A System Architect's View

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NEWM-301A-1 Life Beyond Flash: New Non-Volatile Memory Technologies

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Technology Trends

- Density per Component will continue to go up
  - The challenge for system designers is how to help clients into these footprints?
- Extreme focus on consistent performance
  - It is so much more then getting the single best number
- Careful consideration of system Latency
  - At every level of the stack
  - Each new technology changes where the bottleneck is
- Will continue to use DRAM for volatile features / Functions
- At least five new NVM acronyms will be create by next year

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Disruptions

- Persistent Memory
  - Reduce or remove DRAMs in endpoint storage devices
  - Remove the need for large capacitance
- LL-NAND
  - Components with SLC like capacity and < 20us latency will be important for continued reduction in transactional latencies
- Mixed Mode NAND
  - The ability to customize NAND at the component level
    - Picking transactional latency or capacity or endurance as tunable parameters
- AI/ML
  - Will change the way we think about and use data, including the way it is stored and retrieved

Things to Solve

- NVM interfaces need unified standards
  - Implementers and architects struggle with the not having commonality at the interface
- Persistent Memory
  - Higher component capacity, better endurance, and lower BER
- End to End NVMe
  - Significant advances for individual components and single instance solutions
  - needs in box, turn key solutions, regardless of vendor choice
- Data Analytics
  - The trend is to store everything, but is all useful?
  - Analytics that can help decide what is useful, and dare I say discarded

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Product Roadmaps

- Continue innovation in IBM FlashCore^{TM}
  - Enhance key features for compression, endurance, performance, and density
- Enhance Applications of persistent memory
  - Advance effective use of this key technology
- Vendor Product Engagements
  - Reduce physical footprints, power reductions, interface simplifcations