

BRMS Overview: What does it do and How do I Plan for it?

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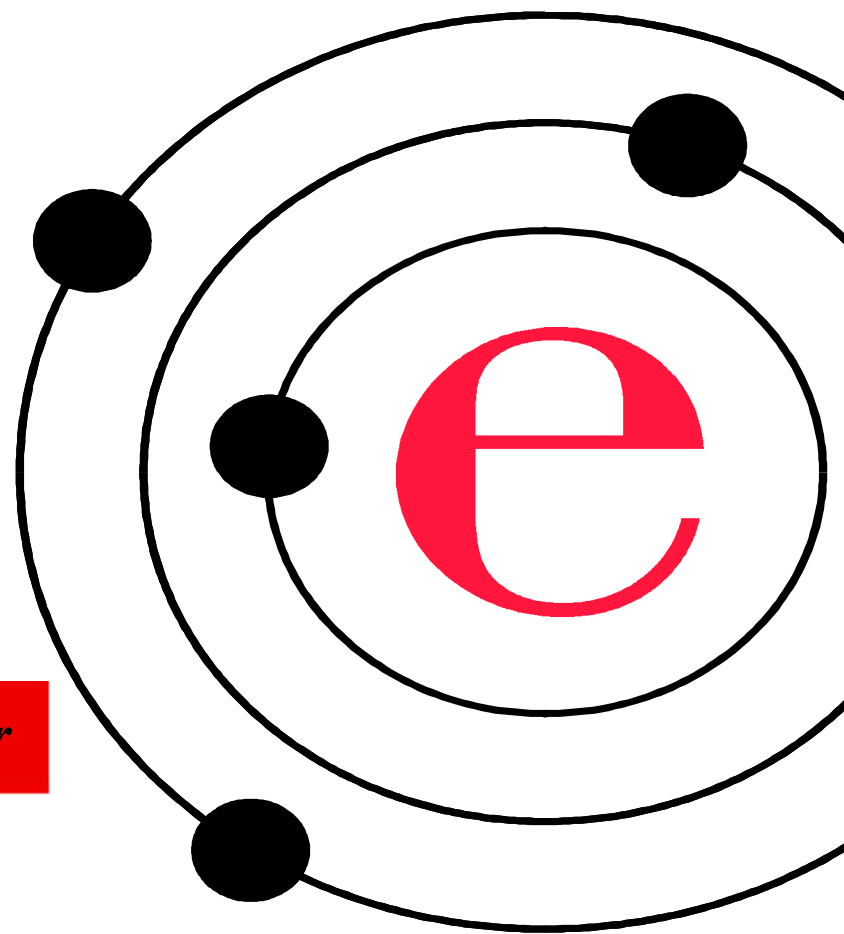
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Agenda

- What is BRMS and What does it do?
 - Are you ready for recovery?
 - What will BRMS do for my Business?
- How do I Get Started Implementing BRMS?
 - How do I recognize a complex BRMS Project?
 - How do I Install BRMS?
 - What are the various BRMS Entities?
 - What order should I create the BRMS Entities?
 - What BRMS reports should I review each day?
 - What "Gotcha's" shall I watch out for?
 - What Resources are Available to help me?



Notes - Agenda

Suppose your management has just heard about BRMS, and knows it will somehow help your firm to manage your backups. They have asked you to learn more about the product and provide a draft implementation plan for their review. If so, then this presentation is for you! We will cover the following topics:

What is BRMS and What does it do?

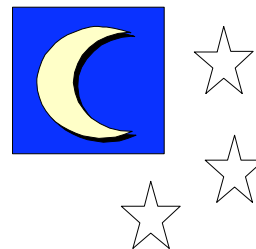
First, we will set the stage, and remind you of the pressures and challenges you face when a system recovery is required. Then we will step through the various functions of BRMS, and highlight various companies that have chosen BRMS, and their reasons for doing so.

How do I get started using BRMS?

Next, we will provide some guidance for you as you plan your BRMS implementation, including the following topics:

- How do I recognize a complex BRMS project?
- What are the SW installation steps?
- What are the various BRMS entities that I need to set up?
- What order should I set up all the BRMS entities?
- What BRMS reports should I print and check each day?
- What "Gotcha's" do first-time BRMS users normally run into?
- What resources are available to help me?

Are You Ready for Recovery?



Notes - Are you Ready for Recovery?

Imagine yourself just waking up one morning and getting ready to walk the dog. Your telephone rings, and your AS/400 operator is on the line to tell you that you had a disk problem overnight, and the system needs to be reloaded. What are the questions that you need to be able to answer?

- When was our last backup? Did it run successfully?
- What tapes do we need to get?
- Where are they? How do we recall them?
- What do we do with them once we get them?
- Who should I call?
-

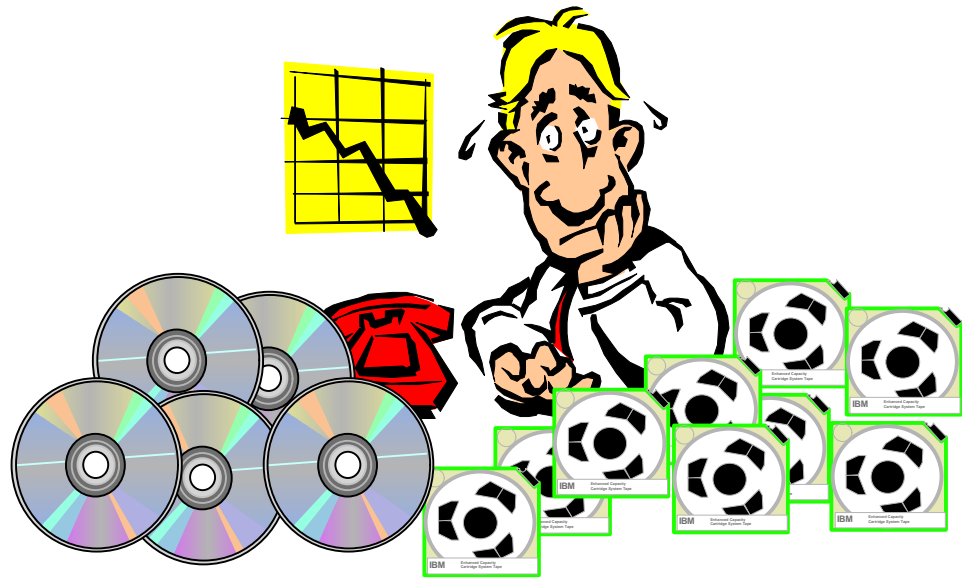
Now imagine a worse scenario still suppose there was a natural disaster overnight. Suppose you and your DP staff all need to be with your families, and are not available to manage your computer operations? What additional questions do you need to ask?

- Do we have a DRP Plan in place?
- Who outside our firm can manage the process of getting us back into business?
-

BRMS will help you to answer these questions with confidence.



What will BRMS do for my Business?



Notes - What will BRMS do for my Business?

BRMS is IBM's Strategic Backup Management Product. It helps you to manage your save/restore operations and makes you confident that you could restore your system if necessary. The BRMS functions fall into 5 key areas, as follow:

Manage your Media:

- tracks the contents of your tapes as they are written
- prevents overwriting active tapes
- provides move reports showing which tapes should move to different locations each day
- provides lists of tapes that should be in each location at any given time, etc

Automate your Backups:

- sets up your backups in a standardized format that others can understand easily
- supports save-while-active, object-level saves, spoolfile saves that maintain print attributes, saves to ADSM, etc
- provides detailed reporting on activity and errors etc

Simplify your Recoveries:

- shows you all the saves of a certain set of objects so you can choose which generation you want to restore
- provides interactive restores of those objects, complete with operator mount messages as appropriate
- simplifies full-system recoveries by providing reports showing ASP configuration, tapes required for recovery, and detailed steps for recovery. Automates those steps once the BRMS product is back on the system.
- provides an on-line progress report during a recovery

Hierarchical Storage Management (HSM):

- migrates objects among disk ASPs based on age, size, and usage criteria
- archives objects to tape based on age and usage criteria
- dynamically recalls *file objects, folders, and streamfiles when accessed by a user or application, and performs interactive recalls of other object types

Tape library Support:

- interfaces with automated tape libraries to select and mount/demount/eject volumes



BRMS - Media Management

Summary

Backup Planning

Critical Application

Lib1
Lib2

Non-Critical Application

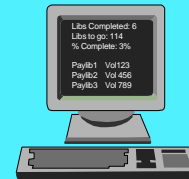
Lib3
Lib4

- ▶ What Objects should be backed up?
- ▶ What media? Tape, savefile, or ADSM?
- ▶ Full, Incremental, or Cumulative Backups?
- ▶ Save-while-active, Parallel saves
- ▶ Spoolfile and Object Level saves
- ▶ Duplicate Backup Tapes
- ▶ Did last night's backup run OK?

Recovery

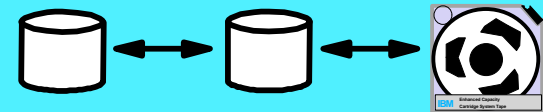
Recovery Volume Summary Report
Vol123 Offsite 3/01/99
Vol456 Comproom 3/01/99
Vol789 MLD01 3/01/99

Recovery Analysis Report
Step.5: Recover your BRMS database by mounting VOL123 and typing RSTLIB QUSRBRM.
Step.6: Recover your user profiles by mounting VOL456 and typing STRCYBRM *SYSTEM *RESTORE.
Step.7: Recover your special OS/400 libraries by mounting VOL789 and typing STR ...



- ▶ List of Tapes required
- ▶ List of Steps to Recover
- ▶ On-Line Progress Report
- ▶ Location-specific Recovery Steps

Hierarchical Storage Management

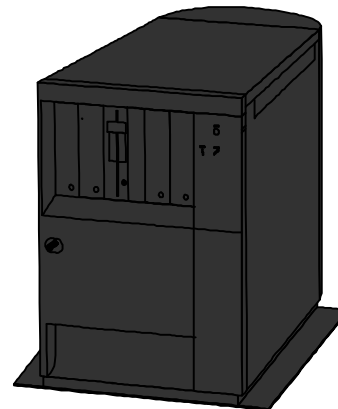
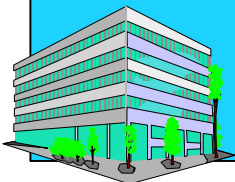


- ▶ Migrate libraries, root folders, and spoolfiles among disk ASPs based on age, size, and last use criteria
- ▶ Archive objects to tape based on age, size, frequency of use, and ASP storage criteria
- ▶ Dynamically recall database files, DLO's and streamfiles when needed

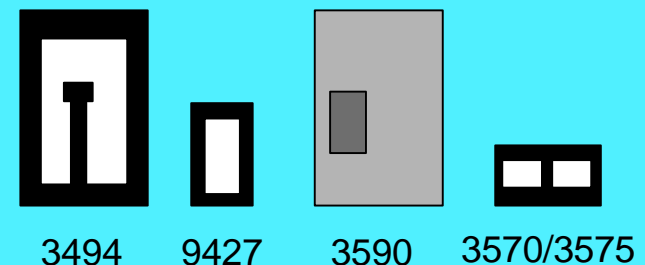
BRMS/400!!

