IBM Storage & SDI

GS13 – IBM Storage News

European GSE

October 25th 2017, Hamburg, Germany

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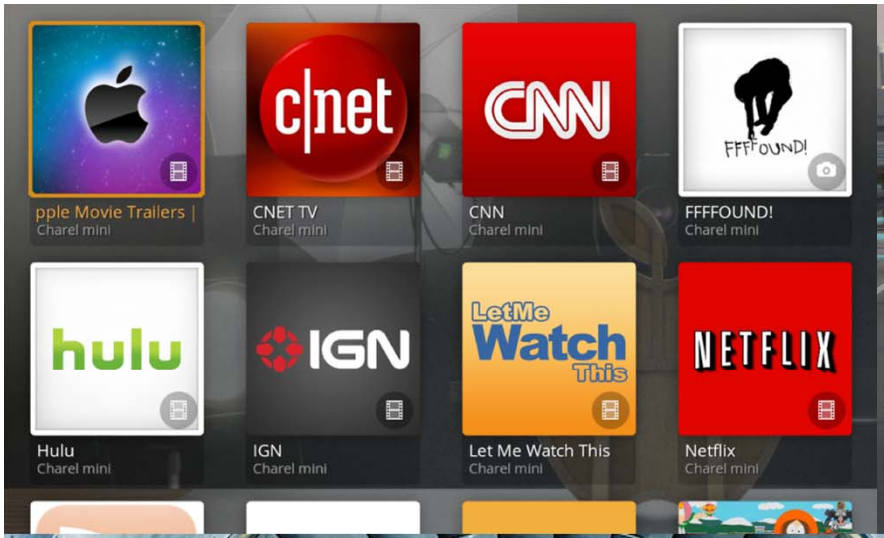
Agenda

- The Storage Industry – Trends and Developments
- Overview IBM Storage Solutions
- DS8880 Family of Products
- The Future of Tape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CNN
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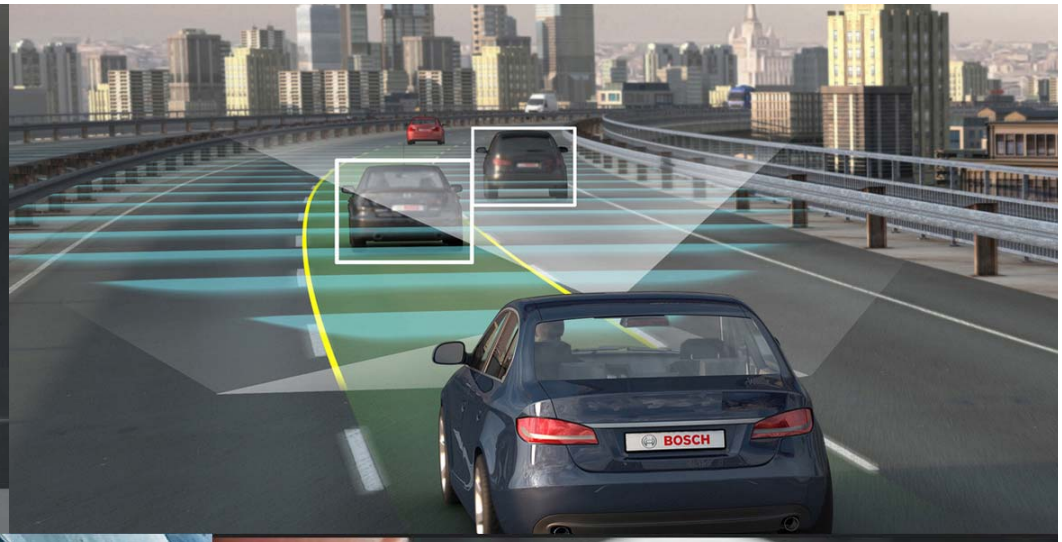
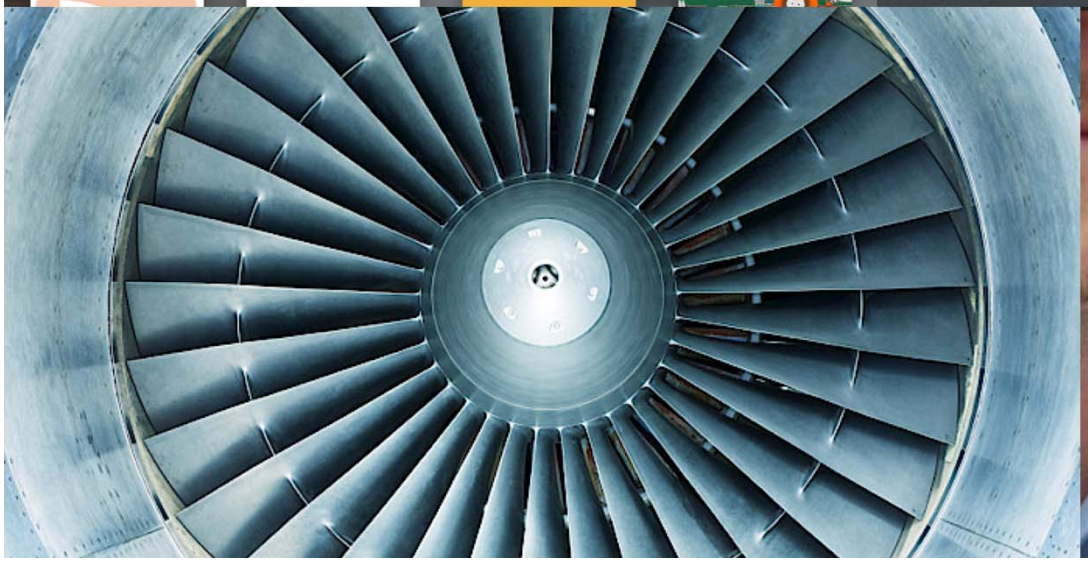
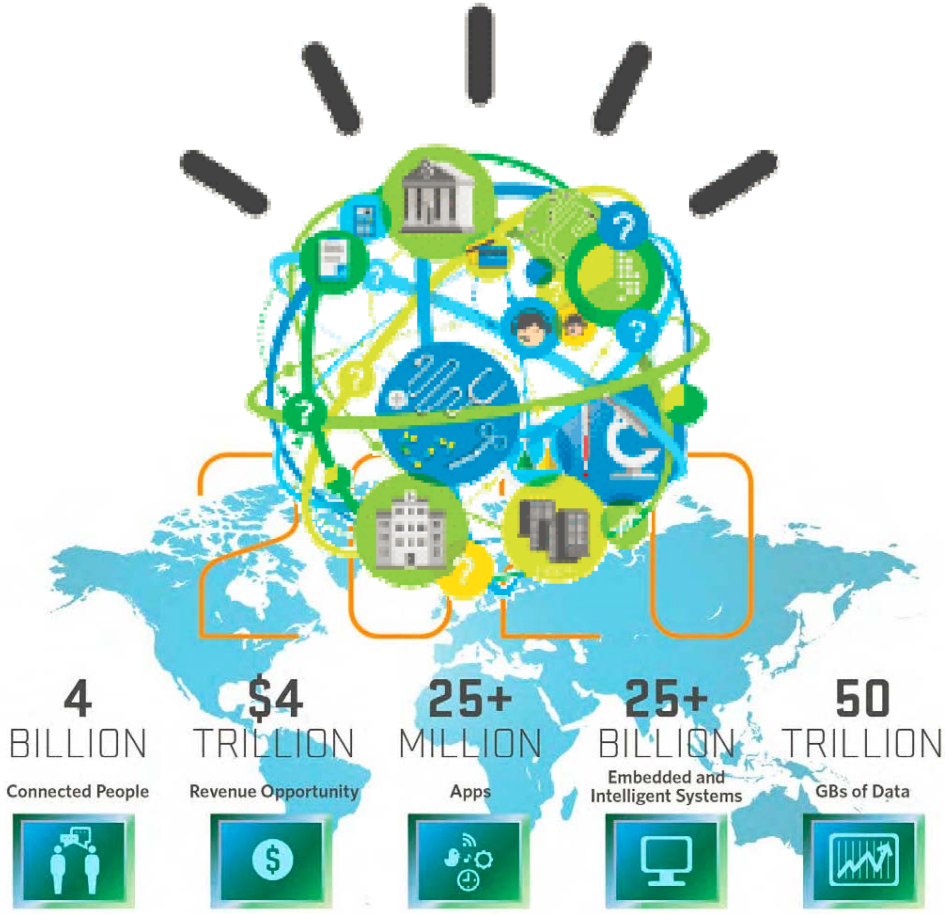

BOSCH



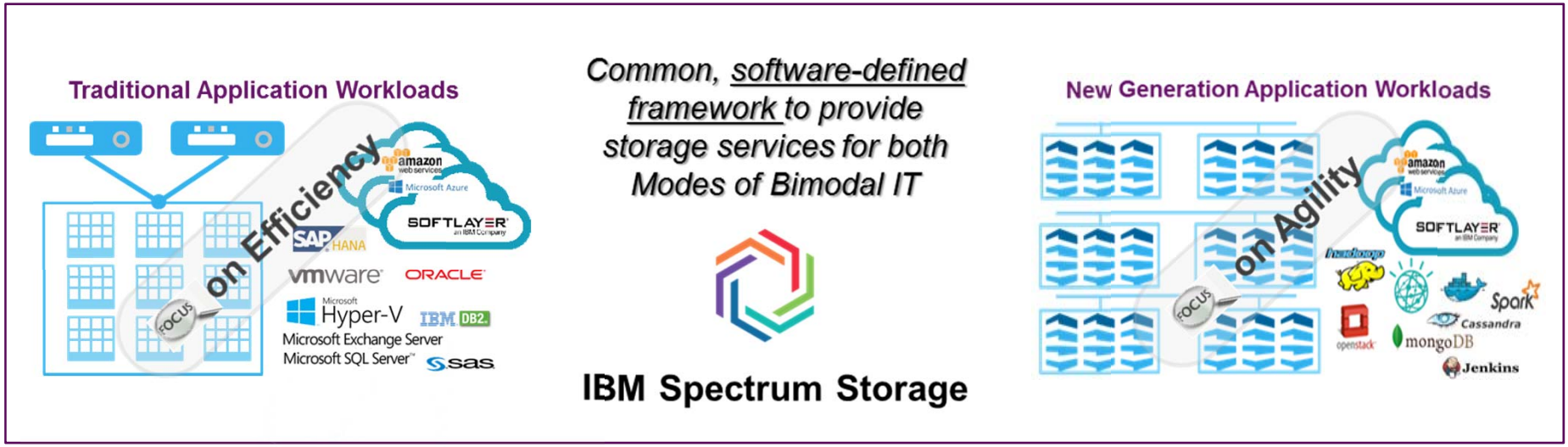
Megatrends in the Storage Market

- Software Defined Storage
- Cloud/Hybrid Cloud
- Transition to Flash
- (Hyper-) Converged Systems



