Flash + Software-Defined Storage = Path To The Hybrid Cloud

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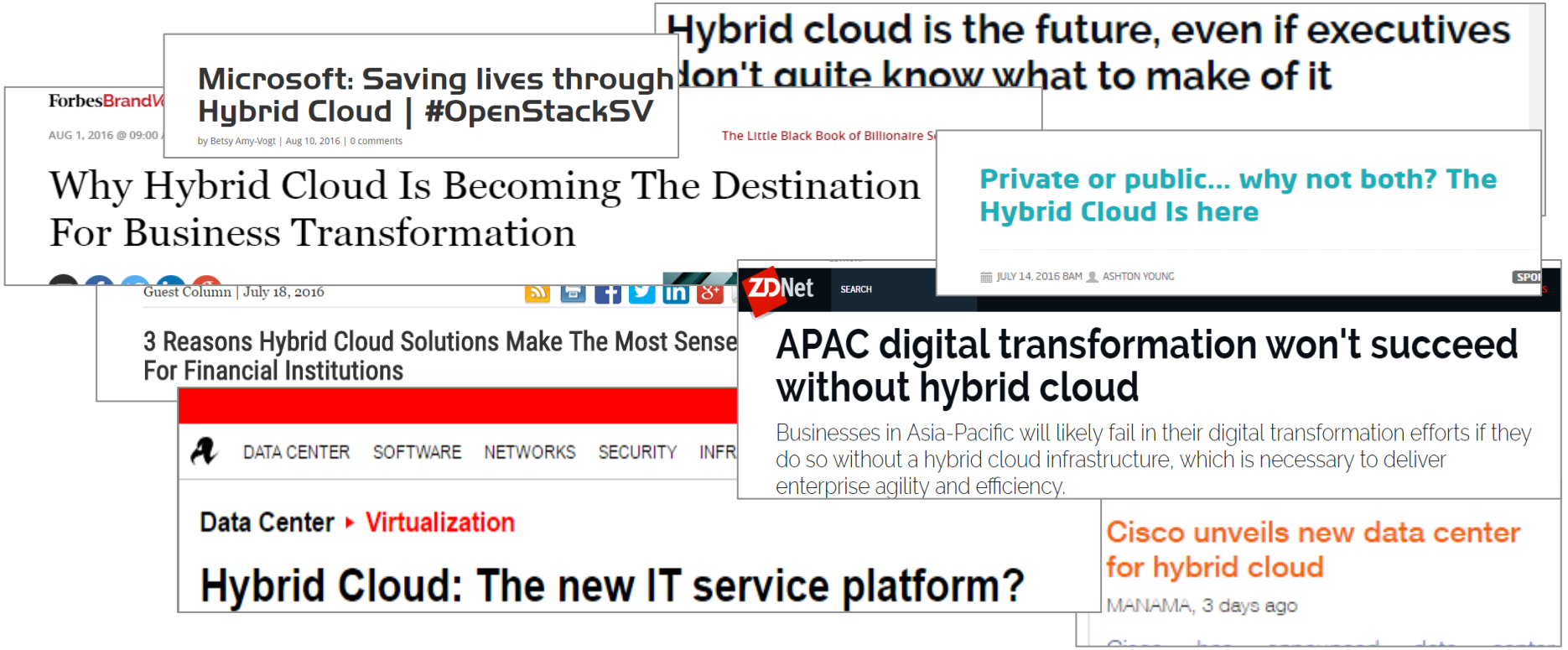
Agenda