Media Management

- ▶ What is on Tape XYZ?
- ▶ What tapes should be in location DEF?
- ▶ What tapes are old or have a lot of errors?
- ▶ What tapes should move offsite today?
- ▶ What tape has the latest copy of Object ABC?



Tape Library Support



Notes - Media Management

BRMS has a database that keeps track of all the tapes in its inventory. This database allows BRMS to help you manage your media as follows:

Media Selection and Protection:

When you request a save, BRMS selects an available tape. If you are using a media library, BRMS will mount the tape automatically. If you are using a standalone drive, BRMS will issue a mount message to your operator showing 10 possible volumes for mount. The operator can mount one of these volumes, or any other valid tape. If the operator accidentally mounts an invalid tape, such as a tape with active data, BRMS will refuse to continue until a suitable tape is provided.

Media Tracking

While BRMS is writing the save, it records all the saved items in the BRMS database. By default, BRMS tracks items at the library level, but you can request object-level-detail and/or member-level-detail on certain saves if desired.

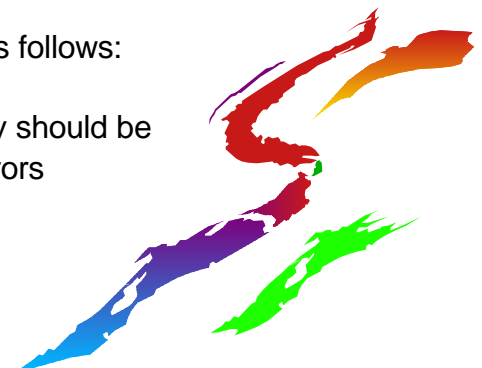
Move Management

When each tape is written, a move policy is associated with the tape, to provide a "travel Itinerary" for the tape to move among locations such as offsite storage. When required, typically each morning, BRMS provides a "Move Report" telling which tapes should move locations that day. The BRMS database logs the current location of each tape at all times.

Reporting

Standard reports and other queries can be run against the BRMS database to provide such info as follows:

- Scratch listing to ensure enough tapes are available for the next evening's backups
- List of all tapes at a given location, which can be used to check that the tapes are where they should be
- Error Threshold listing showing tapes that should be taken out of circulation due to age or errors



Media Management

BRMS Inventory Database

Work with Media

RCHAS400

Position to Starting characters

Type options, press Enter.

1=Add 2=Change 4=Remove 5=Display 6=Work with media set
 7=Expire 8=Move 10=Reinitialize 13=Display Contents 15=Display Duplicates ...

Volume	Creation	Expiration	Move	Media	Dup	
Opt Serial	Expired Date	Date	Date	Class	Sts	
___ R00002		1/13/99	*PERM	COMPRM	*NONE	FMT7GB
___ R00067	*YES	1/23/99	2/20/99	COMPRM	*NONE	FMT7GB
___ Q00001	*YES	1/15/99	2/12/99	TAPMLB01	2/12/99	FMT3590
___ Q00002	*YES	1/29/99	2/29/99	TAPMLB01	2/29/99	FMT3590
___ Q00003+		2/12/99	3/12/99	OFFSITE	2/12/99	FMT3590 *
___ Q00004+		2/12/99	3/12/99	OFFSITE	2/12/99	FMT3590 *
___ Q00005+		3/07/99	4/07/99	COMPRM	3/01/99	FMT3590 1

More...

F3=Exit F5=Refresh F11=Volume statistics F12=Cancel F23=More options

Notes - Media Management

The BRMS tape database can be viewed using the menus or the WRKMEDBRM command. The entire database can be viewed, or the command can be prompted to subset the tapes displayed. The resulting screen has 3-4 views depending on the version. The first view is shown on the attached chart. Subsequent views show information such as error threshold information, parallel save information (V4R4) and the text associated with the tape, such as "Weekend Full Save", or "Daily Pre-Application Backup".

The tape contents can be viewed by drilling down on each tape with option 13=contents. If object-level-detail or member-level-detail was recorded, additional levels of drill-down are also possible.

Volumes that are members of a tape set are marked with a '+' sign just to the right of the volume serial. Drill down with 6="Work with Media Set" to see the other tapes in the set.

Volumes that have been marked for duplication have a '1' in the right-hand column under "Dup Sts". After they are duplicated, they are marked with a '*' in this column. Drill down with 15="Display Duplicates" to see the twin tape.



Media Management

Media Report by Expiration Date "Scratch Listing"

Media Expiration Report

Volume Serial	Expired	Media Class	Creation Date	Expiration Date	Storage Location	System ID
H1J616	Yes	FMT3590	1/12/99	2/17/99	MLB3494	ABC400V
J001	Yes	QIC120	1/17/99	2/17/99	COMPROOM	PI D400J
J002	Yes	QIC120	1/20/99	2/20/99	COMPROOM	PI D400J
J003	Yes	QIC120	1/27/99	2/27/99	COMPROOM	PI D400J
M00901	Yes	FMT7GB	8/12/98	9/15/98	COMPROOM	ABC400V
M00902	Yes	FMT7GB	1/11/99	2/11/99	COMPROOM	ABC400V
M00903	Yes	FMT7GB	1/12/99	2/12/99	COMPROOM	ABC400V
Total active			:	20		
Total expired			:	7		
Total volumes			:	27		

Media Report by Expiration Date "Scratch Listing"

Notes - Media Management

The Media Report by Expiration Date provides a scratch tape listing. For standalone drive environments, it can be used as a picking list to choose tapes for the next night's backups. In an automated tape library environment, it can be used to confirm there are sufficient scratch tapes available in the library. In a complex environment with many systems and media classes, customers may choose to customize the parameters on this report to group the tapes by type so a detailed check of available tapes is possible.



Media Management

Move Report

Media Movement Report All Volumes

From Location . . : COMPRROOM

To Location . . : OFFSITE

Volume Serial	Creation Date	Expiry Date	Move Policy	Move Date
SAM420	3/1/99	3/28/99	OFFSITE	3/1/99
SAM421	3/1/99	3/28/99	OFFSITE	3/1/99
SAM422	3/1/99	3/28/99	OFFSITE	3/1/99
SAM423	3/1/99	3/28/99	OFFSITE	3/1/99

Total Volumes : 4

Notes - Media Management

Move Report

The Media Movement Report shows all the tapes that are to move between locations each day. A standard consolidated report is generated by the MOVMEDBRM command or the STRMNTBRM MOVE(*YES) command. However, many customers prefer the report shown, which is generated with the PRTMOVBRM command, because it generates a separate page for each pair of locations.

By setting various date parameters, you can create a move list for a future date. Systems with FAX/400 installed can then fax the list to the offsite storage vendor each day, thus giving him a picking list for the returned tapes.



Media Management

Media Error Threshold Report

Media Threshold Information

Media class : FMT2GB

Volume Serial	Creation Date	Expiry Date	Location	Uses	Read Errors	Write Errors	Exception Detail
ABC001	2/1/99	2/28/99	COMPRM	2461	3	2	*2
ABC032	3/1/99	3/29/99	OFFSITE	1137	9	4	*3
ABC138	1/6/99	2/03/99	COMPRM	2359	5	8	*2 *4
ABC151	3/2/99	3/30/99	OFFSITE	2522	2	1	*2

*2 = Media has exceeded use count

*3 = Read error threshold has been exceeded

*4 = Write error threshold has been exceeded.

Notes - Media Management

The Media Threshold Report shows tapes that should be investigated, and possibly removed from the BRMS inventory because they have exceeded the thresholds set for their media class, eg QIC120, FMT3590, etc. For example, tapes should be retired when they have been used more than a certain number of times, or are receiving too many read or write errors.





Notes - Media Management

Our first customer success story takes us to Toronto, Canada, where a small hotel was using the AS/400. Instead of operators, they hired a series of co-op students who would learn how to manage the AS/400 during their 4-month workterm. They used BRMS/400 to track and manage their backups.

One day, one of the co-op students called IBM to say that he was having trouble running his backup. BRMS was asking him to mount tape volume 000023, but when he mounted it and answered the mount message, BRMS issued another message saying that the tape was active and could not be used. The co-op student had repeated this process multiple times with the same results, and was growing quite frustrated.





Notes - Media Management

Eventually, we discovered that the operator had inverted two digits in the tape volume serial number, and was actually trying to mount physical tape 000032 which had active data on it, when BRMS had requested tape 000023. The BRMS Media Management functions saved the day by preventing the student from overwriting his data.



BRMS - Backup Planning

Summary

Backup Planning

Critical Application

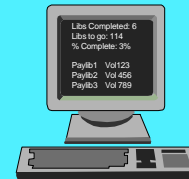
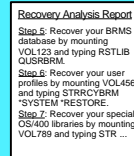
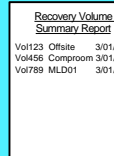
Lib1
Lib2

Non-Critical Application

Lib3
Lib4

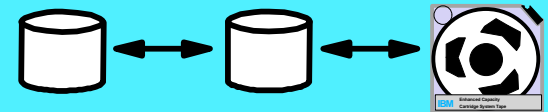
- ▶ What Objects should be backed up?
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- ▶ Full, Incremental, or Cumulative Backups?
- ▶ Save-while-active, Parallel saves
- ▶ Spoolfile and Object Level saves
- ▶ Duplicate Backup Tapes
- ▶ Did last night's backup run OK?

Recovery



- ▶ List of Tapes required
- ▶ List of Steps to Recover
- ▶ On-Line Progress Report
- ▶ Location-specific Recovery Steps

Hierarchical Storage Management

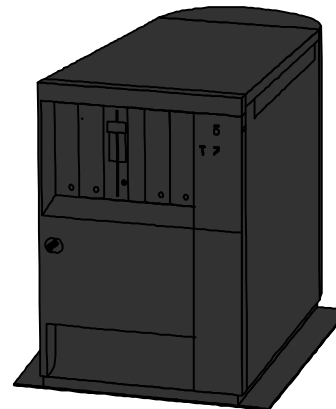
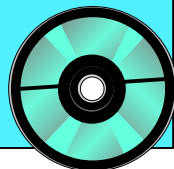
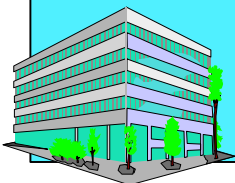


- ▶ Migrate libraries, root folders, and spoolfiles among disk ASPs based on age, size, and last use criteria
- ▶ Archive objects to tape based on age, size, frequency of use, and ASP storage criteria
- ▶ Dynamically recall database files, DLO's and streamfiles when needed

BRMS/400!!

Media Management

- ▶ What is on Tape XYZ?
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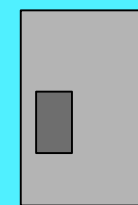
Tape Library Support



3494



9427



3590



3570/3575

Notes - Backup Planning

Backup Control Groups

When you set up BRMS for backup, you create "Control Groups" that describe your backup fully and typically replace your backup CL programs. They include a list of the items to backup, save-while-active controls if desired, a list of subsystems to end/restart, a list of JOBQ's to hold/rls, the parameters for the underlying save command (eg access paths, compression, etc), and optionally, any number of CL commands interspersed throughout the backup using the BRMS *EXIT function.

