StorageRAM with a New Spin

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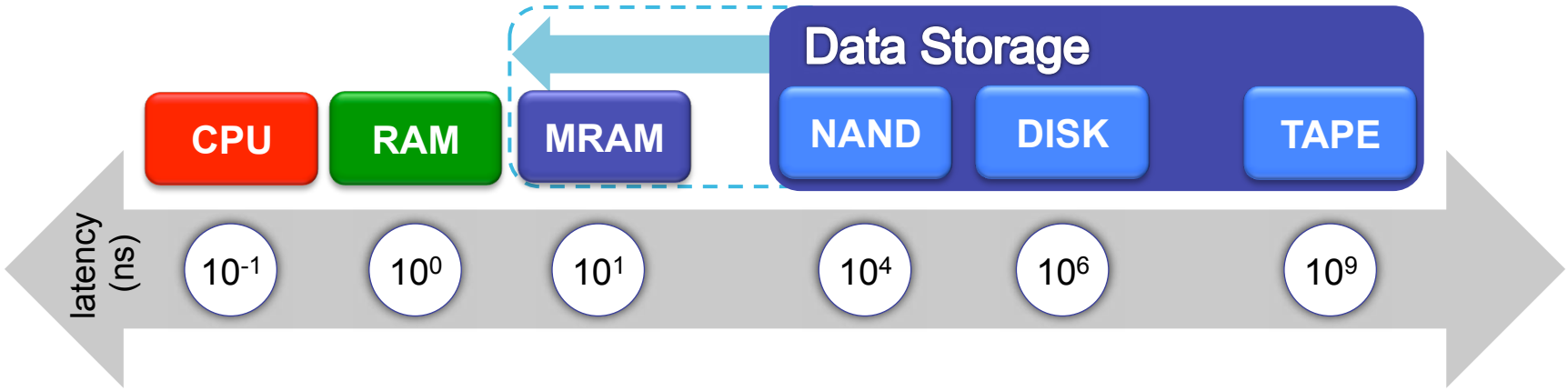
Everspin – The MRAM Company

- **MRAM - Magnetic Random Access Memory**
  - *Fastest non-volatile memory with unlimited endurance*
- **Addressing a fundamental Problem of Storage:**
  - *Truly Non-Volatile RAM – Power Fail Data Protection*
- ***Complementing DRAM and NAND***
  - *Making NAND perform better and last longer*
  - *MRAM for write caching, DRAM for read caching*
  - *More IOPS and better IOPS/Watt than NAND*

