Backup Strategies for z/VM and Linux on z Systems
SHARE, Session #16468

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Agenda

- Positioning
- Recommended practices and available options
  - Backing up and restoring z/VM
  - Backing up and restoring Linux on z Systems
- Backing up and restoring data in a z/VM SSI cluster
- Overview of IBM products
  - Backup and Restore Manager for z/VM
  - Tape Manager for z/VM
- Backup scenarios
  - Live demos
  - Configuration options and sample code
- Summary and reference information
- Hands-on lab - all products in IBM Infrastructure Suite for z/VM and Linux
  - Wednesday, 4:30pm-5:30pm
  - Location: Redwood (Level 2)
### Three Dimensions of Systems Management

<table>
<thead>
<tr>
<th>Who is doing the managing?</th>
<th>Application Owner</th>
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<th>Linux System Administrator</th>
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- Application Owner
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**Skills**

- z/VM System
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**What are they managing?**
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**Skills**
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- Linux Virtual Machine
- Middleware
- Applications

**What are they managing?**
- ✔️
- ✔️
- ✔️
IBM z/VM Management Solutions

- **Security**  
  - RACF and zSecure Manager for z/VM

- **Performance monitoring**  
  - OMEGAMON XE on z/VM and Linux  
  - Performance Toolkit for z/VM

- **Backup and recovery**  
  - Backup and Restore Manager for z/VM  
    - New release (V1.3) announced February 24, 2015  
  - Tape Manager for z/VM  
  - Tivoli Storage Manager

- **Automation and operational monitoring**  
  - Operations Manager for z/VM  
    - Including integration with existing monitoring and alert systems

- **Interactive provisioning and system resource management**  
  - IBM Wave for z/VM
IBM Infrastructure Suite for z/VM and Linux

- New IBM bundle/suite
- Announced and available September 2014
- Tools needed to manage the z/VM and Linux on z Systems infrastructure
  - Wave for z/VM
  - OMEGAMON XE on z/VM and Linux
  - Operations Manager for z/VM
  - Backup and Restore Manager for z/VM
    - Order Tape Manager for z/VM separately if plan to back up to tape
  - Tivoli Storage Manager Extended Edition

- Discounted price as a bundle

- Website:

- DeveloperWorks Wiki
Recommended Practices and Available Options
Recommended Practices – Backup and Recovery

**Image level backup of z/VM**
- Operating system

**Image level backup of (some?) Linux guests**
- Operating system
- Applications
- Application data (maybe)

**File level backup of z/VM data**
- Directory information
- Configuration files
- Log files
- Tools – REXX EXECs, automation scripts, etc.

**File level backup of Linux guests**
- Configuration files
- Log files
- Tools

**Recovery of z/VM system, including Linux guests**
- Dependence on z/OS versus
- Independent recovery
High Availability and Backup/Recovery are **NOT** the Same

Location A

Location B

Does not address operational recovery needs
Recommended Practices – Backup and Recovery

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**File level backup of Linux guests**
- Configuration files
- Log files
- Tools
Image level backup and recovery of DASD volumes from z/OS

- Existing z/OS procedures and tools in place
- Use existing tape devices
- Fast
- Doesn’t include FCP-attached DASD
- Linux should be down
  - Flashcopy can minimize downtime
- Dependent on z/OS for recovery and DR
  - Is Linux workload critical – recovery required in parallel with z/OS in event of disaster?
- Using z/OS cycles (on general purpose processors) to back up z/VM and Linux
**Image Level Backup/Recovery of z/VM and Linux Guests from z/VM**

- **Image level backup and recovery of DASD volumes from z/VM**
  - Low risk if z/VM is running – but not zero risk
  - Includes FCP-attached DASD (defined to z/VM as EDEVICEs)
    - Volumes cannot be DEDICATED to guest
  - **Linux should be down**
    - Flashcopy can minimize downtime
  - **Recovery of z/VM and Linux independent from recovery of z/OS**
    - Critical Linux workload recovered in parallel with z/OS in event of disaster
    - Faster recovery of z/VM and Linux overall
  - **Backup software required on z/VM**
    - Use z/VM cycles on IFL processors to back up z/VM and Linux
  - **Requires mainframe attached tape devices**
    - Share tape devices with z/OS – does not require both systems to be up
What About DDR?

- DDR - DASD Dump Restore utility in z/VM
  - Basic ability to copy data from one location to another
    - Command driven
    - Specify a source location
    - Specify a target location (disk or tape)
  - Useful when copying/cloning minidisks or volumes
    - No ability to do file level backup/recovery
    - Be aware of “changing data” on active disks or volumes
  - Very limited in terms of production level backup and recovery
- Advantages of Backup and Restore Manager for z/VM over DDR
  - File level backup and recovery
  - Incremental backups of z/VM (CMS and SFS) files
  - Cataloging of what has been backed up
    - Including full screen interfaces for finding backup data and restoring it
  - Automated expiration processing of catalog data and backup data on disk or tape
  - Flexibility to define a job once using wildcarding – future invocations of that job will back up any new data that meets the criteria
  - Invoke multiple service machines to share the backup task – completing the backup sooner
  - Integration with a tape management system – no need to manage tapes and tape mounts manually
Do I Need to Back Up Every Linux Guest?

- It depends …

- Is each guest image unique?
  - Are logs or other output stored within each guest?
  - Is configuration of each guest automated?

- Can a new guest be recreated from a golden image more easily than restoring it?

Is backing up just the “golden images” sufficient?
Recommended Practices – Backup and Recovery

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**File level backup of Linux guests**
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- Tools

**Recovery of z/VM system, including Linux guests**
- Dependence on z/OS versus
- Independent recovery
File Level Backup and Recovery of Linux Guests

- File level backup & recovery of Linux guests using Tivoli Storage Manager
  - Low risk if Linux is running
  - Plugs into existing distributed backup infrastructure
  - Includes volumes DEDICATED to Linux guests
  - Requires FCP-attached tape hardware if TSM Server is on Linux on z Systems (or a distributed platform)
  - Can use FICON-attached tape hardware using TSM for z/OS Media
  - Can be used in addition to image level recovery
  - Application/middleware specific clients available (DB2, Oracle, etc.)
Recommended Practices – Backup and Recovery

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Recovery of z/VM system, including Linux guests
- Dependence on z/OS versus
- Independent recovery
File Level Backup and Recovery of z/VM

- **File level backup and recovery of z/VM**
  - Low risk if z/VM is running
  - Requires mainframe-attached tape hardware (or DASD)
    - Supports dynamically sharing tape devices with z/OS
    - No need for dedicated tape devices on z/VM
  - Can be used in addition to image level recovery

Must be done using z/VM-based tools
Where and How to Back Up z/VM and Linux Guests

- Using z/OS to back up and restore z/VM and Linux
  - Useful during Linux on z Systems POC or early stages of Linux roll-out
    - Easy and fast to implement for existing z/OS customers
    - Provides disaster/volume level recovery (not file level recovery)
  - Concerns or issues long term as Linux workload grows or becomes critical
    - Doesn’t support FCP-attached DASD
    - File level recovery of z/VM or Linux data is time consuming and manual
      - Backups only contain volume images
    - In disaster situation, z/VM and Linux must wait for z/OS recovery before beginning their recovery
    - Increased use of z/OS CPU cycles to support z/VM and Linux

- Using native z/VM and Linux solutions for backup and recovery
  - Supports operational errors and disaster situations
    - File level backup and recovery of both z/VM and Linux
    - Image level backup and recovery of FCP and FICON-attached DASD (z/VM and Linux)
  - Independent of z/OS
    - Backups run on (less expensive) IFLs
    - Recovery in parallel with z/OS
    - Dynamically sharing of tape devices with z/OS is still possible
      - Does not require both systems to be up
Backing Up Linux – Should the Guest Be Up or Down?

- Linux keeps pending I/O’s in memory when possible
  - Designed for distributed platforms where I/O is assumed to be slow

- Backup solutions that read Linux DASD volumes but run outside Linux don’t have a view of these pending I/Os
  - Data on DASD may be in inconsistent state due to pending I/Os
  - Restoring data that has been backed up while Linux is running may not yield usable results
  - SYNC command exists to force all I/Os to be processed
    - Linux will immediately start caching new I/Os
  - Dependent on type of application running on Linux
    - Similar to pulling the plug on a distributed Linux server, then restarting it
      - But worse – backup occurs over a period of time
Back up Linux – Should the Guest Be Up or Down?

- Reduce risk by
  - “Right-sizing” Linux guests – don’t give more memory than needed
    - Recommended for performance reasons anyway
  - Using Flashcopy to flash the disks and back up the flashed copy

- For guaranteed recovery, shut down or suspend the guest before backing it up from z/VM or z/OS
  - Your experience may (will) vary
  - Evaluate the risk based on the application
  - Use Flashcopy to reduce the downtime

- Additional notes
  - For DASD volumes DEDICATED to Linux guests
    - Backups can not be done while guest is running
      - Volume is attached to guest
    - Backups can be done while guest is down
      - Requires attaching volume to SYSTEM before backup begins
Using Suspend Before Backing Up Linux Guests …

- SUSPEND/RESUME functions available in Linux on z Systems distributions

- Similar to hibernate function in Windows
  - Suspend
    - Completes all pending I/Os
    - Writes memory to disk
  - Resume
    - Detects suspend state
    - Reads memory from disk to restore previous state of the guest

- Requires setup and planning
  - Verify the effort is worth it for each type of guest
  - Otherwise, use shutdown instead of suspend
… Using Suspend Before Backing Up Linux Guests

- **Setup**
  - Specify swap disk in zipl.conf
    - Example: resume=/dev/disk/by-path/ccw-0.0.010f-part1
  - In list of swap disks
    - Specify this one with lowest priority
    - Use real disk (not VDISK)
    - Needs to have enough room for all memory of Linux guest + swap space

- **Issue suspend via one of the following:**
  - echo disk > /sys/power/state
  - CP SIGNAL SHUTDOWN
    - Must update config file on Linux to specify suspend rather than kill in response to signal shutdown

- **Reference:**
  - White paper – “Methods to pause a z/VM guest: Optimize the resource utilization of idling servers”
Backing up and Restoring Data in a z/VM SSI Cluster
SSI Considerations for Backup and Restore

Option 1

Backup Strategies for z/VM and Linux on z Systems

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SSI Considerations for Backup and Restore

- **Backup Servers**
  - **ZVMA**
    - **OPERATOR 191**
      - FN1 FT1 FM1
      - FN1 FT2 FM2
    - **TCP/IP 191**
      - FN1 FT1 FM1
      - FN1 FT2 FM2
  - **LINUX1**
    - **Catalog Server**
  - **ADMIN1**

- **Backup Catalog**
  - **BKRSVSFS 191**
    - FN1 FT1 FM1
    - FN2 FT2 FM2
  - **BKRSVSFS 205**
    - FN1 FT1 FM1
    - FT2 FT2 FM2

- **Backup Catalog**
  - **LINUX1 191**
    - FN1 FT1 FM1
    - FT2 FT2 FM2
  - **LINUX1 201**
    - FN1 FT1 FM1
    - FT2 FT2 FM2

- **Backup Catalog**
  - **LINUX2 201**
    - FN1 FT1 FM1
    - FT2 FT2 FM2
  - **ADMIN1 191**
    - FN1 FT1 FM1
    - FT2 FT2 FM2

- **ZVMB**
  - **OPERATOR 191**
    - FN1 FT1 FM1
    - FN1 FT2 FM2
  - **TCP/IP 191**
    - FN1 FT1 FM1
    - FN1 FT2 FM2

Option 2
Recommended
SSI Considerations for Backup and Restore

- Backup service machines on any member can see all minidisks of single configuration users

- Backup service machines on any member can see all minidisks of local multiconfiguration (IDENTITY) users
  - Can **not** see minidisks of IDENTITY users on other members
  - Can **only** see DASD volumes (if shared/available) of IDENTITY users on other members

