DDN® STORAGE

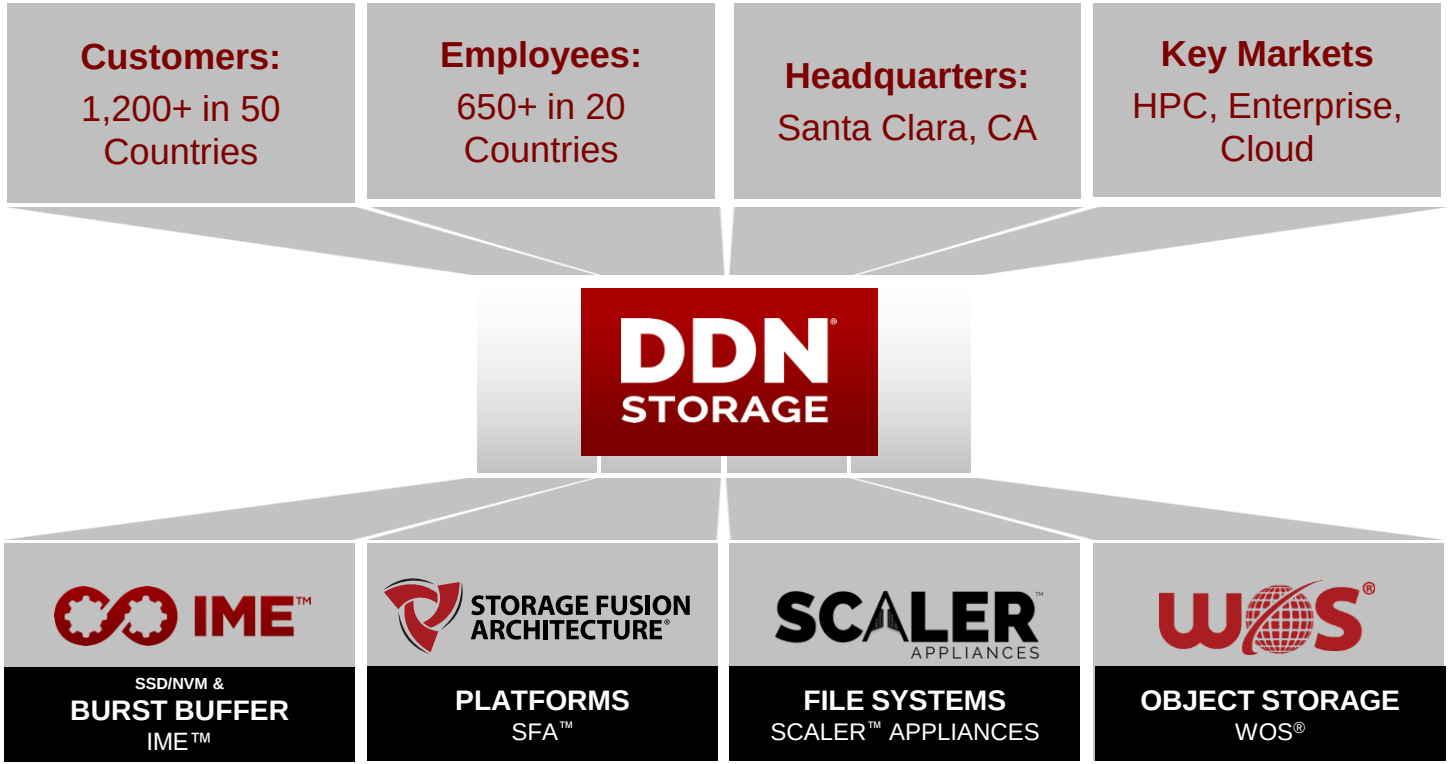
AFM Use Cases

Spectrum Scale User Meeting

March, 2017

Jan Heichler, PreSales Manager (Europe)

