Innovation in Hyperscale Storage

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Seagate
You May Know Seagate as a Hard Drive Manufacturer...

- 1st and only to ship over 2 billion drives
- Stores more than 40% of the world’s data
- #1 OEM storage – over 2 billion drives

But We’re Also a Company That:

- Delivers deep expertise and unique IP in storage & data management
- Offers a complete range of storage components & solutions
- Works with providers & solution builders to combines UX, software & design to create new categories of storage solutions
- Ranks as one of the top 25 companies worldwide in supply chain operations
The Digital Universe of 2020...

... Generates a LOT of data!!

44 Zetabytes of raw data is created. Video, social media, mobility, IOT & scientific research and discovery drive this explosive explosive growth.

13 Zetabytes of this data “could” be valuable if stored. Advancements in real-time analytics are driving better efficiencies in deciding what data unlocks incremental value.

6.5 Zetabytes is a realistic estimate of what the entire universe of data storage capacity will be.

- Major industry storage trends?
- SSD impact on HDDs?
- How will HDDs stay relevant?
Data Explodes | Demand for Storage Components Grows

Ten-fold increase between 2016 and 2025!

Industry Petabytes Shipped* (HDD & SSD)

*Includes HDD & SSD

Cloud is now over 50% EB’s shipped.
Will become 80% of Enterprise by 2020.
Nearline Hard Drives - The Home For Cloud Data

- Source: Seagate Strategic Marketing & Research (Forecasting Team, May, 2016 Publication)  
- *Includes HDD & SSD

**PC Storage 2010**
- PC Storage 2010: 26%
- Non-PC Storage 2010: 35%
- Non-PC Storage 2020: 68%

**Non-PC Storage 2020**
- PC Storage 2020: 6%

**1,185 Exabytes**

**Exabytes**

- 2010: 0
- 2011: 100
- 2012: 200
- 2013: 300
- 2014: 400
- 2015: 500
- 2016: 600
- 2017: 700

**Legend**
- PC Storage
- Non-PC Storage
- Tablet and Smartphone storage

- **Source:** Seagate Strategic Marketing & Research (Forecasting Team, May, 2016 Publication)
- *Includes HDD & SSD
Storage Tiers & Specialized Storage Components

Different tiers & use cases in Hyperscale call for differing component choices

- Real-time Computing
- Transaction Processing
- Big Data Storage
- Content Storage
- Cloud Content Storage
- Object Storage
- Data Archive

- Cost: Highest to Lowest
- CPU Proximity: Closest to Farthest
- Latency: Lowest to Highest

Delivering Data
Processing Data
Streaming Data
Storing Data
Saving Data
Optimized for all your storage needs

Enterprise & Cloud

NAS | Video & Media

Surveillance

Client (Desktop & Mobile)
Challenges in Cloud Storage

Cloud players need to carefully weigh their options & priorities

- PERFORMANCE (IOPS, WRL, SDR)
- SECURITY (Stds: SED, FIPS)
- SUPPLY QUALITY (Reliability, MTBF, Supply Chain)
- COST ($/TB, $/IOPS)
- CAPACITY (TB’s, Areal Density)
Seagate Is the Leading Innovator

We continue to push the envelope on cloud-storage innovations

**Storage Density**
- Seagate HAMR Leadership
- 16TB-20TB HDD’s in next 3 years
- Unlock 10x Areal Density for 10 years

**Performance**
- Dual Actuator and Parallelism designs
- Firmware queuing and latency bounded I/O solutions

**Cost**
- Continued erosion of $/TB
- Added features, improved weight
- Reduced power for better TCO

**Supply & Quality**
- Global supply chain
- Reliability & tough quality control

**Security**
- Self-encrypting, crypto-erase (SED / ISE), FIPS certification, etc.

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2000: Seagate invents the lollipop nano-plasmonic antenna (NFT)

2012: Seagate CEO presents a HAMR drive at the STX analysts’ meeting

2016: Seagate demonstrates 2 Tbps using HAMR and SMR

Near future: Seagate will deliver 16TB+ Nearline drives for data center growth
Seagate Cybersecurity Strategy Moving Forward
Next Gen Security Platform for Products in 2018/19 and beyond

Customer Needs
- Certified, Government-Grade Security
- Data at Rest, Locking Protection
- Fast, Complete - Data Disposal & Repurposing
- Authentic Products

