Enterprise Backup and Restore (BUR) Technology and Solutions

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3. Kiril Dimitrov, HP Sofia GOC Backup L3 engineer (Symantec Netbackup)
4. Victor Dochev, HP Sofia GOC Backup L3 engineer (IBM TSM)

AGENDA

PART I

Enterprise Backup and Restore Basics

LESSON 1: 4 hours presentation

I. Backup Concepts

1. Reasons for a data loss
   - 1.1. HW failure
   - 1.2. SW failure
   - 1.3. Human fault
   - 1.4. Criminal activity
   - 1.5. Natural disasters
   - 1.6. Data loss prevention considerations

2. What is not an enterprise backup solution?
   - 2.1. Different types of simple data object/s copy
   - 2.2. HW/SW fault tolerance (RAID)

3. What is a backup?
   3.1. Common Definition and Overview

II. Data Center Backups Overview and Terminology

1. Backup levels
   1.1. FS backup
   1.2. DB backup
   1.3. Open/locked objects backup

2. Backed up data repository overview
   2.1. on-line
   2.2. near-line
   2.3. off-line
   2.4. off-site vault
   2.5. backup site/DR center
   2.6. backup medium

3. Backup types
   3.1. Full
   3.2. Diff
   3.3. Incr
   3.4. Backup Copy jobs

4. Backup consolidation
   4.1. Definition and overview
   4.2. Solutions

5. Backup deduplication
   5.1. Definition and overview
   5.2. Solutions

6. Backup replication
   6.1. Definition and overview

7. Backup encryption
   7.1. Definition and overview

III. Enterprise Data Backup Concepts and Specifics Overview

1. Application Backup integrations Overview
   1.1. Online DB backup (API concept)
   1.2. Online DB backup (agentless concept)
   1.3. Offline DB backup
   1.4. Exotic Databases Backup overview
   1.5. Virtual machines backup
   1.6. Zero Downtime Backup (ZDB) concept and overview

2. Cloud backup service
    2.1. definition, overview and specifics

3. Best Practices for Data Backup Management
    3.1. Traditional practices issues
    3.2. Five best practices

IV. BUR policy, strategy, design and planning

1. Backed data importance
2. Server tiers
3. Types of backed up data
4. Data changes frequency
5. restore/recovery urgency
6. Backup HW availability
7. BUR RASIC
8. Backup schedules and frequency
9. Backup retentions
10. Tape rotation scheme
11. Onsite or offsite backup media storage protection
12. Media labeling
13. Protecting backups
14. Media dispose/destruction
15. Backup Reporting
16. Backup implementation via RFC (ITIL)
17. Backup tests
18. Automation and simplification

2. Backup or Archive?
    2.1. Definition of enterprise archiving
    2.2. Differences
    2.3. Archiving solutions examples

V. Restore and Recovery Concepts

1. Data Restore from a backup
    1.1. Definition
    1.2. FS object restore
    1.3. Application restore
    1.4. DB restore
    1.5. Backout (rollback) planning
    1.7. Restore tests

2. Data Recovery from a backup
    2.1. Definition
    2.2. Server OS recovery overview

2.3. Application recovery overview

3. Disaster Recovery
   3.1. Definition and overview
   3.2. DR Tiers

4. Business continuity
   4.1. Definition and overview

5. Disaster Recovery planning
   5.1. Definition and overview

Lesson 1 Test: 15 minutes

PART II

Enterprise Tape storage and Media technologies overview

LESSON 2: 3 hours presentation + 1 hour practice

I. Introduction and overview

1. Backup devices and subsystem technology

2. Media components
   2.1. Physical tape format
   2.2. Scan technologies
   2.3. Media cartridge
   2.4. Tape media
   2.5. Tape storing and cleaning

3. Tapes types
   3.1. Overview and specifics

4. Near Line technologies
   4.1. Overview and specifics

5. Tape rotation
   5.1. Overview and specifics

II. Tape Hardware overview and features

1. Tape interconnects
   - 1.1. Introduction
   - 1.2. U320e SCSI Host Bus Adapter
   - 1.3. SC44Ge Host Bus Adapter
   - 1.4. Network Storage Router N1200-320

