

June 2023



**z/VM Disaster Recovery Testing**  
with an IBM TS7700 Tape Grid,  
IBM Backup and Restore Manager for z/VM, and  
IBM Tape Manager for z/VM



## Contents

Special Notices .....	2
Assumptions .....	2
Target Audience .....	2
Introduction.....	3
Steps to perform once in the production environment .....	4
Steps to perform once at DR testing.....	7
Perform these steps each time at DR testing .....	8
Steps to perform at the end of DR testing .....	10
Summary .....	10

## Special Notices

This document reflects the author’s understanding of IBM Backup and Restore Manager for z/VM and IBM Tape Manager for z/VM as they relate to TS7700 virtual tape environment. This document is presented “As-Is” and IBM does not assume responsibility for the statements expressed herein. It reflects the opinions of the author, based on her experiences. If you have questions about the contents of this document, please contact the author: Tracy Dean at [tld1@us.ibm.com](mailto:tld1@us.ibm.com).

## Assumptions

1. Backup and Restore Manager for z/VM V1.3, DFSMSrms for z/VM FL 221, and Tape Manager for z/VM V1.3 are installed, configured, and running in the production environment.
2. Production DASD volumes are mirrored to the Disaster Recovery (DR) testing site.
3. DR **testing** is performed by halting the DASD mirroring (mimicking a disaster), bringing up the system at the DR site, and testing applications and procedures at the DR site.
4. The production system is running while the DR test is performed.
5. A TS7700 grid is in place with 2 or more clusters with at least 1 at the DR site. Virtual tape volumes are replicated across the grid.

## Target Audience

This document is intended for z/VM system programmers and storage administrators.

### Introduction

In a z/VM environment with Tape Manager, the status of a tape volser (scratch, used, retention period, etc.) is managed by Tape Manager for z/VM. Tape Manager runs commands to move the tape in the library from the scratch pool to the volume-specific pool when a new tape is mounted, and vice versa when a tape is expired. Since there is a tape grid, this status is reflected across all of the tape library clusters. When Tape Manager is running in a DR test, it starts with a copy of the production tape catalog and updates its own copy of this catalog as tape mounts and expirations are happening during the DR test. The production Tape Manager is also running with a separate copy of the tape catalog. So the 2 catalogs diverge but are connected to the same tape library grid. This situation can cause tapes in the library to be used by both systems without the other knowing about it.

**Note:** This issue only applies in a DR **test**. In a real DR situation, the production system is no longer running and there is only one Tape Manager tape catalog being used at any point.

For these reasons, during a DR **test**, the DR site:

- Needs read access to the production tape volumes
- Must only have scratch/write access to a unique range of volsers specifically used for DR testing
- Must not expire production tapes

In addition, you can choose to use a separate range of virtual device addresses for tapes in DR testing.

To meet the above requirements, you must make configuration changes in the TS7700, Tape Manager and Backup and Restore Manager. Follow the procedures documented below when preparing for and starting a DR test.

## Steps to perform once in the production environment

You only need to perform these steps once in your production environment since your production environment is copied to the DR site at the start of each DR test.

1. In the TS7700, create a new scratch category for DR testing.
  - We used **0081** aka **SCRATCH1**. This is different than the one used for production.
2. In the TS7700, create/add a new range of tape volsers to the TS7700. These will be used specifically in DR testing.
  - We created **V10000-V10099**.
3. In the TS7700, determine what private category to use for DR testing.
  - Choose a private category not in use by any host connected to the TS7700
  - Do not use x'0000' or x'FFxx', where xx equals 0–9 or A-F
    - x'0000' represents a null value
    - x'FFxx' is reserved for use by the hardware
  - Note: You do not need to create this private category in the TS7700. The library will create it automatically the first time Tape Manager moves a tape into this category.
4. Update the Tape Manager `SYS CONFIG` file on the TCTMM 198 disk to:
  - Add a new `Define_media` statement for DR test, specifying the new DR test scratch category, a new device pool, and the new DR test private category. For example:

```
Define_Media DRPOOL,  
  DevPool 3590D,  
  Mode RW,  
  ScrSel RANDOM,  
  VolCat DF81,  
  ScrCat SCRATCH1,  
  ExpHold 3
```