Seagate Secure Solutions
- FIPS 140-2 CERTIFIED
- TCG-COMPLIANT SECURITY
- Full Deployment with Key Management Software
- INSTANT SECURE ERASE
  Quick and Simple
  Crypto-Erase and Sanitize Features
- BASE DRIVE SECURITY
  Cryptographically-Signed Firmware, Secure Boot and Protected Download/Diagnostic Ports

In-field Activation
- Cybersecurity Configs. and Features
- Non-Security Features - Capacity on Demand and others

Cloud Key Management enabled by Seagate Proprietary TCG API

Common Criteria Certification on SED and FIPS Configs. (CSfC)

Security API Transition to TCG Opal for Enterprise
- TCG NVMe Leadership

Multi Tenancy & HW based end to end Security
- Max possible TCG bands
- Secure Messaging (TCG Standard and Certificates based)
- Data in Motion Security

Endpoint Security in Present Products

Endpoint and Cloud Security

Increasing Assurance (Authentic & Unaltered)

Product Development

Supply Chain

Infrastructure
**Enterprise Product Technologies**

**Path to 2020**

- **Performance Optimized**
  - Multi Actuator
  - Parallelism

- **Capacity Optimized**
  - **Traditional – Areal Density**
    - Helium
    - TDMR
  - **SMR**
  - **HDMR**

- **Nearline**
- **Mission Critical**
  - **Mission Critical Drives**: 10K & 15K RPM
  - Boot devices, enterprise use cases
  - Compete with SSD’s in a few areas

- **Near Line Drives**: 7200 RPM, 1TB-16TB+
  - **Short Term**
    - Conventional as well as Shingled Magnetic Recording
    - Significantly lower cost than SSD’s
  - **Long Term**
    - HAMR & other related tech
    - Maintain $/TB advantage over Flash
    - Keep the performance high enough for hyperscale needs
Announcing - 12TB Enterprise Capacity 3.5” CMR Drive

Leading Nearline High Capacity
• 20% added petabytes per rack

Power and Weight Supporting TCO
• Least operating power using helium technology
• ~20% weight reduction vs air Nearline drives

Driving Increased Performance
• Scaling IOPs/TB with Seagate firmware
• Leading sustained data rate & random write performance
Collaborative Innovation for Competitive Advantage

Partners with HDD & Builder ecosystem for better TTM, Cost & Technology

- Helium, Low Power, HAMR
- Dual Actuation, Parallelism, Firmware
- Spindle and Flash Ratio Optimization
- Opex/Capex, APIs, Supply Continuity
- $/GB, Software Stack Control
Hyperscale storage is experiencing incredible growth

For cloud-based storage, SSD’s and HDD’s complement each other.

You need right components & architecture for scale, savings & TTM advantages in Cloud

Partnership with the right HDD, SSD & systems vendors is the key to cloud success

Seagate is innovating for cloud players by pushing the HDD & SSD envelope on capacity, scale, cost, performance & security

SUMMARY

The Storage Industry Is Innovating for Cloud & Hyperscale

That great sucking sound? It's data going into the public cloud

The great slurp is inevitable, just you watch

The public cloud is like a data-sucking tornado

Article in The Register by Chris Mellor http://www.theregister.co.uk
APPENDIX
12TB Nearline Drive

• High Capacity Helium 3.5” reducing TCO

Density
• 12TB
• Standard 3.5” design
• 8 Platters, 16 heads
• Sealed drive (He)

Higher capacity in the same 3.5” footprint delivering 20% more petabytes

Efficiency
• PowerBalance™
• PowerChoice™
• Helium design

Helium-enabled lower power and weight plus the ability to tradeoff performance for additional power savings

Security
• Self-encrypting drive
• Instant secure erase
• Protection information

Robust drive-level data security and integrity for when the drive is at rest, recording, or retired

Reliability
• In-drive diagnostics
• RAID rebuild
• 2.5M-hour MTBF
• 5 Year warranty

Highest-proven quality and field reliability protecting from data loss and unneeded expense

Agility
• Enhanced caching
• 5xxe or 4Kn formats
• 12Gb/s SAS
• 6Gb/s SATA

Flexible design delivering wider integration options and support for a greater number of workloads
Presenter Profile:

UNMESH KULKARNI

Unmesh works at Seagate as the Senior Director of Product Line Management for Hyper-scale & Cloud Segment.

Unmesh has extensive experience in Cloud Storage, Cloud based Data Protection & Enterprise Software. He can be reached at Unmesh.Kulkarni@seagate.com