Backup Strategies for z/VM and Linux on z Systems

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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
  - Managing a z/VM and Linux on z Systems Environment Using IBM Solutions
  - Tuesday: 04:30 PM - 05:30 PM, Asia 5
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
Image level backup of z/VM
- Operating system

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

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

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

Location A

Location B
High Availability and Backup/Recovery are **NOT** the Same

Location A

Does not address operational recovery needs

Location B
Recommended Practices – Backup and Recovery

**Image level backup of z/VM**
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**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
Image level backup and recovery of DASD volumes from z/OS

- Existing z/OS procedures and tools in place
- Use existing tape infrastructure
- 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 can not 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
What About DDR?

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 wildcards – 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**

**Image level backup of z/VM**
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**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
File Level Backup and Recovery of Linux Guests

- File level backup & recovery of Linux guests using Spectrum Protect (formerly 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 Spectrum Protect Server is on Linux on z Systems (or a distributed platform)
  - Can use FICON-attached tape hardware using Spectrum Protect 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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**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 tapes 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
      - 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
Where and How to Back Up z/VM and Linux Guests

- 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
      - DASD A backed up, then while backing up DASD B, DASD A changes again
Backing 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

Backup Strategies for z/VM and Linux on z Systems

Option 1

Single Config Users and MDisks
Multiconfig / IDENTITY Users and MDisks
Considerations for Backup and Restore

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
SSI Considerations for Backup and Restore

- Recommendation
  - Create Backup service machines as IDENTITY users on each member
    - For IBM Backup and Restore Manager: BKRBKUP, BKRCATLG, BKRWRKnn
  - Create one backup catalog for the entire cluster
    - Place the backup catalog in SFS
      - One single configuration user for SFS server/filepool (e.g. BKRSVSFS)
      - Configure as SSI (or REMOTE) in DMSPARMS file
    - Allows admins to see all backup data from all members of the cluster in one view
    - Allows single configuration users to restore their own data when logged onto any member
SSI Considerations for Backup and Restore

**Recommendation**

- Create separate backup jobs for single configuration users vs IDENTITY users
  - Backup job(s) for *single configuration users* – only run them from one member
    - Running them on other members will just back up the same data twice
  - 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
Backup Data and Media

Backup and Restore Manager

Shared File System (SFS)
CMS minidisk
ECKD
FBA
VFB-512

Tape
Twin Tapes
Dual Tapes
DDR Tape

CMS minidisk or SFS file pool (disk pool)
Restore Data and Media

Backup and Restore Manager

- Tape
- CMS minidisk or SFS file pool
- Share File System (SFS)
- CMS minidisk
- Spool/reader
- VFB-512
- ECKD
- FBA

- DIRA/DIRB/FN1 FT1
- DIRA/DIRC/FN2 FT2
- FN2 FT2 FM2
- FN3 FT3 FM3
- FN1 FT1 FM1
- FN2 FT2 FM2
- MDisk/Volume
- MDisk/Volume
- MDisk/Volume
- MDisk/Volume
Backup and Restore Manager and Linux Guests

Using Backup and Restore Manager with Spectrum Protect (formerly Tivoli Storage Manager)

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

- Spectrum Protect Server
- Linux
- CMS minidisk and SFS files
- FN FT FM
- FBA or ECKD DASD
- dirA/file1.ext
- dirB/file2.ext
- dirC/file3.ext