Bimodality in Storage

…transformation to adapt new business models while preserving core IT operation



Flash – IBM Flashsystem Family

Commodity Hardware, Hybrid Cloud

Traditional Disk Systems and Tape Systems

IBM Storage Portfolio Q4 2017:

IBM SDS und SDI

Traditional Workload

IBM Spectrum Accelerate

IBM Spectrum Virtualize

New-generation Workload

IBM Spectrum Scale

Neu

IBM Cloud Object Storage

Data Management Products

IBM Spectrum Protect

IBM Spectrum Control

IBM Spectrum Copy Data Management

IBM Spectrum Protect Plus

SDI

IBM Spectrum Conductor

IBM Flash-Storage

Neu

Storwize „F“

Neu

FS900

Neu

V9000

Neu

A9000 R

Neu

A9000

DS8888

Optimized Storage

Storwize

Neu

Storwize

SVC

DPR

Neu

Tape

VTL-Systems

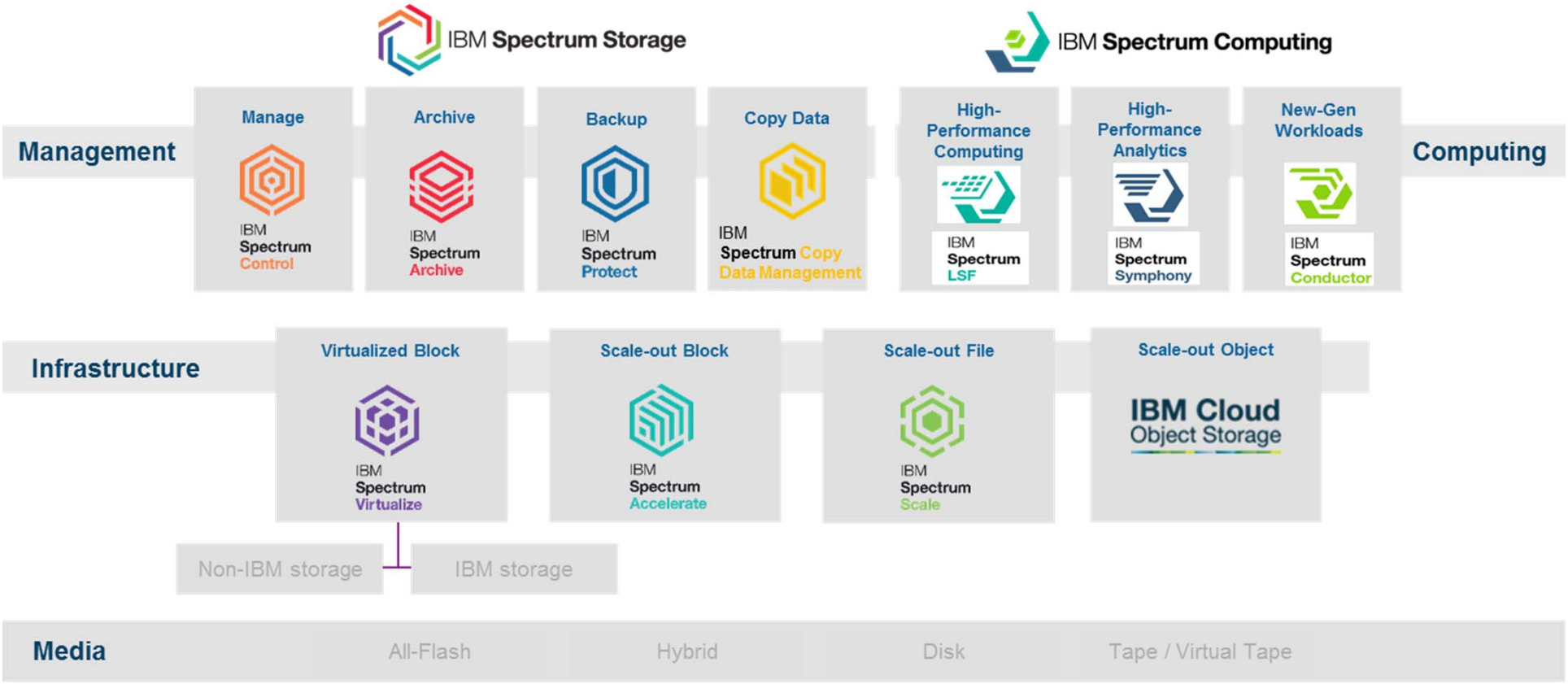
IBM ESS

Integrated

VersaStack

Software-defined Flexibility

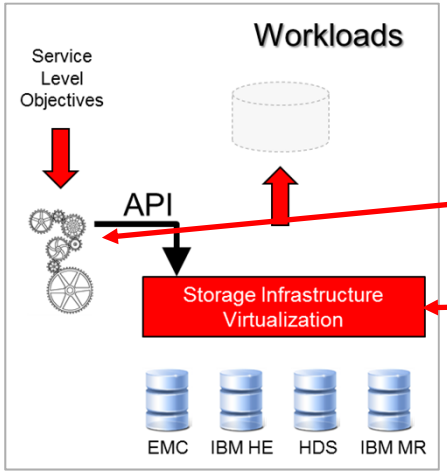
agility, efficiency and performance

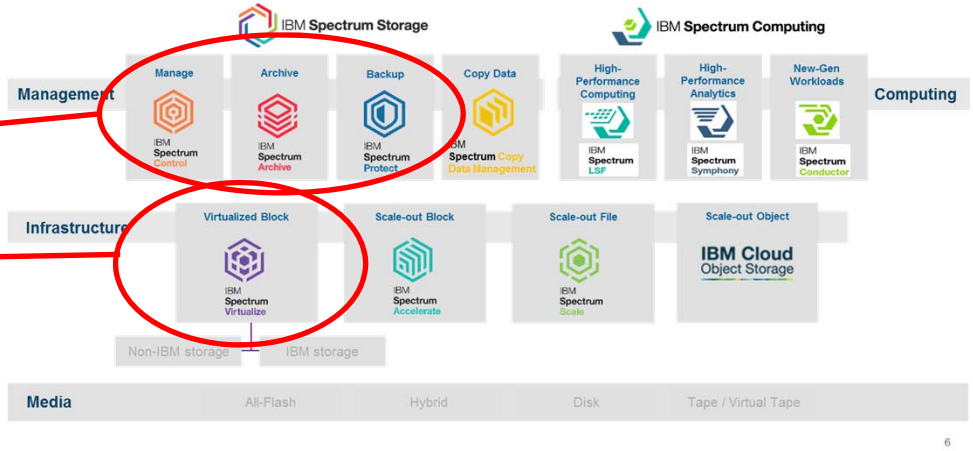


Software-defined Flexibility

agility, efficiency and performance

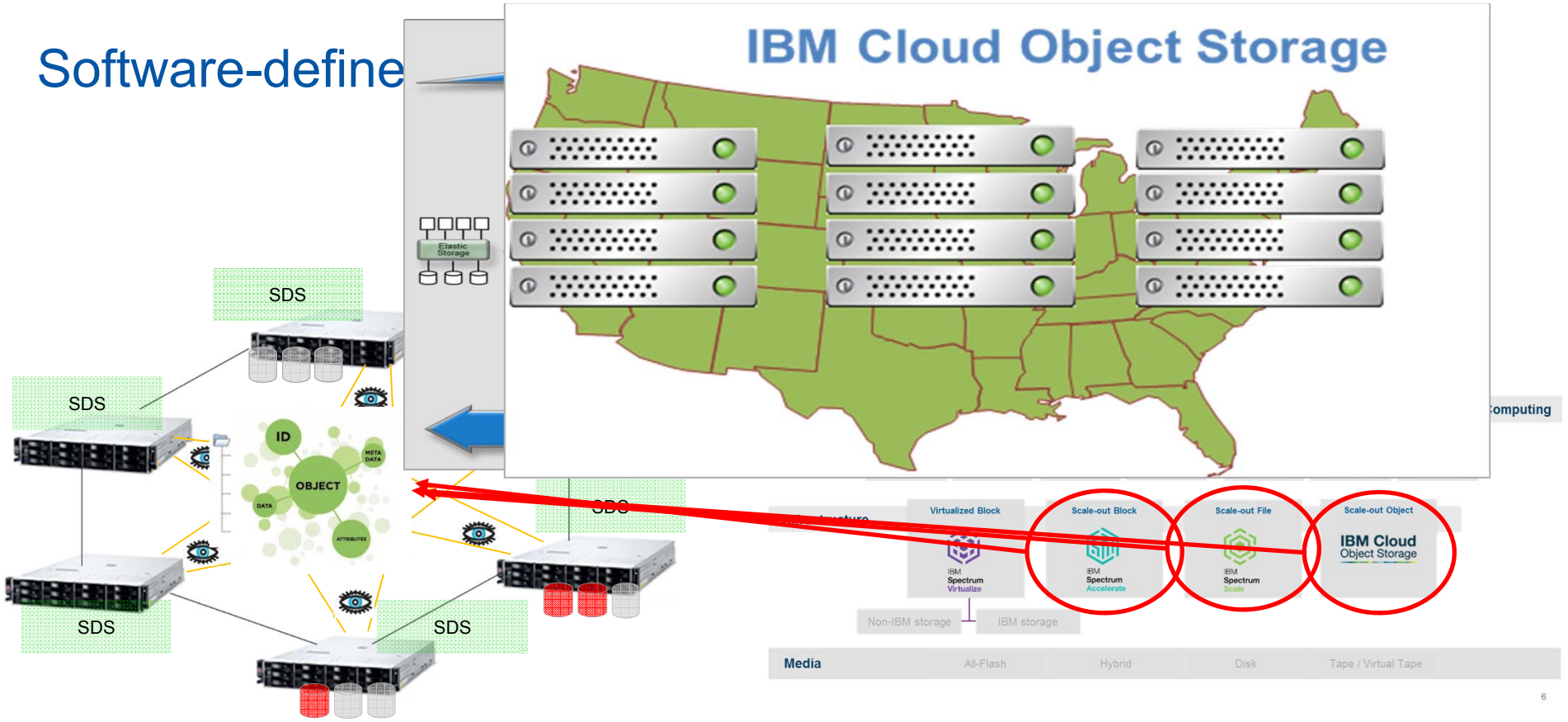
Optimize Efficiency/Automation





