Mainframe Storage Best Practices Utilizing Oracle’s Virtual Tape Technology

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9959: Mainframe Storage Best Practices Utilizing Oracle’s Virtual Tape Technology
Introduction

“The selection of storage technologies has never been greater. Today’s choices range from ultrahigh capacity, low cost, low performance storage at one end to highly advanced data management functionality and very high levels of performance at the other.” - Tiered Storage Takes a Center Stage, Horizon, Inc, April 2011

“Tiered storage allows an organization to optimize its data storage infrastructure using a combination of storage solutions to lower costs, increase performance and scale technology to address growing storage demands” - Tiered Storage Takes a Center Stage, Horizon, Inc, April 2011

• In this presentation we will show you how Virtual Tape can address these challenges utilizing disk and tape storage tiers
• Effective use of the these technologies can significantly reduce data storage costs
“BIG Data” Is Getting BIGGER!!!

- 50% Per Year Growth Rate

- IT budgets and headcounts can’t keep up with this growth
- Budgets growing 2-3%/yr*
- Disk prices are not declining fast enough
- Customers can’t afford to simply “put everything on disk”

*Source: SearchStorage Magazine, July 2011
Different Data Categories/Different Use Cases

Put Data On The Right Technology

- **Current - operational**
  - Current month’s statement
  - Current year tax withholding
  - Next appointment health info

- **Business critical**
  - Any loss can result in significant business impact
  - High legal liability

- **Recent - active**
  - Last 3 months statements
  - Last 6 months patient visit data

- **Business continuity**
  - Protected with backup
  - Data needs to be recoverable

- **Archival – inactive**
  - Statements older than 3 months
  - Lifetime X-rays and health records
  - Former employees data

- **Historical info**
  - Required for auditing
  - Governed by data retention regulations
Data Classification & Usage Patterns

- **Current**
  - Frequent changes
  - Immediate access
  - Instantaneous protection

- **Recent**
  - Infrequent changes
    - Any modifications change classification to “Current”
  - Slight access delay acceptable

- **Archival**
  - Very infrequent/no changes
  - Offsite/offline/nearline protected
Challenge: The Nature of Data is Changing
Align value of data with storage capabilities and cost

- The re-use of data is shrinking
  - 80% of data is never used after 90 days
- But the need to archive is growing
  - 100-year archives
- Storage management costs more
  - Left unchecked, it could reach 30% of total IT spend
- Storage consumes ~40% of data center power
  - Growing at 20% CAGR
Single Tier Architecture

- Primary storage – 100% of data
  - High performance disk
  - Instantaneous data access
- Spare capacity
  - Provision extra capacity to maintain system stability
- Data protection
  - Secondary disk system
  - Double capacity requirement
  - Can be lower performance
- Technology migration
  - Every 4-5 years
- Archive?
Two Tier Architecture

- **Primary - Current**
  - High performance disk
  - Instantaneous data access
- **Secondary – Recent/Archival**
  - Capacity disk or tape
- **Spare capacity**
  - Overflow to secondary storage
- **Data protection**
  - Secondary disk or tape
- **Technology migration**
  - Primary - every 4-5 years
  - Secondary – every 10 years
Multi-Tier Architecture

- **Primary** – Current data
  - High performance disk
  - Instantaneous data access
- **Secondary** – Recent
  - Capacity disk
- **Archival**
  - Tape
- **Spare capacity**
  - Overflow to secondary or archive
- **Data protection**
  - Disk and/or tape
- **Technology migration**
  - Current data - every 4-5 years
  - Archival – every 10 years
Data Center Best Practices: Tiered Storage

- Tape Is The Foundation Layer: Most of the data; at the lowest cost

- Single Tier of Disk Storage

- Disk Multi-tiered Storage

- Modern Multi-tiered Storage

- Source: Horison Information Strategies, Digital Curator Paper, April 2010, updated with T10000C

- Tape Storage: $0.1 - $0.2/GB
- Flash Storage: $50 - $100/GB
- Performance Disk: $7 - $20/GB
- Capacity Disk: $1 - $8/GB

- Average Cost:
  - Tape: ~$700,000/PB
  - Disk: ~$11,000,000/PB
  - Single Tier of Disk Storage: ~$13,500,000/PB
Virtual Storage Manager (VSM)

Oracle/StorageTek™ Virtual Architecture

VSM2 1998
VSM3 1.78 TB
VSM4 14.9 TB

VSM5

9840A RTD 9490
Dual ACS
Migrate Immediate
VTV Consolidation
Policy Management
Export/ Import
Clustered VTSS
VSM GUI

9940B RTD
9840C RTD

SL8500 Support
DR Test Utility
T10000B/ T9840D & Encryption
SL3000 Support
Cross TapePlex Replication
Dynamic Reclaim

