Open Source Storage

Does Use Case Matter?

Michael Letschin
Product Manager, Nexenta
@mletschin
Drastic Growth....

- Storage is growing at 2.7 zettabytes/year\(^1\)
- HDD Shipments growth 30%/year\(^1\)
- HDD Areal Density growth 20%/year\(^1\)
- New drive tech improves areal density by 25%\(^1\)

\(^1\)http://www.storagenewsletter.com/news/disk/seagate-shingled-magnetic-recording
Is your application special?
Application Centric Storage

• General Purpose Storage is DEAD
• Applications have custom storage requirements
• Storage should change with application load
• Augments “virtual first” mentalities
• Availability is integrated with infrastructure
How does that change the hardware?
Traditional Drives

- Data areas – white
- Guarded by gaps – gray
- Can randomly read/write any data area
LAYING DOWN SHINGLES (LIKE A ROOF)

Track 1 Write Area

Track 1 Read Area

Track 2 Write Area

Track 2 Read Area

Track 3 Write Area

Track 3 Read Area

Track 4 Write Area
Shingled Magnetic Recording

- Shingles are grouped in bands
- Copy from one band to another to consolidate/delete
- Random I/O in outer zone and inner zone
- Perfect organization for ZFS Uberblocks
ZFS Highlights

- **HUGE Capacity:** 128-bit file system
  - 16 billion-billion times that of a 64-bit file system

- **Hybrid Pooled Storage:** Automatic & Intelligent use of DRAM, SSD, & HDD
  - File system + volume manager + RAID built together

- **Always Consistent on Disk**
  - Copy on write; no journaling; no fsck ever!

- **Unmatched Data Integrity**
  - Data checksummed at every point
  - Detects & **corrects** silent data corruption

- **Simple & Efficient Snapshots, Clones, & Replication**

- **Simple & Fast Initialization and Resilvering**
  - Increasingly important with growing HDDs
**TREND TO OBJECT STORAGE**

- Mobile clients
- BYOD
- NoSql databases
- S3 compatible applications*

**Objects & Files on top of POSIX (ORUWC)**

**Objects that are CCOW & Distributed (POSIX Emulation)**

**Objects & Files on top of Block I/O (iSCSI, AOE, FCOE)**

**Next Gen Drives**

- Key value store HDDs and SSDs
- Key value store all flash systems

*Amazon in 4/13 announced 2 trillion S3 objects in AWS*
Future of Open Source Archival

- HDD will give way to SMR as the dominant media
- Archive is not big metal storage – Needs Application Centric Storage
- Data Integrity over time is the key
- Self Healing Filesystems dominate the archival space
• **3.1** What do you see as the role of open source software in the current and future options for inter-operability and portability in storage architectures?

• **3.2** What do you think large archive users and planners should be doing if they are interested in expanding the use of open source software for these architectures?

• **3.3** What interfaces do you think will be used in archival storage in 1, 5, 10 years? a. REST/SOAP (AWS, object) b. POSIX (NFS, CIFS, file system)