Building your Castle in the Cloud for Flash Memory

Effectively using flash in the cloud

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Agenda

- Speaker Perspective
- State of Cloud Computing
- Cloud Shift
- Flash is used in all clouds
- How to succeed

Speaker Perspective

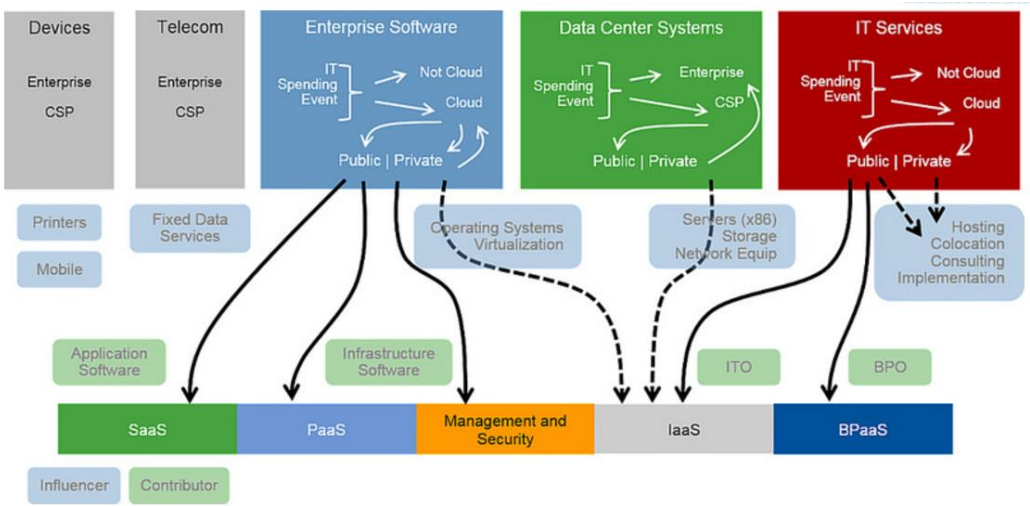
- Management and technology consultant
- Focus on Enterprise companies performing IT infrastructure risk assessments, data center and cloud strategic planning, and implementation advocacy
- Experience across numerous verticals (healthcare, manufacturing, insurance, government)
- Previously CTO of a cloud computing company, early adopter (2012) of flash in the data center.

State of Cloud Computing

- Cloud computing (in all of it's forms) is now widely accepted and used
- Many deployments don't meet all the purist definitions of cloud namely on demand self-service, broad network access, resource pooling, rapid elasticity, and measured service
- In reality, the cloud has become synonymous with a solution that is often hosted, uses pooled resources, is somewhat elastic, and is frequent measured.
- **Most importantly, cloud is fundamentally a business model and as a result greatly impacts how flash is selected, utilized, and consumed.**

“Cloud Shift”

- According to Gartner research, by 2020 “Cloud Shift” will affect more than $1 Trillion in IT Spending making cloud computing one of the most disruptive forces in IT since the early days of the digital age.



Source: Gartner (July 2016)

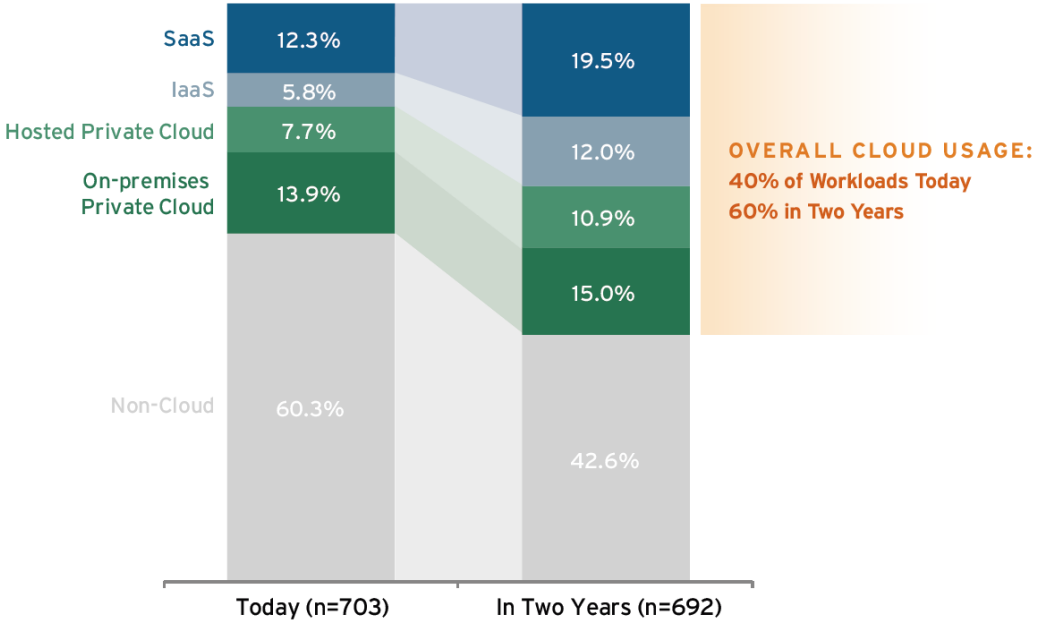
IDC: IT Spending To Hit $2.7 Trillion By 2020

Companies that invest in third platform services such as cloud, mobility, and big data as part of their digital transformation efforts will drive IT spending growth, according to IDC.