Since BRMS backups are in a standard format, any BRMS-trained person can quickly understand your backup strategy, which is helpful as your staff turns over, and more importantly, in an emergency situation where your own staff may not be available to tend to your system.

Small and medium-sized shops typically only need a handful of control groups, eg one for their weekend full saves, and one for their daily pre-application backup. Larger shops may choose a more granular approach. For example, they may use a separate control group to backup each application, thus allowing them to recover their most critical application first in a disaster scenario.

Special Features

BRMS allows spoolfiles to be backed up in such a way that their attributes such as overlays, graphics, images, special fonts, etc will be retained. The user merely makes a list of spoolfiles to be backed up, based on their OUTQ, job name, file name, user name, and/or userdata parameters. Contrast this with the OS/400 method of backing up spoolfiles whereby they must be copied to database files prior to saving, and the attributes are NOT retained.

Beginning at V4R4, BRMS is able to run parallel saves whereby a single job can use multiple tape drives simultaneously to backup a library or group of objects from within a library. This function will be helpful for customers who have very large objects that can now be split across multiple tapes simultaneously. This function is only available in OS/400 via an API interface.

Reporting

BRMS provides detailed reporting while backups are running. This includes the BRMS log that gathers all the save/restore messages in one place, and the Media Information Report that summarizes all libraries saved.

Backup Planning

Work with Backup Control Group

Type options, press Enter

1=Create **2=Edit entries** 3=Copy 4=Delete 5=Display

6=Add to schedule **8=Change attributes** 9=Subsystems to process ...

		Full	Incr	Weekly	
	Control	Media	Media	Activity	
Opt	Group	Policy	Policy	SMTWTFS	Text
	*BKUGRP	*BKUPCY	*BKUPCY	*BKUPCY	Entry created by BRM
	*SYSGRP	SAVSYS	SAVSYS	*BKUPCY	Entry created by BRM
2	TESTSAVE	WEEKEND	DAILY	Fiiiiif	Demo CTLG

Notes - Backup Planning

BRMS Backup Control Groups describe the backup to be performed. BRMS is shipped with 2 default control groups as follow:

- *BKUGRP which does the majority of your full save, excluding *SAVSYS, *IBM, and spoolfiles.
- *SYSGRP which does your *SAVSYS and *IBM

You can use these groups directly, or copy them into other groups to modify, or create your own.

To describe a control group fully, you need to complete 4 types of screens as follow:

- #2 = Edit Entries (ie describe the libraries/objects/etc to be backed up)
- #8 = Attributes (ie specify the other BRMS entities related to the save, and set the various parameters for your saves)
- #9 = Subsystems to end/restart
- #10 = JOBQ's to hold/release

Backup Planning

Edit Backup Control Group Entries

Group : TESTSAVE
 Default activity F i i i i F
 Text Demo Backup Control Group

Seq	Backup Items	Weekly Activity SMTWTFS	Retain Object Detail	Save While Active
10	*EXIT	*DFTACT		
20	*SAVSECDDTA	*DFTACT	*NO	
30	LIB*	*DFTACT	*ERR	*NO
40	PAYLIB	FFFFFFFF	*NO	*LIB
50	CUSTLIB	*DFTACT	*OBJ	*SYNCLIB
60	EMPLIB	*DFTACT	*MBR	*SYNCLIB

Notes - Backup Planning

On the "Edit Entries" screen of the control group, you can list the items you want to backup. Libraries, generic libraries, and special values such as *ALLUSR, *ALLDLO etc can be listed directly on the lines provided. To backup other items, such as objects, spoolfiles, folders, and IFS objects, you can create a BRMS list and put the list name onto the blank lines in the control group. If you need to issue CL commands or call programs during the backup, they may be included using *EXIT line items.

Beside each line item, indicate what kind of backup you would like on each day of the week. Using the default system values, "F" will indicate a full save, "I" will indicate an incremental save (eg SAVCHGOBJ), and a blank will indicate that the item should not be backed up that day.

For each line item, you can specify whether you want BRMS to log library-level detail only (*LIB - default at V4R2 and below), or object-level-detail (*OBJ), member-level-detail (*MBR), or library level detail with object level detail ONLY if an object isn't saved successfully (*ERR - default at V4R3 and above). You can also indicate what level of save-while-active synchronization is required.



Backup Planning

Change Backup Control Group Attributes

Group	TESTSAVE	
Media policy for full backups	WEEKEND	F4 Prompt
Media policy for incremental backups	DAILY	F4 Prompt
Backup devices	MLB3570	F4 Prompt
Parallel Drive Resources:		
Minimum Resources	*NONE	
Maximum Resources		
Sign off interactive users	*BKUPCY	
Sign off limit	*BKUPCY	
Incremental type	*BKUPCY	
Text	Demo Backup	

Notes - Backup Planning

On the Control Group Attributes screen, specify the various BRMS entities that will be used for this save (eg media policy, tape device) and set the various save parameters such as saving access paths, saving the contents of savefiles, object pre-check, etc.

Note that from V4R4 onwards, new parameters are available to allow parallel saves whereby a single save is sent to multiple tape drives simultaneously.



Backup Planning

Start Backup using BRM (STRBKUBRM)

Type choices, press Enter.

Control group	TESTSAVE	*BKUGRP, *SYSGRP
Schedule time	*IMMED	hhmm, *IMMED
Submit to batch	*YES	*CONSOLE, *YES, *NO
Starting sequence:		
Number	*FIRST	1-9999, *FIRST
Library	*FIRST	Name, *FIRST
Append to Media	*NO	*YES, *CTLGRPATR, ...

Notes - Backup Planning

To run a BRMS Backup Control Group, use the STRBKUBRM command. Notice that you have the option to restart a failed control group, and to override the append parameter. Recall that if the backup includes a *SAVSYS, it needs to be submitted interactively from the console, or the BRMS console-monitoring parameters need to be set (ie do not choose "submit-to-batch" for a *savsys). If you submit a save to batch, be careful that you haven't asked BRMS to end the subsystem that the BRMS job will be running in.



Backup Planning

Backup Reports: BRMS Log

BRMS Log

Begin processing for control group NANCYTEST type *BKU.

Interactive users are allowed to stay active.

Starting save of library NANCYR to save file.

***FILE DSPPTF2 in NANCYR not saved.**

11 objects were saved; 2 objects were not saved.

Starting save of library JEFFM to save file.

7 objects saved from library JEFFM.

Starting save of library JOHND to save file.

134 objects saved from library JOHND.

Starting save of BRM media information at level *LIB to device *SAVF.

11 objects saved from library QUSRBRM.

Save of BRM media information at level *LIB complete.

Control group NANCYTEST type *BKU completed with errors.

Notes - Backup Planning

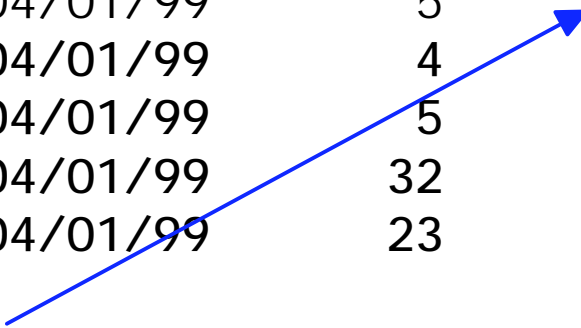
Backup Reports: BRMS Log

When BRMS is running backups, it logs all messages in a central location called the BRMS Log. This log can be searched and subsetted by message id or message severity or type of operation (eg backup, recovery, archive, retrieve, maintenance, etc), and printed if desired. The BRMS Log makes it much easier to check the status of the overnight backup streams, compared with locating and checking the joblogs for all backup jobs if you did not have BRMS.



Backup Planning

Saved Item/File Label	Save Date	Expiry Date	Objects Save	Not Saved	Volume Serial	Control Group
PAYLIB1	03/01/99	04/01/99	4	0	MN0844	DAI LY
PAYLIB2	03/01/99	04/01/99	5	0	MN0844	DAI LY
QFILEUPR	03/01/99	04/01/99	59	0	NOP042	*BKUGRP
QFILEIOC	03/01/99	04/01/99	94	0	NOP042	*BKUGRP
#LIBRARY	03/01/99	04/01/99	2	0	NOP042	*BKUGRP
DBLIB2	03/01/99	04/01/99	5	3	NOP042	*BKUGRP
PAYLIB1	03/01/99	04/01/99	4	0	NOP042	*BKUGRP
PAYLIB2	03/01/99	04/01/99	5	0	NOP042	*BKUGRP
PAYLIB3	03/01/99	04/01/99	32	0	NOP042	*BKUGRP
PAYLIB3	03/01/99	04/01/99	23	0	NOP042	*BKUGRP



* Check this report for objects not saved

Notes - Backup Planning

The Media Information Report shows all the items backed up since midnight the day before yesterday. BRMS users can scan the "not saved" column and investigate any objects that were missed ... they may decide that *MSGQ's don't need to be re-saved, whereas more-critical objects such as QUSRSYS objects may need to be saved immediately to ensure recovery will be possible.





Notes - Backup Planning

Our next customer success story takes us to Calgary where Shell Canada is located. In order to meet their backup and recovery windows, Shell has split their backup into a series of control groups that run concurrently across multiple tape drives, thus allowing much higher data rates. Shell also uses the save-while-active function, allowing their backups to run while their users and batch jobs are active, thus achieving near 7x24 operations.





Notes - Backup Planning

Our next customer success story takes us to Blumenthal Printworks in New Orleans. One day, when Angel Diaz reviewed his BRMS Log, he noticed a new message stating "Critical Recovery Data not Saved". This prompted Angel to make enquiries, and he eventually learned that a change had been made on their system whereby they were no longer getting a clean save of the QUSRSYS library. The QUSRSYS library is critical for recovery: for example, one of the files in this library is the index to the DLO, and the DLO cannot be restored without it. BRMS saved the day by bringing this to Angel's attention so he could make the appropriate changes to his backup strategy to ensure a clean save of QUSRSYS.





Notes - Backup Planning

Our next customer success story takes us to Thunder Bay, Canada, where the Ministry of Education and Training is located. The Ministry administers Student Loans for the Ontario and Canadian Governments, and as such, generates a large number of spoolfiles that contain overlays, and fancy text such as boldface, underlining, large fonts, etc. They have an audit requirement to keep these spoolfiles for 7 years.

If they did not have BRMS, the Ministry would have to use OS/400 techniques to save these spoolfiles using the following process: (1) create a database file using a naming convention that will allow them to locate the spoolfile when needed, (2) copy the spoolfile into the database file, (3) save the database file to tape, (4) keep track of the tape. If they ever needed to restore the spoolfile, they would need to reverse this process, as follows (1) locate the appropriate tape, (2) restore the database file, (3) recreate the spoolfile from the database file. The resulting spoolfile would be text only, and would not contain the overlay or fancy fonts.

