Leveraging the power of Flash to Enable IT as a Service

Steve Knipple

CTO / VP Engineering

August 5, 2014

In summary…

Flash in the datacenter, simply put, solves numerous problems. The challenge is to use the right variation of the technology for the particular use case.

About Steve Knipple

- CTO, VP of Engineering at EasyStreet
  - Responsible for technology direction

- 20 years' experience in IT enterprise strategy, architecture, management and operations

- A specialist in Corporate IT transformational programs
  - … which are always "transforming"

- Diverse experience: national and international (US, EMEA, APAC)

- Worked as both a "builder" and "buyer"
  - Prior Enterprise experience
 - Current Service provider experience

About EasyStreet

- Specialized in personalized hybrid "IT-as-a-Service" solutions
  - Bringing together people, technology, and processes to deliver tailored, fully managed solutions
  - Colocation and fully managed clouds, data protection, compliance, and applications → ready for a hybrid world
  - Consultative approach providing strategic guidance, integration engineering, and ongoing enterprise class ITIL based operations
  - 19 year old company with 3 years operational experience using Flash (local SSD, hybrid arrays, all flash arrays)

- Based in Portland Oregon
  - National and International client base
  - Data Centers in Portland and Phoenix currently
  - Nationwide service delivery footprint expansion underway

- Two similar, but distinct client segments
  - Software Vendors – SaaS / eCommerce Applications
  - Enterprise

Customer Segmentation

Enterprise	SaaS / Ecommerce
Information Technology is not their core business but is critical to their operation. Information Technology can be a strategic differentiator, it can be a cost of business, it can be both	Information Technology is the foundation of the business Information Technology is the store front

Requirements
Reliability
Predictable Performance
Security

CIO / CFO

Developers, CTO
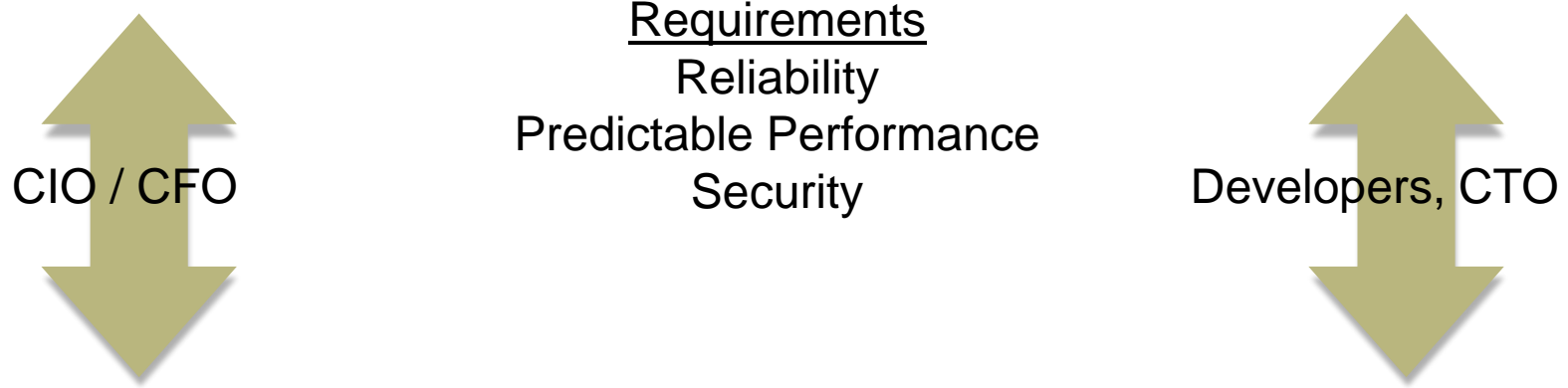
EasyStreet Services

IT as a Service

Colocation	Managed Services	Cloud Services

| Internal IT	Managed Services	Cloud Services
- Large CapEx - Staff Recruitment and retention critical - Slower innovation cycles	- Sourcing of day to day management of service - Access to the people providing the service - Purchased through a sales process with an AE and SE - Access to more innovative offerings and a deep bench of engineering skills - Diverse set of services across the Enterprise - Often done to improve operations (reduce speed, increase speed, decrease risk)	- On demand resources - Resource sharing - Rapid elasticity - Utility based charging

Flash is a component of a standardized architecture...