Other guest
z/VM
Backup and Restore Manager
Linux
Linux
Spectrum Protect Client
Spectrum Protect Client
Spectrum Protect Server
Spectrum Protect Server
dirA/file1.ext
dirB/file2.ext
dirC/file3.ext
FN FT FM
FN FT FM
FN FT FM
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

```c
#include <stdio.h>

FUNCTION MEDIATYPE OWN "VDEV VOLUME DEVT " START END SIZE
|----------|----------|--------|--|----|------|--------|--|----------|--|----------|--|-------|
| INCLUDE  MINIDISK  * = * = * = * = * = * = * = *
| EXCLUDE  MINIDISK  *LNX* = * = * = * = * = * = * = *
| EXCLUDE  MINIDISK  MAINT 0123 = * = * = * = * = * = *
| EXCLUDE  MINIDISK  MAINT 0124 = * = * = * = END = *
| EXCLUDE  MINIDISK  * = * = * = * = * = * > 3300
| INCLUDE  MINIDISK  MAINT 012* = * = * = * = *

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<td>EXCLUDE  RDEVICE  *B</td>
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FUNCTION MEDIATYPE VOLSER
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<td>INCLUDE  RDEVVOL  630*</td>
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FUNCTION MEDIATYPE POOLNAME OWNER FS
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```
Backup and Restore Manager Architecture – non-SSI

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

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

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

- **Main Server (BKRBKUP)**
  - Performs backup and restore tasks
  - Sends catalog data to catalog server
  - Retrieves catalog data from catalog server

- **Worker (BKRWRKnn)**

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

[Diagram showing the architecture with various components such as OPERATOR, LINUX1, LINUX2, TCPIP, BKRBKUP, BKRCATLG, and BKRWRKnn connected through arrows indicating data flow and relationships.]
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

**Backup Manager**
- Spectrum Protect

- 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)
- IP

- z/OS RMM Agent
  - Started Task (VMTMRMM)
- z/OS RMM Started Task via API (DFRMM)

z/VM

z/OS
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 volsers
  - All z/VM systems share one catalog
- IP used for communication between systems
Communication Between Service Machines and Systems

TMTM1

TMLM1

RMSMASTR

SYSTEM1 (Catalog node)

TMDM1

Tape catalog

SYSTEM2 (Request node)

TMTM1

TMDM1

TMLM1

RMSMASTR
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 (Real) Tape Devices

- No need to dedicate real 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 accesses tape devices directly
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
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

Hands-on Lab
- Managing a z/VM and Linux on z Systems Environment Using IBM Solutions
- Tuesday: 04:30 PM - 05:30 PM, Asia 5
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
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 opmgrm1 viewcon user(backup)`
Backup Strategies for z/VM and Linux on z Systems

Processing REVIEW INCREM01 command for TSTADMI.

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 0002 RECS 0002 CPY 001 A NOHOLD NOKEEP

File INCREM01 LINKFAIL D1 sent to TSTADMI at DEMIZVM on 03/03/09 14:48:58
BKRMK9102W 2 minidisks were selected by INCLUDE/EXCLUDE processing but could not be CP LINKed.
BKRMK8559I INCLUDE / EXCLUDE processing for job INCREM01 selected 149 objects
BKRMK8559I for backup processing.
BKRMK8563I Worker count for job INCREM01 has been set to 2.
BKRMK8568I CMS files will be filtered against file mask "**".
BKRMK8566I SFS file spaces will be filtered with path mask ".".
BKRMK8583I Sending results to TSTADMI for review.
File INCREM00 JOB D1 sent to TSTADMI at DEMIZVM on 03/03/09 14:48:58
File INCREM01 JOB D1 sent to TSTADMI at DEMIZVM on 03/03/09 14:48:58

Return code 0 from command REVIEW INCREM01 at 03/03/09 14:48:58.
### Backup Strategies for z/VM and Linux on z Systems

**IBM z Systems**

---

### Command Line Interface

**Backup Dump List**

<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>
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</thead>
<tbody>
<tr>
<td></td>
<td>INCREM01</td>
<td>LINKFAIL</td>
<td>PUN</td>
<td>A</td>
<td>BKRBKUP</td>
<td>DEMIZVM</td>
<td>NONE</td>
<td>6</td>
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<tr>
<td></td>
<td>INCREM00</td>
<td>JOB</td>
<td>PUN</td>
<td>A</td>
<td>BKRBKUP</td>
<td>DEMIZVM</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>DEMIZVM</td>
<td>NONE</td>
<td>82</td>
<td>3/03</td>
</tr>
</tbody>
</table>

