New Visions for Digital Storage

Storage for Unstructured Data
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June 7, 2018
at the Doubletree, Culver City, CA

Creative STORAGE™
2018 Conference

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AN ENTERTAINMENT STORAGE ALLIANCE™ EVENT
Mark Your Calendar Now!

October 2018

Storage Visions® 2018

StorageVisions.com

AN ENTERTAINMENT STORAGE ALLIANCE™ EVENT
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2017 KEYNOTES

Tim Long,
Director,
Enterprise Data Science, Micron Technology

Carol Wilder,
Director of Strategic Planning,
Data Center Group, Intel

Mark Pastor,
Director, Solution and Product Marketing, Quantum

Irshad Raihan,
director of product marketing, Red Hat

Scott Miller,
Technical Fellow, Eng. & Infrastructure,
DreamWorks Animation
Morning Agenda

7:30 to 8:00 AM Continental Breakfast - Sponsored by Red Hat

8:00 to 8:15 AM Introduction: Tom Coughlin, Coughlin Associates

8:15 to 9:15 AM A1: Solid State Memory and Storage Visions
Moderator: Brian Berg, Berg Software Design
Speakers: Jim Pappas, Intel           Luca Bert, Seagate
          Rob Peglar, Symbolic IO        Rakesh Cheerla, Xilinx
Panelists: Rick Kumar, Newisys       Rob Davis, Mellanox

9:15 to 9:45 AM Keynote 1: Tim Long, Director, Enterprise Data Science, Micron Technology

9:45 to 10:15 AM Keynote 2: Mark Pastor, Director, Solution and Product Marketing, Quantum

10:15 to 10:30 AM Morning Break - Sponsored by Komprise

10:30 AM to 11:30 AM B1: Software Visions for High Performance Applications
Moderator: Chris Preimesberger, eWEEK
Speakers: Brendan Wolfe, Primary Data           Chuck Piercey, Tidalscale
          Aaron Edell, Graymeta           Lior Gal, Excelero

11:30 AM to 12:00 PM C1: Bringing Compute to the Data
Moderator: Jim Handy, Objective Analysis
Panelists: Thad Omura, ScaleFlux           Frankie Roohparvar, Xitore
          Bharadwaj Pudipeddi, NVSL Tech   Kurtis Bowman, Gen-Z Consortium

12:00 to 1:00 PM, Lunch - Sponsored by Intel
Afternoon Agenda

1:00 to 1:30 PM Keynote 3: Carol Wilder, Director of Strategic Planning, Data Center Group, Intel

1:30 to 2:00 PM Keynote 4: Irshad Raihan, Director of Product Marketing, Red Hat

2:00 to 3:30 PM D1: Hardware Visions for Ubiquitous Storage and Memory
Moderator: Jean Bozman, Hurwitz
Session Sponsor - Sony
Speakers: Amit Bakshi, Teledyne
Michael Johnson, Sony Optical Archive
Radoslav Danilak, Tachyum
Panelists: Andrew Klein, Backblaze

3:30 to 3:45 PM Afternoon Break and Networking - Sponsored by SATA-IO

3:45 to 4:15 PM Keynote 5: Scott 'Skottie' Miller, Technology Fellow for Engineering and Infrastructure, DreamWorks Animation

4:15 to 5:15 PM E1: Clear Visions for Future Cloud Storage
Moderator: Allan McLennan, PADEM Media Group
Speakers: Gary Green, Avid
Krishna Subramanian, Komprise
Panelists: Mark Pastor, Active Archive Alliance
Ramin Elahi, UCSC

5:15 to 6:15 PM F1: Visionary Applications of Digital Storage
Moderator: Dhaval Brahmbhatt, Phychip
Speakers: Jon Toor, Cloudian
Thomas Rivera, SNIA
Panelists: Robert Thibadeau, Drive Trust Alliance
Marc-Antoine Benglia, Kwilt

6:00 to 8:00 PM Reception - Sponsored by Quantum
8:00 PM Conference Ends
Entertainment Storage Alliance™

