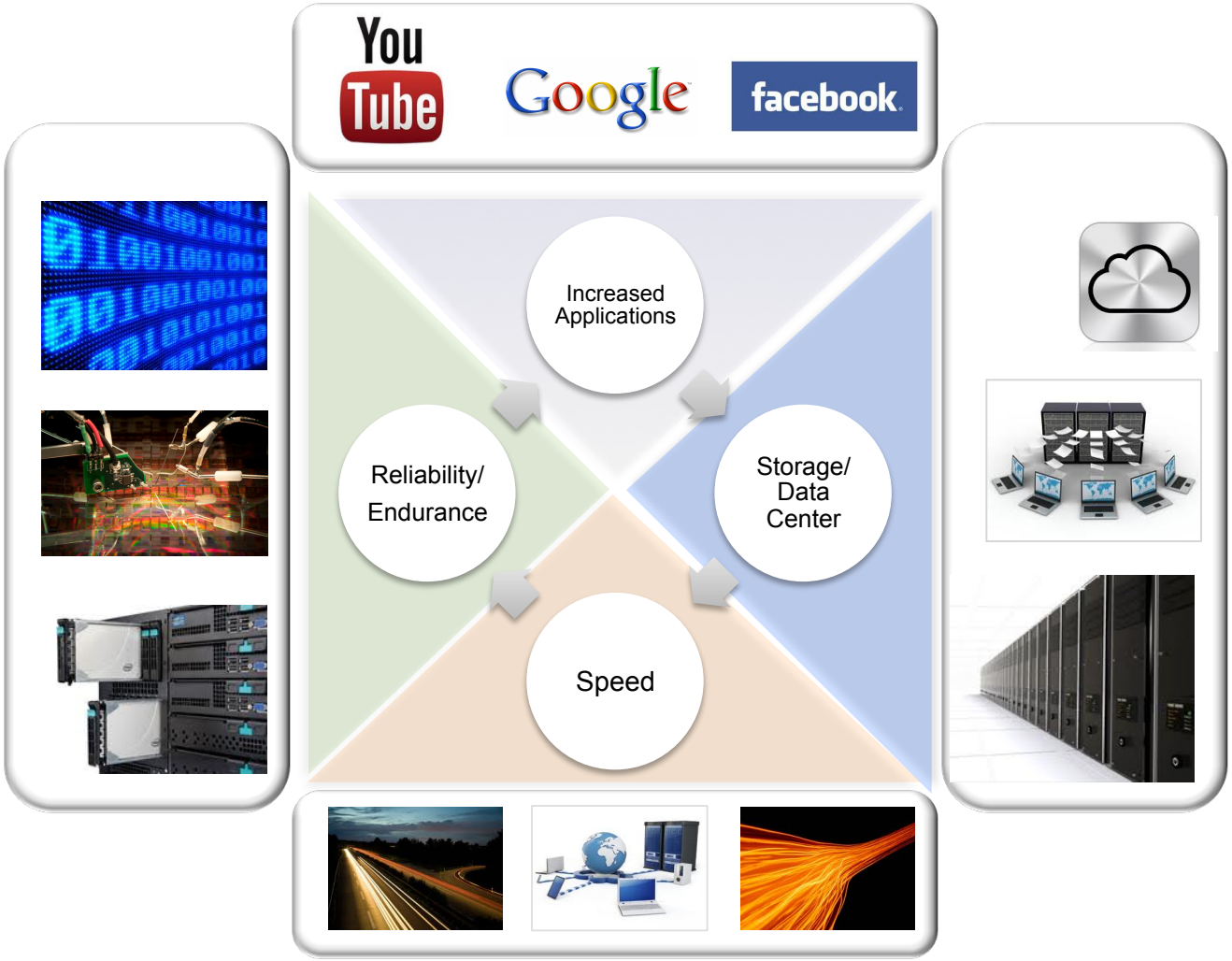
MRAM, the Next Storage Memory

a non-volatile memory

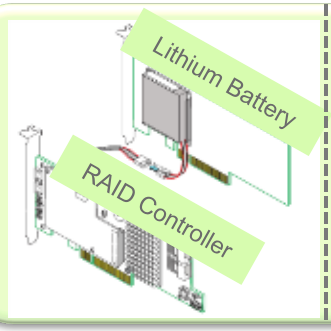
Hamid Haidari
Sr. Director, WW Sales

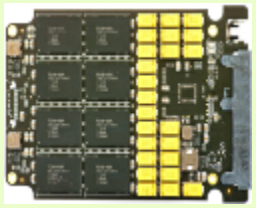
Increased Applications Demand Performance



