Maslow’s Hierarchy of Needs for Storage Management

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What Lies Ahead

• Storage Management Impact
• End User Sentiments
• Hierarchy of Needs for Storage Management
• HP product examples within this framework
Storage Management impact

- Storage capacity dramatically expanding
- Data criticality growing
- IT technical headcount flat
- Storage management tools seen as the solution
- But - a plethora of management tools abound
- No holistic instruction for integrating tools
- Users needs assistance assessing priorities
# Top Ten Customer Pain Points

1. Cost (price and total cost of ownership (TCO))
2. The challenge of managing growth and meeting capacity needs
3. The inability to manage storage assets and infrastructure
4. The lack of integrated and/or interoperable solutions
5. Increasing complexity of storage infrastructure
6. Poor service, support, and ill-informed or poorly educated marketing channels
7. Lack of desired functions and features
8. Finding the right solutions and justifying expenditures
9. Undelivered promises
10. Lack of robust automation for provisioning

- SNIA End User Council (EUC), 2004
Assessing End User Sentiments

- Frustration is obvious
- Complaints not revealing of a central cause
- So where to start?
- Marketplace needs a framework to guide the intelligent use of storage management
“If the only tool I have is a hammer, I tend to treat everything like a nail.”

Abraham Maslow
Abraham Maslow, 1908-1970

- establishing the theory of a hierarchy of needs
- human beings are motivated by unsatisfied needs
- certain lower needs need to be satisfied before higher needs can be satisfied
Storage Management Needs Hierarchy

- Fully Integrated Services
- Automated Policy Management
- Integrated Storage Resource Management
- Advanced Storage functions
- Advanced Data Protection and Media Services
- Integrated SAN Management and Trouble Reporting
- File System and Basic Backup
- Device Monitoring and Management

MANAGEMENT CONTINUUM

SPAN OF CONTROL
File System Management

DATA – the primary entry point for most storage management tools

File Systems:
- Common Internet File System (CIFS)
- Network File System (NFS)
- Online Journal File System (JFS)

Single OS File Systems
# HP StorageWorks scalable file share

## Pacific Northwest National Labs (PNNL)

National supercomputing laboratory addressing environmental, energy, health and national security issues

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<th>Business needs</th>
<th>HP solution</th>
<th>Customer benefits</th>
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| - Faster answers from complex long-running simulations  
- Higher scalability from faster interprocessor communication and balanced I/O  
- High capacity and high bandwidth sharable file systems | - One of the “Top 5” fastest supercomputers (11+ TFLOPS, 1800+ Itanium 2 processors)  
- High throughput from 2.5 GB/s of scalable-shared bandwidth to 53TB Lustre server  
- HP design, installation, integration, and support | **Simplicity**  
- Centralized, easy to use, manage, and expand  
**Agility**  
- Faster more accurate analysis in research to understand impacts to US environment  
- Leverage existing IT investments  
**Value**  
- Cost-effective scalability leading to faster times to solution and better science |
Business continuity planning – one of the most important components of running a successful business today.

Without it, companies risk incurring staggering costs from downtime and data loss.

Data is the foundation of any business – it means:
- customers
- communications
- cash flow

Yet despite the risks of human error, internal sabotage, and disasters:
- Less than 25% of Global 2000 firms have adequate business continuity plans, policies and technologies in place.
- Only 50% have fully tested disaster recovery plans
Basic Backup

(HP portfolio example) HP OpenView Storage Data Protector 5.5

Ideal Use

- A single automated data protection solution for heterogeneous environments of companies of any size
- Eliminate backup window with online backup, open file backup, zero downtime backup, Microsoft Volume Shadow Copy Service (VSS)
- Recover terabytes of data in minutes with instant recovery
- Full range of bare metal recovery options
- Centralized, multi-site management
- Media management
- Track and manage of media outside the library with Data Protector Media Operations

Software that manages backup and recovery from disk or tape
Device Monitoring and Management

DEVICE – the other entry point for storage management tools, effectively providing:

Device Monitoring
  • Fault Detection and Isolation

Device Management
  • Basic Device Configuration

At this level, each device is managed as a single entity.