However, because the Ministry has BRMS, this process is much simpler, and much more effective. In order to save the spoolfiles, the Ministry has simply listed the spoolfiles to be saved in a BRMS Spoolfile list, based on the following criteria: output Q, job name, user name, user data. When they run the spoolfile backup, BRMS works behind the scenes to save the spoolfile, complete with attributes, to a DLO, and track it in the BRMS database. If they ever need to restore the spoolfile, they simply select it from the WRKSPLFBRM list, and BRMS will restore it, complete with overlays, fancy fonts, etc. They can optionally restore it to a different OUTQ from the one it was in when it was saved.

The Ministry also uses the BRMS Spoolfile Archive function to clean up old spoolfiles, by moving them to tape after a certain number of days so they are not using up disk space, but can be restored if someone needs them. Some time later, once the Ministry believes that the spoolfiles will no longer be needed, the tapes expire. For some particular spoolfiles, the tapes are kept *PERM.



BRMS - Recovery

Summary

Backup Planning

Critical Application

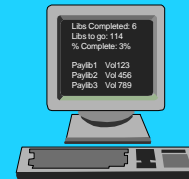
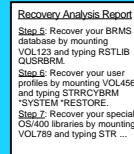
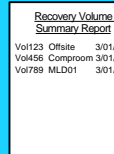
Lib1
Lib2

Non-Critical Application

Lib3
Lib4

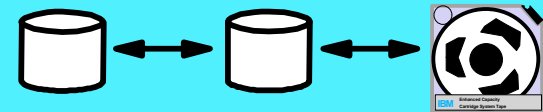
- ▶ What Objects should be backed up?
- ▶ What media? Tape, savefile, or ADSM?
- ▶ Full, Incremental, or Cumulative Backups?
- ▶ Save-while-active, Parallel saves
- ▶ Spoolfile and Object Level saves
- ▶ Duplicate Backup Tapes
- ▶ Did last night's backup run OK?

Recovery



- ▶ List of Tapes required
- ▶ List of Steps to Recover
- ▶ On-Line Progress Report
- ▶ Location-specific Recovery Steps

Hierarchical Storage Management

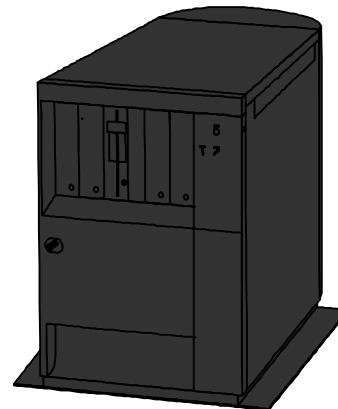
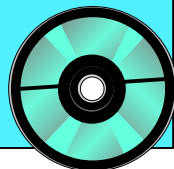
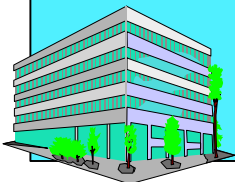


- ▶ Migrate libraries, root folders, and spoolfiles among disk ASPs based on age, size, and last use criteria
- ▶ Archive objects to tape based on age, size, frequency of use, and ASP storage criteria
- ▶ Dynamically recall database files, DLO's and streamfiles when needed

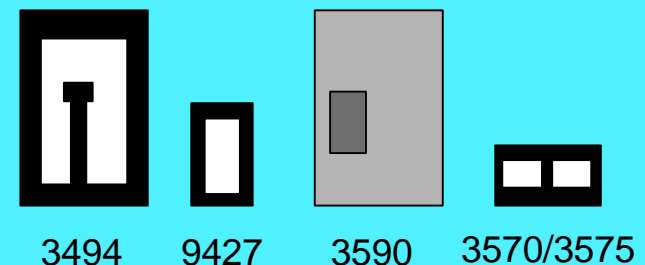
BRMS/400!!

Media Management

- ▶ What is on Tape XYZ?
- ▶ What tapes should be in location DEF?
- ▶ What tapes are old or have a lot of errors?
- ▶ What tapes should move offsite today?
- ▶ What tape has the latest copy of Object ABC?



Tape Library Support



Notes - Recovery

Using the information logged in the BRMS database, BRMS is able to simplify recoveries as follows:

Recovering Objects Interactively

Suppose a user calls to say he believes he corrupted his data libraries over the weekend. You can use BRMS to list all the available saves of those libraries, and find out which copy he wants to restore. BRMS will then mount the required tape, and restore the objects, all the while displaying an online progress screen indicating the next 10 libraries to be restored, along with the number of objects remaining and their size.

Performing a Full Restore

Each morning when the saves are completed, BRMS generates a series of recovery reports, that provide custom-tailored instructions for recovering the entire system. Duplicate copies should be kept in a safe place both onsite and offsite. The reports are as follow:

- The ASP Configuration Report shows the ASP sizes and %full so new disk can be configured at a hot site if required
- The Recovery Volume Summary Report shows all the tape volumes that are required for a full system recovery, and where to find them
- The Recovery Analysis Report provides customized, step-by-step instructions, including volume serials and object names, to recover your system
- The Recovery Activities Report documents any special in-house procedures that may be required as part of the recovery process

Recovery

Work with Media Information

RCHAS400

2=Change 4=Remove 5=Display 6=Work with media **7=Restore**
9=Work with saved objects

Opt	Saved Item	Date	Time	Save Type	Volume Serial	File Seq	Expiration Date
7	LIB1	2/01/99	22:13	*FULL	VOLA	1	3/15/99
7	LIB999	2/15/99	08:00	*FULL	VOL3	1	3/30/99
7	LIBXYZ	2/15/99	08:23	*FULL	VOL3	2	3/30/99
	QUSRSYS	1/30/99	15:40	*FULL	WW04	1	4/11/99
	QUSRBRM	1/30/99	15:48	*QBRM	WW04	2	4/11/99

F3=Exit F5=Refresh F12=Cancel

Notes - Recovery

To recover objects, simply locate them in the BRMS database using the various BRMS commands and menus, then choose option #7 to restore. If you are in a standalone environment, BRMS will issue mount messages to your operator. If you have an automated tape library and the tape is inside, BRMS will automatically mount it and restore the data.

If you kept object-level-detail and you want to restore individual objects from within a library, you can drill down and select those objects for restore. Otherwise, BRMS will present a RSTOBJ screen where you can key the names of the specific objects you need.



Online Recovery Progress Screen

Recovery

Display Recovery Items

RCHAS400

Remaining items	3		
Remaining objects.	126		
Remaining size	349 M	96.8%	

Saved Item	Date	Time	Save Type	Vol Serial	File Seq	Expiration Date	Objects Saved
LIB1	2/01/99	22:13:26	*FULL	VOLA	1	3/15/99	38
LIB9992	15/99	08:00:01	*FULL	VOL3	1	3/15/99	29
LIBXYZ	2/15/99	08:23:00	*FULL	VOL3	2	3/30/99	59

Press ATTN to cancel recovery.

Notes - Recovery

While BRMS does the restore, you will see an on-line-progress report with details about the number of items restored to date, and the number of objects still to go. This screen is very helpful during a large recovery to estimate how much longer the restore will take, particularly when compared to the input-inhibited sign seen during an OS/400 RSTLIB command.



Recovery

Recovery Volume Summary Report

Recovery Volume Summary Report

Volume Serial	Expired	Media Class	Creation Date	Expiry Date	Location Date	Storage Location	System ID
ABC071		FMT3590	2/16/99	3/16/99	3/02/99	MLB3494	PI D400V
ABC951		FMT3590	2/18/99	*ver 002	3/04/99	MLB3494	PI D400V
HI J787		FMT3590	2/28/99	3/28/99	2/28/99	BLDGXYZ	PI D400V
MN0843		FMT3590	3/05/99	4/05/99	3/05/99	BLDGXYZ	PI D400V
NOP042		FMT3590	3/06/99	4/06/99	*pendi ng	OFFSI TE	PI D400V
VOL006		FMT3590	3/07/99	*ver 002	*pendi ng	OFFSI TE	PI D400V

Total volumes needed for Recovery: 6

* This report lists all the tapes you would need for a specific recovery

Notes - Recovery

The Recovery Volume Summary Report shows all the tapes that would be needed in order to do a full system restore. A typical report would include the most recent *SAVSYS, the fullsave from the previous weekend, the incremental saves from each weeknight prior to the failure, any adhoc saves performed, and the most recent copy of the BRMS database.

Two copies of this report should be stored, one locally, and one offsite, so a copy will always be available should a restore be necessary. Shops that have a network of systems in different buildings, will sometimes send the recovery reports to a system in another building, so they will be available even after a site loss.



Recovery

Recovery Analysis Report

STEP 1: Recover Licensed Internal Code

Use media as shown below and the procedure for "Recovering the Licensed Internal Code" using option 2 if you are recovering to a different system or using option 3 if you are recovering to the same system as detailed in the book under Chapter 10.

Save Item	Save Type	Save ASP	Date	Time	Objects	File Seq	Control Group	Volume(s)
*SAVSYS	*FULL	01	1/18/99	23:51:43	0	1	ENTIRESYS	HIJ787 MN0843

STEP 2: Recover operating system.

Use the media shown below and the procedure for "Restoring the Operating System using the Complete Restore Method", as detailed in the book under Chapter 11.

Save Item	Save Type	Save ASP	Date	Time	Objects	File Seq	Control Group	Volume(s)
*SAVSYS	*FULL	01	1/18/99	23:51:43	0	1	ENTIRESYS	HIJ787 MN0843

STEP 3: Recover the BRMS/400 product and associated libraries.

The BRMS/400 product and associated libraries must be recovered before you can use the product to perform other recovery operations. Use WRKCFGSTS *DEV *TAP to see which tape devices are configured. Then run RSTLIB for each of the following libraries specifying SEQNBR and using media as shown below.

