SHARE Session 09481

Automation and Backup Scenarios for z/VM and Linux on System z

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Agenda

- Requirements for these scenarios
- Overview of products being used
- Automation scenarios
  - Can be product agnostic
  - Live demos
  - Configuration options and sample code
- Backup scenarios (including automation)
  - Can be product agnostic
  - Live demos
  - Configuration options and sample code
- Summary
Requirements

*Implementing these Scenarios*
Automation requirements for z/VM system

- Take an action based on a message on a console
  - Provide data from the message to the action
- Send commands to Linux guests
- Schedule an action to occur immediately
  - Or on a regular schedule
- Trigger an action if spool usage reaches a specified percent full
- Chain any actions (triggered by messages, schedules, etc.)
- Suspend and resume message rules, schedules, spool monitors, etc.
- Issue commands real-time on a service machine console
- Add messages to a console view from local or remote sources
- Detect a user ID logging off
Backup requirements for z/VM system

- Define a backup job that limits the backup to a specified set of disks
- Customize messages that are displayed when backup is complete
- Invoke backup via an “API”
Automating Operations

*Operations Manager for z/VM*
Operations Manager for z/VM

Increase productivity
- Authorized users view and interact with monitored virtual machines without logging onto them
- Multiple users view/interact with a virtual machine simultaneously

Improve system availability
- Monitor virtual machines and processes
- Take automated actions based on console messages
- Reduce problems due to operator error

Automation
- Routine activities done more effectively with minimal operations staff
- Schedule tasks to occur on a regular basis

Integration
- Fulfill take action requests from OMEGAMON XE on z/VM and Linux
Monitor Service Machine Consoles

Operations Manager

Test Data
OPERATOR
LINUX
TCPIP
syslog data

Data space 1
TEST Message 1
TEST Message 2
...

Data space 2
OPER Message 1
OPER Message 2
...

Data space 3
LNX Message 1
LNX Message 3
...

Data space 4
TCP Message 1
TCP Message 2
...

Data space 5
slog Message 1
slog Message 2
...

Data space 6
OPER Message 1
LNX Message 1
LNX Message 2
LNX Message 3
...
slog Message 1
slog Message 2
...
OPM Message 1
TCP Message 1
DIRM Message 1

Daily log

FILTERED

Unfiltered
Monitor Service Machines

- **Define rules to**
  - Scan console messages for text matching
    - Includes column, wildcard, and exclusion support
    - Optionally restrict to specific user ID(s)
  - Take actions based on matches

- **Multiple rules can apply to one message**
  - Rules processed in order of definition in the configuration file
  - FINAL option available to indicate no additional rules should be evaluated
View and Interact with Consoles

- **Authorized users can view live consoles of monitored service machines and guests**
  - Multiple users can view the same console simultaneously
  - No need to logon to the service machine to see its console
  - Test data and Linux syslog data treated as a “console”
  - Views can be defined to look at a group of consoles in one view

- **Full screen mode**
  - Scroll up and down to view and search historical data
  - Auto scroll (on or off) as new output is displayed on the console
  - From command line, issue commands back to the monitored console

- **Amount of data that is visible depends on specified or default data space size**

- **Rules/actions may modify the view**
  - Suppress messages from the console
  - Hold or highlight messages with color, blinking, etc.

- **Authorized users can view the log file**
  - Can also request a copy of the log file from today or a previous day
Monitor and View Spool Files

- Create spool monitors to trigger actions when
  - Percent of spool usage falls within a specified range
  - Percent of spool usage increases at a specified rate
- Actions triggered can be the same actions used by console monitoring
- Authorized users can
  - Display a list of spool files based on one or more attributes
    - Owner
    - Size
    - Date created
  - From the list the user can
    - View the contents of an individual spool file
    - Transfer, change, or purge a spool file
Schedule Events and Actions

- **Define schedules**
  - Hourly, daily, weekly, monthly, or yearly, nth weekday of the month
  - Once on specified month, day, year, and time
  - At regular intervals
    - Every x hours and y minutes
  - Within a specified window of time
    - Specify start time
    - Specify conflicting schedules
    - Specify maximum time to defer this schedule
  - Within limits
    - Restrict to specific days of the week: Monday through Sunday plus holidays
    - Restrict to certain hours of the day

- **Specify the action associated with the schedule**
  - Actions specified are the same as those for console and spool monitoring
Respond to System Events

- Create monitors for z/VM system events (*VMEVENT) related to user IDs
  - Logon
  - Logoff
  - Failure condition (typically CP READ)
  - Logoff timeout started
  - Forced sleep started
  - Runnable state entered (VM READ)
  - Free storage limit exceeded
- Optionally restrict to specific user ID(s)
- Specify the action associated with the event
  - Actions specified are the same as those for schedules and console and spool monitors
Summary

- **Use Operations Manager to**
  - Automate daily operations
  - Prevent problems rather than react to them
  - Automate reactions to problems when they can’t be prevented
  - Improve problem determination procedures
  - Increase programmer and operator productivity
Managing Backup and Recovery

*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**
  - Performed by users for their own data
  - Extending to other users available via exit
  - Performed by administrators for any data
  - Selection of data to restore
    - Full screen interface or commands

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 exits available**
  - Call your own routine
  - Use vendor-written routine, such as V/Soft Software’s Encrypt/Backup for z/VM
Backup Data and Media

Shared File System (SFS)

CMS minidisk

ECKD

FBA

VFB-512

MDisk/Track

MDisk/Track

MDisk/Track

Backup and Restore Manager

Tape

Twin Tapes

Dual Tapes

DDR Tape

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

Backup and Restore Manager

Tape

Share File System (SFS)

CMS minidisk

Spool/reader

VFB-512

FBA

ECKD

MDisk/Track

MDisk/Track

MDisk/Track

DIRA DIRB FN1 FT1

DIRA DIRC FN2 FT2

FN2 FT2 FM2

FN3 FT3 FM3

FN1 FT1 FM1

FN2 FT2 FM2

CMS minidisk or SFS file pool

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Backup and Restore Manager and Linux Guests

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

z/VM

Linux

FBA or ECKD DASD

CMS minidisk and SFS files

TSM Server

TSM Client

Other guest

Other guest

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, 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
  - 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
Summary

- **Use Backup and Restore Manager to**
  - Perform file-level backups of z/VM data
  - Perform image level backups on non-z/VM guest data
  - Perform disaster recovery backups of entire system
  - Easily find and restore data as needed
  - Manage retention of backup data
Recommended Practices – Operational Management

Generate alerts and/or automatically recover from:
- Service machine disks approaching full
- Termination messages
- Abend messages
- Critical user IDs being logged off or entering error state
- Spool approaching full

Schedule automated system maintenance procedures:
- Spool cleanup based on policies
- Minidisk cleanup (from logs) – may include archiving

Schedules ➔ Event monitors ➔ Rules ➔ Spool monitors ➔ Schedules

SFPURGER ➔ Schedule automated system maintenance procedures ➔ Archive or Backup Manager
Recommended Practices – Backup and Recovery

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

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

**Disaster recovery of z/VM system, including Linux guest**
- Dependence on z/OS
- Independent recovery in parallel with z/OS

**Backup Manager using DDRTAPE output spec**

INCLUDE MINIDISK
INCLUDE RDEVICE
INCLUDE RDEVVOL

Back up from z/OS
Reference Information

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

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

- **White papers on Operations Manager website (Library page)**
  - Routing Linux syslog data
  - Sending alerts from Operations Manager to Netcool/OMNibus
  - Using Shared File System to store Operations Manager configuration files and automation EXECs
  - Automatically logging on a user at Linux system boot time for easier console management

- **White paper and presentation on Backup and Restore Manager website (Library page)**
  - Getting Started with Installation, including SFS server creation and installation of Backup Mgr
  - Backing up z/VM and Linux on System z – Tivoli Storage Manager vs Backup Manager
Demonstration Scenarios
Demos Available

1. Send an e-mail based on a console message
2. 
   Send an alert to Netcool/OMNibus based on a console message
   a. Using POSTZMSG interface to Netcool/OMNibus
   b. Using SNMP interface to Netcool/OMNibus
3. Send a message or e-mail based on spool usage
4. View and clean up spool files
5. Automated spool cleanup
6. Archiving DIRMAINT’s log files when disk gets full
7. Process a file of test messages as a console
8. Process Linux syslog data as a console
9. Create a central operations console on one z/VM system
10. Create a central operations console across multiple z/VM systems
11. Integration with OMEGAMON XE on z/VM and Linux - take action based on CPU usage of a Linux guest
12. Monitor service machines for logoff – and autolog them
13. Perform an incremental backup
14. Find and restore a file from the backup catalog
15. Automatically shut down, back up, and restart a Linux guest
16. Reviewing a disaster recovery backup
17. Reviewing other ways to find data in the backup catalog
Automation Scenarios
Scenario 1: Send an E-mail if Abend or Fatal Message Occurs

- Watch all monitored consoles for an error message that includes the word “fatal” or “abend”
  - Message must also contain the word “mail” (for demo purposes only)

- Send an e-mail if one of the words appears on a console

- Dynamically include in the e-mail
  - Host name of z/VM system where the error occurred
  - User ID that received the error message
  - Indicator of whether the word was fatal or abend
  - Full text of the error message
Scenario 1: Detailed Steps

- From any VM user ID:
  `tell opmgrc1 this is an abend message from SHARE. Send an e-mail, please.`

- From an authorized VM user ID, view the console of OPMGRC1:
  `gomcmd opmgrml viewcon user(opmgrc1)`

- Check the inbox of the appropriate person to see the e-mail
tell opmgrctl this is an abend message from SHARE. Send an e-mail, please.
Ready; T-0.01/0.01 19:36:19
The following message was received on OPMGRC1 running on MSINE.WASHINGTON.IBM.COM:

* MSG FROM SINE  : this is an abend message from SHARE. Send an e-mail, please.

