

White Paper

Why using automation to manage DASD utilization results in better system performance and improved resource utilization.

Introduction

Managing the resources consumed by any computer system is a time-consuming, unrewarding and more often than not, very expensive operation. Unfortunately, as the system grows, disk management tasks must be performed more frequently. By using software that automates these critical tasks, tangible improvements in the utilization of computing and human resources can be realized.

Terminology

References to DASD also means disk

References to IBM i5 also means IBM iSeries and AS/400

Areas of Concern

1. Machine throughput and performance
2. Expenditures relating to unnecessary disk upgrades
3. The availability of machine production time
4. Time consumed facilitating backups, recovery or generally protecting disk resources
5. Expenses associated with having technicians monitor disk space
6. Accurately forecasting future DASD requirements
7. Documentation and control of thousands of objects

The IBM i5 is an exceptional computing platform. With over 10,000,000 lines of code and 20,000 plus objects in the operating system, it provides a very sophisticated operating environment.

With power, comes complexity. The i5 operating system (OS/400) keeps many undocumented items of information that must be cleared. An automated disk management solution can eliminate these tedious, time consuming, and sometimes technically difficult housekeeping tasks by tending to them automatically and continuously. One such product is *S4i DASD-Plus* from *S4i Systems, Inc.* which is designed to be easy-to-use and, where practical, automatic in its operation.

S4i DASD-Plus routines are all parameter-driven with time constraints so you have the flexibility to dictate just how much of the i5's time is spent on these housekeeping tasks. For instance, the disk compression functions will continually analyze and optimize the disk usage of your i5 system. Once a technician defines the time window for the software to run, *S4i DASD-Plus* will run automatically and maximize disk space.

S4i DASD-Plus encompasses two major functional areas of disk management:

1. Job Management

S4i DASD-Plus includes a built-in job monitoring and control system, called Job Execution Manager, that allows you to setup and run OS/400 and *S4i DASD-Plus* tasks as a complete job stream without having to create CL programs. Job Execution Manager features include:

- Organize tasks (commands) into one or more job streams (without having to create CL programs), e.g. Daily, Monthly. etc.
- Include *S4i DASD-Plus* and user-defined tasks as steps
- Include any *S4i DASD-Plus* utility as a step
- Automate running the steps using OS/400 or your job-scheduling system
- Set up a job execution window by setting a maximum run-time for the job
- Specify a maximum time to allow for each step
- Automatically restart a job where it left off when the maximum time expired
- Create a history entry for each job and each step in each job so you're not required to search for job logs to see how the job ran
- Hold a user-defined number of history records for each step

2. Disk Space Analysis

The Analyze Disk Space group of functions allow you to analyze disk space utilization and run a variety of reports and queries using the data. Analyze Disk Space functions may be run interactively or as a Job Execution Manager step. The analyze Disk Space functions consist of the following:

Disk Space Survey

Survey Disk Space functions are used to build a database of information about your DASD utilization. The survey functions include the following:

- Ability to create multiple definitions of the objects and libraries to be surveyed
- Ability to set and check expiration dates for surveys
- Ability to run a survey when required, or as a Job Execution Manager job step
- Availability for inquiries and reports
- Separate recording of size information for Trend Analysis
- Comparison of Survey results taken at two points in time, for variance reporting
- Rebuild Survey program will run as a separate step
- Facility to save and recall multiple survey setup parameters

Analyze Disk Space Reports

S4i DASD-Plus includes a report definition facility where you can set parameters to produce *S4i DASD-Plus* reports that meet your individual needs. Disk Analyzer report options include:

- Standard Disk Analyzer reports are available to run with limitation by user parameters
- Standard reports can be easily modified to meet your needs
- Additional reports can be created using the report generator functions
- Any report can be run over any set of survey results
- A pop-up box on the report selection that shows the last "rebuild" date and asks if you want to rebuild the survey

S4i DASD-Plus includes the following pre-defined Disk Analyzer and exception reports:

- Disk Space Analysis Sequenced by Library Name/Size
- Disk Space Analysis Sequenced by Object Type
- Disk Space Analysis Sequenced by Library Size/Object Type
- Disk Space Analysis Sequenced by Object Type/Library Name
- Disk Space Analysis Sequenced by Object Type/Object Attribute
- Disk Space Analysis Sequenced by Library Size/Object Type/Object Attribute
- Disk Space Analysis Sequenced by Object Type/Object Attribute/Library Name
- Disk Space Analysis Sequenced by Library Size/Object Type/Object Size
- Disk Space Analysis Sequenced by Library Size/Object Type/Object Attribute/Object Size
- Disk Space Analysis Sequenced by Library Size/Object Size
- Disk Space Analysis Sequenced by Object Type/Object Size
- Disk Space Analysis Sequenced by Object Type/Library Name/Object Size
- Disk Space Analysis Sequenced by Object Type/Object Attribute/Object Size
- Disk Space Analysis Sequenced by Object Type/Object Attribute/Library Name/Object Size
- Disk Space Analysis Sequenced by Object Size/Object Type/Object Attribute/Library Name
- Disk Space Analysis Sequenced by Object Owner/Object Size
- Disk Space Analysis Sequenced by Object Owner/Library Name/Object Type/Object Size
- Disk Space Analysis Sequenced by Object Owner/Object Type/Library Name/Object Size
- Unused Objects (List objects not used in X number of days)
- Files Nearing Capacity (List of files within X% of their capacity)
- Damaged Objects (List of damaged objects)
- Library, Object and document analysis by date last used, date last changed, date last saved or date last restored
- Unused Object Summary (aged by date last used, date last changed, date last saved, or date last restored)
- Unused Object/Library Detail
- Damaged objects
- Files with deleted records
- Overflowed and misplaced objects

History-Based Trend Reports

Trend reports provide the ability to forecast your future DASD needs based on historical trends. *S4i DASD-Plus* uses linear regression formulas to predict future DASD growth and size. Trend reports include the following features:

- Confidence factor that indicating accuracy of the trend-line
- Reports that indicate fastest growing libraries and files
- Available by record count, object count and size
- Available as online query or report
- Ability to limit scope of analysis

S4i DASD-Plus includes the following pre-defined Trend Reports:

- Trend survey summary report sequenced by survey
- Trend library summary report sequenced by library
- Trend object report sequenced by library

Variance Reports

Technicians can look at an object's last change date to find out if and when an object has changed.

There are two types of variance reports available: date and library. A date-type variance report gives you the ability to compare libraries, objects or documents at two different points in time. A library type variance report allows you to compare two libraries in the same survey. You can use these reports to determine objects added, objects deleted, or any object changes that occurred between the two observations, or the differences that exist between two libraries.

Variance reports contain an extremely flexible selection method where you can easily set up and", or, "not_ comparison logic on any or all of the following attributes:

- Size
- Date changed
- ASP
- Damaged
- Text
- Date saved
- Owner
- Deleted records
- Record count
- Date restored
- Creator
- Members
- Date created
- Date Used
- Free

In addition, you can set limits on numeric fields (size, record-count, deleted records, members) by absolute number or percent (e.g., show me all files that are larger than 5,000,000 bytes and have grown more than 10%).

Save Disk Space

The Save Disk Space group is a series of utilities that may be run individually or under the control of the Job Execution Manager. These utilities scour your DASD storage based on rules you define. Save Disk Space utilities manage the space used by the operating system and your applications.

You have the ability to place limits on the libraries and objects that Save Disk Space utilities examine. Save Disk Space utilities (except reclaim storage) can be run in _What-if_ mode. _What-if_ is a facility where you can simulate running Save Disk Space utilities without actually making any permanent changes.

