

SyncSort for z/OS

The high performance
sort/merge/copy utility
for z/OS



syncsort

Proven Performance

SyncSort for z/OS



PROVEN WORLDWIDE

SyncSort for z/OS is a high-performance sort/merge/copy utility designed to exploit the advanced facilities of the z/OS operating system and zSeries computers. SyncSort for z/OS also supports the OS/390 operating system and S/390 and compatible computers.

SyncSort is used in over fifty countries and is the most frequently installed third-party software product on IBM and plug-compatible mainframes. Over 95 percent of Fortune 100 companies use SyncSort.

SyncSort is a product of nearly forty years of specialized sorting expertise and exploits every significant hardware and operating system advance. Easily implemented and cost effective, SyncSort is an integral component of data centers throughout the world.

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

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

ADDITIONAL HIGH-PERFORMANCE PRODUCTS

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

Visual SyncSort for z/OS, included with SyncSort for z/OS, provides a familiar graphical environment to create and maintain SyncSort applications. Visual SyncSort integrates desktop and mainframe to save programmer time. Visual SyncSort is so simple that even non-programmers can use it. Buttons, pull-down menus, and other aids make navigation easy, and context-sensitive Help is always available. Instant error checking provides immediate feedback.

PROC SYNCSORT, 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 SYNCSORT'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.



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.

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

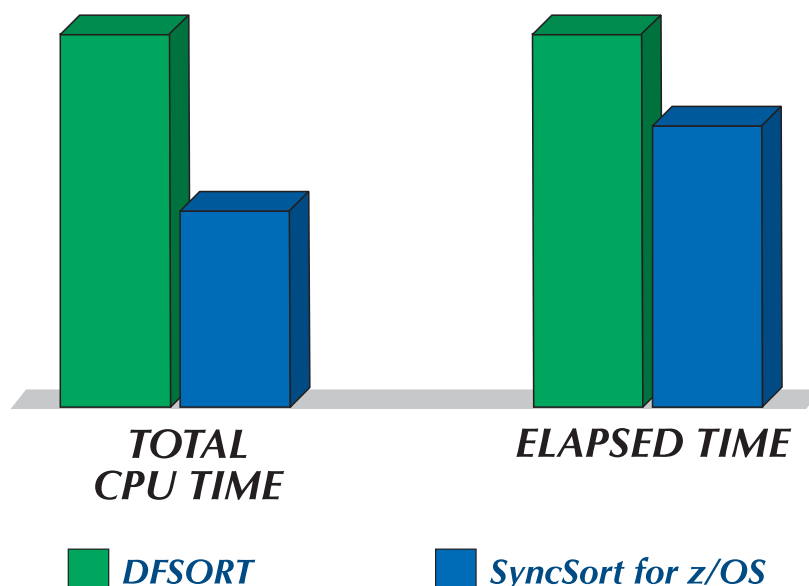
SyncSort optimization procedures dynamically monitor and respond to system status, including CPU utilization, DASD contention, controller caching, central storage availability, paging rates, and the specific make and model computer SyncSort is running on. SyncSort also exploits parallel access volume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

SyncSort exploits the new MIDAW and System z9 Integrated Information Processor (zIIP) facilities on z9 processors. SyncSort'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.

SyncSort'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 SyncSort to utilize resources efficiently:

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

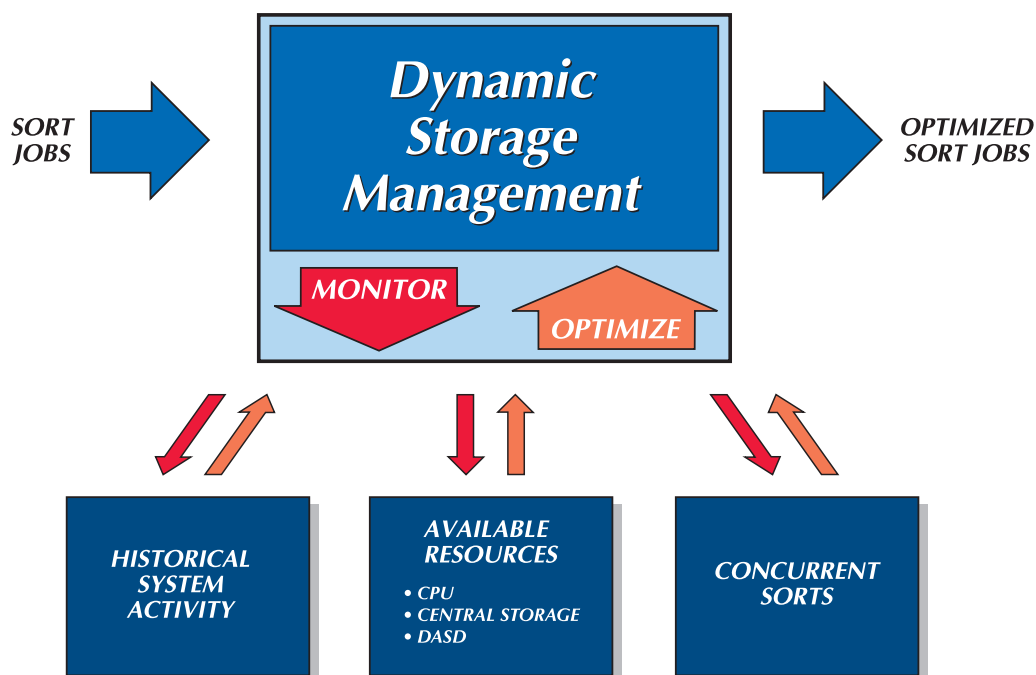
- ◆ **Monitoring.** DSM continually monitors central storage availability and the performance and work load of DASD and DASD I/O channel paths. The information acquired is recorded in a special history database.
- ◆ **Optimization.** DSM analyzes the history database along with current levels of resource 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, SyncSort 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 multi-volume and/or concatenated tape data set input. This breakthrough technology allows SyncSort 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.

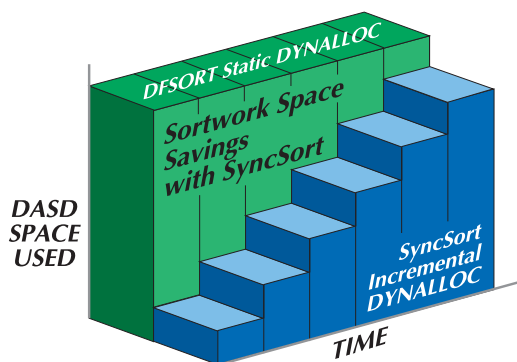
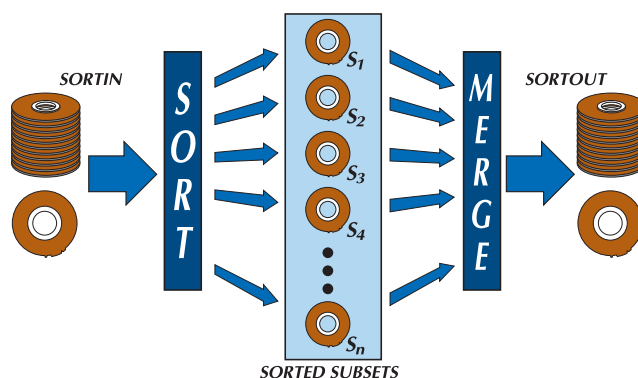




3. Dynamic Sortwork Allocation employs a unique incremental sortwork allocation technique that minimizes the use of DASD resources for sorting while preventing abends due to unavailable DASD space or inaccurate filesize estimates. Incremental sortwork allocation can save up to 25% of overall sortwork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

Unlike DFSORT's static DYNALLOC, SyncSort'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, SyncSort prevents sortwork abends without overallocating DASD space. Also unlike DFSORT's DYNALLOC, SyncSort 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

SyncSort 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

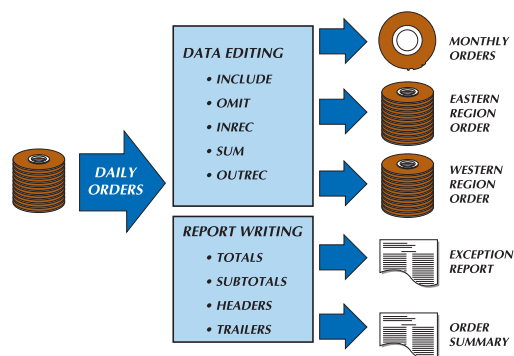
Powerful features retrieve DB2 data, edit records, join records, produce multiple output files, and generate reports

- ◆ **The DB2 Query feature** allows SyncSort SORT or COPY operations to directly retrieve data from a DB2 database based on a query specified by an SQL SELECT statement. The DB2 Query feature improves performance over DB2's DSNTIAUL program by eliminating the need for setup steps and user-written exits. Most SyncSort 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. SyncSort control streams take full advantage of SyncSort performance.