- **Modular "building block" architecture**
  - Small components with different performance characteristics
  - Multiple data protection options
  - Multiple geographic locations

- **Operationally flexible**
  - Ability to dynamically move loads
  - All redundant and highly available
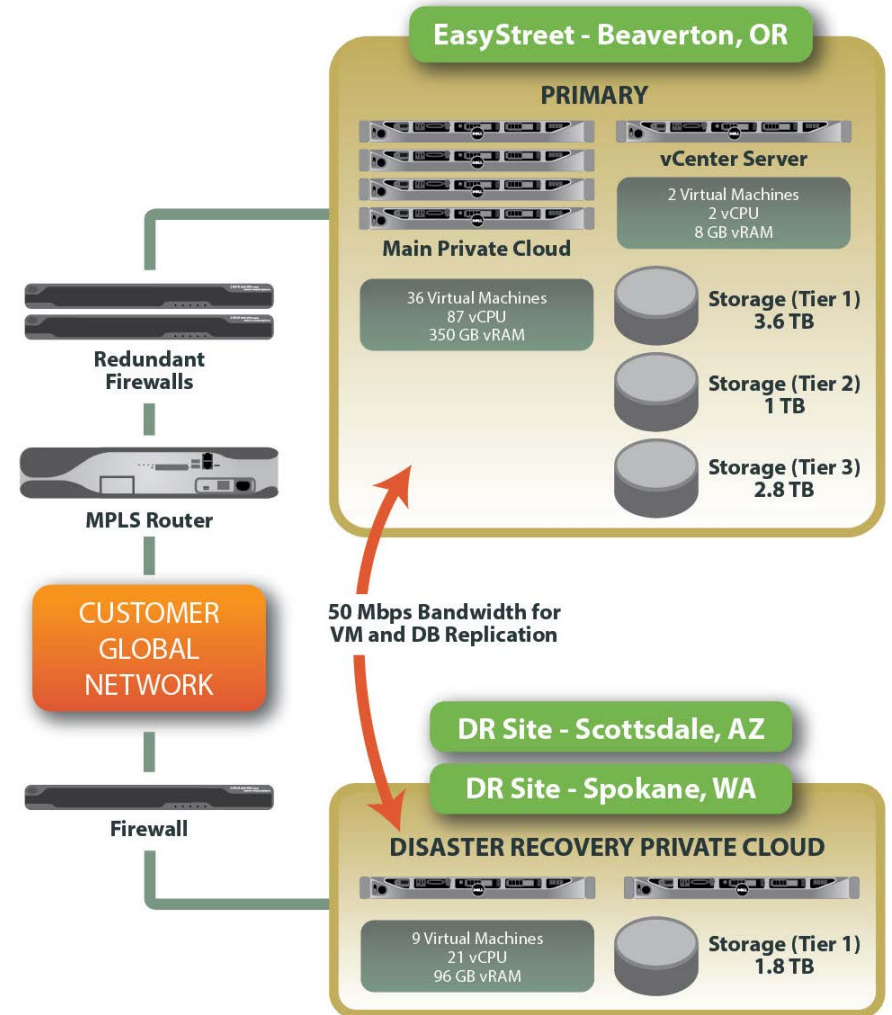
Storage Challenges for IaaS Providers

- **High customer expectations**
  - Predictable, repeatable performance (SLAs)
  - Unit pricing ($ / GB / month)
  - Different levels of price / performance
  - Reliability, reliability, reliability

- **Architectural flexibility**
  - Reusability
  - Multi-tenancy
  - Scalability (very small to very large solutions)