DDN | Who We Are



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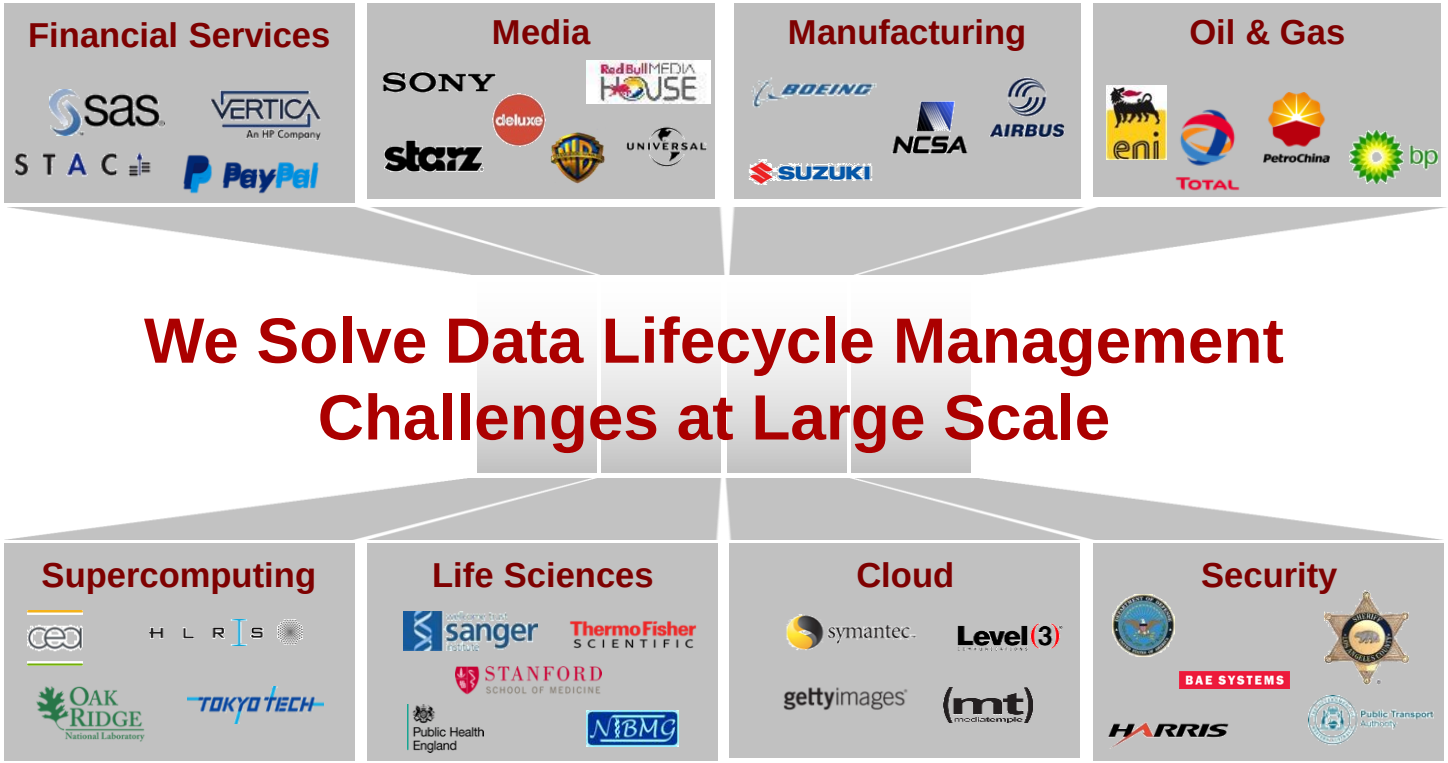
DDN | What we do



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DDN | GRIDScaler

IBM Spectrum Scale

- **Spectrum Scale Experience**
- >50% of all DDN File-based solutions work with IBM Spectrum Scale
- Support of Spectrum-Scale-Solutions with own Support Engineers
- We have been doing this at the high end for more than a decade
- GRIDScaler reduces deployment times and puts Spectrum Scale in a defined environment