“Cloud Shift”

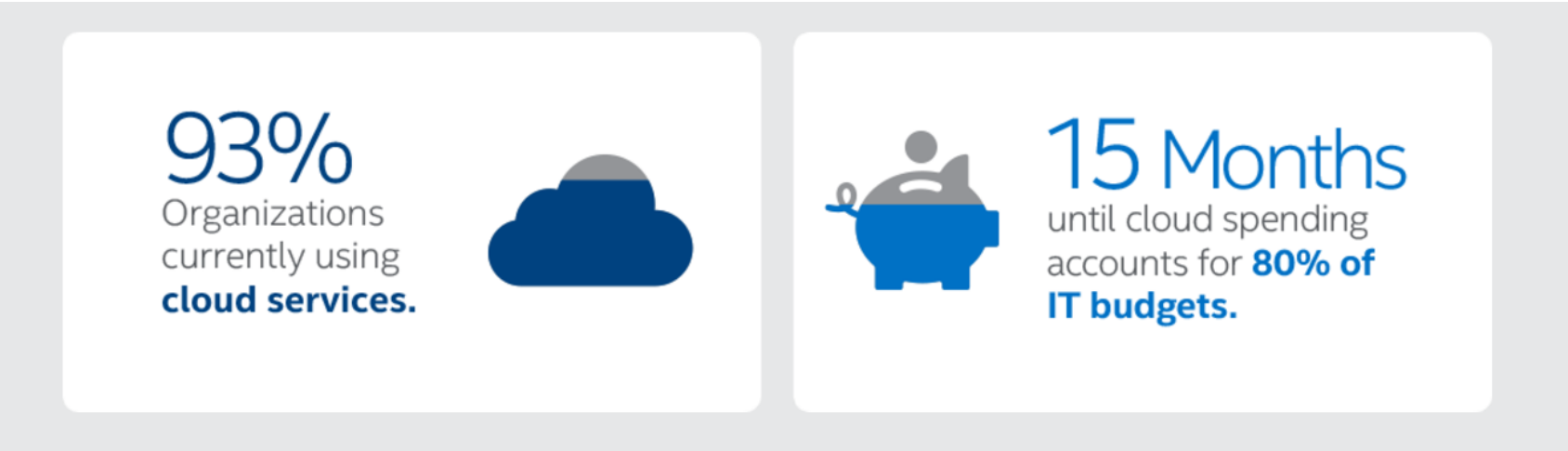
- Workloads are moving fast
- Shift is accelerating as technologies mature

Figure 1: Percentage of Workloads Running in the Cloud



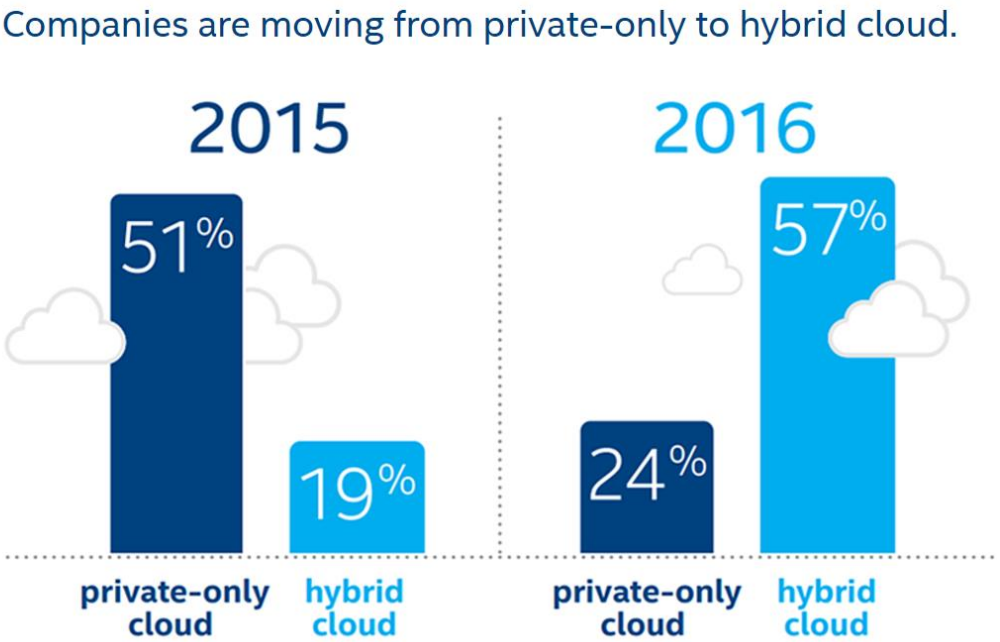
Source: 451 Research 2017

The barriers to cloud adoption have dropped



Source: mcafee.com

Hybrid cloud… a mix of public, managed, and customer owned cloud is becoming the standard



Source: mcafee.com

So how does the Cloud affect flash?