Processor-Storage Performance Gap

Shorter storage latency improves system performance

MRAM extends storage memory latency to ns-class

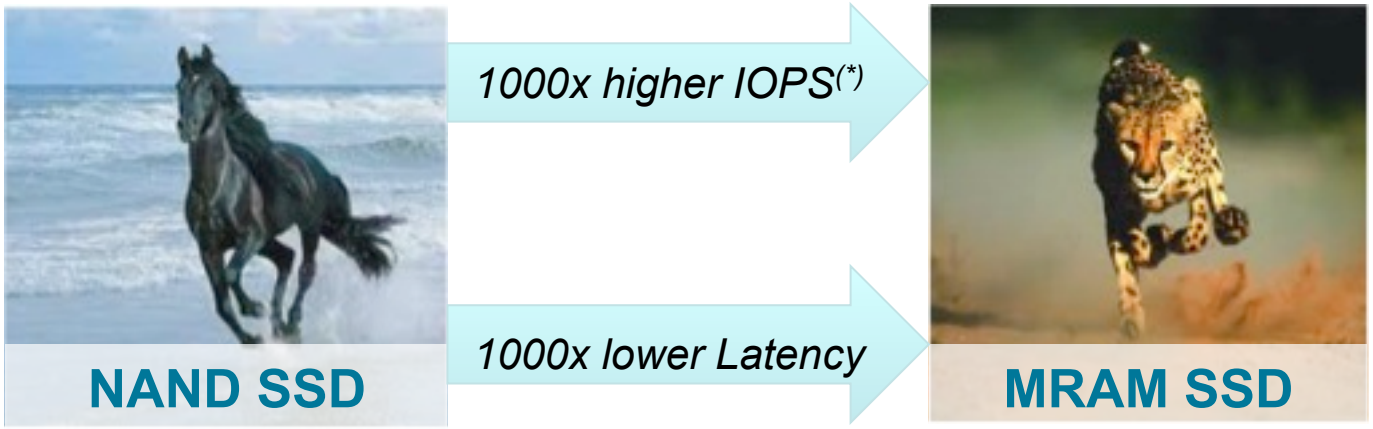


~1,000,000,000 operations/s

~100 operations/s

The Quest for Faster Data Access

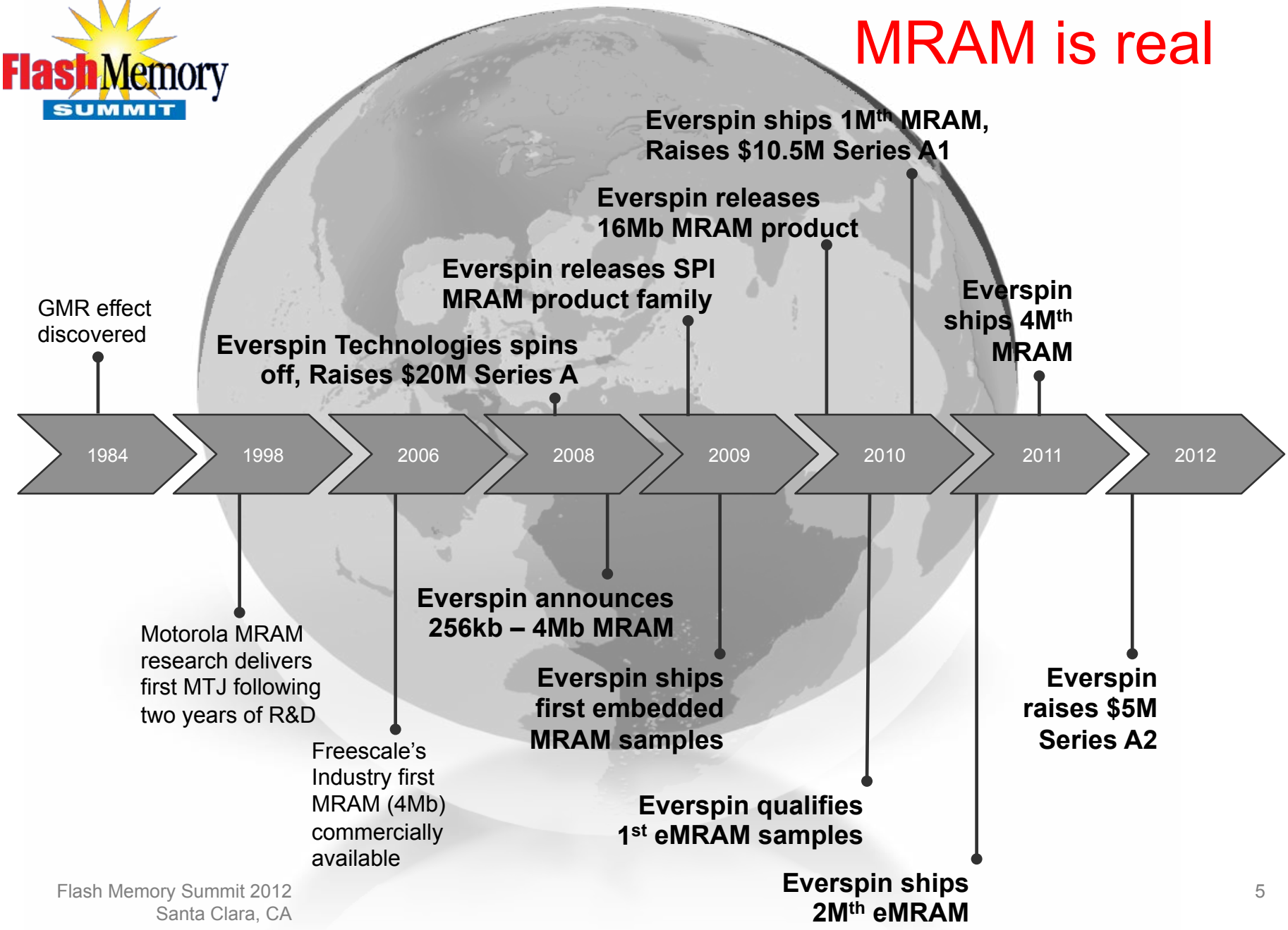
Data Storage must deliver predictable and scalable performance & response times



MRAM delivers the only nanosecond-class, gigabyte-per-second nonvolatile storage tier

