OCP U.S. SUMMIT 2016

Disks for Data Center
in the era of Cloud-based storage

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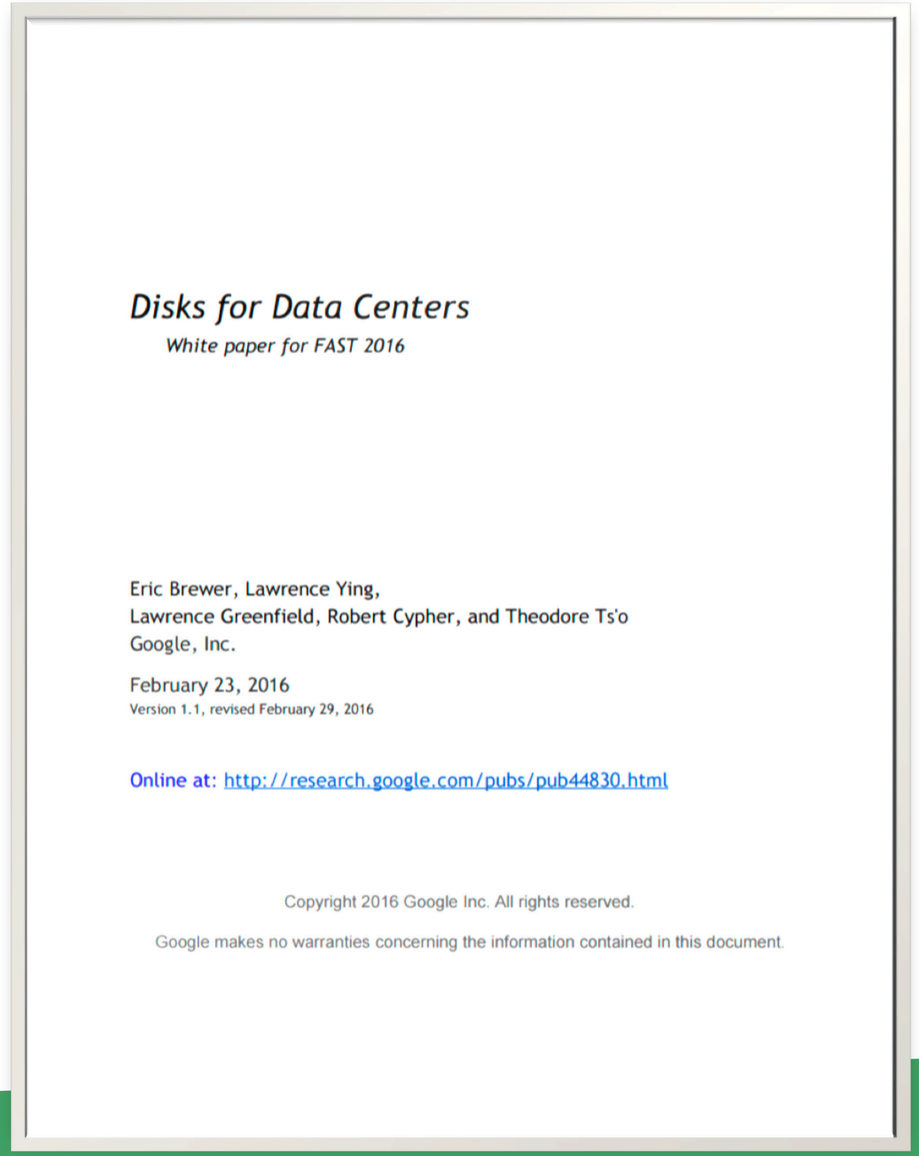
“Disks for Data Center” White paper

- Co-authored by Eric, Larry, Bob, Ted, and me
- First presented publicly in FAST 2016
- You can find this paper here:

  https://research.google.com/pubs/pub44830.html
- Or search for the following using your favorite web search engine:

  “*google research disks for data center*”

We would like to work with the industry to collaborate and standardize on such a Data Center optimized Hard Disk Drive.



Disks for Data Centers

White paper for FAST 2016

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Lawrence Greenfield, Robert Cypher, and Theodore Ts'o
Google, Inc.