- In the Data Center, fewer people are deciding what flash to buy and how to deploy it.
- IT continues the evolution to be defined “as a service” rather than a product
- Decisions are being made at the application layer, and then being purchased all inclusive.
- Lots of innovation continues in the mobile space where “cloud independent” operations are necessary (ex autonomous vehicles)

Flash is used is all clouds

Type	Flash Characteristics
Software as a Service (SaaS)	Used, but completely hidden to the end user. Examples include Salesforce, Office 365, Dropbox, LinkedIn.
Platform as a Service (PaaS)	Used, but available behind “performance tiers”.
Infrastructure as a Service (IaaS)	Available for system disks, block storage, and file storage. Flash supplier hidden, price based on performance metrics on a unit basis.
Hosted Private Cloud	Mixed of standardized and customized offerings. Performance variable
On-Premises Private Cloud	Fully customizable. All Flash products transparent and readily available

Flash in SaaS

$12.00 user/month (annual commitment)	$8.00 user/month (annual commitment)	$20.00 user/month (annual commitment)	$35.00 user/month (annual commitment)
Office 365 ProPlus	Office 365 Enterprise E1	Office 365 Enterprise E3	Office 365 Enterprise E5
Buy now	Buy now	Buy now	Contact sales
Learn more	Learn more	Learn more	Learn more
Office applications plus cloud file-storage and sharing. Business email not included.	Business services—email, file storage and sharing, Office Online, meetings and IM, and more. Office applications not included.	All the features of Office 365 ProPlus and Office 365 Enterprise E1 plus security and compliance tools, such as legal hold, data loss prevention, and more.	All the features of Office 365 Enterprise E3 plus advanced security, analytics, and voice capabilities.

Source: MSFT Office 365

Flash in PaaS

Service tier	Target workloads
Basic	Best suited for a small database, supporting typically one single active operation at a given time. Examples include databases used for development or testing, or small-scale infrequently used applications.
Standard	The go-to option for cloud applications with low to medium IO performance requirements, supporting multiple concurrent queries. Examples include workgroup or web applications.
Premium	Designed for high transactional volume with high IO performance requirements, supporting many concurrent users. Examples are databases supporting mission critical applications.
Premium RS	Designed for IO-intensive workloads that do not require the highest availability guarantees. Examples include testing high-performance workloads, or an analytical workload where the database is not the system of record.

Source: MSFT Azure

Flash in IaaS

Premium Disks Type	P4	P6	P10	P20	P30	P40	P50
Disk size	32 GB	64 GB	128 GB	512 GB	1024 GB (1 TB)	2048 GB (2 TB)	4095 GB (4 TB)
IOPS per disk	120	240	500	2300	5000	7500	7500
Throughput per disk	25 MB per second	50 MB per second	100 MB per second	150 MB per second	200 MB per second	250 MB per second	250 MB per second

Source: MSFT Azure

Flash in Hosted Private Cloud

Dedicated and Multi-Tenant Environments

We offer two types of deployments based on a customer's needs and budget.

Dedicated

- Single-node, high-availability (HA) and redundant configurations
- High-performance storage options
- Dedicated firewall and security
- Advanced and active performance monitoring with management workflows
- Extensive analytics on infrastructure performance, capacity, availability and stability

Multi-Tenant

- Customized configurations
- Enterprise-class reliability
- Pay-as-you-go options
- 24x7x365 support and monitoring

Source: Atmosera

Flash in on-premise private cloud

TECHNICAL SPECIFICATIONS*

	//M10	//M20	//M50	//M70
Capacity	Up to 25TBs effective capacity** 5 – 10TBs raw capacity	Up to 250+TBs effective capacity** 5 – 80TBs raw capacity	Up to 500+TBs effective capacity** 20 – 176TBs raw capacity	Up to 1.5PBs effective capacity** 42 – 512TBs raw capacity
All-Inclusive Performance* **	Up to 100,000 32K IOPS† <1ms average latency Up to 3 GB/s bandwidth††	Up to 200,000 32K IOPS† <1ms average latency Up to 6 GB/s bandwidth††	Up to 270,000 32K IOPS† <1ms average latency Up to 9 GB/s bandwidth††	Up to 370,000 32K IOPS† <1ms average latency Up to 11.5 GB/s bandwidth††

Source: Pure Storage

In the end… it's complicated!

- Options are many
- Deploying hybrid cloud infrastructures is relatively easy, managing the environment is complicated
- Realtime and historical performance analytics is critical to understand exactly what performance your workloads need, how they will get it, and how they will be maintained
- Spend the time to create an enterprise cloud architecture and strategy to drive your decisions