Generally practical only with relatively small amounts of data and small numbers of devices.
Device Monitoring and Management
(HP portfolio examples)

HP OpenView Storage Operations Manager

- Centrally configures, monitors and manages HP StorageWorks Enterprise Virtual Arrays across distributed SANs

Ideal Use

- Configure EVA disk groups, vdisks, and host presentation
- Manage array configuration, asset inventory, and problem identification from anywhere
- Visually monitor network storage topology, zones, and health status
- Consolidate all EVA/SAN-based events to a single console
Device Monitoring and Management
(HP portfolio examples)

**HP StorageWorks CommandView XP**
- Web-based device management for XP disk arrays

**Ideal Use**
- Globally manage XP disk arrays via the web
- Launch all XP applications from a single management console
- Integrate XP arrays with Enterprise Management applications
Integrated SAN Management and Trouble Reporting

• This level deals with movement to an integrated approach
• Networked storage can be managed as a system
• Provides system view of basic operations and trouble reporting for both devices and data.
• Using topological views for fault detection and configuration management
• Basic security management possible (e.g. zoning and LUN masking)
• User span-of-control extended for greater efficiency
SAN Management (HP strategy example)

Unified Storage / Server Management – a Better Approach

- **Simplicity**
  - Breaks down artificial boundaries between servers and storage
    - Common tools – learn once
    - Eliminates duplicate tasks – do once
    - Systems level view – view once

- **Agility**
  - Open and extensible
    - Built on industry standards
    - Foundation that HP and partners can continually build upon

- **Value**
  - Enables demonstrable improvements in IT operational efficiency while your existing infrastructure evolves
    - Embraces heterogeneity and legacy environments
    - Basic management built-in
    - Expanded capabilities at an affordable price
SAN Management
Unified Storage / Server Management – What you can do with HP that you could not do before

• Unified Server/Storage Management
  – Systems level view enables management of servers and storage together
    • Change management (config mgmt, asset mgmt)
    • Performance management (look at system in total)
    • Common fault and element management
    • Event correlation between servers and storage

• Simplified Deployment (CIMOM/SMI-S)
  – Non-disruptive to existing environments
  – No deployment of host agent required

• Consistent Storage Management
  – Consistent end-user experience across supported arrays
Advanced Data Protection and Media Services

• This level fits best once system level management has been implemented.

• Key to success of any reliable data protection scheme
  – understanding business needs
  – having a strategy that addresses critical requirements
  – strategy keeps current with changing business needs

• At this level, recovery ability assurance is vital

• Business value of instant recovery
  - reduced cost of downtime
  - increased application service levels
  - operational efficiencies and cost savings
  - consolidation of servers, applications
Advanced Data Protection and Media Services (HP portfolio examples)

- Data protector starter pack
  - Data protection and media management

- Drive and library management
  - Scalable device and media management

- On-line backup
  - 24x7 application-aware backup

- Zero downtime backup
  - Disk array integration for zero-impact

- Direct backup
  - 24x7 efficient server-less data movement

- Instant recovery
  - 24x7 disk-based recovery

- Storage media operations
  - Automated management of removable media
Automated management of removable storage media

Increases data availability and maximizes the effectiveness of media operations

- software for tracking 2K, 10K or unlimited tape cartridges outside of the library
- sits on top of Data Protector for automatic media labeling and download of media info into its dB for tracking throughout media lifecycle
- directs daily media handling processes via operator task lists
- supports firewalls in an IT environment
Advanced Storage Functions

• Moving to the next level, also involves a deeper understanding of business needs.

• Then, if required by business need, advantage taken of:
  - data replication
  - mirroring
  - remote capabilities
  - distributed data storage / applications hosting
  - business continuity schemes
HP OpenView Storage Virtual Replicator

A Windows host-based storage replication product that pools and replicates local storage resources

Ideal use

- Small departmental SANs with Windows servers
- Consolidation of Windows based resources into virtual disks
- Snapshots of virtual disks
- Un-disrupted backups of production volumes
- Online volume growth - HP OpenView Storage Volume Growth
HP OpenView Storage Mirroring

Windows host based application performing asynchronous remote replication over an IP LAN/WAN.