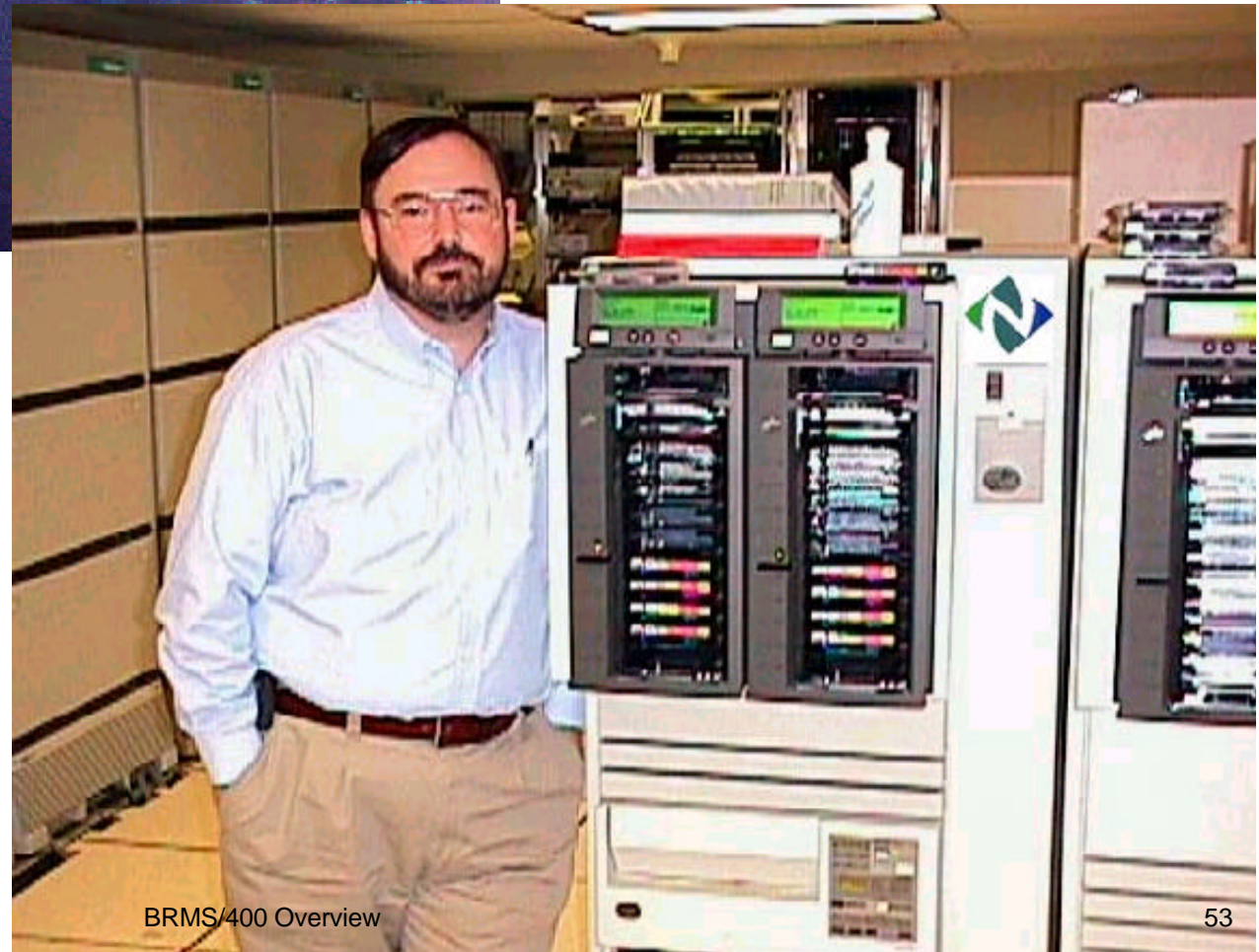
Save Item	Save Type	Save ASP	Date	Time	Objects	File Seq	Control Group	Volume(s)
QBRM	*FULL	01	3/6/99	23:57:00	1	5	ENTIRESYS	MN0843
QUSRBRM	*FULL	01	3/6/99	23:59:30	1	6	ENTIRESYS	MN0843

ETC.

Notes - Recovery

The Recovery Analysis Report shows the steps to follow and the tape volumes to use, in order to do a full system recovery. Notice that the early steps say which tapes to use, then refer to the checklists in the Backup and Recovery Guide, since BRMS is not yet loaded onto the system to guide the recovery. Partway through the recovery, once BRMS is loaded, the report will instruct you to use BRMS commands to automate the rest of the process.





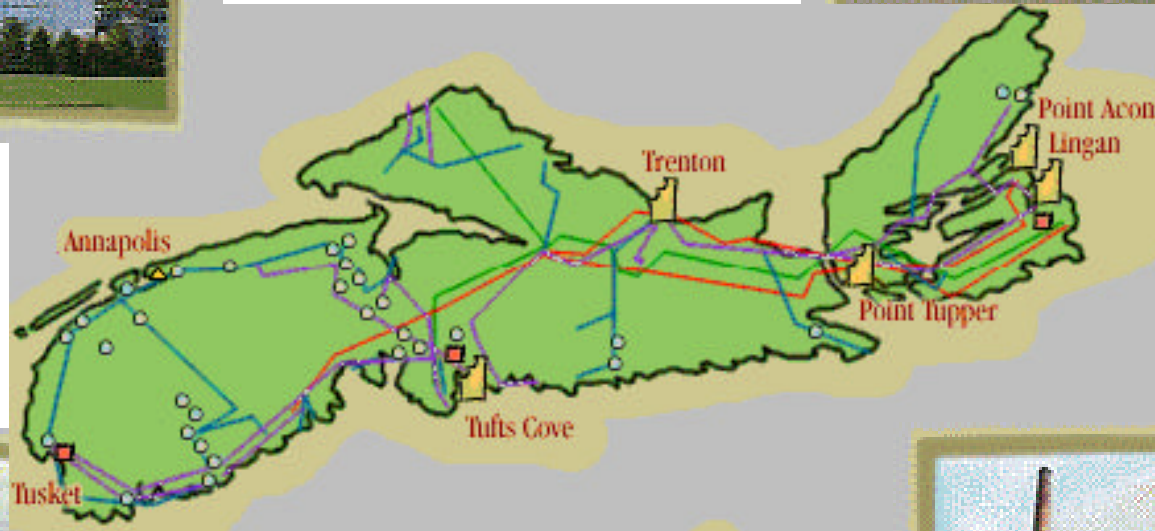
Notes - Recovery

Our next customer success story takes us to Portland, Oregon, where Northwest Natural Gas is located.

Ken Graap, the Systems Administrator, had only recently joined the company, when he was asked to do a recovery test. Luckily, Northwest Natural uses BRMS, and as Ken said, "It made me look like a star. The BRMS Recovery Reports provided a summary list of the tapes I needed to recover, details of the ASP configuration, and customized, step-by-step instructions for the recovery".

Some months later, Northwest Natural purchased a large amount of new disk. In order to balance the data across the disks, Ken suggested reloading the system, again using the BRMS saves and recovery reports. In Ken's words, "That's what we did and BRMS worked like a dream.... After restoring the BRMS product and starting the restore process, all we had to do was sit back and watch the status screens. We were able to recover our entire system (over 180GB's) in a little over 12 hours. Another success story for BRMS.... "





Notes - Recovery

Our next customer success story takes us to Halifax, Nova Scotia, where Nova Scotia Power Inc is located.

Shortly after NS Power implemented BRMS, they planned a recovery test to ensure they were comfortable with the BRMS Recovery Reports and procedures. Afterwards, their comment was "We loved all the BRMS Recovery Reports, just like you said we would. But what you didn't tell us, was how helpful the BRMS Online Recovery Progress Screen is. Throughout the recovery, it was easy for us to keep everyone informed of how far along we were, and how much longer it was likely to be before we were finished".

Keith Richards, Software Analyst, says the following: " We have completed several Year 2000 tests ... and in the building and reload of these test systems, we have used BRMS. ... The product is very easy to use, and in a system recovery, it lays it all out step by step"



BRMS - Hierarchical Storage Mgmt

Backup Planning

Critical Application

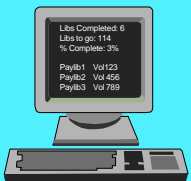
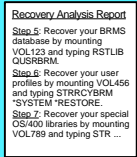
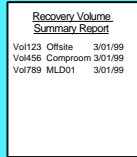
Lib1
Lib2

Non-Critical Application

Lib3
Lib4

- ▶ What Objects should be backed up?
- ▶ What media? Tape, savefile, or ADSM?
- ▶ Full, Incremental, or Cumulative Backups?
- ▶ Save-while-active, Parallel saves
- ▶ Spoolfile and Object Level saves
- ▶ Duplicate Backup Tapes
- ▶ Did last night's backup run OK?

Recovery



- ▶ List of Tapes required
- ▶ List of Steps to Recover
- ▶ On-Line Progress Report
- ▶ Location-specific Recovery Steps

Hierarchical Storage Management

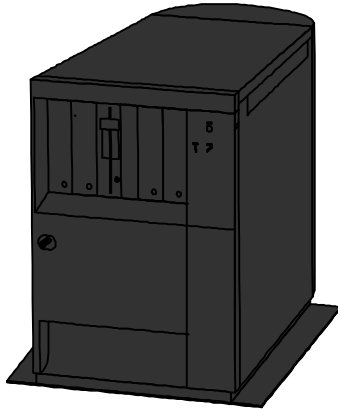
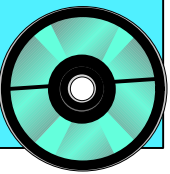
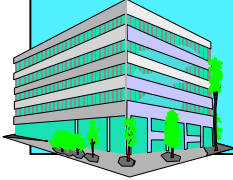


- ▶ Migrate libraries, root folders, and spoolfiles among disk ASPs based on age, size, and last use criteria
- ▶ Archive objects to tape based on age, size, frequency of use, and ASP storage criteria
- ▶ Dynamically recall database files, DLO's and streamfiles when needed

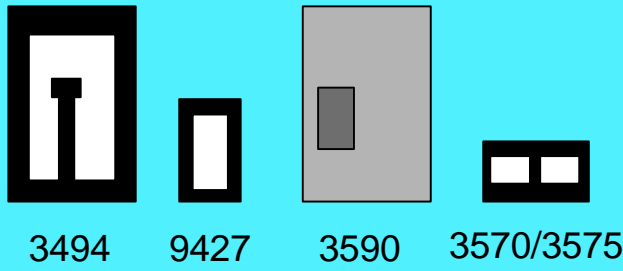
BRMS/400!!

Media Management

- ▶ What is on Tape XYZ?
- ▶ What tapes should be in location DEF?
- ▶ What tapes are old or have a lot of errors?
- ▶ What tapes should move offsite today?
- ▶ What tape has the latest copy of Object ABC?



Tape Library Support



Notes - HSM

The BRMS Backup and Recovery functions help you to ensure you can recover your system in case of a problem. By comparison, HSM helps you to ensure you are using your storage space in an economical fashion by letting you move less-frequently used objects to less-costly media. This is done using "migration" to move objects among disk ASPs, and "archive/auto-recall" to move objects between disk and tape. Migration is available from V4R3 onwards, whereas archive/auto-recall is available on all supported releases, with auto-recall of streamfiles and folders being added at V4R3. Selection criteria for HSM is as follows:

Migration of Libraries and Folders

Full libraries and root level folders can be selected for migration based on the following criteria: size, creation date, age, last-used-date, last-changed-date, last-migration-date, days-since last use/change/migration. Selection can demand that ALL objects in the library or folder meet the criteria, or that a certain percentage of the objects meet the criteria. Note that at the present time, the entire library or folder must migrate between ASPs when selected for migration: it is not possible to have some of the objects in one ASP, and the rest of the objects in another ASP.

