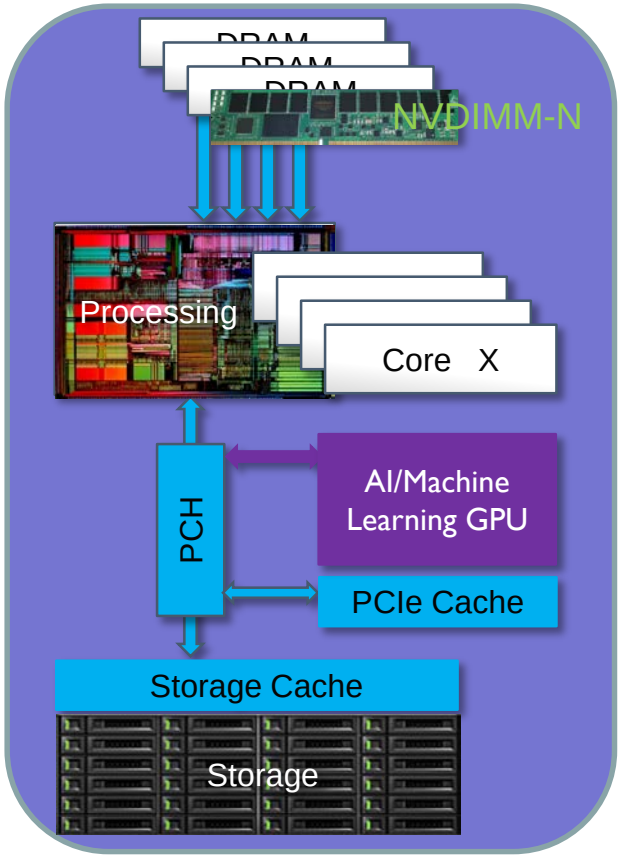
- **Needs**
  - Persistence
  - Low Power
  - Smallest die size

Inference: Local Decision Making

IoT Roadmap

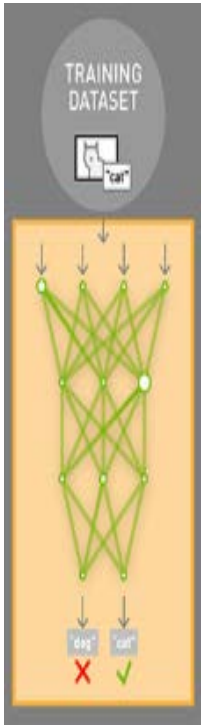


Edge/Cloud Architecture



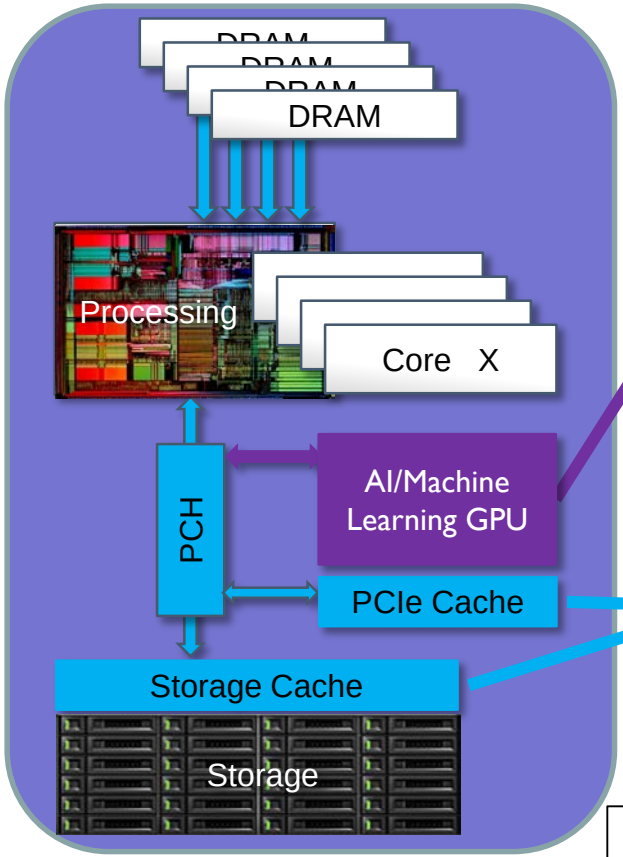
- The ***Cloud*** and the ***Edge*** Architecture are similar, but with the possible variations in:
  - ***GPU Cores*** which can be used for Machine learning
  - ***PCIe Cache*** for performance
  - ***Communication*** to other domains in the edge for inference and learning