DO NOT REPLY - This e-mail was generated by an automated service machine
Scenario 1: How Do You Do That?

Rules in Operations Manager:

* Send an e-mail to someone if I see a message containing the word "fatal" on any monitored console

DEFRULE NAME(FATLMAIL),+
  MATCH(*FATAL*mail*),+
  EXUSER(ESMTS112),+
  ACTION(EMAIL),+
  PARM(FATAL)

* Send an e-mail to someone if I see a message containing the word "abend" on any monitored console

DEFRULE NAME(ABNDMAIL),+
  MATCH(*ABEND*mail*),+
  EXUSER(ESMTS112),+
  ACTION(EMAIL),+
  PARM(ABEND)
Scenario 1: How Do You Do That?

**Action in Operations Manager:**

* 
* Replace "tld1 at us.ibm.com" with the e-mail address of the user that should receive the e-mail
* Leave &u, &p, and &t as-is. These represent the user ID that had the "fatal" message, the parameter passed (fatal or abend), and the text of the message. These will be included in the text of the e-mail.

DEFACTN NAME(EMAIL),+

   COMMAND(EXEC SMTPNOTE tld1 at us.ibm.com &u &p &t),+

   OUTPUT(LOG),+

   ENV(LVM)
Scenario 1: How Do You Do That?

SMTPNOTE EXEC (excerpts)
/* */
Parse arg mail_user 'AT' mail_node baduser errtype msgtext
if errtype = 'FATAL' then
  errtext = 'Fatal error on user ID' baduser 'on z/VM system'
else
  if errtype = 'ABEND' then
    errtext = 'Abend on user ID' baduser 'on z/VM system'
  else errtext = msgtext
/* Construct the e-mail */
line.1 = 'OPTIONS: NOACK LOG SHORT NONOTEBOOK ALL CLASS A'
line.2 = 'Date: ' Date() ',' Time()
line.3 = 'From: Operations Manager for z/VM'
line.4 = 'To: ' mail_user 'at' mail_node
line.5 = 'Subject: ' errtext
line.6 = 'The following message was received on' baduser 'running on'
line.7 = msgtext
line.8 = ''
line.9 = 'DO NOT REPLY - This e-mail was generated by an automated service machine
line.0 = 9
'PIPE stem line. | > TEMP NOTE A'
'EXEC SENDFILE TEMP NOTE A (NOTE SMTP'
Scenario 2a: Send an Alert to OMNIbus – Using POSTZMSG

- Watch all monitored consoles for an error message that includes the word “fatal” or “abend”
  - Message must also contain the word “omni” (for demo purposes only)

- Send an alert to OMNIbus if one of the words appears on a console
  - Use POSTZMSG, running on Linux guest
    - Do not trigger the action if the message is on this guest

- Dynamically include in the alert
  - User ID that received the error message
  - Indicator of whether the word was fatal or abend
Scenario 2a: Detailed Steps

- View “All Events” in OMNIbus

- From any VM user ID:
  
  `tell opmgrc1 this user is abending at SHARE. Tell OMNIBUS.`

- From an authorized VM user ID, view the console of OPMGRC1:
  
  `gomcmd opmgrm1 viewcon user(opmgrc1)`

- From an authorized VM user ID, view the console of the Linux guest that runs POSTZMSG:
  
  `gomcmd opmgrm1 viewcon user(esmts112)`

- View the OMNIbus console to see the alert
Ready; T=0.01/0.01 20:10:47

tell opmgrc1 this user is abending at SHARE. Tell OMNIBUS.

Ready; T=0.01/0.01 20:10:52
00:55:15 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
00:55:15 hasl112:/workloads #
00:55:41 cd /workloads
00:55:41 hasl112:/workloads #
00:56:25 cd /workloads
00:56:25 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m guest_is_abe
00:56:27 hasl112:/workloads #
00:58:05 cd /workloads
00:58:05 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m guest_is_abe
00:58:06 hasl112:/workloads #
01:01:47 cd /workloads
01:01:47 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m guest_is_abe
01:01:48 hasl112:/workloads #
01:02:36 cd /workloads
01:02:36 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m guest_is_abe
01:02:36 hasl112:/workloads #
01:03:32 cd /workloads
01:03:32 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m fatal_error
01:03:32 hasl112:/workloads #
01:04:01 cd /workloads
01:04:01 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
01:04:01 hasl112:/workloads #
14:01:16 cd /workloads
14:01:16 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m fatal_error
14:01:17 hasl112:/workloads #
14:01:17 hasl112:/workloads #
14:05:33 cd /workloads
14:05:33 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
14:05:34 hasl112:/workloads #
14:05:34 hasl112:/workloads #
14:07:00 cd /workloads
14:07:00 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m fatal_error
14:07:00 hasl112:/workloads #
14:07:59 * MSG FROM SINE : test fatal error for omnibus
14:12:40 cd /workloads
14:12:40 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
14:12:40 hasl112:/workloads #
14:13:43 cd /workloads
14:13:43 hasl112:/workloads # ./postzmsg -f e2o.conf -r WARNING -m fatal_error
14:13:43 hasl112:/workloads #
14:10:43 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
20:10:51 cd /workloads
20:10:51 hasl112:/workloads # ./postzmsg -f e2o.conf -r CRITICAL -m guest_is_ab
20:10:52 hasl112:/workloads #
Scenario 2a: How Do You Do That?

Rules in Operations Manager:

* Send an alert to OMNIBUS for fatal errors on consoles

DEFRULE NAME(FATLOMNI),+
  MATCH(*fatal*omni*),+
  EXUSER(ESMTS112),+
  ACTION(ALRTOMNI),+
  PARM(FATAL)

* Send an alert to OMNIBUS for abends on consoles

DEFRULE NAME(ABNDOMNI),+
  MATCH(*abend*omni*),+
  EXUSER(ESMTS112),+
  ACTION(ALRTOMNI),+
  PARM(ABEND)
Scenario 2a: How Did You Do That?

**Action in Operations Manager:**

* Call POSTZMSG on a Linux guest to send alert to OMNIBUS
DEFACTN NAME(ALRTOMNI),+
  COMMAND(EXEC POSTZMSG &u &p),+
  OUTPUT(LOG),+
  ENV(LVM)
Scenario 2a: How Did You Do That?

POSTZMSG EXEC (excerpts)

/* */
Parse arg baduser errtype
if errtype = 'ABEND' then
do
  zerrtype = 'CRITICAL'
cmdpart2 = '-m guest_is_abending hostname='baduser
cmdpart4 = 'sub_origin=tcp SCARY_EVENT OpsMgr'
end
else
do
  zerrtype = 'WARNING'
cmdpart2 = '-m fatal_error_on_guest hostname='baduser
cmdpart4 = 'sub_origin=tcp WARN_EVENT OpsMgr'
end
cmdpart1 = './postzmsg -f e2o.conf -r' zerrtype
cmdpart3 = 'sub_source=postzmsg origin='baduser
'CP SEND ESMTPS112 cd /workloads'
'CP SEND ESMTPS112' cmdpart1 cmdpart2 cmdpart3 cmdpart4
Scenario 2b: Send an Alert to OMNIbus – Using SNMP

- Watch all monitored consoles for an error message that includes the word “abend”
  - Message must also contain the word “snmp” (for demo purposes only)

- Send an alert to OMNIbus if this word appears on a console
  - Use SNMPTRAP command on z/VM

- Dynamically include in the alert
  - IP address of the z/VM system where the error occurred
  - User ID that received the error message
  - Text of the abend message
Scenario 2b: Detailed Steps

- View “All Events” in OMNIbus

- From any VM user ID:
  
  ```
  tell opmgrc1 this user is abending during demo. Send SNMP alert to Netcool
  ```

- From an authorized VM user ID, view the console of OPMGRC1:
  
  ```
  gomcmd opmgrm1 viewcon user(opmgrc1)
  ```

- View the OMNIbus console to see the alert
tell opmgrcl this user is abending during demo. Send SNMP alert to Netcool
Ready; T=0.01/0.01 12:47:08

gomcmd opmgrmi viewcon user(opmgrcl)
Scenario 2b: How Do You Do That?

Rule and action in Operations Manager:

* Send an alert to OMNIbus using SNMP for abend msgs on consoles

DEFRULE NAME(ABNDSNMP),+
    MATCH(*abend*snmp*),+
    ACTION(SNMPALRT),+
    PARM(ABEND)
*

DEFACTN NAME(SNMPALRT),+
    COMMAND(EXEC SNMP2OMN &T),+
    ENV(SVM)
Scenario 2b: How Did You Do That?

**SNMP2OMN EXEC**

/* SNMP2OMN action routine for Operations Mgr */

address command

parse arg ":" msgtext

msgtext2 = ""'msgtext '"'

/* Send message */

snmptrap trape 1.1 number 30 1.2 text "UXZVM001" 1.3 text msgtext2 ent 1.3.6.1.4.1.9545.6

exit
Scenario 2b: Additional Steps Required on z/VM

- SNMPD user ID configured and running
- Update files on TCPMAINT 198 disk
  - Add OMNIbus IP address to SNMPTRAP DEST file
  - Open SNMPD and SNMPQE ports in PROFILE TCPIP
  - Update SNMPMIBX TEXT section of MIB_EXIT DATA
- Give OPMGRM1 and OPMGRS*n access to SNMPTRAP command
  - On TCPMAINT 592 disk
Scenario 2b: Additional Steps Required on OMNIbus

- **Install the IBM Tivoli Netcool/OMNIbus SNMP Probe**
  - Install it on same platform as target OMNIbus server

- **Customize operational information in the probe properties**
  - Listening port, heartbeat interval, mibs and mibs locations, etc.

