Open Source Storage

Does Use Case Matter?

Michael Letschin
Product Manager, Nexenta
@mletschin

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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

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Is your application special?

Archive

Email

User Files

VDI

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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

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How does that change the hardware?

SSD

SMR

Tape

HDD

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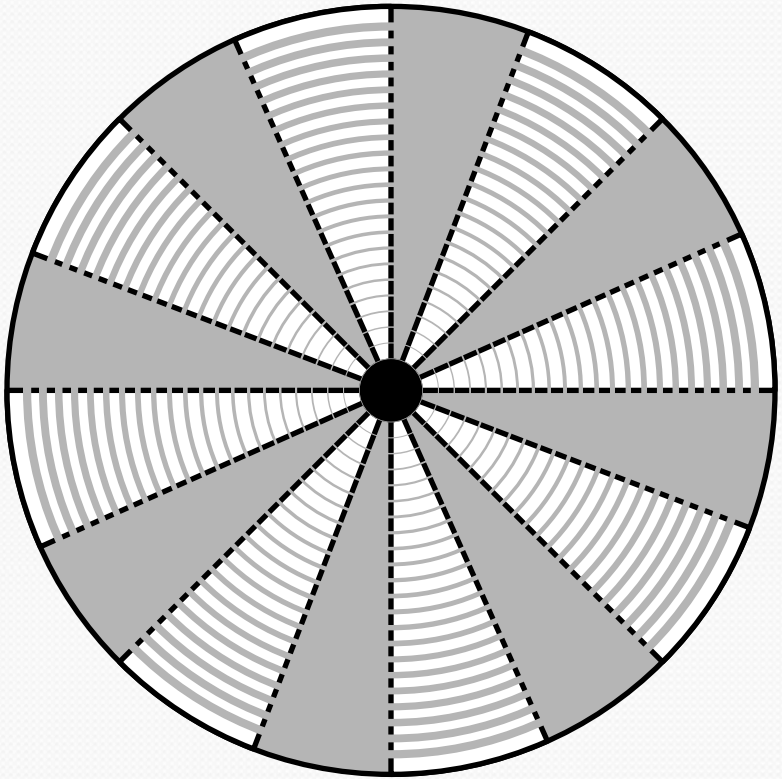
Traditional Drives



- Data areas – white
- Guarded by gaps –gray
- Can randomly read/write any data area

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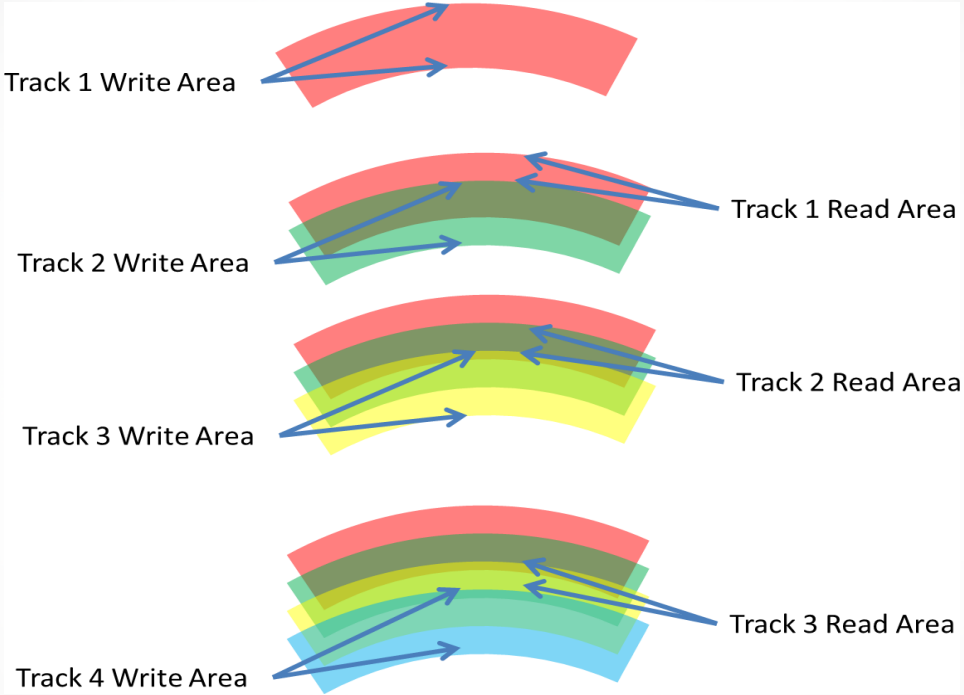
LAYING DOWN SHINGLES (LIKE A ROOF)



