Storage in Windows 2000

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THIC Meeting at the SEATAC Marriott Hotel
Seattle WA
January 19, 1999

Windows 2000
Storage Management Rules of Engagement

- More data to administer

- Increasing retention of data

- Decreasing end-user patience

Windows 2000
Storage Management Infrastructure

■ **New management of devices**

◆ **Plug and play storage**

  ➢ **for devices**

  ➢ **abstracted for volumes**

◆ **Removable storage management**

  ➢ **simplified near-line**

  ➢ **keep your data, change your device**

  ➢ **rich device coverage**

◆ **Power management**

Windows 2000
Storage Management Infrastructure

- **Improved volume management function**
  - ◆ **Self-contained volume state**
  - ◆ **On-line volume growth and contraction**
  - ◆ **Create, break, recover NTFS-formatted parity stripes and mirrors on-line**
  - ◆ Volume mount points
    - ➢ new Win32 calls
    - ➢ name space changes from DAG to DG
    - ➢ GUI support
  - ◆ Volume defrag - files and directories

Windows 2000
Commodity Version of Storage Classes

- **Set three underlying volumes**
  - ◆ **simple, striped, mirrored**
- **Mount them**
  - ◆ c:\storage\simple, c:\storage\striped, c:\storage\mirrored
- **Place NTFS directory junctions to them**
  - ◆ c:\MyData\images -> c:\storage\striped\MyData\images
  - ◆ c:\MyData\databases -> c:\storage\mirrored\MyData\databases
  - ◆ c:\MyData\docs -> c:\storage\mirrored\MyData\docs
  - ◆ c:\MyData\docs\temp -> c:\storage\simple\MyData\docs\temp
  - ◆ **to automate build an extension of *md***

Windows 2000
Storage Management Infrastructure

■ **New features in the NTFS file system**

Dynamic volume growth

Dynamic volume dismount

Storage quotas

ACL check accelerator

Change journal

Faster chkdsk

Find files by owner

Defrag of directories

Sparse files

Reparse points

Atomic data stream rename

Object Ids

Encryption of files

NTFS in SP4 reads v5 volumes

Windows 2000
bigdaddy -- a one terabyte NTFS file

- **Done at Compaq on April 1998**
  - ◆ **Proliant 7000, quad 266 mhz, 2 GB memory, 8 fiber optic hubs, 6 array controllers per hub, 8 disks per controller, 384 disks, 9 GB per disk, 3.5 TB capacity**
- **Stripe volume of 2,039,096,195,584 bytes-- 1.85TB**
  - ◆ **during the week 3 physical disks failed -- 0.75 %**
- **File size 1,099, 511,627,776 bytes -- 1.00 TB**
  - ◆ **Created in 43 hours 32 minutes**
  - ◆ **Verified in 19 hours 42 minutes**
  - ◆ **Buffered extension/shrinking using SetFilePointer**
    - ➢ **100 GB per hour**

Windows 2000
Storage Management Infrastructure

- **Improved redirector (SMB protocol)**
  - ◆ **New internal architecture**
    - ➢ **split between file system aspect and file protocol aspect**
  - ◆ **Better support for large writes**
  - ◆ **Support for off-line operation**
  - ◆ **Improved performance**

Windows 2000
Storage Management Infrastructure

- **Several new file-based services**
  - ◆ **Content indexing**
  - ◆ **Single instance storage**
  - ◆ **Remote storage**
  - ◆ **Replicated storage**
  - ◆ **Client side caching**
  - ◆ **Link tracking**
  - ◆ **Improved DFS**

Windows 2000
Storage Management Infrastructure

- **Improved system recovery**
  - ◆ **Improved NT Backup**
    - ➢ all key components comply
    - ➢ may backup to a file system
  - ◆ **An extensible service for Automated System Recovery**
    - ➢ for when your system does not boot
    - ➢ recovers disk partitions and volumes
    - ➢ works with any ISV backup/restore