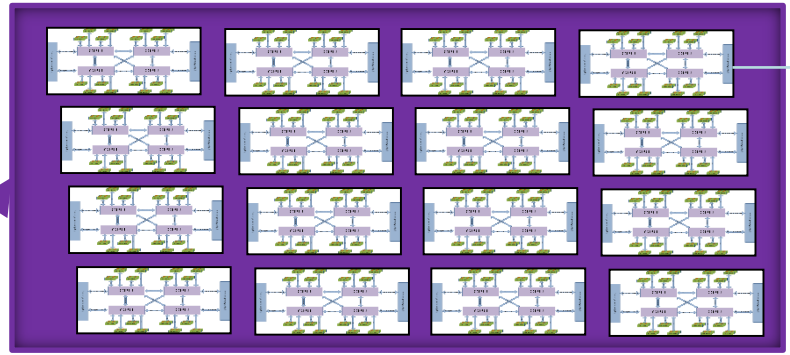
- **Needs**
  - Persistence
  - Speed

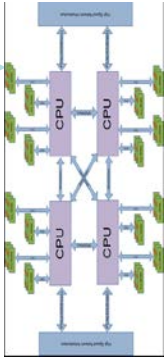


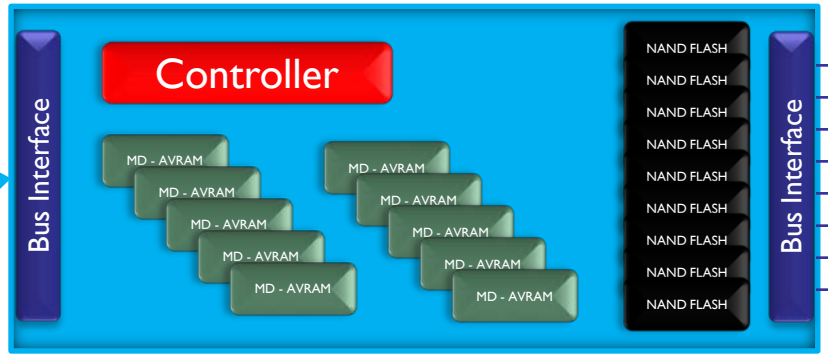
Training : Learning New Capabilities

Speeding up the Cloud/Edge Computing: Cache & GPU Memory



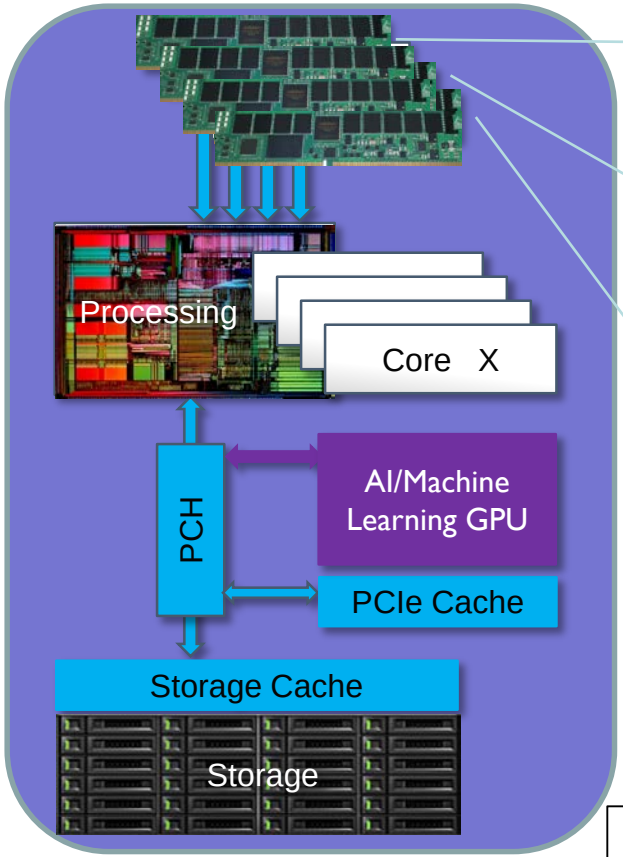




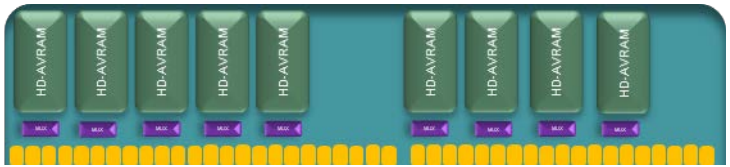


Medium Density Persistent RAM (MD-RAM)