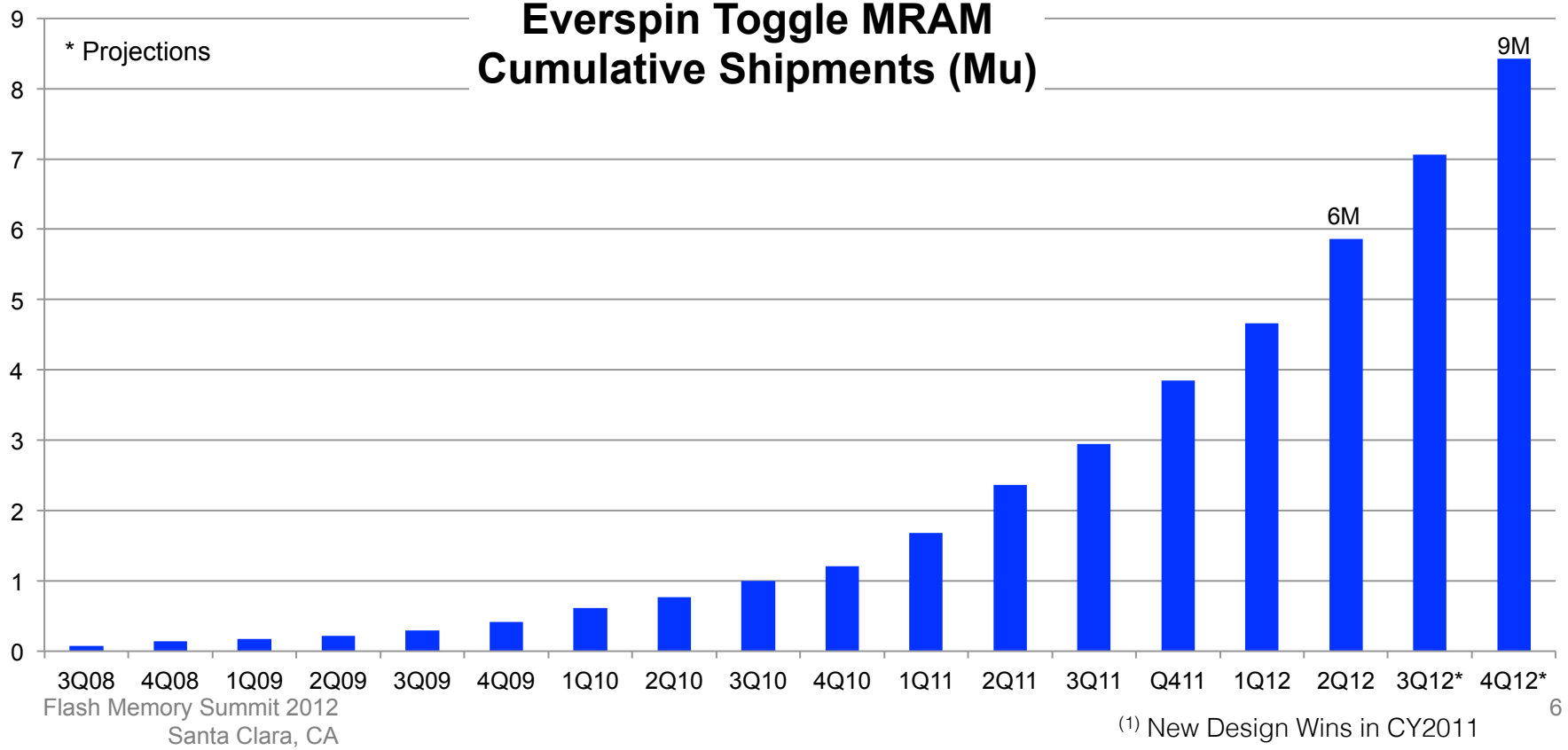
(*) 2kB Transfer Size

MRAM is real


GMR effect discovered
1984
Motorola MRAM research delivers first MTJ following two years of R&D
1998
Freescale's Industry first MRAM (4Mb) commercially available
2006
Everspin Technologies spins off, Raises $20M Series A
Everspin announces 256kb – 4Mb MRAM
2008
Everspin releases SPI MRAM product family
Everspin ships first embedded MRAM samples
2009
Everspin releases 16Mb MRAM product
Everspin qualifies 1st eMRAM samples
2010
Everspin ships 1Mth MRAM, Raises $10.5M Series A1
Everspin ships 2Mth eMRAM
Everspin ships 4Mth MRAM
2011
Everspin raises $5M Series A2
2012

MRAM Adoption Accelerating

6.0M+	400+	250+	100+	100+
MRAM Shipments	MRAM Customers	MRAM Design Wins(1)	MRAM Applications	MRAM Products



(1) New Design Wins in CY2011

Embedded MRAM Value Proposition

Converged Systems

eMemory Concerns:

- Logic Compatibility
- Scalability to <2xnm
- Static Power scaling

MRAM is logic friendly, scales, instantly on/off

Processor and Memory merge into one block

Converged Memories

eMemory Concerns:

- Working Memory
- Storage Memory
- Tuning for apps

MRAM serves all eMemory Requirements

On-Chip Code and Data

Do More With Less

eMemory Concerns:

- Performance of NVM
- Endurance of NVM
- Size of on-chip RAM

MRAM is fastest highest density

ST-MRAM: Storage Class Memory

- **Storage OEMs are tuning storage to application needs**
  - Capacity, Performance, Power, Uptime/Service and Reliability
  - OEMs need to balance storage capacity and performance

  - HDD leveraged as capacity optimized data storage
    - *Benefits : Lowest cost per GB/TB for data storage*
    - *Challenges: Random access, active power & power fail*

  - NAND SSD leveraged as performance optimized storage
    - *Benefits : More IOPS, reduced latency & less overall power*
    - *Challenges: Write latency & variability, endurance, power fail*

  - ST-MRAM leveraged as non-volatile buffer/cache for storage
    - *Benefits : DRAM like access, unlimited endurance & power fail*
    - *Challenges: New storage architecture, density & cost scaling*