



Storage Decisions

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Keys to Optimizing Your Backup Environment: Tivoli Storage Manager

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Introduction


- Audience Profile
- Storage Management Interdependence
- Backup Pain Points
- TSM Architecture
 - Server
 - Storage
 - Network
 - Clients


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Audience Response

- Audience Profile
- Your TSM Backup/Archive Environment
- Number of Years using TSM
- Number of TSM Administrators




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Storage Management Interdependence


- Storage and Production Backup
 - Growing at 65% CAGR (Gartner)
 - Consuming 48% of IT hardware budgets (Gartner)
- Disaster Recovery
 - Enabling Recovery – RPO/RTO impact
- Archiving
 - Compliance
 - Storage efficiency
 - Disposal of data
 - Application Performance

“It’s no longer just backup, it’s data management.”

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TSM Pain Points


<p>Business Problems</p> <ul style="list-style-type: none"> • Backup reliability • Overwhelming data growth • Database and email data explosion • Limited budgets and staff • Regulatory / data retention requirements • Lack of data management policies • Poor operational practices 	<p>Technology Problems</p> <ul style="list-style-type: none"> • TSM architecture scalability • Lack of TSM / OS tuning • Network architecture • Client-side issues (OS, antivirus, network) • Increasingly complex requirements • Shrinking backup windows • Disconnect between application design and storage management
<p>Solution</p> <ul style="list-style-type: none"> • Optimize and right-size existing infrastructure • Improve processes and procedures • Formalize TSM program management 	<p>Benefits</p> <ul style="list-style-type: none"> • Lower TCO for TSM environment • Proactive management model • Lowered risks and exposures • Scalable and manageable environment

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Business Problems

- Backup reliability
- Overwhelming data growth
- Database and email data explosion
- Limited budgets and staff
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Technology Problems

- TSM architecture scalability
- Lack of TSM / OS tuning
- Network architecture
- Client-side issues (OS, antivirus, network)
- Increasingly complex requirements
- Shrinking backup windows
- Disconnect between application design and storage management


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Solution

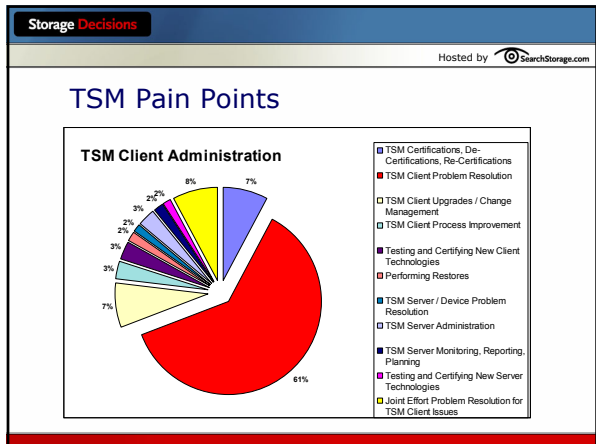
- Optimize and right-size existing infrastructure
- Improve processes and procedures
- Formalize TSM program management

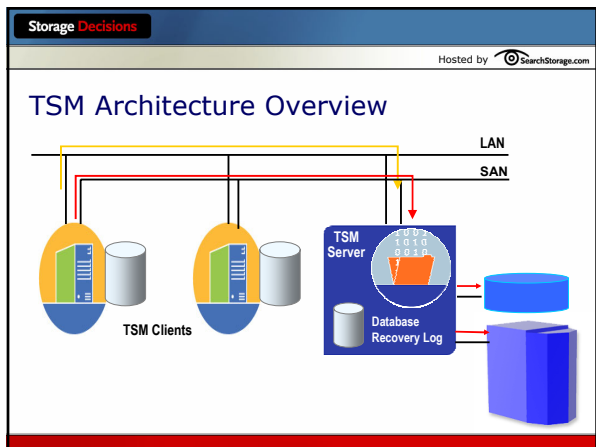
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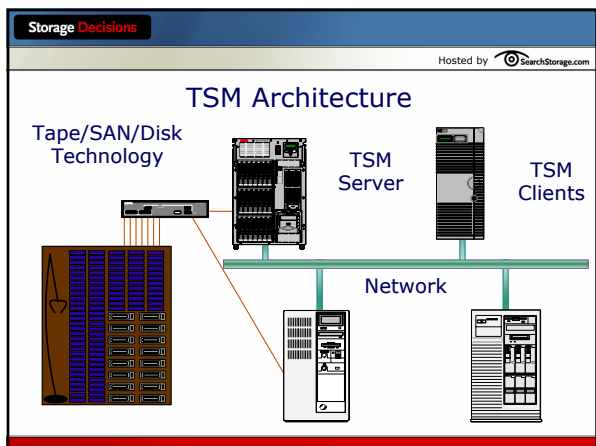
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Benefits