SyncSort 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 SyncSort-supplied or user-defined editing masks. SyncSort can extract fields that are of variable length or position in a record. This is useful for records imported from other platforms. SyncSort 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). SyncSort 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 SyncSort can calculate the average, maximum, or minimum values in specified fields (DUPKEYS).

- ◆ **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. SyncSort 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.



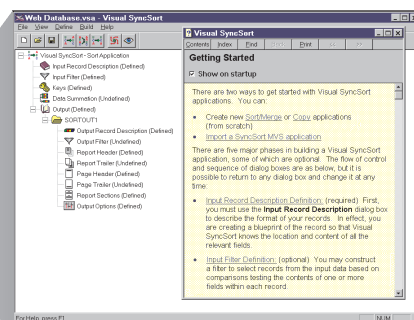
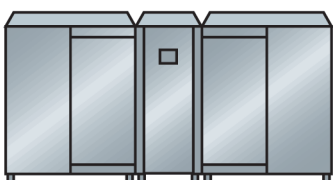
- ◆ **SortWriter** creates high-performance report writing applications without COBOL programming.



VISUAL SYNCSORT FOR z/OS

Mainframe power with desktop simplicity

Visual SyncSort for z/OS, included with SyncSort for z/OS, integrates desktop and mainframe to save programmer time while taking full advantage of the processing power of SyncSort. The PC provides easy access to SyncSort's powerful features through an intuitive Windows-based graphical user interface. SyncSort for z/OS interprets output from the PC and processes the application.



Create SyncSort applications in a Windows environment for mainframe processing.

Visual environment shortens development time, facilitates maintenance

Visual SyncSort's data dictionary and interactive design work together in a visual environment that greatly simplifies application development.

- ◆ **Data Dictionary Simplifies Field References.** Once you import a COBOL or DB2 file definition or identify fields in your record layout and define names for them, you simply specify fields by name in your application. Visual SyncSort tracks the position and length of all fields, automatically handling changes in field specifications that occur as a result of output reformatting, data conversion, summarization, arithmetic manipulation, and report writing.
- ◆ **Intuitive Dialogs Speed Implementation of SyncSort Features.** Visual SyncSort leads you through a series of dialogs that make SyncSort's powerful features easily available. Visual SyncSort builds the SyncSort for z/OS control data set for you, so you can concentrate on what you want to do, not how to do it. And Visual SyncSort checks the information you enter as you are building the application, eliminating the need for debugging runs.
- ◆ **Easy Report Development.** Visual SyncSort makes it easy to develop reports because you type in features like headers and trailers exactly as you want them in your report.
- ◆ **Easily Upgrade Existing Mainframe Applications.** You can import existing mainframe applications into Visual SyncSort to modify them through the Visual SyncSort interface. Visual SyncSort will automatically generate field names and lay out the application so you can modify and re-use it quickly and easily.
- ◆ **Automatic Optimization.** Visual SyncSort automatically analyzes input and output specifications to generate an application that runs fast and efficiently.
- ◆ **Automatic Documentation.** For every Visual SyncSort application, you get a clearly laid out, consistently formatted application description, rather than cryptic control statements.

COMPREHENSIVE SUPPORT

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

- ◆ **SyncSort 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 SyncSort for z/OS technical support specialist 24 hours a day, 365 days a year.
- ◆ **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 Visual SyncSort, PROC SYNCSORT, 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.

TEST SYNCSORT

Benchmark SyncSort on your system. It takes little time and involves no obligation. The results will give you the solid information you need to determine which sort product is best for your shop.

To find out why so many data centers use SyncSort, contact your Syncsort representative or visit www.syncsort.com/coizos

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