FOCUS on Efficiency

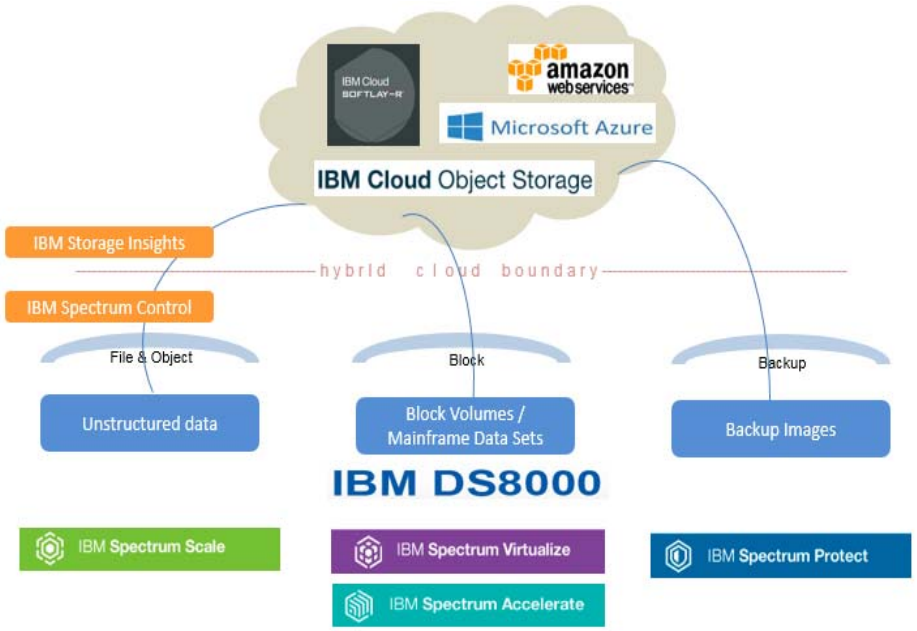
Software-define



FOCUS on Agility

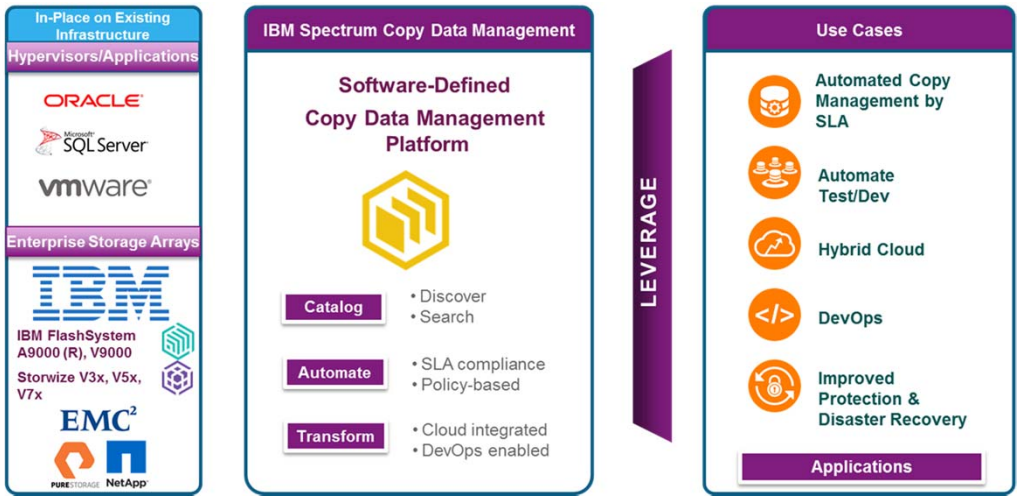
Hybrid Cloud/Object Storage Integration

- Tiering to the Cloud
  - DS8000
  - Spectrum Scale
- Snapshots to the Cloud
  - Spectrum Virtualize
- Replication to the Cloud
  - Spectrum Virtualize
  - Spectrum Accelerate
  - Spectrum Scale



IBM Copy Data Management

Copy Data Management (CDM) is an IT modernization technology that focuses on making **use of existing data** in a manner that is efficient, automated, scalable and easy to use, delivering the data access that is urgently needed to transform IT.

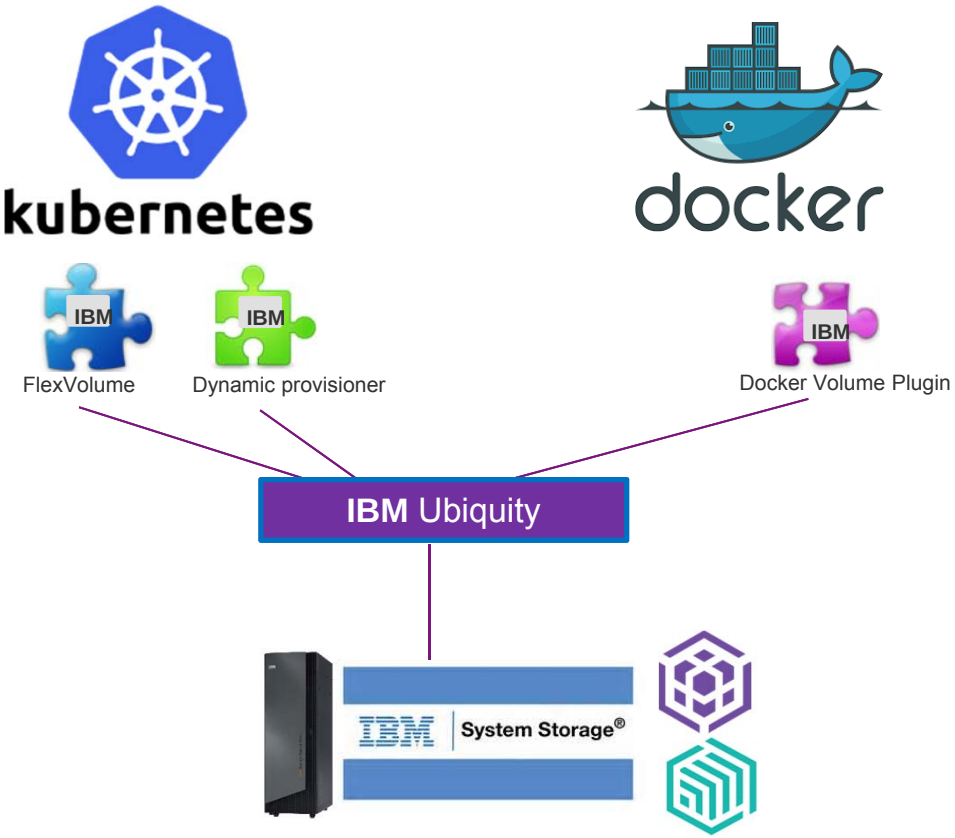


"There's a couple different approaches to CDM that are out there. If you can, you don't want to create a whole other separate storage silo. Because that's not really saving you in terms of capital savings.

The more you can do to manage data "in-place" is really going to give you an edge up in terms of economics."

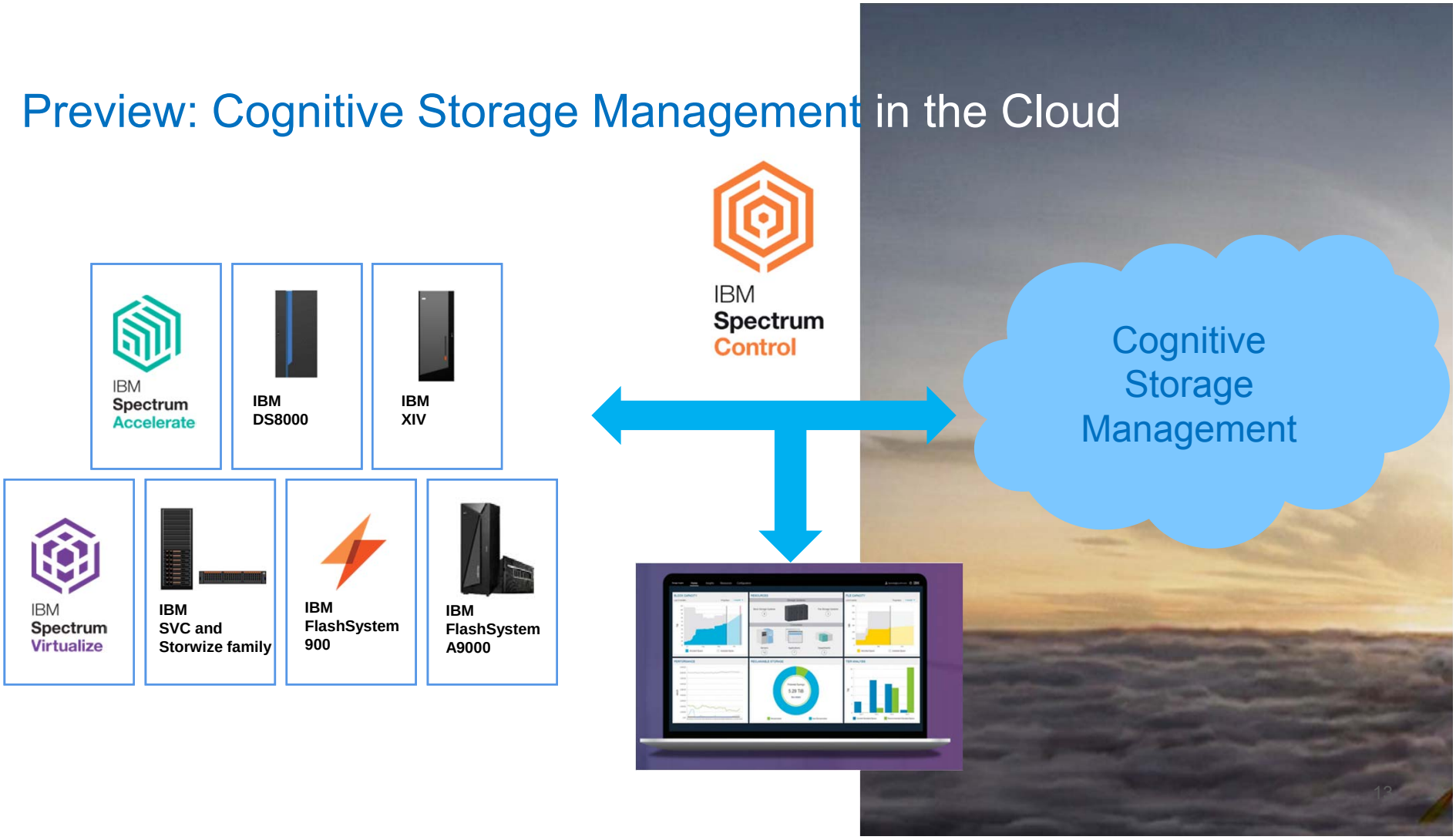
Laura DuBois
IDC – VP of Storage
June 10, 2015