We specified

- **DRPOOL** for the media name
  - **3590D** for the device pool
  - **DF81** for the private category – notice this must match what you chose in step 3.
  - **SCRATCH1** (aka 0081) for the scratch category – notice this must match step 1 above and must be different than the scratch category used in production.
- Add a new `DevPool` statement for the range of devices to be used for DR testing. For example:

```
Devpool,  
  3590D,  
  ATL,  
  VMSYSATL,  
  770-77F
```

We specified

- **3590D** for the device pool name. Notice this much match step 3a above.
- **VMSYSATL** for the library name. This must match the library name specified on the `Library` statement in this `SYS CONFIG` file.

## z/VM Disaster Recovery testing

- **770-77F** for the range of devices. This must be the range of devices available in your DR environment.
  - Verify the value for `ExpStart` is not a time that will be imminent when DR testing normally starts. It's ok for expiration processing to occur during a DR test that lasts more than 24 hours. You just don't want expiration processing to be run before you have time to follow the procedures outlined below for modifying the DR test environment once it's up.
    - In our system, this is currently set to run at 5 minutes after midnight so shouldn't be an issue for our normal DR testing schedules.
5. Run the `TAPEADD` command to add the DR testing volser range of scratch tapes to Tape Manager. Be sure to specify the DR test media value of **DRPOOL** as we defined in step 3a above. For example:  

```
TAPCMD TAPEADD VOL valid-volidn POOL SYS MEDIA DRPOOL ATL VMSYSATL SCRCAT SCRATCH1
```
  6. Run the `POOLDEF` command to create new a tape pool in Tape Manager. This will be used by Backup and Restore Manager during DR testing. For example:  

```
TAPCMD POOLDEF BKRADMIN DRPOOL MEDIA DRPOOL RETNMAX days FREEPOOL SYS
```

    - We specified **BKRADMIN DRPOOL** for the tape pool owner and name.
    - We specified **DRPOOL** for the media name. Notice this must match what you specified in step 3a above.
  7. Run the `POOLACC` command to authorize system programmer user IDs and the Backup Manager service machines to the DR tape pool created in step 5 above. (Add additional Backup Manager workers, if needed, for your environment.) For example:  

```
TAPCMD POOLACC BKRADMIN DRPOOL USER userid1 userid2 TAPE  
TAPCMD POOLACC BKRADMIN DRPOOL USER BKRWRK01 BKRWRK02 BKRWRK03 BKRWRK04 TAPE
```
  8. Update the Backup Manager `BKRSYSTEM CONFIG` file to add new but commented out statements for the new tape pool to be used by Backup Manager exclusively during DR testing. For example:  

```
* Tape pool to be used only during DR testing (not real DR)  
* EUM_Pool_Owner = BKRADMIN  
* EUM_Pool_Name = DRPOOL
```

    - Specify the values **BKRADMIN** and **DRPOOL** as defined in step 5.
  9. Review the backup jobs defined on the BKRBACKUP 199 disk to ensure that none specify an override value for the tape pool to be used. Look for either of the statements `CONFIG EUM_Pool_Owner` or `CONFIG EUM_Pool_Name` option.
    - We confirmed there are no backup jobs with either of these statements on our system.
    - If your system has these statements, add new but commented out statements for the new tape pool to be used by Backup Manager exclusively during DR testing.

10. Review your IBM Operations Manager for z/VM configuration files located on OPMGRM1 198 disk by default. If you have any DEFEMON or DEFMMON statements for any of the Backup Manager or Tape Manager service machines (BKRBKUP, BKRCATLG, TxTMM, TxLM1, and TxDMM), add these new but commented out statements to that configuration file:

- \* Uncomment the following SUSPEND statements during DR testing and run
- \* OMRELOAD to reload the Operations Manager configuration file:
- \* SUSPEND MONITOR `name1`
- \* SUSPEND EVENT `name2`

Replace `name1` and `name2` with the appropriate names from your DEFMMON and DEFEMON statements respectively.