**Recommendation**
- Create Backup service machines as IDENTITY users on each member
  - For IBM Backup and Restore Manager: BKRBKUP, BKRCATLG, BKRWRKnn
  - If backup catalog is in SFS, create one single configuration user for SFS server/filepool
    - Configure as SSI (or REMOTE) in DMSPARMS file
    - Allows single configuration users to restore their own data when logged onto any member
  - Create multiple backup jobs
    - Separate job(s) for single configuration users – only run them from one member
    - For multiconfiguration (IDENTITY) users
      - One job per member
      - Use a unique job name on each member
      - Run the member specific job on that member’s backup server
Backup and Recovery

*IBM Backup and Restore Manager for z/VM*
Product Overview

- **Backup**
  -Requested by administrators
  -Full or incremental
  -Flexible selection of disks and files to back up
  -Review job before submitting for backup

- **Restore**
  -Restore data via full screen interface or commands
  -Performed by users for their own data
    -Extended to other users available via exit
  -Performed by administrators for any data

Catalog in Shared File System (SFS) – presentation on web site for installation and setup

- **Integration with Tape Manager for z/VM**
- **Optional compression of data during backup via exits**
  -Call your own compression algorithm
  -Use IBM provided routine
- **Encryption available via exits**
  -Call your own routine
  -Use vendor-written routine, such as V/Soft Software’s Encrypt/Backup for z/VM
  -Use encryption capable tape devices
Using Backup and Restore Manager with Tivoli Storage Manager

Choose the solution that meets your needs – or combine for file recovery and DR

Backup and Restore Manager and Linux Guests

Backup and Restore Manager
Key Benefits

- **System backups available for Disaster Recovery**
  - Option to restore using DDR or Backup and Restore Manager
  - Manage retention of DR backups
  - Retrieve a list of tapes associated with a specific backup
    - Pull list for movement to off-site storage

- **Guest backups available for restoring to a previous state or level**

- **Backups of user data available for**
  - Restoring to a previous state or level
  - Replacing files accidentally erased or corrupted

- **Users restore their own data**
  - No administrator interaction required
Key Benefits Cont…

- **Flexible selection of data to back up**
  - Include/exclude
    - Minidisks, SFS directories
    - Real device addresses or volsers
    - Extents
  - Mask by filename, filetype, or SFS path
  - Review a defined backup job before submission

- **Management of backup data**
  - Retention set as part of the backup job
  - Automatic aging and pruning of the backup catalog
    - Including associated tapes and disk pools (if backed up to disk)
  - View/query the list of expired backups

- **Reduced backup window with concurrent processing**
  - Multiple worker service machines sharing the job
  - Suggest one worker service machine for each available tape drive
    - Or minidisk in disk pool
### Defining a Backup Job

// Include/Exclude definitions */

```plaintext
FUNCTION MEDIATYPE OWNER VDEV VOLUME DEVTYPE START END SIZE
---------- --------- -------- ----- ---- -------- -- ------ ----
INCLUDE    MINIDISK  *        =  *    *      *        =  *          =  *
EXCLUDE    MINIDISK *LNX*    =  *    *      *        =  *          =  *
EXCLUDE    MINIDISK MAINT = 0123 *    *      *        =  *          =  *
EXCLUDE    MINIDISK MAINT = 0124 *    *      *        =  *          =  *
EXCLUDE    MINIDISK *        =  *    *      *        =  *          =  *
EXCLUDE    MINIDISK *        =  *    *      *        =  *          END = *
EXCLUDE    MINIDISK *        =  *    *      *        =  *          > 3300
INCLUDE    MINIDISK MAINT = 012* *    *      *        =  *          =  *

FUNCTION MEDIATYPE ADDRESS
---------- --------- ---
INCLUDE    RDEVICE  900-90F
EXCLUDE    RDEVICE  *B

FUNCTION MEDIATYPE VOLSER
---------- ---
INCLUDE    RDEVVOL  630*

FUNCTION MEDIATYPE POOLNAME OWNER FS
---------- --------- --- ---
INCLUDE    SFS VMSYSU: *  SFS
EXCLUDE    SFS VMSYSU: VMSERVU SFS
```
Backup Strategies for z/VM and Linux on z Systems

**Backup and Restore Manager Architecture – non-SSI**

- **SFS Server (BKRSVSFS)**
  - Performs backup and restore tasks
  - Sends catalog data to catalog server

- **Catalog Server (BKRCATLG)**
  - Creates catalog entries in SFS
  - Provides catalog data when requested

- **Main Server (BKRBKUP)**
  - Verifies configuration information
  - Processes job templates (review and submit)
  - Assigns backup and restore tasks to workers
  - AUTOLOGs workers as needed

- **Worker (BKRWRKnn)**
  - Performs backup and restore tasks
  - Sends catalog data to catalog server
  - Retrieves catalog data from catalog server

- **Authorized Users**
  - Request backups
  - Request restores
  - Find data in the catalog

- **z/VM**
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Backup and Restore Manager Architecture – SSI

Single Config Users & MDisks

Multiconfig / IDENTITY
Users & MDisks

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Backup Strategies for z/VM and Linux on z Systems
Recommended Practices – Backup and Recovery

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- Tools – REXX EXECs, automation scripts, etc.

**File level backup of Linux guests**
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- Tools

**Recovery of z/VM system, including Linux guests**
- Dependence on z/OS versus
- Independent recovery

**Backup Manager**

**TSM**

**Back up from z/OS**
Summary

- Use Backup and Restore Manager to
  - Perform file-level backups of z/VM data
  - Perform image level backups of non-z/VM guest data
    - Use Tivoli Storage Manager for file level backups of Linux
  - Perform disaster recovery backups of entire system
  - Easily find and restore data as needed
  - Automatically manage retention of backup data
  - Carefully plan for SSI configurations
Managing Tapes and Tape Devices

Tape Manager for z/VM
Product Overview

- Manage tapes
  - Define tapes in a catalog
    - Free or used
    - Retention/expiration information
    - ATL/VTS or manual mount
    - Data Security Erase
  - Group tapes together into pools
    - Ownership and access control
    - Media type

- Manage devices
  - Define available devices
    - Dedicated or assignable
  - Group devices together into device pools
    - ATL/VTS or manual mount
    - Any other grouping you choose (read only vs. write, location, etc.)
  - Share devices with other systems

- Manage mount requests
- Volume specific and scratch requests
  - Standard Label
  - Non-Label
  - Bypass Label Processing
Key Benefits

- Effective management of tapes in ATL or VTS
  - Granular access control
  - Expiration processing
  - Notification for low threshold for tape resources
  - IBM libraries supported through DFSMSRMS on z/VM
  - STK libraries supported through STK Host Software Component for VM, or STK VM Client
  - EMC libraries supported through standard CCW interface

- Improved accuracy of manual tape processing
  - Granular access control
  - Automated interface to Operator for manual mounts
  - Internal label verification at attach/give and detach (SL only)
  - Read/Write verification at attach/give

- Integrated management of z/OS and z/VM tapes using DFSMSrmm on z/OS
  - Optionally use RMM on z/OS as the tape catalog for z/VM and z/OS tapes
  - Tapes, access control, and retention managed by the existing RMM catalog
  - Accessible via Tape Manager on z/VM
  - Tapes managed by RMM
  - Devices managed by Tape Manager – sharing devices with z/OS is discussed later
  - Not available for STK libraries
Data Security Erase (DSE)

- Erase (sensitive) data before tape is reused

- Option to enable DSE at tape pool or individual tape level
  - DSE-enabled flag included in each catalog entry

- DSE-enabled tapes marked as DSE-ready when freed

- Tape Manager DSE utility (TMDSE) executed on a separate user ID
  - Started manually or automatically with Operations Manager
  - Queries the catalog to find all tapes with DSE-ready flag on
  - Mounts each tape
    - Verifies volume label if possible
      - Configuration option to perform DSE on NL tapes or not
    - Erases tape
    - Turns off DSE-ready flag in catalog
  - Tape is now available for scratch unless its HOLD flag is on
Tape Manager in Standard Mode

- Tape Manager Machine (TMTMM):
  - Reads configuration files at startup
  - Interacts with users and applications
  - Manages the tape catalog

- Device Manager Machine (TMDMM):
  - Interacts with real tape devices
  - Attaches/gives drives to end users/applications
  - Verifies volume labels
  - Verifies read/write status

- Library Manager Machine (TMLM1):
  - Interacts with DFSMSRMS or STK software to handle library mounts
  - Handles volume specific and scratch requests
  - One for each RMS or STK server

- Command Manager Machine (TMCMM):
  - Supports subcommand processing in user exit

- Customer defined (optional):
  - Data Security Erase utility
  - ATL synchronization utility
  - Catalog verification utility

z/VM
Tape Manager in RMM Mode

- Tape Manager Machine (TMM)
- DMM
- LMM
- CMM
- Utilities
- RMM Manager Machine (RMM)

- z/OS RMM Agent Started Task (VMTMRMM)
- z/OS RMM Started Task via API (DFRMM)
Support for One Tape Catalog Across Multiple z/VM Systems

- **One “catalog node”**
  - Responsible for the tape catalog contents

- **Multiple “request nodes”**
  - Manage requests on the local system
  - Communicate with catalog node to read or update catalog data

- **One catalog used by multiple z/VM systems**
  - No longer need to create a catalog on each z/VM system, each with its own range of volser
  - All z/VM systems share one catalog

- **IP used for communication between systems**
Communication Between Service Machines and Systems

TMTM1

TMLM1

TMDM1

RMSMASTR

SYSTEM1 (Catalog node)

Tape catalog

SYSTEM2 (Request node)

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Dynamically Share Real Tape Devices

- z/VM systems with IBM Tape Manager
- z/OS systems with IBM Automated Tape Allocation Manager
- Linux systems with software supporting mainframe tape devices

* No multi-user attach support
Dynamically Share Tape Devices

- No need to dedicate devices to z/VM
- Make all or a subset of z/OS devices available to z/VM for use when needed
- Available to z/OS when not actively being used by z/VM
- No need for both systems to be up
  - Each one can access tape devices
Tape Manager for z/VM - Summary

- Use Tape Manager to
  - Manage and share devices
  - Manage tape volumes
    - Access control
    - Retention
    - Data Security
  - Improve accuracy of mount requests
Summary

- Management of z/VM systems with Linux guests requires monitoring and management tools
- IBM solutions exist
  - OMEGAMON XE on z/VM and Linux
  - zSecure Manager for z/VM
  - Operations Manager for z/VM
  - Wave for z/VM
  - Tape Manager for z/VM
  - Backup and Restore Manager for z/VM
  - Archive Manager for z/VM
- Demos are available
Reference Information

- **Product Web site**
  - Product pages include
    - Publications
    - Pre-requisites
    - Presentations
    - White papers
    - Support

- **e-mail**
  - Mike Sine, sine@us.ibm.com, Technical Marketing
  - Tracy Dean, tld1@us.ibm.com, Product Manager

- **White papers and presentations on Backup and Restore Manager and Tape Manager websites (Resources tab)**
  - Getting Started with Installation, including SFS server creation and installation of Backup Mgr
    - z/VM V6.2 and later
    - z/VM V5.4
  - Backing up z/VM and Linux on System z – Tivoli Storage Manager vs Backup Manager
  - Pausing (including SUSPENDing) a Linux Guest
  - Enabling the FACILITY Class for Use by RACF for z/VM
Demonstration Scenarios

*With Screenshots*
Backup and Recovery – Demos Available

A. Performing an incremental backup
B. Restoring files from backup
C. Back up and restore single and multiconfiguration users in an SSI environment
D. Scheduling image backups of Linux guests
E. Suspend and resume a guest as part of backup
F. Reviewing a disaster recovery backup
G. Reviewing data in the backup catalog for recovery
Scenario A: Performing an Incremental Backup