Ideal use
- Replication of critical data from many servers to single server
- Local or long distance disaster tolerance over IP LAN/WAN
- Replication and backup of remote branch office servers
- When array based replication is not practical or not present
- When IT staff is minimal or not present at remote branch offices
- Automated failover and failback
HP StorageWorks Continuous Access XP & Continuous Access XP Extension

Remote data mirroring between XP disk arrays

Ideal Use
- Enhanced business continuity across remote storage sites
- Disaster recovery
HP StorageWorks Business Copy EVA

Delivers point-in-time copy capability for the EVA 3000/5000. Keeps your Enterprise up and running while making the most of your data.

**Ideal Use**
- Keep applications on line while backing up data
- Test applications against real data before deploying
- Restore a volume after a corruption
- Data mine to improve business processes or customer marketing
Integrated Storage Resource Management (iSRM)

Includes functions such as
- capacity and performance reporting and analysis
- capacity/ performance management automation,
- storage provisioning
- storage management product integration
- application integration.*

* InfoStor, September 2003
Integrated Storage Resource Management

HP OpenView building blocks

- System Management
- Application Management
- Network Management
- Performance and Resource Mgmt.
- Storage Management

Centralized management and storage services

- Device (array) management
- Node management
- Capacity management
- Performance management
- Usage metering and billing
- Configure

SMI-S and API’s

HP and heterogeneous storage

- HP
- McDATA
- Sun Microsystems
- LSI Logic
- TeraScale
- QLogic
- Network Appliance
- Hitachi
- Cisco Systems
- EMC
- Brocade
- Hitachi
- Brocade
“HP OpenView Storage Area Manager software is a powerful tool that gives us a detailed view of all our local and SAN network elements—including capacity, utilization, and disk drive status.”

Kevin Donnellan
Director of Enterprise Infrastructure Services,
Screen Actors Guild
Automated Policy Management

- Allows management software to interpret conditions using guidelines that customers establish
- Drive automated change/adjust operations of storage networking environment
- Levels of sophistication can vary from simple event analysis to root cause analysis
- Level of automation can vary as well
- Allows for management of policies vs SLAs
Automated Policy Management
(HP portfolio examples)

HP StorageWorks reference information storage system

Business needs
• Compliance with SEC regulation (17a-4) for e-mail retention.
• Find one e-mail in a Billion
• Need a more automated process for retrieving files (currently very manually intensive).

HP solution
• RISS for email archiving
• 2 locations with replication ensuring disaster tolerant solution and to help address “offsite” copy requirements of SEC

Customer benefits
Simplicity
• Automated and easy to manage
Agility
• Scale in capacity and performance while leveraging existing IT investments
Value
• Additional ROI in just 2 searches, breakeven with just one

Major wall street financial services customer
Fully Integrated Services

• Top level of the management hierarchy of needs
• Point of full integration of business issues with IT infrastructure and data management
• Facilitated through iSRM and enterprise management integration
• Also involves a level of application and data-focused collaborative efforts across the IT organization
Adaptive enterprise computing

- Enable integrated business process and IT management
- Flexible, economical and trusted utility computing
- Dynamically allocate shared virtualized resources
- Wire once, rewire IT infrastructure programmatically in minutes
- Efficient energy control
Fully Integrated Services
(HP strategy examples)

- ROI
- Business impact
- Risk analysis
- Portfolio analysis

- Process monitoring & optimization
- Resource utilization
- Cost control
- Causal analysis

- Server/network availability
- Application load
- Database performance
- Storage capacity

Business manager’s view

Business objectives

Business operations

Infrastructure management

Business view

Infrastructure

IT staff’s view
“Management software allows customers to run IT as a “services delivery” business. It allows CIOs to take cost out of their IT infrastructure and put those dollars into applications to enable the business.

Nora Denzel, HP
Storage Management Progression Recap

**Fully Integrated Services**

- Device View
  - Device Monitor/Mgt
  - Integrated SAN Management and Trouble Reporting
  - Advanced Data Protection and Media Services
  - Advanced Storage functions
  - Integrated Storage Resource Management
  - Automated Policy Management
  - Fully Integrated Services

Ordered pace for Enterprise Management build out
“The ability to manage change is increasingly the difference between the companies that win and the companies that lose.”

Carly Fiorina