

A VSAM/ICF Catalog

White Paper

From Mainstar Software Corporation



Master Catalog – Reorging and Removing the IMBED/REPLICATE Attributes

By Ronald K. Ferguson

Preface: IBM has announced they will remove support for the IMBED and REPLICATE attributes “in some future release” of z/OS. When that occurs, any VSAM data set — including ICF catalogs — with either of the attributes can no longer be processed, and any attempt to open them will fail.

Removal of IMBED or REPLICATE from an application VSAM data set or a user catalog is straightforward, but for a master catalog this process presents several factors that must be carefully evaluated and fully understood.

Beginning with z/OS 1.3, it is no longer possible to define a new catalog with either the IMBED or REPLICATE attribute (i.e., IDCAMS will ignore the attributes, even if explicitly specified on your DEFINE USERCATALOG or MASTERCATALOG command). If your current system level is at least z/OS 1.3, this means that a simple reorg of a catalog will automatically remove these attributes.

This White Paper explores these factors, and presents suggested scenarios to follow.

Catalog RecoveryPlus (CR+), Mainstar’s product for ICF catalog backup, recovery, diagnostic, and repair, provides the ability to remove IMBED and REPLICATE from VSAM data sets or ICF catalogs, either with its BACKUP and RECOVER commands or its REORG command (but only user catalogs).

Master Catalogs — They’re Different!

Structurally and physically, a master catalog is identical to a user catalog. Both are standard KSDS structures, providing key direct and sequential access to records in exactly the same way as any application KSDS. The key for both types of catalogs is 45 bytes in length, and generally consists of a data set name value. A master catalog is opened and managed by the Catalog Address Space (CAS), the same as for a user catalog. The tuning attributes (CISZ,

FREESPACE, etc.) recommended for a user catalog are the same for a master catalog. In fact, when a master catalog is ‘cross-connected’ to another master catalog (for maintenance reasons), the connected master catalog is ‘acting’ as a user catalog for any access through the master catalog it is connected to.

To restate this more succinctly, any catalog ‘connected’ to the current executing system’s master catalog via a UCAT connector record is a user catalog.

Master Catalog Processing at IPL

The primary difference between a master catalog and a user catalog is simply this — *how it is used*.

At IPL, the master catalog is determined by reading the SYSCATxx member of SYS1.NUCLEUS (or an alternate master catalog specified in the LOADxx member of SYS2.PARMLIB). The specified catalog is opened at the beginning of IPL and, by definition, becomes the master catalog for the life of the system (i.e., until this z/OS system is shut down or in some way terminated).

The master catalog is read to obtain access to system data sets necessary to complete the IPL, plus catalog records that identify all connected user catalogs. Also, the catalog alias records are read during IPL, building the alias table that will be searched for all subsequent alias searches. Thus (and this is a direct quote from Section 2.4.2, “The Master Catalog During System Initialization”, *Managing Catalogs* manual), “if the master catalog only contains entries for system data sets, catalogs, and catalog aliases, the entire master catalog is in main storage by the completion of the system initialization”.

Once IPL is complete, nothing can change this master catalog definition throughout the life of

the system, although user catalogs can be connected or disconnected at user discretion.

Master Catalog Limitations

There are significant limitations on what you can — and cannot — do to a master catalog while it is in use as a master catalog.

You cannot dynamically 'switch' the z/OS system to recognize another catalog as the master catalog.

You cannot name an in-use master catalog as the target (output) catalog in a MERGECAT operation (this is true for both IDCAMS REPRO MERGECAT, as well as the **CR+** MERGECAT command — a master catalog *can* be the source (input) catalog in such an operation, though, for either product's MERGECAT function.

You cannot delete a master catalog while it's in use as a master catalog. (This restriction needs further definition, however, as you certainly can delete a master catalog from another system when it's connected as a user catalog, and it's your responsibility to ensure it is not currently in use as a master catalog to the other system — if it *is* currently in use as a master catalog, you've shot yourself in the foot, as you've just guaranteed a system crash of that other system. If this should occur, it is best to confess that you've caused a system failure through a 'finger check', and own up to the consequences.)

You cannot recover a master catalog from a backup copy while it is in use as a master catalog — it can only be recovered once the system for which it is the master catalog has been taken down, and then you can only recover it from another system where it is connected as a user catalog to the master catalog on that system.

The simple fact is, you're stuck with a system outage if you need to perform any of these operations on the system's current master catalog.

Restrictions on Reorging a Master Catalog

Because of the last two restrictions above, you cannot reorg a master catalog while it's in use as a master catalog or from the system on which it is the master catalog.

By definition, reorg of any catalog consists of 'unloading' the records to a temporary file (this is

another way of saying 'back up'), deleting the existing copy of the catalog, then reloading the records (another way of saying 'recover'). You can certainly do the first step of the reorg process against a currently in-use master catalog — the unload operation — but any of the techniques necessary to accomplish the delete or restore will fail.

Therefore, the first and foremost requirement of reorging a master catalog is — it must be performed from a system other than the one for which it is the current master catalog.

Steps for Reorging a Master Catalog to Remove IMBED or REPLICATE

The most important point about reorging a master catalog is: you cannot perform it when it is currently in use as a master catalog. A corollary to this is that you cannot reorg a master catalog from the system on which it is the master catalog. These are inviolate rules.

