Green Storage in Datacenters

The case for SSDs
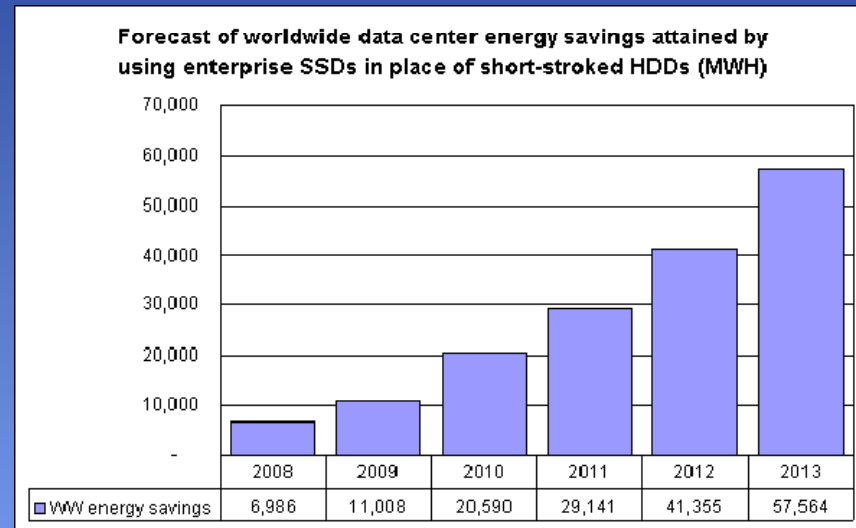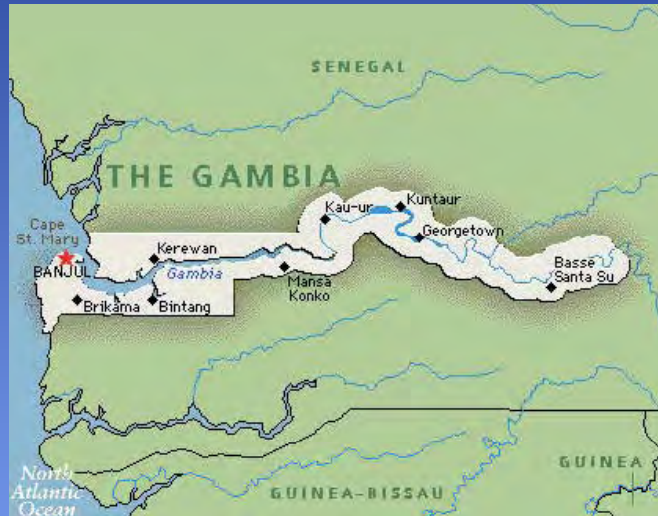
Esther Spanjer

Director, SSD Marketing

The connection between Gambia and SSDs

Forecast of worldwide data center energy savings attained by using enterprise SSDs in place of short-stroked HDDs (MWH)

	2008	2009	2010	2011	2012	2013
WW energy savings	6,986	11,008	20,590	29,141	41,355	57,564

iSupply (May 2009): The use of solid-state drives (SSDs) could allow the world's data centers to REDUCE their cumulative electricity consumption by 166,643 megawatt hours (MWH) from 2008 to 2013.

This amounts to slightly more than the total electricity generation of the African nation of Gambia for the entire year of 2006….

