

Syncsort MFX for z/OS

The **high-performance** sort/merge/join/copy utility for mainframe

Syncsort MFX for z/OS is a high-performance sort/merge/join/copy utility designed to exploit the advanced facilities of the z/OS operating system and IBM System z servers. MFX for z/OS also supports the OS/390 operating system and S/390 and compatible computers.

Used in over 50 countries, Syncsort's mainframe utility is the most frequently installed third-party software product on IBM and plug-compatible mainframes. MFX has a 40-year history of specialized sorting expertise and exploits every significant hardware and operating system advancement for easy implementation and cost effectiveness.

Superior sort performance, documented in benchmark tests, is the hallmark of MFX technology. But MFX provides more than performance; it is a comprehensive product, with demonstrated benefits in key areas:

- Performance
- Resource management
- Data utilities
- Transparency
- Support

Performance

Sort performance is a significant component of system efficiency. Industry studies have shown that sort-related processing can approach 25% of CPU time. Thus, reducing resources used for sorting can significantly increase overall system efficiency.

MFX is an easily implemented, fully transparent response to the need for sort efficiency. But internally MFX is complex and highly sophisticated. MFX exploits current system architecture with a combination of proprietary sorting algorithms, advanced access methods, and dynamic optimization techniques.

Additional High-Performance Products

Syncsort offers several additional products that enhance the performance and functionality of MFX for z/OS:

PROC MFX, a high-performance, transparent replacement for the SAS[®]-provided PROC SORT, reduces CPU time required for sorting within SAS[®] applications up to 40% and cuts sort elapsed time up to 25%. Because sort processing within SAS[®] programs often consumes up to 30% of CPU time and EXCPs, PROC MFX's efficiency results in noticeable improvements in overall system throughput.

PipeSort simultaneously executes up to eight differently sequenced sorts from a single pass of the input data. It uses advanced parallel sorting technology to cut total elapsed time by more than 50% compared to running separate sorts.

Syncsort MFX optimization procedures dynamically monitor and respond to system status, including CPU utilization, DASD contention, controller caching, central storage availability, paging rates, and the specific make and model computer MFX is running on. MFX also exploits parallel access volume (PAV) technology to minimize the elapsed time of sort executions.

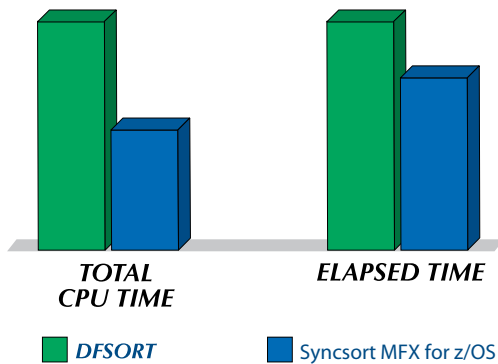
MFX exploits the MIDAW and IBM System z Integrated Information Processor (zIIP). MFX's use of the MIDAW facility reduces CPU time and elapsed time. The zIIP facility allows many sorts to have a portion of their processing directed to the zIIP, thereby lowering the

traditional CPU time cost associated with sorting. The zIIP exploitation also liberates conventional CPU cycles for use by other applications that do not exploit the zIIP facility. MFX's design sophistication improves sort performance while optimizing overall system efficiency. The result is significant superiority to IBM's DFSORT product:

- Reduced total CPU time
- Reduced elapsed time

Reduced CPU time and elapsed time translate directly into improved system throughput.

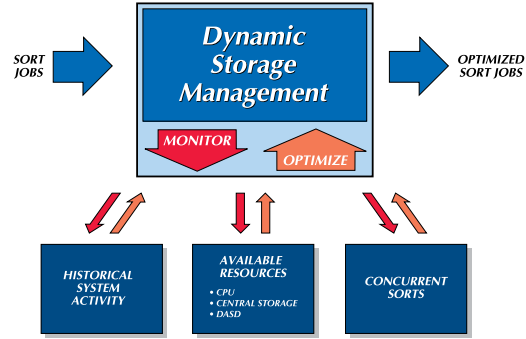
Resource Management



Four special facilities enable MFX to utilize resources efficiently:

1. **Dynamic Storage Management (DSM)** is an advanced MFX proprietary system that monitors and dynamically controls sort performance and resource use. DSM performs two basic functions:

- **Monitoring.** DSM continually monitors central storage availability and the performance and work load of DASD and DASD I/O channel paths. The information acquired is recorded in a special history database.
- **Optimization.** DSM analyzes the history database along with current levels of resource use and individual sort job characteristics. DSM then decides how to allocate resources to concurrently running sort jobs based on a balance among their needs, system load, and the needs of other jobs on the system. Guided by DSM, MFX uses the optimum amount of address space and data space and selects available SORTWK devices with the least contention and highest transfer rates.



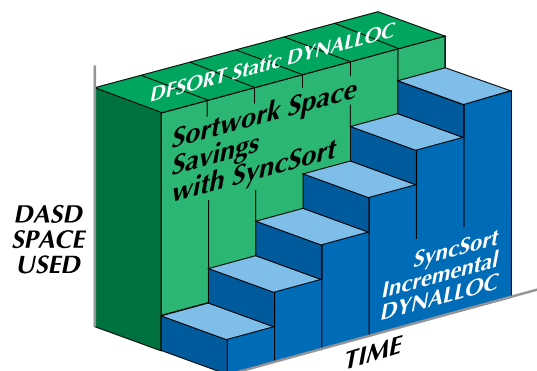
Unlike DFSORT, DSM evaluates historical data acquired in the monitoring process to anticipate recurring variations in system activity. Using a combination of historical tracking and current system monitoring, DSM adjusts resource use for overall system efficiency.

2. **PARASORT** uses specially designed parallel techniques to reduce the elapsed time of sorts with large multivolume and/or concatenated tape data set input. This breakthrough technology allows MFX to read data from two, three, or four tape drives simultaneously.

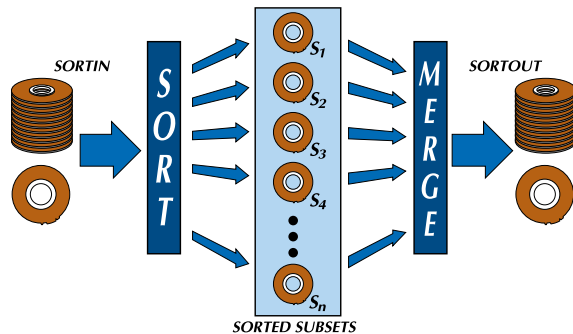
PARASORT can improve elapsed time up to 20% when two volumes are processed in parallel and up to 33% when four volumes are processed.

3. **Dynamic Sortwork Allocation** employs a unique incremental sortwork allocation technique that minimizes the use of DASD resources for sorting while preventing abends due to unavailable DASD space or inaccurate filesize estimates. Incremental sortwork allocation can save up to 25% of overall sortwork space.

Unlike DFSORT's static DYNALLOC, MFX's dynamic sortwork allocation technique acquires sortwork as required during the sort step instead of allocating all anticipated space at sort initiation. In this way, MFX prevents sortwork abends without overallocating DASD space. Also unlike DFSORT's DYNALLOC, MFX retries if DASD space is unavailable.



4. **MAXSORT** makes it possible to sort large data sets with minimal DASD space. This capability is useful for shops where DASD workspace is limited or it is unacceptable to monopolize the available DASD for long periods. MAXSORT dynamically segments the input data, sorts the segments, stores them on tape, then merges them – all in a single job step.



An automatic breakpoint / restart function facilitates restarting after a planned or unplanned interruption. Thus, you can stop MAXSORT, process a higher priority job, then easily resume MAXSORT at your convenience.

