Creating the Fabric of a New Generation of Enterprise Applications

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August 10, 2017
Sneak Preview: NetApp’s NVMe-oF and SCM Vision

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<th>NFS</th>
<th>FCP</th>
<th>NVMF</th>
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Accelerated fabrics for fast FC-NVMe adoption

New media as cache for maximum impact

Enterprise data management everywhere

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The world is changing fundamentally and quickly
By 2020, it’s expected that 50% of the G2000 will see the majority of their business depend on their ability to create digitally enhanced products, services and experiences.

IDC Directions, February 2017
Providing much needed growth for those who get it right.

By the end of 2017, revenue growth from information-based products will double the rest of the product and service portfolio for one-third of G2000 companies.

Companies with data-driven environments have up to 50% higher market value than other businesses.

Source: IDC FutureScape, November 2016
Flash is essential for digital transformation but emerging applications demand more
Real-Time Applications: The Next Phase of Digital Transformation

In-memory technologies will grow to ~$13B by 2020*

Artificial Intelligence  |  Machine Learning  |  Real-Time Analytics

All demand lower latency and higher performance from faster fabrics and faster media


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Digital Transformation Creates New Customer IT Imperatives

**HARNESS**
the power of
the hybrid cloud

**BUILD**
a next-generation
data center

**MODERNIZE**
storage through
data management
Converging “Disruptive” Trends

Faster Fabrics
- NVMe over Fabric (NVMe-oF)
- FC 32Gb
- Ethernet 25/50/100 GbE

Faster Media
- NVMe SSDs
- Storage Class Memory (SCM, aka PMEM)
New Memory and Storage Tiers Drive Value… and Complexity
Partnering with Leaders to Drive Flash Innovation

25 years of innovation across countless technology transitions

- Expensive and unproven new storage media emerges
- Use new media selectively
- Broad adoption and optimization of new media
- Scale adoption and fully integrate new media
- Joint innovation with leading partners

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NVMe shipped

>6 PB
Comprehensive Vision for Enterprise Adoption of NVMe-oF and SCM

Strong R&D funding to execute non-disruptively

Persistency Memory (PMEM)

Storage Class Memory (SCM) as Cache

NVMe over Fabrics

Server CPU

Storage CPU

HBA

RNIC

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Start with an Ultrafast Network Connection

- First 32Gb Fibre Channel and 40Gb Ethernet
- Fibre Channel SAN is often used for enterprise critical applications

32GFC end-to-end configuration reduced DSS query completion time 70% compared to 8GFC network, 48% compared to a 16GFC network.
Accelerated Enterprise Data Fabric for Fast FC-NVMe Adoption
New Media as Cache for Maximum Impact
Enterprise Data Management Everywhere
NetApp innovation will accelerate customer adoption of Flash, NVMe, and SCM data management solutions
Disruptive Technologies Introduced Non-Disruptively...

... so customers can embrace with confidence

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25 years of customer-focused innovation

History of NetApp


1993
- Network Based Backup Protocol
- Multiprotocol NAS Appliance
- NFSv2
- 1st NAS Appliance Snapshots

1996
- Database Solutions
- HA NAS
- SnapVault
- SnapLock
- NearStore
- Native Infiniband
- Direct Access File System (DAFS)

1997
- Unified NAS/SAN
- SnapVault
- SnapLock
- NearStore
- Native Infiniband
- Direct Access File System (DAFS)

2000
- SnapManager
- FlexVol
- Thin Provisioning
- ISCSI
- V-Series
- RAID-DP®

2003
- Data ONTAP 7G
- FlexVol
- Thin Provisioning
- ISCSI
- V-Series
- RAID-DP®

2005
- MetroCluster
- SnapManager for SQL

2006
- Scale Out
- Data ONTAP® GX
- SnapManager for Oracle
- FlexShare & MultiStore
- Kilo Client Lab in RTP (Genesis of FlexPod)

2007
- Performance Acceleration
- SnapManager for VMware
- Hyper-V, SharePoint, Safonaro/OnCommand

2008
- Deduplication
- for Tier 1 & 2
- Rapid RAID Recovery

2009
- Module
- Hyper-V, SharePoint, Safonaro/OnCommand

2010
- Data ONTAP 8
- Data Motion
- FlexPod
- Back/StorageGRID Acquisition
- SSD Aggregates

2011
- Flash Cache I
- FCoE
- Protection Manager
- File Level, FlexClone

2012
- Flash Cache II
- FCoE
- Protection Manager
- File Level, FlexClone

2013
- Clustering
- Data ONTAP
- Flash Pool
- Flash Accel
- ONTAP Edge
- Dynamic Disk Pools

2014
- FlexGroup
- Volume Encryption
- SolidFire Acquisition
- Data Fabric
- AFF Fast Path enhancements, In-line zero block dedupe, adaptive compression, deduplication

2015
- AFF700 / 300
- FAS9000 / 8200 / 2600
- NVMe
- Inline Data Compaction
- 15TB SSD
- RAID-TEC
- NetApp FlexGroup
- Volume Encryption
- SolidFire Acquisition

2016
- Data ONTAP 9
- AFF700 / 300
- FAS9000 / 8200 / 2600
- NVMe
- Inline Data Compaction
- 15TB SSD
- RAID-TEC
- NetApp FlexGroup
- Volume Encryption
- SolidFire Acquisition

2017
- FabricPool
- Cloud Tiering
- Expanded
- Inline Dedupe

25 years of customer-focused innovation
Proven leadership

- **#1** World’s fastest growing top 5 SAN vendor
- **#1** First to deliver 15TB drives
- **#1** World’s fastest growing top 5 all-flash array vendor
- **#1** First with high-speed connectivity
- **#1** First with multi-stream write
- **#1** First with high-speed connectivity
- **#1** World’s fastest growing top 5 SAN vendor
- **#1** World’s fastest growing top 5 all-flash array vendor

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IDC, Worldwide Quarterly Enterprise Storage Systems Tracker - 2017Q1, June 8, 2017 (Top 5 AFA vendor – Year over year revenue growth; SAN Year over Year revenue growth; #1 Branded Storage OS – revenue and capacity share)
IDC, Worldwide Quarterly Converged Systems Tracker - 2017Q1, June 22, 2017 (Year over Year revenue growth)
IDC, Worldwide Quarterly Storage Software, Public Cloud SaaS and IaaS Qviews - 2017Q1, June 8, 2017 (#1 Storage & Device Management vendor – revenue share)
Thank you.