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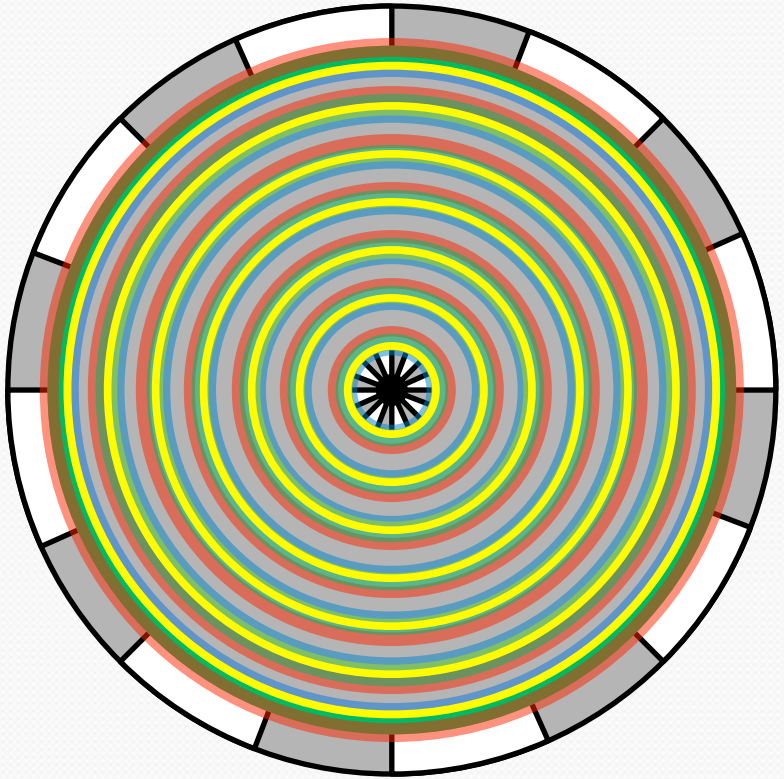
Shingled Magnetic Recording

- 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



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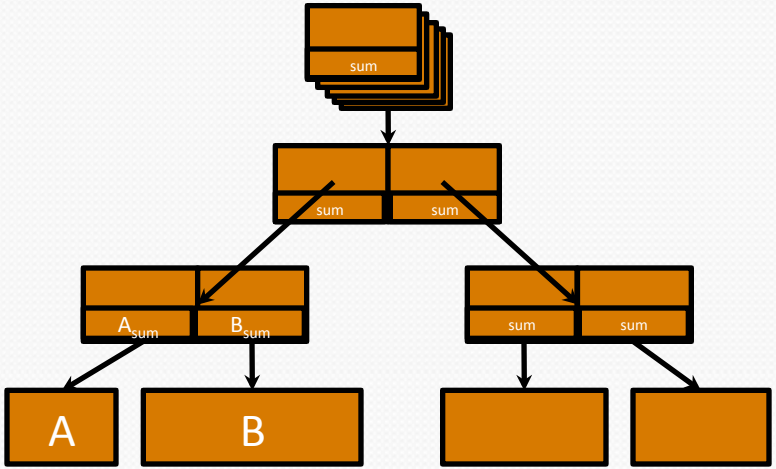
ZFS Highlights