SCALER APPLIANCES

- **GRIDScaler**
- Embedded / Converged
- Installation / Configuration Tools
- SFX read Caching hinting
- Drive Performance Enhancements
- DirectMon, Monitoring

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DDN | GS14KX

2 x Compute Controllers

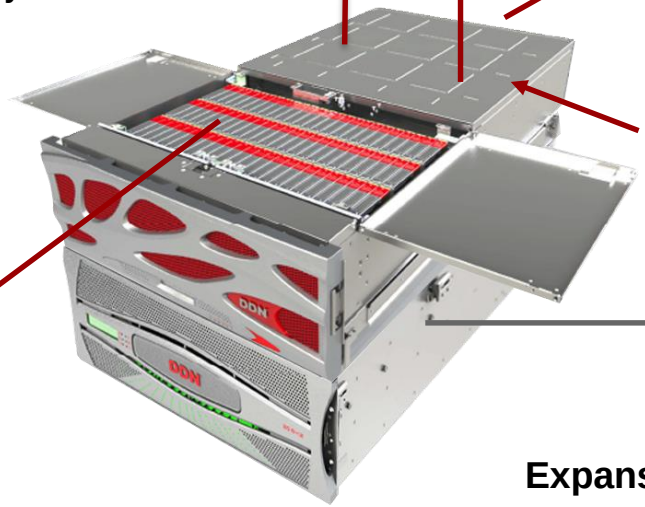
- SFAOS 3.0
- 4x 18-core “Broadwell”
- 360GB **Application memory**
- Redundant Power

Connectivity

- 8 x MultiPurpose Ports
  - EDR/FDR ports
  - 10/40/100 GbE

XOR

- 4 x OmniPath



Hyperconverged

- Embedded PFS
- Applications

Drives

- 72 x 12Gb/s SAS 2.5” slots

Expansion

- Add 1, 2, 4, 5, 6, 10 or 20
- 84 HDDs/SSDs each

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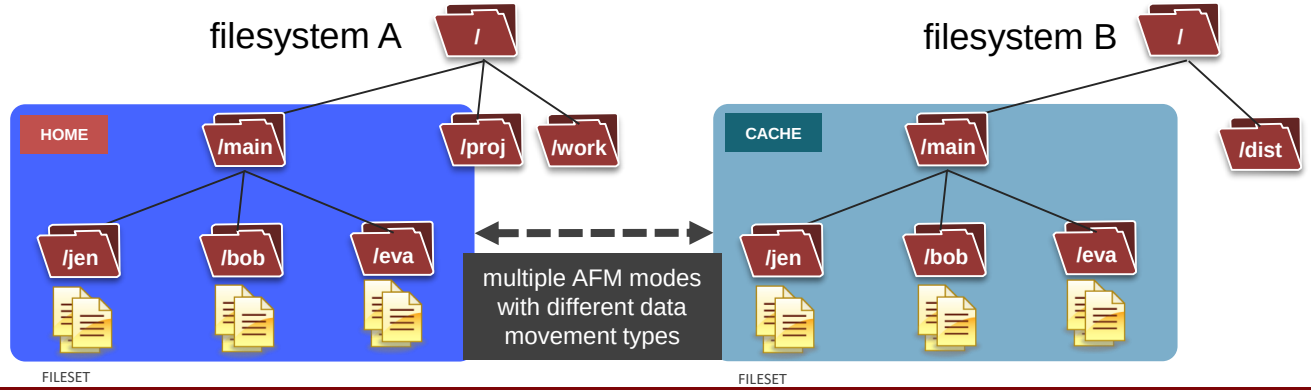
What is AFM ?

