Storage Virtualization from 50,000 Feet

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The C.I.O. Wants to...

- Consolidate and centralize data
- Have 24-hour availability
- Conserve human resources to manage the data
- Save a few dollars
- Achieve the Holy Grail--The Storage Utility
  - Automatically and transparently allocates data

Storage Management

- Storage Management = Information Management
  - Information is a vital, large-scale, global problem
    - Information deployment is no longer a single system problem
    - Information deployment is no longer a local problem

- Email
- Training
- Benefits
- Customer Tracking
- Order Entry and Tracking
- Manufacturing
- Development

Answers

- How do I build scalable, large-scale solutions?
  - Adopt a network solution
    - Ubiquitous client connectivity
    - Information service performance connectivity
    - Broadband - Public network
- How do I operate and manage large-scale solutions?
  - Virtualize
    - Hide details
    - Insulate services from technologies that are subject to Moore's law

Virtualization--What?

- Accommodation of storage to the host operating system
- Tricks the host OS by presenting an image the OS can handle
- Behind that image, perhaps something quite different

Why Virtualization?

Users *DO* Care About

- Capacity
  - Application requirements
  - Growth potential
- Performance
  - Throughput
  - Responsiveness
- Availability
  - Failure resistance
  - Recovery time

In other words, application aspects of storage

Users *Don't* Care About

- Capacity
  - Disk size
  - Number of disks/string
- Performance
  - Disk seek time
  - Cache hit rate
- Availability
  - MTBF
  - Path redundancy

In other words, physical aspects of storage

Storage Virtualization Architectures

Host

Pro

- No additional hardware

Con

- Homogeneity
- Performance
- Integrity
- Distributed control

Storage Subsystem

Pro

Safe choice
Performance

Con

Homogeneity
Cost
Vendor lock-in

Network

Pro

Cross-platform
Vendor neutral

Con

Additional hardware
Out-of-band

Virtualization In and Out of Band

- "In-band" (block appliances)…
  - The flexibility of host-based volume management delivered in storage devices
- …vs. "out-of-band" (metadata servers)
  - Potentially: profound change in enterprise storage
  - Secure protocols aren't there yet
- A better way to look at it
  - In-band: complex, heterogeneous data centers
  - Out-of-band: best when combined with shared file system for integrated application scaling

Conclusion

- Storage Virtualization as an essential SAN service
  - High data availability
  - Efficient storage utilization
  - Secure storage sharing
  - Non-disruptive LAN free backup
  - Centralized SAN administration
- Storage Virtualization architecture must support:
  - Scalability
  - Heterogeneous storage and servers

Special-purpose network appliances as virtualization platforms

Future advances in storage virtualization

Integration of multiple SAN's across IP networks
Additional protocol support (iSCSI, FC over IP)
Tape virtualization
Edge network elements as cost effective virtualization platforms

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