Installing an AFA in our standard architecture

- Testing methodology
  - Deployment into EasyStreet standardized virtualization private platform
  - EF540 with 12 disks (2 volumes: 6 disk, 5 disk, 1 spare), 10G iSCSI
  - VMWare 5.1 at the hypervisor level
  - Mix of Windows and CentOS virtual guests
  - Multiple data block sizes (mainly 4k and 64k)
  - Fio benchmarking tests for random and sequential reads and writes
 - Iometer testing for real world mix of read/writes

- Results
  - Performed as expected
  - Consistently high IOP performance and low latencies
  - Significantly different user experience at the virtual machine level… noticeable at first login

EF Series Performance Results

Job Name	Read IOPs	Read Latency (in ms)	Read Bandwidth (in MB/sec)	Write IOPs	Write Latency (in ms)	Write Bandwidth (in MB/sec)
Random Read	93627.1	1.367793	365.6434658	0	0	0
Random Read/Write	20583.4	3.941817	80.43070898	20580.7	2.29418	80.42266699
Random Write	0	0	0	25230.3	5.071625	98.39324121
Sequential Read	107466.1	1.198509	419.6316465	0	0	0
Sequential Read/Write	32452	1.85117	126.8781279	32447.9	2.09274	126.8621406
Sequential Write	0	0	0	43341	2.956367	169.295543
IO Meter	35792.3	1.573101	220.5592891	8934.7	0.947288	55.0917002
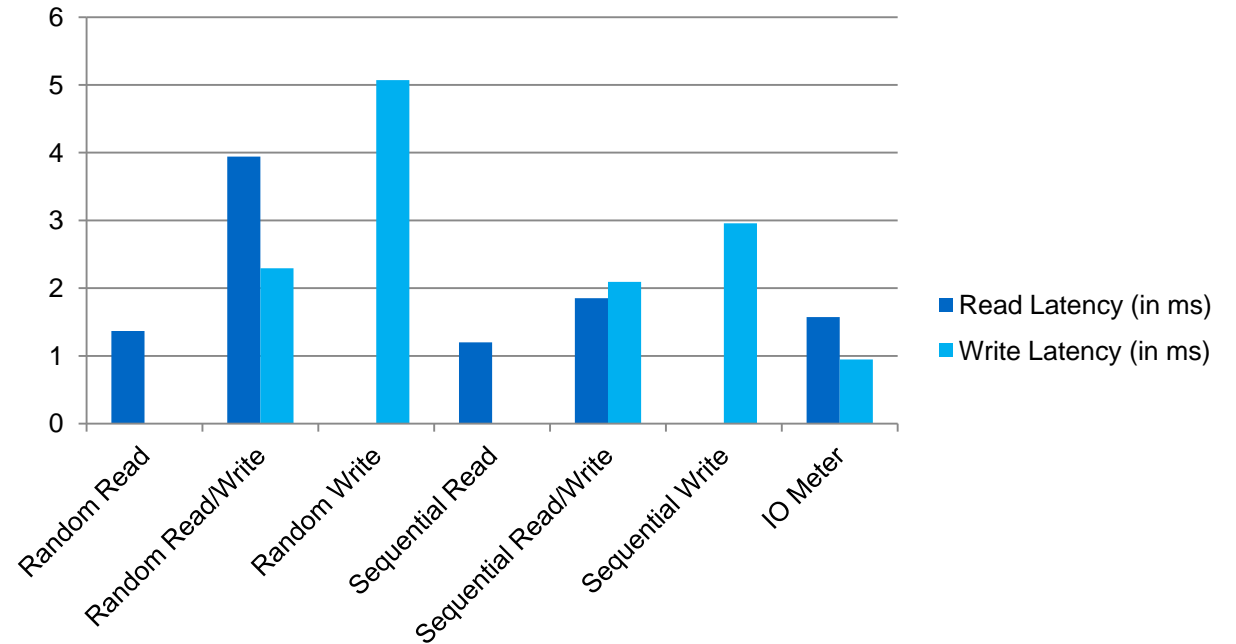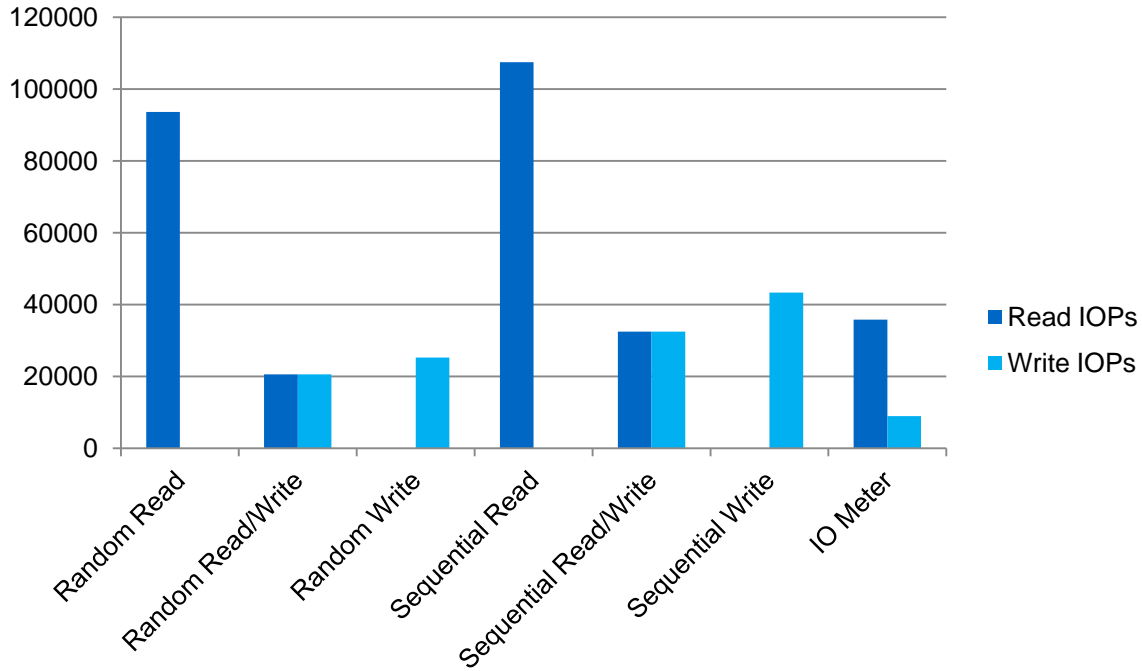
Process for Moving Workloads