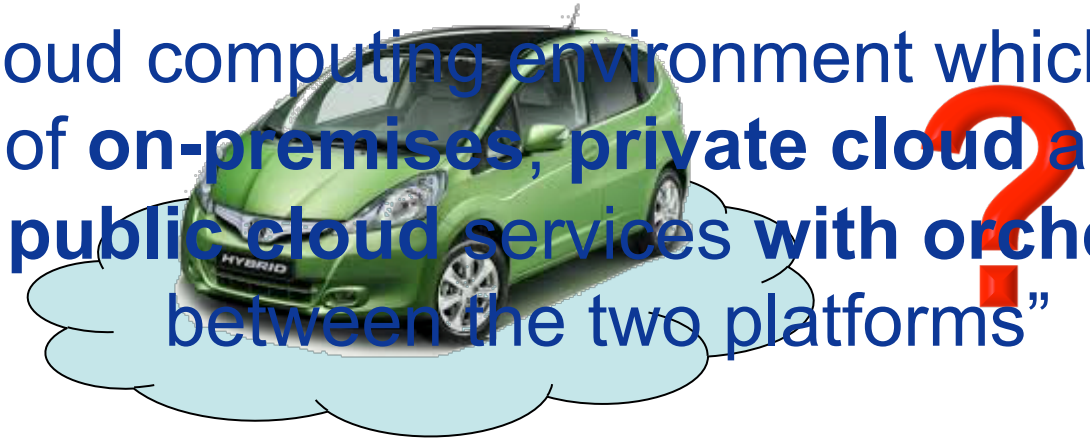
- The Hybrid Cloud Vision
- Storage Requirements
- Flash-Native SDS

Industry Buzz



What is the Hybrid Cloud?

"A cloud computing environment which uses a **mix** of **on-premises**, **private cloud** and third-party **public cloud** services **with orchestration** between the two platforms"



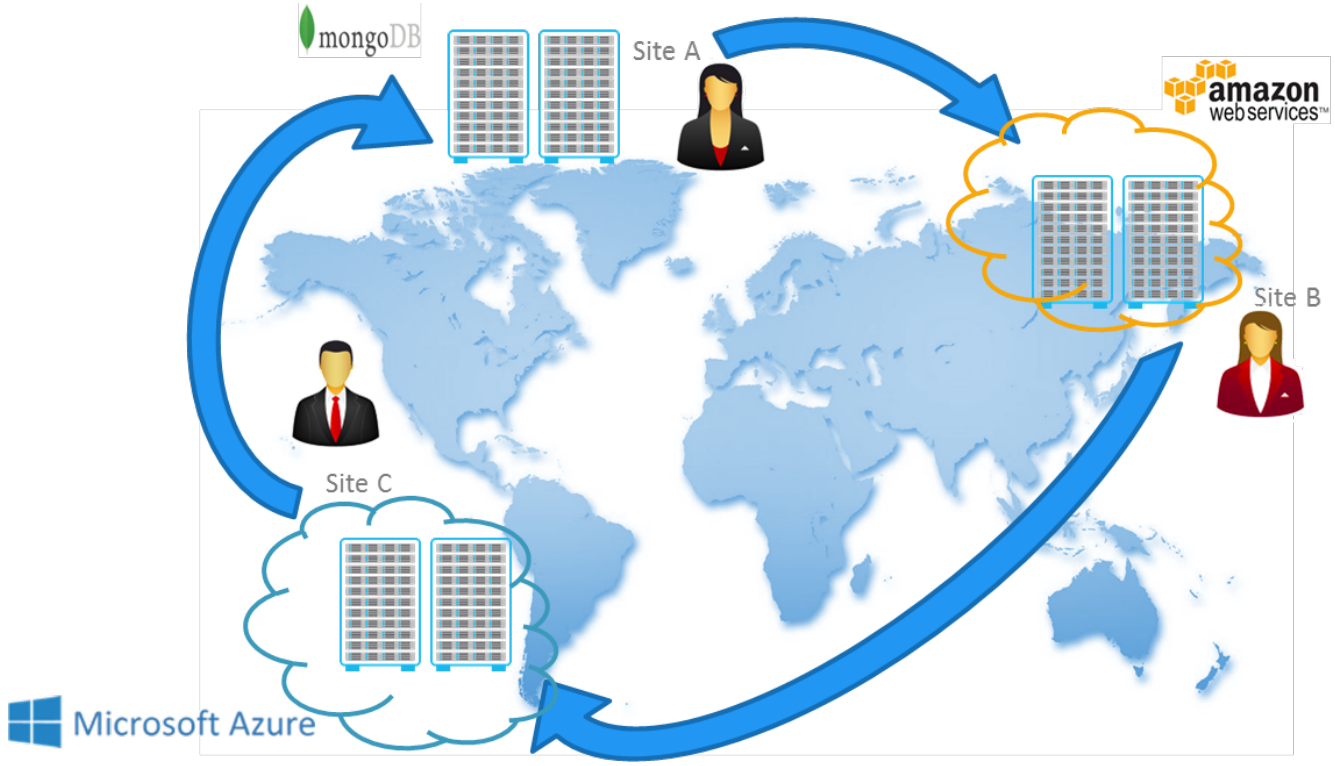
Source: TechTarget

Why All The Hype?