Transparency

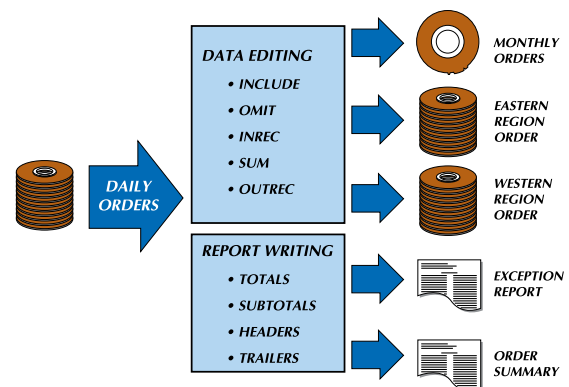
MFX is a transparent replacement for DFSORT and is fully compatible with all current z/OS and OS/390 operating systems and hardware. When converting from another sort product, it is not necessary to change JCL, control statements, parameter lists, exits, invoking applications, or installed system software, including DB2 and IMS utility sorts. No recompiling or relink-editing of user exits or invoking programs is required. Installation options provide full compatibility between sort products.

Data Utilities

Powerful features retrieve DB2 data, edit records, join records, produce multiple output files, and generate reports.

- **The DB2 Query feature** allows MFX SORT or COPY operations to directly retrieve data from a DB2 database based on a query specified by an SQL SELECT statement. It supports the multiple-row fetch feature of DB2, automatically fetching 100 rows at a time. The DB2 Query feature improves performance over DB2's DSNTIAUL program by eliminating the need for setup steps and user-written exits. Most MFX data manipulation and report functions can be applied to the records created by the query operation.

- **Data Editing** features allow you to perform a range of data manipulation functions without COBOL programming. MFX control streams take full advantage of MFX performance. MFX can select input and output records (INCLUDE /OMIT) and reformat them (INREC /OUTREC). Reformatting includes extracting fields, adding or deleting characters, performing arithmetic calculations, converting numeric fields to printable format or other formats, and editing with MFX-supplied or user-defined editing masks. MFX can extract fields that are of variable length or position in a record. This is useful for records imported from other platforms. MFX can convert a variable-length input file to a fixed-length output file (CONVERT) or a fixed-length input file to a variable-length output file (FTOV). MFX can consolidate records with equal sort keys, optionally total values in specified fields, or write eliminated records to a separate data set (SUM, XSUM). In addition to these functions MFX can calculate the average, maximum, or minimum values in specified fields (DUPKEYS). MFX has the ability to add/subtract units of days to/from an input record field date and create an output record date, as well as automatically compute the interval between two date values. MFX 1.4 enables searching for a pattern constant within a field in a record.



- **Join Processing** joins records from two source files based on keys specified in the JOINKEYS statement. Equally-keyed records from the two files are combined into one or more records. The REFORMAT statement defines the field selection and record layout of the resultant records. MFX supports left, right, inner, and outer joins.

- **Multiple Output** provides the ability to create differently selected and reformatted data groups, which can be assigned to multiple output data sets. The entire process (record selection, editing, multiple output) requires only one sort pass. This effectively combines applications, saving system resources by eliminating multiple passes through the same data.
- **SortWriter** creates high-performance report writing applications without COBOL programming.
- **Create output files in PDF, RTF or HTML format**, which can then be emailed as an attachment to one or more recipients.
- Sort products are available for all major platforms. Mainframe operating systems supported include z/OS, OS/390, z/VSE, and CMS. Associated mainframe products include PROC MFX, which accelerates SAS sorting, and PipeSort, which cuts elapsed time by running multiple sorts simultaneously on the same input data.

Two associated products for UNIX environments are a mainframe-to-UNIX sort converter and FilePort, which converts data between mainframe and UNIX formats. DMExpress, a high-speed solution to your data management performance challenges for UNIX, Linux, and Windows, speeds ETL, data warehousing, BI, and other large volume applications.

Comprehensive Support

Specialized sort expertise, based on nearly four decades of advanced research and development, is the foundation for MFX's exceptional customer service and broad operating system support:

- Syncsort MFX technical support, as documented in Datapro, IBEX, and other industry surveys, consistently earns the highest user ratings. The company makes an unqualified commitment to technical support: You can contact an expert MFX for z/OS technical support specialist 24 hours a day, 365 days a year.

About Syncsort

Syncsort is a global software company that helps the world's most successful organizations rethink the economics of data. Syncsort provides extreme data performance and rapid time to value through easy to use data integration and data protection solutions. With over 12,000 deployments, Syncsort has transformed decision making and delivered more profitable results to thousands of customers worldwide.

syncsort RETHINK THE ECONOMICS OF DATA*

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