- Administrator previously performed a full backup
- Incremental job defined, using last full backup as its base
- Change a file on user’s A-disk
- Submit incremental job for review
- Submit incremental job for backup processing
- Use Operations Manager to monitor backup servers
Scenario A: Detailed Steps

- From a z/VM user ID, change a file
  ```
  xedit b b a
  ```
- From an authorized z/VM user ID, submit a backup job for review
  ```
  smsg bkrbkup review increm01
  ```
- Review the resulting files in the reader (LINKFAIL and JOB files)
- From an authorized z/VM user ID, submit a backup job for backup processing
  ```
  smsg bkrbkup submit increm01
  ```
- View the console of the backup servers to see the processing
  ```
  gomcmd opmgrml viewcon user(backup)
  ```
00029 Change made at 15:53pm eastern time April 19, 2008
00030 Change made at 14:44 cet May 5, 2008
00031 Change made at 08:45 pt July 3, 2008
00032 Change made at 08:56am pt July 11, 2008
00033 Change made at 11:04am pt July 15, 2008
00034 Change made at 10:16am pt August 4, 2008
00035 Change made at 08:10am pt Sept 11, 2008
00036 Change made at 09:12am pt Sept 18, 2008
00037 Change made at 2:00pm pt Oct 23, 2008
00038 Change made at 16:27pm Brasil Nov 11, 2008
00039 Change made at 11:31am et Dec 9, 2008
00040 Change made at 11:00am ct Dec 30, 2008
00041 Change made at 15:45 ct Jan 14, 2009
00042 Change made at 12:45 pt Mar 3, 2009
00043 *** End of File ***
BKRBAK8529I Processing REVIEW INCREMO1 command for TSTADM1.
RDR FILE 0050 SENT FROM BKRBKUP PUN WAS 0007 RECS 0006 CPY 001 A NOHOLD NOKEEP
RDR FILE 0051 SENT FROM BKRBKUP PUN WAS 0008 RECS 0001 CPY 001 A NOHOLD NOKEEP
RDR FILE 0052 SENT FROM BKRBKUP PUN WAS 0009 RECS 0003 CPY 001 A NOHOLD NOKEEP

File INCREMO1 LINKFAIL D1 sent to TSTADM1 at DEM1ZVM on 03/03/09 14:48:58
BKRMAK9102W 2 minidisks were selected by INCLUDE/EXCLUDE processing but could
not be CP LINKed.
BKRMAK8559I INCLUDE / EXCLUDE processing for job INCREMO1 selected 149 objects
BKRMAK8559I for backup processing.
BKRMAK8563I Worker count for job INCREMO1 has been set to 2.
BKRMAK8568I CMS files will be filtered against file mask "** **".
BKRMAK8566I SFS filespaces will be filtered with path mask ".".
BKRMAK8583I Sending results to TSTADM1 for review.
File INCREMO0 JOB D1 sent to TSTADM1 at DEM1ZVM on 03/03/09 14:48:58
File INCREMO1 JOB D1 sent to TSTADM1 at DEM1ZVM on 03/03/09 14:48:58

Return Code 'O' from command REVIEW INCREMO1 at 03/03/09 14:48:58.
<table>
<thead>
<tr>
<th>Cmd</th>
<th>Filename</th>
<th>Filetype</th>
<th>Class</th>
<th>User</th>
<th>at Node</th>
<th>Hold</th>
<th>Records</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INCREM01</td>
<td>LINKFAIL</td>
<td>PUN</td>
<td>A</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>6</td>
<td>3/03</td>
</tr>
<tr>
<td>-</td>
<td>INCREM00</td>
<td>JOB</td>
<td>PUN</td>
<td>A</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>81</td>
<td>3/03</td>
</tr>
<tr>
<td></td>
<td>INCREM01</td>
<td>JOB</td>
<td>PUN</td>
<td>A</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>82</td>
<td>3/03</td>
</tr>
</tbody>
</table>
File INCREMO1 LINKFAIL from BKRBKUP at DEM1ZVM Format is NETDATA.

DATAMOVE 05F0 108 "HCPLNM108E DATAMOVE 05F0 not linked; valid $$$$$$ not mounted"
DATAMOVE 05FF 108 "HCPLNM108E DATAMOVE 05FF not linked; valid $$$$$$ not mounted"

End of File

1= Help  2= Add line  3= Quit  4= Tab  5= Clocate  6= ?/Change
7= Backward  8= Forward  9= Receive  10= Rgtleft  11= Spltjoin  12= Cursor

====> -

XEDIT 1 File
**File INCREMENT JOB from BKR8KUP at DEM1ZVM Format is NETDATA.**

* Basic syntax:

* CONSOLE - write something to the console
* CP_COMMAND - CP command, output displayed to console
* CP_QIUIT - CP command, output suppressed
* JOB_HEADER - Emits a job header banner
* JOB_TRAILER - Emits job trailer banner
* CONFI eG - Set the value of a REXX variable
* DUMPEDF - Invoke DUMPEDF to back up a CMS/EDF minidisk
* DUMPCDK - Invoke DUMPCDK to perform an image/raw CKD DASD backup
* DUMPSFS - Invoke DUMPSFS to back up a CMS/SFS file space
* EOJ - Perform end-of-job housekeeping and exit

* WARNING:

* The job processor uses very simple-minded parsing. DO NOT intersperse blank lines, comments, or other values in amongst DUMPxxx statements unless you are certain you know what you are doing.

*CONFIG BKR_OUTPUT_SPEC = IBMTAPE SCRATCH RW 1
*CONFIG BKR_OUTPUT_SPEC = IBMTWIN SCRATCH RW 1 SCRATCH
*CONFIG BKR_OUTPUT_SPEC = CMSFILE DISK POOL X

1= Help    2= Add line  3= Quit    4= Tab    5= Clocate    6= ?/Change
7= Backward 8= Forward 9= Receive 10= Rgtleft 11= Spltjoin 12= Cursor

====> _

XEDIT 1 File
0051 PEEK A0 V 80 Trunc=80 Size=163 Line=32 Col=1 Alt=0
File INCREMENT00 JOB from BKRBKUP at DEM1ZVM Format is NETDATA.

CONFIG BKR_OUTPUT_SPEC = CMSFILE INCREMENT01 DISKPOOL *

* Next two lines override default system tape pool set in BKRSYSTEM CONFIG
* CONFIG BKR_JOB_EUM_POOL_OWNER = xxxxxxxxx
* CONFIG BKR_JOB_EUM_POOL_NAME = xxxxxxxxx

CP_COMMAND TERM MORE 50 10
CP_COMMAND TERM HOLD ON
CP_COMMAND SPOOL CONSOLE TO BKRADMIN CLASS T TERM START NAME INCREMENT01 20090303
CP_COMMAND TERM LINES 255

CONFIG BKR_JOB_WORKERS = 2
CONFIG BKR_JOB_NAME = INCREMENT01
CONFIG BKR_JOB_INSTANCE = $$INST$$
CONFIG BKR_JOB_OWNER = BKRADMIN
CONFIG BKR_JOB_MASTER = BKRBKUP
CONFIG BKR_JOB_TOKEN = 20090303

CONFIG BKR_JOB_CMS_FILEMASK = ***
CONFIG BKR_JOB_SFS_PATHMASK = *
CONFIG BKR_JOB_BACKUP_RESERVED_AS_IMAGE = NO
CONFIG BKR_JOB_SUPPRESS_IMAGE = YES

CONFIG BKR_JOB_CATALOG = Y
1= Help  2= Add line  3= Quit  4= Tab  5= Clocate  6= ?/Change
7= Backward  8= Forward  9= Receive  10= Rgleft  11= Spiltjoin  12= Cursor

<<<<> - X E D I T T 1 File

MB  6

31/007

Connected to remote server/host 9.39.63.141 using port 20
0051 PEEK A0 V 80 Trunc=80 Size=163 Line=76 Col=1 Alt=0
File INCREMO0 JOB from BKRKUP at DEM12VM Format is NETDATA.

JOB HEADER

DUMPCKD $ALLOC 0A02 $$DRIVERS$$
DUMPCKD $DIRECT 0A04 $$DRIVERS$$
DUMPCKD $ADMIN 0191 $$DRIVERS$$
DUMPDEF $MVWRK01 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $MVWRK03 0191 $$DRIVERS$$
DUMPDEF $ARCHLOGS 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $AUTOLOG 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $AVSVM 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $BKRVKUP 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $BKRCATLG 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $BKRWRK02 0191 $$FMAK $$ $$DRIVERS$$
DUMPCKD $BKRWRK04 0191 $$DRIVERS$$
DUMPDEF $BDNRCH 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $BDSEG 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $CONSOL 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $CTRLCON 0191 $$FMAK $$ $$DRIVERS$$
DUMPDEF $DATAMOVE 01AA $$FMAK $$ $$DRIVERS$$
DUMPDEF $DIRMAINT 01AA $$FMAK $$ $$DRIVERS$$
DUMPCKD $DIRMAINT 01DE $$DRIVERS$$
DUMPDEF $DIRMAINT 0155 $$FMAK $$ $$DRIVERS$$
DUMPDEF $DIRMAINT 01DB $$FMAK $$ $$DRIVERS$$
DUMPDEF $DIRMAINT 02DB $$FMAK $$ $$DRIVERS$$
DUMPDEF $DIRMAINT 0155 $$FMAK $$ $$DRIVERS$$

1= Help  2= Add line  3= Quit  4= Tab  5= Cllocate  6= ?/Change
7= Backward  8= Forward  9= Receive 10= Rgltleft 11= Splitjoin 12= Cursor

====> _

31/007
* Retain catalog content for 30 days from date of job completion...
CONFIG BKR_CATALOG_RETENTION = 30
CP_COMMAND QUERY TIME
CONSOLE *
CONSOLE * INCREMO1 INCREMENTAL BACKUP GENERATED 06/18/2007
CONSOLE * JOB IMAGE GENERATED 03/03/09 14:48:58
CONSOLE *

CP_QUIET SPOOL CONSOLE CLOSE NAME INCREMO1 20090303
CP_QUIET SPOOL CONSOLE NAME WORKER OUTPUT
EOJ
Ready; T=0.0270.02 15:13:28
smsg bkrbkup submit increm01
Ready; T=0.01/0.01 15:13:36
BKRBAK859321 Processing SUBMIT INCREM01 command for TSTADMIN1 at 03/03/09 15:13:06

RDR FILE 0053 SENT FROM BKRBKUP PUN WAS 0011 RECS 0006 CPY 001 A NOHOLD NOKEEP

File INCREM01 LINKFAIL D1 sent to BKRADMIN at DEM1ZVM on 03/03/09 15:13:36
File INCREM01 LINKFAIL D1 sent to TSTADMIN1 at DEM1ZVM on 03/03/09 15:13:37
BKRMAK9102W 2 minidisks were selected by INCLUDE/EXCLUDE processing but could not be CP LINKED.
BKRMAK8559I INCLUDE / EXCLUDE processing for job INCREM01 selected 149 objects
BKRMAK8559I for backup processing.
BKRMAK8563I Worker count for job INCREM01 has been set to 2.
BKRMAK8570I Instance number 00000055 has been assigned for job INCREM01.
BKRMAK8568I CMS files will be filtered against file mask "* * *".
BKRMAK8566I SFS file spaces will be filtered with path mask "*".
BKRMAK8584I Sending INCREM00 JOB D to worker task BKRWRK01.
File INCREM00 JOB D1 sent to BKRWRK01 at DEM1ZVM on 03/03/09 15:13:37
BKRMAK8584I Sending INCREM01 JOB D to worker task BKRWRK02.
File INCREM01 JOB D1 sent to BKRWRK02 at DEM1ZVM on 03/03/09 15:13:37
Return code "0" from command SUBMIT INCREM01 at 03/03/09 15:13:37.