Save Disk Space is divided into the following subgroups:

Reclaim Disk Space

Reclaim Disk Space functions are Save Disk Space utilities that reduce your DASD usage by removing, reorganizing, and resizing various objects that are no longer needed. These functions include the following features:

- Include various housekeeping tasks addressing different areas of the disk
- Define when to run each step and what objects to include each time the function is run
- Include the function in a Job Execution Manager job, or it may be run as required
- Run all functions, except reclaim storage, in "What-if" mode

The following Reclaim Disk Space functions are included:

- Remove Spool files more than n days in ready, hold, or save status... limit by library, queue, spool file name, user, form and job
- Remove all empty spool members
- Remove Job Queue entries more than n days in release, hold or schedule status... limit by library, queue, user and job
- Remove Message Queue entries more than n days old... limit by library and queue
- Remove History Logs more than n days old... optionally saves log first
- Remove Distribution Logs more than n days old... optionally changes receiver and clears fully saved, part-saved or online receiver
- Remove Problem Logs more than n days old... optionally changes receiver and clears fully saved, part-saved or online receiver
- Remove problem log journal receivers more than n days old... optionally changes receiver and clears fully saved, part-saved or online receiver
- Remove detached journal receivers... optionally changes receiver and clears fully saved, part-saved or online receiver
- Remove Alerts more than n days old
- Reorganize files based on percentage of deleted records... limit by library, file name, number of records in file, journaled files... may order by physical key
- Remove observability from programs created more than n days ago... limited by library
- Remove unused space from Office Documents not referred to for n days
- Remove Office Calendar item more than n days old... limited by user
- Remove Office non-confirmed outgoing mail more than n days old
- Compress complete programs, program observability, files, panel groups, or menus not used for n days... limited by library
- Permanently apply PTFs and remove PTFs from system
- Remove objects more than n days old from QRPLOBJ library
- Recreate job queues, message queues etc. more than minimum size
- Run reclaim storage command
- Remove old save files where a newer save file exists
- Remove empty save files

Compress and Expand

The second Save Disk Space sub-group allows you to save additional space by compressing your physical files and objects. These functions include the following features:

- Compression and automatic expansion of objects based on date last used
- Allow compression and expansion of physical file members
- File members can be source or data
- File member attributes are retained and restored when the file is expanded
- Compression can be to a new member in the same file, to a new file in the same library, or to a new library
- *S4i DASD-Plus* maintains a database of all compressed members for quick retrieval
- *S4i DASD-Plus* records a history of every compress or expand action that is carried out, for easy audit of what has been done
- If the *S4i DASD-Plus* edit commands are installed, then compressed source can be transparently expanded for edit
- A flexible inquiry by object name or description allows quick retrieval of compressed members
- Includes interface to SEU, SDA and RLU
- All compress and expand functions can be run in what-if mode (for objects only)

Remote Control

This facility allows you to manage *S4i DASD-Plus* on remote i5s without having to log-on to the remote machine. You have the ability to perform the following tasks from a central processor:

- Define surveys for remote machines
- Define Analysis, Trend and Variance reports for remote machines
- Set up Job Execution Manager jobs for remote machines
- Submit or schedule jobs to run on remote machines
- Check the status of any DASD Remote task
- Address multiple locations for each task
- Build and maintain list of remote locations
- Uses DDM and IP for transmission
- Remote tasks can be combined into groups and transferred to remote systems as a single unit
- Multiple remote locations be grouped together and referred to with a single location name.
- All functions are centralized under two “work-with” screens

Conclusion

S4i DASD-Plus automates all of the functional areas of i5 DASD management and hence, delivers several tangible benefits:

1. Housekeeping and disk saving will be performed continually and automatically, according to your specific needs and instructions; no operator action is necessary.
2. As well as saving space, your machine performance can improve dramatically when over-utilized disks are optimized.

3. Automated housekeeping saves valuable technician time.
4. Technicians can accurately forecast future disk needs
5. Valuable management reports and enquiries illustrate disk-utilization efficiency .
6. S4i DASD-Plus provides a full audit of all activities it performs.
7. Less unwanted data on the disk means shorter backup times.



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