Keys to optimizing your backup environment: Veritas NetBackup

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Introduction
- Audience Profile
- Storage Management Interdependence
- Case Study
- Backup Architecture and Performance
  - Server
  - Tape
  - Network
  - Clients

Audience Response
- Are you a NetBackup Administrator?
  - Yes
  - No
- How long have you been using the product?
  - 1. 0-6 months
  - 2. 6-12 months
  - 3. 12-24 months
  - 4. More than 2 years
Case Study – Biotechnology Company

Technical Issues

- Backup architecture unable to scale with increasing storage capacities and server growth
- Network architecture unable to support throughputs required for backup
- Lack of NBU / OS tuning: Implementation did not include optimization
- Client-side issues impacting backup success (OS, antivirus, network, applications)

Business Problems

- Limited budget and staff
- Reliability and performance problems for both hardware and software
- Regulatory / data retention requirements
- Disconnect between application design and storage management
- Shrinking backup windows
- Lack of data management policies

Solution

- Upgraded hardware to HP rp7410
- Master: 4GBs of RAM, 4 CPUs, Gb Ethernet cards
- Partitioned server into master and media server
- Upgraded hosts with more than 200 GBs into SAN media servers
- Modified NetBackup server-side variables to maximize performance
NetBackup Server Performance

- Application Performance Tuning
  - Backup Schedule Balancing
  - Number of Backup Jobs
    - Multi-streaming and multiplexing
  - Specific Tuning Variables
    - NET_BUFFER_SZ
    - DISABLE_RESOURCE_BUSY
    - CLEAN_IN_BACKGROUND
    - Pre-Process Interval

- NetBackup Performance Tuning Guide
  - UNIX: http://seer.support.veritas.com/docs/240733.htm
  - Windows: http://seer.support.veritas.com/docs/248373.htm

Average Media Server Volume

NetBackup Architecture

Tape/SAN/Disk Technology

NetBackup Server

Clients

Network

Media Server
<table>
<thead>
<tr>
<th>Case Study</th>
<th>Technical Issues</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution</td>
<td>- Modified SSO to limit drive sharing to smaller number of servers. - Updated persistent bindings to minimize impact of server reboots and SCSI-locks. - Tape drives were “shoe-shining” due to a lack of data. - Increased the number of multiple streams written to each drive. - Reduced the number of drives available for backup. - Modified SIZE_DATA_BUFFERS and NUMBER_DATA_BUFFERS variables on media servers.</td>
<td></td>
</tr>
</tbody>
</table>

### Technical Issues
- Veritas Shared Storage Option deployed with STK L700 and 20 LTO-1 drives.
- Frequent drive problems caused multiple backup failures.
- Overall Throughput was less than expected.

### Tape Tuning Strategies
- **Storage Unit Fragment Size**
  - Rule-of-Thumb = 2GB
- **Multiplexing Data**
  - Reduces “shoe-shining” effect.
  - Too much can negatively impact restore speed.
- **In-Line Duplication**
  - Requires additional hardware, but enables tapes to be sent offsite quicker.
- **Software vs. Hardware Compression**
  - Best Practice: Utilize hardware compression unless network-constrained.

### Disk-Based Backups with NetBackup v5.0
- Enhanced functionality of v5.0 makes disk-based backups a viable option.
- **Disk as a Primary Storage Device**
  - Enterprise-class solutions are limited due to tremendous storage requirements.
Disk-Based Backups with NetBackup v5.0

- **Disk as a Staging Device**
  - v5.0 includes Staging functionality.
  - Data is automatically moved based on pre-established policies.
  - Leverages speed of disk for backup, with tape for long-term storage
- **Disk as Hybrid-Solution**
  - Direct some backups to disk, others to tape.
  - Eliminates additional step of staging, but provides advantages of both disk and tape

### Storage Unit Distribution

<table>
<thead>
<tr>
<th>Storage Location</th>
<th>Amount (TB)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>STK9940A531</td>
<td>0, 0%</td>
<td></td>
</tr>
<tr>
<td>STK9940A317</td>
<td>0.3TB, 2%</td>
<td></td>
</tr>
<tr>
<td>STK9940A258</td>
<td>0.4TB, 2%</td>
<td></td>
</tr>
<tr>
<td>STK9940B317</td>
<td>1.1TB, 7%</td>
<td></td>
</tr>
<tr>
<td>STK9940B531</td>
<td>3.6TB, 23%</td>
<td></td>
</tr>
<tr>
<td>STK9940B532</td>
<td>4TB, 27%</td>
<td></td>
</tr>
<tr>
<td>STK9940B258</td>
<td>5.9TB, 39%</td>
<td></td>
</tr>
</tbody>
</table>

### NetBackup Architecture

- Tape/SAN/Disk Technology
- Media Server
- NetBackup Server
- Clients
- Network
**Case Study**

**Technical Issues**
- Separate Backup Network was created to reduce impact on corporate network
- Clients did not always use backup network for data transfer
- Intermittent backup failures following host reboots
- NICs and Ports set to "auto-negotiate"
- Log files indicate that Media servers were "waiting for full buffers" during network backups
- Slowed backup performance

**Solution**
- Modified “Required Interface” option to bind client backups to appropriate network interface
- Hard-code network settings to 100 Mb, Full-Duplex
- Tuned NET_BUFFER_SZ Variable on both media servers and clients

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**Network Design**

- **Dedicated Private VLAN architectures**
  - Logical network segregation & physical network segregation
  - Use jumbo frames and gigabit VLANS.
  - Improves streaming efficiencies to tape
- **Multiple NICs for client network load balancing**
  - Etherchannel configurations
  - Load balancing for network, switches, server HBAs

**Network Design, II**

- **NetBackup Tuning Variable**
  - NET_BUFFER_SZ: Determines size of network communications buffer used to receive data from network
    - If set too small, media servers can't empty buffers fast enough.
    - If set too large, media servers have to wait for data.
    - Client settings should match media servers.
Sample Charts Available From GlassHouse

Buffer Information Summary
Data Buffer Analysis per Media Server

Number of Times Waited for full buffer Waited for empty buffer

0 5,000 10,000 15,000 20,000 25,000 30,000 35,000 40,000 45,000 50,000

Media Servers Server 1 Server 2 Server 3 Server 4

NetBackup Architecture
Tape/SAN/Disk Technology

NetBackup Server
Clients

Network
Media Server

Case Study
Technical Issues
- Oracle Agent was implemented for Hot Oracle Database Backups
- Backups of some servers ran out-of-window
- Network Appliance Filers backed up via NFS mounts
- Full backups took 5 days
- Backups of Netware clients ran out-of-window

Solution
- Implemented Block-Level Incremental backups of Oracle
- 30% Faster than standard RMAN backups
- Implemented NDMP backups to dedicated tape drives
- Testing indicated that 3rd-Party Remote backups were significantly slower
- Tuned Netware variables per Veritas-recommended settings
- Reduced backup times by 33%
Client Considerations

- Include/Exclude list size
  - Maintenance is difficult, but necessary.
  - Exclude Open Files, Temp files, etc.

- Open File Processing

- Block-Level / Flash Backups

- Client options settings
  - Pre-Process Interval (set on master server) - Increasing default interval

- Number and size of files

- Frequency of data change

Client Backup Performance

Backup Jobs over 1 GB in Volume

To receive charts similar to those seen in this presentation specific to your environment go to:

www.glasshouse.com/backup

For a “cheat sheet” see the highlighter in your conference bag.
Questions?

Thank you.

See me at Ask the Expert – Tuesday 5:00-6:00 PM