**Actions:**

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  

---

**Connected to remote server/**

03/03 01:03:45 using port 33
0050  PEEK   A0  V 87  Trunc=87  Size=2  Line=0  Col=1  Alt=0
File INCREMO1 LINKFAIL from BRKBKUP at DEMIZVM 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= Rght/eft  11= Split/join  12= Cursor

XEDIT 1 File
Backup Strategies for z/VM and Linux on z Systems

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IBM z Systems

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0051 PEEK A0 V 80 Trunc=80 Size=163 Line=32 Col=1 Alt=0
File INCREMO1 JOB from BKRBKUP at DEM12VM Format is NETDATA.

CONFIG BKR_OUTPUT_SPEC = CMSFILE INCREMO1 DISKPOOL *

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

CP_COMMAND TERM MORE 50 10
CP_COMMAND TERM HOLD ON
CP_COMMAND SPOOL CONSOLE TO BKADMIN CLASS T TERM START NAME INCREMO1 20090303
CP_COMMAND TERM LINES 255

CONFIG BKR_JOB_WORKERS = 2
CONFIG BKR_JOB_NAME = INCREMO1
CONFIG BKR_JOB_INSTANCE = $$INST$$
CONFIG BKR_JOB_OWNER BKADMIN
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= Rghtleft 11= Splltjoin 12= Cursor

===> - X E D I T 1 File
* 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_QUICK SPOOL CONSOLE CLOSE NAME INCREMO1 20090303
CP_QUICK SPOOL CONSOLE NAME WORKER OUTPUT
EOJ

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

===> _ X E D I T 1 File
Backup Strategies for z/VM and Linux on z Systems

Ready; T=0.0270.02 15:13:28
smsg bkrbkup submit increm01
Ready; T=0.01/0.01 15:13:36
BKRBAK8592I Processing SUBMIT INCREM01 command for TSTADMIN1 at 03/03/09 15:13:06.

RDR FILE 0053 SENT FROM BKRBKUP PUR 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 filesystems 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
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
  `bkrlist`
- 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
  `rdrlist`
- 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 A</td>
<td>A</td>
<td>1</td>
<td>08/11/07</td>
<td>12:18:04</td>
<td>0191</td>
<td></td>
</tr>
<tr>
<td>TSTUSER1 A</td>
<td>AX</td>
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<td>0191</td>
<td></td>
</tr>
<tr>
<td>TSTUSER1 ABC</td>
<td>XEDIT</td>
<td>1</td>
<td>06/09/19</td>
<td>02:24:28</td>
<td>0191</td>
<td></td>
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<td>0191</td>
<td></td>
</tr>
<tr>
<td>TSTUSER1 B</td>
<td>B</td>
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<td>08/11/07</td>
<td>18:52:40</td>
<td>0191</td>
<td></td>
</tr>
<tr>
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<td>03:40:47</td>
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<td></td>
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</tr>
<tr>
<td>Owner</td>
<td>Filename</td>
<td>Filetype</td>
<td>From</td>
<td>Date</td>
<td>Time</td>
<td>Device or Path</td>
</tr>
<tr>
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<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 filesystem:

and path:

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

Master backup userid: BKRBKUP

3 = Quit 4 = Return 10 = Restore

07/030

[Connected to remote server/host 8.29.66.141 using port 23]
Your command "RESTORE INCREM01 00000054 TSTUSER1 EDF $DEV0191 T0 RDR TSTUSER1 - B B 1" is being processed at 03/03/09 15:57:55.

BRKREST0191 Sending RESTORE request 00000054 to worker task BKRWRK03...

File RESTORE JOB D1 sent to BKRWRK03 at DEM1ZVM on 03/03/09 15:57:55

*** Restore Request 00000054 submitted to worker BKRWRK03 for processing

Return code "0" from command RESTORE INCREM01 00000054 TSTUSER1 EDF $DEV0191 T0 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></td>
<td>RESTORE</td>
<td>00000052</td>
<td>CON</td>
<td>BKRWRK03</td>
<td>DEM1ZVM</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>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15:57:56</td>
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</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

03/001
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 demoadmn a`

- Perform a review of the incremental backup for multiconfiguration users on TEST7SSI
  
  `smag bkrbkup review idssi7in`
Scenario C: Detailed Steps

• Perform a backup for multiconfiguration users on TEST7SSI
  smsg bkrbkup submit idssi7in

• View the console of the worker(s) assigned
  gomcmd opmgrm1 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
  bkrlst

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

• View the files in the reader
  rdrlst

• 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 bkrlis