Migration of Spoolfiles

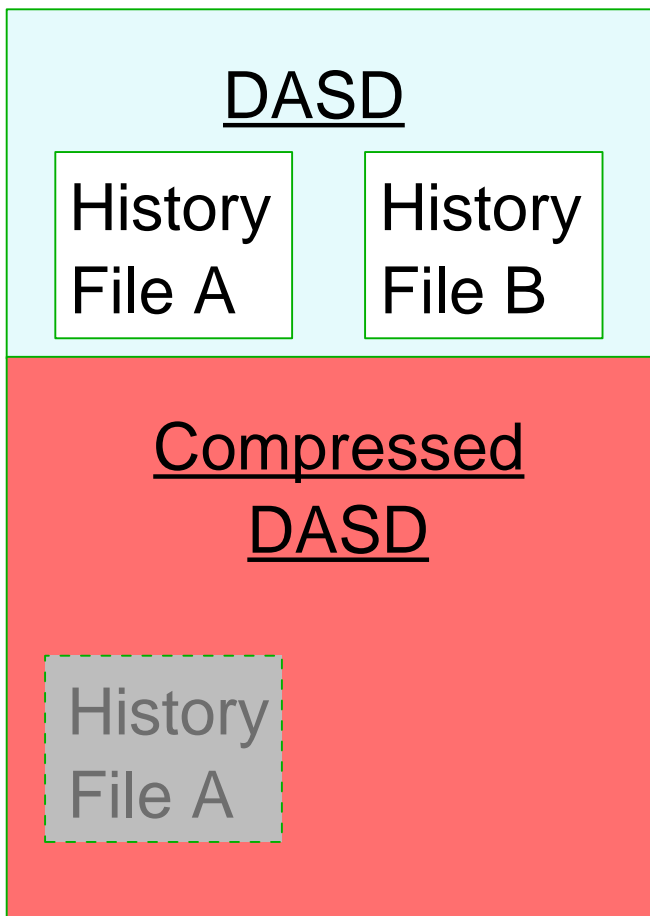
Spoolfiles are migrated from an output Q in one ASP to an output Q in another ASP. Selection criteria include: output Q name, job name, file name, user name, user data, creation date, last used date, and min-max size range.

Archive/Auto-recall

Objects can be selected for archive based on the following criteria: days since last use (all releases), minimum object size (V4R3), minimum ASP % full (V4R3), average number of days used per month (V4R4). Spoolfiles have additional selection criteria of job name, file name, user name, and user data. Any archived object can be restored to the system using the BRMS interactive menus. Certain objects can be auto-recalled to the system when accessed by a user or application. These object types are as follow: *FILE objects (all supported releases), folders (V4R3) and bytestream files (V4R3).



Hierarchical Storage Management

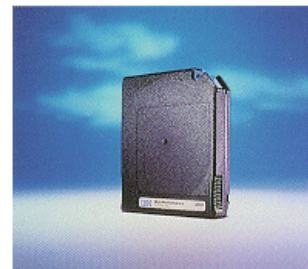


Keep History File A on regular DASD so long as it has been used in the last 30 days. Otherwise, migrate it to compressed DASD

Migrate

Archive/
Auto-Recall

If History File A hasn't been used in 365 days, archive it to tape, with ability to auto-recall if needed



Notes - HSM

An example of an HSM implementation would be as follows:

Suppose a company has an application that writes each month's transaction history into a separate file. Their research shows that the majority of requests for information about past transactions occur in the first month, with moderate activity on the file for up to a year, and very few requests for historical information thereafter.

This company could implement HSM to make their data accessible when needed, without undue disk space costs. They could implement an ASP of compressed DASD on their system (V4R3 onwards) that would be more economical than standard DASD. BRMS migration policies could be set up to move history files to compressed disk either a month after creation, or a month after last use or last change. BRMS archive policies could be set up to move the files to an automated tape library a year after creation or last use or last change or last migration. If a file was needed after it had been moved to tape, BRMS would auto-recall the file to disk when it was accessed. Appropriate parameters could then be set either to re-archive the file if it had been changed, or discard the file from disk a certain number of days later if the previously archived copy was still correct.





Notes - HSM

For our next customer success story, we go back to Shell Canada in Calgary, Alberta.

Shell is one of our most sophisticated BRMS users in the world, and has been making extensive use of the BRMS HSM functions for many years. Since they began using the AS/400 in 1994, Shell has archived vast amounts of historical data to 3590 tape media stored in their 3494 tape library. Using the BRMS dynamic retrieval function, this data is automatically recalled to the system when accessed by a user, then deleted from the system after a certain length of time, provided the data has not been changed. Rather than using the standard BRMS dynamic retrieval interface, Shell has linked an in-house program to the BRMS dynamic retrieval exit. When a user tries to access a *FILE object that has been archived, he is presented with a customized screen advising him of the situation, and allowing him to select the course of action (1) skip the transaction, (2) restore the file immediately, (3) restore the file in batch for use a little later, (4) restore the file overnight for use the following day. Shell adjusts the user options available on their dynamic retrieval screens at different times of the day depending whether tape drives are available for immediate restores.

Shell has recently upgraded to V4R3 and implemented compressed DASD. They are now looking forward to implementing the BRMS migration functions to move data among disk ASPs based on various age and usage criteria.



BRMS - Tape Library Support

Summary

Backup Planning

Critical Application

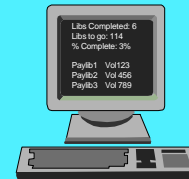
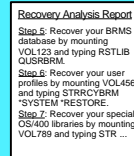
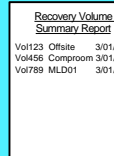
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Lib2

Non-Critical Application

Lib3
Lib4

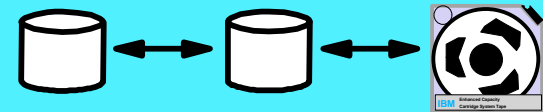
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- ▶ Did last night's backup run OK?

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- ▶ List of Tapes required
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- ▶ On-Line Progress Report
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Hierarchical Storage Management

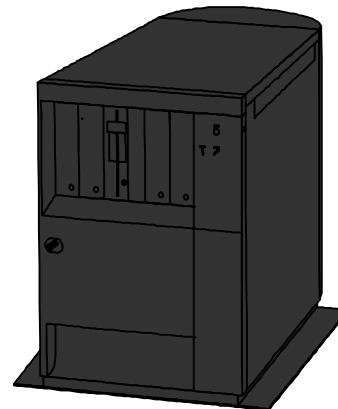
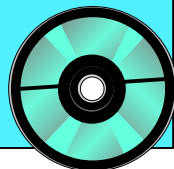
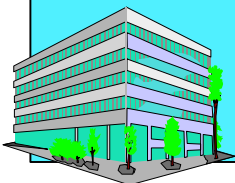


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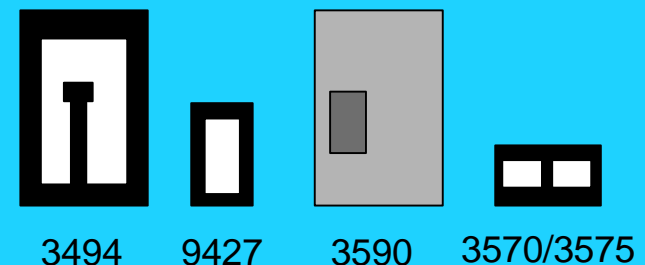
BRMS/400!!

Media Management

- ▶ What is on Tape XYZ?
- ▶ What tapes should be in location DEF?
- ▶ What tapes are old or have a lot of errors?
- ▶ What tapes should move offsite today?
- ▶ What tape has the latest copy of Object ABC?



Tape Library Support



Notes - Tape Library Support

Companies who have tape libraries need software to manage the library by doing the following:

- selecting appropriate media for the save
- submitting mount and demount commands to load the tapes in and out of the drives
- submitting insert and eject commands to move the tapes in and out of the library enclosure for offsite rotation

BRMS provides this support.

Tape Library Support

BRMS will

Select Scratch Tapes

Mount/Demount from drives

Eject Tapes from Library after the save



Notes - Tape Library Support

BRMS provides support for automated tape libraries such as:

- 9427 (8mm cartridges)
- 3490e model F (3490 cartridges)
- 3570 (3570 Magstar cartridges)
- 3575 (3570 Magstar cartridges)
- 3590 (3590 Magstar cartridges)
- 3494 (3490 and 3590 cartridges)



How do I Get Started Using BRMS?



Notes - How do I get Started?

The following section will help you get started in planning a BRMS implementation.



Recognizing a Complex BRMS Project (#1 of 2)

- AS/400 + Save/Restore Skill Level
- Recovery Strategy needs Review
- Complex Recovery Strategy
- Tight Backup Windows
- Numerous Backups
- Media Library Implementation
- Hierarchical Storage Management



Notes - Recognizing a Complex BRMS Project (#1 of 2)

When beginning your BRMS implementation project, first determine whether you will be doing a "simple" BRMS install, or whether you should allow extra time to address any more-challenging project items.

AS/400 and Save/Restore Skill: If the staff that will be working on BRMS already have an in-depth knowledge of the AS/400 and AS/400 save/restore, then it will be very easy for them to understand the BRMS concepts. However, if they are new to the AS/400 system, then extra time should be allowed, and extra training courses or assistance may be in order, to ensure BRMS is implemented quickly and correctly.

Recovery Strategy: Prior to beginning any BRMS project, a company should review its save/restore strategy to confirm current business needs are being met. If they are not, then the strategy should be revised, and approved by the appropriate management and auditors before the BRMS project is undertaken. In a large shop environment, this process could take several months, and could require deep technical skill and many meetings with users.

Complex Recovery Strategy: If a company's recovery strategy is complex, then additional time should be allocated to the BRMS project to allow planning and testing time. For example, contrast a simple BRMS install whereby the default BRMS control groups are run each evening, with a more complex strategy including multiple backup streams with save-while-active, checkpoint monitoring, lots of libraries and object lists, complex logic, etc

Tight Backup Windows: If BRMS is being installed on a test machine, then backups can often be run and debugged during the day. However, if the machine is in production, then backups can only be run at night, and it is imperative that a successful backup be achieved each evening. As a result, it will probably be necessary to tend the initial backups overnight so any oversights can be corrected immediately. There will also likely only be time for one backup test each day, thus prolonging the timeline of the project.

Numerous Backups: If a company has many backup streams, or many libraries within a backup stream, then extra time should be allocated to key each of the backup streams. For example, contrast the keying effort for a customer who runs a simple *ALLUSR backup each evening, with a customer who has hundreds of backup streams, each with hundreds of libraries/objects.

Media Library Implementation: Customers often purchase BRMS at the same time they purchase their first automated Media Library. Extra time should be allocated to the project in this case, to allow users to learn both the new hardware, and also the new software.

Hierarchical Storage Management: Many customers will implement BRMS backup initially, then follow-on with HSM later once they are comfortable with the BRMS software. When implementing HSM, acknowledge that you will also need to develop your corporate archive/auto-recall strategy, so there could be considerable planning time required.

Recognizing a Complex BRMS Project (#2 of 2)

- BRMS networking between multiple AS/400's
- Backups are initiated from within applications
- Use of Save-While -Active
- Migrating an existing Media Inventory to BRMS
- Converting from existing Tape Management Software to BRMS
- Mirrored Systems
- Use SAVSTG, CPYTOTAP, CPYFRMTAP



Notes - Recognizing a Complex BRMS Project (#2 of 2)

BRMS Networking: If you will be running BRMS in a shared-media environment by creating a BRMS network, allow yourself extra time to setup the additional systems, and to troubleshoot any communications issues that may arise. Pay particular attention to systems that do not have an APPC connection, or that have secure-location set to *YES, since this has implications for the underlying DDM communications.