- An ***asynchronous***, ***cross-cluster, data-sharing*** utility
- File data are kept eventually consistent between the “CACHE” and the “HOME” fileset
- Home does not know CACHE exists, CACHE does all the work



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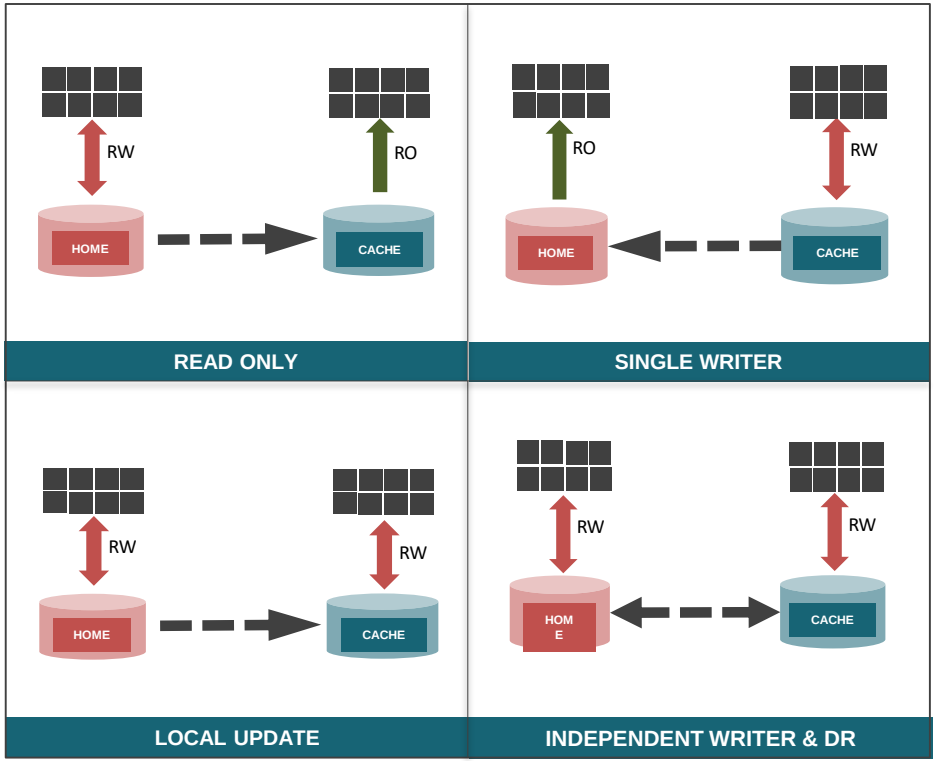
AFM Modes with GRIDScaler

Five Modes of AFM



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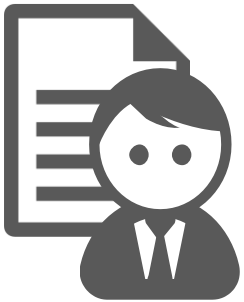
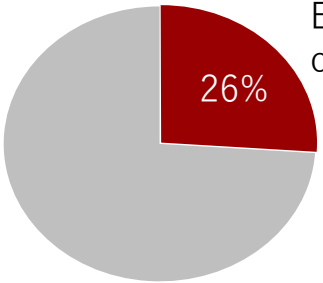
Use Case #1
AFM as WriteCache

Requirements

- **Initial Plan: 11TB/day ⇒ Now: 50TB/day**
  - Backup of all the data was requested within a limited time
- **Backup environment with no stress for users**
  - Responsibilities as an infrastructure provider
  - Non-stop operation
- **Data backup to overseas**
  - Disaster Recovery
  - Transfer to U.S. data center where data transfer cost is lower
  - Data Center located in Washington State founded in 2014





