



A look at the relevance of **DASD Reorganization on Today's DASD Subsystems**



A Case for **FASTCPK**

Innovation Data Processing has been addressing the issue of DASD volume reorganization since 1975, initially with the "dump-and-restore" process employed by COMPAKTOR and latterly with the "in-place" reorganization process offered by FASTCPK.

FASTCPK incorporates three main features, all of which are designed to obtain the maximum performance and efficiency from your DASD subsystem:

- The consolidation of free space into as few as one or two areas.
- The merging of multi-extent data sets.
- The release of over-allocated space within a data set.

Is FASTCPK still relevant on today's DASD Subsystems?

On the surface, it may appear that FASTCPK can provide little benefit on today's high-performance DASD subsystems, but look below the surface, and things aren't as clear cut as they may seem.

Regardless of the underlying physical DASD technology, from the "logical" perspective as seen by z/OS, each disk volume still has a fixed number of cylinders, and space on that disk is managed in the same way it has always been; with a VTOC and a VTOC index.

So, with its logical view of each disk, z/OS still sees things as follows...

- If data sets are consistently **over-allocated**, the unused space within the data set allocations is not available for use by other data sets.
- If the free space on a disk is **fragmented**, then it becomes difficult to allocate new data sets; the allocation may fail, or the data set may be allocated in multiple extents.
- Secondary allocations, occurring after the initial allocation of a data set, may also fail or be satisfied in **multiple extents**.

While today's higher-speed disks, with cached control units will minimize the physical effects of the above problems (i.e. native head movement on the real physical disk), they do not solve the logical problems faced with managing data on individual 3390 volumes.

For example:

- The total number of extents for some data set types (e.g. non-VSAM) is still limited to 16 per volume. If a primary or secondary allocation is obtained in multiple extents, the data set will not be able to get the full amount of space that the user intended when coding the SPACE parameter.
- Jobs may get Sx37 ABENDs. If STOPX37 or a comparable product is present in the system, it will circumvent the Sx37 by allowing the data set to be extended to another volume.
- Forcing data sets to go multi-volume creates its own set of special requirements and potential problems, especially during backup and restore.

What about System Managed Storage (SMS)?

System Managed Storage (SMS) is often put forward as a potential solution to some of the issues highlighted above. For example, SMS can be used to direct data set allocations to different storage groups based on the size of the data sets. Although each pool of volumes will still become fragmented as datasets get deleted, in principle, new allocations will be for datasets of a similar size to those that have been deleted, and so the holes will be conveniently filled with similarly sized data sets.

However, while it is true that SMS can help to alleviate fragmented freespace, it is rarely an all-encompassing solution. Although SMS is active on all z/OS systems, some data centres only roll it out across a fraction of their overall DASD Storage.

It should also be noted that SMS only deals with the *initial* allocation of a dataset; it does not take into account how that dataset can grow and take additional extents, so the issues of multiple dataset extents and volume freespace can still develop over time, even under SMS.

UCB Limits

Another issue that requires consideration when discussing the efficient use of disk volumes is the restriction on the total number of UCBs (disk and tape) that can be defined to z/OS.

A site that routinely ignores DASD efficiency will have to keep adding new disk volumes to keep pace with increasing demand for disk space. Aside from the obvious costs involved in purchasing and maintaining additional DASD space, each new volume that is defined to z/OS will take up one more valuable UCB.

FASTCPK helps to ensure efficient use of each volume. This reduces the requirement for adding new volumes, which in turn reduces the number of UCBs required for your z/OS DASD.

FASTCPK – Still A Valid Solution

So, in spite of advances in hardware technology, and the use of SMS Features, FASTCPK still has a place in today's z/OS environments.

For this reason, Innovation has continued to develop FASTCPK, adding new features, as well as focusing on performance.

- Typically, it takes 1 to 2 minutes for FASTCPK to consolidate free space, merge extents and release unused free space on a 3390-3.
- The optional SIZEKEEP parameter can be used to restrict the movement of larger data sets on the volume, limiting the amount of data that has to be moved. This allows the process to finish much quicker, but with almost the same end result as a kompaktion without SIZEKEEP coded.
- Intelligent selection criteria (e.g CPKFREEX) can be used to bypass disk volumes that do not need to be kompaktet, speeding up the overall process.
- The TYPE=RLSE function can be employed to carry out just the space release function, bypassing the freespace consolidation and extent merging processes. A TYPE=RLSE on a 3390-3 typically takes less than 10 seconds.

Additional Features & Benefits

FASTCPK also includes various other value-added features, including:

- Detecting (and fixing) VTOC errors.
As part of a volume re-organization process, FASTCPK can detect (and in many cases fix) logical errors in the VTOC, such as orphaned DSCBs.
- Simulation
FASTCPK includes a feature for SIMULATING a kompaktion before running it for real. It gives an idea of the results that will be achieved by the Kompaktion, and an estimate on how long the Kompaktion will take.
- Volume Mapping
FASTCPK also includes a nice feature for MAPPING a volume – which provides a quick and easy way to get a list of all data set on a volume, in the cyl/trk order that they appear on the logical volume.

Enlarging VTOCs

Even with today's advanced DASD subsystems, the size of the VTOC still determines the total number of data sets that can be allocated on a logical volume.

- Under-sized VTOCs can occur when the original allocation for the VTOC was wrongly calculated, or when a change of use of the volume means that more data sets will be held on the volume than before - e.g. a change in use from holding just a few large databases to now holding lots of smaller files.
- Under-sized VTOCs also occur where a large disk (e.g. 3390-9) "inherits" a VTOC that has been sized for a smaller disk (e.g. 3390-3).

Licensed users of FDRMOVE can also take advantage of the EXPANDVTOC feature, which internally invokes an enhanced version of FASTCPK, and which can dynamically expand a VTOC on an active volume, even if the volume is being accessed from more than one LPAR.

Users that are not licensed for FDRMOVE can use the original "dump-and-restore" COMPAKTOR to enlarge and optionally re-position the VTOC on inactive volumes (i.e. no open data sets).

COMPAKTOR can be used to enlarge & optionally re-position the VTOC on a volume.

A Case for FASTCPK



Summary

The following table summarizes the three main functions of FASTCPK and the benefits they provide:

Function	Benefit
<p>Consolidate free space on a volume into as few as one or two contiguous areas.</p>	<p>This eases data set allocation, ensuring that more newly allocated data sets get allocated on the right disk(s) and with the requested primary/secondary allocation.</p> <p><i>Typically it takes 1 to 2 minutes for FASTCPK to consolidate free space on a 3390-3</i></p>
<p>Merge the extents of Sequential, PDS, PDSE, VSAM, DB2 and Extended Format VSAM data sets.</p>	<p>This can help to reduce job failures caused by x37 abends. It also restricts the number of data sets that unnecessarily spread onto more than one volume.</p> <p><i>Typically it takes 1 to 2 minutes for FASTCPK to merge extents on a 3390-3</i></p>
<p>Release all or part of the unused space within Sequential, PDS, PDSE, VSAM, DB2 and Extended Format VSAM data sets.</p>	<p>This reduces the wasted/unused DASD space “hidden” within over-allocated data sets – providing a much more efficient usage of the installed DASD capacity.</p> <p><i>Typically it takes than 10 seconds for FASTCPK to release unused space on a 3390-3</i></p>



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