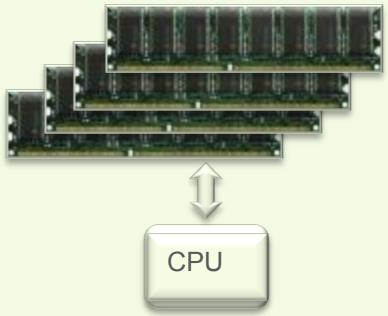
MRAM System Applications

Buffer for Critical Data Storage

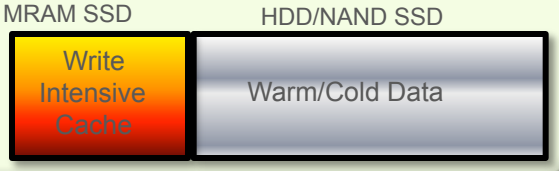




NVM Instant-on



SSD Cached Storage



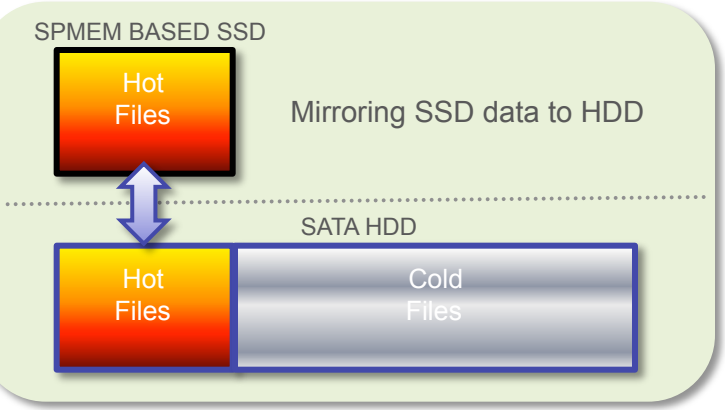
Non-volatile, Fast Random Access SPMEM™

Reliability **Performance** **Power Consumption**

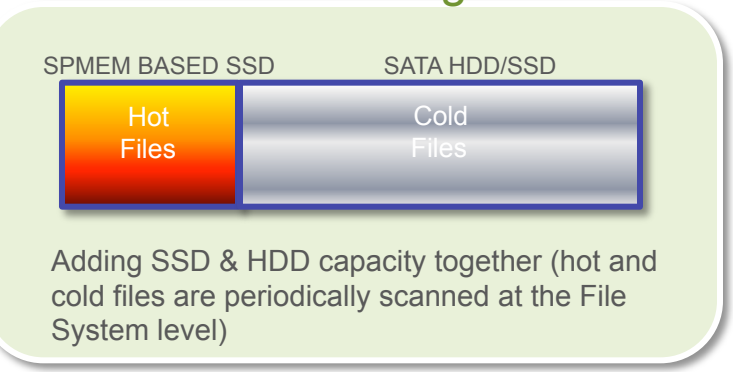
SSD Applications

Tiered & Cached Storage

SSD Tiered Storage



SSD Cached Storage



Avalanche Advantages

Lower Power Consumption

- Reduces Data Center Power Consumption by an Order of Magnitude

DRAM-Based Performance

- 10x Faster Read/Write Speed than NAND SSD

Superior Endurance

- 10^{16} vs. 10^{5} for SLC NAND

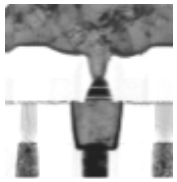
Lower Latency

- Latency Performance of DRAM-Based SSDs

An Industry Leader

- Founded in 2006
- Seasoned Executive Team
- Extensive IP Portfolio
- Strong Balance Sheet
- Focused Go-To-Market
- 150+ Patents

Leading Technology



Fabless Universal Non-Volatile Memory (NVM) Technology

Led by an Experienced Team in Execution Mode

Industry Veterans Delivering Production in 2013

Addressing Large Markets with a Focused Strategy

Storage, Mobile, and Compute System Design Markets

Today's Memory Challenges

DRAM

Cell Capacitance

- <2xnm is Uncertain

Capacity Challenges

- >8Gb no feasible

FLASH

FG below 1xnm uncertain

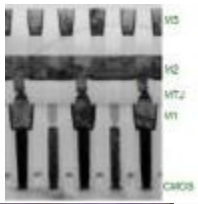
- Retention
- Reliability

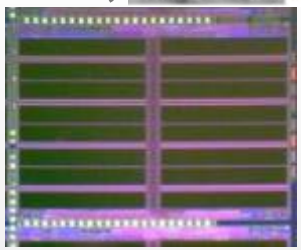
  SLC <50K, MLC <3k

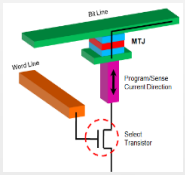
Avalanche
MRAM

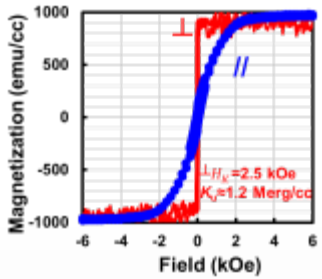
Rapid and Tremendous Progress

64 Mb Functional Silicon (65 nm LL CMOS)









Superior pMTJ Performance Achieved Down to 20 nm

TMR ~150%
FL~1.8 nm
Ic<80 uA (10 ns)

Productization/ Commercialization

SERIES D '12

SERIES C '10

Multiple Tier 1 Foundries Engagement (28-55 nm)

Multiple Tier 1 Customer Engagements

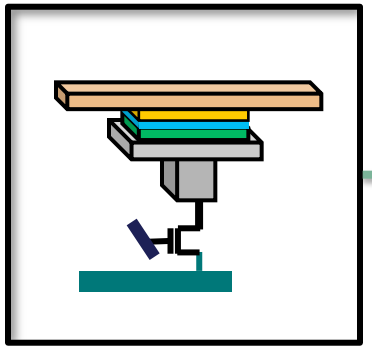
Contracts with 300mm R&D Fab and World Class Foundry (65 nm)

Value

Time

Go-to-Market Strategy

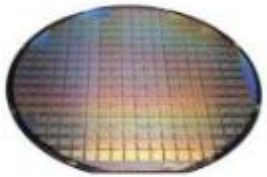
Avalanche SPMEM™ Technology



Branded Stand Alone Avalanche & Licensed Partner SPMEM™ Products

SPI & DDR Devices Discrete Component, Drive & System

Embedded AvRAM™ to Licensed OEM & Fab Partners SOC & Process Node Roadmaps



Embed AvRAM™ into Leading SOC Products

Highly Leveraged MTJ Memory Design Enables Parallel Product Positioning

Thank You!