- **Customize the probe rules (mttrapd.rules)**
  - Map variables created by the probe (from data extracted from the SNMP trap) into the desired OMNIbus event fields
    - Default mappings for the SNMP generic traps (trap types 0-5)
    - Enterprise-specific traps (trap type 6) require customization

- **Documentation for installation and customization**
  - IBM Tivoli Netcool/OMNIbus SNMP Probe Reference Guide (SC23-6003-04)
Scenarios 2a and 2b – POSTZMSG vs SNMP

- **Using POSTZMSG**
  - Can direct the alert to only the IP address(es) you specify
  - Need a Linux guest running and logged on that can run POSTZMSG and must be on the same z/VM system
    - Can be overcome by using a socket interface to send POSTZMSG command to the guest
  - Limit of 160 characters on POSTZMSG command sent to Linux guest (using CP SEND)
    - Can’t always send full text of message
    - Can be overcome by using a socket interface to send POSTZMSG command to the guest

- **Using SNMP**
  - No requirement for a Linux guest. SNMP runs on z/VM.
  - No limit on message size
  - All SNMP alerts on z/VM go the same set of IP addresses
Scenario 3: Send a Message or E-mail if Spool Usage is Too High

- Operations Manager monitors the spool usage (percent full)
- Usage exceeds the specified limit
  - For demo purposes, we’ll dynamically resume (re-activate) an existing spool monitor that requires the spool to only be 25% full
- Automatically send an e-mail to someone who can evaluate and take action
- For demo purposes, suspend (de-activate) the spool monitor when complete
Scenario 3: Detailed Steps

- From an authorized VM user ID, see the spool usage:
  
gomcmd opmgrm1 viewspl

- From a user ID with Operations Manager privileges:
  
gomcmd opmgrm1 resume spool(splfull2)

- Check the Operations Manager log to see the spool monitor triggered:
  
gomcmd opmgrm1 viewlog

- Check the inbox of the appropriate person to see the e-mail

- From a user ID with Operations Manager privileges:
  
gomcmd opmgrm1 suspend spool(splfull2)
Ready; T=0:01/0:01 16:36:46

gomcmd opmgrml resume spool(splfull2)

Ready; T=0:01/0:01 19:00:02


gomcmd opmgrml viewlog_
Automation and Backup Scenarios for z/VM and Linux on System z
Spool is 48% full on z/VM system

From: OPMGRM1
To: Tracy Dean

The following message was received on G0F4.GBSPLEX.USCLAB.WASHINGTON.IBM.COM:
Spool is 48% full on z/VM system

DO NOT REPLY - This e-mail was generated by an automated service machine
Scenario 3: How Do You Do That?

Spool monitor and action in Operations Manager:

*  
*  
DEFSMON  NAME(SPLFULL2),+  
   USAGE(025-099),+  
   ACTION(SPLEMAIL),+  
   PARM(SPOOL)  
*  
DEFACTN  NAME(SPLEMAIL),+  
   COMMAND(EXEC SMTPNOTE tld1 at us.ibm.com &4 &p),+  
   ENV(LVM)
Scenario 3: How Do You Do That?

SMTPNOTE EXEC (excerpts)

/* */

Parse arg mail_user dummyat mail_node baduser errtype msgtext
if errtype = 'ABEND' then
  errtext = 'Abend on user ID' baduser 'on z/VM system'
else
  if errtype = 'SPOOL' then do
    errtext = 'Spool is' baduser '%' full on z/VM system'
    msgtext = errtext
  end
  else errtext = msgtext /* Construct the e-mail */
line.1 = 'OPTIONS: NOACK LOG SHORT NONOTEBOOK ALL CLASS A'
line.2 = 'Date: ' Date() ', ' Time()
line.3 = 'From: Operations Manager for z/VM'
line.4 = 'To: ' mail_user 'at' mail_node
line.5 = 'Subject: ' errtext
...
line.7 = msgtext
line.8 = ''
line.9 = 'DO NOT REPLY - This e-mail was generated by an automated service machine
line.0 = 9
'PIPE stem line. | > TEMP NOTE A'
'EXEC SENDFILE TEMP NOTE A (NOTE SMTP'
Scenario 4:
Find and View Spool Files – Clean up the Spool

- **Authorized user specifies spool search criteria**
  - By user ID
  - By date
  - By file size

- **Result list presented**
  - Sort
  - Open/view a specific spool file
  - Purge, modify metadata, or transfer a file
Scenario 4: Detailed Steps

- From an authorized VM user ID, view the spool files:
  
  `gomcmd opmgrm1 viewspl`

- Sort by date
  - Put cursor on date column header and hit F6

- Find the spool files just sent and type PURGE next to them

- From an authorized VM user ID, view the log to see that the spool monitor is no longer triggered:
  
  `gomcmd opmgrm1 viewlog`
### Automation and Backup Scenarios for z/VM and Linux on System z

#### Spool: 85% Used
- **Max:** 4.8G
- **Files:** 6% Used
- **Name:** 1 of 1075
- **Max:** 1655640

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<td>14:02:25</td>
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<td>18:06:32</td>
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</table>
Scenario 5: Automated Spool Clean Up

- **Use z/VM SFPURGER utility to manage spool files based on criteria, e.g.**
  - User ID
  - Days in spool
  - Class
  - Number of records

- **Automate SFPURGER execution**
  - Regularly scheduled using Operations Manager
  - Triggered by Operations Manager spool monitor
Scenario 5: Detailed Steps

- From an authorized VM user ID, view the spool files for a specific user:
  `gomcmd opmgrm1 viewsp1 user(tstadmin2)`

- Send a file to this user as class Z
  `sendfile profile exec a tstadmin2 (class z)`

- View spool files for this user again to see the new file
  `gomcmd opmgrm1 viewsp1 user(tstadmin2)`

- Delete any existing schedules called DEMO
  `gomcmd opmgrm1 delschd name(demo)`

- Schedule SFPURGER for execution
  - It will purge any files of class Z
    `gomcmd opmgrm1 defschd name(demo),action(sfpurger),WHEN(now)`

- View spool files for this user again to see the new file is gone
  `gomcmd opmgrm1 viewsp1 user(tstadmin2)}`
GOMCMD OPMGRM1 VIEWsplit user(tstadm2)

Ready: T=0.01/0.01 15:01:23

Connected to remote server/host: 9.39.68.141 using port 23
<table>
<thead>
<tr>
<th>Owner</th>
<th>File</th>
<th>CLS</th>
<th>QUE</th>
<th>TYP</th>
<th>Size</th>
<th>Hold</th>
<th>Date</th>
<th>Time</th>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSTADMIN2</td>
<td>0004</td>
<td>A</td>
<td>RDR</td>
<td>PUN</td>
<td>576K</td>
<td>NONE</td>
<td>04/20</td>
<td>04:55:56</td>
<td>AMV1004</td>
<td>BADARC</td>
</tr>
<tr>
<td>TSTADMIN2</td>
<td>0006</td>
<td>A</td>
<td>RDR</td>
<td>PUN</td>
<td>64K</td>
<td>NONE</td>
<td>08/25</td>
<td>11:07:21</td>
<td>TSTADMIN1</td>
<td>NETLOG</td>
</tr>
</tbody>
</table>
Sendfile profile exec a tstadmin2 (class z
File PROFILE EXEC A1 sent to TSTADMIN2 at DEM1ZVM on 09/27/09 15:23:11
Ready; T=0.01/0.01 15:23:11
<table>
<thead>
<tr>
<th>Owner</th>
<th>File</th>
<th>CLS</th>
<th>QUE</th>
<th>TYP</th>
<th>Size</th>
<th>Hold</th>
<th>Date</th>
<th>Time</th>
<th>Name</th>
<th>Type</th>
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</thead>
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<td>RDR</td>
<td>PUN</td>
<td>576K</td>
<td>NONE</td>
<td>04/20</td>
<td>04:55:56</td>
<td>AMV1004</td>
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<tr>
<td>TSTADMIN2</td>
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<td>RDR</td>
<td>PUN</td>
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<td>NONE</td>
<td>08/25</td>
<td>11:07:21</td>
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<td>TSTADMIN2</td>
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<td>Z</td>
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<td>09/27</td>
<td>15:23:11</td>
<td>PROFILE</td>
<td>EXEC</td>
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</table>
Ready: T=0.01/0.01 15:09:49
GOMCMD OPMGRM1 DELSCHD NAME(DEMO)
09/27/2009 15:09:56 GOMCMD021ZE DELSCHD "DEMO " NOT FOUND
Ready: T=0.01/0.01 15:09:56
GOMCMD OPMGRM1 DEFSCHD NAME(DEMO),ACTION(sfpurger),WHEN(NOW)
Ready: T=0.01/0.01 15:11:33
Automation and Backup Scenarios for z/VM and Linux on System z

© 2011 IBM Corporation
<table>
<thead>
<tr>
<th>Cmd</th>
<th>Owner</th>
<th>File</th>
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<th>QUE</th>
<th>TYP</th>
<th>Size</th>
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<td>NONE</td>
<td>08/25</td>
<td>11:07:21</td>
<td>TSTADMIN1</td>
<td>NETLOG</td>
</tr>
</tbody>
</table>
Scenario 5: How Do You Do That?