- **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



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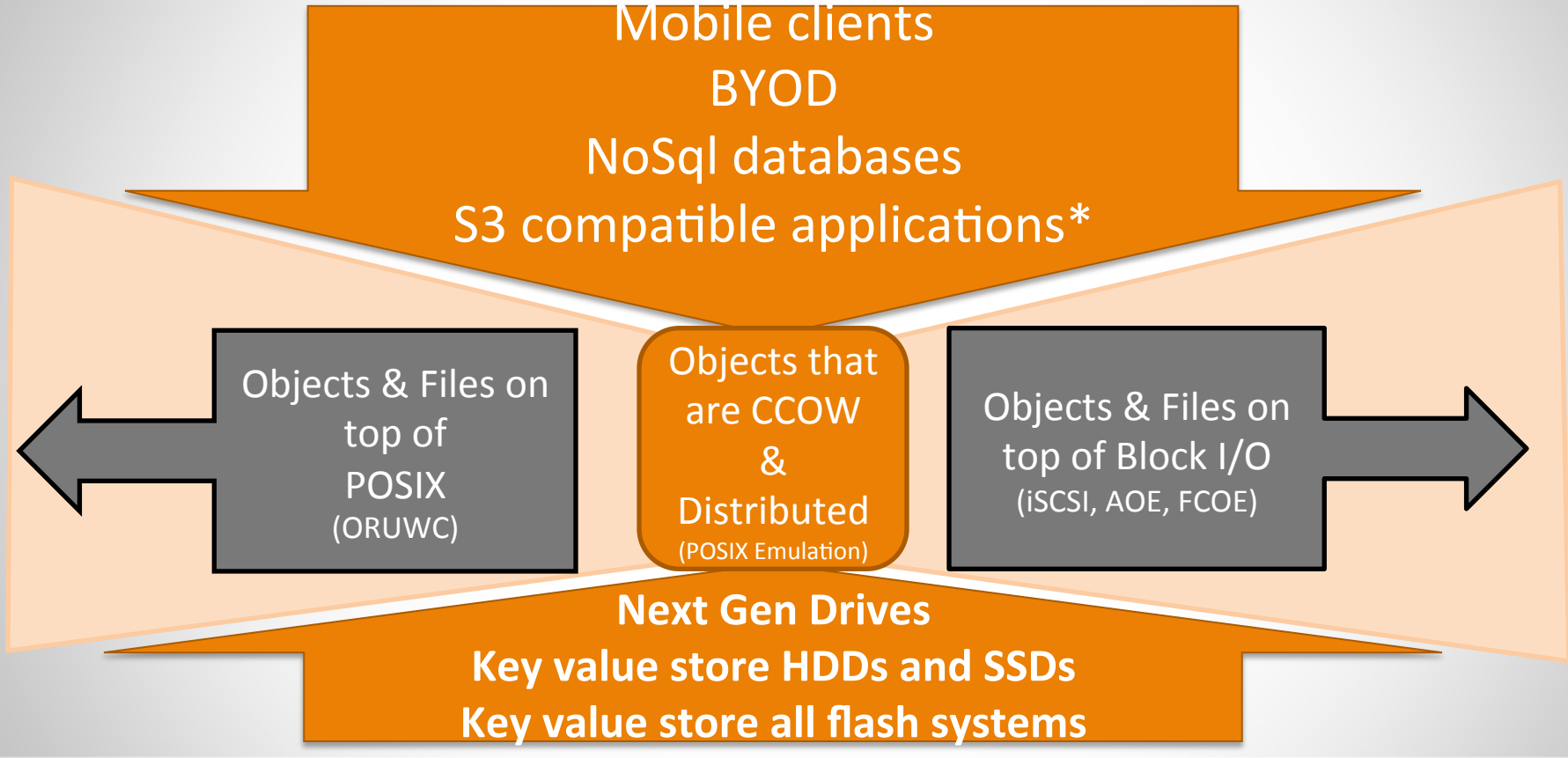
TREND TO OBJECT STORAGE



** Amazon in 4/13 announced 2 trillion S3 objects in AWS*

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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

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Michael Letschin
mletschin@nexenta.com
@mletschin

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

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