Within EasyStreet Private and Public Clouds

- AFA (EF540) is connected via 10g iSCSI

- AFA is presented to VMWare cluster as a storage option

- VM Workloads moved with VMWare storage v-motion

- Loads moved non-disruptively between SAS arrays and AFAs

- DB LUNs are moved via file copies

Use Case for Flash Arrays (AFA) ?

Good for solutions where infrastructure provides the high availability

- Hybrid arrays work well 90% of the time…
  - Until required data only exists on traditional disk
  - Difficult tradeoff for performance sensitive customers
  - Also difficult in shared environments
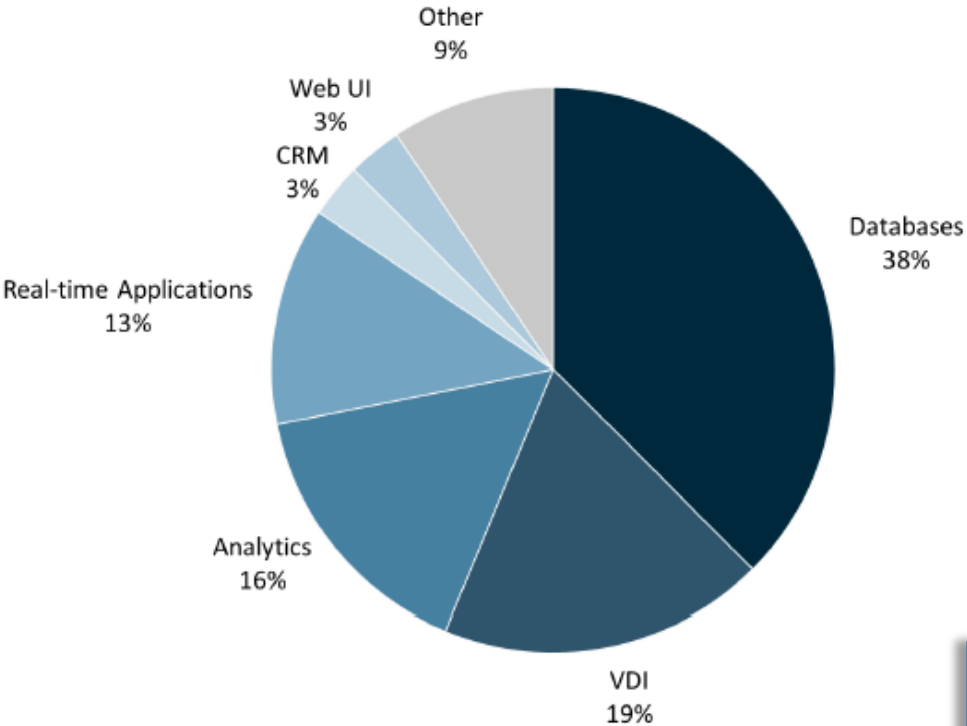- Server-based solutions work well for environments with application-level replication

High performance storage is business impacting for

- SaaS/eCommerce clients
  - Faster site loads
  - Faster complex transactional queries against large data sets
- Enterprise clients
  - VDI workloads
  - Batch reporting performance (i.e. ERP systems)

EasyStreet Experience Consistent with Industry Research

Applications Being Moved to Flash – Excluding Autotiering

- Other 9%
- Web UI 3%
- CRM 3%
- Real-time Applications 13%
- Analytics 16%
- VDI 19%
- Databases 38%

Q. Which category applications are being moved onto flash today? n=43.

Source: Storage – Wave 18 | © 2014 451 Research, LLC. www.451research.com

2014 is the year of the All-flash Array
-- 451 Research, 2014

Real Life Deployment

Global Retailer with Worldwide ERP Hosted at EasyStreet

- Large complicated supply chain with large batch jobs run on regular intervals

- Hosted on traditional SAS array

- SAS array augmented by all flash EF540

- Backup times reduced by 90%

- Batch jobs execution times reduced 20-50%

Real Life Deployment

Food Manufacturer with EasyStreet Managed Private Cloud

EXAMPLE #2

- Large VDI deployment across office space and shop floor

- Diverse and unpredictable server workload mixed with and affecting VDI load

- Moved VDI load to EF540

- Login times reduced by 80%

- Significantly improved user experience

Questions and Answers

Technology Evaluation Criteria

- Company history and roadmap
  - Start-up vs. established firm
  - Product track record
  - Resources to execute on roadmap

- Performance
  - Raw IOPS and latency
  - Availability

- Operational Considerations
  - Installation and workload migration
  - Monitoring and alarming
  - Vendor support

- Pricing
  - Attractive price point for our client base

Factors that led to NetApp Purchase

- **Long relationship with NetApp**
  - Good record of support and responsiveness

- **Positive performance within our environment**

- **Experts available for installation and tuning**

- **Key for EasyStreet…**
  - Our clients trust us to make the right technology choices for them
  - We take that very seriously
  - We back it with our SLAs

Summary

- Very pleased with AFAs (EF540)

- Excited about the future of flash storage arrays

- See flash storage significantly disrupting the storage landscape in the short term

- Multiple smaller SANs with different performance characteristics and price points are key during the transition phase from SAS to SSD

- Advanced analytics and IOP QoS will be future differentiators

- Supportability and vendor strength will be key for large investments