

State of Industry

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Where we are at

- Hardware
- System Software
- Applications

- CPU
 - Hardware instructions for Advanced Encryption Standard (AES) and Secure Hash Algorithm (SHA) need to be in all CPUs or some equivalent
 - Applications need to take advantage of these features in CPUs that support them
- Memory
 - Memory hybrid cubes are just about here
 - <http://www.micron.com/products/hybrid-memory-cube>
 - As are non-volatile memory
 - And DDR-4 (double data rate fourth generation) which adds parity to reduce the potential for Silent Data Corruption (SDC)
 - Connectivity
 - PCIe (Peripheral Component Interconnect Express) connectivity is the rage given flash performance needs
 - But what happens to the PCIe bus is in question
- Storage
 - Disks getting denser and faster less expensive
 - SSDs getting somewhat denser but not faster for writes
 - Tape getting denser but not faster

- Linux OS working to integrate objects
 - Still lacking management and resource control for objects
- Memory management framework needs to take into account non-volatile memory
 - Intel doing some work but more is needed
 - <http://www.enterprisestorageforum.com/storage-management/resource-management-and-control-a-straw-proposal-for-linux.html>
- Still no end to end standard for checksums 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
 - There is hope on this front

- Need application interfaces to:
 - Hardware offload (do things in hardware not software)
 - Example include security, networks and more to come
 - New storage frameworks
 - As Dave Anderson will be discussing
- Need interfaces for reliability end-to-end starting in the applications
 - Still nothing on the horizon
 - I have been asking since the 1st storage conference in ~2004
- Applications framework will never happen in POSIX as there are really no changes being done
 - 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

- Needle has not moved much in a decade given the needs in the preservation world
 - Maybe it was just too hard to do in the frameworks we had
 - Maybe meeting the needs of the preservation world were too high cost for the rest 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
 - Next 1.5 days we hear from people and understand where they are going and hopefully there is an intersection that meets everyone's needs