Once you have this rule firmly in mind, you're ready to proceed with the *preparatory* steps in the reorg process. Here are your basic options:

1. Using an alternate master catalog

- a. Create (and maintain in readiness at all times) an alternate master catalog for the primary master catalog that you wish to reorg. This is essentially an up-to-date copy of your master catalog, *with a different name*, and when it's needed, you can change the SYSCATxx member to point to it as the master catalog, or by replying to the appropriate operator message during IPL.
- b. Then shut down the system, and re-IPL using the alternate master catalog.
- c. Connect the primary master catalog as a user catalog to the alternate master catalog. Ensure the primary master catalog is not in use by any tasks in the system.
- d. Note: If you don't already have an alternate master catalog, consider creating one — it's easy and simple. With **CR+**, all you have to do is define a catalog with the IDCAMS DEFINE USERCATALOG command, then execute a **CR+** MERGECAT command with the COPYONLY keyword, specifying your current master as the source (INBCS) and

your new alternate master catalog as the target (OUTBCS). This will create a copy of all records in your master catalog. You can subsequently keep this up to date with any changes in your production master catalog by simply deleting it, re-defining it, and rerunning the MERGECAT each time you perform maintenance on your master catalog. This can also be done with IDCAMS REPRO NOMERGECAT. This utility function updates the BCS back-pointers in the VVDS for all cataloged data sets — which isn't a major problem, as having out of date back-pointers is only a problem if you ever attempt to delete any of the data sets, but it means that you will probably want to use the output catalog as your master catalog, and the input catalog as your alternate master catalog. With the **CR+** MERGECAT command, BCS back-pointers are not updated, so this is not a consideration that you need to worry about.

2. From another z/OS system (when you have separate master catalogs for each system)

- a. If you have another z/OS system that shares DASD with the system whose master catalog is to be reorged — and if each system has its own master catalog — you can reorg it by running all of the reorg steps on the other system.
- b. Quiesce and shut down the system whose master catalog is to be reorged.
- c. Connect the master catalog (to be reorged) as a user catalog to the other system's master catalog.

3. From another z/OS system (when you have shared master catalogs)

- a. If all of your systems share the same master catalog, you'll need to create a temporary master catalog from which to run during the reorg process. Define this temporary master catalog, then define it to the system as the master catalog to be used at the next IPL (i.e., specify it in a SYSCATxx member of SYS1.NUCLEUS).
- b. Shut down *all* of the systems (there's no way around this, you're going to have an outage for this process on every system sharing the master catalog).

Re-IPL one of the systems, using the temporary master catalog just created. Once this system is up and running, you'll then run your

master catalog reorg job on this system.

The Master Catalog Reorg Process

Reorg of the master catalog involves a backup and delete of the existing catalog, define of a new catalog, and reload of the backup. These steps need to be run in quick succession, without any use or update of the catalog after the backup has taken place; otherwise, any updates will be lost during the reload step.

The process of removing IMBED or REPLICATE from an existing master catalog (or any VSAM KSDS for that matter) simply requires a physical define of a new catalog. If you are executing the define on a z/OS 1.3 or higher system, execution of the DEFINE USERCATALOG or MASTERCATALOG command will not allow either of these two attributes to take effect, even if one or both are explicitly specified.

The two recommended utility functions that can be used for the reorg process are:

- **CR+** BACKUP and RECOVER
- Access Method Services (IDCAMS) EXPORT and IMPORT

With **CR+**, the RECOVER command automatically performs an under-the-covers DELETE/DEFINE of the master catalog just prior to the reload. If the catalog is found to have either IMBED or REPLICATE in effect, it will strip them off the DEFINE command. If you issue your own DELETE/DEFINE command in between BACKUP and RECOVER (and then specify INTO-EMPTY on RECOVER), AMS will strip off the keywords, even if you specify them.

With EXPORT/IMPORT, if you issue your own DELETE/DEFINE command in between EXPORT and IMPORT (and then specify INTOEMPTY on IMPORT), AMS will strip off the keywords, even if you specify them.

Note: just prior to the writing of this White Paper (25 February 2005), Mainstar pointed out to IBM that IMPORT's under-the-covers execution of the AMS DELETE/DEFINE command does not strip IMBED or REPLICATE from a catalog (or any VSAM data set) that currently has the attributes. Apparently, some code was inadvertently not included in IMPORT at z/OS 1.3 for this to take effect. An APAR will be opened to correct this, presumably for z/OS releases 1.3 through 1.7, and when it is published, Mainstar

will notify all **CR+** customers of it. In the meantime, if you are using EXPORT/IMPORT to reorg your catalogs and VSAM data sets that have IMBED and/or REPLICATE, you need to issue an explicit DELETE and DEFINE after EXPORT.

Conclusion

The most important factor you need to remember when planning a reorg of a master catalog is: you cannot execute it on a master catalog that is currently in use as a master catalog, and therefore, you cannot perform it by running the reorg jobs/steps on the system whose master catalog is to be reorged. The net effect of this is, you must accept an outage on the system(s) for which it is a master catalog.

Ronald K. Ferguson – Founder, President & CEO of Mainstar Software Corporation

Ron Ferguson has a technical background in large-scale z/OS systems. As a software instructor for 20+ years, he has presented over 600 courses on VSAM and ICF catalogs, and is recognized worldwide as an expert in these areas. Ron travels widely, meeting with customers and presenting at national and international conferences.