Natural culmination of multiple trends

- Data explosion
- Virtualization
- Infrastructure as a Service (IaaS)
- Flash storage

The Vision


mongoDB
Site A
amazon web services
Site B
Site C
Microsoft Azure

Sounds great…
…so what's holding us back?

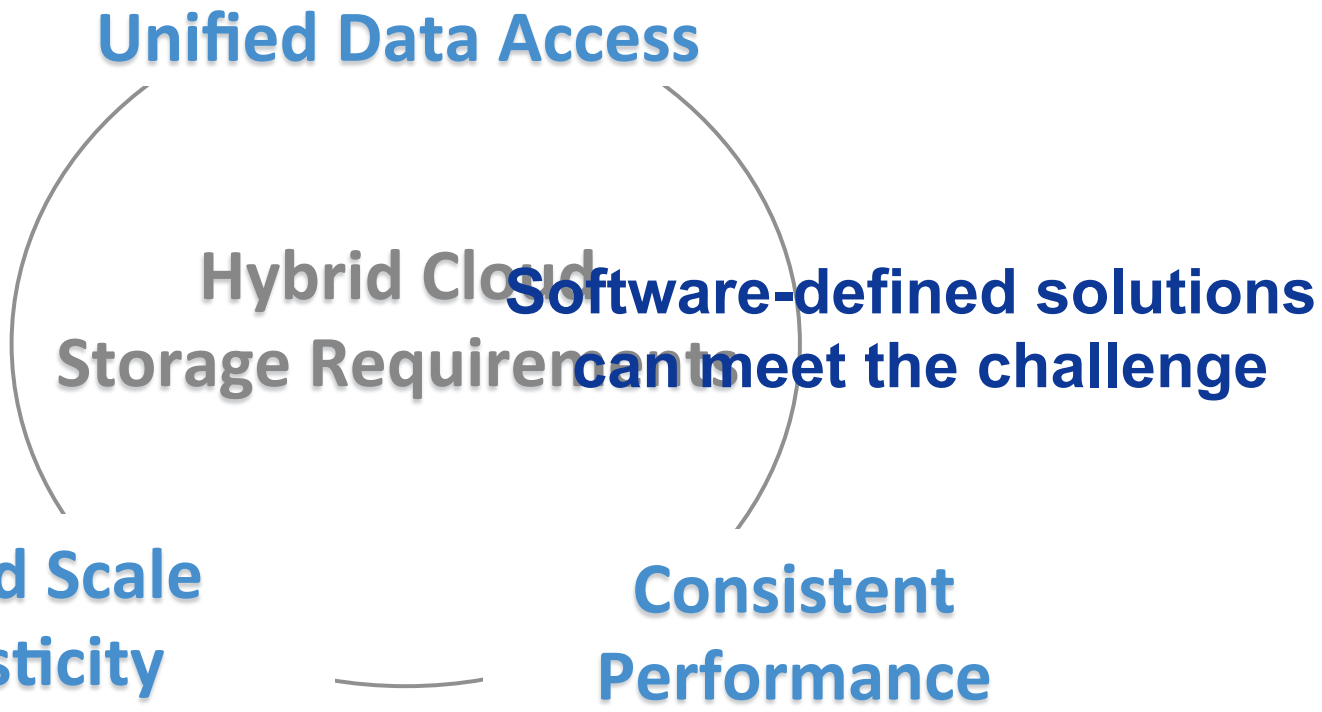
Requires true application and data mobility

- Apps and data accessed where needed…for example:
  - Big data processing = public cloud
  - Final review and analysis = on-premises