**Action in Operations Manager to call z/VM’s SFPURGER EXEC**

*DEFACTN NAME(SFPURGER),+
  COMMAND(EXEC SFPURGER FORCE),+
  OUTPUT(LOG),+
  ENV(LVM)*

**SFPURGER OPTIONS file**

* Send console log to user ID TSTADMN1 at demo node
  CONSOLE TSTADMN1 DEM1ZVM
* Erase LOG and RUN files that are more than 3 days old
  KEEPDAY 21
* Set prime shift start and end times
  PRIMSHFT 07:30:00 16:30:00
* Use defaults for the following:
  * MSGTYPE SORTMOD SFPCNTL SOSCNTL SFPMOD APPEND
  SFPCNTL SFPTRACY
Scenario 5: How Do You Do That?

**SFPTRACY CONTROL**

* Ignore any spool files found in the NSS queue (privilege class E)

```
QUEUE NSS ACTION IGNORE
```

* Purge any spool files found in class Z

```
CLASS Z ACTION PURGE
```

Make sure OPMGRM1 links and accesses MAINT 193 disk for access to SFPURGER functions
Scenario 6: Detecting Disk Full Conditions of Logging IDs

- **Operations Manager monitors the console of a user ID that does logging**
  - DIRMAINT, for example

- **Disk full or early warning message triggers a rule/action in Operations Manager**
  - Quiesce or shut down DIRMAINT
  - Send the log files to a separate service machine
  - Erase the log files from DIRMAINT’s logging disk
  - Restart DIRMAINT
  - Separately, other service machine automatically archives all files it receives (in Archive Manager for z/VM)
  - Log files are safely archived in Archive Manager and DIRMAINT is running with a clean log disk

- **Get a copy of the console for further review/debugging**
Scenario 6: Detailed Steps

- From an authorized VM user ID, view the DIRMAINT console:
  `gocmd opmgrm1 viewcon user(dirmaint)`

- In the console view
  - Issue CMS commands to copy old (large) log files to DIRMAINT’s log disk
    `cms copyfile dirmaint tlog0914 t = tlog0912 h`
  - Verify the logging disk is more than 75% full
    `cms q disk`
  - Run DIRMAINT’s hourly processing now
    `exec dvhourly`
  - Verify the logging disk is less than 75% full
    `cms q disk`

- Exit the console view and find the files in the archive
  `amvlist`
  - Type “archlogs” in the owner field and press ENTER

- Request a copy of the console for further review/debugging
  `gocmd opmgrm1 viewcon user(dirmaint),mode(rdr)`
Automation and Backup Scenarios for z/VM and Linux on System z

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* -- Operations Manager VIEWCON session from TSTADMIN1 entered the following --
cms q disk
23:29:24 * -- Operations Manager VIEWCON session from TSTADMIN1 entered the foll
23:29:24 cms exec dvhourly
23:29:24 DVHRML12148I Wakeup caused by console attention on 09/02/24 at 23:29:24
23:29:24 DIRMAINT DEM1ZVM. - 2009/02/24; T=0.01/0.01 23:29:24
23:29:25 DVHREQ2290I Request is: CMS exec dvhourly
23:29:25 DVHREQ2290I Your CMS request for DIRMAINT at * has been accepted.
23:29:25 DVHRLY3895W Disk 01AA is 75% full, exceeding its
23:29:25 * -- Operations Manager Action DIRMLOGB scheduled for execution -- *
23:29:25 DVHRLY3895W WARNING threshold of 75%.
23:29:25 DVHRLY3895I Hourly processing started, with 0 log
23:29:29 DVHRLY3895I Your CMS request for DIRMAINT at * has completed; with RC
23:29:29 DVHRLY3895I DVHREQ2289I = 0.
23:29:29 DIRMAINT DEM1ZVM. - 2009/02/24; T=0.04/0.04 23:29:29
23:29:33 DVHWA12141I Wakeup caused by *SMSG on 09/02/24 at 23:29:25 from OPMGRM
23:29:33 DIRMAINT DEM1ZVM. - 2009/02/24; T=0.01/0.01 23:29:25
23:29:33 DVHREQ2290I Request is: REQUEST 74 SHUTDOWN
23:29:33 DVHREQ2290I Your SHUTDOWN request for OPMGRM1 at * has been accepted.
23:29:33 DVHREQ2290I Your SHUTDOWN request for OPMGRM1 at * has been accepted.
23:29:33 DVHSHU2193I A shutdown command has been issued by
23:29:33 DVHSHU2193I OPMGR1 from DEM1ZVM.
23:29:33 DVHSHU2198A The DIRMAINT service machine is logging
23:29:33 DVHSHU2198A off.
23:29:33 CONNECT: 03:01:29 VIRTCPUs= 000.00 4G TOTALCPUs= 000.00 47
23:29:33 LOGOFF AT 23:29:27 CST TUESDAY 02/24/09
23:29:33 PRI FILE 0791 SENT FROM DIRMAINT CON WAS 0791 REC 0095 CPY 001 0 HOL
23:29:33 DASD 0191 LINKED R/W; R/O BY DATAMOVE
23:29:33 DASD 011F LINKED R/W; R/O BY DATAMOVE
23:29:33 DIRMAINT

-
gomcmd opmgrml viewcon user(dirmaint),mode(rdr)
RDR FILE 0112 SENT FROM OPMGRM1  PRT WAS 0043 RECS 4039 CPY 001 A NOHOLD NOKEEP
Ready; T 6.01/0.01 11.50.24
Scenario 6: How Do You Do That?