2. Standalone Tape drives
   - 2.1. Ultrium tape drive family
   - 2.2. DAT tape drive family
   - 2.3. DLT VS tape drive family
   - 2.4. SDLT tape drive family
   - 2.5. SB920c Tape Blade
   - 2.6. Tape enclosures and arrays
   - 2.7. Rack-mount Tape Drive Kit

3. HP Tape autoloaders
   - 3.1. 1/8 G2 Tape Autoloader
   - 3.2. DAT 72x10 Tape Autoloader

Lab demonstration and practical exercise: 30 minutes
HP 1/8 LTO SCSI Tape autoloader HW setup

Lesson 2 Test: 15 minutes

LESSON 3: 3 hours presentation + 1 hour practice

4. Business class HP tape libraries
   - 4.1. HP MSL
     - 4.1.1. MSL2024 Tape Library
     - 4.1.2. MSL4048 Tape Library
     - 4.1.3. MSL8096 Tape Library

5. Enterprise class tape libraries
   - 5.1. HP ESL Tape library
   - 5.2. HP EML Tape library
   - 5.3. HP VLS
   - 5.4. HP D2D Generations 2 and 3

6. Value added features
   - 6.1. One Button Disaster Recovery

7. Tape library Management
   7.1. HP Library and Tape Tools
   7.2. Telnet
   7.3. Command View TL Web interface

Lab demonstration and practical exercise:
1. HP L&TT installation and tape library management - 30 minutes

Lesson 3 Test: 15 minutes

PART III

HP Data Protector Overview and Concepts

LESSON 4: 2 hours presentation + 2 hours practice

I. About Data Protector

1. About Data Protector
2. Data Protector architecture
3. Operations in the cell
4. Backup sessions
5. Restore sessions
6. Enterprise environments/Splitting an environment into multiple cells/MOM
7. Media management/Backup devices
8. User interface/Data Protector GUI
9. Overview of tasks to set up Data Protector
10. Creating cells in the UNIX/Windows/mixed environment
11. Clustering/Cluster concepts and support/Example cluster environments
12. Full and incremental backups
13. Considering restore
14. Keeping backed up data and information about the data
    14.1. Data protection/Catalog protection/Logging level
    14.2. Browsing files for restore
    14.3. Backing up data
    14.4. Creating a backup specification
    14.5. Backup types and scheduled backups
    14.6. Scheduling, backup configurations, and sessions
    14.7. Duplicating backed up data
    14.8. Copying objects/Object mirroring
    14.9. Copying media
    14.10. Verifying backup media and backup objects
    14.11. Restoring data

14.12. Disaster recovery

Lab demonstration and practical exercise: 1,5 hours

1. **Install Data Protector cell manager and media server**
2. **create a FS backup specification**
3. **run an on-demand backup and examine the backup log**
4. **create a weekly backup schedule for full and incremental backup**
5. **perform a FS restore and examine the restore log**

Lesson 4 Test: 15 minutes

LESSON 5: 2,5 hours presentation + 1,5 hours practice

II. Media management and devices

1. Media management
   1.1. Media life cycle
   1.2. Media pools
   1.3. Media management before backups begin
   1.4. Media management during backup sessions
   1.5. Media management after backup sessions
   1.6. Devices
   1.7. Standalone devices
   1.8. Small magazine devices
   1.9. Large libraries
   1.10. Data Protector and Storage Area Networks (SAN)

III. Security / Users and user groups

1. Security
   1.1. Cells
   1.2. Data Protector users accounts/groups/rights
   1.3. Visibility of backed up data/what is backup ownership?
   1.4. Data encryption and encrypted control communication
2. Increased security for Data Protector users/Access to backed up data
3. Users and user groups - Using predefined user groups/Data Protector user rights

Lab demonstration and practical exercise: 1,5 hours

1. **create a file library**
2. **create a Media pool**
3. **perform tapes operations**
4. **create Data Protector user group and add user to perform backup and restore operations**

Lesson 5 Test: 15 minutes

LESSON 6: 2 hours presentation + 2 hours practice

IV. The Data Protector internal database

1. About the IDB / The IDB on the Windows/Unix Cell manger and in the MOM environment
2. IDB architecture
3. IDB operation
   - 3.1. During backup/restore/object copying or object consolidation/object verification
   - 3.2. Exporting media/Removing the detail catalog
   - 3.3. Filenames/File versions purge
4. Overview of IDB management
5. IDB growth and performance
   - 5.1. Key IDB growth and performance factors
   - 5.2. IDB growth and performance: key tunable parameters
   - 5.3. IDB size estimation