- Lower TCO for TSM environment
- Proactive management model
- Lowered risks and exposures
- Scalable and manageable environment







TSM Server Performance

- **Hardware**
 - CPU, Memory, HBAs
 - Server backplane/bus architecture
 - HBA location
- **Operating System Tuning**
 - VMTUNE for AIX has a significant impact
 - Must be tuned specifically for environment
 - Asynchronous I/O (requires TSM settings too)
 - Direct I/O (requires TSM settings too)
 - Network options tuning

TSM Application Tuning

- **TSM Application Tuning**
 - Database Buffer Pool Sizing
 - Server Options bufpoolsize parameter (up to 50%)
 - Seltunebufpoolsize parameter (up to 10%)
 - Relates closely to page space sizing
 - Mirrorwrite db parallel and DBpageshadow
 - Txngroupmax, movebatchsize, movesizethresh



TSM Application Tuning, II

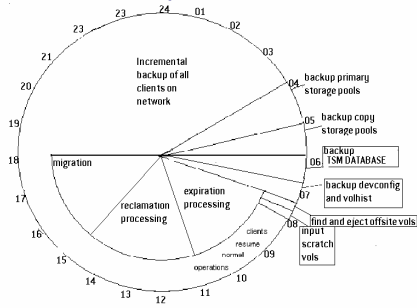
- 64-bit and 32-bit code levels (and OS levels)
- TSM performance tuning guide
 - http://publib.boulder.ibm.com/tividd/td/TSM/SC32-9101-01/en_US/HTML/SC32-9101-01.htm
- Maintain a link between operating system, application, and device performance analysis.

TSM Server Performance

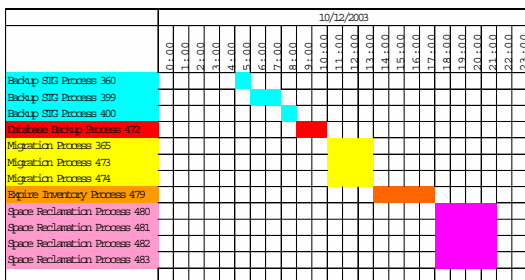
Other Considerations

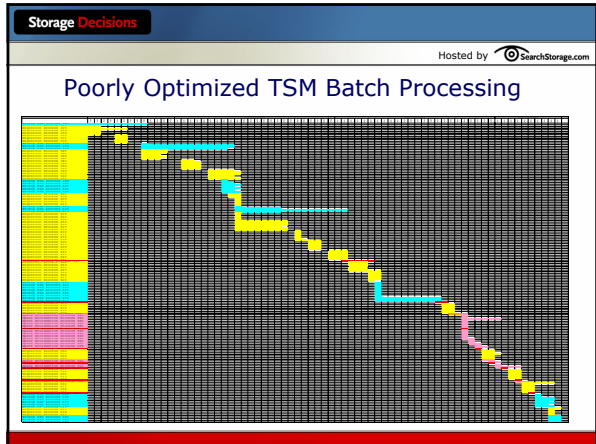
- Backup versioning policies have an effect.
- Schedule randomization versus static schedules
- Spread production workload across backup window.
- Control batch TSM processes to avoid overlap for resource intensive processes.
- Low-level policies can have a high-level impact.
 - shrstatic versus shrdynamic
 - Changing retries settings