Application mobility has emerged…

...but data mobility is still lacking

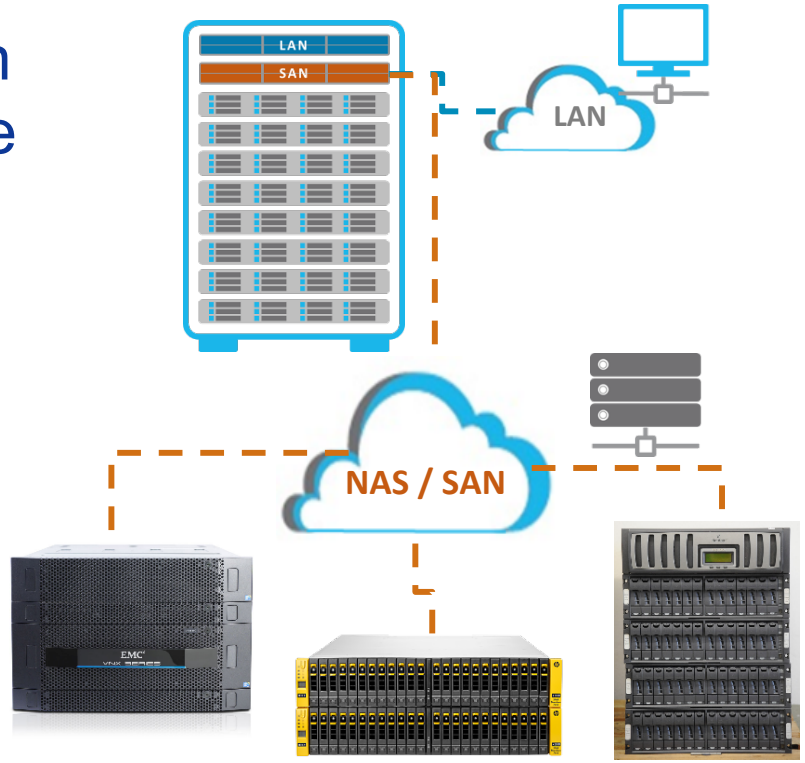
Storage Needs to Evolve



Unified Data Access

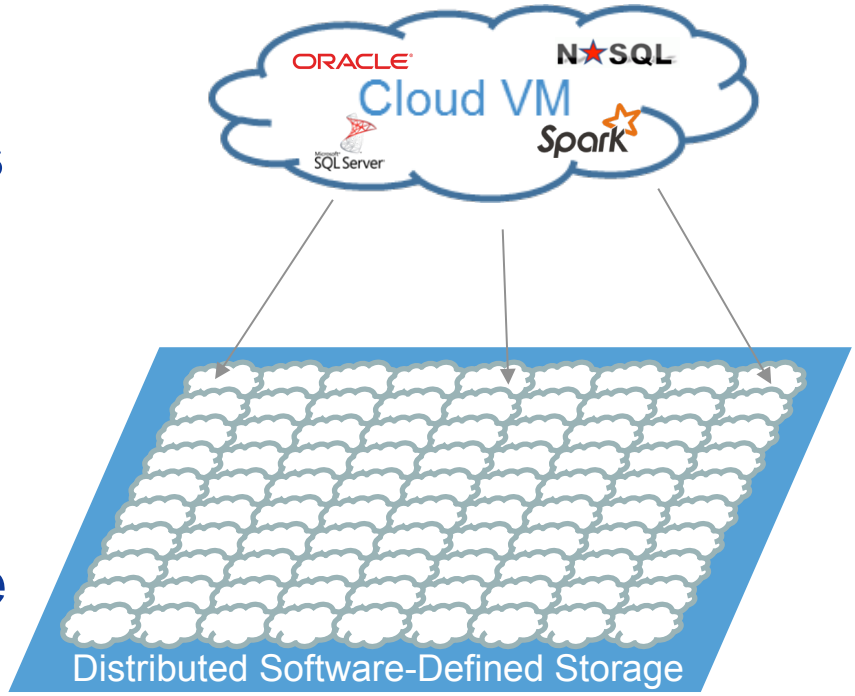
- Today, most data resides in siloed, proprietary hardware
  - "Data type"-specific
  - Environment-specific
  - Geo-specific

- SDS can provide a **flexible** framework to achieve unified access



Cloud Scale Elasticity

- Cloud deployments can incorporate **1000s of nodes**
- **Fully distributed** SDS can scale accordingly
- SDS can **scale out** or **scale in** as needed