Optimizing Storage Budget

The IT Manager's dilemma

Power/Cooling

Capacity

Space

Price
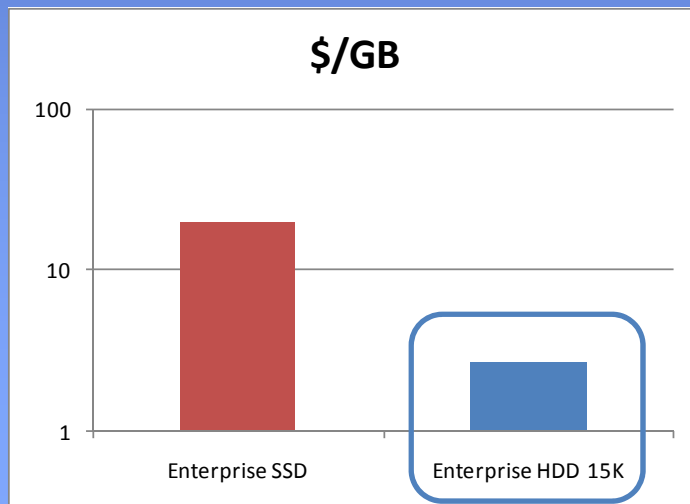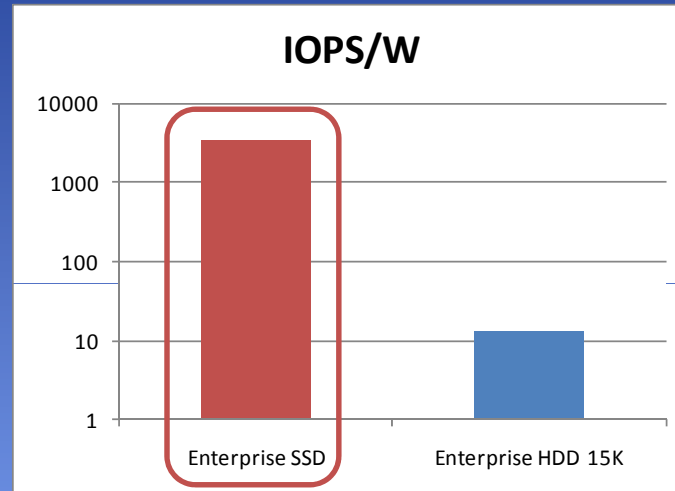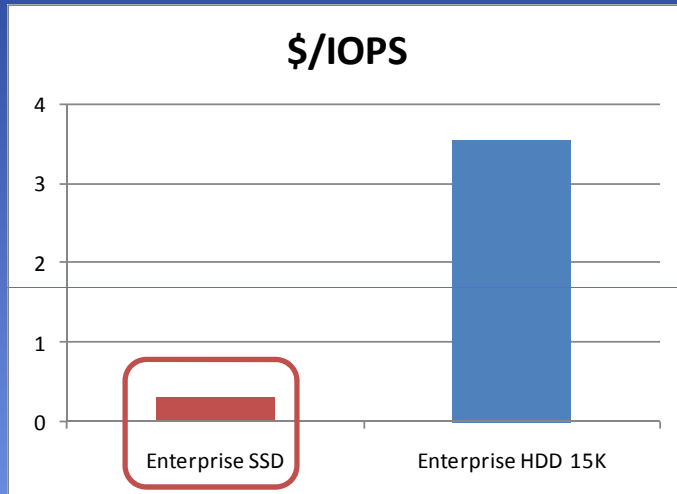
Performance

Maintenance

Storage Tradeoffs in Datacenter SSD vs HDD

$/IOPS

(bar chart, y-axis 0 to 4)
- Enterprise SSD (low, ~0.3, circled in red)
- Enterprise HDD 15K (~3.5)

IOPS/W

(bar chart, y-axis 1 to 10000, log scale)
- Enterprise SSD (~3000, circled in red)
- Enterprise HDD 15K (~13)

$/GB

(bar chart, y-axis 1 to 100, log scale)
- Enterprise SSD (~20)
- Enterprise HDD 15K (~3, circled in blue)
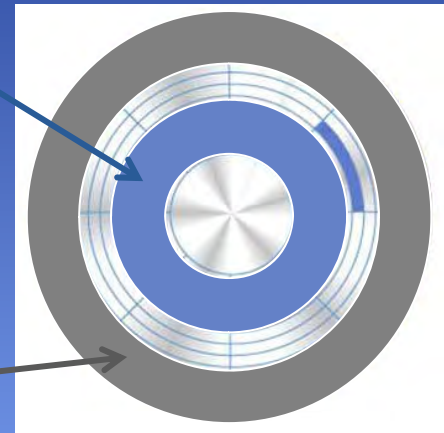
Deploy SSD if performance is main metric

Deploy HDD if capacity is main metric

HDD Capacity Utilization
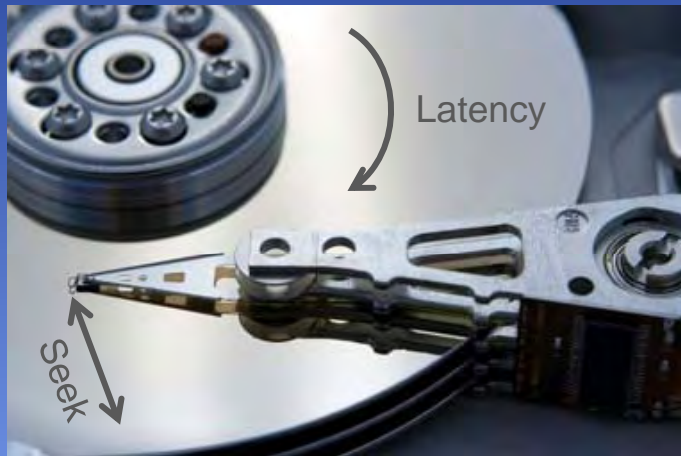
Inner tracks used to obtain higher random performance (IOPS)