Electricity cost of U.S. DC

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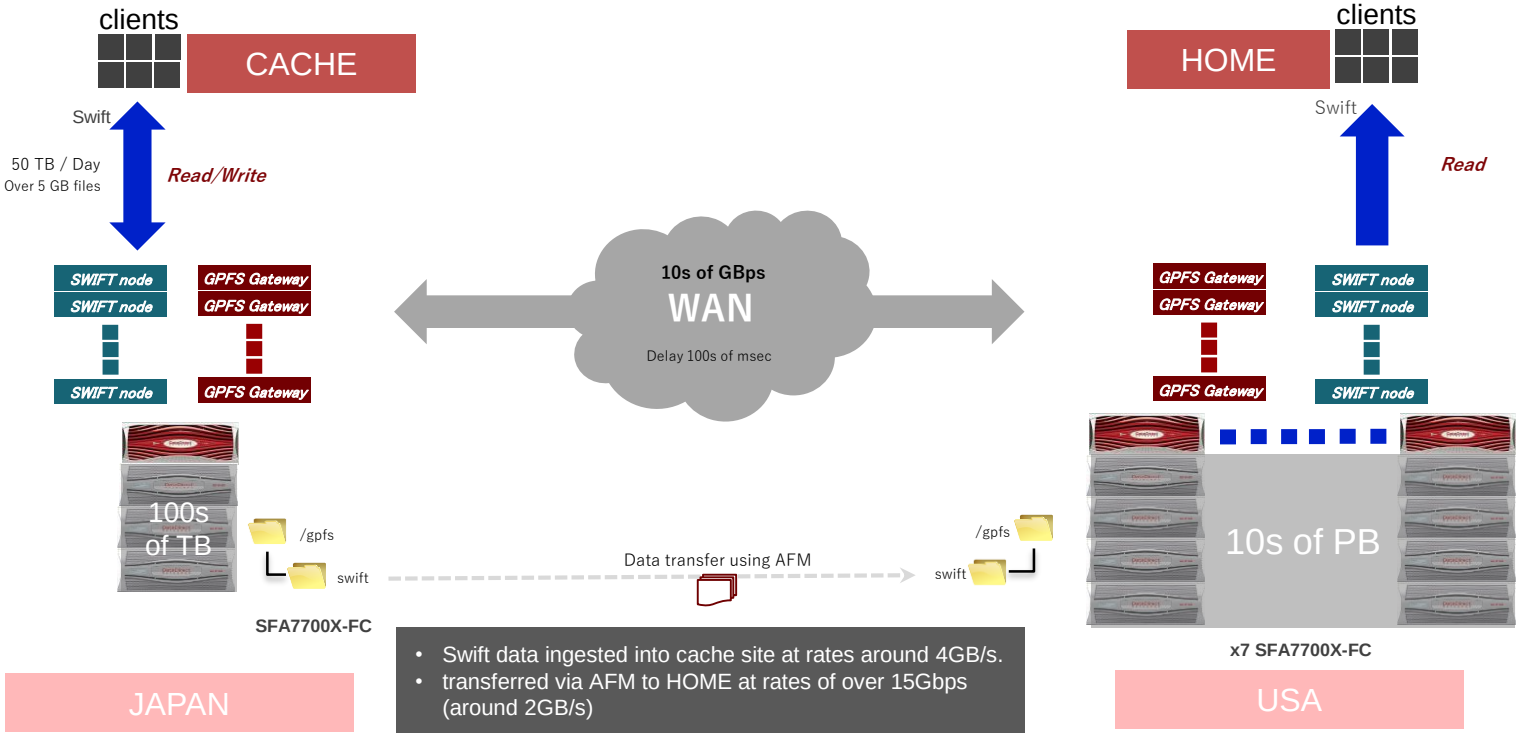
AFM implementation



- Swift data ingested into cache site at rates around 4GB/s.
- transferred via AFM to HOME at rates of over 15Gbps (around 2GB/s)