11. In the Operations Manager configuration file on the OPMGRM1 198 disk, look for an action that runs MSG BKRCATLG EXPIRE. Find the associated DEFSCHD statement that calls that action. Add this new but commented out statement to the configuration file:

- \* Uncomment the following SUSPEND statement during DR testing and run
- \* OMRELOAD to reload the Operations Manager configuration file:
- \* SUSPEND SCHEDULE `name3`

Replace `name3` with the appropriate name from your DEFSCHD statement.

## Steps to perform once at DR testing

Perform the following step once in your DR testing environment. The settings will be retained each time you return to the DR testing environment.

1. In the TS7700, enable the DR site to write to tapes in the following categories that will be used during DR testing by adding them to the “Write Protect Exclusion” list. This is required so you can perform backups during DR testing.
  - 0081 (this should match the scratch category you chose in step 1 above)
  - DF81 (this should match the private category you chose to use for DR testing)
  - 002E (this is used for errors in the TS7000)

For more information, see <https://www.ibm.com/support/pages/node/6355447>

## Steps to perform each time at DR testing

Each time you start a DR test, perform the following steps:

1. In the TS7700, enable Write Protection and Flash to protect the production tapes. For more information, see <https://www.ibm.com/support/pages/node/6355447>
2. Update the Operations Manager for z/VM configuration file(s) on the OPMGRM1 198 disk to suspend any monitors that would automatically restart any of the Backup Manager and Tape Manager service machines (BKRBKUP, BKRCATLG, TxTMM, TxLM1, and TxDMM) if they logoff.
  - a. Uncomment the SUSPEND lines added in step 9 above.
  - b. Reload the Operations Manager configuration file using the `OMRELOAD` command.

Alternatively, manually load a different Operations Manager configuration file in DR testing. This is useful if you have other Operations Manager changes that apply only to DR testing.

3. Stop or prevent starting the Backup Manager service machines: BKRBKUP, BKRCATLG. To stop them if they are running:
  - a. Run `SMSG BKRBKUP HALT` for the main Backup Manager server.
  - b. Run `SMSG BKRCATLG HALT` for the Backup Manager catalog server.
4. Turn off the schedule in Operations Manager that does expiration processing in Backup Manager:
  - a. In the Operations Manager configuration file on the OPMGRM1 198 disk, look for an action that runs `SMSG BKRCATLG EXPIRE`. Find the associated `DEFSCHD` statement that calls that action. Uncomment the `SUSPEND` line added in step 10 above.
  - b. Reload the Operations Manager configuration file using the `OMRELOAD` command.

Alternatively, manually load a different Operations Manager configuration file in DR testing. This is useful if you have other Operations Manager changes that apply only to DR testing. and comment it out.

5. If needed, modify the `ExpStart` time to ensure it is several hours in the future. You can do this by issuing the following command:

```
TAPCMD CNFGSET EXPSTART hh:mm:ss
```

- In our environment this is currently set to run at 5 minutes after midnight so this will not normally be an issue in a DR test.

## z/VM Disaster Recovery testing

6. Run the `TAPEMOD` command to put all production tapes on hold. Tapes on hold are not subject to expiration processing. They can still be mounted for read access for restore operations in the DR test environment.
  - a. Use the `POOL` parameter with the owner and name of the production tape pool.
  - b. Use the `HSTAT HOLD` parameters to indicate place all the tapes in the specified pool on hold.
  - c. For example:

```
TAPCMD TAPEMOD POOL BKRADMIN BKRPOOL HSTAT HOLD
```
  - d. Ignore the RMS error messages. You can confirm the tapes are on hold in Tape Manager by looking at the flags column in the command output from:

```
TAPCMD TAPEQRY POOL BKRADMIN BKRPOOL SHORT
```