- On-going activities to provide resources and a forum for the integration of storage and entertainment
- [www.entertainmentstorage.org](http://www.entertainmentstorage.org)
- Quarterly Updates on Storage and Entertainment (newsletter)
- Discounts on partner reports related to storage, entertainment and consumer electronics
- Discounts on Storage Visions, Creative Storage and other ESA programs.
THE INTERNET OF THINGS
AN EXPLOSION OF CONNECTED POSSIBILITY

BILLIONS OF DEVICES

YEAR

1992
1,000,000
About the equivalent of the population of New York

2005
0.5 BILLION
A supporter amount in computer devices in just systems

2012
11.2 BILLION
Majority of machines headed to Machine to Machine

2015
18.2 BILLION
Evolution to machine connected all over the internet

2016
22.9 BILLION
Smart thermostats, garbage, parking, etc.

2018
34.8 BILLION
Smart thermostats, garbage, parking, etc.

2019
42.1 BILLION
Smart thermostats, garbage, parking, etc.

2020
50.1 BILLION
Smart thermostats, garbage, parking, etc.

Trend over the years according to experts there will be about 84 billion devices on the planet.
Most of the data generated by IoT is transitory

- Increasing storage demands—IDC 163 Zetabytes of data created by 2025 (16 ZB in 2016)
- New sources for unstructured data from media and entertainment, IoT, medicine, geo-science and big data
- Growth in local storage, storage at the edge (or the fog) and storage in large data centers (the cloud)
- There is a need for fast memory and storage to support processing and accessing this data and cheap storage to keep it for the long term
Digital Storage Capacity Projections

- The growth and processing of data will lead to the use of many types of digital storage
- SSDs will dominate for high performance storage and higher total revenue
- HDDs will be high capacity and used for colder storage
- Magnetic tape will be used by some organizations for the lowest cost (currently <1 cent/GB)
Larger Storage Devices

- LTO-8 offers 15 TB native capacity, 30 TB with compression
- HDDs with 14 TB from WD, announcements of MAMR drive to create 40 TB HDDs by 2025
- SSDs up to 128 TB announced and key value store SSDs (Samsung, prior work on key value HDDs by Seagate and WD)
- Flash road map shows several generations of 3D Flash ahead
The move to Non-Volatile Storage

• NVMe PCIe-based storage interfaces avoid much of the overhead of hard disk drives—designed for fast solid state storage
• 2D to 3D manufacturing transition is underway with 3D yields improving and achieving cost parity with 2D by 2018
• 3D flash fab investments are over $10 B US per plant—many being build—now at 96 layers, 100’s layers possible
• Shortage of flash memory throughout 2017 and into 2018 is due to yield issues with the 3D flash transition
MRAM and PRAM

• MRAM
  – Everspin shipped over 70 M MRAM Chips. Company has partnership with Global Foundries, who is building 300 mm wafers and targeting embedded memory applications
  – Samsung—plans to ship STT MRAM product samples by 2018.
  – Seagate was showing an Everspin MRAM boot SSD at the 2017 FMS

• PRAM
  – Intel Optane NVMe products now shipping.
  – Micron planning to introduce DIMM-based 3D XPoint products
The SNIA Persistent Memory Programming Model

- [https://www.snia.org/PM](https://www.snia.org/PM)
Memory-centric Computing

For many emerging challenges, memory capacity, memory access latency and memory bandwidth are more constrained than compute resources

- **Memory Disaggregation**
  Remove memory from behind the processor

- **Memory Pooling & Sharing**
  Enable efficient use of memory. Address new class of problems with large memory footprint

- **Heterogeneous Compute**
  Enable multi-vendor heterogeneous compute (e.g. ML accelerators)
Growth of Cloud Storage in M&E

Cloud Storage Revenue in M&E to increase 5.7 X to over $2 B by 2022
Conclusions

• Unstructured data will be biggest driver of all storage technologies
• Larger storage devices: Tape, HDDs and SSDs
• Need for storage/memory for processing and for long term storage drives storage capacity growth in multiple storage technologies
• Solid state storage growth and new entrants
• New storage interfaces built for solid state storage and move to in-memory processing
• Growth of object as well as hybrid and public cloud storage for many applications