Console rule and action in Operations Manager:

```plaintext
DEFRULE NAME(DIRMLOG),+
    MATCH(*DVHRLY3895*01AA*),+
    USER(DIRMAINT),+
    ACTION(DIRMLOG)
*
DEFACTN NAME(DIRMLOG),+
    INPUT(AHI),+
    NEXTACTN(DIRMLOGB)
*
DEFACTN NAME(DIRMLOGB),+
    COMMAND(EXEC DIRM1AA &U),+
    ENV(LVM)

Authorize Operations Manager to issue DIRM SHUTDOWN – from MAINT issue
DIRM AUTHFOR OPMGRM1 CMDLEVEL 150A CMDSET O
Scenario 6: How Do You Do That?

**DIRM1AA EXEC (excerpts):**

Parse Upper Arg Tuser . ;
/* Try to shut DIRMAINT down. */
Say 'DIRM1AA - Issuing DIRM SHUTDOWN ....';
Address CMS 'DIRM SHUTDOWN';

Address Command 'CP LINK' Tuser '1AA' Dev 'MR';
Address CMS 'ACCESS' Dev Fm;

Address Command 'PIPE CMS LISTFILE DIRMAINT *LOG*' Fm '( NOHEADER',
  '|' STEM FILES.');
Do I = 1 to Files.0;
  Parse Upper Var Files.I Fn Ft . ;
  Address CMS 'SENDFILE' Fn Ft Fm 'TO ARCHLOGS';
If Rc = 0 then Do;
  Sent = Sent+1;
  Address CMS 'ERASE' Fn Ft Fm;
End

Address Command 'CP XAUTOLOG' Tuser;
Scenario 7: Process a File of Test Messages as a Console

- Create a file containing lines of test messages
  - Test rules and actions without creating critical conditions

- Use Operations Manager to send the file for processing
  - Treat it as the console of one user
  - Send it again treating it as the console of another user
  - Notice triggered rules and actions are different

- View the “consoles” of these two users
Scenario 7: Detailed Steps

- **Create or view a file of test messages**
  
  `xedit test consdata a`
  
  – Notice the “hello” message in the file

- **From a z/VM user ID, send the test file to Operations Manager**
  
  – Send it twice, specifying two different “owning” user IDs. One generates a message and one doesn’t:
  
  `gomrsif test consdata a 9.39.64.72 63000 tstadminn8`
  `gomrsif test consdata a 9.39.64.72 63000 tstuser8`

- **From an authorized z/VM user ID, view the consoles of the owning user IDs:**
  
  `gomcmd opmgrm1 viewcon user(tstadminn8)`
  `gomcmd opmgrm1 viewcon user(tstuser8)`
TEST CONSDATA A1 F 80 Trunc=80 Size=5 Line=0 Col=1 Alt=0

*** Top of File ***
00001 hello there from remote system input
00002 here is another critical system message
00003 warning message to test
00004 junk
00005 noise
00006 *** End of File ***
gomrsif test consdata a 9.39.68.141 63000 tstadmin8
Connecting to 9.39.68.141
Sending TEST CONSDATA A to 9.39.68.141
Ready; T=0.01/0.01 13:39:18

gomrsif test consdata a 9.39.68.141 63000 tstuser8
Connecting to 9.39.68.141
Sending TEST CONSDATA A to 9.39.68.141
Ready; T=0.01/0.01 13:39:18
hello there from remote system input
* -- Operations Manager Action TESTEX scheduled for execution -- *
here is another critical system message
warning message to test
junk
noise
hello there from remote system input
here is another critical system message
warning message to test
junk
noise
Scenario 7: How Do You Do That?

**Console rule and action in Operations Manager:**

* 
DEFRULE NAME(TESTEX),+ 
  MATCH(*HELLO*),+ 
  MCOL(001:030),+ 
  ACTION(TESTEX),+ 
  EXGROUP(TSTUSERS) 
* 
DEFACTN NAME(TESTEX),+ 
  COMMAND(CP MSG TSTADMIN1 HELLO BACK FROM &U.),+ 
  OUTPUT(LOG),+ 
  ENV(LVM)
Scenario 7: How Do You Do That?

Set up TCP/IP listener for test data and define group of consoles:

*                           DEFTCPA NAME(TESTDATA),+    TCPUSER(TCPIP),+          TCPAPPL(GOMRSIF),+        TCPADDR(000.000.000.000),+ TCPPORT(63000)            *

*                           DEFGROUP NAME(TSTUSERS),+   USER(TSTUSER*)

Update TCP/IP configuration to allow Operations Manager to listen on the specified port
Scenario 8: Process Linux Syslog Data as a Console

- Route syslog data from a Linux guest to Operations Manager for z/VM
  - Supports syslog and syslog-ng
  - syslog-ng includes hostname or IP address in message
- Treat it as the console of a “fake” user ID
- Trigger rules and actions based on syslog data
- View the “console” containing syslog data
- Option to create one console per syslog or combine multiple syslogs into one console
Scenario 8: Detailed Steps

- From an authorized z/VM user ID, view any syslog data already received
  
gomcmd opmgrml viewcon user(lxsyslog)

- Use PUTTY to connect to a Linux guest

- Login as root and issue the command
  
  `logger here is a critical test message from SHARE`

- Return to the VIEWCON session
  
  - See the message in the syslog “console”
  
  - Using syslog, so no hostname or IP address

- Repeat from a different Linux guest that uses syslog-ng
Session B - TSTADMIN - [32 x 80]

14:59:47 (78) crond[17539]: (root) CMD (run-parts /etc/cron.hourly).
15:59:46 (78) crond[19771]: (root) CMD (run-parts /etc/cron.hourly).
16:59:46 (78) crond[21997]: (root) CMD (run-parts /etc/cron.hourly).
17:59:46 (78) crond[24224]: (root) CMD (run-parts /etc/cron.hourly).
18:59:47 (78) crond[26456]: (root) CMD (run-parts /etc/cron.hourly).
19:59:46 (78) crond[28682]: (root) CMD (run-parts /etc/cron.hourly).
20:59:46 (78) crond[30908]: (root) CMD (run-parts /etc/cron.hourly).
21:59:47 (78) crond[672]: (root) CMD (run-parts /etc/cron.hourly).
22:59:47 (78) crond[2945]: (root) CMD (run-parts /etc/cron.hourly).
23:59:47 (78) crond[5171]: (root) CMD (run-parts /etc/cron.hourly).
00:00:46 (78) crond[7937]: (root) CMD (run-parts /etc/cron.daily).
01:00:46 (78) crond[9629]: (root) CMD (run-parts /etc/cron.hourly).
02:00:46 (78) crond[11885]: (root) CMD (run-parts /etc/cron.hourly).
03:00:46 (78) crond[11883]: (root) CMD (run-parts /etc/cron.daily).
03:00:46 (78) crond[11897]: (root) CMD (run-parts /etc/cron.hourly).
03:00:47 (78) sendmail[12016]: n239210V012016: from=root, size=1043, class=0, n
03:00:48 (78) sendmail[12018]: n239210V012018: from=root@hasli06.weslab.washing
03:00:48 (78) sendmail[12016]: n239210V012016: to=root, ctldaddr=root (0/0), dela
03:00:48 (78) sendmail[12019]: n239210V012018: to=root@hasli06.weslab.washington
03:00:47 (78) crond[14346]: (root) CMD (run-parts /etc/cron.hourly).
04:59:46 (78) crond[16578]: (root) CMD (run-parts /etc/cron.hourly).
05:59:46 (78) crond[18804]: (root) CMD (run-parts /etc/cron.hourly).
06:59:46 (78) crond[21030]: (root) CMD (run-parts /etc/cron.hourly).
07:59:47 (78) crond[23256]: (root) CMD (run-parts /etc/cron.hourly).
08:59:47 (78) crond[25489]: (root) CMD (run-parts /etc/cron.hourly).
09:59:46 (78) crond[27715]: (root) CMD (run-parts /etc/cron.hourly).
10:59:47 (78) crond[29941]: (root) CMD (run-parts /etc/cron.hourly).
11:59:47 (78) crond[32167]: (root) CMD (run-parts /etc/cron.hourly).
12:59:46 (78) crond[1967]: (root) CMD (run-parts /etc/cron.hourly).
13:59:46 (78) crond[4204]: (root) CMD (run-parts /etc/cron.hourly).

LXSYSLOG (Scroll)
login as: root
root@9.82.56.106's password:
Last login: Thu Feb 12 17:12:21 2009
[root@has1106 ~]# logger here is a critical test message from share
[root@has1106 ~]#
14:14:58  * MSG FROM OPMGRM1 : GOT A CRITICAL MESSAGE '<<13>ROOT: HERE IS A CRITICAL TEST MESSAGE FROM SHARE.' FROM LXSYSLOG.

Ready; T=0.01/0.01 14:18:41
Session A - TSTADM1 - [32 x 80]

(Oct 27 13:16:08 omeglnx1 -- MARK --.
(Oct 27 13:16:08 omeglnx1 syslog-ng[1301]: Log statistics; dropped='pipe(/dev/log)
(Oct 27 13:36:08 omeglnx1 -- MARK --.
(Oct 27 14:43:49 hasl114 syslog-ng[1433]: STATS: dropped 0.
(Oct 27 15:36:08 omeglnx1 -- MARK --.
(Oct 27 14:16:08 omeglnx1 syslog-ng[1301]: Log statistics; dropped='pipe(/dev/log)
(Oct 27 14:36:08 omeglnx1 -- MARK --.
(Oct 27 15:42:44 hasl114 sshd[7320]: error: PAM: Authentication failure for
(Oct 27 15:44:38 hasl114 sshd[7320]: fatal: Timeout before authentication for
* -- Operations Manager Action MSGOPER8 scheduled for execution -- *
(Oct 27 15:44:38 hasl114 sshd[7323]: pam_unix2(sshd:auth): conversation fail
(Oct 27 15:44:38 hasl114 sshd[7323]: error: ssh_msg_send: write.
(Oct 27 14:56:08 omeglnx1 -- MARK --.
(Oct 27 15:16:08 omeglnx1 -- MARK --.
(Oct 27 15:16:08 omeglnx1 syslog-ng[1301]: Log statistics; dropped='pipe(/dev/log)
(Oct 27 15:36:08 omeglnx1 -- MARK --.
(Oct 27 15:56:08 omeglnx1 -- MARK --.
(Oct 27 16:16:08 omeglnx1 -- MARK --.
(Oct 27 16:16:08 omeglnx1 syslog-ng[1301]: Log statistics; dropped='pipe(/dev/log)
(Oct 27 16:36:08 omeglnx1 -- MARK --.
(Oct 27 17:43:49 hasl114 syslog-ng[1433]: STATS: dropped 0.
(Oct 27 16:56:08 omeglnx1 -- MARK --.
(Oct 27 17:16:08 omeglnx1 -- MARK --.
(Oct 27 17:16:08 omeglnx1 syslog-ng[1301]: Log statistics; dropped='pipe(/dev/log)
(Oct 27 17:36:08 omeglnx1 -- MARK --.
(Oct 27 18:32:35 hasl114 root: demo message from linux guest with syslog-ng.

13Oct 27 18:32:35 hasl114 LXSYSLOG2 (Scroll)

Connected to remote server/host: 9.39.68.141 using port 23

Automation and Backup Scenarios for z/VM and Linux on System z
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GOMCMD OPMGRM1 VIEWCON USER(LXSYSLG2),mode(rdr)

Ready: T=0 01/01 17:38:12

receive 13S (rep)
DMSRDC738I Record length is 204 bytes
VIEWCON LXSYSLG2 A1 replaced
File VIEWCON LXSYSLG2 A1 received from OPMGRM1 at DEM1ZVM sent as VIEWCON LXSYSLG2 A
VIEWCON LXSYSLOG2 A1 F 204 Trunc=204 Size=663 Line=0 Col=1 Alt=0

---

10/22/2010 11:57:08 (43)Oct 22 11:56:07 omeglnx1 syslog-ng[1301]: I/O er
10/22/2010 14:36:08 (46)Oct 22 14:36:07 omeglnx1 -- MARK --.
Scenario 8: How Do You Do That?

Console rule and action in Operations Manager:

*  
DEFRULE NAME(LXLOG),+  
   MATCH(*critical test message*),+  
   ACTION(LXLOG),+  
   USER(LXSYSLOG)  
*  
DEFACTN NAME(LXLOG),+  
   COMMAND(CP MSG TSTADMN1 Got a critical message 'T' from U.),+  
   OUTPUT(LOG),+  
   ENV(LVM)
Scenario 8: How Do You Do That?

- **Set up TCP/IP listener for syslog data**
  ```plaintext
  *  
  DEFTCPA NAME(LNXSYSLG),+
      TCPUSER(TCPIP),+
      TCPAPPL(GOMRSYL),+
      TCPADDR(000.000.000.000),+
      TCPPORT(00514),+
      PARM(LXSYSLOG03330417UTF8)
  *
  DEFTCPA NAME(LNXSYSL2),+
      TCPUSER(TCPIP),+
      TCPAPPL(GOMRSYL),+
      TCPADDR(000.000.000.000),+
      TCPPORT(00515),+
      PARM(LXSYSLOG203330417UTF8)
  *
  ```

- **Update TCP/IP configuration to allow Operations Manager to listen for UDP traffic on the specified port(s)**
  - Ports 514 and 515 used here

- **Update the Linux guest to send its syslog data to the IP address and port of your z/VM system**
Scenario 9: Create a Central Operations Console on One z/VM System

- Use Operations Manager to watch for error, warning, fatal messages on service machine consoles
  - DIRMAINT, TCP/IP, RACF, etc.
  - Linux guests
  - Linux syslog

- Route these messages to a central operations console

- Operations staff watches operations console for signs of trouble
  - View individual service machine consoles for more details when needed
Scenario 9: Detailed Steps

- From an authorized z/VM user ID, put “abend”, “fatal”, and error messages on DIRMAINT console

  msgnoh dirmaint this is a test abend message
  msgnoh dirmaint this is a fake fatal message
  msgnoh dirmaint DMSxxxxxX here is a made-up CMS error msg

- View the “Operations Console” to see the messages

  gomcmd opmgrml viewcon user(oper8)

- Note the fatal message is red and abend message is highlighted and will be held when other messages come in
Scenario 9: Detailed Steps

- From another user ID, run an EXEC to send multiple messages to the Operations Console
  lotsmsgs

- View the “Operations Console” to see the messages
  gomcmd opmgrm1 viewcon user(oper8)

- Watch the scrolling, held messages, etc.
Session A - TSTADMIN1 - [32 x 80]
File Edit View Communication Actions Window Help

msgnoch dirmaint this is a test abend message
Read<=> T=0.01/0.01 10:36:23
msgnoch dirmaint this is a fake fatal message
Read<=> T=0.01/0.01 10:36:29
msgnoch dirmaint DMSxxxxxxxxE here is a made-up CMS error msg
Read<=> T=0.01/0.01 10:36:39

gomcmd opmgrml viewcon user(ope8)

Connected to remote server/host: 9.39.68.141 using port: 23

RUNNING DEM1ZVM

IBM Software

Automation and Backup Scenarios for z/VM and Linux on System z

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Automation and Backup Scenarios for z/VM and Linux on System z

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11:54:03 A FAKE ABEND HAS OCCURRED
11:54:03 A fake abend has occurred
11:54:26 DIRMAINT : TEST MESSAGE WITH ABEND TEXT
11:54:26 DIRMAINT : THIS IS A TEST ABEND MESSAGE
11:54:16 A fake abend has occurred
10:46:52 This is standard non scary message 11
10:46:53 This is standard non scary message 12
10:46:54 This is standard non scary message 13
10:46:55 This is standard non scary message 14
10:46:56 This is standard non scary message 15
10:46:57 This is standard non scary message 16
10:46:58 This is standard non scary message 17
10:46:59 This is standard non scary message 18
10:47:00 This is standard non scary message 19
10:47:01 This is standard non scary message 20
10:47:02 This is standard non scary message 21
10:47:03 This is standard non scary message 22
10:47:04 This is standard non scary message 23
10:47:05 This is standard non scary message 24
10:47:06 This is standard non scary message 25
10:47:07 This is standard non scary message 26
10:47:08 This is standard non scary message 27
10:47:09 This is standard non scary message 28
10:47:10 This is standard non scary message 29
10:47:11 This is standard non scary message 30
10:47:12 This is standard non scary message 31
10:47:13 This is standard non scary message 32
10:47:14 This is standard non scary message 33
10:47:15 This is standard non scary message 34
10:47:16 This is standard non scary message 35

OPER8 (Scroll)
Scenario 9: How Do You Do That?

Console rules in Operations Manager:

```
*  
DEFRULE NAME(ABEND),+  
  MATCH(*abend*),+  
  EXUSER(OPER8),+  
  ACTION(MSGOPER8)  
*  
DEFRULE NAME(FATAL),+  
  MATCH(*fatal*),+  
  EXUSER(OPER8),+  
  ACTION(MSGOPER8)  
*  
DEFRULE NAME(EMSGS),+  
  MATCH(DMS*E),+  
  MCOL(001:011),+  
  EXUSER(OPER8),+  
  ACTION(MSGOPER8)  
```

Action in Operations Manager:

```
*  
DEFACTN NAME(MSGOPER8),+  
  COMMAND(CP MSGNOH OPER8 &U : &T),+  
  OUTPUT(LOG),+  
  ENV(LVM)
```
Scenario 9: How Do You Do That?

Console rules in Operations Manager:

*                       DEFRULE NAME(ABENDHLT),+ MATCH(*abend*),+ USER(OPER8),+ ACTION(HLTHOLD)

*                       DEFRULE NAME(FATALRED),+ MATCH(*fatal*),+ USER(OPER8),+ ACTION(RED)

Actions in Operations Manager:

*                       DEFACTN NAME(HLTHOLD),+ INPUT(AHI,HLD)

*                       DEFACTN NAME(HILITE),+ INPUT(AHI)

*                       DEFACTN NAME(RED),+ INPUT(CRE)
Scenario 10:
Create a Central Operations Console across multiple z/VM systems

- Use Operations Manager to watch for error, warning, fatal messages on service machine consoles on one or more systems
  - OPERATOR, DIRMAINT, TCP/IP, RACF, etc.
  - Linux guests
  - Linux syslog

- Route these messages to a central operations console on one of the z/VM system

- Operations staff watches one operations console for signs of trouble across multiple z/VM systems
  - View individual service machine consoles for more details when needed
Creating a Central Console Across Multiple LPARs

- **OPERATOR**
  - Message 1a
  - Message 2a
  - Mount Message 3a
  ...  

- **DIRMAINT**
  - Message 1a
  - Abend Message 2a
  - Message 3a
  ...  

- **LINUX01**
  - Urgent Message 1a
  - Message 2a
  - Message 3a
  ...  

- **z/VM A**

- **OPMGRC1**
  - Urgent Message 1a
  - Abend Message 2b
  - Mount Message 3a
  - Urgent Message 1b
  - Abend Message 2a
  - Mount Message 3b

- **OPERATOR**
  - Message 1b
  - Message 2b
  - Mount Message 3b
  ...  

- **DIRMAINT**
  - Message 1b
  - Abend Message 2b
  - Message 3b
  ...  

- **LINUX01**
  - Urgent Message 1b
  - Message 2b
  - Message 3b
  ...  

- **z/VM B**

- **IP** or **IP or CP MSGNOH**
Scenario 10: Detailed Steps

- On System A (DEM1ZVM) put an “error” message on the OPERATOR console
  - Must contain the text “remote error”

  ```
  msgnoh operator here is a remote error message
  ```

- View the “Operations Console” (user ID OPMGRC1) on System B (ZVMV5R40) to see the message

  ```
  gomcmd opmgrm1 viewcon user(opmgrc1)
  ```

- Note the message received on OPMGRC1 on ZVMV5R40 from OPERATOR on DEM1ZVM
megnoh operator here is a remote error message
<table>
<thead>
<tr>
<th>ID</th>
<th>DEMOADMIN AT ZVMV5R40 VIA RSCS</th>
<th>01/12/11 11:15:16 EDT</th>
<th>WEDNESDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ready: T=0 01/12/11 11:15:16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

```bash
gomcmd opmgrm1 viewcon user(opmgrc1)_
```
Scenario 10: How Do You Do That?

Console rule in Operations Manager on System A:

*  
DEFRULE NAME(OPERMSGS), +  
    MATCH(*remote error*), +  
    USER(OPERATOR), +  
    ACTION(MSG2GBRG)

Action in Operations Manager on System A:

*  
DEFACTN NAME(MSG2GBRG), +  
    COMMAND(EXEC MSG2OPS OPMGRCL From &u on DEM1ZVM: &t), +  
    OUTPUT(LOG), +  
    ENV(LVM)
Scenario 10: How Do You Do That?

MSG2OPS EXEC on System A:

/* Send a message to a console in Ops Mgr on another system */
/* */
trace r
Address Command
Parse arg cons_user msgtext
'PIPE var msgtext | > TEMP NOTE A'
'EXEC GOMRSIF TEMP NOTE A 9.82.24.129 63000' cons_user
Exit

Central Console (OPMGRC1)

IP address of System B
Scenario 10: How Do You Do That?

TCP/IP listener definition in Operations Manager on System B:

```
DEFTCPA NAME (TESTDATA), +
    TCPUSER (TCPIP), +
    TCPAPPL (GOMRSIF), +
    TCPADDR (000.000.000.000), +
    TCPPORT (63000)
```

- May also need to update TCP/IP on System B to allow Operations Manager to listen on port 63000
- Can alternatively use TELL (instead of GOMRSIF) to send messages from System A to System B, but requires RSCS
Scenario 11
Integration with OMEGAMON XE on z/VM and Linux

- Use Operations Manager to take action based on a triggered situation in OMEGAMON XE on z/VM and Linux
- Virtual CPU consumption is high for a Linux guest
- OMEGAMON detects the situation, creates an event, and sends message to Operations Manager
- Action is triggered by a rule in Operations Manager
- Operations Manager checks SHARE status of guest and issues CP commands to tune the guest
  - SET QUICKDSP
  - SET SHARE
- Event is resolved in OMEGAMON when virtual CPU consumption of guest is back down
OMEGAMON XE and Operations Manager for z/VM

Process Flow

System z

1. *MONITOR
2. Linux Guest
3. VM Agent
4. VM Cmd Proc
5. Web browser (TEP)

Operations Manager
Perf Toolkit
z/VM

Web Server
Linux Agent
Database Server
Linux Agent
Linux Guest
Linux Guest
Linux Guest
Scenario 11: Detailed Steps

- Create and start an application on a Linux guest that uses more than 20% of virtual CPU
  - HOG command on our demo system

- Updates to Tivoli Enterprise Portal
  - z/VM CPU graph shows guest CPU % as it runs the application
  - Event pops up on situation event console to say higher than 20%

- Use Operations Manager to watch z/VM user console used by OMEGAMON
  - Message receive from OMEGAMON to address high CPU on the guest
  - Message from Operations Manager indicating action is triggered

- Updates on Tivoli Enterprise Portal
  - CPU used by that guest decreases below 20%
  - Event closed (removed from the event console)
Scenario 11: How Do You Do That?

Rules in Operations Manager:

* Adjust SHARE of Linux guest if CPU usage is too high
* Watch for message from OMEGAMON

DEFRULE NAME(GUSTCPU),+
    MATCH(*NEEDS CPU PRIORITY*),+
    ACTION(GUESTCPU)

* Highlight message from OMEGAMON and call EXEC to check and adjust
* SHARE of Linux guest

DEFACTN NAME(GUESTCPU),+
    INPUT(AHI),+
    NEXTACTN(GUSTCPUB)

* 

DEFACTN NAME(GUSTCPUB),+
    COMMAND(EXEC VCPU &4),+
    ENV(LVM),+
    OUTPUT(LOG)
Scenario 11: Detailed Steps
OMEGAMON Configuration
Scenario 11: Detailed Steps
OMEGAMON Configuration

Image of a screenshot showing the OMEGAMON configuration settings for situations in a workload scenario.
Scenario 12: Monitor Service Machines for LOGOFF Status – and AUTOLOG them

- **Monitor specific service machines to make sure they stay logged on**
  - Demo will monitor TSTADMIN2 user ID
  - If it changes from logged on to logged off status, then restart it

- **Dynamically pass the user ID to the action**
  - Re-use action for multiple user IDs
GOMCMD OPMGRM1 VIEWCON USER(tstadm2)
Scenario 12: How Do You Do That?

**Console rule and action in Operations Manager:**