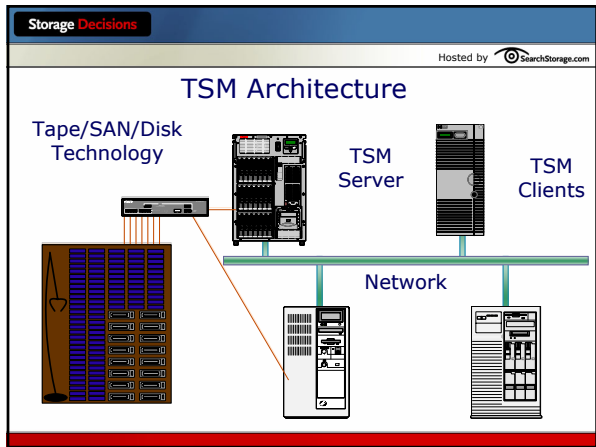
TSM Server Operations



Ideal TSM Batch Processing







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- ### SAN Architecture
- **Disk Fabric Design**
 - Dedicated SAN/Disk resources for Database/Logs
 - Dedicated SAN/Disk for storage pools
 - **Tape Fabric Design**
 - Load Balancing and design is important
 - Develop Ratios based on throughput and SAN fabric
 - 1 GB Fabric w/ 3590-E1A Drives
 - 1:3 Ratio HBA: Drive
 - 2 GB Fabric w/ 3590-E1A Drives
 - 1:6 Ratio HBA: Drive

Disk Architecture

- **Disk architecture**
 - Fast, redundant, flexible and scalable
- **File system design**
 - Create naming conventions and plan for scalability.
 - Raw volumes versus file systems
 - Create file system schema with disk layout in mind.
 - Database/log performance (Random I/O)
 - Storage volume performance (sequential)

Disk Architecture, II

- **Storage device architecture**
 - Design/layout is key for sequential versus random disk performance requirements
 - TSM is often the most I/O intensive application in the datacenter.
 - Disk performance tuning is often necessary.

Disk Storage Pools

- **Capacity Planning for disk storage pools**
- **Plan for using Migration Delay for critical client data.**
 - A note on storage pool caching and database performance
- **Disk is traditionally used in TSM as a staging area for daily migration to tape.**
- **This paradigm is evolving.**

Disk as a Primary Storage Pool

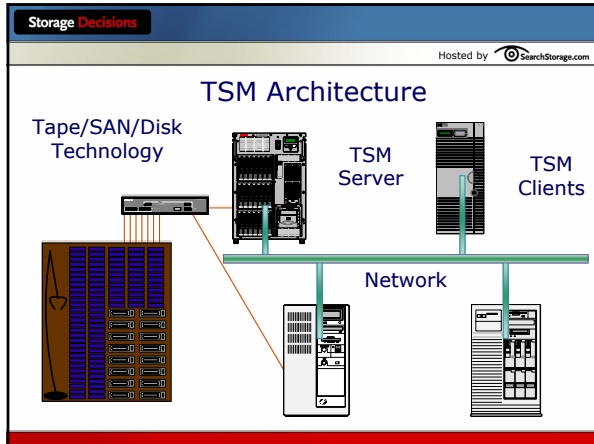
- **Considerations**
 - Detailed Capacity planning methods for disk storage are required.
 - TSM Backup Policies have to be carefully planned.
 - Formatting and Recovering Terabytes of *.dsm files is incredibly time and resource intensive.
 - Performance-oriented disk storage pool design becomes even more important.
 - Copies to tape will still be required, and simultaneous R/W can be a big issue for S-ATA technologies.

Tape Architecture

- **Size and Type of Library**
 - Robot speed, Compression, Scalability, etc.
- **Number and Type of Tape Drives**
 - R/W Speed, Caching, Mount/Seek Times, etc.
- **Media Formats**
 - Create a media migration strategy and plan.
- **Consider emerging tape technologies.**
 - Tape is not dead and is not dying.
 - High-end tape I/O is faster than low-end disk I/O.
 - The real issue is random vs. sequential access to data.

Tape Storage Pools

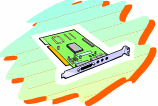
- **Stream large database objects data directly to tape.**
 - Lowers disk pool requirements
 - Lowers TSM batch processing time
 - Optimizes use of tape resources during backup window
 - Schedule and resource planning is key.
 - Resource Utilization and Maxnummp settings
- **Synchronous Copy Storage Pool Writes ("")**
 - Can reduce batch window significantly
 - Use only for large object backup clients.
- **Recovery optimized TSM tape storage pools**
 - Collocation=yes (+ 's an -'s)