The IBM Storage solution: Ubiquity



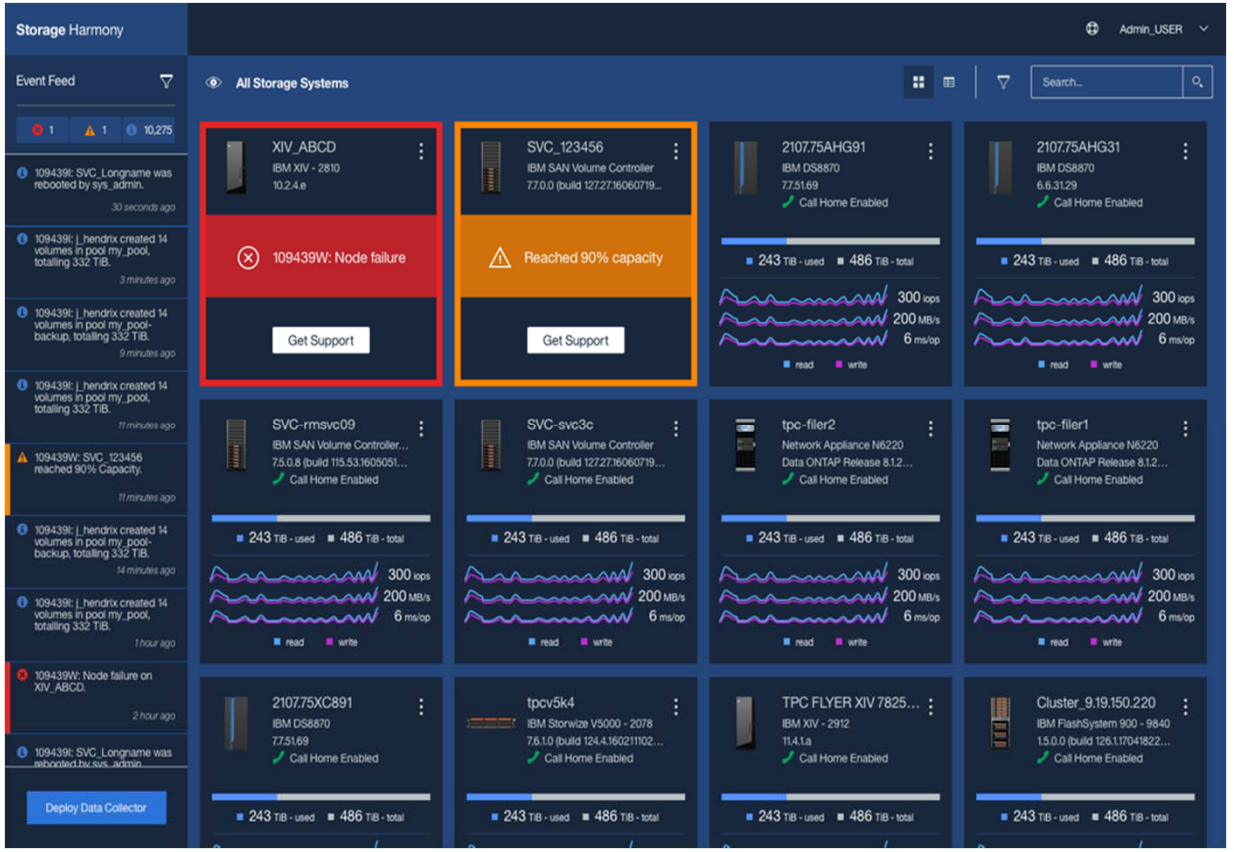
- Persistent Storage for Docker
- Orchestration for IBM Cloud Private, Kubernetes and Docker Swarm
- Pre-defined Storage Policies for Provisioning
- A-Line
- V-Line

Preview: Cognitive Storage Management in the Cloud



IBM Spectrum Control Storage Insights Foundation

- SaaS based Supportservice for IBM Storage
- Inventory IBM Storage-Systems
- IBM Support has Access to Logs and Performance-Data
- Best-Practice Performance KPIs, Comparisons
- Simple Creation and Management of PMRs
- Next: Cognitive Analysen



Transition to Flash

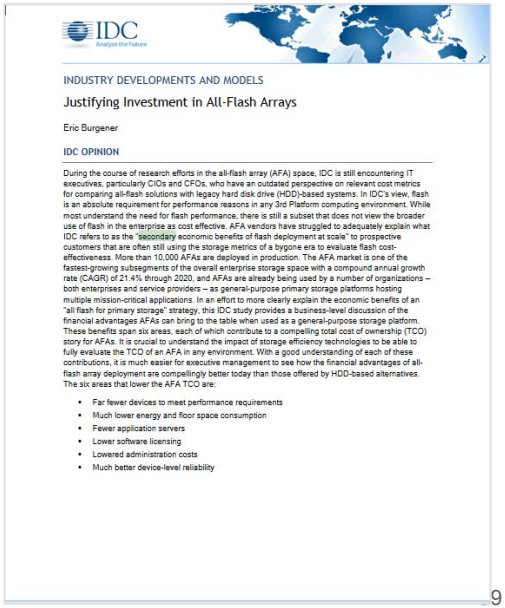
Why Flash?

- Fast storage
- Predictable performance
- Fast applications
- Stable applications

- Far fewer storage device
- Much lower environ
- Fewer servers
- Lower Softw g
- Lowered Admin tion Cost
- Much better device level reliability

All-Flash for all workloads

"secondary economic benefits of flash deployment at Scale"



IDC

INDUSTRY DEVELOPMENTS AND MODELS

Justifying Investment in All-Flash Arrays

Eric Burgener

IDC OPINION

During the course of research efforts in the all-flash array (AFA) space, IDC is still encountering IT executives, particularly CIOs and CFOs, who have an outdated perspective on relevant cost metrics for comparing all-flash solutions with legacy hard disk drive (HDD)-based systems. In IDC's view, flash is an absolute requirement for performance reasons in any 3rd Platform computing environment. While most understand the need for flash performance, there is still a subset that does not view the broader use of flash in the enterprise as cost effective. AFA vendors have struggled to adequately explain what IDC refers to as the "secondary economic benefits of flash deployment at scale" to prospective customers that are often still using the storage metrics of a bygone era to evaluate flash cost-effectiveness. More than 10,000 AFAs are deployed in production. The AFA market is one of the fastest-growing subsegments of the overall enterprise storage space with a compound annual growth rate (CAGR) of 21.4% through 2020, and AFAs are already being used by a number of organizations – both enterprises and service providers – as general-purpose primary storage platforms hosting multiple mission-critical applications. In an effort to more clearly explain the economic benefits of an "all flash for primary storage" strategy, this IDC study provides a business-level discussion of the financial advantages AFAs can bring to the table when used as a general-purpose storage platform. These benefits span six areas, each of which contribute to a compelling total cost of ownership (TCO) story for AFAs. It is crucial to understand the impact of storage efficiency technologies to be able to fully evaluate the TCO of an AFA in any environment. With a good understanding of each of these contributions, it is much easier for executive management to see how the financial advantages of all-flash array deployment are compellingly better today than those offered by HDD-based alternatives. The six areas that lower the AFA TCO are:

- Far fewer devices to meet performance requirements
- Much lower energy and floor space consumption
- Fewer application servers
- Lower software licensing
- Lowered administration costs
- Much better device-level reliability

The Power of All Flash

Swiss Bank

Before:

this picture shows 16 of 23 Storage-Racks (IBM Enterprise Storage) per location

Today:

10x840 = ½ Rack per location

98% Footprint Savings

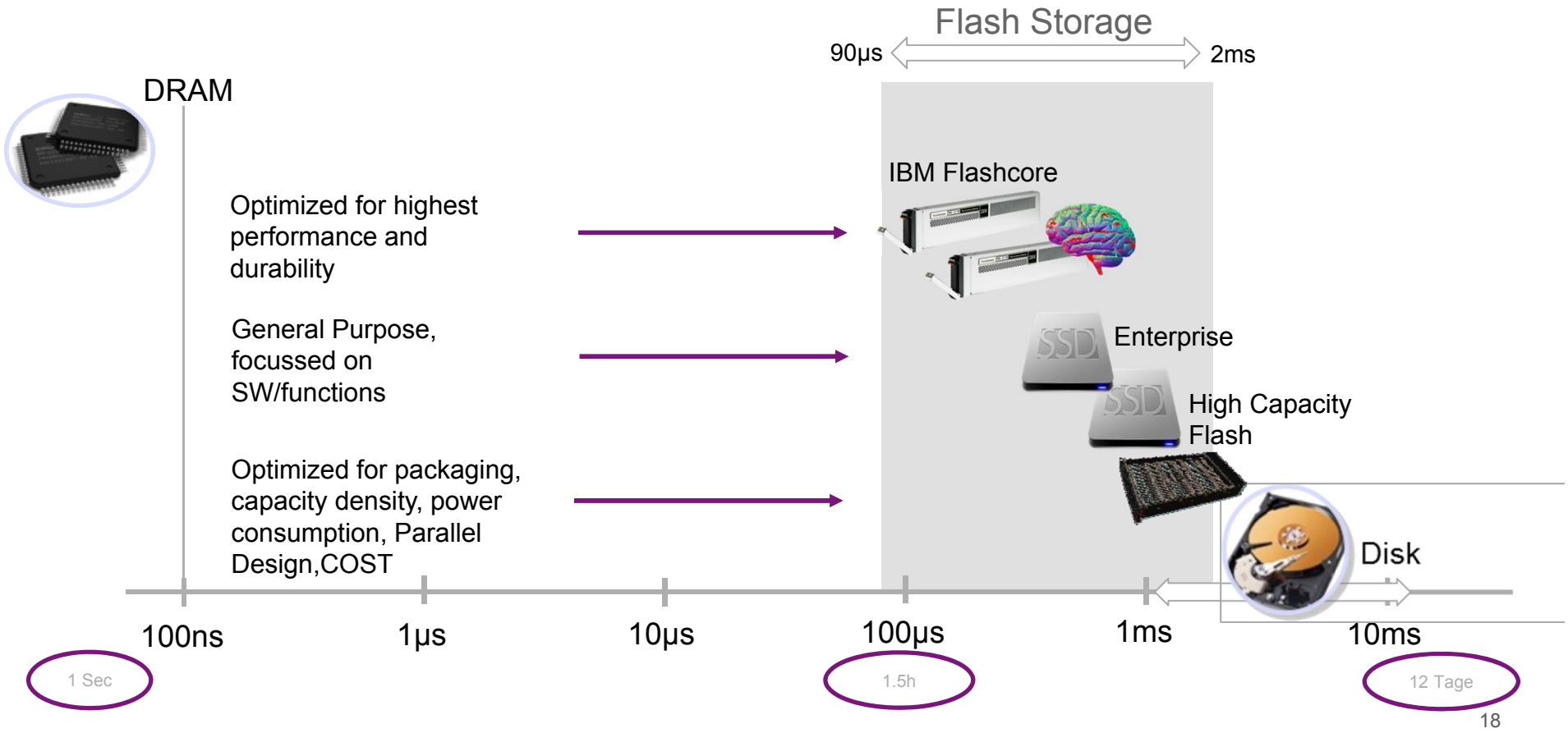
96% Energy Savings

Original Customer Pictures

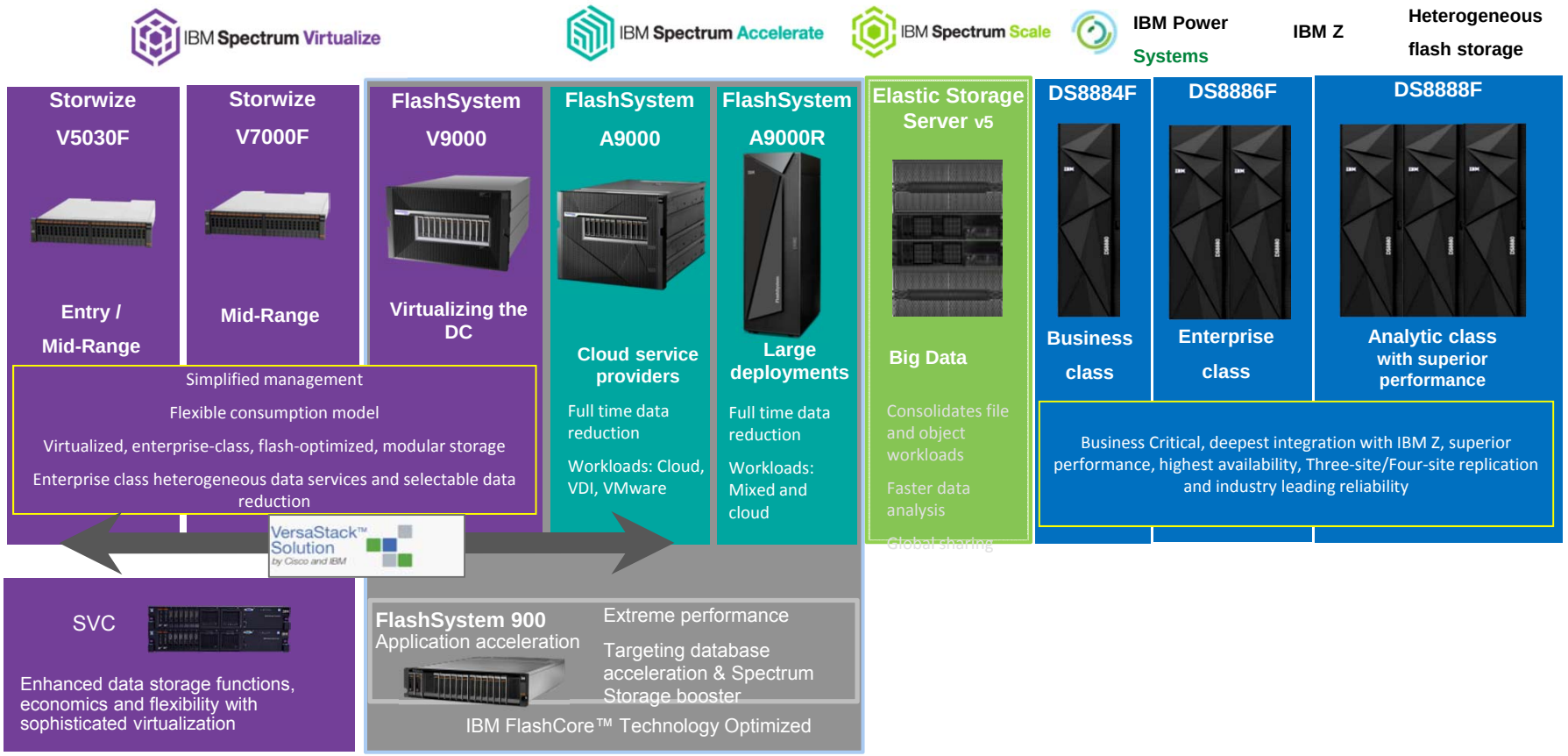
900% Faster Performance

Enterprise Reliability
99.999% Availability

Flash ≠ Flash


Flash Storage
90µs
2ms
DRAM
IBM Flashcore
Optimized for highest performance and durability
General Purpose, focussed on SW/functions
Optimized for packaging, capacity density, power consumption, Parallel Design,COST
Enterprise
High Capacity Flash
Disk
100ns
1µs
10µs
100µs
1ms
10ms
1 Sec
1.5h
12 Tage

We offer differentiation…

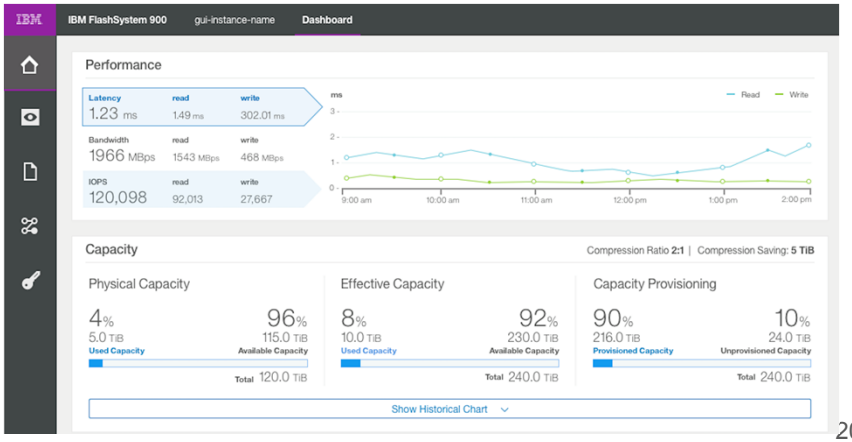


FlashSystem 900

Optimize CapEx and OpEx with low latency, ultra-dense flash

Announcing October 24

- **3X capacity** to **180TB effective capacity** with new 3D TLC in **2U**
- **Inline data compression (2:1)** with **no performance impact**
  - **Next generation FlashCore** technology
- **High performance you can count on**
  - Consistent response time; latency as low as 90 microseconds
- **Enhanced user experience**
  - Consistency (cross-generation familiarity)
  - Visualization of effective capacity
- **Centralized encryption key management**
  - **SKLM** (AES 256); backwards compatible
- **7-year flash wear guarantee**
- **Foundation of the entire FlashSystem family and FlashSystem based Versastack**



IBM Flash Awards and Recognition

CRN

IBM FlashSystem A9000/A9000R
2016
Top 10
Coolest Flash Products

IBM FlashSystem 900/V9000
2015
Top 10
Coolest Flash Products

IBM FlashSystem V9000
2015
Tech Innovator Award
Runner-Up
Storage Category

Gartner

IBM FlashSystem
2014 - 2016
A Leader:
Magic Quadrant for Solid State Arrays[1]

Flash Memory SUMMIT

IBM FlashSystem 900
2016
Best of Show
Most Innovative Flash Memory
Enterprise Business Application

IDC

IBM FlashSystem
2015 - 2016
A Major Player in All-Flash Array by IDC MarketScape[2]

IBM All-Flash Arrays
2014
#1 Market Share
Canada[3]

STORAGE MAGAZINE PRODUCTS OF THE YEAR 2015 FINALIST

IBM FlashSystem V9000
2015
Product of the Year Finalist:
All-Flash Systems

IBM FlashSystem 840
2014
Product of the Year Finalist:
Enterprise All-Flash Storage Systems