```
*  
DEFEMON NAME(ADMIN2),+  
   TYPE(1),+  
   USER(TSTADMIN2),+  
   ACTION(AUTOLOG1)  
*  
DEFACTN NAME(AUTOLOG1),+  
   COMMAND(CP SLEEP 3 SEC),+  
   NEXTACTN(AUTOLOG2),+  
   OUTPUT(LOG),+  
   ENV(OPMGRS1)  
*  
DEFACTN NAME(AUTOLOG2),+  
   COMMAND(CP XAUTOLOG &3),+  
   OUTPUT(LOG),+  
   ENV(OPMGRS1)  
```
Backup and Recovery Scenarios
Including Automation
Scenario 13: 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 13: 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)`
Session A - TSTUSER1 - [32 x 80]

00009 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 et Dec 16, 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 TSTADMIN1.
RDR FILE 0050 SENT FROM BKRBKUP PUN WAS 0007 RECS 0006 CPY 001 A NOHOLD NKEEP
RDR FILE 0051 SENT FROM BKRBKUP PUN WAS 0008 RECS 0001 CPY 001 A NOHOLD NKEEP
RDR FILE 0052 SENT FROM BKRBKUP PUN WAS 0008 RECS 0002 CPY 001 A NOHOLD NKEEP
File INCREMO1 LINKFAIL D1 sent to TSTADMIN1 at DEM1ZVM on 03/03/09 14:48:58
BKRMK89102W 2 minidisks were selected by INCLUDE/EXCLUDE processing but could
not be CP LINKed.
BKRMK85359I INCLUDE / EXCLUDE processing for job INCREMO1 selected 149 objects
BKRMK8559I for backup processing.
BKRMK8563I Worker count for job INCREMO1 has been set to 2.
BKRMK8568I CMS files will be filtered against file mask "* * *".
BKRMK85661 SFS filesystems will be filtered with path mask "*".
BKRMK8583I Sending results to TSTADMIN1 for review.
File INCREMO00 JOB D1 sent to TSTADMIN1 at DEM1ZVM on 03/03/09 14:48:58
File INCREMO1 JOB D1 sent to TSTADMIN1 at DEM1ZVM on 03/03/09 14:48:58
Return code "0" from command REVIEW INCREMO1 at 03/03/09 14:48:58.
<table>
<thead>
<tr>
<th>Command</th>
<th>File Name</th>
<th>File Type</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></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INCREM01</td>
<td>LINKFAIL</td>
<td>PUN</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>6</td>
<td>3/03</td>
<td>14:48:58</td>
<td></td>
</tr>
<tr>
<td>INCREM00</td>
<td>JOB</td>
<td>PUN</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>81</td>
<td>3/03</td>
<td>14:48:58</td>
<td></td>
</tr>
<tr>
<td>INCREM01</td>
<td>JOB</td>
<td>PUN</td>
<td>BKRBKUP</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>82</td>
<td>3/03</td>
<td>14:48:58</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
File INCREMO0 JOB from BKRBKUP at DEM1ZVM Format is NETDATA.

Basic syntax:

* CONSOLE - write something to the console
* CP_COMMAND - CP command, output displayed to console
* CP_QUIT - CP command, output suppressed
* JOB_HEADER - Emits a job header banner
* JOB_TRAILER - Emits job trailer banner
* CONFIG - Set the value of a REXX variable
* DUMPEDF - Invoke DUMPEDF to back up a CMS/EDF minidisk
* DUMPCKD - Invoke DUMPCKD to perform an image/raw CKD DASD backup
* DUMPSFS - Invoke DUMPSFS to back up a CMS/SFS filesystem
* 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 verbs 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

```plaintext
0051 PEK A0 V 80 Trunc=80 Size=163 Line=32 Col=1 Alt=C
File INCREMENT0 JOB from BKRBKUP at DEM12VM Format is NETDATA.

CONFIG BKR_OUTPUT_SPEC = CMSFILE INCREMENT0 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 INCREMENT0 20090303
CP_COMMAND TERM LINES 255

CONFIG BKR_JOB_WORKERS = 2
CONFIG BKR_JOB_NAME = INCREMENT0
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= Close 6= ?/Change
7= Backward 8= Forward 9= Receive 10= Right 11= Split join 12= Cursor

=====> X EDIT 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_QUIET SPOOL CONSOLE CLOSE NAME INCREMO1 20090303
CP_QUIET SPOOL CONSOLE NAME WORKER OUTPUT
EOJ
15:13:54 BKRWRK02 BKRRVB90141 Job completed at 15:13:55 on 03/03/09.
15:13:54 BKRWRK02 BKRRVB90051 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 VIRTCPUs= 000:00.42 TOTCPUs= 000:00.56
15:13:54 BKRWRK02 BKRRVB90061 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 BKRCATLG RDR FILE 0134 SENT FROM BKRWRK01 PUN WAS 0066 RECS 0013 CPY
15:13:54 BKRWRK02 *
15:13:54 BKRWRK02 BKRRVB90051 Executing CP command "SPOOL CONSOLE CLOSE NAME IN
15:13:54 BKRWRK02 BKRRVB90061 CP return code 0
15:13:54 BKRWRK02 BKRRVB90051 Executing CP command "SPOOL CONSOLE NAME WORKER 0
15:13:54 BKRWRK02 BKRRVB90061 CP return code 0
15:13:54 BKRWRK02 *** End-of-Job Summary:
15:13:54 BKRWRK02 ***
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 ***
16:13:54 BKRCATLG 00000001 FILE PURGED
Scenario 14: 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 14: 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
  `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>From</th>
<th>Date</th>
<th>Time</th>
<th>Device or Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSTUSER1 A</td>
<td>A</td>
<td></td>
<td>1</td>
<td>08/11/07</td>
<td>12:18:04</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 A</td>
<td>AX</td>
<td></td>
<td>1</td>
<td>06/09/20</td>
<td>18:21:58</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 ABC</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/19</td>
<td>02:24:28</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 AMV1004</td>
<td>VMARC</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:29:28</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 B</td>
<td>B</td>
<td></td>
<td>1</td>
<td>08/11/07</td>
<td>18:52:40</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BAAAA</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:40:47</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BBBB</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:40:37</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BCCCC</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:01</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BDDDDD</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:34</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BEEEE</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:38</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BBBBB</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:43</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BGGGG</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:49</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BHHHH</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:41:59</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BITI</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:42:03</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BBBBB</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:42:10</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BKKKK</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:42:25</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 BLLLL</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:42:30</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 C</td>
<td>C</td>
<td></td>
<td>1</td>
<td>08/04/19</td>
<td>17:24:35</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 CLAUDE</td>
<td>CLAUDE</td>
<td></td>
<td>1</td>
<td>08/11/07</td>
<td>18:26:04</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 CLAUDE1</td>
<td>CLAUDE1</td>
<td></td>
<td>1</td>
<td>07/01/04</td>
<td>14:55:00</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 D</td>
<td>D</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:50:32</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 DCREQS</td>
<td>HTML</td>
<td></td>
<td>1</td>
<td>06/09/16</td>
<td>03:39:26</td>
<td>0191</td>
</tr>
<tr>
<td>TSTUSER1 DEF</td>
<td>XEDIT</td>
<td></td>
<td>1</td>
<td>06/09/19</td>
<td>02:24:28</td>
<td>0191</td>
</tr>
</tbody>
</table>
From TSTUSER1 0191 date 09/01/14 time 15:45:10 (job INCREM01 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 9.39.88.141 using port 23
Your command "RESTORE INCREMO1 00000054 TSTUSER1 EDF $DEV0191 TO RDR TSTUSER1 - B B 1" is being processed at 03/03/09 15:57:55.

BKR0029I SENDING RESTORE Request 00000032 to Workre Task BKWRK03...

File RESTORE JOB D1 sent to BKWRK03 at DEM1ZVM on 03/03/09 15:57:55

*** Request Request 00000032 submitted to worker BKWRK03 for processing.

Return code "0" from command RESTORE INCREMO1 00000054 TSTUSER1 EDF $DEV0191 TO RDR TSTUSER1 - B B 1 at 03/03/09 15:57:55.