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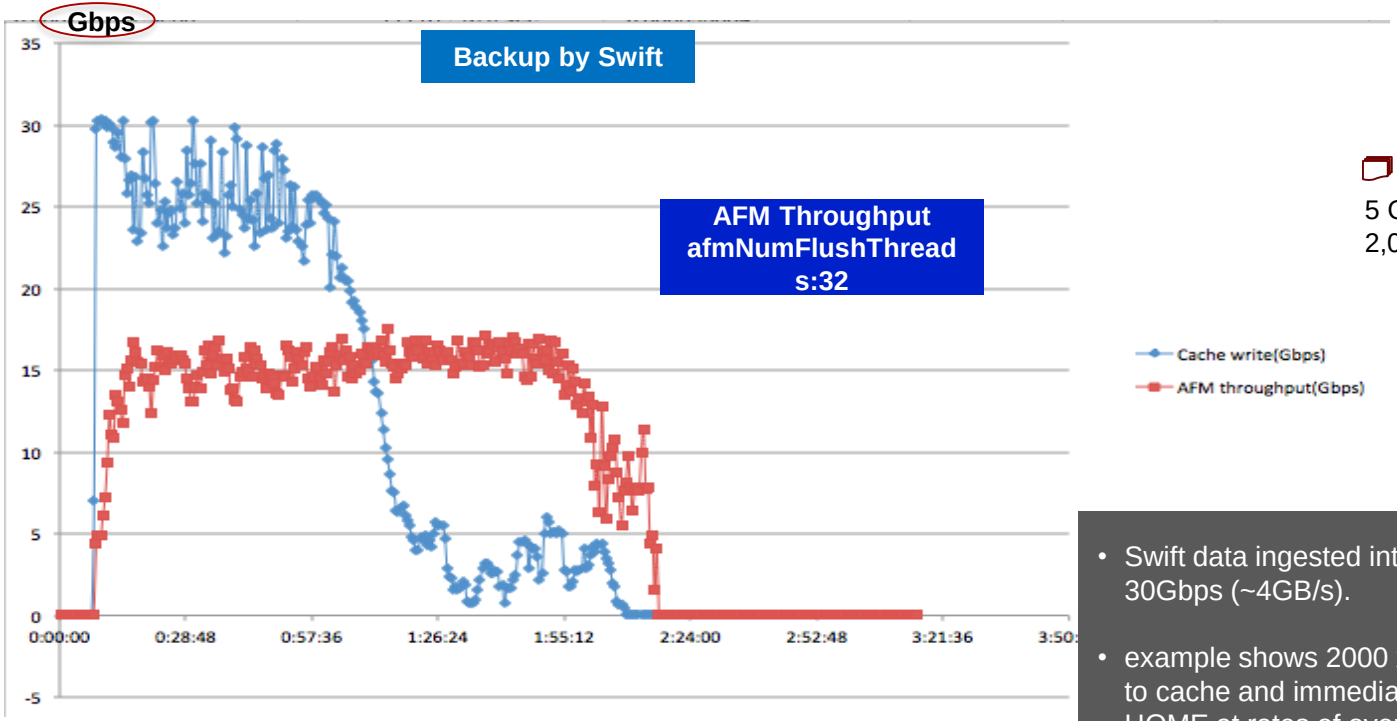
Swift + AFM Performance



5 GB
2,000 files

- Swift data ingested into cache site at rates around 30Gbps (~4GB/s).
- example shows 2000 x 5GB files (~10TB) being written to cache and immediately being transferred via AFM to HOME at rates of over 15Gbps (around 2GB/s)