- 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
Ownerid filter: *
Devices for ownerid OP1

Device filter: *  Type filter: *

1 of 1 devices displayed

$DEV0191 EDF  8 instances
Catalog: BKRSFS: BKRCATLG. USERCAT.

For OP1 $DEVO191 EDF

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
IDSSICF1     00000005    2012/03/06  18:54:01
IDSSIC1      00000001    2012/03/09  14:09:14
IDSSIC1      00000002    2012/03/14  17:11:04
IDSSIC1      00000003    2012/05/21  04:15:22
IDSSIC1      00000004    2012/05/21  11:21:16

1= Help      2=        3= Quit        4= Return
6= Sort Down 7= Backward 8= Forward 10= Restore 11= Details
Ownerid filter: DEMO*

DEMOADMIN DEMOADM2

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

Ownerids

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
Ready; T=0.10/0.10 14:50:07
link op1 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 op1 z

Running TEST7SSI
"...+...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 15:06:19

**msg bkrbkup review idss17in**

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

BKRBAK8529I Processing REVIEW IDSS17IN command for DEMOADMN.
RDR FILE 0477 SENT FROM BKR BKUP  PUN WAS 0006 RECS 0144 CPY 001 A NOHOLD NOKEEP
RDR FILE 0481 SENT FROM BKR BKUP  PUN WAS 0007 RECS 0145 CPY 001 A NOHOLD NOKEEP

**BKRMAK8559I INCLUDE / EXCLUDE processing for job IDSS17IN selected 183 objects**

BKRMAK8559I FOR backup processing.
BKRMAK8563I Worker count for job IDSS17IN has been set to 2.
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 ... BKRM 01
BKRMAK9346I ... BKRM 02

**BKRMAK8583I Sending results to DEMOADMN for review.**
File IDSS17IO JOB D1 sent to DEMOADMN at TEST7SSI on 08/08/12 15:06:25
File IDSS1711 JOB D1 sent to DEMOADMN at TEST7SSI on 08/08/12 15:06:25
Return code "0" from command REVIEW IDSS17IN at 08/08/12 15:06:25.
SMSP BKR BKUP SUBMIT IDSSI7IN

Ready, T 08/08/12 15:08:27

BKRBAK8532I Processing SUBMIT IDSSI7IN command for DEMOADMN at 08/08/12 15:08:27.
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.

BKRMAK8588I CMS files will be filtered against file mask **.*.
BKRMAK8566I SFS file space 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
GOMCMD OPMGRM1 VIEWCON USER(bkrwrk09)
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 0000001 FILE PURGED
15:08:34 BKWRK8512I The stack contains 0 entries. There are 0 lines on the con
15:08:44 * MSG FROM BKRCATLG: BKRCAT8885I Expiration for IDSSI71IN 00000005 set
15:08:44 Return code: 0
15:10:34 BKWRK8509I Invoking WAKEUP with parameters 08/08/12 15:10:34 [ timer
15:10:34 BKWRK9081I Idle timeout limit of +00:02:00 reached; logging off...
15:10:34 HCPMSG045E BKADMIN not logged on
15:10:34 CONNECT= 00:02:06 VIRTCPU= 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
PF01= SCROLL PF02= PF03= END PF04= PF05= HOLD PF06= FORMAT
PF07= UP PF08= DOWN PF09= PF10= LEFT PF11= RIGHT PF12= RECALL

BKRWRK03 (Scroll)
Ready, T=0.01/0.01 15:15:49
**msg bkrbup submit userincr**
Ready, T=0.01/0.01 15:15:58

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 ... BKRWRKO1
BKRMAK9346I ... BKRWRKO2

**BKRMAK8584I Sending USERINCO JOB D to worker task BKRWRKO1.**
File USERINCO JOB D1 sent to BKRWRKO1 at TEST7SSI on 08/08/12 15:15:57
BKRMAK8584I Sending USERINCI JOB D to worker task BKRWRKO2.
File USERINCI JOB D1 sent to BKRWRKO2 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 BKRWRKO2 CON WAS 0002 RECS 0339 CPY 001 T NOHOLD NOKEEP
RDR FILE 0505 SENT FROM BKRWRKO1 CON WAS 0002 RECS 0353 CPY 001 T NOHOLD NOKEEP

**Running TEST7SSI**
### Files for owner(s): *

**Current filters:** Name: TEST  Type: *  Mode: *  Owner: OP1

<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>

**Keys:**
- 1 = Help
- 2 = Mixed case
- 3 = Quit
- 4 = Return
- 5 = Sort Up
- 6 = Sort Down
- 7 = Backward
- 8 = Forward
- 10 = Restore
- 11 = Details
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: demoadm1 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: BKR BKUP  Options:

2=Mixed case  3= Quit  4= Return  10= Restore
id
DEMOADMN AT TESTCSSI VIA RSCS 08/08/12 15:27:58 EDT WEDNESDAY
Ready; T=0.01/0.01 15:27:58

bkrlst

Running TESTCSSI

Connected to remote server/host host: 9.60.86.170 using port 23
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
  \texttt{gomcmd opmgrml defschd name(demo), action(stoplnx), when(now)}
- View the Operations Manager log to see the schedule trigger
  \texttt{gomcmd opmgrml viewlog}
- View the console of the Linux guest to see it shut down
  \texttt{gomcmd opmgrml viewcon user(omeglnx1)}