The third byte of the flags will indicate H for hold.
7. Update the `BKRSYSTEM CONFIG` file on the BKRBKUP 198 disk to use the DR tape pool instead of the production tape pool.
  - a. Uncomment the `EUM_Pool_Owner` and `EUM_Pool_Name` statements for DR testing.
  - b. Comment out the `EUM_Pool_Owner` and `EUM_Pool_Name` statements used for the production environment.
8. Start Backup Manager by issuing `XAUTOLOG` for BKRBKUP and BKRCATLG.
9. Verify tapes can be mounted by RMS directly, volume categories can be changed, and tapes can be mounted via Tape Manager:
  - `VMLINK DFSMS 1B5`
  - `DFSMSRM MOUNT VOL nnnnnn`  
`DFSMSRM SET VOLCAT nnnnnn TARGET DF81`  
where `nnnnnn` is one of the DR tapes and DF81 is the private category for DR testing.
  - `TAPCMD TAPEMNT VOL nnnnnn`  
where `nnnnnn` is one of the other DR tapes

You are now ready to proceed with DR testing, including Operations Manager, Tape Manager, and Backup and Restore Manager.

## Steps to perform at the end of DR testing

While still in the DR testing environment, perform the following steps:

1. Mark all tapes written during DR testing free again so Tape Manager will tell the library to put them back into the library's scratch category. For example:

```
TAPCMD TAPEMOD POOL BKRADMIN DRPOOL STATUS FREE
```

- a. Specify the owner and name of the tape pool used in DR testing: **BKRADMIN DRPOOL**. Note this must match the pool defined in step 5 of the section above listing the steps to be done once in the production environment.
- b. The **FREE** parameter indicates each tape should be marked free/scratch.

If you don't have time to do this while in the DR test environment, you can do it from the production environment. However, you will need to do some testing to confirm if you can run the **TAPEMOD** command for the entire range of volsers defined for the DR test environment (not just those in **BKRADMIN DRPOOL** because the production environment does not have any tapes in this tape pool.) Alternatively, you may have to run Tape Manager commands to temporarily move the entire range of volsers used in the DR testing environment into the **BKRADMIN DRPOOL** tape pool and then FREEing them. Contact the author or IBM Support if you have questions.

2. In the TS7700, disable Write Protection and Flash.

## Summary

With these steps:

1. No existing Tape Manager production tapes will be expired by Tape Manager running on the DR test system.
2. Backup Manager can perform restore operations in the DR test environment from backups created by Backup Manager in the production environment.
3. Backups done by Backup Manager in the DR test environment will use a unique range of volsers specifically for DR testing.

## z/VM Disaster Recovery testing



©Copyright IBM Corporation 2023  
IBM Corporation  
New Orchard Road  
Armonk, NY 10504  
U.S.A.  
05/21

IBM, ibm.com, IBM logo, IBM Z, z/OS, and z/VM are trademarks or registered trademarks of the International Business Machines Corporation.

A current list of IBM trademarks is available on the Web at <https://www.ibm.com/legal/us/en/copytrade.shtml>, and select third party trademarks that might be referenced in this document is available at [https://www.ibm.com/legal/us/en/copytrade.shtml#section\\_4](https://www.ibm.com/legal/us/en/copytrade.shtml#section_4).

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

InfiniBand and InfiniBand Trade Association are registered trademarks of the InfiniBand Trade Association.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

The registered trademark Linux® is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

OpenStack is a trademark of OpenStack LLC. The OpenStack trademark policy is available on the [OpenStack website](#).

Red Hat®, JBoss®, OpenShift®, Fedora®, Hibernate®, Ansible®, CloudForms®, RHCA®, RHCE®, RHCSA®, Ceph®, and Gluster® are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries.

RStudio®, the RStudio logo and Shiny® are registered trademarks of RStudio, Inc.

TEALEAF is a registered trademark of Tealeaf, an IBM Company.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Worklight is a trademark or registered trademark of Worklight, an IBM Company.

Zowe™, the Zowe™ logo and the Open Mainframe Project™ are trademarks of The Linux Foundation.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

The information contained in this documentation is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this documentation, it is provided "as is" without warranty of any kind, express or implied. In addition, this information is based on IBM's current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this documentation or any other documentation. Nothing contained in this documentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM (or its suppliers or licensors), or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

References in these materials to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in these materials may change at any time at IBM's sole discretion based on market opportunities or other factors and are not intended to be a commitment to future product or feature availability in any way.