



# The Perfect Storm

Flash Recovery Solutions

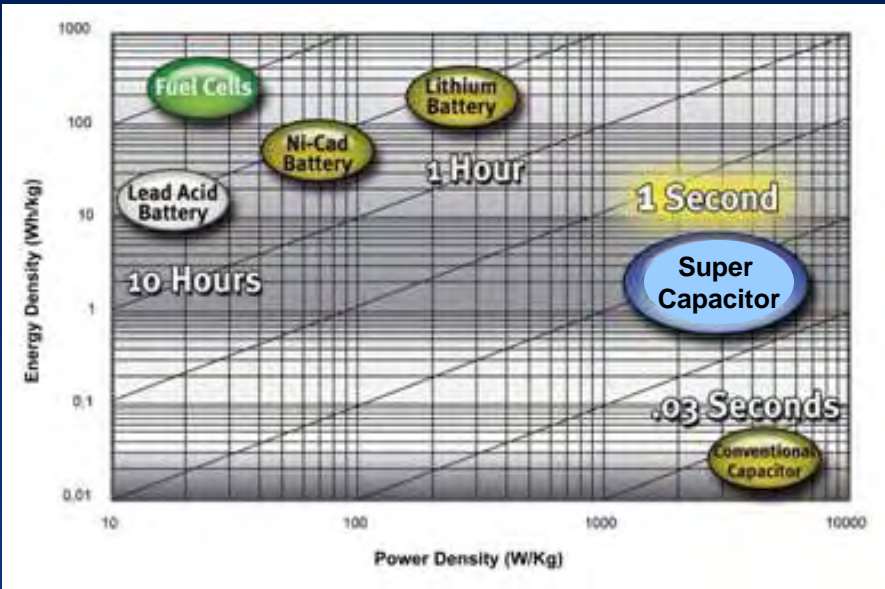


# Data Center Reliability

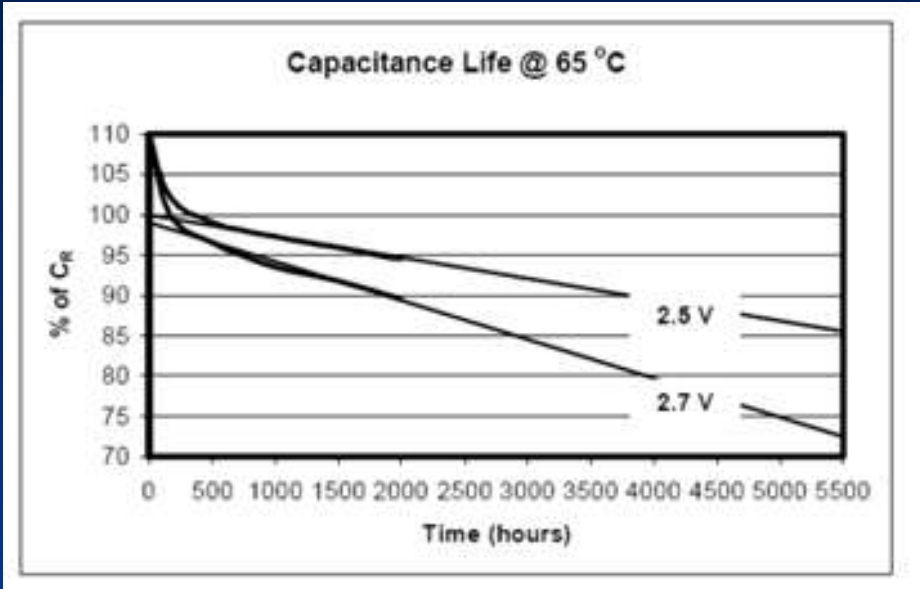
- Data Center server power outages continue
- Read/Write Consequences
  - Data Loss
  - Undetected errors in host application
- NVDIMM designs protect system integrity but...