RUNNING DEM1ZVM
15:13:54 BKRWRK02  -------------------------------
15:13:54 BKRWRK02  -------------------------------
15:13:54 BKRWRK02  BKRREB90014I Job completed at 15:13:55 on 03/03/09.
15:13:54 BKRWRK02  BKRREB90051 Executing CP command "QUERY TIME"
15:13:54 BKRWRK02  TIME IS 15:13:55 CST TUESDAY 03/03/09
15:13:54 BKRWRK02  CONNECT= 00:00:17  VIRTCP= 000:00.42  TOTCPU= 000:00.56
15:13:54 BKRWRK02 BKRREB90061 CP return code 0
15:13:54 BKRWRK02 *
15:13:54 BKRWRK02 * INCREMO1 INCREMENTAL BACKUP GENERATED 06/18/2007
15:13:54 BKRWRK02 * JOB IMAGE GENERATED 03/03/09 15:13:37
15:13:54 BKRWRK02 * BKRCATLG RDR FILE 0134 SENT FROM BKRWRK01 PUN WAS 0066 RECS 0013 CPY
15:13:54 BKRWRK02 *
15:13:54 BKRWRK02 BKRREB90051 Executing CP command "SPool CONSOLE CLOSE NAME IN
15:13:54 BKRWRK02 BKRREB90061 CP return code 0
15:13:54 BKRWRK02 BKRREB90051 Executing CP command "SPool CONSOLE NAME WORKER 0
15:13:54 BKRWRK02 BKRREB90061 CP return code 0
15:13:54 BKRWRK02 *** End-of-Job Summary:
15:13:54 BKRWRK02 *** Start time: 03/03/09 15:13:41
15:13:54 BKRWRK02 *** Ended time: 03/03/09 15:13:55
15:13:54 BKRWRK02 ***
15:13:54 BKRWRK02 *** DUMPCKD tasks, Max RC: 0, 0
15:13:54 BKRWRK02 *** DUMPFA tasks, Max RC: 0, 0
15:13:54 BKRWRK02 *** DUMPEDF tasks, Max RC: 67, 4
15:13:54 BKRWRK02 *** DUMPSFS tasks, Max RC: 0, 0
15:13:54 BKRWRK02 *** RESTORE tasks, Max RC: 0, 0
15:13:54 BKRWRK02 ***
15:13:54 BKRCATLG 0000001 FILE PURGED
BACKUP
31/001
Scenario B: Restoring Files from Backup

- Full and incremental backups performed previously
- User accidentally erases or corrupts a file
- User restores the file from backup
  - Full screen interface to see all files available in backup
    - Including multiple “versions” of the same file
  - Filters and sorting available to easily find the needed file
  - Request restore directly to disk or to reader
- No administrator intervention required
Scenario B: Detailed Steps

- From a z/VM user ID, view all catalog data you own
  `bkrlsit`
- Use the filters to find the file you want to restore
- Put the cursor on the file and hit F10
- Specify the user ID to whom the file should be sent and hit F10
- Look at the reader of that user ID to see the restored file and a copy of the console during the restore processing
  `rdrlsit`
- View the contents of the file to verify it’s the correct version
  `peek`
<table>
<thead>
<tr>
<th>Owner</th>
<th>Filename</th>
<th>Filetype</th>
<th>Fm</th>
<th>Date</th>
<th>Time</th>
<th>Device or Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSTUSER1</td>
<td>A</td>
<td>A</td>
<td>1</td>
<td>08/11/07</td>
<td>12:18:04</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>A</td>
<td>AX</td>
<td>1</td>
<td>06/09/20</td>
<td>18:21:58</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>ABC</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/19</td>
<td>02:24:28</td>
<td>0191</td>
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<td>06/09/16</td>
<td>03:29:28</td>
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<td>TSTUSER1</td>
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<td>1</td>
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<td>18:52:40</td>
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<td>1</td>
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<td>03:40:37</td>
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<td>03:41:01</td>
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<td>03:41:34</td>
<td>0191</td>
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<tr>
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<td>XEDIT</td>
<td>1</td>
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<td>03:41:43</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:42:03</td>
<td>0191</td>
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<td>03:42:10</td>
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<td>CLAUDE1</td>
<td>1</td>
<td>07/01/04</td>
<td>14:55:00</td>
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<td>TSTUSER1</td>
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<td>1</td>
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<td>02:24:28</td>
<td>0191</td>
</tr>
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</table>

1= Help    3= Quit    4= Return    5= Sort Up    6= Sort Down    7= Backward    8= Forward    10= Restore    11= Details

03/025

Connected to remote server host 9.39.50.141 using port 23
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<th>Filetype</th>
<th>Fm</th>
<th>Date</th>
<th>Time</th>
<th>Device or Path</th>
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<td>10:40:42</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:42:25</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>BJJJJ</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:42:10</td>
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<td>06/09/16</td>
<td>03:42:03</td>
<td>0191</td>
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<tr>
<td>TSTUSER1</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:41:59</td>
<td>0191</td>
</tr>
<tr>
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<td>1</td>
<td>06/09/16</td>
<td>03:41:49</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>BFFF</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:43</td>
<td>0191</td>
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<tr>
<td>TSTUSER1</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:41:38</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>BDDD</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:34</td>
<td>0191</td>
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<tr>
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<td>BCCC</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:01</td>
<td>0191</td>
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<tr>
<td>TSTUSER1</td>
<td>BAAN</td>
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<td>1</td>
<td>06/09/16</td>
<td>03:40:47</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1</td>
<td>BBBB</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/16</td>
<td>03:40:37</td>
<td>0191</td>
</tr>
</tbody>
</table>
CMS LDF Minidisk Restore Specifications

From TSTUSER1 0191 date 09/01/14 time 15:45:10 (job INCREMO1 00000054 ).

To EDF minidisk, userid: and virtual address:

Or to RDR of userid: tstuser1 node: (defaults to this node).

Or to SFS filepool: and filepace:

and path:

File filters: Filename: B Filetype: B mode_number: 1

Master backup userid: BKRBKUP

3= Quit 4= Return 10= Restore
Your command "RESTORE INCREM01 00000054 TSTUSER1 EDF $DEV0191 TO RDR TSTUSER1 - B B 1" is being processed at 03/03/09 15:57:55.

BKREST0191 Sending RESTORE request 00000052 to worker task BKRWRK03...
File RESTORE JOB D1 sent to BKRWRK03 at DEM12VM on 03/03/09 15:57:55
*** Request 01: Request 00000052 submitted to worker BKRWRK03 for processing.

Return code "0" from command RESTORE INCREM01 00000054 TSTUSER1 EDF $DEV0191 TO RDR TSTUSER1 - B B 1 at 03/03/09 15:57:55.
RDR FILE 0007 SENT FROM BKRWRK03 PUN WAS 0003 RECS 0026 CPY 001 R NOHOLD NOKEEP
RDR FILE 0008 SENT FROM BKRWRK03 CON WAS 0002 RECS 0080 CPY 001 R NOHOLD NOKEEP

Ready; T=0.027 0.02 15:57:57
<table>
<thead>
<tr>
<th>Cmd</th>
<th>Filename</th>
<th>Filetype</th>
<th>Class</th>
<th>User</th>
<th>at Node</th>
<th>Hold</th>
<th>Records</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>00000052</td>
<td>CON</td>
<td>R</td>
<td>BKRWRK03</td>
<td>DEM12VM</td>
<td>NONE</td>
<td>80</td>
<td>3/03</td>
<td>15:57:55</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = Help  2 = Refresh  3 = Quit  4 = Sort(type)  5 = Sort(date)  6 = Sort(user)
7 = Backward  8 = Forward  9 = Receive  10 =  11 = Peek  12 = Cursor

====>

XEDIT 1 File

03/01
0007 PEEK A0 V 80 Trunc=80 Size=41 Line=24 Col=1 Alt=0
File B B from *BACKUP* at DEMI2VM Format is NETDATA.
Change made at 11:37am central time Sept 17, 2007
Change made at 12:31am Eastern time Sept 25, 2007
Change made at 2:06pm mountain standard time Oct 9, 2007
Change made at 11:14am pacific time March 8, 2008
Change made at 9:29am central time March 4, 2008
Change made at 15:53pm eastern time April 19, 2008
Change made at 14:44 cet May 5, 2008
Change made at 08:45 pt July 3, 2008
Change made at 08:56am pt July 11, 2008
Change made at 11:04am pt July 15, 2008
Change made at 10:16am pt August 4, 2008
Change made at 08:19am pt Sept 11, 2008
Change made at 09:12am pt Sept 18, 2008
Change made at 2:00pm pt Oct 23, 2008
Change made at 16:27pm Brasil Nov 11, 2008
Change made at 11:01am ct Dec 3, 2008
Change made at 11:09am ct Dec 30, 2008
Change made at 15:45 ct Jan 14, 2009
** End of File **
Scenario C: Back up and Restore Single and Multiconfiguration Users in SSI

- Two member SSI cluster
  - TEST7SSI, TESTCSSI

- Three backup jobs for full backups
  - USERFULL – all single configuration users across the SSI cluster
    - Always run from TEST7SSI (required (for now))
  - IDSSI7FL – all multiconfiguration (IDENTITY) users on TEST7SSI
    - Always run from TEST7SSI (required)
  - IDSSICFL - all multiconfiguration (IDENTITY) users on TESTCSSI
    - Always run from TESTCSSI (required)

- Three similar jobs for incremental

- Restore files in multiple ways
  - Single configuration users
    - Restore to disk or reader from any member of the cluster
  - Multiconfiguration users
    - Restore to disk from the local member
    - Restore CMS files to reader from any member
Scenario C: Detailed Steps

- From a Backup Manager admin ID (DEMOADMN) on TEST7SSI, view all catalog data for multiconfiguration user OP1

  bkruser

- Use the filters to find all files for OP1’s 191 disk
  - Note files exist from both TEST7SSI and TESTCSSI

- F4 to return and then find all files for single configuration user DEMOADMN
  - Note files only exist in the USERxxxx jobs – not member specific

- Update a file on OP1 191 disk

  link op1 191 333 mr
  acc 333 z
  x test op1 z

- Add a new line to the file

  file
  rel z (det

- Similarly update a file on DEMOADMN 191 disk

  x test demoadmnn a

- Perform a review of the incremental backup for multiconfiguration users on TEST7SSI

  smsg bkrbkup review idssi7in
Scenario C: Detailed Steps

- Perform a backup for multiconfiguration users on TEST7SSI
  
smsg bkrbkup submit idssisi7in

- View the console of the worker(s) assigned
  
gomcmd opmgrml viewcon user(bkrwrkxx)

- Perform a backup for single configuration users in the TEST7SSI and TESTCSSI cluster
  
smsg bkrbkup submit userincr

- When jobs are complete find the updated test files for OP1 and DEMOADMN in the catalog
  
bkrlist

- Once a file is chosen, use F10 to restore the file to the reader

- View the files in the reader
  
rdrlist

- Logoff DEMOADMN (do not disconnect – must logoff)
  
logoff
Scenario C: Detailed Steps

- Logon DEMOADMN on the other member of the cluster TESTCSSI
- Find the test files for DEMOADMN in the catalog `bkrlist`
- Once a file is chosen, use F10 to restore the file to the reader
- View the files in the reader `rdrlist`
- Notice you can restore files for DEMOADMN from either member of the cluster
id
DEMOADMN AT TEST7SSI VIA RSCS 08/08/12 14:47:42 EDT WEDNESDAY
Ready, T=6.01/6.01 14:47:42

bkruiscer

Running TEST7SSI
Ownerid filter: * 72 of 72 ownerids displayed

Ownerids

$ALLOC$  ATSSERV  AUDITOR  AUTOLOG1  AUTOLOG2  AVSYM  BKRADMIN  BKRBACKUP  BKRCATLG  BKRSYSFS  BKRWRK01  BKRWRK02  BKRWRK03  BKRWRK04  BLDCMS  BLADRACF  BLDSEG  CMAINT  CMBSBATCH  DEMOADMN  DEMOADMN2  DHCPD  DISKACNT  DTCENS1  DTCENS2  DTCSMAPI  DTCSVW1  DTCVSW2  EREP  GCS  GSKADMIN  IBMUSER  IMAP  LDAPSRV  LGLOPR  LPSEVER  LVL2VM1  MAINT  MROUTE  OPERATOR  OPERSS1  OPERSYMP  OPMGRM1  OPMGRS1  OPMGRS2  OPMGRS3  OPMGRS4  PERFSYM  PORTMAP  RXEXED  RSCSDNS  SNMPD  SNMPQE  SNMPSUBA  SSLDCSSM  SYSADMIN  SYSMON  TCPIP  TOOLS  TSAFVM  UFTD  VMRADMN  VMSERVIP  VMSERVRS  VMSERVU  VMSERVU  569706B  569710D  6VMLEN20  6VMRSC20

1= Help  2=  3= Quit  4= Return  5= Sort Up  6= Sort Down  7= Backward  8= Forward  10= Restore  11= Details
Catalog: BKRSFS: BKRCATLG. USERCAT.