- View the console of the backup server to see the backup start
  \texttt{gomcmd opmgrml viewcon user(bkrbkup)}
- Find the worker that has been assigned and view its console
  \texttt{gomcmd opmgrml viewcon user(bkrwrkxx)}
- View the console of the Linux guest to see it restart
  \texttt{gomcmd opmgrml viewcon user(omeglnx1)}
- View the backup catalog to see the completed job
  \texttt{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/tty30(/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 Unmount 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 ñIN..done
16:11:07 Shutting down service network . . . . . . . . . . .
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Job name: BKUPLNX1, instance identifier 00000186 starting

Master backup server: BKRBKUP; worker virtual machine BKRW

Temporary catalog granularity data will be generated in CMS files.

Reblocking of Tape output is enabled.

Catalog content creation is enabled.

Catalog content will be delivered to backup catalog server.

SSI is configured but not active. DIAGZCC rc was 248.

Scanning DISKPOOL "LNXBKUP DISKPOOL" for a volume with at least 4K blocks free.

Continuing backup with output to BKUPDISK 0930.

Backup completed at 14:10:03 on 07/09/15.

Backup completed at 14:10:03 on 07/09/15.

CONNECT= 00:00:00 YIRTCP= 000:00:00 TOTCPU= 000:00:00

PF01= SCROLL PF02= TOP PF03= END PF04= EXCMD PF05= HOLD PF06= FORMAT

PF07= UP PF08= DOWN PF09= CMS CO PF10= LEFT PF11= RIGHT PF12= RECALL

Connected to remote server/host 9.39.68.141 using port 23

Disconnected

108
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/VMP 05.4.0 2009 09 25 10.29
17:51:30 BMGETCODE File SVN SVN2NM7M * 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 - 0000000000000001
17:51:30 100M.412M 0000000006400000 - 0000000010000000
17:51:30 Storage cleared - system reset.
17:51:30 zIPL v1.8.0 interactive boot menu
17:51:30
17:51:30 0. default (LinuxV2)
17:51:30
17:51:30 1. LinuxV2
17:51:30 2. ipl
17:51:30
17:51:30 Note: VM users please use 'Hcp vi vmsg <number> <kernel-parameters>'
17:51:30
17:51:30 Please choose (default will boot in 10 seconds):
17:51:40 Booting default (LinuxV2)... 
17:51:41 Initializing cgroup subsys cpu
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:
17:51:50 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 unused
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: Y80CY43Dnfs smbfs 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)
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 SMSG BKRBKUP SUBMIT BKUPLNX1),+
  ENV(LVM)

* Restart Linux guest when Backup is complete
  
  DEFRULE NAME(BKUPDONE),+
  MATCH(*BKRBAK8519I Processing WRKRSTAT command EOJIDLE BKUPLNX1*),+
  USER(BKRBKUP),+
  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 opmgrm1 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
GOMCMD DPMGRM1 VIEWCON USER(rhel6d)
cp signal shutdown rhel6d within 90

Ready, T=0.01/0.01 08:31:35
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 freezeable tasks ... (elapsed 0.00 seconds) done.
06:31:54 PM: Preallocating image memory... done (allocated 65127 pages)
06:31:54 PM: Allocated 266580 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 AO
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: IPv4 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
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
HCPCLS6856I XAUTOLOG information for RHEL6D: The IPL command is verified by the IPL command processor.
The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.

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The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.

The virtual machine is placed in CP mode due to a SIGP.
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06:37:51 Enabling non-boot CPUS ...
06:37:51 cpu: Processor 1 started, address 0, identification 07CB92
06:37:51 CPU1 is up
06:37:51 dasd-ecd 0.0.0.201: 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-ecd 0.0.0.0501: A channel path to the device has become operational
06:37:51 dasd-ecd 0.0.0.0502: A channel path to the device has become operational
06:37:51 dasd-ecd 0.0.0.0503: A channel path to the device has become operational
06:37:51 dasd-ecd 0.0.0.0202: A channel path to the device has become operational
06:37:51 dasd-ecd 0.0.0.0203: 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.

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

Connected to remote server/host 96.80.86.71 using port 23
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>
<table>
<thead>
<tr>
<th>LABEL</th>
<th>VDEV</th>