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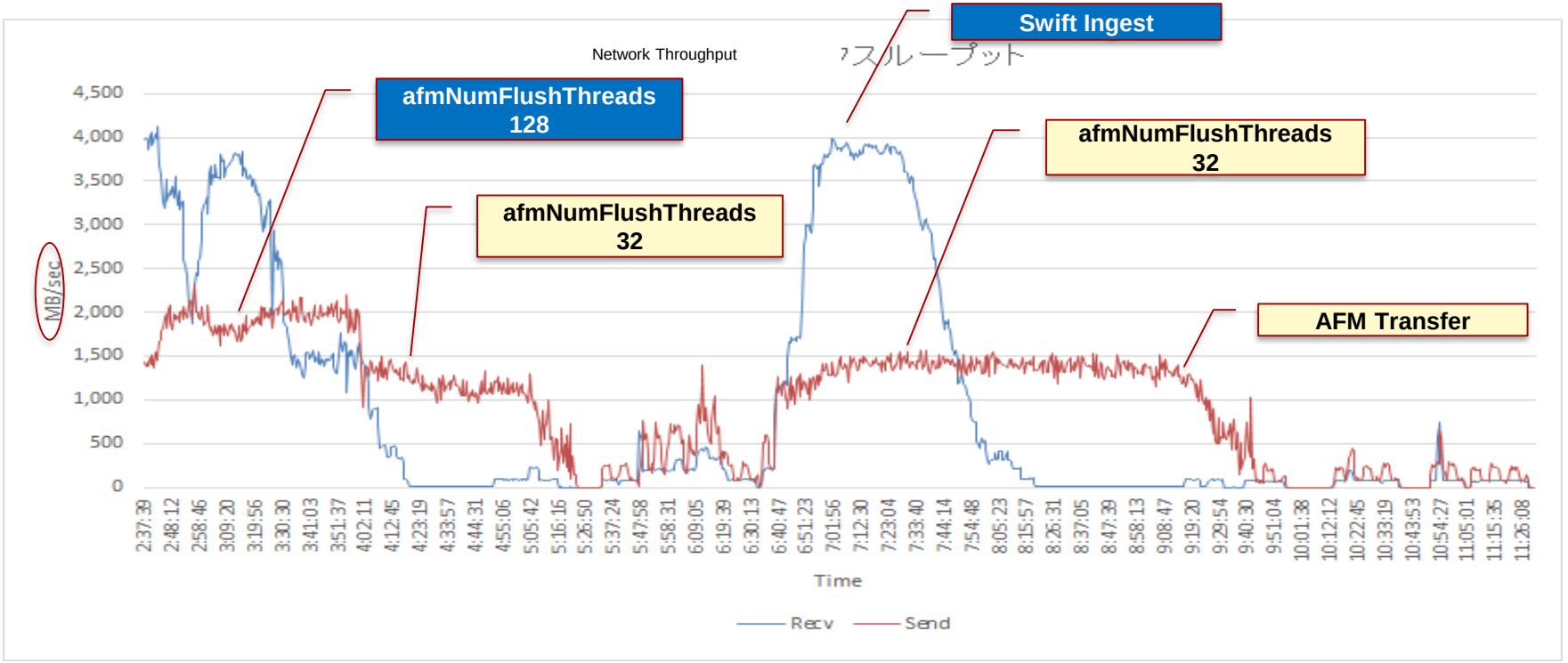
Bandwidth Management by Flush Threads



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Why DDN + Spectrum Scale

- **OpenStack integration**
  - Swift, Keystone can be used
- **AFM**
  - Replication independent of SWIFT layer
- **Low Cost, High Performance**
  - I/O Performance that can support 50TB/day
  - excellent performance with read & write simultaneously
  - low Operation cost

YAHOO! JAPAN

- **DDN supports the whole solution – both in Japan and the US**

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DDN® STORAGE

Use Case #2
AFM Independent Writer

Requirements

- **HighPerformance all-flash solution for SAS-GRID**
- **Separation of different internal customers data from each other**
- **Provide Test- and Production environment**
- **Reduce footprint and power consumption**
- **Replication between Site A and Site B for disaster prevention**