Universal Memory in the Cloud: NVDIMM

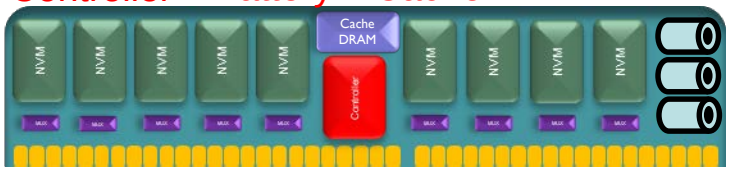


AVA-DIMM: Persistent DRAM replacement



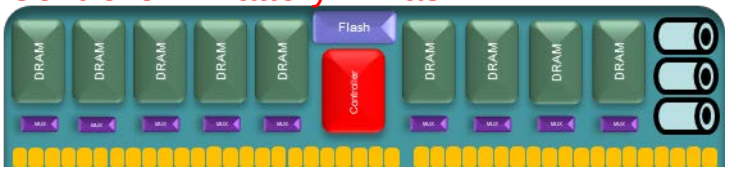
NVDIMM-P: Hides Persistent Memory Endurance

Controller + Battery + Cache



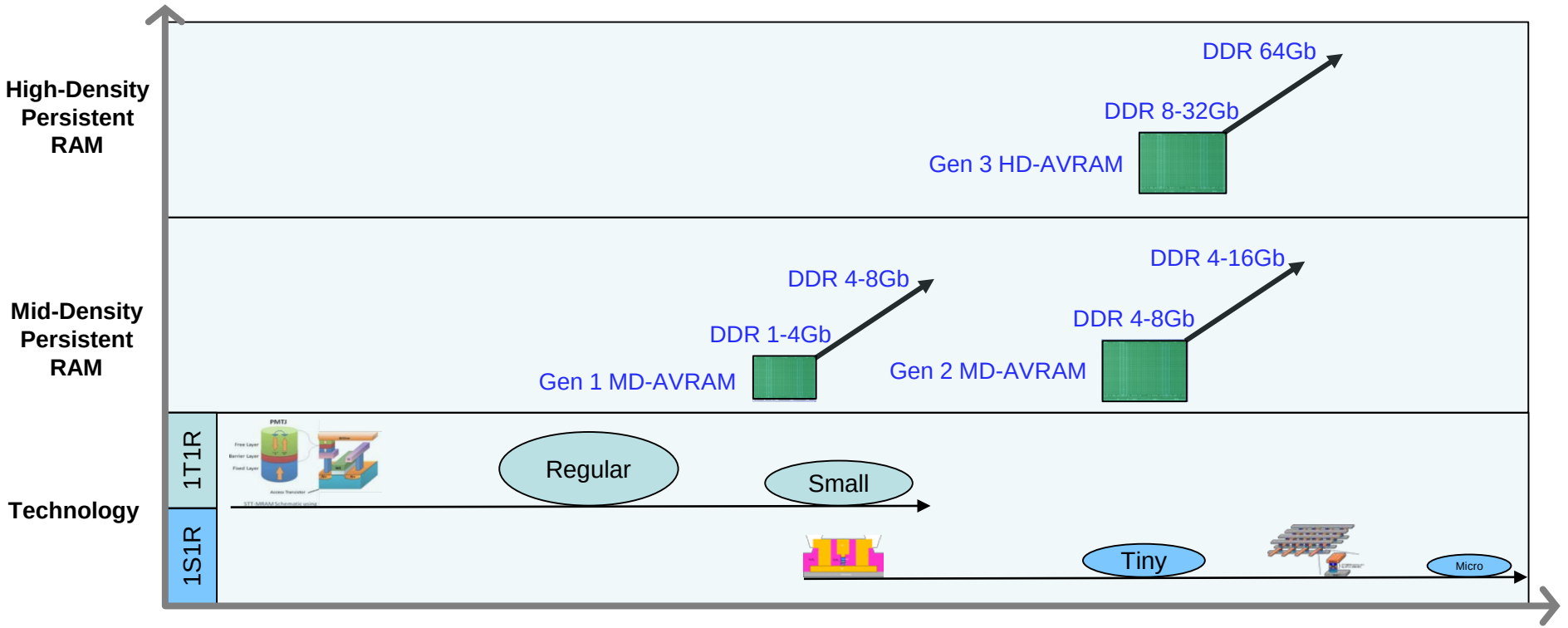
NVDIMM-N: Brought Persistence to DRAM

Controller + Battery + Flash

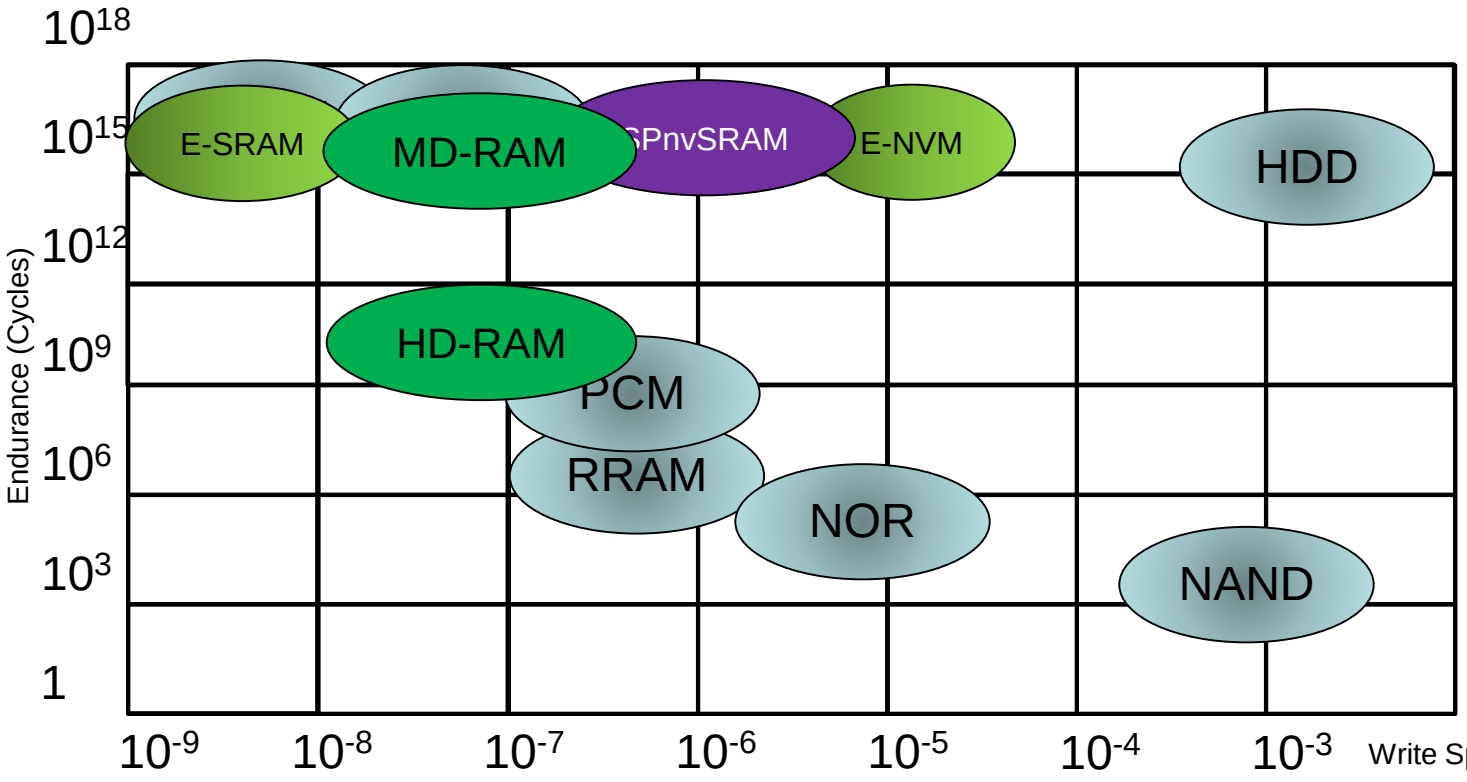


High Density Persistent RAM (HD-RAM)

High and Mid Density Persistent RAM



Where does MRAM fit into the picture



1 Magnetic structure

Embedded:
- High Performance
- High Temperature

Stand Alone:
- IoT
- Med Density RAM
- High Density RAM

Avalanche Specification for different MRAMs available at: www.avalanche-technology.com/products

Summary

- MRAM products are making inroads from the cloud to the IoT Node
  - It is not one product
- MRAM is unifying the Software defined world
  - Compute
  - Storage
  - Network
- Built on a Unified CPU & Memory platform based on a unified MTJ architecture for
  - Compute, Storage, Network
  - Across the Cloud, Edge, Node
- Phased product introduction has begun