Consistent Performance

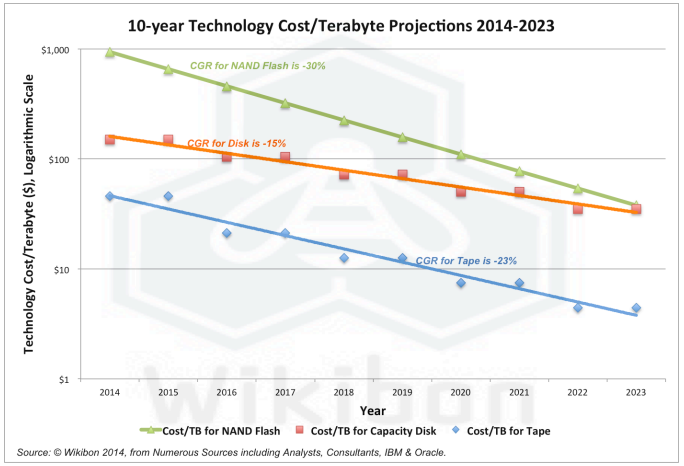
- Hybrid cloud environments must support a mix of workloads
- Usability at scale requires high, consistent Quality of Service
- SDS can deliver **optimized performance** for varying environments and workloads***…but requires supporting HW***

SDS Media Options: Flash vs HDD

Feature	HDD	FLASH
Performance	x1	x1000
Latency	x100	x1
Cost	x1	x5

There's Good News

- Flash storage is becoming increasingly **affordable and accessible**
  - Higher capacities (3D, TLC)
  - Streamlined interface for performance efficiency (NVMe)
  - Decreasing NAND cost (Better $/GB & IOPS/$)
  - Standardized form factors (2.5")



Source: Wikibon

Flash is the focus of modern SDS

1st-Generation SDS

- **Leveraging flash…but not effectively**
- **Flash bolted onto legacy architectures**
  - HDD replacement
  - Cache
  - Metadata store

Not aligned with hybrid cloud requirements

SDS Architecture For The Hybrid Cloud

- **All-Flash**
  - Provides consistent performance to support consolidation of mixed-workloads
- **Flash-Native**
  - Purpose-built to most effectively leverage flash

Key Attributes of A Flash-Native SDS Design

- **Eliminates legacy stack overhead**
  - Most 1st-generation SDS designs leverage flash as a caching layer
  - All-flash SDS = no cache management required

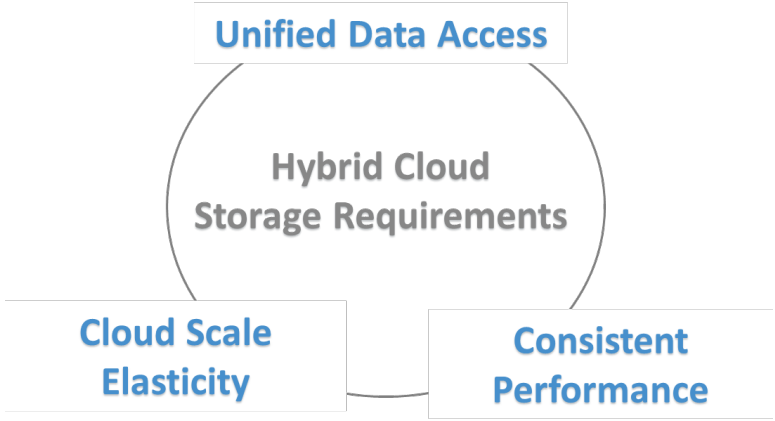
Key Attributes of A Flash-Native SDS Design

- **Aligned with flash performance characteristics**
  - 1st-gen SDS solutions assume HDD as primary media
    - Not optimized for highly-parallel data transfer
    - Not optimized for low latency
  - All-Flash SDS can be designed to fully leverage flash parallelism and latency (e.g. via NVMe)

Key Attributes of A Flash-Native SDS Design

- **Intelligently manages flash**
  - Enable use of heterogeneous SSD hardware
    - Multiple Vendors = Lower cost
    - Latest technology = Better $/GB
  - Provide intelligent data tiering between SSD types
    - High performance/endurance SSDs for low latency / frequent writes
    - High capacity SSDs to minimize cost

Bringing It All Together



Spans Environments and Data Types

+

Truly Distributed with Seamless Scale Out/In

=

Data Mobility To Support Hybrid Clouds

+

All-Flash, Flash-Native Architecture

The Time Is Now

- As IaaS evolves (see Amazon EFS), the interest in hybrid cloud deployments is intensifying
- Storage is the key bottleneck, but…
- …flash-native, distributed SDS solutions are already in the works

…stay tuned

Thank You