V. Service management

1. Overview
2. Data Protector and service management
3. Native Data Protector functionality
4. Integration with HP Operations Manager software
5. SNMP traps
6. The monitor
7. Reporting and notification
8. Event logging and notification/Data Protector log files/Windows application log
9. Java-based online reporting
10. Data Protector checking and maintenance mechanism
11. Central management, distributed environment
12. Using the data provided by Data Protector

Lab demonstration and practical exercise: 2 hours

1. **Review the IDB structure**
2. **tune the logging level and catalog protection**
3. **Add a DCBF**
4. **Perform IDB purge**
5. **create Data Protector sessions report**

Lesson 6 Test: 15 minutes

LESSON 7: 2 hours presentation + 2 hours practice

VI. How Data Protector operates

1. Data Protector processes or services
2. Backup sessions
   2.1. Scheduled and interactive backup sessions
   2.2. Backup session data flow and processes
   2.3. Pre-exec and post-exec commands
   2.4. Queuing of backup sessions
   2.5. Mount requests in backup sessions
   2.6. Backing up with disk discovery
3. Restore sessions
   3.1. Restore session data flow and processes
   3.2. Queuing of restore sessions
   3.3. Mount requests in a restore session
   3.4. Parallel restores
   3.5. Fast multiple single file restore
   3.6. Resuming restore sessions
4. Object copy sessions
   4.1. Automated and interactive object copy sessions
   4.2. Object copy session data flow and processes
   4.3. Queuing of object copy sessions
   4.4. Mount requests in an object copy session
5. Object consolidation sessions
   5.1. Automated and interactive object consolidation sessions
   5.2. Object consolidation session data flow and processes
   5.3. Queuing of object consolidation sessions
   5.4. Mount requests in an object consolidation session
6. Object verification sessions
   6.1. Automated and interactive object verification sessions
   6.2. Object verification session data flow and processes
7. Media management sessions/Media management session data flow

VII. Integration with applications

1. Integration with database applications
   1.1. Overview of database operation
   1.2. Filesystem backup of databases and applications
   1.3. Online backup of databases and applications
2. Integration with virtualization environments
   2.1. Offline filesystem backup of virtual machines
   2.2. Online backup of virtual machines

Lab demonstration and practical exercise: 2 hours

1. **Manage Data Protector processes from CMD**
2. **Create an online MSSQL DB backup specification**
3. **Perform an online MSSQL DB backup and examine the backup log**
4. **Perform an online MSSQL DB restore and examine the restore log**
5. **Configure pre-exec and post-exec script for an MSSQL DB offline backup specification**

Lesson 7 Test: 15 minutes

LESSON 8: 2,5 hours presentation + 1,5 hours practice

VIII. Disk backup

1. Overview
2. Disk backup benefits
3. Data Protector disk-based devices

IX. Synthetic backup

1. Overview
2. Synthetic backup benefits
3. How Data Protector synthetic backup works
   3.1. Synthetic backup and media space consumption
4. Restore and synthetic backup
   4.1. How data protection periods affect restore from synthetic backup

X. Split mirror concepts

5. Overview
6. Supported configurations
   6.1. Local mirror - dual host/Local mirror - single host/Remote mirror
   6.2. Local/remote mirror combination/Other configurations

XI. Snapshot concepts

1. Overview
2. Storage virtualization
   2.1. Snapshot concepts
   2.2. Snapshot backup forms
   2.3. Instant recovery
   2.4. Replica set and replica set rotation
   2.5. Types of snapshots
3. Supported configurations
   3.1. Basic configuration: single disk array - dual host
   3.2. Other supported configurations
   3.3. Other configurations

XII. Microsoft Volume Shadow Copy Service

1. Data Protector Volume Shadow Copy integration
2. VSS filesystem and disk image backup and restore

XIII. Data Protector Deduplication

1. Overview and Features

XIV. Virtual Machines environment

1. Overview
2. Data Protector VM backup integrations and specifics
3. Data Protector VM restores

XV. Backup scenarios (lab demonstration)

1. Company XYZ - Environment/Backup strategy requirements/Proposed solution
2. Company ABC – Environment/Backup strategy requirements/Proposed solution