Devices for ownerid OP1
Device filter: *  Type filter: *

Device Type Instances in catalog

$DEV0191 EDF  8 instances

1= Help  2=  3= Quit  4= Return  5= Sort Up
6= Sort Down  7= Backward  8= Forward  10= Restore  11= Details

03/017
For OP1 $DEV0191 EDF
Jobname filter: *

8 of 8 instances displayed

Jobname  Instance Date/time completed
IDSSICFL 00000002 2012/03/06 18:54:51
IDSSICIN 00000001 2012/05/21 04:24:30
IDSSICIN 00000002 2012/05/21 04:27:30
IDSSI7FL 00000005 2012/03/06 18:54:01
IDSSI7IN 00000001 2012/03/09 14:09:14
IDSSI7IN 00000002 2012/03/14 17:11:04
IDSSI7IN 00000003 2012/05/21 04:15:22
IDSSI7IN 00000004 2012/05/21 11:21:16

1= Help  2=  3= Quit  4= Return  5= Sort Up
6= Sort Down  7= Backward  8= Forward  9= Restore  11= Details
Ownerid filter: DEMO*

Ownerids

DEMOADMN DEMOADM2

Catalog: BKRSFS:BKRCATLG.USERCAT. 2 of 72 ownerids displayed

1= Help  2=  3= Quit  4= Return  5= Sort Up  6= Sort Down  7= Backward  8= Forward  10= Restore  11= Details

03/018

Connected to remote server/host 9.60.86.71 using port 23
For DEMOADMIN $DEV0191 EDF
Jobname filter: *

<table>
<thead>
<tr>
<th>Jobname</th>
<th>Instance</th>
<th>Date/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>USERFULL</td>
<td>00000002</td>
<td>2012/03/06 19:12:38</td>
</tr>
<tr>
<td>USERINCR</td>
<td>00000001</td>
<td>2012/03/09 14:31:50</td>
</tr>
<tr>
<td>USERINCR</td>
<td>00000002</td>
<td>2012/05/21 04:18:24</td>
</tr>
</tbody>
</table>
Ready; T=0.10/0.10 14:59:07
link opl 191 333 mr
DASD 0333 LINKED R/W; R/O BY OPERATOR at TEST7SSI
Ready; T=0.01/0.01 14:59:11
acc 333 z
Ready; T=0.01/0.01 14:59:13

x test opl z
TEST
= file

* * * Top of File * * *
Sample line created at 11:01am eastern time March 9, 2012
Sample line created at 5:08pm eastern time March 14, 2012
Sample line created at 10:11am CET May 21, 2012
Sample line created at 17:15am CET May 21, 2012
Sample line created at 12:01pm pacific time August 8, 2012
* * * End of File * * *
TEST DEMOADMIN A1 F 80 Trunc=80 Size=5 Line=0 Col=1 Alt=2

+++>

| ...+..1...+..2...+..3...+..4...+..5...+..6...+..7...

===== ** ** Top of File ** **

===== Sample line created at 11:15am eastern time March 9, 2012

===== Sample line created at 5:10pm eastern time March 14, 2012

===== Sample line created at 10:12am CET May 21, 2012

===== Sample line created at 17:18 CET May 21, 2012

==== Sample line created at 12:04pm pacific time August 8, 2012

==== ** ** End of File ** **
Ready; T=0.01/0.01 15:06:18

.smsg bkrbkup review idssi7in

Ready; T=0.01/0.01 15:06:24

BKRMAK8529I Processing REVIEW IDSSI7IN command for DEMOADMN.
RDR FILE 0477 SENT FROM BKRBKUP PUN WAS 0006 RECS 0144 CPY 001 A NOHOLD NOKEEP
RDR FILE 0481 SENT FROM BKRBKUP PUN WAS 0007 RECS 0145 CPY 001 A NOHOLD NOKEEP

BKRMAK8559I INCLUDE / EXCLUDE processing for job IDSSI7IN selected 183 objects
BKRMAK8559I for backup processing.
BKRMAK8563I Worker count for job IDSSI7IN has been set to 2.
BKRMAK8568I CMS files will be filtered against file mask "* * *".
BKRMAK8566I SFS filesaces will be filtered with path mask "*".
BKRMAK9345I Job will be processed by:
BKRMAK9345I ... BKRAMK01
BKRMAK9346I ... BKRAMK02

BKRMAK8583I Sending results to DEMOADMN for review.
File IDSSI7I0 JOB D1 sent to DEMOADMN at TEST7SSI on 08/08/12 15:06:25
File IDSSI7I1 JOB D1 sent to DEMOADMN at TEST7SSI on 08/08/12 15:06:25
Return code "0" from command REVIEW IDSSI7IN at 08/08/12 15:06:25.
smg bkrbkup submit idssi7in
Ready, T 08/08/12 15:08:26

BKRBAK8532I Processing SUBMIT IDSSI7IN command for DEMOADMN at 08/08/12 15:08:26.
BKRMAK8559I INCLUDE / EXCLUDE processing for job IDSSI7IN selected 183 objects
BKRMAK8559I for backup processing

BKRMAK8563I Worker count for job IDSSI7IN has been set to 2.
BKRMAK8570I Instance number 00000005 has been assigned for job IDSSI7IN.

BKRMAK8568I CMS files will be filtered against file mask **.
BKRMAK8566I SFS filesystems will be filtered with path mask "."
BKRMAK9345I Job will be processed by:
BKRMAK9346I ... BKRWRK03
BKRMAK9346I ... BKRWRK04

BKRMAK8584I Sending IDSSI7I0 JOB D to worker task BKRWRK03.
File IDSSI7I0 JOB D1 sent to BKRWRK03 at TEST7SSI on 08/08/12 15:08:27
BKRMAK8584I Sending IDSSI7I1 JOB D to worker task BKRWRK04.
File IDSSI7I1 JOB D1 sent to BKRWRK04 at TEST7SSI on 08/08/12 15:08:27

Return code "0" from command SUBMIT IDSSI7IN at 08/08/12 15:08:27.
RDR FILE 0485 SENT FROM BKRWRK03 CON WAS 0002 RECS 0347 CPY 001 T NOHOLD NOKEEP
RDR FILE 0489 SENT FROM BKRWRK04 CON WAS 0002 RECS 0350 CPY 001 T NOHOLD NOKEEP

Running TEST7SSI
 connectivity to remote server/host 9.60.86.71 using port 23
15:08:34 ***
15:08:34 *** Catalog entry insertion elapsed time (ss.uu): 0.628553
15:08:34 ***
15:08:34 *** DUMPCKD tasks, Max RC: 12, 0
15:08:34 *** DUMPFBA tasks, Max RC: 0, 0
15:08:34 *** DUMPEDF tasks, Max RC: 79, 0
15:08:34 *** DUMPSFS tasks, Max RC: 0, 0
15:08:34 *** RESTORE tasks, Max RC: 0, 0
15:08:34 ***
15:08:34 DASD 03F1 DETACHED
15:08:34 00000001 FILE PURGED
15:08:34 BKRWRK8512I The stack contains 0 entries. There are 0 lines on the con
15:08:44 * MSG FROM BKRCATLG: BKRCAT8885I Expiration for IDSSI7IN 00000005 set
15:08:44 Return code: 0
15:10:34 BKRWRK8509I Invoking WAKEUP with parameters 08/08/12 15:10:34 [ timer
15:10:34 BKRWRK9081I Idle timeout limit of +00:02:00 reached; logging off...
15:10:34 HCPMSG045E BKRAKADMIN not logged on
15:10:34 CONNECT= 00:02:06 VIRTCP= 000:00.70 TOTCPU= 000:00.81
15:10:34 LOGOFF AT 15:10:34 EDT WEDNESDAY 08/08/12
15:10:34 CON FILE 0094 SENT TO DEMOADMN RDR AS 0493 RECS 0027 CPY 001 T NOH
PFO1= SCRLL PFO2= PFO3= END PFO4= PFO5= HOLD PFO6= FORMAT
PFO7= UP PFO8= DOWN PFO9= PFO10= LEFT PFO11= RIGHT PFO12= RECALL

BKRWRK03 (Scroll)
msg bkrbkup submit userincr

BKRBAK8532I Processing SUBMIT USERINCR command for DEMOADMN at 08/08/12 15:15:56.
BKRMAK8559I INCLUDE / EXCLUDE processing for job USERINCR selected 72 objects
BKRMAK8559I for backup processing.
BKRMAK8563I Worker count for job USERINCR has been set to 2.
BKRMAK8570I Instance number 00000003 has been assigned for job USERINCR.
BKRMAK8568I CMS files will be filtered against file mask "* * *".
BKRMAK8566I SFS file spaces will be filtered with path mask "*".
BKRMAK9345I Job will be processed by:
BKRMAK9346I ... BKRWRK01
BKRMAK9346I ... BKRWRK02

BKRMAK8584I Sending USERINCO JOB D to worker task BKRWRK01.
File USERINCO JOB D1 sent to BKRWRK01 at TEST7SSI on 08/08/12 15:15:57
BKRMAK8584I Sending USERINCO JOB D to worker task BKRWRK02.
File USERINCO JOB D1 sent to BKRWRK02 at TEST7SSI on 08/08/12 15:15:57

Return code 0 from command SUBMIT USERINCR at 08/08/12 15:15:57.
RDR FILE 0501 SENT FROM BKRWRK02 CON WAS 0002 RECS 0339 CPY 001 T NOHOLD NOKEEP
RDR FILE 0505 SENT FROM BKRWRK01 CON WAS 0002 RECS 0353 CPY 001 T NOHOLD NOKEEP
<table>
<thead>
<tr>
<th>Owner</th>
<th>Filename</th>
<th>Filetype</th>
<th>Fm</th>
<th>Date</th>
<th>Time</th>
<th>Device or Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>OP1</td>
<td>1</td>
<td>12/05/21</td>
<td>04:22:38</td>
<td>0191</td>
</tr>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>FILE</td>
<td>1</td>
<td>12/03/09</td>
<td>14:02:12</td>
<td>0191</td>
</tr>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>OP1</td>
<td>1</td>
<td>12/03/14</td>
<td>17:08:35</td>
<td>0191</td>
</tr>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>OP1</td>
<td>1</td>
<td>12/05/21</td>
<td>04:11:46</td>
<td>0191</td>
</tr>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>OP1</td>
<td>1</td>
<td>12/05/21</td>
<td>11:10:40</td>
<td>0191</td>
</tr>
<tr>
<td>OP1</td>
<td>TEST</td>
<td>OP1</td>
<td>1</td>
<td>12/08/08</td>
<td>15:02:59</td>
<td>0191</td>
</tr>
</tbody>
</table>
CMS EDF Minidisk Restore Specifications

From OP1 0191 date 12/08/08 time 15:02:59 (job IDSSI7IN 00000005).

To EDF minidisk, userid: and virtual address:
FORMAT: OK if needed? NO  FORMAT regardless? NO

Or to RDR of userid: demoadmn node: (defaults to this node).