<th>M</th>
<th>STAT</th>
<th>CYL</th>
<th>TYPE</th>
<th>BLKSIZE</th>
<th>FILES</th>
<th>BLKS</th>
<th>USED-(%)</th>
<th>BLKS</th>
<th>LEFT</th>
<th>BLK</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADM191</td>
<td>191</td>
<td>A</td>
<td>R/W</td>
<td>10</td>
<td>3390</td>
<td>4096</td>
<td>53</td>
<td>245-14</td>
<td>1555</td>
<td>1800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADM192</td>
<td>192</td>
<td>B</td>
<td>R/W</td>
<td>50</td>
<td>3390</td>
<td>4096</td>
<td>3</td>
<td>7927-88</td>
<td>1073</td>
<td>9000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06B199</td>
<td>199</td>
<td>C</td>
<td>R/W</td>
<td>5</td>
<td>3390</td>
<td>4096</td>
<td>9</td>
<td>31-03</td>
<td>869</td>
<td>900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06B202</td>
<td>202</td>
<td>D</td>
<td>R/O</td>
<td>2</td>
<td>3390</td>
<td>4096</td>
<td>37</td>
<td>113-31</td>
<td>247</td>
<td>360</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06B592</td>
<td>592</td>
<td>G</td>
<td>R/O</td>
<td>5</td>
<td>3390</td>
<td>4096</td>
<td>24</td>
<td>145-16</td>
<td>755</td>
<td>900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06B593</td>
<td>593</td>
<td>H</td>
<td>R/O</td>
<td>5</td>
<td>3390</td>
<td>4096</td>
<td>15</td>
<td>82-09</td>
<td>818</td>
<td>900</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td>198</td>
<td>I</td>
<td>R/O</td>
<td>2</td>
<td>3390</td>
<td>4096</td>
<td>5</td>
<td>14-04</td>
<td>346</td>
<td>360</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10C400</td>
<td>400</td>
<td>J</td>
<td>R/W</td>
<td>5</td>
<td>3390</td>
<td>4096</td>
<td>20</td>
<td>124-14</td>
<td>776</td>
<td>900</td>
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</tr>
<tr>
<td>06J197</td>
<td>197</td>
<td>K</td>
<td>R/W</td>
<td>2</td>
<td>3390</td>
<td>4096</td>
<td>6</td>
<td>16-04</td>
<td>344</td>
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<td></td>
<td></td>
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<tr>
<td>J10401</td>
<td>401</td>
<td>L</td>
<td>R/W</td>
<td>3</td>
<td>3390</td>
<td>4096</td>
<td>7</td>
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<td>522</td>
<td>540</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TCM92</td>
<td>692</td>
<td>M</td>
<td>R/O</td>
<td>67</td>
<td>3390</td>
<td>4096</td>
<td>885</td>
<td>8526-71</td>
<td>3534</td>
<td>12060</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNT190</td>
<td>190</td>
<td>S</td>
<td>R/O</td>
<td>100</td>
<td>3390</td>
<td>4096</td>
<td>687</td>
<td>14513-81</td>
<td>3487</td>
<td>18000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNT19E</td>
<td>19E</td>
<td>Y/S</td>
<td>R/O</td>
<td>250</td>
<td>3390</td>
<td>4096</td>
<td>1102</td>
<td>28088-62</td>
<td>16912</td>
<td>45000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNT19D</td>
<td>19D</td>
<td>Z/Z</td>
<td>R/O</td>
<td>146</td>
<td>3390</td>
<td>1024</td>
<td>14855</td>
<td>53765-74</td>
<td>18505</td>
<td>72270</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ready; T=0.01/0.01 19:36:52

`x ddrdemo template c_`
```
<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup type</td>
<td>Full backup; no incremental backup processing will</td>
</tr>
<tr>
<td></td>
<td>(See SAMPINCR TEMPLATE for an incremental backup job)</td>
</tr>
<tr>
<td>Output destination</td>
<td>Single-copy tape, DASD Dump Restore (DDR) format.</td>
</tr>
<tr>
<td>Number of workers</td>
<td>1; to increase bandwidth on larger systems, add additional workers</td>
</tr>
<tr>
<td>Instance tracking</td>
<td>Automatic; this is the recommended setting.</td>
</tr>
<tr>
<td>Catalog content</td>
<td>Enabled; results of this job will be transmitted to</td>
</tr>
<tr>
<td></td>
<td>BKR_Job_Catalog</td>
</tr>
<tr>
<td>CMS file filtering</td>
<td>None; all files and SFS directories will be included</td>
</tr>
<tr>
<td></td>
<td>BKR_Job_CMS_FileMask, BKR_Job_SFS_PathMask</td>
</tr>
</tbody>
</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 $$UPDATE$$ $$TIME$$
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.
RDR FILE 0093 SENT FROM BKRBKUP. FAY WAS 0044 REC=0062 CPT=601 A NOHOLD NOKEEP
BKRMK8559I INCLUDE / EXCLUDE processing for job DDRDEMO selected 6 objects
BKRMK8559I for backup processing.
BKRMK8563I Worker count for job DDRDEMO has been set to 1.
BKRMK8566I CMS files will be filtered against file mask "* * *".
BKRMK8566I SFS file spaces will be filtered with path mask "*".
BKRMK8583I 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.
Backup Strategies for z/VM and Linux on z Systems