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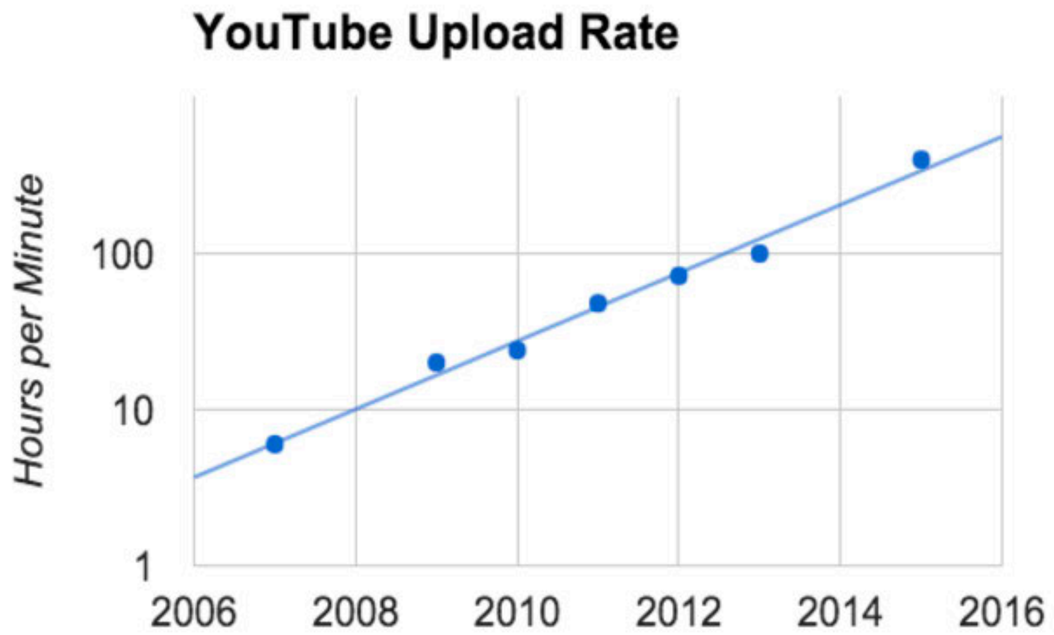
Online at: http://research.google.com/pubs/pub44830.html

Exponential Growth of Bytes



>400 hr of videos, every min !

... or ...

>1PB of videos, every day !!

The Collection View

The Collection View: Five Core Metrics

- Higher **capacity**
- Higher I/Os per second (**IOPS**)
- Lower **tail latency**
- Meet **security** requirements
- Lower total cost of ownership (**TCO**)

The Collection View – Some Not-so-crazy Ideas

- Higher Read Error Rates

  (Weaker Error Correcting Code) + (Early abandoning of read retry)

- Flexible Disk Capacities

  (Degrading disk capacity over time) + (Non-uniform disk capacity)

- Wider Trusted Computing Group OPAL/Enterprise Security Adoption

  (Per LBA-band encryption and access authentication)

The Collection View – Some Not-so-trivial Ideas

- Alternative Form Factors

  Parallel accesses? Multi-disk packages? Power delivery changes?

- Cache Memory

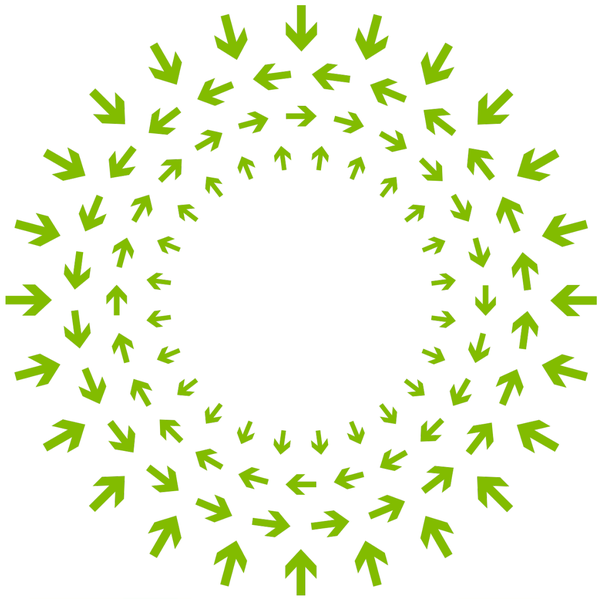
  Memory sharing? Alternative interconnect? Opportunistic reads?

- Hybrid Shingled Magnetic Recording

  (Traditional perpendicular + Shingled) recording on the same disk?

Talk to you soon…
in OCP Storage Monthly Calls

Thank You !



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Compute Project