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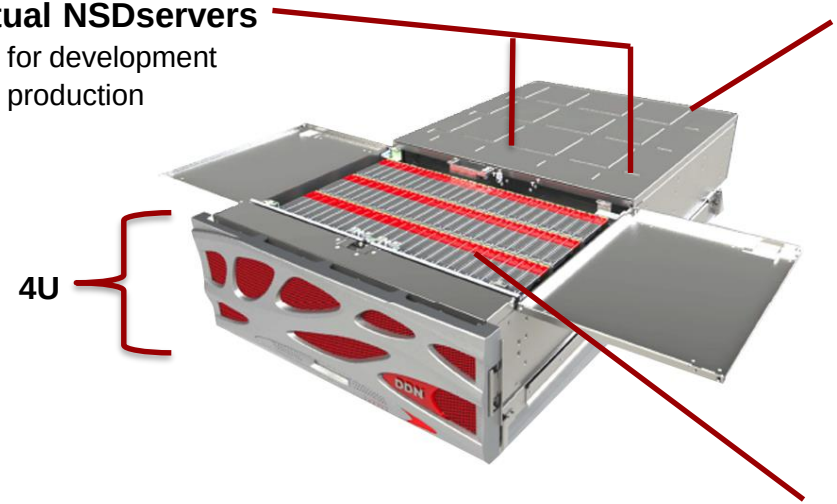
DDN | GS14K

Embedded GRIDScaler

12 x virtual NSDservers

- 4 VMs for development
- 8 VMs production



8 x 40GE Uplinks

- Ethernet interfaces shared between development and production VMs (SR-IOV)
- Development and production networks are separate tagged VLANs

IBM Spectrum Scale

52 x SAS 12GBPS SAS SSD – 1.6TB

- 10 x R5 4+1
- 2 x Spare

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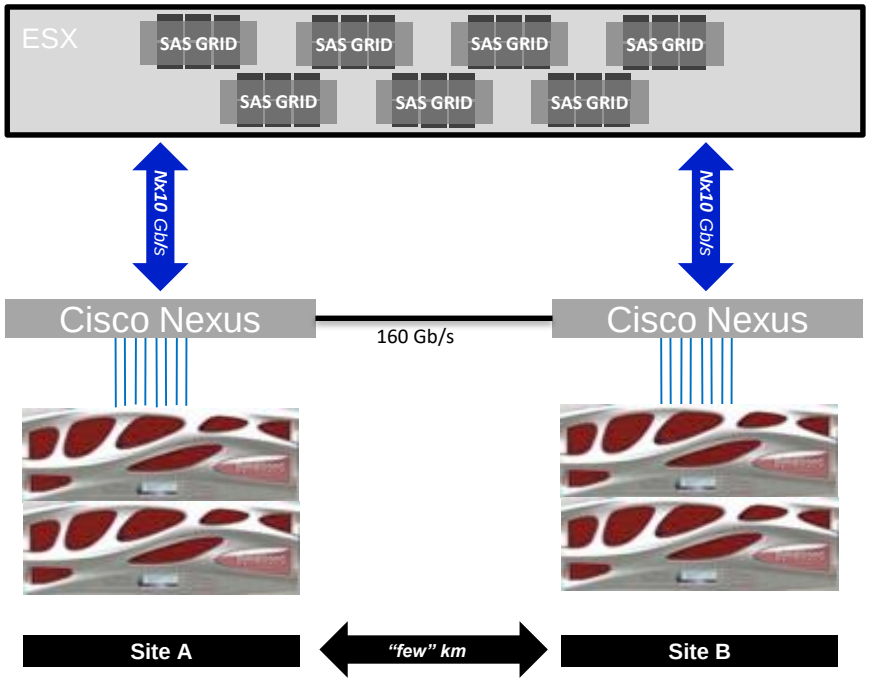
GS14KX SAS Platform Solution



- 4 GPFS clusters, 2 multi-cluster configurations (development and production)
- 14 filesystems – 6 development and 8 production
- 42 filesets (21 per site) with AFM replication
- ESX based clients
- "Failover" handled on the client basis with manual intervention

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Why DDN + Spectrum Scale

- **AFM**
  - Replication with “independent writer” allows for manual disaster recovery with acceptable failover time
  - Replication per fileset allows fine-grained control

- **High Performance – All Flash**
  - GS14KX delivered the required performance – and allows for easy future expansion
  - GS14KX allowed to separate the workloads as much as possible with minimal hardware deployment/overhead

- **DDN provided all hardware and professional services**

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Questions?

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