Backups Initiated within Applications: If your SAVxxx commands are issued from within your applications, changes may be required. Allow time to work through your change management procedures to implement these changes.

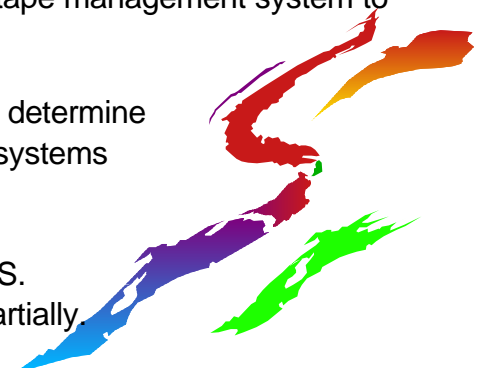
Using Save-while-Active: Implementing save-while-active is a project on its own, since you need to determine relationships between objects, ensure you can get a checkpoint, quiesce your application, etc. Be sure to allow time for this planning and testing in addition to the time you allow for BRMS.

Migrating Existing Inventories: Tapes that were written prior to the implementation of BRMS can be loaded into the BRMS inventory by mounting the tapes and running the EXTMEDiBRM command. If an existing tape inventory is maintained online, programs can be written to migrate that inventory to BRMS. In either case, time needs to be allowed to research and implement this aspect of BRMS.

Converting from an Existing Tape Management System: Since OS/400 can only communicate with one tape management system at a time, careful research and project planning is required when migrating from another tape management system to BRMS.

Mirrored Systems: If mirrored "hot standby" systems are in operation, planning will be required to determine the most suitable sequence of operations to ensure the appropriate backups are taken, and the systems remain synchronized as needed.

SAVSTG, CPYTOTAP, CPYFRMTAP: These commands are not supported natively within BRMS. If you are using them, you will want to use the SETMEDBRM command etc to log these tapes partially.



Installing BRMS/400

- Ensure no other tape management software exists
- Install Media Storage Extensions 57xx-SS1 Option#18
- Install BRMS 57xx-BR1
- CHGLICINF 57xx-BR1 Feature Code #5050 (V4R3 and below)
- Apply latest CUM and Save/Restore Group PTF
- Apply BRMS Network PTF's on all AS/400's in BRMS network
- Installation provides three (3) libraries:
 - QBRM BRMS Program Objects
 - QUSRBRM BRMS User setup and BRMS DB
 - QMSE MSE Program Objects

Notes - Installing BRMS

To install BRMS, do the following:

- Ensure no other tape management system is installed on your system, since OS/400 can only communicate with one tape management system at a time. If you will be migrating from another tape management system, careful planning will be required in advance to avoid problems
- Install the Media and Storage Extensions (MSE) feature of OS/400 that should have been shipped on your BRMS tape, using the standard RSTLICPGM interface. MSE provides the tape exit programs that advise BRMS of all tape activity on your system so your tapes can be logged and protected. Note that MSE should be installed prior to BRMS so the exit points can be registered.
- Install BRMS using the standard RSTLICPGM interface
- For V4R3 and below, run CHGLICINF to indicate the number of tapes that you are licensed to manage with BRMS. If you forget to do this, the tapes will show as *UNR (unregistered) when you add them to BRMS, and you will need to go back and register them after you set your licensing. On CHGLICINF, use feature 5050, and be sure to set both the usage and threshold fields.
- Load the latest CUM tape, and then the save-restore group PTF to ensure you are up-to-date on your PTFs for tape, save/restore, and BRMS. To have IBM ship you the latest save-restore group PTF, do a SNDPTFORD for the following PTF:

(V3R1: not available)

V3R2: SF99072

(V3R6: SF99070)

V3R7: SF99071

V4R1: SF99073

V4R2: SF99074

V4R3: SF99075

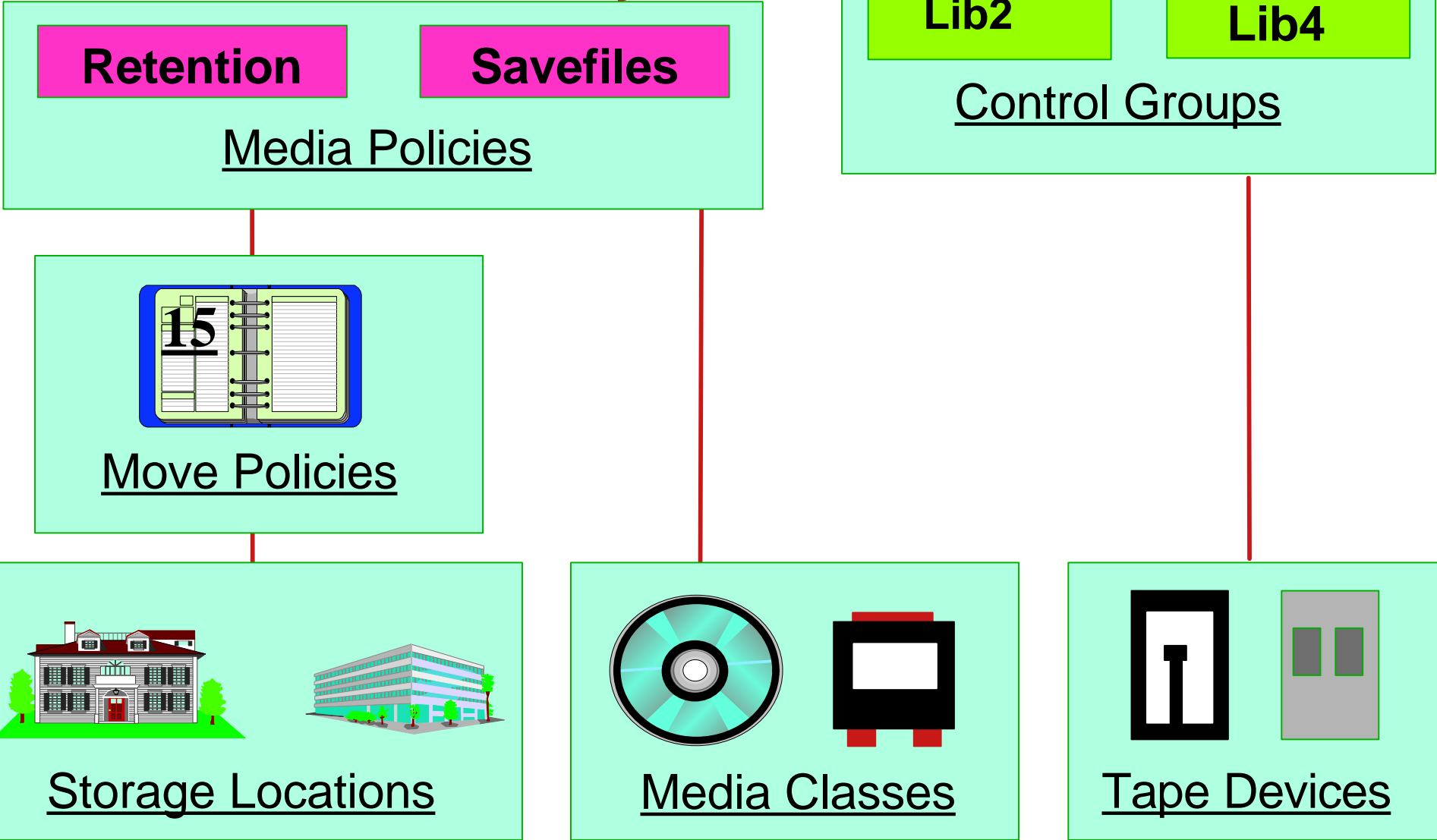
V4R4: SF99076 (?)

- If you are in a BRMS network, you should install the CUM and group PTF on ALL systems in the network. For example sometimes new versions of BRMS incorporate new fields in the BRMS database to allow new function. Prior to adding a new system to the network, all systems must have the appropriate PTFs to convert the database records as they are passed between systems at higher and lower release levels
- Following the installation, you will notice 3 new libraries on your system as follow:
 - QBRM has the BRMS programs
 - QUSRBRM has your BRMS setup and inventory databases
 - QMSE has the Media and Storage Extensions programs.

BRMS Entities

Defaults

System Policy
Backup/Recovery/Archive Policy



Notes - BRMS Entities

In order to setup a BRMS backup, you will need to consider each of the following objects. Default objects are created by BRMS, or you can create similar objects of your own:

- A Backup Control Group is the list of items that should be backed up, along with various parameters for the underlying save command.
- A Media Policy indicates where the scratch tapes are located, whether savefiles should be used, and how long the saves should be kept
- A Move Policy describes the rotation cycle for the tapes
- A Storage Location describes a place where you keep tapes, such as COMPROOM, MLB3494, OFFSITE, LEFT_DRAWER, etc
- A Media Class describes the type of tape that should be used, eg 1/2" reel, QIC, 8mm, 3490, 3570, 3590, etc
- A Tape Drive is a BRMS description for a device on the system. It includes additional information such as where the drive is located, and what valid tape densities it can read/write.

You can start at the Control Group, and drill down to select/create the other objects as required, or you can start at the bottom of the chart, and work your way upwards as you create the various objects.

You may find all these objects confusing at first, but as you grow more familiar with BRMS, you will find that they provide a very flexible save environment.



BRMS Implementation Summary

- Identify/Review/Design Recovery/Backup Strategy
- Add and Update Storage Locations
- Review/Update Media Classes
- Review/Update Media Device Entries and/or Media Library Entries
- Add and Modify Move and Media Policies
- Review/Update System, Backup and Recovery Policies
- Create Backup Control Groups
- Enroll Tapes, Specifying Media Class and Storage Location
- Perform Initial Full Save of System (Recovery Starting Point)
- Establish BRMS Maintenance and Media Movement Procedures
- Review Reports & Address Any Problems
- Plan a Recovery Test

Notes - BRMS Implementation Summary

To setup BRMS, the steps are as follow. If you use this sequence, you will find that the objects you need for the later steps will be created in your earlier steps:

- Review your Recovery Strategy: Before setting up BRMS, it is VERY important to ensure you have a sound backup/recovery strategy that is meeting the needs of your business
- Add and Update Storage Locations: This simply entails keying names and addresses. These will be used later in the Tape Drive Description setup (WRKLOCBRM)
- Review and Update Media Classes: BRMS will setup the default media classes based on the drives attached to your system at the time you loaded BRMS. You can add text, and make any other adjustments that you require. (WRKCLSBRM *MED)
- Review Tape/Library Devices: BRMS will setup devices based on the drives attached to your system at the time you loaded BRMS. Check/adjust the following parameters to suit your environment: Storage Location, Media Classes allowed, Shared Device, Optimum Block, Next Volume Mount Message (WRKDEVBRM)
- Review System, Backup, Recovery Policies: These provide default values for your BRMS system. (WRKPCYBRM *SYS etc)
- Add and Modify Move and Media Policies: Be sure to make the move policies first since the media policies point back to them. Also be sure to set the "Location" parameters correctly in each ... The Media Policy Storage Location tells BRMS where to take the input tape from. The Move Policy Home Location tells BRMS where to leave the tape after it is finished all its moves. (WRKPCYBRM *MOV or *MED)
- Create Backup Control Groups: Define the items you want to backup, and link the save to the other BRMS entities by making a control group, You can also specify "subsystems to end/restart" and "jobQ's to hold/release" as part of the backup. (WRKCTLGBRM *BKU)
- Enroll Tapes: Add your tapes into the BRMS Database using ADDMEDBRM for standalone tape drives, and ADDMLMBRM for tape libraries. Be sure to specify the media class and storage location according to those requested in your media policy and control group.
- Perform Initial Full Save of System: Run a complete backup of the system, so BRMS will be aware of at least 1 copy of each object. (STRBKUBRM)
- Establish BRMS Maintenance and Media Movement Procedures: Arrange to run BRMS maintenance and media movement each evening to expire tapes, cleanup the database, adjust volume locations, print recovery reports, etc. (STRMNTBRM)
- Review Reports and Address any problems: Arrange for an operator or analyst to check the BRMS reports each morning as described later in this document
- Plan a Recovery Test: Ensure that you practise your full system recovery at least once a year to ensure your recovery strategy is complete and your staff is familiar with the most efficient procedures.