Or to SFS filepool: and filesystem: and path:

File filters: Filename: TEST  Filetype: OP1  mode number: 1

Master backup userid: BKRBKUP  Options:

2=Mixed case  3= Quit  4= Return  10= Restore
Your command "RESTORE IDSSI7IN 00000005 OP1 EDF $DEV0191 TO RDR DEMOADMN - TES T OP1 1" is being processed at 08/08/12 15:22:25.
BKREST9029I Sending RESTORE request 00000006 to worker task BKRWRK03...
File RESTORE JOB D1 sent to BKRWRK03 at TEST7SSI on 08/08/12 15:22:25
*** Restore: Request 00000006 submitted to worker BKRWRK03 for processing.
Return code "0" from command RESTORE IDSSI7IN 00000005 OP1 EDF $DEV0191 TO RDR DEMOADMN - TEST OP1 1 at 08/08/12 15:22:25.

RDR FILE 0517 SENT FROM BKRWRK03 PUN WAS 0097 RECS 0009 CPY 001 R NOHOLD NOKEEP
RDR FILE 0521 SENT FROM BKRWRK03 CON WAS 0096 RECS 0174 CPY 001 R NOHOLD NOKEEP
Ready; T=0.22/0.24 15:22:26

peek 521
File TEST OP1 from *BACKUP* at TEST7SSI Format is NETDATA.

* * * Top of File * * *

Sample line created at 11:01am eastern time March 9, 2012
Sample line created at 5:08pm eastern time March 14, 2012
Sample line created at 10:11am CET May 21, 2012
Sample line created at 17:15am CET May 21, 2012
Sample line created at 12:01pm pacific time August 8, 2012

* * * End of File * * *

1= Help 2= Add line 3= Quit 4= Tab 5= Clocate 6= ?/Change 7= Backward 8= Forward 9= Receive 10= Rgtleft 11= Splitjoin 12= Cursor

====> 

XEDIT 1 File
id
DEMOADMIN AT TESTCSSI VIA RSCS  08/08/12 15:27:58 EDT  WEDNESDAY
Ready; T=0.017/0.01 15:27:58

bkrlist
Files for owner(s):

Selection: Name: * Type: * Mode: *

Current filters: Name: TEST Type: * Mode: * Owner: DEMOADMN

<table>
<thead>
<tr>
<th>Owner</th>
<th>Filename</th>
<th>Filetype</th>
<th>Em</th>
<th>Date</th>
<th>Time</th>
<th>Device or Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEMOADMN</td>
<td>TEST</td>
<td>DEMOADMN</td>
<td>1</td>
<td>02/03/09</td>
<td>14:15:31</td>
<td>0191</td>
</tr>
<tr>
<td>DEMOADMN</td>
<td>TEST</td>
<td>DEMOADMN</td>
<td>1</td>
<td>02/05/21</td>
<td>04:13:05</td>
<td>0191</td>
</tr>
<tr>
<td>DEMOADMN</td>
<td>TEST</td>
<td>DEMOADMN</td>
<td>1</td>
<td>02/08/08</td>
<td>15:04:32</td>
<td>0191</td>
</tr>
</tbody>
</table>

1= Help  2= Mixed case  3= Quit  4= Return  5= Sort Up  6= Sort Down  7= Backward  8= Forward  10= Restore  11= Details
Scenario D: Scheduling Image Backups of Linux Guests

- **Initiated or scheduled by Operations Manager**
  - Schedule defined in Operations Manager to initiate backups at specific times/ intervals
  - Action associated with each schedule
    - Linux guest is shut down
    - Operations Manager watches for shutdown complete
    - Sends request to Backup and Restore Manager to back up the specific DASD/minidisks associated with the guest
      - Alternatively use FLASHCOPY to copy DASD, restart guest, then perform backup of copy of DASD.
    - Operations Manager watches for backup complete message
    - Restarts Linux guest
  - Guest is down for minimum time required for backup
Scenario D: Detailed Steps

- Define a schedule to start the automated backup process
  gomcmd opmgrm1 defschd name(demo),action(stoplnx),when(now)
- View the Operations Manager log to see the schedule trigger
  gomcmd opmgrm1 viewlog
- View the console of the Linux guest to see it shut down
  gomcmd opmgrm1 viewcon user(omeglnx1)
- View the console of the backup server to see the backup start
  gomcmd opmgrm1 viewcon user(bkrbkup)
- Find the worker that has been assigned and view its console
  gomcmd opmgrm1 viewcon user(bkrwrkxx)
- View the console of the Linux guest to see it restart
  gomcmd opmgrm1 viewcon user(omeglnx1)
- View the backup catalog to see the completed job
  bkrjob
16:10:53 Broadcast message from root (console) (Tue Mar  3 16:10:53 2009):
16:10:53 The system is going down for system halt NOW!
16:10:53 INIT: Switching to runlevel: 0
16:10:53 INIT: Sending processes the TERM signal
16:10:57 INIT: Sending processes the KILL signal
16:10:59 Boot logging started on /dev/tty50(/dev/console) at Tue Mar  3 16:11:0
16:10:59 Master Resource Control: previous runlevel: 5, switching to runlevel:
16:11:00 Shutting down CRON daemon
16:11:00 ..done
16:11:00 Shutting down service kdm..done
16:11:00 Shutting down mail service (Postfix)..done
16:11:01 Shutting down Name Service Cache Daemon
16:11:01 ..done
16:11:01 Shutting down cupsd
16:11:01 ..done
16:11:02 Shutting down slpd ..done
16:11:02 Shutting down sound driver..done
16:11:02 Shutting down SSH daemon..done
16:11:03 Remove Net File System (NFS) unused
16:11:03 Umount SMB/ CIFS File Systems ...done
16:11:03 Shutting down resource manager..done
16:11:03 Shutting down RPC portmap daemon..done
16:11:03 Shutting down syslog servicesMar  3 16:11:04 sles9 kernel: Kernel logg
16:11:04 ..done
16:11:06 Shutting down network interfaces:
16:11:06 eth0
16:11:06 eth0 configuration: qeth-bus-ccw-0.0.0600
16:11:07 %1A..done
16:11:07 Shutting down service network

OMEGLNX1
17:51:19 Unloading AppArmor profiles..done
17:51:19 Turning off quota
17:51:19 ..done
17:51:19 Turning off swap files
17:51:19 Unmounting file systems
17:51:19 ..done..done
17:51:19 Stopping udevd:..done
17:51:19 ..done
17:51:19 Sending all processes the TERM signal...
17:51:19 ..done
17:51:19 Sending all processes the KILL signal...
17:51:19 ..done
17:51:19 Please stand by while rebooting the system...
17:51:19 md: stopping all md devices.
17:51:29 Restarting system.
17:51:29 HCPGR450W CP entered; disabled wait PSW 00020001 80000000 00000000 00
17:51:29 * -- Operations Manager Action LNXBKUP1 scheduled for execution -- *
17:51:29 CONNECT: 20.52.00 VIRTSPU -001-00-30 TOTCPU: -001-10-29
17:51:29 LOGOFF AT 17:51:29 CDT WEDNESDAY 08/25/10 AFTER SIGNAL
17:51:30 z/VM V5.4.0 2009-09-23 15:29
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:11:22</td>
<td>*SMG  OPMGRM1  SUBMIT  BKUPLNX1  Queued command #1: &quot;*SMG  OPMGRM1 SUBMIT  BKUPLNX1&quot;</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRBAK855151  Processing SUBMIT  BKUPLNX1  command for OPMGRM1 at 03/03/09</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRBAK855321  Processing SUBMIT  BKUPLNX1  command for OPMGRM1 at 03/03/09</td>
</tr>
<tr>
<td>16:11:22</td>
<td>AUTO LOGON  ***  BKRWRK01  USERS = 18</td>
</tr>
<tr>
<td>16:11:22</td>
<td>HCPCLS60561  XAUTOLOG  information  for  BKRWRK01:  The  IPL  command  is  veri</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 1: BKRMAK85591  INCLUDE / EXCLUDE  processing  for  job  BKUPL</td>
</tr>
<tr>
<td>16:11:22</td>
<td>ed 1  objects</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRMAK85591  INCLUDE / EXCLUDE  processing  for  job  BKUPLNX1  selected  1  o</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 2: BKRMAK85591  for  backup  processing.</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRMAK85591  for  backup  processing.</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 3: BKRMAK85631  Worker  count  for  job  BKUPLNX1  has  been  set</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRMAK85631  Worker  count  for  job  BKUPLNX1  has  been  set  to  1.</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 4: BKRMAK85701  Instance  number  00000073  has  been  assigned</td>
</tr>
<tr>
<td>16:11:22</td>
<td>KUPLNX1.</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRMAK85701  Instance  number  00000073  has  been  assigned  for  job  BKUPLNX</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 5: BKRMAK85681  CMS  files  will  be  filtered  against  file  ma</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 6: BKRMAK85661  SFS  filesystems  will  be  filtered  with  path</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 7: BKRMAK85641  Sending  BKUPLNX1  JOB  D  to  worker  task  BKRU</td>
</tr>
<tr>
<td>16:11:22</td>
<td>BKRMAK85841  Sending  BKUPLNX1  JOB  D  to  worker  task  BKWRK01.</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Output line 8: File  BKUPLNX1  JOB  D1  sent  to  BKWRK01  at  DEM1ZVM  on  03</td>
</tr>
<tr>
<td>16:11:22</td>
<td>File  BKUPLNX1  JOB  D1  sent  to  BKWRK01  at  DEM1ZVM  on  03/03/09  16:11:23</td>
</tr>
<tr>
<td>16:11:22</td>
<td>Return code &quot;0&quot;  from  command  SUBMIT  BKUPLNX1  at  03/03/09  16:11:23.</td>
</tr>
<tr>
<td>16:11:23</td>
<td>BKRBAK85101  03/03/09  16:11:23  WAKEUP  exited  on  a  VMCF  interrupt.</td>
</tr>
</tbody>
</table>
16:11:23 BKRVRB9011I Job name: BKUPLNX1, instance identifier 00000073 starting
16:11:23 BKRVRB9011I Job owner: BKRADMIN
16:11:23 BKRVRB9011I Master backup server: BKDRKUP, uses virtual machine BKDU
16:11:23 BKRVRB9011I Job token value is 200090303.
16:11:23 BKRVRB9012I Catalog content creation is ENABLED.
16:11:23 BKRVRB9012I Catalog content will be delivered to backup catalog server
16:11:23 BKRVRB9012I Temporary catalog granule data will be generated in CMS fi
16:11:23
16:11:23
16:11:23
16:11:23
16:11:23
16:11:23 BKRVRB9161I Scanning DISKPOOL "LNXBKUP DISKPOOL" for a volume with at
16:11:23 BKRVRB9162I DISKPOOL volume AMVCATLG 333 has 23968 4K blocks free.
16:11:23 BKRVRB9163I Continuing backup with output to AMVCATLG 333
16:11:31 OMEGLNX1 0191  RR EDF 4096 0X1191 00009000 00003977 00000050 00000050
16:11:31
16:11:31
16:11:31
16:11:31
16:11:31
16:11:31 BKRVRB9014I Job completed at 16:11:31 on 03/03/09.
16:11:31 BKRVRB9005I Executing CP command "QUERY TIME"
16:11:31 TIME IS 16:11:31 CST TUESDAY 03/03/09
16:11:31 CONNECT= 00:00:08 VIRTCPU= 000:00.05 TOTCPU= 000:00.10
16:11:31 BKRVRB9006I CP return code 0
16:11:31 * BACKUP COMPLETE - OMEGLNX1 LINUX GUEST
16:11:31 * Operations Manager Action STRTINXKB scheduled for execution -- *
16:11:31 * Operations Manager Action STRTINXC scheduled for execution -- *