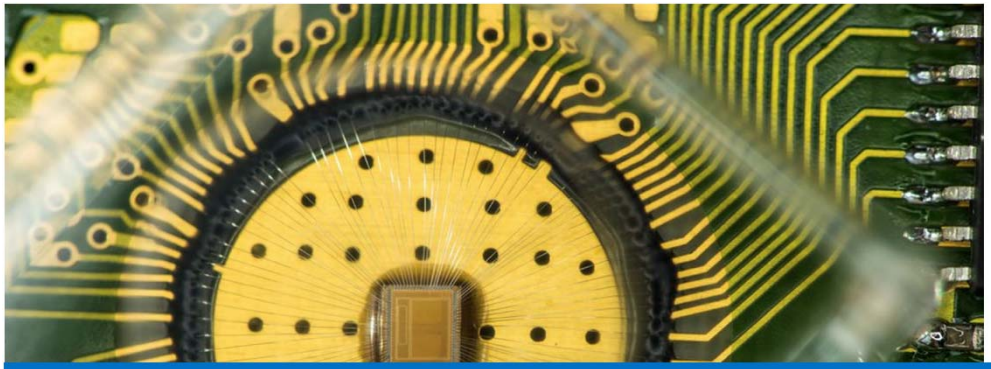
Trophée innovation IT 2015

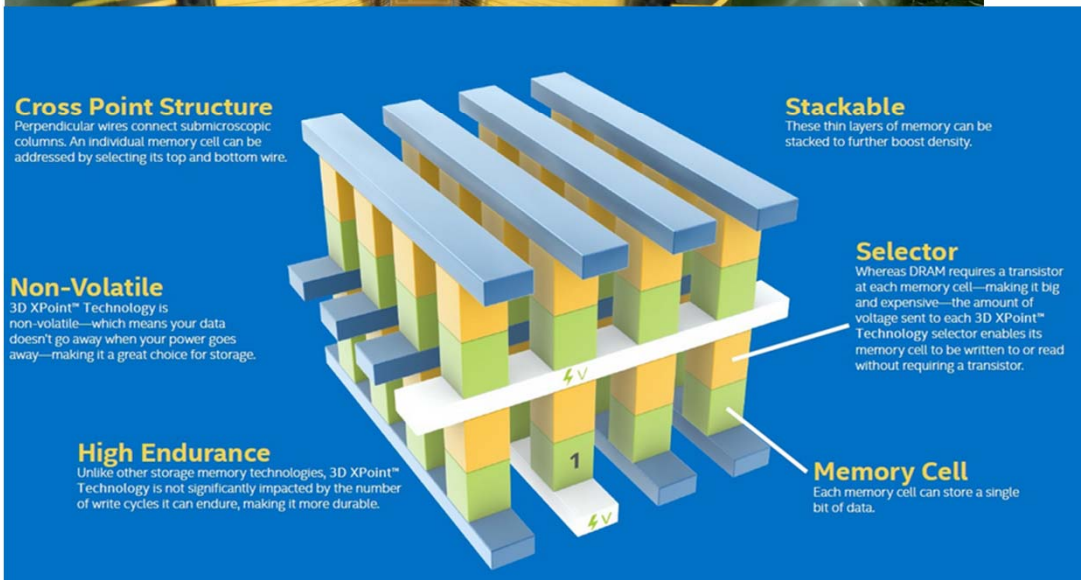
IBM FlashSystem
2015
France CRIP IT Innovation
Forum Winner: Cloud,
Infrastructure & Storage Category

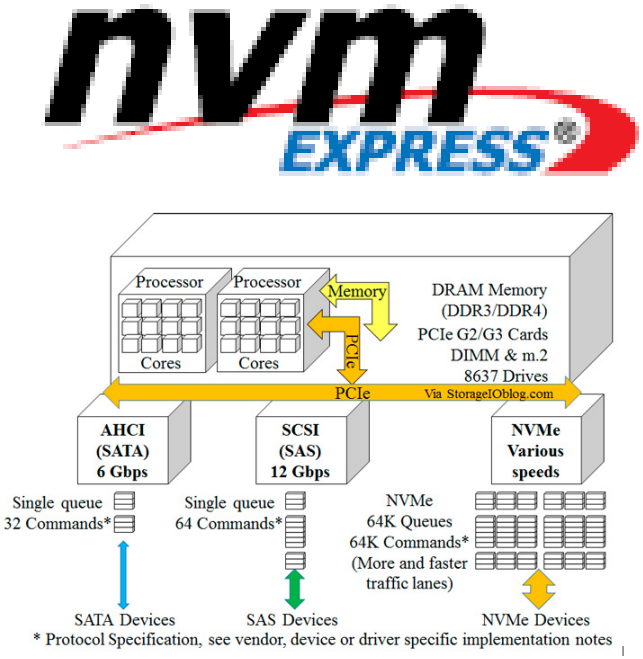
[1] Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings or other designation. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose. GARTNER is a registered trademark and service mark of Gartner, Inc. and/or its affiliates in the U.S. and internationally, and is used herein with permission. All rights reserved.

[2] IDC MarketScape WW All-Flash Array 2015-2016 #US40721815 Dec. 2015; [3] IDC WW Quarterly Enterprise Storage Systems Tracker 2Q, 2016

Storage Media…the future in Sight







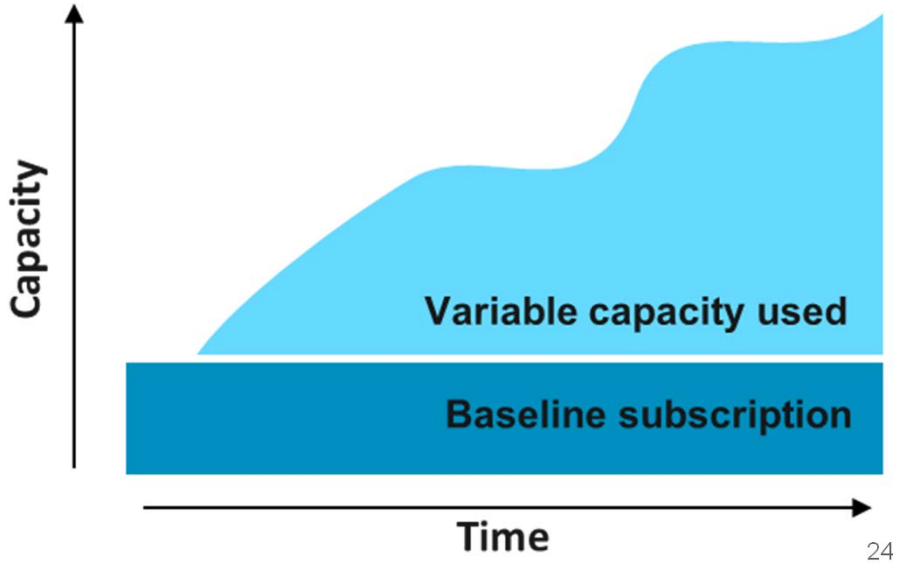
Storage Utility Model

Benefits

The Storage Utility Offering program provides End Users with the ability to pay for storage capacity based on their actual monthly usage, which may increase or decrease monthly.

It is designed for **End Users with high rates of storage growth** needing storage capacity immediately available who can't afford the time required to go through the procurement process each time they need to increase capacity.

- Capacity is ready to use whenever needed
- Pay for what you use, when you use it
- Flex-up and flex-down the variable charge
- Asset title remains with IBM
  - Implemented as OPEX via an IGF Lease
- Model promotes increased utilization with decreased costs



DS8880
Family of Products

The DS8880 Family

DS8884 and DS8884F

Hybrid and All-Flash Block Storage

Lowest entry cost for midrange enterprises

256 GB Cache (DRAM)

64 16Gb FICON or FCP Ports

192 High Performance or High Capacity Flash

or 768 HDD plus 96 HP/HC Flash

19” Rack

Single phase Power

DS8886 and DS8886F

Hybrid and All-Flash Block Storage

High performance for large enterprises

2 TB Cache (DRAM)

128 16Gb FICON or FCP Ports

384 High Performance or High Capacity Flash

or 1536 HDD plus 192 HP/HC Flash

19” Rack

Single / three phase Power

DS8888F

Fastest All-Flash Block Storage

Industry’s fastest T1 Subsystem

2 TB Cache (DRAM)

128 16Gb FICON or FCP Ports

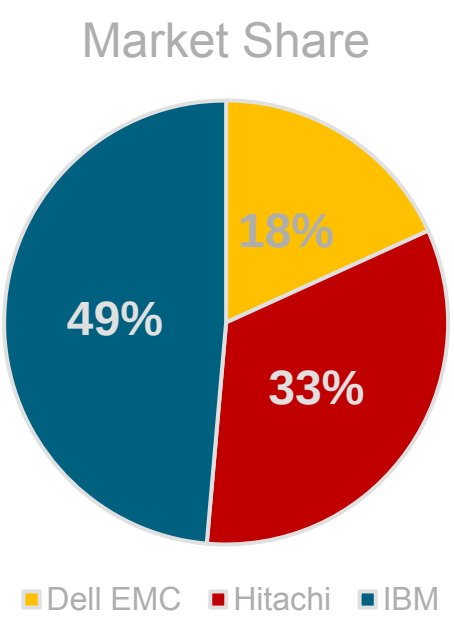
768 High Performance or High Capacity Flash

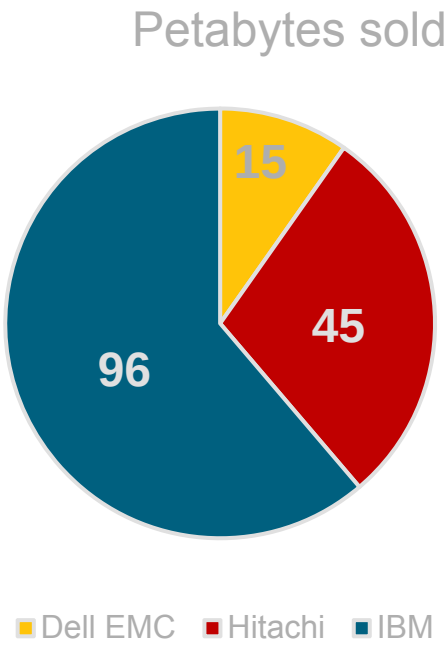
19” Rack

Three phase Power

DS8880 Success

*During 1Q17, DS8000 increased leadership by 2% in the **external storage market for mainframe environments***





Calculations **based on data from IDC WW Quarterly Enterprise Storage Systems Tracker** file, June 8, 2017

IBM DS8880 Highlights

Bulletproof hybrid- and all-flash data systems, made for the cognitive business in the digital era

PERFORMANCE

- **All-flash configuration**
- **Low latency storage to open up new business opportunities**
- **Up to 2.5 million IOPS**
- **Built on Power8 platform**

SYNERGY

- Deep synergy with IBM z Systems and integration with IBM Power servers
- The most robust FICON connectivity
- Integration with spectrum control, spectrum virtualize, GDPS and OpenStack
- **Thin provisioning for maximum utilization and reclamation of capacity from deleted data ***
- **Super PAV**

SECURITY

- Self-encrypted flash drives
- **Key Interoperability Management Protocol (KMIP)**
- **Syslog protocol**

AVAILABILITY

- More than six 9's availability
- Flexible replication (IBM FlashCopy, Metro Mirror, Global Mirror, Metro/Global Mirror, Global Copy & Multiple Target Peer-to-Peer Remote Copy (MT-PPRC)
- 3-site replication