Monitoring BRMS

- Find the Recovering Your Entire System Report, Recovery Volume Summary Report, ASP Information Report, and Recovery Activities Report (if it exists). Make sure you keep these reports safe since they tell you how to reconfigure your disks and recover your system to today's backup. Consider one copy on-site and one copy off-site.
- BRMS network: find the Centralized Media Audit Report that compares the BRMS database across systems and correct any errors.
- Check the Volume Movement Report for error messages in the right-hand column and resolve. Gather the volumes that need to move off-site and watch for the volumes returning.
- Check the Media Report by Expiration Date to ensure you have enough scratch tapes of each class for tonight's backups.
- Review the Media Information Report to ensure zeroes in the "not-saved" column and investigate any problems (it is VERY important to resolve any problems).
- Review the Media Movement Report--Next Scheduled Volume Movement and contact your off-site storage company to arrange to have the tapes returned on the dates indicated.
- Review the BRMS Services Log (DSPLOGBRM) for error messages
- Check whether a Media Threshold Information Report was printed. If there are any exceptions, replace those tapes.

Notes - Monitoring BRMS

Checking the BRMS Reports

The attached checklist shows the minimum number of BRMS reports that should be reviewed each day to ensure the saves ran correctly, and the appropriate tapes and documentation are stored in a safe place in case a recovery is necessary.



Top Ten List for new BRMS users

10. **No tape drive available?**
Be sure to identify the tape drive location in BRMS Devices
9. **Tapes display as *EXP after a successful save?**
Check to see that Media & Storage Extensions is installed
8. **MSE installed, but tapes are still not tracked?**
Verify Media Monitor is turned on in the System Policy
7. **Running into unexplainable problems?**
Install the latest CUM and Save/Restore Group PTF
6. **Are your tapes marked as *UNR ?**
Set the usage & threshold levels on CHGLICINF

Notes - Top Ten List (#1 of 2)

Some Tips for Troubleshooting your initial BRMS configuration are as follow:

No Tape Drive Available: If BRMS gives you a message indicating that no tape drive is available, and you are certain that there IS a drive free, then check that you have indicated the proper storage location in your BRMS Device description and your Media Policy Storage Location field. If you have used *MEDCLS to indicate your tape drive in the control group, BRMS will be looking for a tape drive that is in the same location as the tapes you have asked it to use, so if these parameters are incorrect, BRMS will think there is no drive available.

Tapes display as Expired after a Successful Save: If you forget to install the Media and Storage Extensions feature, the tape drives will not communicate with BRMS, and thus the BRMS database will not be updated. Check using GO LICPGM, and reload MSE if necessary. You will also have to run INZBRM *DATA to register the exit points, since BRMS would not have been able to do this for you automatically during the install since the tape exit programs were not on the system yet.

MSE Installed but Tapes Still not Tracked: Check the System Policy using WRKPCYBRM *SYS, and verify that the media monitor field is set to *YES. If it is set to *NO, you have essentially turned off the tape exits, so BRMS does not do any tape tracking for you.

Running into Unexplainable Problems?: Always ensure you are up-to-date on PTFs by loading the current CUM tape shortly after it becomes available, and updating with the save/restore group PTF every few weeks. See the "Implementing BRMS" section earlier in this presentation for a list of the group PTF numbers for each release.

Are your Tapes Marked as *UNR?: This means that you have either forgotten to set your BRMS licensing information, or you have exceeded the number of tapes you are licensed for. Use CHGLICINF on the BRMS product with feature code 5050, and be sure to set both the usage and threshold values. Then register the *UNR tapes using either WRKMEDBRM option #16, or INZBRM *REGMED command. Note that this is only required on V4R3 and below.

Top Ten List for new BRMS users ...

5. **The backup seems to run successfully but nothing is saved?
Check your FULL and INCREMENTAL specifications in CTLG**
4. **The backup seems to start but does not finish?
The CTLG may have ended the SBS before running the backup**
3. **Spoolfile Saves Fail?
Verify the user is in the AS/400 Distribution Directory (WRKDIRE)**
2. **The *SAVSYS does not seem to Run?
Run interactively from the console or turn on Console Monitoring**
1. **Error that no tapes are available?
Check that tapes are in the Storage Location that
the backup is requesting**

Notes - Top Ten List (#2 of 2)

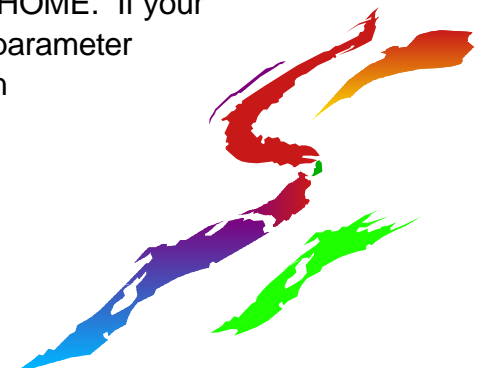
The Backup Runs with Endcode 00 but Nothing is Saved: In a BRMS control group, there are 7 spaces where you indicate what type of backup you would like for each line item on each day of the week. "F" stands for a full backup, "I" stands for an incremental backup, and a "blank" means to skip backing up that item on that day of the week. If your backup ends successfully but nothing appears to have been saved, you have likely left blanks in the "F/I" field for that day of the week, and BRMS has done just what you asked it to backup nothing!!

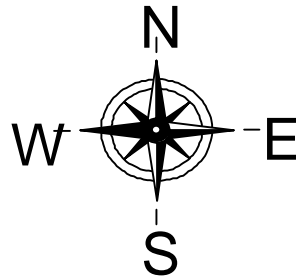
The Backup seems to Start but does not Finish: When creating a BRMS control group, the option #9 screen allows you to specify certain subsystems that you would like to end at the start of the backup. A common oversight is to submit the backup into QBATCH, but then ask it to end QBATCH as the first step of the backup.

Spoolfile Backups Fail: In order to preserve spoolfile attributes, BRMS converts spoolfiles into DLO's prior to saving them. However, in order to create a folder for the DLO, OS/400 demands that the user be enrolled in the System Distribution Directory. Hence BRMS users will often find that their first spoolfile backup fails until they use ADDDIRE to add the user to this directory.

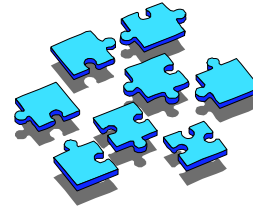
The *SAVSYS Save does not seem to Run: OS/400 demands that a *SAVSYS be run interactively from the console. Hence, BRMS only runs the *SAVSYS item in a control group if the group is run interactively from the console, or if it is run in console-monitoring mode. Otherwise, BRMS skips over the *SAVSYS and continues with the rest of the backup.

Error that no Tapes are Available: When you add tapes to BRMS, the default storage location is *HOME. If your media policies are setup to take scratch tapes from another location, then either key the location parameter on ADDMEDBRM, or use WRKMEDBRM option 8=move to move the tapes to the proper location before running the backup.





Where are my tapes?



Recovery steps outlined



Priority Applications up first

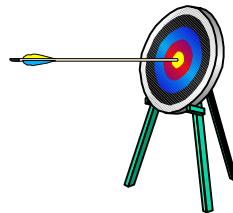


How much longer for the restore?

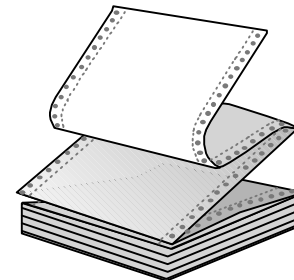
Backup & Recovery Media Services/400



Avoid human error: writing over critical data



Confidence in backup



Ability to save spool files

Notes - Summary

BRMS is IBM's Strategic Backup Management Product. It helps you to manage your save/restore operations and makes you confident that you could restore your system if necessary by doing the following:

Manage your Media:

- tracks the contents of your tapes as they are written
- prevents overwriting active tapes
- provides move reports showing which tapes should move to different locations each day
- provides lists of tapes that should be in each location at any given time

Automate your Backups:

- sets up your backups in a standardized format that others can understand easily
- supports save-while-active, object-level saves, spoolfile saves that maintain print attributes, saves to ADSM, etc
- provides detailed reporting on activity and errors etc

Simplify your Recoveries:

- shows you all the saves of a certain set of objects so you can choose which generation you want to restore
- provides interactive restores of those objects, complete with operator mount messages as appropriate
- simplifies full-system recoveries by providing reports showing ASP configuration, tapes required for recovery, and detailed steps for recovery. Automates those steps once the BRMS product is back on the system.
- provides an on-line progress report during a recovery

Hierarchical Storage Management (HSM):

- migrates objects among disk ASPs based on age, size, and usage criteria
- archives objects to tape based on age, size, usage, frequency-of-use (V4R4) criteria
- dynamically recalls *file, DLO and IFS objects when accessed by a user or application, and performs interactive recalls of other object types

Tape library Support:

- interfaces with automated tape libraries to select and mount/demount/eject volumes



BRMS/400 Resources

EDUCATION	Course #N1974 (USA), S5255 (Canada)	Course # BRMS2
	Introduction to BRMS/400	Advanced BRMS/400
	4.5 Days w/ Hands-On Labs	2.5 Days w/ Hands-On Labs
	1-800-IBM-TEACH	1-800-IBM-TEACH

BRMS Internet Home Page <http://www.as400.ibm.com>

**Select PRODUCTS, Select SOFTWARE, Select SYSTEMS MANAGEMENT,
Select BRMS**

BRMS Redbook: "Practical Guide to Managing BRMS/400" SG24-4840

**Availability Redbook: "The Systems Administrators Guide to Availability and
Recovery" SG24-2161**

IBM Support Line @ 1-800-237-5511 - AS/400 (USA)

IBM Support Center @ 1-800-426-7378 - AS/400 (Canada)

Rochester Technology Solutions Center (TSC)

507-253-9025 rchsymgt@us.ibm.com