Flash Memory SUMMIT


# Addressing Flash Endurance, Reliability and Security

Storage Switzerland, LLC

# Agenda

Storage Swiss Background

State of Flash in The Enterprise

What Are the Flash Endurance Issues?

What Are the Flash Reliability Issues?

What Are the Flash Security Issues?

Addressing Endurance, Reliability and Security

Storage Switzerland, LLC

Analyst firm covering storage, cloud and virtualization markets

Knowledge of these markets is gained through product testing, real world implementations and interactions with users and suppliers

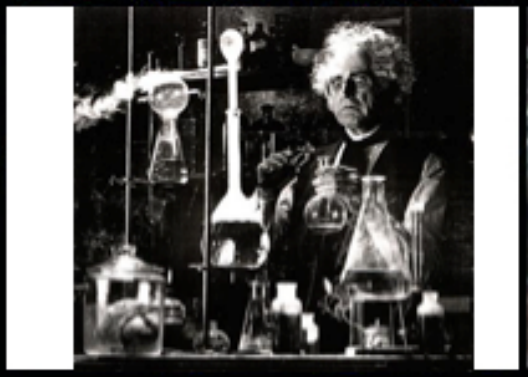
The results of this research are found in the articles, briefing reports, case studies and lab reports on our web site www.storage-switzerland.com

# INDUSTRY ANALYSTS

What my friends think I do

What my mom thinks I do

What users think I do



What vendors think I do

What I think I do


What I really do

# The State of Flash In The Enterprise

Becoming the "go to" option for Storage Performance

**BUT**

Reliability and Endurance remain top concerns

Security of discarded flash is becoming an increasing concern

Vendors are ineffective in communicating performance benefits

# Flash Endurance

- Endurance Remains a top concern for users and even legacy storage vendors
- What is the Endurance Problem?
  - Flash wears out
  - It gets worse from SLC to MLC
  - It gets worse with each generation

# Flash Endurance

For most enterprise flash products, endurance has been fixed using:

- Over-Provisioning
- Intelligent Writing of Data for enhanced reads, writes and life expectancy
- Heavier use of DRAM buffers to better organize writes and coalesce them

# Flash Reliability

Redundancy requires Flash Aware RAID to not exacerbate endurance challenges

You need more than just RAID

- *Need for power management because of DRAM*

What is DRAM doing in Flash Appliances

The DRAM Problem

- *Power Failure can cause data loss and long restart times*

# Flash Reliability

- Flash redundancy is slowly becoming a standard offering in Flash Appliances
  - Flash RAID
  - In-Place Chip Fail
  - Redundant Components
- Bigger problem is dealing with power failures
  - Requiring UPS is not enough
  - Capacitors are risky
  - NVRAM is Key

# Flash Security

Unlike hard drives, erasing flash is problematic - all flash cells are not accessible for erase functions

Endurance fixes like over-provisioning hides cells

Reliability fixes like hot flash swap hides read only cells

# Flash Security

Erasing flash is basically false security

Even if special tools are created to access hidden areas, how do you fix erase charge-less cells?

Encryption is the key to eliminate the risk

# Next Steps

- Understand the Endurance Trick Differences
  - *Over-provisioning is not enough and may be too much*
- Understand the Reliability Issues especially as it relates to power fail
  - *Requiring a UPS is not enough*
- Be aware of security risks and understand what level of protection you need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