IBM z Systems

**Session B** - TSTADMIN - [32 x 80]

0093  PEEK A0 V 112 Trunc=112 Size=113 Line=0 Col=1 Alt=0
File DDRESAMP .JOB from BKRBKUP at DEMIZVM Format is NETDATA.

* * * Top of File * * *

* IBM Backup and Restore Manager for z/VM - 5697-J06 - 1.2.0
* * Sample backup job template - DDRESAMP
* * 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 will
* * (See SAMPINCR TEMPLATE for an incremental backup
* * Output destination: Single-copy tape, DASD Dump Restore (DDR) format,
* (BKPR_Output_Spec)
* * Number of workers : 1; to increase bandwidth on larger systems, add a
* (BKPR_Workers)
* * Instance tracking : Automatic; this is the recommended setting.
* (BKPR_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= Splitjoin 12= Cursor

===> 

X E D I T  1 File

31/007

Connected to remote host 9.39.68.141 using port 23
IBM z Systems

Backup Strategies for z/VM and Linux on z Systems

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**Session B - TSTADMIN - [32 x 80]**

0093 PEEK AO V 112 Trunc=112 Size=113 Line=78 Col=1 Alt=0
File DDRTAPE JOB from BKRBACKUP at DMBZVM Format is NETDATA.

```
JOB_HEADER
DUMPRDV 520RES 0123 $DRIVER$$
DUMPRDV 520SPL 0124 $DRIVER$$
DUMPRDV 520PAG 0125 $DRIVER$$
DUMPRDV 520W01 0126 $DRIVER$$
DUMPRDV 520W02 0127 $DRIVER$$
DUMPRDV DM2U00 0128 $DRIVER$$
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 * SAMPLE DDRTAPE BACKUP TEMPLATE CREATED 5/10/2007.
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= Splitjoin 12= Cursor

====> _
X E D I T 1 File
```

---

135
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