Latency

Seek

Outer tracks used to obtain higher sustained performance (MB/s)

- HDD is main I/O performance bottleneck in Enterprise Storage Systems
- High IOPS achieved through hundreds of "spindles"
- Destroke HDD to optimize random I/O performance → small capacity utilization (~20-30%)
  - Power, cooling, space, maintenance are still 100%

Storage Tiering in Datacenter
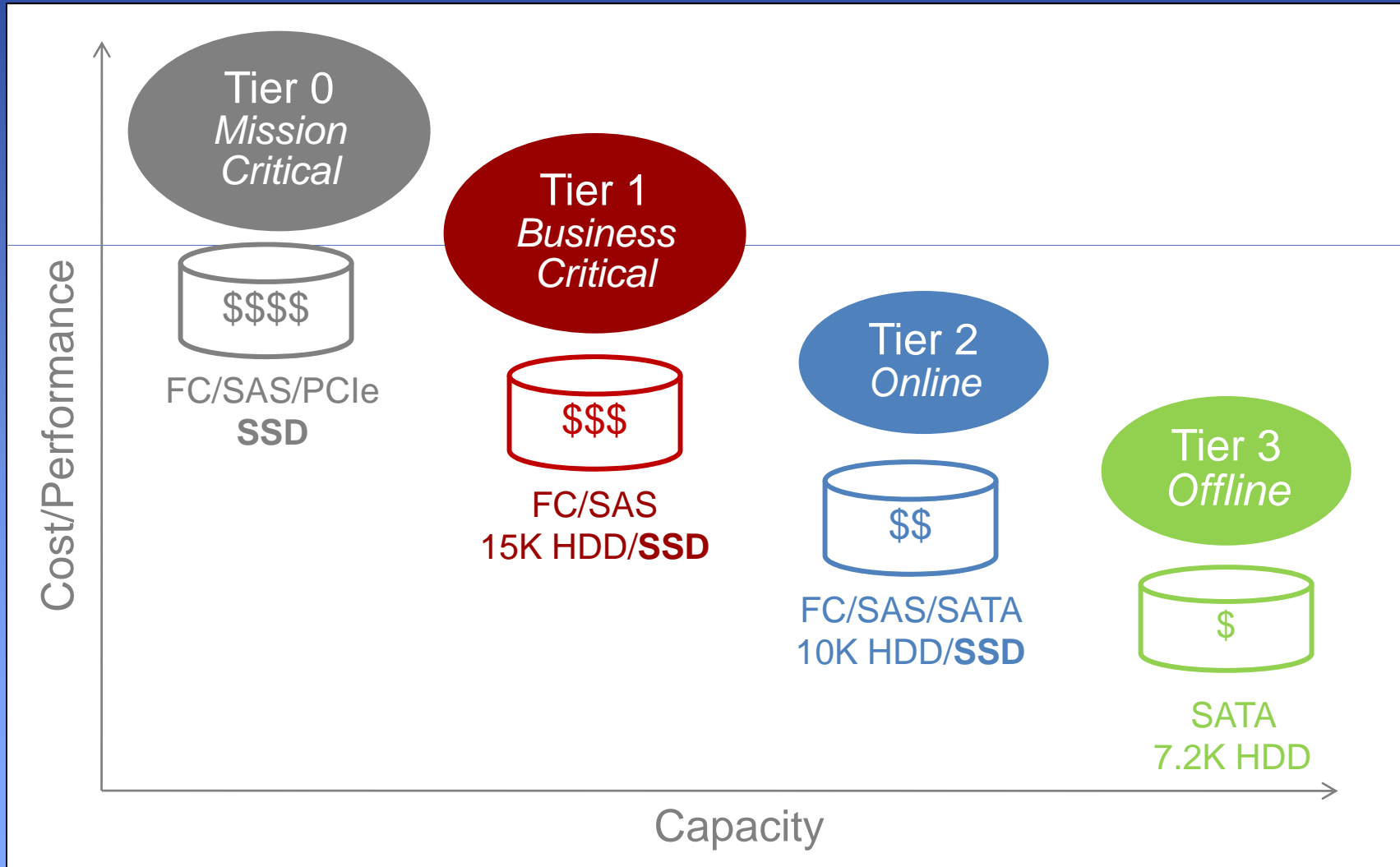
The Future of the Datacenter

Legacy:
All HDD

Near Term:
HDD + SSD

Future:
All SSD

Thank You