EFFICIENCY

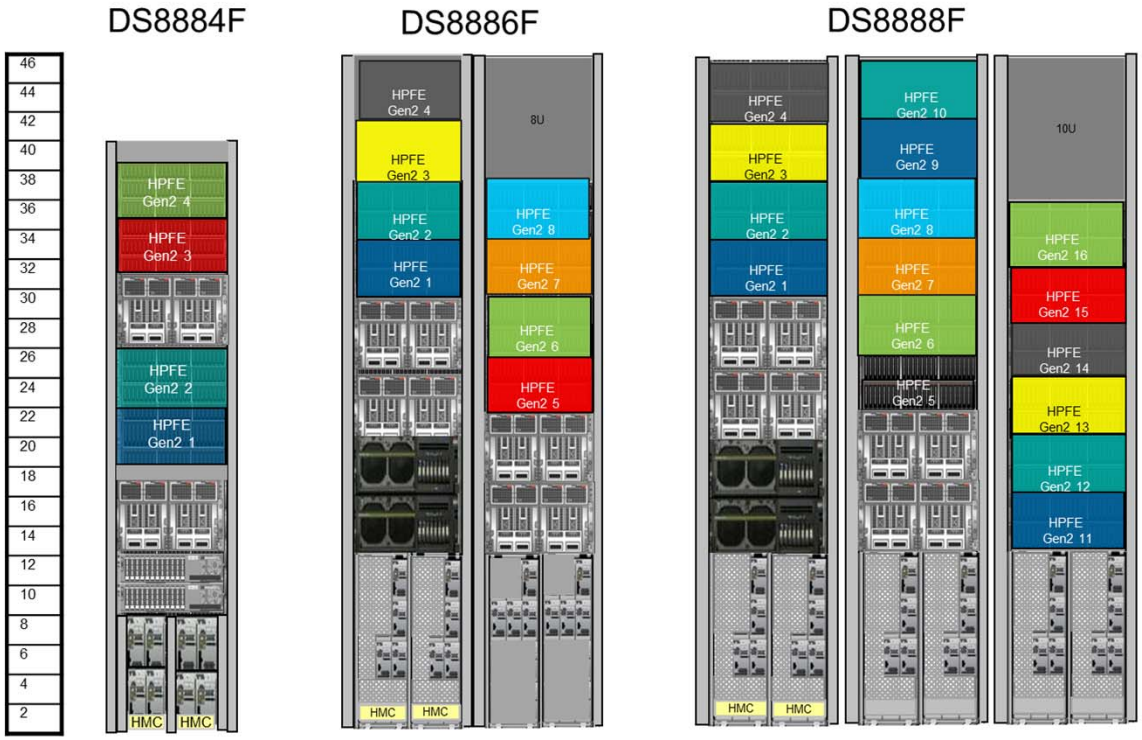
- Intuitive graphical user interface (GUI)
- Innovative DS8880 advanced function license packages
- RESTful and OpenStack APIs to move critical workloads between private & public cloud environments
- **Three-phase power support for DS8888 and now optional on the DS8886**

Highlighted in **BOLD** new features of the DS8880 Release 8.1

* Thin Provisioning ESE on CKD as Flash Copy Target for DS8884 and DS8886
  Small Extents as Flash Copy Target on CKD and FB for DS8884 and DS8886

DS8880 Flash Configurations

Manage business data growth with up to 3.75x more flash capacity in the same physical space for storage



730 TB

- DS8884F
  - 192 Flash Drives
  - 64 FICON/FCP ports
  - 256GB cache memory

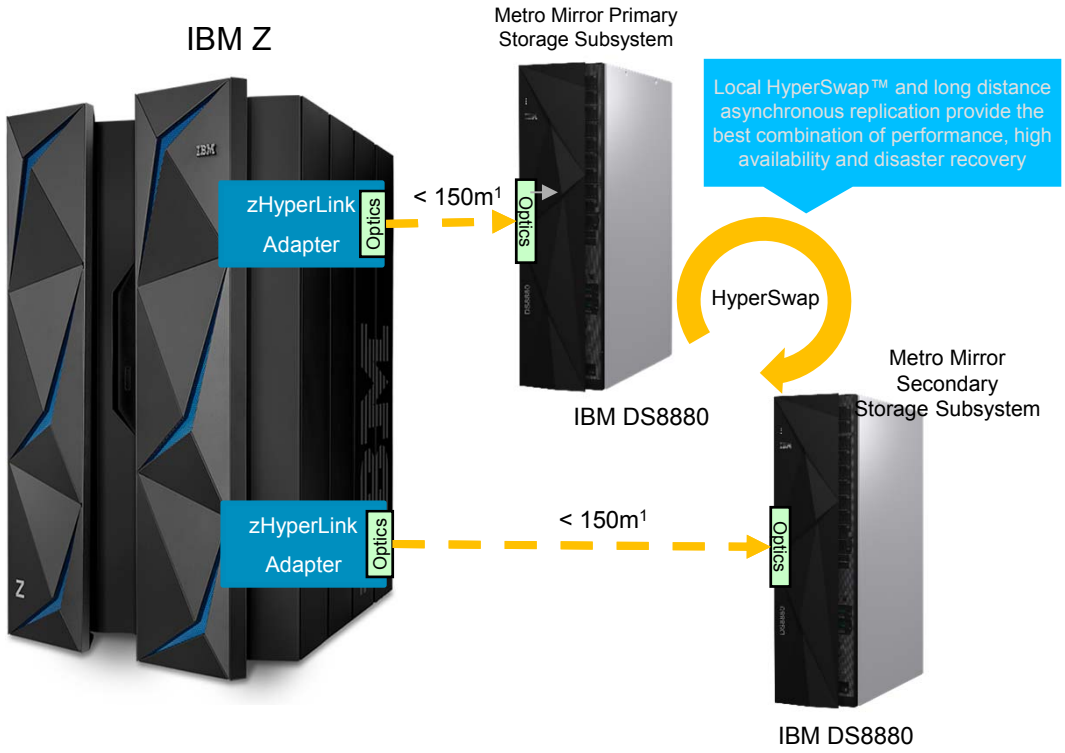
1460 TB

- DS8884F
  - 384 Flash Drives
  - 128 FICON/FCP ports
  - 2TB cache memory

2918 TB

- DS8888F
  - 768 Flash Drives
  - 128 FICON/FCP ports
  - 2TB cache memory

zHyperLink™ delivers extreme data access acceleration



zHyperLink2 provides real value:

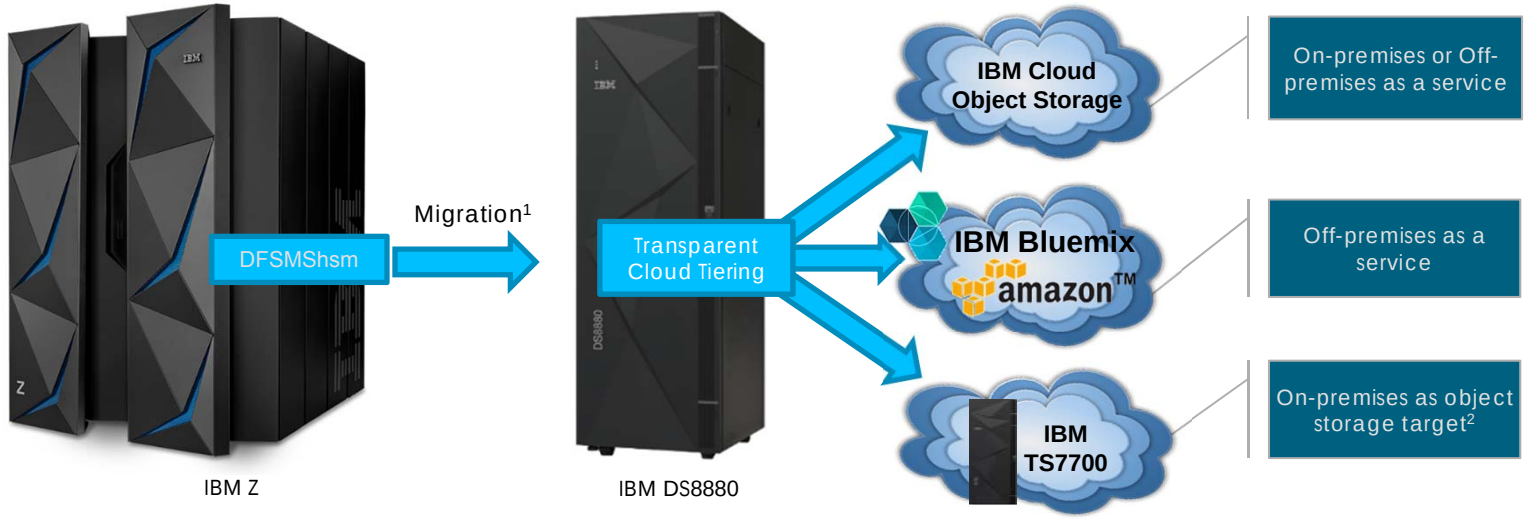
- ✓ Dramatically accelerates the read access to data with less than 20μs response time; this represents a 10x improvement compared to High-performance FICON (zHPF)
- ✓ Cuts the elapsed time of DB2 transaction in half without requiring application changes

[1]zHyperLink™ point to point connections should be lower than 150m

[2] The initial release of zHyperLink will only support read IO

Transparent Cloud Tiering for DS8880

Transparent Cloud Tiering improves business efficiency and flexibility while reducing capital and operating expenses with direct data transfer from DS8880 to hybrid cloud environments for simplified data archiving operations on IBM Z

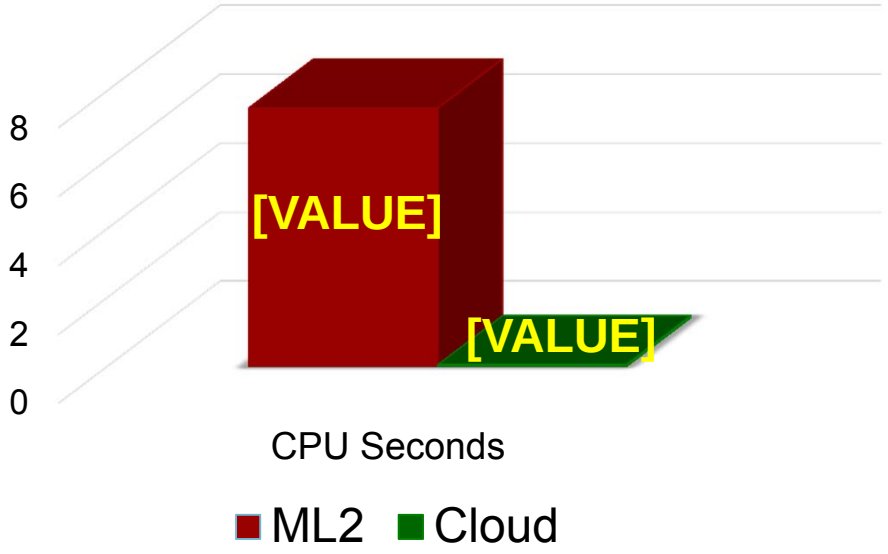


[1] Migration based on age of data

[2] For development and testing environments on this first release.