BKRWRK01
17:51:29 HCPGIR450W CP entered; disabled wait PSW 00020001 80000000 00000000 00
17:51:29 * Operations Manager Action LNXBKUP1 scheduled for execution -- *
17:51:29 CONNECT= 26:52:36 VIRTCPU= 001:06.93 TOTCPU= 001:13.29
17:51:29 LOGOFF AT 17:51:29 CDT WEDNESDAY 08/25/10 AFTER SIGNAL
17:51:30 z/VM V5.4.0 2009-09-25 10.29
17:51:30 SMSSTC0016E File SYN SYNSYNSYM * not found
17:51:30 STORAGE = 508M
17:51:30 Storage Configuration:
17:51:30 0.96M 100M.412M
17:51:30 Extent Specification Address Range
17:51:30 0.96M 0000000000000000 - 00000000000000005FFFFFFF
17:51:30 100M.412M 0000000064000000 - 000000001FFFFFFF
17:51:30 Storage cleared - system reset.
17:51:30 zIPL v1.8.8 interactive boot menu
17:51:30 0. default (LinuxV2)
17:51:30 1. LinuxV2
17:51:30 2. ipl
17:51:30 Note: VM users please use 'Hcp vi vmsg <number> <kernel-parameters>'
17:51:30 Please choose (default will boot in 10 seconds):
17:51:40 Booting default (LinuxV2)...
17:51:41 Initializing cgroup subsys cpuset
17:51:41 Initializing cgroup subsys cpu
17:51:41 Linux version 2.6.27.42-0.1-default (geeko@buildhost) (gcc version 4.3
17:51:41 setup.1a06a7: Linux is running as a z/VM guest operating system in 64-
17:51:41 Zone PFN ranges: OMEGLNX1

17:51:50 Aug 25 17:51:50 omeglnx1 SuSEfirewall2: SuSEfirewall2 not active
17:51:50 eth0
17:51:50 .done
17:51:50 Setting up service (localfs) network
17:51:50 Starting rpcbind
17:51:51 .done
17:51:51 Not starting NFS client services - no NFS found in /etc/fstab:...unused
17:51:51 Mount CIFS File Systems...unused
17:51:51 Starting service gdm
17:51:51 .done
17:51:51 Starting auditd
17:51:51 .done
17:51:51 Starting cupsd
17:51:51 .done
17:51:52 Starting irqbalance...unused
17:51:52 Setting up (remotefs) network interfaces:
17:51:52 Setting up service (remotefs) network
17:51:52 .done
17:51:52 Starting Name Service Cache Daemon
17:51:52 .done
17:51:52 Starting mail service (Postfix)
17:51:53 Starting smartd...unused
17:51:53 Starting SSH daemon...done
17:51:53 .done
17:51:54 Starting CRON daemon...done
17:51:54 Starting INET services. (xinetd)
17:51:55 .done
17:51:55 Master Resource Control: runlevel 5 has been reached
17:51:55 Skipped services in runlevel 5: Y80CÝ43Dnfs smvfs irq_balancer smartd
17:51:55 Welcome to SUSE Linux Enterprise Server 11 (s390x) - Kernel 2.6.27.42-
17:51:55 omeqlnx1 login:
Scenario D: How Do You Do That?

Console rule in Operations Manager:

* Watch for shutdown complete message on Linux guest

DEFRULE NAME(LNXDOWN),+
  MATCH(*HCPGIR450%*),+
  USER(OMEGLNX1),+
  ACTION(LNXBKUP)

* Turn off the rule in general

SUSPEND RULE(LNXDOWN)
Scenario D: How Do You Do That?

Chain of actions in Operations Manager, triggered by schedule

* Start of guest backup scenario, resume rule for guest shutdown msg
DEFACTN NAME(STOPLNX),+
   COMMAND('RESUME RULE(LNXDOWN)'),+
   ENV(GOM),+
   NEXTACTN(STOPLNXA)
*

* Change SECUSER to Operations Manager before shutting it down
DEFACTN NAME(STOPLNXA),+
   COMMAND(CP SET SECUSER OMEGLNX1 OPMGRM1),+
   ENV(LVM),+
   NEXTACTN(STOPLNXB)
*

* Action to shut down Linux guest in prep for backup
DEFACTN NAME(STOPLNXB),+
   COMMAND(CP SIGNAL SHUTDOWN OMEGLNX1 WITHIN 90),+
   ENV(LVM)
Scenario D: How Do You Do That?

Chain of actions and rules in Operations Manager:

* Highlight message and submit backup job for a specific Linux guest
  DEFACTN NAME(LNXBKUP),+
    INPUT(AHI),+
    NEXTACTN(LNXBKUPB)
  *
  DEFACTN NAME(LNXBKUPB),+
    COMMAND(CP SMGST BKRBKUP SUBMIT BKUPLNX1),+
    ENV(LVM)
  *
  * Define all Backup Manager workers as a group
  DEFGROUP NAME(BKRWRKRS),+
    USER(BKRWRK0*)
  *
  * Restart Linux guest when Backup is complete
  DEFRULE NAME(BKUPDONE),+
    MATCH(*BACKUP COMPLETE - OMEGLNX1*),+
    GROUP(BKRWRKRS),+
    ACTION(STRTLNX)
Scenario D: How Do You Do That?

Suspend rule in Operations Manager (don’t back up the guest every time it is shut down)

* Suspend rule for backing up Linux guest

DEFACTN NAME(DELBKUP),+

   COMMAND(SUSPEND RULE(LNXDOWN))+

   ENV(GOM)
Scenario E: Suspend and Resume a Linux Guest

- From DEMOADMN, view the console of the Linux guest
  
  gomcmd opmgrml viewcon user(rhel6d)

- From MAINT, suspend a Linux guest using CP SIGNAL SHUTDOWN
  
  cp signal shutdown rhel6d within 90

- On DEMOADMN, note the guest suspending and logging off

- From MAINT, resume a Linux guest
  
  cp xautolog rhel6d

- On DEMOADMN, note the guest resuming
cp signal shutdown rhel6d within 90

Ready, T=0.01/0.01 08:31:55
06:15:53
06:31:53 PM: Syncing filesystems ...
06:31:54 done.
06:31:54 Freezing user space processes ... (elapsed 0.00 seconds) done.
06:31:54 Freezing remaining freezable tasks ... (elapsed 0.00 seconds) done.
06:31:54 PM: Preallocating image memory... done (allocated 65127 pages)
06:31:54 PM: Allocated 266598 kbytes in 0.07 seconds (3721.54 MB/s)
06:31:54 Suspending console(s) (use no_console_suspend to debug)
06:31:54 01: HCPGSP2629I The virtual machine is placed in CP mode due to a SIGP
06:31:54 01: HCPGSP2627I The virtual machine is placed in CP mode due to a SIGP
06:31:54 Disabling non-boot CPUs ...
06:31:54 cpu: Processor 1 stopped
06:31:54 PM: Creating hibernation image:
06:31:54 PM: Need to copy 62425 pages
06:31:54 PM: Hibernation image created (62425 pages copied)
06:31:54 Enabling non-boot CPUs ...
06:31:54 cpu: Processor 1 started, address 0, identification 07CB92
06:31:54 CPU1 is up
06:31:54 qdio: 0.0.1e02 OSA on SC a using AI:1 QEBSM:0 PCI:1 TDD:1 SIGA:RW A0
06:31:54 qeth 0.0.1e00: Device is a Guest LAN QDIO card (level: V620)
06:31:54 with link type GuestLAN QDIO (portname: )
06:31:54 qeth 0.0.1e00: Hardware IP fragmentation not supported on eth0
06:31:54 qeth 0.0.1e00: Inbound source MAC-address not supported on eth0
06:31:54 qeth 0.0.1e00: VLAN enabled
06:31:54 qeth 0.0.1e00: Multicast enabled
06:31:54 qeth 0.0.1e00: IPV6 enabled
06:31:54 qeth 0.0.1e00: Broadcast enabled
06:31:54 qeth 0.0.1e00: Using SW checksumming on eth0.

PF01= SCROLL PF02= PF03= END PF04= PF05= HOLD PF06= FORMAT
PF07= UP PF08= DOWN PF09= PF10= LEFT PF11= RIGHT PF12= RECALL

RHEL6D
06:32:08 83%
06:32:08 84%
06:32:08 85%
06:32:09 86%
06:32:09 87%
06:32:09 88%
06:32:09 89%
06:32:09 90%
06:32:09 91%
06:32:10 92%
06:32:10 93%
06:32:10 94%
06:32:10 95%
06:32:10 96%
06:32:10 97%
06:32:11 98%
06:32:11 99%
06:32:11 100% done
06:32:11 PM: Wrote 250188 kbytes in 16.62 seconds (15.05 MB/s)
06:32:11 PM: S |
06:32:11 md: stopping all md devices.
06:32:11 Disabling non-boot CPUs ...
06:32:11 01: HCPGSP26281 The virtual machine is placed in CP mode due to a SIGP
06:32:11 09: HCPGIR458W CP entered; disabled wait PSW 00000001 00000000 00000000 00000000
06:32:11 09: CONNECT= 08:32:00 VIRTCPU= 001:15.80 TOTCPU= 001:29.34
06:32:11 09: LOGOFF AT 06:32:11 EDT TUESDAY 10/16/12 AFTER SIGNAL

PF01= SCROLL PF02= PF03= END PF04= PF05= HOLD PF06= FORMAT
PF07= UP PF08= DOWN PF09= PF10= LEFT PF11= RIGHT PF12= RECALL
cp signal shutdown rhel6d within 90
Ready; T=0.01/0.01 06:31:53
HCPSIG2113I User RHEL6D has reported successful termination

cp xautolog rhel6d
ICH70001I RHEL6D  LAST ACCESS AT 15:09:56 ON FRIDAY, OCTOBER 12, 2012
Command accepted
Ready; T=0.01/0.01 06:37:36
AUTO LOGON ***  RHEL6D  USERS = 41
HCPCLS6056I XAUTOLOG information for RHEL6D: The IPL command is verified by the IPL command processor.
06:32:11 01: HCPGSP2629I The virtual machine is placed in CP mode due to a SIGP
06:32:11 00: HCPGTR450W CP entered; disabled wait PSW 00020001 80000000 00000000
06:32:11 00: CONNECT= 88:32:08 VIRTCP= 001:15:80 TOTCPU= 001:20.34
06:32:11 00: LOGOFF AT 06:32:11 EDT TUESDAY 10/16/12 AFTER SIGNAL
06:37:36 NIC 1E00 is created; devices 1E00-1E02 defined
06:37:36 STORAGE = 512M MAX = 4G INC = 2M STANDBY = 1G RESERVED = 0
06:37:36 Storage cleared - system reset.
06:37:36 DASD 0101 DEFINED
06:37:36 DASD 0102 DEFINED
06:37:36 00: CPU 01 defined
06:37:36 z/VM V6.2.0 2012-06-01 09:49
06:37:36 DMSACP729I A (191) R/O
06:37:36 DMSVML2060I Tools disk accessed as file mode J
06:37:36 EXEC MKSWAP 0101 (BLK 512)
06:37:36 EXEC MKSWAP 0102 (BLK 512)
06:37:36 EXEC MKSWAP 0102 (BLK 512)
06:37:36 DASD 0102 9336 (VDSK) R/W 262144 BLK ON DASD VDSK SUBCHANNEL
06:37:36 DASD 0102 9336 (VDSK) R/W 262144 BLK ON DASD VDSK SUBCHANNEL
06:37:37 2012-10-16 06:37:37 IPLing device 201 ...
06:37:37 00: zIPL v1.0.2-40.el6 interactive boot menu
06:37:37 00: 0. default (linux-2.6.32-279.el6.s390x)
06:37:37 00: 1. linux-2.6.32-279.el6.s390x
06:37:37 00: Note: VM users please use 'Hcp vi vmsg <input>'
06:37:37 00: Please choose (default will boot in 5 seconds):
06:37:42 00: Booting default (linux-2.6.32-279.el6.s390x)...
PF01= SCROLL PF02= PF03= END PF04= PF05= HOLD PF06= FORMAT
PF07= UP PF08= DOWN PF09= PF10= LEFT PF11= RIGHT PF12= RECALL