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Network Overview

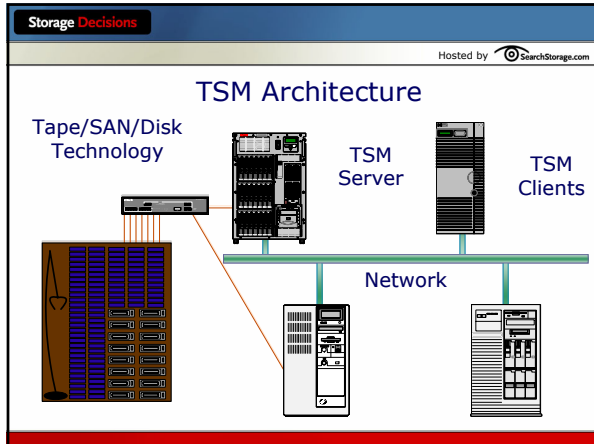
- **Network Architecture**
 - Private / Public network configurations
- **Type of Architecture**
 - 100 Mb and Gigabit IP architectures are the defacto standard.
- **Develop Network Architecture Standards.**
 - Map network standards to SLAs and to service delivery.
 - Publish metrics on network throughput.
 - Enforce Standards.
- **Advancing a network architecture can be cost prohibitive and time consuming...so can poor recovery times and data loss.**




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Network Design


- **Dedicated Private VLAN architectures**
 - Logical network segregation and physical network segregation
 - Use jumbo frames and gigabit VLANs.
 - Improves streaming efficiencies to tape
 - 9000 and 9004 MTU size differences
 - DNS Considerations
- **Multiple HBA's for client network load balancing**
 - Etherchannel configurations
 - Load balancing for network, switches, server HBAs
 - Don't use auto-negotiate network card settings.




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TSM Client Performance

- **Fact: Client machines are often sized for application workload, not backup workload.**
- **Client Tuning Parameters**
 - Resource Utilization (2-10)
 - Memoryefficientbackup
 - Virtualmountpoint
- **Network / Transaction Tuning Parameters**
 - Tcpcnodelay
 - Tcpcwindowsize
 - Tcpcbufsize
 - Txnbytelimit



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TSM Client Configuration

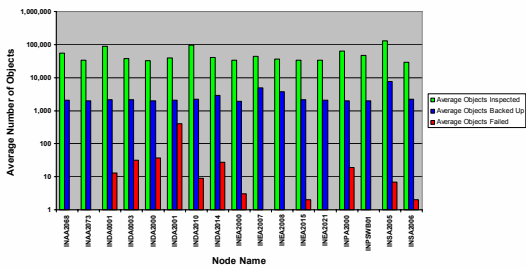
- **File System Design and Type**
 - File system size and number impacts memory consumption.
 - TSM client can be memory intensive (300 MB Memory / Million Objects).
- **Include/Exclude list size has a direct impact on processing overhead.**
 - Leverage domain statements.

TSM Client Configuration, II

- **Journal-based backups**
 - Data drives only
 - Journal size is limited to 2 GB
- **Image backups**
- **LAN-free backups**

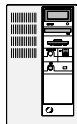
TSM Client Performance

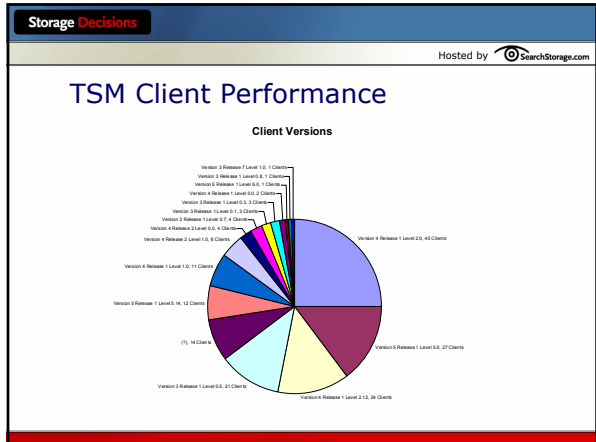
Backup Object Success Rates
Chart 2



TSM Client Performance

- **Additional Considerations**
 - Data characteristics
 - Data type, volume, volatility
 - Number of files
 - Client workloads and backup schedule
 - Client Software Version
 - Network load and utilization
 - Communication with application architects and developers is increasingly important.





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To receive a copy of the charts seen in this presentation and more for your environment go to:

www.glasshouse.com/backup

For a "cheat sheet" see the highlighter in your conference bag.

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Thank you.

Questions?

Mr. Merryman will be available at the Ask-the-Experts booth in the Exhibit Hall:

Tuesday 4-5 PM

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