Just how much CPU?

CPU consumed to migrate a 5 GB data set



*** Disclaimer:** ***Based on projections and/or measurements completed in a controlled EC12 environment. Results will vary by customer based on individual workload, configuration and software levels.***

CPU Efficiency Estimator Tool
Uses SMF Type240 records
Available at : ftp://public.dhe.ibm.com/eserver/zseries/zos/DFSMS/HSM/zTCT

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Save the Date: DS8000 Userday Fall 2017

IBM Storage & SDI

Date:	*16. November 2017, 10:30 – 17:30*
Location:	*IBM Kelsterbach*
Audience:	*Kunden, Prospects, BP, IBMer*

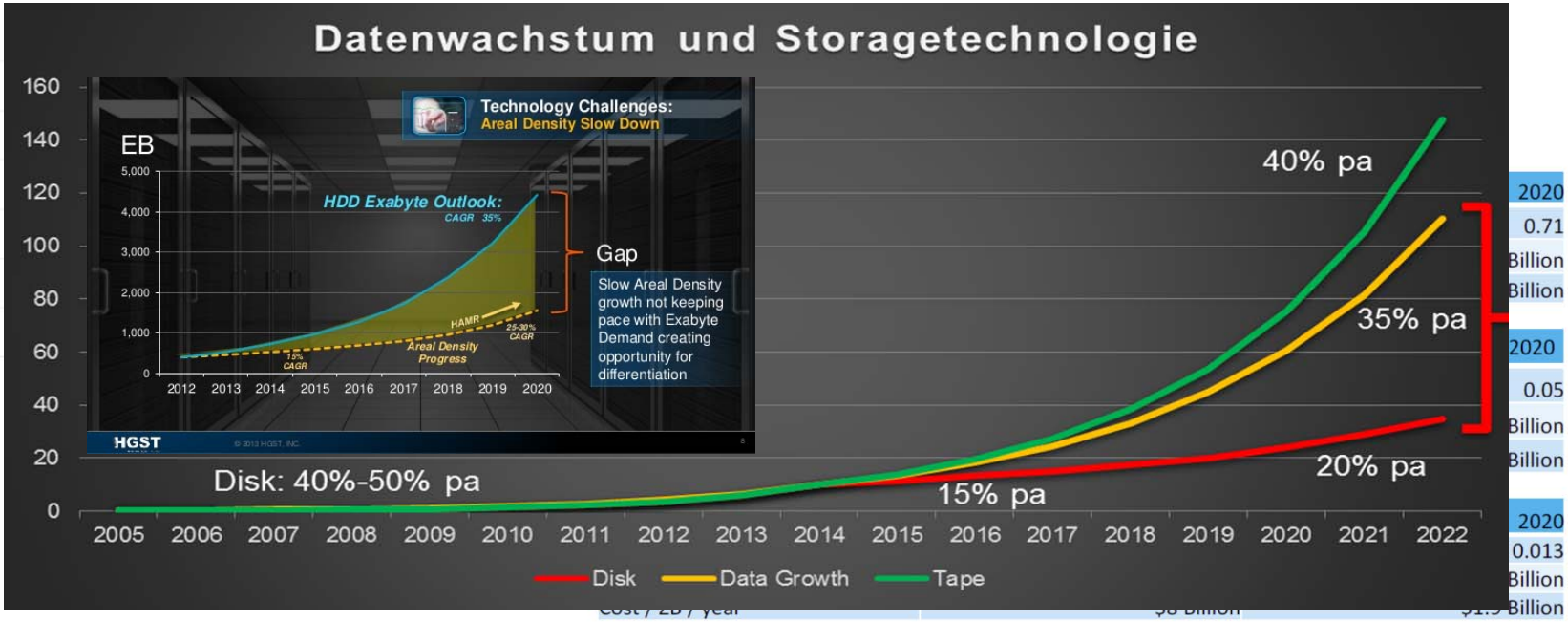
- ✓IBM DS8880 Release 8.3 Deep Dives
  - ✓Hyperlink
  - ✓TCT
  - ✓Performance
- ✓Roadmap Session
- ✓Abendveranstaltung
- ✓TS7700 Userday, 17. November

The future of Tape

Some facts…real facts…

1. still the cheapest way to store data
2. The only technology to keep pace with projected data growth

Relative Costs of Different Platforms



IBM Lab Rüschlikon: Tape-Technology Demonstration August 2017

Areal recording density :
201 Gb/in^2

20x TS1155 areal density

→ 330 TB cartridge capacity

Cost advantage of tape will continue to grow!

Why Tape…

- Cost
- Performance (single Stream, Scalability)
- **Security**
- Capacity / Floorspace
- Roadmap

Use Case….

- Data Protection / Backup
- Last Line of Defense (Sicherheit)
- Backup/Restore of big capacities (Performance)

- Archive of „Content-Rich“ Data
- Big Data / Much Data
- Scientific / Engineering Data, Video, CCTV, TV, Automotive
- Cold Data
- Unstructured Data / NAS (Never Access Storage)

IBM Tape Drive History and Roadmap

LTO Generations	LTO-5	LTO-6	LTO-7	LTO-8	LTO-9
New Format Capacity (Native)	1.5 TB (L5)	2.5 TB (L6)	6 TB (L7)	12.0 TB	Up to 25 TB (L9)
Other Format Capacities (Native)	800 GB (L4) (400 GB L3 R/O)	1.5 TB (L5) (800 GB L4 R/O)	2.5 TB (L6) (1.5 TB L5 R/O)	6 TB (L7)	Up to 12 TB (L8) (6 TB L7 R/O)
Native Data Rate	140 MB/s	160 MB/s	300 MB/s	Up to 360 MB/s	Up to 708 MB/s

2008 2010 2013 2015 2017

2011 2014 2017

TS1100 Generations	TS1130	TS1140	TS1150	TS1155	TS1160	TS1165	TS1170
New Format Capacity (Native)	1 TB (JB) 640 GB (JA)	4 TB (JC) 1.6 TB (JB)	10 TB (JD) 7 TB (JC)	15 TB (JD)	18-20TB (JE) 15-17 TB (JD) 10-12 TB (JC)	~30 TB (JE) 15-17 TB (JD) 10-12 TB (JC)	30-40 TB (JE)
Other Format Capacities (Native)	700 GB (JB) 500 GB (JA) 300 GB (JA)	1 TB (JB) 700 GB (JB) (All JA R/O)	4 TB (JC)	7 TB (JC) 4 TB read only (JC)	10 TB (JD) 7 TB (JC) 4 TB (JC)	TBD	18-20 TB (JE) 15-17 TB (JD) 10-12 TB (JC)
Native Data Rate	160 MB/s	250 MB/s	360 MB/s	360 MB/s	Up to 500 MB/s	Up to 500 MB/s	Up to 1000 MB/s

IBM Spectrum Archive

Linear Tape File System (LTFS)

Tape usable like a „USB-Stick“

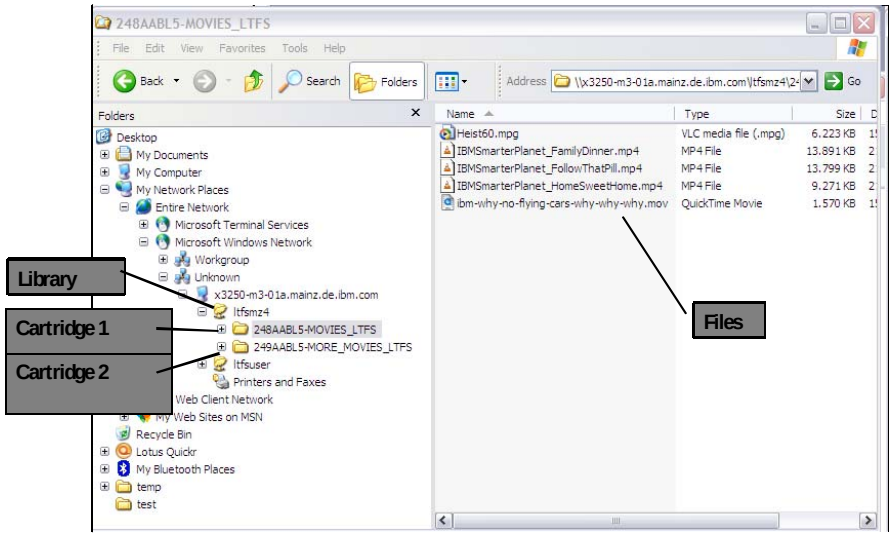
- Tape as a file system
- For Single-Drive and Library

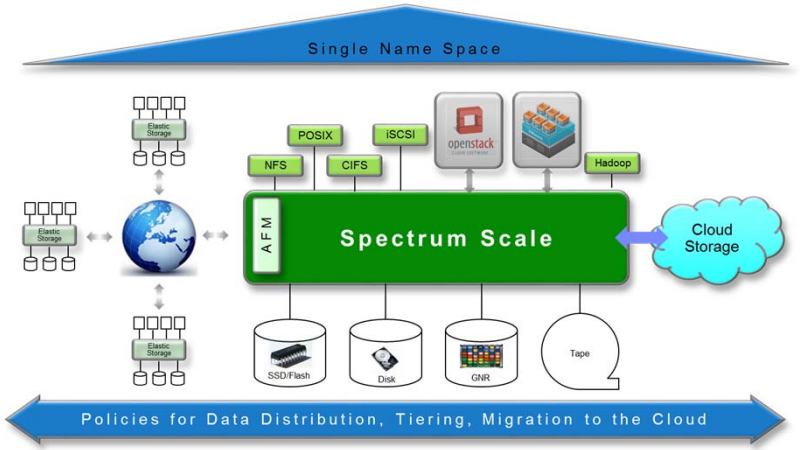
New Use Cases for Tape with LTFS

- Simple Archiving to Tape
- Data Transfer/Exchange

Products:

- Single Drive: LTFS SE (free)
- **Library Version: LTFS LE (free)**
- Integrated into Spectrum Scale: LTFS EE
  - Spectrum Scale & Spectrum Archive





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Thank You.

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