All Flash Array Nodes in a Hybrid Storage Cluster

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Where Do All Flash Arrays Fit?

- AFAs are deployed today primarily for a subset of enterprise workloads
  - Random R/W requiring very low latency or high IOPS at low latency
  - But…the opportunity is much bigger

- AFAs should displace performance HDDs for all primary workloads
  - The transition has already begun at many customers
  - Performance, capacity efficiency, density, lower power, etc. have broad appeal
  - But…these attributes are not enough to satisfy enterprise storage requirements

- AFAs must be as capable as existing HDD-based enterprise storage
  - AFAs and hybrid/disk storage will co-exist in on-premise enterprise data centers, and at service providers
  - Both need to be Enterprise Grade
Enterprise Grade All Flash Storage

Enterprise Grade all flash storage has these integrated capabilities:

- Flash-optimized architecture
- Scale-out for capacity/performance
- SAN, NFS and SMB/CIFS support
- Non-disruptive operation during planned and unplanned events
- Dynamic data migration between flash and disk
- Async and sync replication
- Backup/recovery flexibility across flash, disk, and cloud (F2D2C)

- Multi-workload QoS management
- Secure multi-tenant operation
- Hypervisor support: VMware, Hyper-V, Citrix, KVM
- Application integration: Microsoft, Oracle, SAP
- CloudStack support
- Backup/data management software support: Commvault, Veritas, TSM, Veeam
Example Data ONTAP Cluster

- Enterprise Grade storage
- All Flash FAS (AFF) for application workloads
- Hybrid (cache-accelerated HDDs) for secondary workloads
- All nodes in the cluster run the same storage OS
  - Nodes can be different controller models
  - SAN, NFS and CIFS/SMB flexibility
  - Scale-out and scale-up flexibility
Use Case: Virtual Desktop Deployment

- VMs provisioned on flash storage
  - Consistent latency and VM density
- User files provisioned on hybrid
  - Cost efficiency and better performance for repeat reads
Use Case: Online Workload Migration

- Storage performance requirements for a workload may change
  - New workload – unclear requirements
  - Workload demand changes
- LUN, VVOL or volume is migrated to storage tier that meets performance and cost needs – while workload I/O is being served
Use Case: On-Premise Flash to Disk Backup/Recovery

- Snapshots on AFF for immediate recovery
- Incremental forever backups to FAS with fast recovery
  - Lower storage cost
  - Read-only copies or writeable clones can be used for other workloads, e.g.
    - Report generation
    - Data analysis
Use Case:
On-Premise App Development and Test

- Production datasets incrementally replicated to secondary storage
- Writable FlexClone® copies share common blocks to provide multiple dev and test environments
Use Case:
Cloud App Development and Test

- Production datasets incrementally replicated with SnapMirror to cloud directly from AFF, or from backup copies on FAS
- Writable FlexClone® copies share common blocks to provide multiple dev and test environments
- Read-only copy provides DR as well
Use Case:
Archive On-Premise Data to Cloud

- With Data ONTAP destinations (FAS system or Cloud ONTAP), use SnapMirror for incremental transfer
- For other destinations, NetApp AltaVault provides compressed, deduped, encrypted transfer
Summary

- Flash and disk storage will co-exist in data centers
- Enterprise grade flash storage and hybrid disk storage – integrated into a unified infrastructure – is required to realize maximum value and benefit
- Data ONTAP clusters with All Flash FAS and hybrid FAS already do this
Thank You!