Battery Limitations	Issue
Shelf Life	One year max or 500 cycles
Disposal and Handling	Hazardous Waste Management
Data Storage Capacity	Up to 72 hours
Down Time	Charge Time up to 6 hours
Replacement Cost	Field Time and Materials

# Batteries vs. Super Capacitors

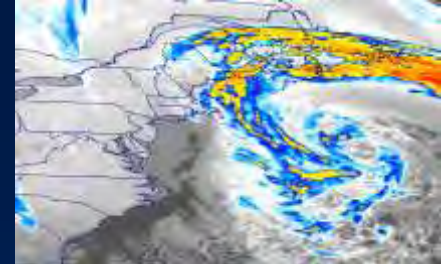


Energy and Power Density Comparisons



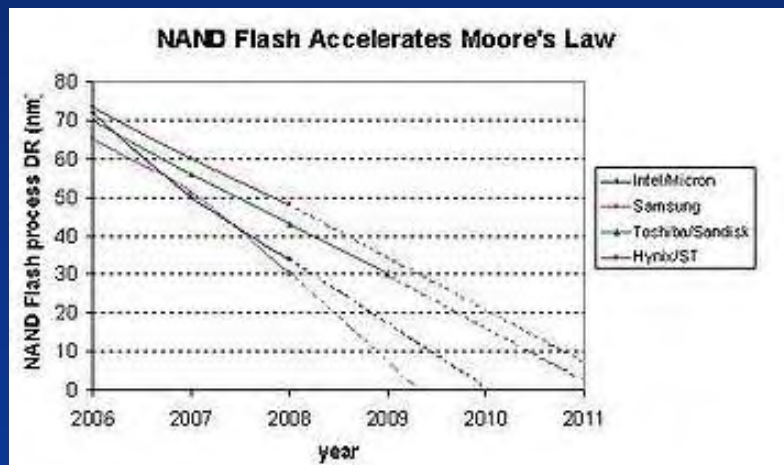
Super Capacitor Life Expectancy

Graphics Courtesy of Maxwell Technologies

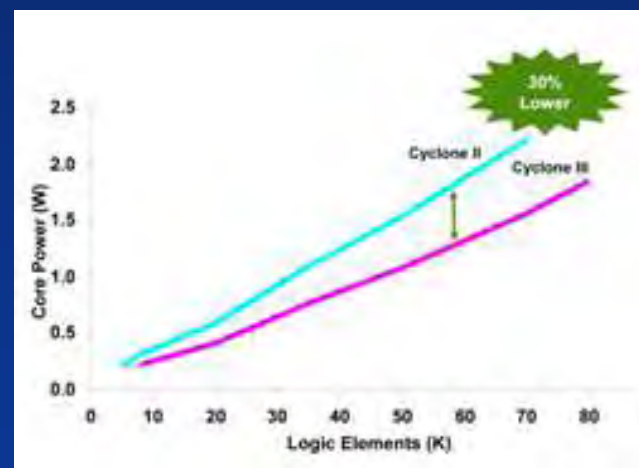


## Technology Enablers

- **Super Capacitors** are production worthy
- **Flash Memory** costs continue to decline
- **FPGA** technology meeting power/performance/cost



Lower Cost per Process Node Step



FPGA Low Power Attributes

# Data Integrity - The Green Approach

## Battery Backed Data Recovery



Add-on modules that protect against data loss in the event of a server or power failure by providing emergency power to the cache memory. When power is restored, the data not yet written to the hard drives can be retrieved from cache memory.



## Super Capacitor Based Alternative



Benefit	Battery Power Source	Super Cap Power Source
Less Cost		<input checked="" type="checkbox"/>
Lower Power		<input checked="" type="checkbox"/>
Smaller Footprint		<input checked="" type="checkbox"/>
Field service required	<input checked="" type="checkbox"/>	
Permanent backup		<input checked="" type="checkbox"/>

# Data Recovery Summary

- There is a green alternative to battery backed data recovery products
- Data Recovery applications are expanding
  - Data Center Growth
  - Gaming
  - Persistent Memory
- Altera provides leading edge FPGA and ASIC solutions for Flash applications
- Questions?
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