

State of the Industry

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Where we are at

- Hardware
- System Software
- Applications

- CPU
 - Intel, Micron and others look to be moving functions from CPU to FPGAs (field-programmable gate arrays)
 - Software not keeping up to take advantage of these functions
 - Encryption and key management is a great example
- Memory
 - Non-volatile memory is here finally but software is immature
- Connectivity
 - What happens to the PCIe bus is still in question
- Storage and Storage Systems
 - Disks getting denser and somewhat faster with greater areal density and less expensive
 - SSDs getting somewhat denser but not faster for writes and not much cheaper
 - Tape getting denser but going much faster

- Memory management framework needs to take into account non-volatile memory
 - Intel doing some work but MUCH more is needed
 - Scheduling is a good example
- Still no end-to-end standard for application embedded hashes or ECC (Error Correction Codes)/Erasure code/Forward error correction
 - It will not happen within POSIX (Portable Operating System Interface) framework for I/O but maybe the object world can solve this
 - Object storage vendors are taking different approaches

- Need application interfaces to take advantage of new hardware technology:
 - Hardware offload (do things in hardware not software)
 - Examples include security, networks and more to come
 - That is why FPGAs are being used
- Need interfaces for end-to-end reliability starting in the applications
 - Still nothing on the horizon
 - Object storage vendors have far better reliability potential with erasure coding than RAID storage
- Applications framework will never happen in POSIX as there are really no changes to POSIX since 1991
 - I am hopeful that it will be done with objects
 - But we have 30+ years of code that need to be ported to support object interface and new workflows

- The needs of the preservation world have not changed nor have the offerings of the vendors in decades
 - Maybe it was just too hard to do in the frameworks we had
 - Maybe meeting the needs of the preservation world was too high cost for the industry
 - Maybe it is both and/or something else
- Challenges of the preservation world continue to grow and yet the industry as a whole is not taking action
 - During next 1.5 days we will hear from people and understand where they are going and hopefully there is an intersection that meets everyone's needs