SFD6 - Wednesday PM

Tegile

*Narayan (CMO)
Business transformation through storage transformation

First product shipped Feb 2011
Close to 700 customers
Focused on enterprise mid-range
1200 systems in the field, 300+ partners

Early stages of the flash revolution

Dial up or down the flash in the system depending on requirements
Same OS, feature set or uxp whether you;re using hybrid or AFA

HA2100, HA2130, HA2300, HA2400, T3400, T3600, T3700, T3800
All models can run AFA or hybrid as required

All software features bundled in

Support eMLC and spinning disk, can support SLC. TLC - the economics and
resilience aren't there yet. PCIe Flash support is coming.

Support
Performance
metadata acceleration
r/w/meta in DRAM/SSD cache
pin data sets in all SSD pools
sustained low-latency

Economics
inline dedupe
inline compression
zero elimination
thin provisioning
automatic block reclamation

Protection
Dual a/a controllers
multiple RAID options
instantaneous thin snapshots, thin clones
block-based remote replication (asynchronous)

Multi-protocol
Block and file (FC, iSCSI, NFS & SMB)

Currently 2-controller, scale up architecture. Working on scale out architecture (12 -
18 months)

They are a systems company - you can't uncouple the hardware

IntelliCare - Cloud Analytics (sits on AWS), IntelliCare Portal and Proactive Customer Support

Value proposition:
Server virtualisation,
5 - 10x perf gain
3:1 - 5:1 data reduction
VM-consistent backup and recovery

desktop virtualisation,
no boot storms
10x better uxp
8:1 - 10:1 data reduction
VM-centric mgmt

databases
3x - 20x reduction in latency
sub ms response times
2:1 - 3:1 data reduction
integrated backup and DR

dedupe and compression can be turned on and off on a per volume or per pool basis
Dedupe is typically done on a pool basis

standard x86 architecture, SAS back-end, no custom silicon
tested up to 96000 snaps per system

Self-encrypting drives, SSDs

entry level 50000 IOPS up to 250 - 300000 IOPS

Design Premises
Flash densities doubling and cost halving every 18 - 24mos
Flash densities increasing faster than HD densities
latency and economics will drive adoption of new media types
continued innovations in incumbent media tech ensure longevity

Design Goals
architecture must support a perf and one or more capacity layers
data mgmt @ speed and scale of the fastest medium
comprehensive data mgmt regardless of media or access methods
abstraction of media types for rapid incorporation of new media

*Rajesh (CTO)

IntelliFlash

Physical Media - Performance (DRAM and eMLC today) and a capacity layer (dense eMLC, MLC or HDD)
DRAM, Perf Flash, Capacity Flash and Capacity HDD

Media Optimization - Media Management
Media aligned writes
- aligned along sector and page boundaries
- avoids page fragmentation
- adjust to specific drive models (e.g. SSDs that advertise a 512 byte sector size)
Even wear across flash pages
- segment flash into high-low I/O ranges
- over-provision high I/O ranges
Fewer writes extend media life
- compress and dedupe writes
- variable block size support
- zero block avoidance

Vendors provide them with "performance" firmware from drive vendors

Media Optimization - Storage Pooling
Pooled Storage
- Media virtualised and aggregated
- provision luns and shares from pool
- simplified on-demand provisioning
- optimal space utilisation
Dynamic Stripe Widths
- variable block sizes
- each logical block is its own stripe
- all writes are full stripe writes
- no read-modify-write media wear
Coalesced writes to media
- writes in DRMA aggregated
- Coalesced and mostly sequential writes to data layer
- Efficient media handling
- Consistent performance

Media Optimization - Resiliency
Redundant Controllers
- dual redundant controllers
- active i/o for handling for local store
- standby i/o handling for peer store
continuous data access
Redundant Paths
- duel ported SSDs and HDDs
- No SPoF
- Redundant I/O fabrics
Live swaps and Upgrades
- online capacity expansion
- hot swap controllers and media
- non-disruptive sw upgrades

Metadata
information about data

Metadata Acceleration: Aggregation and Placement
• Metadata abstracted from data
• aggregated metadata placed on logical metadata devices
• optimal I/O paths
• increases locality of metadata and ease of metadata access
• enables high-perf inline dedupe and accelerates all storage operations

Typically 10 - 15% of total capacity used for metadata (not advertised as useable space)

Metadata is accessible by both controllers, but lives in a pool, controlled by one controller
Multiple copies of metadata stored in the system in multiple media

Metadata Acceleration: Caching and Scaling
Metadata abstraction and aggregation
- intelligent real-time caching across Hdd, SSD and DRAM
- adapative algorithms opt fo multi io patterns
- cachine engine adapts to block size, i/o patterns and media sizes
automated expansion of metadata space
- threshold-based alerts for metadata space expansion

Data Services - Data Reduction, Protection, Recovery, Block and File Layers

Data Services: Data Reduction
in-line dedupe
- block-level
- dedupe across media
- perf multiplier
inline compression
- block level
- turn on/off at LUN / share level
- alogrithm - LZ4, LZJB, GZIP
- perf multiplier
thin provisioning
- array-level thin
- for LUNs and shares
- supports VMware VAAI "STUN"
- JIT storage provisioning

Compress then dedupe

Data services: Data Protection
Instantaneous thin snaps
- PIT copies of data
- space allocated only for changed blocks

- no reserve space for snaps
- unlimited number of snaps
- VM-consistent and app-consistent
Instantaneous thin clones
- mountable copies
- R/W able copies
- PIT copies
- Space allocated only for deltas
Detect and correct silent corruption
-checksums all data blocks
- data and checksum in separate locations
- match data/checksum for integrity
- corrupt / mismatched data fixed using blocks from mirrored copy

Data Services: Data Recovery
Instantaneous stable Recovery
- data-consistent VM snaps
- hypervisor integrated
- MSFT VSS co-ordinated data-consistent snaps
- VM-consistent and app-consistent snaps
Intelligent data reconstruction
- no need to rebuild entire drive
- only portion of data rebuilt
- accelerated metadata accelerates rebuilds
WAN-optimized replication
- snap-based site-to-site replication
- no need to replicate to multiple updates to a block within repo interval
- minimizes bandwidth usage
- one to many / many to one replication

Data Services: Block and File Services
Block Layer
- logical block volumes
- thin / thick provisioning
- vol expansion / contraction
- optimised I/O services (block copy, clone, etc)
File Services Layer
- file system folders
- Rich ACLs
- Quotas / Reservations
- Optimized file I/O services (file copy, extended attributes, etc)

Protocol Choice
Block
iSCSI 1Gb 10Gb
FC - 4/8Gb

File Access
- NFS, CIFS and SMB 3.0 (coming)
- Autohome directories for CIFS

- AD integration

*Rajiev talks about Management
Web UI
REST API
VMware vCenter
MSFT SCVMM support coming soon
Call Home