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Managing Storage Complexity Across the Enterprise

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Storage Growth

- Storage needs continue to grow
  - Capacity
  - Performance
- Administrative costs rising
  - Protocols getting more complicated
  - Environments are more complex
- Requirements cannot be met by a single system

Single System Limiters

- Capacity
- Bandwidth
- Geographical
- Environmental
- Organizational

Moving Beyond "Islands of Storage"

- ## Unified namespace
  - Isolate clients from server layout
  - Allow transparent migration of data

- ## Horizontal scaling
  - Performance beyond single server

- ## Distributed management
  - Centrally manage system settings and data policies

Unified Namespace

- Single namespace
  - Clients point to single location
  - Unaware of server topology
- Each filesystem on single server
- Transparent redirection between servers

Unified Namespace Protocols

- ## Novel protocols
  - – Object-based
  - – Cloud storage

- ## Native protocol interposition
  - – Maintains compatibility

- ## Standard protocol enhancements
  - – NFSv4 referrals, Microsoft DFS
  - – Requires client support

Unified Namespace Migration

- Transparently move data between servers
- Client service is not interrupted
- Requires client cooperation
  - Unless using interposition
- Data can exist in multiple locations
  - Local cache servers

Horizontal Scaling

- In unified namespace, filesystems still limited to one server
  - Limits on bandwidth
  - Limits on capacity

- Horizontal clusters spread data across multiple servers
  - Clients can stream data to/from multiple servers at the same time

Namespace vs. Scale

- ## Client load exceeds one system
    - Some workloads mitigated by caching
    - Others require horizontal scale

- ## Heterogeneous environment
    - Organizational, geographical
    - Unified through virtual namespace

- ## Complementary technology
    - Horizontal cluster within namespace

Distributed Management

- ## Storage consolidation
  - More protocols, data, clients
- ## New technologies
  - Compression, dedup
- ## Storage lifecycle more complex
  - Snapshots, replication, backup
- ## Cost of administration going up

Control Points

- Dedicated management server
  - Centralized server or tree of servers
- Ad hoc management
  - Peer to peer network
  - Each capable of management
- Neither replaces individual server management

Management Options

- ## Passive monitoring
  - Inventory, faults, performance

- ## Data management
  - Create filesystems, LUNs, change properties

- ## Service configuration
  - System settings (DNS, LDAP, etc)

- ## Policy management

Data Policy Management

- ## Centralize policy decisions
  - Snapshot schedules
  - Replication schedules
  - Backup policy
  - Compliance, retention
  - Encryption
  - Dedup, compression

- ## Namespace management
  - Physical location
  - Cached locations

Diverse Environments

- ## Heterogeneous environments
  - Works well for monitoring
  - Not as good for active management
    - Abstractions and administrative paradigms differ widely

- ## Homogenous environments
  - Tightly coupled management stack
  - Limits scope to one vendor or product
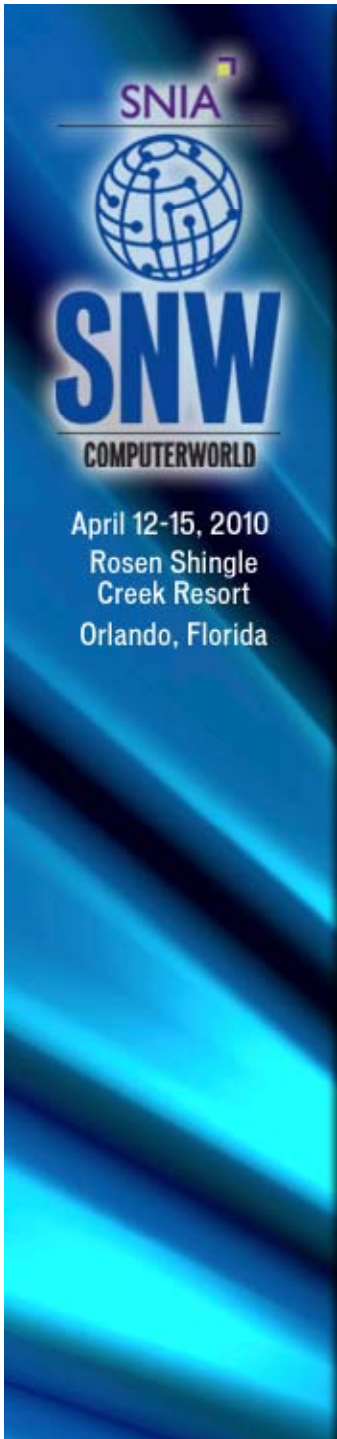
Summary

- Storage needs span single system
- Unified namespace
  - Virtual namespace across enterprise
  - Insulates clients from topology
- Horizontal scaling
  - Performance beyond single system
- Distributed management
  - Reduce administrative overhead
  - Data centric policy management

Thank You!