RHEL6D
124

06:37:44 udev: starting version 147
06:37:44 dracut: Starting Plymouth daemon
06:37:44 dracut: rd_NO_DM: removing DM RAID activation
06:37:44 dracut: rd_NO_DM: removing MD RAID activation
06:37:44 dasd-eckd 0.0.010f: New DASD 3390/0A (CU 3390/01) with 000 cylinders,
06:37:44 dasd-eckd 0.0.010f: DASD with 4 KB/block, 576000 KB total size, 48 KB/
06:37:44 dasdal:nonl) dasdal
06:37:44 dasd-eckd 0.0.0201: New DASD 3390/0A (CU 3390/01) with 600 cylinders,
06:37:44 dasd-eckd 0.0.0201: DASD with 4 KB/block, 432000 KB total size, 48 KB/
06:37:44 dasdb:nonl) dasdb1
06:37:44 PM: Starting manual resume from disk
06:37:44 Freezing user space processes ... (elapsed 0.00 seconds) done.
06:37:44 Freezing remaining freezable tasks ... (elapsed 0.00 seconds) done.
06:37:44 PM: Loading image data pages (62547 pages) ... 0%

06:37:44 1% 2%
06:37:44 3% 4%
06:37:44 5% 6%
06:37:45 7% 8%
06:37:45 9% 10%
06:37:45 11% 12%
06:37:45 13%
06:37:45 14% 15%
06:37:45 16% 17%
06:37:45 18% 19%
06:37:45 20% 21%
06:37:45 22%
06:37:46 23% 24% 25%
06:37:46 26%

PF01= SCROLL PF02= PF03= END PF04= PF05= HOLD PF06= FORMAT
PF07= UP PF08= DOWN PF09= PF10= LEFT PF11= RIGHT PF12= RECALL

RHEL6D
06:37:51 Enabling non-boot CPUs ...
06:37:51 cpu: Processor 1 started, address 0, identification 07C892
06:37:51 CPU1 is up
06:37:51 dasd-eckd 0.0.0.0201: A channel path to the device has become operational
06:37:51 dasd-fba 0.0.0.0101: A channel path to the device has become operational
06:37:51 dasd-fba 0.0.0.0102: A channel path to the device has become operational
06:37:51 dasd-eckd 0.0.0.0501: A channel path to the device has become operational
06:37:51 dasd-eckd 0.0.0.0502: A channel path to the device has become operational
06:37:51 dasd-eckd 0.0.0.0503: A channel path to the device has become operational
06:37:51 dasd-eckd 0.0.0.0202: A channel path to the device has become operational
06:37:51 qdio: 0.0.1e02 OSA on SC a using AI:1 QEBSM:0 PCI:1 TDD:1 SIGA:RW AO
06:37:51 qeth 0.0.1e00: Device is a Guest LAN QDIO card (level: V620)
06:37:51 with link type GuestLAN QDIO (portname: )
06:37:51 qeth 0.0.1e00: Hardware IP fragmentation not supported on eth0
06:37:51 qeth 0.0.1e00: Inbound source MAC-address not supported on eth0
06:37:51 qeth 0.0.1e00: VLAN enabled
06:37:51 qeth 0.0.1e00: Multicast enabled
06:37:51 qeth 0.0.1e00: IPV6 enabled
06:37:51 qeth 0.0.1e00: Broadcast enabled
06:37:51 qeth 0.0.1e00: Using SW checksumming on eth0.
06:37:51 qeth 0.0.1e00: Outbound TSO not supported on eth0
06:37:51 Restarting tasks ... done.
Scenario E: How Do You Do That?

- Define swap space in /etc/fstab

/dev/disk/by-path/ccw-0.0.010f-part1 swap

- Enable suspend/resume and define swap space to use for it in zipl.conf

resume=/dev/disk/by-path/ccw-0.0.010f-part1

- Define suspend as response to signal shutdown (via control-alt-delete.conf)

script
/bin/echo disk > /sys/power/state || /sbin/shutdown -h -t 4 now
end script
Scenario F: Reviewing a Disaster Recovery Backup

- Create a backup job based on sample provided
- Perform image backup of DASD volumes for Disaster Recovery (DR) purposes
  - Can include z/VM and Linux guests
- Output of backup is a DDR tape
  - Compatible with DDR for restore at recovery site
- Submit DR job for review
- Review output of review processing
Scenario F: Detailed Steps

- From an authorized z/VM user ID, copy the sample DDR template from the sample disk to a new backup job
- Edit the new job and make necessary changes
  ```
  xedit ddrdemo template c
  ```
- If not using SFS for templates disk, tell Backup Manager to reaccess the disk
  ```
  smsg bkrbkup cms acc 199 e/e
  ```
- From an authorized z/VM user ID, submit the backup job for review processing
  ```
  smsg bkrbkup review ddrdemo
  ```
- View the file(s) returned to you by Backup Manager
  ```
  peek <rdrfile>
  ```
```
q disk
<table>
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</tbody>
</table>

x ddrdemo template c_  
```

```
[Image of a computer screen with terminal output]
```

```
31/021

[Text reading 'Connected to remote server host 9.39.68.141 using port 23']
```
DDRDERR TEMPLATE C2

V 112 Trunc=112 Size=156 Line=0 Col=1 Alt=0

===>

...+....1...+....2...+....3...+....4...+....5...+....6...+....7...

00000 * * * Top of File * * *
00001 * IBM Backup and Restore Manager for z/VM - 5697-J06 - 1.2.0
00002 *
00003 * Sample backup job template - DDRSAMP
00004 *
00005 * This file includes records longer than 80 characters. A screen width of
00006 * (327x model 5 or equivalent) is recommended when viewing or customizing
00007 * sample file for local use.
00008 *
00009 * SAMPDDR is an example of a full backup job definition. Output is direc
00010 * to single-copy tape via the IBMTAPE output handler.
00011 *
00012 * Backup type : Full backup; no incremental backup processing will
00013 * (See SAMPINCR TEMPLATE for an incremental backup j
00014 *
00015 * Output destination: Single-copy tape, DASD Dump Restore (DDR) format,
00016 * (BKR_Output_Spec)
00017 *
00018 * Number of workers : 1; to increase bandwidth on larger systems, add ad
00019 * (BKR_Job_Workers)
00020 *
00021 * Instance tracking : Automatic; this is the recommended setting.
00022 * (BKR_Job_Instance = $$INST$$)
00023 *
00024 * Catalog content : Enabled; results of this job will be transmitted t
00025 * (BKR_Job_Catalog)
00026 *
00027 * CMS file filtering: None; all files and SFS directories will be includ
00028 * (BKR_Job_CMS_FileMask, BKR_Job_SFS_PathMask)
<table>
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<tr>
<th>FUNCTION</th>
<th>MEDIATYPE</th>
<th>OWNER</th>
<th>VDEV</th>
<th>VOLUME</th>
<th>DEVTYPE</th>
<th>START</th>
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<td>*</td>
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<td>0128</td>
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</table>

* Job_Trailer terminates the INCLUDE / EXCLUDE / SELECT definition section.
  post-backup processing specifications.

Job_Trailer

Tell the catalog service virtual machine to retain catalog contents and
for a period of 30 days. The output from CP QUERY TIME provides a reco
to process this backup. Output from INDICATE USER provides additional
worker virtual machine resource consumption.

Config BKR_Catalog_Retention = 30
CP_Command QUERY TIME
CP_Command INDICATE USER

Console *
Console * Sample DDRTAPE backup template created 5/10/2007.
Console * Job image generated $$UDATE$$ $$TIME$$
Console *

Close the console log; this will deliver the job history to the backup
SMSG BKRBKUP REVIEW ddrdemo
Ready: T=0.01/0.01 19:46:06

BKRBK8929I Processing REVIEW DDRDEMO command for TSTADMIN1.

RRR FILE 0099 SENT FROM BKRBKUP  PUN WAS 0099  RECPS 0082 CPT 001 A NONOLD NONKEEP
BKRMMAK8559I INCLUDE / EXCLUDE processing for job DDRDEMO selected 6 objects
BKRMMAK8559I for backup processing.

BKRMMAK8559I Worker count for job DDRDEMO has been set to 1.
BKRMMAK8568I CMS files will be filtered against file mask "** **".
BKRMMAK8566I SFS filespaces will be filtered with path mask "**".
BKRMMAK8583I Sending results to TSTADMIN1 for review.

File DDRSAMP JOB 01 sent to TSTADMIN1 at DEM1ZVM on 04/20/09 19:46:06
Return code "0" from command REVIEW DDRDEMO at 04/20/09 19:46:06.
File DDRSAMP JOB from BKRBKUP at DEM1ZVM Format is NETDATA.

** Top of File **

* IBM Backup and Restore Manager for z/VM - 5697-J06 - 1.2.0
* Sample backup job template - DDRSAMP
* This file includes records longer than 80 characters. A screen width
*  (327x model 5 or equivalent) is recommended when viewing or customizin
* sample file for local use.
* SAMPDDR is an example of a full backup job definition. Output is dire
* to single-copy tape via the IBMTAPE output handler.
* Backup type : Full backup; no incremental backup processing wil
  (See SAMPINCR TEMPLATE for an incremental backup
* Output destination: Single-copy tape, DASD Dump Restore (DDR) format,
  (BK_Output_Spec)
* Number of workers : 1; to increase bandwidth on larger systems, add a
  (BKR_Workers)
* Instance tracking : Automatic; this is the recommended setting.
  (BKR_Job_Instance = $INST$)
* Catalog content : Enabled; results of this job will be transmitted
1= Help  2= Add line  3= Quit  4= Tab  5= Locate  6= ?/Change
7= Backward  8= Forward  9= Receive  10= Rgtleft  11= Spltjoin  12= Cursor

****
JOB_HEADER
DUMPRDV 520RES 0123 $$DRIVER$$
DUMPRDV 520SPL 0124 $$DRIVER$$
DUMPRDV 520PAG 0125 $$DRIVER$$
DUMPRDV 520W01 0126 $$DRIVER$$
DUMPRDV 520W02 0127 $$DRIVER$$
DUMPRDV DMZU00 0128 $$DRIVER$$
JOB TRAILER

* Tell the catalog service virtual machine to retain catalog contents an
* for a period of 30 days. The output from CP QUERY TIME provides a rec
* to process this backup. Output from INDICATE USER provides additional
* worker virtual machine resource consumption.

CONFIG BKR_CATALOG_RETENTION = 30
CP_COMMAND QUERY TIME
CP_COMMAND INDICATE USER

CONSOLE *
CONSOLE * JOB IMAGE GENERATED 04/20/09 19:46:06
CONSOLE *

* Close the console log; this will deliver the job history to the backup
1= Help  2= Add line  3= Quit  4= Tab  5= Clocate  6= ?/Change
7= Backward  8= Forward  9= Receive  10= Rgtleft 11= Spltjoin  12= Cursor

====> _

X E D I T 1 File

31/007
Scenario G: Reviewing data in the Backup catalog for recovery

- Various backup jobs have previously been submitted and completed
- Full screen interfaces available for searching the backup catalog and finding data available for recovery
  - BKRLIST
    - Useful when looking for a specific file or set of files owned by a specific user ID
    - Users with ADMIN authority beware of size
      - Use parameters to narrow the search
  - BKRUSER
    - Useful when looking for backup jobs associated with a specific user ID
  - BKRJOB
    - Useful when looking for backup jobs by job name
  - BKRVOL
    - Useful when looking for backup jobs associated with a specific DASD volume
Scenario G: Detailed Steps

- From an authorized z/VM user ID, issue one of the following commands to browse the catalog:
  - `bkrlist`
  - `bkruser`
  - `bkrjob`
  - `bkrvol`

- Use F11 to drill down through details.
- Use F10 to restore data.