XVI. Further information

1. Backup generations
2. Examples of automated media copying
3. Example 1: automated media copying of filesystem backups - Incr1 / Full backup
4. Example 2: automated media copying of Oracle database backups - Full backup

Lab demonstration and practical exercise: 1,5 hours

1. **Manage MS VSS snapshots: create/delete**
2. **Create a VSS-enabled FS backup specification**
3. **perform a VSS-enabled backup and examine the backup log**
4. **perform a VSS-enabled restore and examine the restore log**

Lesson 8 Test: 15 minutes

PART IV

SYMANTEC NetBackup Administration (Fundamentals)

LESSON 9: 3 hours presentation + 1 hour practice

I. Course Introduction
II. NetBackup Essentials

1. NetBackup environment and concepts

III. Installing and Configuring NetBackup

1. Considerations, Installation and Configuration

IV. Configuring Devices

1. Sharing, adding, monitoring and troubleshooting

V. Configuring Storage Units

1. Configuring and troubleshooting

VI. Configuring Volumes/Media

1. Configuring, managing and troubleshooting

VII. Netbackup Policies: attributes and schedule

1. Creating and managing policies
2. Client Lists and Backup Selections

Lab demonstration and practical exercise: 1 hour

1. **Installing and configuring Netbackup master server**
2. Managing volumes and policies

Lesson 9 Test: 15 minutes

LESSON 10: 2 hours presentation + 2 hours practice

VIII. Client Lists and Backup Selections: Performing Backups and Restores

1. Performing Backups
2. Performing Restores
3. Managing and Monitoring Backups

IX. Managing Media and images

1. Media states and status

X. Performing Catalog Backups and Restores

1. Catalog backups
2. Catalog restores

Lab demonstration and practical exercise: 2 hours

1. **Managing, Performing and monitoring backups**
2. **Managing, Performing and monitoring restores**
3. Managing media

Lesson 10 Test: 15 minutes

PART V

EMC NetWorker Administration (Fundamentals)

LESSON 11: 3 hours presentation + 1 hour practice

1. Networker Basics

2. The Networker solution

3. Networker backup terminology

4. Networker Data Zone

5. Networker resources and control data

6. Networker Core

7. Networker backup levels

8. Networker backups

9. Networker management server

Lab demonstration and practical exercise: 1 hours
1. **Installing and configuring Networker server and client**
2. **Networker GUI and Networker Network Management Console overview**

Lesson 11 Test: 15 minutes

LESSON 12: 3 hours presentation + 1 hour practice

10. Networker pools and volumes

11. Networker clients recovery

12. Networker server recovery

13. Networker interfaces

14. EMC Data Domain and Networker operations

Lab demonstration and practical exercise: 1 hours
1. **Performing basic operations with the library**
2. **Troubleshooting mount requests**
3. **Viewing Networker logs**
4. **Network troubleshooting**
5. **Performing Backup and Restore operations**

Lesson 12 Test: 15 minutes

PART VI

IBM Tivoli Storage Manager (TSM) Server Administration (Fundamentals)

LESSON 13: 3 hours presentation + 1 hour practice

1. Policies
2. Schedules
3. Data Storage
4. TSM DB
5. Backup types and retentions
6. TSM processes
7. Licenses

Lab demonstration and practical exercise: 1 hour

1. **Installing and configuring TSM server**
2. **Performing backup and restore**

Lesson 13 Test: 15 minutes

References:

1. Wikipedia.org – backup and recovery definitions articles
2. http://www.lto.org/About/faq.html
3. HP Backup and recovery solutions:

http://www8.hp.com/us/en/products/data-storage/data-storage-solutions.html?compURI=1226240&jumpid=reg_r1002_usen_c-001_title_r0011

4. HP StorageWorks Full-Line Technical Training: Tape HW part
5. HP D2D Solutions Training
6. HP Data Protector Concept guide
7. Symantec NetBackup™ Administrator's Guide
8. Symantec NetBackup web site:

http://www.symantec.com/netbackup/?inid=us_ps_flyout_prdts_netbackup

9. EMC NetWorker Installation and Administrator's Guides
10. IBM TSM Administration guide