RDR FILE 0007 SENT FROM BKWRK03 PUN WAS 0003 RECS 0026 CPY 001 R NOHOLD NOKEEP

RDR FILE 0008 SENT FROM BKWRK03 CON WAS 0002 RECS 0080 CPY 001 R NOHOLD NOKEEP

Ready; T=0.0270.02 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>7</td>
<td>RESTORE</td>
<td>0000052</td>
<td>CON R</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>B</td>
<td>B</td>
<td>PUN R</td>
<td>BKRWRK03</td>
<td>DEM1ZVM</td>
<td>NONE</td>
<td>26</td>
<td>3/03</td>
<td>15:57:56</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

---

Connected to remote server/host 9.39.68.141 using port 23
Scenario 15: Scheduling Image Backups of Linux Guests

- **Initiated or scheduled by Operations Manager**
  - Schedule defined in Operations Manager to initiate backups at specific times/interval
  - 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 15: Detailed Steps

- Define a schedule to start the automated backup process
  `gomcmd opmgrml defineschd name(demo), action(stoplnx), when(now)`
- View the Operations Manager log to see the schedule trigger
  `gomcmd opmgrml viewlog`
- View the console of the Linux guest to see it shut down
  `gomcmd opmgrml viewcon user(omeglnx1)`
- View the console of the backup server to see the backup start
  `gomcmd opmgrml viewcon user(bkrbkup)`
- Find the worker that has been assigned and view its console
  `gomcmd opmgrml viewcon user(bkrwrkxx)`
- View the console of the Linux guest to see it restart
  `gomcmd opmgrml 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/ttyS0(/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  
16:11:07 Shutting down service network . . . . . . . . . . . . . . . .

OMEGLNX1
31/001
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  HCPGIR450W CP entered; disabled wait PSW 00020001 80000000 00000000 00
17:51:29  * -- Operations Manager Action LNXBKUP1 scheduled for execution -- *
17:51:29  CONNECT 20:01:00 VIRTCPU 001.00.30 TOTCPU 001.10.25
17:51:29  LOGOFF AT 17:51:29 CDT WEDNESDAY 08/25/10 AFTER SIGNAL
17:51:30 2/VM V5.4.0 2009-09-23 15:29

OMEGLNX1
16:11:22 *MSG OPMGRM1 SUBMIT BKUPLNX1

16:11:22 BKRBAK85151I Queued command #1: "*MSG OPMGRM1 SUBMIT BKUPLNX1"
16:11:22 BKRBAK8532I Processing SUBMIT BKUPLNX1 command for OPMGRM1 at 03/03/09
16:11:22 BKRBAK8532I Processing SUBMIT BKUPLNX1 command for OPMGRM1 at 03/03/09
16:11:22 AUTO LOGON *** BKRWRK01 USERS = 18
16:11:22 HCPCLS6056I XAUTOLOG information for BKRWRK01: The IPL command is veri
16:11:22 ed 1 objects
16:11:22 BKRMAK8559I INCLUDE / EXCLUDE processing for job BKUPLNX1 selected 1 o
16:11:22 Output line 1 : BKRMAK8559I INCLUDE / EXCLUDE processing for job BKUPL
16:11:22 ed 1 objects
16:11:22 BKRMAK8559I INCLUDE / EXCLUDE processing for job BKUPLNX1 selected 1 o
16:11:22 Output line 2 : BKRMAK8559I for backup processing.
16:11:22 BKRMAK8559I for backup processing.
16:11:22 Output line 3 : BKRMAK8563I Worker count for job BKUPLNX1 has been set
16:11:22 BKRMAK8563I Worker count for job BKUPLNX1 has been set to 1.
16:11:22 Output line 4 : BKRMAK8570I Instance number 00000073 has been assigned
16:11:22 KUPLNX1.
16:11:22 BKRMAK8570I Instance number 00000073 has been assigned for job BKUPLNX
16:11:22 Output line 5 : BKRMAK8586I CMS files will be filtered against file ma
16:11:22 .
16:11:22 BKRMAK8586I CMS files will be filtered against file mask "**".
16:11:22 Output line 6 : BKRMAK8566I SFS filespaces will be filtered with path
16:11:22 BKRMAK8566I SFS filespaces will be filtered with path mask "*".
16:11:22 Output line 7 : BKRMAK8584I Sending BKUPLNX1 JOB D to worker task BKWR
16:11:22 BKRMAK8584I Sending BKUPLNX1 JOB D to worker task BKWRK01.
16:11:22 Output line 8 : File BKUPLNX1 JOB D1 sent to BKWRK01 at DEM1ZVM on 03
16:11:22 File BKUPLNX1 JOB D1 sent to BKWRK01 at DEM1ZVM on 03/03/09 16:11:23
16:11:22 Return code "0" from command SUBMIT BKUPLNX1 at 03/03/09 16:11:23.
16:11:23 BKRBAK8510I 03/03/09 16:11:23 WAKEUP exited on a VMCF interrupt.
17:51:29 HCPGIR450W CP entered; disabled wait PSW 00020001 00000000 00000000 00
17:51:29 * * Operations Manager Action LINXBKUPI scheduled for execution -- *
17:51:29 CONNECT= 26:52:36 VIRTCPUP= 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 2/VM V3.4.0 2009 09 25 15.29
17:51:30 ENSTT000E File SWM SYNONYM 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 - 0000000040000000
17:51:30 100M.412M 0000000040000000 - 0000000100000000
17:51:30 Storage cleared - system reset.
17:51:30 zIPL v1.8.0 interactive boot menu
17:51:30 0. default (LinuxV2)
17:51:30 1. LinuxV2
17:51:30 2. ip1
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):
17:51:30 Initializing cgroup subsys cpuset
17:51:30 Initializing cgroup subsys cpu
17:51:30 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:
17:51:41 OMEGLNX1

Session A - TSTAMPM - [32 x 80]

17:51:50 Aug 25 17:51:50 omeglnx1 SuSEfirewall2: SuSEfirewall2 not active
17:51:50 eth0
17:51:50 done
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: YB0CY43Dnfs smbfs irq_balancer smartd
17:51:55 Welcome to SUSE Linux Enterprise Server 11 (s390x) - Kernel 2.6.27.42-
17:51:55 omeglnx1 login:

OMEGLNX1 (Scroll) 31/001

Connected to remote server/host: 9.36.68.141 using port 23
Scenario 15: 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 15: 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 15: 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 MSG BKBKUP 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 15: 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 16: 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 16: 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>
```
**SAMPDDR** is an example of a full backup job definition. Output is directed to single-copy tape via the IBMTAPE output handler.

**Backup type** : Full backup; no incremental backup processing will be done.

**Output destination** : Single-copy tape, DASD Dump Restore (DDR) format, (BKR_Output_Spec)

**Number of workers** : 1; to increase bandwidth on larger systems, add ad

**Instance tracking** : Automatic; this is the recommended setting.

**Catalog content** : Enabled; results of this job will be transmitted to

**CMS file filtering** : None; all files and SFS directories will be includ
DDRTAPE TEMPLATE C2 V 112 Trunc=112 Size=156 Line=117 Col=1 Alt=1

00117 \file{\}

00118 \\

00119 FUNCTION MEDIATYPE OWNER VDEV VOLUME DEVTYPE START

00120 |-------|-------|------|------|------|------|------|------|

00121 EXCLUDE MINIDISK * = * * * = *=

00122 INCLUDE RDEVVOL 520*

00123 INCLUDE RDEVICE 0128

00124 *

00125 * Job_Trailer terminates the INCLUDE / EXCLUDE / SELECT definition secti

00126 * post-backup processing specifications.

00127 *

00128 * Job_Trailer

00129 *

00130 * Tell the catalog service virtual machine to retain catalog contents and

00131 * for a period of 30 days. The output from CP QUERY TIME provides a reco

00132 * to process this backup. Output from INDICATE USER provides additional

00133 * worker virtual machine resource consumption.

00134 *

00135 Config BKR_Catalog_Retention = 30

00136 CP_Command QUERY TIME

00137 CP_Command INDICATE USER

00138 *

00139 Console *

00140 Console * Sample DDRTAPE backup template created 5/10/2007.

00141 Console * Job image generated $$UPDATE$$ $$TIME$$

00142 Console *

00143 Console *

00144 *

00145 * Close the console log; this will deliver the job history to the backup
BKRBAK8529I Processing REVIEW DDRDEMO command for TSTADMIN1.

BKRBAK8529I Processing REVIEW DDRDEMO command for TSTADMIN1.

BKRMAK8559I INCLUDE / EXCLUDE processing for job DDRDEMO selected 6 objects

BKRMAK8559I for backup processing.

BKRMAK8563I Worker count for job DDRDEMO has been set to 1.

BKRMAK8568I CMS files will be filtered against file mask "* * *

BKRMAK8566I SFS file spaces will be filtered with path mask "*"

BKRMAK8583I Sending results to TSTADMIN1 for review.

File DDRSAMP JOB D1 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.
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 customizing sample file for local use.

SAMPDDR is an example of a full backup job definition. Output is directed 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, (BKR_Output_Spec)

Number of workers: 1; to increase bandwidth on larger systems, add a (BKR_Job_Workers)

Instance tracking: Automatic; this is the recommended setting. (BKR_Job_Instance = $$INST$$)

Catalog content: Enabled; results of this job will be transmitted

键位: 1= Help 2= Add line 3= Quit 4= Tab 5= Glocate 6= ?/Change 7= Backward 8= Forward 9= Receive 10= Rgtleft 11= Splitjoin 12= Curs
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 * SAMPLE DDRTAPE BACKUP TEMPLATE CREATED 5/10/2007.
CONSOLE * JOB IMAGE GENERATED 04/26/09 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

====>  -

XEDIT 1 File

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* Connected to remote server/host 9.30.68.141 using port 23
Scenario 17: 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 17: Detailed Steps

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

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