220-880TB
90TB
T10000C

T10000B/ T9840D & Encryption
Native IP
ESCON
VTCS 7.0
VTCS 7.1

VLE-VLE Replication
VLE-Capacity 220TB-225PB

2011

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Oracle Virtual Storage Manager (VSM)

- Centralized management for all parts of storage system
  - Seamless integration
- Performance and cost of storage closely matched to type of data
  - High performance disk buffer – up to 90TB per VSM5
  - Can have up to 256
Oracle Virtual Storage Manager (VSM)

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- Performance and cost of storage closely matched to type of data
  - High performance disk buffer – Up to 90TB per VSM5
    - Have up 256
  - High capacity disk virtual tape
    - Up to 880TB per VLE
    - Up to 256 racks of storage
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    - Have up to 256
  - High capacity disk virtual tape
    - Up to 880TB per VLE
    - Up to 256 racks of storage
- Ultra high capacity tape system
  - Up to 1 EB with T10000C drive
Highly Scalable Solution

- Centralized management for all parts of storage system
  - Seamless integration
- Performance and cost of storage closely matched to type of data

Cost / GB

- Tier 1 (0.8 – 23PB)
- Tier 2 (220TB – 225PB)
- Tier 3 (TBs to PBs to EBs)

System z

SL8500 or SL3000
9840 (A-D)
T10K (A-C)
What’s new!! (GA July 29, 2011)

- Massive Scalability
  - A single VLE can have up to 256 racks of storage
  - Each VLE can access any other VLE in complex
  - 225 PB Effective Capacity

- VLE to VLE Copy
  - Manage data transfer independent of VSM5
  - Housekeeping tasks like reclaim and audit no longer consume VSM5 resources
  - High Speed (10 GigE)
Options: Easy Storage Transitions

1. System z
   - VLE is added to existing config
   - SL8500

2. System z
   - VLE is expanded to replace physical tape
   - SL8500

3. System z
   - Physical tape easily added
Oracle VSM/VLE – Data Protection

Production

- VSM5
- System z
- FICON/ESCON
- IP
- VLE

Disaster Recovery

- SL3000/SL8500
- Eject
- Vault

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Oracle VSM/VLE – Data Protection Offsite Archival

- Store second copy of current & recent data on economy disk
- Archival storage located offsite

System z

Production Site

DR Site

FICON/ESCON

VSM5

VLE

SL8500 or SL3000 Library
T10000C drives

IP
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Production Site

System z

FICON/ESCON

VSM5

VLE

IP

Production Site

DR Site

SL8500 or SL3000 Library
T10000C drives

VLE

VLE
Oracle VSM/VLE – Data Protection High Availability Clustering

- Full DR Testing & Business Continuity

System z  VSM5  FICON/ESCON  FICON/ESCON Replication  OR  IP Replication  VSM5

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Oracle VSM/VLE – Data Protection
High Availability Clustering

- Full DR Testing & Business Continuity

System z

FICON/ESCON

VSM5

FICON/ESCON Replication

OR

IP Replication

VSM5

IP

VLE

IP

VLE
Oracle VSM/VLE – Data Protection
High Availability Clustering

- Full DR Testing & Business Continuity

System z

FICON/ESCON

VSM5

FICON/ESCON Replication

OR

IP Replication

VLE

SL8500 or SL3000 Library
T10000C drives
Oracle VSM/VLE – Data Protection

Separate Tapeplex

- Active/Active

FICON/ESCON Replication

OR

FICON/ESCON Replication

IP Replication

VSM5

OR

VSM5

VLE

VLE

SL8500 or SL3000 Library
T10000C drives

Separate Tapeplex

SL8500 or SL3000 Library
T10000C drives
Enhanced Virtual Tape Benefits

• Leverage central, single point of management
• Significantly drive down the total cost of ownership
  • Acquisition – up to 10x
  • Power and cooling – up to 20x
  • Technology migration – up to 2x improvement
• Improve recent data access performance
• Optimization of physical tape
  • Leverage physical tape strengths for majority of data:
    • Long term data retention – 30+ years
    • Long technology migration cycle – 10+ years
    • Environmental – significant cooling/power reduction – up to 290x
• More efficiently utilize physical tape
  • Reducing tape recall
  • Reduce tape space reclamation
Summary

• Match data type and usage patterns closely to type of storage to provide the best performance/cost
• Automated tiered storage reduces overall storage management costs
• Configuration is dependent upon your BC/DR requirements
• Consider “peripheral” factors
  • Expected “shelf life”
  • Technology migration
  • Cooling and power consumption
  • Footprint

• Questions?